Trematoda & Stool pH test

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Medical Parasitology Ⅱ

(Summer School)

Lab 3

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Trematoda

Trematodes are leaf-shaped unsegmented, flat, and broad helminths (hence the name fluke, from the Anglo-Saxon word floc meaning flat fish). The name trematode comes from their having large prominent suckers with a hole in the middle (Greek trema: hole, eidos: appearance).

Classification Based on Habitat

- Liver fluke
- Intestinal fluke
- Lung fluke
- Blood fluke

Schistosoma sp.

Schistosomiasis is caused by some species of blood trematodes (flukes) in the genus *Schistosoma*. The three main species infecting humans are S*chistosoma haematobium*, *S. japonicum*, and *S. mansoni*.

Unlike other trematodes, which are hermaphroditic, *Schistosoma* spp. are dioicous (individuals of separate sexes).

Habitat

Schistosoma haematobium:

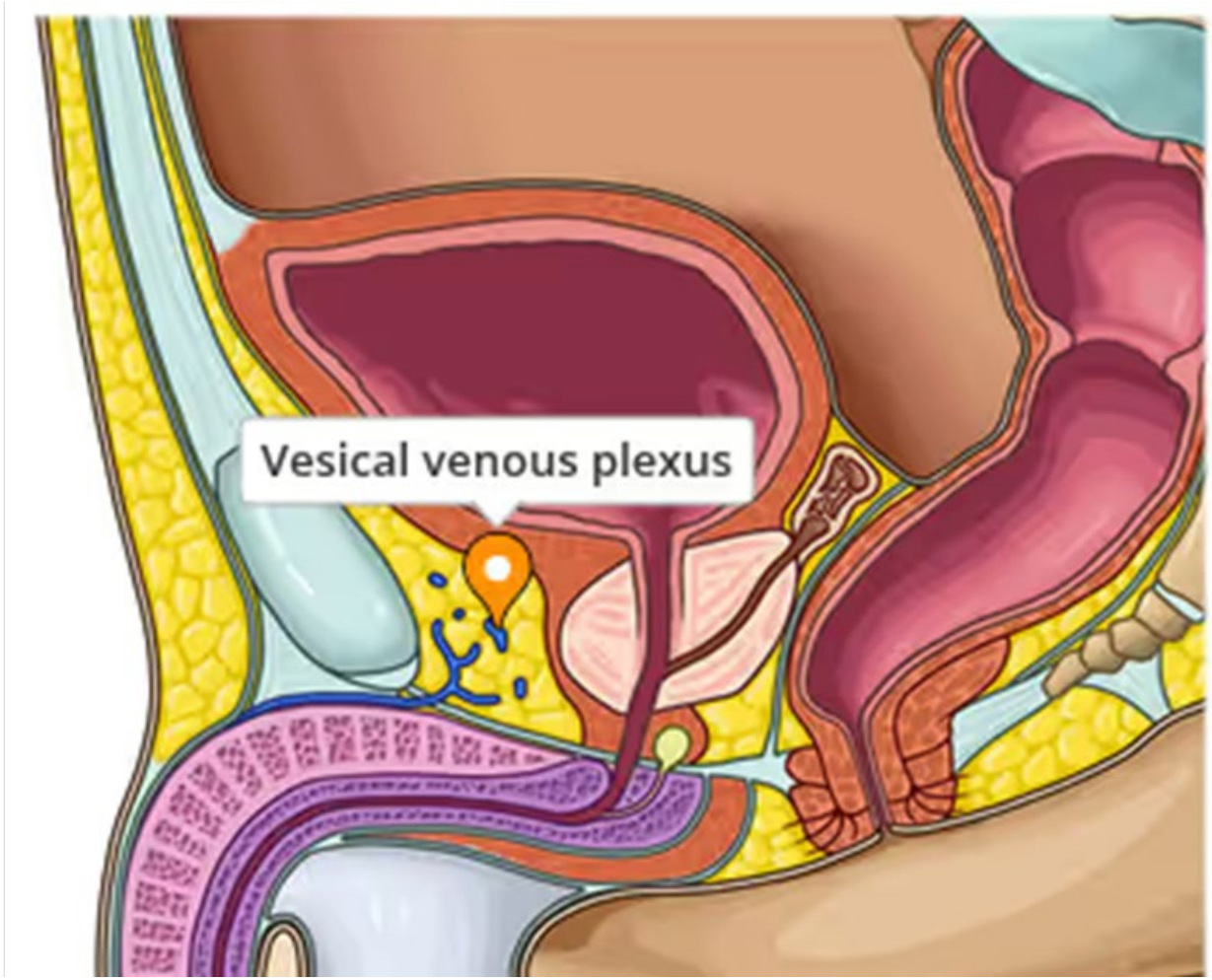
The adult worms live in the vesical and pelvic plexuses of veins.

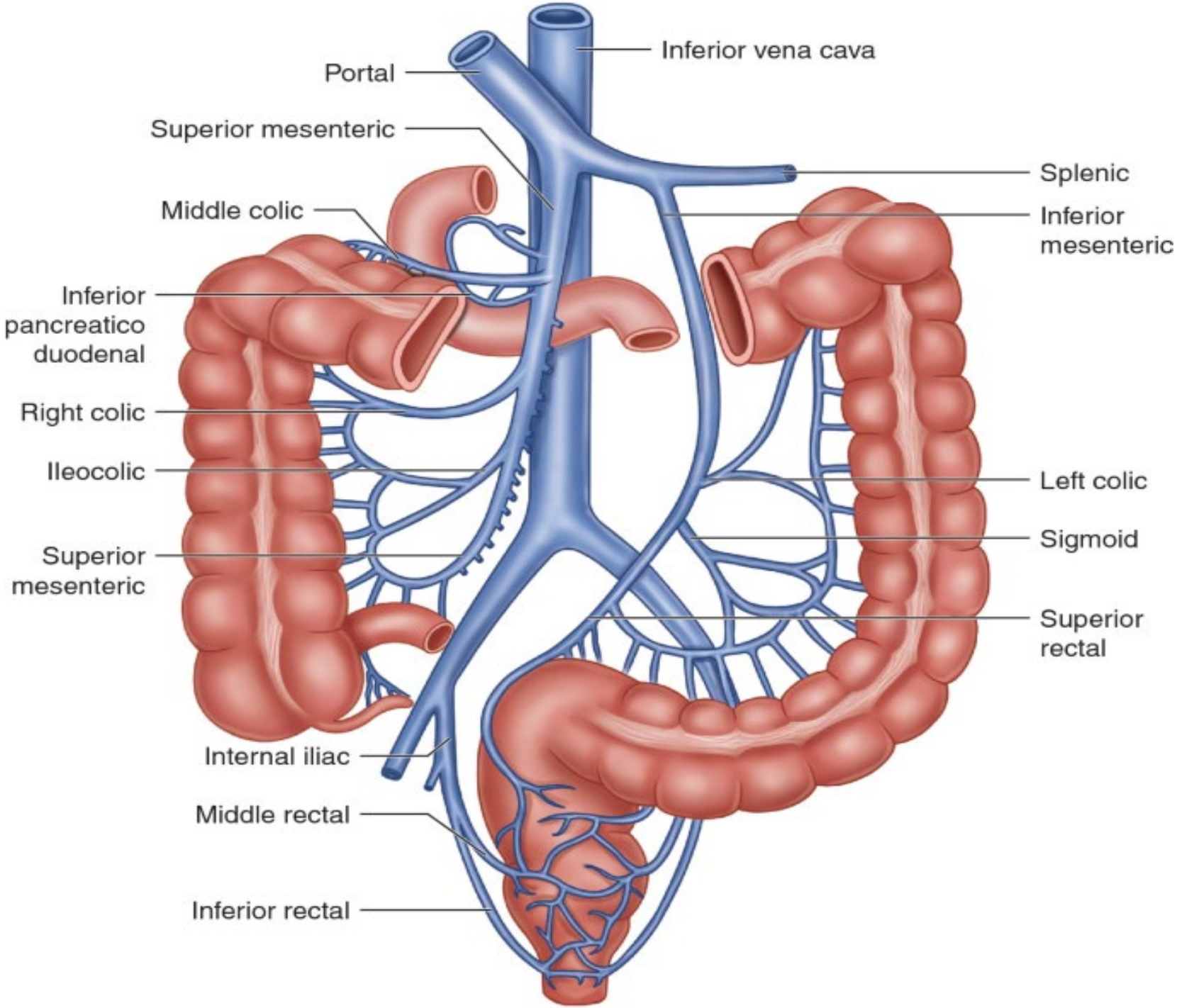
Schistosoma mansoni:

