Tree of Life

Learning about phylogenies and your semester project

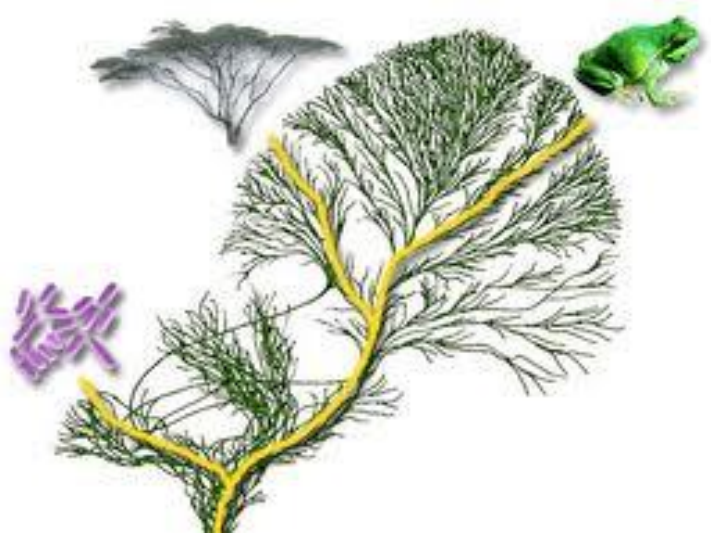
This semester's lab is about the diversity of life. One way to understand the diversity of life is with phylogenetics.

Phylogeny – a reconstruction of evolutionary relationships

Phylogenetics – the study of evolutionary relationships

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

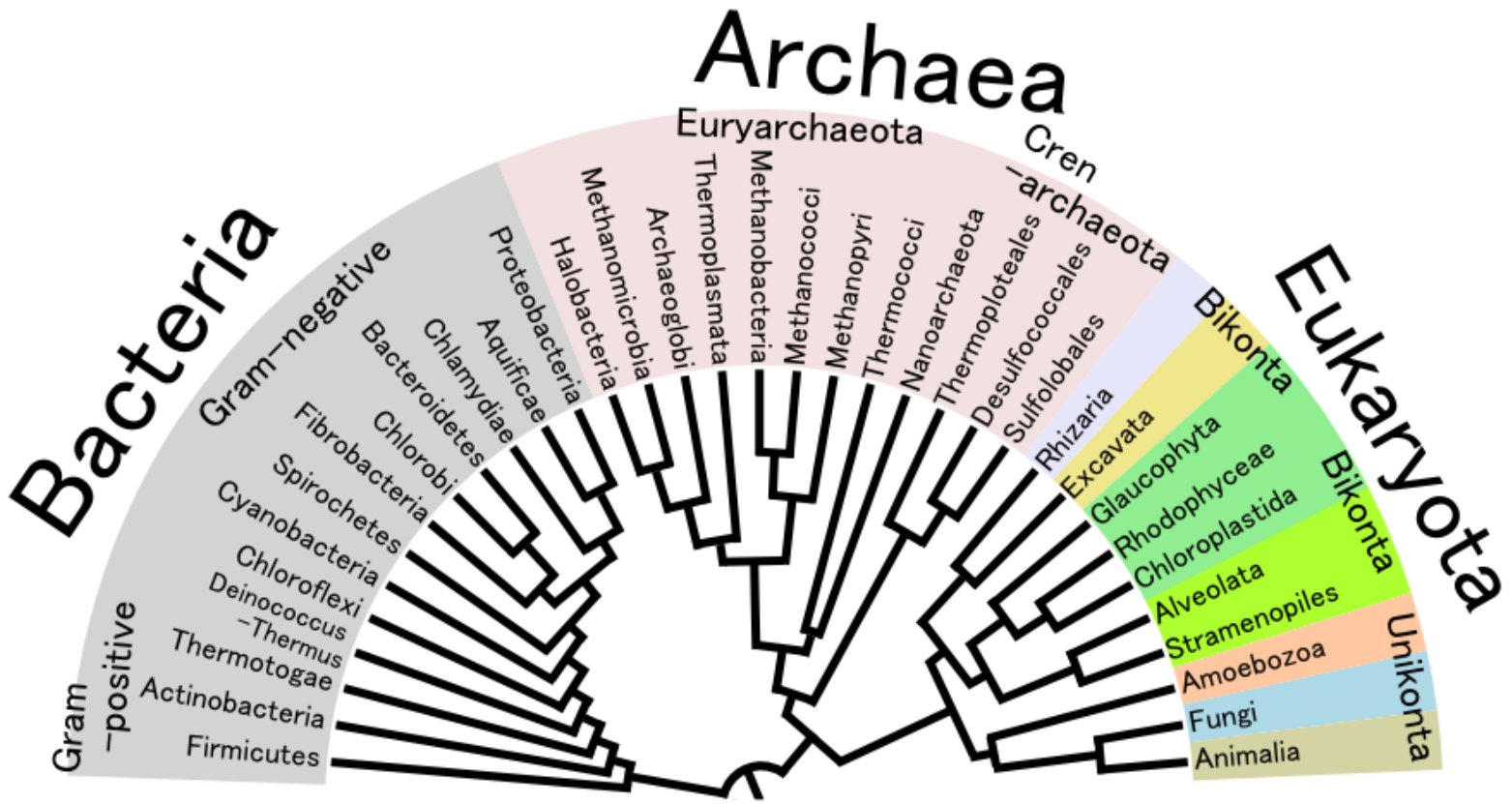
http://www.youtube.com/watch?v=ooLr8d_pDBc



