

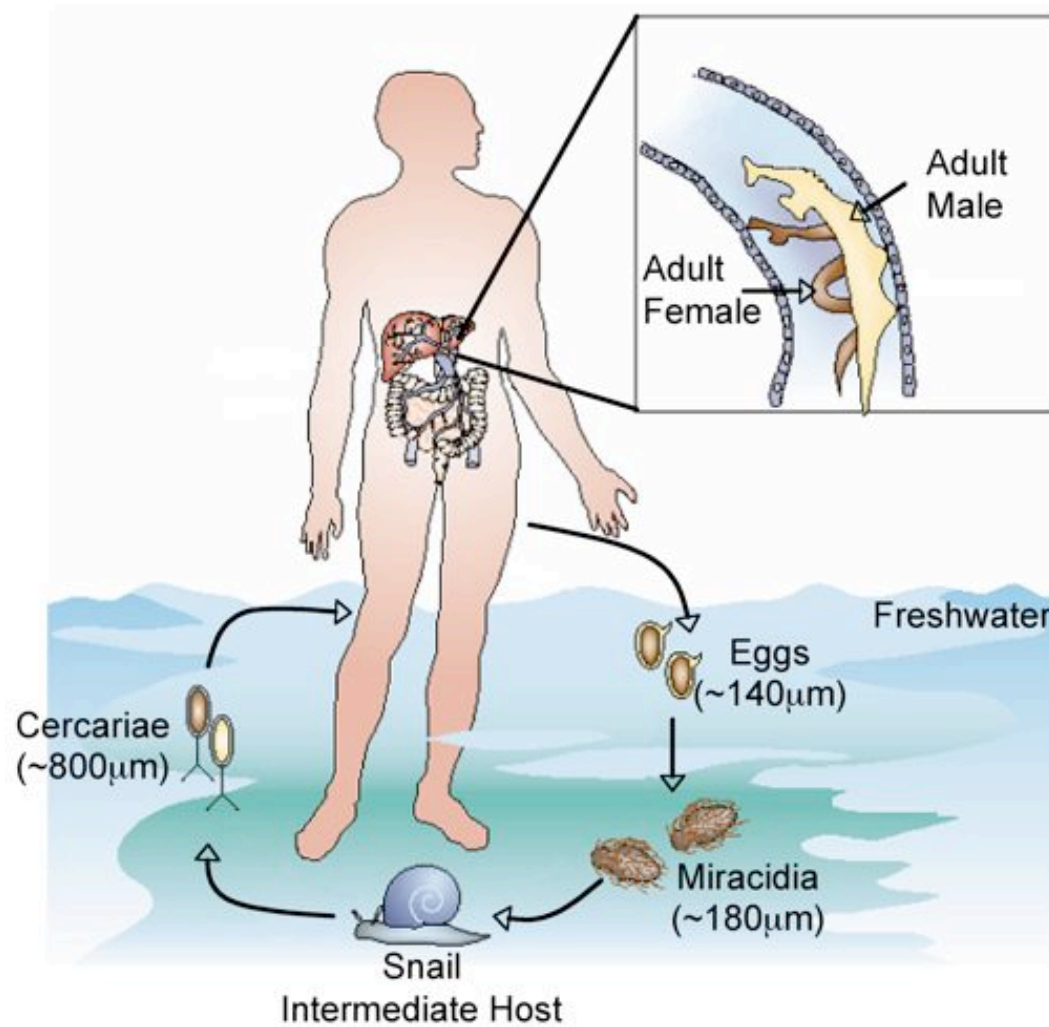
# *Schistosoma mansoni*

- Parasitic flatworm (Trematode)
- Life cycle includes two hosts: mammals and snails.
- ~80 million people are infected world-wide.
- Considered a “neglected tropical disease”.

# *Schistosoma mansoni*

- Interesting Facts:
  - One of few parasitic flatworms that exist as two sexes in the adult stage. Most parasitic flatworms are hermaphrodites.
  - Females require the presence of a male to fully mature.
  - The eggs released by the parasite are what cause disease, not the worm.

# The life cycle of *Schistosoma mansoni*



Adapted from: Pearce and MacDonald, Nat Rev Immunol. 2002 Jul;2(7):499-511.

