

Tree of Life

Learning about phylogenies and your
semester project

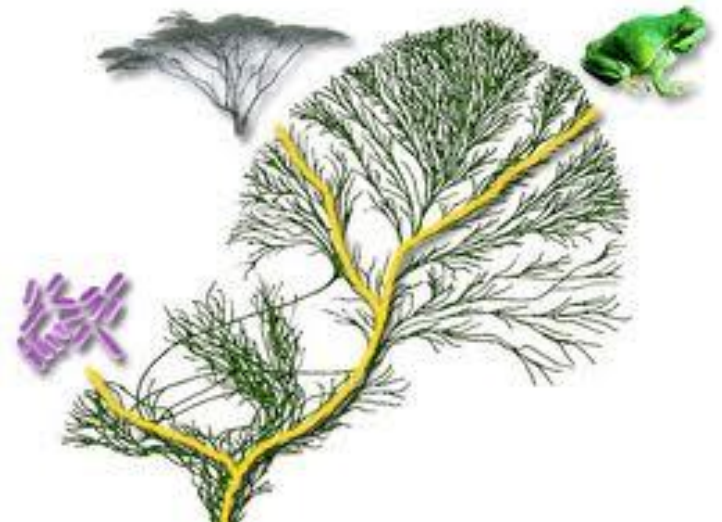
This semester's lab is about the diversity of life. One way to understand the diversity of life is with phylogenetics.

Phylogeny – a reconstruction of evolutionary relationships

Phylogenetics – the study of evolutionary relationships

<http://www.youtube.com/watch?v=mD94D0KAn2U>

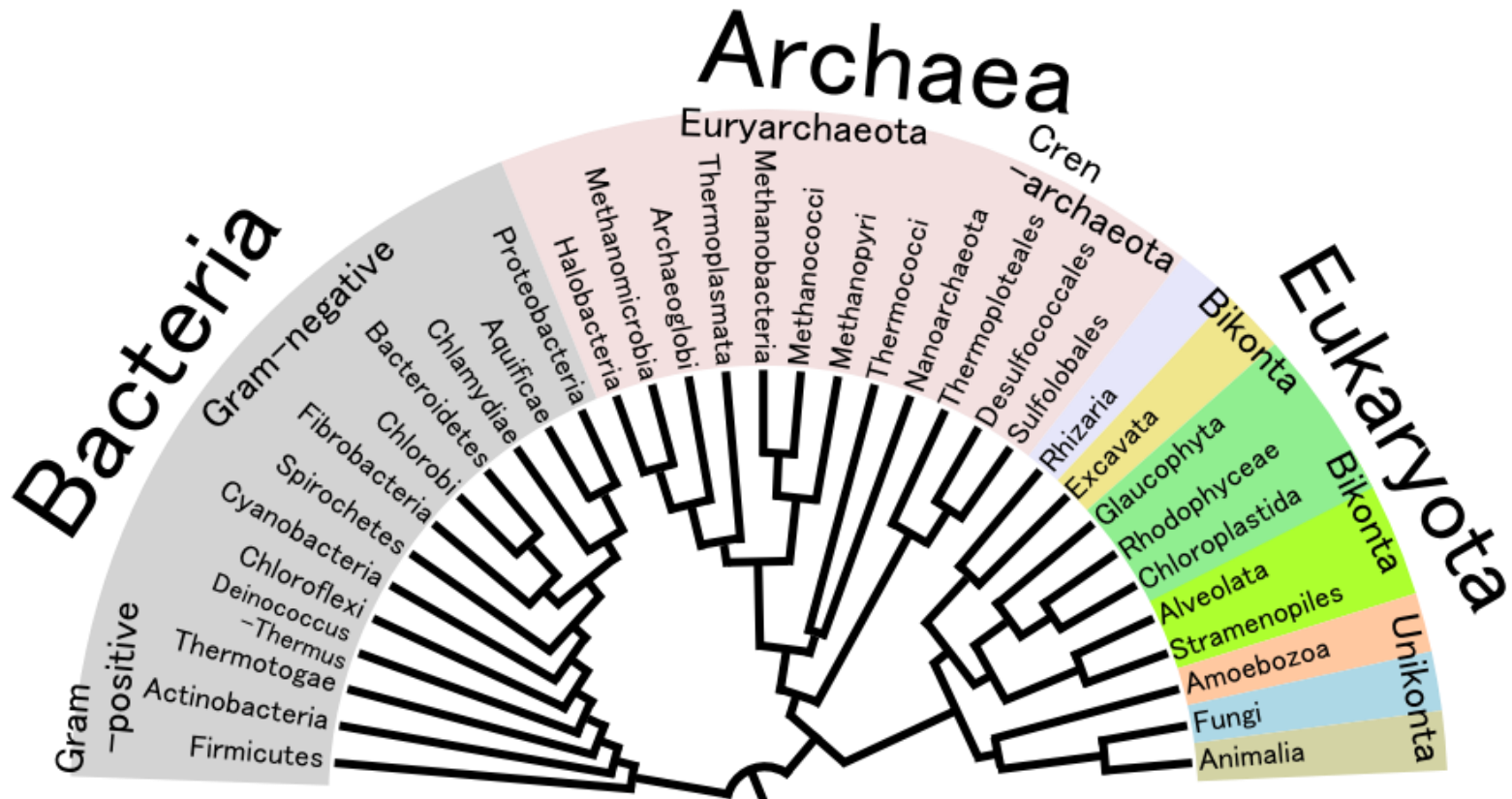
http://www.youtube.com/watch?v=ooLr8d_pDBc



