



***Fasciola hepatica
and
Clonorchis sinensis***

**Presented by:
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Fasciola hepatica

Introduction:

- It is commonly called ‘**sheep liver fluke**’.
- In sheep, the migratory phase of the parasite produces severe parenchymal disease of the liver for which the parasite is called sheep liver fluke and the disease is known as liver rot.
- The first trematode was discovered in 600 years ago by Jehan de Briein -1379 then Linnaeus -1758.
- The disease caused by the fluke is called **fascioliasis** (also known as fasciolosis).
- Primarily a parasite of herbivores (particularly sheep and cattle) causing zoonosis.



Fig 1: *Fasciola hepatica*

Morphology of the Eggs of *Fasciola hepatica*

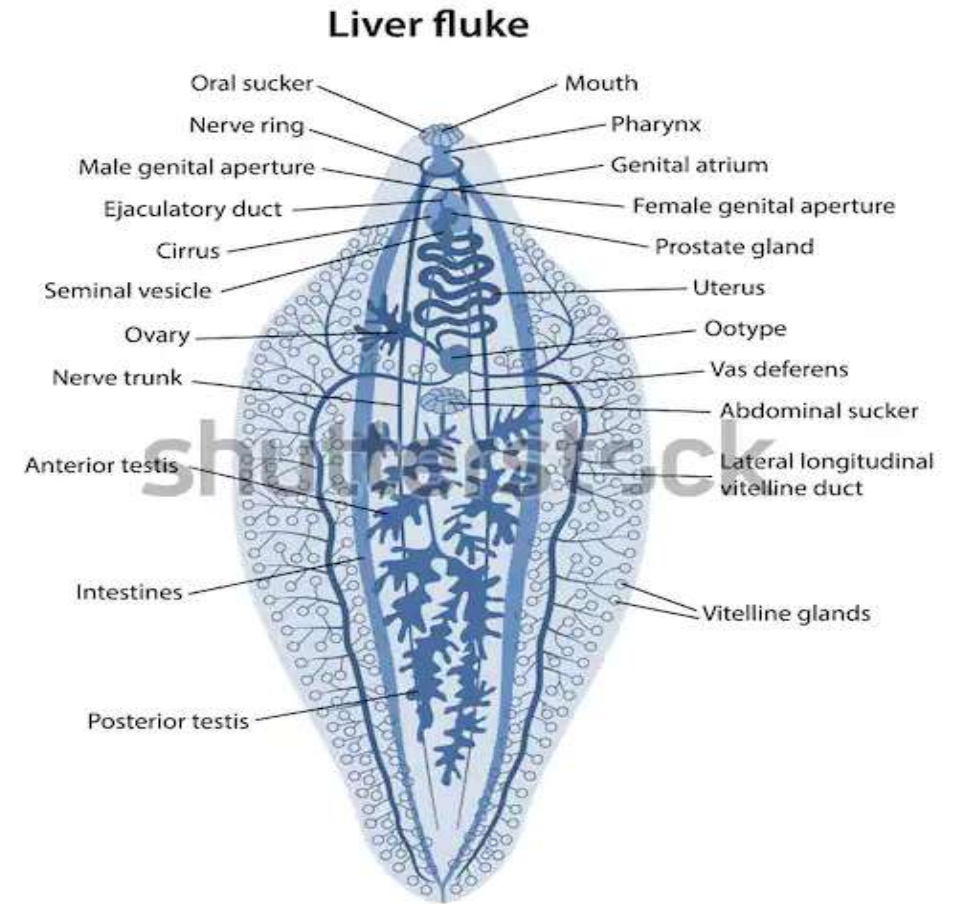
- **Operculum** :Operculated and unembryonated (contains a big unsegmented ovum).
- **Colour** :Brownish yellow •Size :130-150 μm \times 63-90 μm , ovoid.
- **Concentration**: Eggs do not float in the saturated solution of common salt.
- Egg can further develop only in water.



