Genito-Urinary System

Schistosomiasis – Schistosoma hematobium

- Schistosomiasis-—-S.-hematobium
- Candidiasis-—-Candida-albicans
- Gonorrhea
- Chlamydia trachomatis, Ureaplasma and Gardnerella
- Syphilis
- Trichomoniasis
- Ectoparasitic infections: pubic lice, Scabies
- HSV
- HPV
- HIV

Helminthes

- Helminths are invertebrates characterized by elongated, flat or round bodies.
- Platyhelminthes (flat)
  - **Trematodes (flukes)**
  - Cestodes (tapeworms)
- Nemathelminthes (circular)
  - Nematodes (Roundworms)

Trematodes

Intermediate host : snail

Flukes, or trematodes

- Leaf-shaped, and vary in length from a few millimetres to 8cm.
- Excluding **blood flukes**, trematodes are **hermaphroditic**
  - having both male and female reproductive organs.
  - Both self-fertilisation and cross-fertilisation occur.
- **Blood flukes (schistosomes)** are the only bisexual flukes that infect humans
  - Within the definitive (human) host, male and female worms inhabit the lumen of blood vessels and are found in close physical association.

Common flukes (trematodes)	
Organ inhabited	**Fluke**
Lung	*Paragonimus westermani*
Intestine	*Fasciolopsis buski*, *Heterophyes heterophyes*, *Mettgonimus yokagawi*
Liver	*Clonorchis sinensis*, *Opithorchis* species, *Fasciola hepatica*
Blood	*Schistosoma mansoni*, *Shistosoma haematobium*, *Schistosoma japonicum*

SCHISTOSOMIASIS
(BLOOD FLUKE INFECTION)

Parasitology

- The schistosomes are a group of closely related flukes that inhabit the portal vascular system of a number of animals.
- Of the five species known to infect humans, three, *S. mansoni, S. haematobium,* and *S. japonicum,* are of primary importance

- The 1 to 2 cm male possesses a deep ventral groove, or “schist.”
- Within this gynecophoral canal it carries the longer, more slender female in lifelong copulatory embrace.

- Each pair deposits 300 (S mansoni, S haematobium) to 3000 (S japonicum) eggs daily for the remainder of its 4- to 35-year life span.

