Natural History of Vertebrates
Lecture Notes
Fossils and Continental Drift (Chapter 7)

These notes are provided to help direct your study from the textbook. They are not designed to explain all aspects of the material in great detail; they are a supplement to the discussion in class and the textbook. If you were to study **only** these notes, you would not learn enough to do well in the course.

Be sure to study the List of Terms

Every time that you set down to study, the first thing that you should do is write down the periods of the **geologic time scale** in order and the times that define the boundaries of these periods (see the inside front cover). It is important that you know these periods because as we progress through the evolution of the vertebrates, times of occurrence will typically be given in terms of these periods.

When examining the fossil record, some things to keep in mind.

1. Organisms fossilized better in some environments
    a. grasslands, forests are very poor at producing fossils.
    b. swamps are better because of the anaerobic conditions
    c. areas with high siltation rates are good e.g. the floodplain of a river
    d. ocean bottoms are generally good because of the high siltation and reduced activity of decomposers and scavengers
    e. reefs are generally good

    Many organisms probably never produced fossils, thus the fossil record is better for some habitats and essentially non-existent for other habitats.

2. Older fossils are less common than recent fossils.
    Degradation of fossil-bearing rocks has had longer to occur for older rocks and thus fewer old fossil-bearing rocks exist today.

3. Fossil record has gaps
    a. the vagaries of nature: which rocks are brought to the surface and which rocks are destroyed determines which rocks we might find
    b. **Punctuated equilibrium** leads to inconstant rates of evolution. During some periods, the rate of change was so fast there was little chance of producing a fossil of the intermediate life forms. At other times, there would be little to no change for a very long time, with a much greater chance of producing a fossil.

When attempting to describe the nature of some ancient habitat or the habits of a fossil animal,

we use the principle of **uniformitarianism**, which says that processes that occurred in the past are the same processes that occur today. For example, the movement of glaciers causes striation in the rock as the glacier passes over the rock. Similar striations found in an ancient rock would be assumed to be caused by an ancient glacier. Another example, in modern taxa, flat, rounded teeth are associated with organisms that crush their food; the same type of teeth found in a fossil are assumed to be from an animal that also crushed its food.

Continental Drift is an important concept. Basically, the continental plates float on a bed of molten lava and because of this the continents tend to drift around. However, much of the movement is not random but directed by upwelling of molten lava to form new crust at a **ridge** and the loss of material from the crust into a **subduction zone**. For example, the North American Plate is being pushed from the European Plate by upwelling of material at the Mid-Atlantic Ridge. The North American Plate is being reduced at its western edge as it flows into a subduction zone along the California coast (figure 7.1). Thus the North American Plate moves a little west away from European Plate each year and a little bit of the western edge passes under the Pacific Plate (figure 7.1). Be sure to note the relative positions of the continental land masses during the Cambrian through Devonian time periods. (figures 7.2, 7.3, and 7.4)

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