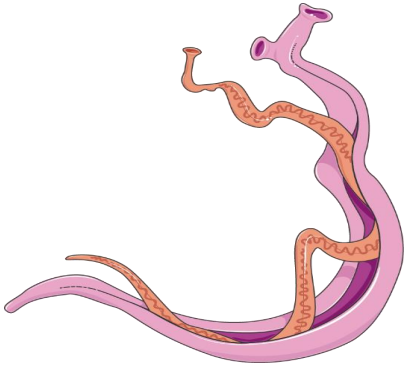
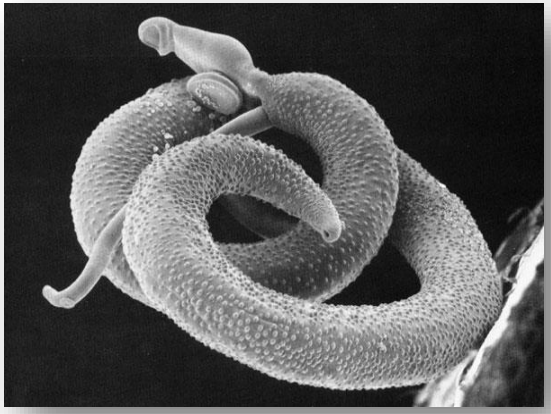
Schistosoma and hydatid cyst

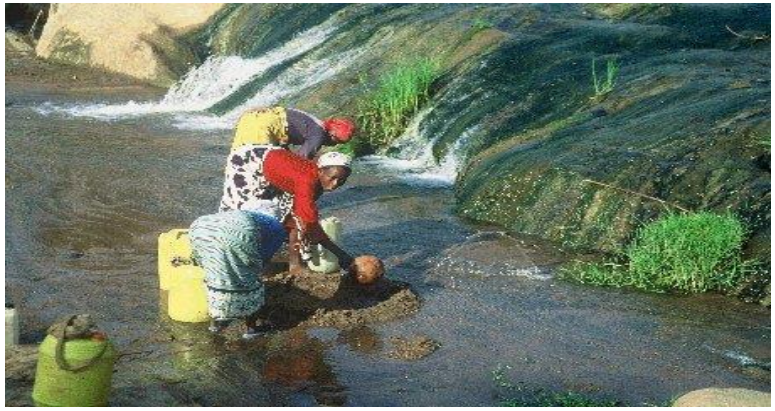
Presented by

Professor Dina Abou Rayia



Schistosoma species (Blood flukes)

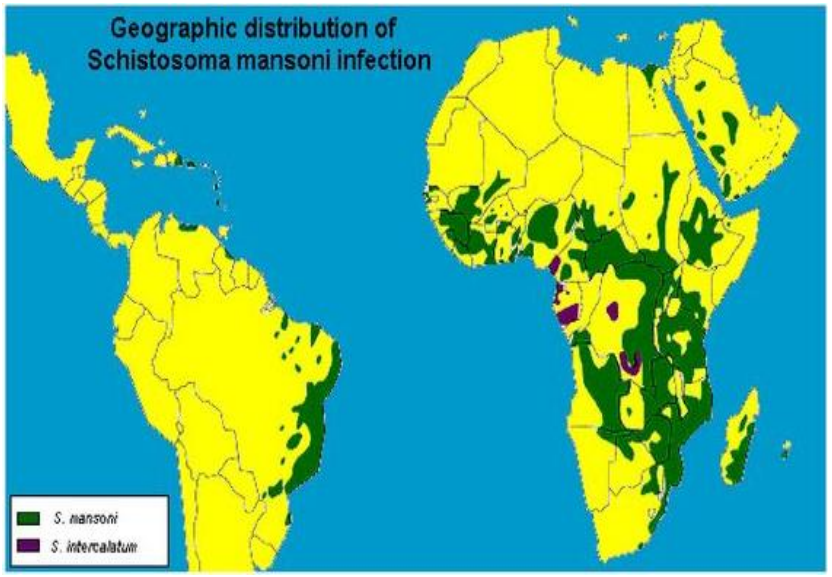




Classification of *Schistosoma species*

Phylum	• Platyhelminths
Class	• Trematoda
Order	• Digenea
Genus	• *Schistosoma*
Species	• *mansoni* and *japonicum*

