

EVOLUTION - A change over time.

PROOF

- + Fossil - rock, tar, amber or ice (remains/structure preserved)
- + Comparative Biochemistry - Nucleic acid → proteins → enzymes
- * Cell structures (organelles)
- * Anatomy - Homologous (arm + wing), Analogous (wing + wing), Vestigial (appendix)
- * Embryology - Longer look similar in development the closer related.

THEORIES

Lamark - Use + Disuse (Inheritance of acquired characteristics)

Change due to need. Once acquired can be passed on to offspring
Weismann proved not true with mice



Darwin (Wallace) Theory of Natural Selection (Survival of the fittest)

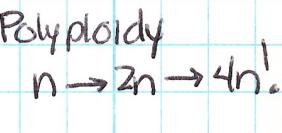
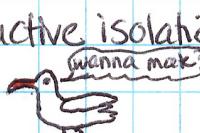
Change by chance: If variation favorable → survival + reproduction

Overproduction → Competition → Survival → Reproduction → speciation
 * Variation?

Modern Theory - mutations explain variation that Darwin didn't know why. (See last unit)

WAYS

What causes change?

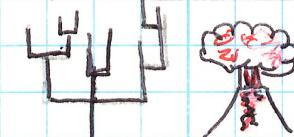


Rates of Change

Gradualism (slow)



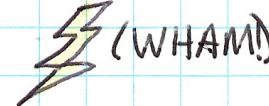
Punctuated Equilibrium (catastrophic) (fast)



Primitive Earth



$\text{NH}_3, \text{H}_2, \text{H}_2\text{O}, \text{CH}_4$



↓
Aggregates (organic molecules)

↓
Anaerobic heterotrophs (fermentation)



↓
Autotrophs (photosynthesis)



↓
 $\text{O}_2 \rightarrow$ Also Δ to O_3 (ozone) protection

↓
Aerobic respiration heterotrophs + autotrophs



HOW LIFE BEGAN?
HETEROTROPH HYPOTHESIS

SELECTING AGENTS

Examples of change

Moths + color

Insects + pesticide



Bacteria + antibiotics

