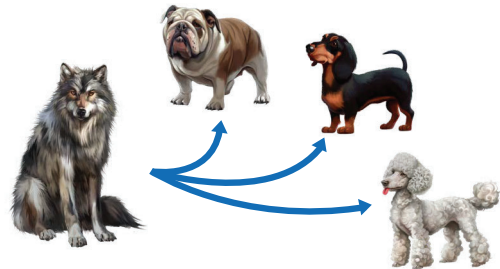
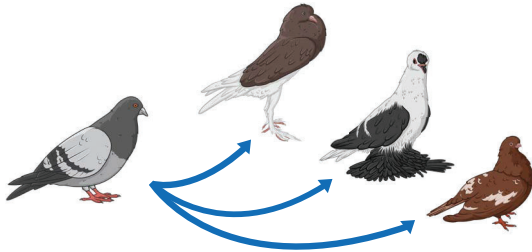


TOPIC: EVIDENCE FOR NATURAL SELECTION

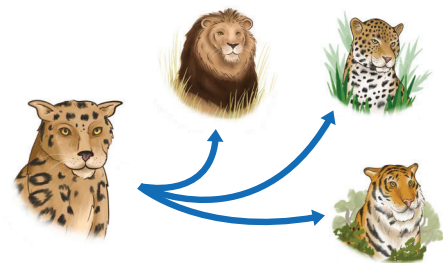
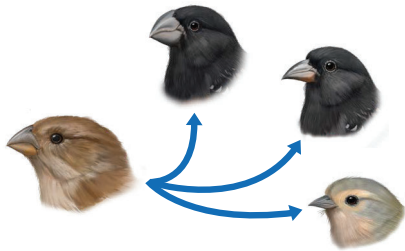
Natural and Artificial Selection

◆ In "Origin of Species", Darwin explained _____ selection by comparing it to _____ selection.

- **Artificial Selection:** selective breeding of individuals with traits favored by _____.

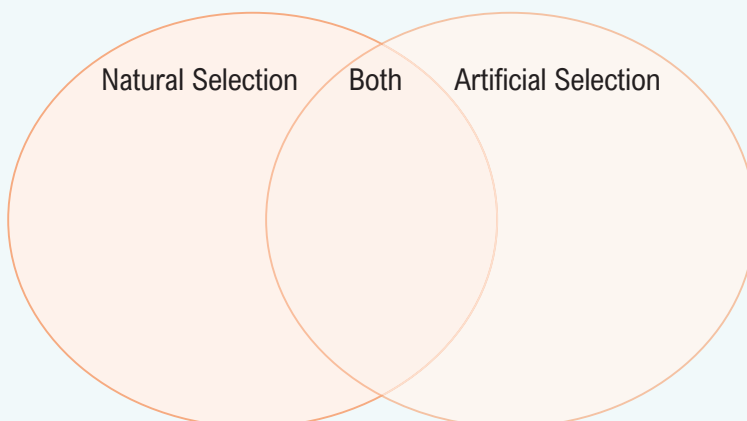


- **Natural Selection:** reproduction of individuals with traits favored in the _____.



EXAMPLE

Place the statements below in the Venn Diagram depending on whether they describe natural selection, artificial selection, or both.



- Over time, the frequency of traits in the population will change.
- Organisms with certain traits reproduce at a higher rate.
- Breeding is controlled by humans.
- More offspring are produced than will survive or reproduce.
- Competition for environmental resources or mates determines survival and reproduction.
- Requires variation in the population.

TOPIC: EVIDENCE FOR NATURAL SELECTION

PRACTICE

Kale, brussels sprouts, cabbage, broccoli, and kohlrabi are all vegetables that come from selecting for different traits in the wild mustard (*Brassica oleracea*). For example, to produce kale, humans selected plants with the large leaves. Over repeated generations of selection this led to the modern plant kale. This is an example of:

-
- a) Natural Selection. b) Artificial Selection. c) Homology. d) Use and Disuse

PRACTICE

Which statement identifies the main difference between natural selection and artificial selection?

-
- a) Natural selection is controlled by the environment, while artificial selection is controlled by humans.
b) Natural selection only influences phenotype, while artificial selection influences genotype.
c) Natural selection works on existing variation in the community, while artificial selection introduces variation into the community.
d) Natural selection has the goal of cultivating specific characteristics, while artificial selection does not.

