

Basic Of Classification

1ST CLASS BIOLOGY
PROF. MOHAMMED QAIS

COLLEGE OF SCIENCE

What is Classification?

Classification is the arrangement of organisms into orderly **groups** based on their **similarities**

Classification is also known as **taxonomy**

Taxonomists are scientists that identify & name organisms

Benefits of Classifying

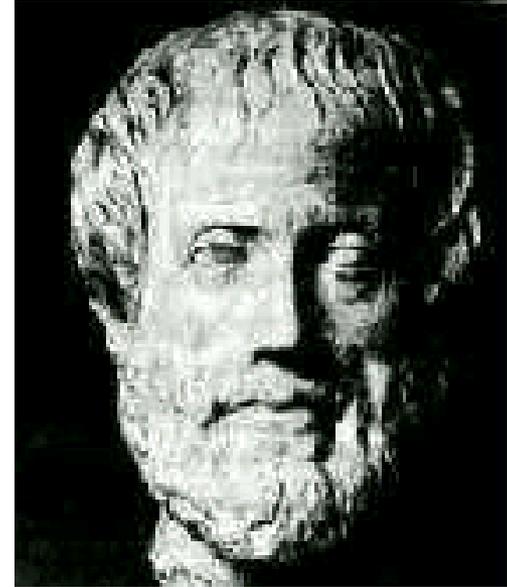
- **Accurately & uniformly** names organisms
- Prevents **misnomers** such as starfish & jellyfish that aren't really fish
- Uses **same language (Latin or some Greek)** for all names



Sea "horse"??

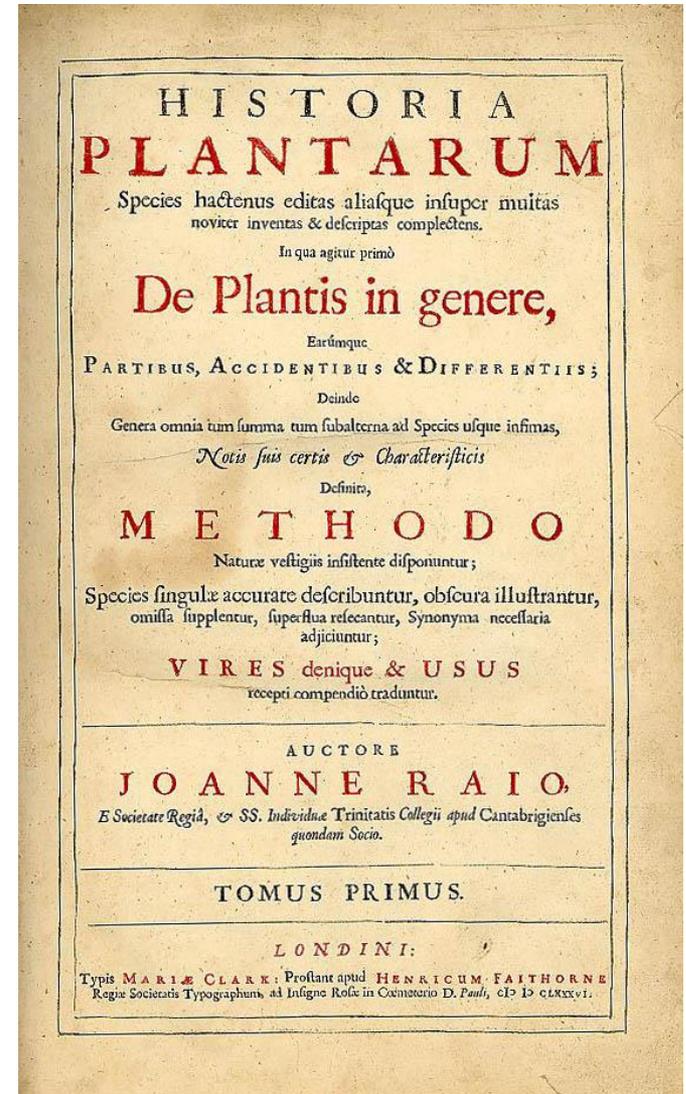
Early Taxonomists

- 2000 years ago, **Aristotle** was the first taxonomist
- Aristotle divided organisms into **plants & animals**
- He **subdivided** them by their **habitat** --- land, sea, or air dwellers



