

## Fish Parasitological Studies in Bangladesh: A Review

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### ABSTRACT

*Fish parasitological investigation and research performed in Bangladesh has been reviewed through study of available literature. Considerable works mainly on systematics, nature of infestation and pathology of different groups of fish parasites- protozoa, helminths and crustacea have been done. A total of 290 species of parasites have so far been recorded from freshwater and marine fishes in Bangladesh. Ectoparasitic protozoans and monogenetic trematodes are recorded mainly from cultured fish species of farms. Two helminth parasites of zoonotic importance *Dibothriocephalus latus* and *Gnathostoma spinigerum* are also reported from Bangladesh fishes. Much attention has been given on caryophyllid cestodes of two catfishes *Magur* and *Singhi*. Few fish diseases of parasitic origin have been reported and studied. Commonly occurring parasitic diseases are agrulosis (fish louse), ichthyophthiriasis (white spot) and myxoboliasis. Only few attempts were taken to their control measures using simple chemicals like salt, lime, formalin, dipterex and sumithion. Recommendation has been made for the future works on parasitology for sustainable production of healthy fish.*

**Key words:** Fish parasites, freshwater fishes, marine fishes .

### INTRODUCTION

Parasite is an important group of pathogen causes infection and diseases of fish both in freshwater and marine environments. With the increasing interests in aquaculture parasitic infestations are becoming threats for fish health management and aquatic crop production throughout the world. It is therefore an essential area for proper attention to be given by the scientists for sustainable aquaculture production.

Bangladesh has a vast potential for the development of marine, estuarine and freshwater fishes. Its coastline is about 710 km long with about 24, 800 sq. n. miles continental shelf, 2, 640 sq. n. miles territorial water and with 41,040 sq. n. miles exclusive economic zone. In addition, there are 5,332, 657 ha. of water area offered by pond, ditches, oxbow lake, reservoirs, beels, Kaptai lake and flood plain. At present there are 260 freshwater fish species, 12 species of exotic fish, 475 species of marine fish and 60 species of prawn and shrimp available in these waters. Fisheries sector contributes to GDP 5.24%, animal protein supply 63% and foreign exchange earning 4.76% for the nation. If the available fisheries resources are properly exploited through development, fisheries would certainly meet the demand of animal protein for the entire nation.

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The various fishery development programmes depends to certain extent on the successful fish parasitological research, as the improvement of fish yield can mainly be achieved from healthy fish stock. As hosts fishes play an important role for parasites. Among the animals fishes are the most important host for maintenance of mainly helminthes. Most of the fishes have parasites. They not only serve as the host of different parasites but also serve as carrier of many larval parasitic forms that mature and cause serious diseases in many vertebrates including man. The parasites of fishes cause decrease in growth rate, weight loss and emaciation, affect yield of fish products (liver oil etc), spread human and animal diseases, postpone sexual maturity of fish and mortalities of fish.

## NATURE OF RESEARCH DONE IN BANGLADESH

### Systematics of parasites

Parasites of different systematic groups recorded in Bangladesh are listed in Table 1.

**Protozoa:** Several researchers worked out the systematics of this group of parasite. Mostly ectoparasitic protozoans- *Ichthyobodo*, *Chilodonella*, *Ichthyophthirius*, *Trichodina* reported by Hossain and Barua (1991), Hossain and Khan (1992), Chowdhury (1993) and Banu *et al.* (1999). Sanaullah and Ahmed (1980) reported myxobolids from Indian major carps and Chandra *et al.* (1996b) described myxosporeans from juvenile carps of both government and private nurseries of Mymensingh regions.

**Helminths:** Helminth is a big group of fish parasites belong to Trematodes (monogeneas and digeneans), cestodes, nematodes and acanthocephalans attack the fish both as external parasites (monogenean, few digeneans) and internal parasites.

**Monogenea-** This group of parasite mainly attacks gills and body surfaces of fishes and causes heavy damage. Considerable works have been done on systematics of monogenetic trematodes of fishes by Bashirullah (1973), Hafizuddin and Shahabuddin (1996). Recently significant works on systematics, population ecology and some aspects of histopathology have been done by Chandra *et al.* (2000a, 2000b), Mohanta and Chandra (2000), Mohanta *et al.* (2000), Hossain *et al.* (2000), Chandra and Jannat (2001), Ferdousi and Chandra (2002), Chandra and Yasmin (2003), Begum and Chandra (2003), Ghosh *et al.* (2003), and Saha *et al.* (2003). Most of the monogenetic trematodes are reported from freshwater fishes and only few of them are described from marine fishes. Chandra (2003) made a checklist on the monogenean fish parasites reported from Bangladesh and Indian freshwater fishes.

