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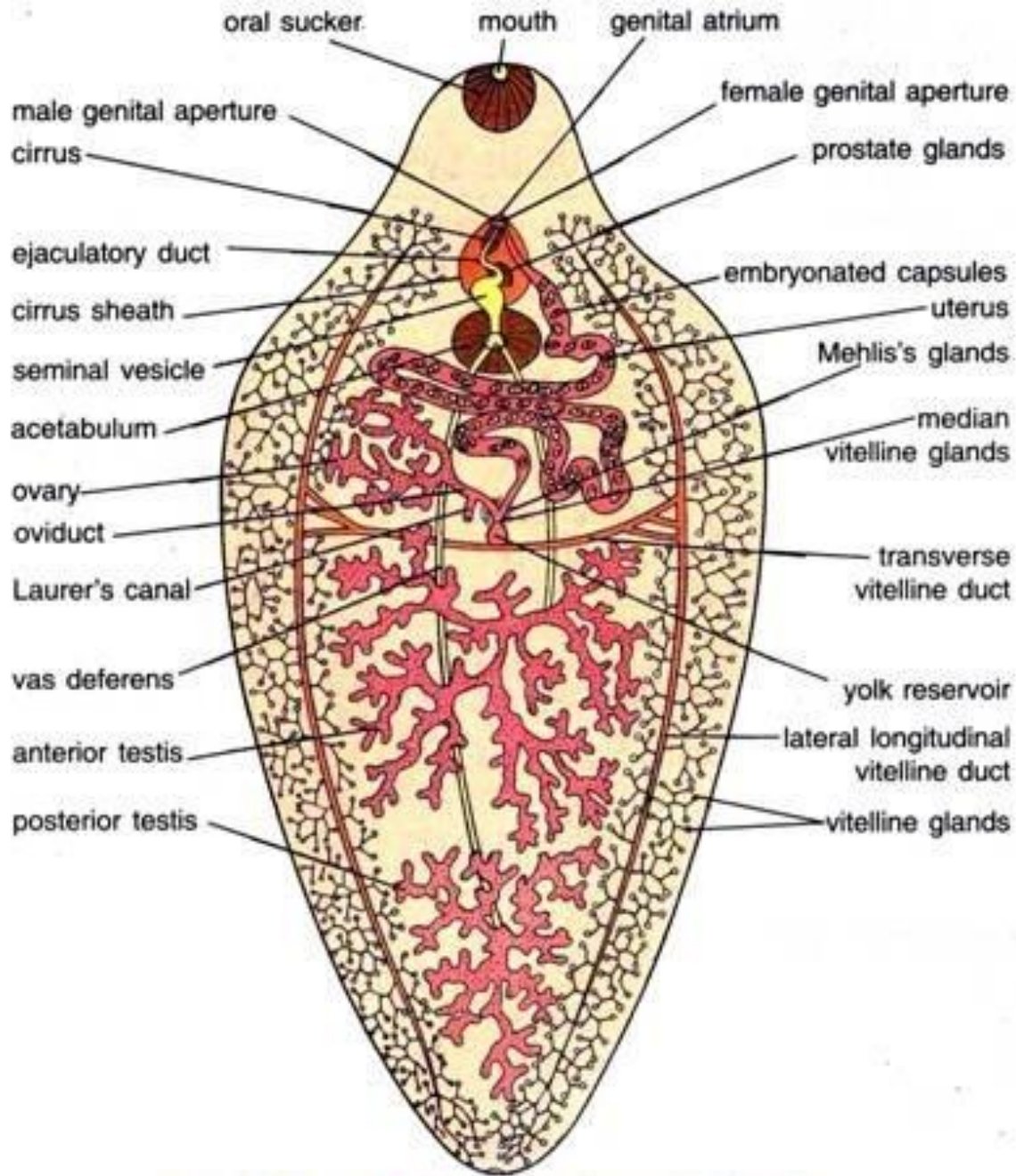
Presented By,
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Male and Female Reproductive System of LIVER FLUKE (*Fasciola hepatica*)

