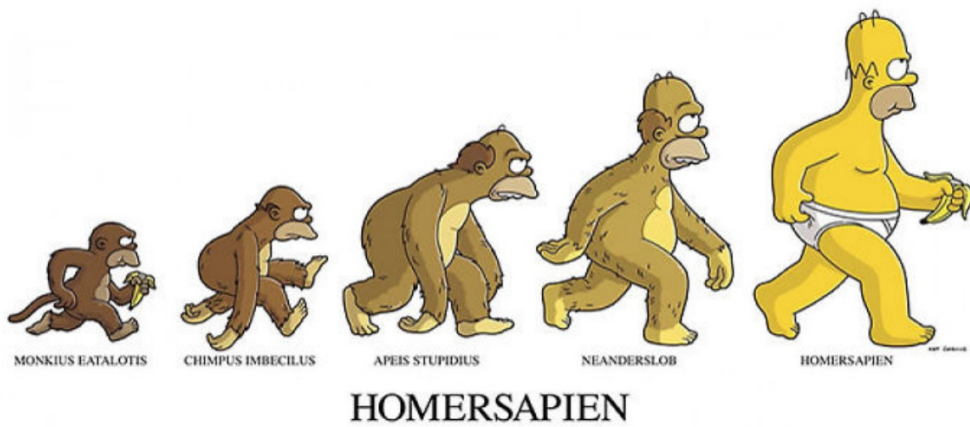


Darwin and the theory of evolution



– Varieties of life forms

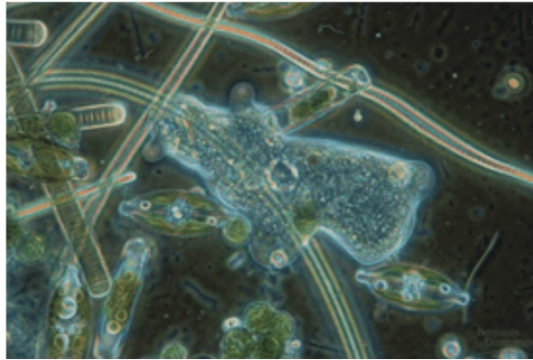


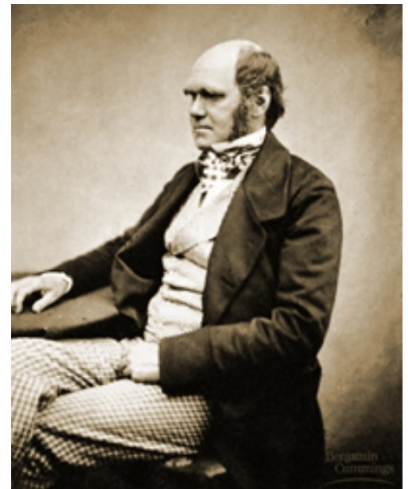
Figure 1.4C-F

- All organisms have evolutionary adaptations
 - **Inherited characteristics** that enhance their ability to **survive** and **reproduce**Example: blue-footed booby



Evolution explains the unity and diversity of life

- Charles Darwin **synthesized** the Theory of Evolution by **natural selection**



