Relevant Literature

Anderson, K., H. L. Ching, and R. Vik. 1987. A review of freshwater species of Diphyllobothrium with redescriptions and the distribution of D. dentdriticum (Nitzsch, 1824) and D. ditremum (Creplin, 1825) from North America. Canadian Journal of Zoology 65: 2216-2228.

Hoffman, G. L. 1998. Parasites of North American Freshwater Fishes. 2nd Edition. Cornell University Press 339 pp.

Mitchum, D. L. 1995. Parasites of Fishes in Wyoming. Whoming Game and Fish Department. 304 pp.

The Special Publication Series is a joint project between the Fish Parasite Laboratory at SMU and the Nova Scotia Department of Fisheries and Aquaculture aimed at providing scientific information about parasites to fishers.

We welcome any queries about fish parasites found by anglers and fishers.

Saint Mary's University
Department of Biology
923 Robie Street
Halifax, Nova Scotia
B3H 3C3

Phone: 902-420-5644
Fax: 902-4918620
E-mail: david.cone@smu.ca

Parasites of Trout In Nova Scotia

"Diphyllobothriasis of Trout"

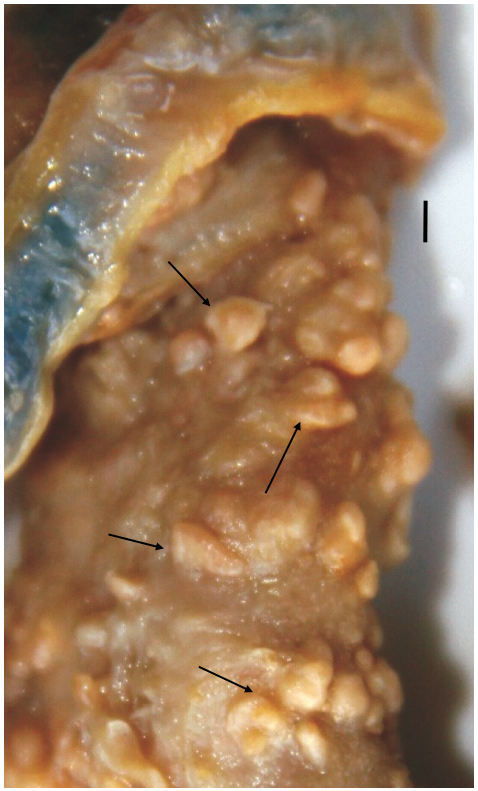
Special Publication No. 3. 2012
Fish Parasitology Laboratory
Saint Mary's University

SAINT MARY'S UNIVERSITY SINCE 1802
One University. One World. Yours.

NOVA SCOTIA

"Diphyllobothriasis"

This disease is found in brook trout and other salminids in certain freshwaters of Nova Scotia, with the overall distribution covering much of North America and northern Eurasia. It is caused by the tissue reaction to a larval cestode parasite (called *Diphyllobothrium)*, and typically appears as small (1mm) granulomas or nodules scattered on the surface of viscera, particularly tissues of the stomach and upper intestine. It is generally of little concern to adult fish but the health of young fish may be affected.



Arrows are pointing to several plerocercoids encapsulated in the trout stomach wall. Scale bar = 3 mm.

Parasite Life Cycle

Adult parasites live in the intestine of fish eating birds and sometimes fish eating mammals, where they feed and reproduce. They lay eggs that are released into water via feces. These egg hatch and a free-swimming larva is eaten by a copepod (plankton) where it develops into an form infective to fish. If a fish eats an infected copepod the parasite emerges in the stomach, penetrates the stomach wall and migrates onto internal organs throughout the fish. Some end up in the flesh and can be seem as small "worms". This stage, and what we see in trout when we clean them, is the plerocercoid stage. When infected fish are eaten by the bird definitive host the parasite matures into an adult, reproduces and lays eggs to start the cycle over.

Taxonomy

If you gently cut open the contents of a nodule (see Figure opposite) with a knife and squeeze out the cyst content you should see what looks like a small piece of noodle, which slithers slightly. This is the plerocercoid, made up of the beginnings of an anterior attachment organ called a scolex and primordial segments containing future sex organs behind it.

Two different species of this parasite appear to infect the internal organs of trout, one called *D. ditremum* (Creplin), the other *D. dendriticum* (Nitzsch), with experts differentiating them on morphology and genetics. *D. ditremum* is generally described as being on trout gut organs, and, as adults, in the intestine of loons, mergansers and cormorants. On the other hand, *D. dendriticum* is reported frequently in trout flesh and, as an adult, reported from the gut of a wide variety of birds and mammals.

Parasite Ecology

Noticeably infected fish have been reported from specific sites in the province, particularly lakes with bird rookeries nearby. In some cases, high levels of infected copepods have resulted in closures of trout farms. Fish get infected when they consume these infected copepods. Hatcheries sometimes have to switch to ground water during certain peak times of the year to avoid infections coming in from the river.

Young trout that acquire this parasite are reported to grow slower than non-infected fish under the same conditions. If young fish end up carrying heavy numbers of nodules the infection can likely kill them.

Reports on whether humans can obtain infections are rare, but nevertheless there. Most people cook the fish and this process will kill the parasites. If the infection is severe with many cysts distributed throughout the gut organs and muscle, most people discard the fish simply because of the esthetics.

It is certainly advisable to not eat heavily infected flesh and to not give infected raw guts to cats or dogs. It is possible that the parasite may infect these hosts.

It will be interesting to hear from anglers on where they might have encountered the parasite.

The Fish Parasitology Laboratory at Saint Mary's University is interested in hearing from you about fish parasites that you find. Just contact David Cone at the following email address: david.cone@smu.ca.