

Respiratory Module

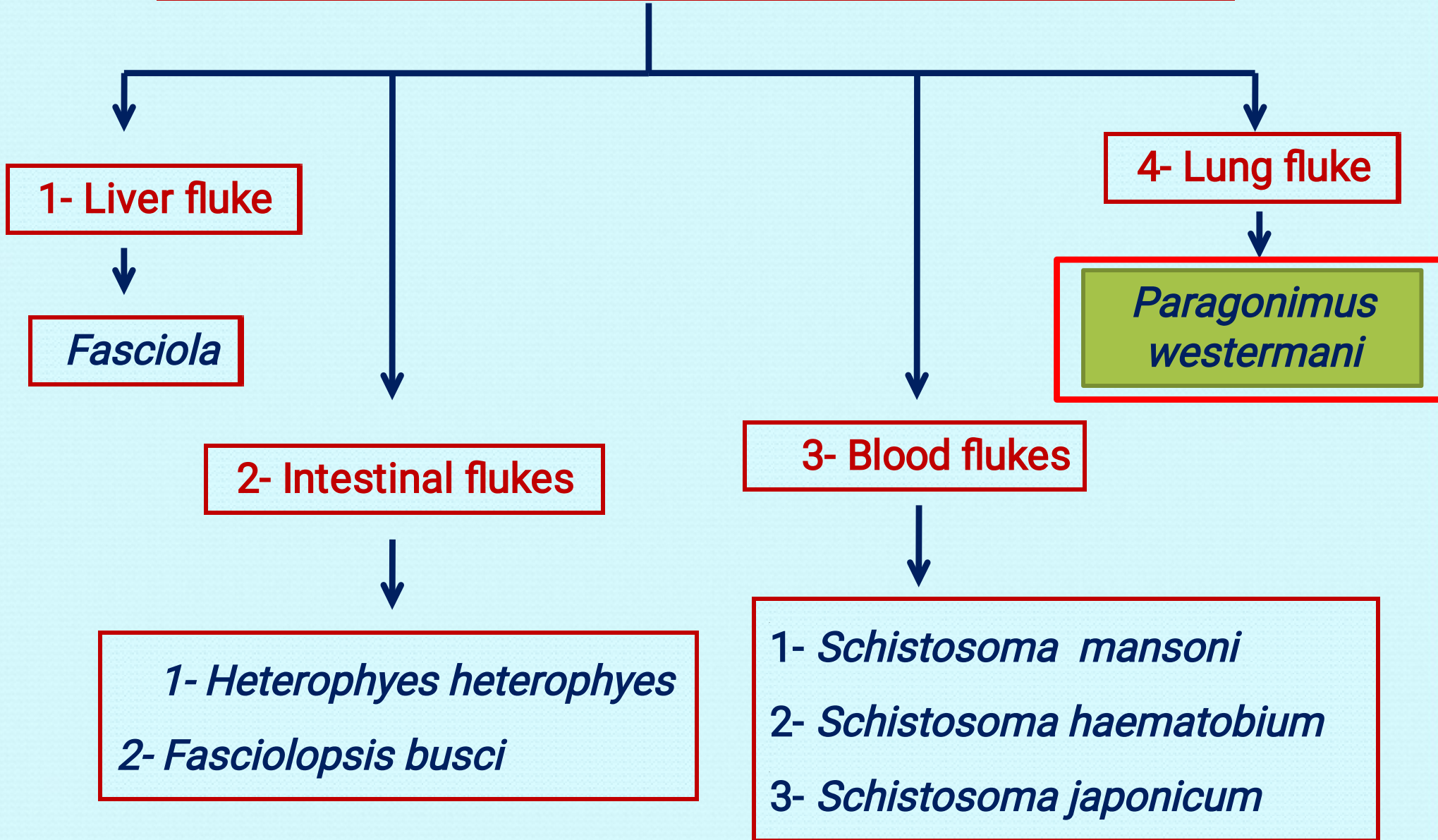
2022-2023

Paragonimus westermani

(Lung Fluke)

Dr. Mohammad Odaibate

Class Trematoda (flukes) are classified into



Paragonimus westermani (Oriental lung fluke)

❖ Geographical distribution :-

Endemic in Far East of Asia (Japan, Korea, China, Philippine and Central & South America.

❖ **Habitat** : Lung in cyst like pockets.

❖ **D.H** : Man, fish eating animals & carnivorous.

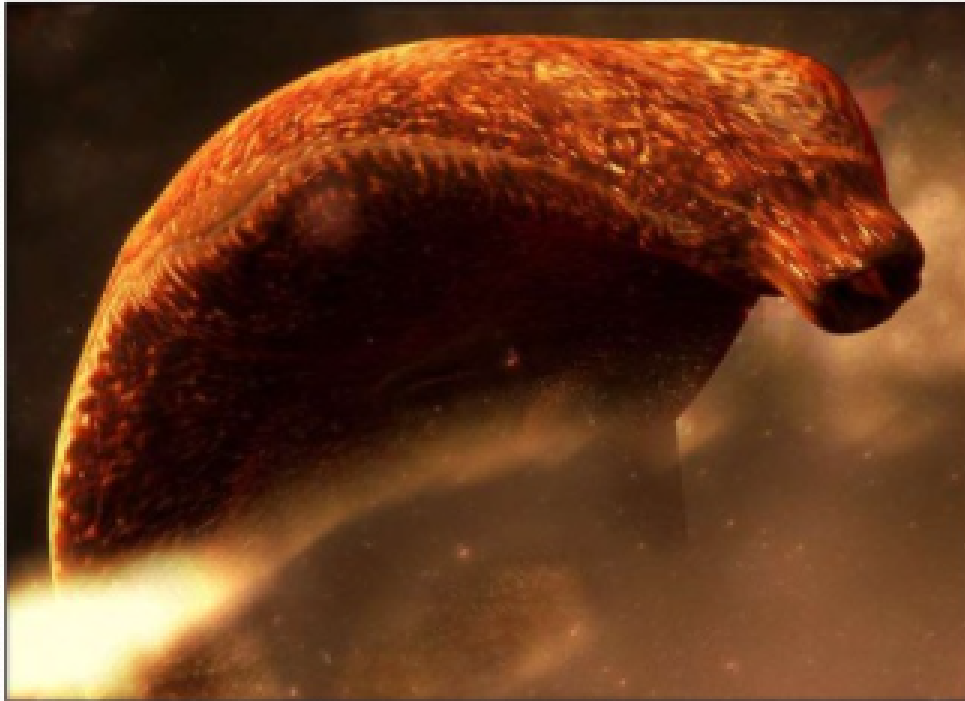
❖ **I.H:** • 1st: Fresh water snail (*Semisulcospira*).