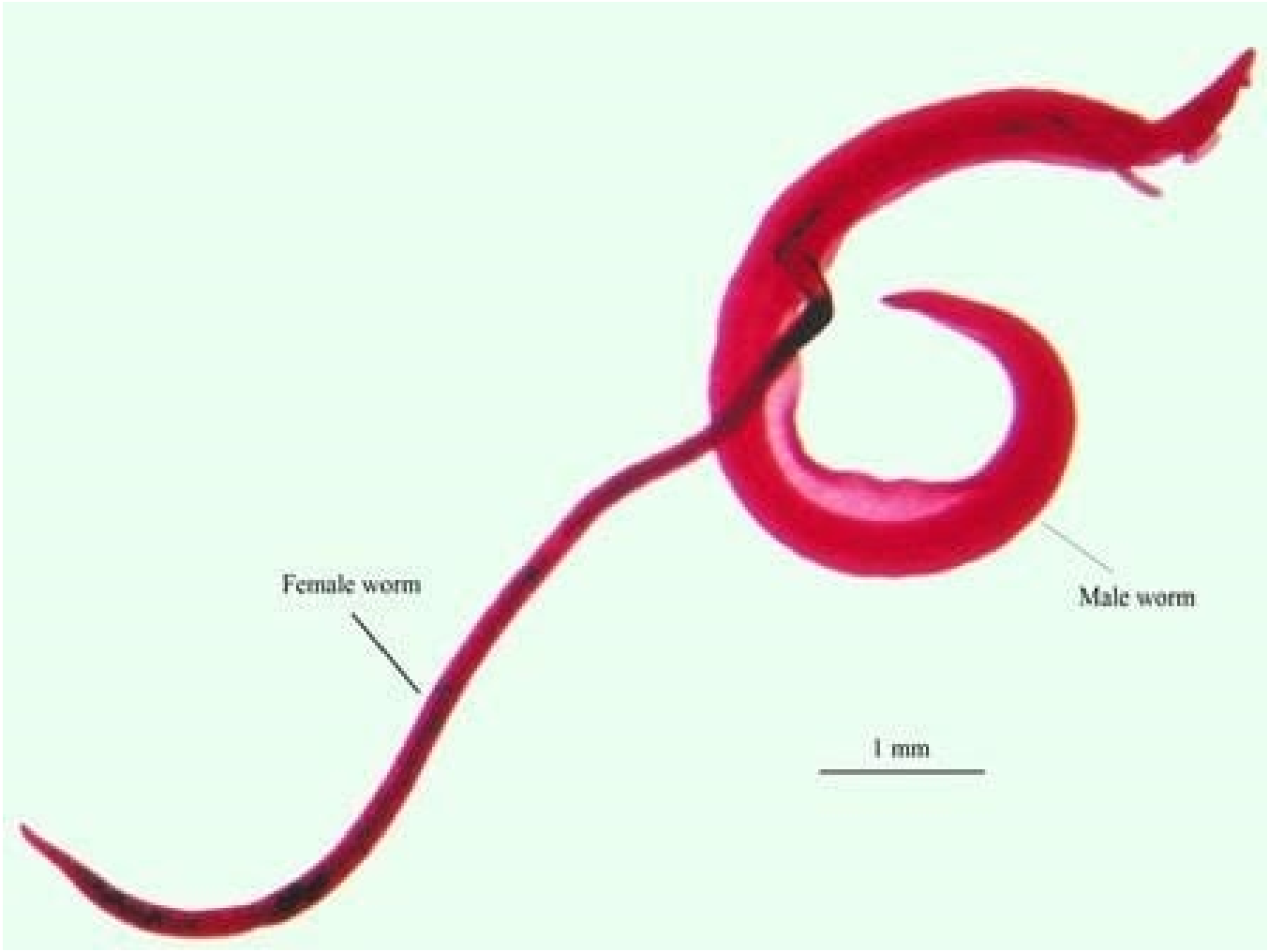
Adult worm lives in the inferior mesenteric vein

Schistosoma Japonicum

The adult worms are seen typically in the venules of the superior mesenteric vein draining the ileocecal region.


