Lab parasitology

Class Trematoda (fluke worm)

This class consisting of 3 subclass:

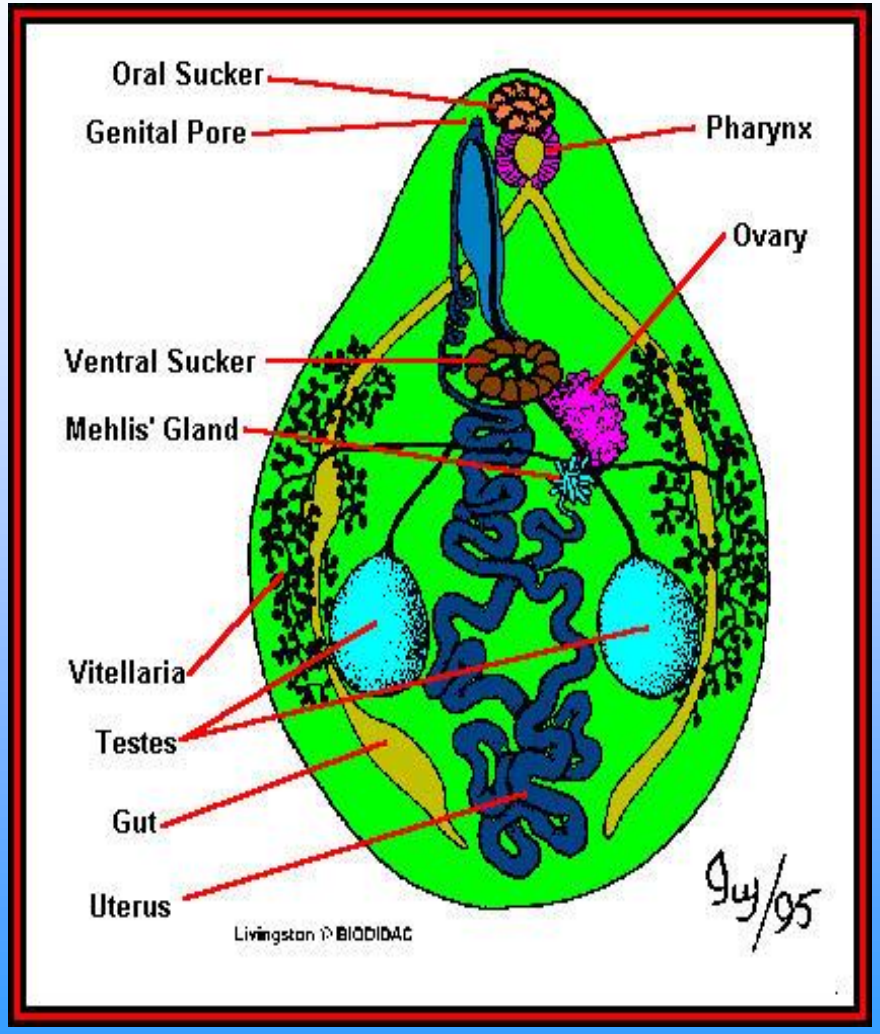
Subclass monognea (fish)

Subclass aspidogasteria (fish- snail)

