

### Germ Layers- 3 Major tissues

Germ Layer	Organs and Tissues in the Adult
Ectoderm	Epidermis of skin and its derivatives (e.g., skin glands, nails); epithelial lining of mouth and rectum; sense receptors in epidermis; cornea and lens of eye; nervous system; adrenal medulla; tooth enamel; epithelium of pineal and pituitary glands.
Endoderm	Epithelial lining of digestive tract (except mouth and rectum); epithelial lining of respiratory system; liver; pancreas; thyroid; parathyroids; thymus; lining of urethra, urinary bladder, and reproductive system.
Mesoderm	Notochord; skeletal system; muscular system; circulatory and lymphatic systems; excretory system; reproductive system (except germ cells, which start to differentiate during cleavage); dermis of skin; lining of body cavity; adrenal cortex.

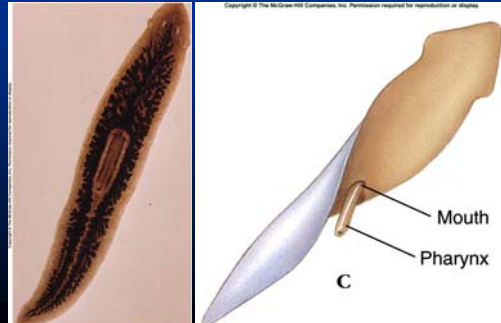


## Classes of Phylum Platyhelminthes

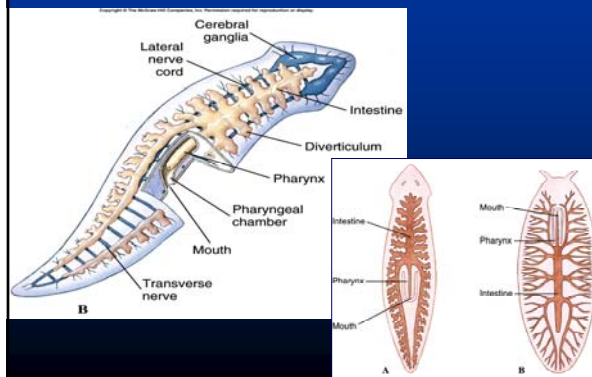
Table 33.2 Classes of Phylum Platyhelminthes

Class and Examples	Main Characteristics
Turbellaria (mostly free-living flatworms; e.g., <i>Dugesia</i> ) (see FIGURE 33.9 and 33.10)	Most marine, some freshwater, a few terrestrial, predators and scavengers; body surface ciliated
Monogenea (monogeneans)	Marine and freshwater parasites; most infect external surfaces of fishes; life history simple; a ciliated larva starts an infection on a host
Trematoda (trematodes, also called flukes) (see FIGURE 33.11)	Parasites, almost always of vertebrates; two suckers attach to host; most life histories include intermediate hosts
Cestoidea (tapeworms) (see FIGURE 33.12)	Parasites of vertebrates; scolex attaches to host; proglottids produce eggs and break off after fertilization; no head or digestive system; life history with one or more intermediate hosts