Vesical venous plexus


Inferior vena cava
Portal
Superior mesenteric
Splenic
Middle colic
Inferior mesenteric
Inferior pancreatico duodenal
Right colic
Ileocolic
Left colic
Sigmoid
Superior mesenteric
Superior rectal
Internal iliac
Middle rectal
Inferior rectal

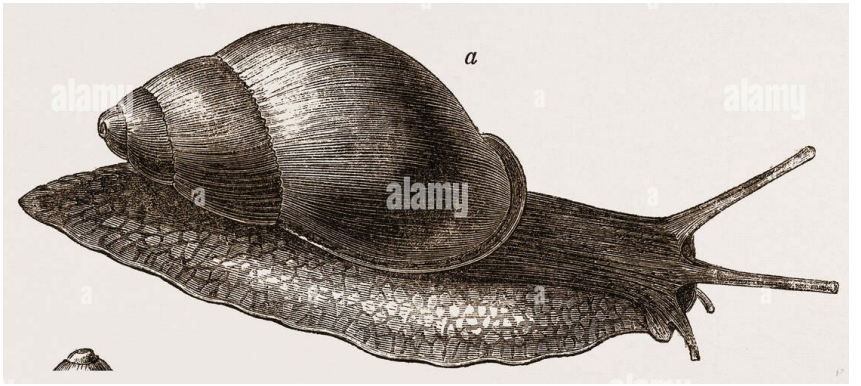

Female worm
Male worm
1 mm

	Schistosoma haematobium	*Schistosoma mansoni*	*Schistosoma japonicum*
Habitat	Veins of the vesical and pelvic plexuses, less commonly in portal vein and its mesenteric branches	Inferior mesenteric vein and its branches	Superior mesenteric vein and its branches
Morphology Size: Male Female Integument Number of testes Ovary Uterus	 • 1.5 cm × 1 mm • 2 cm × 0.22 mm • Finely tuberculated • 4–5 in groups • In the posterior one-third of the body • Contains 20–30 eggs	 • 1 cm × 1 mm • 1.4 cm × 0.25 mm • Grossly tuberculated • 8–9 in a zigzag row • In the anterior half of the body • 1–3 eggs	 • 1.2–2 cm × 0.5 mm • 2.6 cm × 0.3 mm • Nontubercular • 6–7 in a single file • In the middle of the body • 50 or more eggs
Egg	Elongated with terminal spine	Elongated with lateral spine	Round with small lateral knob
Cephalic glands in cercariae	Two pairs oxyphilic and three pairs basophilic	Two pairs oxyphilic and four pairs basophilic	Five pairs oxyphilic, no basophilic
Distribution	Africa, Near East, Middle East and India	Africa and South America	China, Japan and Far East (oriental)
Definitive host	Man	Man	Man (mainly) domestic animals and rodents (which act as reservoir of infection)
Intermediate host	Snail of genus *Bulinus*	Snail of genus *Biomphalaria*	Amphibian snail of genus *Oncomelania*

Hosts

- **Schistosoma haematobium**
- Intermediate Host: Freshwater snails (***Bulinus* sp.*).***

Definitive host: Human



- **Schistosoma mansoni**
- Intermediate Host: Planorbid freshwater *snails* of the genus ***Biomphalaria.***

Definitive host: Human

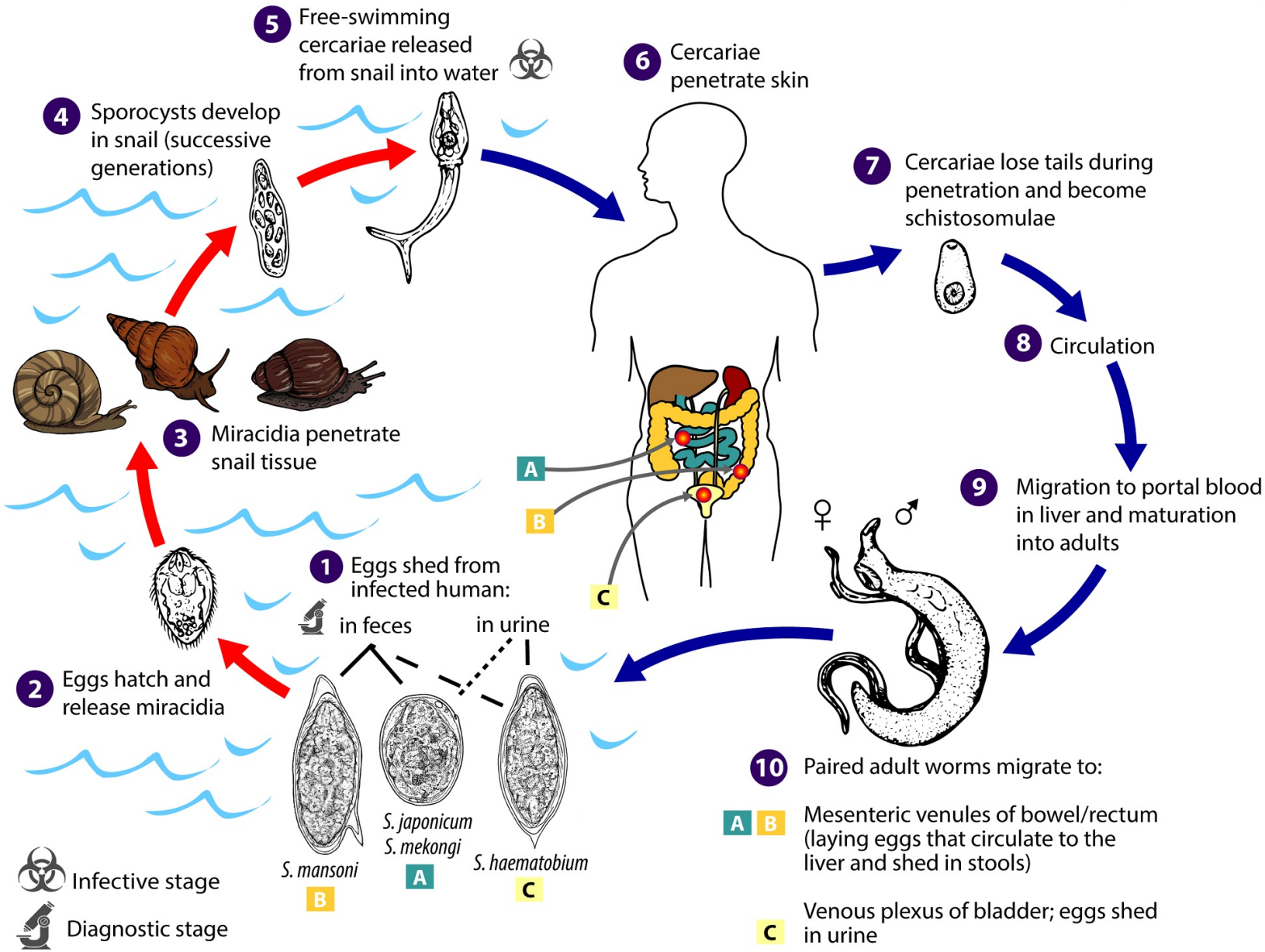
- **Schistosoma japonicum**
- Intermediate Host: Amphibian snails of the genus ***Oncomelania.***

Definitive host: Human

DPDx

Schistosoma spp.