• 2nd: Fresh water crayfish or crabs.

Diseases : Paragonimiasis

Morphological Characters

Adult worm



18

Egg (D.S)



Size : 90 x 50 μm .

Shape : Oval.

Shell : Thick shell with operculum .

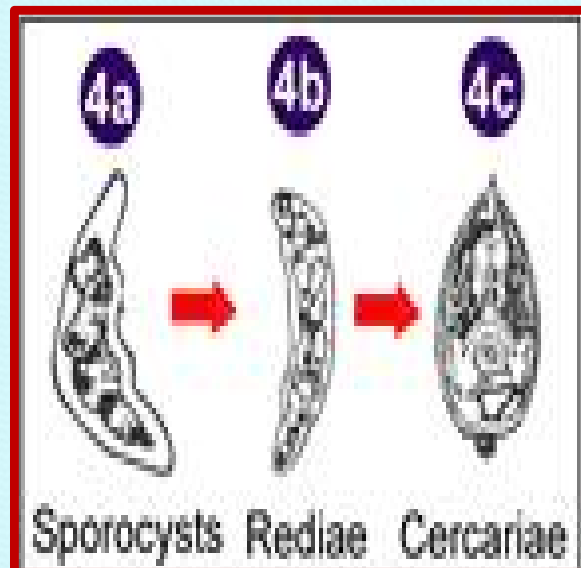
Color : Golden brown.

Content : Immature ovum.

Snail 1st(I.H)



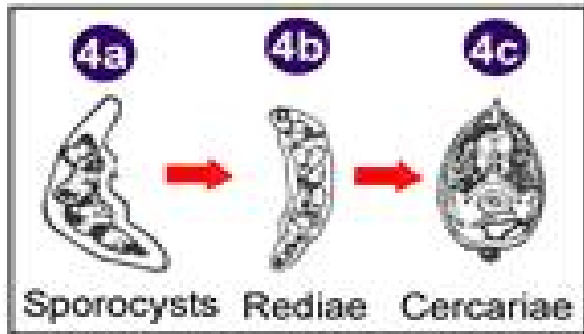
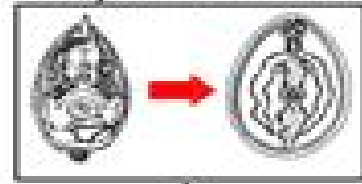
Semisulcospira



Crabs (2nd I.H)

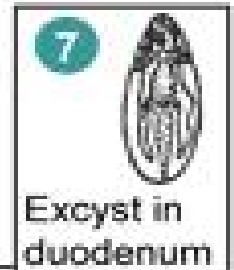


5 Cercariae invade the crustacean and encyst into metacercariae. **I**

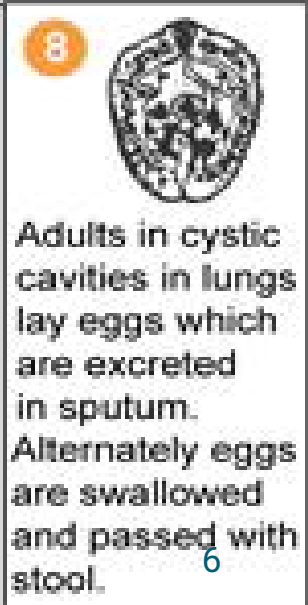


Sporocysts Rediae Cercariae

Humans ingest inadequately cooked or pickled crustaceans containing metacercariae. **6**



Excyst in duodenum



Adults in cystic cavities in lungs lay eggs which are excreted in sputum. Alternately eggs are swallowed and passed with stool. **6**

