BIOLOGY 1100

VANCOUVER COMMUNITY COLLEGE

Instructor: Maria Morlin

September 2020 – hybrid course

Lab #3: Invertebrates (Topics 18 and 19 in manual)

Outline

- Invertebrate lab summary of demonstrations
- Objectives
- Student submissions of dissections
- Miscellaneous photos
- Notes on invertebrates
- Resources

Protis lab summary of demonstrations

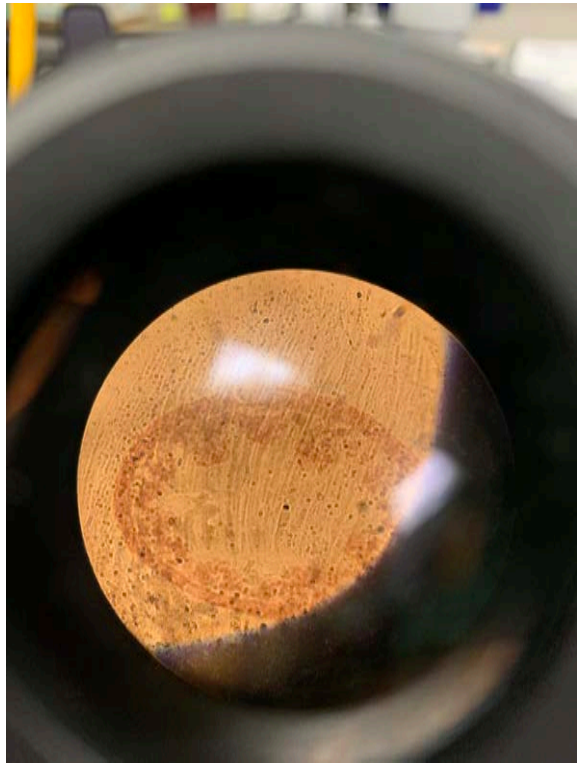
Robyn demonstrated:

1. Content of student stations in the lab, including a dissecting microscope, compound microscope, prepared slides of hydra, planaria and porifera, dissection tray with one invertebrate specimen, and dissection tools.
2. Students followed the lab manual instructions and answered questions in the manual.
3. Importantly, a table of invertebrate characteristics to be filled in was provided.
4. Specimens dissected: clam, clamworm, nematode, grasshopper, crayfish, seastar, earthworm.

Objectives

1. Capture and identify characteristics of the invertebrate groups: symmetry, locomotion, body cavity, digestive openings, circulatory system, habitat, respiratory organs, excretory system, locomotion, support, segmentation, appendages, nervous system. This portrays the progression of development of more complex and efficient characterics over time.
2. Fill out table for: sponge, hydra, planarian, clam, clamworm, earthworm, roundworm, crayfish, grasshopper, sea star (lancelet and pig next lab).
3. Develop observations skills and use of microscopes and dissection tools to investigate tissue and organ systems of invertebrates.
4. Investigate the evolution of complex systems.
5. Discover the wondrous adaptations of invertebrates to exploit various habitats such as marine, freshwater, human gut, land and air.