**Digenea-** This by far the most studied group among the fish parasites of Bangladesh. Bashirullah (1972) described *Isoparorchis hypselobagri* and noted its life cycle. A number of both marine and freshwater digenens are also reported by Bashirullah (1973), other important works are of Ahmed (1981), Bashirullah and Elahi (1972a, 1972b), Bashirullah & Hafizuddin (1973, 1974, 1976), Chandra (1983, 1984, 1992, 1994) and Chandra and Banerjee (1992, 1993a, 1993b,). Golder and Chandra (1987), Golder *et al.* (1987) studied the digeneans of different fishes and Chandra (1993) recorded digenetic trematode of estuarine fishes.

**Cestodes:** Fish cestodes of Bangladesh, mainly the systematics have been studied by many workers. However, histopathology, intensity of infestation and seasonal variations were also studied by several workers. Caryophyllids a special group of cestode of catfishes (magur and singhi) were given more attention for their study (Ahmed and Sanaullah, 1977, 1979; Rasheed *et al.*, 1983, 1984, 1985; Ahmed *et al.*, 1984; Chandra and Khatun, 1993 and Chandra *et al.*, 1997). Khushi *et al.* (1993), and D'Silva and Khaton (1997) identified few marine cestodes. Chandra (1992) described trypanorhynchid larval cestodes from estuarine fishes of eastern part of Bay of Bengal, Bangladesh. Uddin *et al.* (1980) described *Dibothriocephalus latus* from Bombay duck (*B. loitta*), a marine fish of Bay of Bengal and Chowdhury *et al.* (1982) reported Diphyllbothrid plerocercoid from meni fish of Mymensingh. However, some authors (Hoffman, 1968, Moravec, 1998) termed its presence in Bangladesh as improbable.

**Acanthocephala:** This is a small group of fish parasite though causes serious injuries and secretes toxins to infested fish. It has received very little attention by Bangladeshi scientists. Ahmed and

Rouf (1981), Ahmed and Begum (1978), Chowdhury *et al.* (1982), Chandra (1985, 1987, 1992a, 1993), Chandra and Rahman (1988) and few others contributed on the systematics of this group fish parasite and described several species.

**Nematode:** A good number of nematode species have been described equally from marine and freshwater fishes. Bashirullah (1973) reported several nematode species from marine fish. Chandra (1992b) listed the nematodes recorded from freshwater fishes of Indian sub-continent. Bashirullah (1972, 1973, 1974a, 1974b), Ahmed and Begum (1978) and Ahmed and Rahman (1977) studied the systematics of several nematode worms. Bashirullah and Ahmed (1976a, 1976b) observed development of *Camallanus adamsi* and *Spirocamallanus intestinecolisi* in the copepod intermediate host. Chandra and Modak (1995) observed the development, activity and penetration efficiency of first stage larvae of *Procamallanus heteropneustus* in copepods. Mandal (1995) described few nematodes from lizardfishes of Bay of Bengal. Bashirullah (1973) and several other workers (Khanum *et al.*, 1996, AKhter *et al.*, 1997) reported *Gnathostoma spinigerum* from a dozen of fish species. This nematode is the cause of gnathostomiasis, a serious disease of man.

**Crustacea:** These include parasitic copepods, isopods, argulids etc. parasitising the gills and skin of fishes. They often pose great problem in fish nurseries and culture systems. No systematic works were conducted on crustacean parasites of fishes of Bangladesh. But there are several reports particularly of *Argulus* (fish louse) infesting nurseries and other cultural fishes. Golder *et al.* (1983) reported them from a fish farm survey and Rahman (1968) described from tilapia, chital, khalisha and singhi. Chandra *et al.* (2004) reported fish louse in the cultured major carps of Mymensingh. *Lernaea* (anchor worm) was recorded by Hossain *et al.* (1978) and isopods by Ahmed and Rahman (1976).

