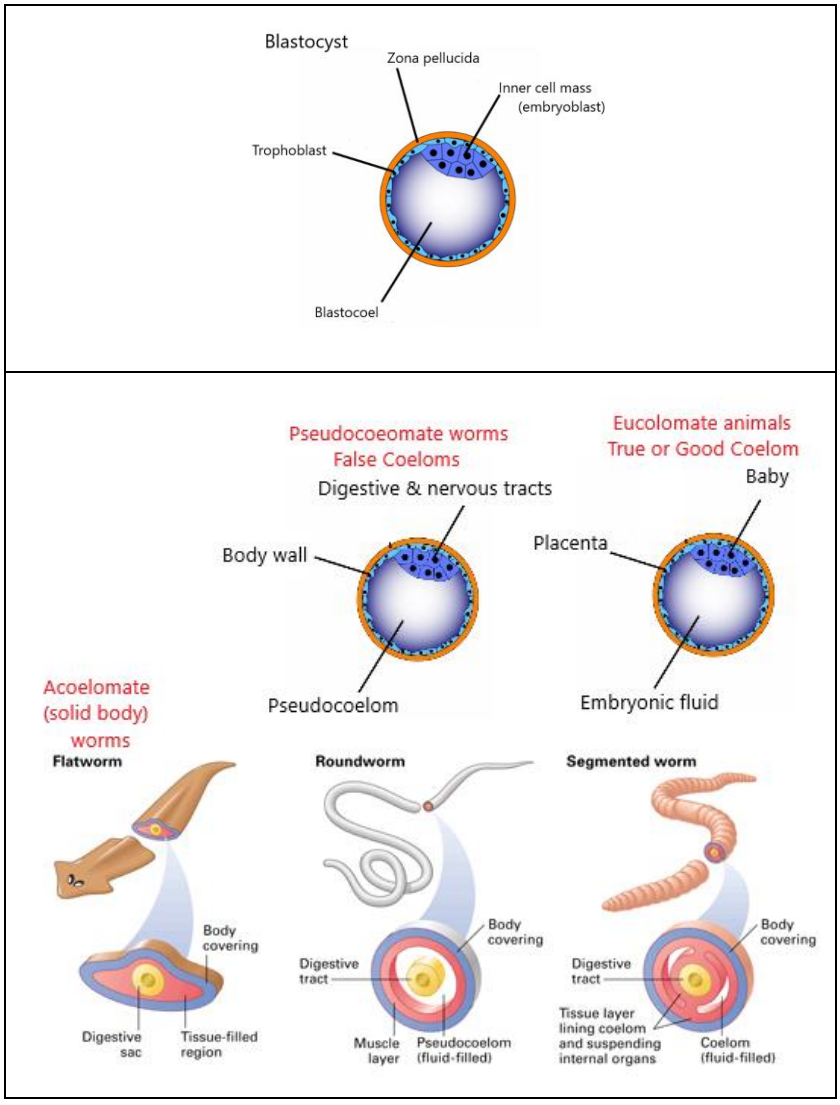
Zoology - PSEUDOCOELOMATE ANIMALS – the Aschelminthes

I. Compared and Contrasted to Acoelomate Animals

A. They are like the acoelomate animals in that they…
   1. They are bilateral “worms”
   2. Cephalization
   3. Lack circulatory and respiratory systems

B. They are more complex than the acoelomate animals in that they…
   1. They have a pseudocoelom derived from the blastocoel.
   2. They are more mobile.
   3. They have more complex reproductive systems.
   4. They can store wastes for discharge out of the body.
   5. They have a complete mouth to anus digestive system

II. What is a pseudocoelom?



A. Structure

1. The original _____ of the embryo persists as a space or cavity between digestive cavity and the body wall. These worms are retaining an embryonic structure as part of their adult body.
2. Since it lacks the peritoneal lining of a true coelom, it is a Pseudocoel "_____".

B. Biological Contributions

1. Pseudocoelom generally provides greater freedom of movement.
2. There is space for more development of digestive, excretory, and reproductive systems.
3. It is simpler to distribute materials throughout the body.
4. This provides a storage area for waste products to be later discharged.
5. As a _____ organ, the cavity is a base for muscles that provide movement.