- The voyage of the *Beagle*

5 years

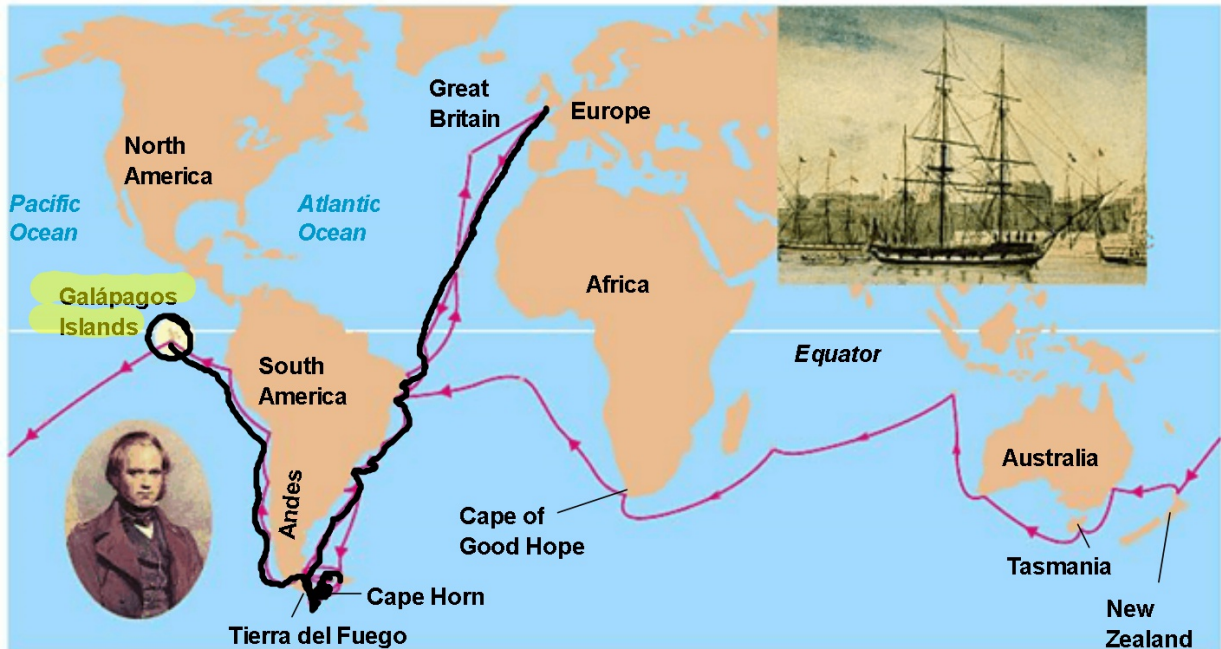


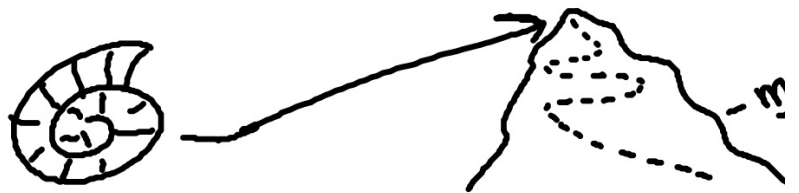
Figure 13.1B

Prevalent ideas at Darwin's time

1700's, 1800's

- species are fixed
- Earth is about 6,000 years old

New ideas proposed



- Fossils indicated the earth was very old
- Lyell, a geologist, argued that land forms changed constantly.
- Lamarck proposed that organisms changed and these changes were passed to progeny.

↳ Evolution in 1 organism X

- Darwin became convinced that the Earth was old and continually changing

- He concluded that living things also change, or evolve over generations

- He also stated that living species descended from earlier life-forms: descent with modification

Darwin proposed natural selection as the mechanism of evolution

- Darwin observed that — Thru Malthus' writings
 - organisms produce more offspring than the environment can support
 - organisms vary in many characteristics
 - these variations can be inherited

• **natural selection** explains the mechanism of **evolution**

Examples:

- **Pesticide-resistant insects**
- **Antibiotic-resistant bacteria**

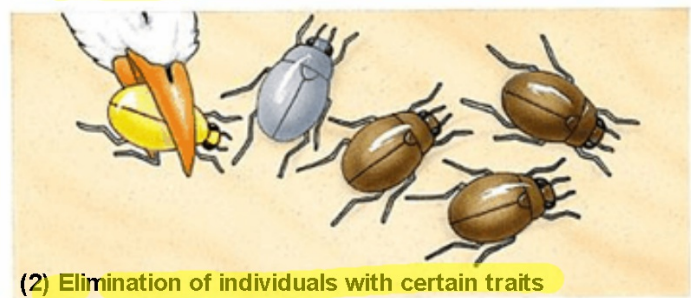
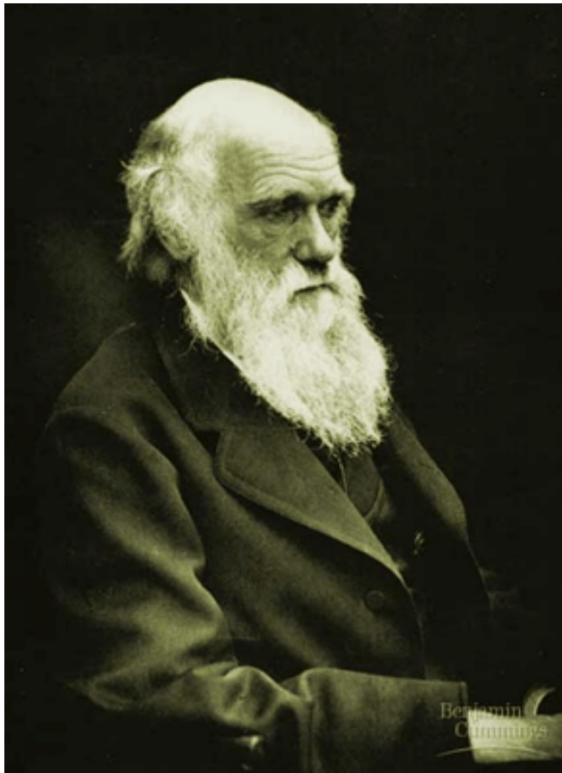


Figure 1.6B

- Charles Darwin, 1874



- Alfred Wallace



Figure 13.1x2

• Evolution happens when **populations** of organisms with **inherited variations** are exposed to **environmental** factors that favor the **reproductive success** of some individuals over others

- Natural selection is the **editing mechanism**
- Evolution is based on **adaptations**

Figure 1.6C



Fossils provide strong evidence for evolution

- Hominid skull



- Petrified trees



Figure 13.2A, B

– Ammonite casts



– Fossilized organic matter in a leaf

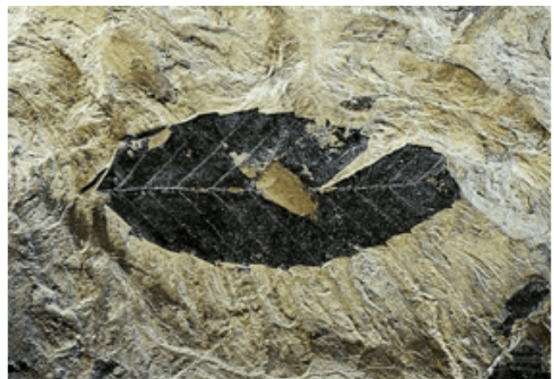


Figure 13.2C, D

- Scorpion in amber

Time
1990



- "Ice Man"
- acid bogs



Figure 13.2E, F

- Mammoth tusks



Figure 13.2x4

- fossils show that organisms have appeared in a historical sequence



- Many fossils link early extinct species with species living today
 - hind leg bones of fossil whales

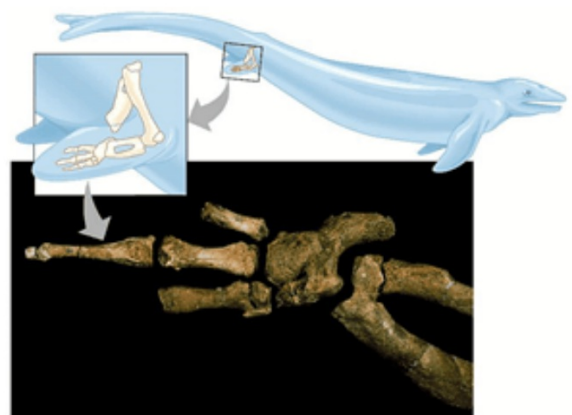


Figure 13.2G, H

Other evidence for evolution

- Biogeography
- Comparative
- anatomy
- Comparative

embryology

Molecular biology

↓
DNA

CTAG



Human



Cat



Whale



Bat

Figure 13.3A

Four agents of microevolution

1. Mutation changes alleles
 2. Genetic drift = random changes in allele frequency
Bottleneck
Founder effect } - Isolating genes, populat
- Gene flow can change a gene pool due to the movement of genes into or out of a population
ex. Migration
4. Natural selection leads to differential reproductive success