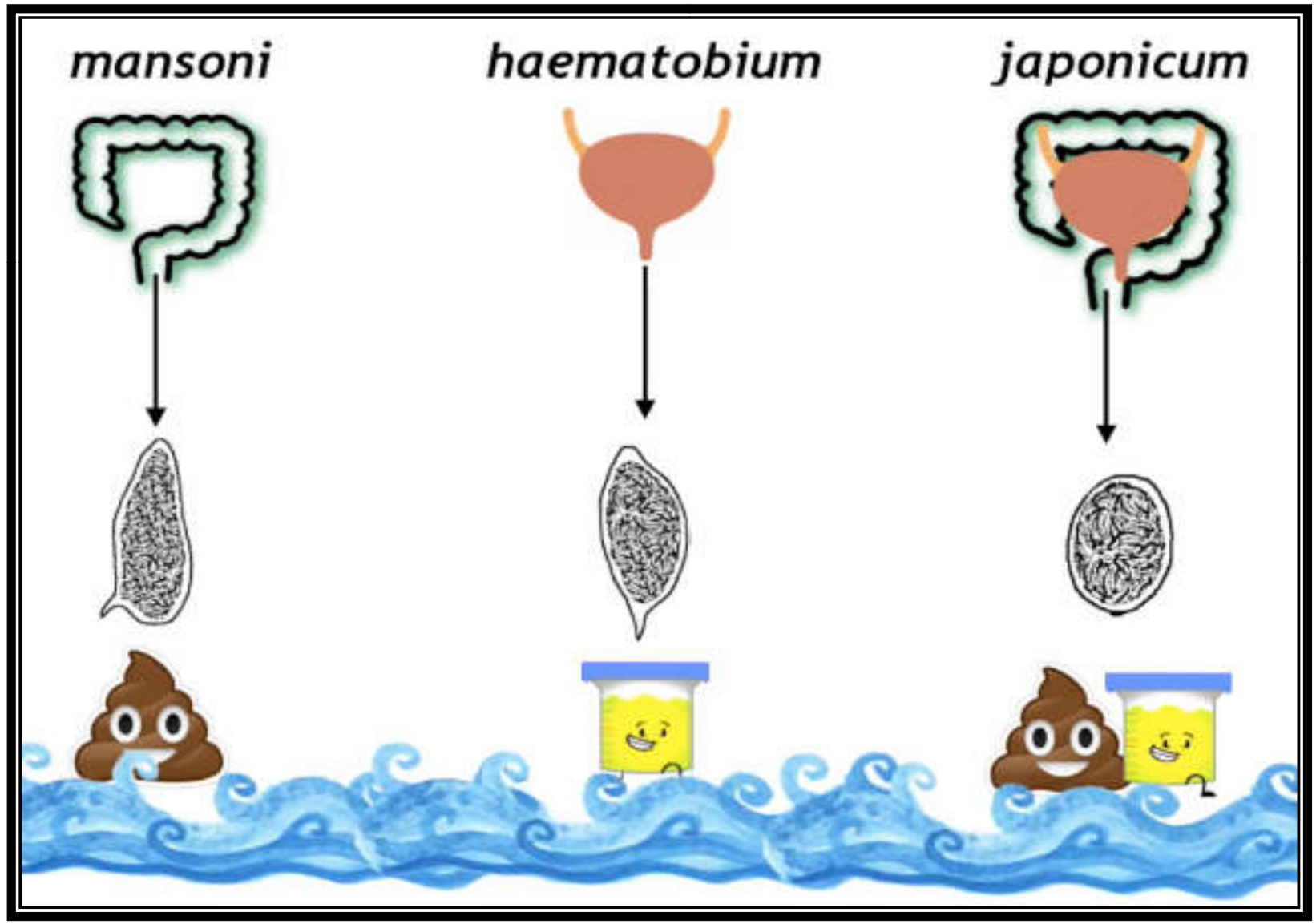
- After mating of the adult worms in the portal vein, the conjoined couple use their suckers to ascend the mesenteric vessels against the flow of blood.
- *S. japonicum* enters the superior mesenteric vein,
  - the venous radicals of the small intestine and ascending colon;
- *S. mansoni* and *S. haematobium* are directed to the inferior mesenteric system.

- ***S. haematobium*** passes through the hemorrhoidal plexus to the systemic venous system, ultimately coming to rest in the venous plexus of the bladder and other pelvic organs.

- Schistosoma japonicum—veins of small intestines
- Schistosoma mansoni—portal veins of colon and rectum
- Schistosoma haematobium—veins of bladder and pelvic organs

S. haematobium

- On reaching the submucosal venules, the worms initiate oviposition.
  - Each pair deposits 300 eggs daily for the remainder of its 4- to 35-year life span.
- Ova lying immediately adjacent to the mucosal surface rupture into the lumen of the bladder and are passed to the outside in the urine.
- The eggs measure 60 by 140 µm and possess a terminal spine.