Early Taxonomists

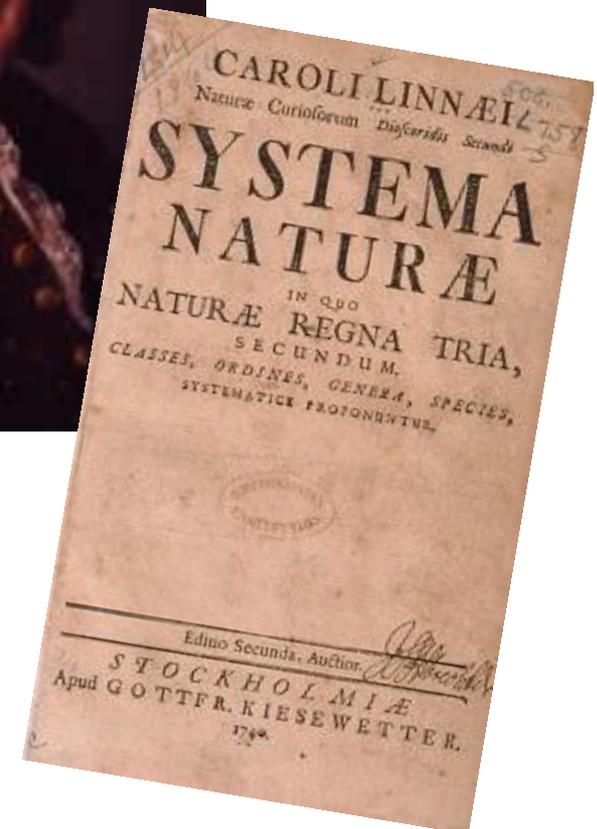
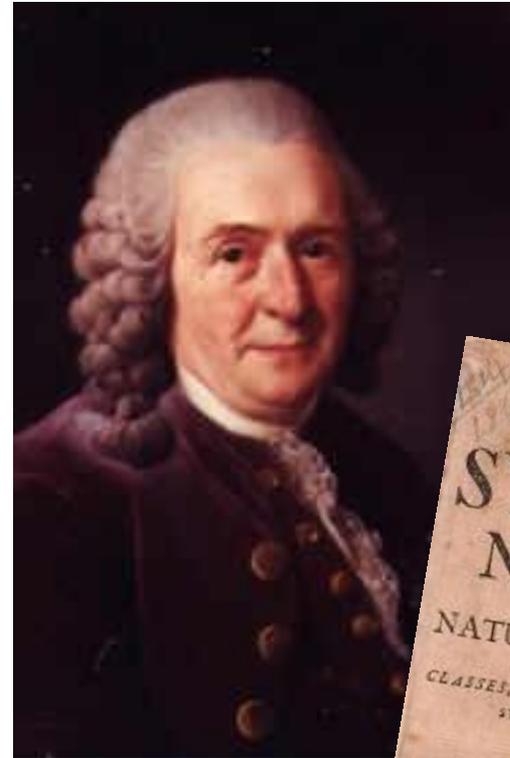
- John Ray, a botanist, was the first to use Latin for naming
- His names were very long descriptions telling everything about the plant



Carolus Linnaeus

1707 - 1778

- 18th century **taxonomist**
- Classified organisms by their **structure**
- Developed **naming system** still used today

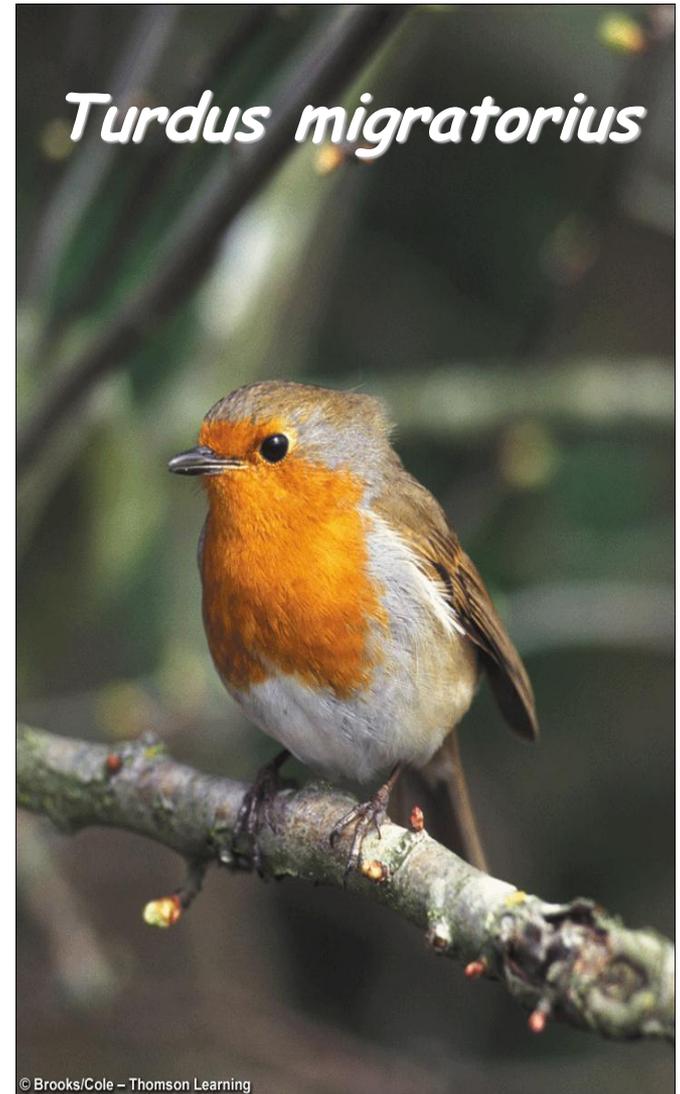


Carolus Linnaeus

- Called the “Father of Taxonomy”
- Developed the modern system of naming known as binomial nomenclature
- Two-word name (Genus & species)

