Mechanisms of Change

The following four processes are the basic mechanisms by which evolution occurs.
A mutation could cause parents with bright green coloration to have offspring with a gene for brown. The genes for **BROWN** would then become more frequent in the population.
Gene Flow (Migration)

• Some individuals from a population of brown beetles might have joined the population of green beetles. That would make the gene for brown beetles more frequent in the green beetle population.
Genetic Drift

• Imagine that in one generation, two brown beetles happened to have four offspring survive to reproduce. Several green beetles were killed when someone stepped on them. The next generation would have a few more brown beetles than green (purely by chance).
Example of Bottleneck Effect

- The bottleneck effect is an event in which a population’s size is greatly reduced.
- When this happens, genetic drift may have a substantial effect on the population. In other words, when the population size is radically reduced, gene frequencies in the population are likely to change just by random chance and many genes may be lost from the population, reducing the population’s genetic variation.
Bottleneck Effect

Original population → Bottleneck event → Surviving population

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Imagine that green beetles are easier for birds to spot (and eat). Brown beetles are a little more likely to survive and produce offspring. They pass their genes for brown coloration to their offspring. In the next generation, brown beetles are more common than in the previous generation.
Sexual Selection

- Sexual selection is a “special case” of natural selection.
- Sexual selection acts on an organism's ability to obtain (often by any means necessary) or successfully reproduce with a mate.
- Examples: peacocks (top left) maintain elaborate tails, elephant seals (top right) fight over territories,
Artificial Selection

• nature provides variation, humans select variations that are useful.
• Example - a farmer breeds only his best livestock
Selective Breeding

Humans create the change over time

“descendants” of the wolf
Artificial Selection gone bad!

- Unexpected consequences of artificial selection
  - Pesticide resistance
  - Antibiotic resistance