III. Pseudocoelomates

A. A term which refers to animals with a pseudocoelomate body plan is Aschelminthes.

1. _____ -- A heterogeneous phylum of small to microscopic wormlike animals; individuals are pseudocoelomate and mostly unsegmented and are covered with a cuticle.

B. Except in parasitic _____, the digestive tract is complete (from mouth to pharynx to intestines to anus).

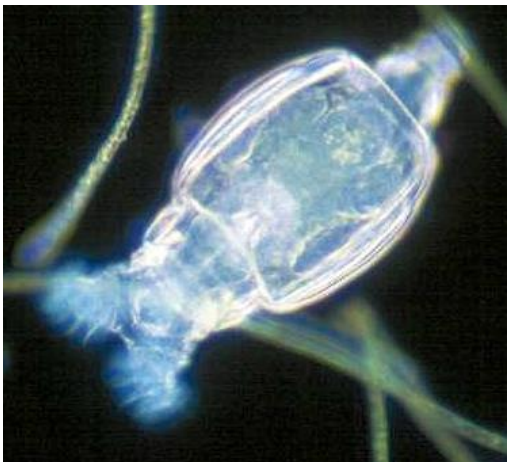
C. Digestive tract, gonads and excretory organs are within the _____.

D. In some, the epidermis secretes a nonliving _____.

IV. Lophotrochozoan phyla – the Aschelminthes that do NOT molt

- **Phylum Rotifera**
- **Phylum Acanthocephela**

A. Phylum Rotifera



1. Rotifers have a ciliated crown, the _____ that beats like a rotating wheel.
   a. Rotifers are highly diverse in color, size and shape; some are colonial.
   b. Rotifers are found worldwide _____ distribution) with over 1,800 species known.
   c. Most are freshwater species but a few are _____ (living in salt water), _____ (living on dry land) or parasitic.
   d. Many endure _____ (drying out) and temperature changes by _____.

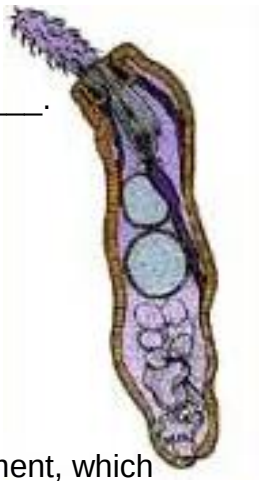
2. Reproduction
   a. Rotifers are usually _____
      1) Males are smaller than females.
      2) In some classes, males are unknown, and in others, males occur only

briefly.

b. Bdelloidea females are _____, producing diploid eggs that hatch into diploid females.

c. Monogononta females produce diploid _____ eggs that form diploid females, or haploid _____ eggs that, if not fertilized, become haploid males.

B. Phylum Acanthocephala – _____ worms



1. All spiny-headed worms are parasites in the intestines of _____.
   a. Its proboscis has rows of recurved spines that penetrate and may rupture host intestines.
   b. Larvae develop in crustaceans or insects.
   c. They never infest humans.

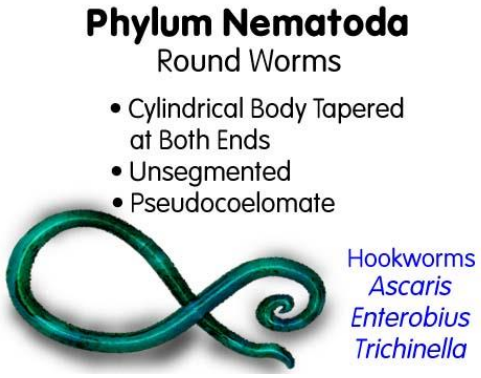
2. Form and Function
   a. The body is somewhat flattened.
   b. Both longitudinal and circular body wall muscles are present.
   c. There is no respiratory system or heart.
   d. They lack a digestive tract and absorb all nutrients across the tegument, which bears some enzymes.
   e. Shelled embryos discharged in the feces do not hatch until eaten by an intermediate host, often _____.
   f. Larval **acanthors** burrow through beetle intestine and develop into juvenile **cystacanths** in the insect hemocoel.