Fig 3: Egg of *F. hepatica*

Morphology of adult *Fasciola hepatica*

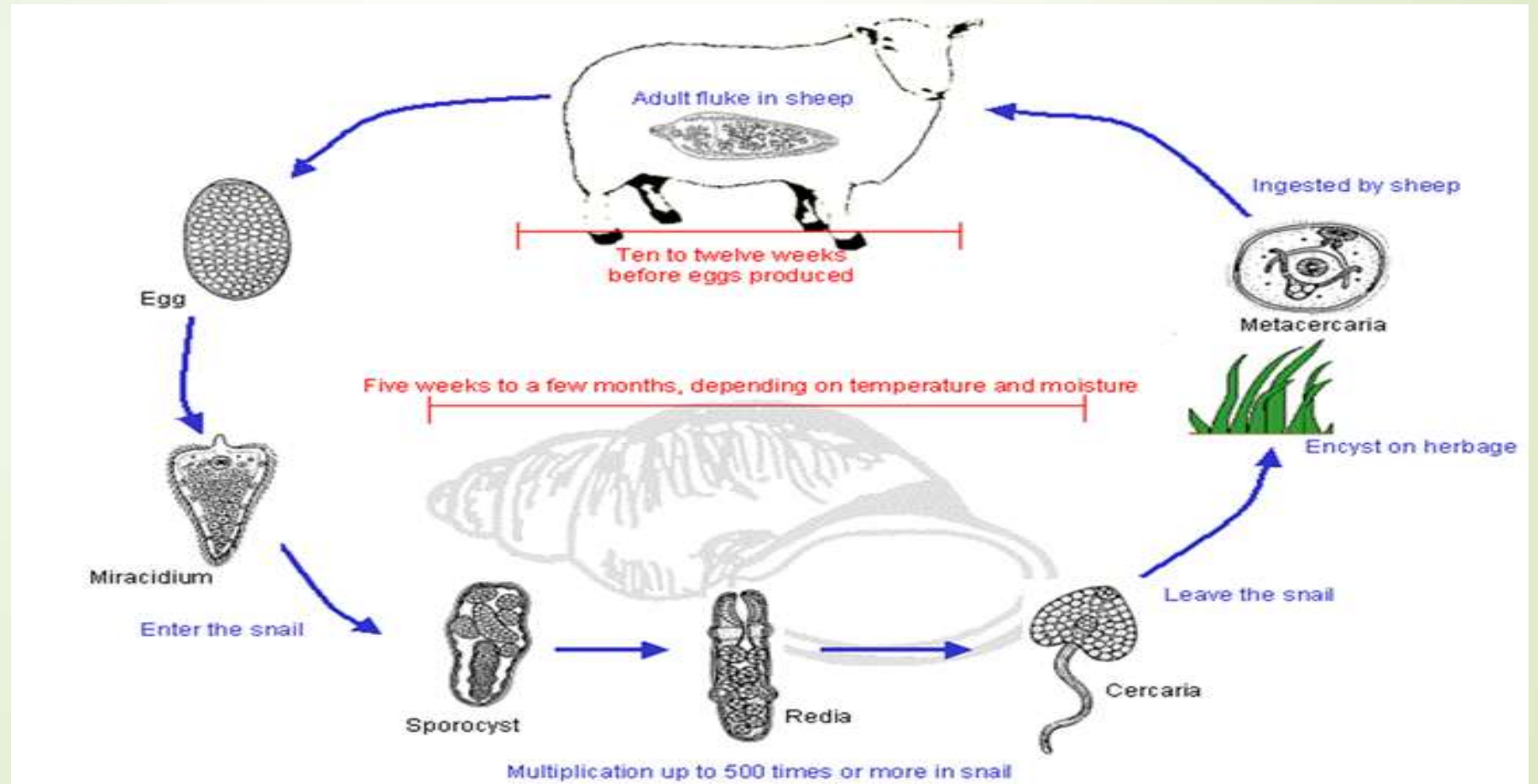
- **Size** : It is a large leaf-shaped fluke measuring 30×13 mm.
- **Appearance** : Brown and pale grey in colour with spiny tegument.
- **Suckers** : There are two suckers, the oral(smaller) and the ventral larger
- **Intestine** : Both the intestinal caeca show a number of lateral compound branches
- **Genital system** : It is a hermaphrodite like other trematodes.
- **Longevity** : Adult live for 5 years in sheep and 9-13 years in man. Adult lays approx. 20,000 eggs/day.



