Evolution Notes

Variations, Adaptations, & Natural Selection

Variations are differences in the characteristics of organisms in a population. Variations are based on genetics. They are caused by mutations (changes in DNA) & genetic recombination (sexual reproduction).

Certain variations are considered adaptations.

Adaptation – a positive trait that helps an individual survive in its environment (advantage). Ex: polar bears with thick fur survive better.

The goal of all living things is to reproduce. Surviving longer allows an organism to reproduce more times.

Natural Selection
Organisms with adaptations have an increased chance of survival to the age of reproduction so they can pass on their positive traits. Natural Selection is also called “survival of the fittest.”

Fitness is the ability of an organism to survive & reproduce. Natural selection increases the fitness in a population.

Types of Natural Selection

1. Directional Selection – population shifts in one direction. Ex. An insect population becoming immune to a pesticide over time. The insects that were not immune did not survive. The new population is immune.
2. **Stabilizing Selection** – population maintains the status quo
Ex. Human birth weight. Lower and higher than average birth weights have a higher mortality.

3. **Disruptive Selection** – the variations on the extremes are selected for & the intermediate variation disappears
Ex. Large bird beaks are good for cracking seeds and small bird beaks are good for catching insects.

4. Heterozygote Advantage – the organisms with the heterozygous genotype (Aa or Bb) have an advantage over the homozygous genotypes
Example: Sickle Cell Anemia
AA = no sickle cell but susceptible to malaria
aa = has severe sickle cell
Aa = Advantageous. Not susceptible to malaria, and does not get sickle cell

**Summary of Natural Selection**
1. There is genetic variation in populations
2. Individuals make more offspring than can survive
3. Individuals compete for resources
4. Those individuals with the best traits have more offspring
5. In the next generation, those traits (from step 4) become more common