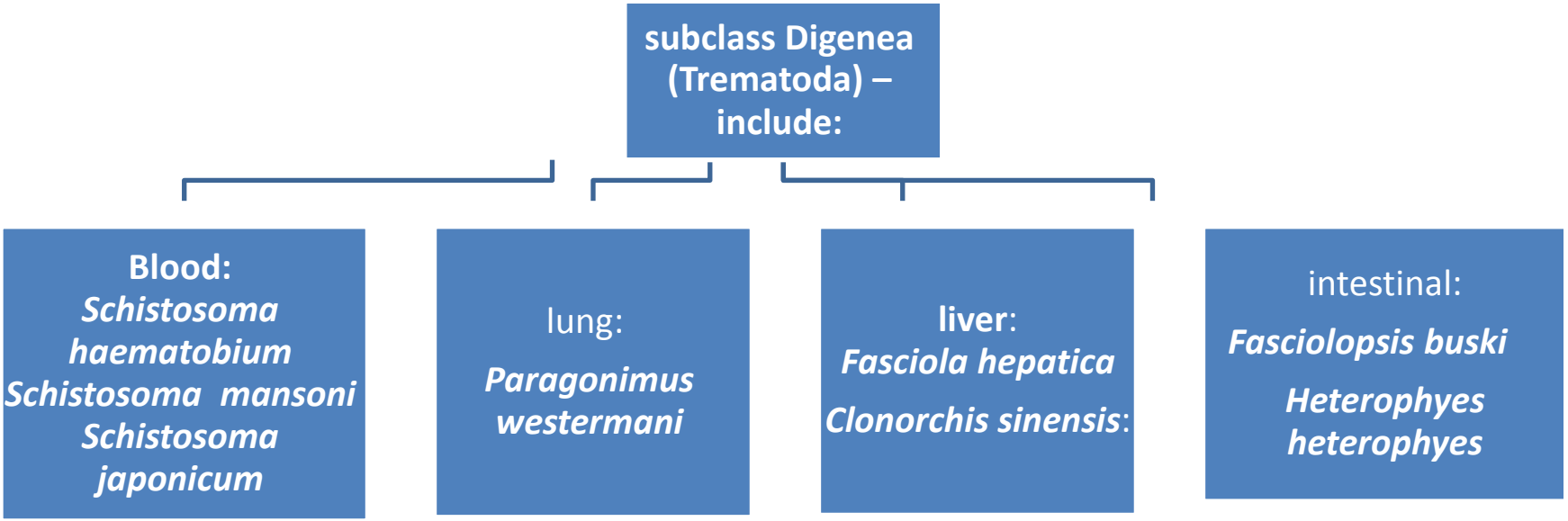
Subclass digenea (animals & human)

TREMATODES OR FLUKES

- Leaf like unsegmented flat worms
- One to several centimeters in length
- Characteristic feature is presence of 2 suckers, one oral (opening of digestive tract) and one ventral (acetabulum) for attachment
- Hermaphrodite (monoecious) except Schistosomes
- Body covered with integument and has no body cavity
- Eggs of S. haematobium and Paragonimus westermani are passed in urine and sputum respectively others in faeces



- Alimentary tract incomplete,anus absent
- Excretory, nervous and reproductive system present
- Oviparous, eggs operculated except Schistosomes


subclass Digenea (Trematoda) – include:
Blood: Schistosoma haematobium Schistosoma mansoni Schistosoma japonicum
lung: Paragonimus westermani
liver: Fasciola hepatica Clonorchis sinensis:
intestinal: Fasciolopsis buski Heterophyes heterophyes

The Blood Flukes

General features of *Schistosoma* spp. :

1- Schistosomes are unisexual .
2- Males are shorter and stouter than females.
3- Males possess a gynaecophoric canal.
4- Suckers are armed with delicat spines.
5- In males, the number of testes varies from 4-8 .
6- Eggs are non-operculated and are fully embryonated when laid.
7- Cercariae have bifid tails, they can penetrate the unbroken skin of the definitive host.
8- Encysted metacercarial stage is absent

