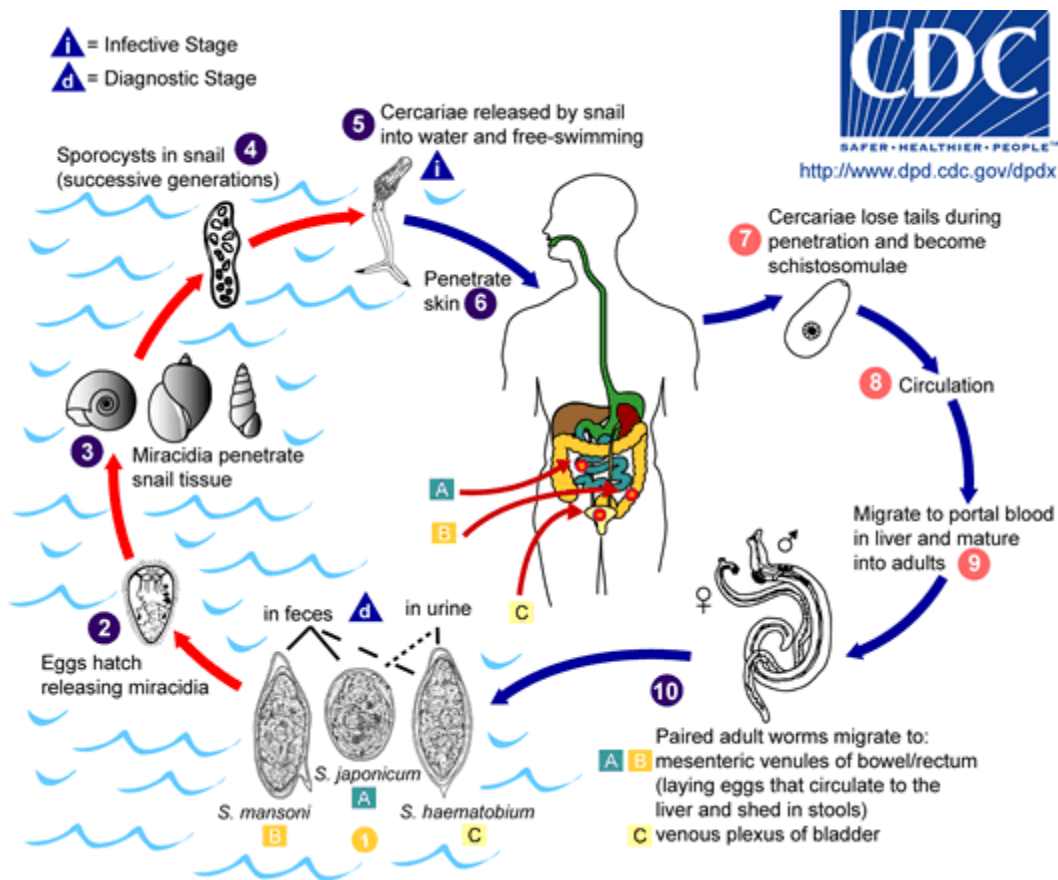


Schistosomiasis

Causal Agents:

Schistosomiasis is caused by digenetic blood trematodes. The three main species infecting humans are *Schistosoma haematobium*, *S. japonicum*, and *S. mansoni*. Two other species, more localized geographically, are *S. mekongi* and *S. intercalatum*. In addition, other species of schistosomes, which parasitize birds and mammals, can cause cercarial dermatitis in humans.

Life Cycle:



Eggs are eliminated with feces or urine **1**. Under optimal conditions the eggs hatch and release miracidia **2**, which swim and penetrate specific snail intermediate hosts **3**. The stages in the snail include 2 generations of sporocysts **4** and the production of cercariae **5**. Upon release from the snail, the infective cercariae swim, penetrate the skin of the human host **6**, and shed their forked tail, becoming schistosomulae **7**. The schistosomulae migrate through several tissues and stages to their residence in the veins (**8**, **9**). Adult worms in humans reside in the mesenteric venules in various locations, which at times seem to be specific for each species **10**. For instance, *S. japonicum* is more frequently found in the superior mesenteric veins draining the small intestine **A**, and *S. mansoni* occurs more often in the superior mesenteric veins draining the large intestine **B**. However, both species can occupy either location, and they are capable of moving between sites,

