Lecture
On
DIPHYLLOBOTHRIDAE

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DIPHYLLOBOTHRIDAE

- Scolex has narrow deep weakly spatula shaped muscular groove known as **bothria** as hold fast organ instead of suckers**.**
- Eggs are operculated.

Life-cycle

I. Egg hatches in the environment form ciliated larva i.e. coracidium

II. Coracidium enters inside the 1st intermediate host form Procercoid.

III. Procercoid develops into plerocercoid in a 2nd intermediate host

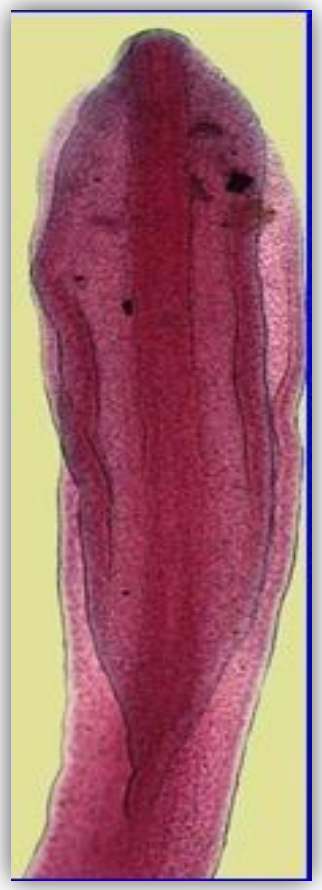
IV. Adult tapeworms in a vertebrate host

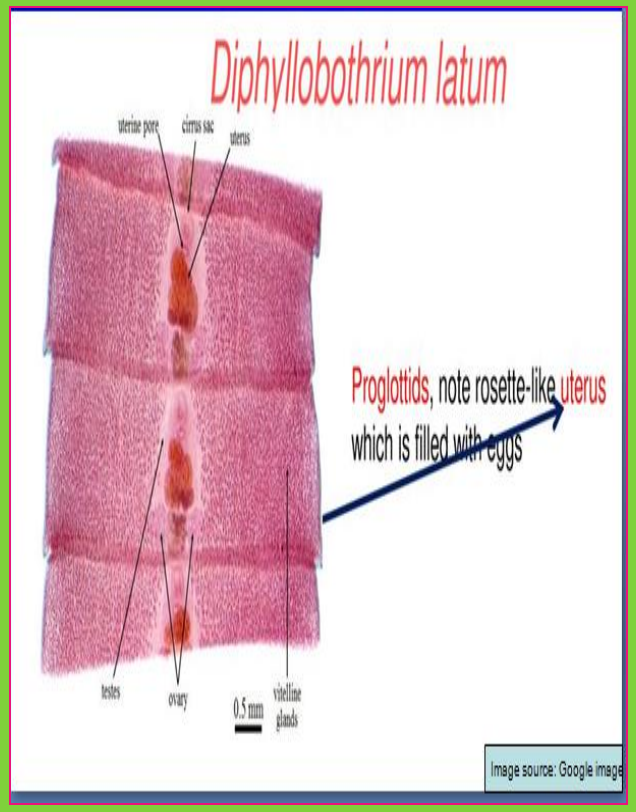
Diphyllobothrium latum

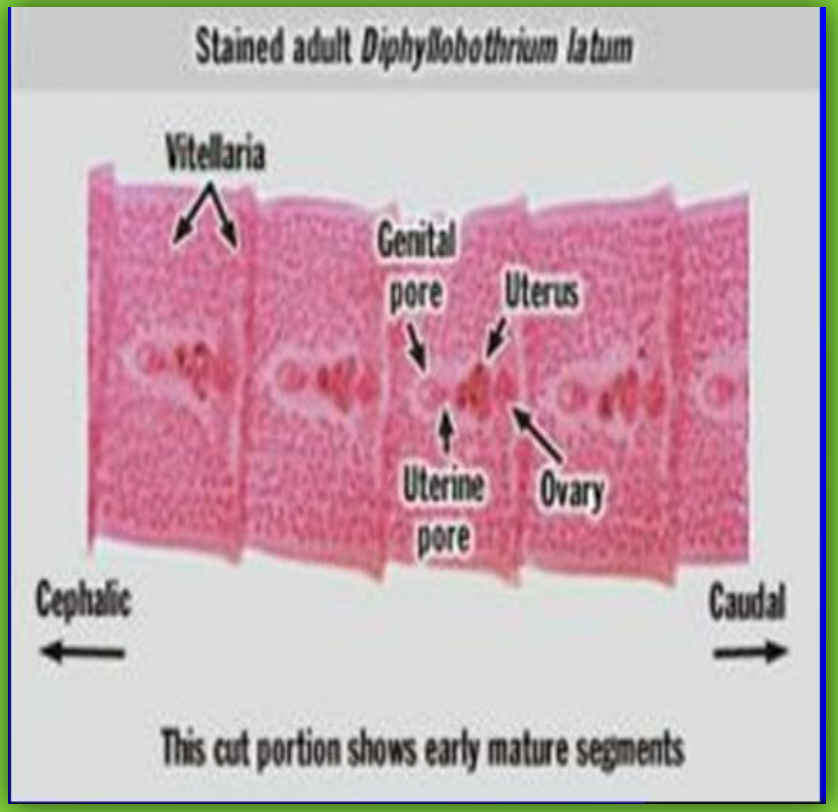
Common name	Broad fish tape worm
Host	Man, dog, cat, pigs and other fish eating mammals
Location	Small intestine
I/H	1.) 1st I/H - Cyclops (*Diaptomus gracilis* – copepod crustaecean). 2.) 2nd I/H – Fresh water fish. (Pike, trout and perch

