SUMMARY

The present investigation has aimed to get a comprehensive idea of the immune system and immune response of a Mega chiroptera, Pteropus giganteus. The location, gross morphology and histological features of the lymphoid organs like thymus, spleen and lymphnodes have been studied. Gradual organisation of the lymphoid cells in these organs have also been studied from the different developmental or ontogenic stages of the bat starting from foetus. The immune responses in terms of antibody mediated and cell mediated reactions in P. giganteus have also been studied.

The location and gross morphology of the lymphoid organs follow the general pattern as in other mammalian species. The noteworthy features of the lymphoid organs of the bat are well organised white pulp in normal condition, germinal centres in immunized spleen and lymph nodes, Hassall's bodies in thymic medulla from neonatal stage and involution of thymus in adults. Interestingly, most of the features are similar to these in the lymphoid organs of a recently evolved group like primates. It has been observed that gradual differentiation of white pulps into germinal centres correlates well with the kinetics of antibody response in bats.

Analysis of the percentage of lymphocytes in different lymphoid organs, peritoneal exudate cells and peripheral circulation of the bat was done by the complement dependent anti-lymphocyte antibody (ALS) mediated killing of the leukocytes from these sources. The specificity of anti-lymphocyte serum raised in the rabbit was tested and was found specific to the bat's lymphocytes. It was noted that higher percentages of lymph node cells are susceptible to ALS killing, this was followed serially by splenocytes, peritoneal exudate cells, bone marrow and peripheral blood lymphocytes. Thus it seems that possibly the bat's lymph nodes harbour highest number of lymphocytes than this in other secondary lymphoid organs and white blood cell population in circulation.

The susceptibility of different leukocyte population to ALS before and after absorption with brain cell homogenate have been studied as it is known in case of mouse the brain cells share Thy-1 type of antigen with thymus and it was difficult to raise bat anti thymocyte serum. Interestingly the absorption of ALS with brain cell homogenate resulted decrease in killing of the lymphocytes from secondary lymphoid organs. This possibly indicates the heterogeneity in the lymphocyte population of the secondary lymphoid organ of the bat in the

line of T and B cells as in mice.

Antibody mediated immune response of the bats was measured in terms of primary and secondary antibody secreting plaque forming cells, mercapto ethanol-sensitive and resistant haemagglutination titre (HA) of the immunized sera on different days of immunization with Sheep's erythrocytes. The kinetics of the antibody response in reference to the different doses for SRBC from 0.2 to 1 ml per animal have also been studied. The antibody secreting cells from the immunized spleen of bats have been found specific in lysing a particular type of antigen in assay slides. It was also observed that out of the complement from 3 different sources, homologous complement was best for lysing the sheep's erythrocyte in PFC assay. To our knowledge the present study is the first attempt of assaying kinetics of antibody mediated immune response of bats by employing PFC technique.

The peak of the primary antibody response and the decay of the response were notably delayed in comparison to that other conventional laboratory animals and with single antigenic challenge ME-resistant PFC and HA-titre appeared within a few days of initiation of the primary response. With the increment of the dose of antigen, PFC response in

bat was at higher level and the peak was reached earlier. It was found that the profile of HA-titre response follows the pattern of the PFC response with all the doses of antigen.

Individual protein fractions of serum of normal and immunized bats were separated electrophoretically and amount of protein in each class was estimated. It has been found that immunization leads to increase in amount of total protein without any significant variation in γ globulin.

Two methods, delayed type hypersensitive (DTH) skin reaction to DNFB and mixed lymphocyte cultures (MLC) were employed in this study to measure the cell mediated immune response in this variety of bats. In DTH reaction maximum induration was observed at 48 hrs after secondary application of DNFB only in 3 bats out of 12 experimental animals.

Assay for MLC response was performed on 4th and 7th day of initiation of the culture. It was observed that the index for MLC reaction was better on 7th day indicating the time required for this type of cell mediated response is more in bat than in other mammals. Delayed MLC response is mostly the characteristics of lower vertebrates like amphibians.

Thus it seems that immune responses in bat, either antibody mediated or cell mediated are slow processes although the bats have an organized lymphoid system very much similar to that of the primates. It has also been discussed that delayed onset of the immune response and prolonged state of immunization with a single antigenic challenge could have some role in making the bat reservoir of dreaded viruses and bacteria without being apparently infected. Further studies for the causative mechanisms of the delayed responses, prolonged state of immunization and induction of tolerance in bats would possibly help for better understanding of the immune system of the bat and might be useful in devising some techniques to discontinue the bat's role as reservoir of pathogenic agents.