Acoelomate taxa

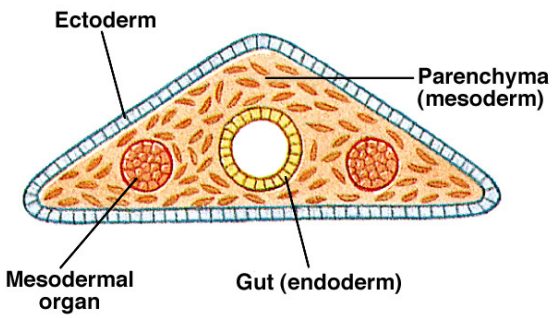
Flatworms (Phylum Platyhelminthes)

- **First appearance of bilateral symmetry**
- **Still no coelom, just gut cavity**
- **Do have 3 well defined germ layers (ectoderm, endoderm, mesoderm)**

Acoelomate taxa

- **Space between gut and ectoderm filled with mesodermal parenchyma**
- **Mesoderm allows for more complex organization**
- **System level of organization (still simple)**
- **Evolution of cephalization**
- **Advances in nervous coordination and appearance of excretory system**

The acoelomate body plan



Flatworm Form and Function

Phylum Platyhelminthes

General traits

- Large range in size
- Body flattened dorsoventrally
- Both free-living and parasitic forms

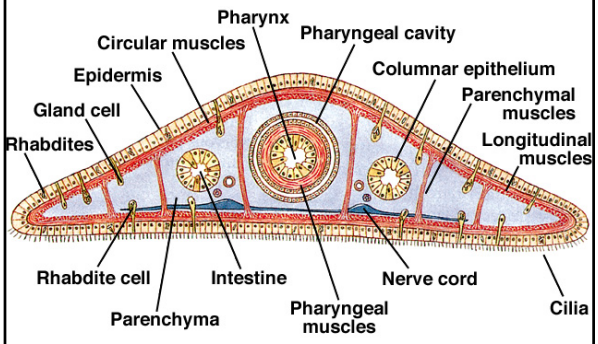
Free-living

- Some freshwater and terrestrial, most marine

Parasitic

- Both endo and ectoparasites
- Often multiple hosts (some in humans)

Cross section of planarian

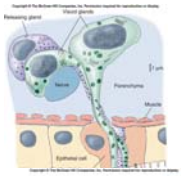


Flatworm Form and Function

Phylum Platyhelminthes

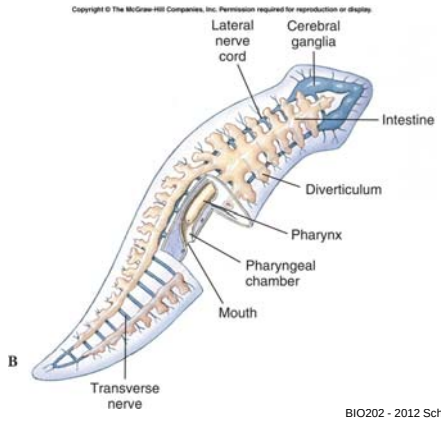
Locomotion

- Epidermis has cilia
- Dual gland organs for anchoring and release
- Multiple layers of muscle fibers



Nutrition and Digestion

- Have mouth, pharynx and intestine (usually branched)
- Free-living members are carnivorous
- Both extracellular and intracellular digestion



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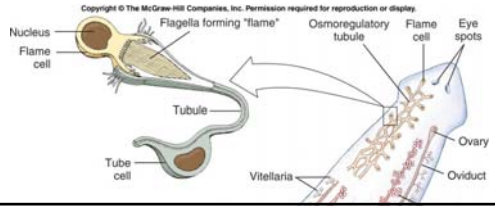
Flatworm Form and Function

Phylum Platyhelminthes

Excretory system

- **Organs called protonephridia**
- **Flame cells with tuft of flagella**
- **Beating flagella creates negative osmotic pressure**
- **Fluid passes out through ducts and excretory pores**

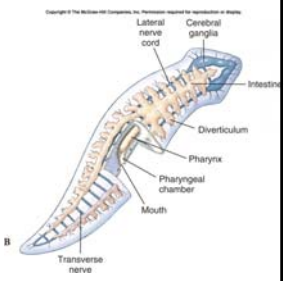


Flatworm Form and Function

Phylum Platyhelminthes

Nervous system and sense organs

- **Longitudinal nerve cords**
- **Connecting nerves in ladder pattern**
- **Ocelli, ear-like organs, chemical & mechanical receptors**



