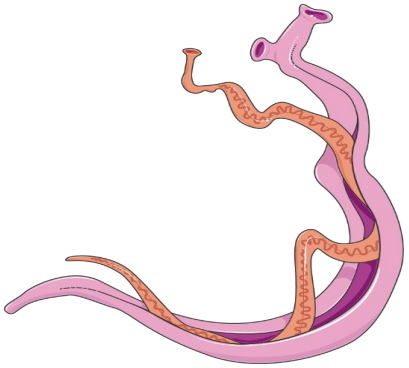
Schistosoma and hydatid cyst

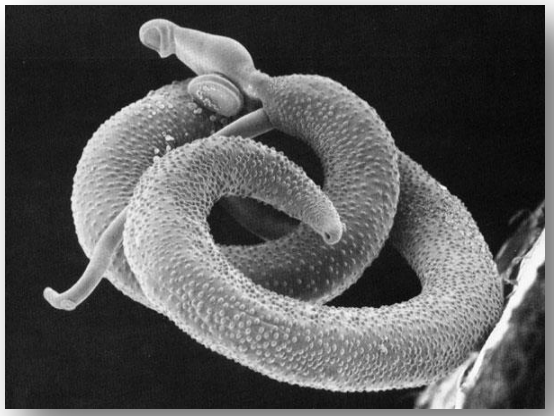
Presented by

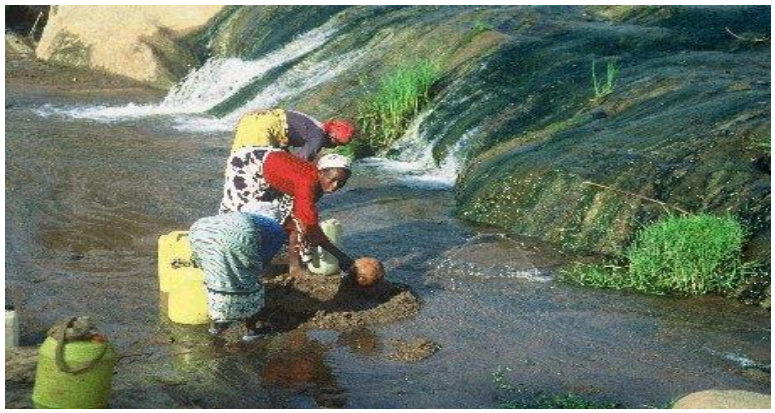
Professor Dina Abou Rayia



2nd leading cause of death in world due to parasitic infection

Schistosoma species (Blood flukes)

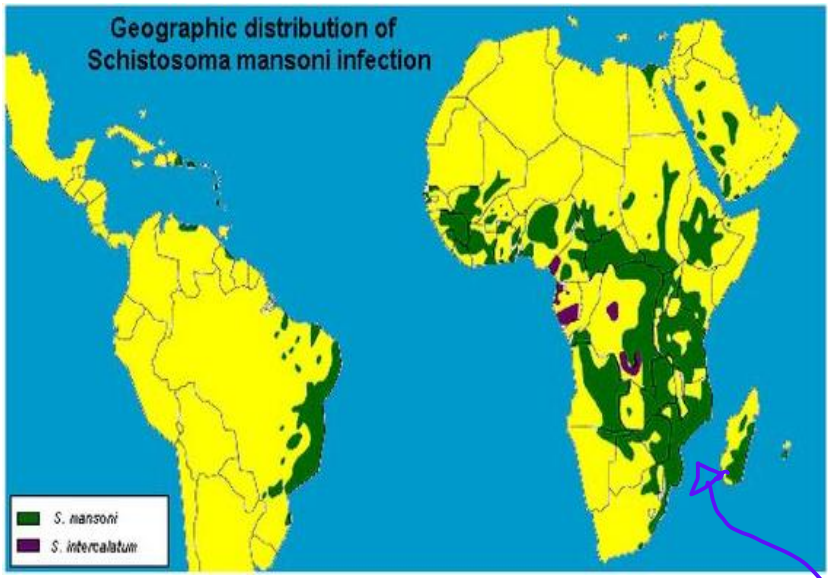


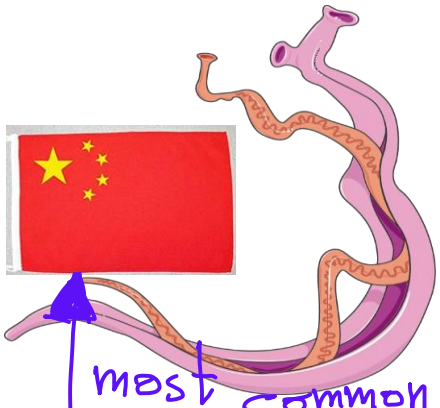


Classification of *Schistosoma species*

- **Phylum**
  - Platyhelminths
    - no lumen
    - no body cavity
- **Class**
  - Trematoda → body is one segment
- **Order**
  - Digenea → 2 hosts one of them is (snail)
- **Genus**
  - *Schistosoma*
- **Species**
  - *mansoni* and *japonicum*

