

PROPERTY OF:

BIOLOGY – UNIT 3 – CHAPTER 18 NOTES

CLASSIFICATION

Why classify?

- 2.5 million identified species
- estimated 20 million additional species (rain forests, oceans, microorganisms)
- common language (Latin)
- place organisms into groups with real biological meaning

Binomial Nomenclature

- developed by Carolus Linnaeus – Swedish botanist
- 2 part scientific name: *Genus species* (note capital and underline/italics)
- genus = group name, species = name that describes main characteristics
- EX: *Acer rubrum* = red (rubrum) maple (acer)
Acer palmatum = hand-like (palmatum) maple (acer)

Taxonomy

- taxonomy = the science of naming organisms and placing them in groups
- **Dumb King Phillip Came Over For Good Spaghetti**
- ***Species*** = smallest taxon, defined as organisms with similar characteristics that can successfully breed with each other
EX: *Felis domesticus* (house cat) & *Felis concolor* (mountain lion)
- ***Genus*** = next largest taxon, defined as organisms with many similar features that are clearly different species
EX: *Panthera leo* (lion) & *Panthera tigris* (tiger)
- ***Family*** = next largest taxon, contains related genera (plural of genus)
EX: Felidae (cats) & Canidae (dogs)
- ***Order*** = next largest taxon, contains related families
EX: Carnivora (meat-eaters) & Primata (primates)
- ***Class*** = next largest taxon, contains related orders
EX: Mammalia (mammals) & Reptilia (reptiles)
- ***Phylum*** = next largest taxon, contains related classes, major grouping within a kingdom
EX: Nematoda (roundworms) & Chordata (vertebrates)
- ***Kingdom*** = second largest taxon
Linnaeus described only 2 kingdoms: Animalia and Plantae
- ***Domain*** = largest taxon
most modern way of classifying organisms (Bacteria, Archaea, Eukarya)

Taxonomy Today

- blurred lines between species, genera, or families
- taxons change as soon as new evidence is discovered
- species are now grouped by close evolutionary relationships, not necessarily by similar physical features
EX: homologous structures (similar body parts that evolved from a common ancestor) vs. analogous structures (similar body parts that evolved from different origins)
- genetic similarities = similarities in DNA or protein sequences
EX: cytochrome c = a protein found on the electron transport chain, found in all organisms, but in slightly different forms

The Six-Kingdom System

- all organisms classified as prokaryotes (smaller; no nucleus or other membrane-bound organelles) or as eukaryotes (larger; contains a nucleus and other membrane-bound organelles)
- other classification terms: unicellular (contains 1 cell), multicellular (contains 2 or more cells), heterotrophic (cannot make its own food), autotrophic (makes its own food using photosynthesis)
- ***Archaeobacteria*** = “ancient bacteria”
can live in harsh environments
prokaryotic cells
EX: methanogens (live in anaerobic environments, such as digestive tracts, produce methane), thermophiles (live in hot springs or in volcanoes), halophiles (live in extremely salty environments)
- ***Eubacteria*** = “true bacteria”
prokaryotic cells
EX: soil bacteria, infectious bacteria, cyanobacteria (perform photosynthesis, produce oxygen and glucose)
NOTE: most bacteria are completely harmless
- ***Protista*** = single-celled eukaryotic organisms, heterotrophic or autotrophic
EX: plant-like protists, animal-like protists, fungus-like protists
protists are the “link” between bacteria and fungi/plants/animals
Modern evolutionary biologists do not agree on the classification of protists.
- ***Fungi*** = contains cell walls that do not contain cellulose, heterotrophic, multicellular, decomposers
EX: molds, mushrooms
- ***Plantae*** = contains cell walls that contain cellulose, autotrophic, multicellular
EX: algae, mosses, ferns, flowering plants
- ***Animalia*** = does not contain cell walls, heterotrophic, multicellular

THE ----- SIX ----- KINGDOMS ----- OF ----- LIFE

ARCHAEBACTERIA

“ancient bacteria”

live in extremely harsh environments

- EX: - very hot areas: thermophiles
 - anaerobic areas: methanogens
 - strong acid areas: acidophiles
 - very salty areas: halophiles

- unicellular
- prokaryotic (no nucleus)
- cell wall
- some are autotrophs and some are heterotrophs

EUBACTERIA

“true bacteria”

common, everyday bacteria

- EX: - infectious bacteria that cause illnesses
 - bacteria that live in the soil
 - bacteria found in the house, on the body, or in food

- unicellular
- prokaryotic (no nucleus)
- cell wall
- some are autotrophs and some are heterotrophs

PROTISTA

protists are the evolutionary link to fungi, plants, and animals
microscopic (like archaeobacteria and eubacteria)

- EX: - Some protists are “fungus-like”.
 - Some protists are “plant-like”.
 - Some protists are “animal-like”.

- unicellular
- eukaryotic (has a nucleus)
- some have a cell wall and some do not
- some are autotrophs and some are heterotrophs

FUNGI

usually decomposers (eats dead material in the environment)

NO PHOTOSYNTHESIS

- EX: - molds
 - mushrooms
 - yeast

- multicellular
- eukaryotic (has a nucleus)
- cell wall
- heterotrophs

PLANTAE

photosynthetic (absorbs sunlight and turns carbon dioxide and water into glucose and oxygen gas)

- EX: - algae
 - moss
 - trees
 - flowering plants

- multicellular
- eukaryotic (has a nucleus)
- cell wall
- autotrophs

ANIMALIA

non-photosynthetic – must eat to acquire nutrients
many animals (but not all) are capable of movement

- EX: - Annelida - Mammalia
 - Amphibia - Aves
 - Porifera - etc...

- multicellular
- eukaryotic (has a nucleus)
- no cell wall
- heterotroph

Evolution of Phylum Chordata

(Continued From Previous Tree)

