**Diphyllobothrium latum**

*D. latum* belongs to the pseudophyllidean tape worm group which is characterized by having a scolex with 2 bothria (sucking organs). This worm have a world wide distribution.

**Life cycle and morphology**

Infection with the adult worm is acquired by the ingestion of row, poorly cocked or pickled fresh water fish containing the encysted plerocercoid larvae. After ingestion, the worm matures, with egg production beginning about the fifth or sixth week. The adult worm reaches a length of 10m or more and may contain up to 3000 proglottids. The scolex of *D. latum* is elongate, spoon-shaped, and has two long sucking grooves, one on the dorsal and the other on the ventral surface (Figure 13.2). The mature and gravid proglottids are wider than long, with the main reproductive structures (mainly the uterus) located in the center of the gravid proglottid. Both eggs and proglottids may be found in the stool. Often a partial chain of proglottids may be passed. The eggs are broadly oval and operculated. After developing for 2 weeks in fresh water, the eggs hatch and the ciliated, coracidium larvae are ingested by the first intermediate host, the copepod (crustacean). The copepods, containing the second larval stage (procercoid), are then ingested by fish, which may be ingested by larger fish. In this situation, the final fish intermediate host may contain many plerocercoid larvae which initiate the infection with the adult worm when ingested by humans.

**Clinical Disease**

Symptoms in the patient depend on a number of variables: the number of worms present; the amounts and types of by-products produced by the worm: the patient's reaction to such byproducts; and the absorption of various metabolites by the worms. There may be occasional intestinal obstruction, diarrhea, abdominal pain, or anemia. If the worm is attached at the jejunal level, there may be a vitamin B₁₂ deficiency which resembles pernicious anemia and which develops in a very small percentage of persons harboring the tapeworm.
Diagnosis
Diagnosis is usually based on the recovery and identification of the characteristic eggs and/or proglottids. If the egg operculum is difficult to see, the coverslip of the wet preparation can be tapped and the pressure may cause the operculum to pop open, thus making it more visible. The eggs are unembryonated at the time they are passed in the stool. Proglotlids are often passed in chains and this is a clue to *D. latum*. The overall proglottid morphology with the rosette uterine structure also facilitates identification.

Epidemiology and Prevention
Although *D. latum* infections have been recorded in other mammals, in areas where human infection has become rare, the natural transmission cycle from mammals other than humans does not seem to be sustained. It is quite possible to acquire the infection from the ingestion of infected raw freshwater fish that has been shipped under refrigeration to areas where the infection is not endemic. Preventive measures would include thorough cooking of all freshwater fish and freezing for 24-48 hours at—18°C.

*Diphyllobothrium* spp. (SPARGANOSIS)

Introduction
These larval forms (spargana) were first recognized in humans from tissues removed at autopsy. In endemic areas, similar forms can be found in the subcutaneous connective tissue and between the muscles in frogs, lizards, snakes, birds, and certain mammals. When these spargana are fed to the definitive hosts (dogs and cats), adult tapeworms develop. Although cases have been reported worldwide, sparganosis is more common in China, Japan, and Southeast Asia.

Life Cycle and Morphology
Spargana Eggs passed from adult tapeworms in the dog or cat intestine hatch in fresh water and are ingested by Cyclops, where they develop into the procercoid larva. When the Cyclops is eaten by a second intermediate host (fish, snakes, amphibians, or mammals), the procercoid larva penetrates the intestinal wall, migrates to the tissues and develops into the plerocercoid larva, the sparganum. On ingestion by a dog or cat, the sparganum will develop into the adult tapeworm, thus completing the life cycle. Human infection can occur from 1) ingestion of infected Cyclops (procercoid stage penetrates intestinal wall, migrates into tissues, develops into sparganum), 2) ingestion of raw infected flesh of one of the second intermediate hosts (fish, snakes, amphibians, and mammals), and 3) local application of raw, infected flesh of one of the second intermediate hosts to the skin, conjunctiva, or vagina (the spargana migrate from vertebrate host tissues into human tissue).

Clinical Disease
Most patients have slow growing, tender, subcutaneous nodules. These nodules may also be migratory. Ocular sparganosis is accompanied by pruritis, pain, lacrimation, and edematous swelling of the eyelid. Depending on the location of the sparganum, there may be elephantiasis (lymph channels), peritonitis (intestinal perforation), and brain abscess. Most patients will have leucocytosis and eosinophilia.
Diagnosis
Usually diagnosis is not made until drainage of the lesion, surgical removal of the worms, and gross and/or microscopic examination of the tissue has been performed. The more elongate, worm-like structure of the sparganum can usually be distinguished from the bladder structure of a cysticercus or coenurus, since they have suckers and booklets, both of which are lacking in a sparganum.