1 Unembryonated eggs

2 Embryonated eggs

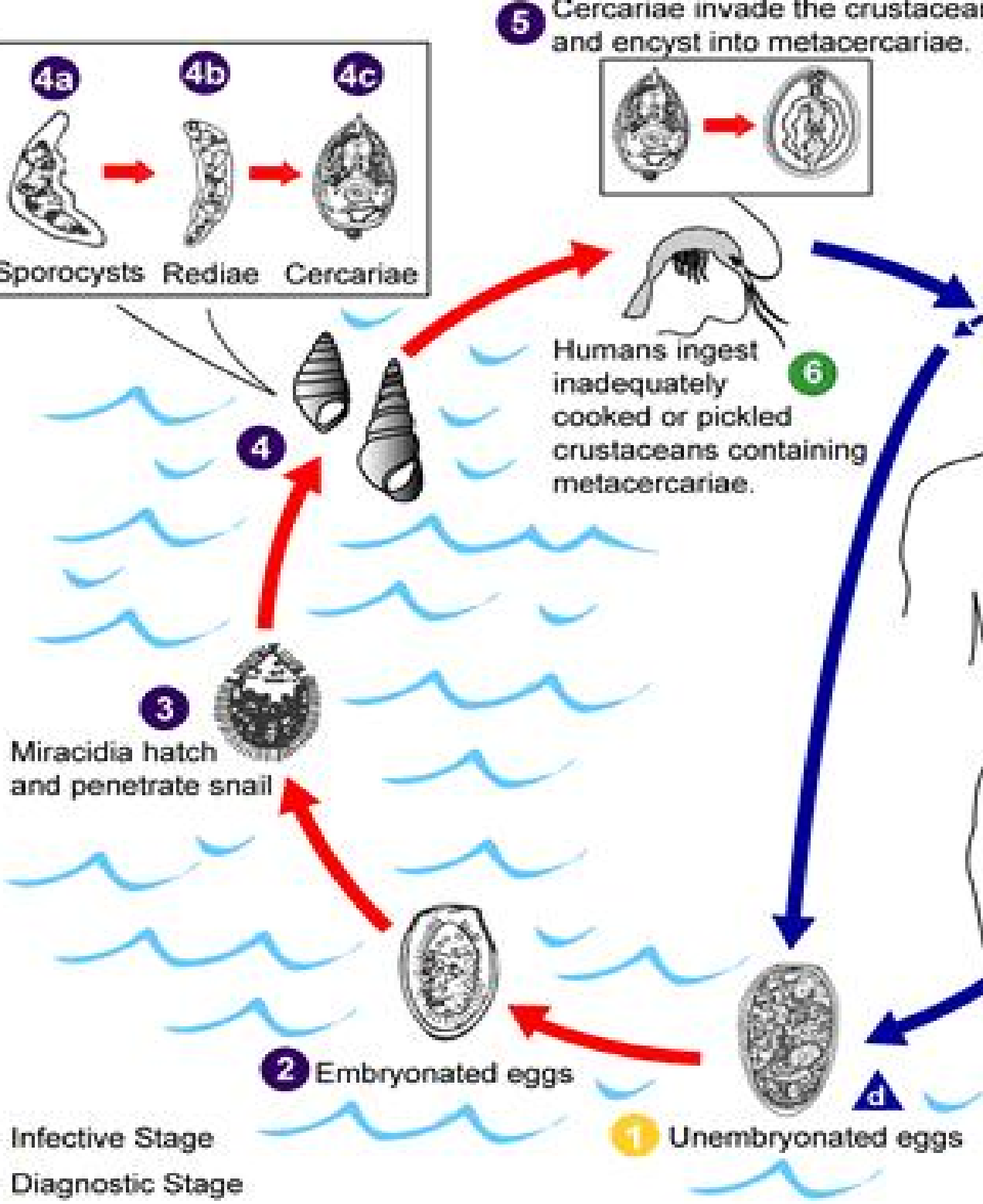
3 Miracidia hatch and penetrate snail



3

4

I = Infective Stage
d = Diagnostic Stage

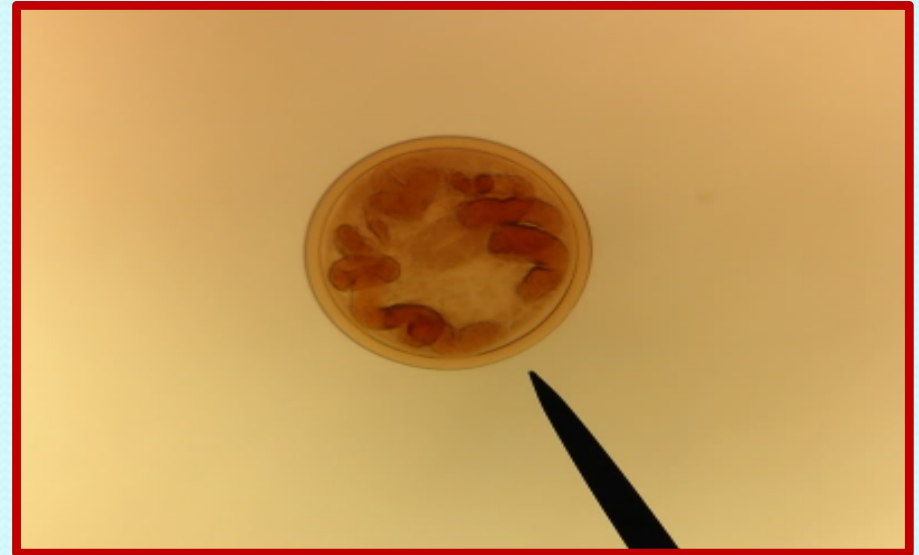


Cercaria



Microcercous cercaria with small tail

Encysted metacercaria (I.S)



Mode of infection:

Infection occurs by eating raw or undercooked crabs or crayfish containing encysted metacercaria

(I.S)