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Fig 4: Adult *F. hepatica*

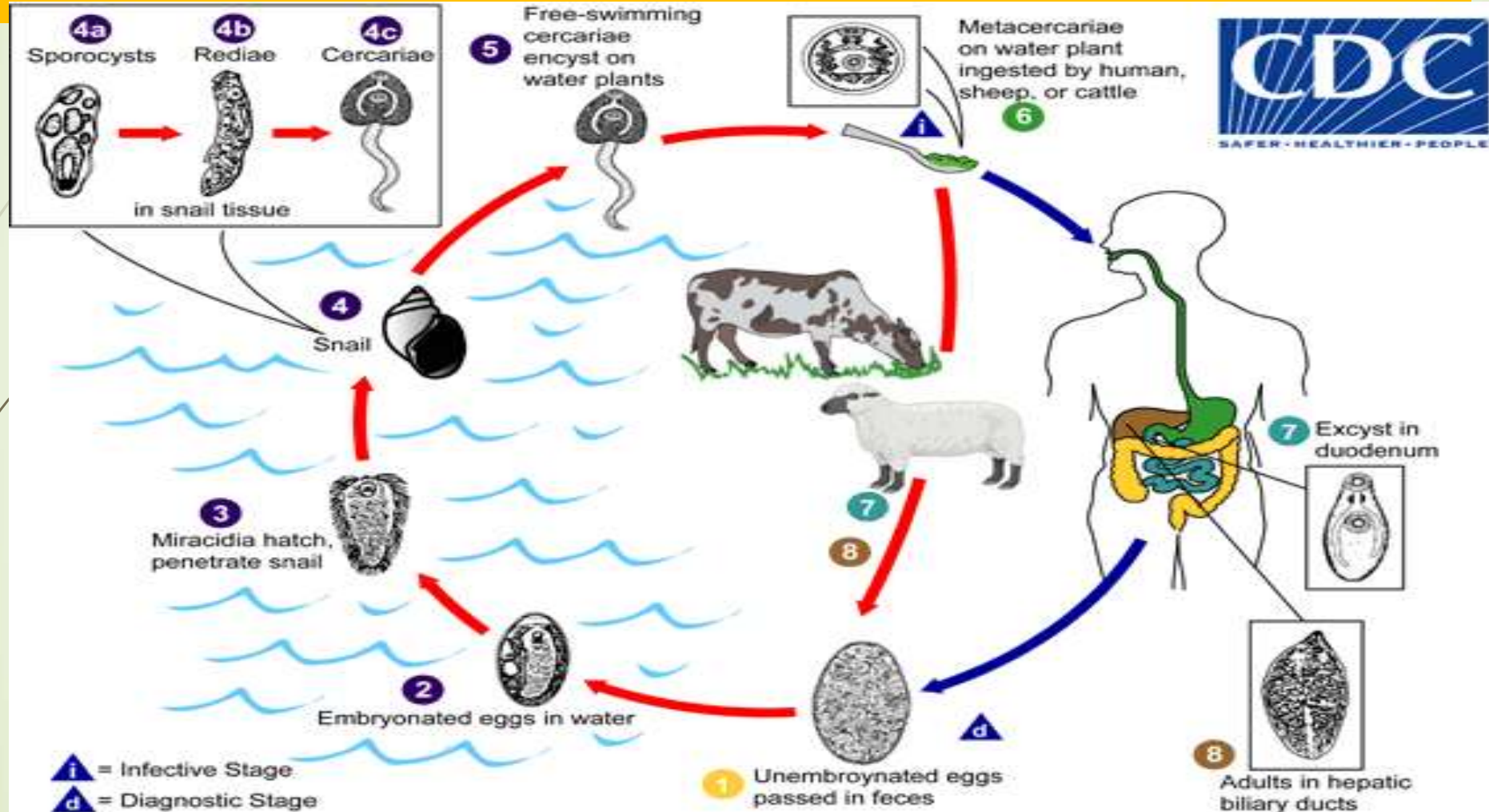
Different stages of *F. hepatica*



Life cycle of *Fasciola hepatica*

- ▶ *Fasciola hepatica* requires two hosts to complete its life cycle.
- ▶ Definitive hosts: Herbivores like sheep, goat, cattle and man and Intermediate hosts : Snails of the genus *Lymnaea* (e.g; *L. trunculula*) and *Succinea* in which larval development occurs.
- ▶ Immature eggs are discharged in the biliary ducts and passed in the stool image .
- ▶ Eggs become embryonated in freshwater over ~2 weeks image ; embryonated eggs release miracidia , which invade a suitable snail intermediate host image .
- ▶ In the snail, the parasites undergo several developmental stages (sporocysts image , rediae image , and cercariae).
- ▶ The cercariae are released from the snail image and encyst as metacercariae on aquatic vegetation or other substrates.
- ▶ Humans and other mammals become infected by ingesting metacercariae-contaminated vegetation .
- ▶ After ingestion, the metacercariae excyst in the duodenum image and penetrate through the intestinal wall into the peritoneal cavity. The immature flukes then migrate through the liver parenchyma into biliary duct.
- ▶ In humans, maturation from metacercariae into adult flukes usually takes about 3–4 months; development of *F. gigantica* may take somewhat longer than *F. hepatica*.

Life cycle of *Fasciola hepatica*



https://www.cdc.gov/parasites/fasciola_hepatica/biology.html

Epidemiology

- ▶ Cosmopolitan disease found in all sheep-rearing and cattle-rearing areas such as Russia, Europe, Latin American countries(Peru, Argentina), Egypt, Iran, Iraq, Northern Thailand , China, Japan and Australia.

