

ORGANIZING LIFE

How did life come to exist on earth?

- billions of years ago atmosphere was water (H₂O) vapor, Nitrogen, Methane, Ammonia, Carbon Dioxide, and Hydrogen.
- no ozone layer to protect from sun's UV radiation
- free Oxygen began to form by release of O₂ by water vapor
- *approximately the time in earth's history that life began

Where did early life forms live? why?

- in the oceans, several meters below the surface
 - the water provided protection from UV radiation

How did early life forms get nutrition?

- first forms of life were probably consumers
 - = obtain energy by eating other organisms
- later, some consumers changed to obtain their energy by chemosynthesis
 - = chemical process in which energy from chemical rxns of different nutrients is used to synthesize food
- as nutrients were used up, photosynthesis evolved
 - = chemical process that uses light, carbon dioxide, and water to synthesize food and produce oxygen
 - * these organisms were the 1st producers!*
 - = makes its own food
 - as the producers released more and more Oxygen, the Ozone layer was formed around the earth

Multicellular organisms eventually evolved from the earlier unicellular life forms (eating one another and combining genetic information?). After millions of years, the biosphere became a complex system with diverse life forms.

Classification

- - grouping of things for practical purposes based on similarities
- - recognize relationships by comparisons or all available characteristics of each species

Taxonomy

- - science of grouping and naming organisms
- - purpose = to use information from many different sources in order to classify organisms
- - modern taxonomy attempts to produce a system of natural classification
 - - based on evolutionary relationships
 - - means that closely related organisms have more characteristics in common than those that are less related
 - relationships are determined by:
 1. phylogeny (evolutionary history)
 2. development
 3. biochemistry
 4. behavior
 - organisms are grouped into a series of categories, each one larger than the previous one

Why don't we just use the common names?

- common names can be misleading... an organism with a common name may not have the same common name in another region OR a common name may refer to more than one organism, depending on the region.

- using Latin to specify each organism takes away the possibility for confusion b/c it is a “dead language” -> it will never change.

Scientists

- 1. Aristotle
 - - classified all living things into plants or animals
- 2. Carolus Linnaeus
 - - developed the modern classification system based on close relationships of organisms
 - Binomial Nomenclature
 - 2 word naming system (genus & species)
 - selected characteristics that lead to more natural groupings of species
- 3. Ernst Haeckel
 - placed unicellular organisms into Kingdom Protista
 - separated bacteria from the rest of the unicellular organisms b/c they had no nucleus
 - presence or absence of a nucleus in a cell distinguishes 2 major types of cellular organization
 - prokaryote = no nucleus
 - eukaryote = true nucleus

Phylogeny “phylon” – related group “geny” - origin

- evolutionary history of a species
- scientists began to compare modern-day organisms to fossils of similar forms as they classified organisms
- evolution of a species is represented by branching into six kingdoms from a common origin
 - the 6 kingdoms can be distinguished by the method in which they obtain food, their cellular structures, and chemical makeup of their cells

THE 6 KINGDOMS

ARCHAEBACTERIA

- primitive bacteria that live in extreme environments
- similar to the extreme conditions of a newly formed earth
 - i.e. very hot, very cold, high salinity (salt content)

EUBACTERIA or BACTERIA

- contains only unicellular prokaryotes
- appeared about 3.5 bya according to the fossil record
- over 10,000 known species (named and described)
- obtain food by chemosynthesis or photosynthesis
- many have a cell wall and flagella or cilia
 - flagella = long whip-like structure for movement
 - cilia = short numerous hair-like structures for movement

PROTISTA

- combination of different characteristics -> some plant-like, some animal-like, some fungus-like
- eukaryotes without complex organ or tissue systems
- lives in or near water
- producers or consumers
- 1st appeared in fossil record about 1 bya
- most are unicellular, but seaweeds are multicellular

FUNGI

- used to be classified as plants
 - have a close association w/plants

- believed that ancient partnerships with plants were vital to the survival of early plant species
- some species of fungi live in association with the roots of plants and provide the plants with nutrients
- unicellular (yeasts) or multicellular (mushrooms, puffballs, truffles)
- eukaryotes
- decomposers
- over 100,00 known species (named and described)
- 1st appeared in fossil record about 400 mya

PLANTS

- multicellular
- producers
- eukaryotes
- defined tissue systems with specific functions
- ancestors were most likely the green algae of Kingdom Protista
- 1st appeared in fossil record about 400 mya
- about 500,000 known species (named and described)
- provide earth with Oxygen for life processes in organisms
 - also important to formation of earth's protective Ozone layer

ANIMALIA

- multicellular
- consumers
- eukaryotes
- have the most complex body structures of all kingdoms
- over 1 million known species (named and described)
- some are microscopic, others are among the largest organisms on earth
- 1st appeared in fossil record about 700 mya