جامعة الانبار

كلية: الصيدلة

قسم: العلوم المختبرية السريرية

اسم المادة باللغة العربية: الاحياء المجهرية

اسم المدة باللغة الإنكليزية: **microbiology**

المرحلة: الثانية

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عنوان المحاضرة باللغة العربية: المنشقات

عنوان المحاضرة باللغة الإنكليزية: **Schistosomes (Blood flukes)**

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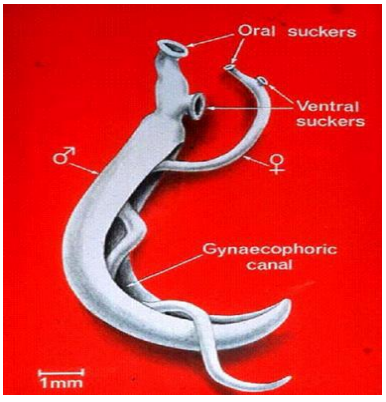
# *Schistosomes (Blood flukes)*

## Schistosomiasis

• Schistosomiasis (sometimes called bilharziasis) caused by blood trematodes belonging to the Phylum Platyhelminthes called *Schistosoma*.

• 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**



## Schistosoma spp.

There are three medically important species:

- **Schistosoma mansoni**, lives in the mesenteric venules of large intestine, and cause intestinal bilharziasis.
- **Schistosoma japonicum**, lives in the mesenteric venules of small intestine.
- **Schistosoma haematobium**, lives in the venous plexus of the urinary bladder and cause schistosomal hematuria or urinary bilhariziasis.

S. mansoni and S. japonicum are produce their eggs in stool, but S. haematobium produce eggs in urine.

• Schistosoma spp. have 4 stages:
**(Eggs, miracidia, cercaria, and adult stage)**

✓ Intermediate host: **snail.**

✓ Definitive host: **human**.

✓ Infective stage: **Cercaria**

✓ Diagnostic stage: **eggs**

Eggs are passed through urine or feces to fresh water, where larvae stage can infect a new host by penetrating the skin.

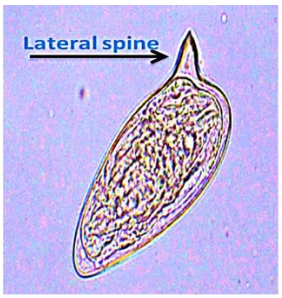
Oncomelania
S. japonicum

Biomphalaria
S. mansoni

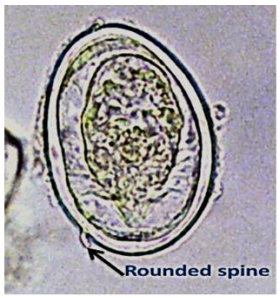
Bulinus
S. haematobium

## Schistosoma Eggs:

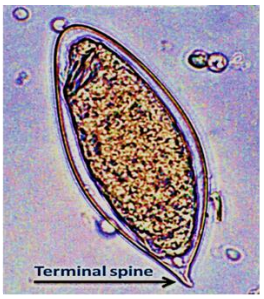
Three species can be recognized by the look of their eggs under a microscope based on the presence of the characteristic ova in feces or urine:




***S. mansoni*** eggs have prominent lateral spine.

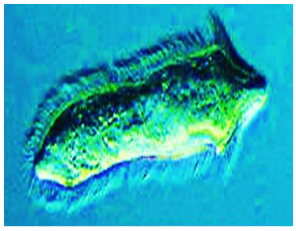



***S. japonicum*** eggs have a very small round lateral spine.



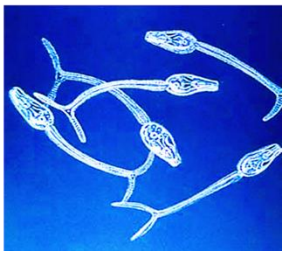

***S. haematobium*** eggs have a terminal spine.

## Schistosoma Miracidium



- Free swimming ciliated embryo liberated from the egg and infect snails.

