

Parasitic Diseases of Freshwater Fishes

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ABSTRACT — *The major parasites of freshwater fishes are briefly discussed. Life cycles, host-parasite relationships, pathogenicity, and possible prevention and control are given.*

Parasitic diseases of fishes are usually encountered more often than microbial diseases. From 30 to 50 percent of the cases received at several fish disease diagnostic laboratories involve parasites.

Host reaction to parasitic invasion is highly variable. The severity of a parasite epizootic may be related to environmental factors; host condition, age, and size; and population density. Some species that may be considered commensals become pathogenic under certain conditions. However, most obligate parasites are pathogenic and some, such as the ciliated protozoan *Ichthyophthirius*, cause great losses. Many helminths, such as the digenean grubs, appear to be only slightly or moderately pathogenic but destroy the aesthetic value of fish.

PROTOZOANS

Many biologists consider the protozoans to be the most important group of parasites affecting fish. Fish culturists throughout the world report great losses caused by protozoans. The most devastating fish parasite of all is *Ichthyophthirius*. "Ich" is an obligate parasite infecting the skin and gills of fish. The life cycle of "Ich" involves production of many young individuals (tomites) produced from a single cell after the

mature cell, the trophozoite, leaves the fish. The trophozoite settles on a substrate, secretes a cyst wall and undergoes multiple fission, giving rise to up to 1,000 tomites. The tomites then leave the cyst, seek a host, bore into the epidermis or gill epithelium, and produce a severe irritation accompanied by excess mucus production and hyperplasia of the epithelium. The cells mature, creating small white spots that are easily seen with the naked eye.

We were able to demonstrate that fish will develop an immune response to *Ichthyophthirius* infections. After fish were experimentally infected, they were treated with malachite green to rid them of "Ich". Fifteen days later they were challenged: All control fish developed "Ich" and died while previously infected fish did not.

One researcher collected "Ich" trophozoites, ground them up using 1.0 ml of trophozoites in 10 ml of 0.85 percent saline, added Freund's adjuvant, and injected the fish intraperitoneally. Fifteen days later upon challenge the controls developed "Ich" and died, but all injected fish survived (Areerat, 1974). A problem in developing a vaccine for "Ich" would be in-vitro culturing of "Ich." Many people have attempted in-vitro culture without success.

Several other ciliates such as *Chilodonella*, *Trichodina*, *Ambiphrya*, and *Epistylis* can cause mortality under certain conditions. Flagellates such as *Costia* and *Bodomonas* often cause mortality but are fairly easy to control with an external treatment.

Spore-forming Cnidospora include members of the genus *Myxosoma* that cause whirling disease of salmonids in which young fish are infected and the cartilage destroyed prior to bone formation. When the eroded cartilage ossifies, the bone is distorted and the fish usually has severe curvature of the backbone, resulting in the fish swimming in a circle thus giving the condition the name "whirling disease."

Henneguya is another Cnidosporidian commonly infecting channel catfish, *Ictalurus punctatus*. Several different species occur in the gills and skin with an interlamellar form reported to cause extensive mortality in very young fish.

Several species of *Pleistophora*, a microsporidian, occur in fish, one of which occupies the ovary of golden shiners, *Notemigonus crysoleucas*, and can cause sterility. Older fish have a much heavier infection rate and more ovary damage, but a technique of using 1-year-old brood fish has practically eliminated the problem of sterility.

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TREMATODES

Some genera of monogenetic trematodes can build up large populations under intensive culture situations but they are not considered to be a serious threat to fish in North America.

Two groups of digenetic trematodes occur in fish: adults normally living in the gastrointestinal tract and larval forms, metacercaria or grubs, living in the tissues. The eye grub, *Diplostomum*, attacks the lens of the eye causing blindness while white grubs, black grubs, blackspot, and yellow grubs affect mainly the aesthetic value of the fish. There are no controls known for the tissue-inhabiting larval forms.

CESTODES

Cestode pleurocercoids of the large-mouth bass, *Micropterus salmoides*, tapeworm, live in visceral organs of bass and commonly migrate through ovaries causing sterility. One approach we have taken is replacement of brood

fish about every 3 years in an attempt to manage around the problem by maintaining a low intensity of infection. Earlier attempts to rid fish hatcheries of the bass tapeworm by disinfecting the ponds and restocking both brood and forage fish were unsuccessful as the fish would show a reinfection within a year after restocking. *Corallobothrium* is a tapeworm sometimes found in great numbers in the intestine of channel catfish. Little apparent damage is caused by this worm and it has been easily controlled using tin compounds in the feed.

NEMATODES

Nematodes in the gastrointestinal tract are not considered detrimental, but

tissue inhabiting forms can seriously affect the fish population. *Philometra* is a nematode commonly found behind the eye of centrarchid fishes and up to 40 percent of some reservoir populations in the southeastern United States have been affected.

CRUSTACEANS

Crustaceans are one of the main groups of detrimental parasites, especially the anchor worm that has both adult and a parasitic larval stage that feeds on the fish.

LITERATURE CITED

Areerat, S. 1974. The immune response of channel catfish, *Ictalurus punctatus* (Raf.) to *Ichthyophthirius multifiliis*. Masters Thesis, Auburn Univ., Auburn, Ala., 44 p.

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