

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

Prokar-yotes 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, archaeobacteria, protists, fungi, plantae and animalia).

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

Domain	Kingdom	Other details
<i>Bacteria</i>	<i>Eubacteria</i>	70s ribosomes Eubacteria = "true bacteria" found in all environments
<i>Archaea</i>	<i>Archaeobacteria</i>	70s ribosomes Archaeobacteria = "ancient bacteria" Extreme environments
<i>Eukaryotes</i>	<i>Protists, fungi, plantae, animalia</i>	80s ribosomes

Phylogenetic tree

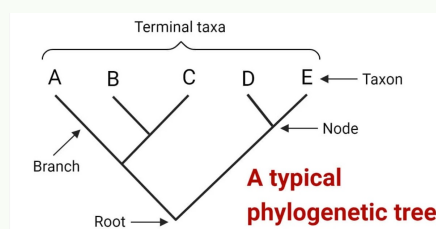
Show evolutionary relationships.

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.

Evidence for evolution (cont)

<i>Biochemical evidence</i>	Differences between proteins - some important molecules are the same in different species (e.g. cytochrome C, rRNA...).
<i>Embryological evidence</i>	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

<i>Interspecific variation</i>	Differences between species
<i>Intraspecific variation</i>	Differences within species

Causes of variation

<i>Environment</i>	Sunlight, nutrient, and water availability
<i>Genetic</i>	Alleles, mutations, sexual reproduction, meiosis...

or both

Types of adaptations

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

Types of adaptations (cont)

<i>Behavioural</i>	Survival behaviours (e.g. playing dead) Courtship Seasonal behaviours (e.g. migration, hibernation...)
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Explanations for convergent evolution

<i>Convergent evolution</i>	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.
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<i>Analogous structures</i>	Structures that perform the same function but aren't structurally similar (e.g. wings in different animals)
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<i>Founder effect</i>	Small number of individuals separate to form new colony. Rare alleles become more common.
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Modern examples of evolution

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

Modern examples of evolution (cont)

<i>Selection pressure</i>	- 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.
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