

Skin Flukes of Pet Fish

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Acknowledgements

Dr. Glenn L. Hoffman, United States Department Interior's Fish Farming Experimental Station, should be generously thanked for his encouragement of my interest in fish pathology, reviewing the manuscript and mainly for his continued push to discover results and not to give up hope.

Also thanks should be extended to John and Mary Lou Walker, John Stanton, Warren Solomon and Paul Felter for their assistance in gathering the many documented reports needed.

The Everglades Aquarium Society of Miami, Florida, the Tacoma Aquarium Society of Tacoma, Washington, the Mid-South Aquarium Society, Memphis, Tennessee, and the North American Native Fish Association should be recognized for their dedication and assistance in the research of Pet Fish Diseases and the quick reporting to their membership when a crisis arises.

Introduction

Recent outbreaks of skin flukes in pet fish populations has prompted this report. The importance of fish parasites is related directly to the value of the fish that they infect. As our world becomes more and more crowded with people, all our foodstuffs, including fish, will become increasingly more valuable. As a recreational aspect, fish rank at or near the top, both for sport fishing and as a hobby. Observing live fish, both in nature and aquariums, is an enjoyable pastime for young and old.

In natural populations of plants and animals, parasites are often ubiquitous. The parasites are normally in a complex dynamic equilibrium with the freelifing communities. Many fish are the apex of the prey-predator pyramid and therefore tend to be infected by a considerable range of parasites.

The composition of the parasite fauna in nature depends upon the geographical location, season of the year, characteristics of the water (temperature and chemical composition), the type of bottom, and the flora and fauna present in and around the habitat. Thus you can see the parasitocoenosis of the host and the environment is quite complicated; more so than many people realize.

There are different fish parasite groups such as algae, fungi, protozoa, trematodes, cestodes, nematodes, acanthocephalans, gordiaccans, hirudineans, copepods and glochidia. This report will be restricted to the monogenetic trematodes (skin flukes) which are a single host parasite.

Trematoda, General Information

The skin flukes (Trematoda; Monogenea), *Gyrodactylus* and *Tetraonchus* found on guppies and other fish, infect one host only and are hermaphroditic. These parasites do not exhibit alteration of generation or hosts, as some other parasites do. The flukes range in size from 0.05-3.0 mm long and parasitize external areas of the host (Schubert, 1975). They often infest the non-scaled areas, such as the long flowing fins of guppies, bettas and angel fish. They attach themselves by means of acetabuli and hooks and consume fish tissues and fluids.

Monogenetic trematodes can be identified by the dorsoventrally flattened body, lack of true suckers, a mouth that usually opens into a muscular pharynx and the haptor bearing chitinous hooks. The immature flukes are morphologically similar to the adults.

Life Cycle of *Tetraonchus*

The Monogenea develop without intermediate hosts and in this respect their life cycles are relatively simple. They are however, very complex in the adaptation of various stages of their life cycle to the cycle of the host and to the particular set of environmental circumstances. According to the life cycle and the mode of reproduction the Monogenea are divided into two biological groups. One is viviparous, such as *Gyrodactylus*, a small group. The oviparous one containing *Tetraonchus* is a larger group. The oviparous ones can be further subdivided into two groups: those that deposit their eggs into the water to sink to the substrate (such as *Dactylogyrus*, a gill fluke) and *Tetraonchus* which deposits its eggs on the surface of the host's body, gills or the inside of the operculum. The most primitive are those that drop their eggs onto the bottom substrate and have a long period of egg laying. The more modern ones have developed a short life cycle, and they are particularly adapted to the host's life cycle. The reproductive season of the parasite coincides with the stages of the host's life cycle when the greatest chances of success are seen, such as the fry period. The skin flukes are usually more numerous on small fish where they reproduce readily.

Life Cycle of *Gyrodactylus*

The parasite we are most concerned with is the viviparous *Gyrodactylus*, which carries the young alive in their bodies. When the young leave the adult's body they attach to their parent's host, at least temporarily. In this respect many generations of flukes from the original parent can live upon the same host.

Methods of Studying and Preserving Flukes

Many flukes can be obtained for study by gently shaking the fish in 250 ppm formalin for 30 to 45 minutes (Putz and Hoffman, 1963). A wet mount can be made and evaporation allowed to flatten the flukes for study. The trematodes can be killed in hot Bouin's or 10% formalin solution. The whole infested fins or gills can also be preserved in 10% formalin.