Pathogenesis & Symptomatology

Migration stage

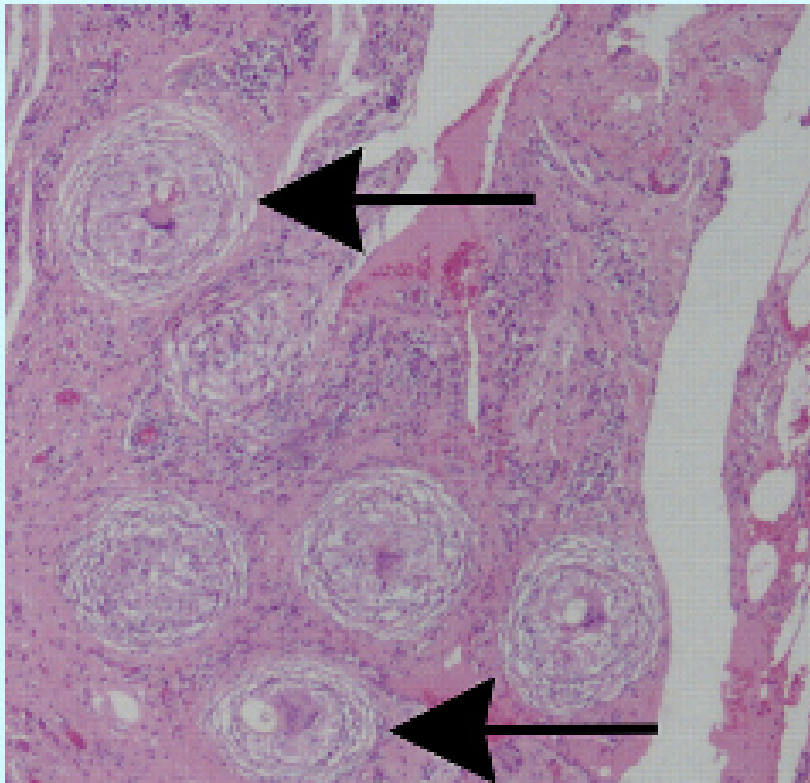
nonspecific symptoms:
diarrhea,
abdominal &
chest pain,
allergic rxn, fever
& chills .

Adult worms live in lung and stimulate granulomatous reaction, fibrous capsule is formed surrounding worms and eggs to form cyst containing blood tinged fluid.

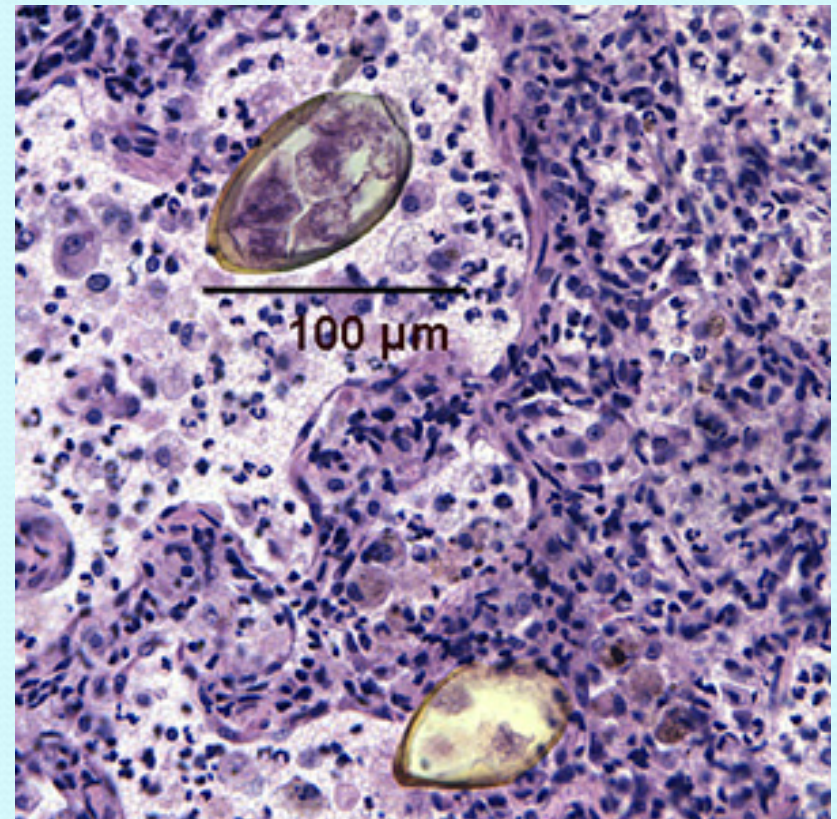
Small Blood vessels in the capsule provide leakage of metabolites from the cystic cavity into the bronchioles, so the patient shows paroxysmal coughing due to the discharge of eggs and worm metabolites. Blood is also leaked out from the cyst mixed with ova to give blood tided sputum.

Cont...

Pathogenesis & Symptomatology



An acute and chronic inflammatory cell infiltrate with eosinophils, and eggs of that are entrapped in nonnecrotizing granulomas that are beginning to be surrounded by concentric fibrosis (arrows).



Eggs of *Paragonimus* sp. taken from a lung biopsy stained with hematoxylin and eosin (H&E). These eggs measured 80-90 μm by 40-45 μm.

Pathogenesis & Symptomatology

Rupture of the cyst
into bronchioles
causes **pulmonary**
symptoms such as
fever, chest pain and
cough with rusty
sputum (blood tinged
with eggs)

Complications:
pneumonia,
bronchitis, lung
abscess
& pneumo-thorax
and pleural
effusion.

Chronic cases
resemble
pulmonary
tuberculosis.

