



Family: Fasciolidae



Veterinary Helminthology – I
(VPA- 601)

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Family: Fasciolidae

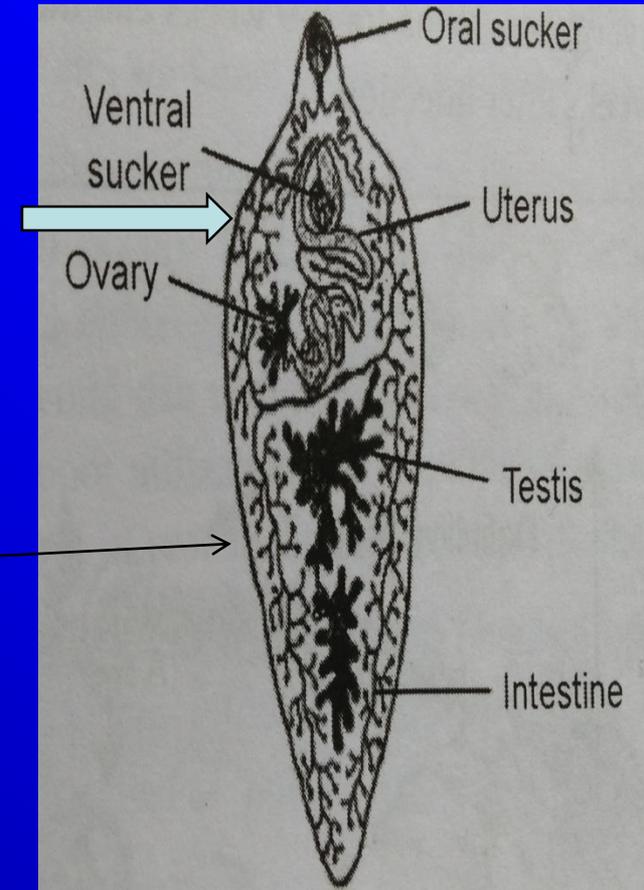
❖ Large sized flukes, broad, **leaf-shaped body** with usually **spinosed cuticle**.

Tegument

❖ Outer surface of the fluke is called **tegument**.

