WHIRLING DISEASE

COMMON NAME: Whirling Disease
Named for its effect on infected fishes, which swim in radical circular motions.

SCIENTIFIC NAME: *Myxobolus cerebralis*
The parasite that causes whirling disease is of the family Myxosomatidae.

DISTRIBUTION: Whirling disease is native to the Eurasian continent. However, through fish transfers whirling disease is currently found in 22 states: Alabama, California, Colorado, Connecticut, Idaho, Maryland, Massachusetts, Michigan, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oregon, Pennsylvania, Utah, Virginia, Washington, West Virginia and Wyoming. It is also in several European countries, South Africa, and in New Zealand.

Distribution map borrowed from www.protectyourwaters.net

DESCRIPTION: Whirling disease is a chronic disease that can cause high morality among young, hatchery-raised fish. The common name is the descriptive side effect that highlights the interaction of a parasite and a segmented worm (*Tubifex tubifex)* that infects coldwater game fish, specifically salmon and trout. The parasite comes in contact

with the host fish and multiplies rapidly. It then penetrates the cartilage causing spinal deformities and erratic swim patterns. This makes feeding and avoiding predators difficult resulting in high mortality. Some fish can survive until the cartilage hardens and live a normal life span, however they will show the effects of the parasite through skeletal deformations. Reproduction is not affected by whirling disease and the parasite is not passed to the offspring.

LIFE CYCLE BIOLOGY:

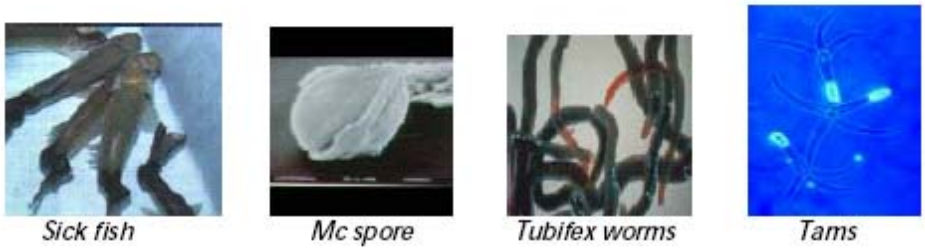
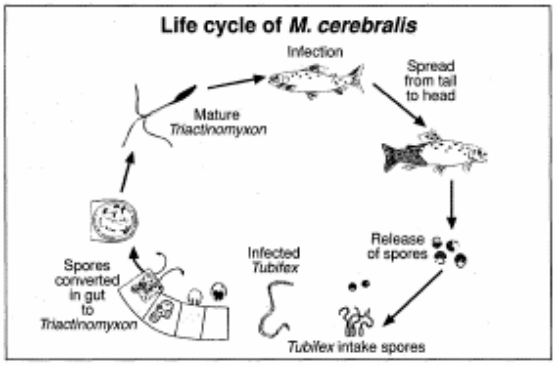


Image borrowed from http://www.whirling-disease.org/

The parasite alternates between two hosts, a species of segmented worm (*Tubifex tubifex)* and salmonid fishes. Myxospores are released into the sediment by infected, decomposing fish carcasses, or from feces of predators who have consumed infected fish. These spores can survive in the sediment for up to 30 years. The myxospores are then eaten by the tubifex worms and attach to the gut lining, converting the spores into an infectious form, *Triatinomyxon* (TAM). The tubifex worm which resist infection by the parasite, releases the TAMs two to four months later. TAMs then come in contact with the fish attaching and penetrating through the muscous cell openings on the epidermis, gills, or buccal cavity. Reproducing on the skin of the fish, the parasite then moves to the central nervous tissue and surrounding cartilage. Devouring the cartilage and eventually forming myxospores in the cartilage, the symptoms of spinal deformities and erratic circular swimming appear. The inability to feed effectively, due to poor swimming performance, causes many of the young to die. Symptomatic fish are easy prey due to their inability to avoid predators. The deceased carcasses or waste from predators decompose, depositing the myxospores in the sediment, which starts the cycle again.



Circle of death. The whirling disease parasite *M. cerebralis* passes from rainbow trout to mud to worms and back again into the trout.

*Life cycle of M. cerebralis diagram borrowed from "Fishing for Answers" by Carol Potera, 1997.

PATHWAYS/HISTORY: Whirling disease was first described in Europe in 1898 in farmed rainbow trout, and then classified in 1903. With the transportation of fish, the parasite was introduced into the United States in 1950. Wherein Indiana is concerned, the nearest infestation and potential pathways are Michigan and Ohio by means of fish transfers and mud on the waders of anglers.

DISPERSAL/SPREAD: Transfer, by means of stocking or natural movement, of infected fish or infected Tubifex worms. Sediment transport when it contains the spores of the parasite is another method of spread of the disease.

RISKS/IMPACTS: Though whirling disease does not affect humans, all species of salmonid are susceptible to whirling disease and the disturbing impacts it has on fish populations. When an infected fish dies, thousands of the parasite spores are released to the water. These parasitic spores are virtually indestructible -- they can withstand freezing and desiccation, and can survive in a body of water for 20 to 30 years. The parasite is sure to continue to spread to drainages now clean, since it is so easily and unknowingly transported by animals, birds and humans.

MANAGEMENT/PREVENTION: There is no known treatment to counteract the effects of whirling disease on infected organisms. However, fish hatcheries have begun to install prevention measures such as using pond designs which reduce potential habitat for tubifex worms and/or using well water to prevent exposure.

Indiana has strategies in place to reduce the likelihood that fish infected with whirling disease will be sold or released in the state. Hatcheries intending to import trout and salmon into Indiana must provide documentation showing the parental broodstock have been free of whirling disease and a number of other diseases or pathogens for at least 3 years. Fish health inspections must be performed by an American Fisheries Society Fish Health Inspector, Fish Pathologist, Doctor of Veterinary Medicine, or other individuals as approved by the Indiana Department of Natural Resources. Those conducting the tests must follow specified procedures.

Like all invasive species, the key to preventing their spread is knowledge! You can reduce the likelihood of spreading whirling disease by practicing a few simple techniques.

- ✓ Dispose of unused bait in the trash or on land rather than in the water.
- ✓ Never transfer live fish from one body of water to another.
- ✓ Do not use whitefish, trout, salmon parts or mollusks as cut bait.
- ✓ Never discard fish entrails or skeletal parts in a body of water.

- ✓ Rinse any mud and/or debris from equipment and wading gear and drain any water from boats before leaving drainage areas.

REFERENCES:

Myxobolus cerebralis: The causative agent of whirling disease in salmonid fish. Topics in Ecology. http://is2.dal.ca/~emelrose/zmelrose/xecol/melroset.html and references.

Potera, Carol. Fishing for Answers to Whirling Disease. 10 October 1997. Science 278:5336.225. 1p.

Soliman, H., Geissler, K., El-Matbouli, M. SDS-PAGE and Western blot analysis of triactinomyxon spores of Myxobolus cerebralis, the cause of whirling disease in salmonid fish. 2003. Journal of Fish Disease. 26, 621-625.

Support the Whirling Disease Foundation at: *http://www.whirling-disease.org/*

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