Geographical distribution and habitat





most common place

S. Japonicum

Superior mesenteric veins mainly that supply the small intestine but can invade inferior mesenteric veins that supply the large intestine too

most common place

الأخضر

S. mansoni

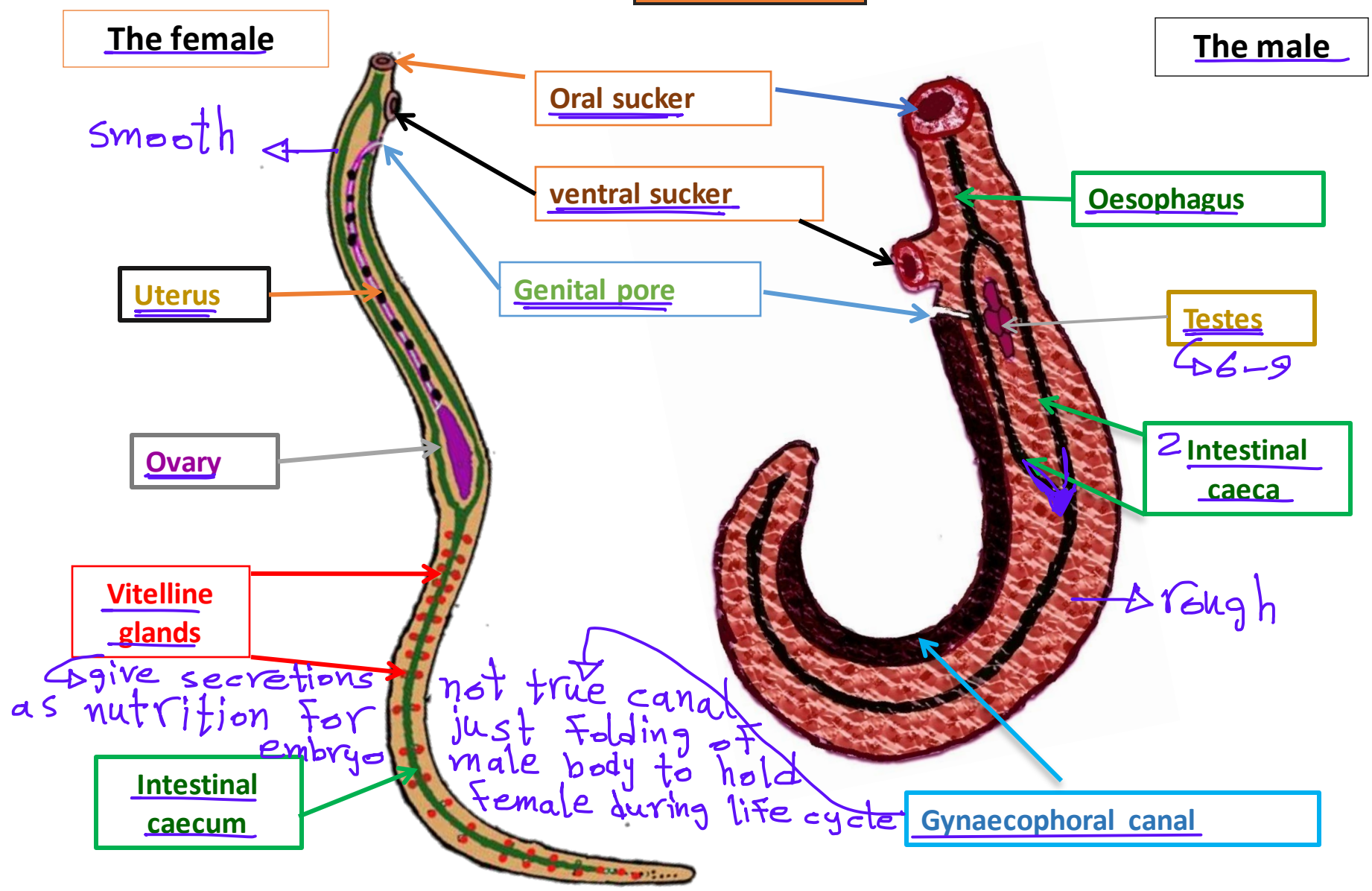
Inferior mesenteric veins that supply the large intestine

* does not live in large intestine

Why does Jordan lack a high number of cases of schistosomiasis ???????

General characters

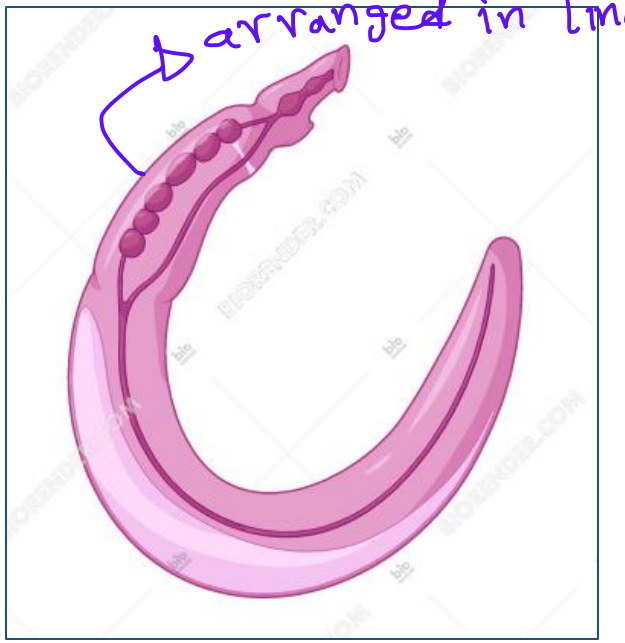
THE ADULTS



- intestinal caeca union help to know the type of schistosomes
- genital pore is posterior to ventral sucker

