

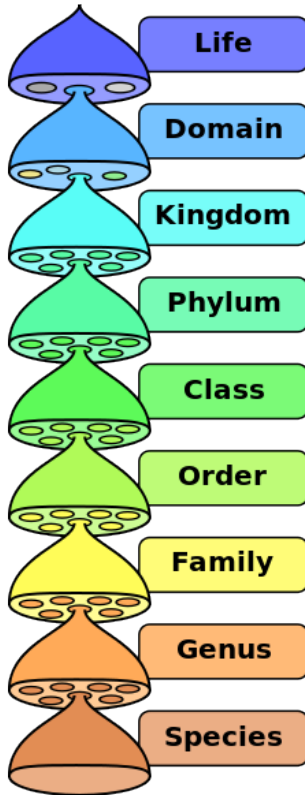
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CONCEPT: PHYLOGENIES

- Taxonomy – the science of defining groups of organisms based on shared characteristics

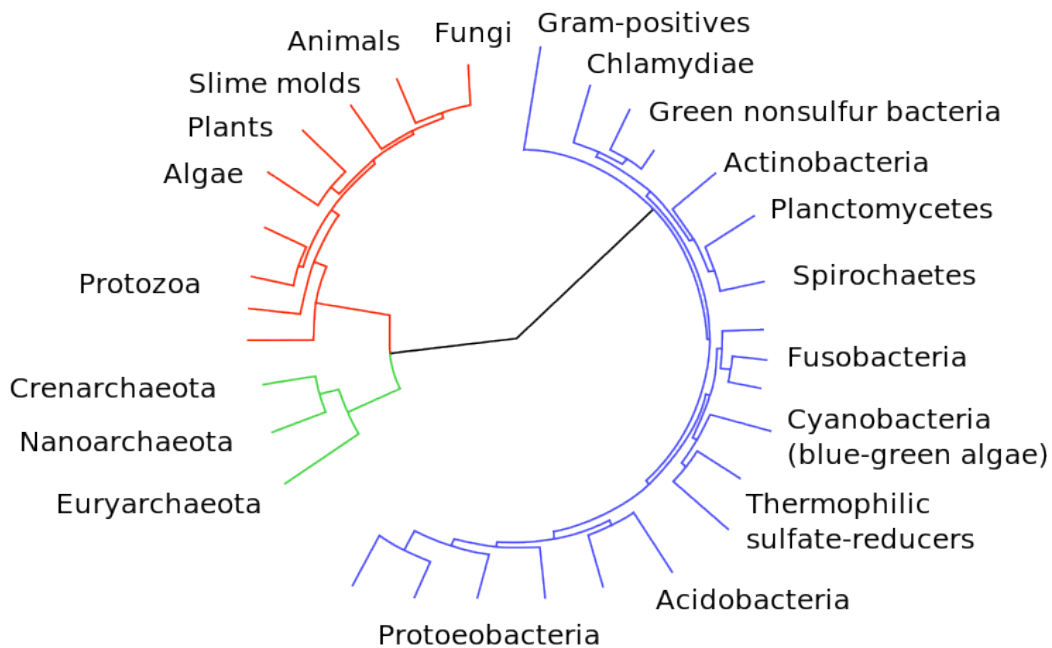
EXAMPLE:



Systematics – the study of life and the relationships between living things through time

- **Phylogenies** – evolutionary relationships between groups of organisms
 - **Phylogenetic tree** – a branching diagram showing inferred evolutionary relationships between species

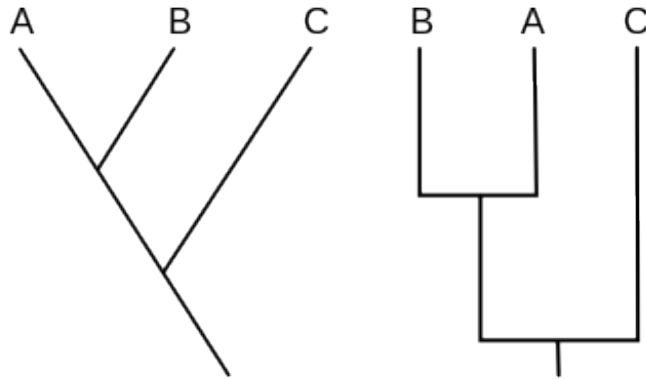
EXAMPLE:



CONCEPT: PHYLOGENIES

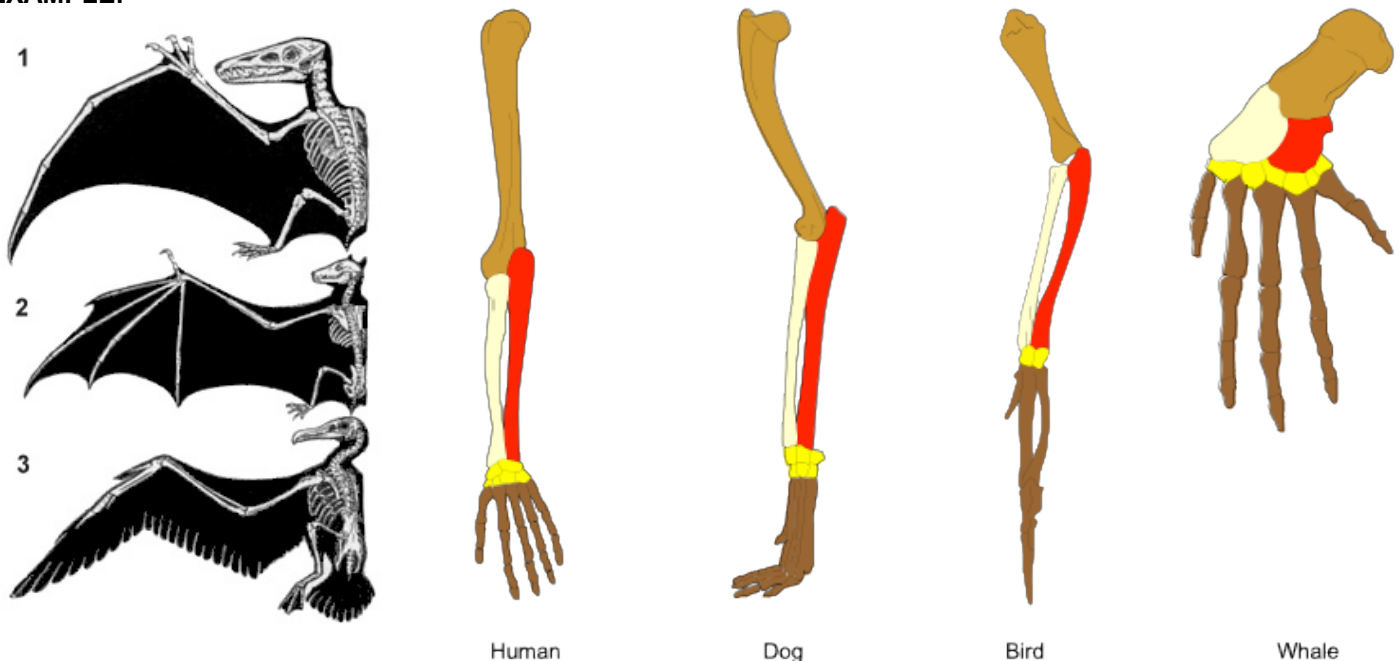
- **Character** – any genetic, morphological, physiological, or behavioral characteristic being studied
 - **Ancestral trait** – a character that existed in an ancestor
 - **Derived trait** – modified form of an ancestral trait

EXAMPLE:



- **Homology** – similarity between organisms due to a shared ancestral trait
- **Analogy** – similarity between organisms due to convergent evolution
 - **Homoplasy** – analogous structures that arose independently

EXAMPLE:

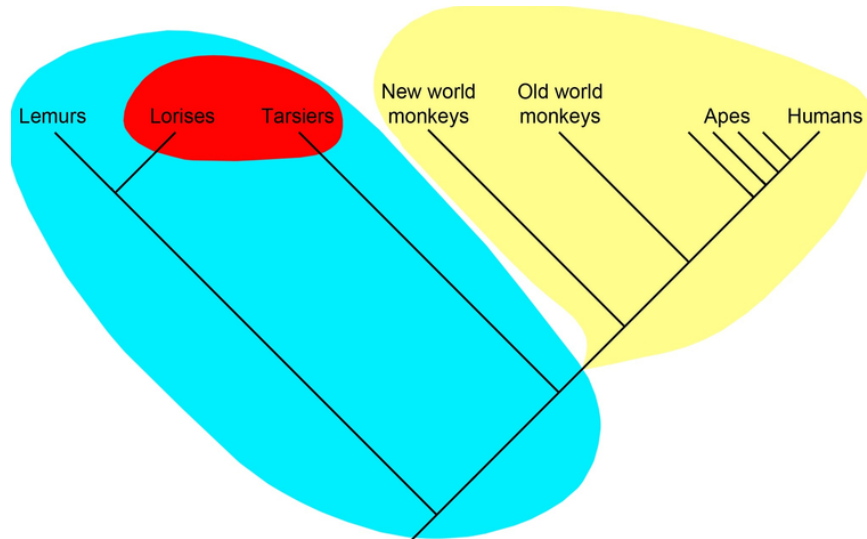


- **Orthologous gene** – homologous genetic sequences that are separated by a speciation event
- **Paralogous gene** – homologous sequences created by a gene duplication event
- **Horizontal gene transfer** – gene is transferred from one genome to another

CONCEPT: PHYLOGENIES

- **Cladistics** – type of classification based on shared characteristics between common ancestors
 - **Clade** – group of organisms based on a common ancestor and it’s descendants
- **Monophyletic** – ancestral species and all of its descendants
- **Paraphyletic** – ancestral species and some, but not all, of its descendants
- **Polyphyletic** – includes various distantly related species, but not their common ancestor

EXAMPLE:



- Outgroup – monophyletic group that serves as a reference point to the one being studied
- **Synapomorphy** – a trait shared by taxa and their most common ancestor, but not the previous ancestor
- **Symplesiomorphies** – ancestral traits shared by two taxa

EXAMPLE:

