Fish Parasites

Like other vertebrate animals, fishes have parasites. I have generally refrained from listing these in the species accounts; the material in this section is provided for the fisherman who is curious about parasites in fish he has just caught. I have simplified this section by listing only the most frequently encountered parasites. Further details dealing specifically with the parasites of Wisconsin fishes can be found in Marshall and Gilbert (1905), Pearse (1924a, 1924b), Cross (1938), Bangham (1944), Fischthal (1945, 1950, 1952, 1961), Degurse (1961), Anthony (1963), and Les (1975). Useful general works on the parasites of North American fishes are Davis (1956) and Hoffman (1970).

The yellow grub (Clinostomum marginatum) appears as a small (about 6 mm long) whitish or yellowish cyst deep in the flesh of the fish, or occasionally just beneath the skin. Yellow perch and bluegills are the prime targets, although northern pike, minnows, darters, and pumpkinseeds are commonly infected. The yellow grub has a complex life cycle. A fish parasitized by a yellow grub may be eaten by a great blue heron; the flesh of the fish is digested and the grub crawls to the throat and mouth of the bird, where it matures into an adult. The adult releases eggs, which are washed out of the heron's mouth into the water as the heron is feeding. The eggs hatch in the water into free-swimming larvae that penetrate certain species of snails. In the snail, each larva multiplies a thousandfold or more, and when a certain stage of development is reached the progeny leave the snail and become free-swimming again. These, upon contacting certain species of fish, burrow into the flesh and become yellow grubs. Light infections in the fish have no detrimental effect, but heavy infections cause the fish to swim more slowly, or may interfere with their growth. There is little danger of the yellow grub infecting man, and any parasites of this type are killed by thorough cooking.

The black grub, or black spot (Neascus spp.), is the most conspicuous parasite of fish. The parasite appears as a small black spot in the skin, about 1 mm
The encysted larva is surrounded by a thin inside wall laid down by the worm and a thicker wall on the outside deposited by the fish. The latter is black pigmented and is responsible for the black appearance of the cyst. Frequently the outer surface of a parasitized fish will have hundreds of cysts, some on top of one another, which give the fish a rough and distasteful appearance. Trout, bass, perch, northern pike, minnows, darters, and many other species may be infested.

The life cycle of the black grub is complex. A fish-eating bird, usually a kingfisher, eats the infected fish. The larva is digested out in the bird's intestine, where it transforms into an adult worm which lays eggs; these pass out into the water with the bird's droppings. The eggs hatch into larvae that swim about until they find and penetrate the right species of snail, where they multiply a thousandfold. Finally, free-swimming black grub larvae are released from the body of the snail; these larvae find a fish and penetrate beneath its scales or into the deeper layers of the fish's muscles. The cycle is then complete. It is suspected that heavy infections of black grub would have some unfavorable effect on the growth and vitality of fish. The black grub is not harmful to man, and it may be safely stated that infested fish are quite edible, even though they may not be pleasing to the eye. Skinning infested fish will remove most grubs, and normal cooking will destroy all grubs present.

The white grub of liver (Posthodiplostomum minimum) is a widespread and economically important larval fluke or trematode. It is most common in bluegills, pumpkinseeds, and rock bass; it occurs occasionally in black basses, minnows, and darters, but rarely in walleyes, perch, and bullheads. The grubs are present in thin-walled, transparent cysts in the liver, kidneys, spleen, reproductive organs, heart, and other body membranes. The complicated history of this grub begins when a parasitized fish is eaten, usually by the great blue heron. In the bird's intestine the grub matures into an adult, which produces eggs that are released into the water with the droppings of the bird. The eggs hatch into larvae and penetrate a particular species of snail, in which several generations
of larvae develop and multiply. Eventually a free-swimming larva leaves the snail, finds a suitable fish, penetrates beneath the scales, and migrates to its destination in the liver and associated organs, where it encysts. If sufficient tissue is destroyed, the host fish will die; sometimes the liver is almost completely destroyed. The white grub of liver, even if swallowed alive, will not infect man. Moreover, since the parasite is not found in the fish's flesh, there is little danger of eating grubs, and normal cooking will destroy any grubs present should some accidentally cling to the body membranes in the dressed fish.