**Table 1. List of fish parasites with their hosts recorded in Bangladesh**

Name of parasite	Name of host	Name of parasite	Name of host
<b>Protozoa</b>		<i>D. mymensinghi</i>	Puti
<i>Ichthyobodo</i> sp.	Rui, Catla	<i>D. bangladeshi</i>	Puti
<i>Chilodonella</i> sp.	Catla, Tila	<i>D. ogawai</i>	Puti
<i>Ichthyophthirius multifiliis</i>	Catla, Rui, Mrigal	<i>D. tripathii</i>	Puti
<i>Ichthyophthirius</i> sp.	Mrigal	<i>D. gussevi</i>	Puti
<i>Apisoma</i> sp.	Carps	<i>D. glossogobii</i>	Bele
<i>Trichodina</i> sp.	10 spp of carps	<i>D. cirrhini</i>	Bele
<i>Tripartiella</i> sp.	Lata, Mrigal, Magur, Rui, Baim, Carp	<i>D. multispiralis</i>	Puti
<i>Myxobolus</i> sp.	Sarputi, Major carps, Magur, Silver carp	<i>D. mrigali</i>	Mrigal
<i>Thelahanella dogieli</i>	Rui	<i>D. vastator</i>	Magur
<b>Monogenea</b>		<i>D. hypothalamus</i>	Silver carp
<i>Dactylogyrus labei</i>	Major carps	<i>D. minutus</i>	Carpio
<i>D. kalyanensis</i>	Catla	<i>D. rebai</i>	Reba
<i>D. mrigali</i>	Mrigal	<i>Neodactylogyrus chandrai</i>	Bele
<i>D. caltius</i>	Catla	<i>Glossodactylogyrus bangladeshi</i>	Bele
<i>D. chauhanus</i>	Mrigal	<i>Silurodiscoides octotylus</i>	Boal, Garua
<i>D. yogendrai</i>	Mrigal	<i>S. indicus</i>	Boal
<i>D. angularis</i>	Puti	<i>S. sudhakari</i>	Vacha
<i>D. subtilis</i>	Puti	<i>S. siamensis</i>	Pangus
<i>D. brevitignus</i>	Puti	<i>S. parvulus</i>	Tengra, Batasi
<i>D. lampam</i>	Sarputi	<i>S. parvulus</i>	Tengra, Batasi
<i>D. lamellatus</i>	Grass carp	<i>Silurodiscoides</i> sp.	Vacha
<i>D. hypophthalmichthys</i>	Silver carp, Miror carp	<i>Silurodactylogyrus chandai</i>	Chanda
<i>D. siamensis</i>	Thaisarputi	<i>Mizelleus wallogonius</i>	Boal
		<i>M. indicus</i>	Boal
		<i>Heteronchocleidus buschkieli</i>	Khalisha
		<i>H. colisai</i>	Khalisha
		<i>H. bangladeshi</i>	Khalisha
		<i>H. anabasi</i>	Koi

