Zoology Lecture - Pseudocoelomate Animals

A. Coelom - Peritoneal Cavity

1. True coelom formed from mesoderm during development -
    a. Remember 3 germ layers
        1. Ectoderm
        2. Mesoderm
        3. Endoderm
2. Covered with mesodermal epithelium called peritoneum
3. Higher invertebrates (molluscs, annelids, echinoderms) and vertebrates

B. Pseudocoelom

1. Not formed from cavity in mesoderm - between mesoderm and endoderm
2. Purpose of pseudocoelom:
    a. Hydrostatic Skeleton
        1. Water-filled. used to counteract force of muscles
3. Nine phyla have this characteristic - so basic that it sets them apart
    a. Most phyla small, some microscopic.
    b. Few characteristics are shared - diverse group of phyla
    c. Once put together in one phylum - since split
4. We will emphasize the Nematodes -

C. Nematodes (round worms)

1. Abundant in many environments - soils, freshwater, many parasites
2. 12,000 named species, but many unnamed in soil and freshwater
3. Characteristics
    a. Bilaterally symmetrical, cylindrical in shape
    b. Body covered with cuticle - flexible non-living
    c. No cilia or flagellae
    d. Longitudinal muscles only - no radial muscles
    e. Excretory system one or more simple gland cells
    f. Pharynx - muscular throat
    g. Male reproductive tract opening into rectum to form cloaca - female separate
    h. Pseudocoel - hydrostatic skeleton
4. Functional Anatomy
    a. Hydrostatic skeleton
        1. Pseudocoel contains fluid under high pressure

2. Contract muscles on one side - resistance - snap back
    a. Allows thrashing movement
    b. "Swimming"

b. Alimentary canal is mouth and muscular pharynx
    1. Food sucked into pharynx
    2. Intestine with single cell layer
    3. Rectum

c. Ring of nerve tissue around pharynx - dorsal and ventral nerve chords

5. Nematode parasites of humans - not only nematodes that are important, but best known

a. *Ascaris lumbricoides* - you will see in lab
    1. Common parasite of humans
    2. 30 cm (1 ft long) produce 200,000 eggs per day
    3. Live in intestine - eggs pass in feces - eggs are really resistant
        a. last alive through formalin
    4. Host picks up parasite from fecally contaminated food or fingers in mouth
    5. Life cycle in humans
        a. Enter from fecal contamination
        b. Juveniles hatch in intestines
        c. Penetrate intestinal wall and carried through blood to lungs
        d. Reswallowed and reach intestine - grow to maturity
        e. Cause intestinal blockage and/or abdominal cramps
        f. Diagnosed from eggs in feces - killed by proper drugs
            1. "Deworming" in dogs

b. Hookworm - *Necator americanus*
    1. Live in intestines - penetrate intestinal wall and suck blood
    2. Cause anemia
    3. Embryos passed in feces - juveniles hatch in soil - burrow into naked human skin (bare feet) - get to intestines like *Ascaris*

c. Trichina worm - *Trichinella spiralis*
    1. Trichinosis - Potentially lethal
    2. Tiny adults burrow into small intestine - female produces young

3. Young float in blood and penetrate skeletal muscle - live in muscle cells
4. Only mature if muscle is eaten by another animal
5. Symptoms - muscle pain
6. Source = uncooked pork
    a. Pigs fed on garbage which contains pork scraps
    b. Can be killed by thorough cooking of pork
7. Curable by medicines
8. Ecological transmission of worm - from prey to predators
    a. Especially cannibalistic predators

d. Pinworm - not much disease
1. Live in large intestine
2. Lay eggs around anus - causes itching -spread eggs
3. Scratching itch spreads eggs

e. Filariasis - mainly tropical
1. Live in lymph system
2. Transmitted by mosquitoes
3. Elephantiasis - caused by long-term exposure - gross swelling of limbs

6. Nematodes important pests on plants - destroy roots
7. Free-living nematodes - large numbers in soils
    a. Consume organic matter in soils - detritus feeders
8. *Caenorhabditis*
    a. Many pseudocoelomates have eutely
        1. Each individual has a fixed number of cells in body
        2. *Caenorhabditis* has 1,000
    b. Convenient characteristic of worm - allows developmental biology research
        1. We know the history of each cell
    c. Model system for developmental biology of nervous system
    d. Check web - hot topic in molecular biology

D. Rotifers - important freshwater plankton
1. Zooplankton float in water
2. Wheel organ - cilia around mouth

3. Mastax - a jaw-like structure in mouth that allows grinding food - species specific
4. Food
    a. Unicellular plants
    b. Other rotifers
5. Important food for juvenile fish
6. Parthenogenetic through most of the year - when conditions get bad (fall) they produce mictic eggs that are fertilized and overwinter in lake mud
7. Dominate Tower Lake