Student submissions

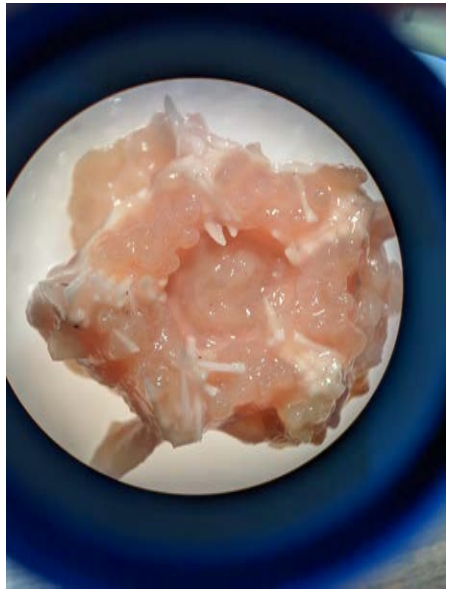
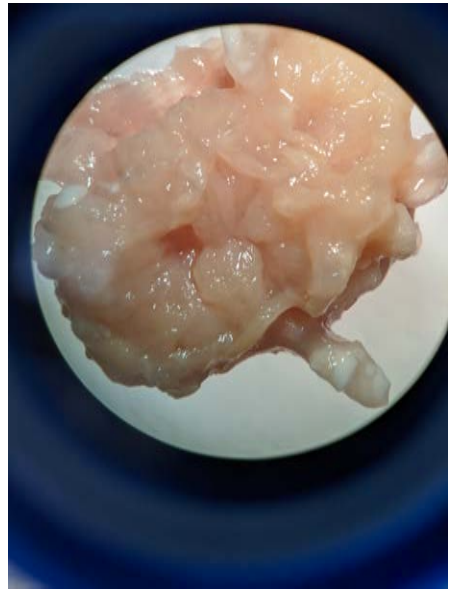
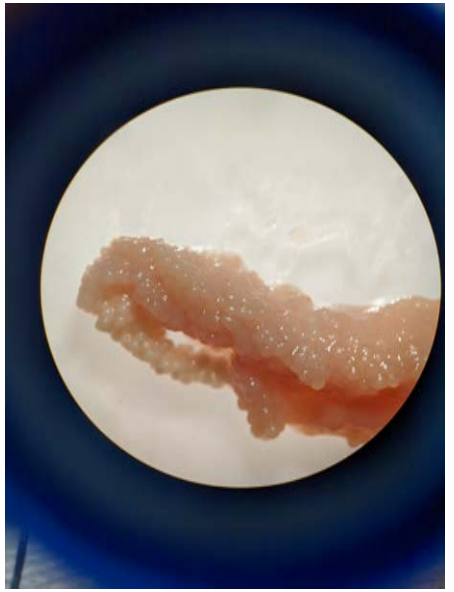



Bivalvia: clam specimen – Dissection specialist: Safaa

Identify the umbo, mantle, foot and gills.

