

COMMON PARASITES OF YUKON



FRESH WATER FISHES



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W.R. Ricks Consulting.



LAKE WATERSHED

1	Aishihik	Alsek
2	Dezadeash	Alsek
3	Frances	Mackenzie
4	Shilsky	Mackenzie
5	Braeburn	Yukon
6	Ethel	Yukon
7	Fish	Yukon
8	Hanson	Yukon
9	Kloo	Yukon
10	Kluane	Yukon

LAKE WATERSHED

11	Kusawa	Yukon
12	Laberge	Yukon
13	Little Atlin	Yukon
14	Quiet	Yukon
15	Squanga	Yukon
16	Tagish	Yukon
17	Tarfu	Yukon
18	Tatchun	Yukon
19	Teslin	Yukon

INTRODUCTION

A survey of macroparasites of freshwater fishes was conducted in the Yukon Territory during the summers of 1991–1992. The survey included nineteen lakes in three watersheds. Eight species of fish were analyzed in varying numbers. Only lake trout, whitefish and, in some cases, northern pike were sampled in adequate numbers to present a reasonable cross-section of macroparasite infestation for the lakes of a particular watershed. Eleven Genera of parasites were identified from this survey.

None of the adult parasites identified were found in quantities that would conclusively indicate a potential health hazard to the fish host on which they were found. In a few instances, encysted larval stages of certain trematode parasites were extensive. The potential threat of these parasites to the health of the fish was difficult to determine, but they could become pathogenic in extreme numbers.

Diphyllobothrium spp. cysts were encountered in fish from five lakes. Certain species of this Genus of tapeworm can be infective to humans and other mammals. The larval stage of the parasite *Cotylurus* or *Tetracotyle* has experimentally infected humans. However, this parasite is not considered to be a concern. The threat of infection can be eliminated by thorough cooking of fish and proper hygiene when cleaning and handling raw fish.

This brochure presents photographs and life cycles of some of the more common macroparasites encountered during this survey.

DEFINITIONS

The following is a list of terms used in this booklet with which you may not be familiar.

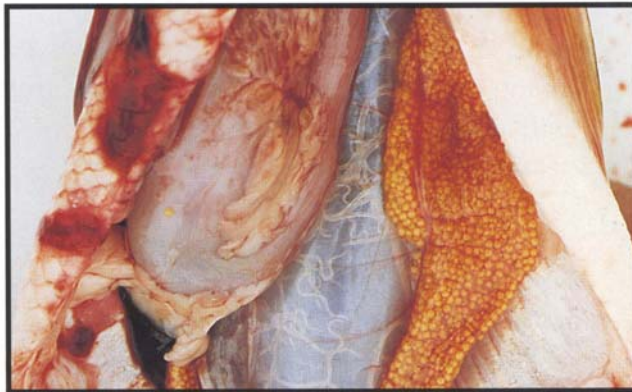
1. **Cestode**—a member of a group of parasites; also referred to as a tapeworm.
2. **Nematode**—a member of a group of parasites; also referred to as a roundworm.
3. **Trematode**—a member of a group of parasites; also referred to as a flatworm or “fluke”.
4. **Acanthocephalan**—a member of a group of parasites which are known also as “thorny-headed” worms. They are distinguished by a multi-hooked projection or “proboscis” by which they attach to the intestinal lining of the host.
5. **Final Host**—this is the organism on or in which the adult form of a parasite resides.
6. **Intermediate Host**—this is an organism on or in which the larval form of a parasite resides.
7. **Larva**—an intermediate stage of a parasite; a non-adult stage which may still be considered to be parasitic. Larvae is the plural of larva. Larval—refers to larvae.
8. **Parasite**—a plant or animal which lives upon or within another living organism, gaining benefit usually at the expense of that organism.
9. **Life Cycle**—the complete sequence of events which makes up the development of a parasite from one stage to another.