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.

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/

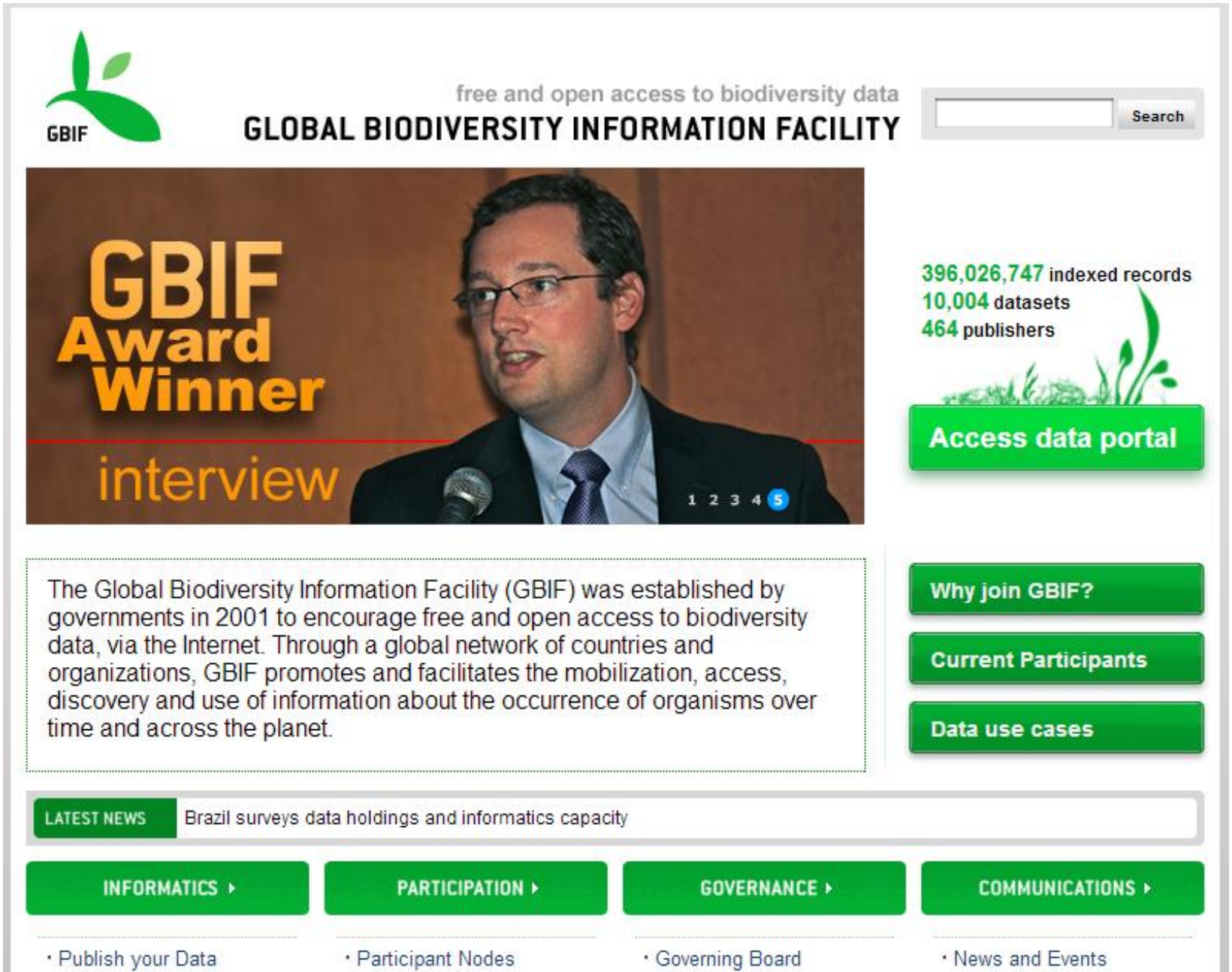
Others have biodiversity data, such as the Global Biodiversity Information Facility, http://www.gbif.org/

