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E. Content for student of Patliputra University
BSc Part I Paper I

Topic: Life history of Fasciola

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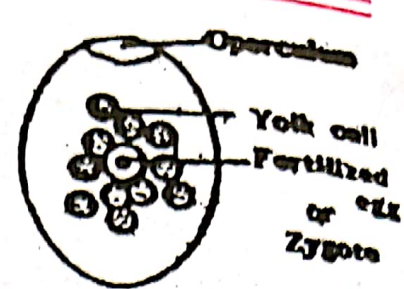
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Q. ■. Describe the life history of Fasciola.

Ans. Liver fluke is a digenic parasite. It completes its life cycle in two hosts, namely sheep and a snail called *Limnaea truncatula*. Sheep is the primary host and snail is the secondary host. Its development is indirect since there are larval stages.

Capsule : Fertilization is internal. It occurs in the ootype. The fertilized egg is surrounded by many yolk cells. The egg and yolk cells are surrounded by a shell. The complete structure is called **capsule**. The capsule is oval in shape and it has a lid or **operculum** on one side.

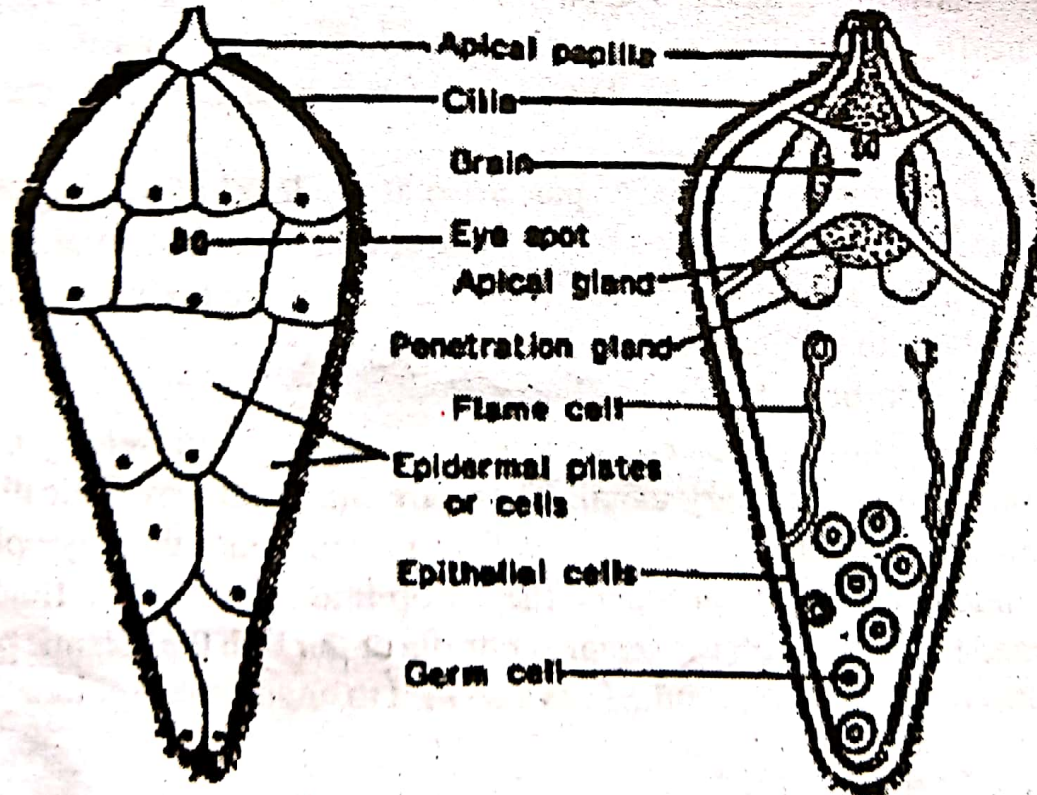


A capsule

The capsules pass into the uterus. From there, they pass into bile duct of sheep through the gonopore. Then they reach the intestine and pass out through the faeces. When the eggs are laid in dry places, they die out. But when they are laid in moist places, the operculum opens and a larva is released. This larva is called **miracidium larva**.