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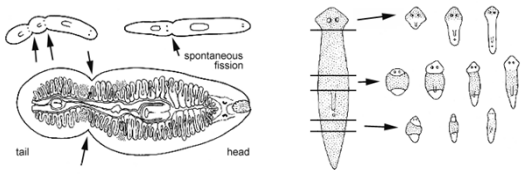
Flatworm Form and Function

Phylum Platyhelminthes

Reproduction

- Both asexual and sexual
- Asexual by fission or budding
- Nearly all monoecious
- Complex reproductive organs
- Some require host for hatching



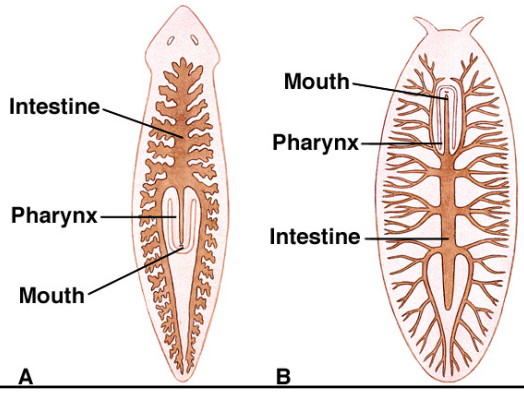
Flatworm Taxonomy

Four classes of Phylum Platyhelminthes

1. **Turbellaria**

- Mostly free-living
- Muscles and cilia for movement
- Some gliding over mucous from adhesive glands
- Form of gut or pharynx used to classify Orders

Intestinal pattern of turbellarians



Flatworm Taxonomy

Four classes of Phylum Platyhelminthes

2. Trematoda

- All parasitic flukes
- Endoparasitic in vertebrates
- No cilia on epidermis
- Suckers and hooks for adhesion, sense organs minimal

Subclass Digenea

- Intermediate host (mollusc) and Definitive host (vertebrate)
- One hatched egg can generate many progeny
- Important parasites of humans and domestic animals
- Liver flukes, blood flukes, lung flukes

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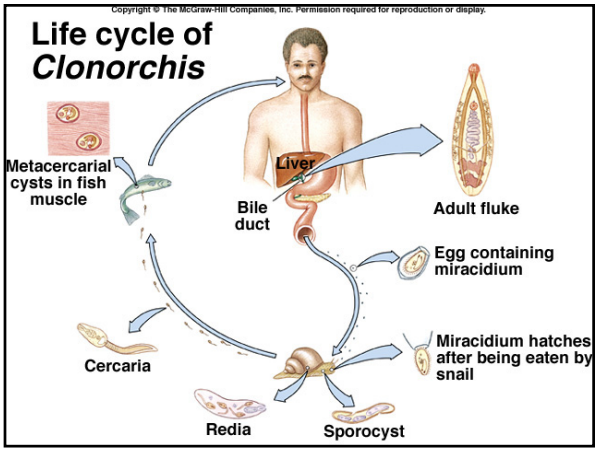
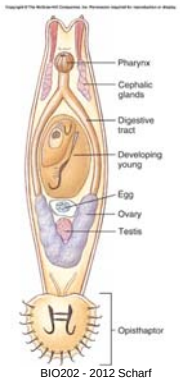


Flatworm Taxonomy

Four classes of Phylum Platyhelminthes

3. Monogenea

- Ectoparasites, mainly of fish
- Attach to gills and feed on body fluids (blood)
- Only damaging in crowded conditions
- Single host (direct life cycle)



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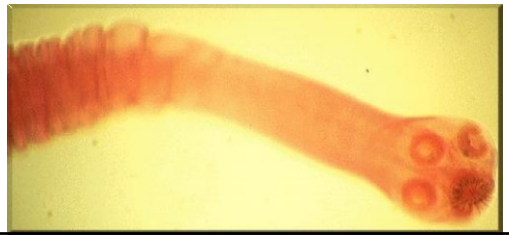
Flatworm Taxonomy

Four classes of Phylum Platyhelminthes

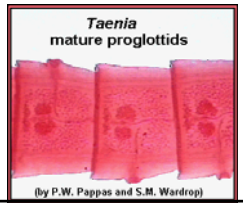
4. Cestoda

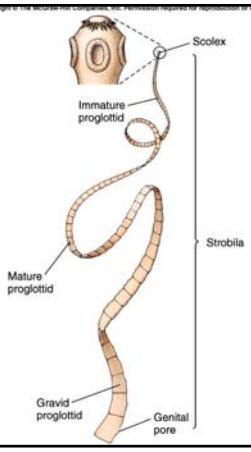
- **Tapeworms**
- **Sets of reproductive organs (proglottids)**
- **Microvilli expand surface area for absorption (no digestive system)**
- **Suckers and hooks present**



