

Lab 1: Lab Setup/Parasite Diversity/Microscope Basics

Learning Objectives:

At the end of this lab, a successful learner should be able to...

- 1) Describe the overall structure of the laboratory course, expectations for laboratory conduct, and how their grade is assessed
- 2) Successfully demonstrate how to use a compound light microscope, including loading specimen slides, focusing at multiple magnifications, calculating total magnification, and to accurately measure the size of objects under magnification
- 3) Label the basic parts of a compound microscope and be able to explain their function
- 4) Define parasitism (in an ecological sense), identify major parasitic groups of interest, and outline some of the life history strategies lumped together under the term "parasite"
- 5) Distinguish morphological differences separating major groups of helminth parasites across multiple life stages, and apply that knowledge to identify unknown specimens

What is a parasite?

"If a definition is helpful in the understanding of a biological process, it is worthwhile, but it should never be allowed to channel or limit one's idea" - Poulin, Evolutionary Ecology of Parasites (2007)

*Great fleas have little fleas upon
their backs to bite 'em,
And little fleas have lesser fleas,
and so ad infinitum.*

Augustus De Morgan—A
Budget of Paradoxes (1915)

Hands-on/Active Learning:

Series of scope stations dedicated to different parasite groups. Students have a handout that has a chart, with an entry for each group. Need to fill in identifying information, sketch 1-2 specimens, list identifying characteristics. After going to each station, students will be given a series of unknown samples and asked to 1) identify them to course group, and 2) describe at least 2 characteristics they used to identify them.

Assessment: Grading their chart, and identification of unknown specimens, and maybe microscope anatomy (should this be a quiz?)

What to ask them: Fill out the common name for each of these, ID a picture, place the specimen you worked with today in the right category, write some of the defining characteristics (traits common to the group, where the specimen you're looking for may be found)

What is a helminth?

Kingdom: Animalia

1. Phylum Apicomplexa (Malaria, Babesia, Cryptosporidiums, toxoplasmosis)
2. Phylum Platyhelminthes
 - a. Trematoda
 - b. Cestoda - see altizer notes. Segmented reproductive stages + suction head
3. Phylum Nematoda (roundworms)
4. Phylum Acanthocephala (thorny-headed worms)
5. Phylum Arthropoda
 - a. Class Crustacea
 - b. Class Chilipoda (centipedes)
 - c. Class Arachnida
 - i. Superorder Acariformes (Mites)
 - ii. Order Ixodida (Ticks)
 - d. Class Insecta (botflies, etc)
6. Other Assorted: leeches (annelids), birds (cowbirds),
7. Kingdom Bacteria
8. Viruses
 - a. DNA viruses
 - b. RNA viruses
9. Kingdom Fungi
 - a. Phylum Microsporidia
10. Kingdom Protozoa
11. Kingdom Plantae

Specimen Checklist

Kingdom: Animalia

- ☒ ~~Phylum Apicomplexa (Malaria, Babesia, Cryptosporidiums, toxoplasmosis)~~
 - ☒ ~~Trypanosome~~
 - ☒ ~~Plasmodium (bad quality)~~
 - ☒ ~~Toxoplasma gondii~~
- ☒ ~~Phylum Platyhelminthes~~
 - ☒ ~~Trematoda~~
 - ☐ ~~Diogenean~~
 - ☒ ~~Monogenean (liver fluke)~~
 - ☒ ~~Cestoda (2x, gravid, mature)~~
- ☒ ~~Phylum Nematoda (roundworms)~~
- ☒ ~~Phylum Acanthocephala (thorny headed worms) — not that great samples~~
- ☐ ~~Phylum Arthropoda~~
 - ☐ ~~Class Crustacea~~
 - ☐ ~~Wish I had one of these~~
 - ☒ ~~Glass Arachnida~~

☒ Superorder ~~Acariformes (Mites)~~, 1x (Unionicola)

☒ ~~Order Ixodida (Ticks)~~ -- large box

☒ ~~Class Insecta (mosquitoes)~~

☐ Kingdom Bacteria

☐ Viruses

☐ DNA viruses

☐ RNA viruses

☐ Kingdom Fungi

☐ Phylum Microsporidia

☐ Kingdom Protozoa