Miracidium larva : Miracidium is hatched from the capsules. It has the following salient features :

1. It is a free swimming larva living in ponds.
2. It lives for 24 hours.
3. It is microscopic.
4. It is conical in shape.
5. The anterior end is broad and the posterior end is narrow.
6. The anterior end has a small projection called apical papilla.
7. The body is covered by cilia.



Miracidium larva 1. Surface view 2. Inner view.

8. The body wall is covered by a layer of **epidermal plates**. There are twenty one plates arranged in five rows. The number of plates in each row is as follows : I row has 6 plate; II row has 6 plates; III row has 3; IV row has 4 and V row has 2.

9. At the anterior end inside the body, there is a sac-like gland called apical gland. It opens at the apical papilla by aduct.

10. Two sac-like glands are located on the sides of the apical gland. They are called penetration glands. They also open at the apical papilla.

11. A large brain or apical ganglion is situated near the anterior end.

12. Two eyes are located above the brain.

13. The larva has two **protonephridia**. Each protonephridium has a flame cell and a long duct. The duct opens to the outside by a **nephridiopore**.

14. The interior of the larva is filled with groups of specialised cells called **germ cells**

15. It does not feed.

16. When it comes in contact with the snail **Limnaea truncatula**, the miracidium penetrates into the body of the snail. It reaches the digestive gland of the snail and gets transformed into another larva called sporocyst.

Sporocyst : Sporocyst develops from miracidium. It is the second larva of liver fluke. It has the following salient features :

1. It lives in the digestive glands of snail.

2. It is in the form of an elongated sac.

3. It is covered by cuticle.

4. It has two **protonephridia**. Each protonephridium has two flame cells; they open to the outside by a single **nephridiopore**.

5. The larva is filled with germ cells. The germ cells divide and redivide to form the next larva called **redia** larva. Each sporocyst can produce 5 to 8 larvae.

Redia larva : Redia larva develops from the germ cells of sporocyst. The redia larva has the following salient features :

1. It lives in the digestive glands of the snail.

2. It is cylindrical in shape.

3. The body is covered by cuticle.

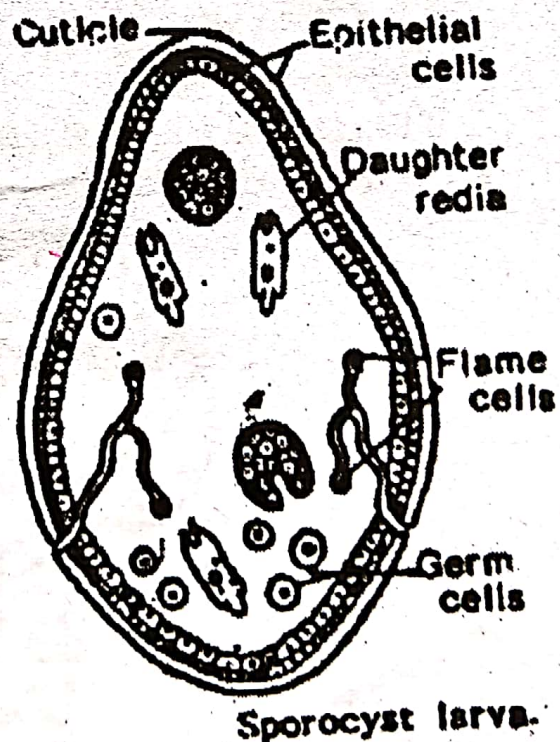
4. The anterior end has a mouth.

