

# Evolution and Natural Selection Unit

## Notes Name: \_\_\_\_\_

Evolution: evolution is \_\_\_\_\_ of a population of organisms from one generation to the next. Usually an advancement.

### Evidence of Evolution

- The \_\_\_\_\_ record of changes in plants and animals over millions of years.
  - From simple to more \_\_\_\_\_.
- Chemical and anatomical \_\_\_\_\_ of related life forms.
- The geographic \_\_\_\_\_ of related species.
- Genetics (\_\_\_\_\_) A more recent branch of science that shows how organisms have evolved and are related on a \_\_\_\_\_ level.

Common Descent: All organisms on Earth are descended from a \_\_\_\_\_ ancestor or ancestral gene pool.

-Not observable

- Evolution is the change in the \_\_\_\_\_ pool overtime.
  - Gene Pools can change when...
  - Populations can \_\_\_\_\_
    - Diseases, extinctions, introduction of new better adapted species, predators.
  - Non-random \_\_\_\_\_
    - Organisms choose strongest mate, ones in similar boundaries,
  - Mutations in the \_\_\_\_\_
    - Genes can change. Some are good, some are bad.
    - The environment will decide.
  - M \_\_\_\_\_ in and out of the population
    - Immigration, gene flow.
  - Natural \_\_\_\_\_
    - A \_\_\_\_\_ to the environment that do well replace poor ones. Usually a advancement.

The four parts to Darwin's theories.

- Organisms have \_\_\_\_\_ over time.
- Organisms share a \_\_\_\_\_ ancestor.
- Change is a \_\_\_\_\_ process over many generations.

- Punctuated evolution shows us that it can during some periods \_\_\_\_\_ up.
- The mechanism of evolutionary change was \_\_\_\_\_ selection.

Descent with Modification: The passing on of \_\_\_\_\_ from parent organisms to their offspring.

- Offspring will display small changes.

Natural Selection: Organisms \_\_\_\_\_ suited to their environment reproduce more often than others and \_\_\_\_\_ the adaptation to their offspring (kids).

The mechanism for evolution is natural selection.

- #1.) Without checks like \_\_\_\_\_, populations would increase exponentially. Survival of the fittest!
- #2.) Most populations are \_\_\_\_\_ in size except for seasonal changes.
- #3.) Natural Resources are \_\_\_\_\_. - A struggle for existence.
- #4.) No two \_\_\_\_\_ are alike.
- #5.) Variation is \_\_\_\_\_. (Animals pass their traits to their young).

Variation + Many Offspring + Heredity = \_\_\_\_\_  
\_\_\_\_\_.

Divergent evolution: When a group from a specific population develops into a \_\_\_\_\_ species.

Convergent Evolution: Similar evolved structures in \_\_\_\_\_ animals.

Coevolution: The evolution of \_\_\_\_\_ or more species, each adapting to changes in the other.

- These ecological relationships include:
  - Predator/\_\_\_\_\_ and parasite/\_\_\_\_\_
  - Competitive species
  - M\_\_\_\_\_ species

Please record the following

- -Spoon beak.
- -Grabber Beak.
- -Magnetic Beak.
- -Tweezer Beak.

# EARTH SYSTEM HISTORY NOTES

## Earth System History and Astronomy

### Earth History Components

- Earth system history has \_\_\_\_\_, chemical, and biological components
- Uniformitarianism: Laws of nature have \_\_\_\_\_ changed over time.
- The system is \_\_\_\_\_. Changes in living conditions for animals have been numerous throughout earth's history.
- 99.5% of all things that have ever lived have become \_\_\_\_\_.
- Principle of superposition - Oldest rocks and fossil are on \_\_\_\_\_, youngest on \_\_\_\_\_.