Standardized Naming

- Binomial nomenclature used
- *Genus species*
- Latin or Greek
- Italicized in print
- Capitalize genus, but NOT species
- Underline when writing



American Robin

Rules for Naming Organisms

- The *International Code for Binomial Nomenclature* contains the rules for naming organisms
- All names must be approved by **International Naming Congresses** (International Zoological Congress)
- This **prevents duplicated** names

Classification Groups

- **Taxon** (**taxa**-plural) is a category into which related organisms are placed
- There is a **hierarchy** of groups (taxa) from broadest to most specific
- **Domain, Kingdom, Phylum, Class, Order, Family, Genus, species**

Hierarchy-Taxonomic Groups

Domain ← BROADEST TAXON

Kingdom

Phylum (Division - used for plants)

Class

Order

Family

Genus

Species ← Most Specific

Table 1.1 **Classification of Humans**

Classification Category	Characteristics
Domain Eukarya	Cells with nuclei
Kingdom Animalia	Multicellular, motile, ingestion of food
Phylum Chordata	Dorsal supporting rod and nerve cord
Class Mammalia	Hair, mammary glands
Order Primates	Adapted to climb trees
Family Hominidae	Adapted to walk erect
Genus <i>Homo</i>	Large brain, tool use
Species <i>Homo sapiens</i> *	Body proportions of modern humans

Domains

- **Broadest**, most inclusive taxon
- **Three** domains
- **Archaea and Bacteria** are unicellular prokaryotes (no nucleus or membrane-bound organelles)
- **Eukarya** are more complex and have a nucleus and membrane-bound organelles

ARCHAEA

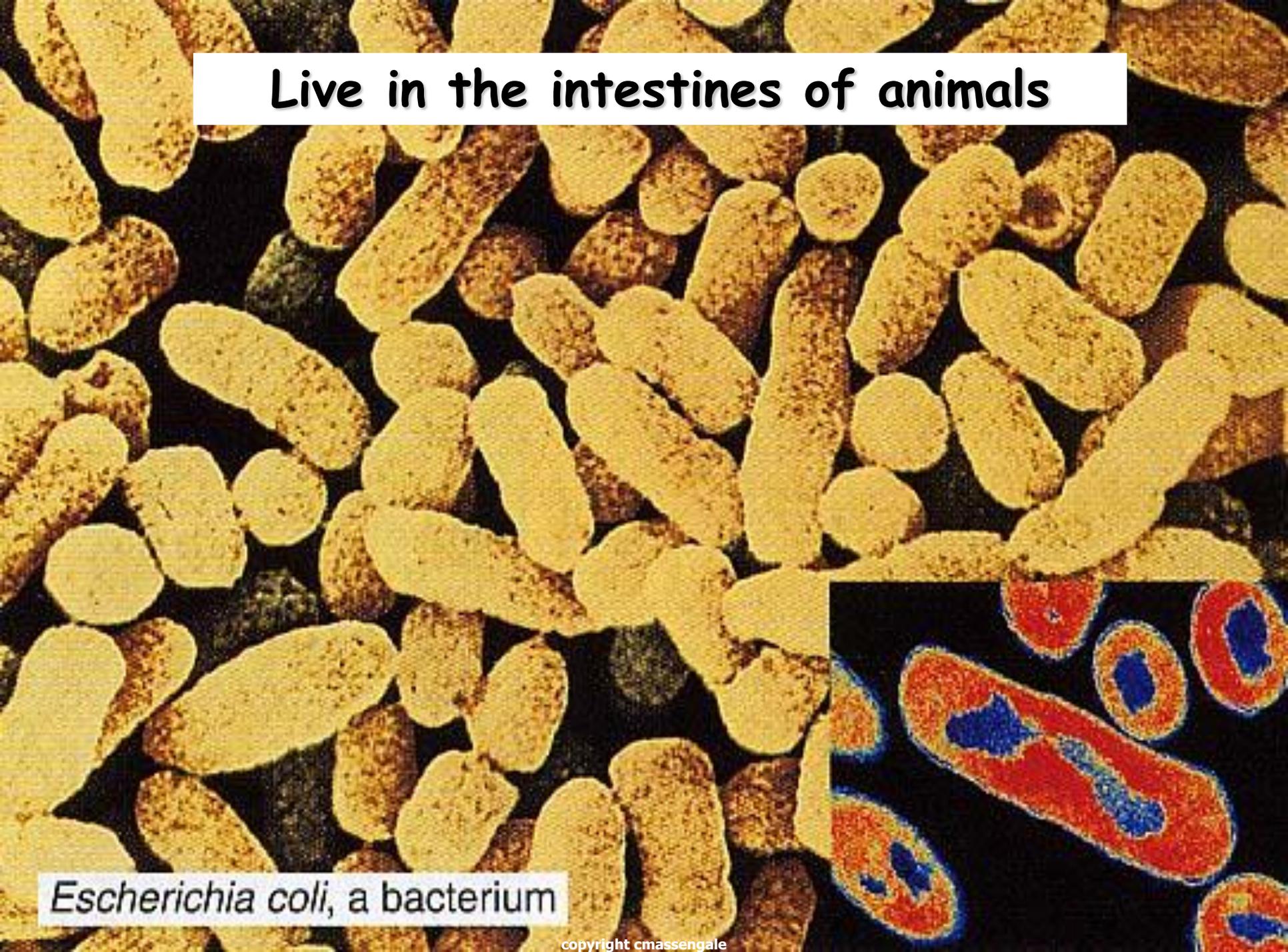
- Kingdom - ARCHAEABACTERIA
- Probably the 1st cells to evolve
- Live in HARSH environments
- Found in:
 - Sewage Treatment Plants
(Methanogens)
 - Thermal or Volcanic Vents
(Thermophiles)
 - Hot Springs or Geysers that are acid
 - Very salty water (Dead Sea; Great Salt Lake) - Halophiles