Geographical distribution and habitat



S. Japonicum

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

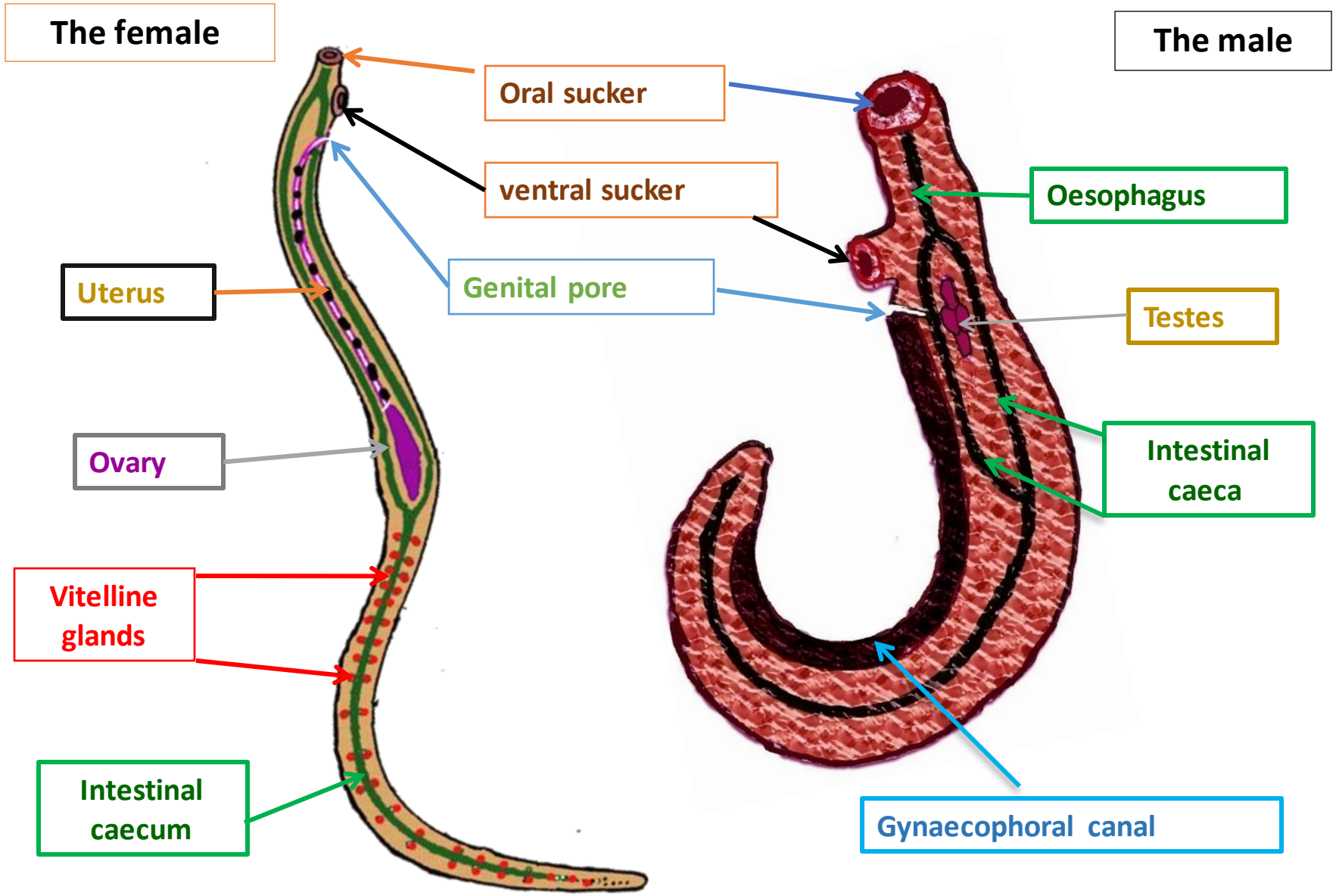
S. mansoni

Inferior mesenteric veins that supply the large intestine

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

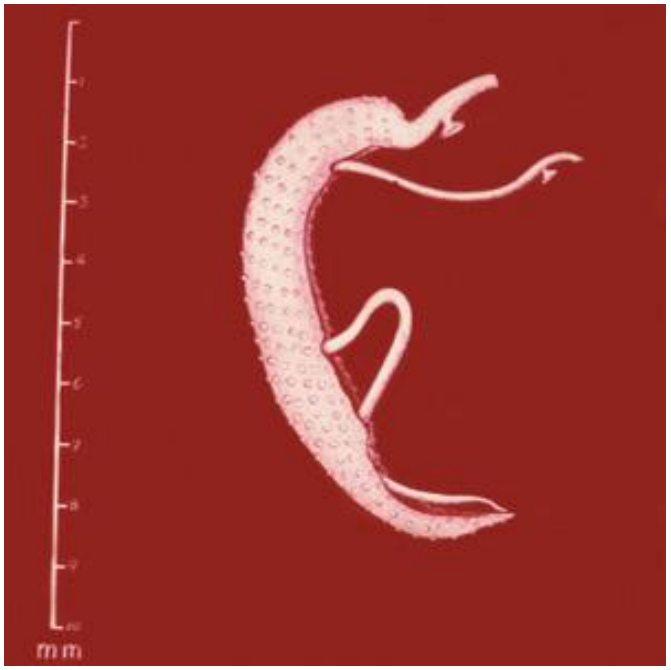
General characters

THE ADULTS



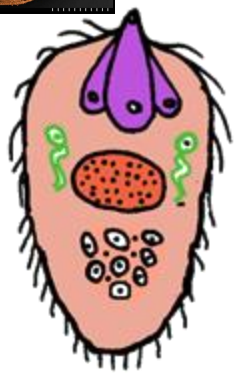
Schistosoma mansoni

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



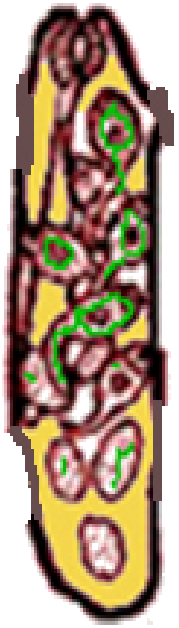
Male and female in copula

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



Miracidium

Mother sporocyst