Asst.Prof.Sangita Telgote

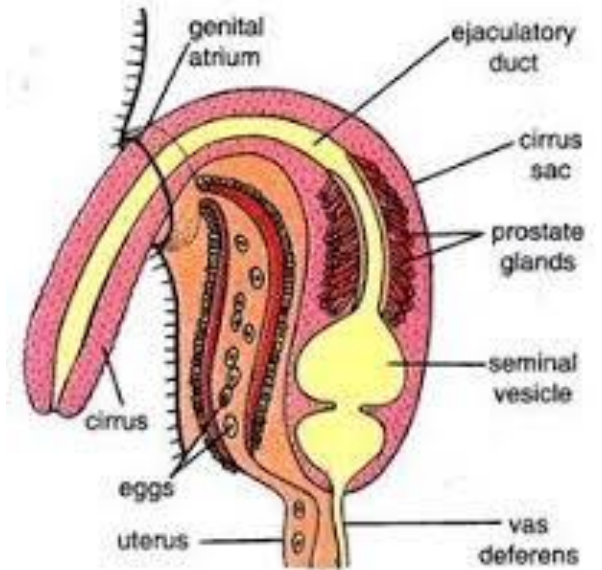
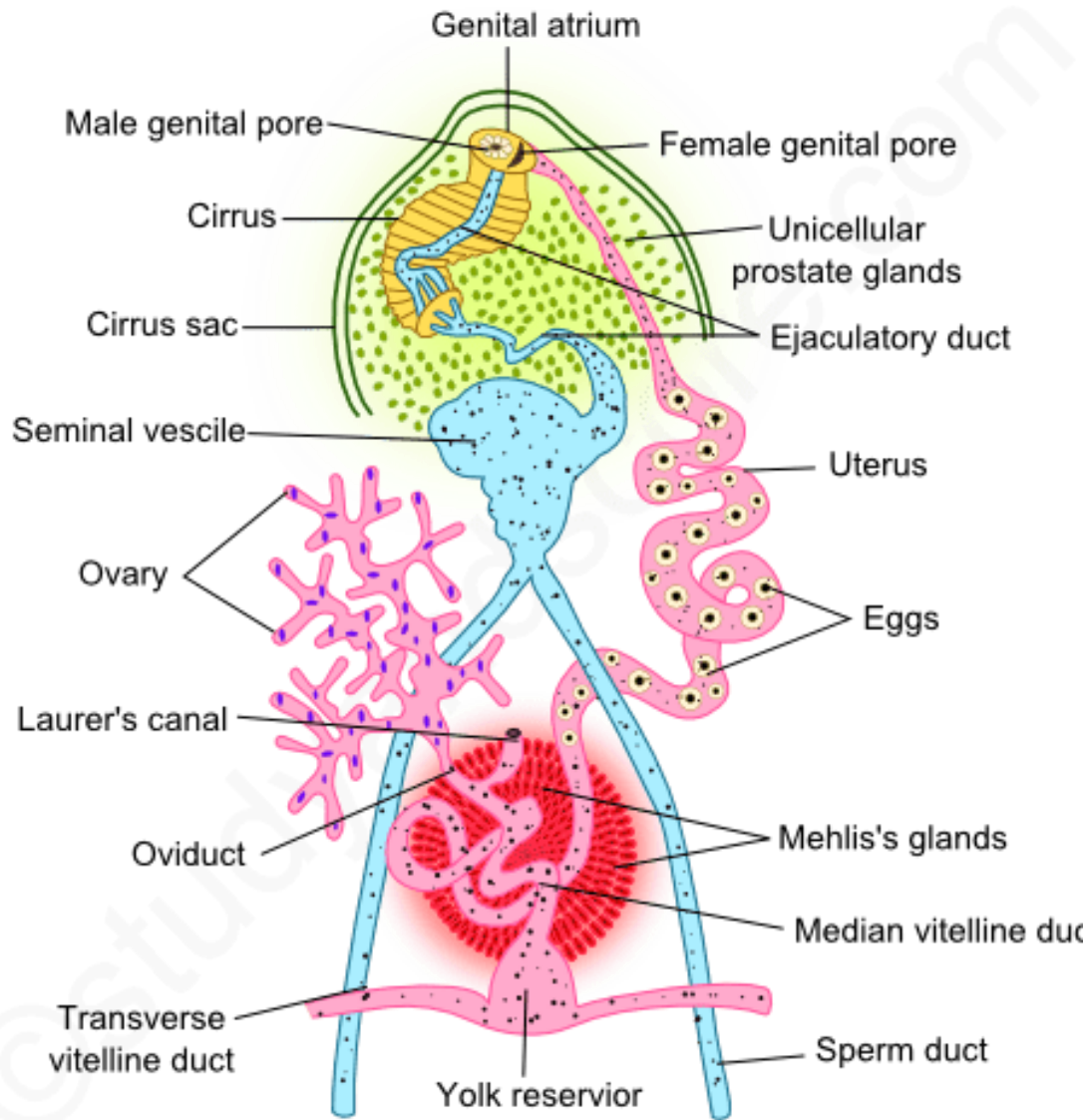
Male Reproductive System

1. **Testes:** 1 pair; highly lobed, tubular; one behind another
2. **Vasa deferentia (VD):** 2 in number, one from each testis, runs side by side, anteriorly upto the level of acetabulum
3. **Seminal vesicle:** A large pear-shaped, 2 VD unite here, act as storage of sperm.
4. **Cirrus sac:** a narrow **ejaculatory duct (ED)** → into a muscular **penis or cirrus** → **Genital atrium** → **Gonopore**
5. **Prostate gland:** Numerous, unicellular, surrounds and open into ED



Female Reproductive System

1. **Ovary:** Single, highly branched, tubular, anterior to testes
 2. **Oviduct and Uterus:** a short, narrow oviduct, posterior to ovary. Oviduct → median vitelline duct → Ovo-vitelline duct/Uterus. Laurer's canal (a short muscular copulatory tube connected to oviduct).
 3. **Vitellaria (Vi):** composed of **Vitelline glands (VG)** and **Mehlis's glands (MG)**.
 - Vi cells secrete yolk for nourishment of developing egg and also form egg shell
 - VG (cluster of follicles) → Ductules → Lateral longitudinal ducts (2) → Transverse duct → Yolk reservoir → Median vitelline duct → Uterus**
- **MG (shell glands):** cluster of unicellular glands in the junction of oviduct, its secretion lubricate uterus for smooth passage of eggs.