Student submissions



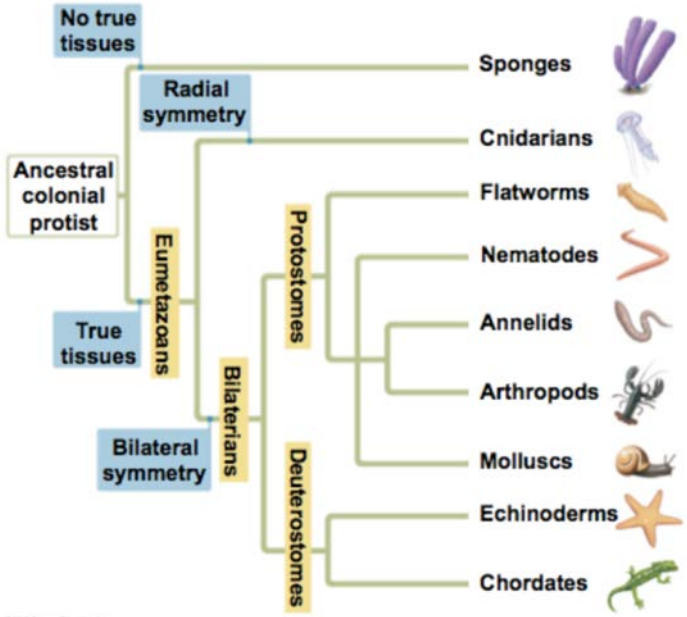




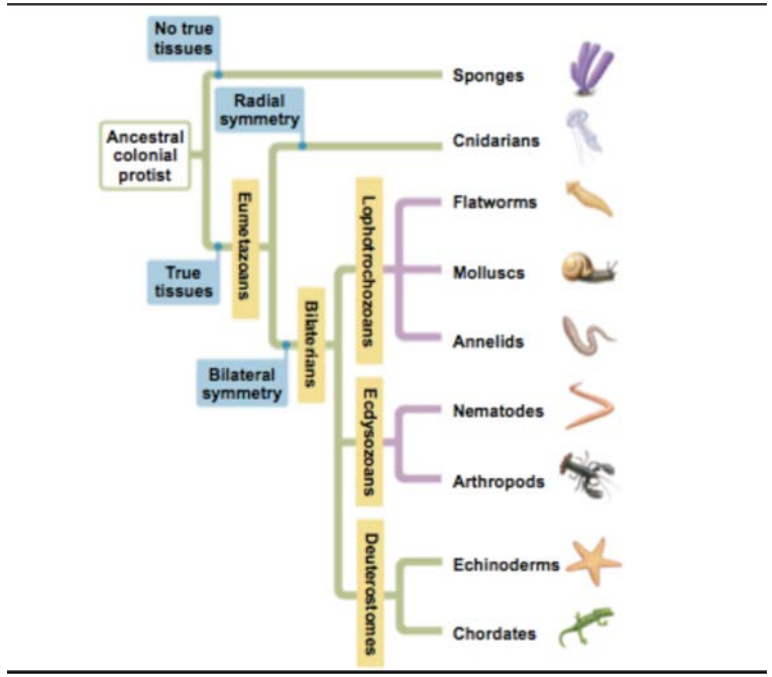
Echinodermata: seastar specimen – Dissection specialist: Andrea

Identify the water vascular system, tubefeet, digestive glands, reproductive organs, eggs.

Notes on invertebrates

Differences in the characteristics observed in the lab, such as body symmetry, segmentation, and body cavities help to organize a phylogenetic tree. Molecular evidence (DNA and proteins) sometimes rearranges the tree. A phylogenetic tree is really an hypothesis of how extant species are related, and which ones had common ancestors and how far back. There can be many hypotheses. Here are two different ones:





The right graph splits into protostomes and deuterostomes while the left graph splits into lophotrochozoans, ecdysoans, and deuterostomes. Lophotrochozoans are characterized as "crest-bearing animals". They are labeled under Lophotrochozoans because they have a lophophore or a ring of ciliated tentacles around their mouth to grasp food particles. Ecdysoans are characterized as the molting of their exoskeletons. Deuterostomes are overall characterized as fairly complex creatures.

This is the one in the manual, and is pretty good. It splits Ecdysozoa - animals that molt (nematodes and arthropods), from lophotrochazoa (flatworms, annelids and molluscs) which have the same kinds of larvae (trochophore). Taxonomists rearrange tables for different reasons – new information about body structures, embryonic development, and molecular sequencing mostly.