Daughter sporocyst

Furcocercus cercaria

Miracidium, Sporocyst, Daughter sporocyst, Cercaria

Larval stages

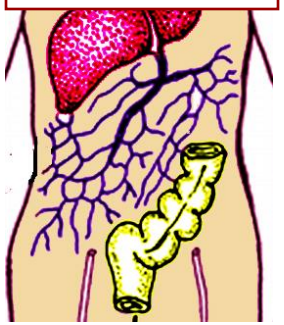
S. mansoni LIFE CYCLE

systemic circulation

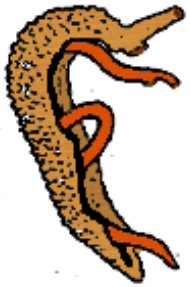
lungs

venous circulation

Maturation in the portal vein of the liver

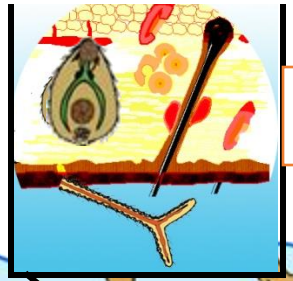


Adults inhabit inferior mesenteric veins



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

Cercariae emerge from the snail host

Miracidium penetrates snail

I. H.

Habitat: Inferior mesenteric veins

Host

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

Diagnostic stage: Egg