Phylogenetics

This semester:

- One lab on building a phylogeny
- Then a lab on questions that can be addressed with phylogenies
- Assigned readings and discussions on phylogenies
- Semester project reconstructing one portion of the Tree of Life



Semester Project

Work in pairs and use the skills you learn in lab to build a phylogeny. Final product will be a poster on your phylogeny that will be presented in the department.

Deadlines

Week 6 – assignment of project taxonomic group

Week 7 – turn in project topic and question

Week 8 – turn in draft poster

Week 10 – turn in final poster

Week 11 – present poster

See handout for details on deadlines.

Before deciding on your project topic we will have two labs that teach you how to build a phylogeny. To prepare for those, do the tutorials and readings in the handout. Be prepared to discuss these next week.

Phylogenetics Tutorial #1 Phylogenetics systematics, a.k.a. evolutionary trees

Phylogenetics Tutorial #2 Travels in the Great Tree of Life

Assigned Reading #1

Assigned Reading #2

There are many tools and resources for building a phylogeny.

For example, phylogenies can be built with DNA, RNA, proteins, or morphology. Once a phylogeny is built, it can then be used to study the evolution of the members of the phylogeny (taxon evolution) and the traits of those species or taxa. (trait evolution)

To begin learning about the available data, visit the sites on your handout and do the database activity.

Animal Diversity Web, Global Biodiversity Information Facility, Arctos, GenBank, Tree of Life

We will be relying on data that comes from museum specimens. Museum specimens, such as those at the Museum of Southwestern Biology, serve as a record of a specimen in time and space. We can use those specimens for genetic, isotopic, and morphological data.

These specimens are important because they are a way to verify and repeat the outcomes of a study.



Photos © 2010 J.L. Dunnum

Databases

There is a lot of information currently stored in databases that are accessible online.

Some information is about animals in general, such as the Animal Diversity Web, <http://animaldiversity.ummz.umich.edu/>

Others have biodiversity data, such as the Global Biodiversity Information Facility, <http://www.gbif.org/>

Some databases are specific to museums and their collections, such as Arctos, <http://arctos.database.museum/>

Some databases have data that have been generated and published, such as GenBank, www.ncbi.nlm.nih.gov



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← **REPTILIA** *Phrynocephalus mystaceus* →
turtles, snakes, lizards, and relatives Secret Toadhead Agama

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Taxon Information



Explore Data @ Quardvark

Search Guide

ADW Mission

The Animal Diversity Web is an online database and encyclopedia of animal natural history, built through contributions from students, photographers, and many others.