CDC



Diagnosis

Stool Examination for: *Schistosoma mansoni* and *Schistosoma japonicum*

Urine Examination for: *Schistosoma haematobium*

Laboratory diagnosis (*Schistosoma haematobium*)

1. Urine microscopy:

The eggs with characteristic terminal spines can be demonstrated by microscopic examination

2. Histopathology:

Schistosome infection may also be diagnosed by demonstrating its eggs in bladder mucosa! biopsy and rectal biopsy

3. Serology:

Detection of antigen or antibody by ELISA

4. Ultrasonography (USG):

is also useful in diagnosing S. haematobium infection. USG may show hydroureter and hydronephrosis

Laboratory diagnosis (*Schistosoma mansoni* & *Schistosoma japonicum)*

1. Stool microscopy:

Eggs with lateral spines may be demonstrated microscopically in stools.

2. Rectal biopsy:

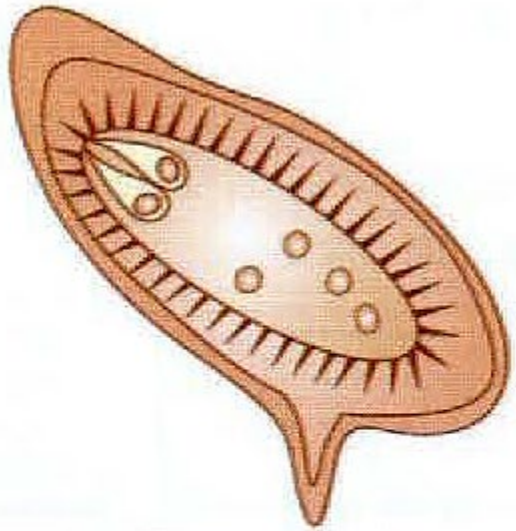
Proctoscopic biopsy of rectal mucosa may reveal eggs when examined as fresh squash preparation between two slides.

3. Serology:

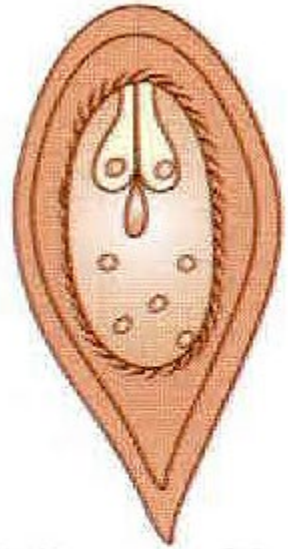
Detection of antigen or antibody by ELISA

4. Imaging:

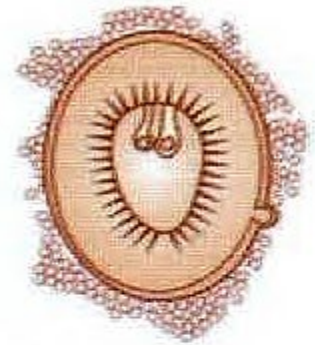
Ultrasonography is useful to detect hepatosplenomegaly and periportal fibrosis.



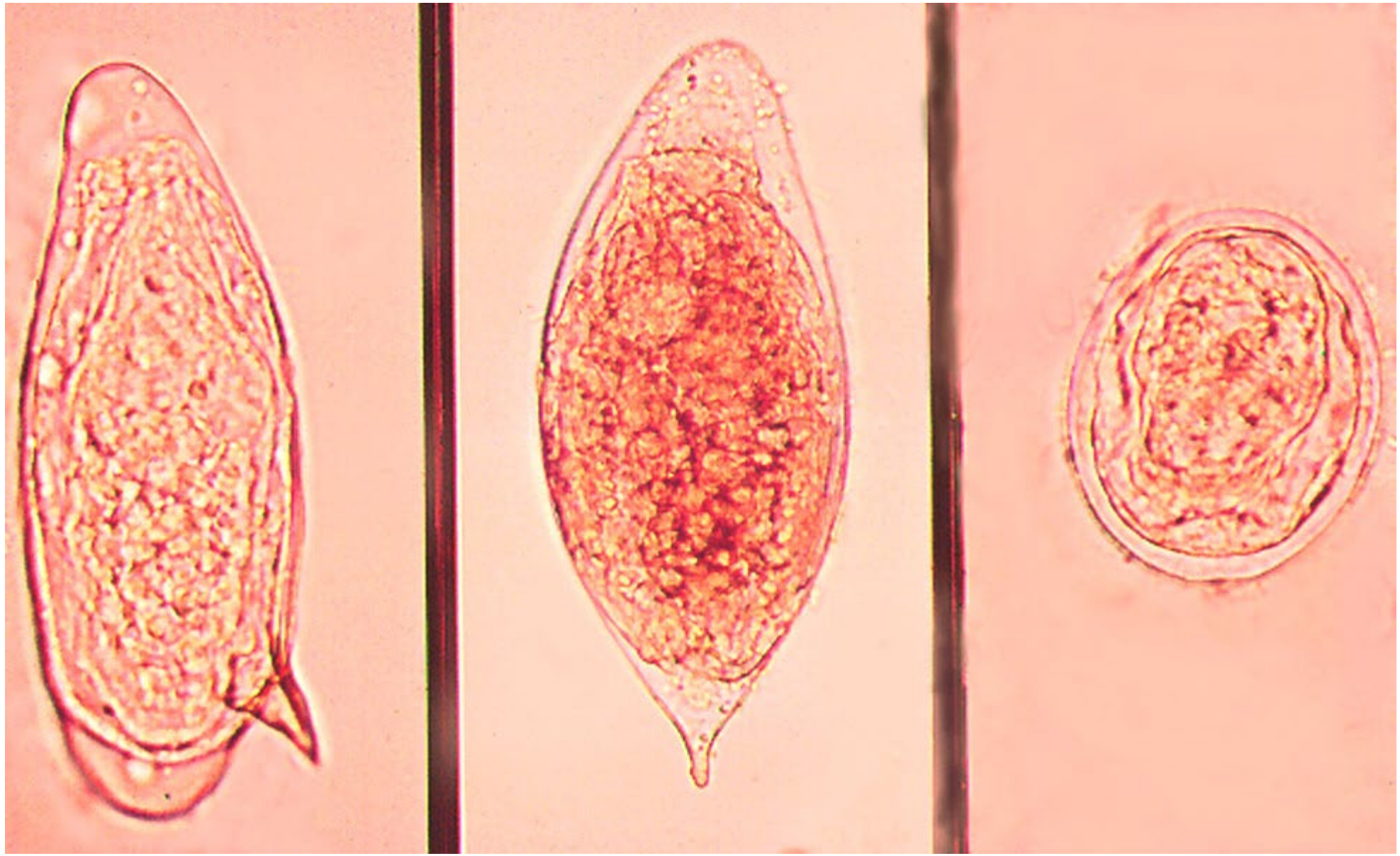
S. mansoni
Ova with a lateral spine
(obtained from stool)



