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Lectures: MWF 1-2 pm, 88 Dwinelle. **Labs:** 3007 VLSB, M 2-5 *or* Tu 2-5 (no substitutions)

Text (required): Michael J. Benton, *Vertebrate Palaeontology*, 4th edition (paperback). You will need to bring the text to class for most lectures.

SYLLABUS AND SCHEDULE

LAB: NO LAB THIS WEEK

W 1/21 Introduction; history of the field; how vertebrates are preserved [Ch. 2]

F 1/23 Basics of geology, tectonics, geologic time, and taphonomy

M 1/26 **Quiz on geologic time (you must get 80% or better to stay in the class);**
Skeletal tissues, organs and elements; morphological theory; skeletal growth;
bone structure and histology [Ch.2]

LAB: Basic skeletal structure; taphonomy and fossil remains; skeletal structure

W 1/28 Continuation of previous lecture topics

F 1/30 Pre-test on cladistics [Ch. 2]; using phylogenetic analysis in vertebrate evolution

M 2/2 Vertebrate phylogeny; gill-arch theory; basal chordates; origin of vertebrates;
basal vertebrates (jawless) [Chs. 1, 3];

LAB: Basal vertebrates (jawless and jawed), Chondrichthyes, and rayfin fishes

W 2/4 Acanthodians and placoderms [Chs. 3, 7], Chondrichthyans [Chs. 3, 7]

F 2/6 Osteichthyans: Actinopterygian; rayfins; intro to sarcopterygians [Ch. 3. 7]

M 2/9 Basal sarcopterygians (fleshy-fins): lungfishes, coelacanths, tetrapods; origin of
tetrapods and the transition to land life [Ch. 4]

LAB: Basal sarcopterygians, the first tetrapods and amphibians

W 2/11 Amphibians: a halfway solution to life out of water? [Ch. 4]

F 2/13 Anthracosaurs and the origin of amniotes; or, how to breed on land. [Ch. 5]

M 2/16 **HOLIDAY**

LAB: NO LAB THIS WEEK

W 2/18 Basal amniotes, and the Reptilia-Synapsida split. [Ch. 5]

F 2/20 **EXAM** [Chs. 1-5, 7] (through last Friday's lecture)

M 2/23 Turtles: archaic or just weird? Origin of diapsids. [Ch. 8.7]

LAB: Basal amniotes; Diapsids I: Sauropterygia, Ichthyopterygia, Lepidosauria

- W 2/25 Marine diapsids: Sauropterygia (plesiosaurs, etc.), Ichthyosaurs [Chs. 6, 8.10]
 F 2/27 Lepidosauromorpha (lizards, snakes, sphenodontids, and friends) [Ch. 8.9]
- M 3/2 Late Paleozoic and Mesozoic faunas: the Age of Dinosaurs begins [Ch. 6]
LAB: Diapsids II: Crocodiles and basal archosauromorphs; dinosaur relatives
 W 3/4 Archosauromorpha. How to structure a Mesozoic ecosystem. [Ch. 6]
 F 3/6 Archosaurs: pseudosuchians and ornithosuchians (including pterosaurs);
 various solutions to locomotion. [Chs. 6, 8.6, 8.8]
- M 3/9 Origin of dinosaurs; the dinosaur success story. [Chs. 6.4, 8]
LAB: Diapsids III: basal dinosaurs and ornithischians
 W 3/11 Dinosaurs: ornithischians [Ch. 8.4]
 F 3/13 Dinosaurs: saurischians: sauropodomorpha [Ch. 8.3, 8.11]
- M 3/16 Dinosaurs: saurischians: theropods [Ch. 8.3] **TERM PAPER TOPICS DUE**
LAB: Diapsids IV: saurischian dinosaurs: sauropodomorphs and theropods
 W 3/18 Dinosaur biology [Ch. 8.2, 8.5]
 F 3/20 Origin of birds [Ch. 9]
- M 3/23 - F 3/27 **SPRING BREAK**
- M 3/30 The avian radiations [Ch. 9] **FINAL TERM PAPER TOPICS DUE**
LAB: Diapsids V: origin of birds; the avian radiations
 W 4/1 Cretaceous-Tertiary extinctions: a bang or a whimper? [Ch. 8.11]
 F 4/3 **EXAM** [Chs. 6, 8, 9] (through Wednesday's lecture)
- M 4/6 Basal synapsids: "pelycosaurs" and therapsids [Chs. 5.6, 5.7, 10.1]
LAB: Basal synapsids and therapsids, including Mesozoic "mammals"
 W 4/8 Origin of mammals [Ch. 10.2-10.3]
 F 4/10 Mammal phylogenies; early mammal radiations [Ch. 10.4, 10.5, 10.7]
- M 4/13 Marsupials and placentals [Ch. 10]
LAB: Non-therian mammals, marsupials, and basal placentals (afrotheres)
 W 4/15 Afrotheria (especially Proboscidea and Sirenia) [Ch. 10.7]; Xenarthrans
 F 4/17 Euarchontoglires: rodents and rabbits [Ch. 10.12]
- M 4/20 Euarchontoglires: non-hominid primates; Scandentia; Dermoptera [Ch. 10.13]
 Archontoglires: Chiroptera [Ch. 10.11]
LAB: Xenarthrans and Euarchontoglires
 W 4/22 Laurasiatheres: bats and lipotyphlan insectivores [Ch. 10.9, 10.11]
 F 4/24 Laurasiatheres: Carnivores (creodonts, carnivorans, etc.) [Ch. 10.11]
- M 4/27 Laurasiatheres: Artiodactyla (even-toed ungulates, incl. whales) [Ch. 10.10]

