Trematode (Continue), Fecal Calprotectin test & Concentration technique

Lecturer: Omer Sardar

Medical Parasitology Ⅱ

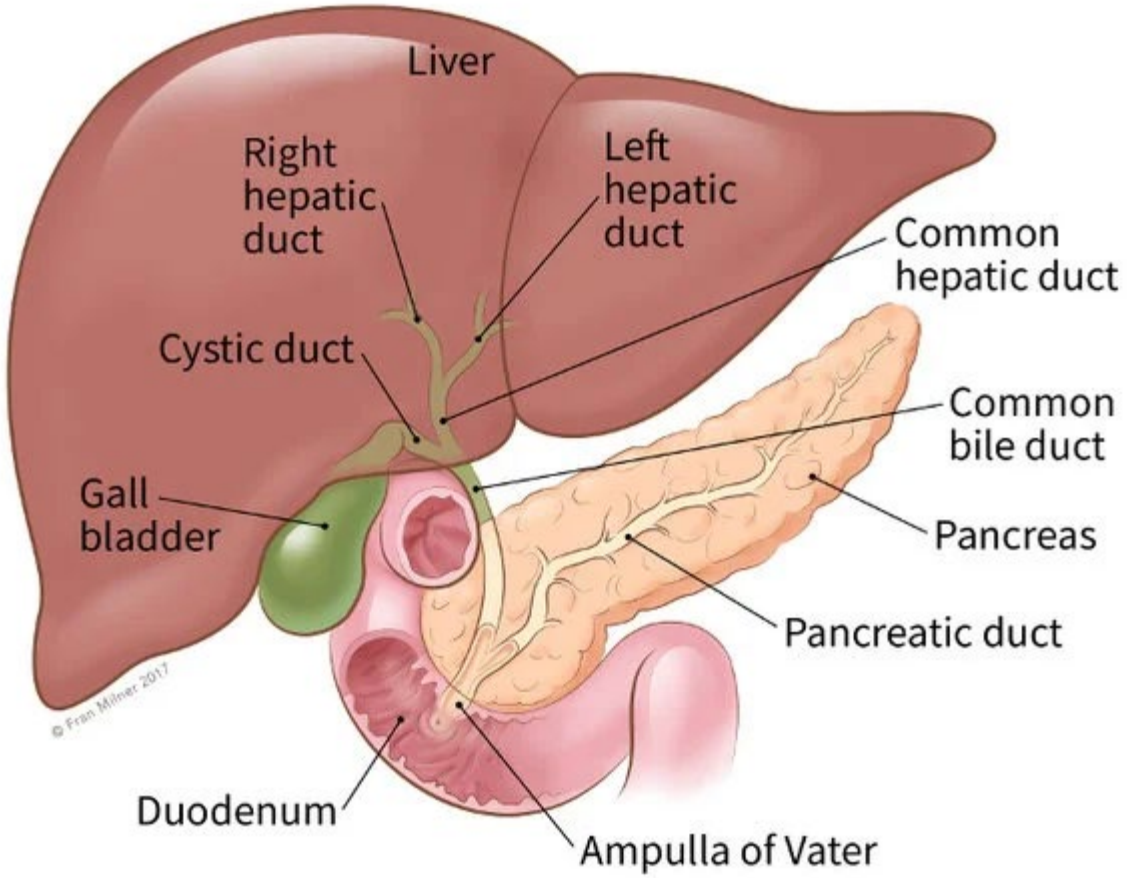
Semester 2 (Spring)

Lab 4

31/08/2025

Clonorchis sinensis (Oriental Liver Fluke)

Adult worm lives in the biliary tract and sometimes in the pancreatic duct.



Morphology

Adult worm:

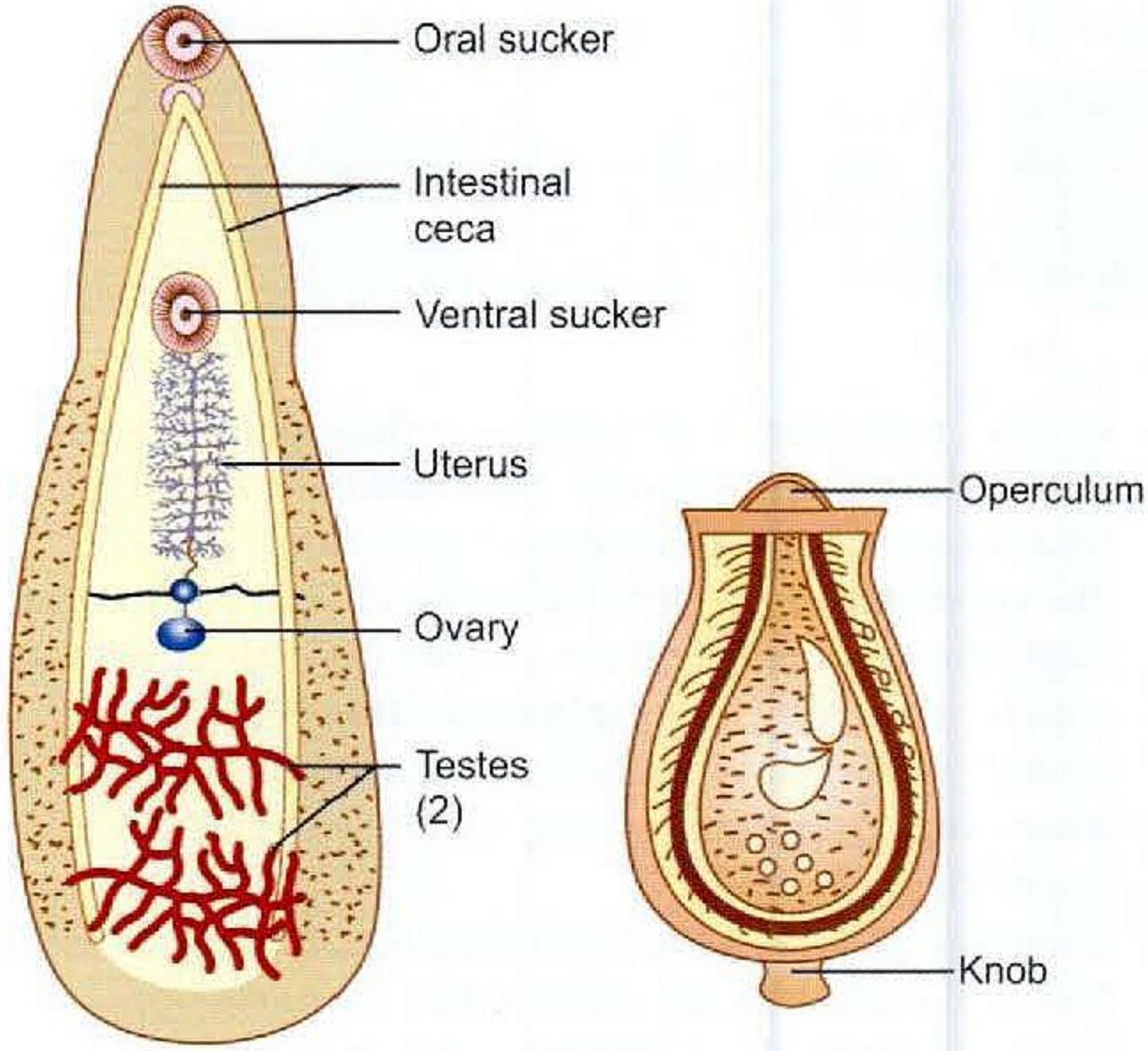
It has a flat, transparent, spatulate body; pointed anteriorly and rounded posteriorly

