Source: [[KBBiologyMasterIndex]]

1 | Evolution

The unifying theory of all biology involving any change in the heritable traits in a population over a long period of time.

Causes of of evolution - different reproduction rates - Environmental pressures - non-random mate choices - Migration

Evidence for evolution - Lab evidence of short-lifespan bacteria - Fossels and and DNA evidence

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1.1 | Begin by defining evolution

⇒ Descend with modification

Micro-evolution: changes in alleal frequency within a population from one generation to the next

Macro-evolution: descend of different special from a common ancestry over much longer timescales

*Remember: evolution happens over **deep time** — much longer than your monkey brain could feasibly preserved*

The size of civilization to now is about 10,000 years, which is 0.002 seconds if all history is 1 minute.

1.1.1 | DNA Evidence for evolution

Comparing DNA between spcecis could show an idea of common ancestry.

Evolution Experiment

- Take bacteria
- Introduce a filter/challenge (antibiotic)
- Result: resistant bacterial is left, and they prosper

1.1.2 | Fossil Example

- Analyzing fossils over time

1.2 | Origin of Life

(Before there was evolution)

- RNA world Hypothesis ⇒ RNA started self replicating and kabamm
- Metabolism Evolution

The Miller-Agieri experiment: fundamental earth molecule + heats and pressure ⇒ kabamm amino acids and DNA and other organic molecules.

1.3 | Common Ancestry

All life on earth is related by descent from a universal ancestor.

There is a certain ancestor LUCA — which is the Last Universal Common Ancestor.

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1.4 | Mechanisms of evolution

- Natural Selection
- Genetic drift
- Gene flow
- Variations

1.4.1 | Natural Selection

- Variatinon ⇒ for a certain trait, there are differences between individuals
- Heritability ⇒ differences that could be passed through generations
- Reproductive advantage ⇒ ability to increase rate of reproduction/competition

Natural selection could change allele frequencies in a particular population over time.

After a longer time, eventually, natural selection will make new species.

Sexual selection: a special case *The process of natural selection acting on an organism's ability to access mates/fertilization*.

Direct Benefits - Care, food, territory, etc.

Indirect Benefits - Choosing of the most competent male - "Good genes" of ornamentation (looking pretty is costly)

This could also produce harmful results (looking good also attracts predators.)

1.4.2 | Genetic Drift + Gene Flow

Mechanisms of evolution without adaptation

- Traits are not selected because they are beneficial against environmental pressures
- Allele frequencies change based on random chance or events