Morphology

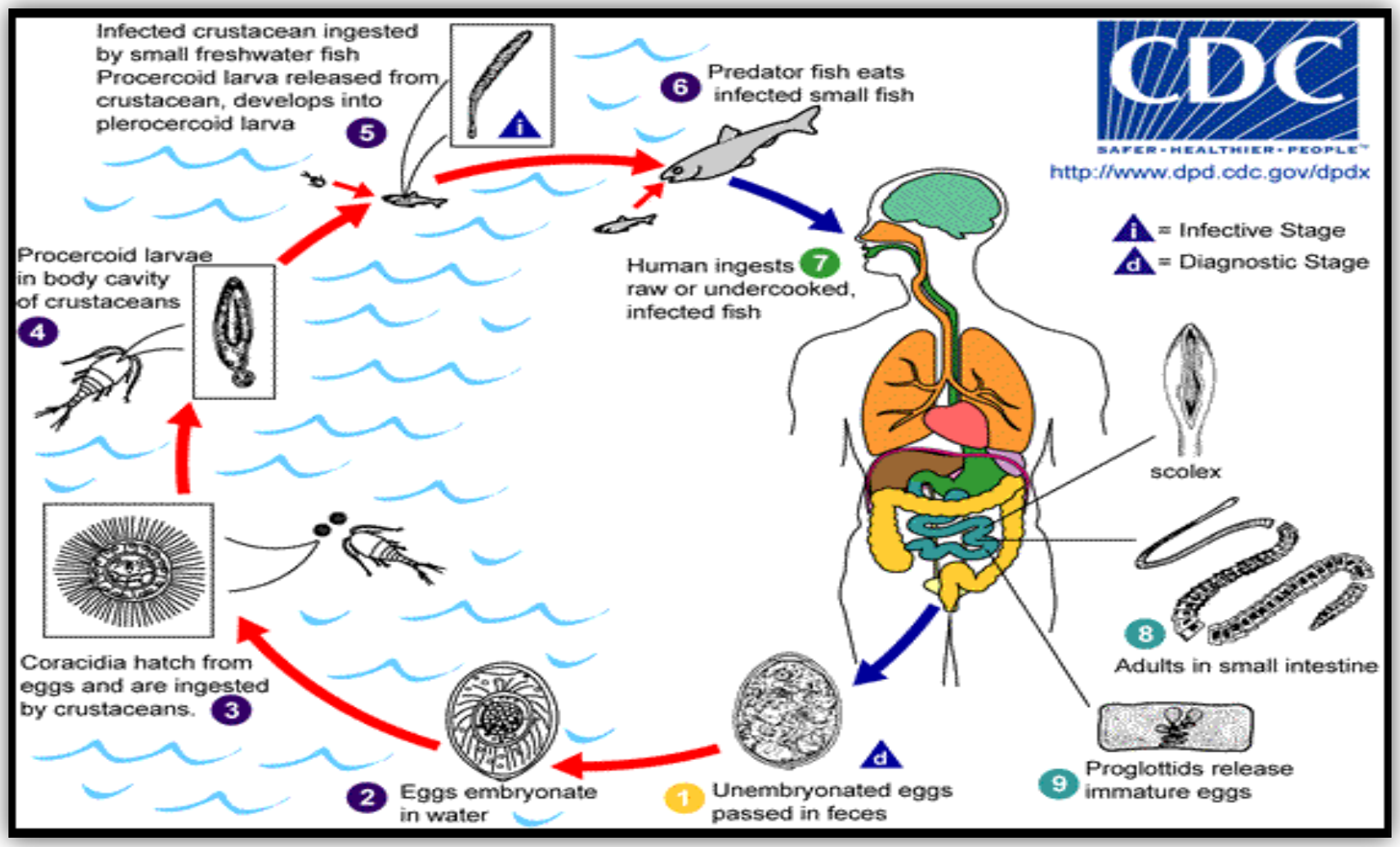
- Scolex has, instead of suckers, slit–like groove called bothria for attachment to the intestine.
- Segments are broader than long.
- Only one set of hermaphrodite reproductive organs in each proglottid.
- Numerous testes and vitellaria are scattered.
- Ovary is bilobed and uterus is rosette shaped.
- Genital pore present on mid ventral line.
- Egg : oval shaped, yellow in colour and operculated.