Name of parasite	Name of host	Name of parasite	Name of host
<i>Ancylo-discoides indicus</i>	Boal	<i>Opisthadena</i> sp.	Nailya
<i>A. notopterus</i>	Chital	<i>Gonocera crassa</i>	Pabda
<i>Sprostonia wallagonia</i>	Boal	<i>Genarchopsis bengalensis</i>	Lata
<i>S. asiatica</i>	Kajali	<i>Genarchopsis bashiri</i>	Singhi
<i>Neosprostonia</i> sp.	Vacha, Garua	<i>G. dasus</i>	Singhi, Bele
<i>Thaparocleidus kao</i>	Boal	<i>G. lobota</i>	Raga
<i>Hamatopenduncularia lucknowensis</i>	Boal	<i>G. microcotyle</i>	Lata
<i>Bychowkyella tchangi</i>	Magur	<i>G. ozaki</i>	Lata
<i>Bychowkyella</i> sp. I	Vacha	<i>G. wallagoni</i>	Boal
<i>Bychowkyella</i> sp. II	Vacha, Garua	<i>Genarchopsis</i> sp.	Silong, Garua, Bele
<i>Quadricanthus kobiensis</i>	Magur	<i>Philopinna</i> sp.	Lata, Singhi
<i>Cichlidogyrus bangladeshi</i>	Tilapia	<i>Lecithocladium excisum</i>	Rup chanda
<i>C. chandrai</i>	Tilapia	<i>L. harpodontis</i>	Loitta
<i>Actinocleidus mulleri</i>	Tilapia	<i>L. magnacetabulum</i>	Ilish
<i>Oreochromogyrus mymensighi</i>	Tilapia	<i>L. megalaspis</i>	Kauwa
<i>Bifurcohaptor indicus</i>	Tengra, Pangus	<i>L. seriolellae</i>	Kauwa
<i>Haploleidus xenotodoni</i>	Kakila	<i>Lecithocladium</i> sp.	Rup chanda
<i>Uroleidus raipurensis</i>	Guchi	<i>Himiurus appendiculatus</i>	Nailya
<i>Cornudiscoides proximus</i>	Tengra	<i>Himiurus</i> sp.	Nailya
<i>C. vittati</i>	Tengra	<i>Isoparorchis hypselobagri</i>	Catfish 16 FW fish
<i>Ancyrocephalus daniconis</i>	Chela	<i>Haploporus</i> sp.	Mugil
<i>A. ambassi</i>	Chanda	<i>Psilostomum</i> sp.	Bhetki
<i>A. chakrabortii</i>	Darkina	<i>Alocreadium banglensis</i>	Baim
<i>Pseudoanthocotyle parvovskyi</i>	Champa	<i>A. glossogobium</i>	Bele
<i>Pricea multae</i>	Maitta	<i>A. handiai</i>	Lata, Garua, Bele, Singhi
<i>Megamicrocotyle pagelli</i>	Ilish	<i>A. madheri</i>	Pabda
<i>Choricotyle</i> sp.	Ilish	<i>A. mehrai</i>	Baim, Guchi
<i>Gyroductylus</i> sp.	Puti, Rui, Carpio, Thaisarputi	<i>A. minimum</i>	Koi
<b>Digenea</b>		<i>A. mymensighi</i>	Singhi
<i>Clinostomum complanatum</i>	Magur, Singhi	<i>A. ovatum</i>	Bele
<i>C. giganticum</i>	Meni	<i>Alocreadium</i> sp.	Pangus
<i>Clinostomum</i> sp.	Magur, Singhi	<i>Macroleithus</i> sp.	Air
<i>Euclinostomum heterostomum</i>	Lata, Shol	<i>Coitocaecum</i> sp.	Air
<i>E. multicaecum</i>	Lata, Shol, Singhi	<i>Crowcrocaecum channai</i>	Gazar
<i>Euclinostomum</i> sp.	Pabda, Singhi, Meni	<i>Neopecoelina sharanpuriensis</i>	Koi, Singhi, Lata
<i>Neascus</i> sp.	Major carps	<i>Neopecoelina</i> sp.	Singhi, Lata
<i>Posthodiplostomum minimum</i>	Magur	<i>Opegaster belyiai</i>	Bele, Singhi
<i>Bucephalus mystusi</i>	Air	<i>Opegaster</i> sp.	Bele
<i>Bucephalus</i> sp.	Silong, Air	<i>Catylogonoporus orfeum</i>	Baim, Guchi
<i>Bucephalopsis thapari</i>	Pabda	<i>Eucreadium daccal</i>	Lata
<i>Neobucephalopsis bagarius</i>	Garua, Vacha, Pabda	<i>Macvicaria crassigula</i>	Singhi
<i>Prosorhynchoides spinosiensis</i>	Garua	<i>Podocotyle atomon</i>	Meni
<i>Prosorhynchoides aspinosiensis</i>	Garua	<i>Opistholebes</i> sp.	Punti
<i>Polyorchitrema inglishi</i>	Garua	<i>Acanthocolpus liodorus</i>	Chhuri
<i>P. clupisomus</i>	Vacha	<i>A. luehei</i>	Chhuri
<i>Prosorhynchoides</i> sp.	Vacha, Air	<i>Mogomtistrema attu</i>	Lata, Guchi
<i>Faustula brevichrus</i>	Ilish	<i>Opithorchis bagarius</i>	Baghair
<i>Faustula</i> sp.	Ilish	<i>Opisthorchis</i> sp.	Rita
<i>Steringotrema</i> sp.	Puti	<i>Phyllodistomum chauhani</i>	Vacha
<i>Rhynchopharynx paradoxa</i>	Guchi	<i>P. folium</i>	Magur, Bele, Lata
<i>Aphanurus stossichi</i>	Ilish, Nailya	<i>P. yousufzai</i>	Rita
		<i>Phyllodistomum</i> sp.	Lata
		<i>Pleurogenes attui</i>	Boal
		<i>P. pabdai</i>	Pabda

