Fasciola hepatica and fasciola gigantica

Fasciola hepatica

- The common names are the sheep liver fluke and the common liver fluke.
- Amongst the trematodes, this was the first to be discovered by Jehan de Brie in 1379.
- Geographical distribution is cosmopolitan .
- Habitat-A parasite of herbivorous animals (sheep,goat and cattle), living in the biliary passages of the liver.It is occasionally found in man.

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Morphology

- **Adult worm-**it is a large leaf-shaped fluke, measuring 3cm in length by 1.5 cm in breadth and brown to pale grey in color.
- There are two suckers, the oral sucker is smaller.
- The anterior end bearing the oral sucker forms a conical projection.
- The posterior end is rounded.
- The acetabulum is situated in a line with the two shoulders formed by the broadening of the conical projection posteriorly.

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- Life span of the adult worm in sheep is 5 years and in man 9 to 13 years.

Eggs-The characteristics of the egg are as follows:

i. Large, operculated, ovoid in shape, brownish yellow in colour (bile stained).
ii. Size 140 µm by 80µm.
iii. Contains a large unsegmented ovum in a mass of yolk cells.
iv. Excreted with the bile into the duodenum and then passed out along with the faeces.
v. Does not float in satureted solution of common salt.
vi. Can develop only in water.

Unembryonated egg of F.hepatica

Embryonated egg of F.hepatica

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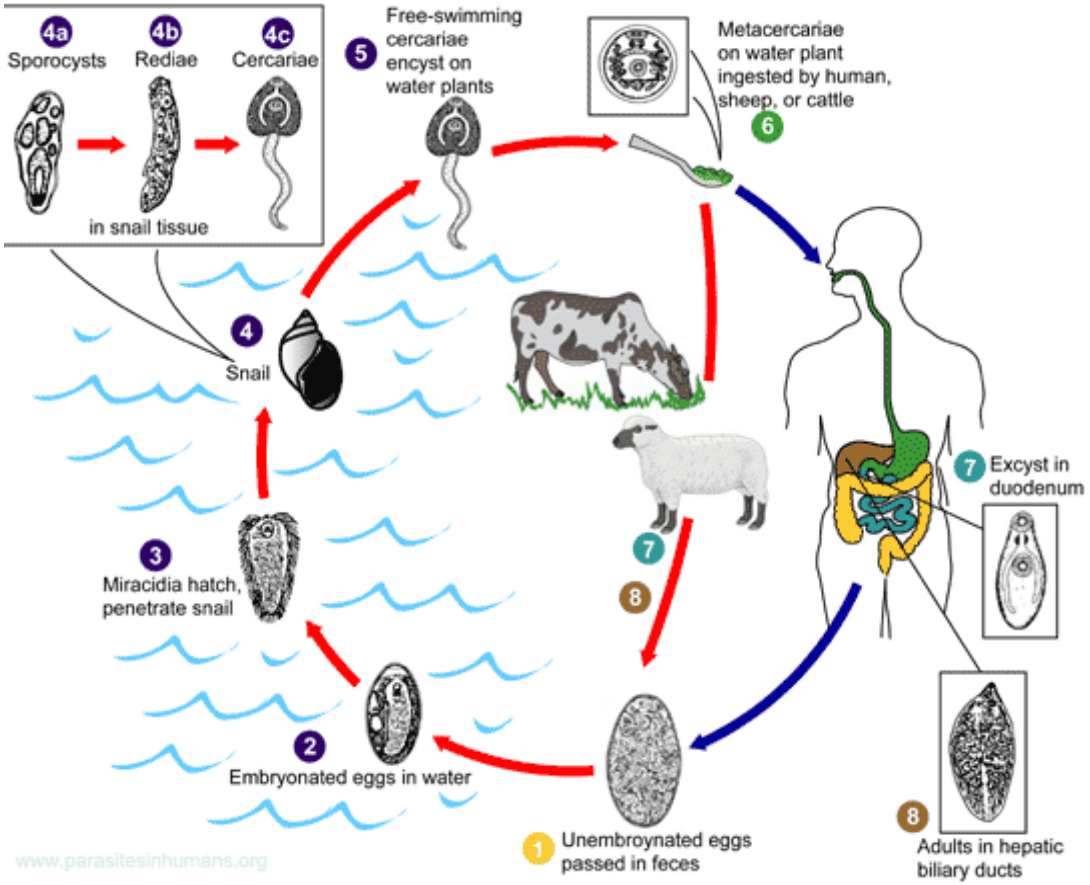
- **Life cycle-**F.hepatica passes its life cycle in two different hosts.

