

SUMMARY

Clarias batrachus is a highly nutritive and commercially important fish and is in great demand in south east asian countries for its therapeutic value and flavour. The fish which is popularly known as 'Magur' in India lives in an environment highly infested with micro organisms which hints towards the presence of a well organised and effective immune system. Moreover it was felt that the knowledge of its immune system and responses will help in developing prophylactic measures which in turn may lead to high density fish culture. The present investigation is a result of these considerations.

The study of lymphoid organs of *Clarias batrachus* indicated that the gross morphology and histological features of the thymus, kidney and spleen follow the general pattern observed in higher teleosts but the location of its thymus does not follow the usual dorsolateral position in the gill chamber, instead it occupies a ventral position. Various types of secretory cells were observed in the thymus including the mucous secreting cells, which perhaps play an important protective role. Besides, antibody secreting cells are also observed in thymus which confer it the status of secondary lymphoid organ also.

The role of the head kidney can be related to that of bone marrow of higher vertebrates but like thymus a large

number of antibody secreting cells are observed in head kidney.

Immunofluorescence analysis of lymphocytes from different lymphoid organs has been attempted to enumerate the cell surface antigens on lymphocytes for distinguishing them along T and B cell lines of higher vertebrates.

Fish immunoglobulins were fractionated by sephadex gel filtration into two fractions of immunoglobulins on the basis of molecular weight. The antibodies raised against each of them showed a large number of Ig bearing cells in different lymphoid organs whereas immunofluorescence studies by employing rabbit anti-fish brain antibody revealed a small percentage of Thy-1 like brain cell associated surface antigen on lymphocytes from different lymphoid organs.

Interestingly nonspecific lytic factors which are characteristics of invertebrates are also found in the serum of *Clarias batrachus* against different types of erythrocytes and probably serve as a stronger arm in immunity. The lytic activity of the serum was found to enhance as the phylogenetic distance of erythrocytes increased while with closely related fish it was very low.

Antibody response was measured in terms of plaque forming cells and haemagglutination titre of the immunized sera on different days of immunization with sheep's

erythrocytes. The specificity of serum antibody and PFC was quite well defined towards the immunizing antigen than any other erythrocytes.

Fishes were immunized with optimum dose of SRBC through different routes like im, ip and iv. The ip route was found to be the most effective in stimulating antibody response. The peaks of antibody secreting cells in head kidney and spleen were observed on the 5th day followed by the peak of circulating antibodies on the 10th day. Peaks of PFC and haemagglutination response were earlier in this fish in comparison to other teleost fishes and this may be ascribed to the tropical acclimatization of the fish.

A definite correlation of environmental temperature with antibody synthesis was noticed in winter when the response was feeble at lower temperature.

Anamnestic response with second antigenic challenge has been noticed in PFC as well as in haemagglutination titre by attainment of higher peaks than primary response.

The cell mediated immune response was mainly studied with reference to delayed type hypersensitivity reaction with 2,4 Dinitrofluorobenzene (DNFB), a soluble sensitizing agent. In DTH reaction, a T cell defined function, maximum induration was observed at 72 hours after secondary application of DNFB in all the experimental animals.

Sensitivity of the lymphocytes of *Clarias batrachus* to ConA and LPS mitogens having specificity for T and B cells in higher vertebrates was measured with reference to degree of blast transformation and ³H thymidine incorporation after 48 hours of stimulation.

Mixed population of lymphocytes responsive to both ConA and LPS was found in head kidney, spleen and peripheral blood. The degree of stimulation of lymphocytes from head kidney was better with LPS in comparison to ConA whereas lymphocytes from spleen and peripheral blood showed the same degrees of responses to both the mitogens.

To sum up, well developed lymphoid organs harbouring lymphocytes with certain characteristics of B and T cells of higher vertebrates, high haemolytic activity of normal serum, early peak of antibody response and reasonable degree of cell mediated immune response suggest a well developed immune system in *Clarias batrachus* which equips it to adapt itself in highly infested environment.