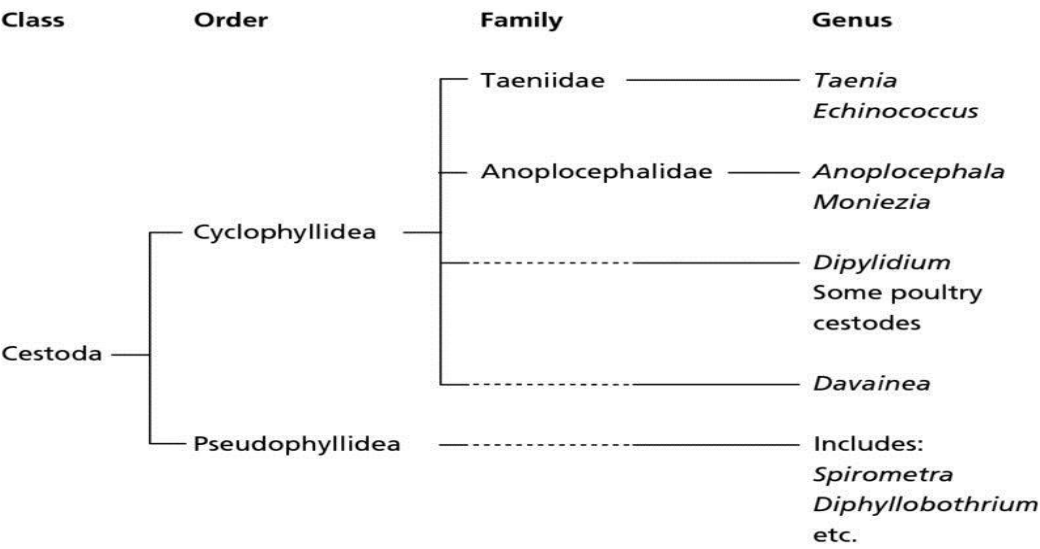


Cestodae(Tapeworms)



A-Pseudophyllideans and Cyclophyllideans

O. Pseudophyllidea

- Typically have a scolex with 2 longitudinal bothria
- Bothria may be equipped with hooks
- Genital pores may be lateral or medial
- Vitellaria are always follicular and scattered throughout the proglottid
- Testes are many
- The life cycles of pseudophyllideans usually involves a crustacean as a first intermediate host and fish as second intermediate hosts

Family Diphyllbothriidae

Diphyllbothrium latum

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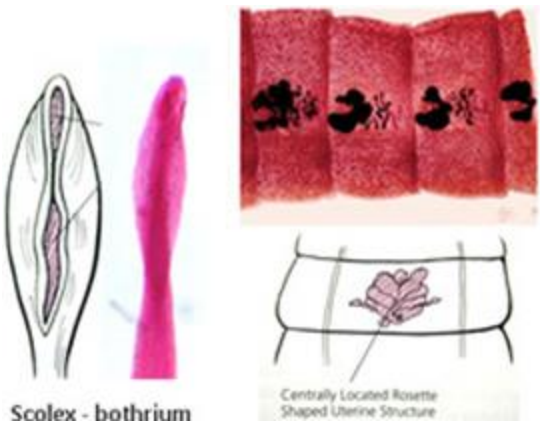
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Diphyllbothrium latum, the broadfish tapeworm, parasitizes several species of fish eating mammals (including humans), particularly in Scandinavia, the USSR and parts of temperate SA

The adult reproductive system possesses a common genital atrium into which male and female genital pores open on the midventral surface of each proglottid

Sperm enter the female pore and pass down the vagina to the oviduct, where fertilization occurs

The bilobed ovary lies in the posterior portion of the proglottid

The oviduct, arising from the ovary, continues antieriad as a coiled uterus, opening to the exterior through the midventral **uterine pore**

Eggs enclosed in tanned eggshells are expelled via the uterine pore

The follicular cells constituting the vitellaria are scattered throughout the cortical fields of the proglottid, and numerous testes are medullary in their distribution except for an area along the midline of each proglottid

The worms are large and their extraordinary size is partially due to anaploysis - the retention of terminal proglottids

Life Cycle

The adult worm is attached to the mucosal lining of the small intestine

Eggs are released from the uterine pore on the ventral surface of the proglottid

The eggs must lie dormant in the water for approximately 8-12 days or longer to complete embryonic development

The hexacanth embryo is covered by a ciliated embryophore and is called a **coracidium**

Soon after hatching, the motile coracidium must be ingested by a FW copepod

In the digestive tract of the copepod, the ciliated embryophore is shed and the naked hexacanth larva bores through the intestinal wall into the hemocoel

The hexacanth embryo metamorphoses into an elongated **proceroid** larva

The prominent cercomer, containing the 6 larval hooks, projects posteriorly

When the infected copepod is ingested by a plankton-feeding FW fish, the proceroid penetrates the intestinal wall and migrates to the body muscles

Here it develops into a long, solid, pseudosegmented **plerocercoid** larva with an adult scolex at one end

