



## Helminths

### Cestodes

### CYCLOPHYLLIDEAN TAPEWORMS

### *Echinococcus Granulosus*

**Common name:** Dog tapeworm

#### Habitat

-The adult worm lives in the jejunum and duodenum of dogs and other canine Carnivora (wolf and fox).

- The larval stage (hydatid cyst) is found in humans and herbivores animals (sheep, goats, cattle, and horses).

#### Morphology

#### Adult Worm of *Echinococcus Granulosus*

The adult worm consists of the head (scolex), neck, and strobila (body). The general features of the adult worm are similar to any cyclophyllidean cestodes

- **The scolex** is pyriform, with 4 suckers and a prominent rostellum bearing 2 circular rows of hooklets (25–30).

-**The neck** is short than the rest of the worm (3 mm ×6 mm).

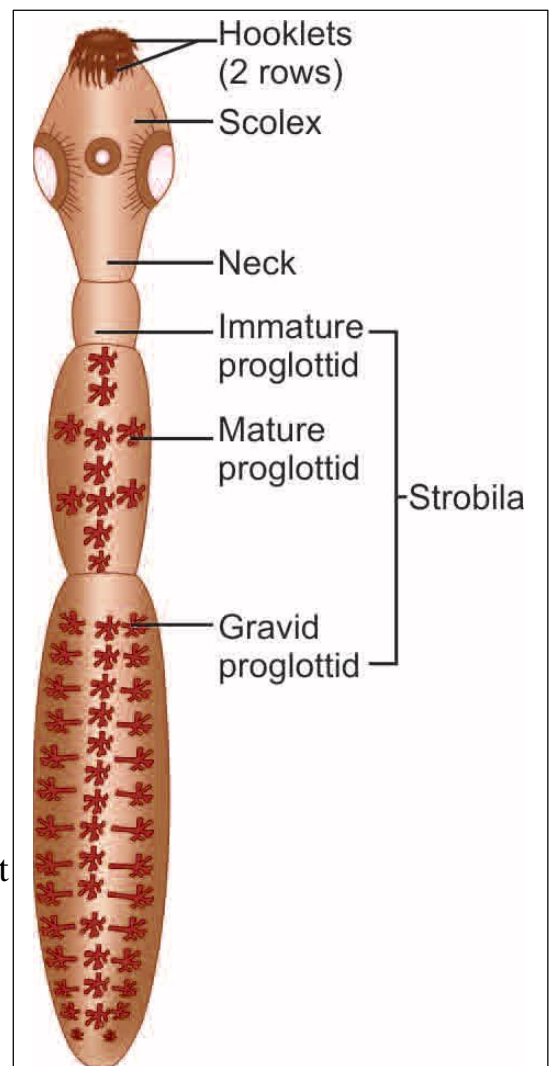
-**The strobila** is composed of only 3 proglottids, the anterior immature, the middle mature, and the posterior gravid segment.

- The terminal proglottid is longer and wider than the rest of the worm and contains a branched uterus filled with eggs.

- The adult worm lives for 6–30 months.

**Morphology of the Larva:** The larval form is found within the hydatid cyst developing inside various organs of the intermediate host.

$\frac{3}{4}$ It represents the structure of the scolex of an adult worm





## Department of Medical Laboratory Techniques parasite / practical

Assist lect. Hussain A. Razuqy



### Lab : 13

and remains **invaginated** within a vesicular body. After entering the definitive host, the scolex with suckers and rostellar hooklets become **evaginated** and develop into an adult worms.

#### **Morphology of the eggs**

- The eggs of *Echinococcus* are indistinguishable from those of *Taenia* species. It is ovoid in shape and brown in color. It contains an embryo with 3 pairs of hooklets

