Lab: parasitology Lecturer: rawaaabdulkaleq

Subclass Digenea (Trematoda) – include:

- **Intestinal:**

  *Fasciolopsis buski*

  *Heterophyes heterophyes*

- **Lung**

  *Paragonimus westermani*

- **Fasciolopsis buski**

*Fasciolopsis buski* is the largest, most prevalent, and most important intestinal fluke of humans.

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

**Morphology:**

1. They are fleshy worms, 2-7.5 cm long by 0.8-2 cm wide.
2. Leaf-shaped, dorsoventrally flattened fluke characterized by a blunt anterior end.
3. Unbranched ceca (sac-like cavities with single openings).
4. Dendritic testes, branched ovaries.
5. Ventral suckers to attach itself to the host. The acetabulum is larger than the oral sucker.
6. The fluke has extensive vitelline follicles. It can be distinguished from other fasciolids by a lack of cephalic cone or "shoulders" and the unbranched ceca.
7. Egg: large, golden, bile-stained eggs with an operculum on the top. The measurements and appearance of *F. buski* eggs are similar to that of the liver fluke *Fasciola hepatica* is found in aquatic environments, where aquatic plants grow. Once consumed by the definitive host, the adult stage of *Fasciolopsis buski* adheres to the small intestine of its host, remaining until it dies or is removed.

**Life cycle of Fasciolopsis buski**

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. 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.

**Laboratory diagnosis**

Stool examination reveals the large, golden, bile-stained eggs with an operculum on the top. Adult flukes can rarely be found in feces or specimens collected at surgery.
**Heterophys heterophyes**

**Causative agent:** Heterophyiasis

**Geographic Distribution**

*Egypt, the Middle East, and Far East*

**Morphology:**

1. Minute teardrop-shaped flukes found in the small intestines of fish-eating birds and mammals.
2. The adult flukes range from 1.1mm to 1.7mm long and about 0.35mm at their greatest width.
3. The body of the fluke is covered in scales mostly concentrated at the anterior end.
4. Also at the anterior end is an oral sucker. Located in the medioanterior of the body is the acetabulum.
5. At the posterior end of the fluke are two oval testes. The uterus is a long tube-like structure that also leads away from the ovary and joins up with the ejaculatory duct to form the genital duct which leads to a genital sinus.
6. Some species have genital sucker.
7. Egg: Light brown in color, ovoid, operculated, fully developed miracidium is already present and operculum fits into the egg smoothly.

---

![Diagram of Heterophys heterophyes](image)

Adult worm

Egg
Adults release embryonated eggs each with a fully-developed miracidium, 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. Pironella is important snail host. 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). The definitive host becomes infected by ingesting undercooked or salted fish containing metacercariae. After ingestion, the metacercariae excyst, attach to the mucosa of the small intestine and mature into adults. In addition to humans, various fish-eating mammals (e.g., cats and dogs) and birds can be infected by Heterophyes heterophyes.

**Diagnosis**

Detection of eggs in the stool using Kato Katz method
Paragonimus westermani

P. westermani, commonly called the oriental lung fluke or endemic hemoptysis, is one of several species of Paragonimus that infect humans and many other animals.

Causative agent: paragonimiasis

Morphology

1. Adult worms are 7.5 mm to 12 mm long and 4 mm to 6 mm wide.
2. The skin of the worm (tegument) is heavily covered with scale-like spines.
3. The oral and ventral suckers are similar in size.
4. The lobed testes are adjacent from each other located at the posterior end.
5. The lobed ovaries are off-centered near the center of the worm.
6. The uterus is located in a tight coil to the right of the acetabulum, which is connected, to the vas deferens.
7. The vitelline glands, which produce the yolk for the eggs, are widespread in the lateral field from the pharynx to the posterior end.

Paragonimus westermani egg. These large, ovoid eggs (80- to 120-μm long and 45- to 70-μm wide) have a thick, yellowish-brown shell and a distinct operculum.

Life cycle:

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, a snail, and penetrate its soft tissues. Miracidia go through several developmental stages inside the snail: sporocysts, rediae, with the latter giving rise to many cercariae, which emerge from the snail. The cercariae invade the second intermediate host, a crustacean such as a crab or crayfish, where they encyst and become metacercariae. This is the infective stage for the mammalian host. Human infection with P. westermani occurs by eating inadequately cooked or pickled crab or crayfish that harbor metacercariae of the parasite. 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. Time from infection to oviposition is 65 to 90 days.

Infections may persist for 20 years in humans. Animals such as pigs, dogs, and a variety of feline species can also harbor P. westermani.
Diagnosis:

- Examination of sputum and feces reveals golden-brown, operculated eggs.
- Pleural effusions, when present, should be examined for eggs.
- Results of chest x-ray films often show infiltrates, nodular cysts, and pleural effusion
- Marked eosinophilia is common.
- Serologic procedures are available through reference laboratories and can be helpful, particularly in cases with extrapulmonary (e.g., central nervous system) involvement.