5. Behind the mouth, there is a muscular ring called **collar**.

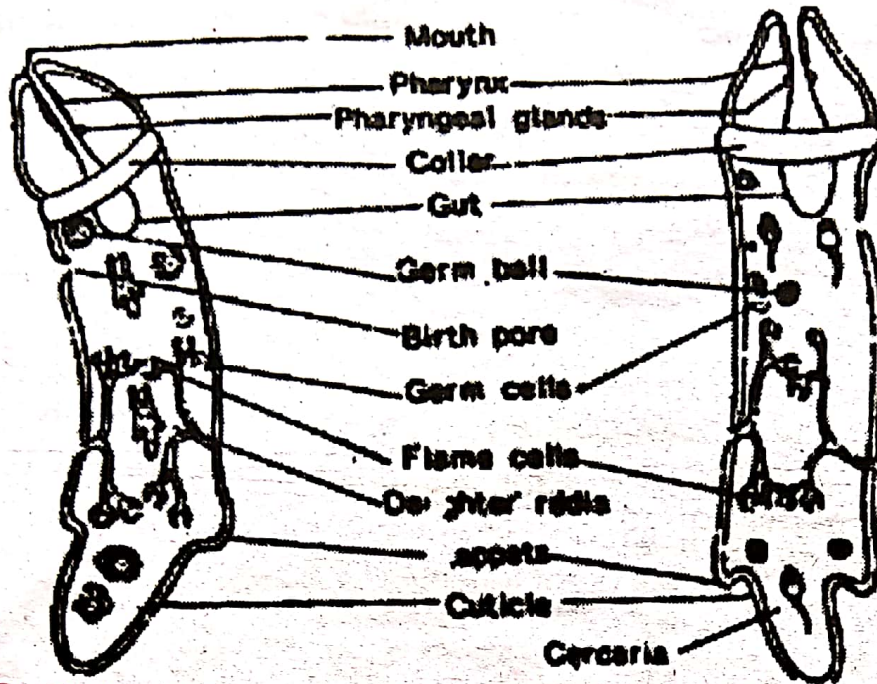
6. Behind the collar, an opening called **birth pore** is located.

7. Near the posterior end a pair of projections is found. They are called **lappets**. They are used for locomotion.

8. The mouth leads into a pharynx which ends in a sac-like intestine. The pharynx is surrounded by a group of **pharyngeal glands**.



9. Two protonephridia are located inside the body. Each protonephridium is formed of many flame cells. It opens to the outside by a nephridiopore.
10. The cavity of redia larva is filled with **germ cells**.
11. The germ cells of redia develop into **daughter redia**.

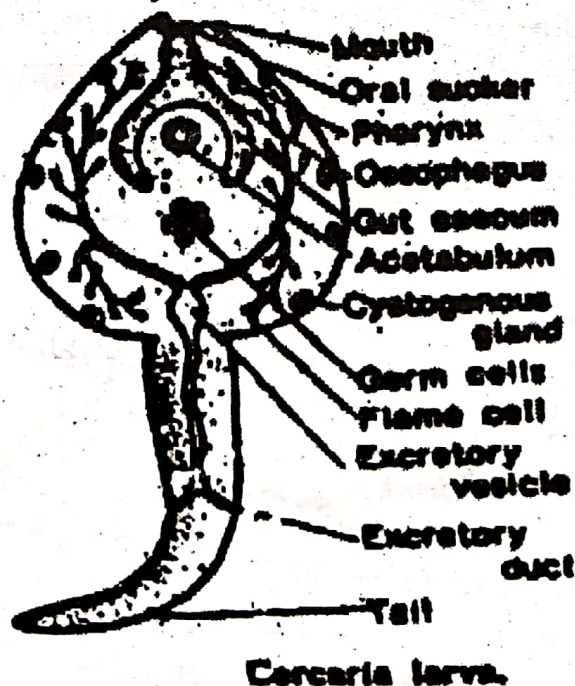


Redia larva : (a) Redia with daughter redia, (b) Redia with Cercaria

12. The germ cells of daughter redia develop into the next larva called cercaria. They come out through birth pore.

Cercaria : The cercaria develops from the germ cells of redia. Each redia produces about twenty cercariae. The cercaria has the following salient features :

1. It is a free living larva.
2. It is tadpole-shaped.
3. It has an oval body and a tail.
4. The body is covered by cuticle.



