

# **Schistosomes**

## **( Blood flukes )**

### **Introduction**

The **Schistosomes** are blood trematodes belonging to the Phylum *Platyhelmintha*.

They differ from other trematodes in that they have separate sexes. The male worms resemble a rolled leaf where they bear the longer and more slender female in a ventral canal (the gynaecophoric canal). They require definitive and intermediate hosts to complete their life cycle. There are many species of *Schistosomes* responsible for human disease:

*S. mansoni*,

*S. haematobium*

*S. japonicum*

*S. nasalis*

### *Schistosoma mansoni*

### **Introduction**

*S. mansoni* occurs in all the world.

The intermediate host is snail of the genus *Biomphalaria*. Man is the most common definitive host, occasionally baboons and rats are infected.

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

### **Morphology**

The adult males measure up to 15 mm in length and females up to 10 mm. The male surrounding the female with his gynaecophoric canal. The male is actually flat but the sides roll up forming the groove. The cuticle of the male is covered with minute papillae. The female only possesses these at the anterior and posterior end as the middle section being covered by the male body. 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.

### *Schistosoma japonicum*

### **Introduction**

*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 faeces.

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 intermediate hosts** are from the subspecies *Oncomelania hupensis*
- **They worms live in mesenteric veins** and deposit 1500 – 3500 eggs per day in the vessels of the intestinal wall. The eggs infiltrate through the tissues and passed in the faeces.

### **Morphology**

The adult worms are longer and narrower than the *S. mansoni* worms. The ova are about 55 - 85µm by 40 - 60µm, oval with a minute lateral spine or knob.

### *Schistosoma..haematobium*

#### **Introduction**

*Schistosoma haematobium* is different from the other two species previously mentioned in that it causes urinary schistosomiasis. It occurs in Africa, India and the Middle East. The intermediate host is the *Bulinus snail*.

Just like *S. mansoni*, its distribution runs parallel to the irrigation projects and in areas which favour the intermediate hosts. They are exclusively parasites of man.

The mature worms live in copula mainly in the inferior mesenteric veins and the females deposit their eggs in the walls of the bladder and finally making their way into the urine. The life cycle is very similar to that of *S. mansoni*, with sexual maturity being reached within 4 – 5 weeks, but eggs may not appear in the urine until 10 – 12 weeks or even later.

### **Morphology**

The adult worms are longer than those of *S. mansoni*. The ova are relatively large, measuring 110µm - 170µm in length and 40µm - 70µm in width. They have an elongated ellipsoid shape with a prominent terminal spine.

#### **Life Cycle**

- Adult worms of *S. mansoni* live in the plexus of veins draining the rectum and colon, and in branches of the portal vein in the liver.
- Adults of *S. japonicum* live in the anterior mesenteric blood vessels and in the portal vein in the liver.
- Adults of *S. haematobium* live in the vesical plexus draining the bladder. Once the eggs are laid by the adult female worms the majority of them first pass through the veins of the blood vessel in which the worm is living, and

then into the lumen of the intestine and are passed in the faeces (*S. mansoni* and *S. japonicum*). Or into the lumen of the bladder, and are then passed in the urine (*S. haematobium*).

- Those eggs that reach fresh water hatch, releasing miracidium which, to develop further must infect a snail of the correct species within 24 hours. The eggs of each species are markedly different but each produce virtually identical miracidium then mature stage of sporocysts in snail .

Asexual multiplication takes place in the snail, and results in the release of cercariae (minute in size with forked tails) into the water about 3 – 6 weeks later. Cercariae actively swim around and when they have located, or come into contact with, a definitive host they actively penetrate the skin. They can stay active looking for a host for 24 – 48 hours after which if they don't find a host they will die. The cercariae migrates to the liver and develops into adult male or female worms (flukes), then migrate to their region of the venous blood system (species specific sites).

- The females leave the males and moves to smaller venules closer to the lumen of the intestine or bladder to lay her eggs (about 6 weeks after infection). The majority of adult worms live from 2 – 4 years .

## **EPIDEMIOLOGY**

The epidemiology is very similar to that of *F. gigantica* and *Paramphistomum spp.*, *Schistosoma spp.* being totally dependent upon water as a medium for infection of both the intermediate and final host. The fact that percutaneous infection may occur encourages infection where livestock are obliged to wade in water. Care has to be exercised in treating clinical cases of schistosomiasis since the dislodgement of the damaged flukes may result in emboli being formed and subsequent occlusion of major mesenteric and portal blood vessels with fatal consequences. The drugs still widely used are the antimonial preparations, tartar emetic, antimosan and stibophen, although these are being superseded by niridazole and trichlorfon, all of which have to be given over a period of days at high dosage rates. Fatalities associated with the use of these drugs Granuloma formation around *Schistosoma* eggs in the liver.

### **Clinical Disease**

- The clinical disease is related to the stage of infection, previous host exposure, worm burden and host response. Cercarial dermatitis (swimmers itch) follows skin penetration and results in a maculopapular rash which may last 36 hours or more.

- The mature flukes of *S. haematobium* migrate to the veins surrounding the bladder. 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 haematuria and proteinuria are characteristic, though not invariable features of urinary schistosomiasis.

- As with all *Schistosoma* species, it is the eggs and not the adult worms which are responsible for the pathology associated with *S. haematobium*. In chronic disease, eggs become trapped in the bladder wall resulting in the formation of granulomata. Following prolonged infection, the ureters may become obstructed and the bladder becomes thickened resulting in abnormal bladder function, urinary infection and kidney damage. Chronic urinary schistosomiasis is associated with squamous cell bladder cancer. Heavy infections in males may involve the penis resulting in scrotal lymphatics being blocked by the eggs.

## **Laboratory..Diagnosis**

### **- Microscopy**

Laboratory confirmation of *S. mansoni* infection can be made by finding the eggs in the feces or urin. When eggs cannot be found 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.

## **TREATMENT :**

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