Name of parasite	Name of host	Name of parasite	Name of host
<i>P. notopteri</i>	Chital	<i>Goezia</i> sp.	Boal, Lombu
<i>Eumanesia</i> sp.	Singhi	<i>Contraecaecum aori</i>	Air
<i>Masenia dayali</i>	Magur	<i>C. brevicaecum</i>	Sawfish
<i>Orientocreadium batrachoides</i>	Magur, Singhi	<i>Contraecaecum</i> sp.	19 spp. of FW fish
<i>Asymphylodora indica</i>	Lata	<i>Heterohylum</i> sp.	Flatfish, Ilish
<i>Masenia</i> sp.	Tengra	<i>Paranisakis</i> sp.	Nailya
<i>Palaeorchis</i> sp.	Lata, Vacha, Garua, Singhi	<i>Rapidaskaris panijii</i>	Tular dandi
		<i>Rapidaskaris</i> sp.	Sardine, Tapasi
		<i>Terranova</i> sp.	Eusphyra
<b>Cestoda</b>		<i>Pseudoanisakis</i> sp.	Eusphyra
<i>Bovienia serialis</i>	Magur	<i>Ascaris</i> sp.	Eusphyra
<i>Bovienia</i> sp.	Magur	<i>Dujardinaskaris</i> sp.	Kukurjib
<i>Djombangia penetrans</i>	Magur	<i>Porrocaecum trichiuri</i>	Serbuti
<i>Lytocestus birmanicus</i>	Magur	<i>Porrocaecum</i> sp.	Meni, Vacha
<i>L. indicus</i>	Magur	<i>Falcaustra brevicaudatum</i>	Pabda
<i>L. latevitellarium</i>	Magur	<i>Falcaustra</i> sp.	Kajuli
<i>L. parvulus</i>	Magur	<i>Cucullanus pangasius</i>	Pangus
<i>Lytocestus</i> sp.	Magur	<i>Cucullanus</i> sp.	Rita, Air
<i>Monothrioides</i> sp.	Magur	<i>Dichelyne</i> sp.	Rita
<i>Bialovarium</i> sp.	Singhi	<i>Paragendria bagarii</i>	Kakila
<i>Caryophyllaeus</i> sp.	Vacha, Garua, Silong, Air	<i>P. wallagonia</i>	Koi
	Pabda, Garua	<i>Paragendria</i> sp.	Air
<i>Lytocestoides</i> sp.	Magur	<i>Buckleynema</i> sp.	Air
<i>Capingentoides batrachii</i>	Magur	<i>Paraquimperia</i> sp.	Kukurjib
<i>Pseudocaryophyllaeus heteropneutes</i>	Singhi	<i>Pingus aori</i>	Air
<i>P. indica</i>	Magur	<i>Quimperia</i> sp.	Sardine, Upenes
<i>Pseudocaryophyllaeus</i> sp.	Magur	<i>Camallanus anabantis</i>	Koi
<i>Pseudolytocestus clariae</i>	Magur	<i>C. magna</i>	Guchi
<i>Nybelinia</i> sp.	Chhuri	<i>C. pearsi</i>	Koi, Lata
<i>Poecilancistrum ilisha</i>	Ilish	<i>Camallanus trichiuris</i>	Chhuri
<i>Pterobothrium acanthotruncalum</i>	Guji	<i>C. truncatus</i>	Tengra
<i>Gangesia</i> sp.	Garua	<i>C. xenentodoni</i>	Baim, Kakila
<i>P. heterocanthum</i>	Ilish	<i>Camallanus</i> sp.	Puti, Lata, Magur, Bele
<i>P. lintoni</i>	Bhetki	<i>Neocamallanus ophiocephali</i>	Lata, Shol
<i>Dasyrhynchus indicus</i>	Bhetki	<i>N. vachi</i>	Vacha
<i>Gynorhynchus gigas</i>	Bhetki	<i>Neocamallanus</i> sp.	Lata, Shol, Gajar
<i>Gymnorhynchus</i> sp.	Pangus, Silong, Ilish	<i>Paracamallanus sweeti</i>	Lata, Shol
<i>Calliotetrarhynchus gracilis</i>	Bhetki	<i>Procamallanus alii</i>	Pabda
<i>Diculiceps pileatum</i>	Telchitta	<i>P. berdii</i>	Datina
<i>Bothriocephalus cuspidatus</i>	Lata, Shol,	<i>P. cancellus</i>	Kakila
<i>Bothriocephalus</i> sp.	Meni	<i>P. clarius</i>	Magur, Singhi, Baim, Pabda
<i>Polyonchobothrium</i> sp.	Lata, Shol	<i>P. mysti</i>	9 spp. of FW Catfish
<i>Senga ophiocephalina</i>	Meni	<i>P. spiculogubernaculus</i>	Lata, Singhi, Boal, Tengra
<i>Taphrobothrium japonese</i>	Lata, Shol	<i>Procamallanus</i> sp.	Lata, Singhi, Boal
<i>Anchistrocehalus</i> sp.	Lata, Shol	<i>Echinocephalus</i> sp.	Lata, Singhi, Magur
<i>Marsipometra parva</i>	Baim	<i>Gnathostoma spinigerum</i>	12 spp. of FW fish
<i>Ligula intestinalis</i>	Singhi	<i>Heliconema brevispiculum</i>	Gajar
		<i>Proleptus inflatus</i>	Baim
<b>Nematoda</b>		<i>Pseudoproleptus vestibulus</i>	Baim
<i>Eustrongylides tubifex</i>	Pabda	<i>Spinitectus indicus</i>	Garua, Vacha, Boal
<i>Eustrongylides</i> sp.	Pabda, Garua	<i>Rhabdochona bagarii</i>	Baghair
<i>Capillaria</i> sp.	!0 spp. of FW fish	<i>R. magna</i>	Rita
<i>Cosmoxyneoides</i> sp.	Khosha		
<i>Ascaridia</i> sp.	Lata, Magur, Singhi, Meni		
<i>Goezia ascaroides</i>	Phissa		

