Intestinal fluke

1. ***Fasciolopsis buski*** **(Fasciolopsiasis). It is also known as (Giant fluke, largest fluke)**

Morphology

1. Large fleshy worm inhabit the duodenum.
2. Size 20-75 mm X 8-20 mm.
3. Tegument spines.
4. Oral sucker is smaller than the acetabulum.
5. Testes are highly branched in the posterior 3/5 of the body.
6. Small branched ovary.
7. Short convoluted uterus.
8. Eggs are large, hen's egg shape with thin transparent shell operculum & unemberyonated, similar to that *F. hepatica*

Epidemiology: Asia and the Indian subcontinent, especially in areas where humans raise pigs and consume freshwater plants.

Life cycle

Habitat: It is found in the mucosa of duodenum and jejunum of man and pig.

Host: It completes its life cycle in one definitive host (pig or man) and two intermediate hosts (first—snail , second—aquatic plants).

Modes of transmission: Humans acquire infection by eating contaminated water plants.

- ✓ Immature eggs are discharged into the intestine and stool.
- ✓ Eggs become embryonated in water, eggs release miracidia ,which invade a suitable snail intermediate host .
- ✓ In the snail the parasites undergo several developmental stages (sporocysts , rediae , and cercariae).
- ✓ The cercariae are released from the snail and encyst as metacercariae on aquatic plants.
- ✓ The mammalian hosts become infected by ingesting metacercariae on the aquatic plants (chest nut).
- ✓ After ingestion, the metacercariae excyst in the duodenum and attach to the intestinal wall. There they develop into adult flukes in approximately 3 months, attached to the intestinal wall of the mammalian hosts (humans and pigs).
- ✓ The adults have a life span of about one year.

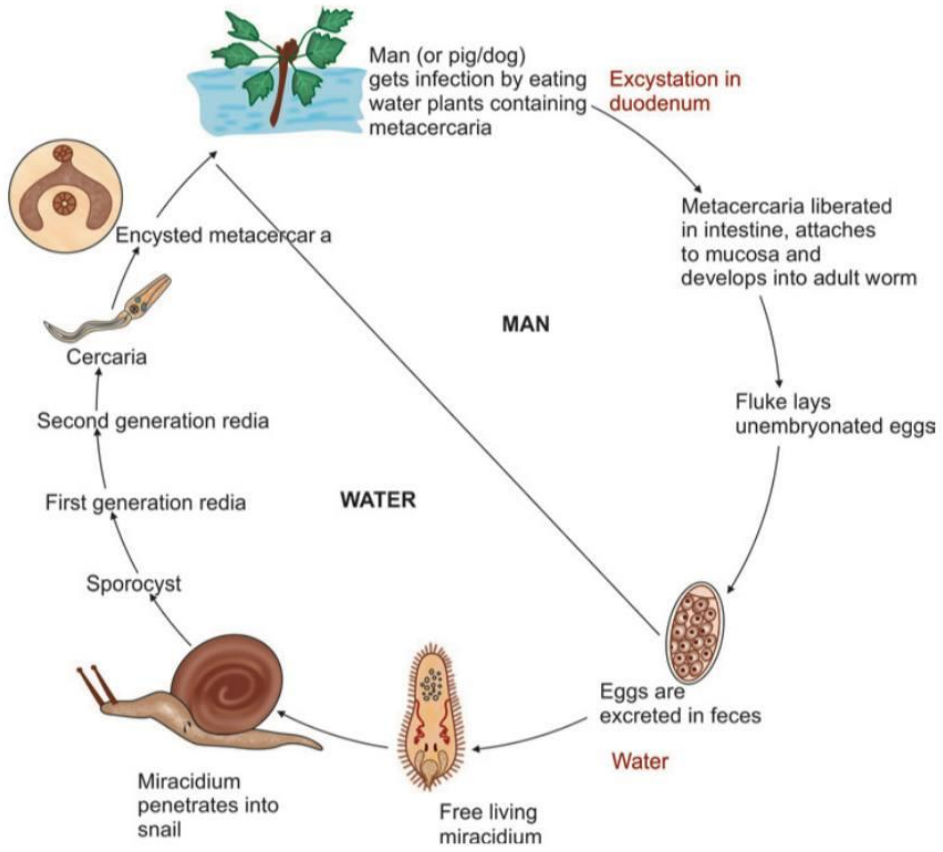


Fig. 11.16: Life cycle of *Fasciolopsis buski*

Pathogenesis:

Most infections are light and asymptomatic. **In heavier infections**, symptoms include diarrhea, abdominal pain, fever, ascites, anasarca and intestinal obstruction. Inflammation and ulceration at the site of attachment and allergy to the products of worm may be present, malabsorption and protein losing enteropathy.