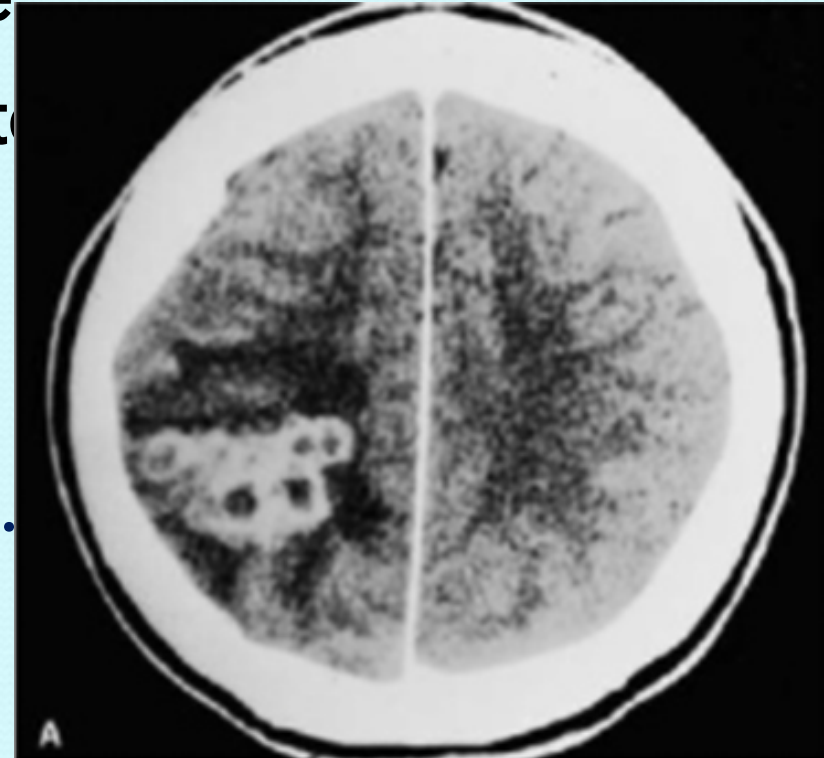
Chronic Paragonimiasis

- 10-20% of radiograph findings will be normal.
- Abnormal Findings including:
 - Lobar infiltration.
 - Cavities.
 - Calcified nodules.
 - Hilar enlargement.
- *P. westermani* is diagnosed after TB treatment has failed, therefore a careful differential diagnosis is key in determining Paragonimiasis infections

Extrapulmonary Paragonimiasis

Flukes that miss the lungs produce extrapulmonary symptoms due to cysts, granulomas, and abscesses including:

- **CNS**: seizures, coma, paralysis.
- **GIT**: abdominal pain & diarrhea.
- **Skin**: migratory allergic skin lesions.



CNS Paragonimiasis

Laboratory Diagnosis

Direct

- Detection of eggs & sometimes adult in rusty sputum.
- Detection of eggs in stool.
- Chest X-ray & CT.

Indirect

- Serological tests:
CFT and ELISA
- Eosinophilia.

Treatment

- 1- Praziquantel is the drug of choice
- 2- Surgical excision of extrapulmonary lesions

Echinococcus granulosus

(Hydatid worm)

Cestodes are classified according to habitat

into

Intestinal cestodes

(Adult in the small intestine of man)
(Man is the D.H)

- 1- *Diphyllobothrium latum*
- 2- *Taenia saginata*
- 3- *Taenia solium*
- 4- *Hymenolepis nana*

Tissue cestodes

(Larvae in the tissues of man)
(Man is the I.H)

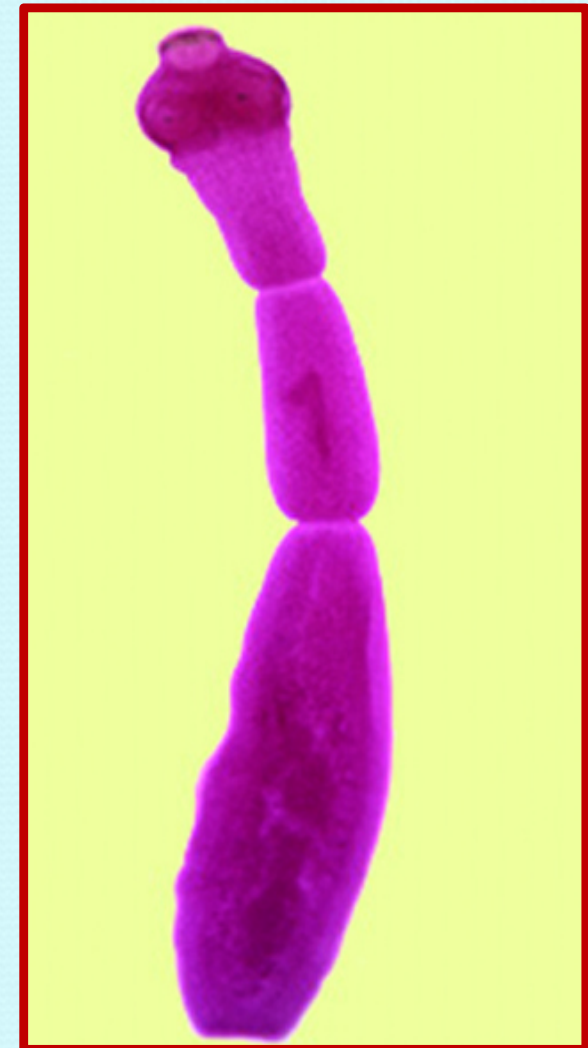
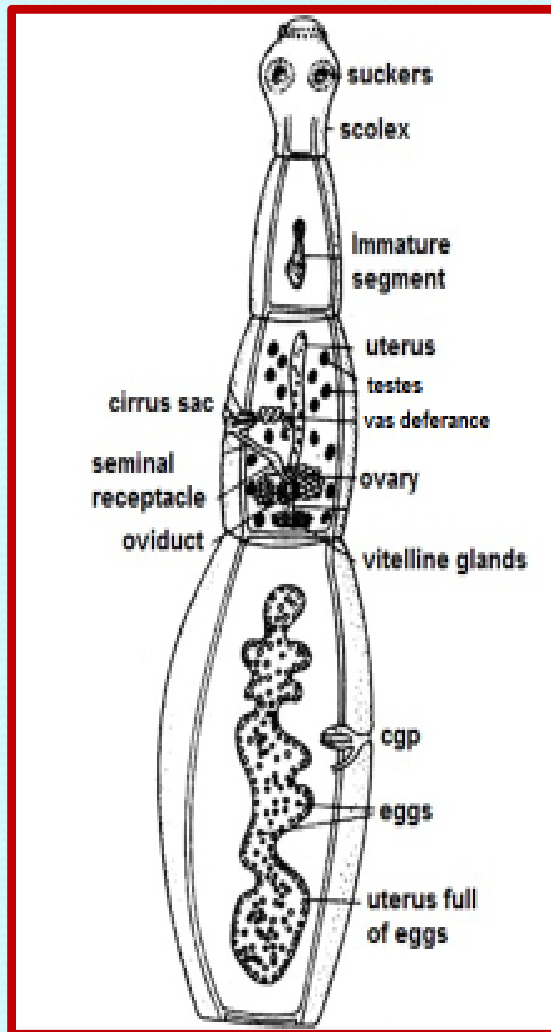
- 1- *Cysticercus cellulosa* (larva of *T. solium*) ⇒ Cysticercosis
- 2- Hydatid cyst (larva of *Echinococcus granulosus*) ⇒ Hydatidosis
- 3- *Cysticercoid nana* (larva of *H. nana*)
⇒ Cysticercoid nana