Life Cycle

- *F. hepatica* is a **digenic parasite**
- *F. gigantica* is more common in India
- Worldwide distribution
- Endoparasites (Adult in the bile duct of sheep)
- **Primary host:** sheep, goat, cattle, horse etc.
- **Secondary or intermediate host:** Fresh water snail of genus *Lymnaea* (*Lymnaea marginalis* is Indian species) , *Bulinus*, *Planorbis*

2- Liver Fluke

Fasciola

Fasciola hepatica



2 prominent shoulders,
converging margins, smaller in
size (magnifier)

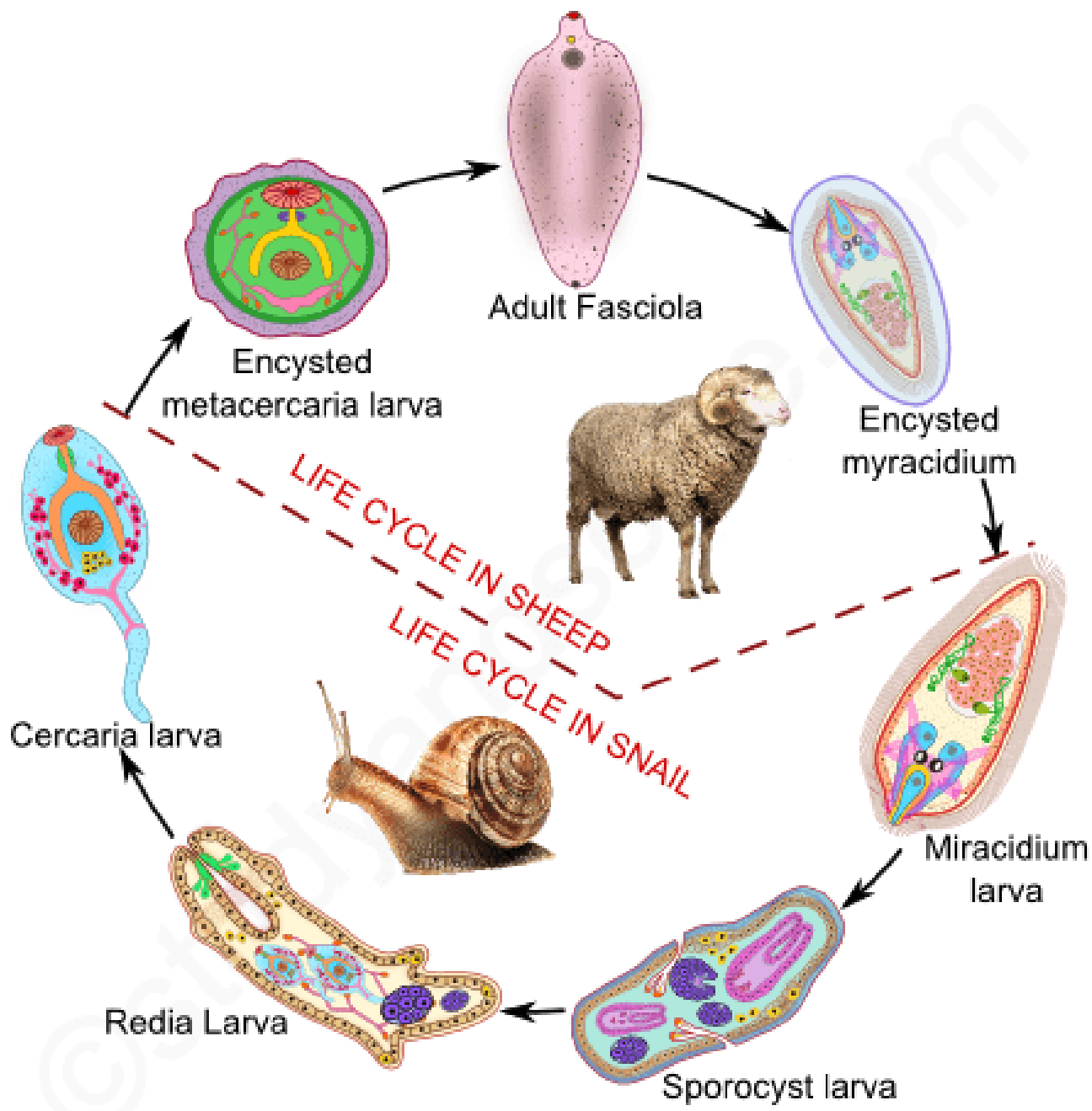
Fasciola aiagantica



Less prominent
shoulders,
parallel margins,
larger in size
(magnifier)

