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Research Note

Prevalent Diseases among Freshwater Ornamental Fishes in Nagaon District, Assam

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Disease is one of the limiting factors associated with ornamental fish trade. Office International des Epizootics (OIE) has detailed provisions for import or export of aquatic animals aimed at avoiding risk of disease transmittance (OIE, 1977). However, the ornamental fishes are not covered by these health codes and tropical ornamental fish trade operates without appropriate quarantine practices. International ornamental fish trade often sustains economic losses, as a result of various infections soon after arrival in importing country or during transportation (Jeong et al., 2002). The North Eastern Region is a hotspot of biodiversity, having 267 fish species of which 57% has ornamental potential (Sen, 2000). In view of the potential trade opportunities and government initiatives, many entrepreneurs are getting involved in ornamental fish trade in recent times. While bulk of the trade of exotic fishes is within the region, indigenous ones are exported through recognized traders in Kolkata (Kalita & Kalita, 2007). The objective of this investigation was to record disease incidences in captive culture of imported and locally collected potential ornamental fishes in Nagaon district of Assam.

A total of 932 fishes of fifteen species were examined from fish shops, instructional unit of the College of Fisheries, Raha and collection sites of Kollong River at regular intervals of 25 to 30 days during the year 2006-07. Parasitic incidences noticed were further examined by scraping body surface mucus from areas of the pectoral fin, adjacent to dorsal fin, operculum, excised gills, lesions and intestine for proper identification under microscope. Use of fresh specimen facilitates visualization of motile parasite (Post, 1987; Southgate, 1994; Wildgoose, 1998). Others were preserved in 10% buffered formalin and 70% ethanol for identification using keys of Kabata (1985) and Cone (1995). For isolation of causative agent of bacterial diseases, selective media such as Rimler – Shotts (Shotts & Rimler, 1973) and King's B Medium (King, 1964) were used in addition to other standard media *viz.,* nutrient agar, tryptone soya agar (TSA) and brain heart infusion broth. Pure culture was obtained by repeated streaking and about 100 colonies were randomly taken in TSA (Himedia, India) slant as stock culture. To identify the bacteria to genus level, the scheme of Bain & Shewan (1968) and Le Chevallier et al. (1980) were pursued. Cultures exhibiting positive oxidase reaction, fermentative metabolism, motility and resistance to vibriostatic agent O/129 were considered to be *Aeromonas* sp. and subjected to biochemical scheme proposed by Popoff & Veron (1984) to ascertain the species. Identification of *Pseudomonas* to species level was done following the scheme of King (1964).

Of the 932 fishes examined, 26.5% was infested by 10 different diseases (Table 1). Four types of parasitic infections were due to one platyhelminth (*Clinostomum* sp.), two crustaceans (*Argulus foliaceus* and *Lernea cyprinacea*) and one sporozoan (*Myxobolus* sp.). The maximum prevalence (3.65%) was by *Clinostomum* sp., followed by *A. foliaceus* (3.43%) and least (0.64%) by *Myxobolus* sp. and *Lernea cyprinacea*. Two fungal diseases, Epizootic Ulcerative Syndrome (EUS) (5.69%) caused by *Aphanomyces* sp. and *Saprolegnia* sp. were recorded. The EUS infection was detected only in indigenous ornamental fishes.

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Table 1. Diseases observed in ornamental fishes of Nagaon district

