5.3 CLASSIFICATION OF BIODIVERSITY

BINOMIAL SYSTEM

It is a system of nomenclature by which all living species are classified

Taxonomy: the classification of organisms.

Rules for writing the nomenclature:

- Genus name comes first
  ↓
  A group of species that share certain characteristics.
- Species - comes second.
- Genus name begins with a capital letter & the species name in lower-case letter.
- typing/printed text - in *italics*
- handwritten - <u>underline the name</u>
- After the binomial has been used once in a piece of text, it can be abbreviated for further usage.

example: Pebble crab

scientific name - <u>Xanthias</u> <u>lamarckii</u>

Why do we use binomial nomenclature?

- allows **identification & comparison** of organisms
- organisms can be **named** according to a globally recognised scheme.
- shows how closely the organisms are **related**.

- makes it easier to **collect, sort & group** information about organisms.

THE HIERARCHY OF TAXA

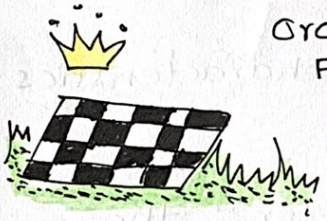
- Taxonomists classify species using a hierarchy of taxa.

Taxa: species are arranged in groups called taxa.

Genus: every species is classified into a genus.

- The more taxa organisms share- the more similar they are.

Kingdom	Kings	Animalia	- K
Phylum	Play	chordata	- P
Class	chess	mammalia	- C
Order	On	primate	- O
Family	Fine	Hominidae	- F
Genus	Green	Homo	- G
species	sand	Sapiens	- S
	↓	↓	
	mnemonic	example	



Domains:

Bacteria, Archaea, Eukaryota

Histones associated with DNA

- Bacteria- absent
- Archea- proteins similar to histones bound to DNA
- Eukaryota- present

Presence of introns

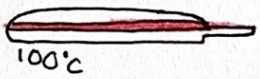
- Bacteria- rare/absent
- Archaea- present in some genes
- Eukaryota- frequent

Structure of cell walls

- Bacteria- made of peptidoglycan
- Archaea- not made of peptidoglycan
- Eukaryota- not made of peptidoglycan, not always present.

About archaeans

- found in habitats such as ocean floors, ocean sediments, oil deposits below the earth's surface.
- extreme conditions - H_2O with high salt concentrations, ↑ temperatures.
- eg: methanogens
  - ↳ give out methane as a waste product
  - ↳ live in intestines of cattle and guts of termites.



viruses - not classified in any of these domains.

CLASSIFICATION

Artificial classification

↳ selecting unifying characteristics first and then grouping organisms accordingly.

advantage -

schemes are easy to develop and are stable.

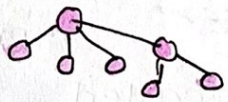
disadvantage -

do not show evolutionary relationships, aren't used commonly

Natural classification

↳ involves grouping organisms based on similarities first and then identifying shared characteristics.

- all members of a particular group would have shared a common ancestor.



advantage -

these schemes can be used to predict characteristics shared by species within a group.

disadvantage -

highly mutable - tend to change as new information is discovered.

According to natural classification, each taxanomic level includes all species that would have evolved from a common ancestor.

Phylogenetic classification

- differenciating organisms based on genetics
- organisms that share greater level of homology in their DNA – more closely related.

PLANTAE KINGDOM

- contains 12 phyla - which include bryophytes, filincophytes, coniferophytes and angiospermophytes.

Bryophyta

- no vascularisation (lacks xylem & phloem)
- no true leaves, roots or stems
- anchored by a root-like structure called rhizoid
- reproduction by releasing spores
- example- liver warts, mosses.

Filicinophyta

- has vascularisation
- eg- ferns
- leaves, roots and stems exist
  - ↓
  - pinnate → large fronds divided into leaflets
- reproduction by releasing spores from clusters called sori → underside of the leaf.

coniferophyta

- has vascularisation
- leaves, roots and stems exist
  - ↓ waxy
  - ↓ woody

- reproduction - non-motile gametes. pines
- eg. pine tree and conifers.

Angiospermophyta

- has vascularisation
- leaves, roots and stems exist
- reproduce by seeds produced in ovules within flowers.
- eg:- flowering plants and grasses.