| GEOLOGIC TIME SCALE                   |            |                                 |                        |  |  |  |
|---------------------------------------|------------|---------------------------------|------------------------|--|--|--|
| Time Units of the Geologic Time Scale |            |                                 |                        | Development of Plants and Animals                        |  |  |
| Eon                                   | Era        | Period                          | Epoch                  |  |  |  |
| Phanerozoic                           | Cenozoic   | Quaternary                      | Holocene               | 0.01-  | Earliest <i>Homo sapiens</i>   |  |
|                                       |            |                                 | Pleistocene            | 1.6  |  |  |
|                                       |            | Tertiary                        | Pliocene               | 5.3  | "Age of Mammals"   |  |
|                                       |            |                                 | Miocene                | 23.8   |  |  |
|                                       |            |                                 | Oligocene              | 33.7   |  |  |
|                                       |            |                                 | Eocene                 | 55   |  |  |
|                                       |            |                                 | Palaeocene             | 65   |  |  |
|                                       | Mesozoic   | Cretaceous                      | 145                    | "Age of Reptiles"  | Extinction of dinosaurs and many other species<br>First flowering plants<br>First birds<br>Dinosaurs dominant<br>First mammals |  |
|                                       |            | Jurassic                        | 208                    |  |  |  |
|                                       |            | Triassic                        | 248                    |  |  |  |
|                                       | Palaeozoic | Carboniferous                   | Permian                | 286  | "Age of Amphibians"  | Extinction of trilobites and many other marine animals<br><br>First reptiles<br>Large coal swamps<br>Amphibians abundant |
|                                       |            |                                 | Pennsylvanian          | 320  |  |  |
|                                       |            |                                 | Mississippian          | 360  |  |  |
|                                       |            | Devonian                        | 410                    | "Age of Fishes"  | First amphibians<br>First insect fossils<br>Fishes dominant  |  |
|                                       |            | Silurian                        | 438                    |  |  |  |
| Ordovician                            |            | 505                             | "Age of Invertebrates" | First land plants<br>First fishes<br>Trilobites dominant |  |  |
| Cambrian                              |            | 545                             |                        |  |  |  |
| Vendian                               |            | 650                             | "Soft-bodied faunas"   | First organisms with shells<br>Abundant Ediacaran faunas |  |  |
| Proterozoic                           | 2500       | Collectively called Precambrian |                        | First multicelled organisms                              |  |  |
| Archean                               |            |                                 |                        |  | comprises about 87% of the geological time scale   |  |
| Hadean                                |            |                                 |                        |  |  | Origin of the earth  |
|                                       | 3800       |                                 |                        |  |  |  |
|                                       | 4600 Ma    |                                 |                        |  |  |  |

## Precambrian

### Hadean, Archean, and Proterozoic Eon's

Earth's Molten layers \_\_\_\_\_ (Denser to middle)

Formation of Earth's Crust (cooling).

- Meteorites bombard the planet and carry with it \_\_\_\_\_ molecules and amino acids (building blocks of protein).

\_\_\_\_\_ created from protoplanet impact

Atmosphere originates (No \_\_\_\_\_ yet)

Earliest life begins (primitive \_\_\_\_\_ cells)

- Microbes helped produce an \_\_\_\_\_ atmosphere through photosynthesis.

First \_\_\_\_\_-cellular life (many cells)

Explosion of new animals (sea)

## Paleozoic Era

Vendian, Cambrian, Ordovician, Silurian,

Devonian, Carboniferous, and Permian Periods.