mansoni
haematobium
japonicum

Diagnostic Stage by Morphology

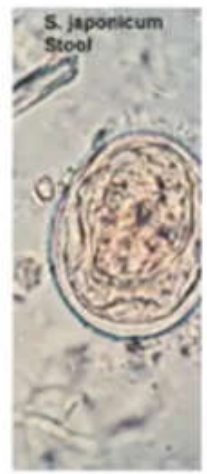
mansoni

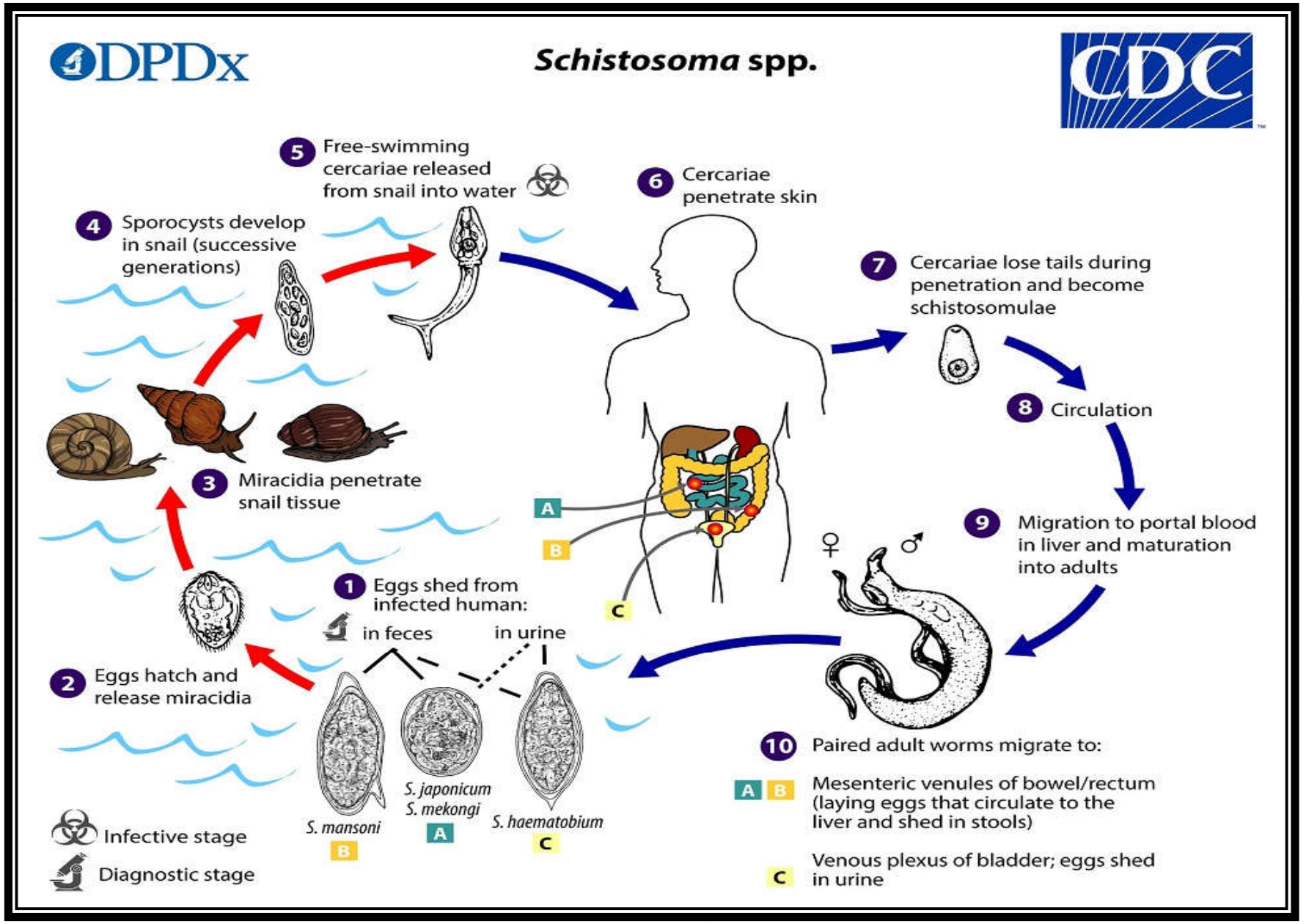
-Lateral spine

haematobium

-Central spine

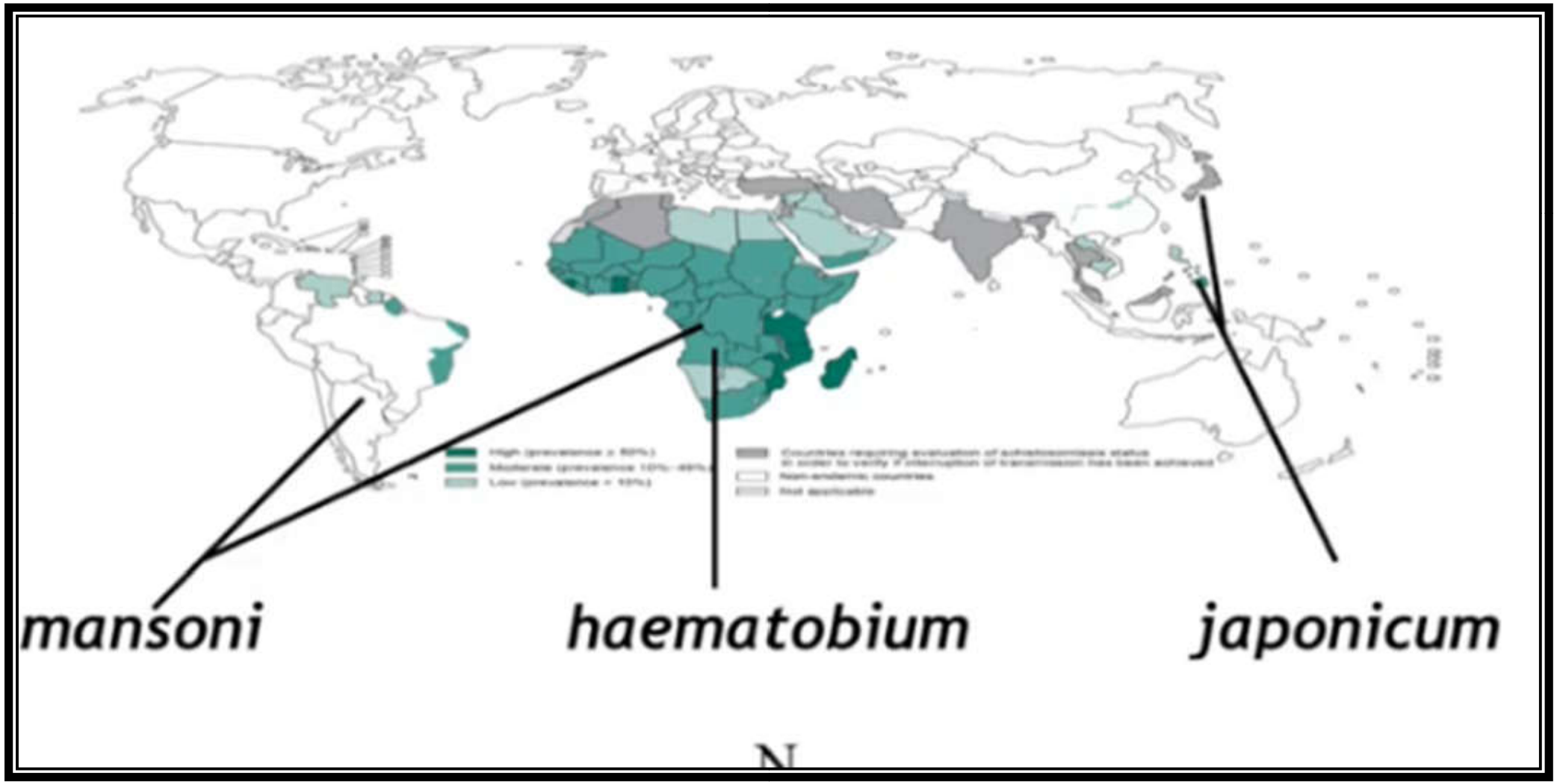
japonicum





Egg…miracidia……snail……..cercariae…..skin….schistosomulae……circulation

- Approximately 200 million people—almost 1 in 30 of all humans—are infected worldwide.
- Of these, roughly 200 000 will die annually.


mansoni
haematobium
japonicum

- Most infected patients carry fewer than 10 pairs of worms in the vascular system and, accordingly, lack clinical manifestations of disease.

- **PATHOGENESIS**
- There are three major clinicopathologic stages in schistosomiasis.
- The first stage is initiated by the penetration and migration of the schistosomula.
- The second or intermediate stage begins with oviposition and is associated with a complex of clinical manifestations.
- The third or chronic stage is characterized by granuloma formation and scarring around retained eggs.

