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# Helminths Trematodes: Flukes

## **General Characteristics**

**Trematodes** are unsegmented helminths, which are flat and broad, resembling the leaf of a tree or a flatfish The name **Trematode** comes from their having large prominent suckers with a hole in the middle

## **Flukes: General Characteristics**

They vary in size from the species just visible to the naked eye, like *Heterophyes* to the large fleshy flukes, like *Fasciola* and *Fasciolopsis* 

- A conspicuous feature of flukes is the presence of 2 muscular cup-shaped suckers (hence called **distomata**)— **the oral sucker** surrounding the mouth at the anterior end and the **ventral sucker** or **acetabulum** in the middle, ventrally

-The body is covered by an integument that often bears spines, papillae, or tubercles.

-They have no body cavity or circulatory and respiratory organs.

-The alimentary system consists of the **mouth** surrounded by the oral sucker, a **muscular pharynx**, and the **esophagus**, which bifurcates anterior to the acetabulum to form 2 blind **caeca**, that reunite in some species. The alimentary canal, therefore, appears like an **inverted Y**. The anus is absent.



- The excretory system consists of flame cells and collecting tubules, which lead to a median bladder opening posteriorly.

-There is a rudimentary nervous system consisting of paired ganglion cells.



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-The reproductive system is well-developed. Flukes are **hermaphroditic** (**monoecious**) except for schistosomes, in which the sexes are separate (**dioecious**).

- The hermaphroditic flukes have both male and female structures, so that **self-fertilization** takes place, though in many species **cross-fertilization** also occurs. In the schistosomes, the sexes are separate, but the male and female live in close apposition (*in copula*), the female fitting snugly into the folded ventral surface of the male, which forms the **gynecophoric canal**.

- Trematodes are **oviparous** and lay operculated eggs except in the case of schistosomes.

## Life Cycle

Medically important members of the class Trematoda belong to the subclass Digenea, as they are digenetic, i.e. trematode require 2 hosts to complete their life cycle

**Definitive hosts:** In which they pass the sexual or adult stage are **mammals**, **humans or animals**.

**Intermediate hosts:** In which they pass their asexual or larval stages are **freshwater molluscs or snails**.

Second intermediate host: Fish or crab is required for encystment in some trematodes.

- The eggs liberated by the definitive host hatch in water to form **the first stage larva**, the motile ciliated **miracidium**.

- The miracidium infects the intermediate host snail in which further development takes place.

- The miracidium sheds its cilia and becomes the sac-like sporocyst (meaning a 'bladder containing seeds'). Within the sporocyst, certain cells proliferate to form the germ balls, which are responsible for asexual replication.

- In schistosomes, the sporocyst develops into the second-generation sporocyst, in which the infective larvae cercariae are formed by sexual multiplication. But in the hermaphroditic trematodes, the sporocyst matures into a more complex larval stage



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name redia, which produce cercariae. Cercariae thus develop within the secondgeneration sporocyst (in schistosomes) or rediae (in all other trematodes).

-On maturity, the cercariae escape from the parent organism and then leave the snail host and become free-living in water.

-Cercariae are tailed larvae and hence their name (Greek kerkos: tail). In schistosomes, cercariae have a forked tail and infect the definitive host by direct skin penetration.

-In the hermaphroditic flukes, the cercariae have an unsplit tail and they encyst on vegetables or within a second intermediate host, fish or crab, to form the **metacercariae**, which are the infective forms to humans.

-Infection is acquired by ingesting metacercariae encysted on vegetables (*F. hepatica, F. buski, W. watsoni*), in fish (*C. sinensis, H. heterophyes*) or crabs (*P. westermani*).

-The asexual multiplication during larval development is of great magnitude and in some species, a single miracidium may give rise to over half a million cercariae.



