

Fish Parasites

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Parasites are a group of organisms that may or may not cause illness in aquarium fish, depending on a number of factors. Before we learn about the different fish parasites, let's find out exactly what a parasite is.

Parasites have arisen by evolution from what were free-living animals (animals not living on or in another animal, and not reliant on another to draw their nourishment). They often resemble their ancestors a good deal, but have become better adapted for a parasitic life. Some parasites have developed organs, such as suckers for hanging on to their hosts. Many lay tremendous numbers of eggs because the chances that any one egg will infect a new host are incredibly small. Parasites have generally changed biochemically and immunologically, so they can survive inside another organism and not be digested or killed. Some of them depend on their hosts for compounds that their ancestors could synthesize.

Some parasites are harmful to their hosts, others are not. A parasite that might be harmful if present in large numbers might not be harmful if just a few have parasitized the host.

The Two Types of Parasites

Parasites are typically divided into two groups: ectoparasites, external parasites that live on the outside of a tropical fish host (including the gills, mouth, skin and fin surfaces), and endoparasites, which live in the tissues, blood and/or organs (including the gastrointestinal tract). Interestingly, we still don't know exactly how intestinal parasites manage to survive without being digested along with the other contents of the intestinal tract. As you can imagine, the inside of the gastrointestinal tract is a pretty inhospitable place to live — it is full of acids and enzymes designed to digest anything passing through it.

Some parasites are transmitted directly from fish to fish, such as some ectoparasitic protozoa and skin/gill flukes. The life cycles of these parasites may also include a free-living phase, when they can be found in the water or aquarium substrate. The life cycle of such parasites is called a direct life cycle.

Other larger parasites often have complex life cycles involving two or more hosts, including a fish. This is called an indirect life cycle. For example, the spiny-headed worm attaches to the intestinal wall of a tropical fish (the definitive host), and after expelled by the fish defecating, the worm's eggs are eaten by freshwater shrimp (the intermediate host), which are in turn ingested by another tropical fish.

It is important to know the difference between life cycles, because this will have an effect on treatment methods and whether you will succeed when treating parasites.

Preparing For Battle

Find a veterinarian who is knowledgeable about aquatic medicine and is willing to work with you. If you can't find such a vet, try to find one who is at least interested in aquatic medicine, but perhaps a novice, and encourage him or her to work with you. Almost all of the major veterinary conferences offer courses in aquatic medicine, and there are many texts and Internet sites that offer excellent information for veterinarians.

Many veterinary labs offer free consultations to the veterinarians who use them, and these can be a great source of information. Parasitologists are also valuable in helping to diagnose certain parasitic problems. Armed with these resources, as well as a basic knowledge of infectious diseases, a good microscope and a pathologist who can read fish samples, you and your vet can work together to diagnose and treat fish problems.

If you have an infected tropical fish, your vet can attempt to diagnose the problem by utilizing stool samples, skin scrapings and lesion culturing, or through biopsy of tissue for histopathology (this entails examination of tissue under a microscope by a trained veterinarian after the sample has been sliced into very thin specimens and stained with agents to identify structures). In some cases, it may be more helpful diagnostically to sacrifice a single fish showing signs in order to accurately identify the problem, especially in cases that involve pet retailers, breeders and aquariums containing valuable fish. A single sacrifice such as this may save many more fish in the long run.

Causes and Cures

Clinical signs of parasitic disease in tropical fish can be vague. A sick fish may be seen swimming alone, or it may swim more slowly and/or on its side. The gills may move more rapidly. The fins may be clamped or droopy, and the fish may be losing weight. There may be white spots on the skin or gills, or the tropical fish may rub against aquatic plants, ornaments or gravel. Some tropical fish appear bloated.

Most parasitic diseases occur as a result of poor water quality. Most parasitic organisms are opportunistic and may be present all the time in the aquarium or on the fish in low numbers, and only cause disease when the tropical fish is stressed. The number of tropical fish in an aquarium, water temperature, pH, lighting, type of filtration system and water chemistries all influence the health of the fish.

Another common reason for parasitic outbreak is inadequate (or a total lack of) quarantine procedures for new tropical fish prior to introducing them into your aquariums. Many diseases do not show up for two to three weeks following transport, and unfortunately this can result in serious problems being introduced into an established aquarium. A quarantine aquarium can be as simple as a bare aquarium outfitted with a heater and sponge filter. Three to six weeks of quarantine should allow owners to identify any sick tropical fish prior to introducing them into the community aquarium. During quarantine, weekly treatments with formalin (25 mg/L) are reasonable and likely to avert serious illness in many cases.

At the first sign of illness, use a test kit to make sure the values are appropriate for the types of tropical fish you are keeping. Also perform a partial water change, which is an important safety measure. If possible, move any ill fish into an isolation aquarium to more closely observe them and prevent the possible spread of any infectious organisms.

Ich: The Most Common Parasite

By far, the most commonly encountered parasite is the organism responsible for ich. Ich is also known as white spot disease, due to the appearance of fish infected with this organism. It is caused by the ciliated one-celled protozoan *Ichthyophthirius multifiliis*.

Often, ich shows up as small white spots on a fish's skin, fins and gills. Each spot is caused by a parasite that lies just beneath the fish's transparent skin (the epithelium). The small spots measure up to 1 millimeter in diameter, but with severe infections several parasites may coalesce to form irregular white patches. Heavily parasitized fish will exhibit many white spots, will often scratch against rocks and gravel, and they may show increased gill movements. Fish heavily parasitized with ich may also develop secondary bacterial infections because the slime coat and epithelium are compromised, allowing bacteria in the water to invade the skin. The organisms feed on body fluids and cells, and a thin capsule forms over each parasite while it is under the skin.

Ich can infect virtually all freshwater fish, including both coolwater and tropical species. The life cycle contains both free-living and parasitic stages. Mature parasites, feeding on the host tissues, break through the skin and fall away from the fish, where they form cysts on the floor of the aquarium. This is the reproductive stage, and each cyst can divide many times, eventually producing many hundreds of "swarmers," as they are called during the infective stage. These exit the cysts and swim off to find a fish host. If they do not find a host within several days, they die.

The time necessary to complete the life cycle depends on the water temperature of the aquarium. The higher the water temperature, the faster the life cycle. At 70 degrees Fahrenheit, it takes about three or four days to complete the life cycle, whereas at 50 degrees it may take up to five weeks. At low temperatures, the parasite may become dormant for considerable lengths of time.

There are a number of effective treatments for ich. Because the organism is found beneath the outermost layer of skin, many treatments are actually aimed at controlling the free-living stages. Diagnosis and treatment should be instituted as soon as the problem is discovered, as prompt treatment is imperative in controlling this organism. It can be introduced with fish, live aquatic plants and live fish food, so proper quarantine can often prevent it from contaminating a community aquarium.

Now that we know the basics about parasites and their life cycles, in the next issue, we will describe many of the more commonly diagnosed parasitic diseases. The physical appearance of the parasitized fish may help in diagnosing the specific organism involved, and other methods of testing will be discussed. Treatments for specific parasitic diseases will be presented, although it is still recommended that you seek the help of a qualified veterinarian or aquaculturist. Many commercially available treatments now are more broad spectrum, which means that they can treat many different types of organisms that cause disease. While this may be helpful when a specific diagnosis is not made, medications that treat a number of diseases may mean that the treated fish are given unnecessary medication.

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