# "LIGULA" — A FRESHWATER PARASITIC TAPEWORM

By: George Barnes

Recently, while discussing natives with several fellow hobbyist, one of them gave me a dozen small specimens of Notropus hudsonus (Spottail Shiner) which he had collected while on a fishing trip in upstate Pennsylvania. Upom looking at these fish in the tank I noticed quite a few that were listless near the surface and rather thin.

I collected several of these specimens and upon dissecting them (I majored in Biology in college and taught the subject for two years) found a large worm wrapped around the internal organs. Once this worm was found, an old bug bit me again and I proceded to dig out the microscope and reams of reference literature. After a careful microscopical examination I found this tapeworm to be a member of the class Cestode. The class Cestode is the main group of fish tapeworms. They are usually found in the muscle tissue, body cavity, and intestinal tract of fishes.

This particular tapeworm belongs to the genus Ligula and is found mostly in smaller fishes such as suckers and shiners, however, they can also be found in some larger types of lake fish. The life cycle of Ligula is really simple, the egg (Fig. A) is deposited in the waste of its final host, The American Merganser.[1] The egg releases a ciliated larva called Coracidium, (Fig. B) this is eaten by a copepod[2] mainly Diaptomus (Fig. C), where it futher developes until the copepod is eaten by the fish (Fig. D). Here the Ligula developes into the larval (worm) form. The fish is then eaten by the final host, Merganser (Fig. E), where it developes into the adult worm, reproduces and shortly thereafter dies. Thus, the entire life cycle is completed and begins once more.

The larval form which is found in fish can be responsible for several problems. It can cause the degeneration of the specimens internal organs due to crowding. On occassion they can grow to such an extent that they can cause bursting of the abdominal wall thus killing the fish. In all five of the specimens I dissected I found only one Ligula per fish, however by reading the reference material I discovered that reports have shown several Ligula to occupy the body cavity of a specimen at one time.

Surprisingly, Ligula will attain lengths of 8 to 10 inches in 3 to 4 inch fish and will weigh an unbelievable 10 to 15 % of the fishes total weight. They are known to infect up to 80% of a fish population in areas where they are present. Usually this area has a high population of 3 to 4 year old fish. This age seems to be the most susceptible host for Ligula.

Generally speaking, Ligula are harmless to fish. However, this largely depends on the rate of infection and the presence of the final host. Many aquarist who are also fisherman may be concerned about Ligula's presence in such food fish as Catostomus commersomi (white sucker) and Cyprinus carpia (Carp). Fortunately, like most freshwater fish parasites, Ligula is harmless to human beings.

In the aquarium little can be done for specimens infected by Ligula. Usually the hobbyist will be totally unaware of the disease if his fish are in truth suffering from it. But, if by chance, you should have some specimens who show the aforementioned symptoms and you can not satisfactorilly identify the cause, you might try treating for Ligula. While the treatment I'm about to offer has only been attempted once (with the remaining Spottail Shiners) it was somewhat effective. Isolate the infected

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fishes in a seperate tank and equip the tank with an outside power filter or strong airation. Add twice the recommended dosage of any of the commercially available parasite medications (I used Maracyde) and continue this dosage pattern for 4 to 6 days, repeating the dosage when and if necessary. At this point (5 days) my specimens appeared normal and very active. I removed one for dissection and discovered the Ligula to be dead and already partly expelled from the fishes system. Based on this disection I changed ½ of the hospital tank water and replaced it with fresh water. One fact which may be of interest, of twelve specimens, nine showed the inital distress. Of these nine, five were used for the first disection and a sixth was used for the final disection. The remainding three shiners were eventually returned to the minnow community tank with the others(shiners) as well as with several mixed types of minnows. To date these three "cured" specimens are still very much alive in my tanks.

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Notes:

1. The American Merganser is the waterfowl which most often acts as the final host to Ligula in the state of Pennsylvania. Any type of waterfowl can act as the final host to Ligula providing they are eating infecting fishes.
2. Copepod:- are crustaceans which occur in countless millions. While Diaptomus is a very common copepod, most aquarist are probably most familiar with another, the Cyclops.

Reference Sources:

1. Brown, M.E. (Ed.) (1957), The Physiology of Fishes, 2 vols. New York: Academic Press.

2. Buchsbaum, R. (1961) 10th edition. Animals Without Backbones. Chicago: The University of Chicago Press.

3. Mayr, E. (1953). Pathological Studies of North American Fishes. New york and London: McGraw-Hill.

4. Schrenheisen, R. (1938). Field Book of the Freshwater Fishes of North America. New York: Putnam.

5. Schultz, L.P. & Stern, E.M. (1948). The Ways of Fishes, New York: Van Nostrand.

6. Sindermann, C.(Dr.) (1969). Parasitology of Fishes, translated from the Russian. New Jersey: T.F.H. Publications, Inc.

7. ReichenbachKlinke, Dr. & Elham, Dr. (1972). Diseases of Fishes, New York,& New Jersey: T.F.H. Publications,Inc.