BACTERIA

- Kingdom - Monera
- Some may cause **DISEASE**
- Found in **ALL HABITATS** except harsh ones
- Important **decomposers** for environment
- **Commercially** important in making cheese, yogurt, buttermilk, etc.

Live in the intestines of animals

Escherichia coli, a bacterium



Domain Eukarya is Divided into Kingdoms

- **Protista** (protozoans, algae...)
- **Fungi** (mushrooms, yeasts ...)
- **Plantae** (multicellular plants)
- **Animalia** (multicellular animals)

Protista

- Most are unicellular
- Some are multicellular
- Some are autotrophic, while others are heterotrophic
- Aquatic



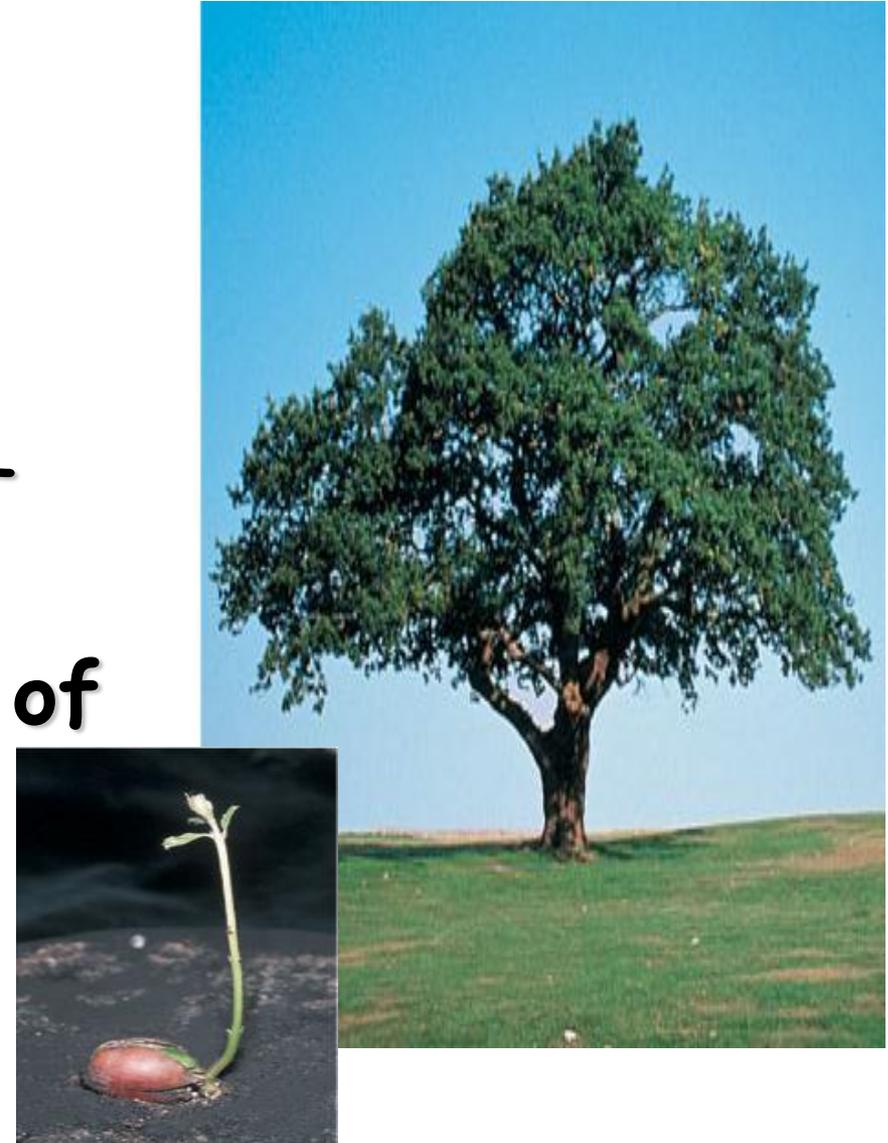
Fungi

- **Multicellular**, except yeast
- **Absorptive heterotrophs** (digest food outside their body & then absorb it)
- Cell walls made of **chitin**



Plantae

- Multicellular
- Autotrophic
- Absorb **sunlight** to make glucose - Photosynthesis
- Cell walls made of **cellulose**



Animalia

- Multicellular
- Ingestive heterotrophs (consume food & digest it inside their bodies)
- Feed on plants or animals