spines

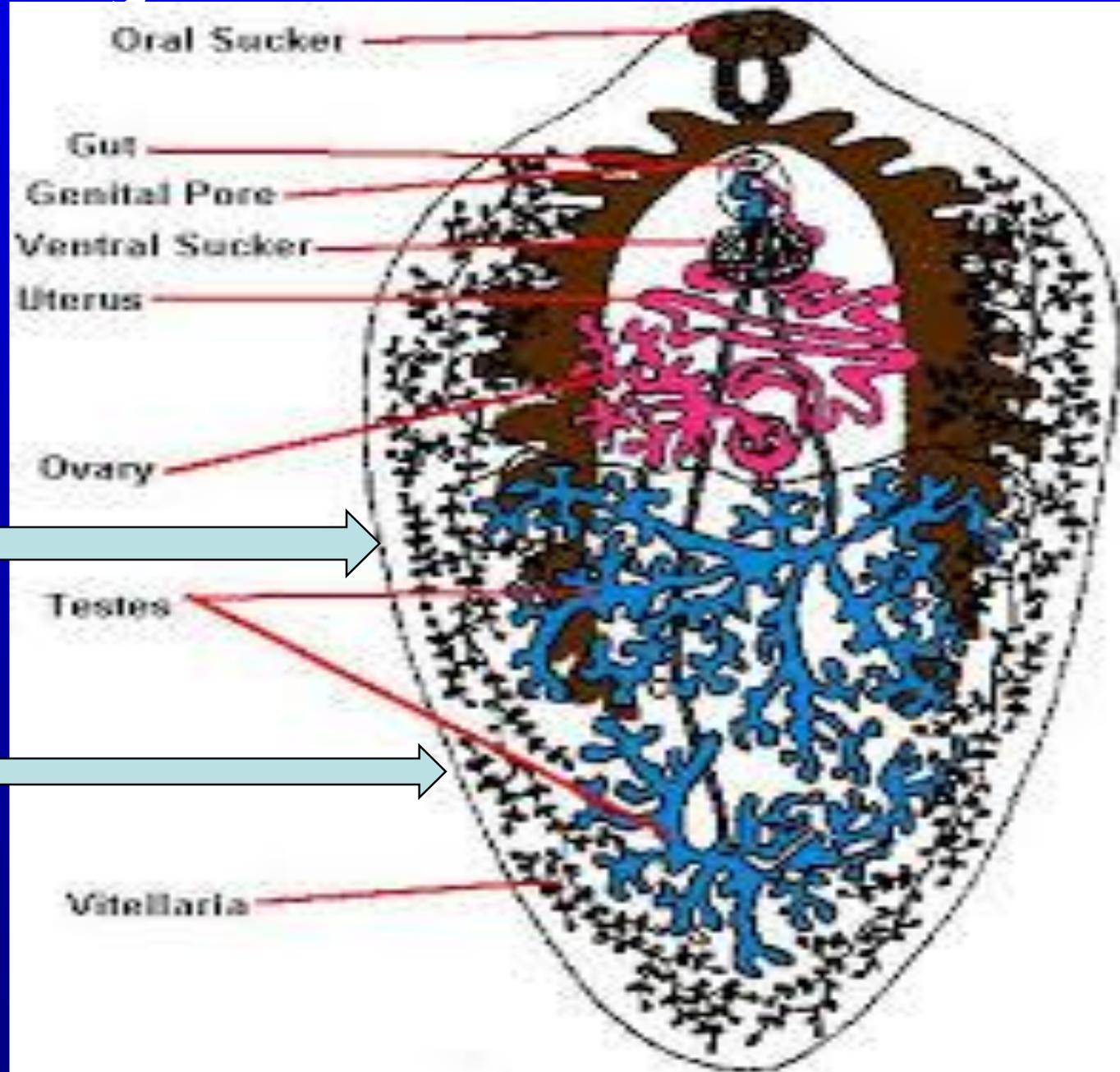
❖ tegument is made up of **scleroprotein** and its primary function is to protect of the fluke from the destructive digestive enzymes of the host.



Family: Fasciolidae

- ❖ Two Suckers i.e. **oral sucker and ventral sucker (acetabulum)** are closely placed.
- ❖ Oral sucker is small in comparison to ventral sucker but powerful.
- ❖ Oral suckers help in adhesion and ingestion.
- ❖ Genital pore is just anterior to the ventral sucker.
- ❖ **Testes tandem**, lobed or branched and **pretesticular ovary** are usually branched,

Family: Fasciolidae



Tegument

Spines

Family: Fasciolidae

❖ Genus: Fasciola ,

Fasciolopsis,

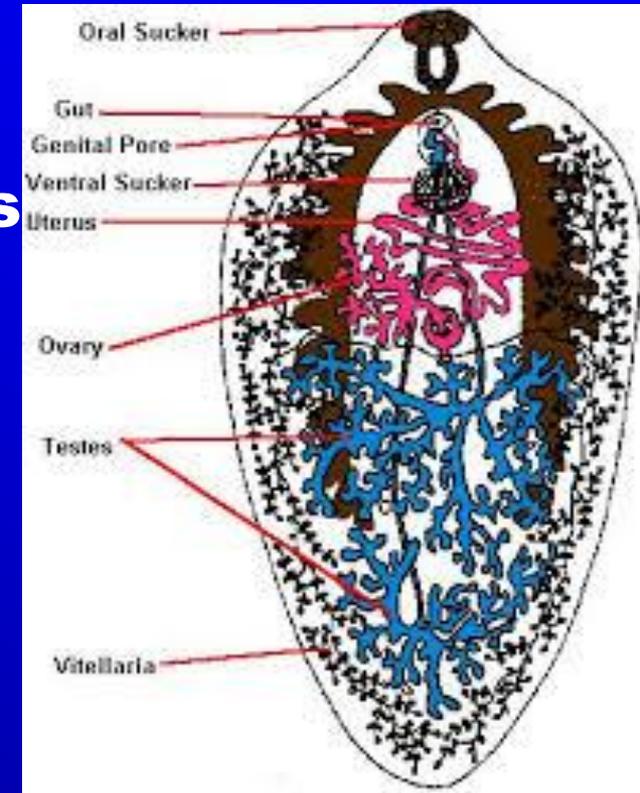
Fascioloides

Genus: Fasciola (Liver fluke)

