Fasciola hepatica

KPM

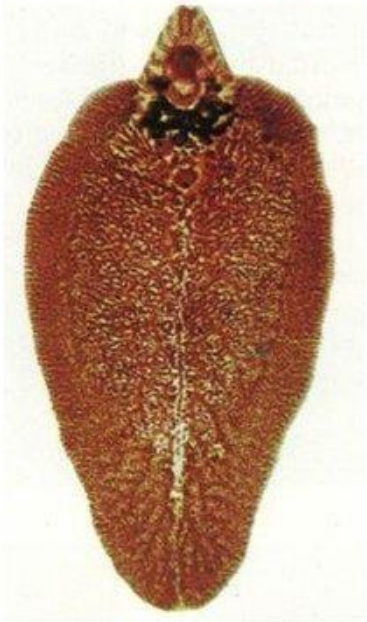
Habit, Habitat and Distribution

- The mature flukes are generally seen in the bile ducts of infected people and animals, such as cattle and sheep.
- In general, fascioliasis is additionally widespread in livestock and other animals than in humans.
- Fascioliasis occurs in more then 70 countries, especially where cattle and sheep are reared.
- *Fasciola hepatica* is found in all continents except for Antarctica.
- *Fasciola gigantica* has been seen in few tropical regions.
- Infection starts when Metacercariae infected amphibian vegetation is eaten or when water containing metacercariae is consumed.
- It is one of the most significant infection specialists of household stock all through the world.

- *F. hepatica* is distributed around the world, and causes extraordinary monetary misfortunes in dairy cattle and sheep.

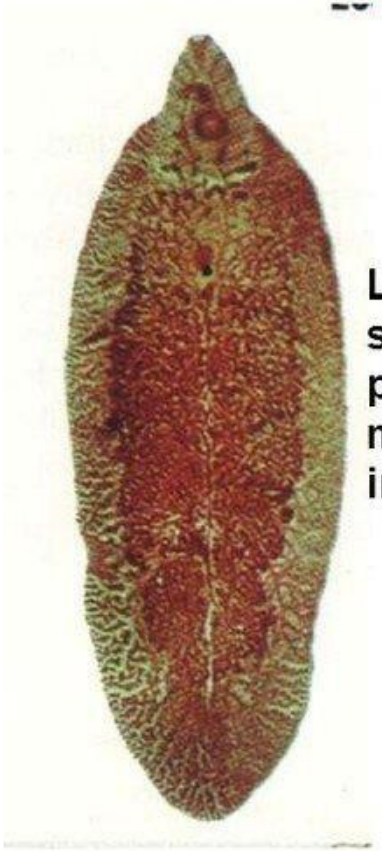
Fasciola sp. cont.

Fasciola hepatica



cephalic cone, 2 shoulders, converging margins,smaller in size

Fasciola gigantica



Less prominent shoulders, parallel margins, larger in size

- Two *Fasciola*

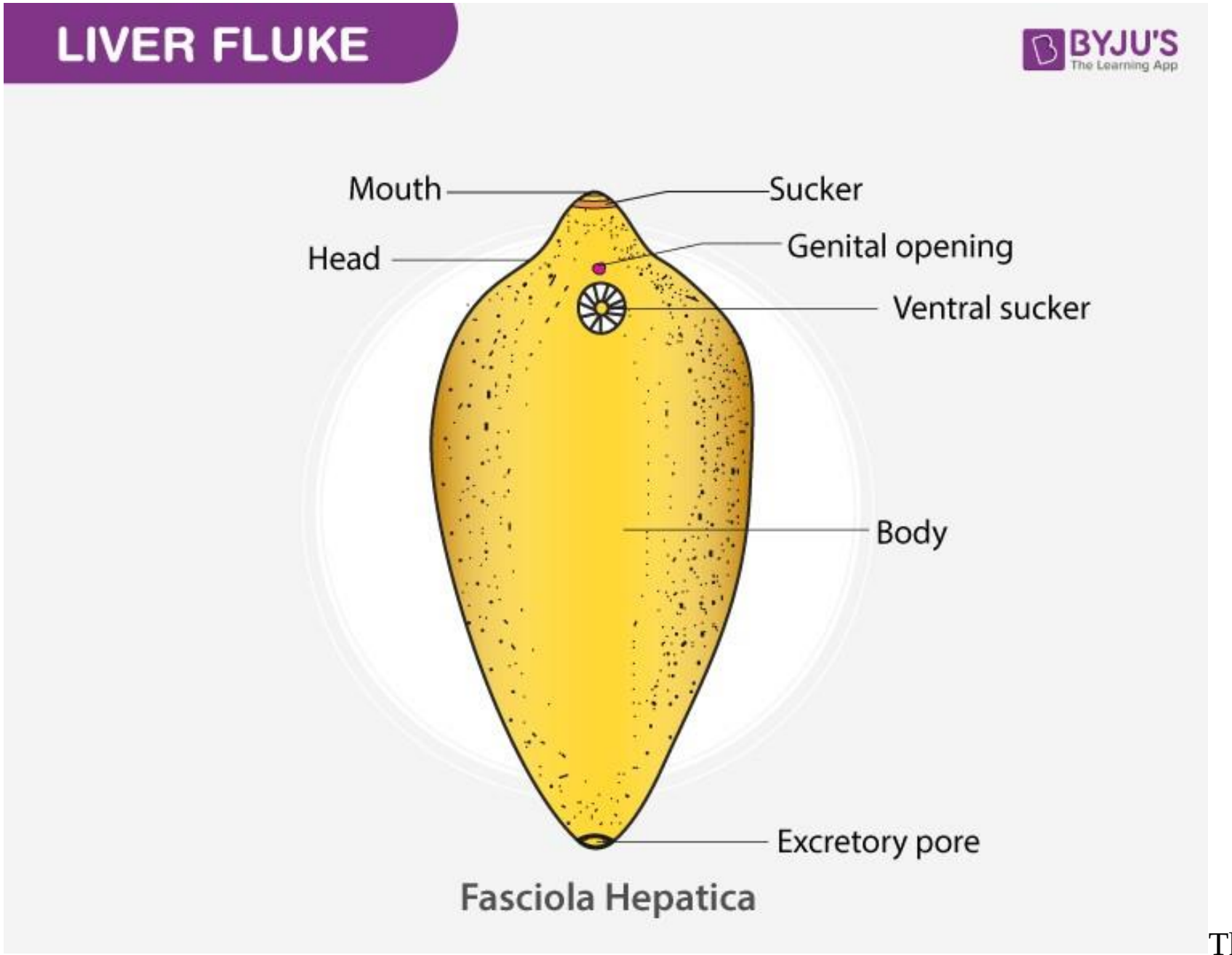
species (types) infect people. The most important species is *Fasciola hepatica*, which is also recognized as “the common liver fluke”.