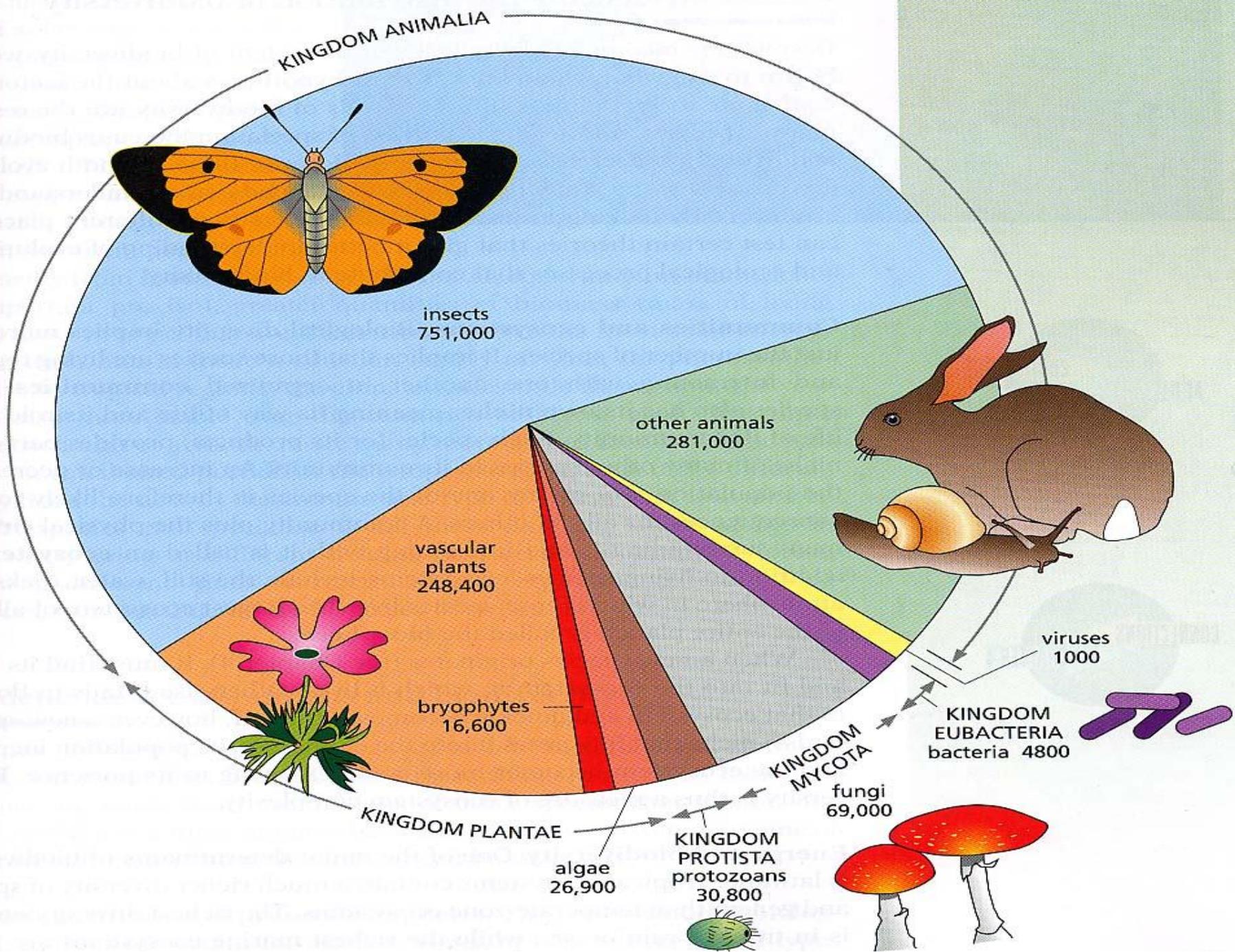
Kingdom	Organization	Type of Nutrition	Representative Organisms				
Protista	Complex single cell, some multicellular	Absorb, photosynthesize, or ingest food	 paramecium	 euglenoid	 slime mold	 dino-flagellate	Protozoans, algae, water molds, and slime mold
Fungi	Some unicellular, most multicellular filamentous forms with specialized complex cells	Absorb food	 black bread mold	 yeast	 mushroom	 bracket fungus	Molds, yeast, and mushrooms
Plantae	Multi-cellular form with specialized complex cells	Photosynthesize food	 moss	 fern	 pine tree	 nonwoody flowering plant	Mosses, ferns, nonwoody and woody flowering plants
Animalia	Multi-cellular form with specialized complex cells	Ingest food	 coral	 earthworm	 blue jay	 squirrel	Invertebrates, fishes, reptiles, amphibians, birds, and mammals

c. Domain Eukarya

Eukaryotes, structurally diverse and organized into the four kingdoms depicted here.