#### **Life Cycle of Echinococcus granulosus**

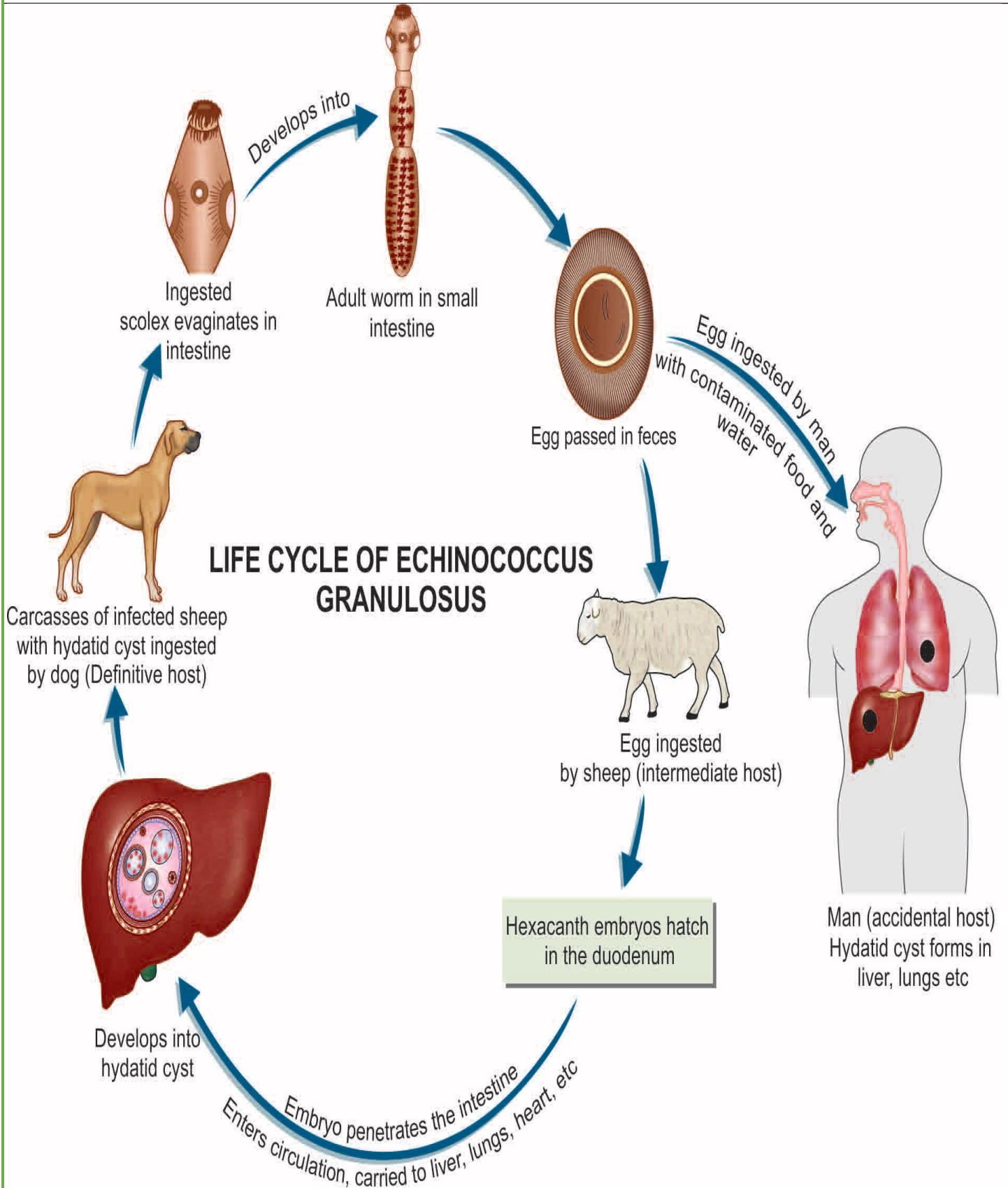
its life cycle in 2 hosts

**Definitive host:** Dog (optimal host), wolf, jackal, and fox

**Intermediate host:** Sheep and Cattle. Sheep is the ideal intermediate host.

- Man acts as an accidental intermediate host (dead end).
- The larval stage of the parasite is passed in intermediate hosts, including man, giving rise to hydatid cysts.
- The adult worm lives in the small intestine of dogs and other canine animals. These animals discharge numerous eggs in their feces.
- Intermediate hosts (sheep and cattle) ingest them while grazing. Human infection follows ingestion of the eggs due to intimate handling of infected dogs or by eating raw vegetables or other food items contaminated with dog feces. The ova ingested by man or by sheep and cattle are liberated from the chitinous wall by gastric juice liberating the **hexacanth embryos** which penetrate the intestinal wall and enter the **portal venules**, to be carried to the liver along the portal circulation. These are trapped in hepatic sinusoids, where they eventually develop into hydatid cysts. About 75% of hydatid cysts develop in the liver, which acts as the first filter for the embryo. However, some embryos that pass through the liver, enter the right side of the heart and are caught in **pulmonary capillaries** (forming pulmonary hydatid cysts), so that the lung acts as the **second filter**. A few enter the systemic circulation and get lodged in various other organs and tissues such as the spleen, kidneys, eyes, brain, or bones