- A linked species, *Fasciola gigantica*, can also contaminate people.
- It is digenetic parasite.
- Definitive host: Sheep/ Goat (Adults exist in the bile ducts of the liver in the definitive host) • Intermediate host: Fresh water snail

Morphology

The Adult Worm:

- Averaging 30mm in length and 13 mm in width, Fasciola hepatica is one of the largest flukes in the world.



- The adult worm has a

very characteristic leaf shape with the anterior end being broader than the posterior end and an anterior cone-shaped projection.

- The body is pinkish in shading. The digestive system appears dark colored in shading due to the ingested bile.
- **External openings:**
  a. At the front end mouth opening is present.
  b. On the ventral side over the ventral sucker a small genital openings is present.
  c. In the reproducing season on the dorsal side a small opening of Laurer's canal persists.
- **Suckers:** Two suckers are present.
  a. At the anterior approximately near the mouth an oral sucker exists. It is 1 mm. in diameter and is useful for ingestion and attachment also.
  b. On the ventral side a ventral sucker exists that is about 3 to 4 mm. away from anteriorend. It is a larger sucker. It is used for attachment.

- **Reproductive system:**

Fasciola is a bisexual animal. It shows both male and female reproductive organs.

- The male reproductive system has a pair of testis one above the other inside the body. Each

- The seminal vesicle is continuous as an ejaculatory duct and opens into the genital atrium that lies

- The terminal portion of the ejaculatory duct is highly muscular and called as the cirrus. Also when not in use the cirrus is present in a sac known as cirrus sac.

Male reproductive system:

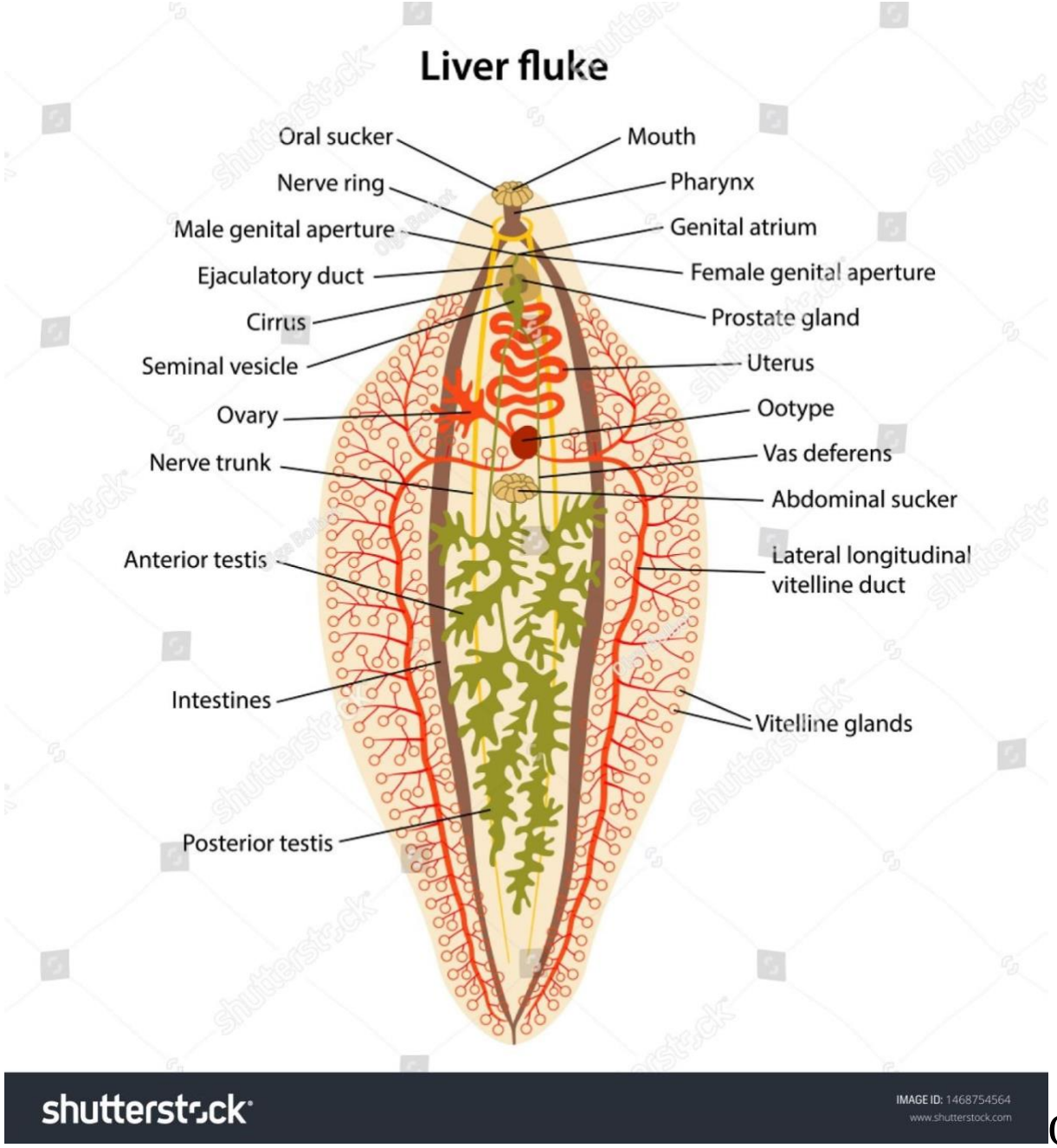
testis is very highly branched.

- From each testis Vas deferens originates.
- The two sperm ducts go ahead and unite.

  just above the ventral sucker.