- CLINICAL ASPECTS

❑Early Stage (within 24 hours)

  - Penetrating the skin,
  - immediate and delayed hypersensitivity to parasitic antigens
  - results in an intensely pruritic papular skin rash that increases in severity with repeated exposures to cercariae.

- As the viable schistosomula begin their migration to the liver, the rash disappears and the patient experiences fever, headache, and abdominal pain for 1 to 2 weeks.

- Intermediate Stage (One to two months)
  - an acute febrile illness that bears a striking resemblance to serum sickness.
  - fever and chills,
  - patients experience cough, urticaria, arthralgia, lymphadenopathy, splenomegaly, abdominal pain, and diarrhea.
  - The onset of oviposition leads to a state of relative antigen excess, the formation of soluble immune complexes, and the deposition of these in the tissues of the host.

- S japonicum infection
  - clinical manifestations of encephalitis. Typically, leukocytosis, marked peripheral eosinophilia, and elevated levels of IgM, IgG, and IgE immunoglobulins are present..

Katayama Syndrome

❑Chronic Stage

- Approximately one half of all deposited eggs reach the lumen of the bowel or bladder and are shed from the body.
- Those retained induce inflammation and scarring, initiating the final and most morbid phase of schistosomiasis.

- Soluble antigens excreted by the eggs stimulate the formation of T lymphocyte–mediated eosinophilic granulomas.
- Early in the infection, the inflammatory response is vigorous, producing lesions more than 100-fold larger than the inciting egg itself.

- Inflammatory and fibrotic reactions to retained eggs cause chronic disease,
- the severity of tissue damage is directly related to the total number of eggs retained.

- In *S. haematobium* infection,
  - the bladder mucosa becomes thickened, papillated, and ulcerated.
  - Hematuria and dysuria result; repeated hemorrhages produce anemia.
  - In severe infections the muscular layers of the bladder are involved, with loss of bladder capacity and contractibility.
  - Progressive obstruction leads to renal failure and uremia.
  - Bladder carcinoma is frequently seen.

- Other urogenital organs may also be involved, including the spermatic cord, testes, fallopian tubes, ovaries, and vagina.

- In S mansoni and S japonicum infections, the bowel mucosa is congested, thickened, and ulcerated. Patients experience abdominal pain, diarrhea, and blood in the stool.
- Eggs deposited in the larger intestinal veins may be carried by the portal blood flow back to the liver, where they lodge in the presinusoidal capillaries.

- The resulting inflammatory reaction leads to the development of periportal fibrosis and hepatic enlargement.

- Presinusoidal obstruction of blood flow can result in portal hypertension and serious manifestations of portal obstruction.

- Eggs that are carried around the liver in the portosystemic collateral vessels may lodge in the small pulmonary arterioles, where they produce interstitial scarring, pulmonary hypertension, and right ventricular failure.

- Immune complexes shunted to the systemic circulation may induce glomerulonephritis.
- Occasionally, eggs may be deposited in the central nervous system, where they may cause epilepsy or paraplegia.

- DIAGNOSIS

❑Definitive diagnosis requires the recovery of the characteristic eggs in urine, or biopsy specimens.

  – filtering the urine through a membrane filter.

- Cystoscopy with biopsy of the bladder mucosa may be required for the diagnosis of mild infection.
- Conventional serologic tests detect circulating antibodies with sensitivities exceeding 90% but cannot distinguish active from inactive infection.

- TREATMENT

❑No specific therapy is available for treatment of schistosomal dermatitis.

  ❑ **Antihistamines** and **corticosteroids** may be helpful in ameliorating their more severe manifestations.

- TREATMENT

❑Several antihelmintic agents may be used.

  ❑**Praziquantel,** which is active against all three species of schistosomes, is the agent of choice, although there is increased resistance to this single-dose oral agent in mass therapy programs. (C/I pregnancy)

- PREVENTION