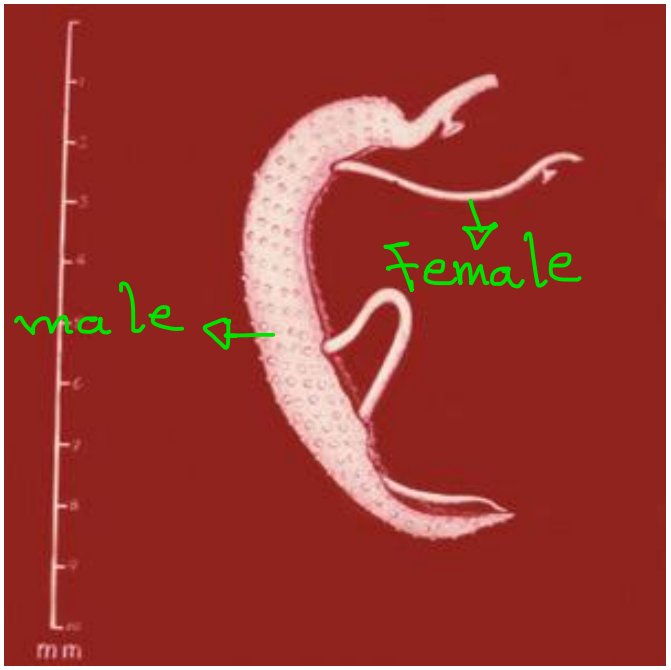
Schistosoma mansoni

arranged in line one by one



long

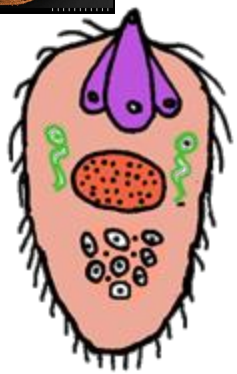
Intestinal caeca reunite at the anterior 1/3 of the body



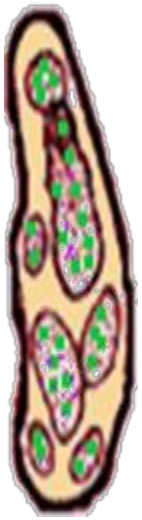
Male and female in copula

- Size: 140x60 µ
- Shape: Oval with lateral spine
- Color: Translucent
- Content: Mature miracidium

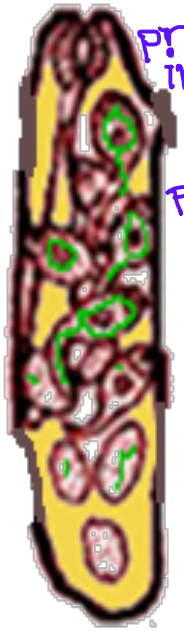
ciliated



Miracidium



Mother sporocyst



Daughter sporocyst

Furcocercus cercaria

head + 2 suckers

primitive intestinal ceaca

penetration glands

covered by spines

no redia stage

Miracidium, Sporocyst, Daughter sporocyst, Cercaria

Larval stages

S. mansoni LIFE CYCLE

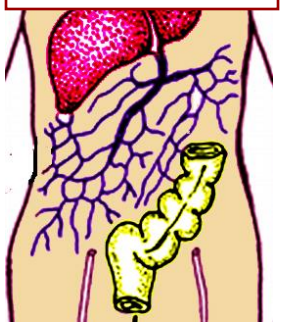
systemic circulation

lungs

venous circulation

Maturation in the portal vein of the liver

the only site for development



Adults inhabit inferior mesenteric veins

Female lay eggs in mesenteric venules of the large intestine

SCHISTOSOMULUM

Cercariae penetrate human skin

D. H.

Eggs pass with stool

Fresh water

Miracidium hatchs

Cercariae attach to human skin

(Miracidium penetrates snail)

Cercariae emerge from the snail host

I. H.

1 month in snail

the male body is rough to survive cause he is moving against blood flow

Habitat: Inferior mesenteric veins

Host

- **Definitive host: Man**
- **Intermediate host: *Biomphalaria alexandrina* snail**
- **Reservoir host: Monkeys and rodents**

Diagnostic stage: Egg

Infective stage: Furcocercus cercaria

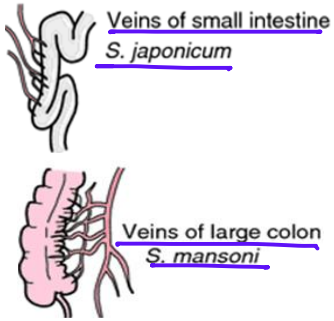
Mode of infection: Swimming or drinking infected water

very rare

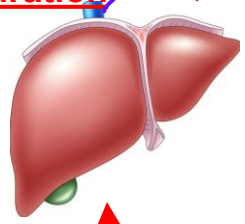
(Intestinal schistosomiasis)

Stages of disease

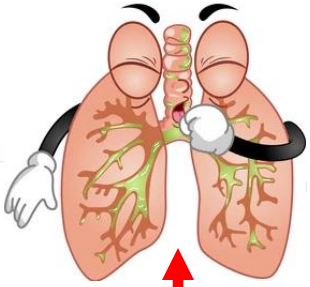
4- Stage of egg deposition and tissue reaction



3- Stage of maturation

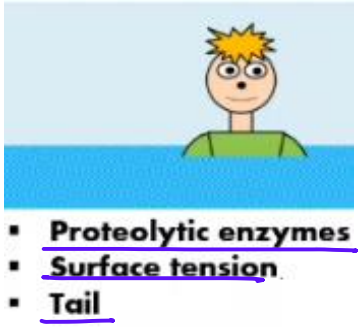


2- Stage of migration



Blood

1- Stage of invasion



Intestinal Schistosomiasis (Bilharziasis)

the main pathogenic stage is egg not Adult

Stages of disease

1- Stage of invasion

Manifestations

- Skin lesion due to cercarial penetration.
- Local dermatitis, irritation, itching and papular rash.