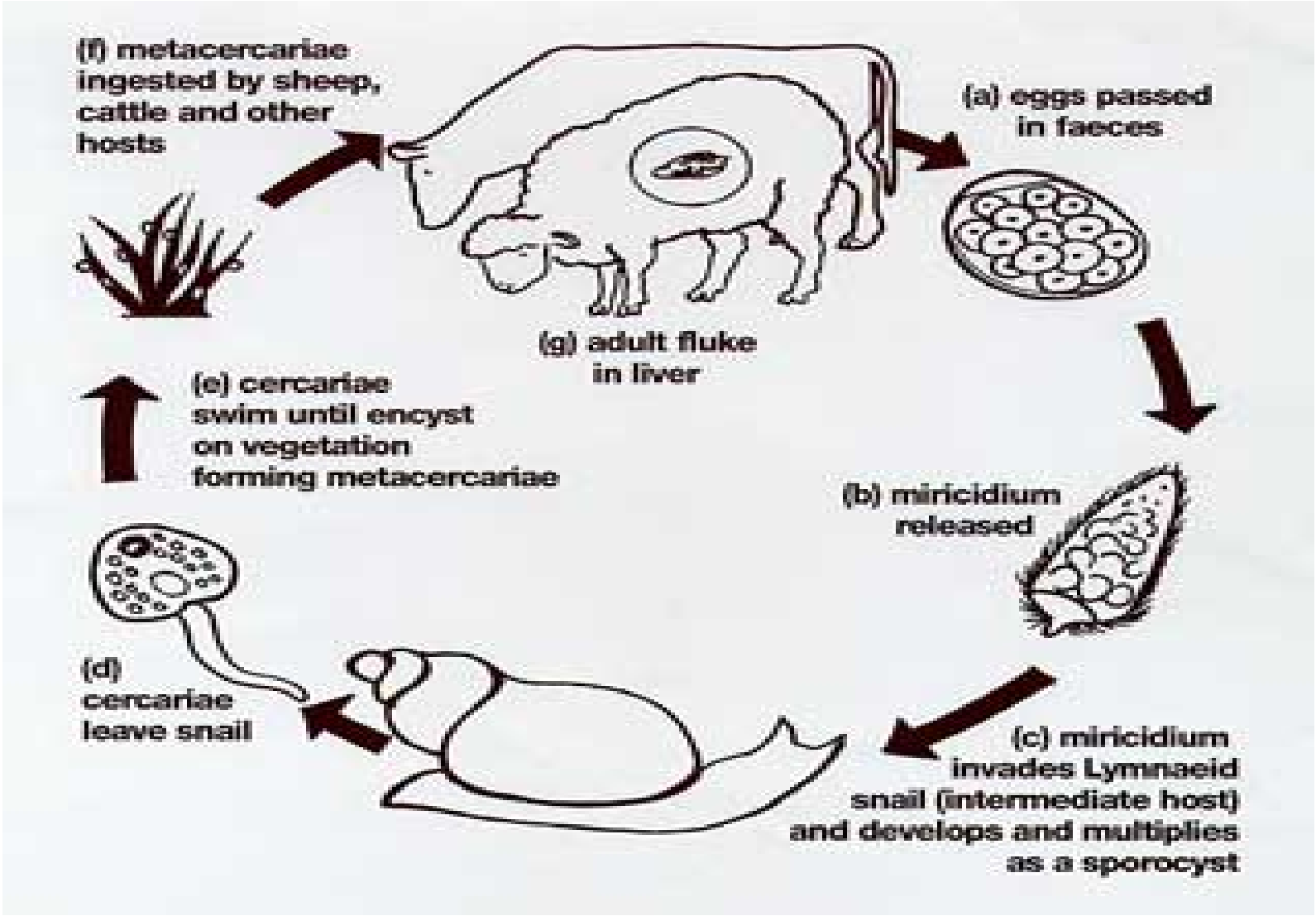
- Definitive hosts-Sheep,goat, cattle or man. Adult worm in the biliary passages of the liver.Reservoir host is primarily the sheep.

- Intermediate hosts-Snails of the genus Lymnaea. Larval development proceeds in this snail.