- It is 10- 25 mm long and 3-5 mm broad.
- The adult worm can survive in the biliary tract for 15 years or more.
- The hermaphroditic worm discharges eggs into the bile duct.

Eggs:

Eggs are **flask-shaped,** 35 µm by 20 µm with a yellowish brown (bile-stained) shell.

- It is operculated at one pole and possesses a **tiny knob** at the other pole and a small hook-like spine at the other**.**


Oral sucker
Intestinal ceca
Ventral sucker
Uterus
Ovary
Testes (2)
Operculum
Knob

Adult

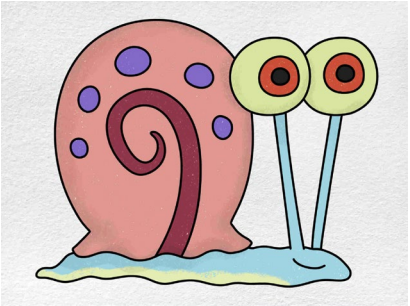
Egg

Life Cycle

Definitive host: Humans are the principal definitive host

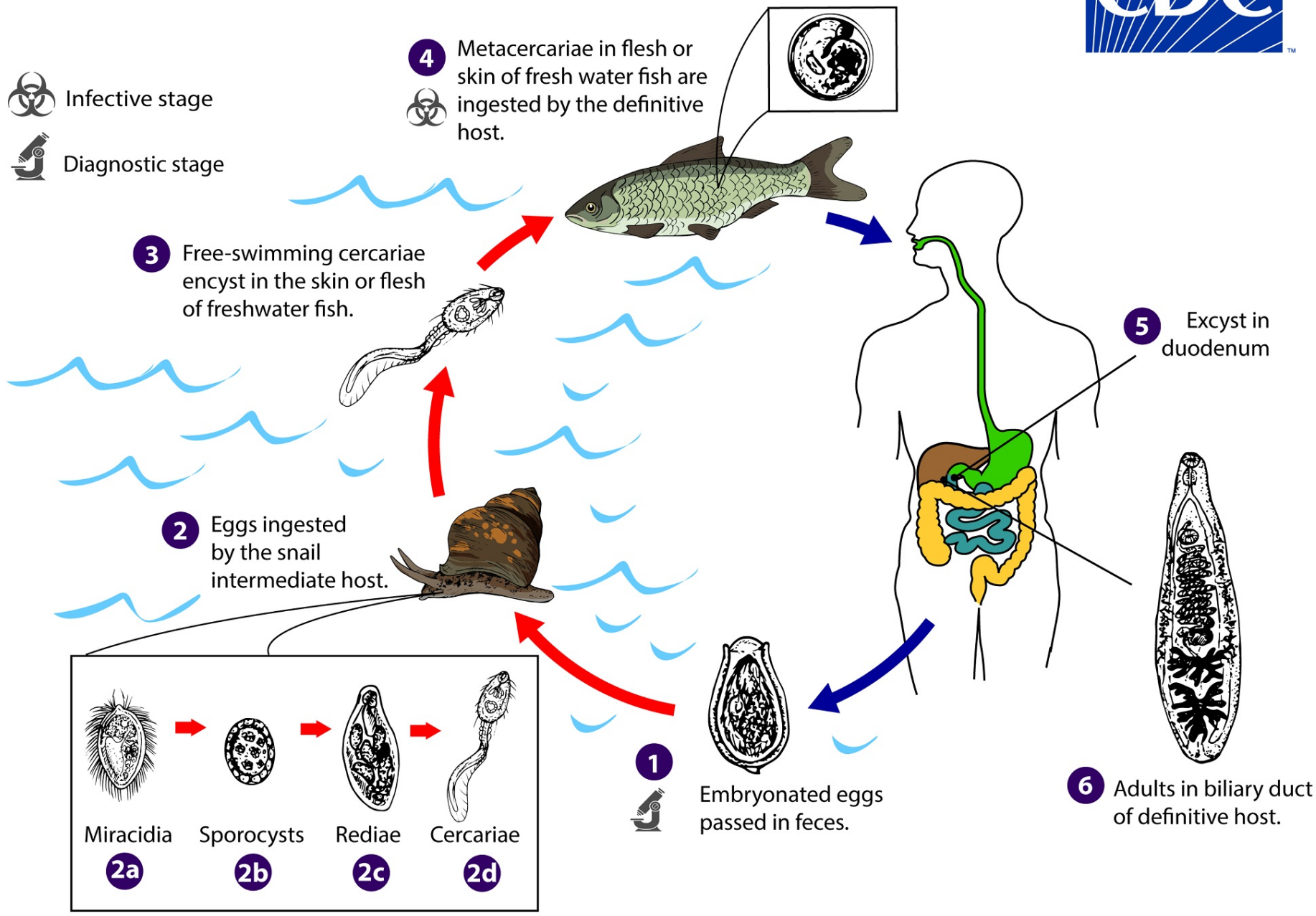
Intermediate hosts:

