



Whirling Disease

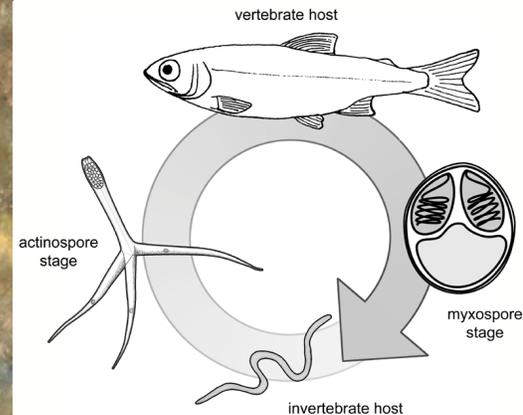
syn. *Myxobolus cerebralis* (Hofer, 1903) *Chondrophagus* (Hofer) *Myxosoma cerebralis* (Kudo)
Lentospora cerebralis (Plehn) *Tractinmyxon gyrosalmo* (Wolf and Markiw)

ALBERTA REGULATION:
FISHERIES ACT

Last Updated: February 2018



Black Tails



Generic Lifecycle

Overview:

Whirling disease is caused by a small microscopic parasite (8-9 um) whose lifecycle requires two hosts to complete its life cycle – a worm and a salmonid fish – as well, they can be released when infected fish decay. The parasite is ingested by the freshwater worm, *Tubifex tubifex* (sludge worms) where triactinmyxon (TAM) spores develop within the worm gut, and eventually release mature TAM spores with fecal matter.² Spores become buoyant, floating around 1-15 days in the water until they come in close proximity with a susceptible fish species.² *M. cerebralis* affects the nervous system of salmonid fish, including trout, salmon, and whitefish and damages the cartilage, the organs of equilibrium, the lesions in the gills, the skull, and the vertebrae of susceptible fish² This disease may cause the fish to abnormally whirl around in a tail-chasing behavior and/or display a characteristic blackened tail and skeletal deformities of the spine or skull,⁴ sometimes resulting in death.² The microscopic whirling disease

spores are hardy and have been shown to survive freezing temperatures up to -20°C,² desiccation and live up to 30 years.

M. cerebralis is believed to have originated in Europe and was introduced to North America by stocking of infected fish. It was then detected in the United States in the 1950s, currently it is unclear how it was introduced into Canada.⁵ Whirling disease is a reportable disease in Canada and any suspected infections must be reported to the Canadian Food Inspection Agency (CFIA).³ Positive diagnosis requires laboratory testing.³ CFIA first confirmed the presence of whirling disease in Johnson Lake in Banff National Park in 2016.⁵ The disease has also established in the Bow River just downstream from the confluence of the Bow and Cascade rivers, as well as the Oldman River and Red Deer River watersheds.⁵

Canadian fish species in the natural environment which are susceptible; trout (cutthroat, rainbow, brown, bull, and brook), salmon (coho, sockeye, chinook,

and Atlantic), and mountain whitefish.³ Not all infected fish will show signs of the disease but will be a carrier of the disease. Also, the impacts of whirling disease will differ between species as well as between waterbodies. The severity of whirling disease depends largely on the age and size of the infected host, where young fish are most vulnerable with mortality rates up to 90%.³

While salmonid eggs cannot transmit the disease, transport of eggs in contaminated water can.¹ Fish-eating wildlife which consume infected fish can spread the disease via their excrement.¹

A Ministerial Order applies to all salmonid commercial fish culture operations in Alberta until December 31, 2016. <http://aep.alberta.ca/fish-wildlife/wildlife-diseases/whirling-disease/documents/MinisterialOrder-52-2016-Sep06-2016.pdf>



Whirling Disease (continued)

Identification:

The presence of whirling disease in susceptible fish is noted through abnormal swimming in a whirl or tail-chasing behavior and/or through a blackened tail; this is characteristic of infected fish.³ Fish may also display skeletal deformities of the spine or skull⁴ shortening of the lower jaw, or an sunken or sloped head.⁵

Ecology:

M. cerebralis has two physically distinct spore stages - a myxospore, which infects the alternate host (*T. tubifex* worms) and a triactinomyxon (TAM) spore, which is released from the worm and disperses to complete its life cycle by infecting susceptible fish species. Both spores bear a filament for attachment to the hosts.¹ The spores are microscopic, oval, frequently asymmetrical, with 5-6 irregular coils in the filament.² Reproduction within the worm host is both sexual and asexual and requires about 3 months in the worm intestine before being released into the water. The new TAM spores must infect a fish within 1-15 days.² *M. cerebralis* then moves into the nervous system, reproduces asexually, eventually moving into the cartilage. Development of myxospores in the fish takes about 3 months. Once an infected fish dies its decaying carcass will release myxospores into the lake sediment where they infect feeding *T. tubifex* worms and the life cycle begins again.² An infected fish consumed by a larger fish will infect the consumer.²

Economic Impacts:

Fish culture operations will face economic losses from fish mortalities, reduced fitness, disinfection and renovation of facilities for prevention, and reductions of available fish for sale and stocking.¹ Economic impacts will also include recreational fishing and tourism from losses incurred by wild fisheries.¹ In Europe, changes in

hatchery practices have minimized losses from whirling disease outbreaks but the transition was costly.¹

Environmental Impacts:

Changes in composition of trout populations will likely occur, impacting genetic resources of native trout species. Whirling disease also presents a threat to endangered fish species affected by the disease.¹

Sociological Impacts:

Loss of the intrinsic value of natural and vulnerable trout populations. Whirling disease is not a risk to human health,⁴ but can significantly impact juvenile finfish populations.³

Prevention:

M. cerebralis can be spread by infected fish, alive or dead, or parts of infected fish (bait, guts), infected *T. tubifex* worms, contaminated water, mud, or any equipment that contacts infected waters - infected meaning containing live *M. cerebralis* spores. Do not release fish or dump aquariums into natural water bodies and do not flush your pets as fish, alive or dead, could have diseases. All watercrafts and equipment that has come in contact with infected waters must be cleaned, drained, and dried of all mud and vegetation, as well as removal of any standing water by pulling out the drain plug (it is illegal in Alberta to transport watercrafts with the plug still in place) on dry land.⁴ Dispose of fish guts and other refuse parts in landfill-bound garbage.

As per the Canadian Food Inspection Agency: "Whirling disease is a federally reportable disease. This means that anyone who owns or works with aquatic animals, who knows of or suspects whirling disease in the animals that they own or work with, is required by law to notify the CFIA."³

Control:

Currently, there is no available treatment for whirling disease, thus, prevention of spread is the only known control method for whirling disease in finfish populations.² If you suspect a finfish may have whirling disease, please report it.

Sanitation - Any gear (footwear, hip waders, life jackets, kayaks, ores, fishing equipment, etc.) that came in contact with infested waters or fish must be washed, disinfected, and dried.³ The movement of fish, fish parts, mud, sediment, and water can spread whirling disease. Myxospores can be killed by freezing at -20°C for 7 days, by drying at high temperatures¹ or by washing with hot water of at least 90°C.⁴ If hot water is not available, spray equipment with high-pressure water; do not use a car wash or clean your boat and equipment near storm drains, ditches or waterways.⁴ Drying equipment is essential; allow for a minimum of 24 hours of drying time prior to entering new waters.⁴ Dogs should also be cleaned, they can be washed with warm water and brushed thoroughly.⁴

Chemical - Treatment of intake water in hatcheries can prevent the disease,² but currently, there are no chemical treatment options for natural bodies of water.

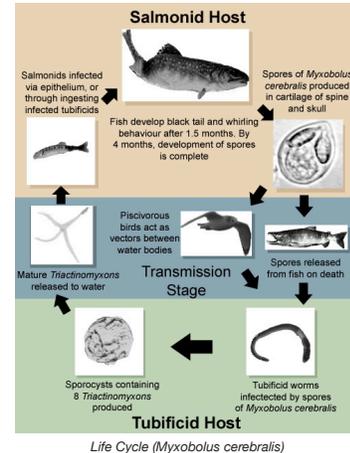
Biological - Management of *T. tubifex* populations in hatcheries can serve as a biocontrol of *M. cerebralis* by preventing sediment accumulation.²



Whirling Disease *(continued)*



Deformities



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3. Whirling Disease - Fact Sheet. Canadian Food Inspection Agency. <http://www.inspection.gc.ca/animals/aquatic-animals/diseases/reportable/whirling-disease/fact-sheet/eng/1336686597267/1336686806593> Accessed: February 8, 2018.
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