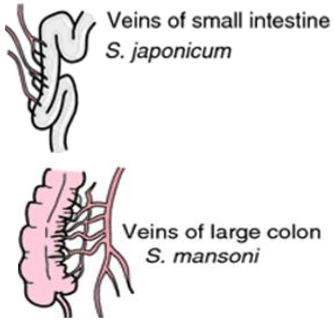
Infective stage: Furcocercus cercaria

Mode of infection: Swimming or drinking infected water

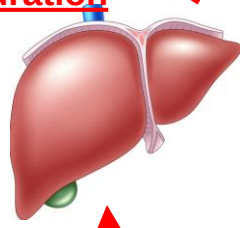
Intestinal schistosomiasis

Stages of disease

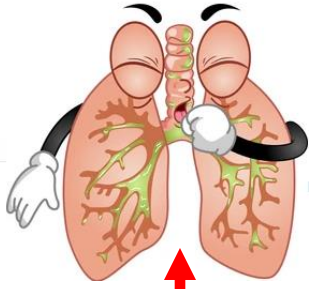
4- Stage of egg deposition and tissue reaction



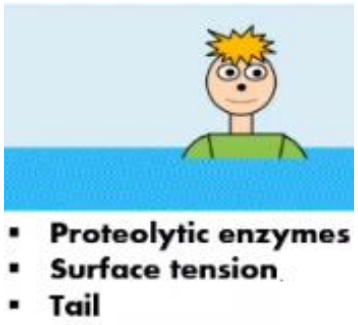
3- Stage of maturation



2- Stage of migration



1- Stage of invasion



Blood

Intestinal Schistosomiasis (Bilharziasis)

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.

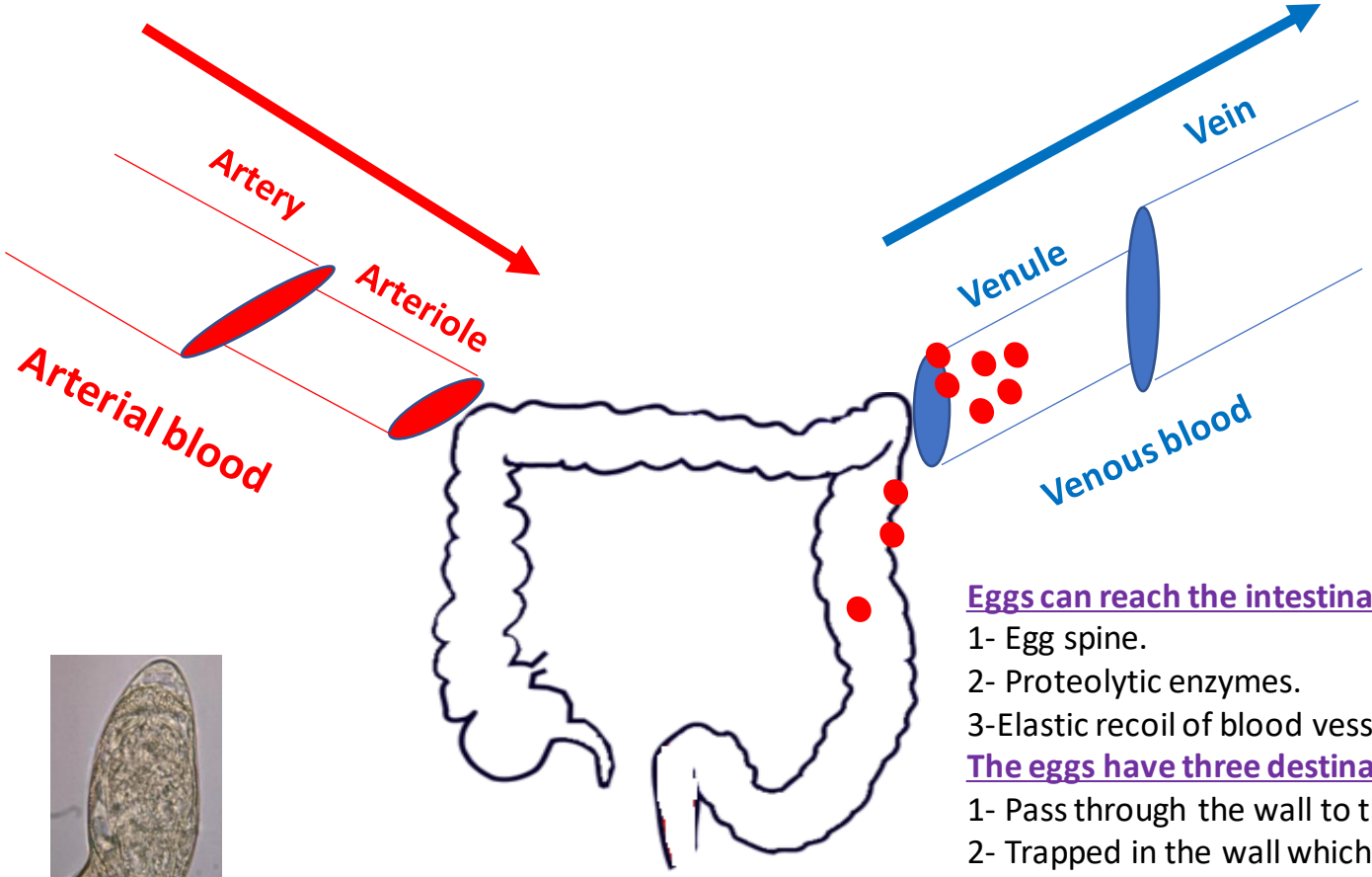
Intestinal Schistosomiasis (Bilharziasis)

