

*lec. 2*  
*Medical Helminthology*

A decorative graphic at the bottom of the slide features a white, wavy, ribbon-like shape that curves across the width of the page. Below this shape, there are several small, cyan-colored squares of varying sizes scattered across the light green background.



# Cestodes: Tapeworms

# 12

- **A. Cyclophyllidean tape worms:**
  - 3- *Hymenolepis nana*
  - 4- *Hymenolepis Diminuta*
  - 5- *Dipylidium caninum*
  - 6- *Echinococcus granulosus*
- **B. Pseudophyllidean tape worm:**
  - 1- *Diphyllobothrium latum*

# Hymenolepis nana

- **Common name : Dwarf tape worm**
- **Final host :** small intestine proximal ileum) of man, Rat, mice
- **Intermediate host:** لا يوجد
- **Disease: Hymenolopiasis**
- **Infective stage: Ovum**
- **Mode of infection :**
  - A. Ingestion of the food and water contaminated with eggs
  - B. **Autoinfection:** Gravid segment which rupture with in the definitive host, in the small intestine, hatching the eggs which contain hexacanth-embryo, penetrates the intestinal villus and develops into the cysticercoid larva. This is a solid pyriform structure, 4 days, the mature larva emerging out of the villus evaginates its scolex and attaches to the mucosa. It starts strobilization, to become the mature worm, which begins producing eggs in about 25 days.

- **Morphology**

1. Adult Worm:

- *H. nana* is the **smallest intestinal** cestode that infects man.
- It is **5–45 mm** in length and less than 1 mm thick.
- The scolex has **4 suckers** and a retractile **rostellum** with a **single row of hooks**.

2. Egg:

- The echinococcal egg is roughly spherical or ovoid, 30–40  $\mu\text{m}$  in size enclosing the hexacanth oncosphere, covered by two membrane.
- The space between 2 membranes contains yolk granules and **4–8 thread like polar filaments** arising from 2 knobs on the embryophore.
- The eggs **float in saturated solution of salt** and are non bile stained.

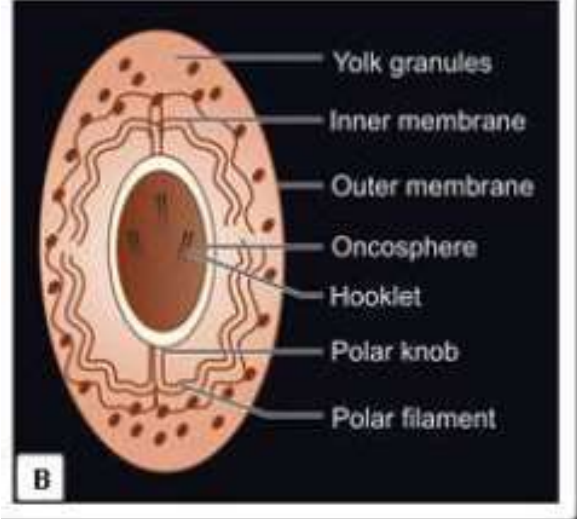
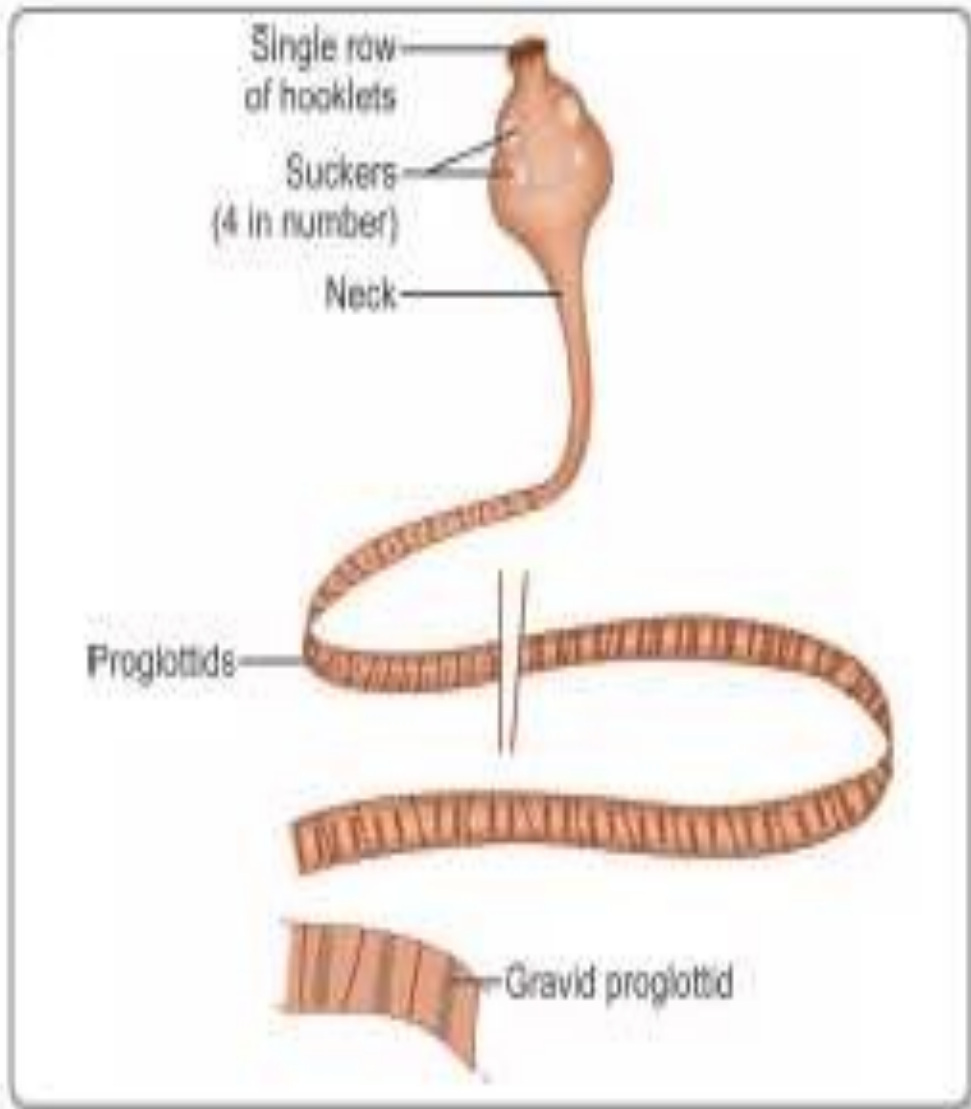