Species of ornamental fish	No. of fish examined	No. of fish infected	Fish diseases									
			Parasitic				Bacterial				Fungal	
			Nodular disease	Argul-osis	Lernae-osis	Clinost-omume-osis	Dropsy	Fin rot	Ulcer	Exopht-halmia	Saprol-egniasis	EUS
Carp (*Cyprinus carpio)*	60	26	-	15	-	-	6	-	-	-	-	5
Koi (*Cyprinus carpio carpio)*	45	5	-	-	-	-	5	-	-	-	-	-
Goldfish (*Carassius auratus)*	125	36	5	12	6	-	10	3	-	-	-	-
Spotfin barb (*Puntius sophore)*	55	21	-	-	-	-	-	5	-	-	4	12
Ticto barb (*Puntius ticto)*	70	26	-	-	-	-	-	-	-	-	-	26
Scissortail rasbora (*Rasbora trilineata)*	50	3	-	-	-	-	-	-	-	3	-	-
Blue gourami (*Trichogaster trichopterus)*	72	20	-	-	-	-	12	8	-	-	-	-
Giant dwarf gourami (*Colisa fasciata)*	35	34	-	-	-	34	-	-	-	-	-	-
Angel (*Pterophyllum scalare)*	70	10	-	-	-	-	-	10	-	-	-	-
Sword tail (*Xiphophorus helleri)*	80	12	-	-	-	-	-	12	-	-	-	-
Black molly (*Poecilia sphenops)*	150	28	-	-	-	-	-	28	-	-	-	-
Black shark (*Morulius chrysophekadion)*	30	5	1	-	-	-	-	-	2	-	2	-
Indian featherback *(Chitala chitala)*	15	7	-	5	-	-	-	-	-	-	2	-
Indian potasi (*Psuedeutropius atherinoides)*	50	4	-	-	-	-	4	-	-	-	-	-
Golden snakehead (*Channa punctatus)*	25	10	-	-	-	-	-	-	-	-	-	10
Total no. of fishes	932	247	6	32	6	34	37	66	2	3	8	53
Prevalence (%) of infected fish	-	26.50	0.64	3.43	0.64	3.65	3.97	7.08	0.21	0.32	0.86	5.69

Four types of bacterial diseases namely finrot, dropsy, exophthalmia and ulcer were recorded, with maximum prevalence (7.08%) of finrot caused by *Aeromonas* sp. and *Pseudomonas flourescens*, followed by dropsy (3.97%) and exophthalmia (0.32%) caused by *A. hydrophila* and the least (0.21%) ulcer caused by *Aeromonas* sp.

Infestation of the platyhelminth parasite *Clinostomum* sp. in giant gourami, *Colisa fasciata* was observed in those collected from wild sources but not in those reared in aquariums. Wright (1971) reported that Gastropoda and Pelecypoda were the main primary hosts of this parasite. Migratory birds visit the natural resources from where the gourami were collected and probably that was how *Clinostomum* sp. was transmitted from bird to mollusk and finally to *C. fasciata.* Infestation of crustacean parasite *A. foliaceus* was more in carps and goldfish than in

others and *L. cyprinacea* occurred in gold fish only. Within a short period of infestation by the parasites, the fishes died due to punctate haemorrhages, lesions and destruction of tissues. Similar pathogenicity and haemorrhages due to heavy infestation, causing serious mortality of fish had been reported by Gratzek (1993). Infestation of *L. cyprinacea* in black molly, *Xiphophorus sphenops* was reported by Jeong et al. (2002). Hoffman (1998) reported infestation of this copepod in a wide range of ornamental fishes, frog tadpoles, salamanders, fishes in aquaculture and natural environment. Thilakaratne et al. (2003) reported 2.20% prevalence of *L. cyprinacea* infestation in freshwater ornamental fishes like gold fish, platy and carps in Srilanka. The infestation potential of *A. foliaceus* in cultured carp species varied from 68.36% in *Labeo rohita* to 23.45% in *Catla catla* (Kalita et al., 2007). Similar observations were made by Rao (1998) that significant mortality of juveniles and adult *L. rohita* in ponds of Andhra Pradesh was due to Argulosis. Nodular disease caused by sporozoan *Myxobolus* sp. was detected in *Carassius auratus* and *Morulius chrysophekadion*, initially as small white cream coloured raised lump on dorsal surface of the body, that gradually enlarged to rupture and caused death of the fish. When kept separately in aquarium, the infected fish survived for a long time. Similar symptomatic features of the disease was recorded in cichlids, carps and other ornamental fishes by Zaidi (2002).