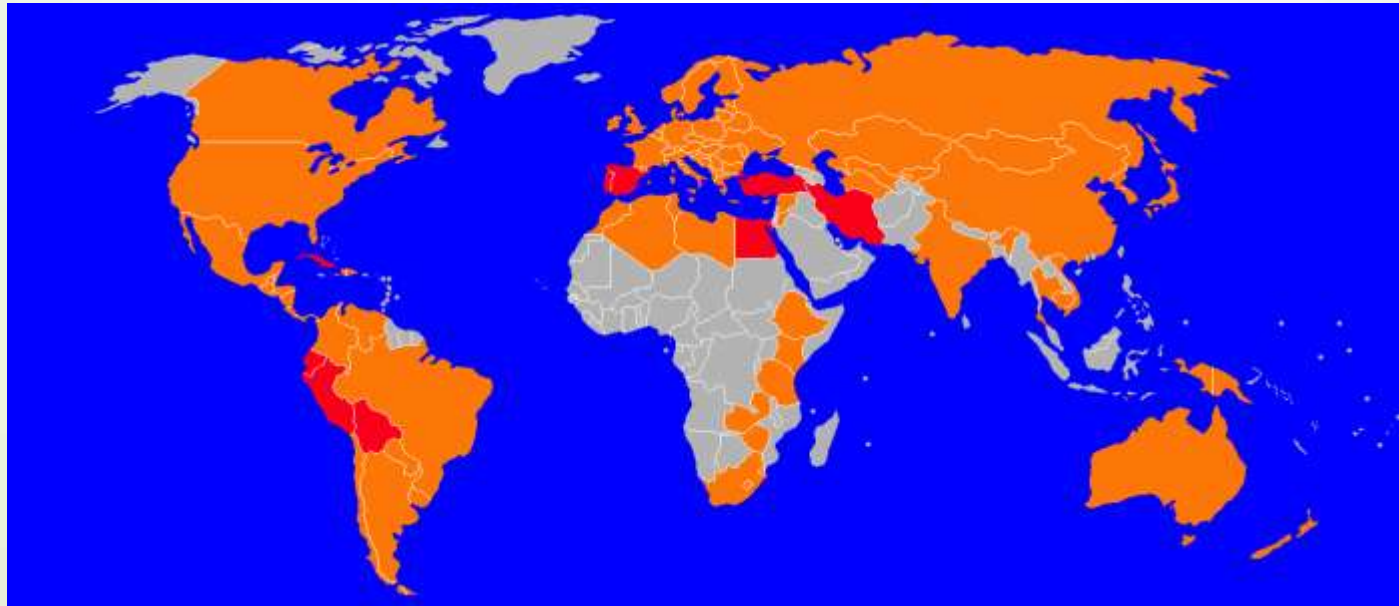


Fig 6: *Fasciola hepatica* prevalence The countries in red are those with high prevalence, those in orange have low-medium prevalence.

Transmission

- ▶ Transmission occurs by the ingestion of metacercariae encysted on aquatic vegetation , such as watercress in salads or contaminated water.
- ▶ In many areas of the world, animal manure is used as primary fertiliser for cultivation of watercress.

Pathogenesis and clinical syndrome

- ▶ While passing through the liver , the larval form causes hepatic damage.
- ▶ ACUTE INFECTION: Acute disease is characterized by nausea, vomiting, pain, chills and fever and marked eosinophilia are commonly observed.
- ▶ 12. CHRONIC INFECTION: Some worms penetrate eroded areas in the duct and invade the liver to produce necrotic foci which is called 'LIVER ROT', a condition more frequently observed in sheep. •In the chronic phase of severe infections, flukes are found both in hepatic and extrahepatic ducts that cause mechanical obstruction leading to cholangitis, cholecystitis and gall stones.

Laboratory diagnosis

- Stool should be examined for several days after individuals have stopped eating liver to rule out spurious infections. Eggs are not seen in faeces in case of ectopic foci.
- **SEROLOGICAL TESTS** •Serological tests for antibodies by ELISA and enzyme-linked immune-electro transfer blots using *F. hepatica* excretion-secretion antigens have been successfully used in areas of endemicity. These tests are useful when few eggs are found in stool or when large populations are to be screened.

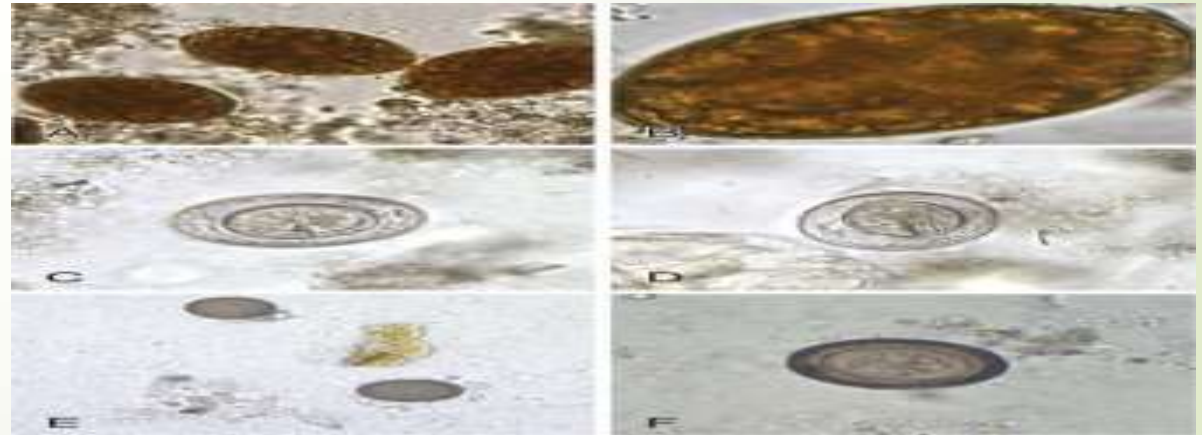


Fig 7:Eggs of *F. hepatica* in stool sample.

Treatments

- ▶ In contrast of *F. buski*, *F. hepatica* responds poorly to praziquantel. Treatment with BIOTHIONOL at 30 to 50 mg/kg body weight on alternate days for 10 to 15 doses is recommended.
- ▶ •Alternatively , benzimidazole compound tricalbendazole 10 mg/kg as a single dose is recommended. Nitazoxanide is another effective drug.
- ▶ •Antibiotics are recommended to control secondary bacterial infection. Prednisolone at a dose of 10-20 mg/day is used.