Intestinal Schistosomiasis (Bilharziasis)

Stages of disease

2- Stage of migration

❖ **Lung :** Irritation due to passage of schistosomulum causing minute haemorrhage, cough, sputum, dyspnea and eosinophilia, and pneumonitis (verminous pneumonia)

❖ **Liver :** Enlarged tender liver and spleen.

❖ **Toxic symptoms:** Due to metabolic products of maturing parasites causing fever, anorexia, headache, malaise and muscle pain.

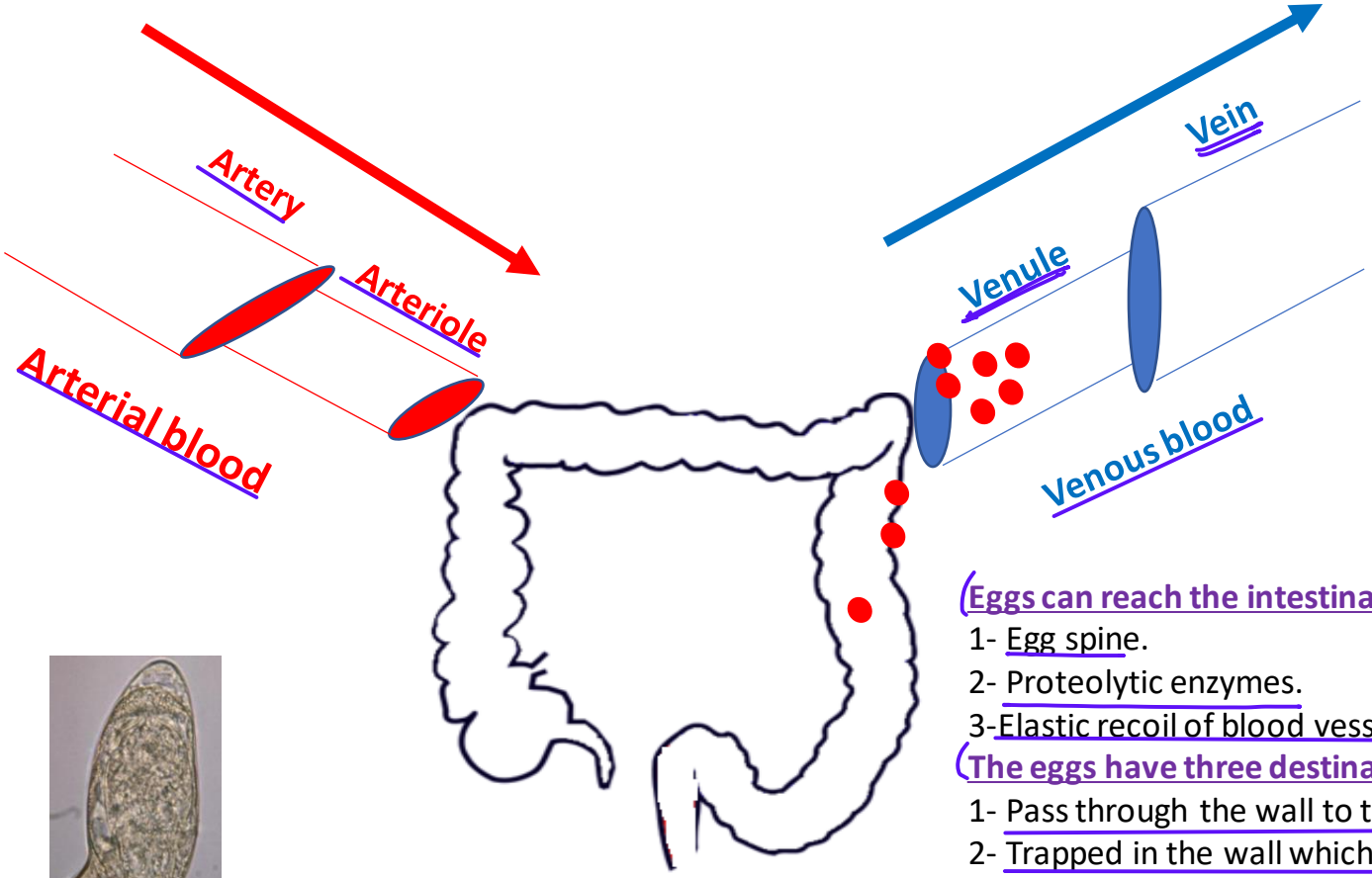
Intestinal Schistosomiasis (Bilharziasis)

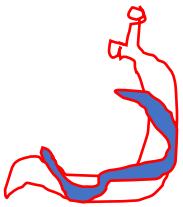
Stages of disease

3- Stage of maturation (acute schistosomiasis -Katayama syndrome)

- The development of schistosomes into sexually mature, egg-producing adults with the beginning of egg-laying produces a form of acute schistosomiasis which is a systemic hypersensitivity reaction like serum sickness.
- It is manifested by fever, vomiting, diarrhea, enlarged lymph nodes and hepatosplenomegaly with marked eosinophilia.

4-Stage of egg deposition and tissue reaction





Eggs can reach the intestinal wall by:

1- Egg spine.
2- Proteolytic enzymes.
3-Elastic recoil of blood vessels.