Marine invertebrates dominate

Jawed \_\_\_\_\_ Evolve

Plants invade land (Oxygen to atmosphere)

Insects emerge

First Am \_\_\_\_\_

First Reptiles

First winged \_\_\_\_\_

## **Mesozoic Era**

**Triassic, Jurassic, Cretaceous Periods**

Di \_\_\_\_\_ dominate

First \_\_\_\_\_

First Mammals

First Flowers

K-T Mass \_\_\_\_\_ Event, 65mya

## **Cenozoic Era**

**Tertiary, and Quaternary Periods**

Mammals change

Earliest \_\_\_\_\_

Climate becomes drier

Panama attaches South America to North America

First human \_\_\_\_\_

Modern Man (Whoa)

Civilization

Age of Exploration, Industrial and Computer Age

## HUMAN EVOLUTION NOTES

- Hominid: any of a family (Hominidae) of erect \_\_\_\_\_ primate mammals comprising recent humans.
- Opposable \_\_\_\_\_ - Gripping (most primates have).
- Bipedalism - Walking on \_\_\_\_\_ feet (regularly).
- Hominids first appeared roughly \_\_\_\_\_ million years ago (A blink in geologic time).
- Many species of hominids evolved and have become \_\_\_\_\_ (lots of fossil evidence).
- We are the only surviving hominid (Homo sapien sapien).
- Hominid dentition is very close 2:1:2:3
- Wisdom \_\_\_\_\_ - Molars leftover from when we ate mostly tough plants.

## ON ORIGINS NOTES

- Organism - Any \_\_\_\_\_ thing
- Characteristics of living things
- Made of \_\_\_\_\_.

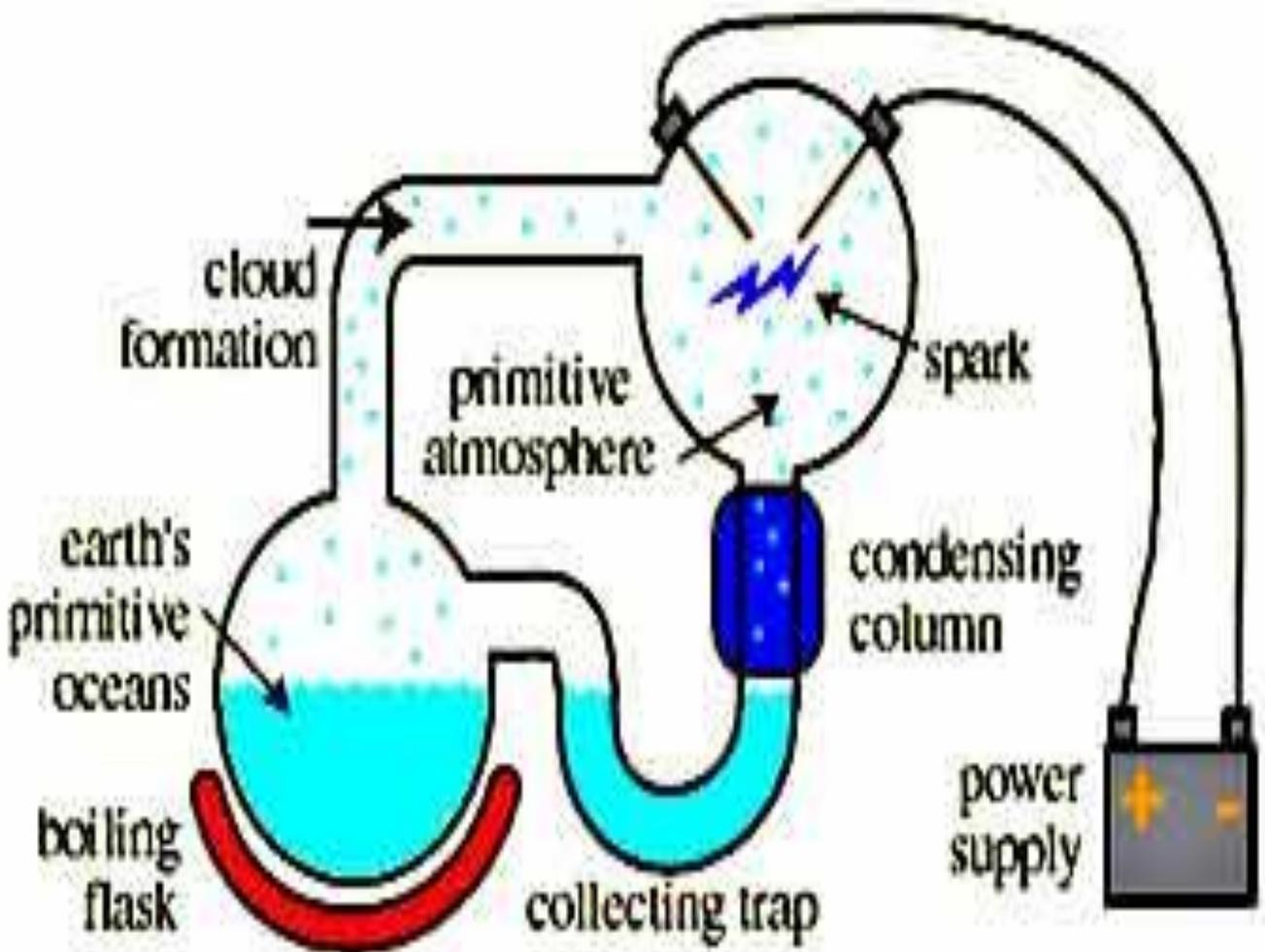
- \_\_\_\_\_.
  - Responds to a stimulus.
  - Uses \_\_\_\_\_.
  - Adjusts to Changes.
    - Maintains steady \_\_\_\_\_ conditions.
    - Maintains homeo\_\_\_\_\_.
  - Reproduces.
  - Grows and \_\_\_\_\_.
  - Grow-To increase in size.
  - Develop-To change in \_\_\_\_\_.
  - Adapts to Change.
    - Evolves / Inherits \_\_\_\_\_ that promote survival.
  - Has a \_\_\_\_\_ span.
- In Science theory
    - Abiogenesis explains the origin of \_\_\_\_\_.
    - Evolution explains how life \_\_\_\_\_ once it exists.
    - The two are different.
  - Needs of Living Things
    - Energy - Supplied by the \_\_\_\_\_ (most of the time) and stored in food. TINSTAAFL!
    - Oxygen - To burn the \_\_\_\_\_ in cells.  
(Respiration)