Of the two fungal diseases recorded in the investigation, EUS caused by *Aphanomyces* sp. in barbs, *Puntius sophore, P. ticto, Channa punctatus* and *Cyprinus carpio* was severe in winter season causing mortality. EUS, a seasonal epizootic condition in fresh and estuarine warm waters, is of complex infectious etiology, characterized by presence of invasive *Aphanomyces.* Das & Das (1997) reported that wild and cultured fishes were infected by EUS in winter in the North east region of India. Lilley et al. (1998) reported EUS infection in snakeheads, catfish, *Puntius* sp., blue gourami, *Glossogobius giurius*, *Mastacembelus armatus* and several other wild fishes. EUS infection in this investigation however was not observed in exotic fishes. Srivastava (1980) reported infections of *Aphanomyces* sp. in *L. rohita* and *P. ticto.*

Saprolegniasis caused by *Saprolegnia* sp. was observed in *P. sophore, Morulius chrysophekadion* and young *Chitala chitala*. The infection was characterized by presence of cotton wool growth on open wounds of the body. These were secondary infections on ulcers caused by other disease conditions. Incidence of saprolegniasis in the investigation was

Table 2. Bacteria associated with ornamental fishes under observation

Infected fish species	Incidence No. observed due to				
	Dropsy	Finrot		Ulcer	Exophthalmia
	Aeromonas hydrophila	*Aeromonas* sp.	*Pseudomonas fluroscens*	*Aeromonas* sp.	*Aeromonas hydrophila*
Carp (*Cyprinus carpio)*	6	-	-	-	-
Koi (*Cyprinus carpio carpio)*	5	-	-	-	-
Goldfish (*Carassius auratus)*	10	3	-	-	-
Spotfin barb (*Puntius sophore)*	-	3	2	-	-
Scissortail rasbora (*Rasbora trilineata)*	-	-	-	-	3
Blue gourami (*Trichogaster trichopterus)*	12	5	3	-	-
Angel (*Pterophyllum scalare)*	-	10	-	-	-
Swordtail (*Xiphophorus helleri)*	-	12	-	-	-
Black molly (*Poecilia sphenops)*	-	23	5	-	-
Black shark (*Morulius chrysophekadion)*	-	-	-	2	-
Indian potasi (*Psuedeutropius atherinoides)*	4	-	-	-	-
Total	37	56	10	2	3

low. Srivastava (1980) observed infections of *Saprolegnia* sp. in *C. lalia, Nandus nandus, Heteropneustes fossilis* and *Notopterus notopterus*.

Bacterial diseases and the number of incidence in the fishes examined is presented in Table 2. Finrot caused by *Aeromonas* sp. and *Pseudomonas fluorescens* was more in *Poecilia sphenops, C. auratus, Xiphophorus helleri* and *Pterophyllum scalare* reared in aquarium. Hettiarachchi & Cheong (1994) reported that *A. hydrophila* caused distinct pathological conditions of tail/finrot and haemorrhagic septicaemia in fish. *P. fluorescens* had been implicated in epizootic outbreaks of several cultured fishes (Miyashita, 1984; Thune et al., 1993). Ahne et al. (1982) stated that bacterial finrot is a contagious infection. Sterba (1956) opined that ecological factors favoured appearance of this disease. Dropsy recognized by ascites and ventral body swelling in *C. auratus, Trichogaster trichopterus, Cyprinus carpio carpio* and few other was caused by *A. hydrophila* and at later stages, it caused distended abdomen of the fishes with ulcers. Abdominal dropsy caused by *Aeromonas* sp. was also significantly higher in this investigation. Shome et al. (1999) reported that *A. hydrophila* caused acute infectious abdominal dropsy in many freshwater fishes. Austin & Austin (2007) reported that the distended abdomen of fishes may be a sign of many diseases caused by *A. hydrophila, A. salmonicida, P. fluorescens* and similar microorganisms. Exophthalmia in *Rasbora trilineat*, characterized by bulging eyes leading to corneal opacity was due to infection of *A. hydrophila*. Austin & Austin (2007) reported that eye damage and corneal opacity in fish leading to corneal rupture were due to infection of *A. hydrophila, A. caviae* and similar pathogens. Bacterial ulcers of *M. chrysophekadion*, initially appearing as small ulcer or shallow open sores on body surface and later spreaded as irregular large ulcers in the fish was caused by *Aeromonas* sp. (Monhar et al., 1976; Kumar et al., 1986; Karunasagar et al., 1988; Sahu et al., 1996). It was also observed that *Aeromonas* and *Pseudomonas* bacteria caused ulcers in fish populations stressed by high stocking density and low water quality.