10. **Direct Life Cycle**—this type of life cycle indicates that the development of the parasite occurs using only one host. The term “monogenetic” refers to a direct life cycle.
11. **Indirect Life Cycle**—this type of life cycle indicates that the development of the parasite occurs using more than one host; intermediate hosts are required for various larval stages. The term “digenetic” refers to an indirect life cycle.
12. **Crustacean**—any member of a large class of invertebrate organisms. Freshwater shrimp and water fleas are members of this group.
13. **Mollusk**—any member of a group of shell-bearing invertebrates, including clams and snails.
14. **Salmonid**—a group of fresh water fish, including salmon, trout and charr.
15. **Hemocoel**—a body cavity in some invertebrates that contains blood and functions as part of the circulatory system.
16. **Macroparasite**—a parasite that is visible to the unaided eye.

Note: Scale—drawings of parasites and various larval stages are not to scale.

CYSTIDICOLA SPP.

Cystidicola is a roundworm, the adult form of which is found in the swim bladder of various fishes. Adult worms have a long life span (up to ten years). Eggs pass into the intestine, presumably via the pneumatic duct (tube connecting the swim bladder with the esophagus), and out in the feces. Larvae develop in various crustaceans (freshwater shrimp). Fish acquire infection by ingesting infected crustaceans.



Adult Cystidicola inside an intact swim bladder.



Cystidicola roundworms with the swim bladder removed.

RAPHIDASCARIS SPP.

Raphidascaris is a roundworm. The adult form is found in the intestine of a fish final host. Eggs are produced and passed out in the feces. The eggs are ingested by small fish. Larval worms develop and become encysted in various tissues. The life cycle is completed when the smaller fish with the infective larval stage is ingested by a larger, suitable fish final host.

This indirect life cycle allows for both adult and larval forms to be found in fish, sometimes in the same fish.



Larval stage of the roundworm Raphidascaris encysted in the intestine of a fish.

NEOECHINORHYNCHUS SPP.

Noechinorhynchus is an intestinal parasite that belongs to the Phylum Acanthocephala, or “thorny-headed worms”. It is a cylindrical worm armed with an anterior retractile proboscis which carries attachment hooks. Eggs produced pass out in the feces. The eggs contain *acanthor* larvae. The egg is ingested by a suitable crustacean in which the *acanthor* larva is released and penetrates through the host’s intestine into the hemocoel. Here the parasite develops into a *cystocanth* or *acanthella* stage. The life cycle is completed when the invertebrate with the *cystocanth/acanthella* larvae is ingested by a final fish host. In some cases, a second intermediate host is required.

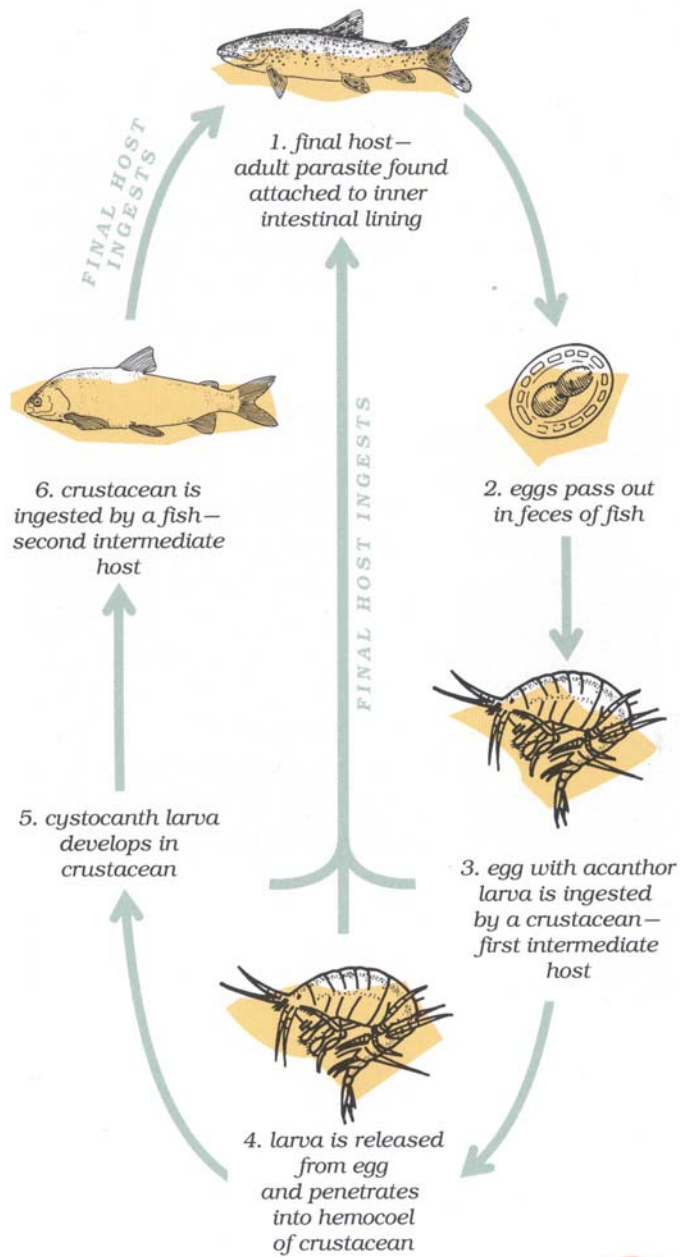
Some species of this parasite are capable of changing their site of attachment within the intestine. This can result in multiple hemorrhagic ulcerations of the internal gut wall.



