General Biology 2: Lecture 5

Morgan McCarty

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- Survival of the Fit
  - Fitness is the relative reproductive success of an individual
  - Most-fit individuals in a population capture a disproportionate amount of the resources and are more likely to pass along their genes
- Rock Pocket Mice
  - Adaptive melanism (darkening of skin) in response to volcanic rock
- Evolution in Action - Industrial Melanism
  - Prior to industrial revolution, light-colored moths were more common (90%) than dark-colored moths (10%)
  - After industrial revolution, dark-colored moths were more common (80%) than light-colored moths (20%)
  - Soot in the atmosphere killed lichens and darkened trees, birds act as a selective agent
  - Now, light-colored moths are more common again (80%) than dark-colored moths (20%)
- Evidence of Evolution
  - Comparative anatomy
    - Homologous structures: similar structures in different species due to common ancestry (not neccessarily similar function)

        * Analogous structures: similar structures in different species due to convergent evolution (similar function, not common ancestry)
        * Vestigial structures: structures that are reduced forms of functional structures (still fully developed) in other organisms (e.g. human appendix)
    - Comparative development
        * All vertibrate embryos have a tail and pharyngeal pouches
        * "Onatogeny recapitulates phylogeny" - Ernst Haeckel
    - Fossil record
        * Fossils record the history of life from the past
        * Document a succession of life forms from simple to more complex
        * Sometimes the fossil reocrd is complete enough to show descent from an ancestor
    - Biogeography
        * Alfred Russel Wallace
        * Study of geographical distribution of plants and animals across Earth
        * Different mixes of plants and animals based on geographical location
        * Different land massses separated by oceans
        * e.g. Marsupials
    - Molecular Homologies
        * Almost all living organisms use same basic biochemical molecules and utilize the same DNA triplet code (same 20 animo acids in proteins)
    - Genetic Homologies - Cytochrome C
        * Human and Chimpanzees identical
        * Chickens and turkeys identical; differing from ducks by 1
        * Humans and chickens differ by 13

- Process of Evolution

1. Variations are produced by chance mutations and sexual reproduction
2. Natural selection selects the “fittest” organisms
3. Natural selection leads to adaptions to a particular environment
4. Process occurs constantly in all species of life on Earth

– Natural selection acts on individuals, but evolution occurs in populations