

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 12: The History of Life

I. The Fossil Record (12.1)

A. Fossils can form in several ways

1. **Permineralization**- _____ carried by water are deposited around or replace the hard structure
2. **Natural casts**- form when flowing water removes all of original bones, leaving _____ in sediment. Minerals fill in the mold
3. **Trace fossils**- record _____ of organism. Include nests, burrows, imprints of leaves, and footprints
4. **Amber-preserved fossils**- organisms trapped in tree _____ that hardens into _____
5. **Preserved remains**- form when entire _____ becomes encased in material such as ice, volcanic ash, or immersed in bogs.

B. Most fossils form in _____ **rock**

1. Most common fossils result from _____
2. Best _____ for fossilization include wetlands, bogs, rivers, lakebeds, and floodplains

C. Only _____ percentage of living things become fossils

D. Radiometric dating provides an _____ estimate of fossil's age

1. **Relative Dating**- estimate of date by comparing _____ of fossils in _____ layers.

2. **Radiometric dating**- technique using natural _____ rate of unstable _____

a. **Radiocarbon dating**- Isotope of Carbon (^{14}C) used with half-life of _____ years

1). Organisms consume carbon by _____ and _____.

2). When organism dies, _____ begins to decay

3) Look at _____ of ^{14}C to ^{12}C

b. Determining Earth's Age

1). Use decay of _____ to determine age (long half-life)

2). Earth's age about _____ **billion years**

II. The **Geologic Time Scale** (12.2)

A. _____ fossils are another tool to determine the age of rock layers.

1. **Index fossils**- organisms that existed only during specific spans of _____ over large _____ area

2. Estimate age of rock layers by _____ they contain

B. The geologic time scale organizes Earth's history

1. **geologic time scale**- representation of the _____ of Earth

a. _____ by major **changes** or **events**

b. Uses _____ from fossil and geologic records

2. Divided into _____ basic units of time

a. _____ - lasts tens to hundreds of millions of years.

1). Separated by periods of **mass**

2). leads to periods of **adaptive** _____ of species

b. _____ - most common used units. Lasts tens of millions of years

c. _____ -smallest units

III. Origin of Life (12.3)

A. Earth was very different billions of years ago

1. Earth was extremely _____ first 700 million years

2. **Atmosphere** formed when **cooled** (no _____ at first)

3. When cooled more, water _____ condensed and fell as _____.

4. _____ **compounds** formed from inorganic materials once _____ was present

B. Several sets of hypotheses propose how life began on Earth

1. Organic Molecule Hypotheses

a. **Miller-Urey experiment** (1953)- demonstrated that _____ compounds could be made by simulating conditions on _____ Earth

b. **Meteorite hypothesis**- organic molecules may have arrived on Earth through meteorite or asteroid _____

2. Early Cell Structure Hypotheses

a. **Iron-sulfide bubbles hypothesis**- biological molecules formed in chimneys of _____ vents

b. Lipid membrane hypothesis- evolution of lipid membranes crucial step for _____ of life.

1). **Lipid** molecules spontaneously form _____-enclosed spheres.

2). These formed around organic molecules forming _____-like structures

3. **RNA** as early _____ material

a. hypothesis that **RNA** instead of _____ was original **genetic material**

b. **RNA** can _____ - _____

IV. Early Single-Celled Organisms (12.4)

A. Single-celled organisms changed Earth's surface by depositing _____

B. Changed _____ by giving off oxygen

1. **3.5 billion** years ago, _____ life evolved (cyanobacteria)

2. Higher _____ levels in atmosphere and oceans allowed evolution of _____ prokaryotes.

C. _____ cells may have evolved through **endosymbiosis**

1. **Endosymbiosis theory**- one organisms lives within body of another, and both _____ from relationship

a. Early _____ and _____ were once simple prokaryotic cells taken up by larger prokaryotes 1.5 billion years ago

b. Based theory on fact that mitochondria and chloroplasts have their own _____ and _____

D. The evolution of **sexual reproduction** led to increased _____

1. First prokaryotes and eukaryotes reproduced _____

2. Sexual reproduction increases **genetic** _____ which lets a population adapt quickly to new conditions

3. First step in evolution of _____ **life**.

V. Radiation of Multicellular Life (12.5)

A. One of most important transitions in history of life

1. First appeared during _____ **era** (544 million years ago)

2. Huge _____ of animal species evolved

a. At first all life was found in _____

b. Eventually life moved onto _____

c. Dead remains of organisms from this era changed into _____ and _____

3. Paleozoic Era ended with **mass** _____

B. _____ radiated during the **Mesozoic era**.

1. **Age of** _____

2. First _____ appeared

3. Era ended with **mass extinction** caused by
_____ impact

C. _____ radiated during the **Cenozoic era**

VI. Primate Evolution (12.6)

A. Humans share a common ancestor with other _____

1. **Primates**- category of mammals with _____
hands and feet, forward looking eyes, and enlarged
_____ relative to body size.

2. Primate evolution- _____ main branches

a. **Prosimians**- _____ living primate group

b. **Anthropoids**- _____-like primates

1). includes _____-all species of
human lineage)

2). _____ - two legged or upright
walking led to _____ success

B. There are many fossils of extinct hominids

1. **Australopithecus afarensis** (3 to 4 millions years ago
in _____)

2. **Homo habilis** (2.4 to 1.5 million years ago) -
"_____-_____"- used crude _____ tools

3. **Homo Neanderthalensis** (200,000 to 30,000 years
ago)

4. **Homo sapiens**- _____ man

C. Modern humans arose about _____ years ago

1. Evidence points to origin in Ethiopia 100,000 years ago

2. Human evolution was influenced by **culture**- _____
are key markers in human evolution

3. Increased skull and _____ size gave humans a
_____ **advantage**