GEOL 104 Dinosaurs: A Natural History
Test I Review Sheet

The nature of Science (hypothesis testing; theory, etc.)

Major events in history of paleontology and evolutionary biology, in particular the major contributions of:

Georges Cuvier  William Buckland  Gideon & Mary Ann Mantell
Richard Owen  Joseph Leidy  Edward Drinker Cope & Othniel Charles Marsh
John Ostrom  Carolus Linnaeus  Charles Darwin & Alfred Russell Wallace
Willi Hennig

Major groups of rocks, esp. detrital sedimentary rocks and how they form (weathering, transport, deposition, cementation)

Environments of deposition and sedimentary structures; be able to reconstruct the environment from rock type and sedimentary structures (beds, cross-beds, mudcracks, ripple marks, trough cross-beds, coal, etc.)

Taphonomy (burial, fossilization [unaltered, permineralized, replaced])

Body Fossils vs. Trace Fossils

Basics of Stratigraphy:
- Principles of Original Horizontality, Superposition, Cross-Cutting Relationships, Fossil Succession
- Formations
- Relative vs. Numerical Ages
- Index fossils and correlation
- Radiometric dating, Magnetostratigraphy
- The Geologic Time Scale: Eras, Periods, Epochs (know the periods & epochs of the Mesozoic)

Plate tectonics (how does it affect the surface of the Earth?): How does plate tectonics result in the Rock Cycle?

Comparative Anatomy:
- Homology vs. Analogy
- Anatomical directions
- Be familiar with major skull landmarks, skull bones, and postcranial bones

Evolution = Descent with Modification
Natural Selection = Differential Survival and Reproduction of Variants in a Population Resulting in Net Change in the Phenotype of the Descendant
Darwin & Wallace’s contributions: Common Ancestry, Individual Variation, Natural Selection

Basic observations of Natural Selection:
- I. Variation in all populations (Variability)
- II. Some (but not all) variation is inherited (Heritability)
- III. More are born in a population than can possibly survive (Superfecundity)

Divergence, Adaptive Trends, Adaptive Radiations, Sexual Selection, Living Fossils, Convergence, Heterochrony (Paedomorphosis vs. Peramorphosis)

Taxonomy: taxonomy & taxonomic grammar

Systematics: Be able to read a cladogram!
- Be able to recognize: evolutionary relationships; types of groups (monophyletic vs. paraphyletic)

Major features in early vertebrate evolution, especially important changes in life style with evolution of: paired limbs; jaws; teeth; bony skeleton & lungs; limbs with long bones; wrists & ankles; limbs with digits; amniotic egg; temporal fenestrae
What factors do terrestrial animals have to deal with that aquatic ones don’t, and how do tetrapods deal with these factors?

Recognize anapsid, synapsid, and diapsid skulls.

Know the basic adaptations and attributes of:
- **Tetrapoda** – limbs with digits; land dwelling as adults
  - **Amniota** – amniotic egg; land-dwelling whole life
    - **Synapsida** – infratemporal fenestra
    - **Therapsida** – differentiated teeth; forelimbs better developed than hindlimbs
    - **Reptilia** – aglandular skin; water conserving kidneys; better color vision
    - **Diapsida** – supra- and infratemporal fenestrae; hindlimbs better developed than forelimbs
      - **Archosauria** – antorbital & mandibular fenestrae; air sac system; parental care of young
      - **Ornithodira** – cervicals distinct from dorsals; elongate tibiae and metatarsi
      - **Dinosauromorpha** – limbs directly underneath body

Know the Amniote Radiations:

<table>
<thead>
<tr>
<th>Order</th>
<th>Time Range</th>
<th>Group</th>
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<tbody>
<tr>
<td>5th</td>
<td>Cenozoic</td>
<td>Mammals</td>
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<tr>
<td>4th</td>
<td>Latest Triassic-end of Cretaceous</td>
<td>Dinosaurs</td>
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<tr>
<td>3rd</td>
<td>Middle and Late Triassic</td>
<td>Pseudosuchian Archosaurs</td>
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<tr>
<td>2nd</td>
<td>Late Permian – Early Triassic</td>
<td>Therapsids</td>
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<tr>
<td>1st</td>
<td>Early Permian</td>
<td>Basal Synapsids</td>
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Permo-Triassic Extinction and its effects