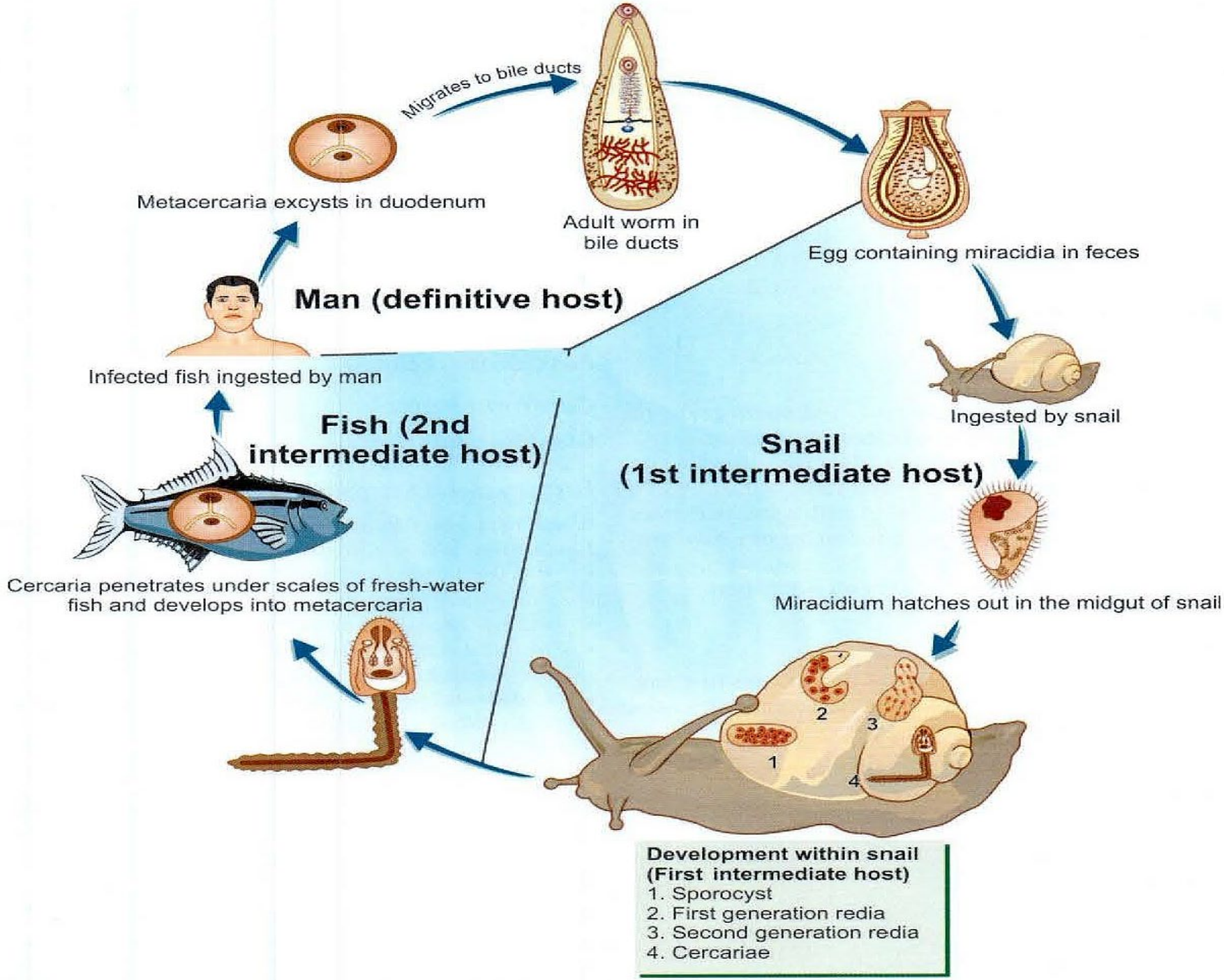
- *First intermediate host: Snail*



- *Second intermediate host: Fish*

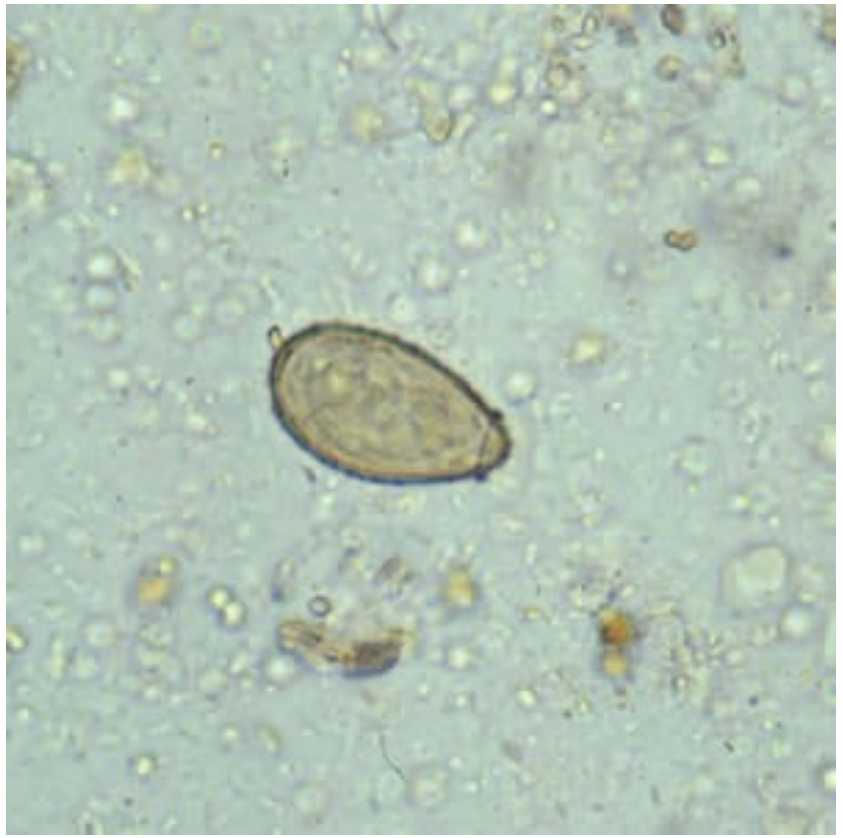
Clonorchis sinensis




Migrates to bile ducts
Metacercaria excysts in duodenum
Adult worm in bile ducts
Egg containing miracidia in feces
Man (definitive host)
Infected fish ingested by man
Ingested by snail
Fish (2nd intermediate host)
Snail (1st intermediate host)
Cercaria penetrates under scales of fresh-water fish and develops into metacercaria
Miracidium hatches out in the midgut of snail
1
2
3
4
Development within snail (First intermediate host)
1. Sporocyst
2. First generation redia
3. Second generation redia
4. Cercariae