**Lab : 13**

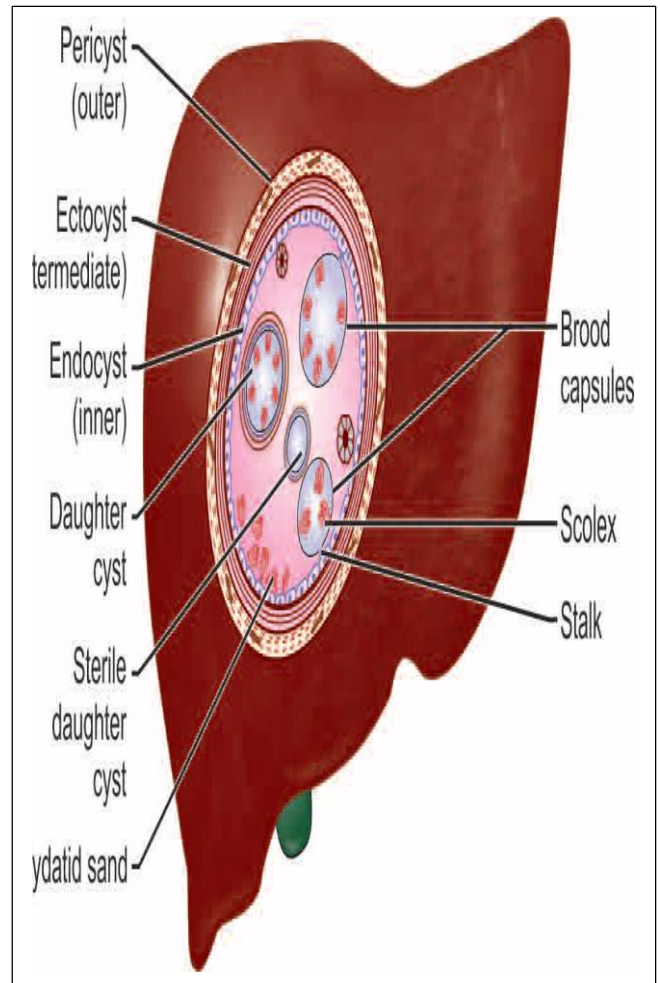




Lab : 13

**Evolution of Hydatid Cyst**

- It enlarges slowly and reaches a diameter of 0.5–1 cm in about 6 months. The growing cyst evokes host tissue reaction leading to the deposition of fibrous capsule around it. The cyst wall secreted by the embryo consists of 3 indistinguishable layers
- Pericyst is the outer host inflammatory reaction consisting of fibroblastic proliferation.
- Ectocyst is the intermediate layer composed of characteristic acellular, chitinous, laminated hyaline material. It has the appearance of the white of a hard-boiled egg.
- Endocyst is the inner germinal layer which is cellular and consists of several nuclei embedded in a protoplasmic mass and is extremely thin (22–25 nm). The germinal layer is the vital layer of the cyst and is the site of asexual reproduction giving rise to brood capsules with scolices. It also secretes hydatid fluid, which fills the cyst.



**Localisation of the hydatid cyst :**

Usually hepatic (75%), sometimes pulmonary (10%), muscular (5%), splenic (3%), osseous (2%), renal (2%), or in other organs (3%).

**Laboratory Diagnosis**

**Imaging:** Radiological examinations and other imaging techniques such as ultrasonography (USG), CT scan, and MRI reveal the diagnosis in most cases of **cystic echinococcosis**

**Imaging techniques**

- **USG:** Diagnostic procedure of choice
- **CT scan:** For extra-hepatic disease
- **MRI:** For cysts in spinal vertebrae and cardiac cysts
- **X-ray:** For cysts of bones and lungs
- **IV pyelogram:** For renal cysts



## Department of Medical Laboratory Techniques parasite / practical

Assist lect. Hussain A. Razuqy



### Lab : 13

**Examination of Cyst:** Examination of aspirated cyst fluid under the microscope after trichome staining reveals scolices, brood capsules, and hooklets. Exploratory puncture of the cyst to obtain cystic fluid should be avoided as it may cause the escape of hydatid fluid and consequent anaphylaxis. Therefore, fluid aspirated from surgically removed cysts should only be examined

#### Examination of cyst fluid

- Reveals- Scolices, brood capsules and hooklets
- Diagnostic puncture of cyst is not recommended

#### Casoni's test

- Immediate hypersensitivity skin test
- Abandoned due to non-specificity

#### Other Diagnosis

##### Serodiagnosis

##### 1) Antibody detection

Tests detecting antibody against antigen B (8 and 16 KDA)

- IHA
- Indirect immunofluorescence
- ELISA

Tests detecting antibody against hydatid fluid fraction 5 antigen

- CFT
- Precipitation test

##### 2) Antigen detection

- Double diffusion
- CIED

##### Others

- Blood- shows eosinophilia
- Molecular diagnosis by DNA probes and PCR