Prevention and control

People residing in areas frequented by sheep and cattle should especially avoid ingestion of watercress and uncooked aquatic vegetation

Clonorchis sinensis

Introduction:

- It is also called “Oriental Liver Fluke” or Food born parasite’.
- *Clonorchis sinensis*, the **Chinese liver fluke**, is a liver fluke belonging to the class Trematoda, phylum Platyhelminthes.
- It infects fish-eating mammals including humans. In humans, it infects the common bile duct and gall bladder, feeding on bile.
- It was discovered by a British physician James McConnell at the Medical College Hospital in Calcutta (Kolkata) in 1874.
- The first description was given by Thomas Spencer Cobbold, who named it *Distoma sinense*.

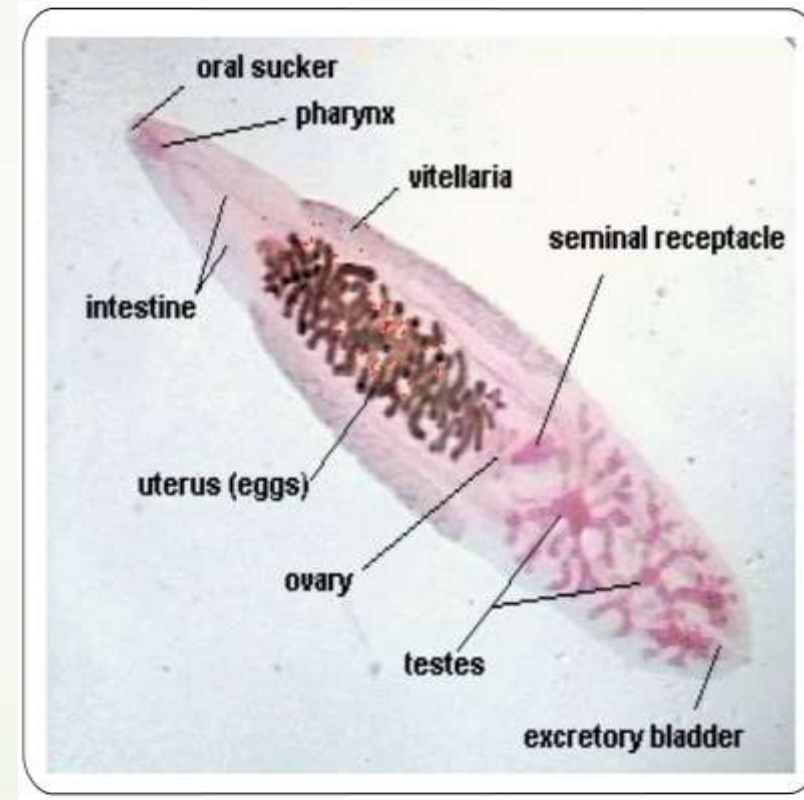


Fig 1: *Clonorchis sinensis*

Morphology of Adult *C.sinensis*

- Adult worm Flat, elongated worm, with the size 10-15×3-5 mm.
- They are monocious, with two suckers.
- The most characteristic feature is branched testis in the posterior third of the body, and relative small ovary before them.