Life cycle of F.hepatica



Life cycle of F.hepatica



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- **Pathogenicity**-Human infection is not exceptional.
- Symptoms of fascioliasis include biliary colic with vomiting, persistent diarrhoea and a tender hepatomegaly with peripheral eosinophilia.
- It is most common in sheep and cattle raising countries.
- In Britain an outbreak occurred in Hampshire in 1960.
- F.hepatica is primarily responsible for producing a disease in animals, known as “liver rot”.
- During migration of the young worms and their localisation in the biliary passages, they cause extensive damage to the liver and in heavy infections, may lead to portal cirrhosis.
- While in the biliary passages, they may interfere with normal flow of bile , causing obstructive jaundice.

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- The mature worms cause marked pathological changes in the biliary tract by mechanical irritation as well as by their toxic secretion.
- They produce cystic dilatation of the bile ducts, the walls of which become greatly thickened by the development of fibrous tissue.
- The biliary epithelium proliferates, giving rise to adenomata.
- **Clinical disease-**The patient's symptoms will reflect the phase of the infection, as well as the number of parasites present in the host.
- In the acute phase, symptoms may be present over a period of weeks to months.

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- Metacercarial larvae do not produce significant pathological damage until begin to migrate through the liver parenchyma.
- The amount of damage depends on the worm burden of the host.
- Linear lesions of 1 cm or greater can be found.
- Hyperplasia of the bile ducts occurs, possibly as a result of toxins produced by the larvae.
- Symptoms associated with this migratory phase have included fever, epigastric and right upper quadrant pain, and urticaria.

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- Leukocytosis,eosinophilia, and mild to moderate anemia are found in many patients.
- Levels of IgG, IgM, and IgE in serum are usually elevated.
- In the more chronic phases of the disease, the patient generally has few to no symptoms once the flukes have lodged in the biliary passages.
- In the chronic phase, there tends to be some liver function abnormalities, as well as eosinophilia.
- Larvae may be found in ectopic foci after penetrating the peritoneal cavity.

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- Once the worms have established themselves in the bile ducts and matured.
- They cause considerable damage from mechanical irritation and metabolic by-products as well as ostruction.
- The degree of pathological change depends on the number of flukes penetrating the liver.
- In areas of endemicity where uncooked goat and sheep livers may be eaten, such as Lebanon, adult worms may attach to the pharyngeal mucosa, causing suffocation(halzoan syndrome).
- This condition is temporary, although it may produce considerable discomfort.

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- It has also been suggested that a number of these cases may be caused by infection with larval linguatulids, rather than adult worms of F.hepatica.

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- **Diagnosis-**This is based on the finding of eggs in stool or in the bile obtained by duodenal intubation.
- The eggs of F.hepatica and F.buski are indistinguishable.
- Patients may be symptomatic during the first weeks of infection, but no eggs will be found in the stool until the worms mature, which takes 8 weeks.
- Multiple stool examinations may be needed to detect light infections.
- Moderate to high eosinophilia.

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- A variety of immunological tests have been used
- ELISA is a sensitive and practical method.
- It becomes positive within 2 weeks of infection and becomes negative after treatment.
- Antigen from adult worm is used for complement fixation test and skin test.

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- **Treatment-**In human infection emetine injection has been attended with beneficial results.
- F.hepatica is not sensitive to Praziquentel and treatment remains problematic.
- Bithionol is now the drug of choice for fascioliasis.
- Triclabendazole as a single dose is also recommended.
- The drug is given orally in single or multiple doses and has few side effects.
- It acts by inhibiting protein synthesis in F.hepatica and will probably become the drug of choice.

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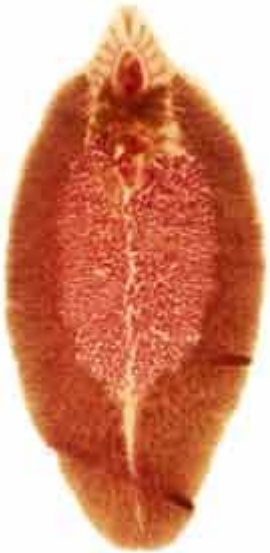
- **Prophylaxis-**Human infection can be prevented by the eradication of the disease in animals.

- The measures consists of treatment of infected animals and destruction of molluscan hosts.

Fasciola gigantica

- F.gigantica is the largest of the human liver and lung flukes.
- It measures upto 75mm in length and 12mm in width.
- It tends to be more oblong with a longer rounded posterior end as compared to broadly pointed posterior end of F.hepatica.
- It has a shorter cephalic cone, a larger ventral sucker and a more anterior position of the testes.
- The eggs of F.gigantica are larger (180µm x 80µm) than those of F.hepatica (140µm x 80µm).
- It lives in the bile duct of herbivorous mammals.