Life History Developmental stages

1. Copulation
2. Development of Zygote
3. Formation of Miracidium larva
4. Infection of Secondary Host
5. Sporocyst Larva
6. Redia Larva
7. Cercaria Larva
8. Metacercaria Larva
9. Infection of Primary Host



Copulation

- Cross fertilization
- Development of fertilized eggs and formation of zygote in the uterus
- Covered by yolk and shell like component

Development of Fertilized egg

- Shelled eggs are known as capsules
- Each about 130-150 μm long and 60-90 μm wide.
- Each fluke can give 3000-35000 eggs/ year (there are about 200 flukes in the liver)
- **Operculum** present at one end.
- **Unequal holoblastic cleavage** gives rise to two cells. Larger cell is considered as **somatic cells**, smaller cell is **propagatory cell (PC)**. PC divides further to **embryonic cell** and **germ cell**.
- Eggs are come out with host faecal matter.
- In **humid environment**, at **22-25°C**, after **14-17 days** development within eggs is complete which gives rise to Miracidium larva.

Development of Fertilized egg

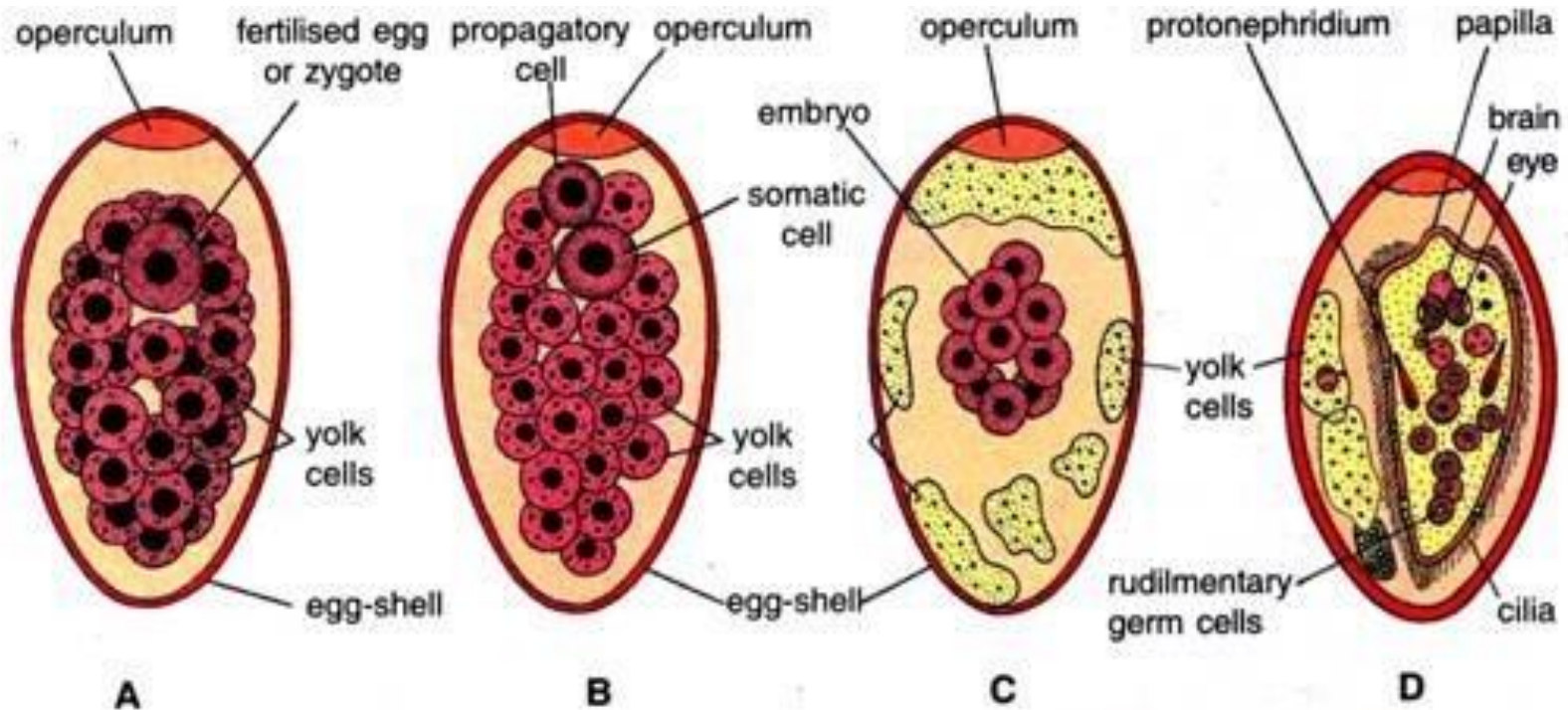
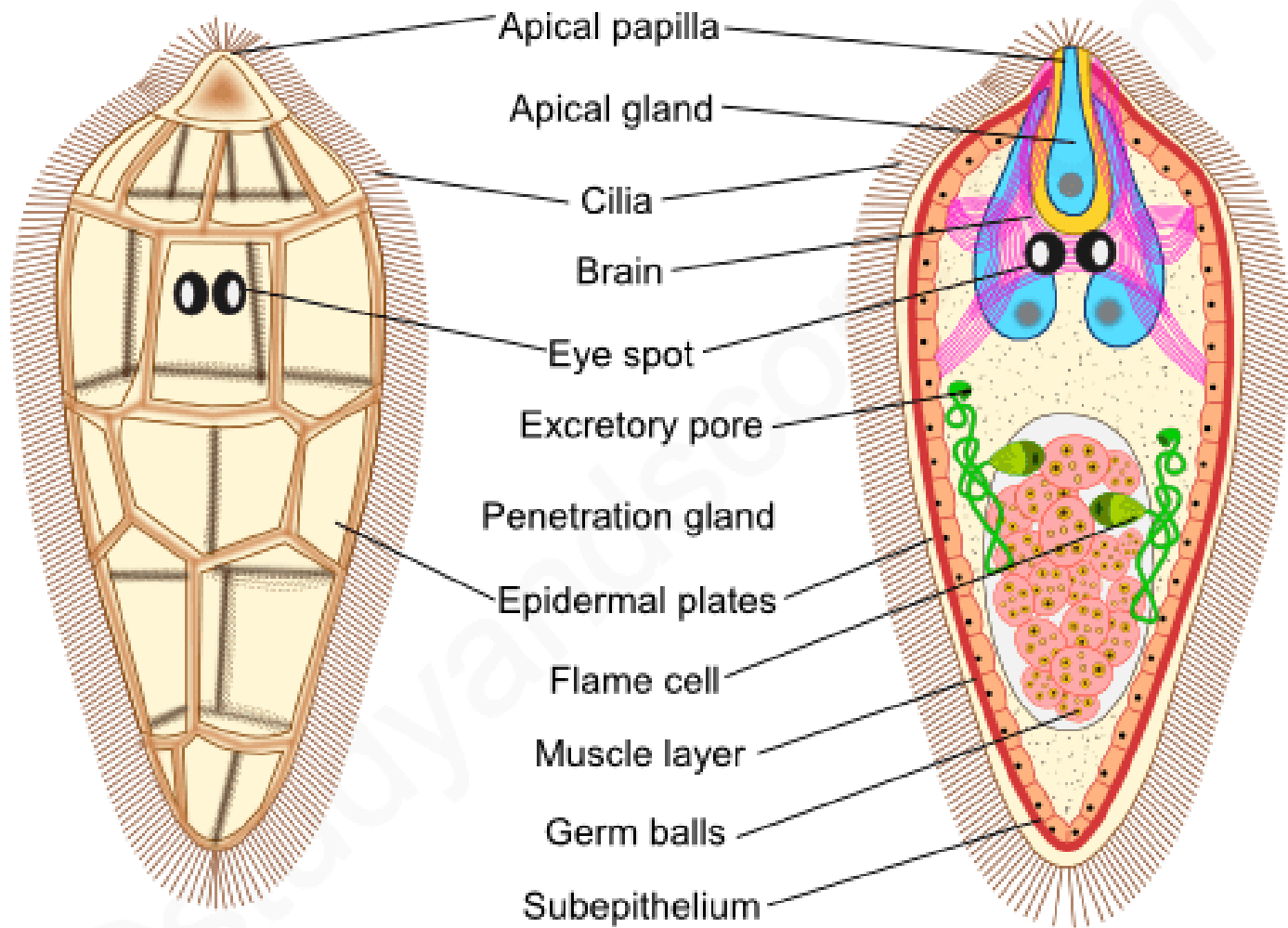


Fig. 41.14. *Fasciola hepatica*. Early stages of development. A—Fertilised egg; B—Two cell stage; C—Many cell stage; D—Miracidium in capsules.