Species	Final Host/ Definitive Host	Intermediate Host (Aquatic Snails)	Location
<i>Fasciola hepatica</i> (Common liver fluke or sheep liver fluke)	Cattle, Buffalo, Sheep, Goat, pig, Horse, elephant, cat, man etc.	<i>Lymnaea truncatula</i> & <i>L. luteola</i> (amphibious snail)	Adult – bile ducts Immature fluke- liver parenchyma
<i>Fasciola gigantica</i>	-do-	<i>Lymnaea acuminata</i> (<i>L.auricularia</i> var <i>rufescens</i>) (amphibious snail)	-do-
<i>Fasciola jacksoni</i>	Indian elephant	<i>Fossaria,</i> <i>Lymnaea,</i>	-do-

Fasciola hepatica

- **Morphological characters:**
- Adult fluke is **Leaf like**, anterior end is conical and **marked off by a pair of distinct shoulders from the body**, unlike in *Fasciola gigantica*.
- The oral sucker surrounds mouth opening whereas ventral sucker is about as large as the **oral sucker** and situated at the level of **shoulders**.
- Then intestinal caeca are much branched and extend posteriorly.
- Paired testes are branched and ovary is **pre-testicular** and much branched.



Fasciola gigantica

- *Fasciola gigantica* (**Indian liver fluke**) is very common in the **plain areas**

Morphological characters:

- Differentiation characters from *Fasciola hepatica* are

- **Larger in size**, smaller anterior cone, **inconspicuous shoulders** and **transparent body** of *Fasciola gigantica*.



F. hepatica & F. gigantica

Fasciola sp. cont.