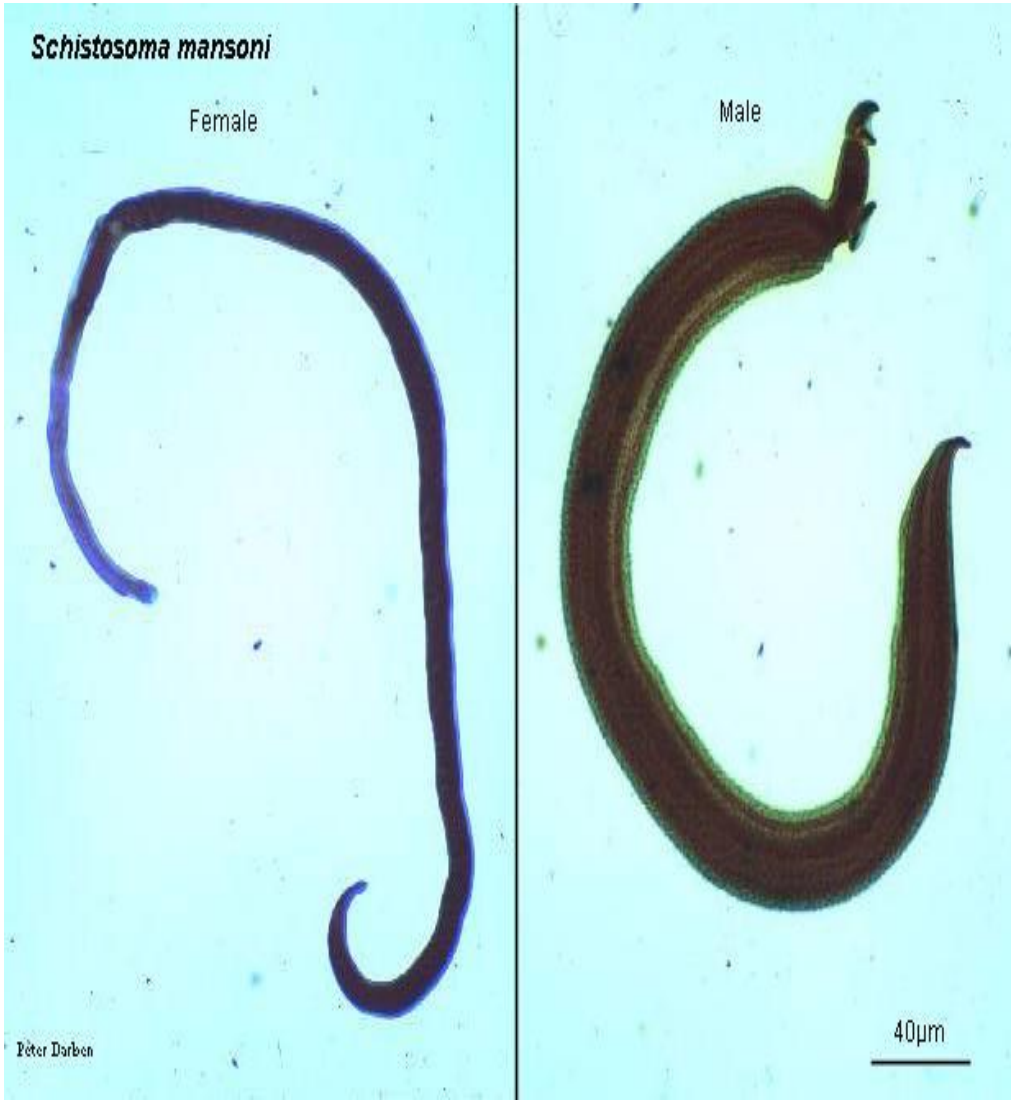
Species of Schistosomes:

Schistosoma haematobium : Africa, Portugal, isolated focus in India, recently Jordan : Vesicles assoc. with bladder, characteristic haematuria