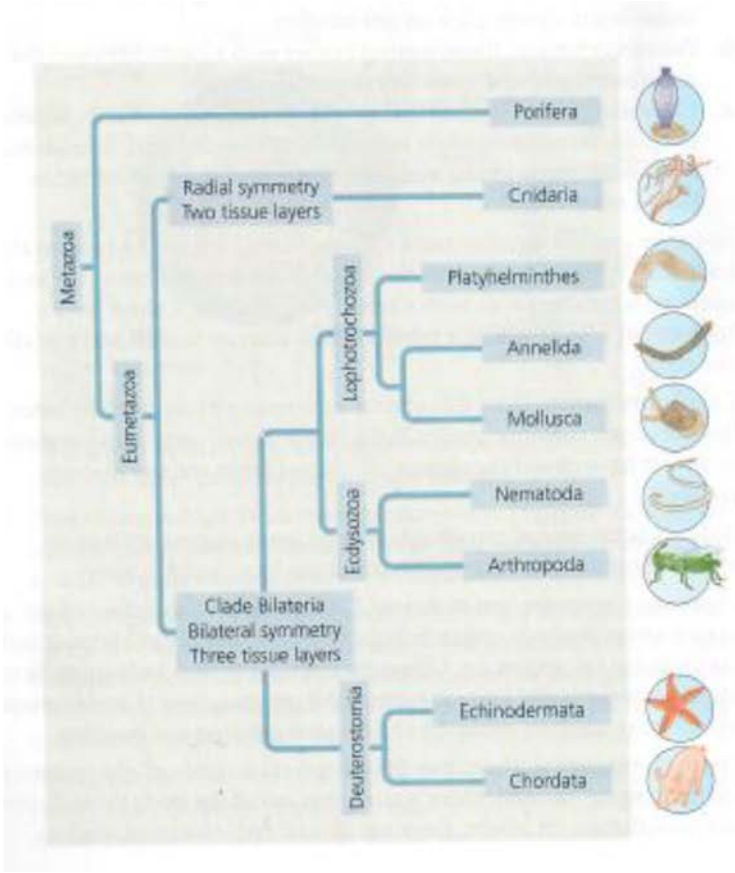
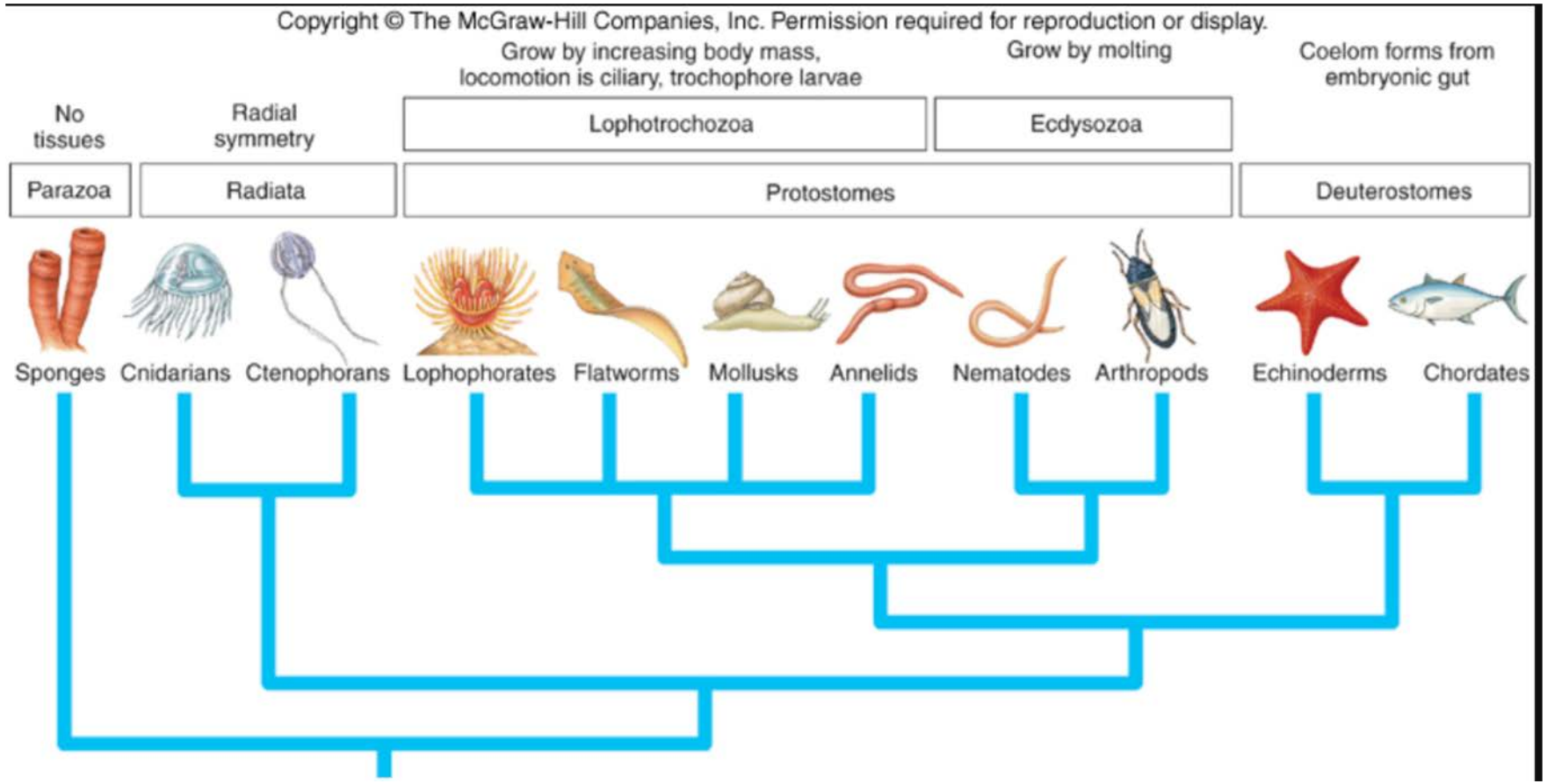