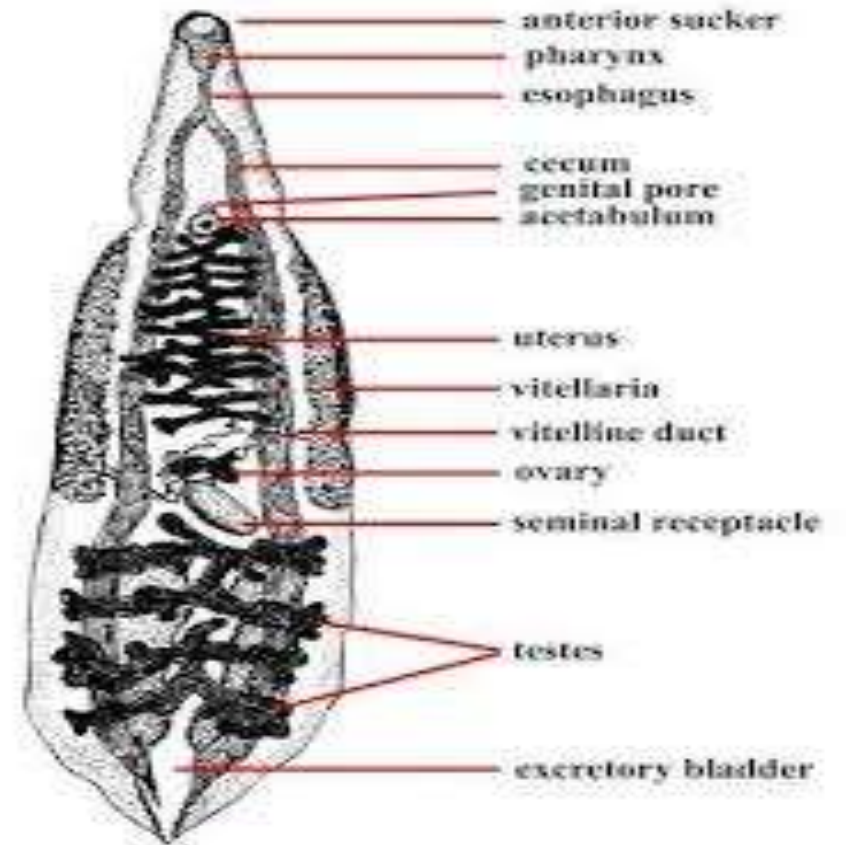


Fig 3: Adult *C.sinensis*

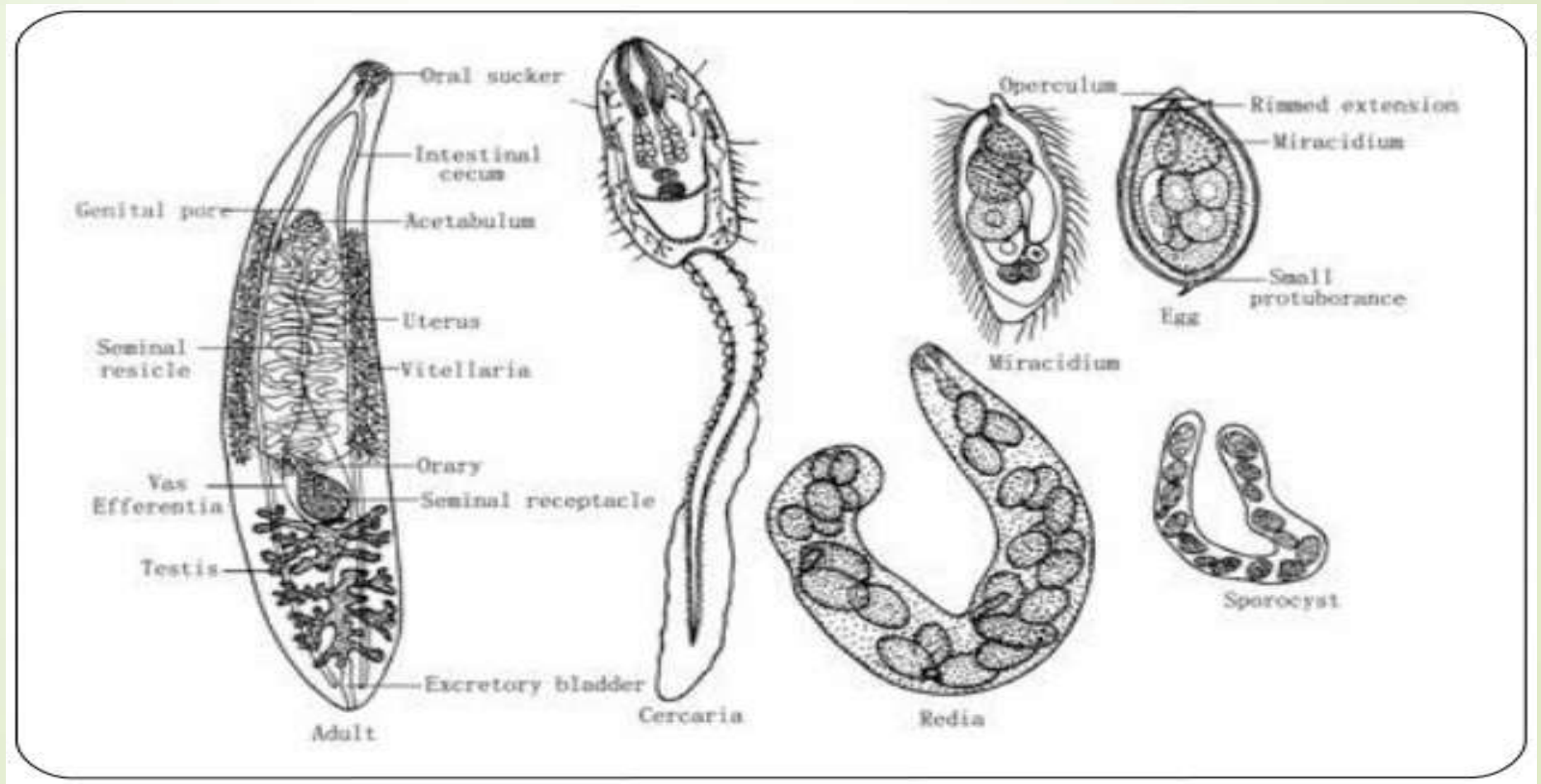
Morphology of Eggs of *C.sinensis*

- Eggs are small, 26-30 x 15-17 um Ovoid, yellowish color .
- Operculated at one end, small knob at opposite end
- Metacercariae of *Clonorchis sinensis* collected from digested fish. The cyst wall is elliptical 0.16-0.20 mm long. Dark granules are in the bladder.