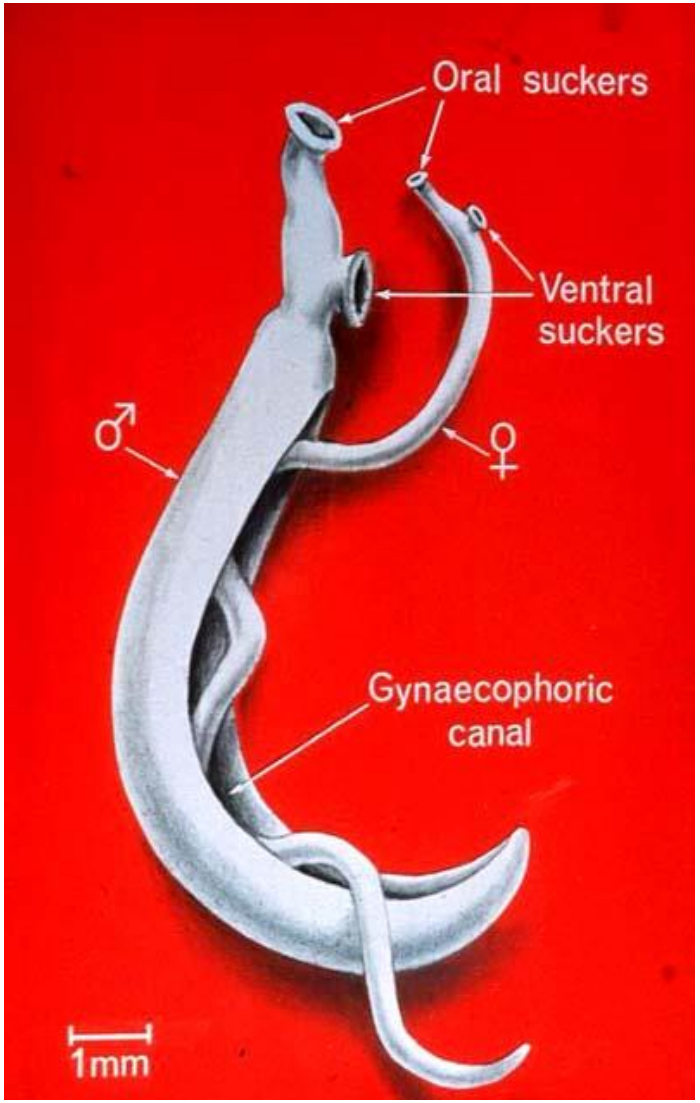
Schistosoma mansoni : Africa, Brazil, Venezuela, parts of the Carribean, : mesenteric veins of colon, no imp reservoirs

Schistosoma japonicum : Far East, parts of China, Japan, Philippines, Indonesia : mesenteric veins of small intestine, many imp. reservoirs. Produces more eggs

	MALE	*S. haematobium*	*S.mansoni*	*S.japonicum*
1.	size	10-18 by 1 mm (medium)	10-12 by 1mm (small)	10-20 by 0.4 mm (large)
2.	Tuberculation on cuticle	Fine	Coarse	Smooth(none)
3.	Re-union of intestinal ceaca in the body	in the middle	In the anterior third of the body	In the posterior third of the body
4.	No. of testes	4-5	6-9	6-7
	FEMALE			
5.	size	16-20 by 0.25 mm	10-20 by 0.16 mm	20-30 by 0.3 mm
6.	Position of the ovary	Posterior half	Anterior half	Middle
7.	Length of the uterus	Long	short	Long
8.	No. of ova in the uterus	10-50	1 -4	50-100
	OVA			
9	shape	Oval with Terminal spine	Oval with Lateral spine	Spherical, Very short lateral spine (rudimentary),
10	Size	150 by62 mm	140by 61 mm	85 by 60 mm
11	Found in	urine	feces	feces
12.	Main Habitat	Vesical plexuses	Veins (large intestines) inferior mesenteric veins.	Veins (small intestines) superior mesenteric veins.
	Life cycle			
13	Definitive host	human	Human and rodents	Human ,dogs,rats,pig and cattle
14.	Intermediate host.	*Bulinus*	*Biomphalaria*	*Oncomelania*
15	Causative agent of	vesical(urinary) schistosomiasis	intestinal schistosomiasis.	Oriental intestinal