## Schistosoma Cercaria (Infective stage)

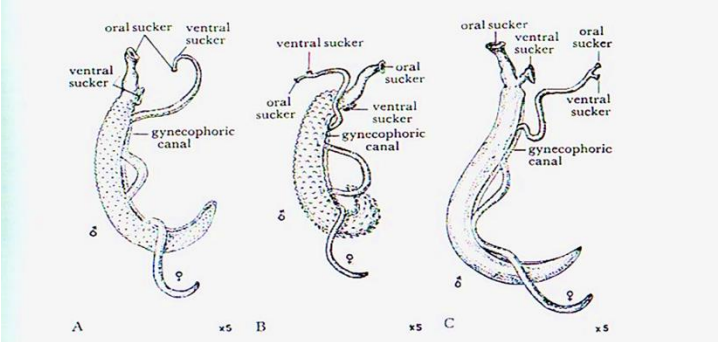


- Emerges from daughter sporocysts and escapes from the snail
- The cercaria has elongated ovoid body and forked tail
- Infects man by skin penetration

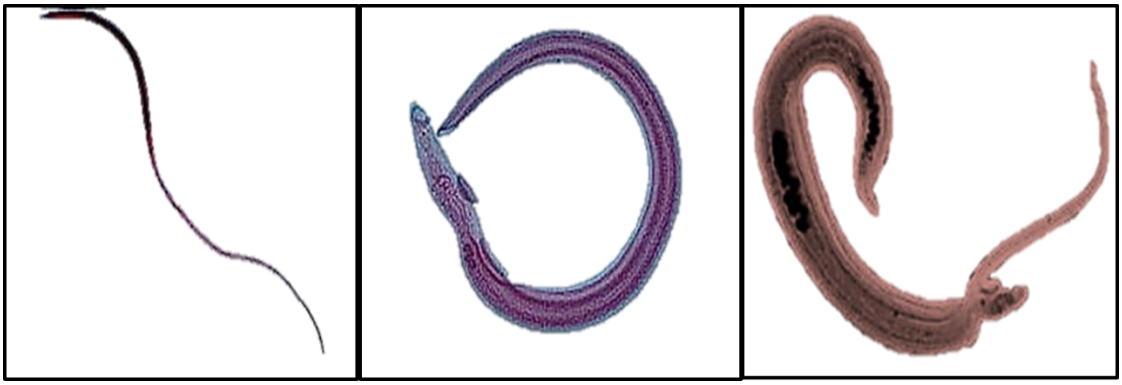
## Morphology

### Schistosoma Adult stage:

- Adult male shorter and thicker than adult female. It has two suckers, the oral sucker and ventral sucker.
- The gynaecophoric canal is located behind the ventral sucker and extends to the caudal end, where the female is held.
- The female is cylindrical and longer than male.
- The ovary from which extend oviduct open in ootype.
- Vitellaria (yolk glands) extend between ootype to posterior end.