V. The Ecdysozoan phyla – Aschelminthes that do molt

- **Phylum Nematoda**
  - Roundworms
  - Pinworms
  - Hookworms
  - Trichina worms
  - Filarial worms
- **Phylum Nematomorpha**

A. Phylum Nematoda: _____

1. About 12,000 species are described; perhaps a half million exist.
   a. They live in virtually all habitats in all biomes; topsoil may contain billions per acre.
   b. Nematode parasites exist in nearly all animal and plant species;
      1) They are economically important.
   c. Free-living nematodes feed on bacteria, yeasts, fungal hyphae and algae.
   d. Predatory nematodes eat rotifers, tardigrades, small annelids and other nematodes.
   e. Nematodes are also important as food for mites, insects, larvae and fungi.



2. Form and Function
   a. Distinguishing Characteristics

1) They have a cylindrical shape.
2) They have nonliving cuticle.
3) Muscles in the body wall only run longitudinally.

b. The pseudocoel serves as a hydrostatic skeleton against which longitudinal muscles work.

c. An outer, thick, noncellular **cuticle** is secreted by the underlying hypodermis.

d. The cuticle has layers of crisscrossing collagen, providing elasticity but constraining expansion.

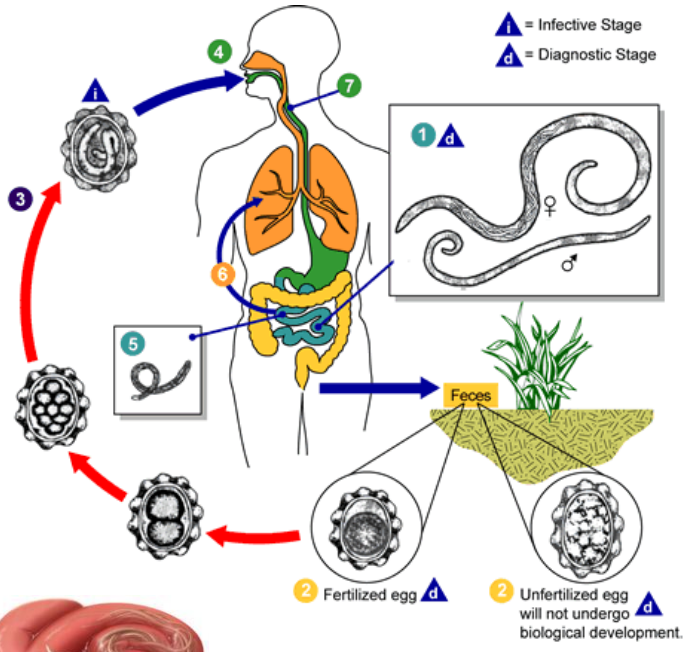
e. Digestion

1) The alimentary canal consists of mouth, pharynx, a non-muscular intestine, a short rectum and the anus.

f. Reproduction

1) Most nematodes are dioecious with males smaller than females.
2) The male has copulatory spicules to hold the female vulva open against hydrostatic pressure.
3) Fertilization is internal and eggs are stored in the uterus until deposited.

B. **Phylum Nematoda: The Large Roundworm of humans**: _____



1. *Ascaris lumbricoides* occurs in up to 64% of people in some areas of the southeastern U.S.
2. More than 1.2 billion are affected worldwide.
3. A female *Ascaris* lays 200,000 eggs a day, passing out in the host's _____.
4. Embryonic development completes in two weeks.
5. Viable eggs remain after signs of fecal matter have disappeared; eggs survive long periods in soil.
6. When a host swallows _____, juveniles hatch and burrow through intestinal wall.
7. Carried through the heart to the _____, they break into the alveoli and are carried up to the tracheae.
8. Coughed up and swallowed, they mature in the _____ two months after they were swallowed.

9. They feed on _____ and may block or perforate the intestines.

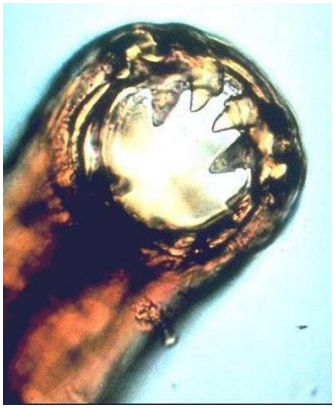
10. Infection avoidance:

C. **Phylum Nematoda: Pinworms**: _____

1. It is the most common _____ parasite in the U.S. but causes little disease.
2. Adults live in the large intestine and cecum.
3. Females, about 12 mm long, migrate to the anal region at night and lay eggs, causing _____.
4. Scratching the anal region contaminates hands and bedclothes.

