



Florida Fish and Wildlife Conservation Commission

Fish and Wildlife Research Institute

From time to time, anglers will find worms in the fish they are cleaning. Although unsightly, these common marine parasites pose no human health threat because even if they are not all removed when the fish is cleaned or filleted, they will be killed when the fish is cooked or frozen. This brochure provides a summary of the types of worms commonly found in fish and offers general guidelines for preparing fish to minimize health concerns.

Types of Worms

Parasitic worms can invade and live on or within another organism, called the “host.” Although virtually all fish can become infested with worms, certain groups of fish appear to be more susceptible to them. Fishes of the drum family, such as red drum, spotted seatrout, croaker, and black drum, are most often affected, but worms are also common in amberjacks, groupers, and sharks.

Most worms have a complicated life cycle that requires that they inhabit more than one host animal before they can reproduce. The worms take advantage of the marine food web to grow and multiply, moving from one type of animal to another as predators become prey.

Worms are rarely harmful to the fish they inhabit, and in fact, they can be good indicators of the overall health of a marine environment. Generally, fish in healthy marine systems will have a greater diversity of species of worms in relatively low numbers, whereas fish in more polluted areas will have fewer species in greater abundance.

There are four major types of worms commonly found on or in fish. A brief overview of their appearance and life cycle is provided here.

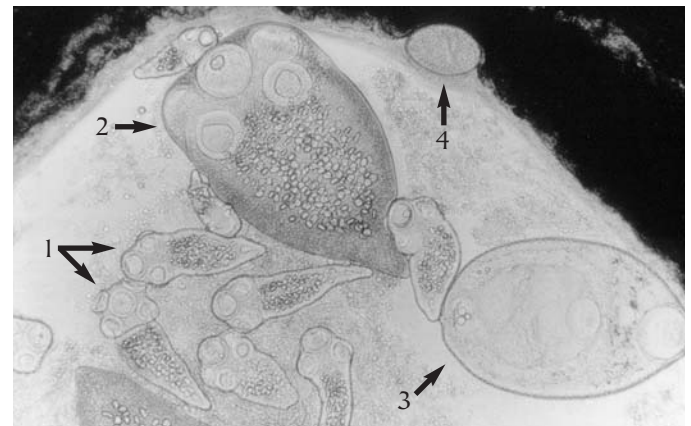
WORMS IN FISH

Unsightly But Safe

Tapeworms

Tapeworms (*cestodes*) are the most common parasitic worms. As their name implies, tapeworms have long, ribbon-like bodies that are usually white or yellow. The flat body of the worm is segmented; each segment, called a proglottid, has its own complete reproductive system and can produce eggs and sperm. In most species of tapeworms, a few new segments are continuously being formed. Tapeworms obtain nutrients by absorbing them through their skin. Adult tapeworms cling to the digestive tracts of their hosts, usually by hooks or suckers. These structures—along with the distinctive shape of the body—are the defining features of this family of worms.

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From a silver perch intestine: Scolex (1 and 2), larval cestodes with multiple suckers; and an oval digenetic trematode (3) and its egg (4).

Typically, two or more host animals are unwitting participants in the tapeworm's life cycle. Adult tapeworms usually take up residence and reproduce in sharks and rays. The worms or the worm segments containing the eggs are released

into the water along with the discharged intestinal wastes of their host. After about a week, one tiny swimming larva pops out of each capped egg. The larvae are eaten by tiny crustaceans such as copepods, advancing the worms to another larval phase. If the crustaceans are then eaten by an appropriate fish, the larvae continue to develop and may remain in this intermediate, “middleman,” host for a few years. The life cycle is complete when a shark or ray consumes the fish, paving the way for the worms to reach adulthood and reproduce inside this final host.