Diagnosis: Microscopic identification of eggs. The eggs are indistinguishable from those of Fasciola hepatica.

Control:

1. Human feces should not be used as fertilizer.

2. Control of snail.

3. Human should not consume raw chest nut.

Treatment: Praziquantel is the drug of choice.

2. Heterophyid flukes: Minute fluke, *Heterophyes heterophyes* (Heterophyiasis)

Morphology

1. Minute pyriform worm rounded posteriorly.
2. Covered by minute spines.
3. Oral sucker is very small and ventral sucker is large.
4. Presence of genital sucker.
5. Seminal vesicle lacks the cirral sac and organs.
6. The eggs are small with conical operculum contain mature miricidium.
7. Present in Egypt, the Middle East, and Far East.

Life cycle

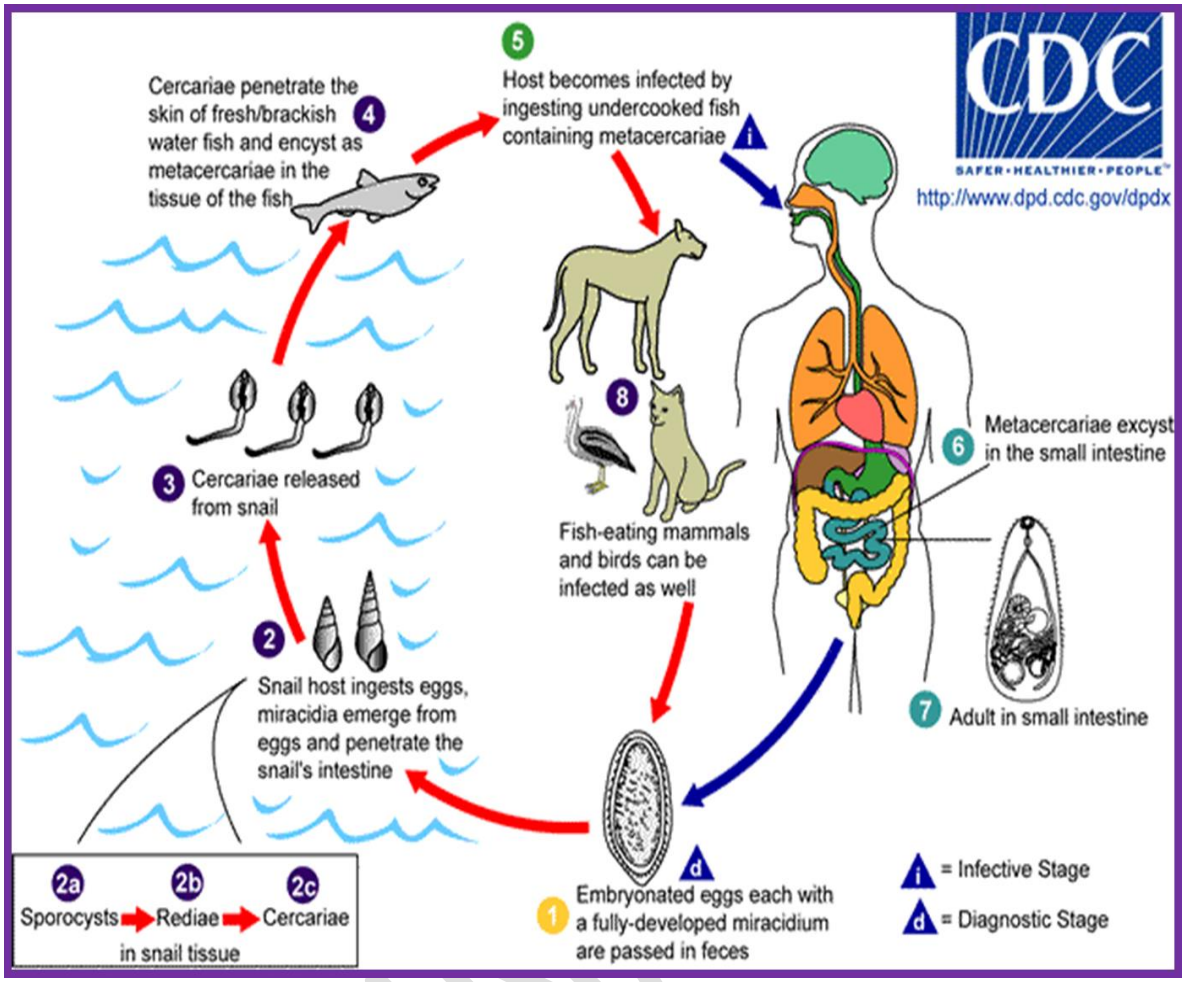
Habitat: The adult worm lives in the small intestine (jejunum and upper ileum) of man and many fish eating mammals like dogs, cats and birds.

