

Schistosomes (Blood flukes)

The Schistosomes are blood trematodes belonging to the Phylum Platyhelmintha. They differ from other trematodes in that they have separate sexes (dioecious trematodes) and are located in blood vessels of the definitive host. The male is broader than females and its lateral borders are rolled ventrally into cylindrical shape producing along groove called the gynaecophoric canal, in which the female is held during copulation. The name schistosome (Greek shisto-split and soma body). Schistosomes were formerly called Bilharzia after Theodor Bilharz who first observed.



They require definitive (human) and intermediate hosts (snail) to complete their life cycle. Infective stage **cercariae**

There are five species of Schistosomes responsible for human disease; **S. mansoni**, **S. haematobium** and **S. japonicum** with **S. mekongi** and **S. intercalatum** being less common. Schistosomiasis (bilharziasis) is a water borne disease constituting an important public health.

Schistosoma haematobium (Vesical Blood fluke , Bilharzia haematobium)

It causes **urinary schistosomiasis**. It occurs in Africa, India and the Middle East. The intermediate host is the **Bulinus** snail and definitive host are human.

Morphology

Adults are found in the venous plexuses around the urinary bladder and the females

deposit their eggs in the walls of the bladder and finally making their way into the urine.

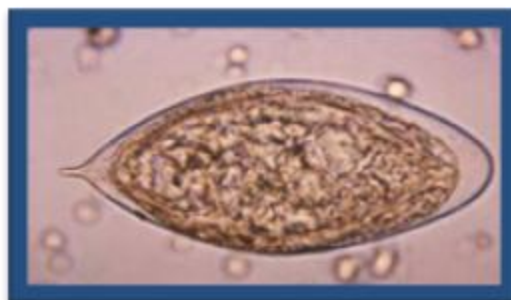
The male is 10-15mm long by 1 mm thick and **covered by a finely tuberculated cuticle**. It has two suckers, the oral sucker being small and ventral sucker large and prominent. Behind the ventral sucker and extending to caudal end is the gynaecophoric canal, in which the female is held. **4-5 large testes** which discharge through a genital pore posterior to the ventral sucker. **The two ceca are united in second half of the body.**

The female is delicately cylindrical, 20 mm in length and diameter of 0.25 mm. The genital organs composed of ovary which is located in **second half of the body** from which extend ovi duct open in ootype. long uterus contains **about 20-100 eggs**, and vitellaria (yolk glands) **which located in posterior half of body**. The adult worms are longer than those of *S. mansoni*



Schistosoma haematobium (male)

The eggs are ovoid, about 150 μm by 50 μm with brownish yellow transparent shell carrying a terminal spine at one pole.



The cercaria has elongated ovoid body and forked tail.



Clinical Disease

- ✓ Cercarial dermatitis (**Swimmer's Itch**) following skin penetration, results in a maculopapular rash and can last 36 hours or more.
- ✓ After mating, the eggs are laid in the venules of the bladder and many penetrate through the mucosa, enter the lumen of the bladder and are excreted in the urine accompanied by blood. Thus hematuria and proteinuria are characteristic (urinary schistosomiasis)
- ✓ In chronic disease, eggs become trapped in the bladder wall resulting in the formation of granulomata
- ✓ Chronic urinary schistosomiasis is associated with squamous cell bladder cancer

Laboratory Diagnosis

- The definitive diagnosis of urinary schistosomiasis is made by finding the characteristic ova of *S. haematobium* in urine
- Terminal urine should be collected as the terminal drops contain a

large proportion of the eggs. The urine can either be centrifuged and the deposit examined microscopically for ova.

- Eggs can sometimes be found in seminal fluid in males.,
- A bladder biopsy may be used in some cases

Schistosoma mansoni

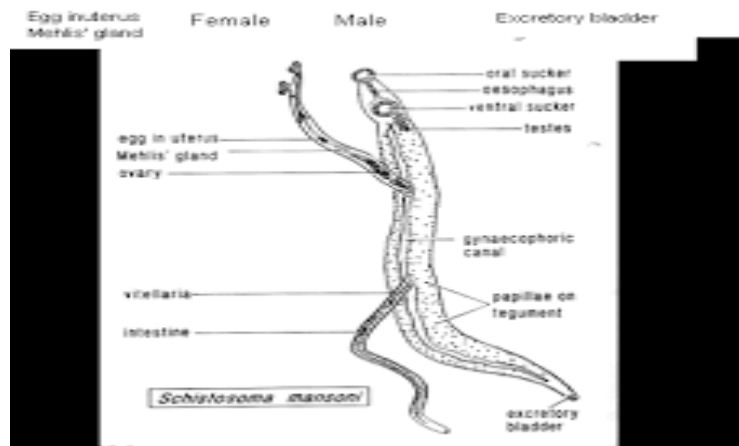
The adults are smaller than those of the other species. *S. mansoni* occurs in West and Central Africa, Egypt, Malagasy, the Arabian Peninsula, Brazil, Surinam, Venezuela and the West Indies The intermediate host is an aquatic snail of the genus *Biomphalaria*. Man is the most common definitive host.

Morphology.