Female reproductive system:

- The female reproductive system has a single highly branched ovary present on the right side of the body.
- From the ovary oviduct originate which proceed towards the middle of the body of fluke.



- On each side of the body there are two

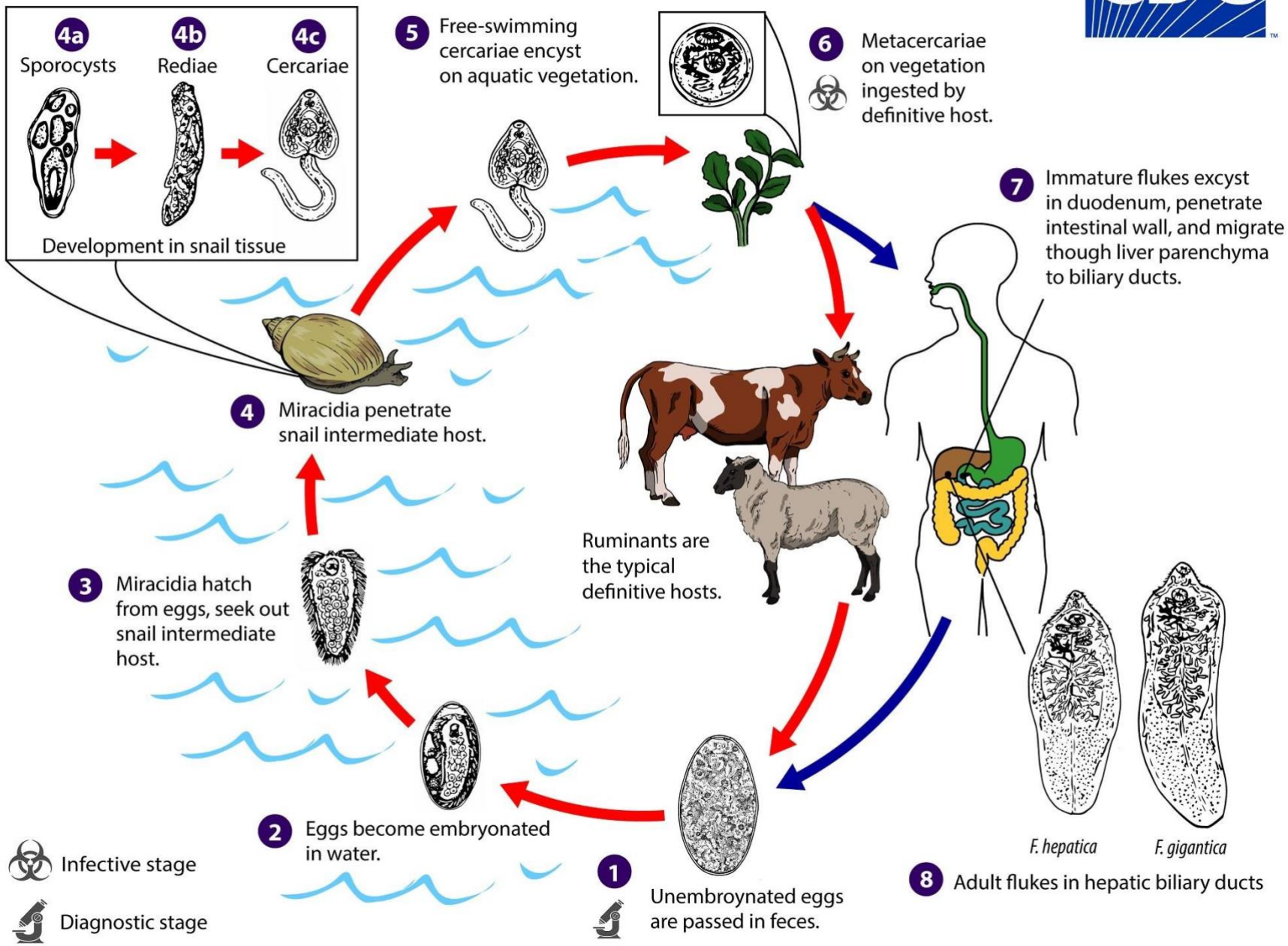
longitudinal vitelline ducts and a huge number of vitelline glands.