Echinococcus granulosus

- **Geographical distribution :** Cosmopolitan.
- **Habitat:** Small intestine of the D.H.
- **D.H:** Dogs, foxes and other canines.
- **I.H:** Sheep, cattle, pigs and occasionally man.

Morphological Characters

1- Adult worm



2-Egg of *E. granulosus*

(I.S to man & herbivorous).

Size: 30-40 um.

Shape: Spherical.

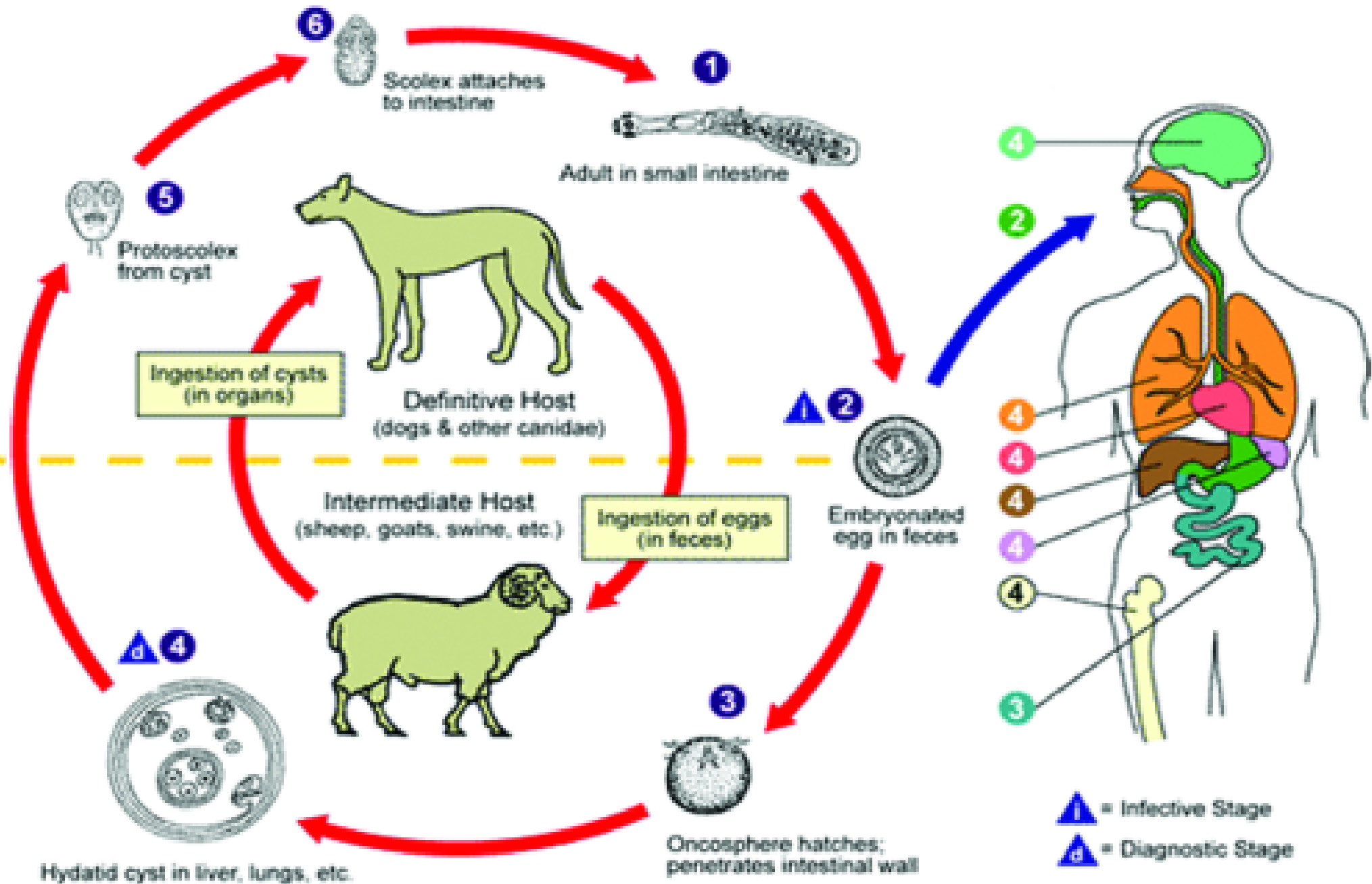
Shell: Thick, radially striated embryophore.

Color: brownish.

