

APES – Chapter 5 – Evolution of Diversity

Intro: The Dung of the Devil

- a) Why is it important to conserve and preserve biodiversity?
- b) List examples of organisms and the pharmaceutical uses they are known to have.
- c) What is the cultural diversity angle of this story?

I. Earth's Diversity

Diversity takes several forms: (define and give examples)

Genetic diversity –

Species diversity –

Ecosystem diversity –

Cultural diversity –

A. Species Number

B. Species Richness – see “Do the Math” (p. 124)

C. Species Evenness

D. Phylogenics

II. Evolution - The Mechanism Underlying Biodiversity

Microevolution –

Macroevolution –

A. Creating Genetic Diversity - two main agents

1. Mutation

2. Recombination

Recall from Biology that while mutations and recombinations provide the raw material for evolutionary changes in genotypes, it is the phenotypes upon which natural (and artificial) selection can act.

B. Artificial Selection – humans as selective agents (see fig. 5.8, p. 126)

There are unintended consequences. List a few.

C. **Natural Selection** – Darwin’s causative agent.

List the 5 key ideas of Darwin’s Theory of Evolution by Natural Selection

- 1.
- 2.
- 3.
- 4.
- 5.

Terms:

What is meant by “fitness”?

What are “adaptations”?

D. **What About Randomness in Evolution?** (see p. 129 - 130)

While natural selection is a non-random process, there are aspects of evolution that are random processes. List and describe each of the 4 random processes:

- 1.
- 2.
- 3.
- 4.

III. **Speciation (Moving from Microevolution to Macroevolution)**

A. **Allopatric** (“other” , “fatherland”) **Speciation** (see fig. 5.13, p. 131)

Geographic isolation

Reproductive isolation

Classic example: Darwin’s Finches (see fig. 5.14, p. 132)

B. **Sympatric** (“same” , “fatherland”) **Speciation** (see fig. 5.15, p. 132)

Polyploidy (in plants commonly) leads to reproductive isolation

C. **The Pace of Evolution** – Several Factors (see p. 133)

Modern technology (Biotechnology, Genetic Engineering) has the power to change the pace of evolution.

Ex: Genetically Modified Organisms

IV. Evolution and Ecological Niche and Species Distribution

- A. **Range of Tolerance and Fundamental Niche** (see fig. 5.18, p. 135)

- B. **Realized Niche** –

- C. **Niche generalist vs. Niche specialist** (Define and give examples)

- D. **Species Distribution** – a way of assessing changes in the environment (see figs. 5.20 and 5.21)

V. Extinction

- A. **5 Global Mass Extinctions** – list and describe each in terms of cause/impact
 - 1. Ordovician
 - 2. Devonian
 - 3. Permian
 - 4. Triassic
 - 5. Cretaceous

- B. **6th Mass Extinction** – the current loss of biodiversity
Causes: (Friedland, et. Al) =

From Edwin O. Wilson (HIPPO) =

WORKING TOWARD SUSTAINABILITY – Buying the Oceans? (see pp. 139-140)

- a) Describe the basic working model of nature conservancies.

- b) Why go to the trouble of preserving small sections of functioning ecosystems?

- c) How will we determine whether harvesting / extraction can be sustainable?

Science Applied – to solving a global problem (p. 144-147)

- a) what are endemic species? Define and give examples:

- b) what are biodiversity hotspots, and what criteria are used to determine them?

- c) how does human population in an area figure into this determination?

- d) What are biodiversity coldspots, and what is the importance of “instrumental value” (see chapter 3) in the preservation/conversation decisions?