Adult *Neoechinorhynchus* attached to inner intestinal lining of a whitefish

LIFE CYCLE

Neoechinorhynchus



PISCICOLA SPP.

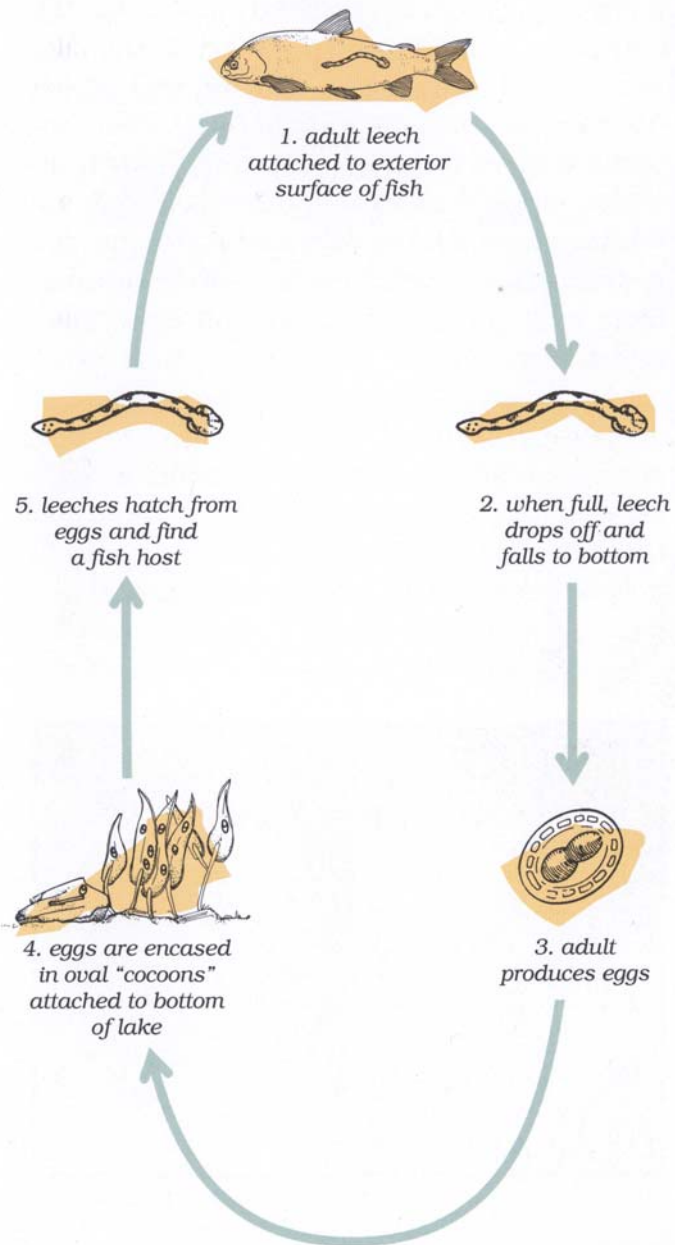
Piscicola is commonly known as a leech. It is an external parasite that attaches itself to the skin of a fish and sucks blood and tissue fluid. The life cycle is direct. The adults will remain attached to a fish for several days. They then drop off and sink to the bottom of the lake to digest blood or produce eggs. The eggs are encased in oval "cocoons" attached to substrate on the bottom. Leeches hatch from the eggs and enter the water column to find a fish on which to feed.