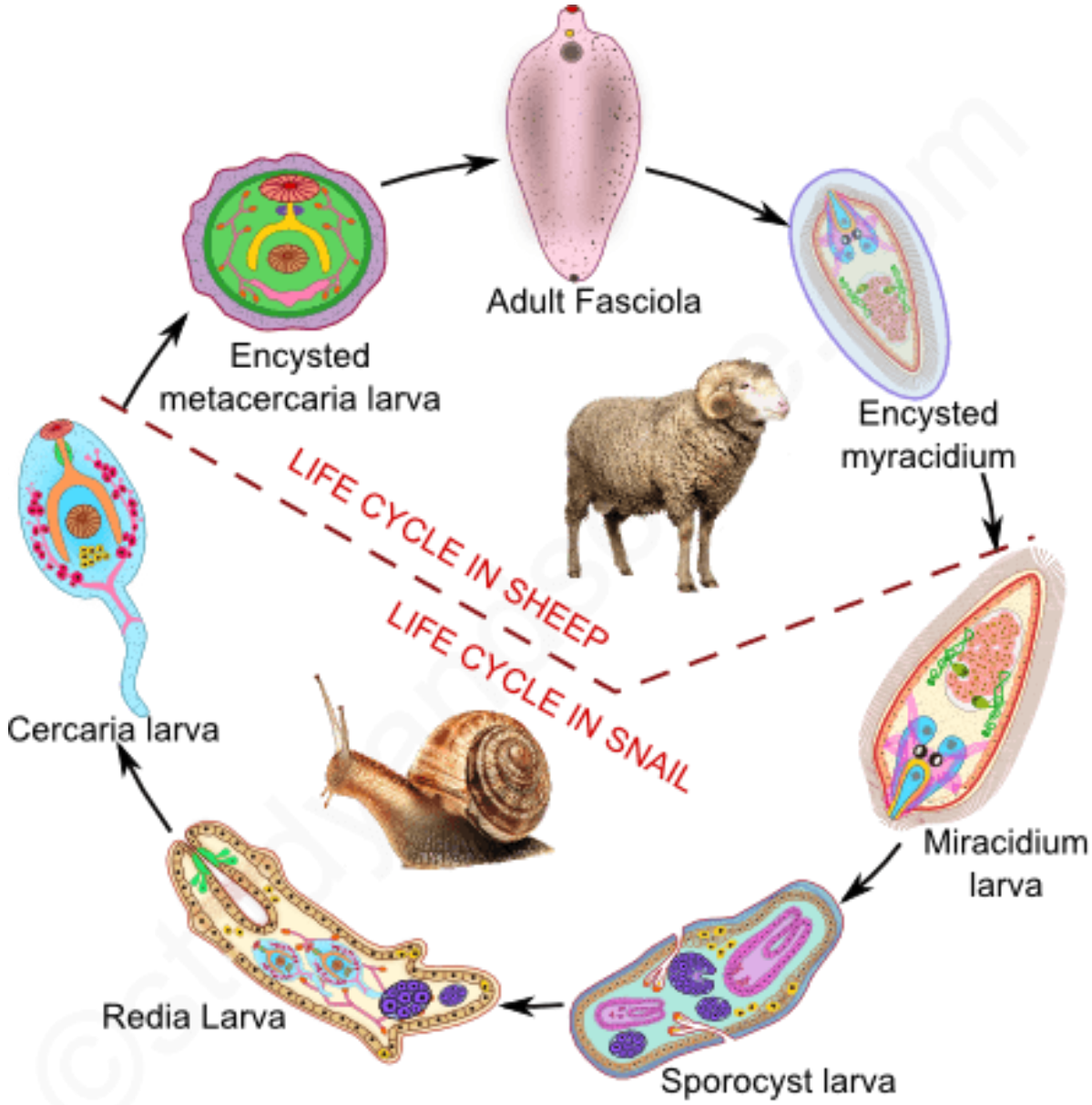
- They all unite with longitudinal vitelline ducts with the help of small ducts. The longitudinal ducts are linked by a transverse vitelline duct which is situated a bit over the middle line of the body.
- From this transverse vitelline duct which is positioned a bit above the middle line of the body.
- From this transverse vitelline duct a yolk reservoir originates.
- This gives a median vitelline duct which unites with oviduct. The joint duct now opens into ootype.
- At the junction of the oviduct-vitelline duct a uterus is present which is a long coiled tube.
- It opens into the genital atrium with the help of female genital opening.
- At the junction of uterus, oviduct and vitelline duct, mehlis glands exist.
- The junction of all these three ducts is called Ootype.

DPDx

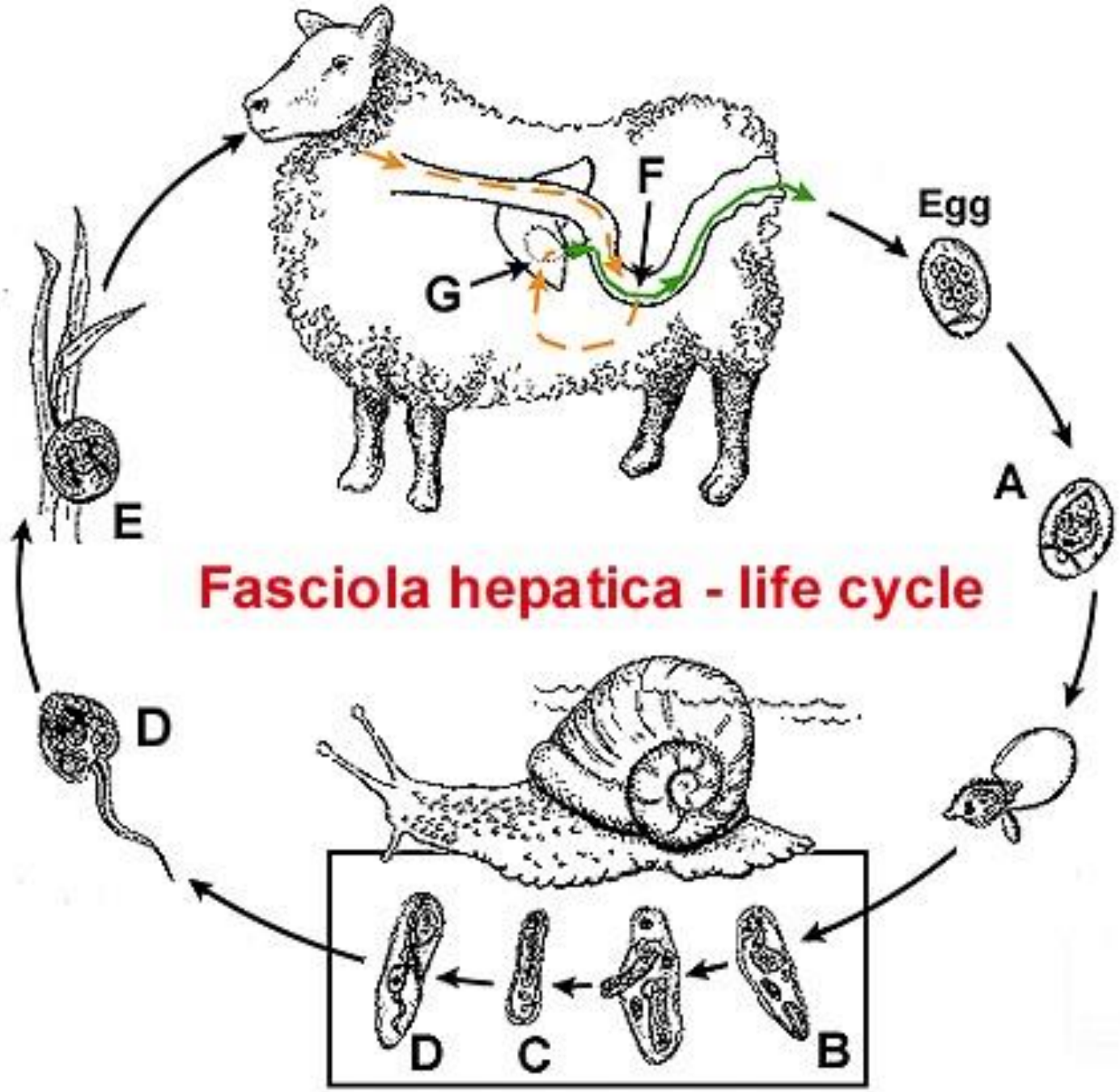
Fasciola spp.