The eggs have three destinations:

1- Pass through the wall to the lumen, or
2- Trapped in the wall which leads to granuloma, fibrosis, and strictures, or
3- Eggs moved with the venous circulation forming embolism. (Liver, lung, CNS, skin, ….)

Intestinal Schistosomiasis (Bilharziasis)

Stages of disease

4- Stage of egg deposition and tissue reaction

severe inflammation

- Trapped eggs in the intestinal wall ➲ formation of polyps, ulcers and granuloma causing abdominal pain, diarrhea and dysentery.
- Sinuses or fistula can occur.
- Rectal prolapse.
- Later on, the intestinal wall becomes fibrosed and thickened ➲ stricture of the wall.
- The eggs secrete proteolytic enzymes that provoke typical eosinophilic inflammatory and granulomatous reactions (bilharzial granuloma) , which are progressively replaced by fibrotic tissue which is the main cause of pathology and complications.

Embolic lesions

Some eggs are swept back into the blood stream to different organs:-

Liver

Periportal fibrosis ➲ portal hypertension ➲ hepatosplenomegaly ,ascites ,oesophageal varices(hematemesis), caput medusa and hemorrhoids

Lung

Biharzial cor-pulmonal

Pulmonary hypertension & Rt. side heart failure with fever, dyspnea, cough, haemoptysis & lower limb edema.

Brain

Cerebral schistosomiasis (more common with *S. japonicum* than *S.mansoni*)

Skin and kidney

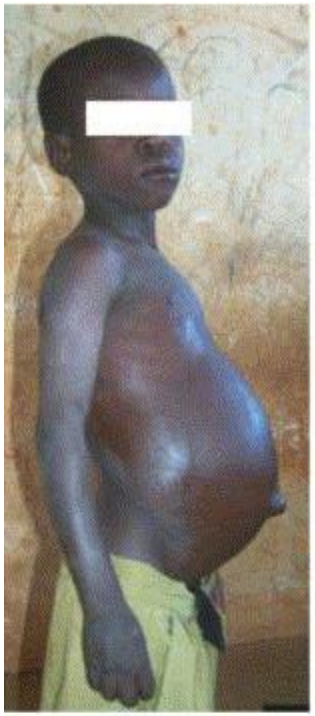
Dermatitis and glomerulonephritis

Clinical picture summary

Stages	Clinical aspect	Manifestations
Early	**1. Cercarial dermatitis**	At the penetration sites of cercariae → itching & papular eruption
	2. Schistosomular migration	**Migration** of schistosomula→ **lungs**: pneumonitis (fever, cough and haemoptysis) and →**liver** (tender hepatomegaly)
	3. Acute schistosomiasis (Katayama syndrome)	It occurs when worms mature in the liver, migrate to the small venules and begin to lay eggs. There is fever, abdominal pain, diarrhoea, wheezing, urticaria, marked eosinophilia, sometimes lymph node enlargement and hepatosplenomegaly.

Clinical picture

Stages	Clinical aspect	Manifestations
Late manifestations	**1. Chronic Intestinal schistosomiasis**	**Oviposition** in the mesenteric plexus ➜ diarrhoea with blood and mucus (schistosomal dysentery)
	2. Chronic hepatosplenic schistosomiasis	**Granuloma Formation** in the liver ➜ periportal fibrosis ➜ Obstruction of the portal venous branches ➜ portal hypertension ➜hepatomegaly & splenomegaly
	3. Advanced complications	Hypersplenism ➜ Anaemia + thrombocytopenia Extensive periportal fibrosis ➜ Hepatic failure Portal hypertension ➜ Opening of porto-systemic collateral ➜ oesophageal varices → fatal haematemesis Egg embolism ➜ Lung & CNS Ascites due to hypoproteinaemia + portal hypertension



(A)

(B)

(C)

Laboratory diagnosis

Direct

1) Detection of eggs in the stool by direct smear or concentration.

2) Thick faecal smear.

3) Rectal swab.

4) Rectal biopsy or liver biopsy in chronic stage

Indirect

1) Intradermal test.

2) Serological tests:

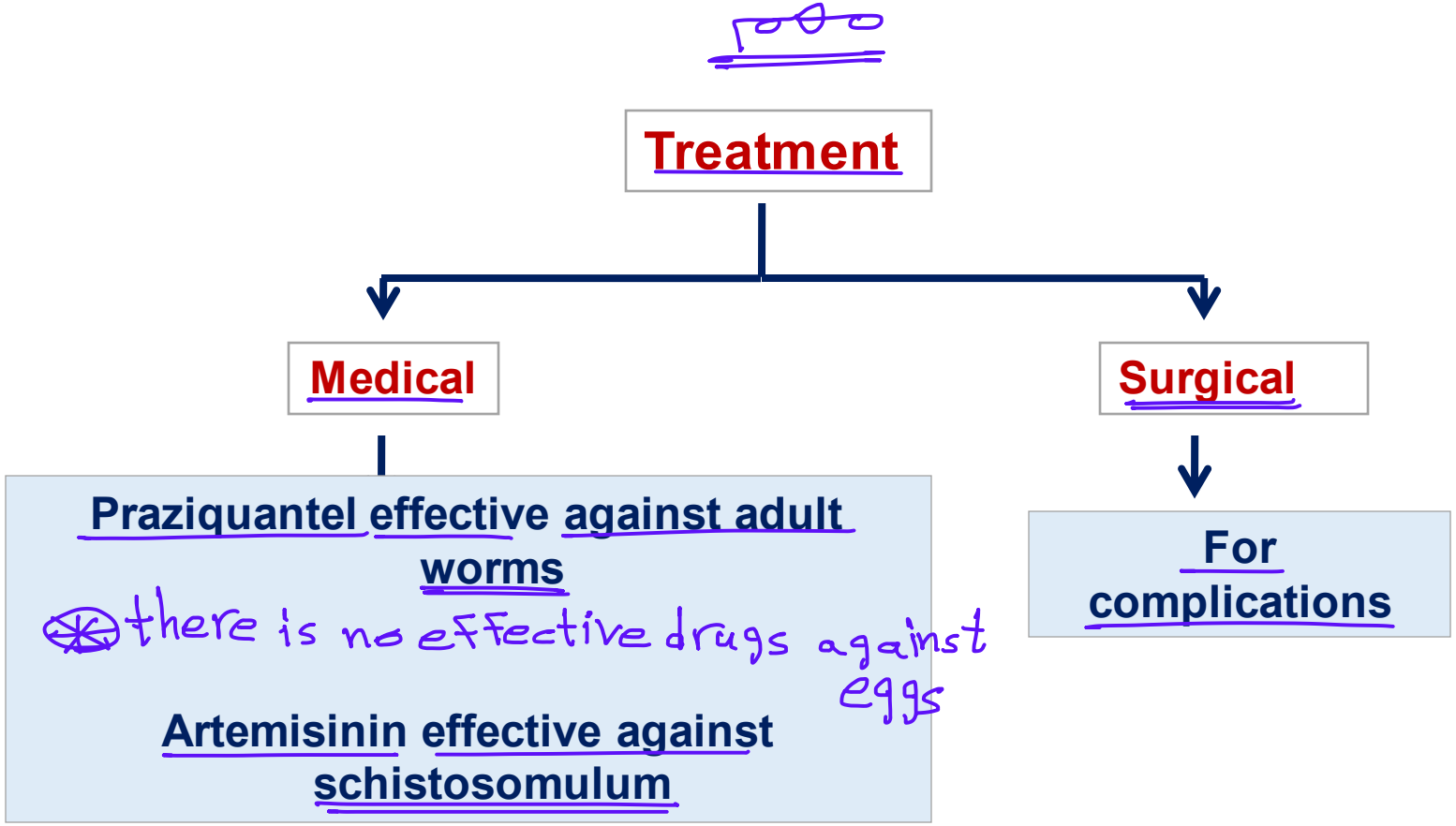
IHAT, CFT, and ELISA.

3) Recently: Detection of circulating *Schistosoma* antigens by using of monoclonal antibodies

4) Anaemia:-

- Iron deficiency anaemia due to blood loss.
- Haemolytic anaemia due to hypersplenism.

6) Eosinophilia → acute stages


Treatment
Medical
Surgical
Praziquantel effective against adult worms
there is no effective drugs against eggs
Artemisinin effective against schistosomulum
For complications

Differences between *S.mansoni* and *japonicum* ??????

	S. mansoni	S. japonicum
Male	**The length**: 8 mm	15 mm
	Tegument: covered with coarse tubercles	free of tubercles
Female	**Length**: 15 mm	22 mm
	Ovary: in anterior 1/3 of the body.	middle of the body
Caecal reunion	Anterior third of the body	Middle

more complications than mansoni

Onchocmelania snail of *S. japonicum*

	S. mansoni	S. japonicum
Eggs		
• **Size**	140 x 60 µm	90 x 60 µm
• **Shape**	Large lateral spine	Small lateral process
• **Colour**	Translucent	Translucent
• **Content**	Miracidium	Miracidium
• **Specimen**	Stool	Stool

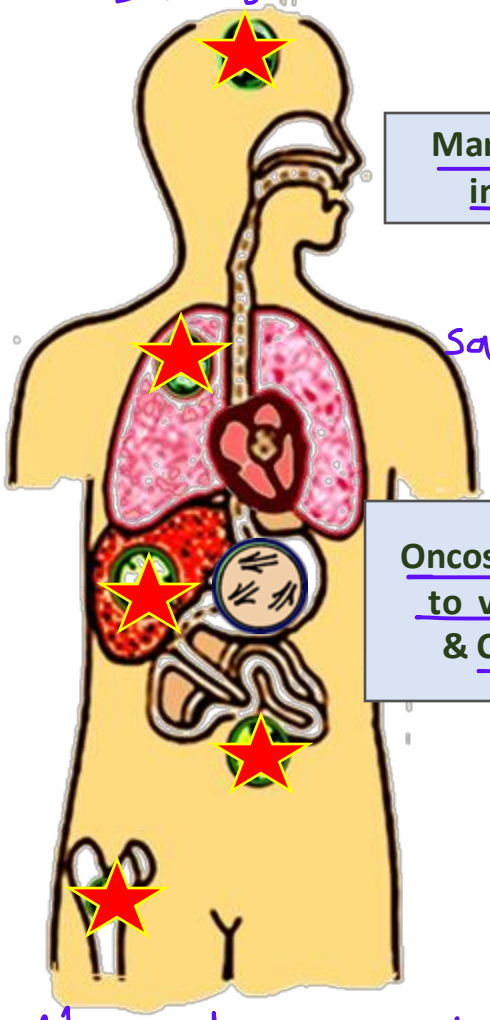
Biomphlaria alexandrina snail of *S. mansoni*

related to dogs

Hydatid cyst disease

Life Cycle of *Echinococcus granulosus*

body is multiple segments



Man accidentally ingests eggs

same as tinea

Oncosphere migrates to various organs & Cyst develops

hatches in intestine

(I.H.) Herbivores & Man

Oncosphere migrates to viscera & Cyst develops

Oncosphere hatches in intestine

ests Eggs or Gravid segment

(D.H.) Carnivores (dogs)