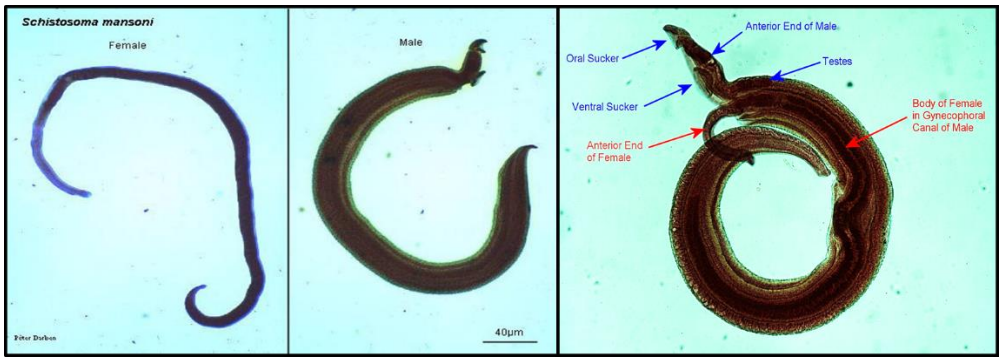



A. *Schistosoma haematobium*, B. *Schistosoma mansoni*, C. *Schistosoma japonicum*,



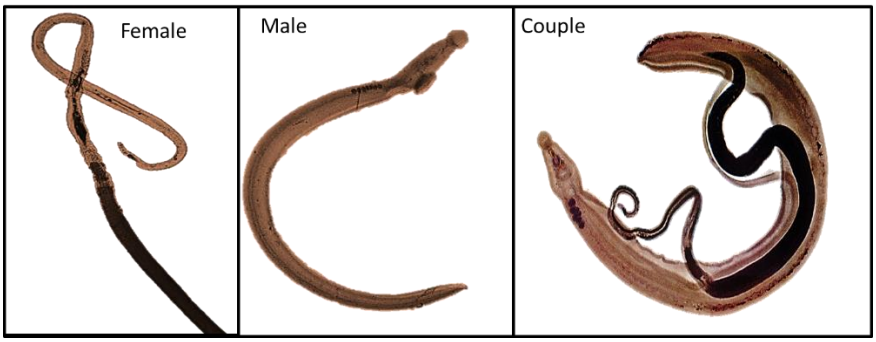
## Morphology: *S. haematobium*

- The male: it has 4-5 large testes. It covered by a finely tuberculate cuticle.
- The female: The ovary is situated in the second half of body. The uterus long contains about 20-100 eggs 3-5 eggs.



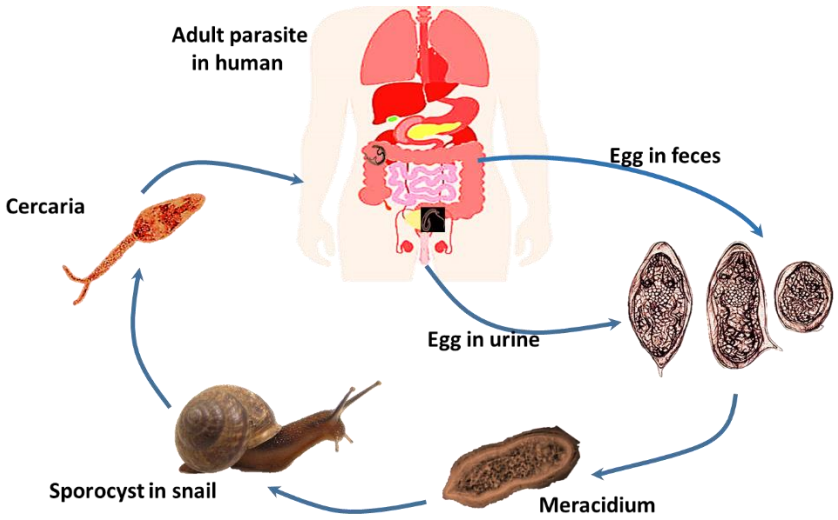

## Morphology: *S. mansoni*

- The male: it has 6-9 testes. The body is covered by thick tubercles.
- The female: The ovary is situated in the first half of body. The uterus short contain a few eggs 3-5 eggs. The female parasite is dark color due to the presence of a pigment (hemozoin) in its digestive tube. This pigment is derived from the digestion of blood.




**Morphology: *S japonicum***

- The male: it has 6-7 testes. The body is nontuberculate (smooth).
- The female: the ovary situated in the middle of the body. The uterus contains 50-300 eggs.