Definitive host: Humans (or other mammals)

Intermediate host: are the Snails are the first and brackish water fishes serve as **second intermediate host**

Mode of transmission: The definitive host becomes infected by ingesting undercooked or salted fish containing metacercariae.

- ✓ Adults release embryonated eggs, and eggs are passed in the host's feces, after ingestion by a suitable snail (first intermediate host), the eggs hatch and release miracidia which penetrate the snail's intestine.
- ✓ The miracidia undergo several developmental stages in the snail, i.e. sporocysts, rediae , and cercariae. Many cercariae are produced from each redia.
- ✓ The cercariae are released from the snail and encyst as metacercariae in the tissues of a suitable fresh/brackish water fish (second intermediate host).
- ✓ After ingestion, the metacercariae excyst, attach to the mucosa of the small intestine and mature into adults.



Pathogenesis: The main symptoms are superficial irritation of the intestine mucosa with excess secretion of mucus, diarrhea and colicky abdominal pain. Migration of the eggs to the heart, resulting in potentially fatal myocardial and valvular damage, has been reported from the Philippines. Migration to other organs (e.g., brain) has also been reported.

Diagnosis: based on the microscopic identification of eggs in the stool.

Control: Infection can be prevented by:

1. Not eating uncooked fish.

2. Control snail.

3. Human feces should not use as fertilizer.

Treatment: Praziquantel is the drug of choice.

Pancreatic Fluke *Eurytrema pancreaticum*

Morphology

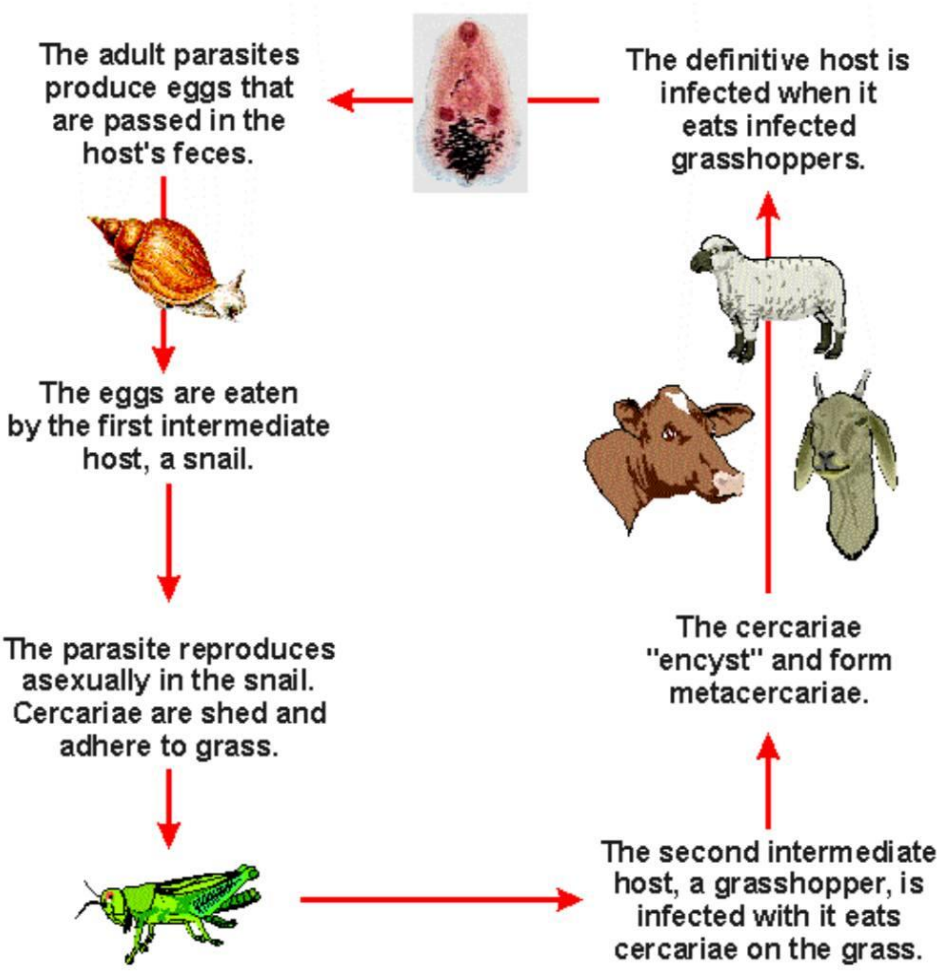
- Stout worm with ruffled margins.
- broad, flat, and oval to fusiform .10~18 x 5~9 mm in size
- Oral sucker is larger than the ventral sucker.

