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Fish Tapeworm and Human Health

The broad fish tapeworm (*Diphyllobothrium latum*) has been reported in parts of Europe, Asia, Australia, and North and South America. It is of particular public health importance in Finland and the Soviet Union.

Infection with the broad fish tapeworm in North America was first observed in a Swedish immigrant in 1879. The primary introduction of *D. latum* into the waters of North America was most likely made by settlers from the endemic areas of Europe. Many of these immigrants, particularly Scandinavian, have settled in the lake regions of North America.

In the United States, endemic centers are known to exist in the northern portion of Minnesota, the Portage Lake region of Michigan, and the vicinity of Winnipeg, Canada. Alaskan natives also have been infected with the broad fish tapeworm.

Source of Human Infection

In North America the following species generally are considered to be the intermediate host and source of infection (*D. latum*) for man: great northern pike, walleyed pike, sand pike, burbot, and yellow perch.

Man is infected by ingesting raw or insufficiently cooked freshwater fish that contain the parasite. The cultural groups that traditionally eat roe or freshwater fish raw, lightly salted, or pickled without cooking are found to have high infection rates.

For example, in October 1980, 14 people from two apparently unrelated groups of Minnesotans were diagnosed as having *D. latum* infestations. Both groups had been fishing in separate lakes in Canada last spring, one in May and one in June. Both groups had used freshly caught northern pike or walleyed pike to prepare seiche, a cold fish dish in which the raw fish is marinated in lemon juice 24-48 hours. Members of both groups were asymptomatic but were diagnosed when a group member passed what was first thought to be a string. A species diagnosis of *D. latum* was confirmed and members of both groups received treatment.

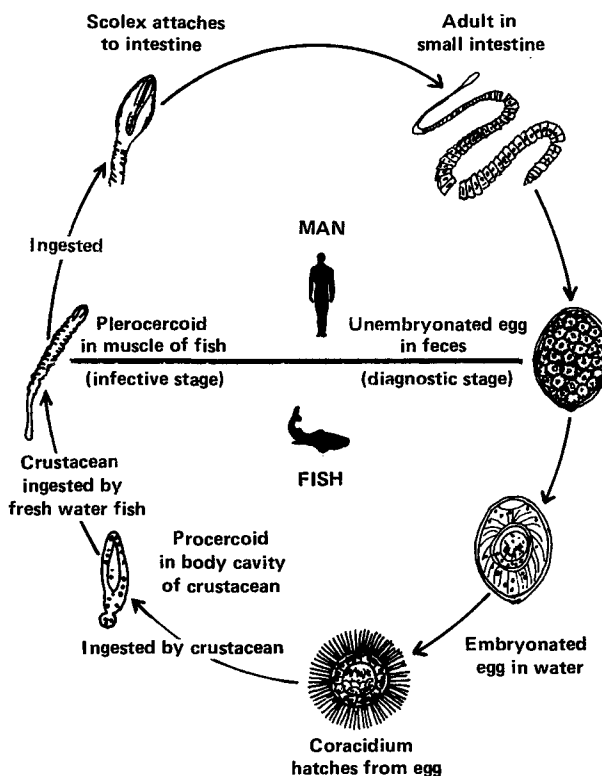
D. latum can be the longest tapeworm in man and grow to 30 feet in length. In untreated cases the tapeworm may persist for as long as 25 years.

Tapeworm Life Cycle

D. latum has the most complicated life cycle of the tapeworm infections acquired from the consumption of animal flesh. The individual proglottids (segments of the adult worm) are contained within the small intestines of man and other mammals. Eggs formed within the proglottids are released through a uterine pore and pass out of the body with feces. The mature adult worm may produce more than one million eggs per day.

The life cycle continues when the embryos are eaten by small aquatic crustaceans (copepods). The larva develops into a proceroid within the copepod.

When infected copepods are eaten by fish, the larvae develop into plerocercoids (infective stage). When smaller fish are eaten by larger carnivorous species, the plerocercoid makes its way into the muscles where it remains as an unencysted glistening white worm. When fish (northern pike, walleyed pike, sand pike, burbot, and yellow perch) are consumed by man and other mammals, the plerocercoid develops into the adult tapeworm in the mammalian intestine and the life cycle is completed.



Life cycle of *Diphyllobothrium latum*.

Human Symptoms

The time required for the ingested plerocercoid to develop into a mature adult tapeworm in the human intestine is 3-6 weeks.



Most carriers of the tapeworm experience very little discomfort or have symptoms such as dizziness, fatigue, and constipation alternating with diarrhea. Hunger and a "craving for salt" also have been associated with infection.

A severe form of broad fish tapeworm infection occurs in a small percentage of those infected wherein a "tapeworm anemia" similar to pernicious anemia is demonstrated. Three cases of human tapeworm anemia have been identified in the United States.

Tapeworm anemia is attributed to the competition between the adult tapeworm and the human host for vitamin B₁₂. Concurrent expulsion of the adult tapeworm and injections of B₁₂ will result in dramatic remission of the anemic state. If you suspect you have a tapeworm infection, you should contact your physician.

Prevention of Infection

Pike, pickerel, or other *D. latum* intermediate host fish species may be examined for the infective stage plerocercoids. However, even in the case of thin fish fillets, the plerocercoid(s) easily may be missed.

The plerocercoids are destroyed readily either by cooking or by freezing. As a protective measure for those who prefer raw marinated or pickled fish, the fish (weighing less than 11 pounds) should be frozen at 0°F for 48 hours before eating or preparation. Plerocercoids are destroyed when heated at 140°F for 5 minutes.

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