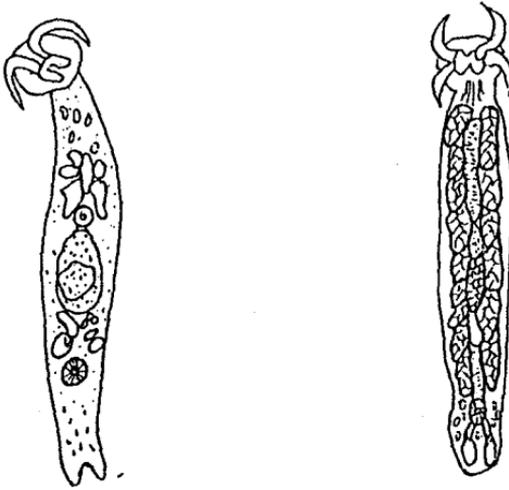


Figure 1. A comparison of the body structures of *Gyrodactylus bullatarudis* and *Tetranonchus monenteron*.

The flukes can be stained Borax Carmine and Semichon's and counter stained with Fast Green. Harris Hematoxylin or Hematin may also be utilized. General body structures can be seen in Figure 1.

The procedures used in the lab were similar to those listed by Hoffman (1967).

Management of Skin Fluke Diseases

The method of Herman (1970) is here modified for our problem.

- 1) Prevention of contact between pathogen and host: This is why we are alerting the people of the fish hobby industry to this problem in order to help prevent further spreading.
- 2) Increase of natural or genetic resistance: No significant work has been done on pet fish in this area of study.
- 3) Immunization: Immunization of fish to bacterial diseases has been accomplished but methods are not yet available for parasite diseases of fishes.
- 4) Manipulation of the environment to favor the host by proper management, periodic water changes, a good varied diet, proper light and temperature. However a person who changes the water frequently can still have a fluke problem, but the water changes keep the parasite population down, so that ragged fins are not as noticeable until mailed out to another person, when parasite populations may build up when the fish's resistance is low.
- 5) Prophylactic use of chemicals to remove the pathogens: The chemical utilized and recommended by the Fish Doctor Laboratory is safe for

most fish to treat skin or gill flukes.

6) Therapy after the disease occurs: The optimum conditions for the host are needed here.

Pattern of Fish Fluke Diagnosis and Treatment

There is a logical pattern to follow to identify and treat a fish parasite disease. Some of the general ideas that apply to human medicine can be utilized in fisheries; such as Koch's postulates. Yet a man trained in human medicine is hardly qualified to speak on fish diseases. Only generalities can be applied.

1) Identify the parasite: The key used was modified from Sproston (1946), Mizelle (1938), Mizelle and Hughes (1938), Hargis (1952) and Hoffman (1967).

2) Obtaining a thorough knowledge of its life history. References as above.

3) Learn the ecological requirements of the parasite, such as host specificity, optimum temperature, pH optimum, nutrition and the other metabolic requirements.

4) Mapping the geographic range of the parasite: This is what the **Fish Doctor Laboratory** is presently engaged in with *Gyrodactylus bullatarudis* and *Tetraonchus monenteron*. Substantiated reports take time to acquire and check out. We all have to work together as hobbyists and it does require funding and time.

5) Study control and treatment methods: The control and treatment measures were completed within a two week period, shorter than normal. When you are the only full time Tropical Fish Laboratory in the U.S. doing research and consulting work and prize fish are dying, you are very time conscious.

Reports of Species of *Tetraonchus*

T. alaskensis — *Oncorhynchus kisutch*, Coho Salmon; Hoffman (1967)

T. alaskensis — *Prosopium w. williamson*; Hoffman (1967)

T. alaskensis — *Salvelinus malma*, dolly; Hoffman (1967)

T. variabilis — *Prosopium cylindraceum quadrilaterale*; Hoffman (1967)

T. variabilis — *Prosopium w. williamson*; Hoffman (1967)

T. borealis — *Salvelinum malma*, dolly; Hoffman (1967)

T. rauschi — *Thymallus arcticus*, arctic grayling; Hoffman (1967)

Reports of *Tetraonchus monenteron* Recently Found on Aquarium Fishes

Notemigonus crysoleucus — golden shiner; Hoffman (1967)