Protoscolices release

Adult maturation

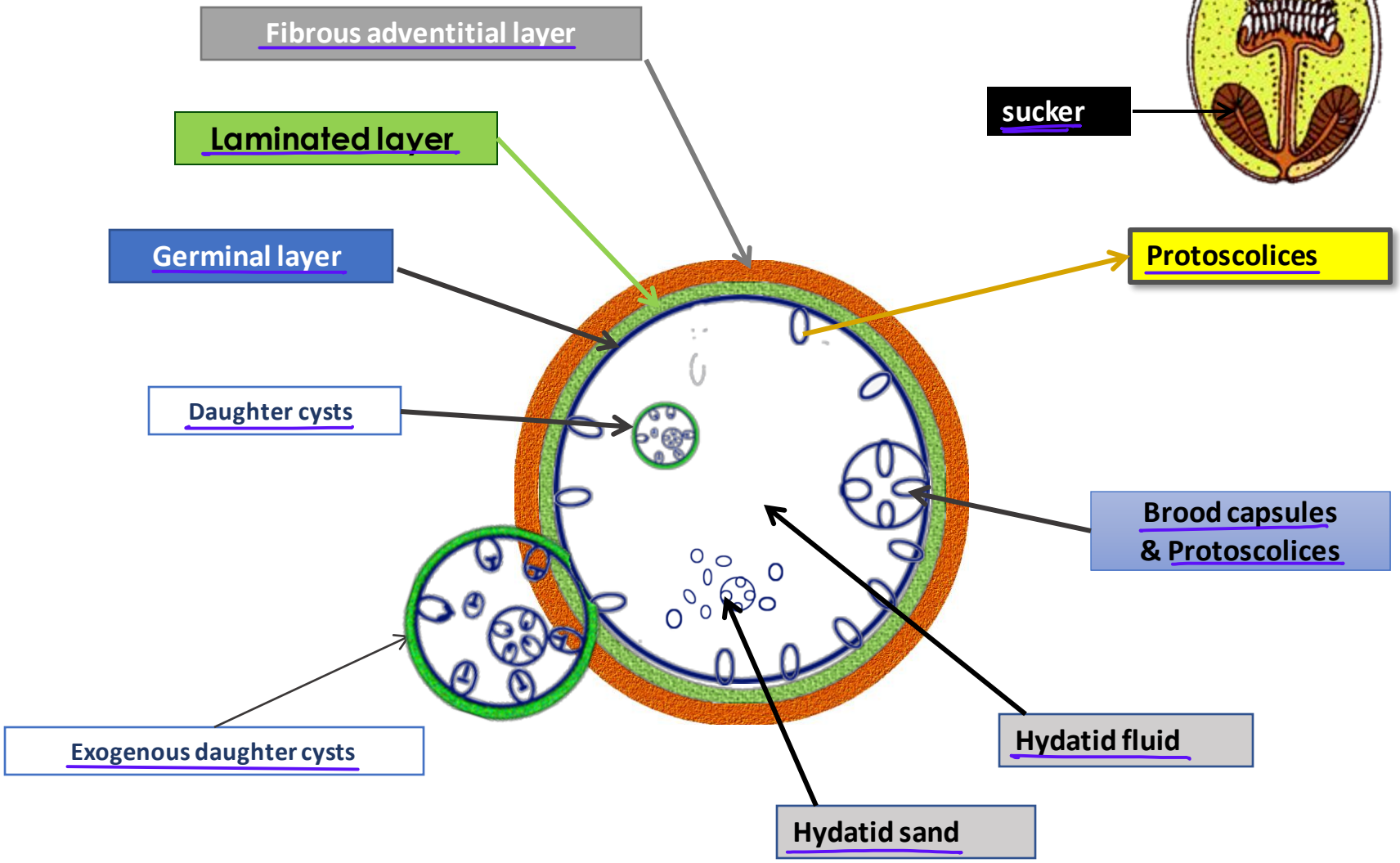
Adult in small intestine

Eggs Pass with stool

Dog (D.H) ingests infected viscera

* the only infective stage in man (eggs)
* man is blind host

Unilocular hydatid cyst



Hydatid cyst

Naked eye

microscope

Hydatid cyst disease (Cystic Echinococcosis or Hydatidosis)

- It is a parasitic infection of both humans and other mammals such as sheep, and cattle with hydatid cysts, the larval stage of *Echinococcus* granulosus.

- Man is an intermediate and blind host for *Echinococcus granulosus*

Pathogenesis & Symptomatology

Local inflammatory reaction around the hydatid cyst, ending in formation of a fibrous capsule which may become calcified or even ossified.

The symptoms depend on the size & site of the cyst.

Large sized cysts ➲ pressure atrophy of affected organs:-

Liver (70%) ➲ enlargement and dysfunction (fever, pain and jaundice).

Lung (20%) ➲ pain, cough and dyspnea.

Brain ➲ epilepsy.

Eye ➲ protrusion of the eye ball.

Bones ➲ Pain& spontaneous fracture.

Kidney ➲ membranous nephropathy.

Spontaneous rupture of cyst into peritoneal cavity or pleura may lead to severe allergic reaction (anaphylactic shock) or secondary cysts.

Diagnosis

Clinical

- History of contact with dogs.
- Slowly growing cystic tumour.
- Hydatid thrill.

