Origins of Eukaryotes

Theory Name	Definition	Evidence
Endosymbiotic theory	Eukaryotic cells are believed to have evolved from early prokaryotes that were engulfed by phagocytosis	Mitochondrion and Chloroplast have double membranes, can reproduce in a fission-like process, have their own DNA which is similar to prokaryotic DNA, and has ribosomes similar to prokaryotes.

Origins of Life

Theory Name	Definition	Evidence
Abiogenesis	life evolved from nonliving chemical systems	Oparin-Haldane hypothesis and Miller-Urey Experiment

Origins of Life

Hypothesis/Experiment	Definition	Evidence
Oparin-Haldane hypothesis	life arose gradually from inorganic molecules, with “building blocks” like amino acids forming first and then combining to make complex polymers.	Miller-Urey Experiment
Miller-Urey experiment	organic molecules needed for life could be formed from inorganic components	Used a sparking device to mimic a lightning storm on early Earth. Their experiment produced a brown broth rich in amino acid

Origins of Life (cont)

RNA world hypothesis	that the first life was self-replicating RNA	Scientists think RNA building blocks (nucleotides) emerged in a chaotic soup of molecules on early Earth. These nucleotides bonded together to make the first RNAs. RNA store of genetic information, self-replicate, and act as a cellular catalyst
Metabolism-first hypothesis	metabolic networks before DNA or RNA	origin of life is triggered by the accumulation of very simple organic molecules in thermodynamically favorable circumstances. Simple organic molecules can then be combined in various ways that result in simple amino acids, lipids, etc. These, in turn, could act as catalysts for the formation of more organic molecules. This is the beginning of metabolism.
Organic compounds came on meteorites	Simple organic compounds might have come to early Earth on meteorites.	70 kinds of amino acids found on them - delivered by comets -

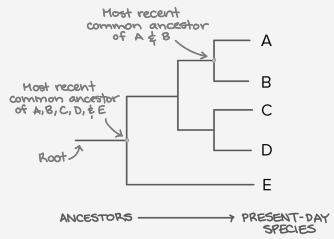
Origins of Life (cont)

Life in Sea	life could have started in the oceans.	Yes - life is there despite scalding temperatures and no sunlight, many types of creatures are surviving here

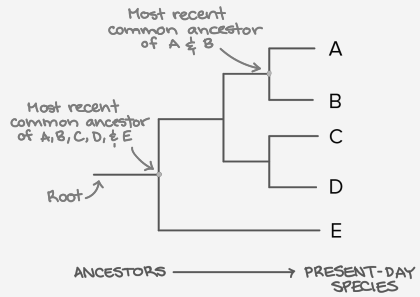
Biological Classification

Taxonomy	the practice of identifying different organisms, classifying them into categories and naming them
Binomial Nomenclature	A standard way to refer to the scientific name of an organism by using the genus and species
Phylogeny	the process of classifying and organizing organisms based on evolutionary relationships
Domain	The new highest level (Eukarya, Eubacteria, Archaebacteria)
Kingdom	The old highest level of classification (Plantae, Animalia, Fungi, Protista and Eubacteria, Archaebacteria)
Phylum	The next level of classification where along a number of Classes are clubbed up to form one Phylum
Class	A group of Orders which share a few similarities
Order	A group of families showing somewhat few similarities
Family	It comprises of a number of genus which share some similarity among themselves
Genus/ Genera	It composes of multiple species which have similar characteristics but different from that of species from other genus
Species	It is the lowest level of classification and shows the high level of similarities among the organisms

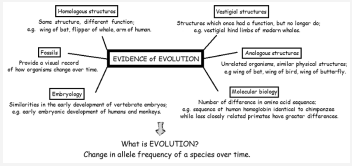
Phylogenetic Tree



Phylogenetic Tree



Evidence for Evolution



Darwin's Theory

Organisms differ; variation is inherited.
Organisms produce more offspring than survive.
Organisms compete for resources.
Organisms with advantages survive to pass them on to their children.
Species alive today are descended with modifications from common ancestors.
This is the theory of Natural Selection.