- Water - To keep things \_\_\_\_\_ in and out of cells. (Universal Solvent)
- Minerals- For proper chemical \_\_\_\_\_.
- The four general ideas about the origin of life.
  - Special \_\_\_\_\_ - divine forces (god).
  - E.T. extraterrestrial origin - landed from \_\_\_\_\_.
  - Spontaneous origin (abiogenesis) - life came from \_\_\_\_\_ materials.
  - Science viewpoint
    - Which includes
      - - \_\_\_\_\_ (Darwinism).
      - -Cosmology (astronomy)
      - - \_\_\_\_\_ (Earth System History)
      - -Abiogenesis (Primitive life / organic chemistry).
- Origins of the Universe, a timeline.
  - Big Bang roughly 10-\_\_\_\_ billion years ago.
  - \_\_\_\_\_ billion years ago: Earth was created.
  - \_\_\_\_\_ billion years ago: life arose.
    - Prebionts - Nonliving structures that evolved into the first living \_\_\_\_\_. (Simple)

- 2.0 billion years ago: Eu \_\_\_\_\_ cells (single cells with a nucleus) evolved.
- 0.5 billion year ago: \_\_\_\_\_ began to saturate the atmosphere.

- Miller-\_\_\_\_\_ Experiment

- Methane (\_\_\_\_\_)
- Ammonia (\_\_\_\_\_)
- Water (\_\_\_\_\_)
- Hydrogen (\_\_\_\_\_)



- The experiment used
  - Electricity (\_\_\_\_\_)
  - Ultra-violet (\_\_\_\_\_) light (no ozone yet).
  - Heat (convection currents).
  - Cooling (condensation)
  - No \_\_\_\_\_ (no plants).

