

NAME \_\_\_\_\_

HR \_\_\_\_\_

### Evolution of Living Things Outline

What Evolution Is Not

1. It is **NOT a fact** (it's a theory: a highly probable explanation affecting all biological phenomena, with much supporting evidence, and NO evidence against it.)
2. It is **NOT something one should believe in** (it is based on science not faith.)
3. It is **NOT concerned with the origin of life** (only the origin of species.)
4. It is **NOT just concerned with the origin of humans...**(no more nor less than any other species.)
5. It was **NOT discovered or first explained by Charles Darwin...**(many other people proposed the general idea long before Darwin did.)
6. It is **NOT the same as natural selection...** (Natural selection deals with how evolution can take place; this idea was first proposed by C. Darwin.)
7. It is **NOT something that happened only in the past...**(it's still going on...)
8. It is **NOT something that happens to individuals...** (it happens to populations.)
9. It is **NOT an accidental or random process...** (There are built-in limits and constraints; it is influenced by both historical circumstances and environmental factors.)
10. It was **NOT developed to undermine religion...** (Rather it was developed to explain observations of life in a testable way. In fact, it grew out of efforts to better understand God's creation, by very religious people.)
11. It does **NOT deny the existence of GOD...** (It is neutral; God is neither required nor eliminated, your choice, based on your beliefs.)
12. It does **NOT conflict with any religion...** (It can't, since it is only another way of trying to understand the natural world using the rules of science. Any apparent conflict can always be traced to misunderstanding of science, evolution, or your religion.)

What is Evolution?

- ♦ The process of gradual (slow) \_\_\_\_\_ through \_\_\_\_\_.
- ♦ Helps to explain the differences in structure, function and behavior among living things.

– Geologic Evolution:

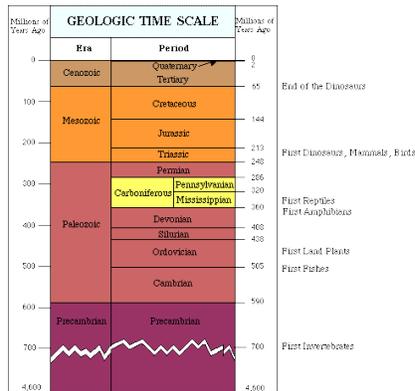
– Organic Evolution:

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## Geologic Time

- ◆ The oldest living thing, a bacteria-like organism, is estimated to be 3.4 billion years old.
- ◆ Each time period is identified by its dominant (common) animal and plant life.



## 4 Major Eras

- ❖ Cenozoic Era
- ❖ Mesozoic Era
- ❖ Paleozoic Era
- ❖ Precambrian Era

## Fossil Evidence

### ❖ Fossils—

### ❖ Paleontologists—

◆ The study of fossils in the earth provides evidence to support the idea that life changed over time from \_\_\_\_\_ to \_\_\_\_\_.

◆ Fossil distribution shows that life began in the \_\_\_\_\_ and then moved to \_\_\_\_\_.

◆ It also provides evidence for the time of \_\_\_\_\_ of various forms of life.

◆ Fossils help scientists understand how \_\_\_\_\_ and land surfaces have \_\_\_\_\_.

◆ By the process of \_\_\_\_\_, scientists determine the \_\_\_\_\_ of the earth's rocks and its fossils.

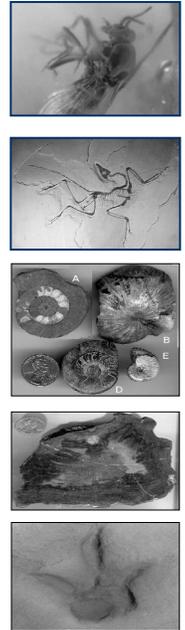


## Fossil Evidence In Sedimentary Rock

- Many Fossils are found in sedimentary rock.
- Where the crust of earth is undisturbed, the oldest rock layers lie under the younger layers.
- Sedimentary rock is formed from layers of slowly deposited sediments.
  - Rock particles
  - Silt
  - Mud
- After long periods of time and great amounts of heat and pressure, sediments harden into rock forming visible layers.