Exos lucius — Northern pike; Wagner (1910), VanCleave & Muller (1934)

Pterophyllum scalare — angel fish; Schaperclaus (1954), Meryman (1976)

Ambisus — glassfish; Schaperclaus (1954)

Betta splendens — fighting fish; Meryman (1976)

Mollienisia splenops — molly; Meryman (1976)

Xiphophorus helleri — sword tail; Meryman (1976)

Tetraodon fluviatilis — green pufferfish; Amlacher (1970), Van Duijn (1973)

Tetraodon dutcutia — pufferfish; Amlacher (1970)

Heniochus acuminatus — pennant coral fish; Amlacher (1970)

Symptoms and Severity from Skin Fluke Infestations

Seriously infested fish will show an opacity of the skin, often with inflamed and reddened areas. Flashing may also occur. Often times hemorrhaging is quite pronounced. Schaperclaus (1954) in similar studies observed opacity of the cornea, followed by blindness.

Following are some important items to be considered:

1) Reichenbach-Klinke (1956) reported the presence of abundant living *Gyrodactylus* on guppies 12 hours after death. Since you may not see a dead fish for 12 hours, the fluke has at least that long to locate a new host. If the dead fish is left in a net, the parasites may crawl off of the dead fish onto the net, ready to be transferred to a new tank. Meryman (1976) has reported living *Gyrodactylus* on fish dead over 24 hours.

2) Even as early as 1924, Plehn reported the external flukes to be the most dangerous enemies of young carp, with hundreds of thousands of fish dying.

3) Turnbull (1956) studied *Gyrodactylus bullatarudis* on guppies and described the life cycle of the parasite from larva to larva producing adult in about 60 hours at 25-27°C. It takes about 2 weeks for a population of one *Gyrodactylus* to build up to 100 producing adults. This indicates that your fish could pick up the parasite at a fish show one month, infect your fish at home, send the fish out again to another show, infecting other persons' fish and still not have it severe enough to cause problems for 2 months.

4) Some new reports of *Tetraonchus* sp. indicate new problems, because it was found on marine fish also. There are 10 documented reports of it in saltwater fish, 2 in freshwater and 5 in aquarium fish.

5) In 1857, Wagener reported the first sighting of this particular fluke in the freshwater northern pike, *Esox lucius*. This may indicate that haphazard dumping of infected fish could infect both saltwater and freshwater sport fish.

6) The parasite's mode of travel is water. It can be passed to other tanks, by fish to fish contact, nets from infested tanks, water on your hands or improper disinfection of infested tanks or equipment.

7) *Gyrodactylus* can be seen in almost all regions of the U.S., yet *Tetraonchus* appears fairly limited. A revision of Manter's (1934) early study of various fish trematodes in the area of Florida was listed by Dogiel (1958). *Tetraonchus* was not listed in this table indicating that the parasite is probably new to the state of Florida and was introduced by interstate shipping of fish.

8) The shipment of freshwater sport fish is minute compared to the tropical fish shipped to shops, shows, and traded with friends. Our problem with parasites cannot be totally based on facts about sport fish hatcheries. Some aquarium fish are constantly exposed to parasites in contaminated tanks, but in large lakes exposure is usually minimal. Skin flukes are usually more numerous on small fish, especially in aquariums, where they reproduce readily.

9) The fluke infestation appears symptomatically similar to bacterial fin rot in freshwater fish and oodinirosis in saltwater fish. This indicates if hobbyists are unaware of a fluke problem they may be treating a disease that is not present and will continue to lose fish.

10) Since *Tetraonchus* is also found in saltwater, mere washing of tanks with a brine solution will have little effect upon these flukes. Even a 15 minute dip in 5% solution will only kill 30% of any flukes present on a host.

Present Research by the Fish Doctor Laboratory on the Fluke Problem

1) We have warned the hobbyists through the media used by the pet fish clubs.

2) We have provided a successful treatment for the flukes.

3) Various research laboratories covering the United States have been alerted to the problem and are assisting. I would appreciate any information on new cases of these two fluke infestations.

4) Dr. Glenn L. Hoffman, nationally noted fish parasitologist, concurred with the author's findings on the *Gyrodactylus* species of guppies. ‡

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