There are three general outcomes of natural selection

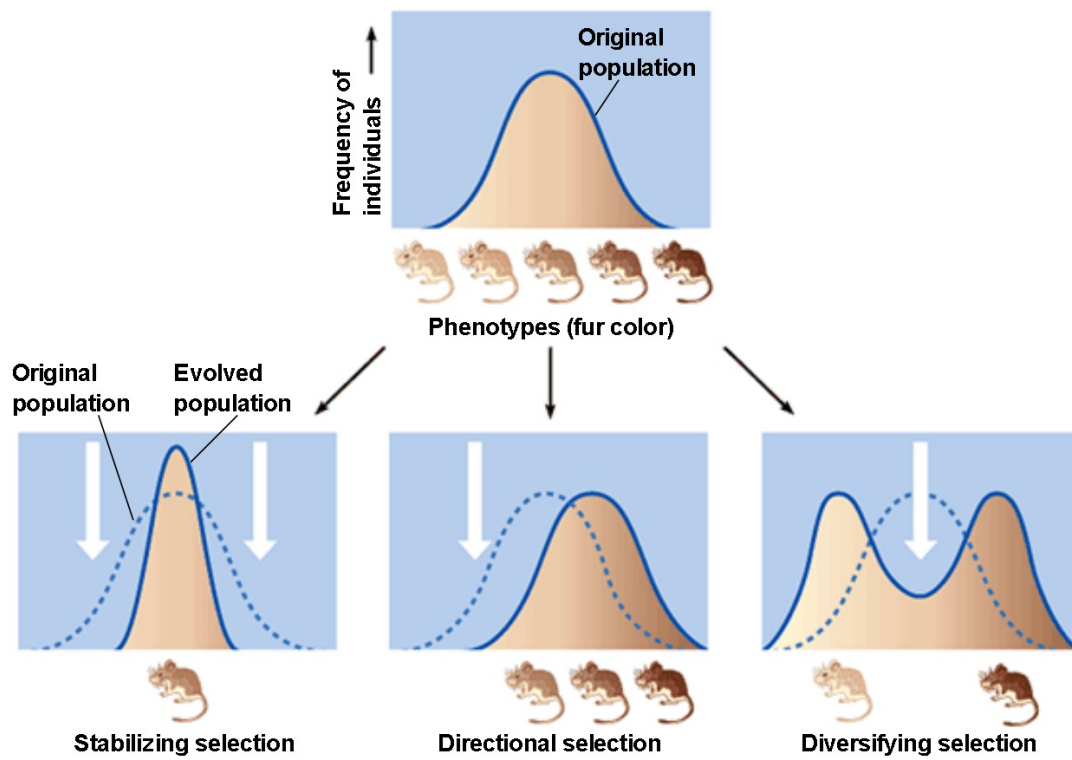


Figure 13.19

Endangered species often have reduced variation

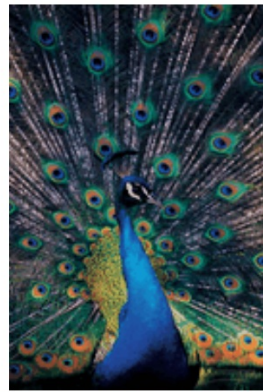
- Low genetic variability may reduce their capacity to survive as humans continue to alter the environment
 - cheetah populations have extreme genetic uniformity

80% "infant" mortality



Why do male and female animals differ in appearance?

- Sexual selection leads to the evolution of secondary sexual characteristics
- Sexual selection may produce **sexual dimorphism**



What is a species?