Name of parasite	Name of host	Name of parasite	Name of host
<b>Acanthocephala</b>		<i>Pallisentis</i> sp.	13 spp. of FW fish
<i>Heterocentis plotosi</i>	Gangmagur	<i>Neoechinorhynchus aminuhaquei</i>	Tengra
<i>Echninorhynchus kushiroensis</i>	Bele	<i>N. topseyi</i>	Topsey
<i>Sachalinorhynchus</i> sp.	Rui	<i>Neoechinorhynchus</i> sp.	Tengra, Meni, Kukurjib
<i>Hypoechinorhynchus</i> sp.	Golsha	<b>Annelids</b>	
<i>Cleavius secundus</i>	Air	<i>Piscicola</i> sp.	Magur
<i>Serrasentis sagittifer</i>	Bhetki	<b>Crustacea</b>	
<i>Acanthogyrus acanthogyrus</i>	Catla	<i>Argulus bengalensis</i>	Vacha
<i>A. dattai</i>	Puti	<i>A. foliaceus</i>	Rui
<i>A. indicus</i>	Phasa	<i>Argulus</i> sp.	11 spp. of FW fish
<i>A. tilapiae</i>	Lata, Magur	<i>Lernaea cyprinacea</i>	Lata, Shol, Puti, Khalisha
<i>Acanthogyrus</i> sp.	Vacha, Magur	<i>Lernaea</i> sp.	Carpio
<i>Pallisentis allahabadi</i>	Lata	<i>Ergasilus</i> sp.	Kukurjib
<i>P. goboos</i>	Lata, Magur, Garua, Pabda	<i>Lernaecocera</i> sp.	Singhi
<i>P. garuai</i>	Garua, Silong	<i>Ichthyoxenus amurensis</i>	Batasi
<i>P. nagpurensis</i>	Lata, Shol	<i>Cymothoidae</i> gen sp.	Kukurjib
<i>P. nandai</i>	Bele, Meni	<i>Isopoda</i> gen. sp.	Catla, Silong
<i>P. ophioccephali</i>	Lata, Shol, Meni, Vacha		