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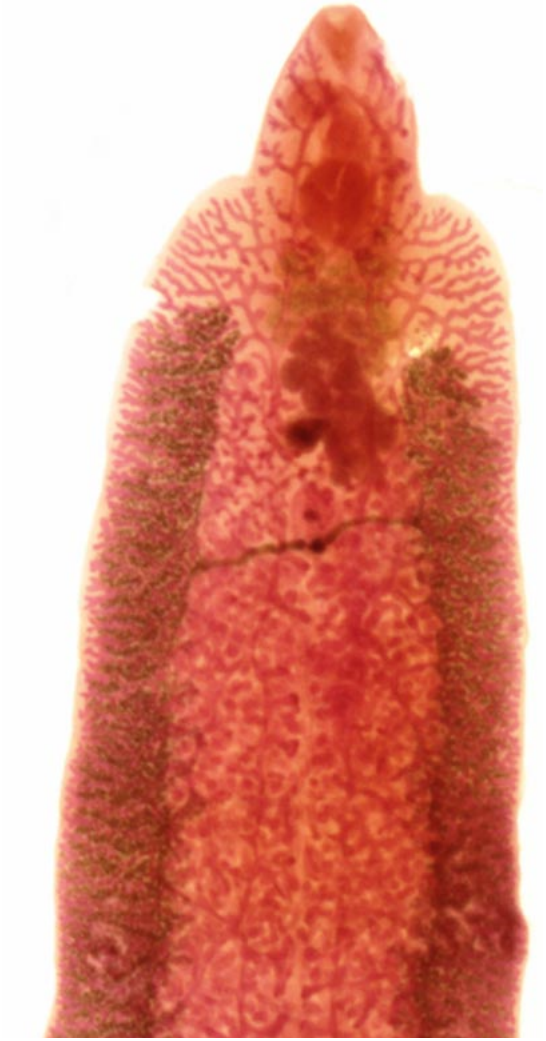
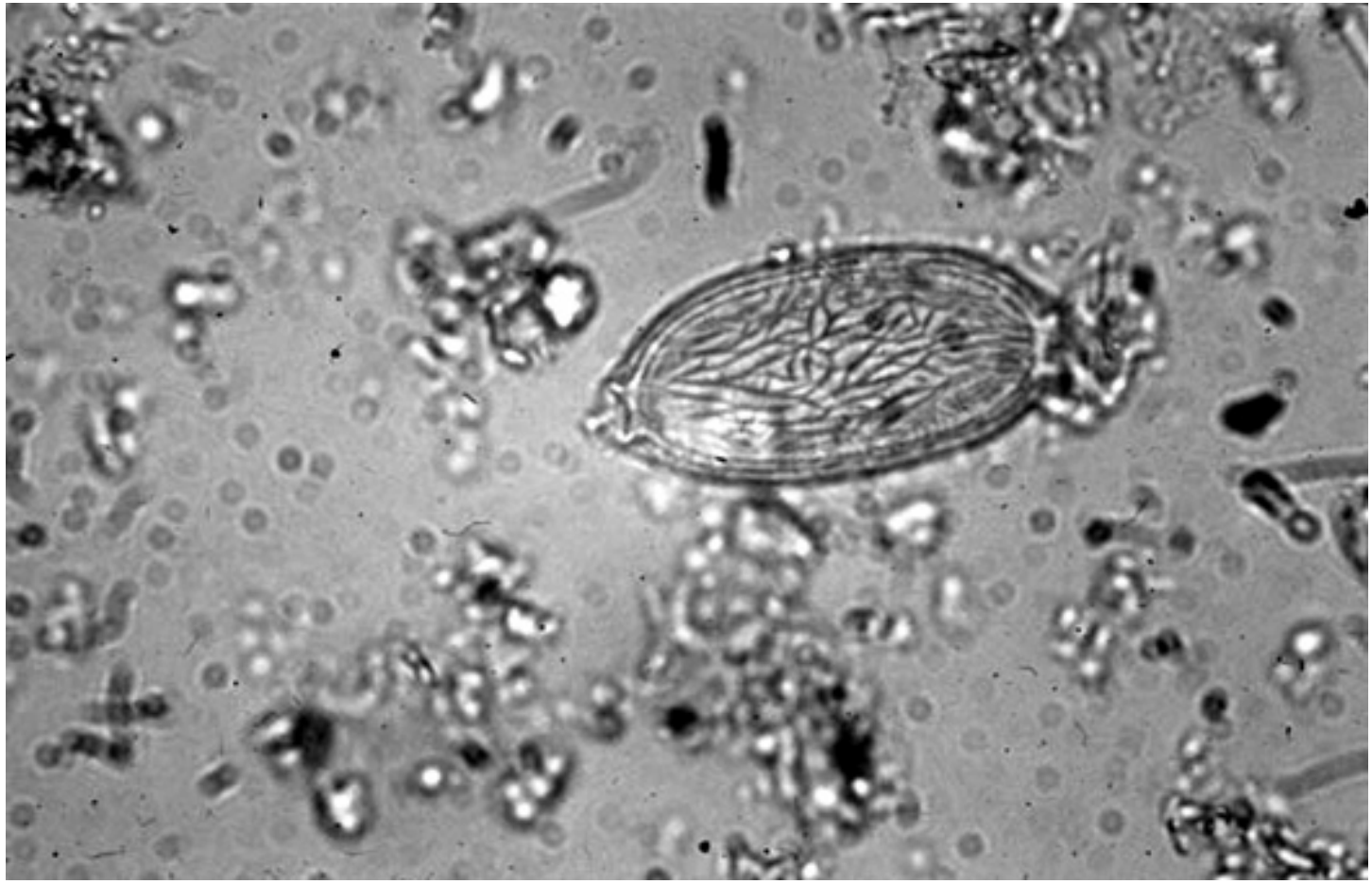
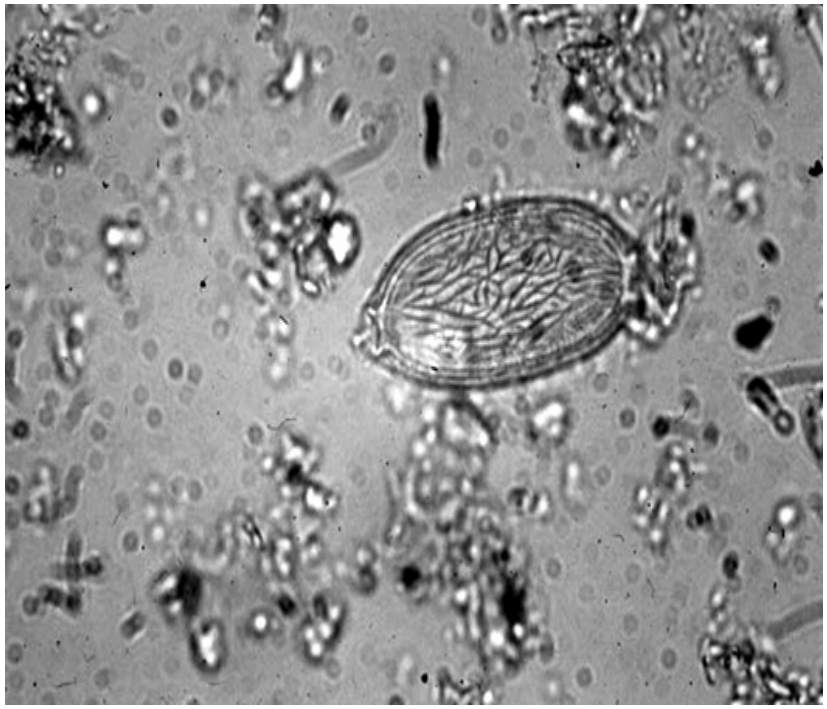
Fasciola gigantica