CDC





FASCIOLA HEPATICA - LIFE CYCLE

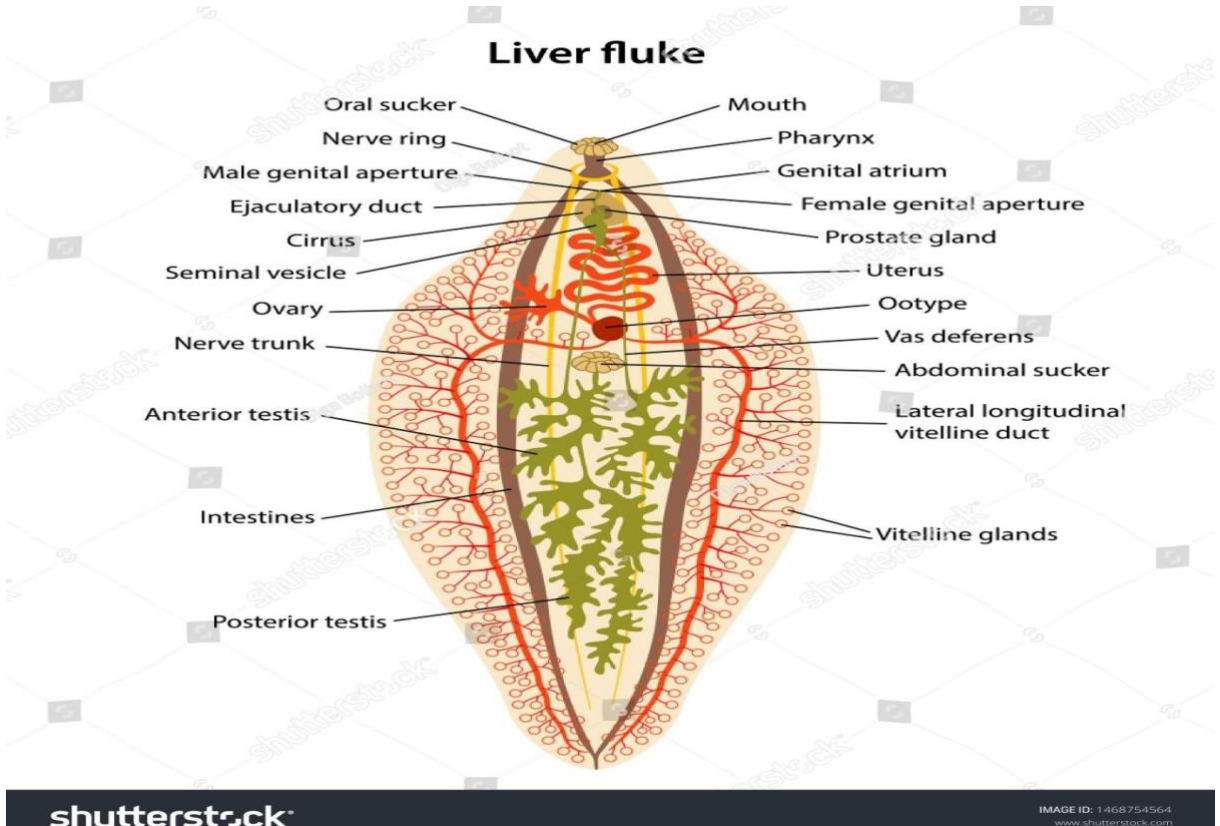


Fasciola hepatica - life cycle

Life cycle

- The existence pattern of *Fasciola hepatica* starts when a female lays eggs in the liver of infected definitive host (Sheep or human)
- Juvenile eggs are discharged in the biliary ducts and taken out in the feces.
- Whenever arrived in water, the eggs become embryonated and create larvae called **Miracidium**.
- A miracidium invades an amphibian snail.
- Within the tissue of snail, Miracidium turns into slender **Sporocyst** larva loosing locomotory organs within which **Redia** larva develops. Within redia, numerous **Cercaria** larvae are formed having tail for locomotion and are released from snail and become free swimming.
- The cercaria exits and finds sea-going vegetation where it forms a cyst called **Metacercariae**.
- A human eats the crude freshwater plant containing the cyst.
- The Metacercaria excyst as they reach duodenum due to enzymatic action.

- It finds the liver and starts eating liver cells. This happens just a couple of days after the underlying contact with the parasite. Usually the larva spends a couple of weeks just browsing and eating the liver.
- At that point it relocates to the bile duct where it begins its last stage and becomes an adult.
- It takes around a quarter of a year for the Metacercariae to form into an adult.
- Grown-up females can deliver up to 25000 eggs for each day.