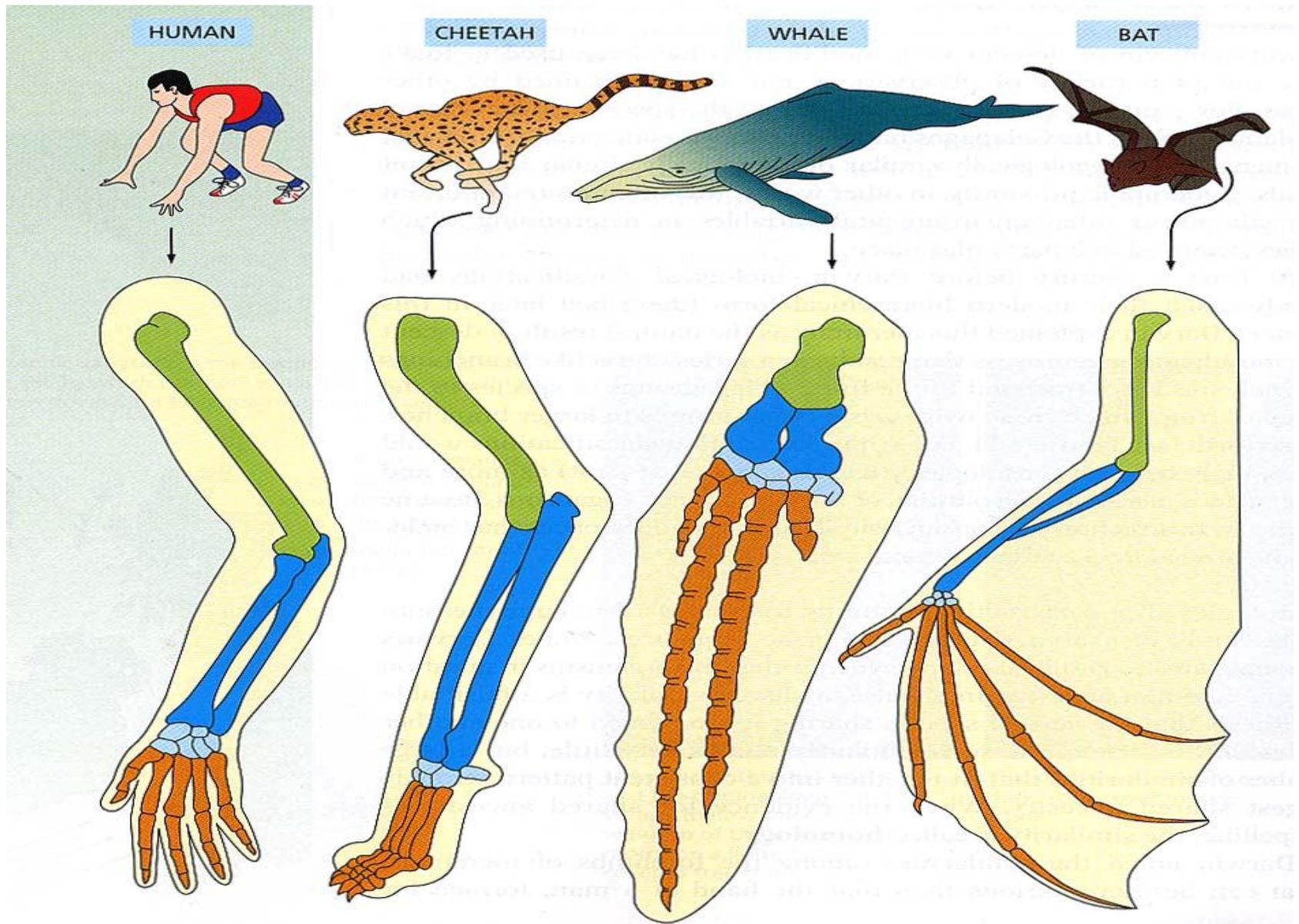
Taxons

- Most **genera** contain a number of similar species
- The genus **Homo** is an exception (only contains modern humans)
- Classification is based on **evolutionary relationships**