Development of Miracidium Larva

- 0.03 mm long, anterior part broad and posterior part tapering
- **21 ciliated epidermal plate** arrange in 5 rows as 6-6-3-4-2
- **Apical papilla has an apical gland**
- **A pair of cephalic or penetration gland**
- **2 eye spots**
- **circular and longitudinal muscles** beneath the **epidermis**
- **2 flame cells** are present in both sides.
- **swims for 8-30 hrs in fresh water to find suitable secondary host (snail)**
- **proteolytic enzymes** from penetration gland helps in penetration to **mantle cavity or pulmonary sac**

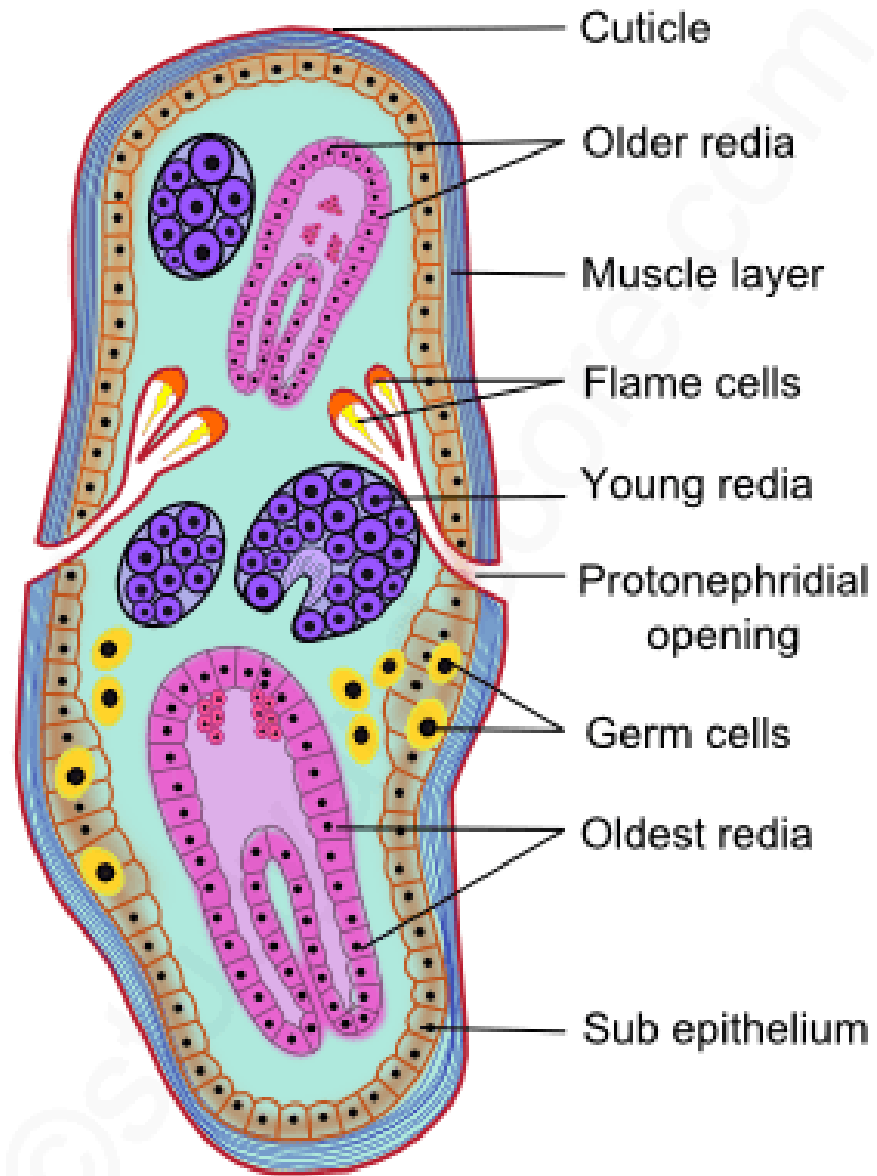


External structure

Internal structure

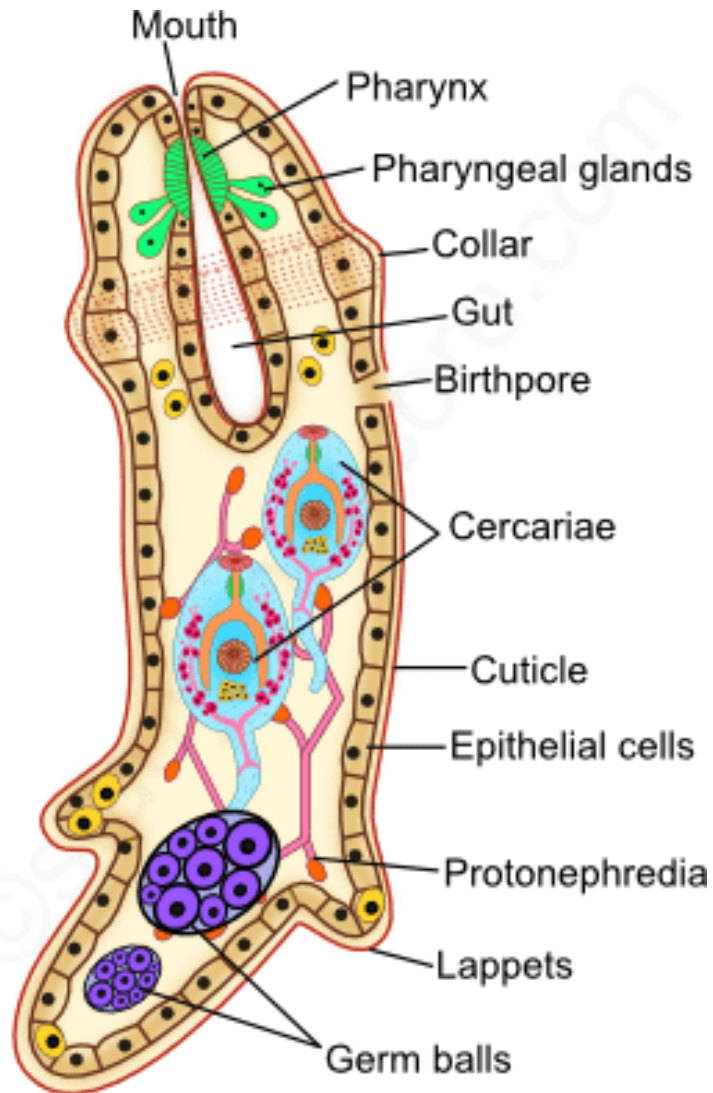
Development of Sporocyst Larva

- 0.03 mm long, anterior part broad and posterior part tapering