It is a rich and flexible resource designed both as an encyclopedia for exploring biodiversity and for use in formal, inquiry-based education.



free and open access to biodiversity data

GLOBAL BIODIVERSITY INFORMATION FACILITY



396,026,747 indexed records
10,004 datasets
464 publishers

[Access data portal](#)

[Why join GBIF?](#)

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The Global Biodiversity Information Facility (GBIF) was established by governments in 2001 to encourage free and open access to biodiversity data, via the Internet. Through a global network of countries and organizations, GBIF promotes and facilitates the mobilization, access, discovery and use of information about the occurrence of organisms over time and across the planet.

LATEST NEWS Brazil surveys data holdings and informatics capacity

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Arctos

Multi-Institution, Multi-Collection Museum Database

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Access to 1,728,510 records

[Search](#) [Clear Form](#) [Use Last Values](#) See results as:

Type: Require Tissues? Require Media:

Identifiers

[Customize](#) [Show More Options](#)

Collection:

Alaska Lepidoptera
CRCM Birds
DGR Arthropods
DGR Birds

Catalog Number:

Identification and Taxonomy

[Show More Options](#)

Current Identification CONTAINS

Locality

[Show More Options](#)

Any Geographic Element:

[Select on Google Map](#)

Date/Collector

[Show More Options](#)

Help Collector

Biological Individual

[Show More Options](#)

Part Name:

Define Add = for exact match

Usage

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Basis of Citation:

Define

[Search](#) [Clear Form](#) [Use Last Values](#) See results as:



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- Sequence Analysis
- Taxonomy
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- Variation

Welcome to NCBI

The National Center for Biotechnology Information advances science and health by providing access to biomedical and genomic information.

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Get Started

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- [How-To's](#): Learn how to accomplish specific tasks at NCBI
- [Submissions](#): Submit data to GenBank or other NCBI databases

Genetic Testing Registry

A portal to clinical genetics resources with detailed information about genetic tests and laboratories.

GO

1 2 3 4 5 6 7 8

Popular Resources

[PubMed](#)

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[PubMed Central](#)

[PubMed Health](#)

[BLAST](#)

[Nucleotide](#)

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[SNP](#)

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NCBI Announcements

Now Available: NCBI Insights Blog!

28 Jan 2013

NCBI has just released a new blog called *NCBI Insights*. Blog posts will provide an insider's perspective to help users better

Come to the NCBI Discovery Workshops

Tree of Life, <http://tolweb.org>

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TREE OF LIFE web project

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Agaricales

(a group of fungi)



[image info](#)

The Agaricales, or euagarics clade, is a monophyletic group of approximately 8500 mushroom species...

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The Tree of Life Web Project (ToL) is a collaborative effort of [biologists and nature enthusiasts](#) from around the world. On more than 10,000 World-Wide-Web pages, the project provides information about biodiversity, the characteristics of

Before Lab 2 Next Week:

Phylogenetics Tutorial #1 Phylogenetics systematics, a.k.a. evolutionary trees
http://evolution.berkeley.edu/evolibrary/article/phylogenetics_01

Phylogenetics Tutorial #2 Travels in the Great Tree of Life
<http://archive.peabody.yale.edu/exhibits/treeoflife/learn.html>

Assigned Reading #1
http://evolution.berkeley.edu/evolibrary/article/0_0_0/specht_01

Assigned Reading #2
http://evolution.berkeley.edu/evolibrary/news/080301_elephantshrew

Database Activity – see handout

Be prepared to discuss the tutorials and the readings.
Bring one question to class for each reading.