*Schistosoma mansoni* egg  
(~140 by 60 $\mu$ m)

*S. mansoni*  
distinctive lateral  
spine



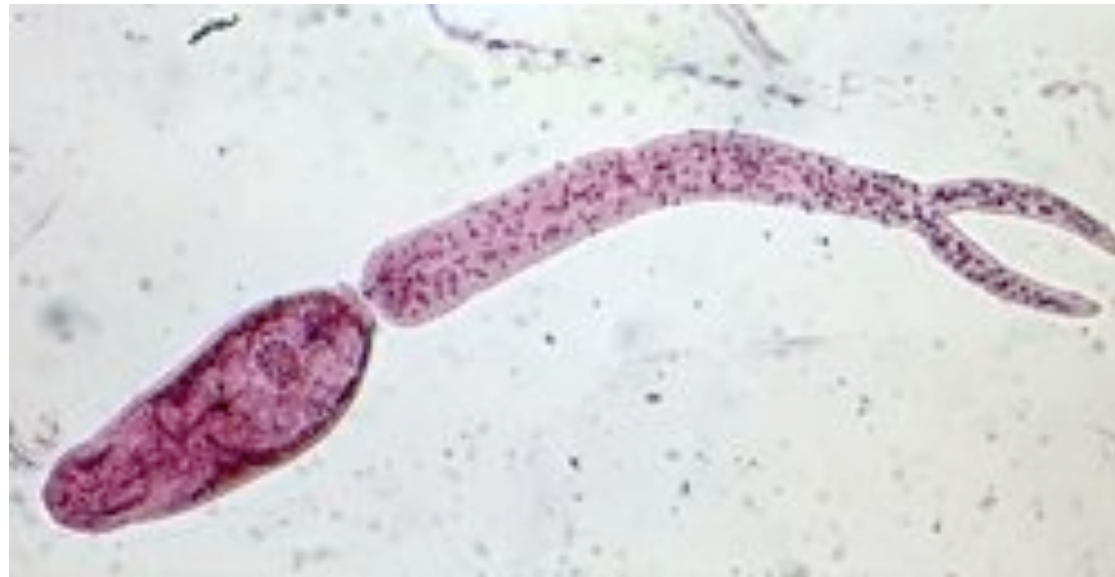
In *S. mansoni* infection, eggs pass out of the body of infected people with feces. Notice the miracidium inside the shell waiting to hatch. Hatching is triggered by exposure to fresh water.

*Schistosoma mansoni* miracidium  
(~180 $\mu$ m)



The miracidium is short-lived and non-feeding and must infect a snail within a day of emerging from the egg. Miracidia swim quickly through water using the many cilia on their surface.

*Schistosoma mansoni* cercaria  
(~800 $\mu$ m)



Body Tail

The *S. mansoni* cercaria is the stage of the parasite that is infectious to humans. Cercariae are released from infected snails when the snails are exposed to light. They swim tail-first through a beating motion and infect us by burrowing through our skin.

*Schistosoma mansoni* adult worm pair  
(~1cm)