- **circular, longitudinal muscles and mesenchyme** beneath the **epidermis**
- **Protonephridium** of each side with 2 **flame cells** opens in **common excretory pore.**
- presence of **germ ball**
- **Each sporocyst** gives rise to **5-8 radiae** by parthenogenesis



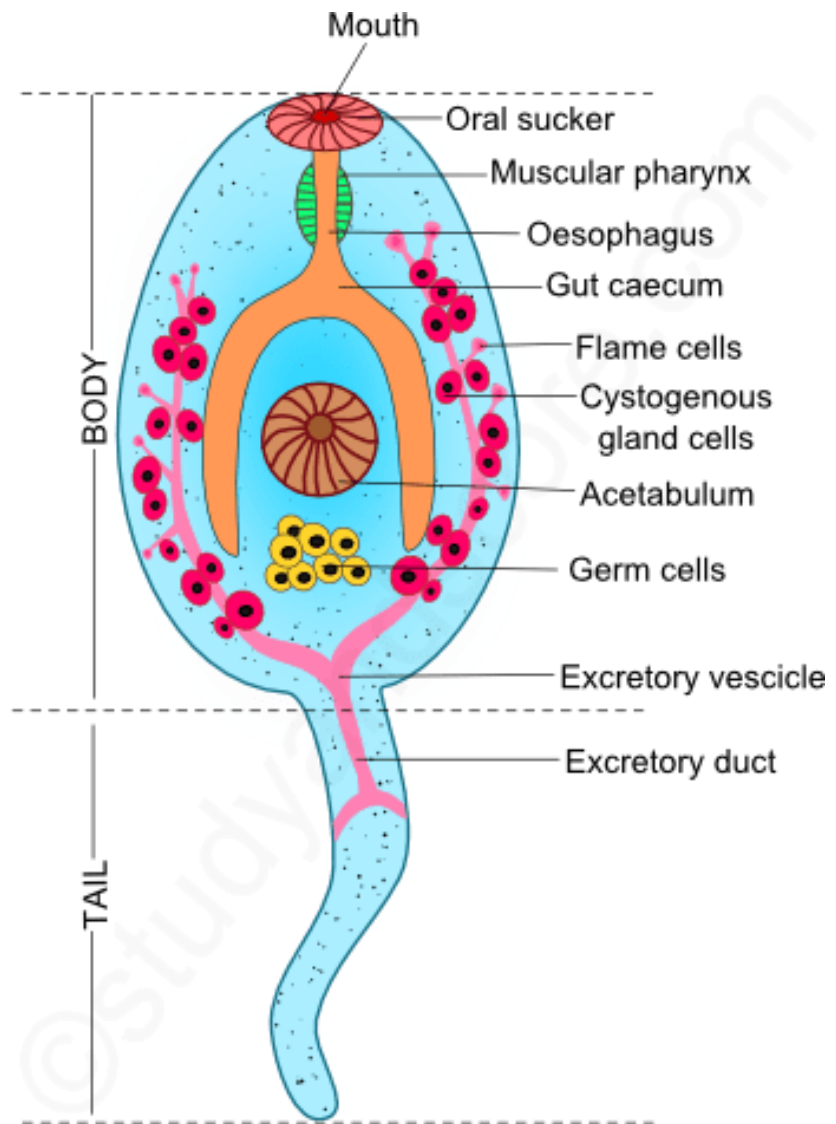
Development of Radia Larva

- 1.3-1.6 mm long, sac-like
- **Mouth** at the middle of anterior end leads to short **muscular pharynx**. Pharynx has **pharyngeal glands**.
Elongated sac-like gut.
- presence of **birth pore** posterior to **collar**
- a pair of projections called **lappets** present posteriorly.
- presence of **germ ball**
- **a pair protonephridia** is present.
- **Each Radia** gives rise to **20 cercariae** by parthenogenesis