Diphyllobothrium latum
uterine pore
cirrus sac
uterus
Proglottids, note rosette-like uterus
which is filled with eggs
testes
ovary
0.5 mm
vitelline glands
Image source: Google image


Stained adult Diphyllobothrium latum
Vitellaria
Genital pore
Uterus
Uterine pore
Ovary
Cephalic
Caudal
This cut portion shows early mature segments

Life-cycle of *Diphyllobothrium latum*



- Eggs of *D. latum* are passed out with the faces of infected definitive host like man, dog, cat etc.
- First larval stages ciliated coracidium released from the eggs in the water.
- Coracidia swim in water with the help of cilia and are ingested by the cyclops (1st intermediate host) where the larval stage (procercoids) are developed.
- Infected Cyclops are again ingested by the fishes (2nd intermediate host) where the another larval stage plerocercoids are developed.

- Definitive host like dog, man etc gets the infection by the ingestion of raw or undercooked plerocercoid infected fishes.
- Adult *Diphyllobothrium latum* will be developed in the small intestine of definitive host within 4 weeks after infection.

Pathogenesis and symptoms

- In man: It causes non-specific abdominal symptom and macrocytic hypochromic anaemia **(pernicious anaemia)** due to competition between the host and parasite for vitamin B12.
- Pernicious anaemia due to competition in absorption of the vitamin B12 between the host and the parasites. As the *D. latum* present in the proximal part of the intestine hence, the majority of the ingested vitamin B12 by the host is absorbed by the *D . latum*.
- *D. latum* may mechanically block the intestine, abdominal pain, vomiting, loss of weight, oedema in face etc.

Diagnosis

- Based on clinical signs.
- Faecal examination for the presence of yellow coloured, unsegmented and operculated eggs.

Treatment

- Praziquantel – 25mg/Kg b wt.
- Niclosamide – 75 – 150mg/Kg b wt.
- Quinacrine – 7 – 10mg/Kg b wt.

Control

- Avoid eating of raw fish
- Treatment of the infected animals.

Spirometra

- These are small to medium-sized cestodes.
- Scolex is spoon- shaped in outline with slit-like broad and shallow bothria.
- Uterus is spiraled and never rosettiform in arrangement and opens in uterine pore.
- The cirrus and vagina open independently on the ventral surface of the proglottid.
- Eggs have pointed ends.
- Adult tapeworms usually occur in domestic cats and other wild felids, occasionally in dogs and man.