Fig. 12.23: Adult worm of *Hymenolepis nana*

- **Pathogenicity and clinical signs**
- **Hymenolopiasis** occurs more commonly in children.
- There are usually no symptoms but in heavy infections, there is nausea, anorexia, abdominal pain, diarrhea, and irritability.
- Sometimes pruritus may occur due to an allergic response.
- **Lab. diagnosis**
- By microscopic examination of the stool showing the characteristic feature of each ova.
- GSE (Concentration methods like salt flotation) and formalin ether may be readily used.

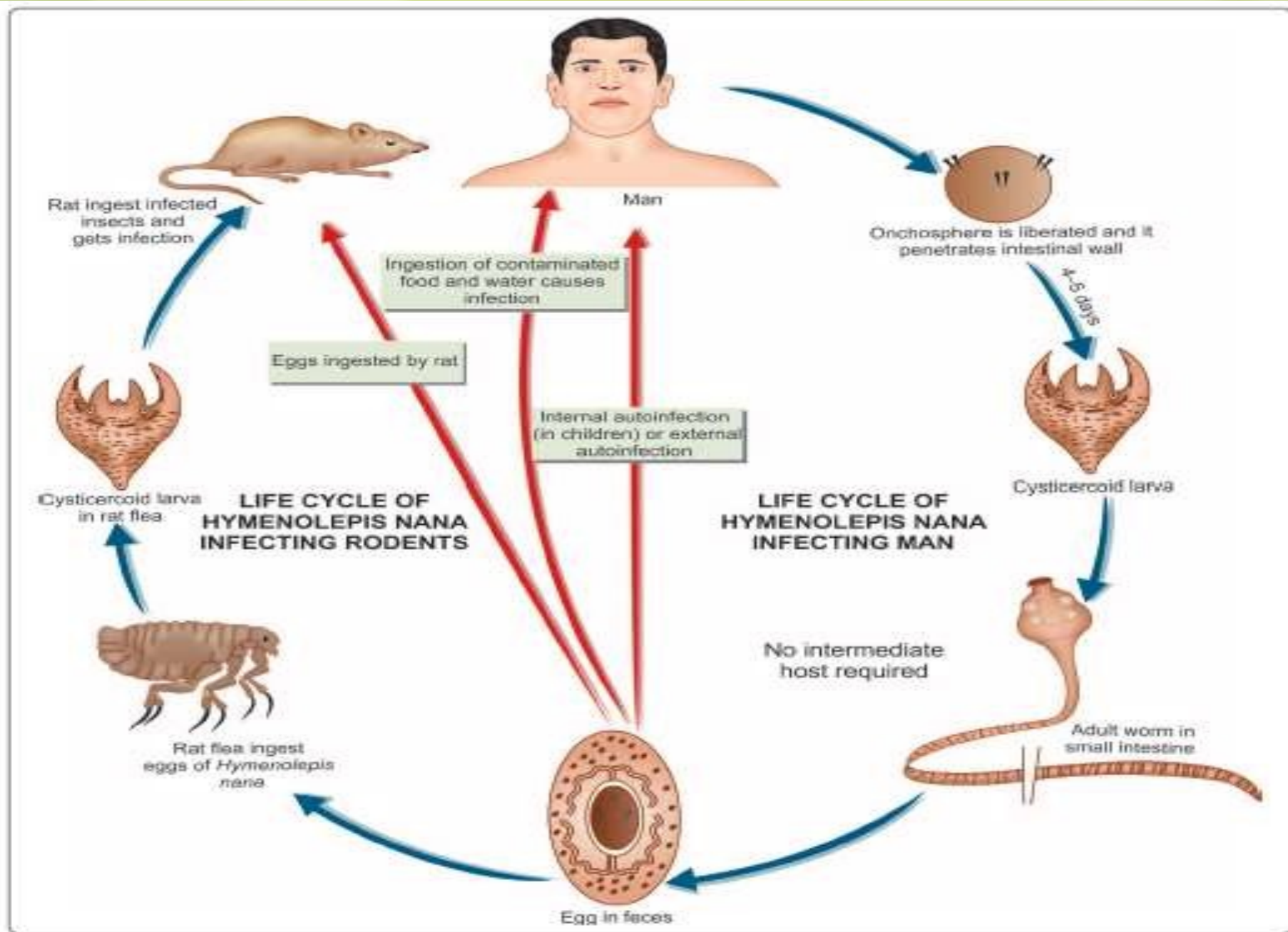
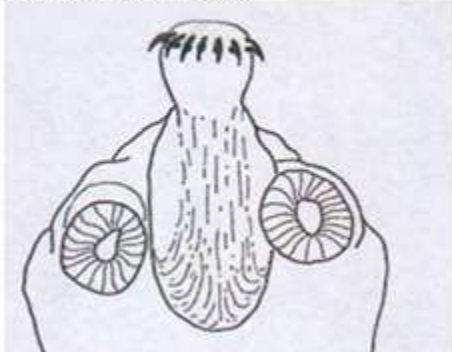
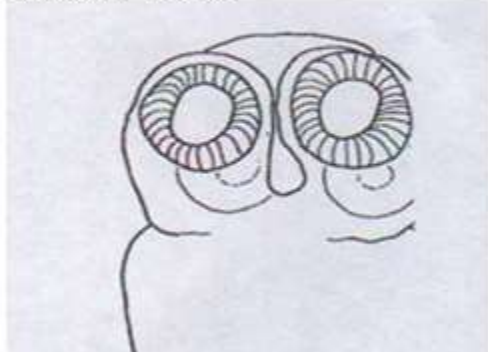
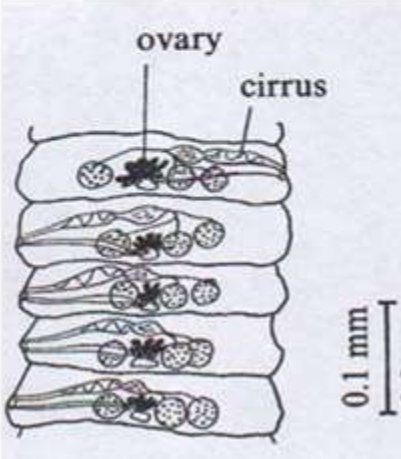
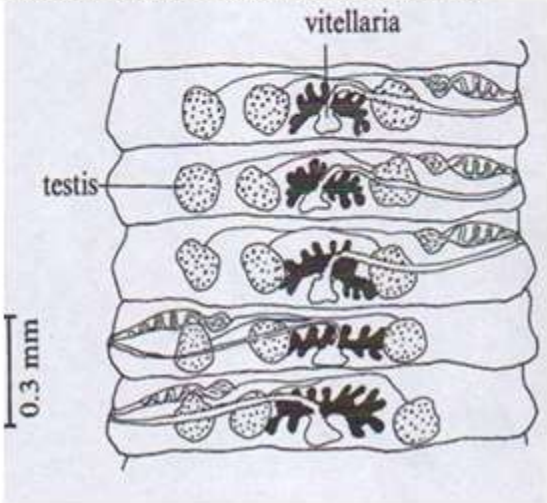


