

BiSci 6215 VERTEBRATE PHYLOGENY

Instructor: Dr. Clark, Lisner Hall 346, 994-7144 or 994-9210. Office hour Wed 3-4P.

Lecture: Mon-Wed 1-215 Bell Hall 204

Lab: Thursdays 9-11A, at NMNH, 10th and Constitution Ave. NW

LECTURES

1) *Introductory lectures*: The first few lectures will provide the necessary anatomical, phylogenetic, and geological background for the remainder of the course. The study of fossils requires both biological and geological frameworks, and most students will be stronger in one discipline than the other. Students in the biological sciences will need background information on the geological time periods, how fossils are dated, and how sedimentary rocks are formed. Students in the geological sciences will need background information on how relationships are inferred, relationships among animal groups, and vertebrate anatomy.

2) *Vertebrate phylogeny*: The main part of the course will be a survey of the groups of vertebrates, including those extinct groups with substantial fossil records. Current ideas about the relationships of each of the groups will be discussed, as well as interpretations of functional anatomy.

3) *Case histories*: The final part of the course will consider several case histories involving a variety of interpretative techniques.

LABORATORIES AND FIELD TRIPS

Laboratories: Will be taught mainly at the Paleobiology and Vertebrate Zoology Departments of the National Museum of Natural History. Students will usually meet in the Constitution Ave. lobby of the museum at 9A. Two labs (fishes, herps) will be at the museum's support center in Suitland, Maryland, to which we will drive from GWU. Labs will include overviews of paleontological laboratory techniques and examination of fossil and living representatives of the vertebrate groups, and will take advantage of the museum displays. One laboratory will be a visit to the National Zoo.

Field trips: Two field trips will be taken. One will be a day-long trip to marine fossil deposits along the Calvert Cliffs of Maryland that are of Miocene age, preserving shark teeth and marine mammal bones. Another will be an overnight trip to NY to visit the American Museum of Natural History's halls of fossil vertebrates.

LEARNING OUTCOMES

This course will provide students with an introduction to current hypotheses about vertebrate phylogeny and evolution and the analytical approaches used to understand them. The laboratory portion will teach students comparative vertebrate osteology. Students should finish the course with an understanding of the relationships of the major groups of vertebrates, their diagnostic characteristics, and their fossil record.

COURSE PREREQUISITES

BiSc 2450 (Organic Evolution) or equivalent course. BiSc 2332 (Comparative Vertebrate Anatomy) and BiSc 6210 (Phylogenetic Systematics) recommended but not required.

STUDENT EVALUATION

One midterm lecture exam, one final lecture exam, one final lab exam, each contributing 1/3 to the final grade.

TEXTS

Readings will be posted on Blackboard for each lecture, including reprints of papers and excerpts from the following texts:

Janvier, P. *Early Vertebrates*. Oxford Monographs on Geology and Geophysics 33, 1998

Liem, K., W. Bemis, W. Walker, and L. Grande. *Functional Anatomy of the Vertebrates: An Evolutionary Perspective*. 3rd Ed. Brooks/Cole Publishing Co., 2001.

Pough, F.H., C.M. Janis, and J.B. Heiser. *Vertebrate Life*, 9th ed. Pearson, 2012.

LECTURE SCHEDULE

Date	Topic
1-13	Introduction to the vertebrates, course logistics, vertebrate development
1-15	Cranial skeleton
1-20	MLK DAY
1-22	Postcranial skeleton
1-27	Agnathans and extinct jawless “fishes”
1-29	Basal gnathostomes, Chondrichthyes - sharks, rays, and ratfish
2-3	Major groups of Actinopterygii (ray-finned “fish”) (Orti)
2-5	Sarcopterygii - lungfish, coelacanths, and their relatives, tetrapod origins
2-10	Early fossil tetrapods
2-12	Living amphibians

- 2-17 **PRESIDENTS' DAY**
- 2-19 Amniote origins, basal amniotes
- 2-24 Non-mammalian synapsids - pelycosaur and therapsids
- 2-26 Mesozoic mammals and prototherians, marsupials
- 3-3 **MIDTERM**
- 3-5 Placentals I - major groups
- 3-10, 12 **SPRING BREAK**
- 3-17 Placentals II - ungulates and carnivores
- 3-19 Basal Reptilia and marine reptiles
- 3-24 Turtles
- 3-26 Lepidosauromorpha - squamates and extinct relatives
- 3-31 Origin and diversity of snakes (Pyron)
- 4-2 Basal archosaurs, crocodylians and pterosaurs
- 4-7 Ornithischians (Forster, different time; 215P?)
- 4-9 Sauropods
- 4-14 Theropods and bird origins
- 4-16 Living bird diversity
- 4-21 Cretaceous -Tertiary extinctions
- 4-23 Great American interchange, Pleistocene extinctions
- 4-28 Calvert field trip preview
- 4-30 Review

FINAL EXAM (Tentative) Wed, May 7, 1P

LAB AND FIELD TRIP SCHEDULE

*= meet in Cooper room of Paleobiology
Meet Thursdays 9-11A

Th Jan 16 Intro to fossil halls, comparative anatomy

Th Jan 23 Fossil prep lab

Th Jan 30* Fossil fish

Th Feb 6 Museum support center (fish)

Th Feb 13* Tetrapod origins, living amphibian anatomy

Th Feb 20* Basal amniotes, mammal origins

Th Feb 27* Mammals 1

Th Mar 6 Mammals 2 (Mammal Division)

Th Mar 13 **SPRING BREAK**

Th Mar 20* Turtles, marine reptiles (Tyler Lyson)

Th Mar 27 Museum Support Center (herps)

Th Apr 3* Dinosaurs, crocs, pterosaurs

Th Apr 10 Zoo

Th Apr 17 Theropods, birds (Bird Division)

Sat Apr 19 AMNH trip (leave Fri evening)

Th Apr 24* Lab test.

Sat May 3 Calvert Field Trip