

Whirling Disease (WD) Activities for the OISC Invasive Species Calendar

1. Crucial Cartilage

Whirling disease destroys cartilage in fish. What is cartilage? Imagine what life would be like for people or a fish if they had a disease that damaged their cartilage?

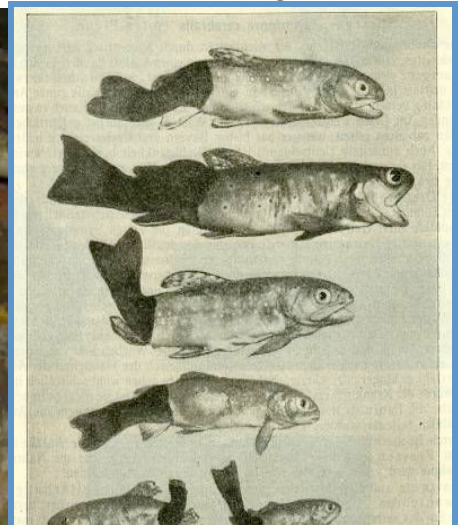
2. Tales Tails Tell. You're fish doctor!

Assume that you are fish doctor (pathologist or vet).

2a. What can we learn about whirling disease by observing the effects on fish based on the photos below.

2b. How would you describe the physical symptoms of Whirling Disease (WD) on fish?

2c. Based on the photos can you hypothesize why this is called whirling disease?



3. Debating the Disease

Watch a video on WD and see and discuss different viewpoints on WD.

<http://revver.com/video/307759/black-tale-the-whirling-disease-invaders/> It is also on Terra: <http://www.lifeonterra.com/episode.php?id=14>

Another good site for quick information is:

http://www.protectyourwaters.net/hitchhikers/others_whirling_disease.p

4. Research Project: Where are the Worms?

Whirling disease requires two hosts to complete its life cycle and become a disease. One host is the tubifex worm and the other host is Salmonid fish, including trout, salmon and steelhead.

Pretend you are a scientist researching habitats more likely to support WD . You decide to approach this question by studying what kind of environment Tubifex worms prefer both in the lab and in the field. Use the following three suggestions to guide your research:

A) Do an experiment in your classroom. Set up a small aquarium with sand/silt on one side and coarse gravel on the other. Buy some tubifex worms and place them in the aquarium. Check the aquarium the next day. Which substrate became home for the majority of the worms?

B) In the field. Use a shovel/kick net to collect substrate from a pond, slow moving reach of stream, a pool and fast section of the stream. Which setting do you find more worms?

C) Share the results of your research with your classroom by summarizing data in a chart or by illustrating your observations. We also want to know what you found! Share your results with Oregon Scientists by emailing them to tania.siemens@oregonstate.edu. With your permission we will post your project on the Oregon Sea Grant website (<http://seagrant.oregonstate.edu/themes/invasives/index.html>)

Note, do not dump the worms from the aquarium or the water into the wild. Tubifex worms may carry WD that can infect fish. Dispose of the water through your schools sink and Treat aquarium with a with a 10% bleach solution for 10 minutes. Rinse the aquarium with clean water to remove the bleach.

Follow up questions

1. Research has shown that conditions in Fish Hatcheries provide optimal habitat for tubifex worms. Do student results support this observation?

2. Given your results, what habitats in Oregon are likely to support Whirling disease?

Answer Key and Resources for Teachers:

1. Crucial Cartilage

Cartilage is a type of connective tissue in the body that provides structure and support to the body's other tissues without being as hard or as rigid as a bone. Cartilage is made of cells called chondrocytes and is strengthened with fibers of collagen and sometime elastin depending on the type of cartilage.

Its mechanical properties are intermediate between bone and dense connective tissue like tendon. Cartilage serves to provide structure and support to the body's other tissues without being as hard or rigid as bone. It can also provide a cushioning or lubricating effect in joints. Some of the bodily structures that include cartilage are the ears, nose, ribcage, and intervertebral discs.

Unlike other connective tissues, cartilage does not contain blood vessels. The chondrocytes are fed by diffusion, helped by the pumping action generated by compression of the articular cartilage or flexion of the elastic cartilage. Thus, compared to other connective tissues, cartilage grows and repairs more slowly.

There are three different types: hyaline cartilage, elastic cartilage, and fibrocartilage. Hyaline cartilage makes up the majority of the body's cartilage. It lines the bones in joints, helping them to articulate smoothly.

Elastic cartilage is more flexible than the other types of cartilage because of the elastin fibers it contains. This type of cartilage is found in the outer ear and the larynx. It provides the perfect balance of structure and flexibility and helps keep tubular structures open.

Fibrocartilage is the strongest and most rigid type of cartilage. Fibrocartilage makes up the intervertebral discs, connects tendons and ligaments to bones, and appears in other high-stress areas.

Without cartilage you would lose your ability to move freely or support your own weight. Important structures that depend on cartilage (like your ear canal) would collapse. Ouch! Did you know that sharks do not have any bone? 100% of their structural tissue is cartilage. Imagine what would happen to a shark if it were susceptible to Whirling Disease!

2. Tales Tails Tell. You're a fish doctor!

Fish have a curve body, black tails and a shortened head and spine. The backbone is contorted, the tail is folded backwards. Deformities are caused by loss of cartilage. Black tails are caused by loss of pigment cell control as a result of pressure on the caudal nerves. The Tail-chasing behavior is the action of parasite toxins, or the weakening of the auditory capsule, destroying equilibrium.

3. Where are the Worms? *Students will likely find that ideal tubifex habitat is that with fine sediment and organic matter with low flow.*

1. Research has shown that conditions in Fish Hatcheries provide optimal habitat for tubifex worms. Do student results support this observation? *Student's data could support the observation that tubifex worms are tolerant of polluted waters characterized by high nutrient, high sediment levels, and low oxygen, such as effluent run-off from fish farms.*

2. Given your results, what habitats in Oregon are likely to support whirling disease? *Ponds, streams and rivers with slow moving backwater areas are good habitat for tubifex worms. They are tolerant of polluted waters characterized by high nutrient, high sediment levels, and low oxygen.*

Read the risk assessment available at:

http://www.oregon.gov/OISC/calendar_march09.shtml for more background and to lead a discussion on habitats at risk and what people can do to help prevent the spread.