Fig 4: Eggs of *C.sinensis*

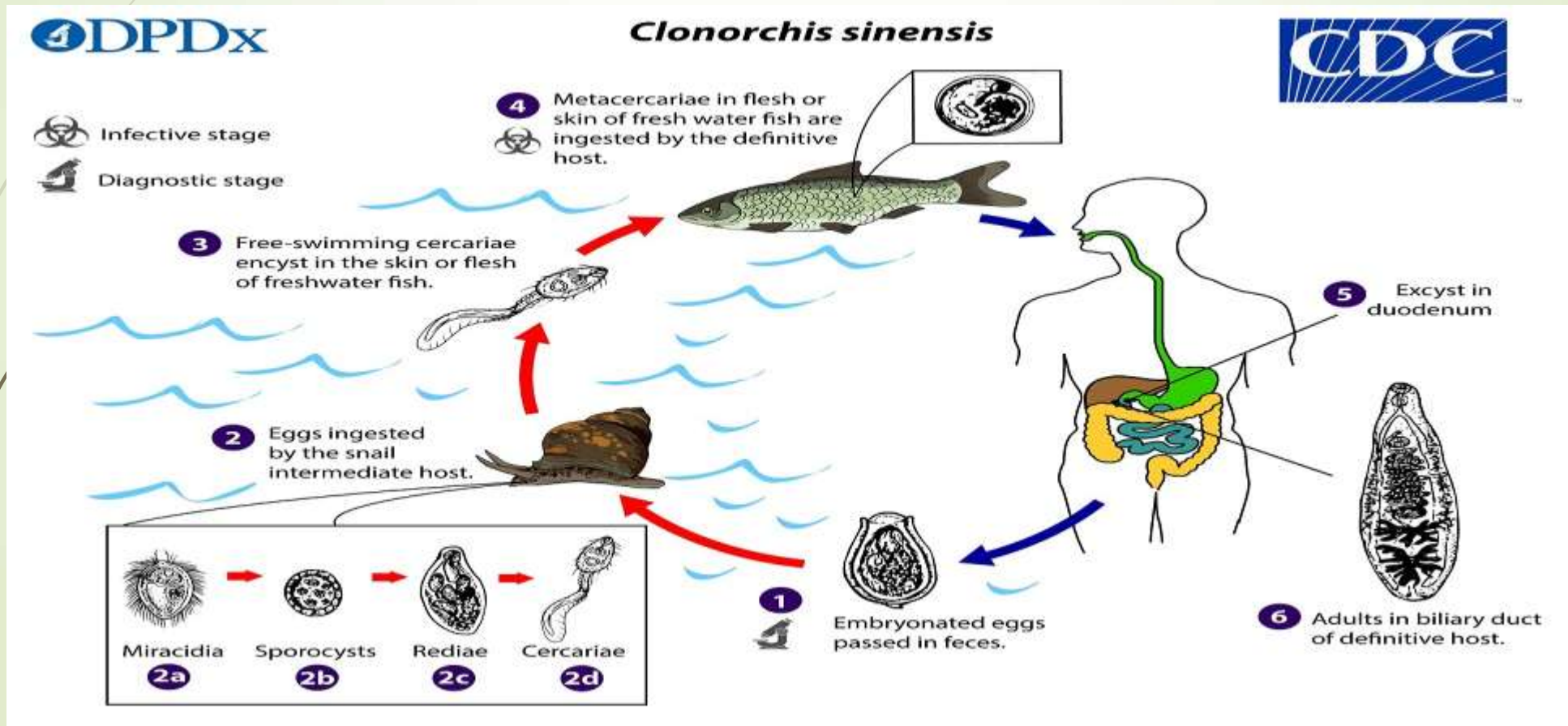
Stages of *Clonorchis sinensis*



Life cycle of *Clonorchis sinensis*

- Adults in biliary ducts, embryonated eggs pass to intestine and out with the feces.
- Eggs reach water, ingested by suitable snail (*P. manchouricus*).
- In the snail (first intermediate host, eggs release miracidium and goes through several stages in host (sporocyst>rediae>cercariae).
- Cercariae released from snail, free-swimming in water, penetrates under scales of an appropriate freshwater fish (second intermediate host) .
- Metacercariae encyst in the fish muscle.
- Humans infected by eating raw, partially cooked, smoked or pickled fish.
- Metacercariae excysts in the duodenum.
- Ascends up through intestine to bile ducts.
- Matures to adult in 30 days.
- Worms may live 30-40 years in final host.
- Carnivorous animals can serve as reservoir hosts.