Egg of F.gigantica



- F.gigantica



- F.hepatica

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- It has been reported from Africa, Asia, Hawaii, Russia, Vietnam and Iraq.
- The life cycle is similar to that of F.hepatica, but F.gigantica employs different snails as intermediate hosts.
- Development is slower, and metacercariae are more susceptible to desiccation.
- Pathology is similar to those of F.hepatica.
- Like F.hepatica, F.gigantica may also be found in ectopic locations.

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- **Clinical disease-**The clinical symptoms of F.gigantica infection are very similar to those seen with F.hepatica and depend on the worm burden.

- The prepatent period between infection and the presence of adult worms in the bile ducts is 9 to 12 weeks.

- Patients may experience fever, nausea, vomiting, abdominal pain, hepatomegaly hepatic tenderness, and eosinophilia.

- Abscess or tumour like reactions have also been reported to occur in subcutaneous tissues or in the liver.

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- **Diagnosis-**The eggs can be found in the stool, however, they may be absent more often than in infections with F.hepatica.
- So multiple stool examinations may be required to demonstrate the eggs.
- Although these eggs are larger than those of F.hepatica or F.buski, they are very similar in shape.
- Recovery of adult flukes at surgery would confirm the diagnosis.
- **Treatment-**Same as F.hepatica.