

## SEGMENT THREE; LECTURE TWO: PALEONTOLOGY

[Conclusion to speciation and reproductive barriers.]

**Hybrid zone:** a region in which members of different species meet and mate (Figs. 24.13-14); Numerous successful hybridizations and backcrosses can produce a hybrid swarm.

Outcomes of interspecific hybridization:

- 1) **Reinforcement** of reproductive barriers, when postzygotic barriers are selected.
- 2) **Fusion** of two species into a single species as reproductive barriers are weakened.
- 3) **Stability** in which the two species remain separate, but continue to produce hybrid offspring, as with the Goatsbeard plants in the Pacific northwest.

Rates of speciation (see Fig. 24.17) may be:

- 1) **Gradual**, the way that Darwin understood speciation;
- 2) a **punctuated** pattern or equilibrium, in which long static periods are interrupted by the sudden appearance of new species. Stephen Gould and Niles Eldredge showed that fossil histories often follow a punctuated equilibrium pattern of evolution.

PALEONTOLOGY is the study of fossils. The Fossil Record is the ordered array in which fossils appear within layers (strata) of sedimentary rocks. Our knowledge of evolution relies partly on the dated fossil record.

Fossils are any preserved remnant or impression of past life (See Fig. 25.4) and include:

- Hard Parts (bones, shells and wood) - may become mineralized
- Molds of structures or tracks
- Casts or compressions
- Small organisms trapped in amber (which is tree resin).

Methods To Determine Fossil Ages

- 1) Relative Dating - younger sediments are deposited above older ones— see Geologic Time Scale (Table 25.1).
- 2) Absolute Dating – generally by radiometric Dating. Radiometric dating was discovered by Bertram Boltwood in about 1905. He reasoned that older uranium-bearing minerals should contain a higher proportion of lead. Radiometric dates can be measured precisely using known half lives (Fig. 25.5). A **half-life** is the amount of time required for half of the radioactive atoms in a sample to decay to atoms of the daughter product.