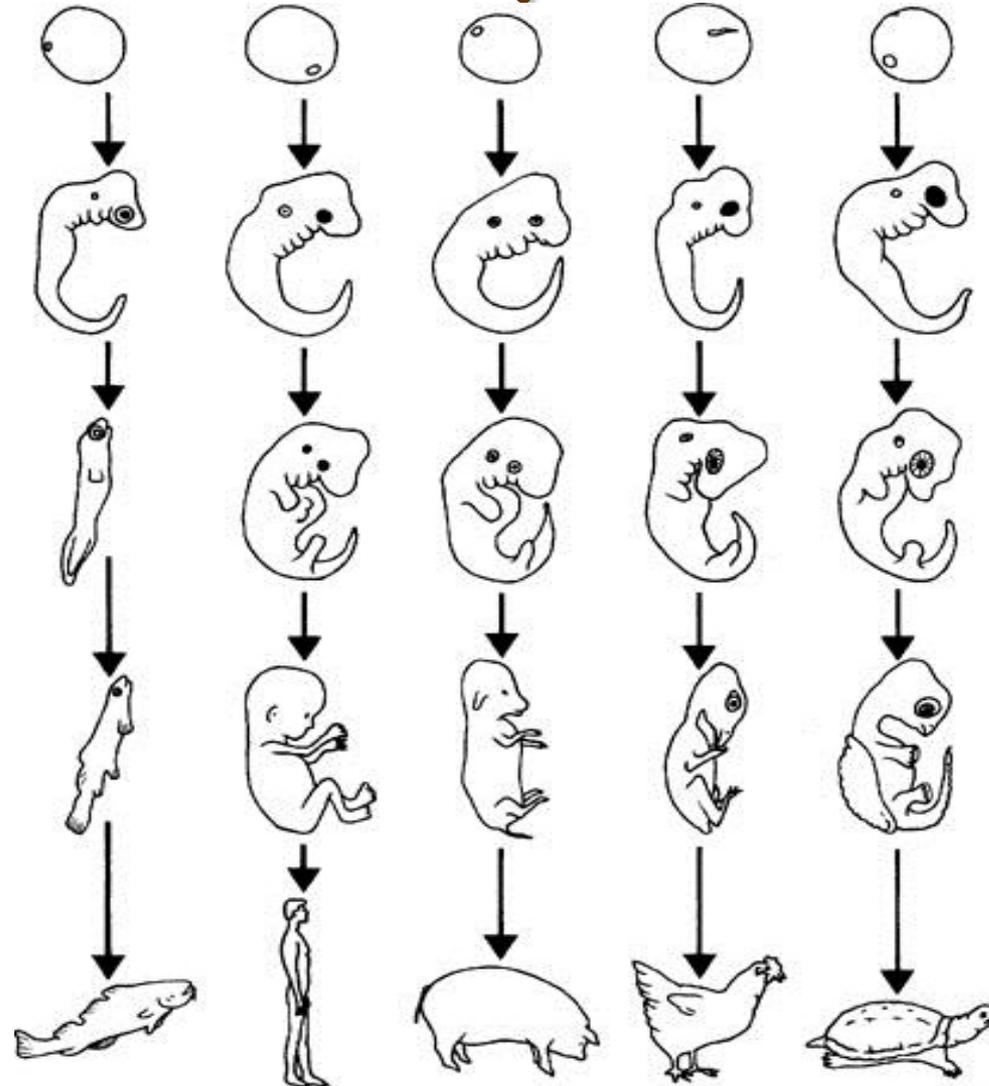
Basis for Modern Taxonomy

- **Homologous structures** (same structure, different function)
- **Similar embryo development**
- **Molecular Similarity** in *DNA*, *RNA*, or *amino acid* sequence of Proteins



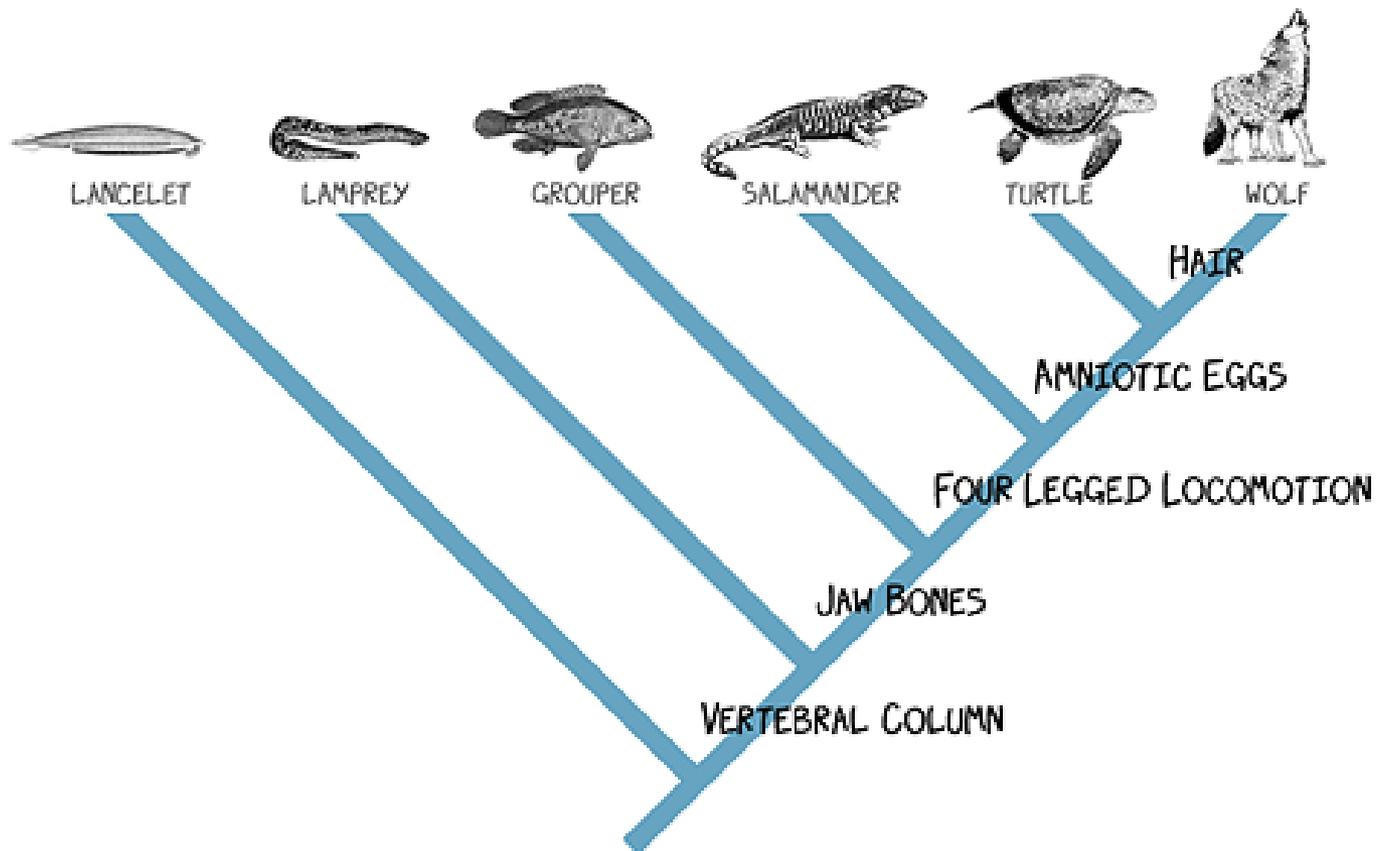
Homologous Structures (BONES in the FORELIMBS) shows Similarities in mammals.