5. Eggs develop rapidly and become infective within six hours at body temperature.
6. When _____, they hatch in the duodenum and mature in the large intestine.
7. Members of this order have haploid males from unfertilized eggs; females are diploid and come from fertilized eggs.
8) Infection avoidance:

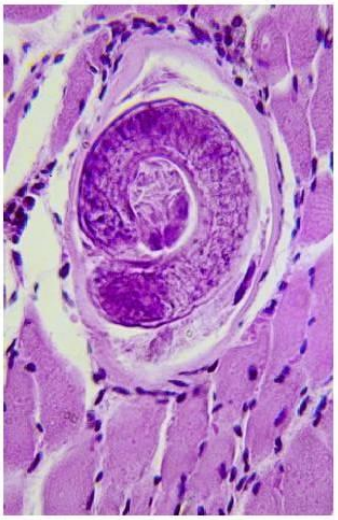
D. **Phylum Nematoda: Most common human hook worm:** _____



1. The anterior end of these small (9-11 mm) worms has a hook-like curve.
2. The males and females are separate.
3. Large plates in their mouths cut into intestinal mucosa; then they suck the _____.
4. They pump through more blood than they digest;

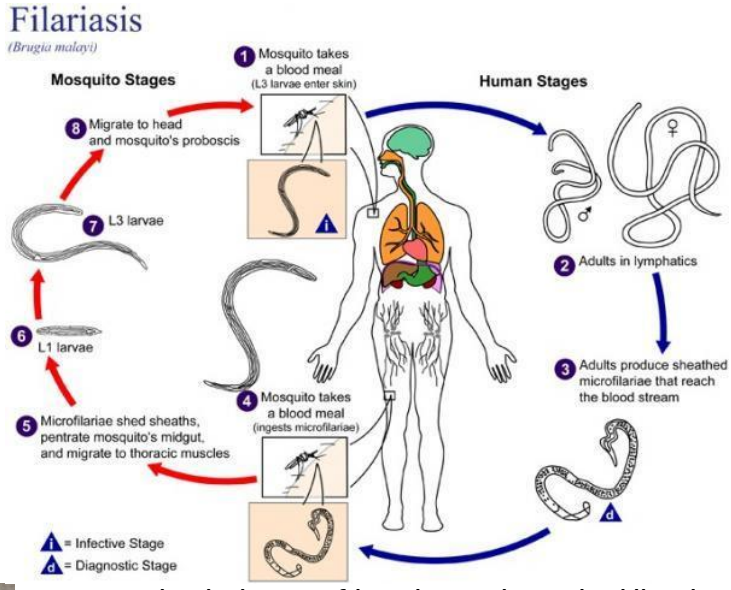
heavy infections cause _____.
5. Eggs pass in _____ and juveniles hatch in soil where they live on _____.
6. If human skin comes in contact with soil, infective juveniles burrow through _____ to _____.
7. Similar to *Ascaris*, they travel in blood to lungs, are coughed up to be swallowed, and mature in the intestine.
8. Infection avoidance:

E. **Phylum Nematoda: The Trichina Worm:** _____



1. While tiny, this worm can cause potentially lethal _____.
2. Adult worms burrow into the intestinal mucosa and females directly produce _____.
3. Juveniles penetrate blood vessels and circulate throughout the body to all tissues and spaces.
4. They penetrate skeletal muscle cells, redirecting gene expression of the musculature so it loses its striations and becomes a _____to the parasite.
5. When meat containing live juveniles is eaten, worms are liberated and mature in the _____.
6. They infect humans, hogs, rats, cats and dogs; hogs can become infected eating uncooked scraps of infected meat or rats.
7. Heavy infections cause death; about 2.4% of the U.S. population is infected, mostly lightly.
8. Infection avoidance:

F. **Phylum Nematoda: Filarial Worms** - Eight species of filarial nematodes infect humans; some cause major and serious diseases.