Adult Piscicola attached to the skin of an Arctic grayling.

LIFE CYCLE

Piscicola



SALMINCOLA SPP.

Salmincola is a crustacean parasite with a direct, yet extremely involved, life cycle. The adults are attached to the surface of the fish, usually at the base of the pectoral and caudal fins, but occasionally on the gills. They are easily seen, as they can reach lengths of 1+ cm when the eggs sacs are fully developed. Eggs are released from the egg sacs and hatch into the *first copepodid larva*. These larvae are free swimming and can survive for several days. They attach themselves to a fish host through a very complex process. Initially the parasite attaches temporarily with sets of appendages. A more permanent attachment occurs when a thread-like structure is produced from a "button" on the frontal region of the parasite. The parasite is now at the *second copepodid* larval stage. At this point, sex differentiation occurs. Mandibles appear. The thread is released at the "button",



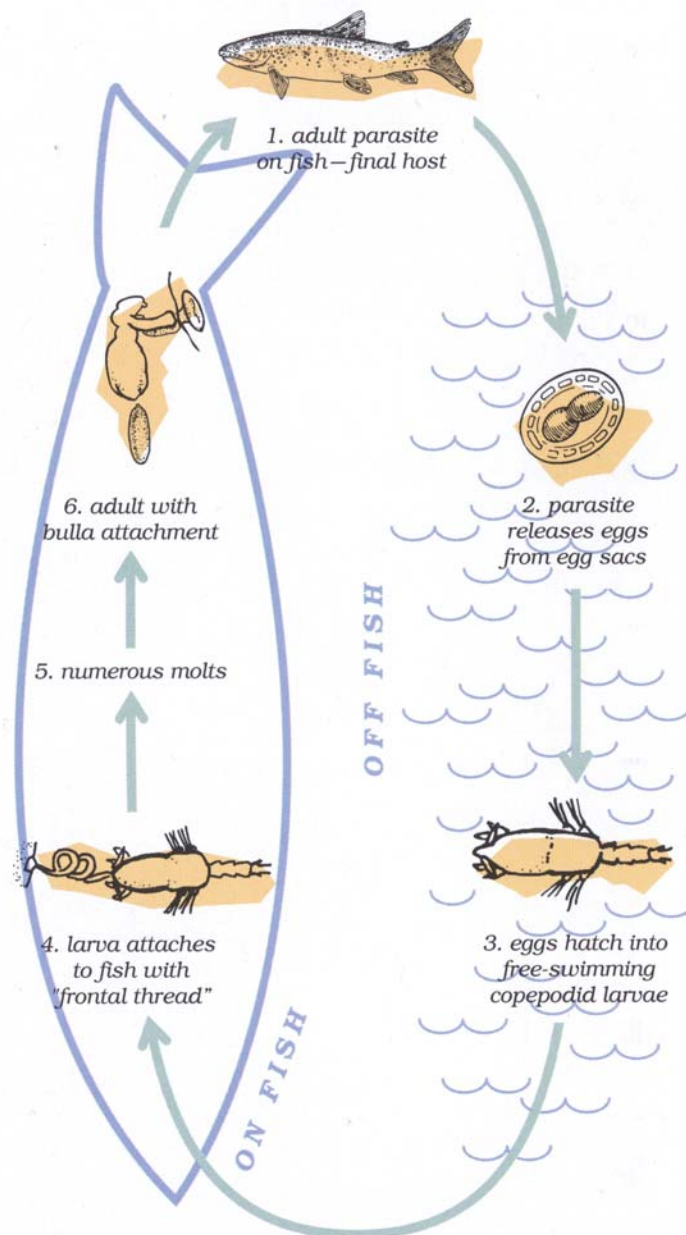
Adult *Salmincola* attached to the caudal fin of a lake trout.

