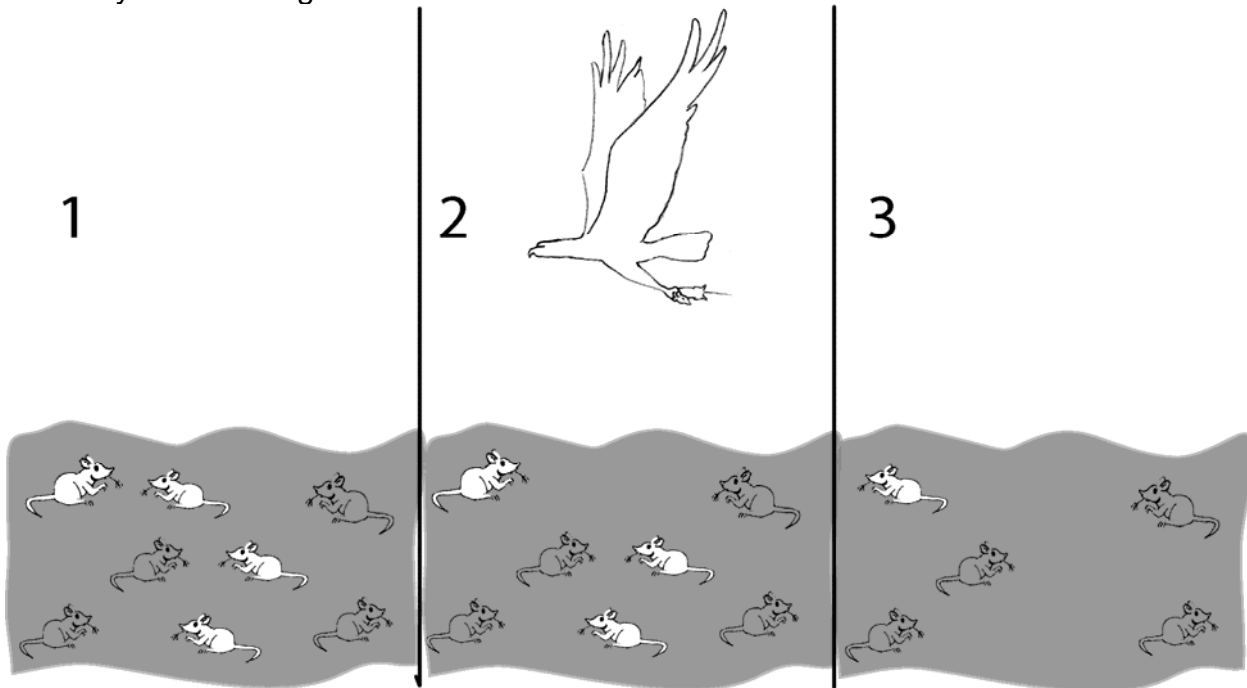


# Evolution by Natural Selection

Adapted from the University of California, Los Angeles Life Sciences 1 Demonstration Manual  
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Carefully examine Figures 1-3 below.



1. Describe what is happening in figures 1-3.

2. Is the population of mice different in figure 3 than in figure 1? Explain why.

Living things that are well adapted to their environment survive and reproduce. Those that are not well adapted don't survive and reproduce. An **adaptation** is any characteristic that increases **fitness**, which is defined as the ability to survive and reproduce.

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3. What characteristic of the mice is an adaptation that increased their fitness?

The table below gives descriptions of four female mice that live in a beach area, which is mostly tan sand with scattered plants.

Color of fur	Black	Tan	Tan and Black	Cream
Age at death	2 months	8 months	4 months	2 months
# pups produced by each female	0	11	3	0
Running speed	8 m/min.	6 m/min.	7 m/min.	5 m/min.

4. According to the definition given for fitness, which mouse would biologists consider the fittest? Explain your answer.

5. If a mouse's fur color is generally similar to its mother's color, what color fur would be most common among the pups?

A more complete definition of fitness **is the ability to survive and produce offspring who can also survive and reproduce.** Below are descriptions of four male lions.

Name	George	Dwayne	Spot	Tyrone
Age at death	13 years	16 years	12 years	10 years
# cubs fathered	19	25	20	20
# cubs surviving to adulthood	15	14	14	19
Size	10 feet	8.5 feet	9 feet	9 feet

(Adapted from Michigan State University, Occasional Paper No. 91, Evolution by Natural Selection: A Teaching Module by Beth Bishop and Charles Anderson, 1986)

6. According to this definition of fitness, which lion would biologists consider the "fittest"? Explain your answer.

Suppose that Tyrone had genes that he passed on to his cubs that helped his cubs to resist infections, so they were more likely to survive to adulthood. These genes would be more common in the next generation, since more of the cubs with these genes would survive to reproduce. A characteristic which is influenced by genes and passed from parents to offspring is called **heritable**.

Over many generations heritable adaptive characteristics become more common in a population. This process is called **evolution by natural selection**. Evolution by natural selection takes place over **many, many** generations.

Evolution by natural selection leads to adaptation within a population. The term evolution by natural selection does not refer to individuals changing, only to changes in the frequency of adaptive characteristics in the population as a whole. For example, for the mice that lived in the beach area with tan sand, none of the mice had a change in the color of their fur; however, due to natural selection, tan fur was more common for the pups than for the mother mice.

In summary, a heritable characteristic that helps an animal or plant to have more offspring which survive to reproduce will tend to become more common in a population as a result of evolution by natural selection.

## Questions

1. Explain why a characteristic which helps an animal to live longer will generally tend to become more common in the population as a result of evolution by natural selection.
  
  
  
  
  
  
  
  
  
  
2. Not all characteristics that contribute to longer life become more common in the population. Some characteristics contribute to long life, but not more offspring. For example, a female cat that is sterile and cannot have any offspring may live longer because she will not experience the biological stresses of repeated pregnancies. Explain why such a characteristic, which contributes to a long life but with few or no offspring, would **NOT** become more common as a result of evolution by natural selection.