Fasciola hepatica



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

Fasciola gigantica



Less prominent
shoulders,
parallel
margins, larger
in size

LIFE-CYCLE OF FLUKES

Egg → **Miracidium**

↓
Sporocyst

↓
Redia

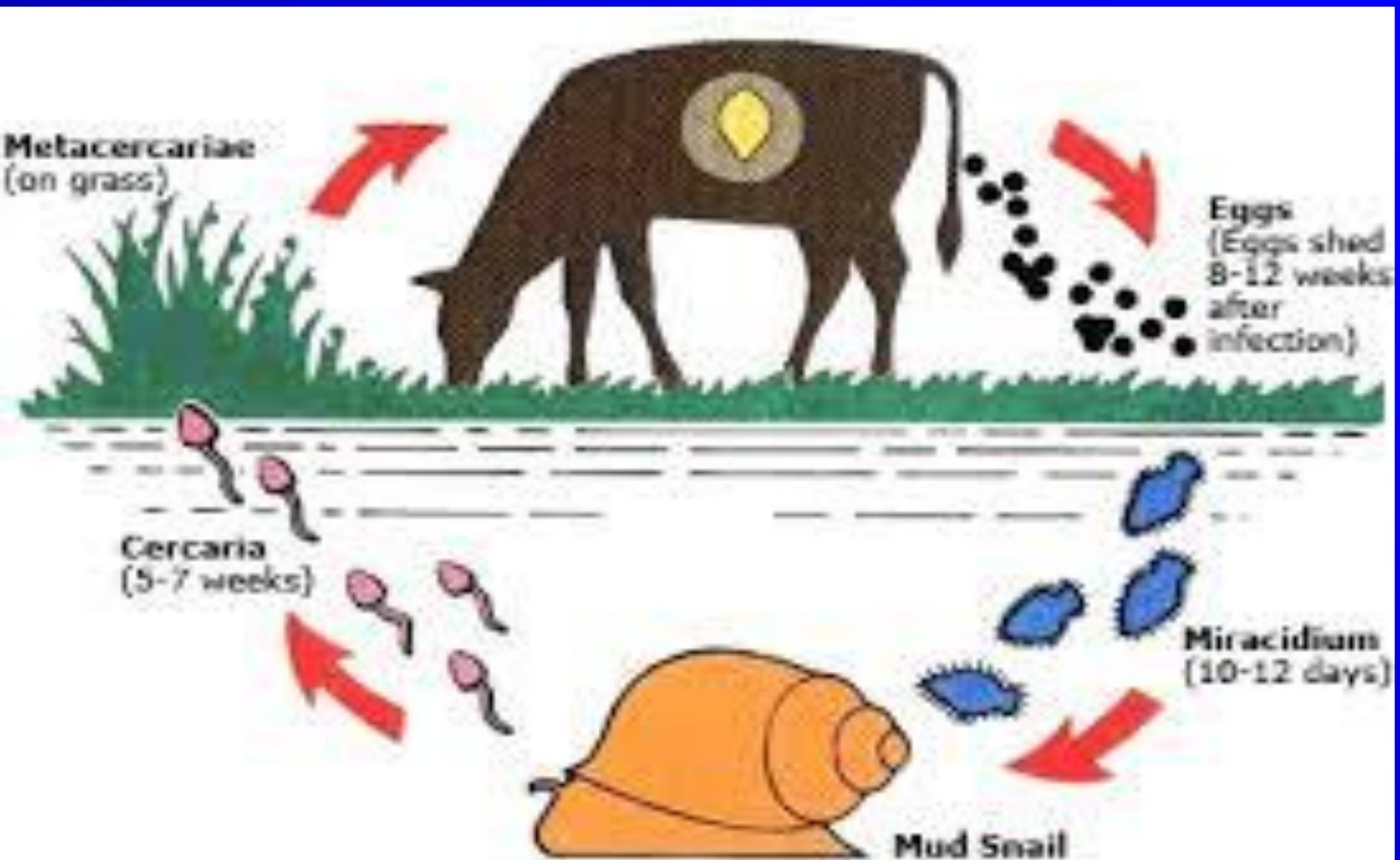
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Cercaria



cercaria

emerge from the aquatic snail and encyst
on aquatic vegetation (**Metacercaria**)

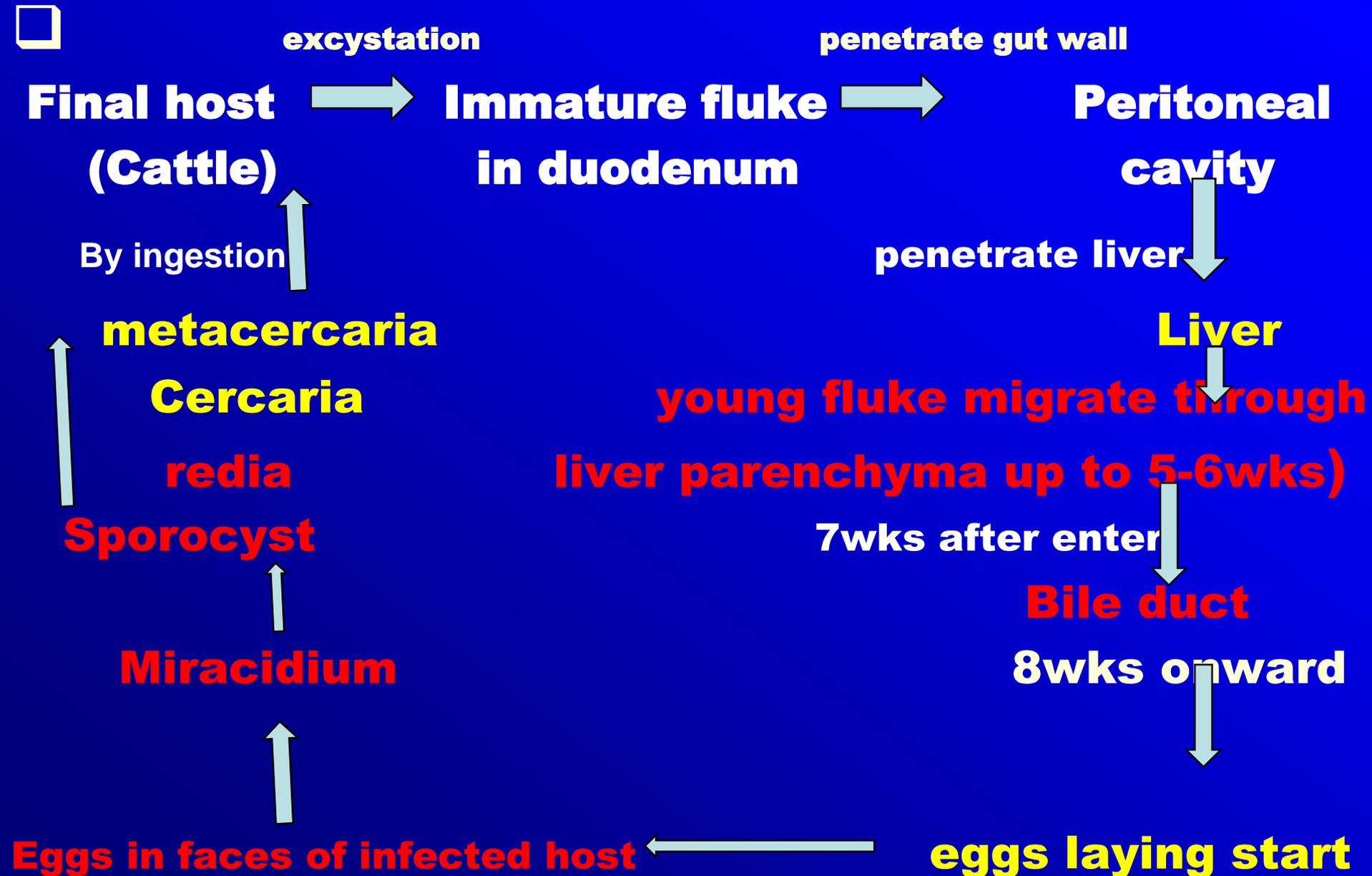
Diagrammatically presentation of Life-cycle of Fasciola sp.