A protein = 100 \_\_\_\_\_ acids of 20 varieties

Proteins can build DNA / RNA

- Water aided in origin of \_\_\_\_\_ in three ways
  - As a \_\_\_\_\_ - Everything dissolves in water.  
food, oxygen, minerals,
  - Participant in chemical \_\_\_\_\_ such as photosynthesis.
  - Medium
    - Organisms \_\_\_\_\_ through, waste travels away, sex cells travel through, etc

# ECOLOGICAL SUCCESSION NOTES

Name: \_\_\_\_\_

## EVERYTHING IS CHANGING

Ecological succession: The gradual \_\_\_\_\_ of one community of living things by another community.

Primary Succession: Begins in an area with \_\_\_\_\_ previous life supported (bare rock).

Secondary Succession: Succession in an area that \_\_\_\_\_ colonized life but is now disturbed.

Plant Succession: Plants are \_\_\_\_\_ (succession is dominated by plants).

Animal Succession: \_\_\_\_\_ are replaced (Animals help succession).

Pioneer Species: The \_\_\_\_\_ species to colonize after a disturbance.

Climax Community: The \_\_\_\_\_ stage of succession, remaining until a major disturbance.

## The order of ecological succession from primary succession

- Bare \_\_\_\_\_
- Lichens
  - \_\_\_\_\_ secreted by the lichens attack the rock (chemical weathering) and create \_\_\_\_\_ fragments.
- Mosses
  - Create humus and retain \_\_\_\_\_.
- Grasses and Sedges
- Meadow Stage
  - Grasses
  - Yearly plants
  - W \_\_\_\_\_
- Old Field Community
  - Perennials (year after \_\_\_\_\_).
  - Goldenrod, Milkweed.
- Sun Loving Shrubs
  - \_\_\_\_\_ base now forms.
  - Sumac, Willow, Dogwood, Apple.
- Sun Loving \_\_\_\_\_
  - Organic matter increases from fallen leaves.
  - Poplar, Birch, Quaking Aspen.
- Conifers

- Enriched soil allows pines to grow
- Pines are \_\_\_\_\_ loving and grow well
- Eventually they shade out their offspring, no new \_\_\_\_\_ grow.
- Shade Tolerant Hardwoods
  - These can grow in shade.
  - Oak, Hickory, Ash.
- Climax Community (Shade loving hardwoods)
  - Beech Trees, and Maples
  - Climax means \_\_\_\_\_ community.

Events that can restart succession.

- - A \_\_\_\_\_ fire.
- - A volcanic event.
- - Logging / Human Impact.
- - \_\_\_\_\_.
- - Ice Age / Glaciers.

Fire: Some seeds require a \_\_\_\_\_ event or very hot temperature after they have been dispersed to germinate.

Fire ecology: A branch of ecology that focuses on the origins of wildland fire and its \_\_\_\_\_ to the environment that surrounds it, both living and non-living.

Fire Dependence: This concept applies to species of plants that rely on the effects of \_\_\_\_\_ to make the environment more hospitable for their regeneration and growth.

Area of focus: Nutrients and Aquatic Systems.

Eutrophic

- Having concentrations of \_\_\_\_\_ optimal or for plant or animal growth. It is used to describe nutrient or soil solutions.

Mesotrophic

Production is considered \_\_\_\_\_.