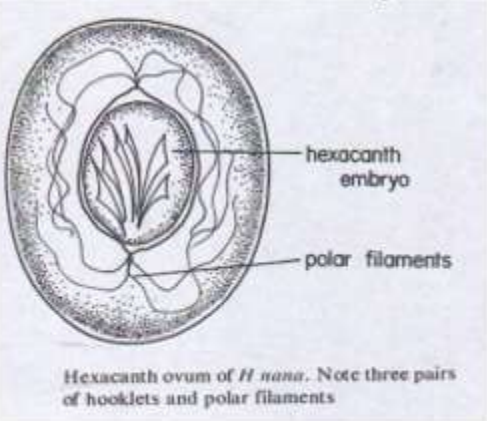
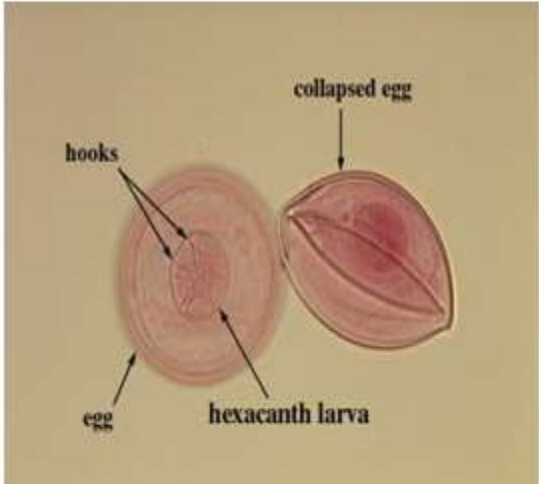
Fig. 12.25: Life cycle of *Hymenolepis nana*

# Hymenolepis diminuta

- **Common name : Rat tape worm**
- **Final host :** small intestine (proximal ileum) of Rat, mice, ( Man accidentally)
- **Intermediate host: rat flea**
- **Disease: Hymenolopiasis**
- **Infective stage: cysticercoid**
- **Mode of infection :** Ingestion of cysticercoid developed on rat flea Infection to man
- **To man :** infection take place accidentally by food or contaminated hands by cysticercoid stage.



|                       | <u>Hymenolepis nana</u> 5-45mm  | <u>Hymenolepis diminuta</u> 10-60cm  |
|-----------------------|---|--|
| <b>common name</b>    | Dwarf tap worm<br>                             | Rat tape worm<br>                       |
| <b>Habitat</b>        | small intestine of man, Rat, mice   | Small intestine of Rat, mice and rarely man  |
| <b>Length</b>         | 10-40mm   | 10-60cm  |
| <b>Scolex</b>         | has 4suckers and retractile rostellum with hooks  | Has 4 suckers and retractile rostellum without hooks   |
| <b>Mature segment</b> | small in size contain <b>three testes</b><br> | Large in size contain three testes<br> |