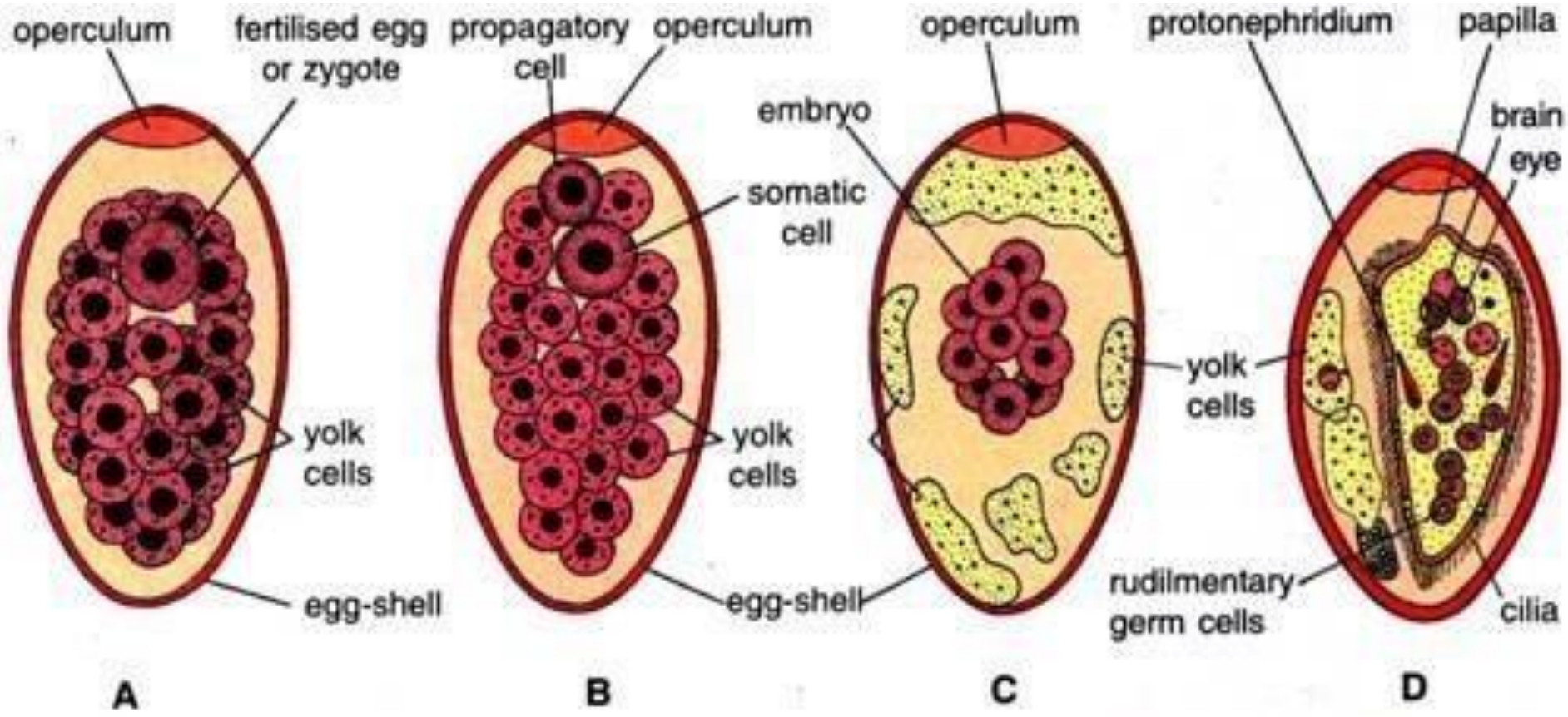
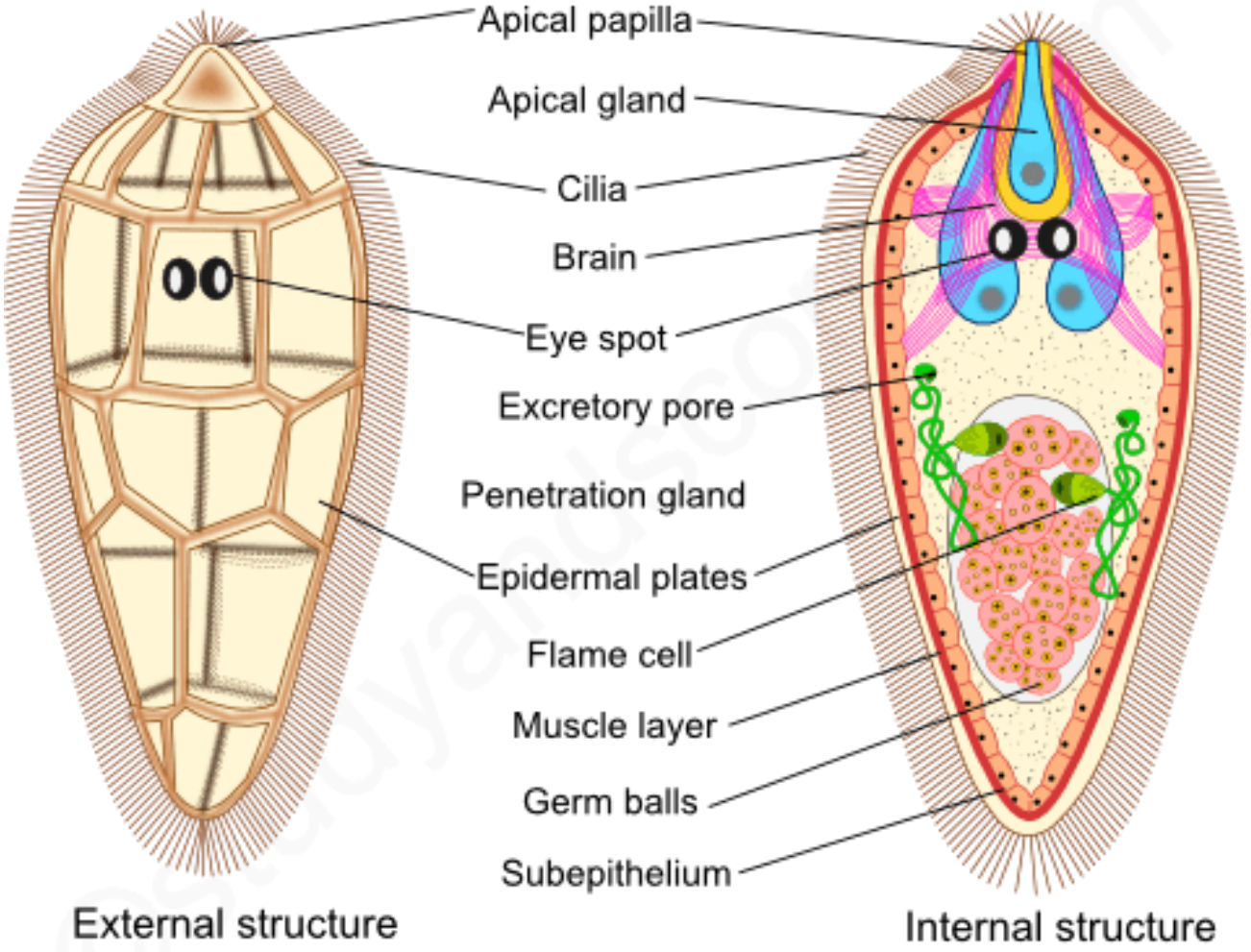
