



Why evolve endothermy? Increased aerobic capacity, greater environmental tolerance, increased metabolic efficiency, help in parental care (pre- and post-natal)

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 and the K/Pg Extinction

Be familiar with the following groups and their fate relative to the K/Pg Extinction:

Marine life:            Coccolithophorids; foraminiferans; ammonoids; belemnoids; rudists; inoceramids

Mesozoic marine reptiles: Ichthyosaurs, plesiosaurs, hesperornithines, sea turtles, mosasaurs, marine crocodylians

Terrestrial life:    Plants, insects, amphibians, turtles, tuataras, lizards (incl. snakes), crocodylians (incl. various non-aquatic types), champsosaurs, pterosaurs

Mesozoic mammals:        Origins; diversity; monotremes, multituberculates, therians (eutherians (placentals and our ancestors) plus metatherians (marsupials plus their ancestors)

Definitions:	Extinction	Mass extinction		
	Maastrichtian	Campanian	Paleogene	K/Pg extinction

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 (Yucatán)

Maastrichtian Regression

What is the environmental impact of each of those agents? The effects and timing of each? What does the magnetostratigraphic record say about the timing of Deccan Traps and the Chicxulub Impact?

Phases of destruction from the Chicxulub impact: Phase I Shockwave & Tsunami; Phase II “Easy-Bake Oven”;

Phase III Impact Winter; Phase IV Greenhouse Summer

Changes in dinosaur populations (especially in western North America) before and at K/Pg boundary

Pattern of fates at K/Pg in marine and continental environments

### 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?