Fasciola

- **Infective stage: Metacercaria.**
- **Final hosts get infection by the ingestion of metacercaria contaminated aquatic vegetation and drinking water.**
- **The minimum period for completion of one entire life cycle of *Fasciola hepatica* is about 17-18 weeks.**
- **Infection of snail with one miracidium can produce over 600 metacercariae.**

LIFE-CYCLE OF FLUKES



Pathogenesis & Symptoms of Fasciola

- Clinical sign of fascioliosis is closely associated with the **amount of infected metacercariae** ingested.

Acute hepatic fascioliosis:

- It occurs after the ingestion of large numbers of metacercariae (1000-5000) and then migration of young flukes (**marita**) through the **liver parenchyma**.

Pathogenesis of Fasciola

Acute Fasciolosis

- The migrating flukes caused mechanical damage and haemorrhage in liver.
- In sheep it causes a fatal disease called **Liver rot with cirrhosis of the liver** and ascitis.
- **Acute fasciolosis** in sheep most often occurs as sudden death without other apparent clinical abnormality like **anthrax blood mixed with froth** comes out from nostril, rectum and other natural orifices in affected sheep.

Pathogenesis of Fasciola

Acute Fasciolosis:

- Acute fasciolosis in **sheep** is complicated by concurrent infections with *Clostridium novyi* resulting in black disease.
- The anaerobic bacillus *C. novyi* may be present in normal liver without causing any harm but they start to proliferates in the anaerobic necrotic lesions of liver produced by the immature flukes.

Pathogenesis of Fasciola



Fasciola sp.



Pathogenesis of Fasciola

Chronic fascioliosis:

- ❖ Most common form of the disease which is found in sheep, cattle and others (including man).
- ❖ seen mainly in late winter/early spring and occurs 4-5 months after the ingestion of 200-500 metacercariae.
- ❖ It leads to hepatic fibrosis and hyperplastic cholangitis
- ❖ Migration of immature flukes lead to traumatic destruction of liver parenchyma, haemorrhage and necrosis. Healing and regeneration of lesions with collagen deposition result fibrosis.
- ❖ A hyperplastic cholangitis is caused by the presence of the adult flukes in the bile duct.