ANIMALIA KINGDOM

- can be divided into 2 main groups - invertebrates & vertebrates.

Porifera

- no body symmetry
- no mouth or anus
- have pores to circulate material
- silica or calcium carbonate based spicules for structural support
- eg: sea sponges

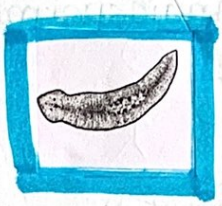
Cnidaria

- radial symmetry
- have a mouth but no anus
- have tentacles for stinging & capturing their prey
- eg: jellyfish, sea anemones and corals
- cells are organised into tissues but not organs

Annelida

- bilateral symmetry
- separate mouth and anus
- body composed of ringed segments - specialisation of segments.
- eg: earthworms and leeches
- triploblastic - 3 layers of cells

Platyhelmintha (before annelida)



- bilateral symmetry
- mouth but no anus
- flattened body shape to increase SA:Vol ratio
- may be parasitic
- eg:- tapeworms and planaria

Mollusca

- bilateral symmetry
- separate mouth and anus
- body composed of a visceral mass, a muscular foot and a mantle (may produce shell).
- eg:- snails, squid, octopus

Arthropoda

- bilateral symmetry
- separate mouth and anus
- jointed body sections
- hard exoskeleton (chitin)
- eg: insects, spiders, scorpions

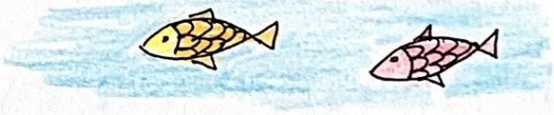
chordata

- bilateral symmetry
- separate mouth and anus
- have a notochord and a hollow, dorsal nerve tube for some period of their life cycles.
- eg: fish, amphibians, reptiles, birds and mammals.
- grouped into sub-phyla - vertebrata

Fish Amphibians Birds Mammals Reptiles

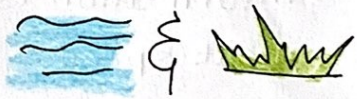
Fish

- covered in scales made out of bony plates in the skin
- reproduction - external fertilisation
- breathe through gills that are covered with an operculum
- do not maintain constant body temperature (internal)
  ↓
  ectothermic.



Amphibian

- moist skin, permeables to gases & water
- reproduce via external fertilisation
- can breathe through skin but also possess simple lungs.
- ectothermic
- (larval state - water, adult state - land)

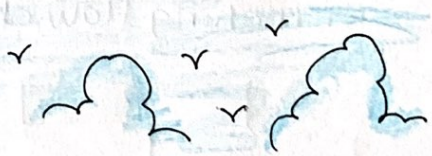


Reptiles

- covered in scales - made out of keratin
- reproduction - internal fertilisation
- females lay eggs with soft shells
- breathe through lungs - extensive folding SA:V ratio ↑
- ectothermic

Birds

- covered in feathers (keratin)
- reproduction - internal fertilisation
- females lay eggs with hard shells
- breathe through lungs with parabronchial tubes.
- constant body temperature.
  ↓
  endothermic



Mammals

- skin has follicles which produce hair – keratin
- reproduce via internal fertilisation
- females feed the young ones with milk - mammary glands
- breathe through lungs with alveoli
- endothermic

DICHOTOMUS KEYS

→ method of identification whereby groups of organisms are divided into 2 categories repeatedly

↓

- with each division more information is revealed about specific features of the organism.
- no sharing of totally of selected characteristics with any organism - it has been identified.

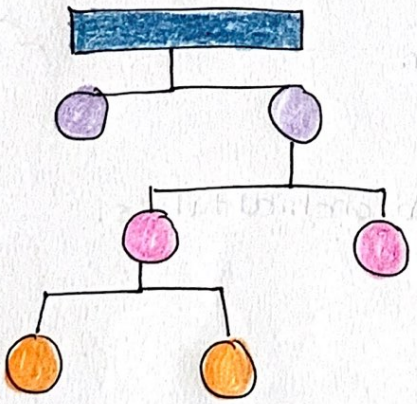
→ preferable to use immutable features like

no. of limbs

method of reproduction

→ can be represented in 2 ways:-

Branching flow chart



series of paired statements laid out in a numbered sequence.