Linnean classification

Carl Linneaus - Hierarchal classification

Mnemonic: King Prawn Curry Or Fat Greasy Sausage

(**Domain**)

Kingdom

Phenus

Class

Order

Family

Genus

Species - Organisms able to reproduce to produce fertile offsprings

Binomial nomenclature - genus and species *in italics* genus has a capital letter, not species.

5 kingdom classification

Prokaryotes	Unicellular
	No nucleus or membrane-bound organelles
	Absorb nutrient through cell walls / produce it internally
Protists	Mainly unicellular
	Nucleus + membrane-bound organelles
	Nutrients through photosynthesis + ingest other organisms
Fungi	Uni/multicellular
	Nucleus + membrane-bound organelles
	Nutrients absorbed from decaying material
Plantae	Multicellular
	Nucleus + membrane-bound organelles
	Nutrients photosynthesised
Animalia	Multicellular
	Nucleus + membrane-bound organelles
	Nutrients ingested

3 domain classification

Proposed by Carl Woese

3 domains (bacteria, arches and eukarya)
6 kingdoms (eubacteria, archaebacteria, protists, fungi, plantae and animalia).

Based on differences in sequence of nucleotides in RNA, lipid structure, sensitivity to antibiotics...

Domain	Kingdom	Other details
Bacteria	*Eubacteria*	70s ribosomes Eubacteria = "true bacteria" found in all environments
Archaea	*Archaebacteria*	70s ribosomes Archaebacteria = "ancient bacteria" Extreme environments
Eukaryotes	*Protists, fungi, plantae, animalia*	80s ribosomes

Phylogenetic tree

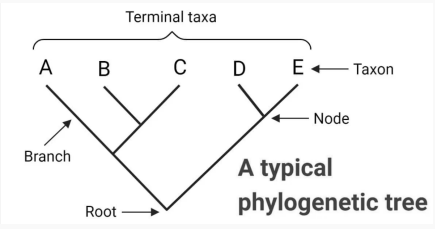
Show evolutionary relationships.

Similarities and differences in physical characteristics of species.

+ *Continuous tree* - Don't have to fit into one group or other, no discrete taxonomical group.

+ *Hierarchal nature of Linnean system* - Suggests same levels are equivalent when actually not necessarily comparable.

Phylogenetic tree



Natural selection

Variation	New alleles because of mutations
Survival	*Selection pressure* increases chance of survival for best adapted organisms
Reproduction	Successful organisms reproduce (survival of the fittest)
Genes	Successful organisms pass on advantageous alleles. Frequency of allele in gene pool increases.
Time	Over time, whole population has advantageous allele. *Speciation* - Can become different species.

Evidence for evolution

Paleontology (fossil record)	Allows us to study phylogenetic relationships. *Biases* - Incomplete because not all organisms fossilise, specific conditions necessary for fossils formation...
Anatomical evidence	**Homologous structures** - Structures that look different (and may have different purposes) but have the same underlying structure (e.g. forelimbs in vertebrates). Example of divergent evolution - common ancestors with different adaptations. Closely related species in different habitats.

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Evidence for evolution (cont)

Biochemical evidence	Differences between proteins - some important molecules are the same in different species (e.g. cytochrome C, rRNA...).
Embryological evidence	Similarities in embryos between species. Shows they develop in a similar way (e.g. human and fish embryos both have gills). Evolutionary history can be traced through embryonic development.

Variation

Interspecific variation	Differences between species
Intraspecific variation	Differences within species

Causes of variation

Environment	Sunlight, nutrient, and water availability
Genetic	Alleles, mutations, sexual reproduction, meiosis...

or both

Types of adaptations

Anatomical	Body covering Mimicry Camouflage Teeth
Physiological	Poison / antibiotic production Water holding (Animals - blinking, reflexes...)

Types of adaptations (cont)

Behavioural	Survival behaviours (e.g. playing dead) Courtship Seasonal behaviours (e.g. migration, hibernation...)

Explanations for convergent evolution

Convergent evolution	Different species start to share similarities, adapt in a similar environment / selection pressures. e.g. Marsupials (in Australia) and placental mammals (USA) are species that resemble each other and because adapted in a similar environment.
Analolgous structures	Structures that perform the same function but aren't structurally similar (e.g. wings in different animals)
Founder effect	Small number of individuals separate to form new colony. Rate alleles become more common.

Modern examples of evolution

MRSA	*Variation* - Some resistant to antibiotics
	Selection pressure - Antibiotics
	Antibiotic-resistant bacteria survive, advantageous alleles are passed on
	After generations, more S. aureus becomes resistant to antibiotics.
Peppered moths	*Variation* - Some white, some black

Modern examples of evolution (cont)

Selection pressure - Change in tree colour because of industrial revolution.

White ones survive pre-revol., black ones survive during and white ones again after.

Moths therefore change colour through generations to match tree colour.