S. haematobium
Ova with a terminal spine
(obtained from urine)



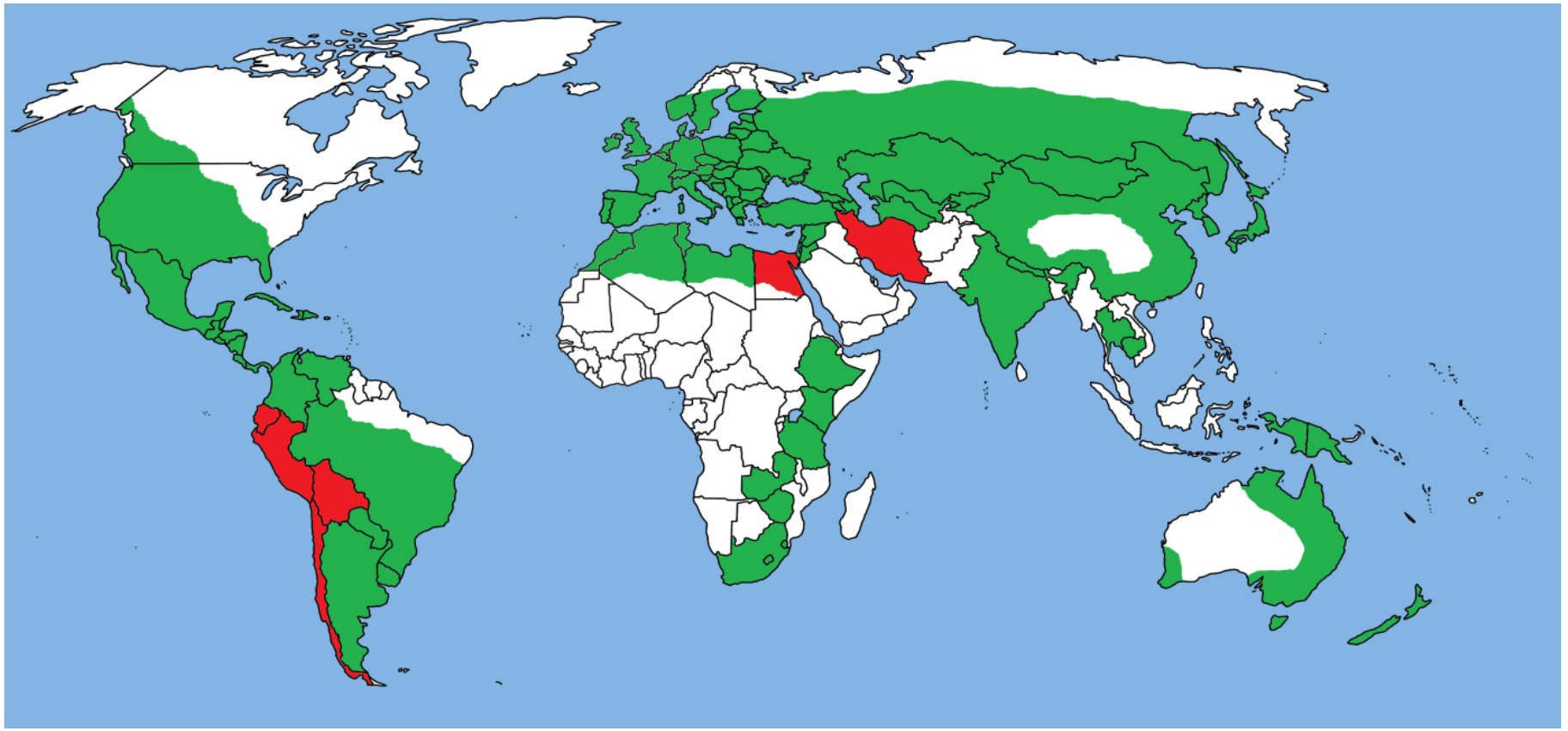
S. japonicum
Ova with a lateral knob
(obtained from stool)
Note: The characteristic surround of tissue particles



