ABSTRACT OF THE Ph.D. THESIS

Fishes are the apex of predatory-prey pyramid within freshwater as well as in sea water and therefore tend to be infested by a considerable range of parasites which occur in large numbers. The economic importance of fish parasites is related directly to the economic importance of fish they affect. Now it has been fully realized that fish constitutes an important items of human diet. Fish is an excellent food which is nutritionally equivalent to meat in protein, low in saturated fats and high in mineral. The fish production is an important source of income, employment generation and plays an important role in economy (Akhtar, 1986). During the first part of the 17th century, natural historians and physician still thought that the few known endoparasite were formed from the excretions and the bodies of man and other animals.

Goeze (1782) and Joerdens (1901) believed that endoparasite helminthes were beneficial because they consumed the host’s excess foods and intestinal mucus, which otherwise would putrefy and brings disease. Helminth is an important group of animal parasites occurring in the adult stage usually in vertebrate’s host. These worms are widespread in almost all animals in every part of the worlds, although the intensity of infection may differ from time to time or place to place and produce a wide variety of direct effects. Thus they play a vital role on determining the welfare of man and the animal with which it is associated to smaller and greater extent. The parasites have detrimental effects upon fish in more ways than one (Srivastav, 1975). Cross (1933) showed that the parasitic infection tend to decrease the growth rate resulting in the stunting of fish. Parasite cause damage to various organs of their hosts affecting the yield of fish products such as, body oil, liver oils etc.

Fish parasites are found in the classes Trematoda, Cestoda, Nematoda and Acanthocephalan. Aristotle (384-322 B.C.), who wrote “Historia Animalium”, had stated, earlier. “……… there are three kinds of helminthes: those which one
calls large and flat (Tapeworm), those which are cylindrical (Ascaris lumbricoides) and the third ones, the Ascaroids (Enterobium vermicularis).

Parasites may be found in all tissues of host, but they are particularly common on the skin and gills because these external surfaces are easily invaded. The helminth cause many health hazards and disease among human and animal population. This leads to major health problems and high economic loss, e.g. Taeniasis is caused by cestodes, Taenia solium and Taenia saginata.

Man made pollutants and intensification of fish culture resulted in all increase of environmental changes, which may be stressful to fish (Lio-po and Lim, 2002). This condition can result in decreased resistance by the fish, causing spread of disease and parasitic infection (Rottman et al., 1992). Among fish parasites, the helminth constitutes the major threat to the fish health. Metazoans parasitic diseases are most common in fishes inhabiting in Indian waters and encounter more frequently than microbial infection in natural as well as culture system (Madhavi, 2003). Sometimes mass fish mortality occurs specially in nursery as well as culture pond and rivers. High stocking density, poor husbandry, and abundance occurrence of vectors, high organic load and unfavorable environmental temperature are also equally important contributory factors for parasitic disease which induce various pathological changes in fishes (Robert, 2001).

Recent reports suggest that fishes act as a source of serious human parasitic infectious disease (Dubois & Pearson, 1963; Schnurrenberger, 1975). Parasites are important in that they affect the productivity of the fish in the system through metabolites, by decreasing growth rate, reducing the quality of meat, loss of protein source and making the hosts more susceptible to more or other pathogenic parasites, i.e. overall loss of economy.

The person gets infected when they eat raw or poorly cooked infected fish. Infection rates are highest in countries where raw flesh is eaten and communities that dispose off sewage directly into lake or rivers without proper
treatment, which provide an opportunity for fishes to pick up infection (Hafeez, 2001). Early symptoms in human infection consist of right upper quadrant abdominal pain, fever, hepatomegaly, biliary colic and with cough, vomiting, marked Jaundice, generalized abdominal rigidity, diarrhea. The parasitic infection from man to animal or from animal to man is common.

The prevention of fish getting infected with tapeworm in endemic areas depends upon controlling the source of infection, proper disposal of sewage and marketing of fish. Disposal of untreated sewage into water should be prohibited. Freezing of fish at \(-10^{\circ}\text{C}\) for 24 hours or cooking at least 10 minutes at \(50^{\circ}\text{C}\) and proper drying and pickling of fish kills the larvae. The public should be educated about the danger of eating raw or improperly cooked fish (Hafeez, 2001). All the helminth parasite indicates that, these and other parasites are important not only in producing diseases in fishes but are also important to other group of animals including human being; which serve as the definitive host for a variety of parasites. In the present thesis it is decided to work on helminth parasites from the piscian hosts from Marathwada region of Maharashtra state.