Laboratory Diagnosis

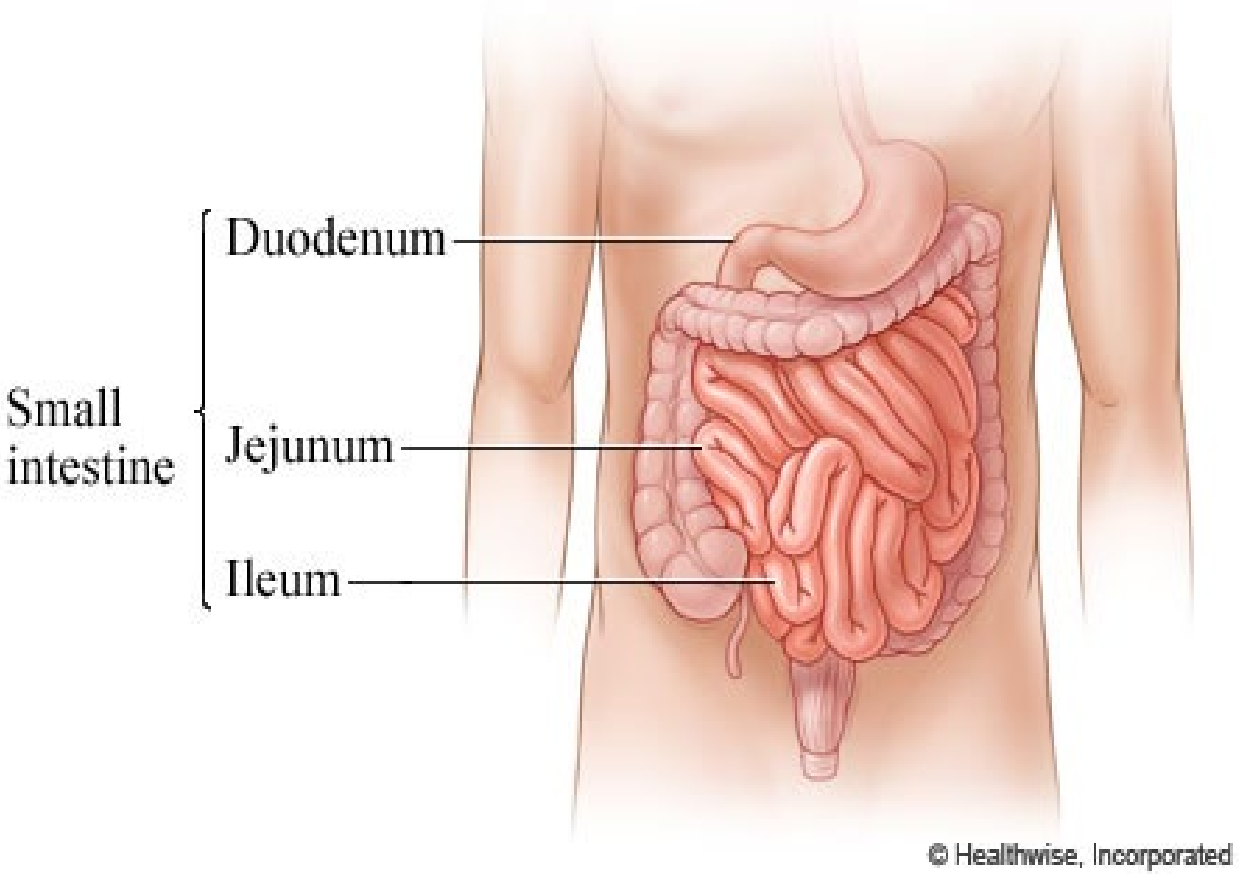
The eggs may be demonstrated in feces *(stool microscopy)* or aspirated bile.



Fasciolopsis buski (Intestinal Fluke)

Habitat

The adult worm lives in the **duodenum** or **jejunum** of pigs and man.

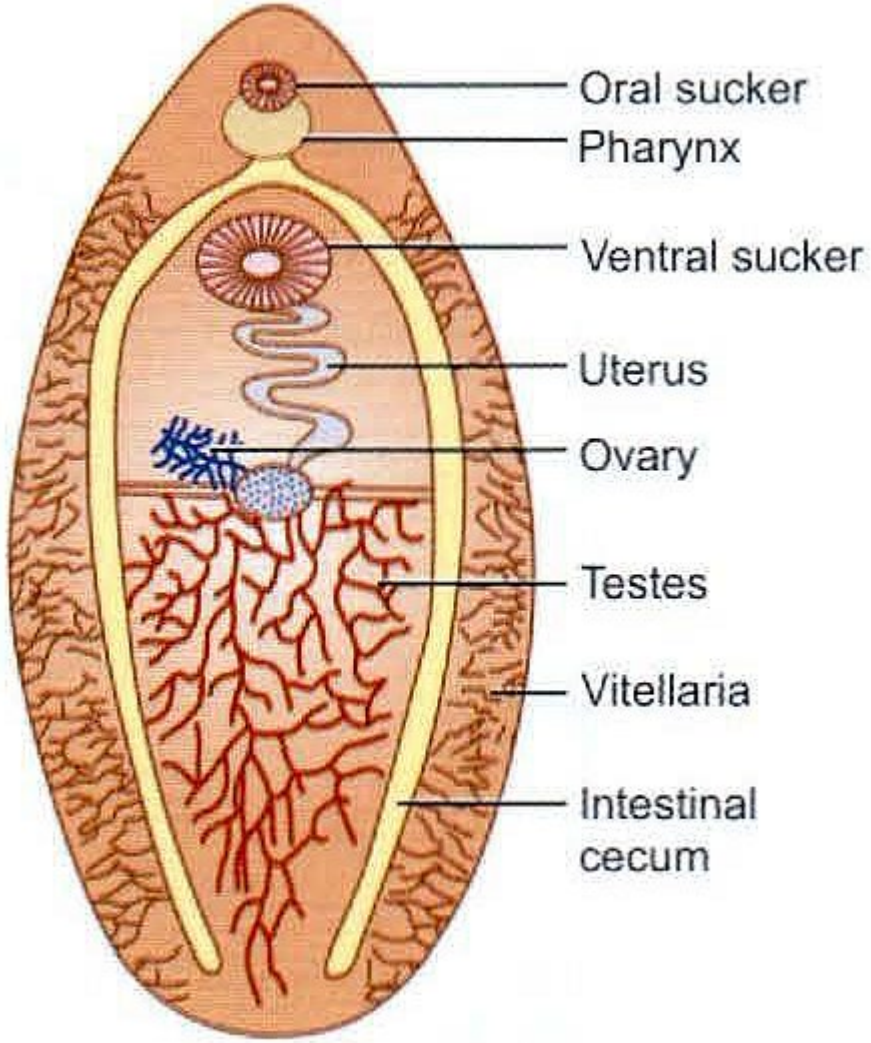


Morphology

Adult worm:

- The adult is a large fleshy worm, 20-75 mm long and 8-20 mm broad and 0.5-3 mm in thickness.
- It is elongated ovoid in shape, with a small oral sucker and a large acetabulum. It has no cephalic cone as in *Fasciola hepatica.*
- The adult worm has a lifespan of about 6 months.