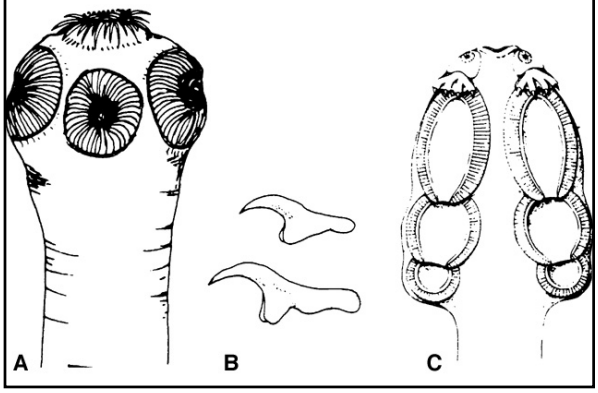
Cestoda

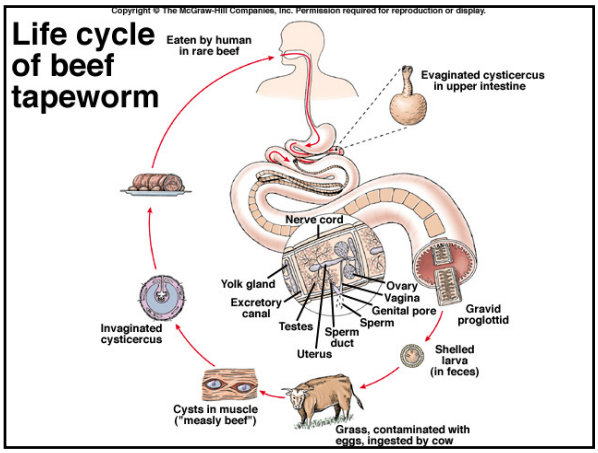
- **Two hosts (indirect life cycle)**
- **Digestive tract of vertebrates is final host**
- **Many infect humans – beef, pork, fish, and dog tapeworms**





Scolices of tapeworms





Pseudocoelomate taxa

Several phyla

Tube-within-a-tube body plan

Pseudocoel (non-Mesodermal) which promotes:

- **Freedom of movement**
- **System development**
- **Storage and distribution of materials**
- **Hydrostatic skeleton**

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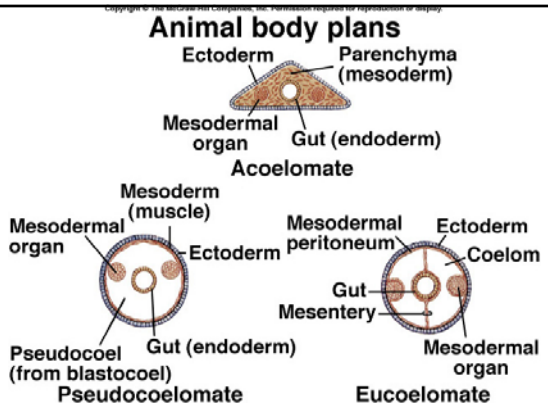

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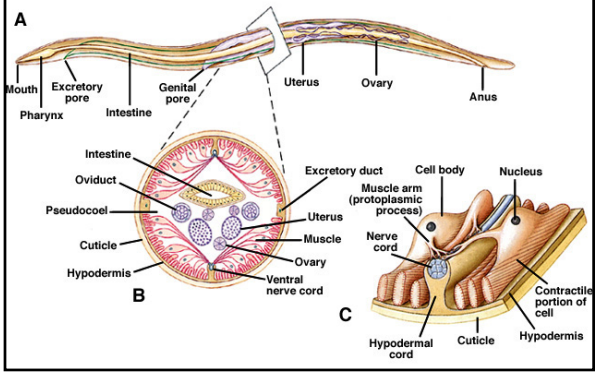
Phylum Nematoda

- Very abundant, 15,000 species
- Found in all habitats (some extreme)
- Many free living, most parasitic
- $100 billion in crop damage each year from plant parasites
- Impact almost all vertebrates, including humans

Phylum Nematoda

- Most are small, some microscopic
- Syncytial epidermis covered by thick cuticle
- Hydrostatic pressure high in the pseudocoel (cuticle important for support)
- Only longitudinal muscles, capable of side-to-side motion
- Suction feeding

Structures of a nematode



Parasitic Nematodes of Humans

Hookworm
- Burrow directly into skin

Pinworm
- Inhale eggs in dust or by fingers, most common

Intestinal roundworm
- Ingest eggs in contaminated food (vegetables)
- Can reach 30cm and cause intestinal blockage

Trichina worm
- Ingest juveniles in pork

Whipworm
- Ingest in contaminated food