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

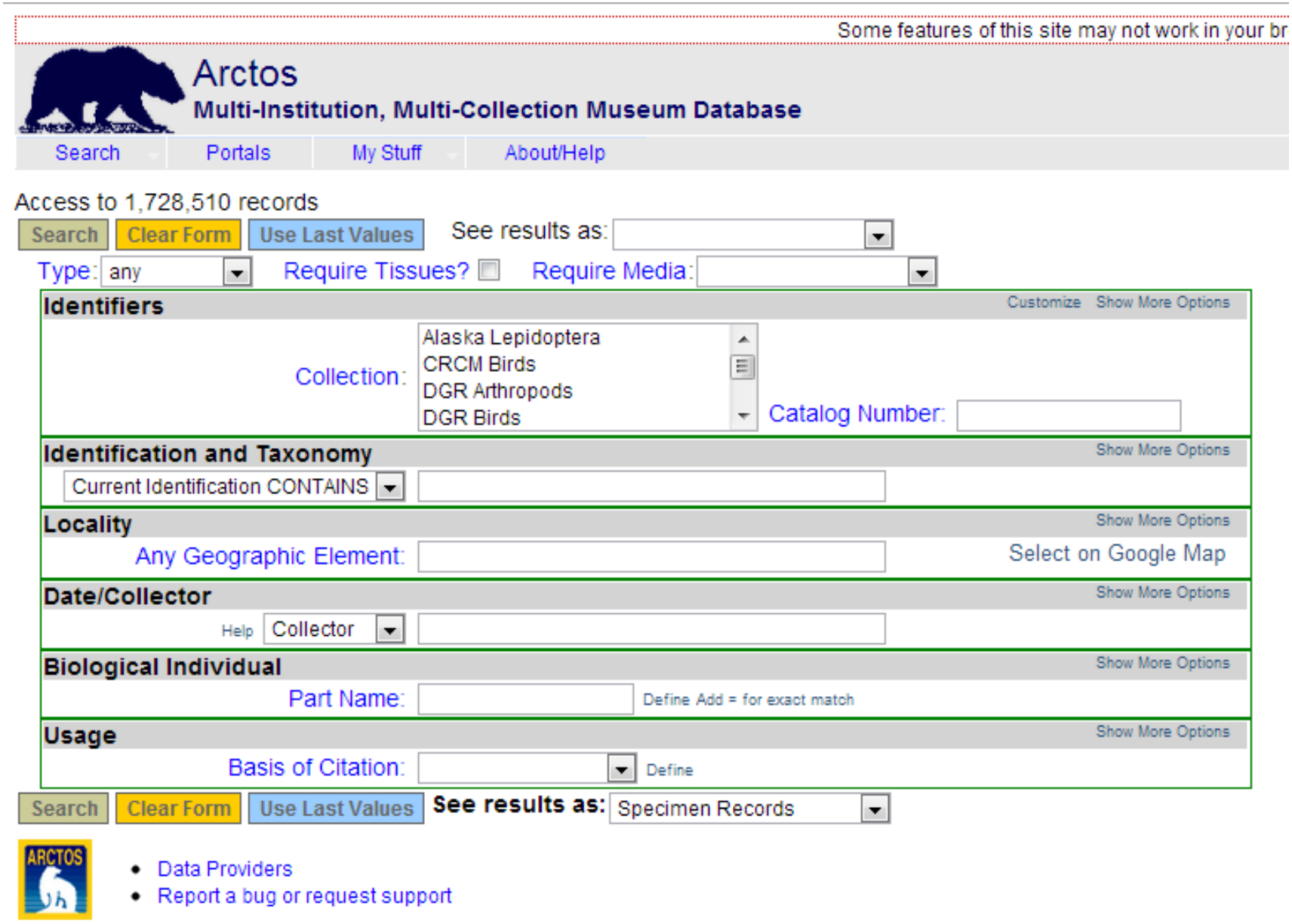
Some databases have data that have been generated and published, such as GenBank, www.ncbi.nlm.nih.gov