## SURVEY OF PARASITIC DISEASES

Ali (1968) made a brief survey on the diseases and parasites from different regions of Bangladesh (then East Pakistan) and recorded argulosis in farm fishes. Rahman (1967, 1968) described mortalities of carp due to argulosis. Rahman and Ali (1968) further noted the prevalence of nematode (*Procamallanus*) and acanthocephala (*Pallisentis*) from different waterbodies of Bangladesh (then East Pakistan). Ahmed (1982) observed skin myxoboliasis in a major carp (*Labeo rohita*). Ahmed and Rahman (1977) studied the pathogenecity of some nematodes in flat fishes of Bay of Bengal. Ahmed and Sanaulah (1979) observed intestinal lesions induced by caryophyllid cestodes in magur. Banu *et al.* (1999) surveyed the parasitic diseases of freshwater fish in nursery operations and deccribed few ectoparasitic diseases. Chandra *et al.* (1996) made a clinico-anatomical study on yellow grub disease of singhi. Mohanta (1995), Hossain (1995) studied the histopathology of dactylogyrosis. Sanaulah (1984) reported black spot and leech infestation in freshwater fish. Sanaulah and Ahmed (1980) reported myxoboliasis in carps and Chandra *et al.* (2000) investigated myxoporean disease of jevenile carps of nurseries of Mymensingh. Muniruzzaman (2002) studied the ichthyophthiriasis from carps and Chandra *et al.* (2004) also recorded argulosis in fish ponds of Bangladesh Agricultural University campus.

## PARASITIC DISEASES AND CONTROL MEASURES

The works on eradication and curative measures of parasitic diseases of fishes have been very few and far between. For external, infection particularly for argulosis few published data and several reports of popular articles are available on their control measures. Rahman (1969) mentioned that lime and potassium permanganate would be useful for argulosis. Chandra *et al.* (2004) used sumithion for controlling argulosis in BAU fish farms. Common salt, dipterex and lime were used in many cases. Sanaulah (1993) suggested to control leech and myxobolus infection with lime and salt. Muniruzzaman *et al.* (2002) has successfully controlled ichthyophthiriasis (white spot) with salt and potassium permanganate in several fish farms. However, fish farmers treat some diseases without systematic approach. Many organizations follow their own technique.

The damage caused by monogenetic trematodes producing dactylogyrosis and gyrodactylosis is not yet known in Bangladesh waters. No treatments have yet been taken in Bangladesh for the diseases caused by cestodes, acanthocephalans, nematodes and digeneans or other endoparasites.

In some cases prophylactic measures like good pond management i.e., avoiding of overstocking, pond drying and limings were suggested to control parasitic diseases.

For chemotherapy, chemicals so far known to be used are : Salt, Lime, Salt + lime, Potassium permanganate, Copper sulphate, Malachite green, Dipterex, Dipterex + lime, Formalin, Sumithion.

## CONCLUSION AND RECOMMENDATION

From the foregoing account it would be clear that information on fish parasites is very meagre and no planned investigations have been carried out so far in Bangladesh. Knowledge about loss incurred in the fish production and fish products due to parasites and parasitic diseases is not available. Parasites that infest fishes occur in a wide variety of forms and may have complicated life histories. Insufficient information of many of the most common parasites greatly handicaps the efforts at their possible control. It may be emphasized that ichthyo-parasitological investigations must be carried out in all river systems, large lakes, haors, reservoirs and maritime belts. It would be better to compile the parasite concentration index and parasite frequency index for different water bodies that will give a clear picture of nature of parasitism. However, some of situations should be tackled on priority basis for healthy growth and better production of fish.

1. Assessment of parasitism and their effect on fishes
2. Ecology and geographical distribution of important parasites and their hosts
3. Studies on the life-history and physiology of parasites
4. Chemical and biological control

From aquaculture point of view the specific recommendations are as follows:

1. Baseline studies on identification of parasites of hatchery, nursery, rearing and culturing ponds
2. Influence of environmental factors (physico-chemical and biological) and agricultural pesticides which increase the susceptibility of fish towards parasitic infestation
3. Histopathological studies of fish diseases caused by parasites which could be used as key indicator of particular disease
4. Preventive and therapeutic measures suitable and appropriate for farms particularly using locally available materials

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