Adult


Oral sucker
Pharynx
Ventral sucker
Uterus
Ovary
Testes
Vitellaria
Intestinal cecum

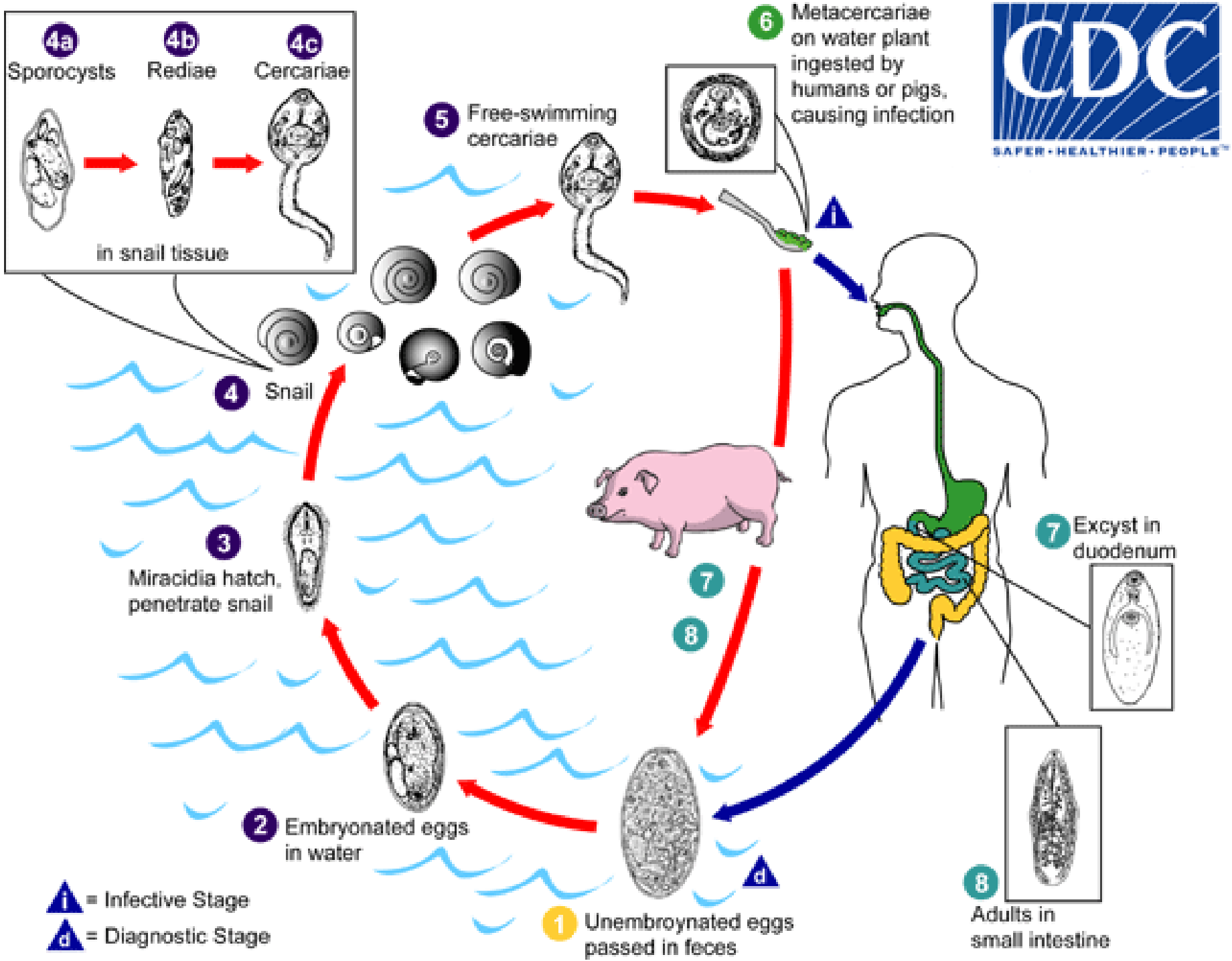
Eggs:

- The operculated eggs are similar to those of *F. hepatica.*
- Eggs are laid in the lumen of the intestine

Life Cycle

Definitive host: human and pigs. Pigs serve as a reservoir of infection for man.

intermediate host: Snails of the genus ***Segmentina*** **sp.**


4a Sporocysts
4b Rediae
4c Cercariae
in snail tissue
5 Free-swimming cercariae
6 Metacercariae on water plant ingested by humans or pigs, causing infection
4 Snail
3 Miracidia hatch, penetrate snail
7 Excyst in duodenum
8 Adults in small intestine
2 Embryonated eggs in water
1 Unembroynated eggs passed in feces
i = Infective Stage
d = Diagnostic Stage