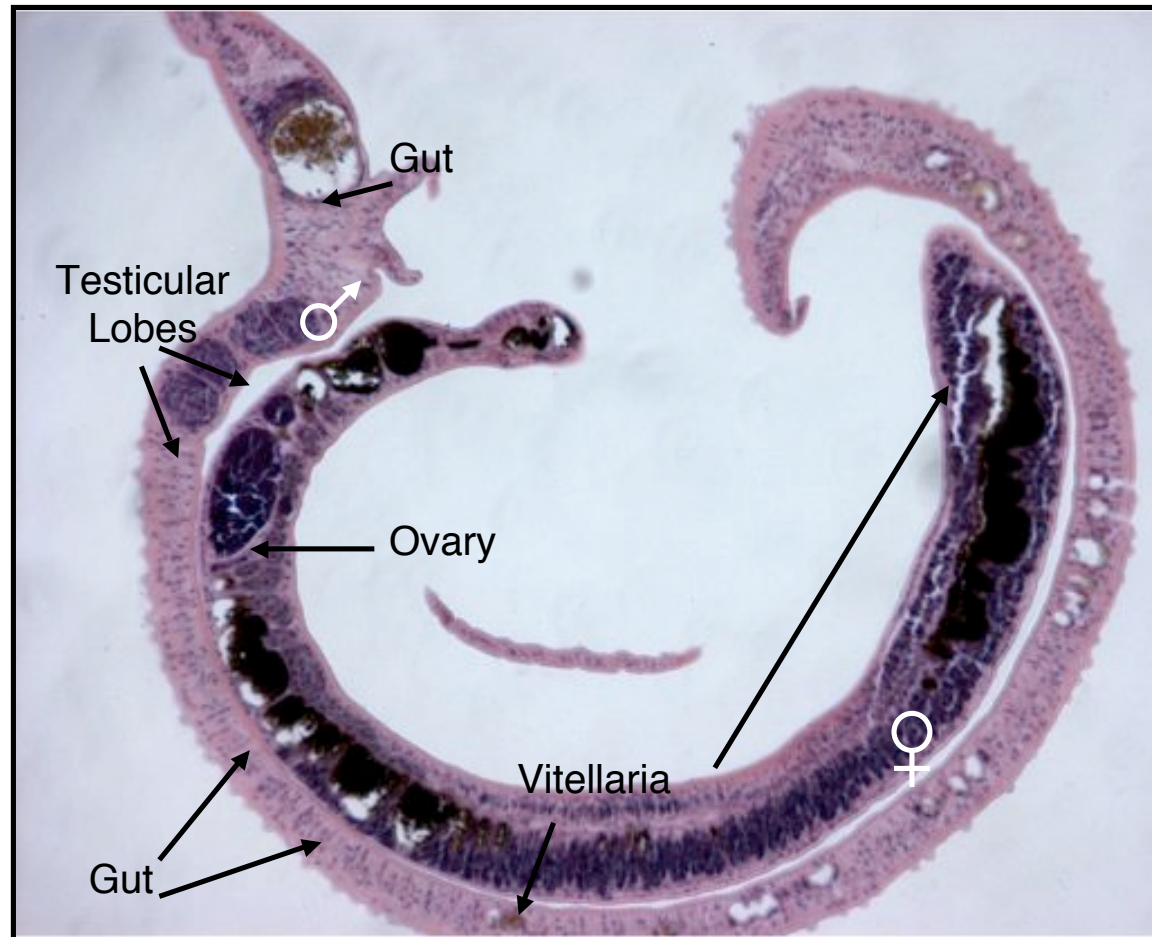


← Male

← Female

Approximately 5 weeks after infection with cercariae, adult worms are found in the blood vessels around the intestines (mesenteric veins). Male and female worms will pair here and the male worm will surround the female worm. Female worms can produce 300 eggs every day, half of which will pass through the intestine and leave the body in feces in order to continue the life cycle, while the other half will be swept up by the blood stream and become trapped in the liver. It is our immune response to these liver-trapped eggs that cause disease.

# *Schistosoma mansoni* morphology



Section of a male and female pair of *S. mansoni*. The black pigment in the gut is the result of the worm digesting red blood cells. The dark purple staining in the female (vitellaria) is the reproductive powerhouse of the worm. This tissue is responsible for making the material needed to make 300 eggs per day.



# Geographical distribution of schistosomiasis



<http://wwwnc.cdc.gov/travel/images/399.ashx>

# Symptoms

- Within days of exposure
  - Rash and itchy skin at the site of infection.
- 1-2 months
  - Flu-like symptoms: Fever, chills, cough, and muscle aches.
- Chronic
  - Enlarged liver and spleen (hepatosplenomegaly), liver tenderness
  - Diarrhea, blood in stool, anemia.
  - Liver failure.
- **PATHOLOGY IS DUE TO IMMUNE RESPONSE TO THE EGG, NOT THE WORM.**

## Healthy Mouse Liver

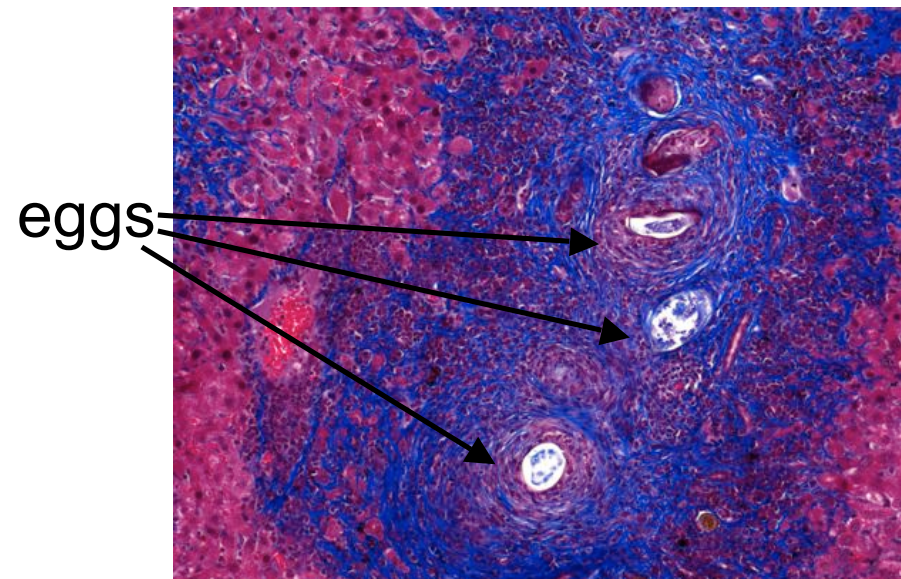


Blood vessel

10X magnification  
Pink = liver cells  
Blue = collagen

Note the massive deposition of collagen around the eggs. This is meant to surround the foreign egg and wall it off from the liver tissue, but instead, leads to liver fibrosis and disease.

## *S. mansoni* Infected Mouse Liver



# Diagnosis

- Identification of eggs in fecal samples.
- Tests must be performed 6-8 weeks AFTER exposure.

# Treatment

- No vaccine is available.
- Only one effective drug (Praziquantel)
  - Only kills adult worms, does not kill the developing stages of the parasite.
  - Must be repeatedly administered to those living in endemic areas. Delivering drugs to these areas is very difficult.
  - You may have given the same drug to your pets for tapeworm infections! (known as Droncit in the veterinary field)