INTRODUCTION

Fish is an important source of protein to humans and other animals. Fish industry also offers employment opportunities to many people as well as income at household and national levels (FAO, 1996, Srivastava, 1988). Due to the rapid rise in human population, there is tremendous pressure on natural fish resources which are on the decline (FAO, 1996). Thus, small to large –scale fish farming is on the increase as an attempt to increase fish availability to meet the ever-increasing protein demand for rising human populations (Satchell, 1991; Mwangulumba, 1997). In order to maximize fish productivity farmers need to be aware of the factors that influence fish performance such as nutrition, diseases, environmental stresses and pollutants (Lebelo, et. al., 2001).

*Clarias* is the genus of catfishes (Order-Siluriformes) of the family *Clariidae*, the air breathing catfishes. These are found in inland waters throughout much of the whole world and is one of the wide spread catfish genera in the world. They are predatory fish so they often impact the local wild life by eating other fish, birds and amphibians. It causes problems by invading aquaculture farms and prey on the fish cultivated there. They are recognized by their long basal dorsal and anal fins which give them an eel-like appearance. Many of the species have great economic importance in both fisheries and fish culture.

Catfish *Clarias batrachus* has come to achieve some special importance in recent years because of number of reasons. They are important part of the diet for the children and lactating mothers and also prescribed as diet for the convalescent of the patients. This fish is highly regarded for food due to its high protein (15.0%), low fat (1.0%) and high iron content (710 mg/100g tissue).

The success of catfish culture elsewhere in the world has encouraged the search for an Indian species that has culture potential and consumer acceptance. Experimental culture of catfish has yielded encouraging results. Because of these reasons the culture of *Clarias* is an important subject of research. Furthermore natural populations of *C. batrachus* form a stable diet for many farmers throughout the Indian continent. Coinciding with the growing economic value of the fish is the increased interest in its parasite loads and what effect they might hold for the aquaculture industry. They are
reared as food crop (Sen, 1985). Population of parasitic fauna of fish in India is on the increase however documentation on piscine haemoparasite is scarce.

Haemoflagellates of the genus trypanosoma are prevalent in freshwater fishes and are transmitted by leeches as vector. The parasitic leeches *P. geometra* and *H. marginata* are well known vectors of fish haemoflagellates (Lom and Dykova, 1992, Sawyer, 1986).

Trypanosoma are truely haematozoic extracellular parasites spending substantial part of their life cycle in the plasma. Fish trypanosomes use blood as a route of entry to their vector, haematophagus *leeches*. After re-entry into the fish they may either directly invade the blood or they may enter it after an initial period of multiplication in tissue fluid local to the point of entry (Baker, 1976).

Trypanosomes are haemoflagellates having a single free flagellum at the anterior end of the body. They cause various diseases in the host like Leucocytosis, hypoglycemia and hypocholesterolemia (Gupta and Jairaj puri, 1985; Gupta and Gupta, 1986), anemia, odema (Woo, 1981b; Islam and Woo, 1991). Stimulation of haemopoiesis, poikilocytosis accompanied by abundant abnormal cell types in heavy natural infection of *T. maguri* in *C. batrachus* have also been reported (Tandon and Joshi, 1973). The first trypanosome was discovered from the blood of Salmo fario by Valentin, (1841) and from India, Lingard, (1904) recorded the first *trypanosome* from *Barbus carniticus* from Poona.

The aim of study is to investigate the occurrence and prevalence of haemoparasites from fish *C. batrachus* found in various waterbodies of Meerut district and also their effect on blood parameters, biochemistry and other organs of the fish *C. batrachus*.

Thus, with a view to study the effect of the parasites *Trypanosoma batrachi* and *Trypanosoma maguri* on the fish *Clarias batrachus* the present investigation is proposed at the advise of Dr. Bindu Sharma, Senior lecturer, Department of Zoology, D.N.(P.G.) College, Meerut.
HISTORICAL REVIEW

As far as our knowledge regarding haemoflagellated parasite trypanosome, is concerned it was Valentin (1841), who first of all started the study of *trypanosomes*, Lingard (1904), for the first time studied trypanosome from India subcontinent.