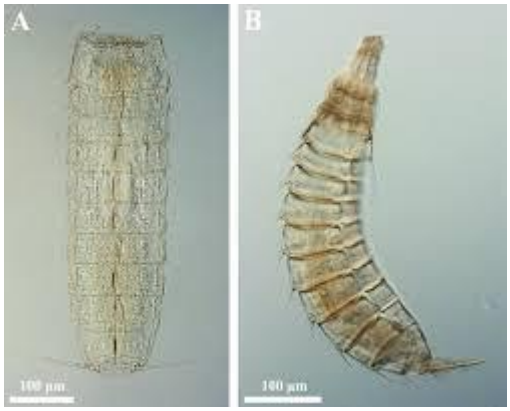
1. *Wucheria bancrofti* and *Brugia malayi* live in the _____ system.
    a. The worms cause inflammation and blockage of the lymphatics.
    b. Females release live young, tiny _____, into blood and lymph.
    c. _____ ingest the microfilariae when they feed; the worms develop to the infective stage and move into the mosquito bite wound when it feeds.
    d. _____ is caused by repeated exposure; swelling and growth of connective tissue causes enormous swelling of body parts.
2. River blindness or _____ is carried by _____ and infects 30 million people in tropics.
3. Dog heartworm, _____, is carried by mosquitoes and is most common U.S. filarial worm.

G. Phylum Nematomorpha – "_____"

1. Resemble coarse hairs from a horse's tail.
    a. People believed they spontaneously generated when a horse's tail fell into water. The name stuck.
2. Form and Function
    a. Adults are free-living in moist habitats; juveniles are parasites of _____.
    b. They range from 10 to 70 cm long but only 0.3 to 2.5 mm in diameter.
    c. Circulatory, respiratory and excretory systems are lacking.
    d. Juveniles only emerge from the arthropod host when _____ is nearby.
    e. Females discharge eggs into water; juveniles hatch and gain entry to the arthropod host.
    f. After months in an arthropod host, the mature worm emerges into nearby water or during rainfall.
    g. Somehow, the parasite stimulates terrestrial insects to seek water.

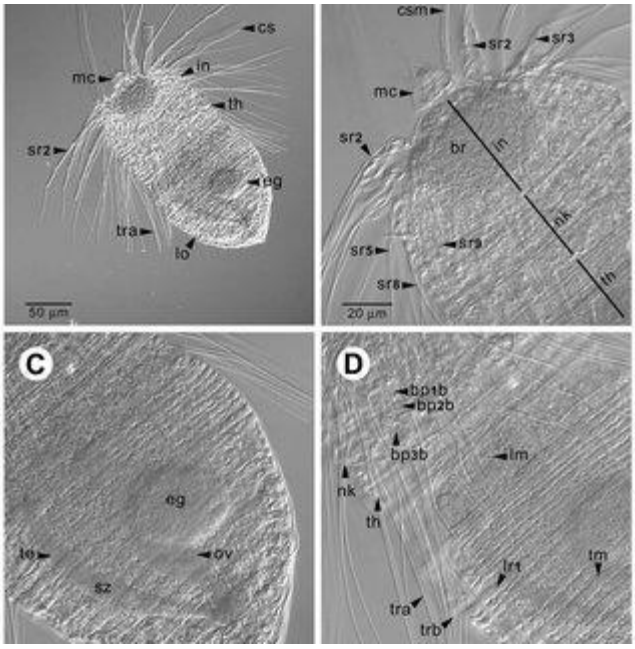
Watch this video of horsehair worm escaping from a cricket! http://youtu.be/D7r1S6-op8E

C. Phylum Kinorhyncha



1. Kinorhynchs are small (usually less than 1mm long) marine animals that feed on _____ (a photosynthetic single celled organism enclosed by a shell of silica).
    a. About 75 species are known.
    b. They are cosmopolitan.
    c. The body is divided into 13 segments with spines but no cilia.
    d. It cannot swim, but anchors in its silt or mud burrow with spines.
2. Reproduction
    a. Sexes are separate with paired gonads and gonoducts.
    b. Development includes a series of six juvenile stages and a nonmolting adult.

D. Phylum Loricifera



1. Loriciferans were recently discovered (_____) in spaces between marine grains.
    a. They are tiny, less than ¼ mm.
    b. They are apparently widely distributed.

E. Phylum Priapulida

1. 18 species of these marine worms occur in colder waters.
2. Some are tube dwellers and feed on _____ (a mass of dead or decaying organic matter).
3. Priapulids have cylindrical bodies under 15 cm long.
4. They burrow by body contractions and orient their mouth at the surface.
5. A chitinous cuticle covers the body and is molted regularly.