

Natural selection handout.

Adapted with permission from Anderson, Fisher, and Norman 2002.

Overreproduction leads to **competition** based on **variation**.

Overreproduction

- *Biotic potential:* All species have such great potential fertility that their population size would increase exponentially if all individuals reproduced successfully.
- *Variation within a population:* Individuals of a population vary extensively in their characteristics.
- *Differential survival:* Survival in the struggle for existence is not random, but depends in part on the hereditary constitution of the surviving individuals. Those individuals with surviving characteristics fit to their environment are likely to leave more offspring than less fit individuals.

Competition

- *Natural resources are limited:* Nutrients, water, oxygen, and other natural resources necessary for living organisms are limited in supply at any given time.
- *Changes in populations:* The unequal ability of individuals to survive and reproduce will lead to gradual change in a population, with the proportion of individuals with favorable characteristics accumulating over the generations.
- *Population stability:* Most populations are stable in size except during seasonal fluctuations.

Variation

- *Limited survival:* Production of more individuals than the environment can support leads to a struggle for existence among individuals of a population—with only a fraction surviving each generation.
- *Origin of variation:* Random mutations and sexual reproduction produce variations; though many are harmful or of no consequence, a few are beneficial in some environments.
- *Variation is heritable:* Much of the variation in individuals is heritable and those with advantageous heritable traits generally produce more successful offspring than those with less advantageous traits.

“Species evolve over time. Evolution is the consequence of the interactions of the potential for a species to increase its numbers, the genetic variability of offspring due to mutation and recombination of genes, a finite supply of the resources required for life, and the ensuing selection by the environment of those offspring better able to survive and leave offspring” (NRC 1996, p. 185).