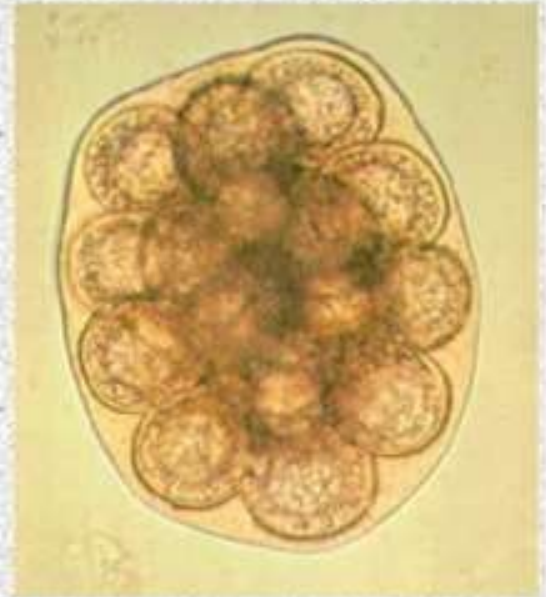
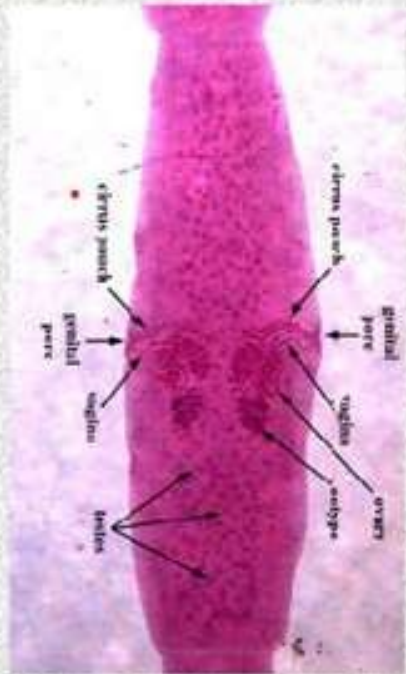
|                                 |   |  |
|---------------------------------|---|--|
| <p><b>Ovum</b></p>              | <p>Ovum surrounded by thin transparent outer membrane and an inner thick membrane with polar filaments the ovum contains hexacanth embryo</p>  <p>Hexacanth ovum of <i>H. nana</i>. Note three pairs of hooklets and polar filaments</p> | <p>same shape as <u><i>H. nana</i></u> but without polar filaments</p>   |
| <p><b>Host</b></p>              | <p><u><i>H. nana</i></u> need only one host to complete their life cycle (man)</p>  | <p><u><i>H. diminuta</i></u> needs two host to complete their life cycle, the final host is the Rat, mice and rarely man While the intermediate host is the <u>arthropoda</u> (<u>cockroaches, fleas, beetles</u>)</p> |
| <p><b>Infective stage</b></p>   | <p>Ovum</p>   | <p>Cysticercoid in <u>arthropoda</u></p>   |
| <p><b>Mode of infection</b></p> | <p><b>Ingestion contaminated food with egg</b><br/><b>Internal autoinfection or contaminated food with ova in man</b></p>   | <p>Eating <u>arthropoda</u> containing cysticercoid</p>  |

# Dipylidium caninum

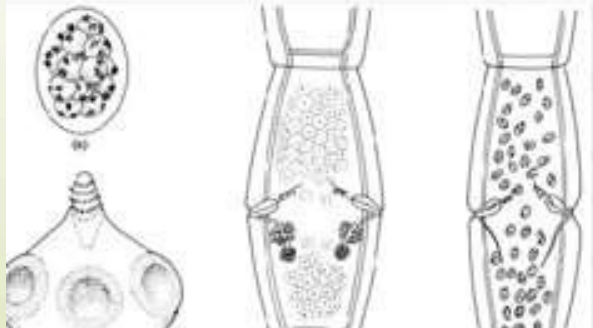
- **Common name:** Double pored dog tapeworm or cucumber tapeworm.
- **Final host :** Small intestine of Dogs, cats, and rarely man
- **Intermediate host:** Dog and cat flea برغوث الكلب
- **Infective stage:** cysticercoid (Man acquires infection by ingestion of flea harboring cysticercoid larva).
- **Lab diagnosis:** Egg packet (capsule) pass with dog feces

- **Morphology**

- The adult worm in the intestine is about 10–70 cm long
- The scolex has 4 prominent suckers and a retractile rostellum with up to 7 rows of spines
- The mature proglottid has 2 *genital pores*, 1 on either side, hence the name *Dipylidium* (*dipylos*—2 *entrances*).
- Gravid proglottids are passed out of the anus of the host singly or in groups.



**Egg packet/capsule**



# Echinococcus granulosus

- **Common name:** Dog tape worm
- **Final host :** jejunum and duodenum of dogs and other canine carnivora (wolf and fox).
- **Intermediate host:** Sheep, Goat, Cattle and Horse
- **Accidental host:** Man (dead end)
- **Infective stage to final host:** Hydatid cyst
- **Infective stage to Intermediate+accidental host:** Ova
- **Disease:** Hydatid cyst
- **Lab diagnosis:**
  1. Using imaging tech. like X-ray ,CT scan, MRI to detect cyst in different body organ
  2. Casoni-test: hypersensitivity skin test

- **Morphology :**
- It is a small tapeworm, measuring only 3–6 mm in length.
- It consists of a scolex, a short neck, and strobila (with 3 proglottid only).
- The scolex is pyriform, with 4 suckers and a prominent rostellum bearing 2 circular rows of hooklets.
- The eggs of *Echinococcus* are indistinguishable from those of *Taenia* species.

