



WHIRLING DISEASE

Other names: *Myxobolus cerebralis*, Black Tail Disease



CAUSE

Whirling disease is a disease caused by the parasitic myxosporean *Myxobolus cerebralis*. Myxozoa are microscopic aquatic parasites that belong to the phylum Cnidaria, meaning they are related to jellyfish, box jellyfish, anemones, hydra, and corals.

SIGNIFICANCE

Myxobolus cerebralis commonly infects salmonid fishes as its final host. These fish are typically of socioeconomic importance due to the large commercial and sport fisheries based on these species, the ancillary businesses supporting these fisheries (e.g. outfitters, guides, tourism, etc.), and the aquaculture businesses that produce salmonids. Whirling disease does not affect all salmonid species, populations, or age classes equally. Young fish are generally more susceptible to the disease and it can potentially cause up to 90% mortality in these fish. The first case of whirling disease was identified in Canada by CWHC-BC when Parks Canada employees submitted brook trout exhibiting symptoms of the disease that had been collected from Johnson Lake in Banff National Park, Alberta. The disease has since been confirmed in the Bow, Oldman, and Red Deer river watersheds.

TRANSMISSION

Whirling disease follows a complex life cycle requiring multiple hosts to complete. Spores of *Myxobolus* reside in the aquatic substrate where they are ingested by and infect the digestive tract of aquatic *Tubifex* worms. These spores develop into sporocysts within the worms. Each sporocyst produces eight Triactinomyxons (TAMs) that are then shed from the worms into surrounding waters. TAMs are the free swimming stage of the parasite, which attach to the skin or gills of a fish then infect the fish with the smaller sporoplasm stage of their life cycle. Conversely, fish may also be infected directly by consuming infected worms. Once infected, sporoplasms invade the cartilage of the fish upon which they feed and where they subsequently multiply and develop into spores. Infection of the cartilage is the reason why whirling disease is more harmful to young fish, because the skeleton of these fish have not yet ossified to bone and thus contain far more cartilage for the parasites to exploit. Spores are subsequently released back into the environment through the gills and in feces from live fish. Spores may also be released from the decaying corpses of dead fish, or may be shed in the feces of birds that have eaten infected fish. *Myxobolus* can be transported among water bodies by birds shedding spores in their feces after consuming infected fish. Humans can transport the parasites to novel water bodies by introducing infected worms and/or fish, often used as bait. *Myxobolus* can also be introduced by transporting contaminated water, sediment, and/or

equipment from one water body to another. The spores of the parasite are highly resilient and may remain viable within sediments for more than 20 years.

CLINICAL SIGNS

Once the parasites have invaded the cartilage of the fish they consume its contents, which can result in deformities in the jaws, head, gill cover, body, and/or tail. Parasites also impair nervous tissue resulting in the characteristic whirling swimming behaviour. *Myxobolus* may also cause the tails of infected fish to turn black.

RISK TO HUMAN AND DOMESTIC ANIMAL HEALTH

Myxobolus cerebralis does not pose a risk to mammalian health, including humans. However, salmonids raised in captivity for aquaculture or other purposes are at risk of infection if fish are exposed to food, water, or equipment.

MANAGEMENT AND PREVENTION

There are currently no known treatments for whirling disease. Additionally, the resilience of spores in sediment makes clearing parasites from infected water bodies extremely difficult. Preventing the introduction of parasites to new water bodies and reducing infection of healthy fish populations is currently the best option for managing the disease:

- Refrain from using fish or *Tubifex* worms as bait.
- Do not transport water, sediment, and/or fish (live, dead, or body parts) among water bodies.
- Thoroughly clean, drain, and dry watercraft, trailers, and equipment before moving between water bodies.
- Report any sick or dead fish to the Canadian Wildlife Health Cooperative. Find your closest regional centre at: <http://www.cwhc-rcsf.ca/>

SUGGESTED READING

- [Government of Alberta Whirling Disease Fact Sheet](#)
- [Government of Alberta Prevention Fact Sheet](#)
- [CWHC Whirling Disease Blog Article](#)
- [North Central Regional Aquaculture Center at Iowa State University: What is Whirling Disease?](#)



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