

CORNELL NOTES

Directions: You must create a minimum of 5 questions in this column per page (average). Use these to study your notes and prepare for tests and quizzes. Notes will be stamped after each assigned sections (if completed) and turned in to your teacher at the end of the Unit for scoring.

UNIT 4: EVOLUTION

Chapter 10: Principles of Evolution

I. Early Ideas about Evolution (10.1)

A. Early scientists proposed ideas about evolution

1. **Evolution**- process of biological _____ by which descendants come to _____ from their ancestors

2. Other scientists besides Darwin came up with idea

B. Four scientists important in development of evolution theory

1, **Carolus Linnaeus** (1700's)- developed _____ system to name living things (grouped by _____)

2. **Georges Louis Leclerc de Buffon** (1700's)- proposed species shared _____ instead of arising separately

3. **Erasamus Darwin**- Darwin's grandfather. Proposed that all living things were _____ from a common _____

4. **Jean-Baptiste Lamarck** -proposed theory that all organisms evolved toward _____ and _____.

a. Proposed changes in environment caused an organism behavior to change, leading to greater use or disuse of a _____ or _____

b. Organism then passed changes on to _____

C. Theories of geologic change set stage for Darwin's Theory

1. _____ **of the Earth** was key issue in early debates

a. Many thought Earth on _____ years old

b. Discovery of _____ created controversy

2. **James Hutton** (late 1700's)- proposed that Earth very _____. Said **geologic** change occurred gradually (called _____)

3. **Charles Lyell** (1830)- published "Principles of Geology". Also said Earth must be very old. Said changes in Earth occurred at constant _____ over time

a. Same changes we see happening _____

b. Greatly affected _____ thinking.

II. Darwin's Observations (10.2)

A. Darwin observed differences among _____ species

1. Differences between species studied on
_____ **Islands**

2. Noticed variations well suited to animals
environment (_____ - differences in physical
traits)

3. Studied birds, tortoises and said somehow adapt
to their surroundings (**adaptation**- a feature that
allows an organism to better _____ in
_____)

B. Darwin observed _____ and **geologic** evidence
supporting ancient Earth

1. Discovered fossil evidence of species _____
over time

2. Suggested that _____ organisms have
relationship to _____ forms

3. Earth must be very _____ (supported Lyell's theory)

4. Darwin said, like the Earth, organisms must change
_____ over time

III. Theory of Natural Selection (10.3)

A. Several key insights led to Darwin's idea for natural selection

1. **Artificial Selection**- process by which _____
changes a species by _____ it for certain traits

a. Darwin compared what he learned about
breeding to his idea of _____

b. Said that in nature, environment creates
_____ pressure instead of humans
in _____ selection

2. **Natural Selection**- mechanism by which
_____ is selective agent

- a. Darwin used work of others to develop theory
- b. Said adaptations arose over many _____ (called process "**descent with modification**")

B. Natural selection explains how evolution can occur

1. 4 main principles to theory of natural selection

- a. **Variation**- variations in _____ are basis for _____.
- b. **Overproduction**- organisms produce more _____ than will survive (creates competition)
- c. **Adaptation**- Some adaptations allow organism to survive at _____ rate and individuals are "naturally selected" to survive and produce _____
- d. **Descent with Modification**- Over time, natural selection will result in species with _____ that are well suited for _____

2. **Fitness**- measure of ability to _____ and _____ more offspring relative to other members of a population

C. Natural selection acts on existing variation

1. **Natural selection acts on** _____ (not _____ material itself)
2. As environment changes, different traits will become _____.

IV. Evidence of Evolution (10.4)

A. Evidence for evolution in Darwin's time came from several sources

1. _____ - supported Darwin's "descent with modification"
2. **Geography**- Darwin realized that _____ found on Galapagos Islands closely resembled those found on _____.
 - a. Over time new _____ became well established in separate island populations

b. The different _____ on each island led to specific adaptations in diets, habits, and _____ shapes

3. **Embryology**- Similarities in _____ showed relationships between organisms and possible common _____

4. **Anatomy**- Some of Darwin's best evidence came from comparing _____ parts of different species

a. **homologous structures**- features that are similar in _____ but have different _____ (**suggested common ancestor**) (i.e. forelimbs of vertebrates)

b. **analogous structures**-structures that perform similar _____ but are not similar in _____ (i.e. wings of bats and insects)

B. Structural patterns are clues to the history of a species

1. **vestigial structures**- structures or organs that seem to _____ any useful _____ that had a function in early ancestor

2. Examples of vestigial structures found in many organisms. (e.g. human _____, wings of Ostriches)

V. Evolutionary Biology Today (10.5)

A. **Fossils** provide a record of _____

1. **Paleontology**- study of _____ or extinct organisms

2. Fossil evidence shows change in _____ over time.

3. New fossils found that fill in "_____" (transitional forms)

B. **Molecular** and _____ evidence support fossil and anatomical evidence

1. **DNA sequence analysis**- more closely related have more similar _____

2. **Pseudogenes**- _____ that no longer function. Similarities in organisms suggest common ancestor

3. **Protein comparisons**- Similarities in _____

found in specific _____ types suggest common ancestor

C. Evolution unites all fields of biology

1. New discoveries and tools helping to study
_____ of evolution

2. Principles used to study _____, disease, ecology,
etc.