so it is not possible to state unequivocally that one species only occurs in one location. *S. haematobium* most often occurs in the venous plexus of bladder **C**, but it can also be found in the rectal venules. The females (size 7 to 20 mm; males slightly smaller) deposit eggs in the small venules of the portal and perivesical systems. The eggs are moved progressively toward the lumen of the intestine (*S. mansoni* and *S. japonicum*) and of the bladder and ureters (*S. haematobium*), and are eliminated with feces or urine, respectively **1**. Pathology of *S. mansoni* and *S. japonicum* schistosomiasis includes: Katayama fever, hepatic perisinusoidal egg granulomas, Symmers' pipe stem periportal fibrosis, portal hypertension, and occasional embolic egg granulomas in brain or spinal cord. Pathology of *S. haematobium* schistosomiasis includes: hematuria, scarring, calcification, squamous cell carcinoma, and occasional embolic egg granulomas in brain or spinal cord.

Human contact with water is thus necessary for infection by schistosomes. Various animals, such as dogs, cats, rodents, pigs, horse and goats, serve as reservoirs for *S. japonicum*, and dogs for *S. mekongi*.

Geographic Distribution:

Schistosoma mansoni is found in parts of South America and the Caribbean, Africa, and the Middle East; *S. haematobium* in Africa and the Middle East; and *S. japonicum* in the Far East. *Schistosoma mekongi* and *S. intercalatum* are found focally in Southeast Asia and central West Africa, respectively.

Clinical Features:

Many infections are asymptomatic. Acute schistosomiasis (Katayama's fever) may occur weeks after the initial infection, especially by *S. mansoni* and *S. japonicum*. Manifestations include fever, cough, abdominal pain, diarrhea, hepatosplenomegaly, and eosinophilia. Occasionally central nervous system lesions occur: cerebral granulomatous disease may be caused by ectopic *S. japonicum* eggs in the brain, and granulomatous lesions around ectopic eggs in the spinal cord from *S. mansoni* and *S. haematobium* infections may result in a transverse myelitis with flaccid paraplegia. Continuing infection may cause granulomatous reactions and fibrosis in the affected organs, which may result in manifestations that include: colonic polyposis with bloody diarrhea (*Schistosoma mansoni* mostly); portal hypertension with hematemesis and splenomegaly (*S. mansoni*, *S. japonicum*, *S. mansoni*); cystitis and ureteritis (*S. haematobium*) with hematuria, which can progress to bladder cancer; pulmonary hypertension (*S. mansoni*, *S. japonicum*, more rarely *S. haematobium*); glomerulonephritis; and central nervous system lesions.

Laboratory Diagnosis:

Microscopic identification of eggs in stool or urine is the most practical method for diagnosis. Stool examination should be performed when infection with *S. mansoni* or *S. japonicum* is suspected, and urine examination should be performed if *S. haematobium* is suspected.

Eggs can be present in the stool in infections with all *Schistosoma* species. The examination can be performed on a simple smear (1 to 2 mg of fecal material). Since eggs may be passed intermittently or in small amounts, their detection will be enhanced by repeated examinations and/or concentration procedures (such as the formalin - ethyl acetate technique). In addition, for field surveys and investigational purposes, the egg output can be quantified by using the Kato-Katz technique (20 to 50 mg of fecal material) or the Ritchie technique.

Eggs can be found in the urine in infections with *S. haematobium* (recommended time for collection: between noon and 3 PM) and with *S. japonicum*. Detection will be enhanced by centrifugation and examination of the sediment. Quantification is possible by using filtration through a Nucleopore® membrane of a standard volume of urine followed by egg counts on the membrane.

Tissue biopsy (rectal biopsy for all species and biopsy of the bladder for *S. haematobium*) may demonstrate eggs when stool or urine examinations are negative.

Diagnostic findings

- Microscopy
- Antibody detection can be useful in both in clinical management (e.g., recent infections) and for epidemiologic surveys.
- Morphologic comparison with other intestinal parasites

Treatment:

Safe and effective drugs are available for the treatment of schistosomiasis. The drug of choice is praziquantel for infections caused by all *Schistosoma* species. Oxamniquine has been effective in treating infections caused by *S. mansoni* in some areas in which praziquantel is less effective.