Incidence of parasitic and microbial diseases in ornamental fishes affect relationship between the population density, source and water quality of the rearing environment. Constant monitoring of water quality, quarantine treatments and disease preventive measures may ensure growth of a sound trade of these fishes in the region.

References

Ahne, W., Popp, W. and Hoffman, R. (1982) *Pseudomonas fluorescens* as a pathogen of *Tinca tinca.* Bull. Eur. Assn. Fish P. 4: 56-57

Austin, B. and Austin, D.A. (2007) Bacterial Fish Pathogens – Diseases of farmed and wild fish, 4th edn., pp 185-235, Published by Praxis Publishing Ltd. Chichester, UK

Bain, N. and Shewan, J.M. (1968) Identification of *Aeromonas, Vibrio* and related organisms. In: Identification Methods for Microbiologists (Part –B), (Grribbs, B.M. and Shapton, D.A., Eds), pp 79-84, Academic Press, London

Cone, D.K. (1995) Monogenea (Phylum Platyhelminthes). In: Fish Diseases and Disorders. (Woo PTK Ed.,), pp 204-289, Cab International, Walling ford

Das, M.K. and Das, R.K. (1997) Fish and Prawn diseases in India – Diagnosis and Control. 114 p, Published by Inland Fish. Soc. of India, Barrackpore, India

Gratzek, J.B. (1993) Parasites associated with freshwater tropical fishes. In: Fish Medicine (Stoskopf, M.K., Ed), 590 p, WB Saunders Company, Philadelphia

Hettiarachchi, D.C. and Cheong, C.H. (1994) Some characteristics of *Aeromonas hydrophila* and *Vibrio sp.* isolated from bacterial diseases outbreaks in ornamental fish culture in Sri Lanka. J. Natl. Sci. Council of Sri Lanka, 22: 261-269

Hoffman, G. L. (1998) Parasites from North America Freshwater Fishes. 2nd edn., pp 317-319, Cornell University Press, Ithaca, NY

Jeong, H.K., Hayward, C.J., Joh, S.J., Heo, G.J. (2002) Parasitic infections in live freshwater tropical fishes imported to Korea. Dis. Aquat. Org. 52: 169-173

Kabata, Z. (1985) Parasites and diseases of fish cultured in the tropics. 287 p, Taylor Francis. London

Kalita, B., Tamuli, K.K., Bhagabati, S.K., Dutta, O.K. (2007) Epidemiology of *Argulus* sp. infections in fish culture ponds in Nagaon district – a case study. Abstract on Recent advances and rebuilding of fish and fisheries in north east India, 17 p, St. Anthony College, Shillong

Kalita, K. and Kalita, B. (2007) Training Manual: Ornamental Fish Trade and Aquarium Maintenance, 47 p, NABARD and College of Fisheries, AAU, Publication

Karunasagar, I., Segar, K., Ali, P.K.M.M. and Jeyasekaran, G. (1988) Virulence of *Aeromonas hydrophila* strains isolated from fish ponds and infected fish. In: Recent Advances in Biotechnology and Applied Biology (Shu – ting Chang., Kwongyu Chan and Norman, Y.S. Woo., Eds), pp 205-211, Chinese University, Hong Kong

King, E.O. (1964) The identification of unusual pathogenic gram negative bacteria. Center for Disease Control, Atlanta, Georgia