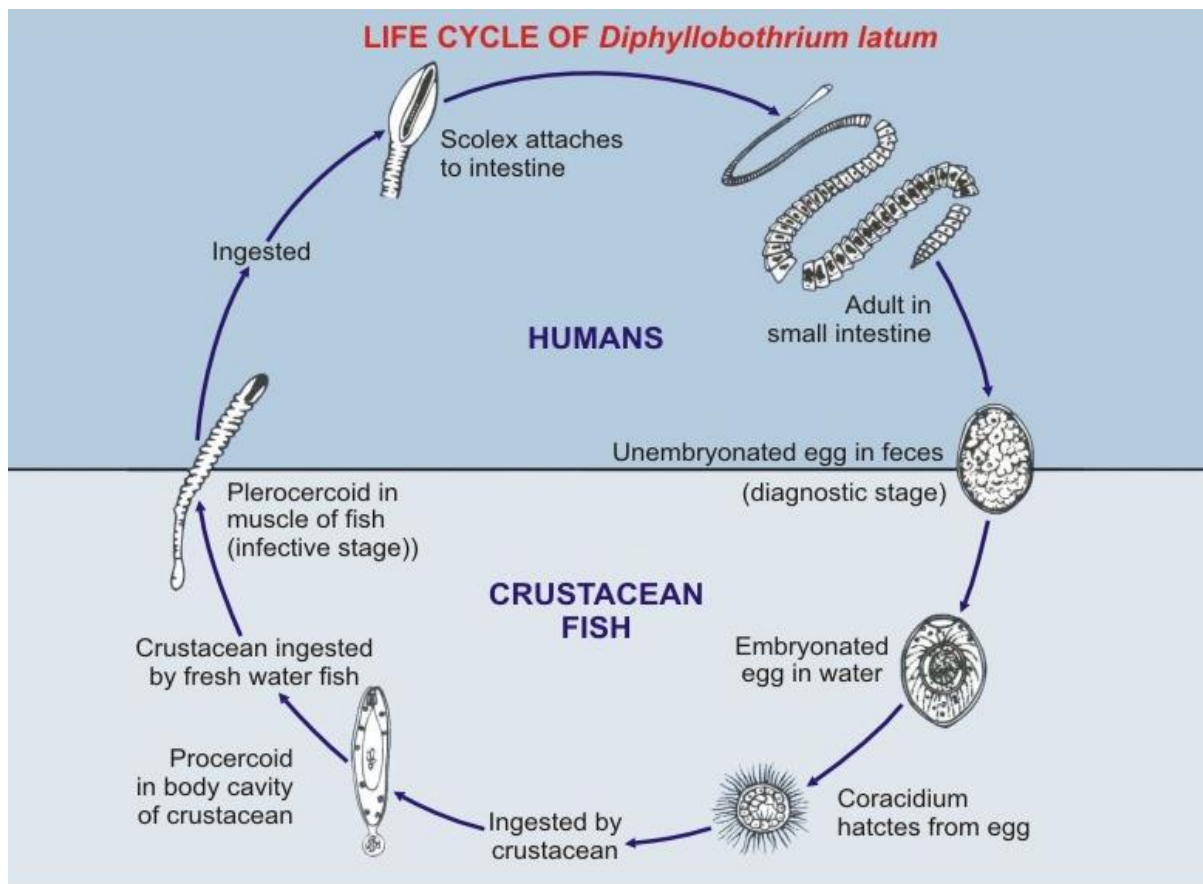
The plerocercoid of *D. latum* is coiled and at times encapsulated, or more commonly, lying free in muscle tissue

When it invades the muscles of the body wall, encapsulation rarely occurs

However, when it settles in or on the viscera, encapsulation is common

Infection of the definitive host results from the ingestion of plerocercoids in poorly cooked, steamed, smoked, pickled, or raw fish

Upon entering the small intestine of the definitive host, it attaches to the mucosa and begin to grow



Epidemiology

Human infection with *D. latum* is primarily, although not exclusively, limited to areas where fresh fishes are commonly eaten or where cleaning and handling of fishes is done. A number of cold water, FW fishes (including pike, salmon, trout) can serve as second intermediate hosts.

In addition to being ingested with raw or improperly cooked fish, plerocercoids may be accidentally ingested when they cling to the hands of fish cleaners.

Symptomatology and Diagnosis

Rarely is more than a single worm found in an infected human, and many victims display few if any symptoms.

There may be abdominal pain, weight loss, weakness, and nervous disorders.

Many of these symptoms are attributable to the patient's reaction to the parasite's metabolic wastes, to degenerating proglottids or to irritation of the intestinal mucosa. Occasionally, the worm is found in the upper portions of the jejunum, in which case it can compete successfully with the host for ingested vitamin B12.

Since this vitamin is important in the synthesis of hemoglobin, deprivation causes an anemia in the human host similar to pernicious anemia.

Other Pseudophyllideans Found in Humans

Sparganosis

When procercoids of some species are accidentally ingested (e.g. swallowing copepods while drinking water) they can migrate from the gut and develop into plerocercoids

This infection is called **sparganosis**

It can cause some rather severe pathology

Another pseudophyllidean is *Ligula intestinalis*, found in the body cavity of carp, suckers, and shiners – causes substantial changes in host behavior

Adult worms often occur with mergansers