Life Cycle:

Final host: cattle, sheep, goats, monkeys, camels and accidentally human

First Intermediate Host: land snail, **Second intermediate Host**: tree crickets or grasshoppers.

- ✓ The life cycle is similar to that of *Dicrocoelium dendriticum*. However, in this case, the snail intermediate host is a land snail.
- ✓ The cercariae are released from the snail after rains follow a long period of dry weather.
- ✓ They are released from the snail's respiratory chamber as slime balls that are left behind on grass as the snail crawls along the ground or on plants.
- ✓ The second intermediate host for *Eurytrema pancreaticum* is either tree crickets or grasshoppers. Human infection is acquired through accidental ingestion infected crickets or grasshoppers can also result in human infection.
- ✓ The metacercariae excyst and migrate to the pancreatic ducts, where they then become adult flukes.



Pathology and clinical symptoms.

- Eurytremiasis usually causes mild symptoms.
- Heavy infections may be marked by gastrointestinal disturbances:

• abdominal distress, flatulence and vomiting can occur.
• diarrhea or constipation. Jaundice, an enlarged liver.
• systemic symptoms are reported.

Diagnosis, Treatment & Control: as that in Dicrocoelium dendricitum.

Pulmonary fluke: *Paragonimus westermani* (paragonimiasis):

Morphology

1. Adult worm normally lives in fibrous capsule in the lung & other tissues of the body.

2. It is stout reddish-brown flukes 7.5-17 mm X 4-6 mm.

3. The tegument bears scales like spines. The oral sucker and acetabulum are subequal.

4. Eggs are ovoid thick shelled golden brown with flattened operculum, unemberyonated when laid.

5. Infections may persist for 20 years in humans.

Life cycle

• Habitat: Cystic spaces in the lung.

• Definitive hosts: Man and domestic animals.

First intermediate host: Freshwater snail,

Second intermediate host: Freshwater crab or crayfish.

Infective form: Metacercariae encysted in crab or crayfish.

Mode of infection: Man acquires infection by eating undercooked crab or crayfish containing metacercariae.

- The eggs are excreted unembryonated in the sputum, or alternately they are swallowed and passed with stool .
- In the external environment, the eggs become embryonated, and miracidia hatch and seek the first intermediate host, operculate snail, and penetrate its soft tissues .
- Miracidia developed inside the snail into: sporocysts , rediae and cercariae .
- The cercariae emerge from the snail and invade the second intermediate host, a crustacean such as a crab or crayfish, where they encyst and become metacercariae .
- Human infection with *P. westermani* occurs by eating inadequately cooked or pickled crab or crayfish.
- The metacercariae excyst in the duodenum, penetrate through the intestinal wall into the peritoneal cavity, then through the abdominal wall and diaphragm into the lungs, where they become encapsulated and develop into adults .
- The worms can also reach other organs and tissues, such as the brain and striated muscles, respectively. However, when this takes place completion of the life cycles is not achieved, because the eggs laid cannot exit these sites. Animals such as pigs, dogs, and a variety of feline species can also harbor *P. westermani*.