TERM PAPERS DUE

- LAB:** Laurasiatheres and Notoungulates
- W 4/29 Laurasiatheres: Perissodactyla (odd-toed ungulates) [Ch. 10.11];
- F 5/1 South American ungulates and the Great American Interchange [Ch. 10.6];
Neogene climates, Pleistocene extinctions [Ch. 10.14]
- M 5/4 Summary and review
- LAB:** Final lab exam (on previous week's lab)

FINAL EXAM: Tuesday, May 12, 8-11 am; location TBA.

GRADING STRUCTURE: Lecture portion 75% of course grade (including: Midterm exams, 25% each; Final exam, 25%; Term paper, 25%); Lab portion 25% of course grade.

LAB: You must take the lab with the lecture. Grading structure: quiz each week; lowest grade dropped; course grade will be the average of grades plus consideration of participation. No makeups for quizzes. Unexcused absences receive zeros unless cleared in advance (these cannot count as your lowest grade to drop). You must attend your scheduled lab section; you cannot go to the other lab section instead, because they are already oversubscribed. If you blow off the lab, you will fail the whole course. Please do not try to game the system.

Term paper: 7-10 pages, standard font, double-spaced. At least five principal references in the peer-reviewed literature (not magazines, websites, etc.). The topic must be cleared with the instructor and must address an evolutionary or ecological question in vertebrate paleontology. "How the elephant really got its trunk," "How did feathers and their functions evolve?", "Did climatic changes cause the Permian land extinction?" and "How did sauropods get enough to eat?" are examples of appropriate topics. **"And how do we know?" is the end of each topic.** Deadlines for term paper topics and drafts are given in the schedule. More details in class.

Office hours: Dr. Padian, 11-12 M and by appt., 5099 VLSB
Ash Poust,
Sara ElShafie,

Please be aware that "by appt." means that it is UP TO YOU to contact us if you cannot make the scheduled office hours, which we fully expect will be the case for many students. It is NOT an excuse to say "I can't make your office hours" because we will make arrangements for you. (How else will you get to know us?) We place strong limits on the amount of texting and emailing we do, so personal contact is by far the most efficient and rewarding approach.

Note: Cell phones and related devices are to be turned off and stowed before class. If you use a cell phone in class you will be ejected from class permanently. You may use a laptop or iPad equivalent to take notes but if you are doing email or web-surfing, you will be ejected from class permanently. You may record lectures on any phone or other device; bring it to the front desk.