At far as Meerut is concerned there is altogether no study so far.
OBJECTIVE OF PROPOSED WORK

The objective of proposed work are –

1. To make a general survey of different water bodies of Meerut district for the fish *Clarias batrachus*.
2. Investigate the occurrence and prevalence of haemoparasite in the host (*Clarias batrachus*) in Meerut district.
3. To study the host parasite relationship through histopathological and biochemistry of the host.
4. The available literature on piscine haemoparasite is scattered and warrants extensive and sophisticated studies.

SIGNIFICANCE OF PROPOSED WORK

The findings of present investigation will –

1. Provide a base line for subsequent workers working on various aspects of piscine haemoparasite.
2. Study is aimed at focusing our attention to factors that influence fish performance such as nutrition, diseases etc.
3. It will help in assessing the magnitude of damage caused by the parasite.
4. These investigations may help future research workers to probe into the many details of this intricate problem.
MATERIAL AND METHODS

Fishes will be brought from the different areas of Meerut district. viz. Sisoli, Nangla (Kubulpur) villages in Garh Road, Kohalla, Bhandora Villages in Hastinapur Block (Mawana), Ikri, Kakkapur, Durjanpur, Daulatpur, Baadam, Dah, Meharmati, Madiyai in Saroorpur Block (Sardhana).

Most of the fishes will be caught in the gill nets while taking out from the pond but some live fishes will be bought from the fish market.

FOR THE PRESENCE OF PARASITES –

In the laboratory fishes will be examined macroscopically for the presence of leeches before transferring in the aquarium. Before examinations for haemoflagellates weight will be recorded. The leeches will be cut in two with a scalpel and the crop content will be administered to a microscope slide and covered with a coverslip and will then examined for the presence of haemoflagellates under the low power (10 x objective, 10 x eye piece).

A number of haematological indices such as haemoglobin, total plasma protein, serum samples, tissues, total RBCs and WBCs will be used to assess the status of blood.

The fishes will be killed by a blow to the head and the tail will be cut immediately. Blood will be collected using a thin Pasteur pipette (heparinized) introduced through the ventral body wall or below the pectoral fins (Lom and Dykova, 1992) and will be examined for the presence of parasites. But if trypanosomes are present in low intensities and their detection in routine blood smears is time consuming. Then they will be detected in the following manner-

A. Haematocrit centrifuge method (Woo, 1969).

B. Clot method (Lom and Dykova, 1992).

Blood parameters are considered pathophysiological indicators of the whole body and are therefore are important in diagnosing the structural and functional status of fish exposed to worm burden. A number of haematological indices such as haematocrit (Hct), haemoglobin (Hb), red blood cells (RBCs), White blood cells (WBCs) will be used to assess the status of blood.
Effect of worm infestation on the various haematological indices in the fish will be studied in the following manners:

i. Haemoglobin(Hb) will be determined with a haemoglobin test kit (DIAGNOVA, Ranbaxy, India) using the Cyanmethemoglobin method.

ii. Plasma total protein (TP) will be determined by Biuret methods.

iii. Serum samples will be checked for antibodies through agglutination test. (Klesius et al., 1991).

The tissues of liver, spleen and kidney of the host *C.batrachus* will be tested for parasites *T.batrachi* and *T.maguri*.

Histological slides of host *C.batrachus* will be made to study the effect of infestation on parts like intestine, liver, kidney, muscles etc.
The thesis will be divided into following chapter-

1. Acknowledgement

2. Introduction

3. Historical review

4. Materials and Methods

5. Observation and discussion
   - Host parasite relationship study through
     a. Histopathological changes in the host.
     b. Biochemical changes in the host.

6. Summary

7. References
REFERENCES


Joerink et. al., (2007). Mixed infection with *Trypanoplasma borreli* and *Trypanosoma carassii* induces protection. Involvement of cross-reactive antibodies. *Article in refereed journal*.