Kumar, D., Suresh, K., Dey, R.K., Mishra, B.K. (1986) Stress mediated *Columnaris* disease in rohu, *Labeo rohita* (Hamilton), J. Fish Dis. 9: 87-89

Le Chevallier, M.W., Seider, R.J., Evans, T.M. (1980) Enumeration and characterization of standard plate count bacteria in chlorinated and raw water supplies. Appl. Env. Microbiol. 45 (5): 922-930

Lilley, J.H., Callman, R.B., Chinabut, S., Kanchanakhan, S., Macrae, I.H., Phillips, M.J. (1998) Epizootic Ulcerative Syndrome (EUS) Technical Handbook. 88 p, The Aquatic Animal Health Research Institute, Bangkok

Miyashita, T. (1984) *Pseudomonas fluorescens* and *Edwardsiella tarda* isolated from diseased tilapia. Fish Pathol. 19: 45-50

Monhar, L., Shenoy, M.G., Chandramohan, K.C., Reddy, T.K.K. (1976) A new bacterial fish pathogen causing skin disease in catfish, *Clarius batrachus* Lin. Curr. Res. 5: 76-77

OIE (1997) International Aquatic Animal Health Code, 267 p, Office International des Epizooties, Paris

Popoff, M. and Veron (1984) *Aeromonas*. In: Manual of Systematic Bacteriology (Krieg, N.R., ed), pp 545-548, Vol. I. Baltimore, Williams and Wilkins Co

Post, G. (1987) Animal parasites of fishes. In: Textbook of Fish Health (Post G., Ed), pp 159-204, TFH Publication, Neptune city, NJ

Rao, G.K. (1988) Current fish disease problems in farmers' ponds of Andhra Pradesh. Asian Fisheries Society, Indian branch, Newsletter 1: 3-6

Sahu, B.B., Gyatri, M. and Mukherjee, S.C. (1996) *Aeromonas* infection in freshwater fish and catfish Pap nat worsh. Fish and Prawn diseases epizool and Quarantin, Adoption of India, CICFRI, Barrackpore

Sen, N. (2000) Occurrence, distribution and status of Diversified fish fauna of Northeast India. In: Fish Biodiversity of Northeast India (Ponniah, A.G. and. Sarkar, U.K., Eds), pp 31 – 48, Proc. National Workshop, Abstracts NATP publications 2, NBFGR, Lucknow, 10-11 Feb

Shome, R., Shome, B.R., Krishnamurthy, V., Soundarajan, R. and Sarangi, N. (1999) Fish Disease Investigations in Bay Islands. Fishing Chimes, 19 (5): 35-39

Shotts, E.B. and Rimler, R.B. (1973) Medium for the isolation of *Aeromonas hydrophila*, Appli. Microbiol. 26: 550-553

Southgate, P. (1994) Laboratory diagnosis of fish diseases. In Practice, 9: 252-255

Srivastava, R.C. (1980) Fungal parasites of certain freshwater fishes of India. Aquaculture, 21: 387-392

Sterba, G. (1956) 'Aquarienkunde' Vol. 2 Leipzig / Jena, 1956

Thilakaratne, I.D.S.I.P., Rajapaksha, G., Hewakopara, A., Rajapaksha, R.P.V.J. and Faizal, A.C.M. (2003) Parasitic infections in freshwater ornamental fish in Sri Lanka. Dis. Aquat. Org. 54: 157-162

Thune, R.L., Stanley, L.A., Cooper, R.K. (1993) Pathogenesis of gram negative bacterial infections in warm water fish. Annual Review of Fish Diseases, 3: 7-68

Wildgoose, W. (1998) Skin disease in ornamental fish: Identifying common problems. In Practice, 5: 226-241

Wright, C.A. (1971) Flukes and Snails. George Allen and Unwin Ltd., London

Zaidi, S.G.S. (2002) Training Manual: Ornamental Fish Culture, pp 130-146, CIFE, Mumbai