Similarities in Vertebrate Embryos



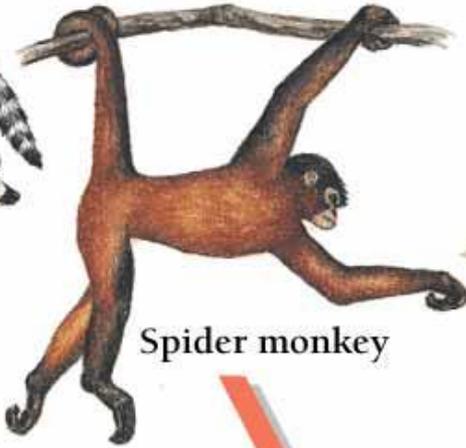
Cladogram

Diagram showing how organisms are related based on **shared, derived characteristics** such as feathers, hair, or scales





Ring-tailed lemur



Spider monkey



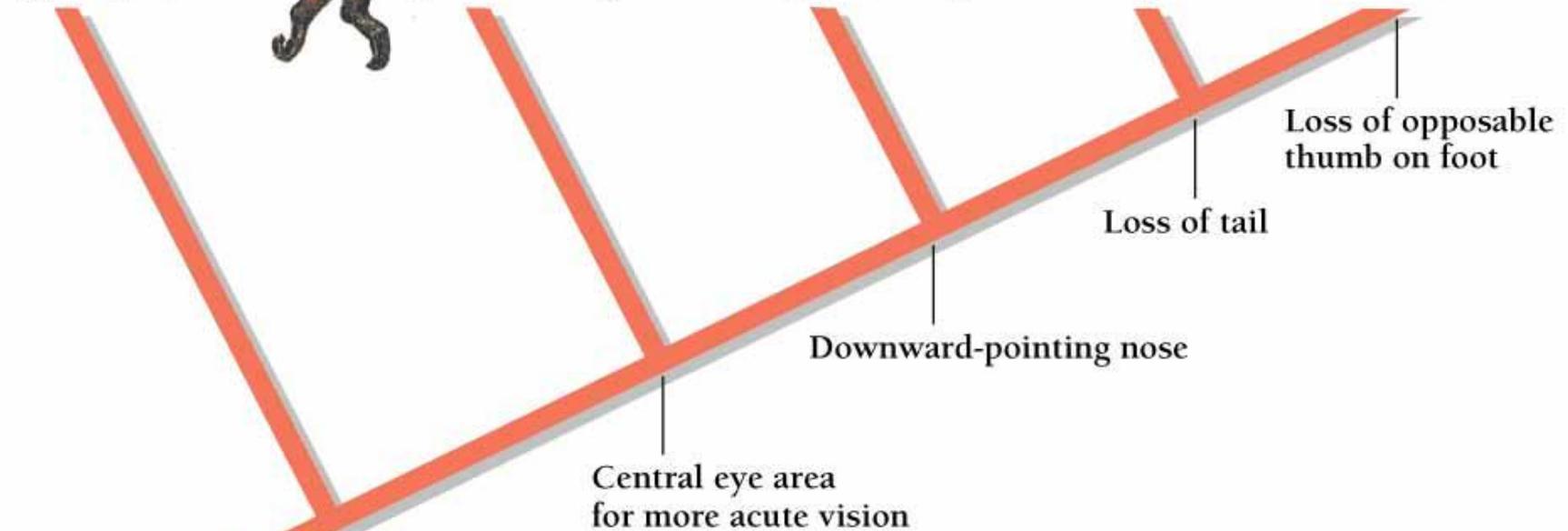
Rhesus monkey



Chimpanzee



Human



Four kinds of teeth
Moveable head and front-facing eyes
Large brain
Omnivorous
Five digits on hand and foot,
with opposable thumbs

Downward-pointing nose

Loss of tail

Loss of opposable
thumb on foot

Primate Cladogram