and one pair of the appendages, the second maxillae, holds the parasite on. The parasite can now move about the fish for a more suitable position. Copulation takes place and the male disappears. The female then produces a large, spherical structure called the "head-bulla". This structure is embedded into the tissue of the fish. The terminal ends of the second maxillae develop "plugs" which are inserted into holes in the bulla. This forms a permanent attachment of the parasite to the fish and allows for undisturbed feeding on gill and/or epithelial tissue. A series of molts occurs to eventually produce the adult.

For the Life Cycle of Salmincola see p. 14.

LIFE CYCLE

Salmincola



DIPHYLLOBOOTHRIUM SPP.

This tapeworm larva (plerocercoid) was found on a few occasions, encysted on the viscera. The life cycle is similar to that of other cestodes. There are two species of *Diphyllobothrium* which may pose a public health hazard to humans and other mammals. One of these is *Diphyllobothrium latum*, and is also known as the “broad tapeworm” and the “fish tapeworm”. Identification to species was not generally feasible for the purposes of this survey. The cysts were, in all cases, found attached to the internal viscera. This is usually the case, as the cysts are not normally found in the muscle. However, thorough cooking kills the larvae and renders them incapable of infection, as does freezing to -21 °C. Smoking of fish does not kill the parasite. The adult tapeworm has been reported in bear, wild canines and humans. Human infections of this tapeworm are not life threatening and are readily treated.



Cysts embedded in fish stomach.

COTYLURUS SPP.

Cotylurus is a digenetic (indirect life cycle) trematode (fluke). It was found only in the larval form in this survey. They typically appear as small, white granular structures on the surface of the heart. The condition has also been referred to as “sand grain” or “sugar grain” heart.

The adult fluke usually resides in the mouths of fish-eating birds, such as gulls, although other fish-eating animals, even vertebrates, are possible final hosts.

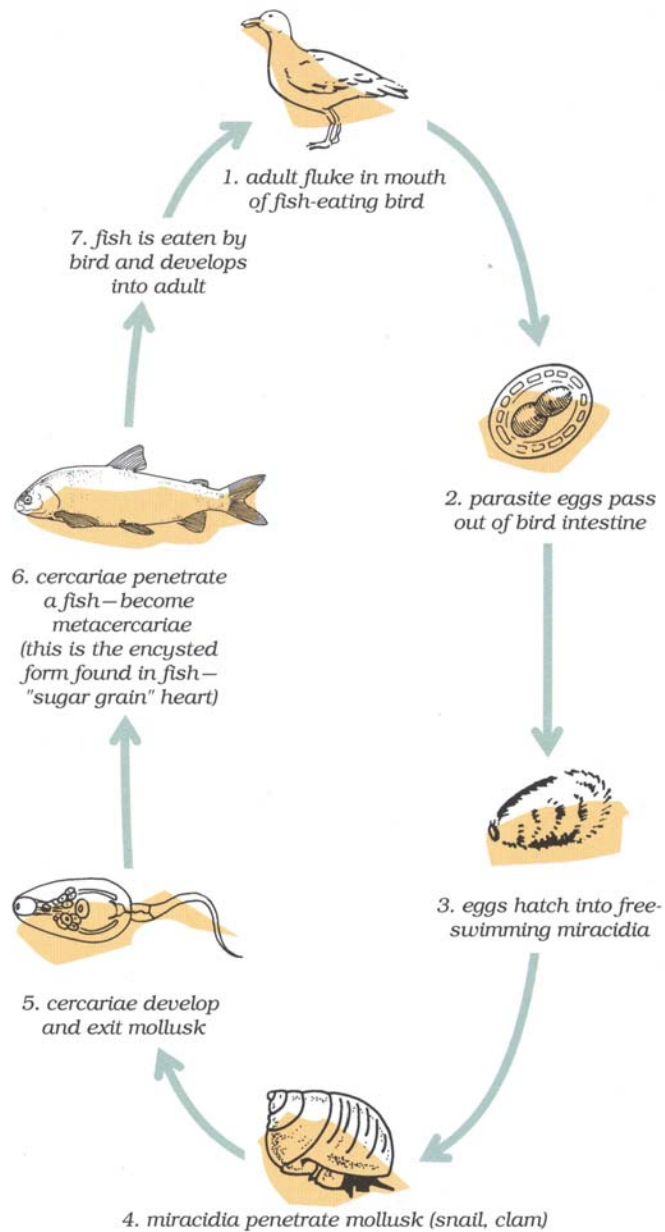
The life cycle of trematodes always involves a mollusk of some kind. The adult fluke releases eggs which pass out with the feces of the final host. The eggs hatch into free-swimming *miracidia*. The *miracidia* penetrate a molluscan (snail/clam) first intermediate host, undergo a series of developmental stages and become *cercariae*. The *cercariae* actively exit the molluscan host and penetrate a vertebrate (fish) second intermediate host. The *cercariae* become *metacercariae*. The *metacercariae* encyst in this fish (commonly on the heart surface) and develop into adults when eaten by a suitable final host, usually a bird.