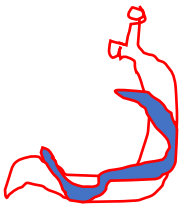
Stages of disease

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

- 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

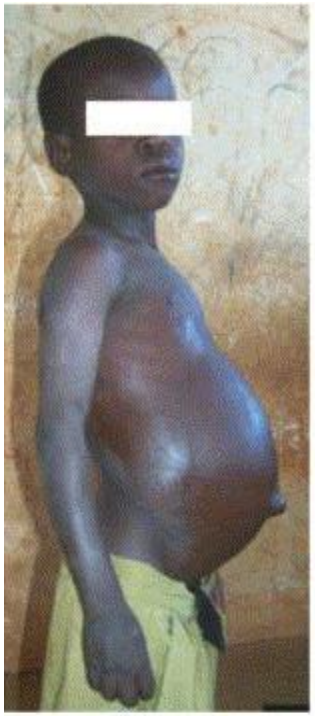
Dermatitis and glomerulonephritis

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 :

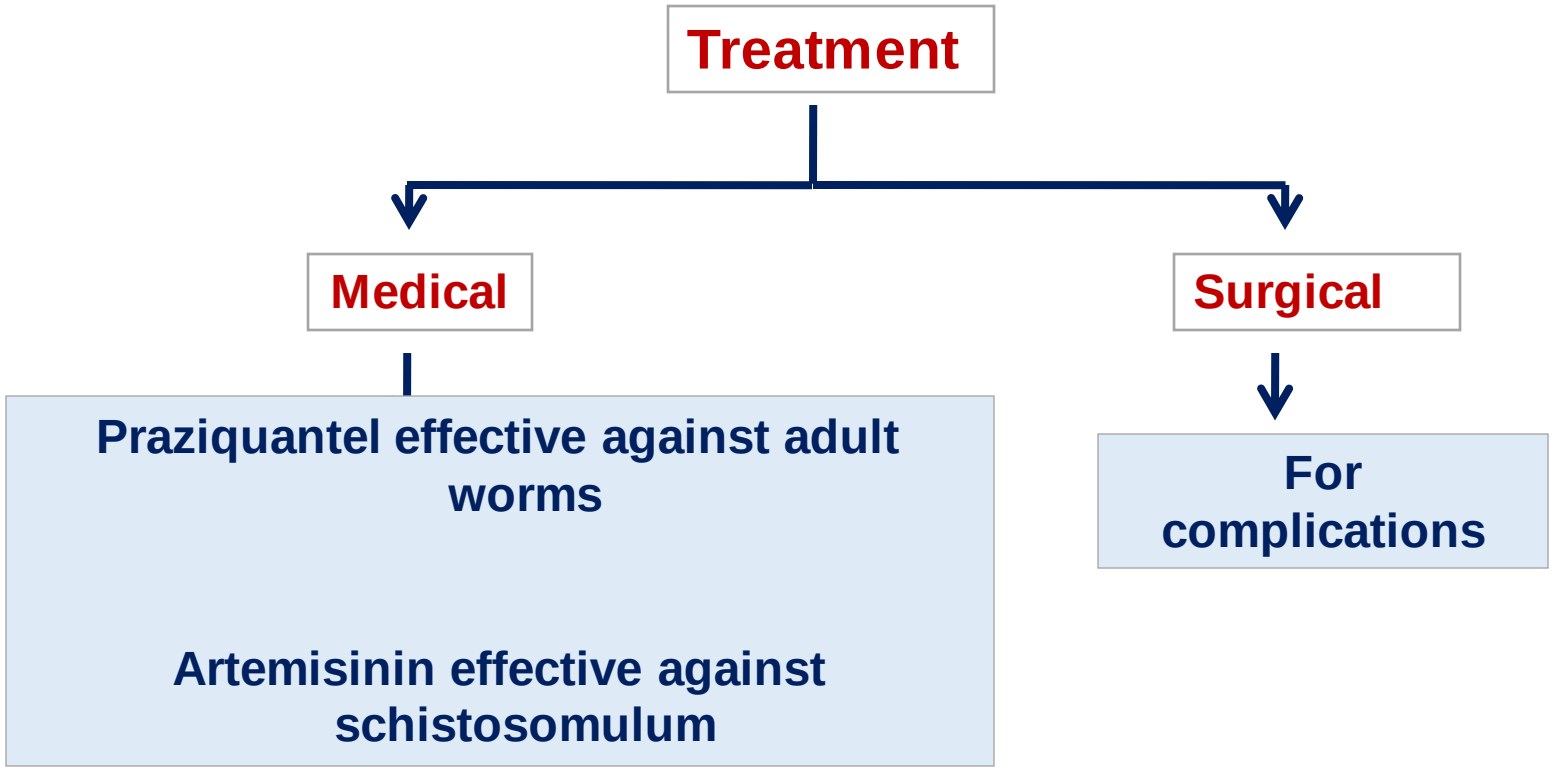
IHAT, CFT, and ELISA.

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


Treatment
Medical
Surgical
Praziquantel effective against adult worms
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