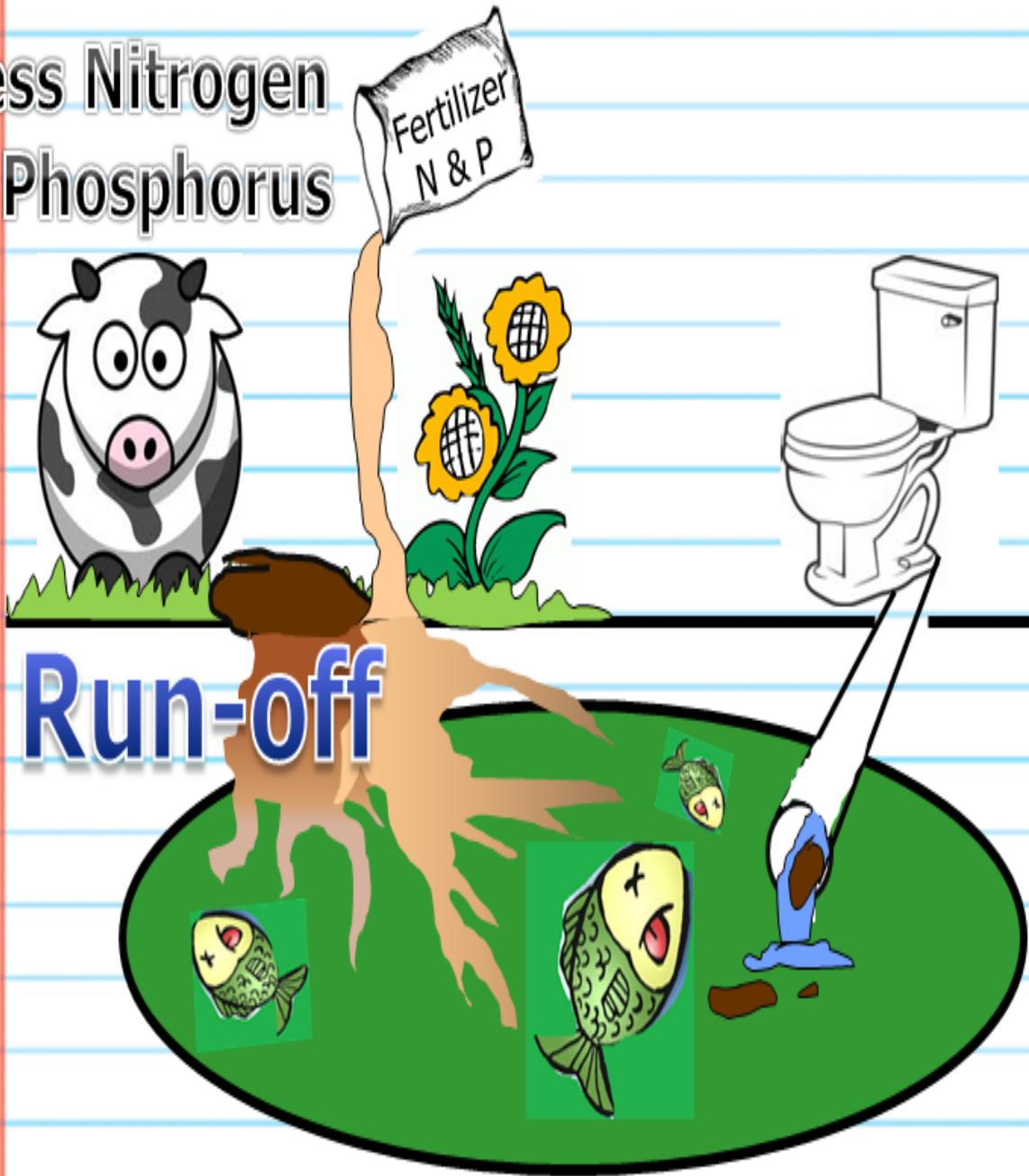
Oligotrophic

Describes a lake or river with \_\_\_\_\_ productivity.

Eutrophication

- Aquatic plants use \_\_\_\_\_ and Nitrogen and grow out of control.
- Aquatic plants \_\_\_\_\_ and die.
- Bacteria break down dead plants and use \_\_\_\_\_ in water (respiration).
- No oxygen left for fish / other aquatic life and they \_\_\_\_\_.

# Excess Nitrogen And Phosphorus



SAVE THESE NOTES. Do Not Lose  
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