

GEOL 104 Dinosaurs: A Natural History  
Final Review

Review Tests 1 & 2, especially:

Definition of “Dinosauria” (the ancestor of *Iguanodon* and *Megalosaurus* and all of its descendants)

Proper taxonomic grammar!

What are the relationships between dinosaurs and other tetrapods?

What are the relationships between and important adaptations of the major groups of dinosaurs? (pay particular attention to those groups who were referred to again during the last third of the course!)

Bird origins

What are the major events in dinosaur history?

Evolution & Cladistics (be able to read a cladogram)

Geologic time

Dinosaur behavior

Methods of interpreting behavior: Analogies with living forms

Phylogenetic distribution of behaviors

Biomechanics

Geological Evidence (tracks, coprolites, bite marks, etc.)

Interspecific vs. Intraspecific Behavior

Message of display: Defensive, Territorial, Sexual, Species Recognition

Medium of display: Visual, Sound, etc.

Examples of dinosaur behavior from the fossil record

Dinosaur Eggs and Babies

Altricial vs. Precocial Growth

Dinosaur nests and nesting patterns

Changes in dinosaur growth (esp. appearance of species-level features in sub-adults)

Lines of Arrested Growth (and their use in discovering dinosaur growth rates)

How dinosaur growth compares to non-avian reptiles? To mammals?

K-selected vs. r-selected

Endothermy vs. Ectothermy

	“Warm-Blooded”	“Cold-Blooded”
Energy Source:	Endothermy	Ectothermy
Metabolic Rate:	Tachymetabolism	Bradymetabolism
Temperature over Time:	Homeothermy	Poikilothermy

The Aerobic Equation ( $C_6H_{12}O_6 + 6 O_2 \rightarrow 6 CO_2 + 6 H_2O + \text{energy}$ ; or “glucose + oxygen yields carbon dioxide, water, and energy”). How to get extra glucose & oxygen? How to distribute extra glucose & oxygen to cells? How to get rid of extra carbon dioxide?

Traditional Estimates of Dinosaur Physiology:

Posture	Latitudinal distribution	Feeding adaptations (such as dental batteries)
Relation to birds	Predator-prey ratio	Microscopic bone structure (Haversian canals, reworked bone)
Insulation	Small brain size	

Non-traditional Physiologies:

Gigantothermy	Heterometabolism (Ontogenetic and Behavioral)
---------------	---

Respiration in Mammals vs. Crocs vs. Birds vs. other tetrapods. Belly-breathing in basal archosaurs (and at least some dinosaurs?). Air sac breathing with one-way lungs in at least Saurischia. Other variations of respiration (in Ornithischia, in Pterosauria).

Function of four-chambered hearts, and evidence for such in dinosaurs.

Nasal Turbinates, and significance of enlarged nares in bigger/more derived dinosaurs.

Significance of higher oxygen and carbon dioxide levels, and higher plant productivity, in Mesozoic

### Other organisms of the Mesozoic

Plants: Differences between spore plants, primitive seed plants (“gymnosperms”), and angiosperms  
Significance of angiosperms: time of origin, how flowers & fruit are used to aid the plant by interactions with animals; how dinosaurs may be related to angiosperm origins

Marine reptiles of the Mesozoic (esp. Ichthyosaurs, Plesiosaurs, Placodonts, Turtles, Mosasaurs, Hesperornithes):  
What advantages does an amniote have by returning to the sea? What difficulties?  
What were each groups main adaptations to help them survive in the ocean?

Pterosaurs: Major adaptations. How did their wings differ from bird wings?  
Evidence for elevated metabolism  
Primitive pterosaurs vs. pterodactyloids

Mammals: What is their place in the phylogeny of amniotes?  
Major adaptations of mammals (and ones they inherited from proto-mammal ancestors)  
Diversity of Mesozoic mammals  
Prototheres (incl. Monotremes), Allotheres (incl. Multituberculates), Metatheres (incl. Marsupials), Eutheres (incl. Placentals)

### Extinction

Definitions: Extinction                      Mass extinction  
Maastrichtian                      Campanian                      Paleogene                      K/Pg extinction  
Coccolithophorids                      Foraminiferans                      Ammonoids                      Belemnoids  
Rudists                      Inoceramids                      Champsosaurs

Fate of various land and sea creatures at K/Pg boundary

Hypotheses of extinction: What evidence exists for different agents of extinction?  
How might each have caused the event?

Good evidence for: Volcanism: esp. Deccan Traps (India)  
Asteroid impact:  
Iridium layer at Gubbio, Italy  
Shocked quartz, melt glass, tsunami deposits, ejecta deposits, etc.  
Crater at Chicxulub (Yucatan)  
Maastrichtian Regression

Environmental impact of each of those agents: effects and timing  
Changes in dinosaur populations (especially in western North America) before and at K/Pg boundary

### Popular Culture

Changing popular perceptions of Dinosauria  
Reconstructing dinosaurs from fossils

### Hunting for Dinosaurs

Field techniques to collect fossils                      Importance of collecting data other than the bones themselves!

### In general

What are dinosaurs? What are not dinosaurs?