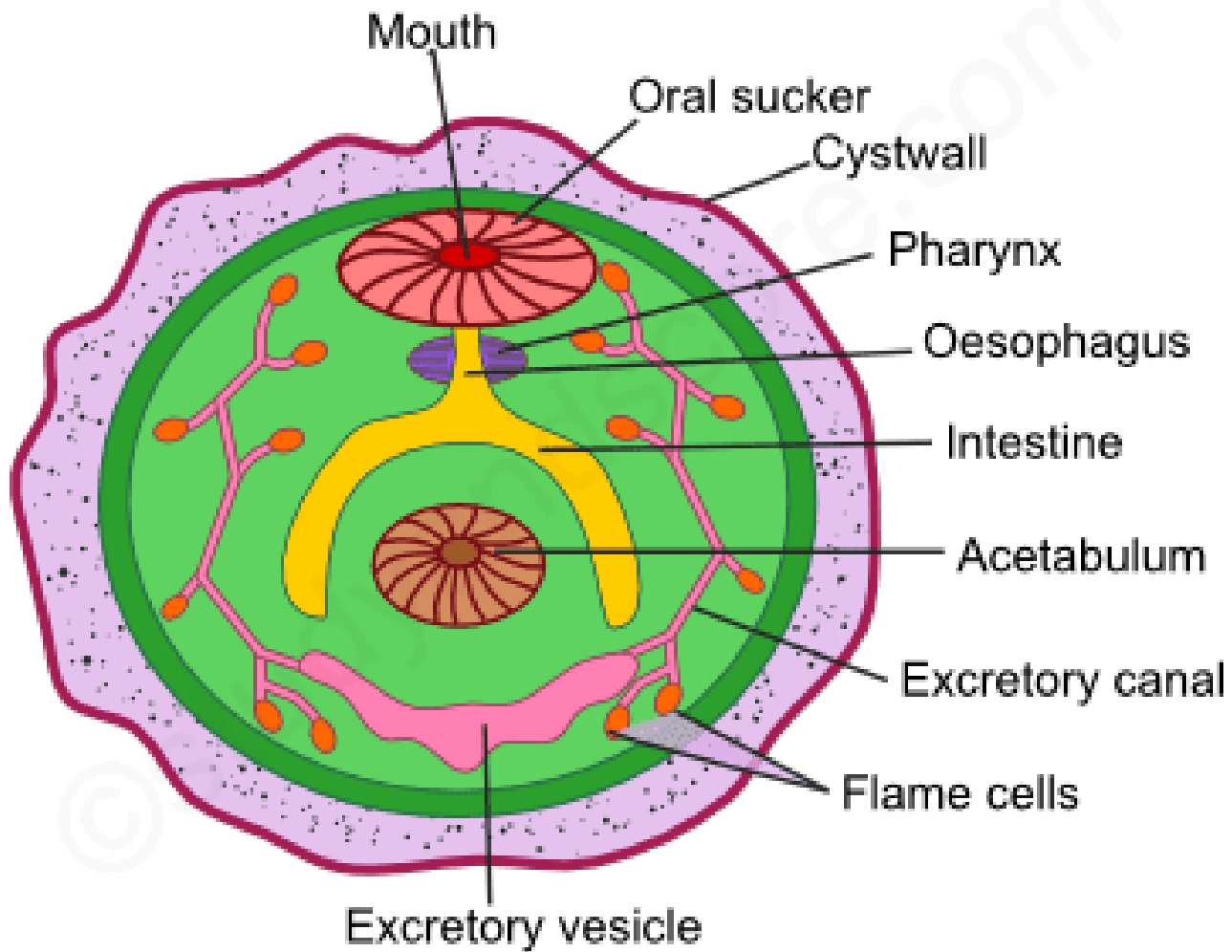
Development of Cercaria Larva

- 0.25-0.35 mm long, presence of tail.
- they comes out from the birth pore of radia and live in the digestive gland of snail. From there to pulmonary sac and outside the body of snail.
- Body covered by **cuticle**
- presence of **cystogenous gland**
- presence of **anterior and ventral sucker**
- **Mouth** within **anterior sucker** leads to **muscular pharynx, oesophagus and bifercated intestine.**
- presence of **germ cells**
- **numerous flame cells opens into two lateral longitudinal canals opens outside through nephridiopore**



Development of Metacercaria Larva

- Cercaria larva swims for 2-3 days and attach to the vegetation near land, remove its tail
- 0.2 mm in diameter
- cystogenous gland secretes cyst surrounding the body
- called **Juvenile fluke consumed by primary host, comes to small intestine, cyst dissolved, comes to portal vein by penetrating the gut, reach the bile duct and within 3 months the become sextually matured.**



Disease and Clinical Features

Fascioliasis

- Inflammation of bile duct
- Pharyngeal Fascioliasis
- Obstructive Jaundice
- Adenoma

References

- Kotpal R.L. (2015). Modern Text Book of Zoology Invertebrates. 11th Edition. Rastogi Publications.