***Schistosoma life cycle***

## Clinical Picture

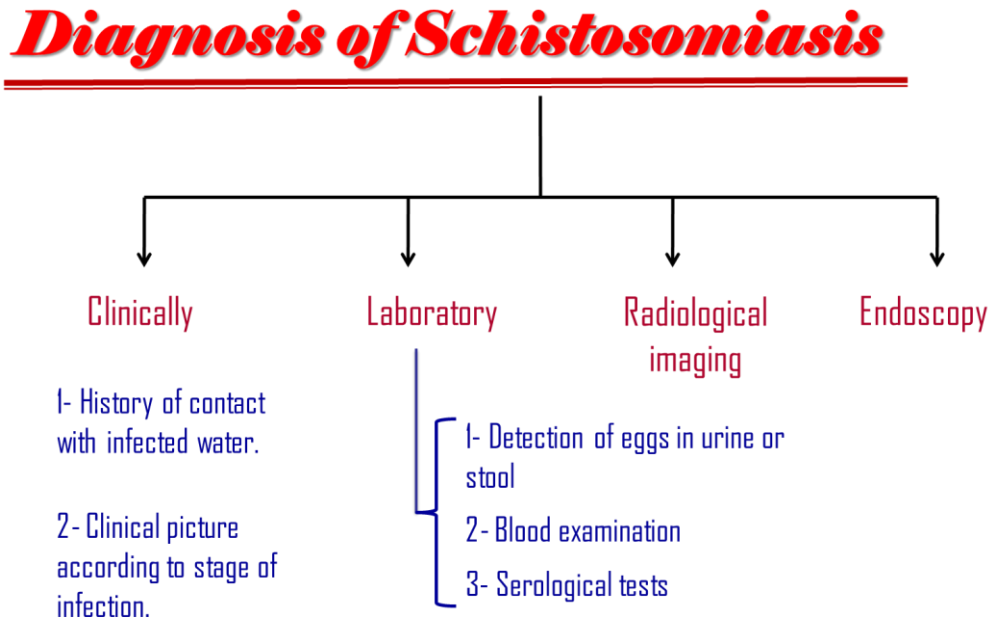
- Low grade fever. Fatigue, weight loss and anemia.
- Cercarial dermatitis (Swimmer's Itch) following skin penetration, results in a maculopapular rash.

## UROGENITAL SCHISTOSOMIASIS

1. Hematuria (terminal)
2. dysuria
3. Frequent need to urinate (polyuria)
4. In females; genital lesions, vaginal bleeding, pain during sexual intercourse and nodules on the vulva, irregular menstruation.

## INTESTINAL SCHISTOSOMIASIS

1. Abdominal pain
2. Bloody diarrhea
3. Hematemesis
4. Liver enlargement
5. ***S. japonicum*** cause oriental schistosomiasis or Katayama fever is associated with heavy primary infection and egg production. Clinical features include high fever, hepatosplenomegaly, lymphadenopathy, eosinohilia and dysentery. Due to the number of eggs released by the females the infection is more severe than one with *S. mansoni.*



## Laboratory Diagnosis:

- Detection of eggs in urine or stool
  - The most practical way for diagnosis is microscopic detection of eggs in feces or urine. When *S. mansoni* or *S. japonicum* infection is suspected, a stool examination should be done, and if *S. haematobium* infection is suspected, a urine examination should be done.
  - Repeated exams and/or concentration methods will help detect eggs that are passed intermittently or in low amounts. When stool and urine investigations are negative. A tissue biopsy (rectal biopsy for all species and bladder biopsy for *S. haematobium*) may reveal eggs.

- Blood examination
  - Schistosomiasis associated with Anemia, Eosinophilia and Leukocytosis.
  - Blood urea and creatinine level.

- Serological tests
  - Detection of anti-Schistosoma antibodies or antigen in patient's serum
  - Sandwich ELISA is used to detect circulating schistosoma antigen in serum as well as in urine.

### Differentiating Features of Schistosomes

| Feature | *S. haematobium* | *S. mansoni* | *S. japonicum* |
|---|---|---|---|
| Testes (male) | 4-5 large testes | 6-9 testes | 6-7 testes |
| Tuberculate cuticle | Fine | Thick | Smooth |
| Ovary (Female) | Located in second half of the body | Located in the first half of body | Located in the middle of the body |
| Number of ova | 20-100 ova | 3-5 ova | 50-300 ova |
| Egg | Terminal spine | Lateral spine | Lateral knob |
| Intermediate Host | *Bulimus* | *Biomphalaria* | *Oncomelania* |