



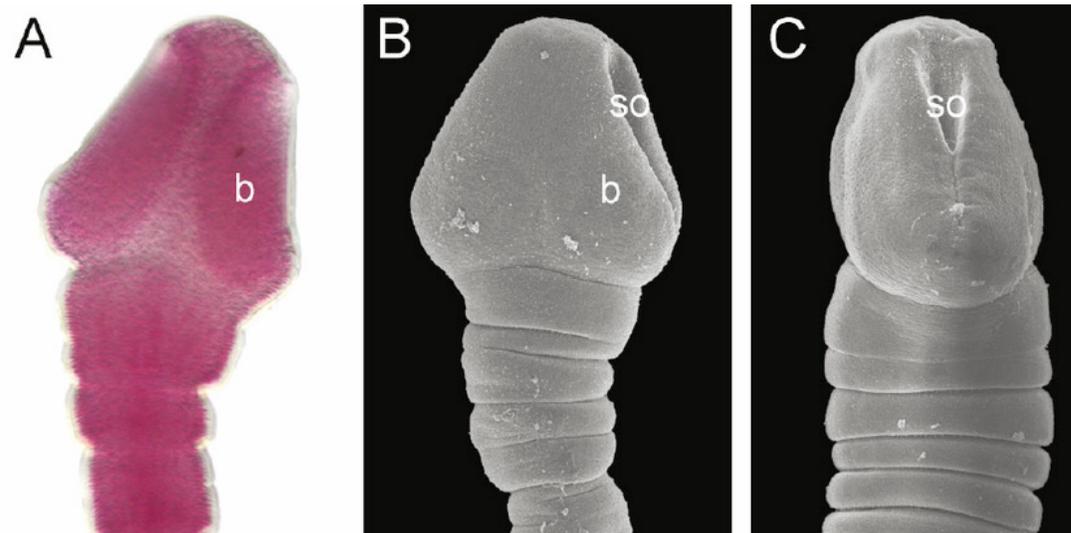
Asian Tapeworm

Bothriocephalus Acheilognathi

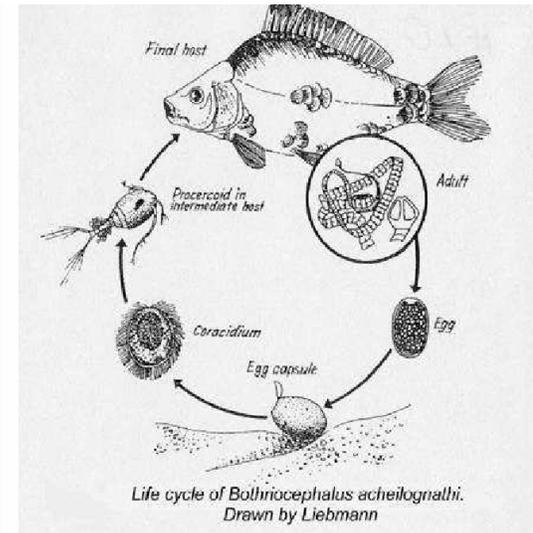
syn. *Bothriocephalus gowkongensis*, *B. opsariichthydis*, *Schyzocotyle acheilognathi* (Yamaguti, 1934)

ALBERTA REGULATION:
FISHERIES ACT

Last Updated: January 2018



Bothriocephalus acheilognathi from the ornamental fish *Symphysodon discus*.



Life cycle of the Asian fish tapeworm from Liebmann.

Overview:

The Asian tapeworm is an intestinal parasite of an estimated 200 species of freshwater fish, but primarily cyprinid (carp) fish species. It is native to East Asia and is now present in all continents, except Antarctica, due to human activities.¹

B. acheilognathi has a relatively simple lifecycle, requiring only one intermediate host: copepods (small crustaceans).² Movement of water containing tapeworm eggs or infected copepods can also disperse this parasite; however, it is primarily dispersed through infected fish.¹

Introductions of common carp and grass carp are the most likely vectors for this parasite arriving in North America; however, the discovery of the Asian tapeworm often lagged the introduction of the host, in some

cases, by decades.¹ In 2003, a single immature *B. acheilognathi* specimen was collected from a white bass in the Southern basin of Lake Winnipeg.³ The white bass is unlikely the source of the tapeworm since common carp have long been established in Lake Winnipeg.³ Nevertheless, this discovery extended the Asian tapeworm's known northern range by over 900 kms.³ Fish-eating birds, which consume infected fish can transport eggs, and spread them via defecation.¹

Since the tapeworms first description, it has been identified under 20 different specific epithets, which was often the result of morphological variability and sample fixation procedures (the scolex and bothria are affected by how they are mounted on slides). Recent studies have declared that all *Bothriocephalus* in cyprinids are the same species.¹

Three species can be confused with *B. acheilognathi* - *Eubothrium tulipai*, *E. rectangulum*, and *Bathybothrium rectangulum* have similar scolex (head), but have lateral rather than medial genital openings.¹

As of January 1, 2016, the possession, sale, or transport of this species in Alberta is illegal under the Fisheries Act.