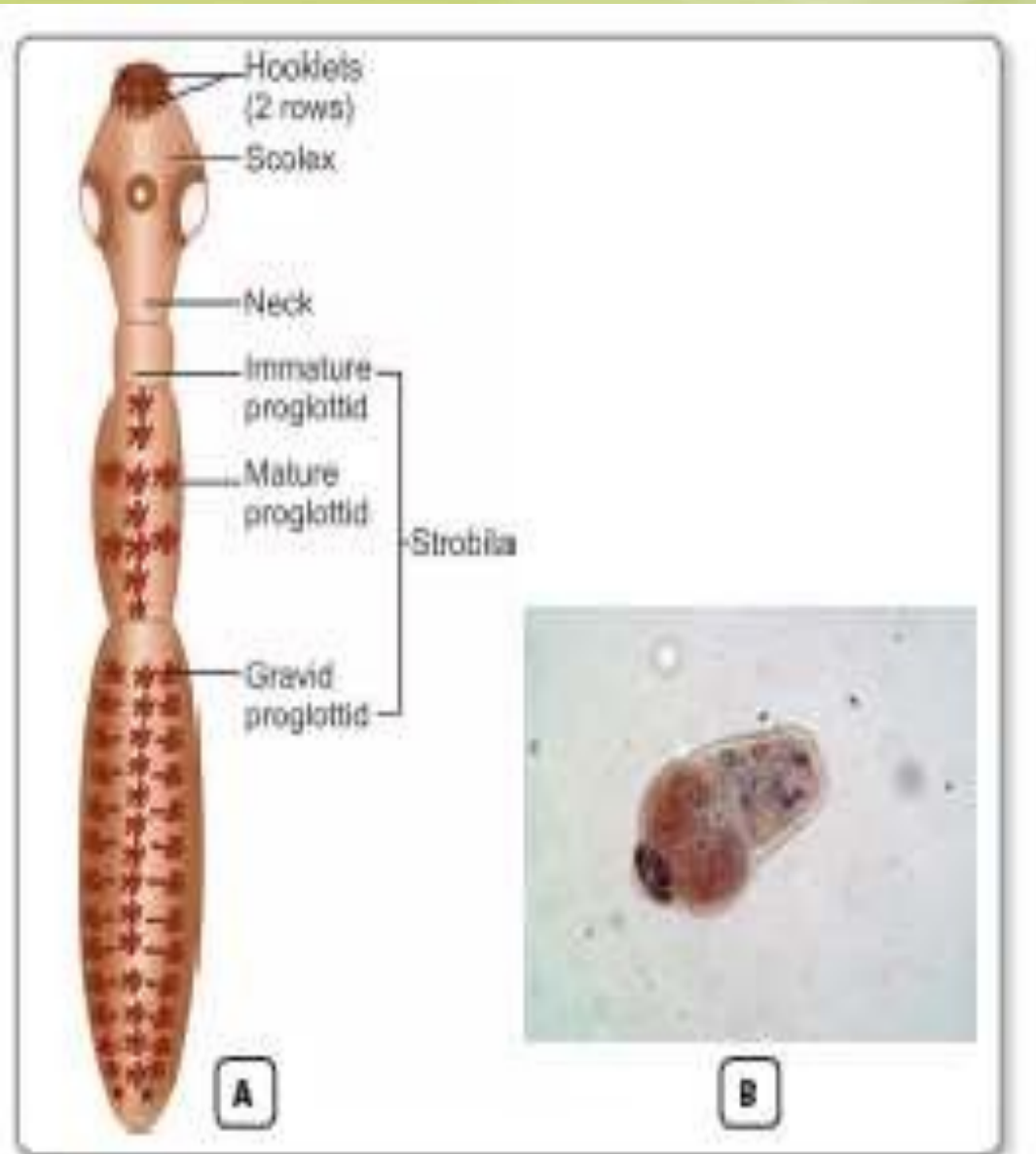
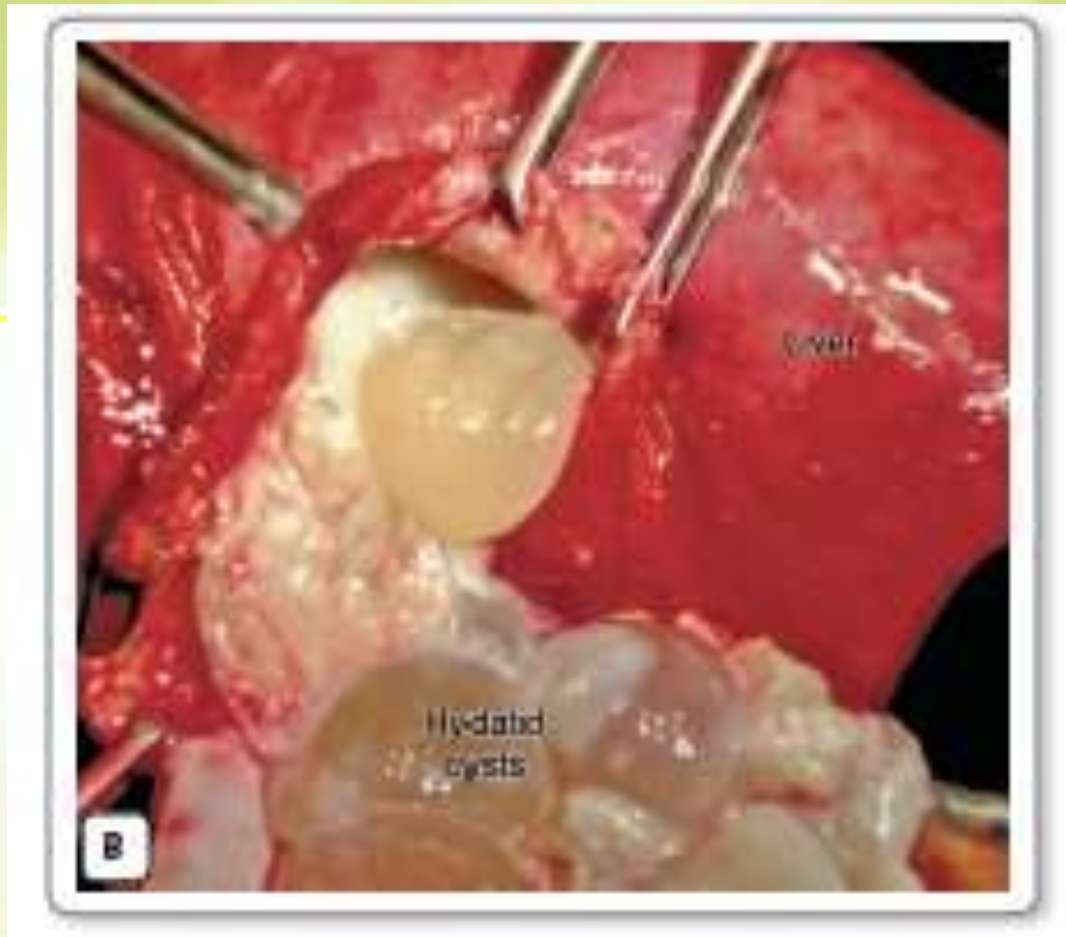