Fasciola hepatica

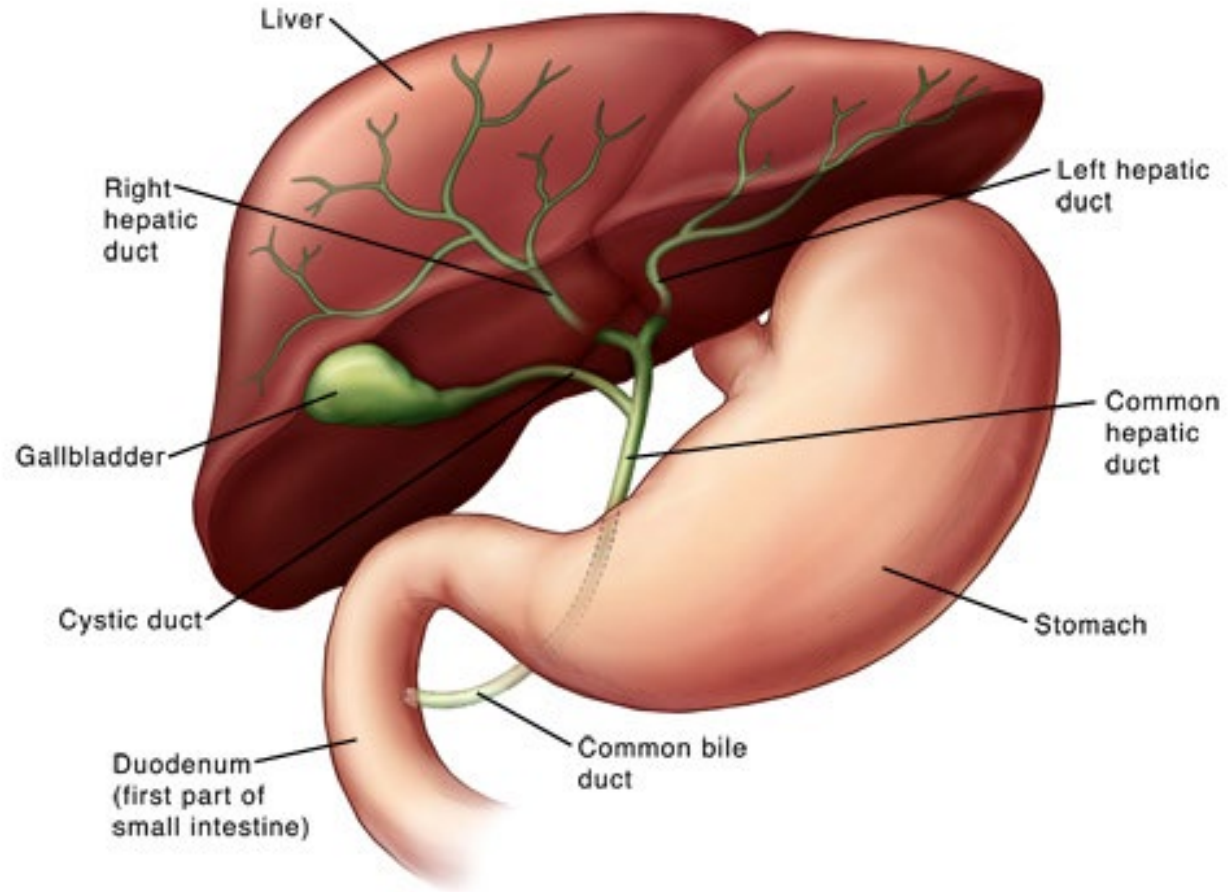
Geographical distribution

Cosmopolitant



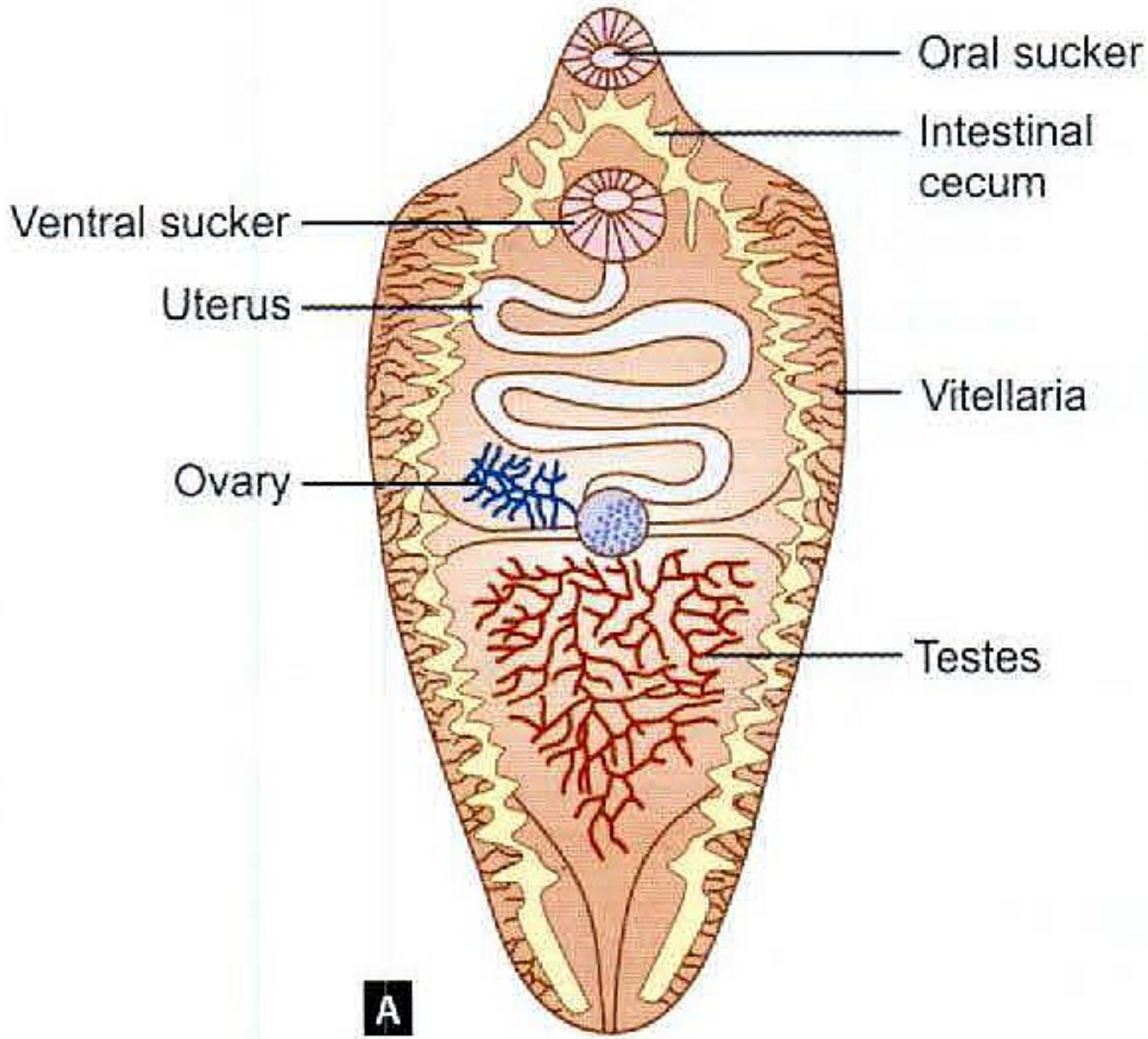
Habitat

Adult worm lives in the bile duct of the definitive host



Morphology

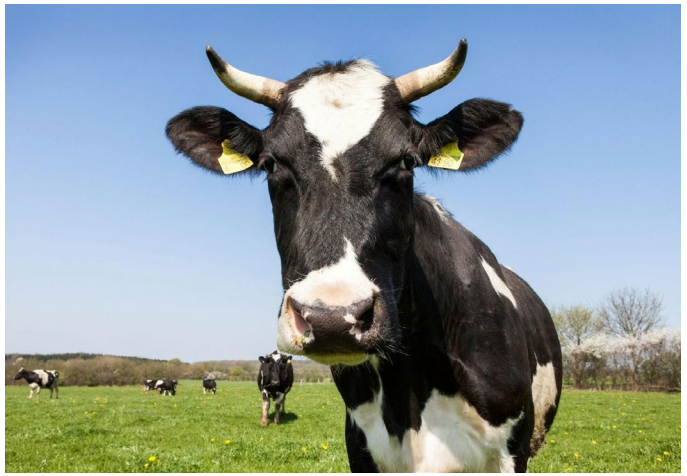
1. Shape: broad and leaf-like with head lobe.
2. Size: 2-3cm in length by 0.8-1.3 in breadth.
3. Oral and ventral sucker: oral sucker is smaller than ventral sucker
4. They are hermaphrodite.
5. Female reproductive system consist of single multilobed ovary, a short oviduct leads from the ovary to ootype, two vitteline gland, and coiled tube uterus.
6. Male reproductive system consist of two testes, vas efferent, vas deferens.
7. The intestinal tract has well developed pharynx, short esophagus and two branched intestinal caeca which are extending from the anterior end to the posterior end of the body.