Content: Mature hexacanth embryo (onchosphere)



Lif cycle of the *E. granulosus*



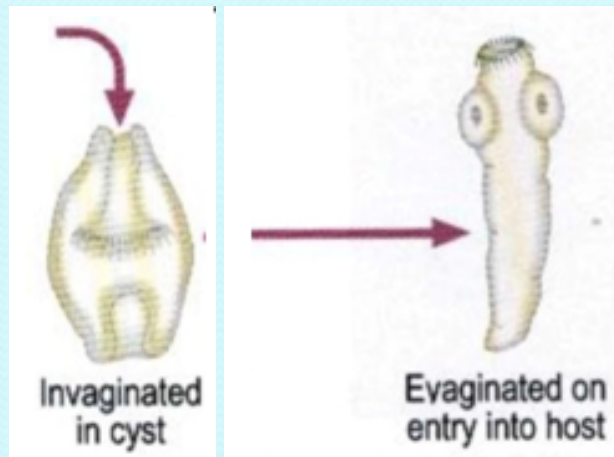
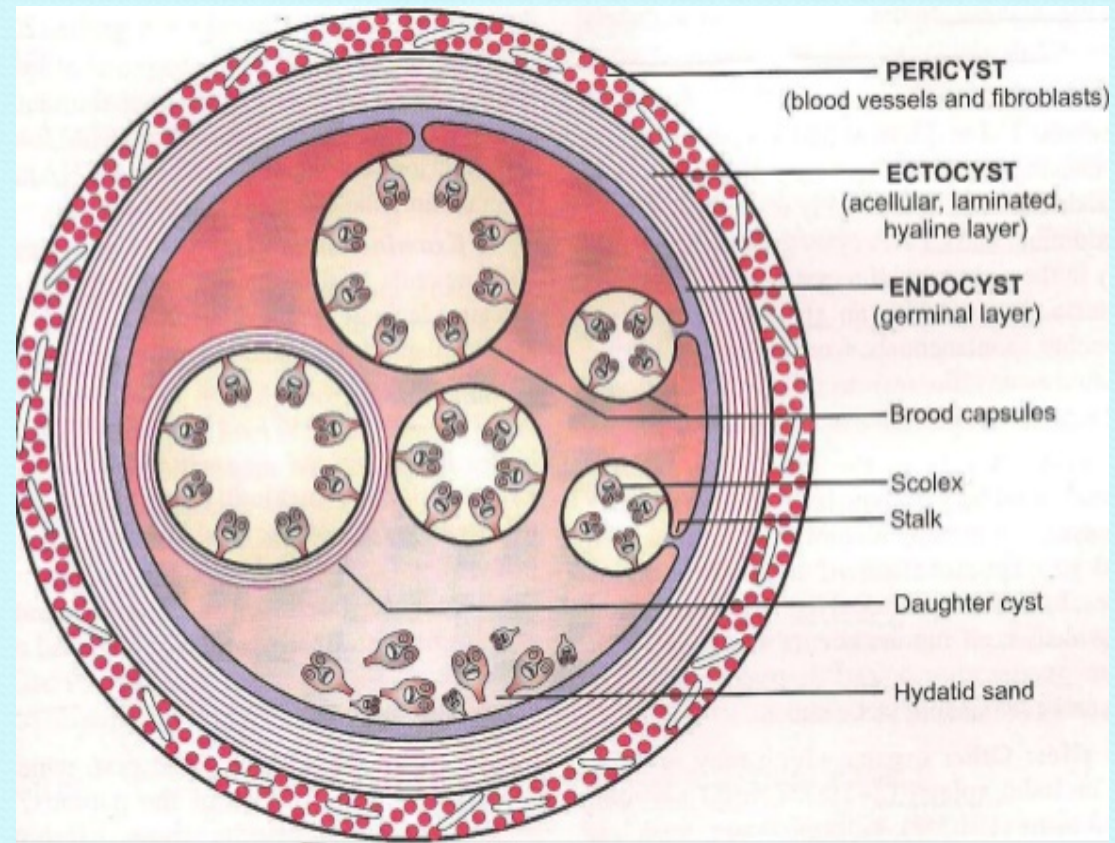
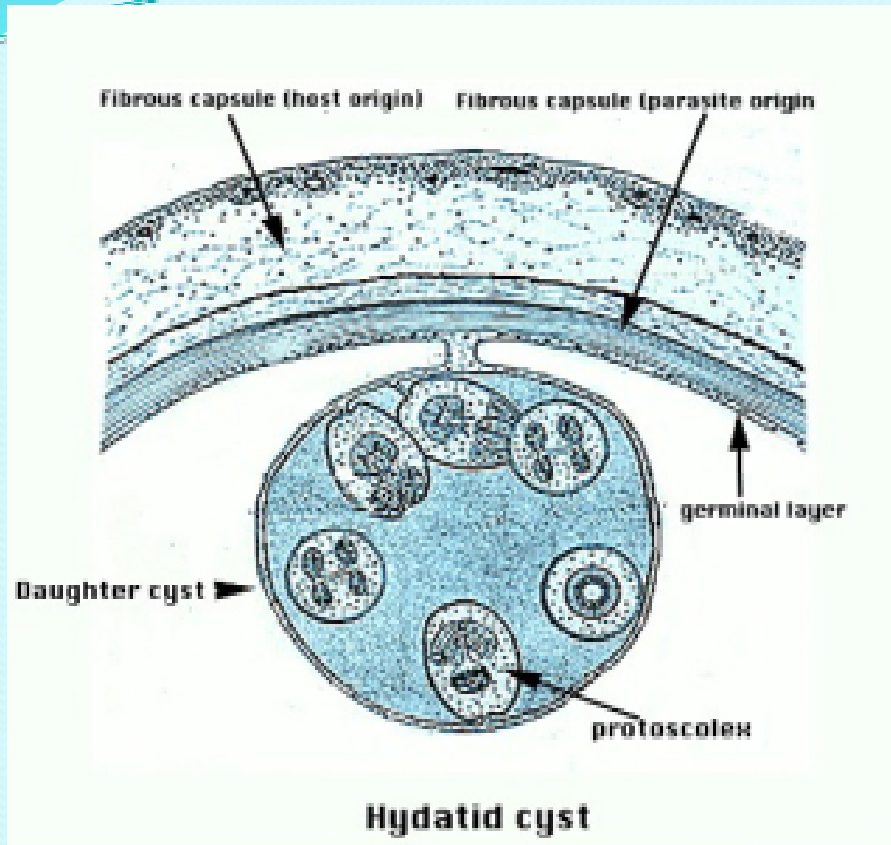
3-Hydatid cyst

Simple unilocular hydatid cyst:-

- The most common type.
- **Size** : Variable from pin's head to head of the foetus (1 mm - 20 cm).
- **Shape** : More or less spherical.