Fig. 12.15: *Echinococcus granulosus*. A. Schematic diagram of adult worm; B. Microscopic appearance of scolex of *Echinococcus*.

# Hydatid cyst





# Life cycle of E. granulosus

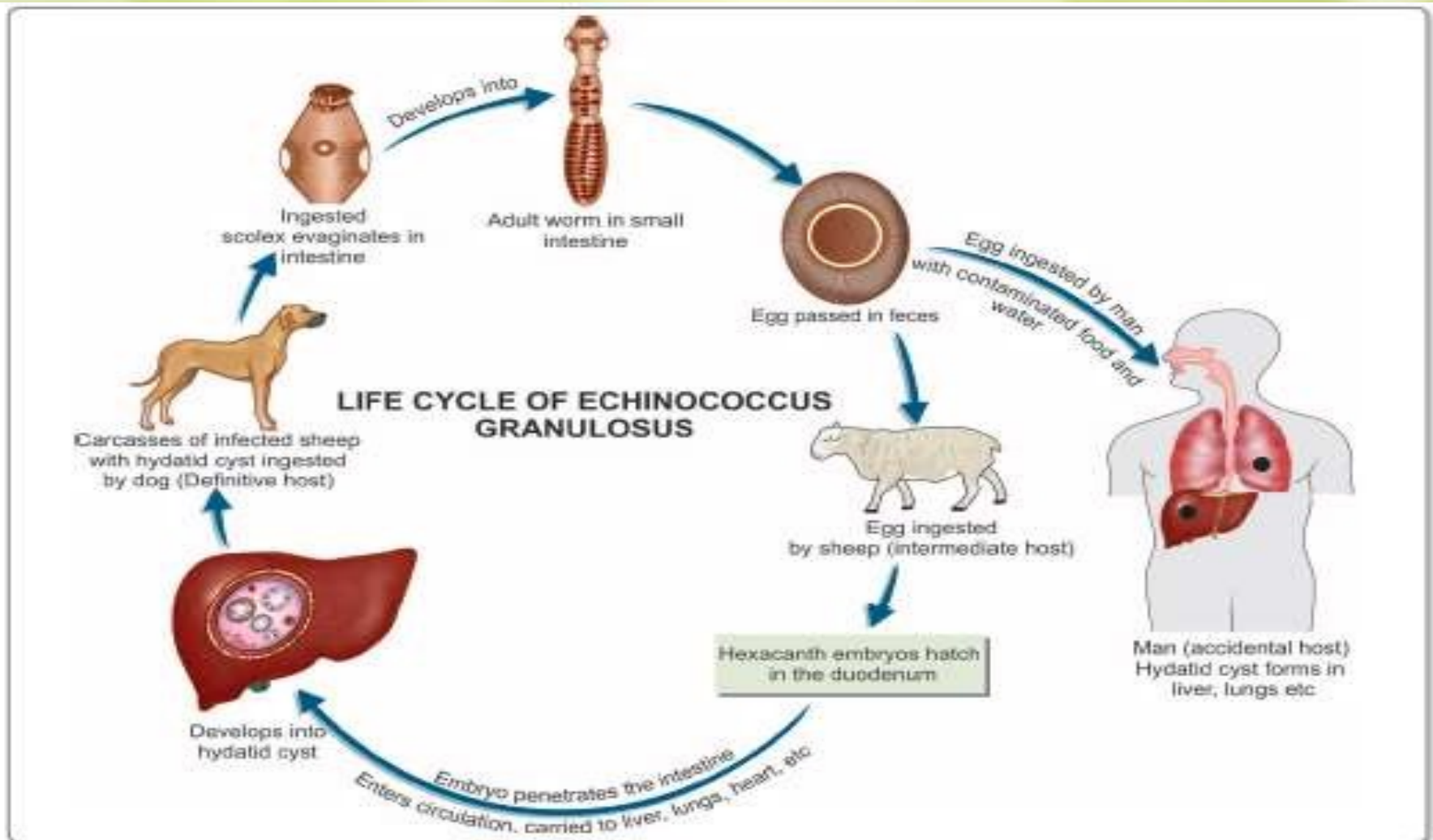
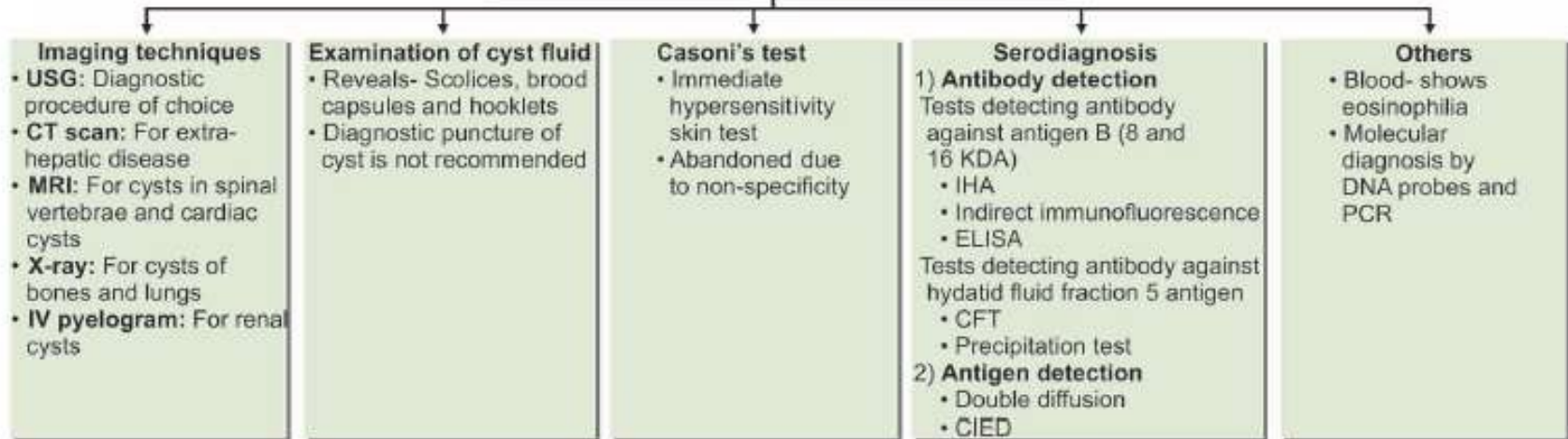


