

EVOLUTION INTRO

Chapter 1

SCALA NATURAE

- **the “great chain of being”**
 - higher and lower organisms
 - hell, minerals, plants, animals, humans, angels, god
 - this idea still persists!
- **taxonomy**
 - Carolus Linnaeus (1707-1778)
 - relatedness?
- **Transformism**
 - Jean Baptiste Pierre Antoine de Monet, Chevalier de Lamarck (1744-1829)
 - inheritance of acquired characteristics

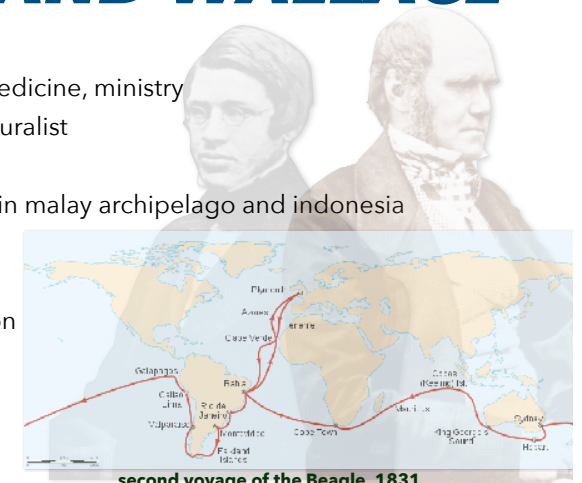
HISTORY

- **Evolution as an idea**
 - Anaximander (610-546 BC)
 - Aristotle (384 - 322 BC)
 - Zhuangzi (369-286 BC)
- **beginnings of “Transformism”**
 - Georges-Louis LeClerc, Comte de Buffon (1707-88)



DARWIN AND WALLACE

- **charles darwin**
 - background - studied medicine, ministry
 - 1831 - naturalist
- **alfred russel wallace**
 - studying biogeography in malay archipelago and indonesia
 - 1858 - writes to Darwin
- **Origin of Species (1859)**
 - descent with modification
 - natural selection

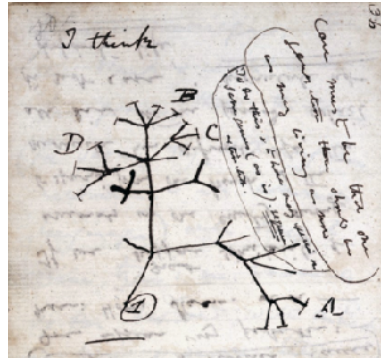


second voyage of the Beagle, 1831

EVOLUTIONARY THEORY

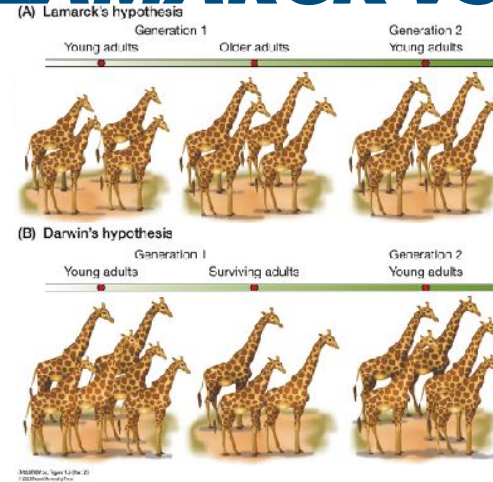
• major components of Darwin's theory (Mayr 1985)

- perpetual change - "evolution as such"
- common descent
- gradualism
- populational change
- natural selection



"it is absurd to talk of one animal being higher than another" - DARWIN

LAMARCK VS. DARWIN



• Gould's giraffe example

- inheritance of acquired characteristics
- populational change
 - changes in frequency of traits resulting from natural selection

• gap in Darwin's theory

- blending inheritance

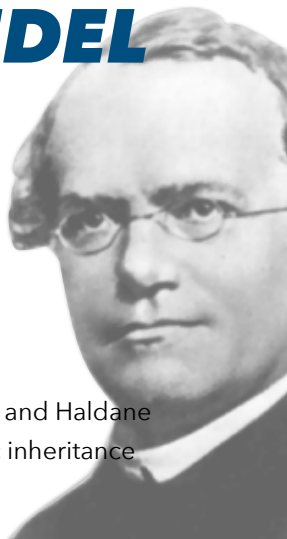
GREGOR MENDEL

• particulate inheritance

- 1866 - gregor mendel
- not widely cited
- very little interest

• Modern Synthesis

- rediscovered in early 1900s
 - Hugo de Vries, Carl Correns (1900)
- Neo-Darwinism
 - developed into modern synthesis by Fisher and Haldane
 - natural selection acts on particulate genetic inheritance
 - read Dobzhansky's 1937 paper



KEY PRINCIPLES

• fundamental principles of evolution (modern synthesis)

1. phenotype is distinct from genotype
2. acquired characteristics are not inherited*
3. heredity is based on discrete genes
4. genetic variation arises from mutation
5. evolution is change in a population
6. changes in allele frequencies may be random or not
7. natural selection can account for both small and large differences in species

KEY PRINCIPLES

• fundamental principles of evolution (modern synthesis)

8. natural selection can alter populations beyond original range of variation due to new combinations of genes
9. populations usually have lots of genetic variation
10. differences in species evolve by small steps
11. species represent separately evolving lineages
12. speciation is usually allopatric
13. higher taxa evolve through sequential accumulation of small differences
14. phylogenies can be represented as trees

KEY MISCONCEPTIONS

- in natural selection, organisms are trying to adapt - orthogenesis
- evolution makes things better over time (directionality of evolution)
- fittest organisms are the strongest or healthiest
- the environment causes changes over time
- evolution explains the origin of life
- humans are no longer evolving
- there are higher and lower organisms (or traits)
 - “more” or “less evolved” organisms