Animal Diversity Web, http://animaldiversity.ummz.umich.edu/

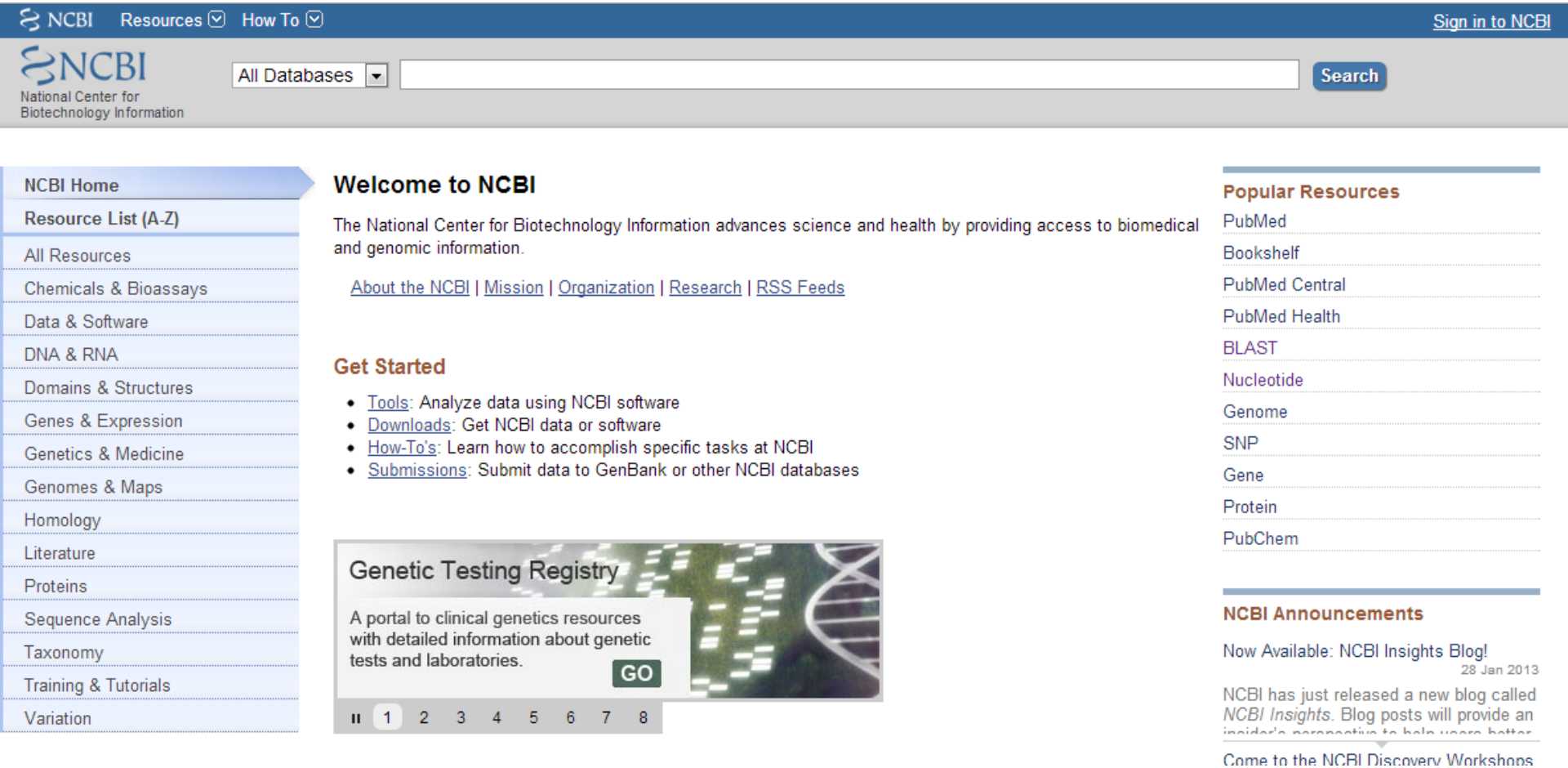
Global Biodiversity Information Facility, http://www.gbif.org/