Few bony marine fishes act as hosts for adult tapeworms, but they do harbor a rich variety of larval ones. For example, larvae of one species of tapeworm, *Poecilancistrum caryophyllum*, are frequently found inside spotted seatrout. Since seatrout are a favorite food of sharks, especially bull sharks, this parasite has apparently adapted to live within the specific fish that will best increase its chances to reach maturity and reproduce.

F a s t FACT

Most sharks infested with tapeworms are at least 4.5 feet long, presumably because large sharks eat more seatrout than small ones do and are thus more likely to consume individuals with worms.

Examinations of many seatrout suggest that the worms do not harm these fish but merely use them as a sort of natural incubator. Trout worms are typically found only in larger seatrout.

Wormy trout occur year-round because once a host is infested, the worm may live inside it for a year or more.

Because tapeworms have such long and twisted bodies—giving the illusion of dozens of individual worms—many anglers may think their catch is more worm-infested than it actually is. In reality, few fish have more than three or four tapeworms.

Flukes

Flukes (*trematodes*) are among the largest groups of parasites affecting marine fishes. Flukes are similar in shape to tapeworms, but are shorter and broader. Unlike tapeworms, flukes have a gut in which food—for example, the blood and the

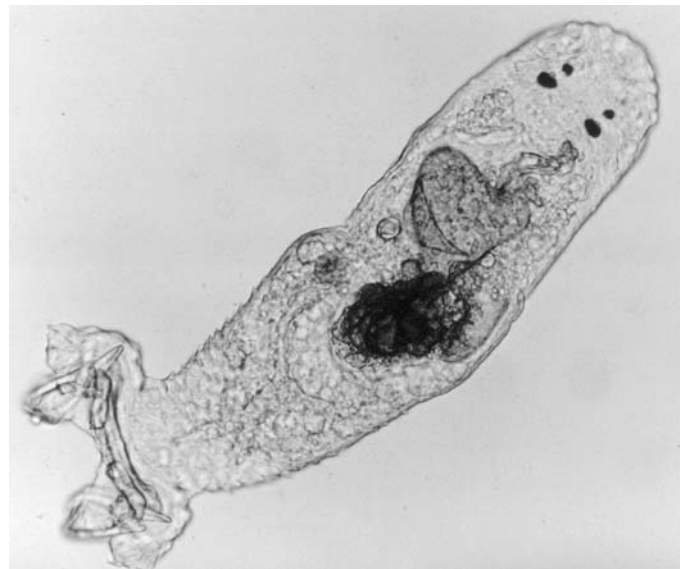


A digenetic trematode from the intestine of a silver perch.

intestinal contents of their hosts—can be digested. Many flukes show a distinct preference for host animals of a certain age or length.

Flukes are divided into two main categories, monogenetic and digenetic. Monogenetic flukes typically lodge on the gills or on the outside of the host and do not require an intermediate host in which to spend certain life-cycle stages. Digenetic flukes live internally and require multiple hosts in their life cycle.

Monogenetic worms have only one host throughout their life cycle. They primarily infest the gills or the skin of fishes, although a few may occur internally. An adhesive organ bearing several



From the gill of a snook: a monogenetic trematode, or fluke, with a developing egg.



clamps or suckers attaches the worm to its host organism. These external worms usually lay a small number of eggs each day. The eggs hatch into larvae that are fringed with hair-like cilia. These larvae can swim onto the same fish or another fish and repeat the cycle.

Some adult monogenetic flukes are so small that they can be seen only through a high-powered microscope, whereas others may be larger than a thumbnail and are often visible to the naked eye. When these larger external flukes are on the tough skins of sharks and rays or on the gills of jacks, drums, seatrout, and many other fishes, they may be fairly easy to spot.