The adult worms live in smaller branches of the inferior mesenteric vein in the lower colon.

Male: The male ranges in size from 1-1.4 cm in length and the body is covered by coarse tubercles, **two ceca united in the first half** of the body so it has long united cecum. Oral and ventral suckers are present, with the ventral one being larger serving to hold the worms in place, preventing them being carried away by the circulatory current The male surrounding female with his gynaecophoric canal. **It has 6-9 testes.**

Female:The female is 1.5-2.0 cm in length. The genital organs ovary is situated **in the first half of body** from which extend oviduct open in ootype . uterus short contain **a few eggs 3-5 eggs** .vitellaria (yolk glands) **extend between ootype to posterior end** The female parasite is darker, and it looks gray. The darker color is due to the presence of a pigment ([hemozoin](#)) in its digestive tube. This pigment is derived from the digestion of blood



The ova of *S. mansoni* are 114-175µm long by 45-68µm wide. They are light yellowish brown, elongate and possess a lateral spine



Clinical Disease

- Cercarial dermatitis (swimmers itch)
- Katayama fever is associated with heavy primary infection and egg production. Clinical features include high fever, hepatosplenomegaly, lymphadenopathy, eosinophilia and dysentery. This syndrome occurs a few weeks after primary infection

Laboratory Diagnosis

Microscopy

Laboratory confirmation of *S. mansoni* infection can be made by finding the eggs in the feces after an iodine stained, formol-ether concentration method. When eggs cannot be found in the feces, a rectal biopsy can be examined.

Serology

Serological tests are of value in the diagnosis of schistosomiasis when eggs cannot be found. An enzyme linked immunosorbent assay (ELISA) using soluble egg antigen

Schistosoma japonicum

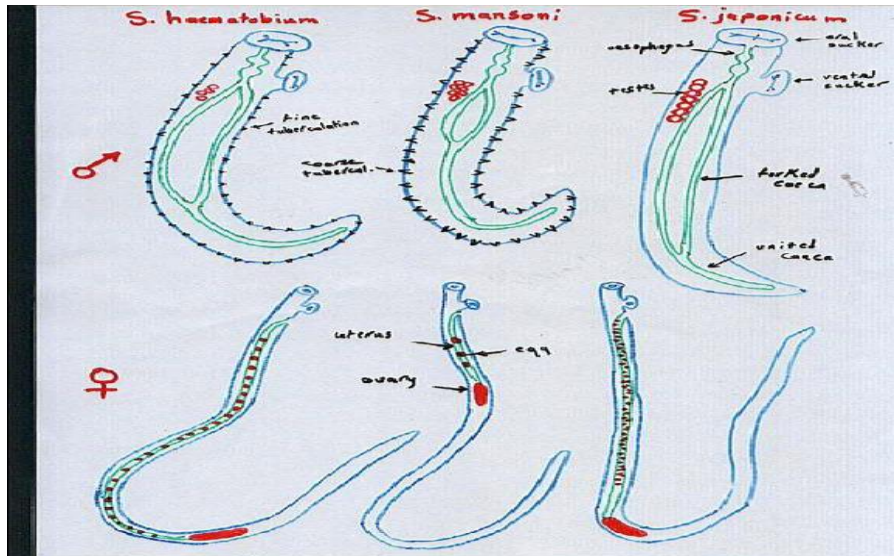
Schistosoma japonicum is found in China, Japan, the Philippines, and Indonesia. It causes disease of the bowel with the eggs being passed out in the feces. It differs from *S. mansoni* and *S. haematobium* in that it is a zoonosis in which a large number of mammals serve as reservoir hosts; cats, dogs and cattle playing major roles in the transmission of the disease. The life cycle is not very different from that of *S. mansoni*, the intermediate hosts are from the subspecies *Oncomelania hupensis*. Sexual maturity is reached in about four weeks and eggs may be seen in the feces as quickly as five weeks

Morphology.

The worms live coupled together in the superior, mesenteric veins and deposit 1500–3500 eggs per day in the vessels of the intestinal wall.

The males of this species are slightly larger than the other Schistosomes and they measure ~ 1.2 cm by 0.5 mm., has two suckers oral and ventral suckers, two ceca united in posterior part of the body to form short united ceca, The adult worms are longer and narrower than the *S. mansoni* worms.. There are 6-7 testes located near ventral sucker, the tegument is nontuberculated (smooth)

The females measure 2 cm by 0.4 mm. The location of ovary in the middle of the body and the number of eggs in uterus 50-300. The ova are about 55-85µm by 40-60µm, oval with a minute lateral spine or knob



Morphology of schistosoma spp.



Eggs of *S. japonicum*

Clinical Disease

- The eggs which are sequesters in the intestine mucosa or submucosa initiate granulomatous reactions, resulting in the formation of pseudotubercles.
- Due to the number of eggs released by the females the infection is more severe than one with *S. mansoni*.

Laboratory Diagnosis

Laboratory confirmation of *S. japonicum* infection can be made by finding the eggs in the feces after an iodine stained, formol-ether

concentration method. When eggs cannot be found in the feces, a rectal biopsy can be examined