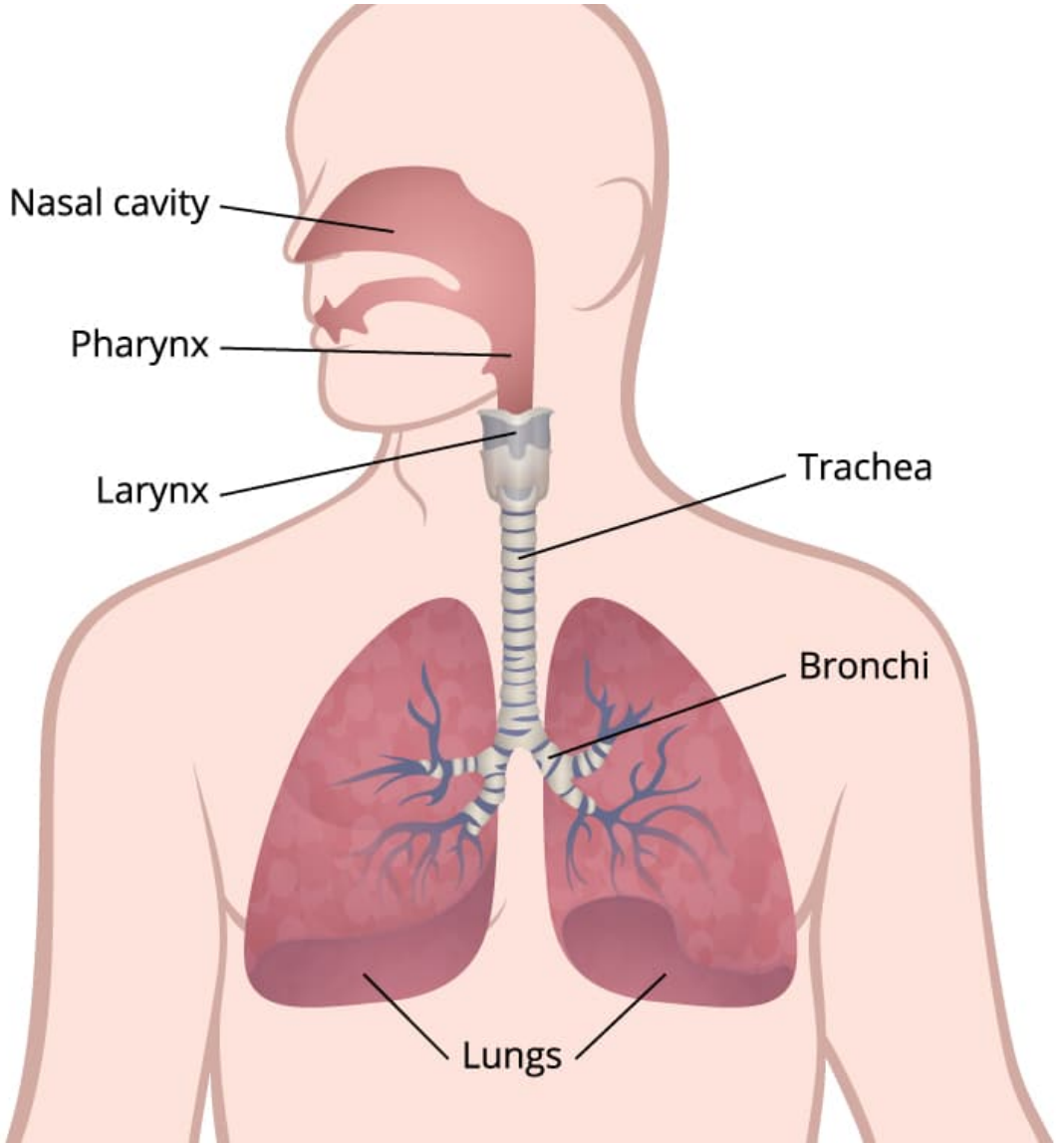
Laboratory Diagnosis

The diagnosis is made by stool microscopical examination finding the flukes or their eggs in the feces.

Paragonimus Westermani (Oriental lung fluke)

Habitat

- Adult worms live in the **lungs,** usually in pairs in cystic spaces that communicate with bronchi