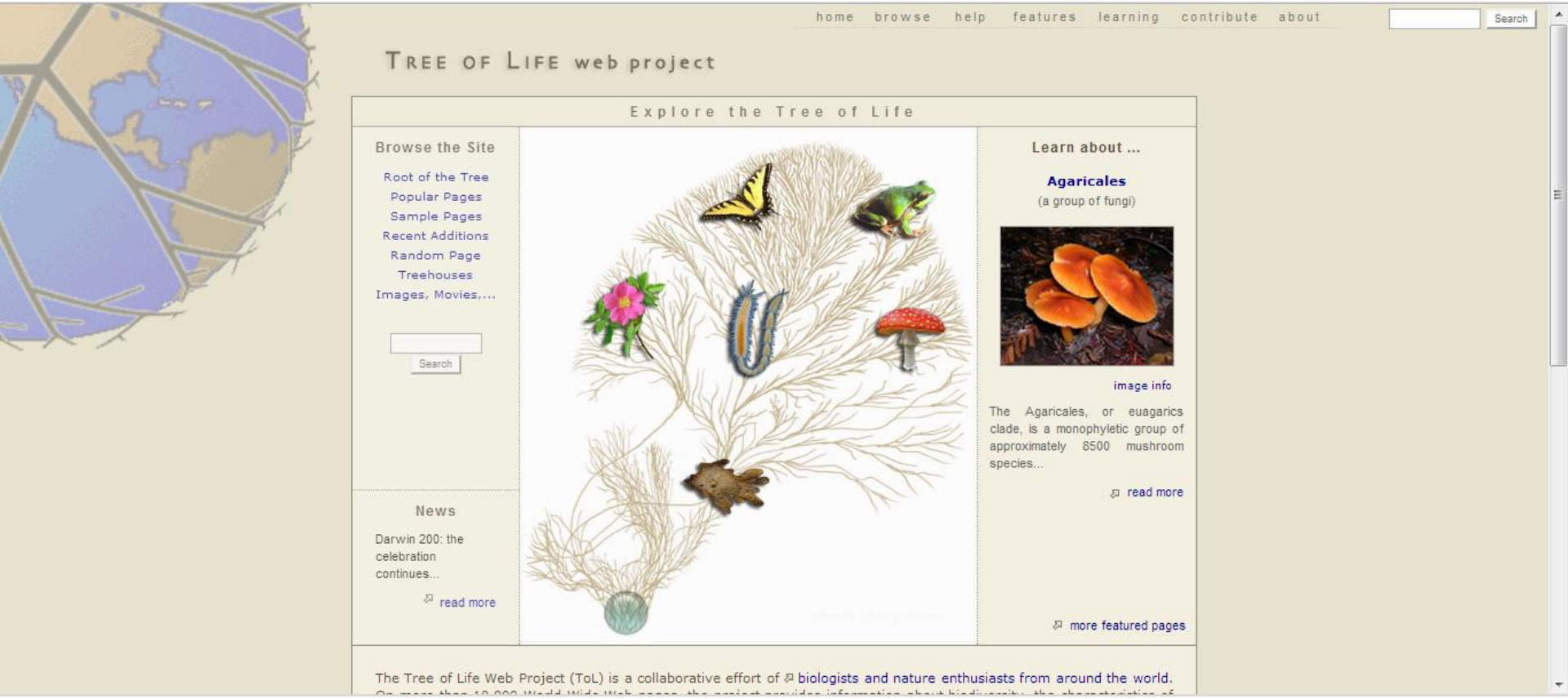
Arctos, http://arctos.database.museum/



GenBank, www.ncbi.nlm.nih.gov



Tree of Life, http://tolweb.org



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.