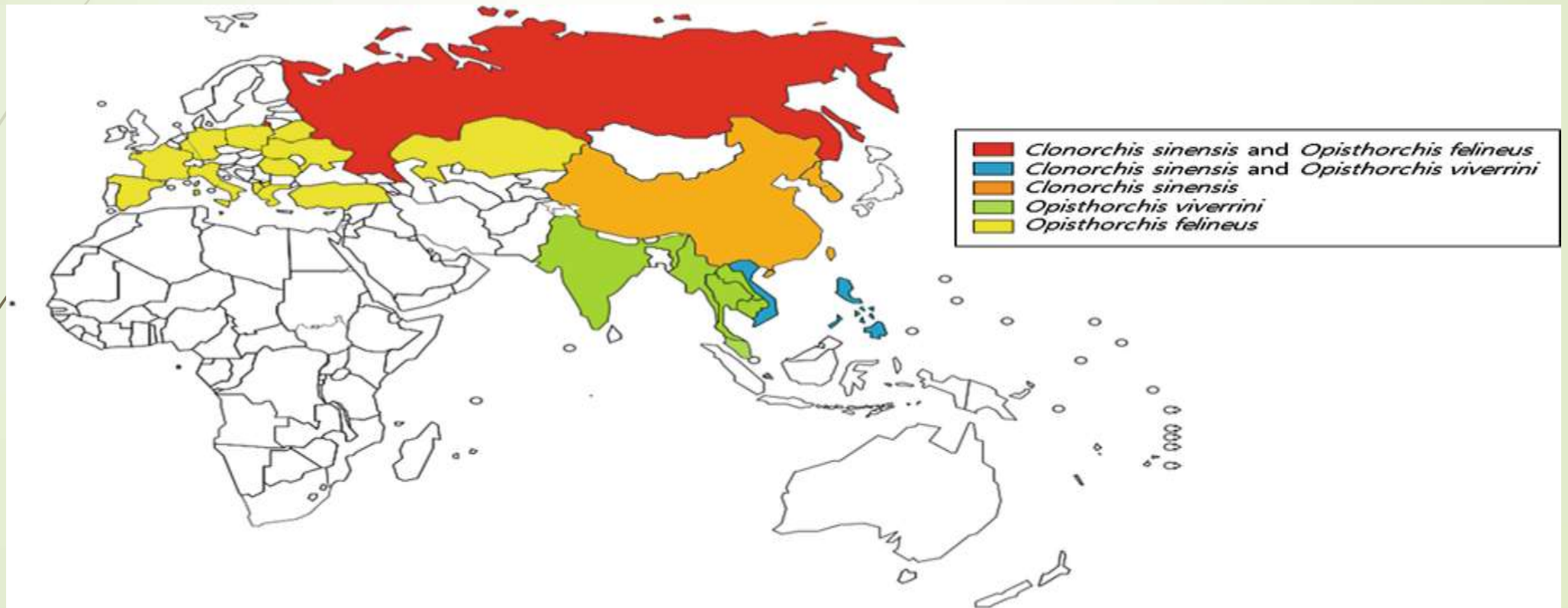
Life cycle of *Clonorchis sinensis*



Prevalence of *Clonorchis sinensis*

- ▶ *C. sinensis* is estimated to be the third-most prevalent worm parasite in the world. It is endemic to Russia, Japan, China, Taiwan, Korea, and Southeast Asia, especially Vietnam.
- ▶ In Asia, it is the most prevalent human trematode with over 15 million people estimated to be infected and 200 million people are at constant risk of infection.
- ▶ China has the highest incidence with about 13 million infection, accounting for 85% of the total cases.
- ▶ Infection rates are generally higher in men, fishermen, farmers, businessmen, and catering staff. The infection is more serious in adults aged 40-60 and the elderly. More cases occur in low- or middle-class countries, increasing the disease burden and creating economic problems. Clonorchiasis causes 275,370 disability-adjusted life years (DALY) globally.

World wide distribution of *Clonorchis sinensis*



https://link.springer.com/chapter/10.1007/978-3-030-18616-6_12

Clinical symptoms


- Acute symptoms appear when the primary infection is heavy: sudden onset, chill, high fever, slight jaundice, hepatomegaly, eosinophilia, a few patients have splenomegaly, and weeks later, enter chronic stage .
- Continuous reinfection: cirrhosis and portal hypertension. In children may cause malnutrition growth development disturbance, even dwarf.
- Acute or chronic cholecystitis, cholangitis and cholelithiasis are the most common complications.
- Portal liver cirrhosis: portal hypertension result in upper gastrointestinal bleeding.
- Cholestatic cirrhosis, Pancreatitis, Primary carcinoma of the liver and cholangiocarcinoma.

Laboratory Diagnosis

- Discovery of characteristic eggs in feces or by duodenal aspiration come to accurate diagnosis Eosinophilia and positive immunologic test support the diagnosis
- Blood routine test: eosinophilia, anemia in severe infection.
- Eggs examination: simple smear feces to find eggs Stool concentration technique may increase the positive rate Duodenal aspiration: raise the chance of finding eggs
- Immunological Test are Skin test: positive rate 97.9%, 99.5% coincide with the result of the feces and PHA: positive rate 53.7%, 80% coincide with the result of the feces.
- ELISA: positive rate 98.3%, 93.5% coincide with the result of the feces



Treatment

- Praziquantel (most effective).
 - Albendazole
 - Praziquantel is the best choice of drug for the therapy and Dose: 15-25mg/kg, three times a day, for 2 days, the total dose is 90-150mg/kg.
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Prevention and control

- Control of the source of infection: Treat the patients and domestic animal(cats and dogs, etc.) at the same time.
- Cut off the route of transmission: Avoid of eating inadequately cooked freshwater fish and shrimp Sanitary disposal of the excreta Avoid of drinking raw water.
- Metacercariae can remain viable even after the fish has been pickled, salted, dried, or smoked



Thank you!