S. mansoni, female and male



S. mansoni, female and male
In Copula

S. haematobium Adult Male

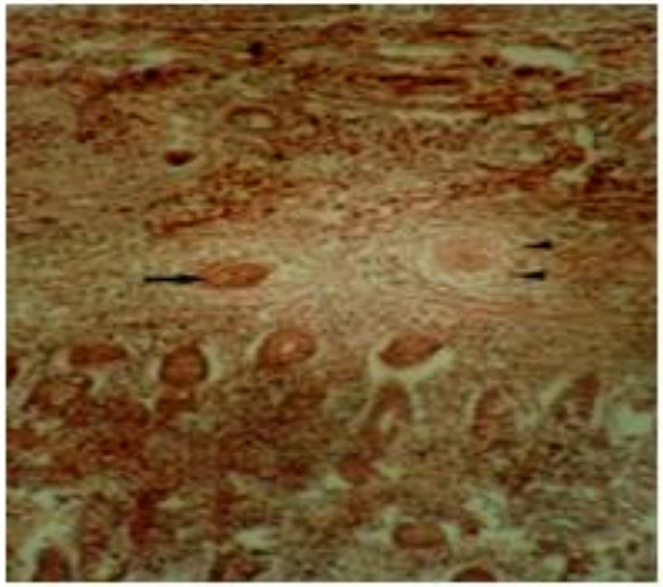
S.haematobium female and male

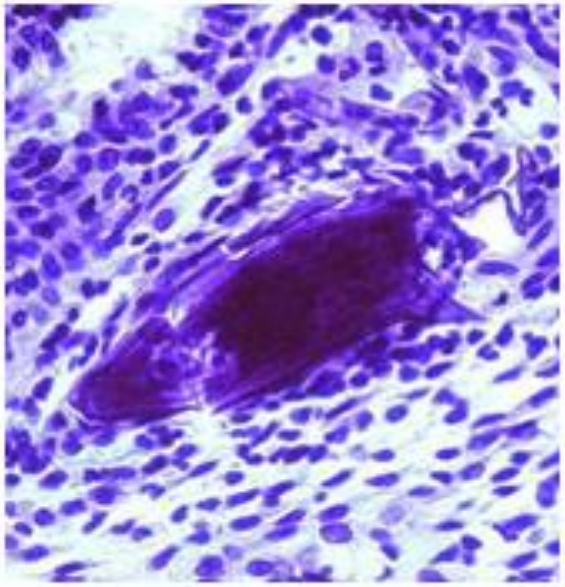
S. haematobium Egg
In Urine

S. mansoni Egg
In Stool

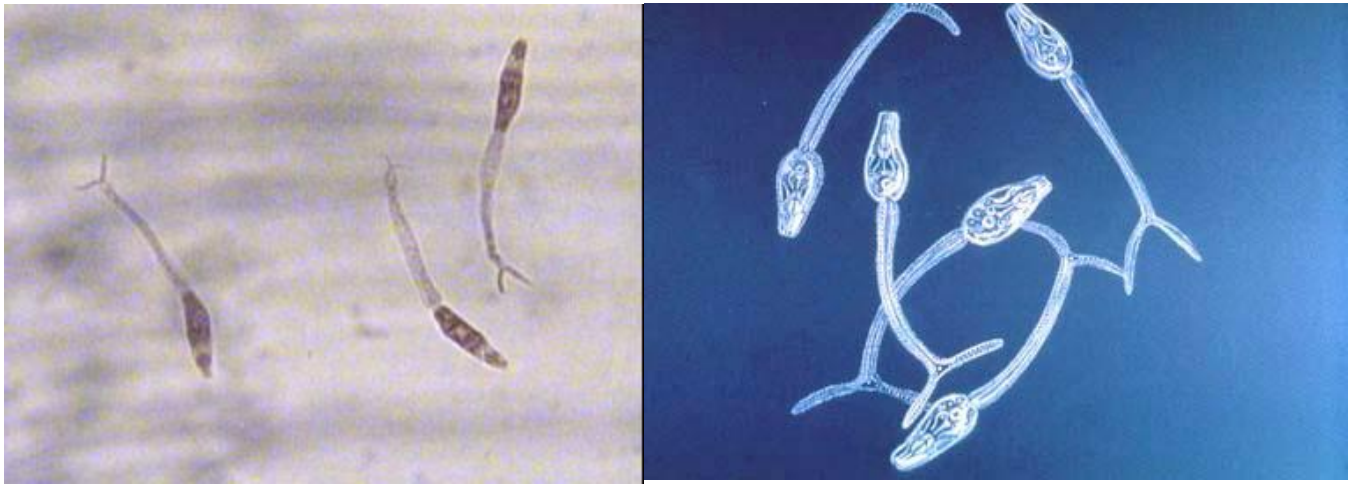
Schistosoma japonicum Egg

S. mansoni Egg





Histopathological section in intestine showing *S. mansoni* eggs



Schistosoma Spp- Cercaria

Schistosoma Spp- Miracidium

stages from the life cycle of the *Schistosoma* spp.

- Life cycle
- 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.

Eggs are eliminated with feces or urine . Under optimal conditions the eggs hatch and release miracidia , which swim and penetrate specific snail intermediate hosts . The stages in the snail include 2 generations of sporocysts and the production of cercariae . Upon release from the snail, the infective cercariae swim, penetrate the skin of the human host , and shed their forked tail, becoming schistosomulae . The schistosomulae migrate through several tissues and stages to their residence in the veins (,). Adult worms in humans reside in the mesenteric venules in various locations, which at times seem to be specific for each species . For instance, *S. japonicum*is more frequently found in the superior mesenteric veins draining the small intestine , and *S. mansoni* occurs more often in the superior mesenteric veins draining the large intestine . However, both species can occupy either location, *S. haematobium* most often occurs in the venous plexus of bladder , but it can also be found in the rectal venules. The females 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 . Human contact with water is thus necessary for infection by schistosomes. Various animals, such as dogs, cats, rodents, pigs, hourse and goats, serve as reservoirs for *S. japonicum*, and dogs for *S. mekongi*