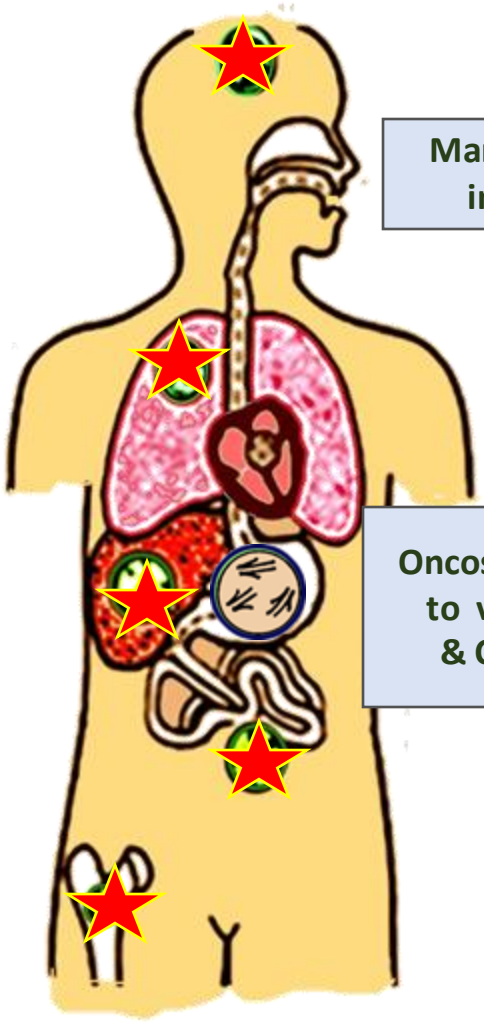
Onchocmelania snail of *S. japonicum*

	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*

Hydatid cyst disease

Life Cycle of *Echinococcus granulosus*



Man accidentally ingests eggs

Oncosphere migrates to various organs & Cyst develops

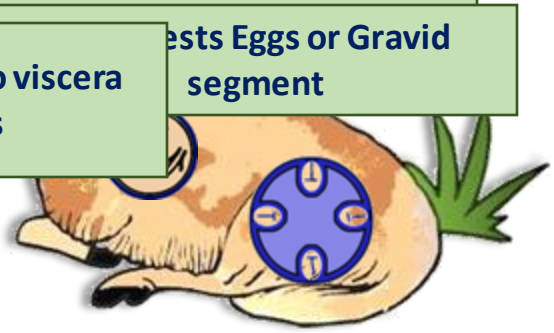
hatches in intestine

(I.H.) Herbivores & Man

Oncosphere hatches in intestine

Oncosphere migrates to viscera & Cyst develops

ests Eggs or Gravid segment



(D.H.) Carnivores (dogs)

