**Ch 10 : Principles of Evolution**

**10.1 Early Ideas About Evolution: There were theories of biological and**

 **geologic change before Darwin.**

Early scientists proposed ideas about evolution.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the biological change process by which descendants

 come to differ from their ancestors.

A species is a group of organisms that can reproduce and have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 offspring.

There were many important naturalists in the 18th century.

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: classification system from kingdom to species
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_: species shared ancestors rather than arising separately
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_: more-complex forms develop from less-complex forms
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_: environmental change leads to use/disuse of a structure

Theories of geologic change set the stage for Darwin’s theory.

There were three theories of geologic change.

* + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = natural disasters (flood/volcano) shaped the land and made some animals and plants extinct and caused new species to evolve as others moved into new areas. CUVIER
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = gradual changes over time in environments (run off/erosion) and species in response to those changes. HUTTON
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = PREVAILING THEORY = Gradualism + changes did so uniformly through time, thus they occur even now at the same constant rate and will continue. LYELL

**10.2 Darwin’s Observations: Darwin’s voyage provided insight on evolution.**

Darwin observed differences among island species.

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a difference in a physical trait.
	+ Galápagos \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that live in areas with tall plants have long \_\_\_\_\_\_\_\_\_ and legs.
	+ Galápagos \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that live in areas with hard-shelled nuts have strong \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a feature that allows an organism to better \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in its environment.
	+ Species are able to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to their environment.
	+ Adaptations can lead to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ in a population.

Darwin observed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ supporting an ancient Earth.

* + Darwin found \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ animals that resemble \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ animals.
	+ Darwin found fossil \_\_\_\_\_\_\_\_\_\_\_\_\_\_ high up in the \_\_\_\_\_\_\_\_\_\_\_\_\_ mountains.
	+ He saw land move from underwater to above sea level due to an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Darwin extended his observations to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**10.3 Theory of Natural Selection: Darwin proposed natural selection as a**

 **mechanism for evolution.**

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

* Darwin noticed a lot of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in domesticated plants and animals.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the process by which humans select traits through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a mechanism by which individuals that have inherited beneficial adaptations and thus produce more \_\_\_\_\_\_\_\_\_\_\_\_\_ on average than do other individuals.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the ability of a trait to be passed down.
* There is a struggle for survival due to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and limited \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Darwin proposed that adaptations arose over \_\_\_\_\_\_\_\_\_\_\_\_ generations.

Natural selection explains how evolution can occur.

* There are four main principles to the theory of natural selection.
	+ 1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ 2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ 3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ 4.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the measure of 1. survival ability and 2. ability to produce more offspring.

Natural selection acts on existing variation.

* Natural selection can act only on traits that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ exist.
* Structures take on new functions in addition to their original function.

**10.4 Evidence of Evolution: Evidence of common ancestry among species**

 **comes from many sources.**

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

* 1.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ provide evidence of evolution.
* Fossils in older layers are more primitive than those in the upper layers.
* The study of 2.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ provides evidence of evolution.
	+ island species most closely resemble nearest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ species
	+ populations can show variation from one island to another
* 3.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ provides evidence of evolution.
	+ identical larvae, different \_\_\_\_\_\_\_\_\_\_\_\_ body forms
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ embryos, diverse organisms
* The study of 4.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ provides evidence of evolution.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ structures are similar in structure but

different in function.

* + Homologous structures are evidence of a common ancestor.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ structures have a similar function.

* + Analogous structures are not evidence of a common ancestor.

 \* 5.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ patterns are clues to the history of a species.

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ structures are remnants of organs or structures that had a function in an early ancestor.

-Ostrich \_\_\_\_\_\_\_\_\_\_ and whale \_\_\_\_\_\_\_\_ bones are vestigial structures.

**10.5 Evolutionary Biology Today: New technology is furthering our**

**understanding of evolution.**

Fossils provide a record of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the study of fossils or extinct organisms.
* Paleontology provides evidence to support evolution.

Molecular and genetic evidence support fossil and anatomical evidence.

* Two closely related organisms will have similar DNA sequences.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are sequences providing evidence of evolution.
	+ no longer function
	+ carried along with functional DNA
	+ can be clues to a common ancestor
* \_\_\_\_\_\_\_\_\_\_ genes indicate a very distant common ancestor.
	+ control the development of specific structures
	+ found in many organisms
* Protein comparisons, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reveals similarities among cell types of different organisms.

Evolution \_\_\_\_\_\_\_\_\_\_\_\_\_\_ all fields of biology.

* Scientist from any fields contribute to the understanding of evolution.
* The basic principles of evolution are used in many scientific fields.