

Simple Invertebrate Animals

BIO 182

Animals are members of the Kingdom Animalia. Zoologists use several major criteria and many minor ones to classify animals. We will focus on some of the major criteria in this laboratory exercise, including symmetry, levels of organization (tissues, organs, and organ systems), embryonic tissues, body plan (i.e., complete or incomplete digestive system), body cavity (coelom), segmentation, and the fate of the blastopore. These properties and others will be demonstrated in this survey of some of the invertebrate phyla.

This first lab will involve microscopic observations of simpler (parazoa, and non-coelomate and psuedocoelomate eumetazoan animals)

Phylum Porifera (Sponges; Parazoa)

Sponges are simple, primitive animals that probably evolved from flagellated protozoans related to the Choanoflagellates. Most forms are marine, with only a few living in fresh water. The cells are so loosely arranged into tissues that the level of organization is intermediate between distinct cellular and tissues levels.

The body wall of the sponge is perforated by numerous pores. The beating flagella of the **collar cells** maintain a constant flow of water through the **incurrent pores**, into the **central cavity**, and out the **osculum** in the top. Tiny food particles in the water are engulfed by the amoeboid action of the collar cells and digested in food vacuoles.

Exercise:

1. Examine a prepared slide of *Grantia* longitudinal and cross section. Sketch and label the collar cells. These are tiny and will require 400 x magnification.

Phylum Cnidaria (Jellies, Anenomes, Hydras, corals; Radial Eumetazoans)

Cnidarians include jellyfish, sea anemones, corals and hydroids. They may live singly or in colonies, and are characterized by a **sac body plan**, with a **mouth** opening into

a **gastrovascular cavity**, a tissue level of organization, radial symmetry, and stinging cells that shoot tiny darts called **nematocysts**.

Two types of adults stages are recognized. 1. **Polyps** have tubular bodies with a mouth and tentacles at one end and usually are attached to a substrate by the other end. 2. **Medusae** are free-swimming jellyfish that have umbrella- or bell-shaped bodies, with a mouth located in the center of the concave side and tentacles hanging from the edge of the bell.

Exercise

1. Examine two slides of Hydra. One labeled plain budding, which illustrates asexual reproduction in these animals. They also reproduce sexually. The second slide is labeled Hydra ingested food and shows the dominant gastric cavity (stomach) which contains some prey inside (hydras are predatory). Sketch and label the mouth, tentacles, gastrovascular cavity, and budding hydra (smaller ones). Examine live hydras, if available.
2. Examine the coral specimens. Look at these under a dissecting scope to locate and sketch the coral openings.
3. Examine the prepared slide of a sea anemone (*Metridium*). The slides are both cross sectioned (CS) and Longitudinal sectioned (LS). Identify and label the gastric cavity (central region) of the *Metridium*.
4. Examine the slides of *Obelia*, another Cnidarian, with both colonial anemone stages and free swimming medusa stages. Draw the anemone stage under 40x and the medusa stage at 100x.

Phylum Platyhelminthes (Flatworms; bilateral Eumetazoans)

Flatworms are distinguished by (1) having a sac-like body plan, (2) bilateral symmetry, (3) being triploblastic, and (4) having no coelom (acoelomate). A common planarian flatworm, *Dugesia*, is typical of non-parasitic forms. The mouth and extensible pharynx are located in the middle of the ventral surface. Food is passed by the pharynx into the branched gastrovascular cavity (not a coelom), where digestion takes place. Nutrients are distributed to other cells by simple diffusion.

Exercises:

1. Examine a prepared slide of *Dugesia* (a planarian) whole mount. Sketch and label the gastrovascular cavity, mouth, pharynx, and eyespots. Use 40-100x. Examine living specimens under the dissecting scope, if available.
2. Examine the slide of *Dipylidium* or *Taenia*, a parasitic tapeworm from the same phylum. Draw and label the proglottid (egg) segments, which should be quite large. Also draw and label the much thinner beginning of the animal – which contains the scolex or head region with hook-like structures (these will appear to be circular areas on the animal. 40x on the body, 100 x on the scolex region.

3. Examine and sketch a specimen of *Fasciola hepatica*, the human liver fluke. Use the dissecting scope for this.

Phylum Nematoda (Roundworms; bilateral Eumetazoa that are pseudocoelomates)

Roundworms are characterized by (1) a cylindrical, bilaterally symmetrical body tapered at each end, (2) a tube-within-a-tube body plan (complete digestive system), and (3) a “false” coelom, or pseudocoelom. Most roundworms are free-living, but some are important parasites of plants and animals. *Ascaris* is a large roundworm parasite that lives in the small intestine of humans and pigs and feeds on partially digested food. Sexes are separate, and females can be distinguished from males because they are larger and do not have a curved posterior end. The body wall consists of longitudinal muscles, epidermis, and a cuticle that is secreted by the epidermis. The cuticle protects the worm from the digestive action of enzymes in the host’s small intestine. The space between the intestine and the body wall is a pseudocoelom, since it is incompletely lined with mesoderm tissue.

Exercise:

1. Examine a prepared slide of *Ascaris* cross section (cs). Sketch and label the epidermis, muscles, intestine, female or male reproductive organs (you will need to compare the male and female specimens for this), and pseudocoelom (this will be the largest open space beyond the gut).

Phylum Rotifera (Rotifers; eumetazoan pseudocoelomates)

Common microscopic animals found in many freshwater environments.

1. Examine the prepared slide and make a fresh slide (if available) to look for rotifers. Draw and label the rotifers. Note the cilia, mastix (mouth like organ) digestive system, and feet (twin toes).

Phylum Tardigrada (*Hypsibius* sp. or water bears; eumetazoan pseudocoelomates).

Examine specimens of water bears, if available, and sketch.