Laboratory

Direct

- X-ray for calcified cyst.
- Ultrasonography, CT scan and MRI.
- Scolices in sputum or urine due to rupture of the cyst in bronchus or urinary tract.
- Puncture or aspiration of hydatid fluid
  - ➲ may lead to anaphylactic shock due to leakage of the fluid.

Indirect

- Eosinophilia.
- Intradermal test(Casoni test).
- Serological tests.
- PCR

Treatment

1) **Surgical removal of the cyst:** The most efficient treatment but it may cause mortality (2%) and recurrence of the disease (2 - 25%).

2) **Medical treatment:** need long time

Indications: In inoperable cases and before and after surgery.

- Albendazole (Drug of choice).
- Mebendazole.
- The combination of ABZ and Praziquantel (PZQ) may provide synergistic effect and better efficacy.

3) Percutaneous treatment (PAIR): In three steps:

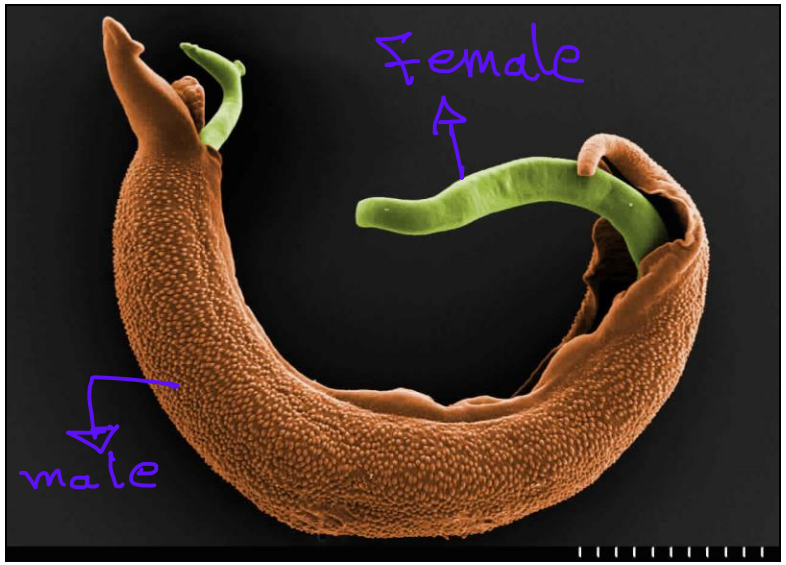
Puncture (P) and needle aspiration (A) of the cyst.

Injection (I) of a scolicidal solution usually hypertonic sodium chloride solution or ethanol and left for 5 - 30 minutes. Cyst-re-aspiration (R) and final washing.

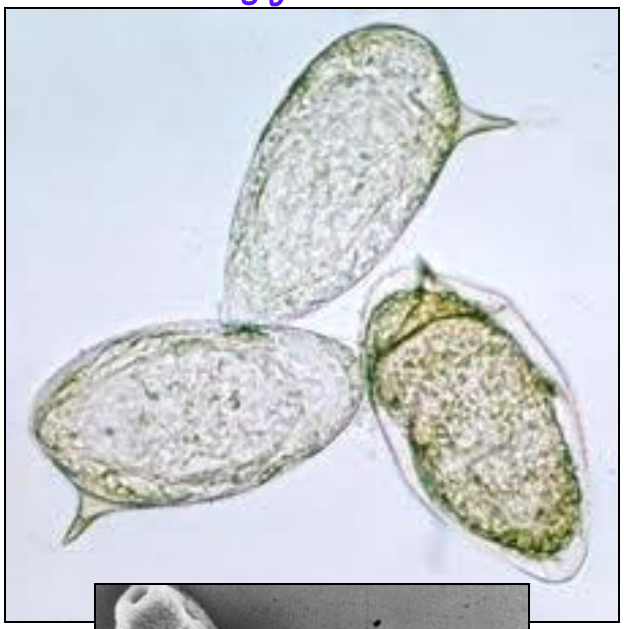
- ✓This procedure is indicated in inoperable cases and who have drug resistance (no response to medical treatment).

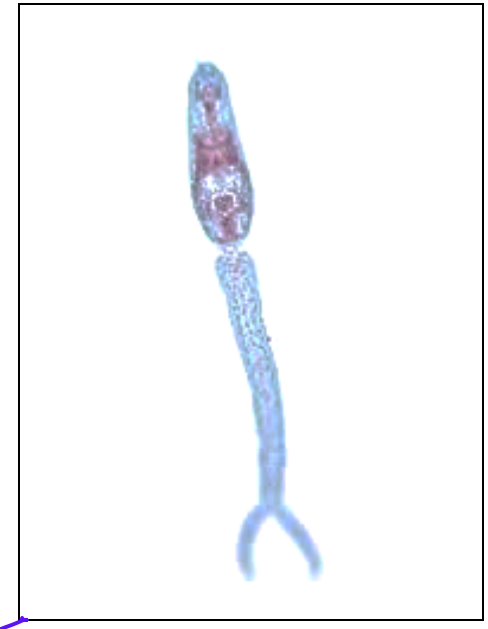

?
Quiz
Time

male and Female in copula



egg





Furcocercus cercaria

Identify ?????

schistosomulum

Case study

liver site

- A 24-year-old man presented to the hospital complaining of a swelling in the right upper quadrant of his abdomen. Clinical examination revealed the presence of a mass on the right side of the abdomen that elicited a thrill on palpation. Blood examination revealed eosinophilia. Abdominal ultrasound showed a medium-sized cyst with heterogenous contents occupying the right liver lobe. → hydatid cyst disease