EYE GRUBS (*Diplostomum* spp.) are small, flattened, and slightly elongated flukes found in the chambers or lenses of the eyes of nearly all species of fish. They have been taken from the eyes of suckers, perch, walleyes, sunfishes, northern pike, basses, crappies, rock bass, darters, trout, and burbot. A fish-eating bird, usually a gull, eats the infected fish and digests out the larvae, which then reach sexual maturity in the gut of the bird. The eggs of the eye flukes, evacuated with the droppings of the bird into the water, hatch into swimming larvae in 2 or 3 weeks. These penetrate a snail, where they develop further and multiply. Finally, a fork-tailed, free-swimming larva (cercaria) emerges and penetrates the fish host, where it becomes localized in the eye. A popeyed condition often results and sometimes develops rapidly. If the invasion is into the lens, the lens may become cloudy or opaque. If the infection results in blindness, the fish, no longer able to feed, gradually becomes emaciated and eventually dies.

The BASS TAPEWORM (*Proconocephalus ambloplitis*) occurs in both the adult and larval stages of fish. The adult and advanced larval stages (plerocercoid) of the bass tapeworm are very common in largemouth and smallmouth bass, and the bass tapeworm has also been found in trout, perch, pike, carp, and sturgeons. In the adult stage, mature segments of the tapeworm break off and pass into the water with the fish feces. These segments disintegrate and the eggs contained in them are eaten by microcrustaceans called copepods. Inside the copepods, the eggs develop into larvae. The copepods are eaten by young or adult fishes, which become infected with the tapeworm larvae; adult fishes are often infected by eating young fish. Although the adult stage of the bass tapeworm usually does little harm to the fish, a larval stage, the plerocercoid, may invade the fish's reproductive organs and cause infections; these often result in sterility. There is little chance of man being infected if the fish containing these larvae are thoroughly cooked.

The RIBBON TAPEWORM (*Ligula intestinalis*) is a yellowish white worm which may reach a length of over 0.6 m. It is most often found in minnows, but has been reported in perch, bass, suckers, and trout. The adult tapeworm is present in the intestines of fish-eating birds, and its eggs are shed into the water along with droppings from the bird host. The eggs develop into ciliated larvae, which are ingested by a copepod host; in the host they develop into small, wormlike procerocoids. When the copepod is eaten by a fish, the procerocoid larvae embed themselves in the intestine of the fish host, where they develop into the final larval stage, the plerocercoid. Fish infected with the ribbon tapeworm develop a swollen belly; heavy infestations may cause sterility in the fish (see picture of spottail shiner, p. 543). The ribbon tapeworm is eliminated when the fish is cleaned. Thorough cooking is recommended to ensure against infection.

Among other fish parasites are the SPINY-HEADED WORMS (*Acanthocephala*)
and ROUNDWORMS (Nematoda), which occur in the intestine, although other internal organs may be invaded as well. Larval nematodes have been observed to cause considerable damage in the body cavity of fish. The kidney roundworm, which is found as a larva in the body cavity and viscera of bullheads and northern pike, may infect man. However, thorough cooking will destroy this parasite.

FISH LICE (Argulus spp.), GILL LICE (Salmincola spp.), ANCHOR WORMS (Lernaea spp.), and LEECHES (Hirudinea) are large, external parasites commonly encountered in Wisconsin fishes. Gill lice infect the gills of trout and salmon; in Wisconsin they are found primarily on brook trout. When the trout become crowded in a stream or a spring pond, the gill copepod also increases in number until the trout die or become so weak that they cannot avoid predators or disease. Anchor
worms, attached to the skin and bases of fins, have been reported from sunfish, trout, gars, bowfins, perch, drum, and minnows. Heavy infestations can slow the growth of a fish, cause it to lose weight, and even kill it. Leeches do not parasitize fish for prolonged periods, and damage from leeches to the fish population of a given lake or stream is usually slight.

Small white spots on the skin and fins of fish, and to a lesser degree on the gills, indicate the presence of the protozoan ich (Ichthyophthirius multifilis). Although this is a disease parasite commonly associated with aquariums, it is a serious parasite in the wild, and heavy infestations can result in the death of fish. It is believed that all species of freshwater fish are vulnerable to ich.

A very destructive protozoan (Myxosporidea) causes the so-called whirling or tumbling disease, which affects fingerling trout. The organism, upon penetration of the cartilages of the trout’s skull and its auditory organs, causes the fish to swim about with convulsive, rapid movements, at times turning on its back and even leaping from the water. A serious infection may be fatal. If the victim does recover, a deformity of the skeleton may affect the fish for life. Wherever the myxosporideans have penetrated cartilage, normal ossification is prevented, resulting in such deformities as shortened gill covers and fins, and fused cheeks which prevent the fish from shutting its mouth.

Fungi (Saprolegnia spp.), which appear as a white, cottony growth on the body of fish such as brown trout in Lake Michigan, can cause considerable damage and even death. Such infections of fish are of no danger to humans, but often result in fish having an unpalatable taste and unsightly appearance. Anglers frequently discard large fish, even of trophy size, that show signs of fungus.