Protoscolices release

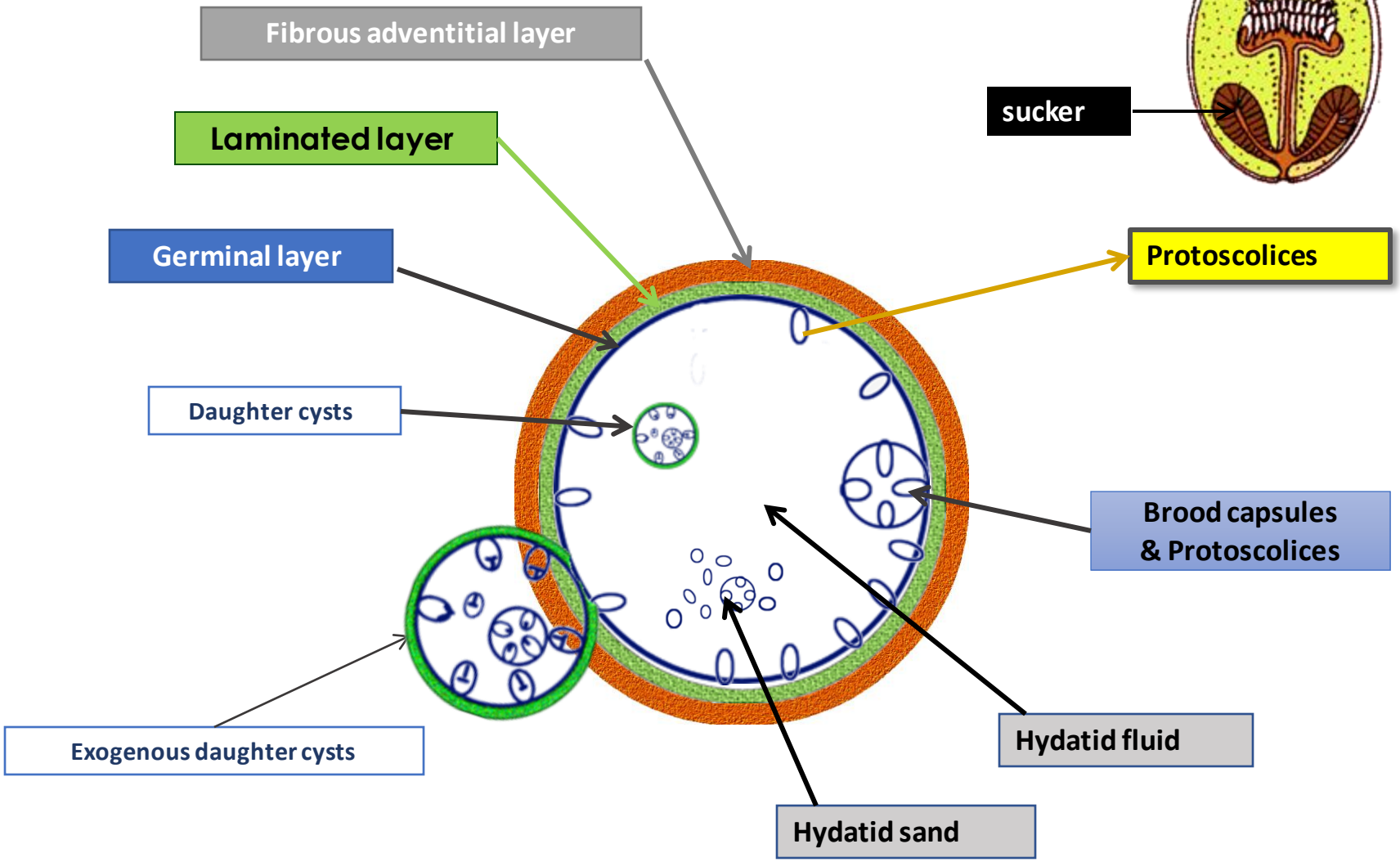
Adult maturation

Adult in small intestine

Eggs Pass with stool

Dog (D.H) ingests infected viscera

Unilocular hydatid cyst



Hydatid cyst

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:

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.