- Naturally interbreeding populations
 - potentially interbreeding
 - reproductively isolated from other species

Reproductive barriers between species

- Habitat - different locations
- Timing - mating, flowering
- Behavioral - mating rituals, no attraction
- Mechanical - structural differences
- Gametic - fail to unite
- Hybrid weak or infertile



- Hybrid sterility is one type of barrier

- A horse and a donkey may produce a hybrid offspring, a mule
- Mules are sterile

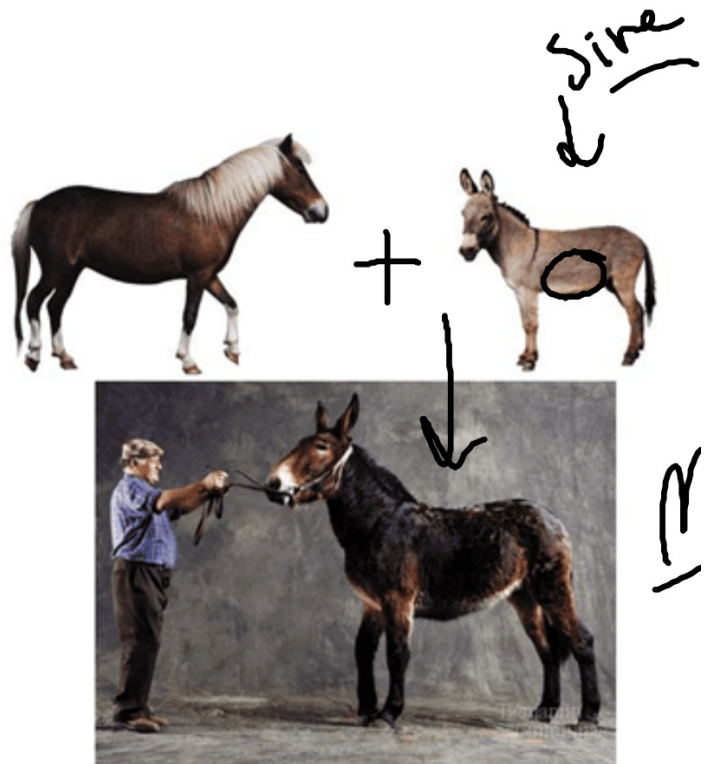


Figure 14.2C

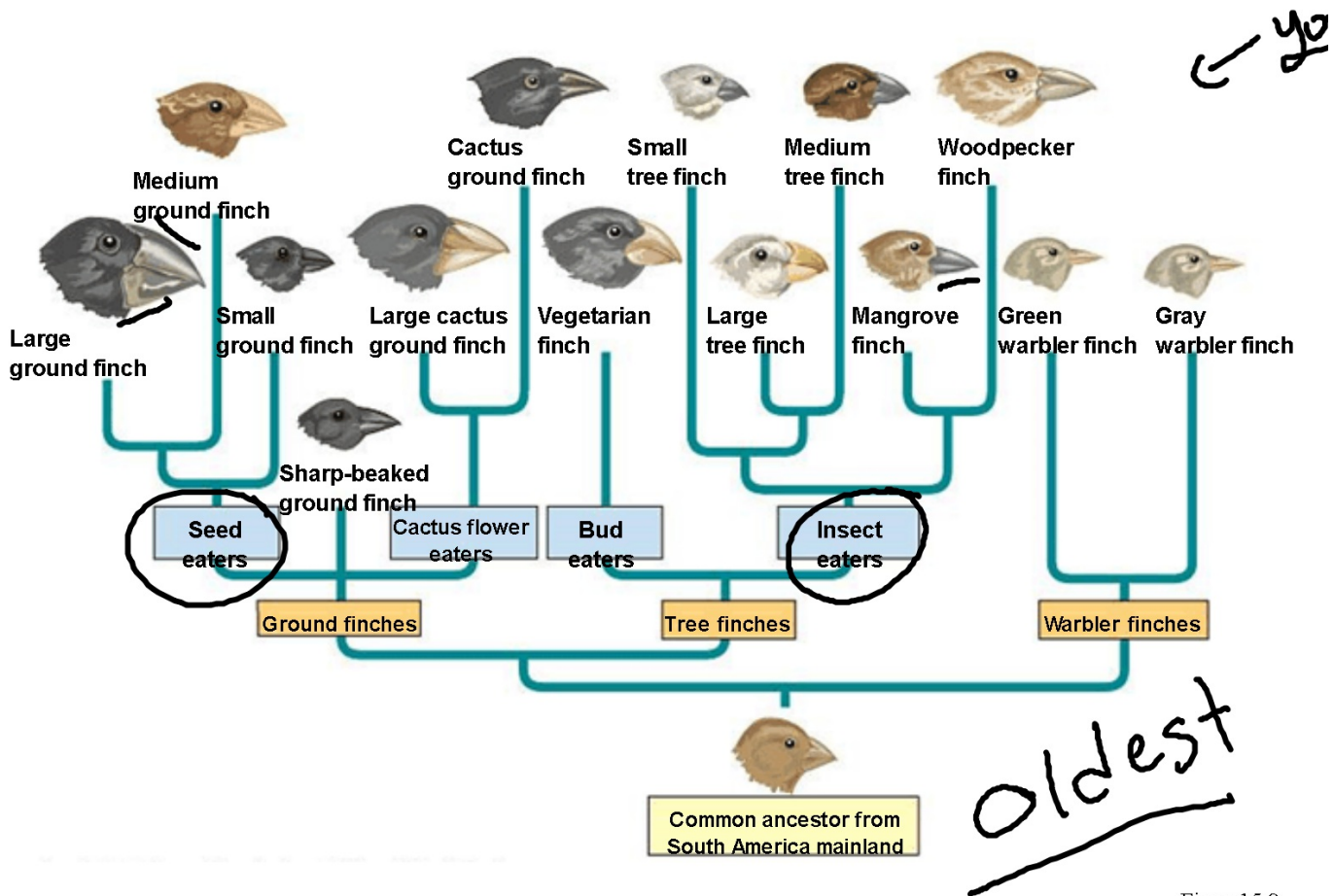


Figure 15.9

No
predestined
goal of
evolution

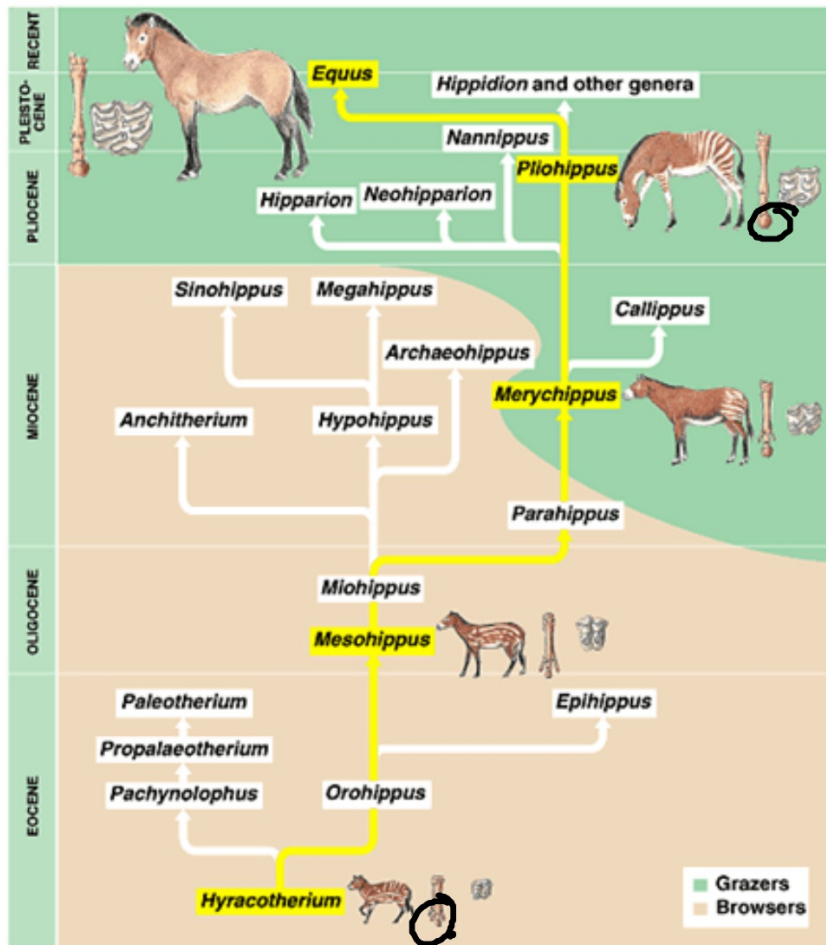


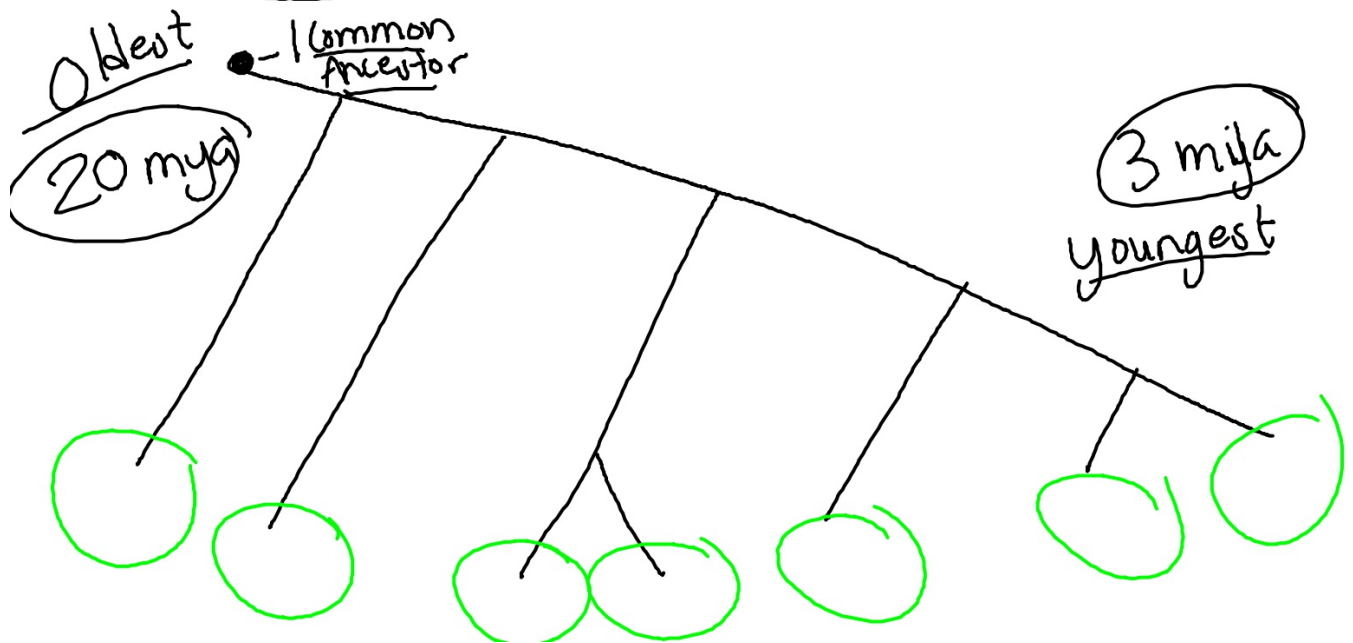
Figure 15.8

Continental drift has played a major role in macroevolution

- Continental drift is the slow, steady movement of Earth's crustal plates on the hot mantle



Phylogenetic tree - Using a diagram to show evolutionary relationships between organisms
(How closely related organisms are)



Shell Phylogeny Reference and Shell Name Index

