ESCI 402 – Review Sheet for Final Exam

Don't forget to review previous exam!

Case Study 5 – Dinosaurs (Ch. 12,14)

- Earliest Chordates - Cambrian
- Rise of vertebrates and tetrapods
  - Five major classes of fish
  - Evidence for tetrapod ancestry in lobe-finned fish
  - Land adaptations that allowed emergence from water (lungs, 3-chambered heart, stronger limbs and bones, interlocking vertebrae, new ear structures, etc)
- Rise of amniotes
  - Key evolutionary innovation of amniotic egg
  - Skull morphologies (Anapsids, Synapsids, Eurypasids, Diapsids)
- Saurischian (lizard-hipped) versus ornithischian (bird-hipped) dinosaurs
  - Saurischian dinosaurs: familiar examples of theropods (e.g., *T. rex*) and sauropods (e.g., *Apatosaurus*, *Brachiosaurus*)
  - Ornithischian dinosaurs: familar examples (e.g., *Stegosaurus*, *Triceratops*)
  - Evolutionary links to birds
- Dinosaur paleoecology
  - Thermoregulation (endothermy vs. ectothermy, homeothermy vs. poikilothermy)
  - Arguments and list of evidence for and against endothermy in dinosaurs
- The K/T boundary mass extinction
  - Lines of evidence for a bolide impact and its geographic location (Yucatan)
  - Other potential causes of the mass extinction (volcanism, random coincidence of several factors)

Case Study 6 – Western Cordillera (Ch. 10,11,13,15)

- The Antler orogeny (Devonian through Pennsylvanian; initiation of subduction and collision with island arc)
- Ancestral Rocky Mountain uplift (Late Paleozoic uplift in middle of continent)
- The Sonoma orogeny (Late Permian – Early Triassic)
  - Accretionary tectonics (growth of North America during the Mesozoic by incorporation of exotic / suspect terranes)
- The Nevadan orogeny (Jurassic; well developed continental arc)
- The Sevier orogeny (Middle Jurassic – earliest Cenozoic, 180–60 Ma; Sevier-type "thin-skinned" deformation)
- The Laramide orogeny (Late Cretaceous – Early Tertiary, 70–40 Ma; Laramide-type "thick-skinned" deformation; shallow subduction of Farallon plate)
- Basin and Range extension (crustal stretching caused by tensional forces, normal faulting, possible causes of extension)
- Development of San Andreas Fault (change in tectonic style caused by subduction of spreading ridge beneath North America)
- Cascades volcanism (classic example of continental arc volcanism produced by subduction of an oceanic plate beneath a continental plate; ancient and modern volcanic activity)
- Yellowstone National Volcano (caused by a plume of upwelling magma?)

Case Study 7 – Mammalian and Human evolution (Ch. 14,16, 17)

- Distinguishing features of mammals (Some preserved in fossils, others are not)
- Early evolution of mammals
  - Three groups of synapsids (pelycosaurs, therapsids, mammals)
  - Use of sail on the back of Pelycosaurs
  - Transitional characters of therapsids
  - Ecology of earliest true mammals (e.g. arboreal, insectivorous, nocturnal)
- Cenozoic Mammalian evolution and climate change
  - Greenhouse to Icehouse transition
  - Evolution of grasslands (Miocene)
  - Great American Interchange
- Anatomical characteristics of primates
- Differences between two major groups of primates (prosimians and anthropoids)
- Three groups (superfamilies) of anthropoids:
  - New World monkeys (Ceboids), Old World monkeys (Cercopithecoids), Hominoids
- Primate origins (archaic forms are prosimian-like animals from Late Cretaceous)
  - Lemur-like adapids and Tarsier-like omomyids
- Origin of anthropoids
- Hominid traits
- Geologic setting of human origins
- Australopithecines (primitive, gracile, robust)
  - Lucy (*Australopithecus afarensis*, Laetoli footprints)
- Transition to genus *Homo* (Distinguishing traits of *Homo*)
  - Earliest members of genus Homo (*Homo erectus*)
  - Later *Homo* evolution
    - Out of Africa hypothesis vs. multiregionalism theory
    - Mitochondrial "Eve"

Case Study 9 – Pleistocene glaciation (Ch. 15)

- What is a glacier?
- Process by which glaciers grow and recede
- Flow of glaciers downslope under force of gravity (ductile deformation at depth and brittle fracturing near surface)
- Evidence for past glaciations
  - Terrestrial evidence (erosive – striations, cirques, horns, u-shaped valleys; depositional – moraines, erratics)
  - Marine-based evidence of glaciation ($^{18}O/^{16}O$ ratios measured in fossil foraminifera)
  - Ice core evidence of glaciation and changes to chemical composition of atmosphere
- Effects of glaciers on North America
  - Isostacy
  - Drainage patterns (Great lakes, pluvial lakes, glacial outburst floods)
  - Sea level (Bering land bridge)
  - Late Pleistocene Megafauna Extinctions
- Causes of Pleistocene glaciation
  - Potential causes of Greenhouse to Icehouse transition
  - Cyclicity of glaciations and relationship to changes in earth's orbit (Milankovich cycles)
- Links between atmospheric CO_2 concentrations and global temperature
- What do records of past climates imply about current and future climate change?
  - IPCC Report