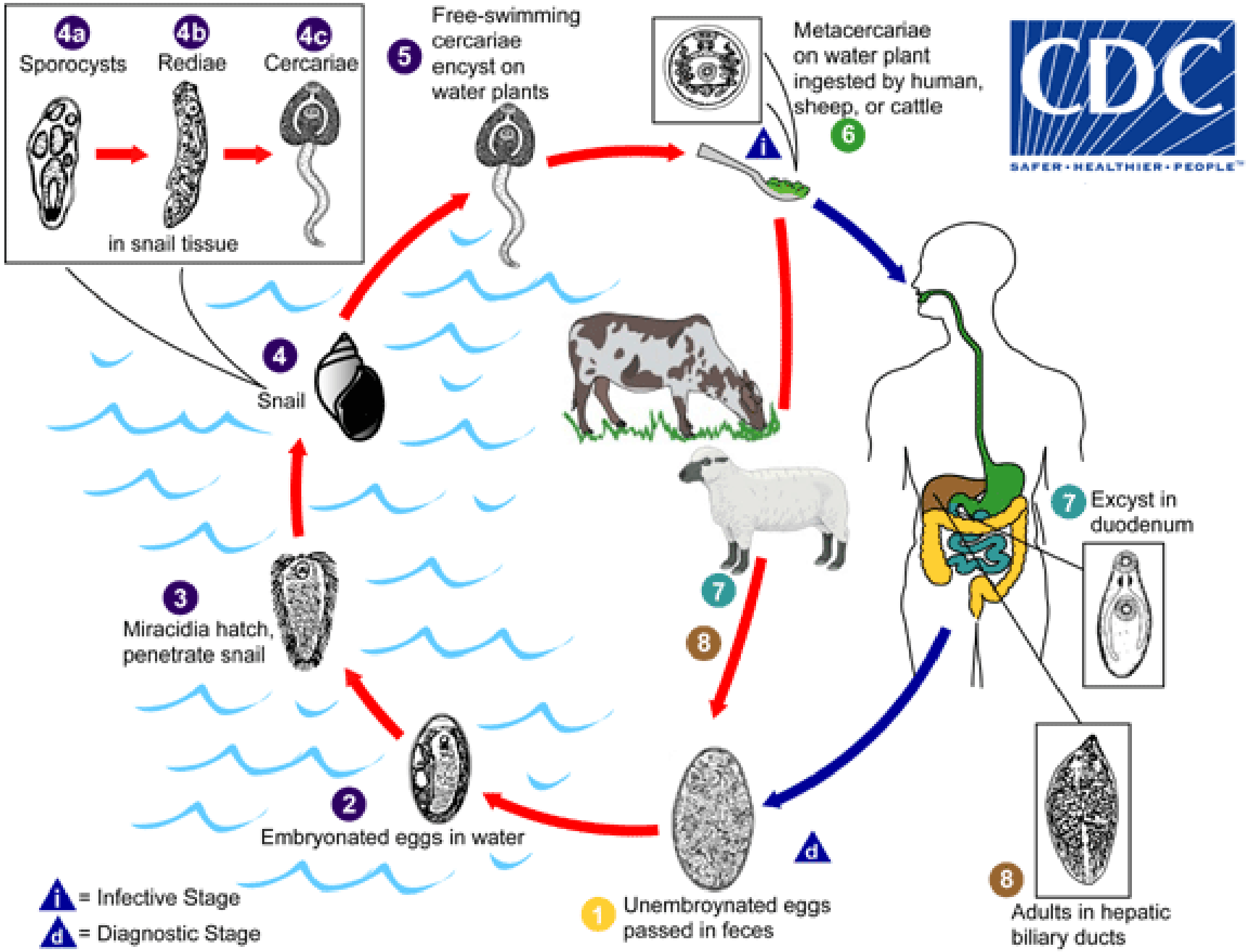

Oral sucker
Intestinal cecum
Ventral sucker
Uterus
Vitellaria
Ovary
Testes
A

Hosts

- Intermediate host: freshwater snail (*Lymnaea* sp.)

- Definitive host: sheep, cattle, goat and human




4a Sporocysts
4b Rediae
4c Cercariae
in snail tissue
5 Free-swimming cercariae encyst on water plants
Metacercariae on water plant ingested by human, sheep, or cattle
6
i
4
Snail
3
Miracidia hatch, penetrate snail
2
Embryonated eggs in water
1
Unembroynated eggs passed in feces
d
7
Excyst in duodenum
8
Adults in hepatic biliary ducts
i = Infective Stage
d = Diagnostic Stage
CDC
SAFER · HEALTHIER · PEOPLE™