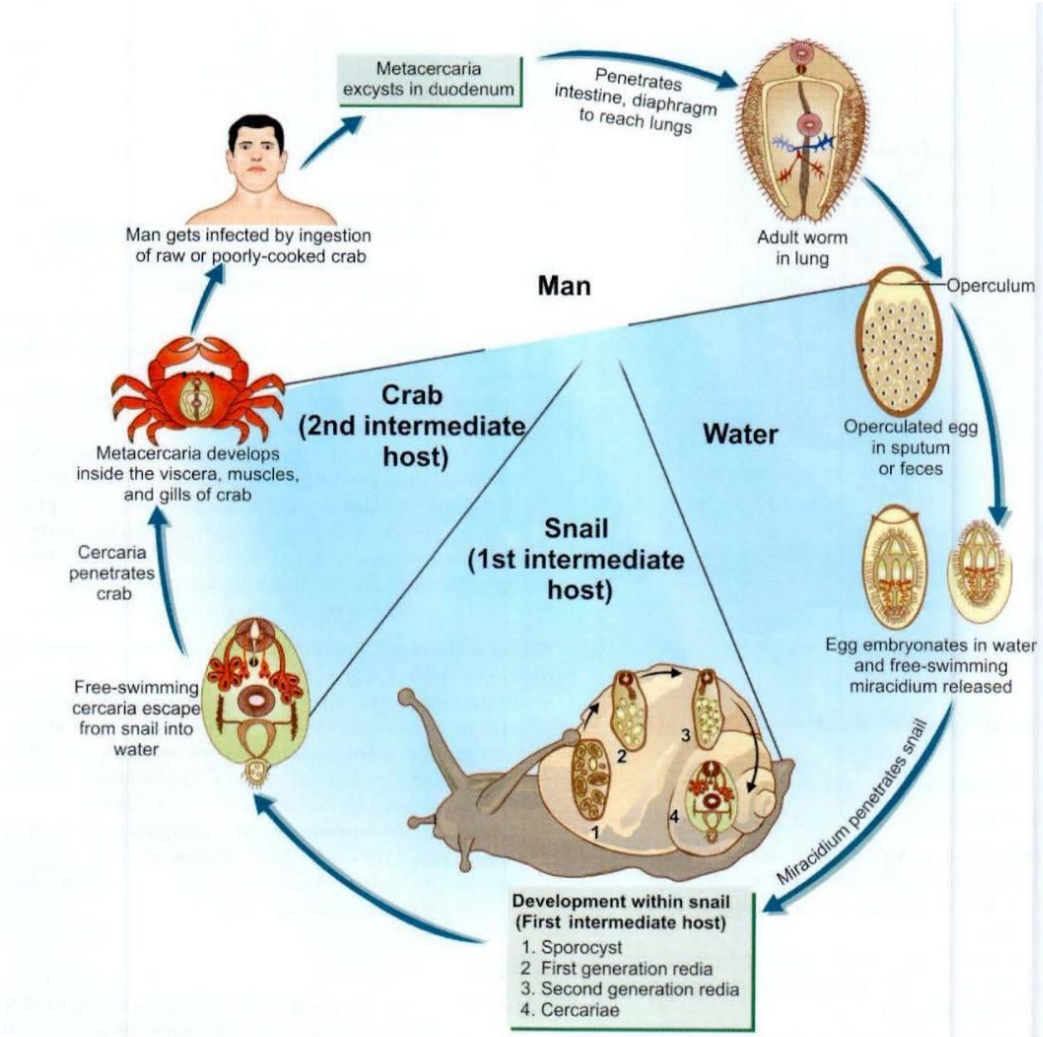


Fig. 21: Life cycle of *Paragonimus westermani*

Pathogenesis:

The acute phase (invasion and migration) may be marked by diarrhea, abdominal pain, ,hepatosplenomegaly. In lung, the parasite found in thick fibrous capsule. The leakage from cystic cavity characterized by: fever, hemoptysis: i.e. Coughing frequently result in hemorrhage with blood in sputum (rusty sputum), urticaria, pulmonary abnormalities, and eosinophilia.

During the chronic phase, pulmonary manifestations include cough, expectoration of discolored sputum, and chest radiographic abnormalities. Extrapulmonary locations of the adult worms (in liver, lymph node, myocardium, testes, pleura, brain and subcutaneous tissues) result in more severe manifestations, especially when the brain is involved.

Cerebral paragonimiasis: Encapsulated cyst of Paragonimus is found in brain and spinal cord. Symptoms include headache, fever, paralysis, visual disturbances and convulses seizures.

Diagnosis:

- Microscopic demonstration of eggs in stool or sputum.
- Concentration techniques may be necessary in patients with light infections.
- Biopsy may allow diagnostic confirmation and species identification when an adult or developing fluke is recovered.
- Radiographs aid in diagnosis
- Multi-dot ELISA

Treatment: Praziquantel or albendazole are the drugs of choice.

Control:

1. Human feces should not be used as fertilizer.

2. Control of snail.

3. Human should not consume raw crab.