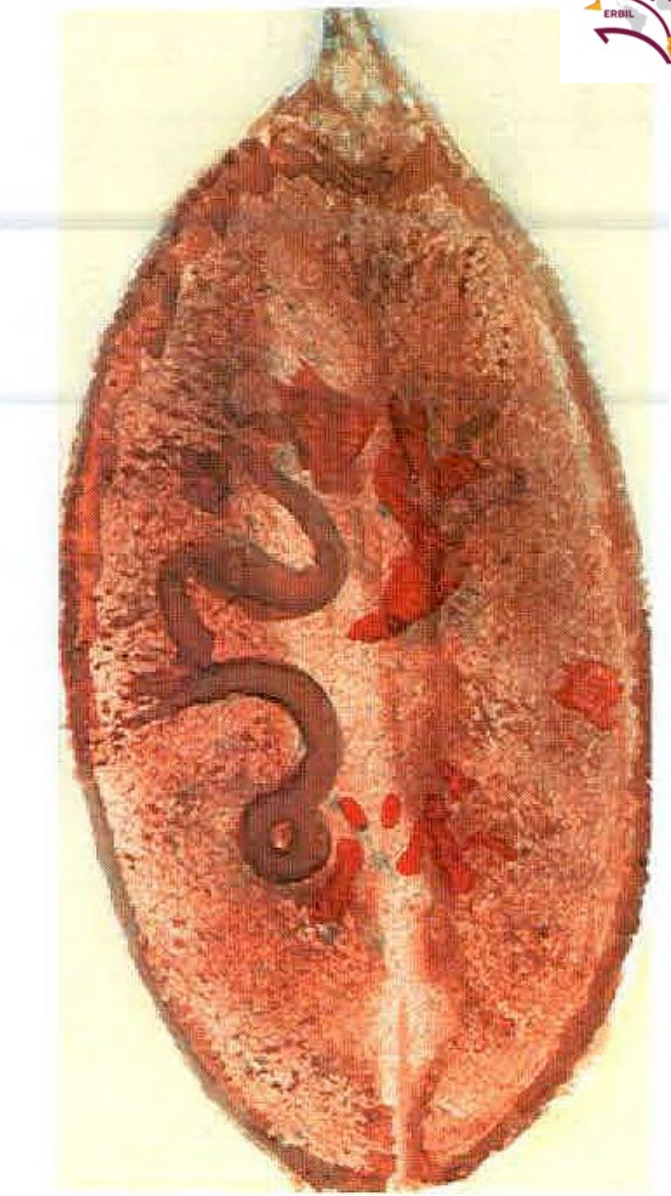


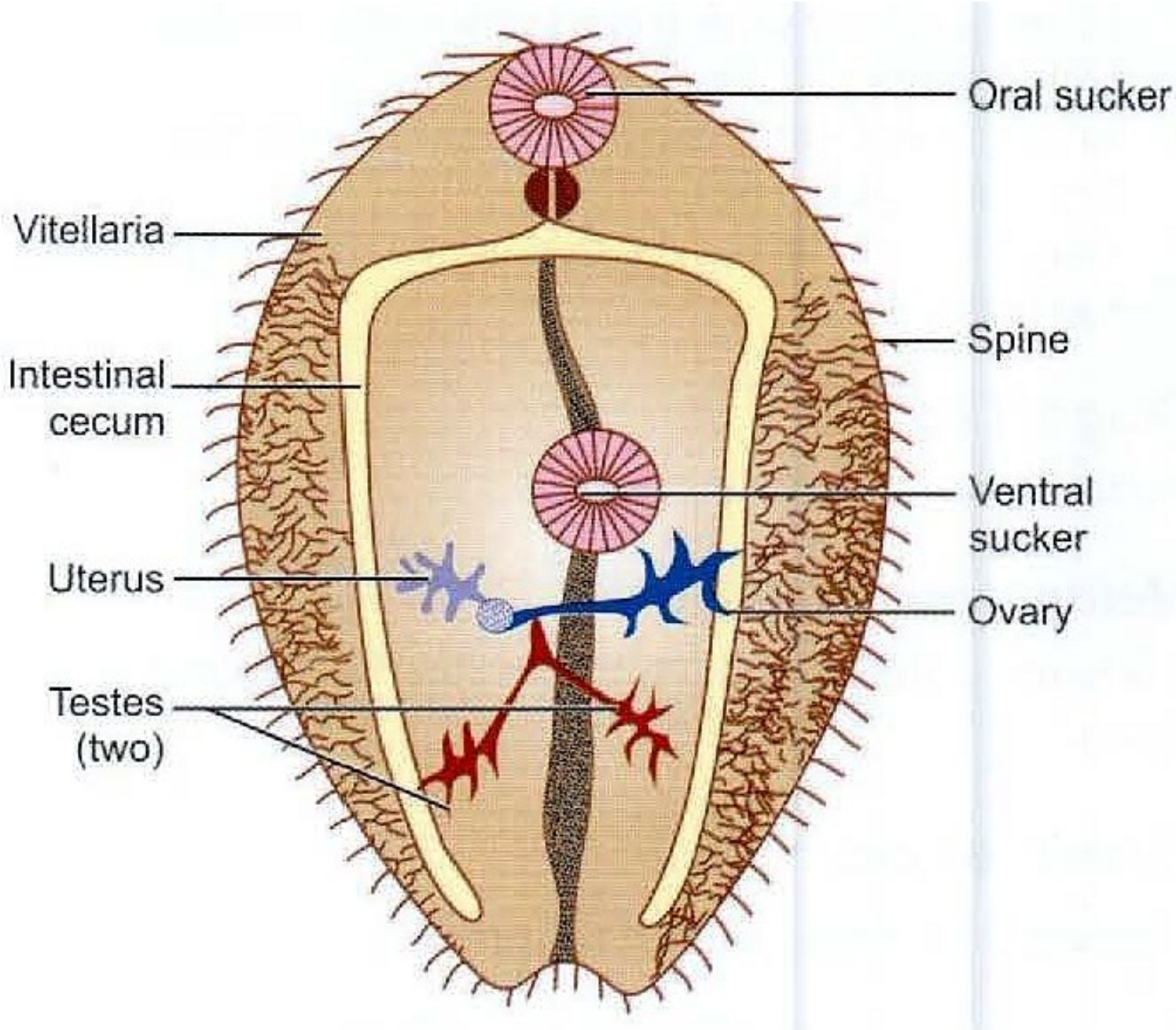
Morphology

Adult worm:

The adult worm is **egg-shaped** about 10 mm long, 5 mm broad and 4 mm thick and reddish-brown in color

- The integument is covered with scale-like spines.
- It has an oral sucker placed anteriorly and a ventral sucker located towards the middle of the body**.**
- It has two unbranched intestinal caeca which end blindly in the caudal area.