F a s t F A C T

*One digenetic fluke that may be familiar to anglers who target billfish and other deep-water species is the giant stomach worm (*Hirudinella ventricosa*). When fully stretched out, this Goliath of the worm world may be longer than a man's hand.*

Digenetic flukes are considerably more varied in their adaptations than monogeneans are. Many different groups of animals serve as intermediate hosts for digenetic fluke larvae. Most fish harbor both larval and adult digeneans, and some have several different species in their bodies. Almost all digenetic flukes use a snail or bivalve mollusk such as a clam as one of their intermediate hosts. In fish, internal flukes usually inhabit the digestive tract. Most digenetic flukes have two suckers, one for latching onto tissue in its host animal, and the other for feeding, holding, and moving about.

Some larval digenetic flukes are enveloped in cysts and can be seen only through a microscope. The dark pigments that occasionally appear around these cysts can be seen with the naked eye. Anglers refer to this condition as "black spot disease."

Roundworms

Roundworms (*nematodes*) are true to their name. Both the immature stages and the adults are round, long, and thin, tapering to a point at each end. They do not have segments and are covered with a hard outer skin called a cuticle. Roundworms are usually white or red.



A nematode from a red drum intestine.

Although small, inconspicuous, and seemingly inconsequential to humans, nematodes are among the most abundant and ancient animals on earth; thousands of species are found on land and in the water. Most nematodes are not parasitic.

Unlike other worms, which move in a coordinated "inchworm" style of locomotion by contracting their muscles, roundworms move in a whiplike, wriggling fashion. Roundworms are found

F a s t F A C T

*One common nematode found in the gut of at least 13 estuarine and nearshore fish is *Spirocamallanus cricotus*. When viewed under a microscope, this species displays a golden, beautifully ribbed capsule that it uses to attach to the digestive tract of its host.*



Spirocamallanus cricotus from a silver perch intestine.



in more types of tissues within the fish than the other types of parasitic worms are. Adult forms usually inhabit the upper part of the intestinal tract, whereas larvae inhabit the lower part.

The life cycle of roundworms in fish is similar to that of tapeworms in that it uses one or more intermediate hosts. At various stages, roundworms may be found in muscle tissues, in internal organs, or in the intestinal tract. Roundworms take several months to mature and may live in a fish for more than a year.

Thorny-headed worms

These aptly named parasites, also known as acanthocephalans, have bodies very much like nematodes except that they do not have a gut. Their common name refers to their impressive retractable proboscis (or snout-like appendage), which is equipped with numerous hooks. Several different species of thorny-headed worms occur in the Gulf of Mexico, including one species that invades the intestinal tracts of cobia, where it can grow longer than a finger, although much narrower. Most thorny-headed worms have a crustacean intermediate host, enabling them to move into cobia and other fish that consume crustaceans.

Public Health Precautions

In general, because of the species-specific nature of such infestations, worm infestations cannot be passed from fish to humans. Furthermore, most worms inhabit the intestinal tracts of fish and crustaceans, which anglers typically remove and discard when cleaning and filleting their catch. If any worms remain after the fish is filleted, they—

and the health concerns about them—can be eliminated by cooking the fish fillets thoroughly or by freezing them before they are used. Understandably, a major infestation of visible worms may not be very appetizing, even with the knowledge that the fillet will be safe to eat after being properly cooked.

The Florida Fish and Wildlife Conservation Commission has established a toll-free number that you can call with questions about marine fish parasites. Anglers or consumers with concerns about worms in fish may call 1-800-636-0511 for assistance or e-mail aquatichealth@MyFWC.com.

Research



Health monitoring of Florida's sport fish is funded through fishing license and federal Sport Fish Restoration dollars. The Sport Fish Restoration Program is a "user pays/user benefits" system that is funded by taxes on sales of recreational fishing equipment and boat fuel. The Sport Fish Restoration Program supplies three dollars for every one dollar provided by the State for projects that improve fishing and boating opportunities. Fish and wildlife health specialists with the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI) routinely collect sport fish (including snook, seatrout, and redfish) from Florida waters and examine those specimens to determine the abundance and types of parasites that are present. FWRI scientists are also studying the role of parasites as biological indicators of the health of marine ecosystems in Florida.



June 2005



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