Identification:

Mature *B. acheilognathi* have a segmented body with an arrowhead or heart-shaped scolex, with an undeveloped terminal disc. Bothria (slit-like openings) are located along the axis of the dorsal and ventral surfaces of the scolex.¹ The proglottids (body segments) begin directly behind the scolex; therefore, it has no neck. The proglottids are much narrower than the scolex.² The tapeworm's total



Asian Tapeworm *(continued)*

length varies with host, the ecological setting, age of infection, and the number of worms but 3.5 to 8 cm is typical. Specimens up to 1 m in length have been reported.¹

Often their presence is noted through an autopsy, examination of the fecal material, or for heavily infected fish, through a distended abdomen.

Ecology:

Adult *B. acheilognathi* are hermaphroditic, each having a complete set of male and female reproductive organs. Eggs are produced via self-fertilization and shed into the water with the host's feces.² Hatching occurs in water temperatures of 12 to 37°C and six-hooked larvae emerge. Hatching at 28-30°C takes 1-5 days and 10-28 days at 14-15 °C.²

The free-swimming larvae, coracidia, are consumed by copepods where they develop into a second larval stage called a proceroid. This is also temperature dependent: 11 to 18 days at 29-31°C and 49 days at 20°C.² Fish are normally infected by consuming the copepods, although predatory fish can also consume infected fish. Once in the fish's intestines the larvae mature into adult worms in 21-23 days at 28-29°C.²

Economic Impacts:

Fish culture operations will face economic losses from fish mortalities, reduced fitness, disinfection of facilities, and the costs of treating fish.¹ Any declines in native sport-fish populations due to tapeworm infection could have significant impacts on recreation and tourism.

Environmental Impacts:

Infection by *B. acheilognathi* reduces a fish's ability to cope with reduced food availability and may lead to decreased fitness, growth, and temperature-dependent mortality, especially in juveniles. Infection also causes intestinal inflammation, protein depletion and alters digestive enzyme activity.²

Sociological Impacts:

Asian tapeworm infected fish are safe for human consumption provided thorough cooking, smoking or pickling.² The transformation of native aquatic communities results in the intrinsic loss of natural capital and enjoyment of natural areas.

Prevention:

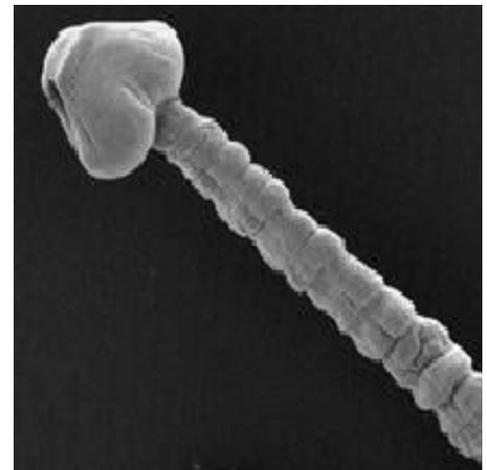
B. acheilognathi can be spread by infected fish or contaminated water containing eggs or infected copepods.

It can also be spread by infected baitfish.¹ Dispose of fish guts, unused bait and other refuse parts in landfill-bound garbage. Koi and goldfish are both cyprinids, and could be vectors for the Asian tapeworm.¹ Never release fish or dump aquariums into natural waters.

Thoroughly drain boat motors, bilge, transom, live wells, and bait buckets of any water that may harbor eggs or infected copepods.

Control:

Prevention of spread is the only control method currently known for Asian tapeworm.¹



From Dr. Boris Kuperman and Dr. Victoria

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3. Choudhury, A., et. al. Update on the Distribution of the Invasive Asian Fish Tapeworm, *Bothriocephalus acheilognathi*, in the U.S. and Canada. *Comparative Parasitology* 73(2):269-273. 2006. doi: <http://dx.doi.org/10.1654/4240.1> Accessed: March 30, 2017.