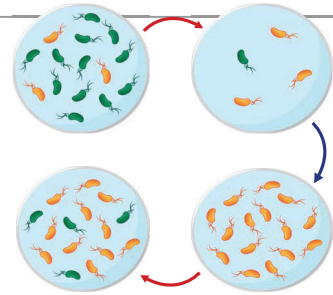
TOPIC: EVIDENCE FOR NATURAL SELECTION

Evidence of Natural Selection

- ◆ Natural selection can be observed in relatively _____ time intervals.

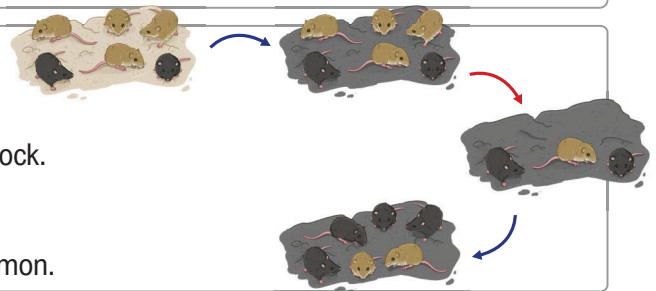
Methicillin-resistant *S aureus* (MRSA)

- ◆ **Variation:** either **not resistant** or **resistant** to antibiotics.
- ◆ **Selection:** presence of _____.
- ◆ **Fitness:** resistant bacteria have _____ fitness.
 - Population evolves: _____ bacteria become more common.



Rock Pocket Mouse

- ◆ **Variation:** either tan or black fur.
- ◆ **Selection:** predators hunting mice on _____ volcanic rock.
- ◆ **Fitness:** black mice have _____ fitness.
 - Population evolves: _____ fur becomes more common.



EXAMPLE

Industrial melanism in the peppered moth is one of the classic examples of evolution by natural selection. At the start of the 1800s, almost all moths were light-colored with small dark spots, which allowed them to camouflage on the lichen of trees. During the Industrial Revolution in the mid to late 1800s, much of London and the surrounding area was covered with a layer of black soot. By the 1900s, most moths were almost fully black-colored. Today, the population again is composed of mostly light-colored moths. Based on this evidence, answer the questions below:

- a. What variation did natural selection act upon?

- b. In the early 1800s what variant had higher fitness? How do you know?

- c. In the late 1800s, which moths had higher fitness?

- d. Why do you think the light-colored moth is again more common today?



TOPIC: EVIDENCE FOR NATURAL SELECTION

PRACTICE

Bedbugs are a pest that has been a nuisance throughout human history. In the 1940s, the widespread introduction of the pesticide DDT allowed people to effectively kill bedbugs at home. However, a mutation in the gene that codes for sodium channels in these insects provided resistance to DDT in some bedbugs. DDT was banned in 1974, but most bedbugs today are still resistant to DDT. What could be an explanation for why most bedbugs still have resistance to DDT?

- a) The mutation that provides resistance to DDT also provides resistance to other commonly used pesticides.
- b) Bedbugs have retained resistance in case DDT is used in the future.
- c) The large amount of DDT used before 1974 bred for exceptionally high levels of resistance, meaning resistance is unlikely to wear off for a very long time.
- d) Once a trait has been selected for, a trait will remain in the population going forward.

PRACTICE

A proposed strategy for combatting the spread of antibiotic resistance is to allow doctors to prescribe only a certain subset of antibiotic drugs and regularly rotate which antibiotics are allowed to be prescribed over several years. Why could this approach limit the spread of antibiotic resistance?

- a) Using different antibiotics at different times will prevent your body from developing too strong a resistance to any one drug.
- b) During times when a specific antibiotic is NOT being used, those bacteria with resistance will not have higher fitness and are more likely to be removed from the population.
- c) Removing the use of certain antibiotics lessens the chance that bacterial genomes will mutate in ways that provide resistance to that specific antibiotic.
- d) This approach would allow bacteria to evolve resistance to less powerful and, therefore, less important drugs while keeping resistance low to more powerful and important antibiotics.