Fig. 12.16: Life cycle of *Echinococcus granulosus*

## • **Clinical Features**

- Most of the times infection is asymptomatic and accidentally discovered.
- Clinical disease develops only when the hydatid cyst has grown big enough to cause obstructive symptoms.
- Disease results mainly from pressure effects caused by the enlarging cysts.
- In about half the cases, the primary hydatid cyst occurs
- in liver (63%) (Hepatomegaly, pain, and obstructive jaundice )
- The next common site is the lung (25%). Cough,
- In the kidney (2%), hydatid cyst causes pain and hematuria.

### Laboratory Diagnosis of *Echinococcus granulosus*



Flowchart 12.2: Laboratory diagnosis of *Echinococcus granulosus*

- **Treatment**

- **Traditionally** surgical removal was considered as the best mode of treatment of cysts. Currently, ultrasound staging is recommended and management depends on the stage.
- In early stages, the treatment of choice is puncture, aspiration, injection, and reaspiration (PAIR).
- *Puncture, Aspiration, Injection, and Reaspiration (PAIR)*
- PAIR, considered as a controversial procedure earlier, is now widely used in early stages of the disease.

**Order: Pseudophyllidean**

***Diphyllobothrium latum***

**Longest cestode infecting man**



# *Diphyllobothrium latum*

- **Common name:** broad or fish tapeworm
- **Habitat (final host):** small intestine of human and other mammals feed on fish.
- **Length:** 3-10 meters. having spoon-shaped head with 2 slit-like grooves (bothria)
- **Proglottids no.** 3000-4000.
- **Disease:** Fish tape worm disease , Diphyllbotheriasis
- **Infective stage:** Plerocercoid
- **Intermediate-host:**
  - 1<sup>st</sup> *Cyclops*
  - 2<sup>nd</sup> Fish
- **Diagnosis:** ova in stool.
- **Mode of transmission:** Man gets infection by consuming uncooked or undercooked fish containing third stage plerocercoid larva

- **Pathogenesis**

1-GIT disturbance such as (diarrhea , abdominal pain ,vomiting ,Intestinal obstruction and may occurs appendicitis.

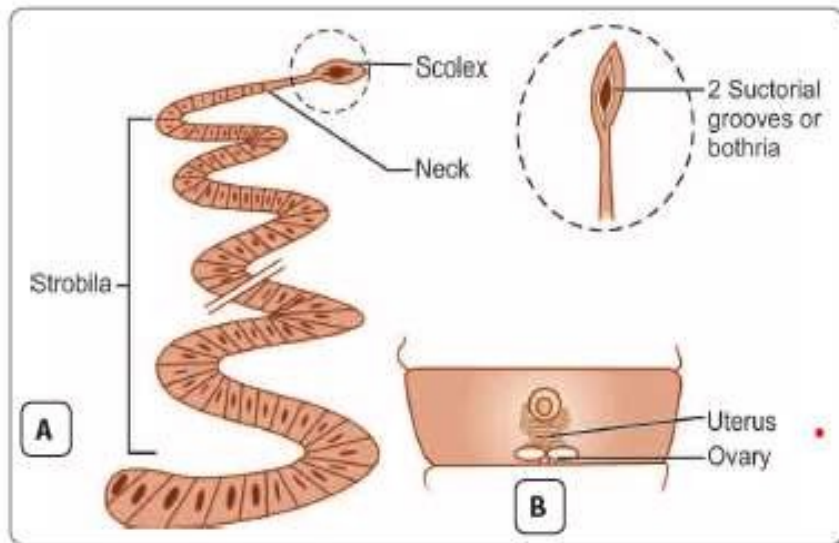
2-cause decrease of Vit.B12 in the blood.