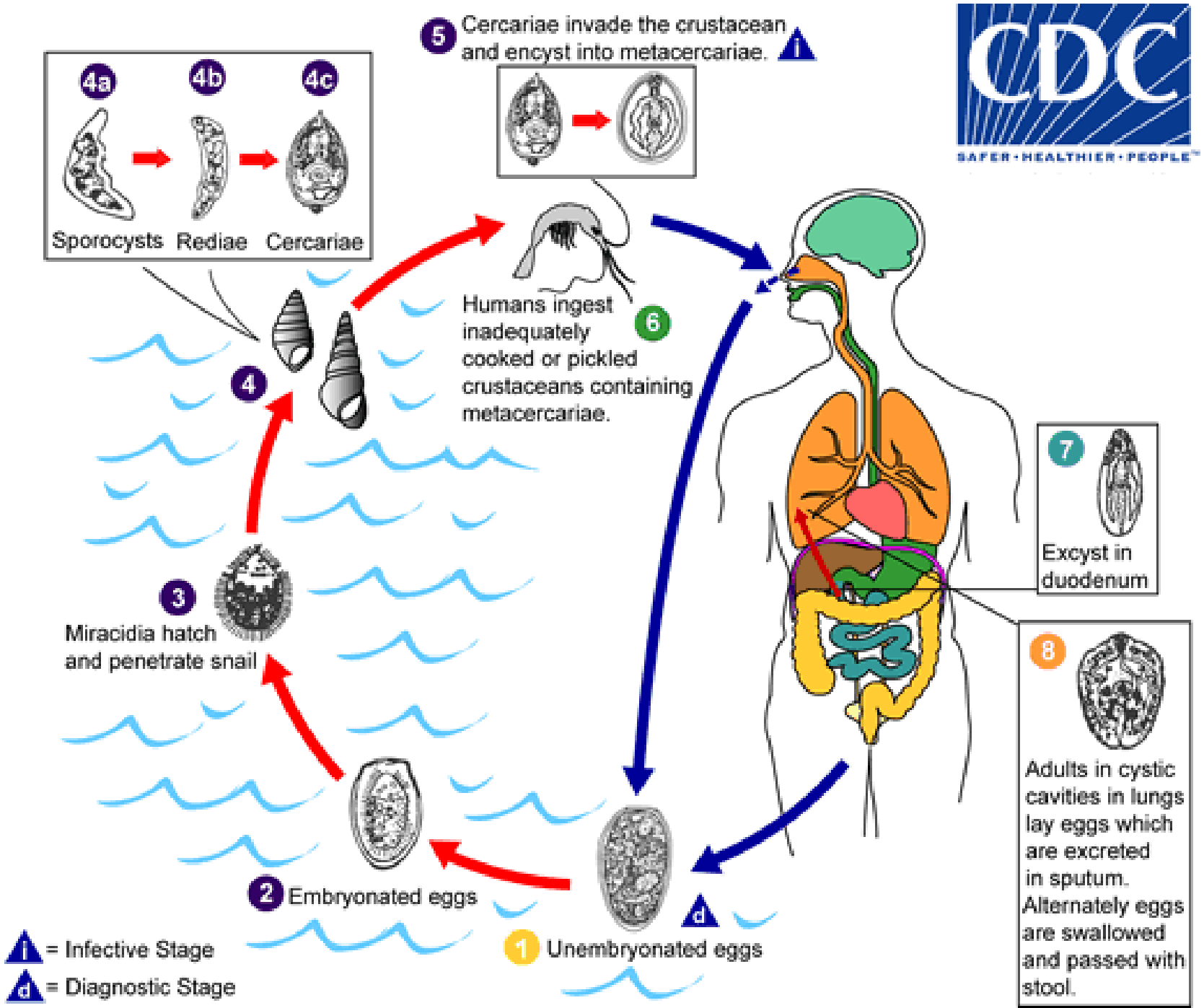



Oral sucker
Vitellaria
Spine
Intestinal cecum
Ventral sucker
Uterus
Ovary
Testes (two)

Egg:

The eggs are operculated, golden-brown in color and about 100µm by 50µm in size.

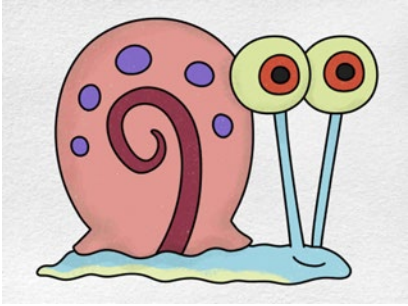
- They are unembryonated when freshly laid.


4a
4b
4c
Sporocysts
Rediae
Cercariae
5 Cercariae invade the crustacean and encyst into metacercariae.
i
Humans ingest inadequately cooked or pickled crustaceans containing metacercariae.
6
4
3
Miracidia hatch and penetrate snail
2 Embryonated eggs
1 Unembryonated eggs
d
7
Excyst in duodenum
8
Adults in cystic cavities in lungs lay eggs which are excreted in sputum. Alternately eggs are swallowed and passed with stool.
i = Infective Stage
d = Diagnostic Stage

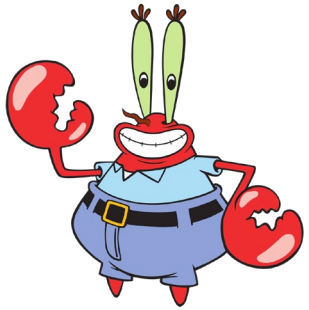
Life Cycle

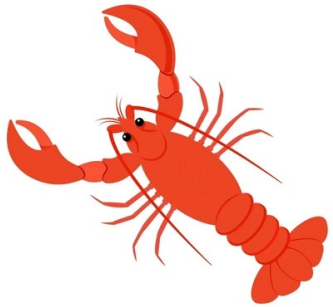
Definitive host: Human.

First intermediate host: Freshwater snail, belonging to the genera *Semisulcospira* and *Brotia.*



Second intermediate host: Freshwater crab or crayfish.





Laboratory Diagnosis

Microscopy: Demonstration of the eggs in sputum or feces provides definitive evidence. Sputum examination should be repeated for 7 consecutive days.

Serology: *ELISA*

Imaging: Chest X-ray reveals abnormal shadows (nodular, cystic, ring infiltrative) in the middle and lower lung field.

Fecal calprotectin test

Introduction

Fecal calprotectin is a biomarker for intestinal inflammation. It is a calcium- and zinc-binding protein predominantly found in neutrophils and is released into the intestinal lumen during inflammation. This test is useful in distinguishing between inflammatory and non-inflammatory gastrointestinal conditions, including infections caused by parasites.

Clinical significance of the test

- Certain parasitic infections, such as Entamoeba histolytica, Giardia lamblia, can cause significant intestinal inflammation.
- Helps in differentiating between inflammatory and functional gastrointestinal disorders (e.g., irritable bowel syndrome vs. inflammatory bowel disease).
- Useful for monitoring disease activity and treatment response in chronic parasitic infections.

Principle of the test

- Calprotectin is released from activated neutrophils during inflammation.
- Its concentration in feces correlates with the degree of inflammation.
- Measured using enzyme-linked immunosorbent assay (ELISA) or lateral flow immunoassay.

Result Interpretation

- **<50 µg/g feces:** Normal (no significant inflammation)
- **50–200 µg/g feces:** Mild inflammation (requires further clinical correlation)
- **>200 µg/g feces:** Significant inflammation (suggests active infection or inflammatory bowel disease)

Artifacts in Stool

Concentration technique

Separate parasites from fecal debris and increase the chances of detecting parasitic organisms when these are in small numbers. They are divided into:

- flotation techniques
- sedimentation techniques.

Flotation techniques

most frequently used: (zinc sulfate or sugar solution) use solutions which have higher specific gravity than the organisms to be floated so that the organisms rise to the top and the debris sinks to the bottom.

Sedimentation techniques

Uses solutions of lower specific gravity than the parasitic organisms, thus concentrating the latter in the sediment. Sedimentation techniques are recommended for general diagnostic laboratories because they are easier to perform and less prone to technical errors. The sedimentation technique used at CDC is the formalin-ethyl acetate technique.

Flotation Technique procedure

1. Weigh out (estimate) 2 or 5 grams of feces.
2. Mix with 10ml of sugar solution(16%)=(sucrose 16g+water 100mL)
3. Pour through tea strainer into a beaker/fecal cup.
4. Pour solution from beaker/fecal cup into 15ml centrifuge tube.
5. Fill tube with sugar solution to the top of the tube. DO NOT place a lid on the tube.
7. Centrifuge at 1200rpm for 5 minutes. Make sure the centrifuge is balanced.
8. Remove the test tube from the centrifuge and fill to the top with sugar solution.
9. Place a lid on the tube and centrifuge again for 10 minutes.
10. Remove lid from tube and place on slide labeled with the name or number.
12. Examine entire coverslip at 10X. Use 40X to identify parasites or eggs.
13. Record results.

References

- Paniker, C. K. J. & Ghosh, S. 2021. *Paniker's textbook of medical parasitology,* New Delhi, Jaypee Brothers Medical Publishers.