Structure of Hydatid cyst



Structure of Hydatid cyst



Hydatid disease

(Echinococcosis or Hydatidosis)

Definition

- It is a parasitic infection of both humans and other mammals such as sheep, cattle and pigs with hydatid cyst, the larval stage of different *Echinococcus* species.

Mode of infection

- Ingestion of eggs with food or drinks contaminated with dogs faeces or by handling dogs whose hair are usually contaminated with eggs.

Pathogenesis

- 1) Local inflammatory reaction around the hydatid cyst, ending in **formation of a fibrous capsule** which may become calcified or even ossified.
- 2) The **symptoms** depend on the **size & site** of the cyst.
- 3) Large sized cysts → **pressure atrophy** of affected organs.
- 4) Liver is the commonest organ affected (70%) then lung (20%) & other organs (10%) as brain, bones, kidney, heart, muscles & eyes.

Pathogenesis

- 5) **Spontaneous rupture** of the cyst into peritoneal cavity or pleura may lead to severe allergic reaction (**anaphylactic shock**) or **secondary cysts**.
- 6) Bacterial infection may occur ➔ abscess formation.

Pulmonary Cystic Echinococcosis

- Common in children than adult.

Clinical pictures:

- ❑ **Mainly asymptomatic** until the cyst enlarges to cause symptoms.
- ❑ **Complication** occurs as a result of cyst enlargement & its rupture. **It presented by:**
 1. Cough.
 2. Chest pain.
 3. Dyspnea.
 4. Haemoptysis.
 5. Pneumothorax, plural effusion & pulmonary abscess.

Diagnosis

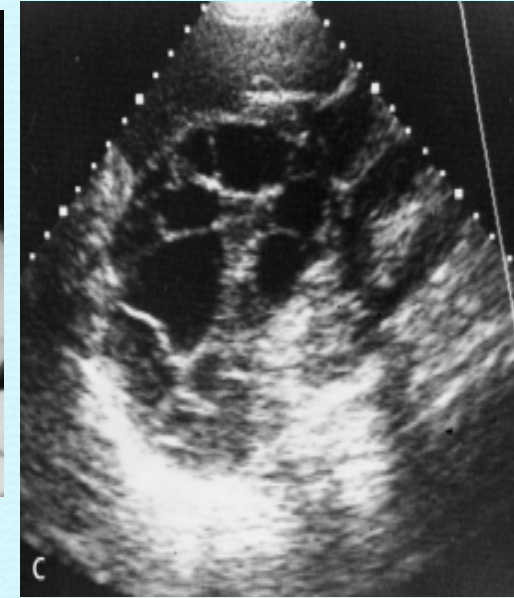
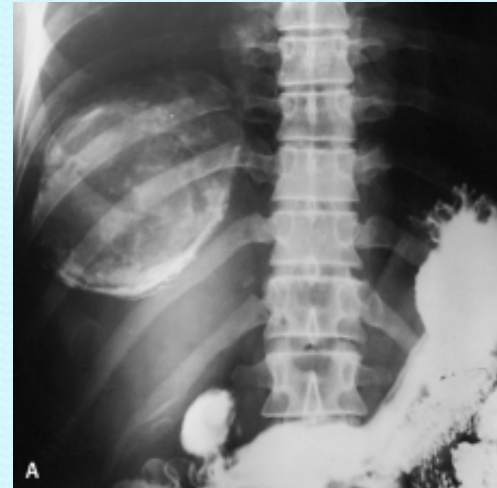
A. Clinical:

- History of contact with dogs.
- Slowly growing cystic tumour.

B. Laboratory:

1) Direct:

- X-ray for calcified cyst.
- Ultrasonography, CT scan and MRI.
- Scolices in sputum due to rupture of the cyst in bronchus.
- Puncture & aspiration of hydatid fluid ➡ may lead to anaphylactic shock due to leakage of the fluid.



Diagnosis

2) Indirect:

A. **Intradermal test (Casoni test).**

B. **Serological tests:** Indirect

hemagglutination test, CFT,

immunofluorescence antibody test, ELISA.

C. **PCR:** Nucleic acid detection.

D. **Eosinophilia.**

Treatment

- 1) **Surgical removal of the cyst:** The most efficient treatment but it may cause mortality (2%) and recurrence of the disease (2 - 25%).
- 2) **Percutaneous treatment (PAIR): In three steps:**
 - Puncture (P) and needle aspiration (A) of the cyst.
 - Injection (I) of a scolicidal solution usually hypertonic sodium chloride solution or ethanol and left for 5 - 30 minutes.
 - Cyst-re-aspiration (R) and final washing.
 - It aimed to achieve safe aspiration of large symptomatic cysts and cysts with a danger of impending rupture.

Treatment

3) Medical treatment:

- Indications: In inoperable cases and before and after surgery.
 - **Albendazole (ABZ)** for 1 - 5 months.
 - **Recently**, the combination of **ABZ** and **Praziquantil (PZQ)** provides synergistic effect and **better efficacy**.
- ✓ **Disadvantages:**
 - It may lead to drug resistance.
 - It is used for long time in high dose.

Case Discussion

- 5-year-old male presented with chest pain.
- X-ray was performed which demonstrates a large cyst involving the right lung.
- CT shows a well defined cystic lesion involving the right lung
- Serological tests indicated positive Echinococcus infection