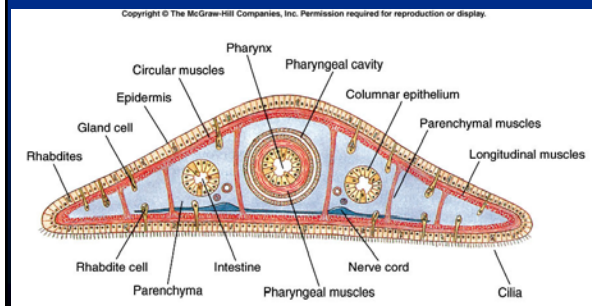
## Planarian



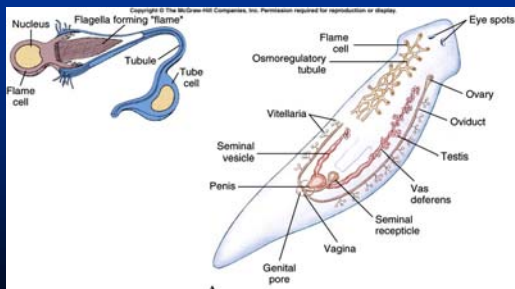
## Triclade and Polyclade



## Cross Section of Flatworm



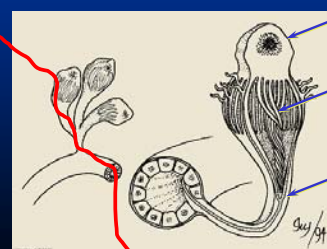
## Excretory and Reproductive system



## Excretory system

Flame cells (Protonephridia)  
Used mostly for osmoregulation

Body (mesoderm)

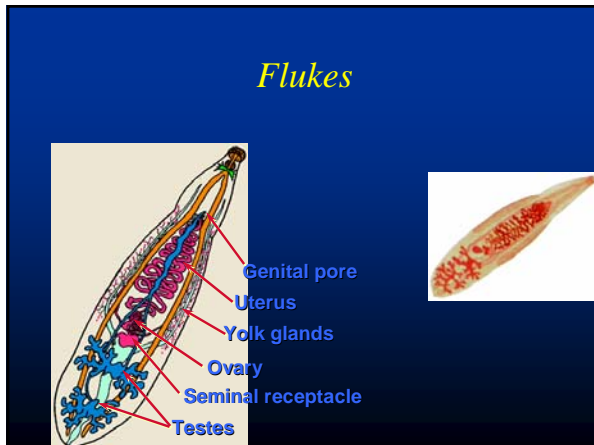




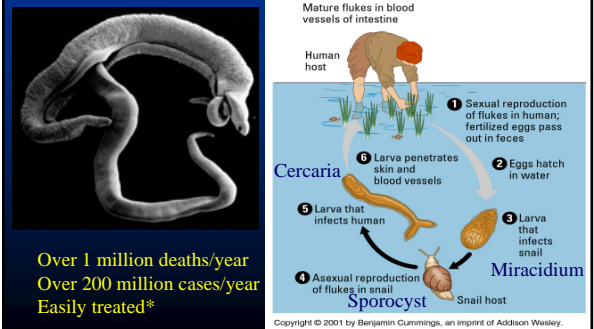
## Class Trematoda



- All parasitic, mostly in vertebrate as definitive host
- Flukes- complex life cycles; 1, 2, 3+ hosts
- Most have obligate hosts, often several.
- Huge cause of illness in humans.
  - Blood, liver, GI, heart, brain, skin...
- Tegument; cysts, adhesion; reduced cephalization



### The life history of a blood fluke, *Schistosoma mansoni*



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#### TABLE 14.1

##### Examples of Flukes Infecting Humans

Common and Scientific Names	Means of Infection; Distribution and Prevalence in Humans
Blood flukes ( <i>Schistosoma</i> spp.); three widely prevalent species, others reported <i>S. mansoni</i> <i>S. haematobium</i> <i>S. japonicum</i>	Cercariae in water penetrate skin; 200 million people infected with one or more species Africa, South and Central America Africa Eastern Asia
Chinese liver flukes ( <i>Clonorchis sinensis</i> )	Eating metacercariae in raw fish; about 30 million cases in eastern Asia
Lung flukes ( <i>Paragonimus</i> spp.), seven species, most prevalent is <i>P. westermani</i>	Eating metacercariae in raw freshwater crabs, crayfish; Asia and Oceania, sub-Saharan Africa, South and Central America; several million cases in Asia
Intestinal fluke ( <i>Fasciolopsis buski</i> )	Eating metacercariae on aquatic vegetation; 10 million cases in eastern Asia
Sheep liver fluke ( <i>Fasciola hepatica</i> )	Eating metacercariae on aquatic vegetation; widely prevalent in sheep and cattle, occasional in humans

## Class Trematoda

Limb abnormalities were induced at high frequencies in Pacific treefrogs (*Hyla regilla*) exposed to larvae of a trematode parasite