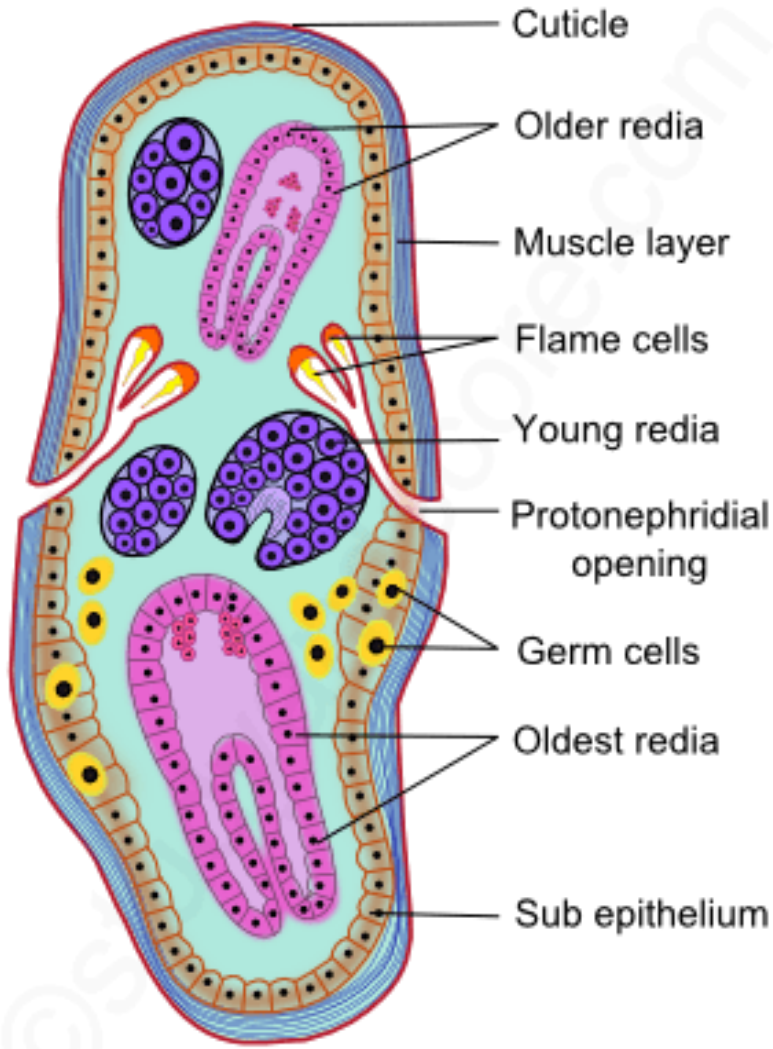