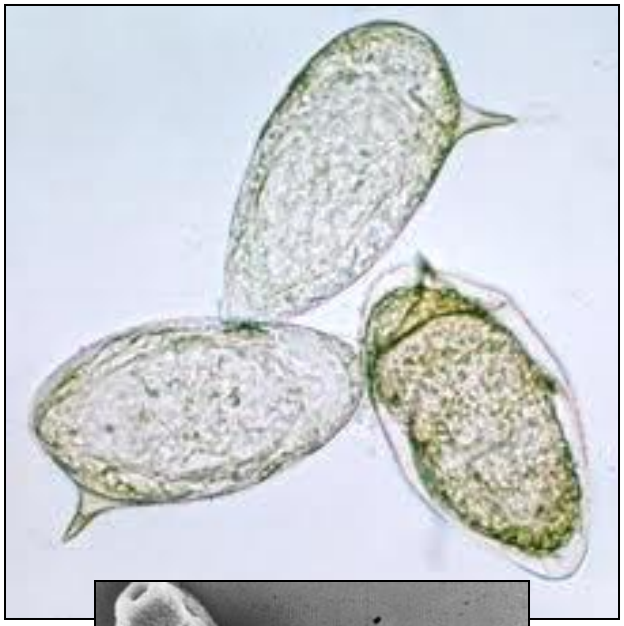
3) Percutaneous treatment (PAIR): In three steps:

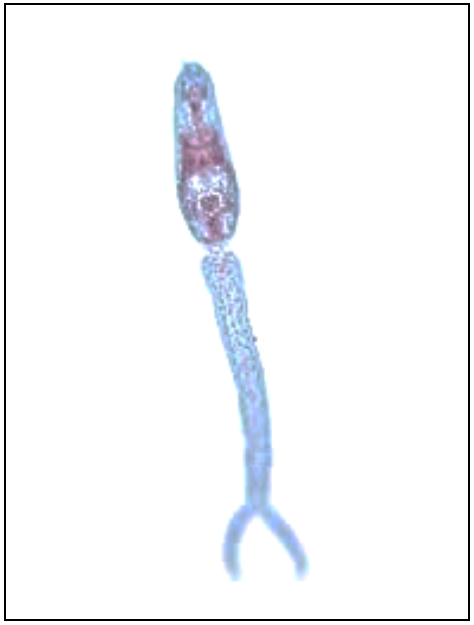
Puncture (P) and needle aspiration (A) of the cyst.

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





Identify ?????

Case study

- **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.**