3-cause Megaloplastic anemia or called (Cephalous anemia)

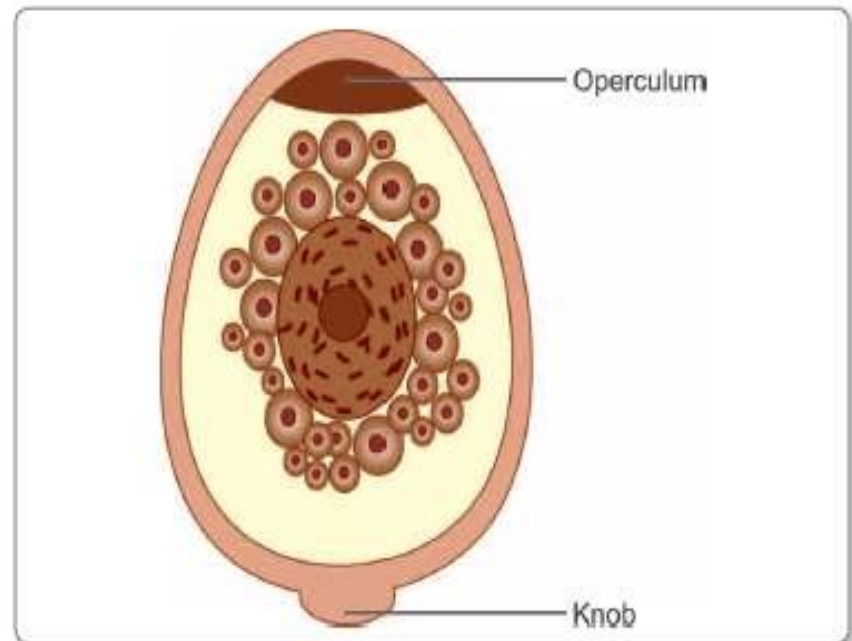
4-worme may secrete toxic material .

- **Laboratory Diagnosis:**

Microscopic identification of eggs in the stool is the basis of specific diagnosis.

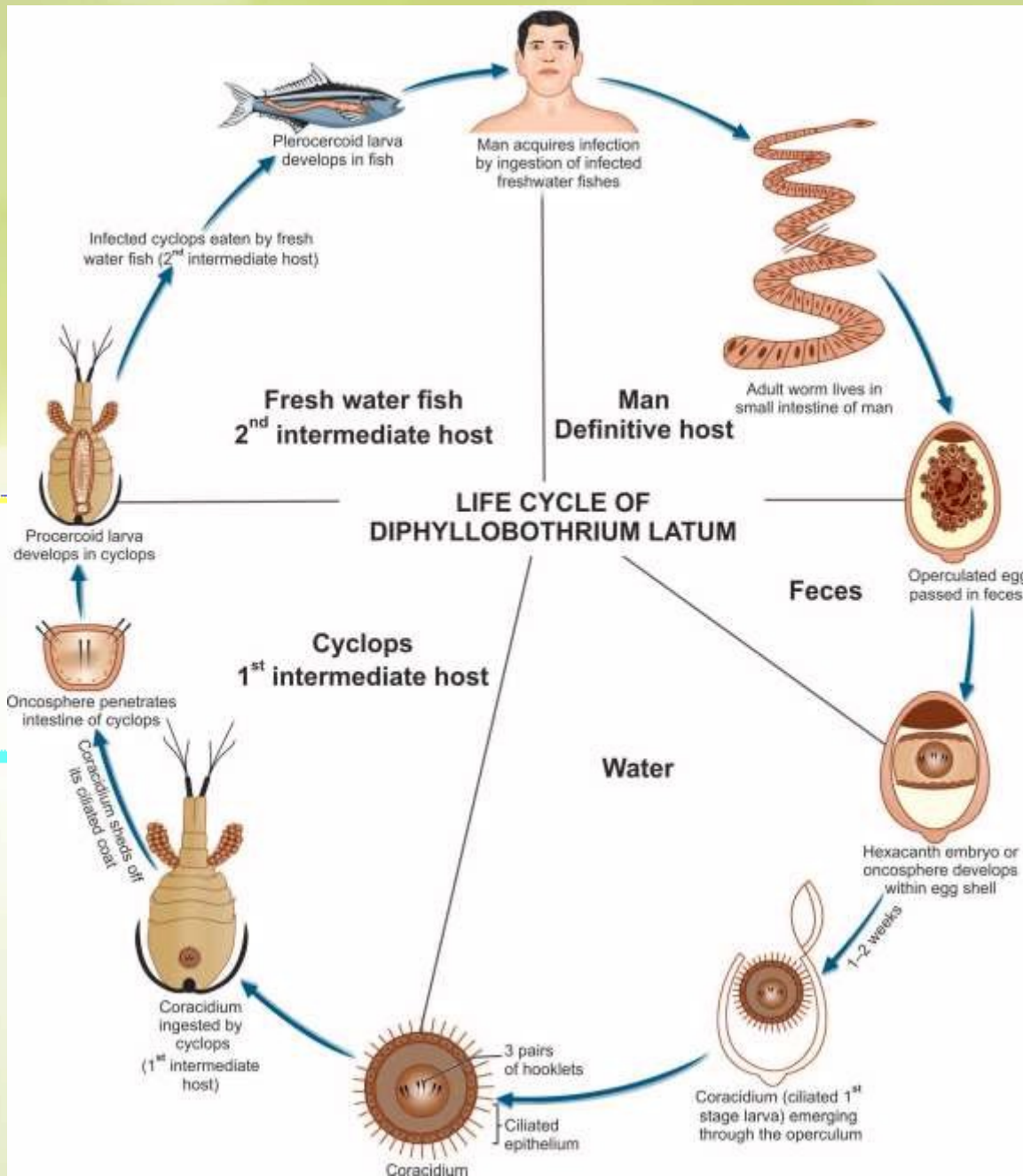


**Fig. 12.3:** *Diphyllobothrium latum* A. Adult worm showing spatulate scolex, neck, and strobila B. Mature proglottid



**Fig. 12.4:** Operculated egg of *Diphyllobothrium latum*





**Thank You**

Thank You