The thesis entitled “Studies on fish helminth parasites from Marathwada region of Maharashtra state”. The thesis comprises;

1) Taxonomical studies of piscian helminth parasites.
2) Histochemical studies of piscian helminth parasites.
3) Histopathological studies of piscian helminth parasites.
4) Electrophoretic studies of piscian helminth parasites with relevant bibliography.

The first chapter deals with the **taxonomical** studies of the helminth parasites collected from two fishes, namely *Mastacembelus armatus* (Lecepede, 1800) and *Channa striatus* (Bloch, 1793). The parasite recovered from these hosts are belonging to class cestoda and trematoda. The parasite belongs to
Eucestoda, order-Pseudophyllidea, family- Ptychobothriidae, Genus-
*Circumoncobothrium*, one *Circumoncobothrium jadhavae* n.sp. collected from
the host, *Mastacembelus armatus* and Genus *Senga*, two new species; one is
*Senga rambaei* n.sp. collected from *Mastacembelus armatus* and one is *Senga
rupchandensis* n.sp. from *Channa striatus*. From Digenea, family-Allocreadiidae,
Genus-Allocreadium, one *Allocreadium khami* n.sp. collected from
*Mastacembelus armatus*; Genus- *Orientocreadium*, one *Orientocreadium
striatusae* n.sp. collected from *Channa striatus*; family-Gorgoderidae, Genus-
*Phyllodistomum*, one *Phyllodistomum aurangabadensis* n.sp. collected from
*Channa striatus*; family- Hemiuridae, Genus- *Genarchopsis*, one *Genarchopsis
paithanensis* n.sp. from *Mastacembelus armatus*; family-Azygiidae, Genus-
*Azygia*, one redescribed species, *Azygia stunkardi* Rai, 1964 from the host
*Channa striatus*.

The second chapter deals with the histochemical detection of enzymes,
alkaline and acid phosphatase from *the Circumoncobothrium jadhavae* n.sp.,
*Genarchopsis paithanensis* n.sp., *Allocreadium khami* n.sp. collected from
*Mastacembelus armatus* (Lecepede, 1800) and *Senga rupchandensis* n.sp.,
*Orientocreadium striatusae* n.sp. recovered from *Channa striatus* (Bloch, 1793)
respectively. In the present study, result indicates that, the histochemical
observation of longitudinal section of mature and gravid proglottids of cestode,
*Circumoncobothrium jadhavae* n.sp. and *Senga rupchandensis* n.sp. for the
alkaline and acid phosphatase enzyme activity is high in the reproductive organs
and vitellaria, in *Genarchopsis paithanensis* n.sp., *Allocreadium khami* n.sp.
*Orientocreadium striatusae* n.sp., the enzyme activity is also high in
reproductive organ and vitellaria but less in sucker and musculature. Detail of all
is described with microphotographs.

The third chapter deals with the histopathological studies of the tissues of
the host namely, *Mastacembelus armatus* (Lecepede, 1800) infected with
*Circumoncobothrium jadhavae* n.sp., *Genarchopsis paithanensis* n.sp. and
*Allocreadium khami* n.sp. and *Channa striatus* (Bloch, 1793) infected with *Senga rupchandensis* n.sp. and *Orientocreadium striatusae* n.sp. The result indicates that, the transverse section of the liver infected with the *Circumoncobothrium jadhavae* n.sp. has cyst and cause enlargement and rupture the hepatocytes of the liver; *Allocreadium khami* n.sp. attach to the liver of the host forming cyst; *Genarchopsis paithanensis* n.sp. destroy the epithelial layers and approaches to the villi. *Senga rupchandensis* n.sp. penetrates deep into the intestinal villi and damage the mucosa and sub mucosa layer of the host; *Orientocreadium striatusae* n.sp. attached and damage the buccopharyngeal area of the host.

The fourth chapter deals with the DNA fingerprinting of parasites; *Circumoncobothrium jadhavae* n.sp., *Allocreadium khami* n.sp., *Genarchopsis paithanensis* n.sp. from the host *Mastacembelus armatus* and *Senga rupchandensis* n.sp., *Orientocreadium striatusae* n.sp. from the host *Channa striatus*. From the parasite sample DNA were isolated, purified, and amplified with the help of PCR and the DNA fragments were seen with the help of electrophoresis. The result indicates that, the amplification of genomic DNA of five piscian parasite sample using ISSR marker set were ordered from University of British Columbia (USB). The present study gave amplification four primer, 811, 812, 814 and 816 for identification. In ISSR analysis 50 fragments ranged from 05-15 and varied in size from 170 bp to 2230 bp. Primer no. 811, 816 showed the lowest fragments size while the primer no. 814 produced the highest fragments size. After banding pattern, shows Dendogram analysis and clustering is discussed in detail.

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