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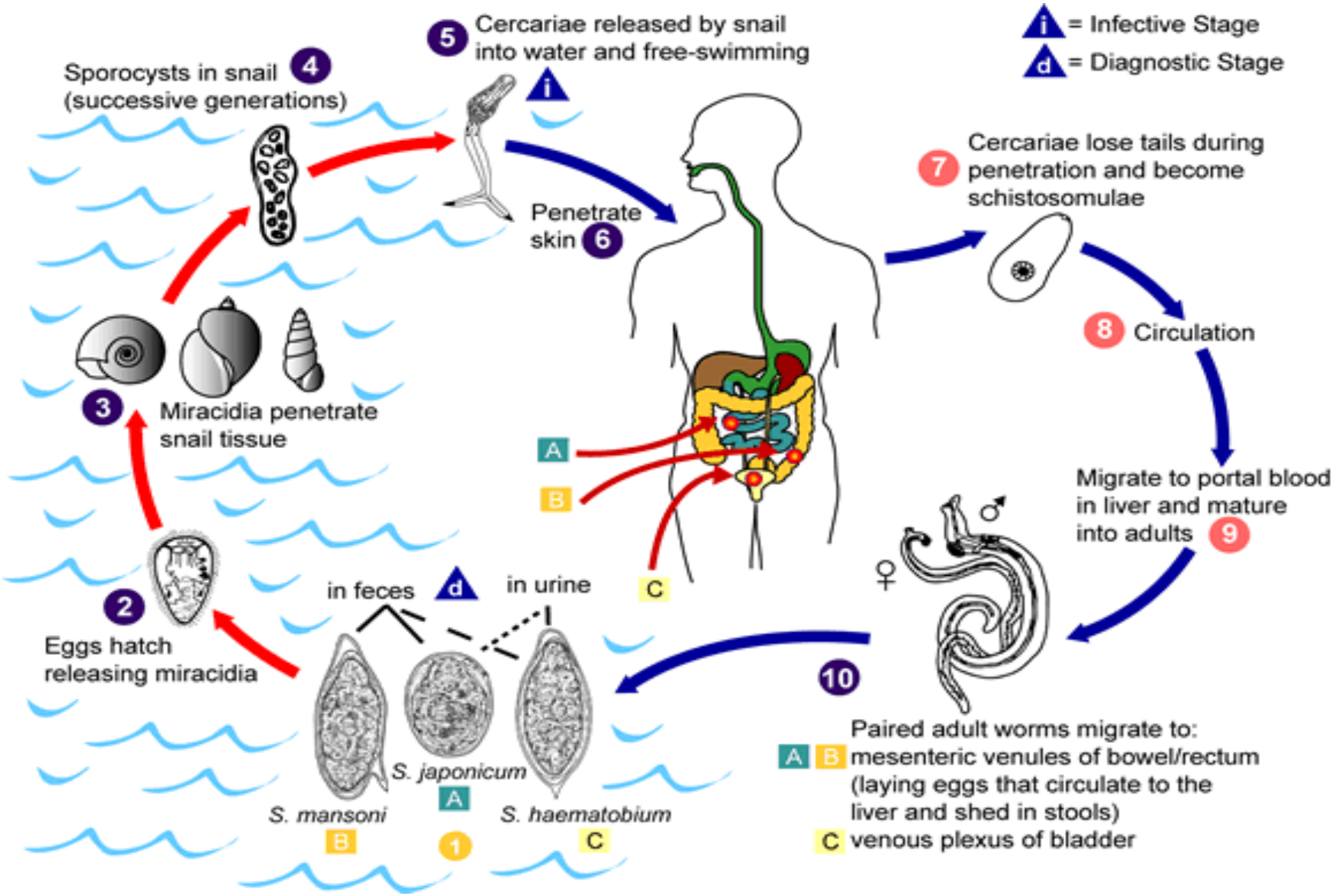
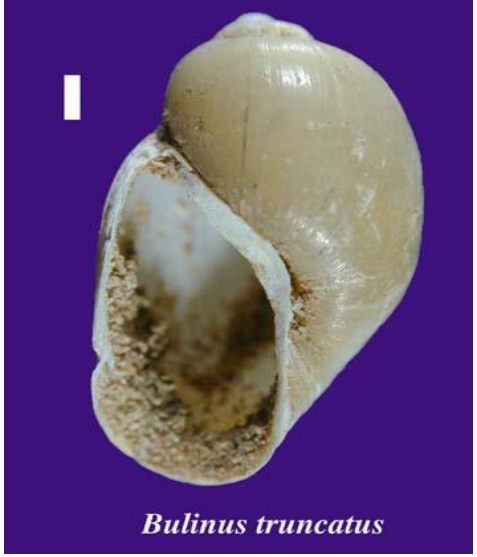


life cycle of *Schistosoma* spp.



Biomphalaria ***Oncomelania***

The intermediate hosts of *Schistosoma* spp.

Distended Abdomen

Dilatation of superficial abdominal blood vessels

some clinical sign of schistosomiasis

laboratory diagnosis:

1- detection of fluke eggs in faecal or urine samples, often after concentration by sedimentation/flotation or filtration techniques. The eggs are sufficiently characteristic to facilitate specific diagnosis. On occasion, microscopy of rectal biopsies has been used to diagnose *S. haematobium* infections.

2- Detection of proteinuria and hematuria

3-Immunoserological tests have been developed to detect host antibodies against infection but they have experienced cross-reactivity problems and cannot discriminate between previous and active infection.

4-More recently, molecular techniques have been used to detect parasite antigens or DNA in host samples; some tests showing good correlations with parasite burdens.

Diagnosis

- Detection of eggs in faeces or urine
- Rectal biopsy
- Immunodiagnosis
- Detection of proteinuria/hematuria
  - urine (sedimentation/filtration/polycarbonate filters, reagent sticks)
  - faeces (formyl ether sedimentation, Kato-Katz, KOH digestion)
  - indirect (new dipstick assay anti-CAA sandwich ELISA)