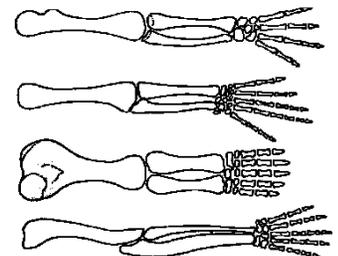
## Fossilization

- ❖ Amber -
- ❖ Tar
- ❖ Ice
- ❖ Mold -
- ❖ Cast -
- ❖ Petrification -
- ❖ Imprints –



## Skeletal Evidence

- ❖ Comparative Anatomy
  - ❖ The science that studies the \_\_\_\_\_ of plants and animals.



Homology: Similarity between forelimbs of the salamander, lizard, turtle, and opossum is suggestive of evolution from a common ancestor.

- ❖ When scientists compare skeletal structures of different vertebrates, they see a \_\_\_\_\_.
- ❖ This observation shows that organisms with similar bone structures may have evolved from a \_\_\_\_\_.
- ❖ Organs or structural parts that seem to have a common evolutionary origin are referred to as \_\_\_\_\_.
- ❖ Although homologous structures are similar in \_\_\_\_\_, they do not always have the same \_\_\_\_\_.

## Vestigial Structures

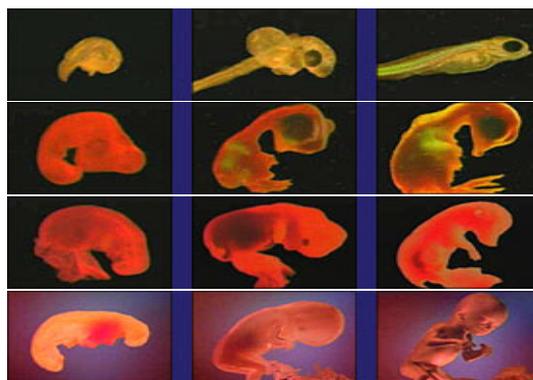
- ♦Parts of an animal's body that are not \_\_\_\_\_.
- ♦These structures look like structures that are fully developed and used by other animals.
- ♦Example: Human Appendix - Scientists think that perhaps some ancestor of humans used their appendix and, as evolution continued, humans stopped using this organ.
- ♦Other Examples: human ear muscles, and the leg bones of the python and porpoise

## Comparing Cell Structure

- ♦Cells and cell organelles are basically \_\_\_\_\_ from one group of organisms to another.
- ♦For example, all cells have a nucleus, cell membrane, cytoplasm, ribosomes, mitochondria, chromosomes, and other organelles.
- ♦This is evidence that different kinds of living things may share a \_\_\_\_\_.

## Comparing Embryos

- ♦Comparisons of early stages of embryonic development show the possibility of \_\_\_\_\_ and \_\_\_\_\_.
- ♦The science that studies the structural similarities among vertebrate embryos is called \_\_\_\_\_.
- ♦At early stages, vertebrate embryos show gill slits, tails and two-chambered hearts.



## Similarities in Biochemistry

- ♦Similarities in the body \_\_\_\_\_ ( \_\_\_\_\_ ) of living things, such as DNA, hormones, and enzymes, show a close \_\_\_\_\_ between various forms of life.

♦Organisms that are closely related, like the cat and the lion, have a greater similarity in their \_\_\_\_\_.

♦Greater differences in \_\_\_\_\_ are thought to show a \_\_\_\_\_ evolutionary \_\_\_\_\_.

### Examples of Evolution

❖The ancient ancestor of the horse was about the size of a fox. It had four toes on its front feet and three toes on its hind feet.

❖The horse gradually got bigger and the length of its feet increased.

❖As time passed, some of the toes disappeared, until today the modern horse is one-toes.

❖The middle toe is the one that remains, but the horse retains tiny splints of two other toes.

❖The skull grew longer and the teeth became flat-topped.

❖The ancestor of the present elephant was the size of a pig and had no tusks.

❖Over time, the size of the elephant's body and head increased tremendously.

❖The two upper incisor teeth increased in size and length and gradually developed into tusks.

❖The early trunk was much shorter than the trunk of today's elephant.