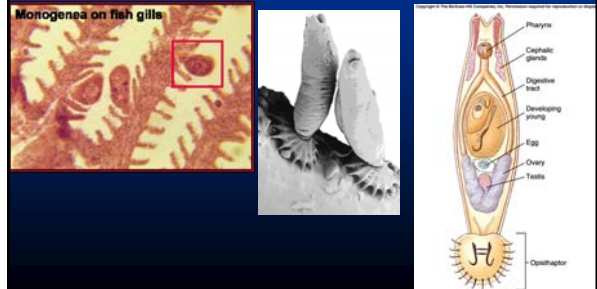
Ant and Snail behavioral changes



## Cl. Monogenea

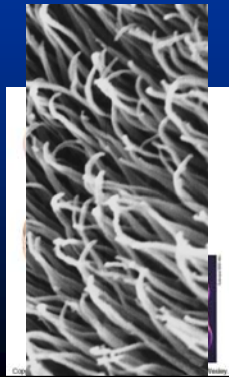
- Old order within Trematoda, but now separate class
- All parasites, mostly on gills of fish, but other places as well (Hippos, amphibians)
- Big problem in intensive fish farming
- Odd reproduction- only one host!

## Monogeneans



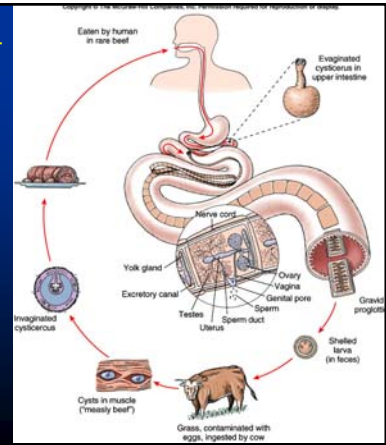
## Class Cestoda

- Tapeworms- long, flat bodies with sections-Proglottids
- Segmentation?
- No Digestive system
- Tegument with microtriches for very high SA
- Complex life cycles

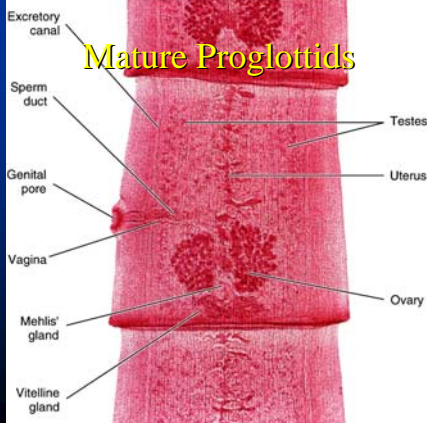


## Taenia saginata- Beef Tapeworm

- Tapeworms, 100's millions of cases
- 100's thousands of deaths
- Extremely easy to treat\*



## Mature Proglottids



## Where's the Beef?

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TABLE 14.2	
Common and Scientific Name	Means of Infection; Prevalence in Humans
Beef tapeworm ( <i>Taenia saginata</i> )	Eating rare beef; most common of all tapeworms in humans
Pork tapeworm ( <i>Taenia solium</i> )	Eating rare pork; less common than <i>T. saginata</i>
Fish tapeworm ( <i>Diphyllobothrium latum</i> )	Eating rare or poorly cooked fish; fairly common in Great Lakes region of United States, and other areas of world where raw fish is eaten
Dog tapeworm ( <i>Dipylidium caninum</i> )	Unhygienic habits of children (jennies in flea and louse); moderate frequency
Dwarf tapeworm ( <i>Hymenolepis nana</i> )	Jennies in flour beetles; common
Unilocular hydatid ( <i>Echinococcus granulosus</i> )	Cysts of juveniles in humans; infection by contact with dogs; common whenever humans are in close relationship with dogs and ruminants
Multilocular hydatid ( <i>Echinococcus multilocularis</i> )	Cysts of juveniles in humans; infection by contact with foxes; less common than unilocular hydatid

~1% of Cattle are infected; 20% are not inspected; 25% of infections are missed...McTapeworm™???