Fig. 41.14. *Fasciola hepatica*. Early stages of development. A—Fertilised egg; B—Two cell stage; C—Many cell stage; D—Miracidium in capsules.



FASCIOLA- MIRACIDIUM LARVA



FASCIOLA- SPOROCYST LARVA

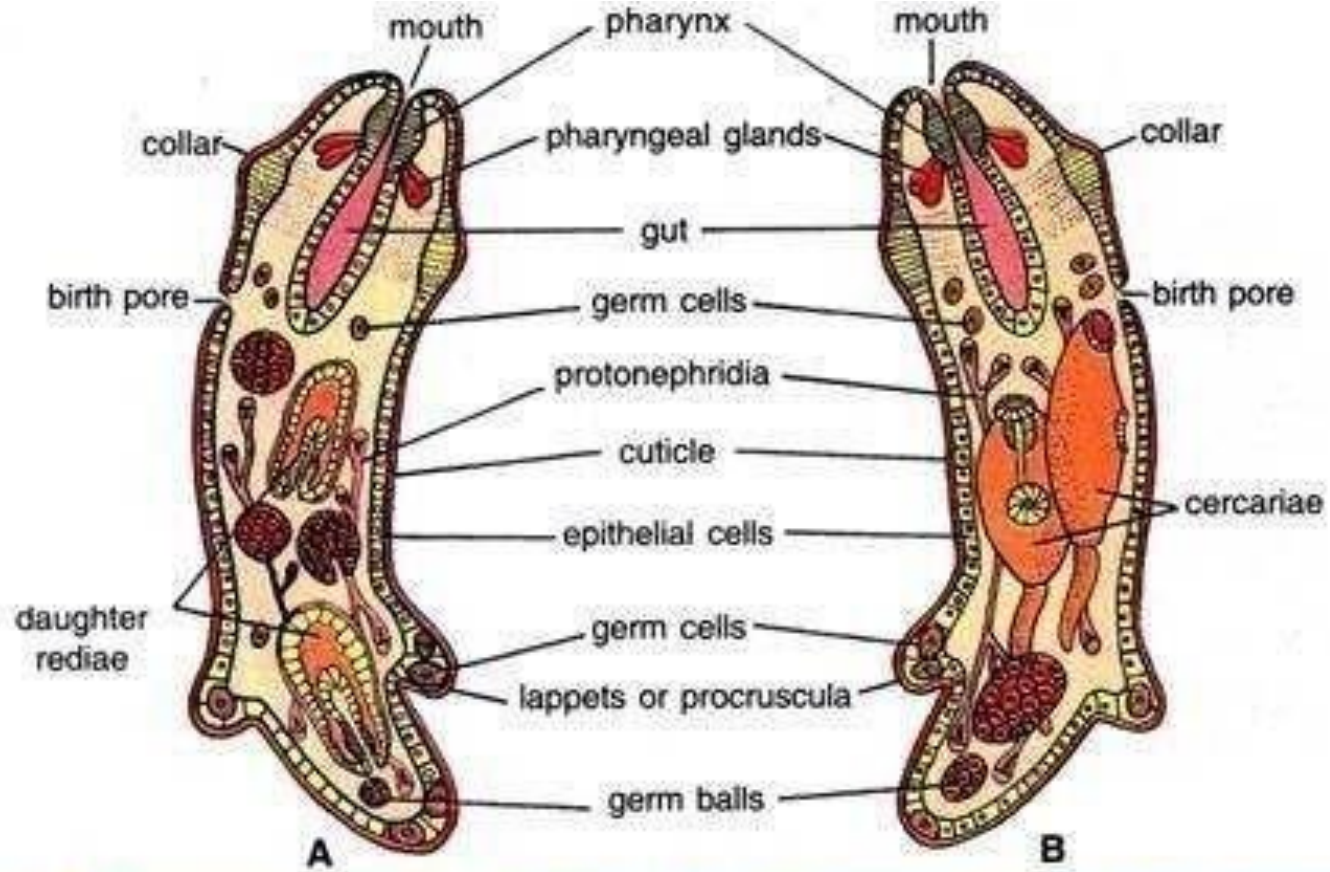
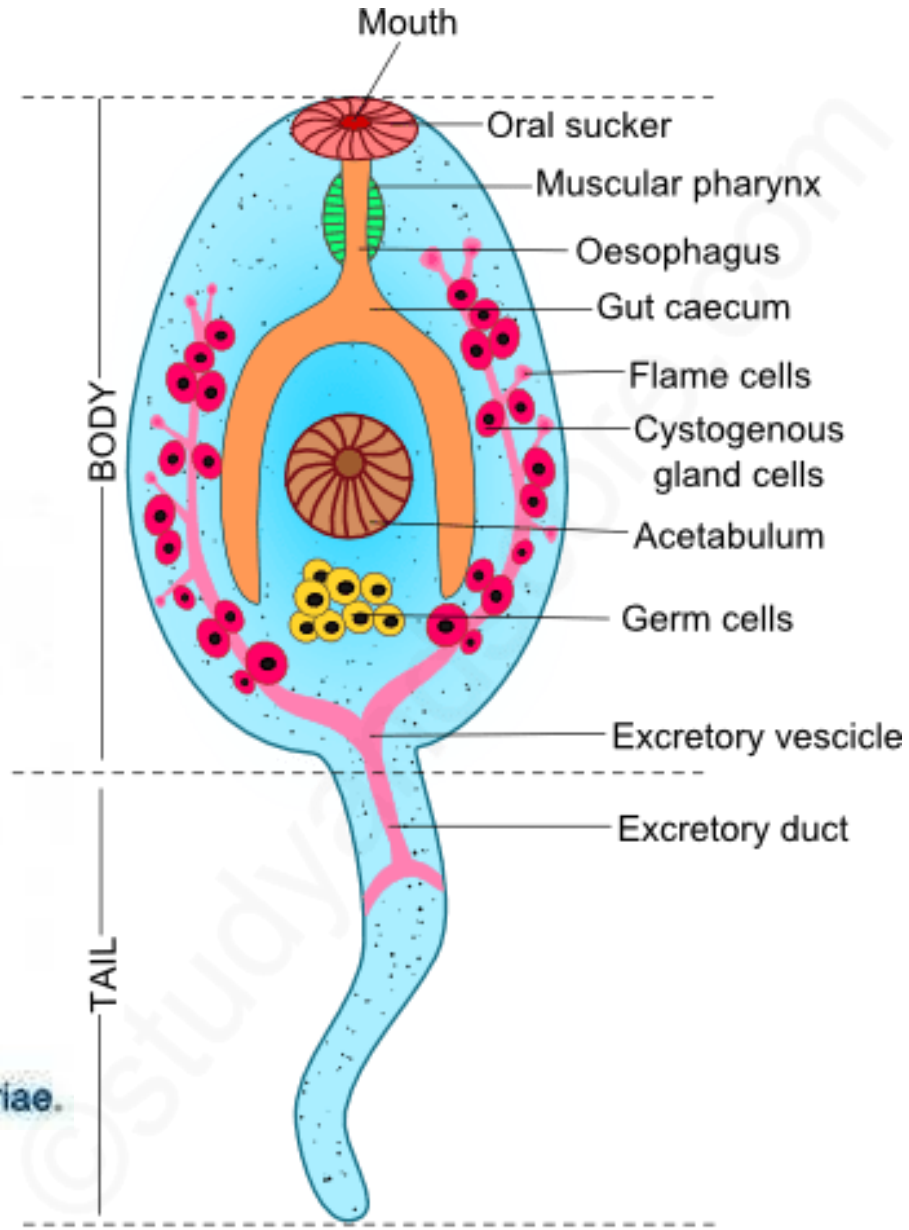


Fig. 41.18. *Fasciola hepatica*. A—Redia with daughter rediae; B—Redia with cercariae.



FASCIOLA- CERCARIA LARVA

Pathology

- Little harm occurs by juveniles infiltrating the intestinal wall and the capsule surrounding the liver however much necrosis results from movement of flukes through the liver parenchyma.
- Worms in bile ducts cause irritation and edema, which thus stimulate creation of fibrous tissue in the walls of these ducts.
- Thus thickened ducts can deal with less bile and are less responsive to needs of the liver.
- Later, it leads to destruction of hepatic cells along with liver cirrhosis and lastly jaundice.
- In overwhelming infections the gall bladder is harmed, and walls of the bile ducts are disintegrated completely.

Symptoms-

- Hepatic Tenderness
- Anemia
- Hepatomegaly resulting from Edema
- Nausea
- Jaundice

- Lethargy (laziness)
- Prolonged High Fever
- Vomiting
- Secondary Infections

Mode of infection

- Sheep / Human get infection by accidentally swallowing the fluke parasite (metacercaria or encysted cercaria).
- The most common was is by eating contaminated freshwater plants.
- Another way humans get infected with the parasite is by ingesting contaminated water by drinking it or by consuming vegetables that were washed or irrigated with unhygienic water.

Diagnosis-

- **Stool Samples**-Yellowish-brown Eggs. Eggs Don’t get Shown for 4 Months.
- **Biliary or Duodenal Extract**

- **Antibody Test-** Can detect presence of worm two weeks after infection
- **Ultrasound-** Shows presence of adult worms in Bile Duct
- **CT Scan**-Reveals numerous burrows in Liver

Treatment-

1.Bithional (Highly Effective)

2.Triclabendazole

3.Surgical remove

Prophylaxis

- Education: Cheapest and Most Cost Effective Way
- Wash Aquatic Vegetables in 6% Vinegar for 5-10 minutes

- Better herding practices
- Keep herds away from aquatic areas
- Moluskicide: Controls Intermediate Snail Host

Adaptational Features of Platyhelminthes

• Hermaphrodism (Self fertilization) • Excess no. of eggs production • Presence of suckers and hooks • Reproductive organs (more developed) • Free swimming larvae