Pathogenesis of Fasciola

Chronic fascioliosis:

- ❖ The principal pathogenic effects are anaemia (more than 0.5 ml blood per fluke can be lost into the bile ducts each day) and hypoalbuminaemia.
- ❖ Hypoalbuminaemia, hypoproteinaemia and hypoglobulinaemia are occurred during infection.
- ❖ Bottle jaw (submandibular oedema) due to hypoalbuminaemia.

Pathogenesis of Fasciola

Chronic fascioliosis:

- ❖ Hypoalbuminaemia is due to progressive and marked loss of plasma proteins particularly albumin into G.I. tract thorough blood sucking activities of blood flukes and through leakage of protein through the hyperplastic biliary mucosa.**
- ❖ Hypoalbuminaemia is also due to abnormal synthesis and catabolism of albumin.**

Pathogenesis of Fasciola

Chronic fascioliosis:

- In cattle, the walls of the bile ducts are generally **calcified and protrude markedly from the surface and are difficult to cut with a knife.**
- **They resemble the stem of a clay pipe, giving the common name of Pipe stem liver to the infection.**

Pathogenesis of Fasciola

Chronic fascioliosis:

The affected animals show

- ✓ reduced appetite, pale mucous membrane
- ✓ **submanibular oedema popularly known as bottle jaw,**
- ✓ anemia, debility, emaciation
- ✓ ascitis
- ✓ drop in milk production and shedding of wool in sheep.
- ✓ **constipation followed by diarrhoea in later stages.**
- ✓ Slight fever sometimes.

Diagnosis of Fasciola infection

- ❖ On the basis of clinical signs
- ❖ microscopic examination of faecal sample which reveals the presence of characteristic eggs of fasciola species.
- ❖ Various Serological diagnosis like ELISA etc.
- ❖ Eggs are **oval in shape, yellow in colour, embryonic cells and operculum are indistinct.**
- ❖ Fasciola eggs are **yellow due to staining of bile.**



Diagnosis of Fasciola infection

- **Glutamate dehydrogenase** and **Glutamyl transpeptidase** enzymes elevated in fascioliosis due to hepatic damage.
- **Sandwich ELISA** is used for the detection of fasciola antigens i.e.
- ❖ **Cathepsin-L** (a vital enzyme of *Fasciola* spp.), **FABP proteins** etc.
- ❖ **Circulating antigen of *F. gigantica*** can be detected as early as 1 week post-infection by sandwich ELISA.

Treatment of Fasciolosis

- ❖ **Oxyclozanide** @ 15 mg/kg b.wt orally is effective against both mature and immature flukes.
- ❖ However, in cattle **Triclabendazole** @ 12 mg/kg b. wt. administered orally found to be more effective.
- ❖ **Rafoxanide** @ 7.5 mg/kg b.wt



Control of Fasciolosis

Control of snails:

Snails may be controlled by the

- **Mechanical control** - By the fishing nets and elimination of snail habitats by improving drainage.
- **Chemical control** – **Copper sulphate** powder should be used @ 10-35 kg/hectare with a sand extender in warm sunny day when snails are very active.

Sodium pentachlorophenate @ 5-10 ppm in water.

Control of Fasciolosis

Control of snails:

Snails may be controlled by the

- **Biological control**

- Duck rearing**

- Frog rearing

- both feed snails.

Plantation of **soap berry, neem plants** around snail habitats can effectively control snail population in water body.

Control of Fasciolosis

Prophylactic control:

- Using **anthelmintic** in **December and May** to prevent contamination of the pasture in the spring and summer.

Vaccination

Fasciola vaccine candidates are-

- ✓ **Glutathione-s-transferase (GST)**
 - ✓ **Cathepsin L-like proteases (CatLs)**
 - ✓ **Leucine aminopeptidase (LAP)-**
Epithelial cells of Gut
- **CatLs** due to their prominence in the **excretory/secretory (E/S)** products of adult and juvenile flukes.
- **LAP** is the **most effective antigen isolated to date**, with reductions in fluke burdens of **89%** in vaccinated sheep compared to