

Phylogenetic Collection Lab

Objectives

To connect the diversity of organisms described in class with the real world.

To connect particular phyla of organisms with their characteristic habitats.

To compare & contrast organisms within the different phyla.

To show that most of “nature” that you usually see belongs to only a few phyla.

To have you look at the world in a different way.

Assignment

Between now and your lab meeting during the week listed on the syllabus, each lab group (1 student minimum; 3 students **maximum**) must collect representatives of 16 different phyla. Groups may not share specimens. You must include one specimen from each of the following 4 phyla as part of the 16: ARTHROPODA; MOLLUSCA; CHORDATA; and ANGIOSPERMAE

Note that you must have collected your specimens **before** this lab meeting!

Specifically:

1. Because different sources disagree on the definitions of several phyla, we have created a set of web pages with the “Official Bio 112 Phylum List”. Links to these pages can be found in the section of the course website for this lab. You can click on the name of each phylum to “Google” the name of that phylum; this will give you a set of links that can help you find samples of that phylum.
2. In lab during in the week of the lab, each group will present and discuss their collection (part of your grade will be based on your participation in this).

3. In order to get credit for a particular phylum, you must bring in something that is clearly recognizable as a member of this phylum to show to your TA. It can be a whole organism or a piece of an organism, but it must be clearly recognizable as a member of that phylum. For example, a dog hair is clearly from a mammal (the only animals with hair) and since mammals are craniates, this is clearly a member of the phylum chordata. You can use a microscope to show your TA any microscopic samples.

4. **You** are responsible for defending the classification for your organism. If you have any doubt, check with your TA **in advance**. Bring any necessary supporting materials.

5. You can obtain samples from any source, including the supermarket, bait shop, florist, woods, etc.

6. In order to get credit, you must also specify where each of your samples came from. You must specify both geography (part of the world) and habitat. Note that, if you get your sample from other than its natural habitat (greenhouse, supermarket, etc.), you must specify where this organism originally came from. For example, if you include Atlantic salmon that you got at Star Market, you'd have to say that it came from the north Atlantic (geography) and from the open ocean (habitat).

7. You must also take a picture of each specimen to turn into your TA through Blackboard

8. Points for your collection will be given as follows (to a maximum of 20 points):

– to count as a member of a phylum:

- Your TA must be able to recognize it as a member of that phylum
- You must specify where it came from (geography & habitat)
- You must have a name for it (common or genus/species)

9. You will organize the data for your collection in the following manor: For each specimen you will have a sheet with Phylum, Species Name, Common name, Habitat, Where you got your specimen, Defining characteristic of the Phylum, How it gets it's nutrition, Trophic position, Mode of reproduction, a photo of your specimen and your actual specimen.

This is a group effort for a group grade. All group members will receive the same grade.

Number of phyla**Points**

1 – 16

1.25 points per phylum

You must be prepared to *defend* your selections. That is, it is up to you to prove to your TA that a particular organism is what you say it is and that it belongs in the phylum you say it is.

Procedure

You can get samples from anywhere. Some suggestions:

marshes near UMB – ethnic markets – supermarket

fish store – in your house – in your neighborhood

bait shop – off of docks or rocks

the links on the course website for this lab can give other hints

a greenhouse (not the one at UMB, though)

You can consult any sources you need (you will need to consult outside sources).

the library – your TA – your course instructor

the WWW (I have put relevant links on the course website for this lab)

You will need to preserve some of your specimens.

You can try freezing, drying, or putting them in a mixture of 2 parts rubbing alcohol (isopropanol) to 1 part water (keep this in a tightly closed container!) and storing at room temperature.

In lab during the week listed on the syllabus:

Each group should bring in their collection with the completed list as described below.

Your TA will check off the various organisms and collect your lab writeup for grading.

Your TA will then go phylum by phylum and ask “does anyone have an ...”.

The class will then discuss what they have found, where they found it, etc.

The class will pick 10 different organisms from 10 different phyla and:

-construct a table of their properties, as described later

-make a phylogenetic tree of all (as best you can) the organisms. This tree will be based on the kingdom, phylum, etc. for each organism.

The 10 Organisms you have chosen to explore in detail: Write their names and a brief description below:

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

A) Describing the Organisms

As a wrap-up of the course material (especially the Themes, Plants, and Animals material) and a review for the final exam, the class will discuss the answers to the following questions. These are based on the Themes, Plants, and Animals sections of the course. Write the numbers of the organisms from the previous page in the blanks as appropriate.

Life cycles a. Which of the *samples* you have contains:

- i) Sporophyte

- ii) Gametophyte

- iii) Gamete

- iv) Adult

- v) Spore

- vi) Seed

- vii) Diploid cells

- viii) Haploid cells

Life Cycles b. Which of the *organisms* in your collection includes the following anywhere in its *life cycle*?

- i. Sporophyte

- ii. Gametophyte
- iii. Gamete
- iv. Adult
- v. Spore
- vi. Seed
- vii. Diploid cells
- viii. Haploid cells

2) Miscellaneous details

- a) Which of the organisms have a flow-through digestive system?
- b) Which of the organisms have a nervous system?
- c) Which of the organisms have an excretory system?

3) Size and Scale

Which of the organisms have specializations required for life at larger than microscopic size? List the organisms and one different specialization for each.

B) Making the phylogenetic tree:

1) For each of the organisms in your class's collection that you can, you need to find its abbreviated taxonomic classification. This should include the levels of classification listed in *Campbell*:

kingdom

phylum

class

order

family

genus

species

Since taxonomists disagree on some classification, it is important to use one single source for this information. We have compiled a list of accepted taxonomic groups for the purpose of this class.

WARNING Taxonomy is a field that is subject to lots of disagreement and debate. As a result, the names of phyla, orders, etc. on other websites such as NCBI or ITIS may be different from those we use in Bio 112 lectures and other labs. When there is a conflict, **always** use the names used in lecture and other labs when you are giving answers on an exam.

2) Use the kingdom, phylum, class, order, family, genus, and species to draw a phylogenetic tree of the organisms in your class using a format similar to that described in your Phylogeny Lab. Label the branch points with the appropriate names.

Phylogenetic Tree of Class Collection. *Draw a tree of your collection, this tree will be based on the kingdom, phylum, etc. for each organism.*

Phylogenetic Collection List:

PRESENTATION AND DISCUSSION 10 points (Collection AND DOCUMENTATION is worth 20 pts).

Your collection and accompanying materials will be due in lab during the week listed on the syllabus in your regular lab section.

It must conform to the following format **exactly**:

- 1) At the top, you should list your TA's name & section, and the names of all the group members.
- 2) Specimen data sheets: For each specimen you will have a sheet with Phylum, Species Name, Common name, Habitat, Where you got your specimen, Defining characteristic of the Phylum, How it gets it's nutrition, Trophic position, Mode of reproduction, and a photo of your specimen.
- 3) Your specimens contained and organized.

Important Note:

Not all of the categories of living things listed in *Campbell* are phyla. For example, your text book, *Campbell* lists "cnidarians" - this is a phylum -and "anthozoans" - not a phylum.

Therefore, if you brought in an anthozoan and a hydrozoan, they would only count as one phylum since they are both members of the *same phylum* (cnidaria).