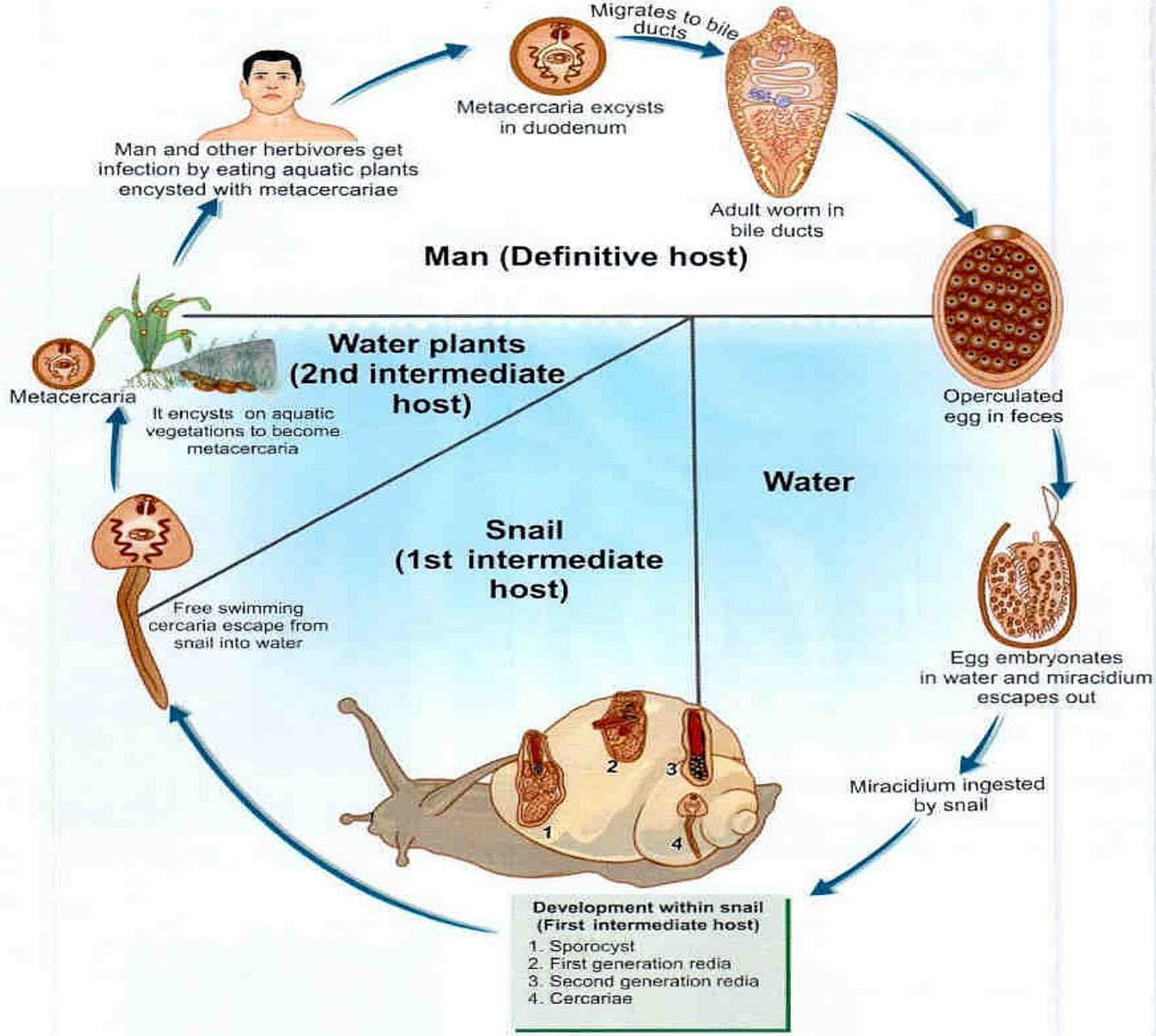


Fig. 10: Life cycle of *Fasciola hepatica*

Disease:

It causes fascioliasis, and liver rot.

Symptoms:

1. Digestive disturbance
2. Abdominal pain
3. Diarrhea
4. Weight loss
5. Hepatomegaly
6. Necrosis of the liver tissue along the pathway of the worm
7. Irregular fever
8. Jaundice

Diagnosis

The infection typically is diagnosed by examining stool (fecal) specimens under a microscope. The diagnosis is confirmed if *Fasciola* eggs are seen. More than one specimen may need to be examined to find the parasite. Certain types of blood tests also may be helpful for diagnosing *Fasciola* infection.

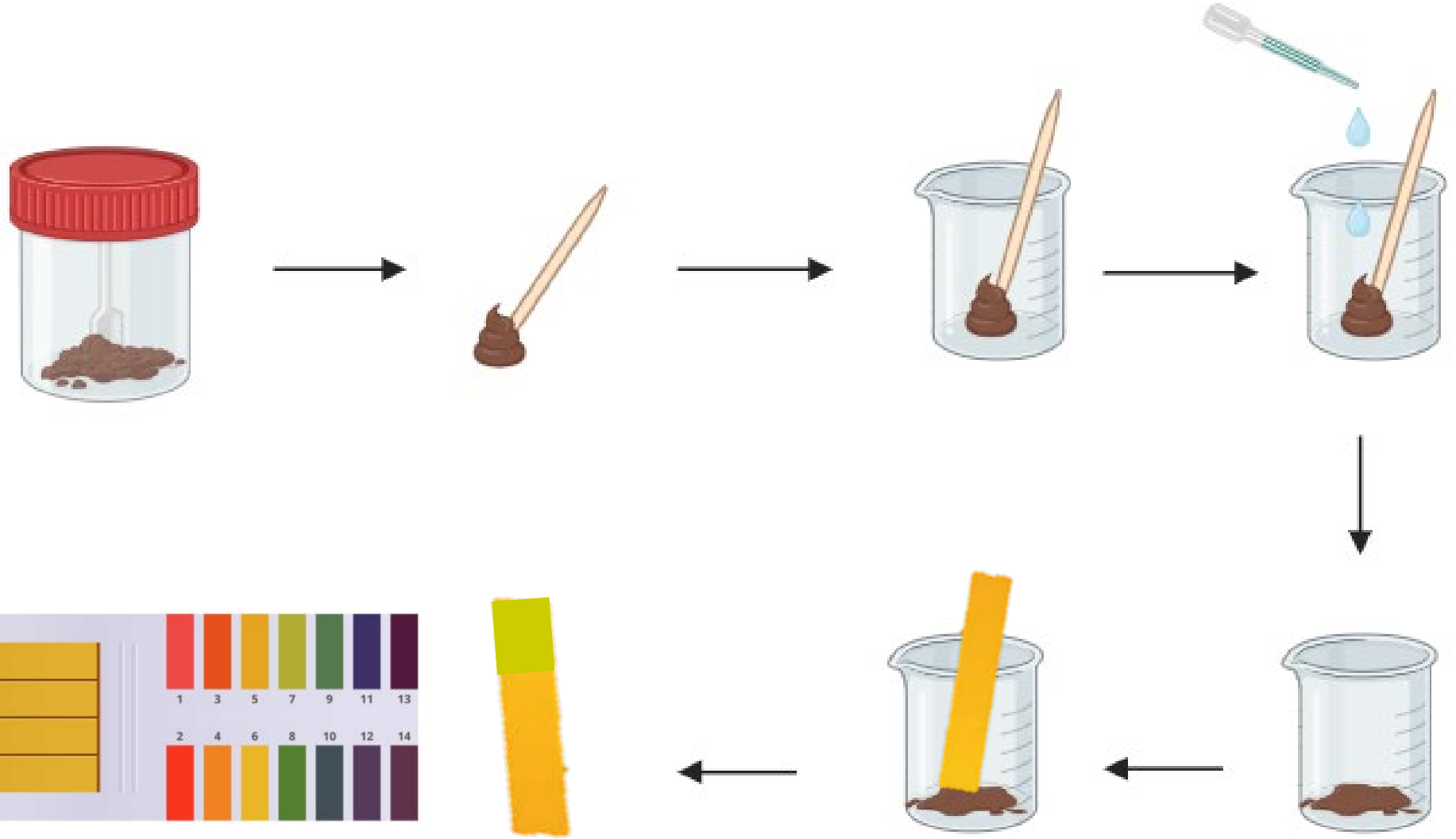
Fecal pH test

Stool Acidity Test

- A **fecal pH test** is one where a specimen of feces is tested for acidity in order to diagnose a medical condition.
- An acidic stool can indicate a digestive problem such as lactose intolerance or a contagion such as *E. coli* or rotavirus, or overgrowth of the acid producing bacteria (such as lactic acid bacteria for instance).
- The average stool pH for a healthy person is a pH of 6.6.
- A high alkaline pH rating being associated with the body's inability to create enough acid along with undigested food.

- A patient must not be receiving antibiotics. At least half a milliliter of feces is collected and a strip of litmus paper is dipped in the sample and compared against a color scale.
- A pH of less than 5.5 indicates an acidic sample.

Procedure



Don’t put too much water!!

Artifacts in Stool