Species

- ***Spirometra mansonoides***
- ***Spirometra mansoni***

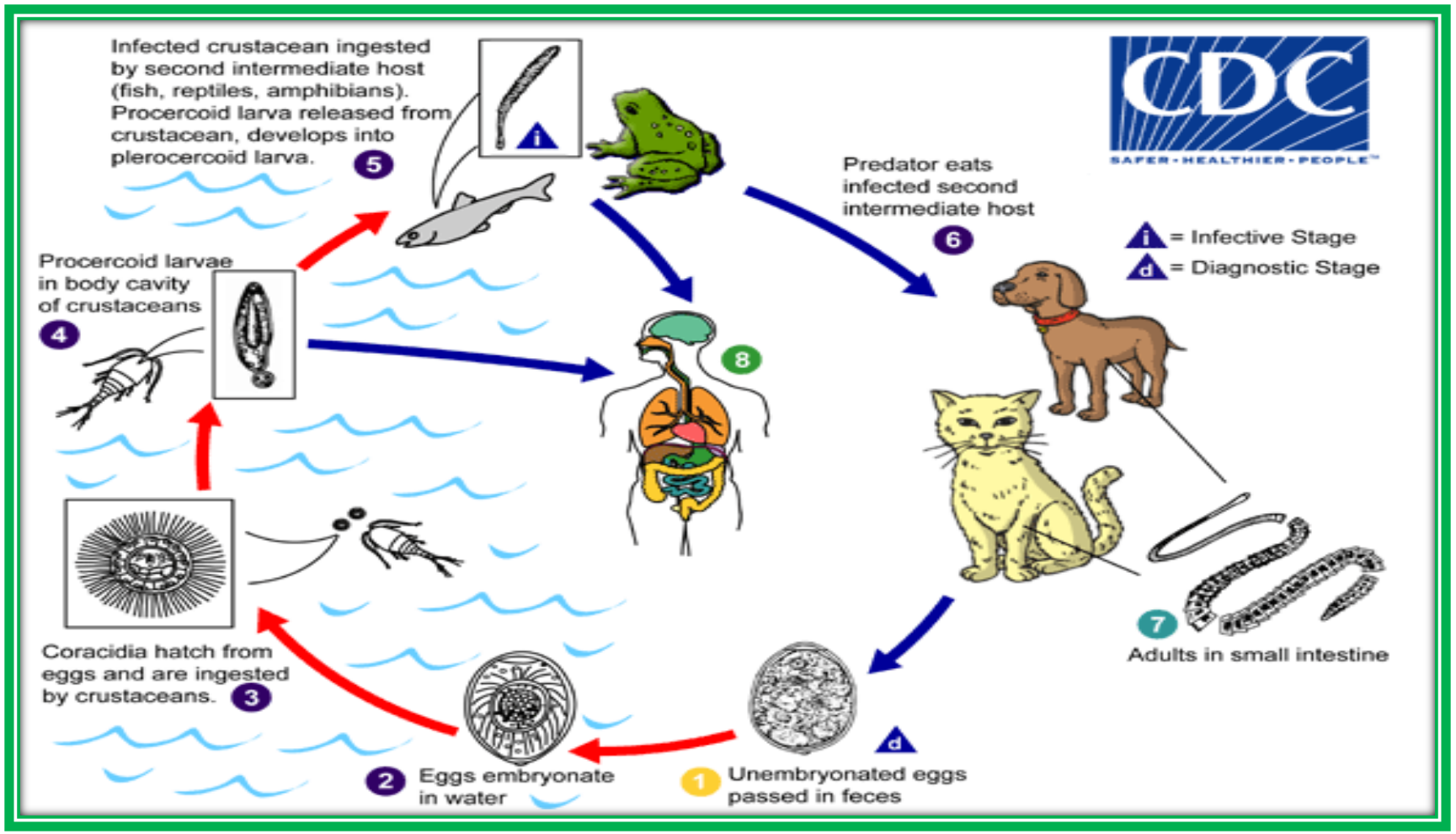
- ***Spirometra*** **species are almost similar to** ***Diphyllobothium latum*** **except following –**

Character	*Spirometra*	*Diphyllobothrium*
Size	Smaller (60-120 cm)	Larger (up to 20 m)
Uterus	Uterine coils forms a spiral of 2-7 coils	Rosette shaped
Egg	Pointed at the ends	Rounded at the ends
2nd Intermediate hosts	Frogs, snakes, birds and mammals like pig, man etc.	Fishes

Spirometra mansonoides

- **Definitive hosts :** *Spirometra mansonoides* found in Jejunum of cat, dog & raccoons.
- **1st intermediate host :** Cyclops
- **2nd intemediate host** : Water snake, tadpoles, birds, mammals and man act as 2nd intermediate host.
- **Larval stages** (metacestodes) : Procercoid in 1st Intermediate host & Plerocercoid (infective stage) in 2nd Intermediate host

Life Cycle


Infected crustacean ingested by second intermediate host (fish, reptiles, amphibians). Procercoid larva released from crustacean, develops into plerocercoid larva.
5
Predator eats infected second intermediate host
6
i = Infective Stage
d = Diagnostic Stage
Procercoid larvae in body cavity of crustaceans
4
8
Coracidia hatch from eggs and are ingested by crustaceans.
3
7
Adults in small intestine
2
Eggs embryonate in water
1
Unembryonated eggs passed in feces
d

Pathogenesis

- Plerocercoids of *Spirometra* species cause **sparganosis** in man which enter inside the body of man either through ingestion of plerocercoid infected host (pig) or accidental ingestion of crustacean (Cyclops) infected with procercoids.
- Spargana (Plerocercoid) migrate through the subcutaneous connective tissue, causing inflammation, nodule formation, oedema and eosinophilia.
- Spargana in man is found mostly in the subcutaneous tissues, muscles and around the eye.

Diagnosis

- On the basis of symptoms.
- Microscopic examination of faeces revealed egg of *Spirometra* sp. which resembles the egg of a digenetic trematode i.e. oval, yellow-brown and possesses a distinct operculum at one pole of the egg shell.

Treatment

- Bunamidine hydrochloride is effective in dog.


Thank you!