5. It has two suckers an **oral sucker** and the **acetabulum**.

6. It has a simple alimentary canal. It is formed of a mouth, the pharynx, the oesophagus and a U-shaped intestine.

7. Numerous flame cells are located inside the body. The flame cells of each side are connected together by an **excretory tubule**. The excretory tubules of the two sides open into an **excretory vesicle**. From the vesicle an **excretory duct** arises. It runs into the tail and bifurcates. These bifurcations open to the outside by **nephridiopores**.

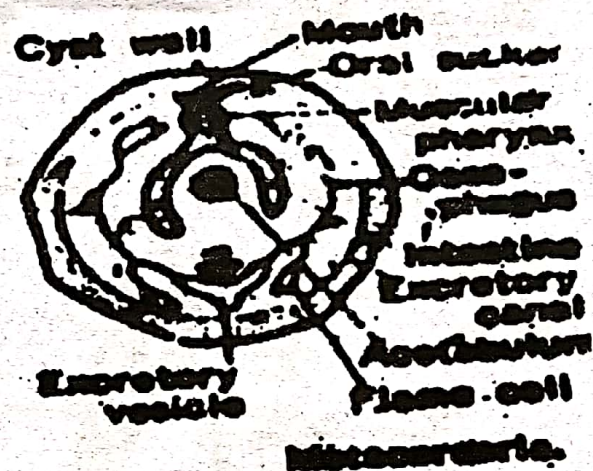
8. The body wall contains many **cystogenous glands**.

9. The body cavity is filled with groups of germ cells.

10. The cercaria lives for three days and it is transformed into another larva called **metacercaria**.

Metacercaria : The cercaria loses its tail and the cystogenous gland secretes a cyst around the larva. The encysted cercaria is called metacercaria. It is found attached to the grasses. It has round shape. Germ cells are located inside the metacercaria.

Infection : When a sheep eats the grass containing metacercaria, the larva enters the intestine. Here the cyst wall dissolves and the larva is liberated. It penetrates the wall of the intestine and enters the coelom. From the coelom it gets into the liver and grows into an adult fluke.



Alternation of generations : The life history of liverfluke shows an alternation of generations. In Fasciola, the sexual reproduction alternates

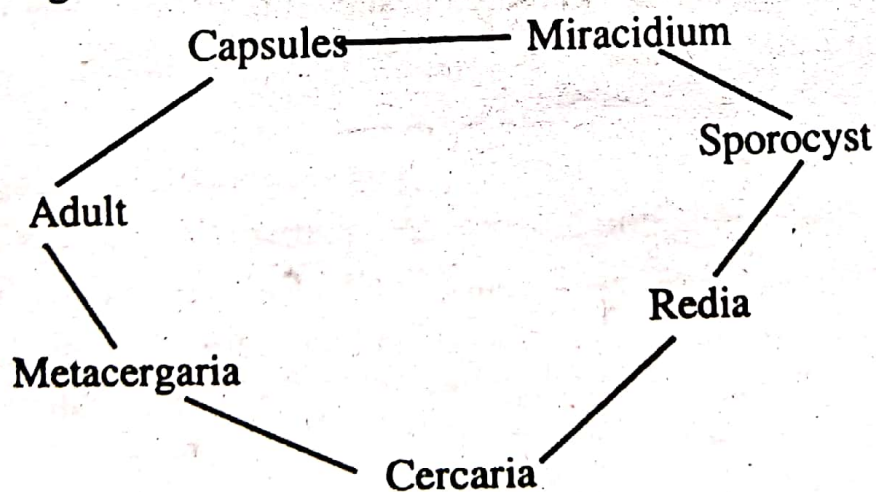


Fig. Fasciola; life-cycle.

with a series of parthenogenetic reproductions. Redia and cercaria are developed by parthenogenesis. Here the term heterogamy is applied.