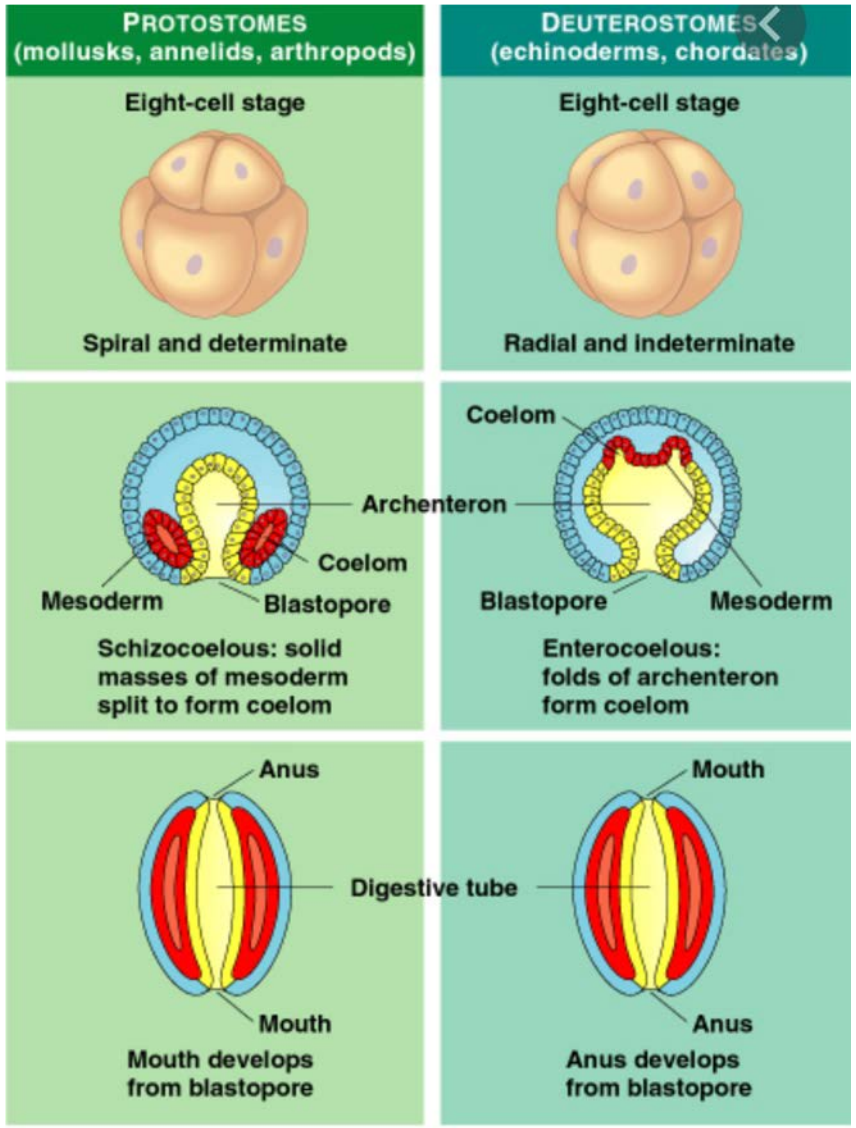
FIGURE 18.1
Phylogenetic organization of animals studied in this lab topic and Lab Topic 19 based on new molecular evidence. Animals with protostome development are assigned to one of two clades, Lophotrochozoa or Ecdysozoa.

This one is similar to the one in the manual, but has explanations for groupings above the tree.



The difference between a protostome and deuterostome

It is what happens very early on in development



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Resources

- The lab handout and the book or lecture slides are the best resources for the lab, both available on the class website.
- This is an nice 9-minute video from the Keipert Labs in Australia showing characteristics of different invertebrate groups.

- https://www.youtube.com/watch?v=EOEgWj3uTC0