Cotylurus cysts or “sand grains” on a whitefish heart.

LIFE CYCLE

Cotylurus



TRIAENOPHORUS SPP.

Triaenophorus is a tapeworm, the adult form of which is found in the intestine of northern pike. Eggs contained in segments (proglottids) are passed out in the feces. A free-swimming *coracidium* develops from each egg. The *coracidium* is ingested by a crustacean (first intermediate host). The *coracidium* becomes infective and migrates to the hemocoel of the crustacean. The parasite is now called a *proceroid*. The crustacean is ingested by a vertebrate (fish) second intermediate host. The *proceroid* is liberated, becomes infective and penetrates the intestine to encyst in various body parts. The parasite is now called a *plerocercoid*. The second intermediate host with the *plerocercoid* is eaten by a vertebrate (usually fish) final host. The parasite develops into an adult in the final host, and produces proglottids and eggs.

One of the larval forms of this specific tapeworm, the *plerocercoid*, is frequently found encysted in the flesh of whitefish. These cysts are a fairly common occurrence in the Yukon. They cause no harm but can be unsightly if found in large numbers.

For the Life Cycle of Triaenophorus see p.20.



Adult Triaenophorus tapeworms attached to the inner lining of the intestine of a pike.



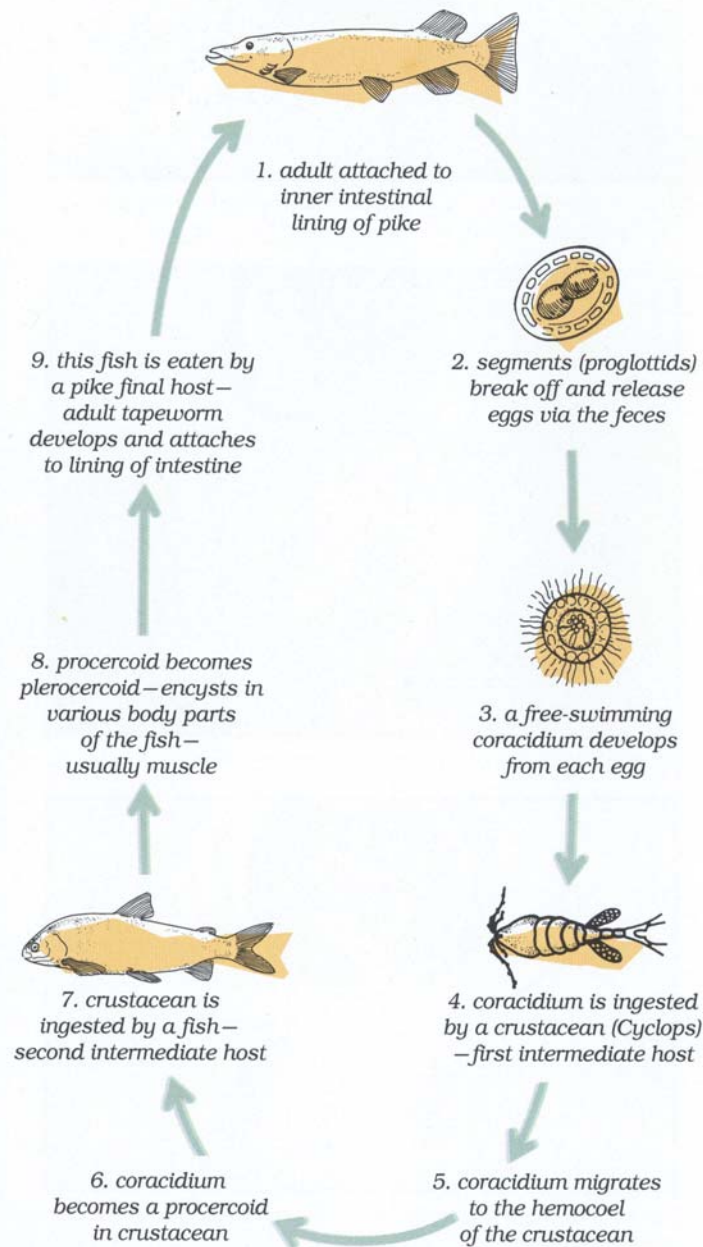
Plerocercoid stage of Triaenophorus encysted in trout flesh.



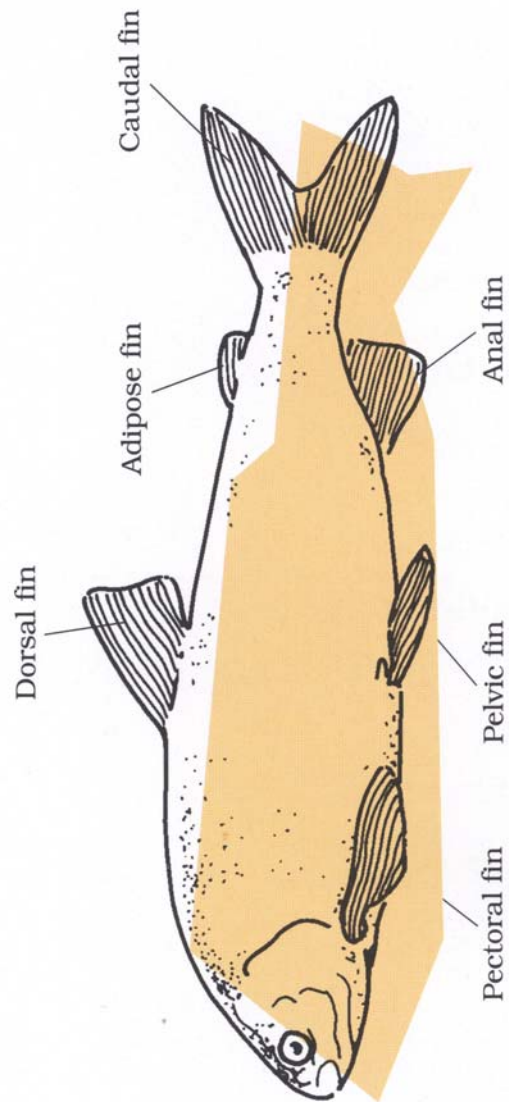
Larval stage of Triaenophorus which has been removed from plerocercoid cyst.

LIFE CYCLE

Triaenophorus



FOR YOUR INFORMATION



PARASITES IDENTIFIED IN THIS SURVEY

By category and scientific name (Genus)

Cestodes

Diphylobothrium*
Proteocephalus
Triaenophorus*
Eubothrium

Nematodes

Raphidascaris*
Cystidicola*

Trematodes

Cotylurus*
Discocotyle

Acanthocephalan

Neoechinorhynchus*

Leech

Piscicola*

Crustacean

Salmincola*

* Parasites represented in this brochure.

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