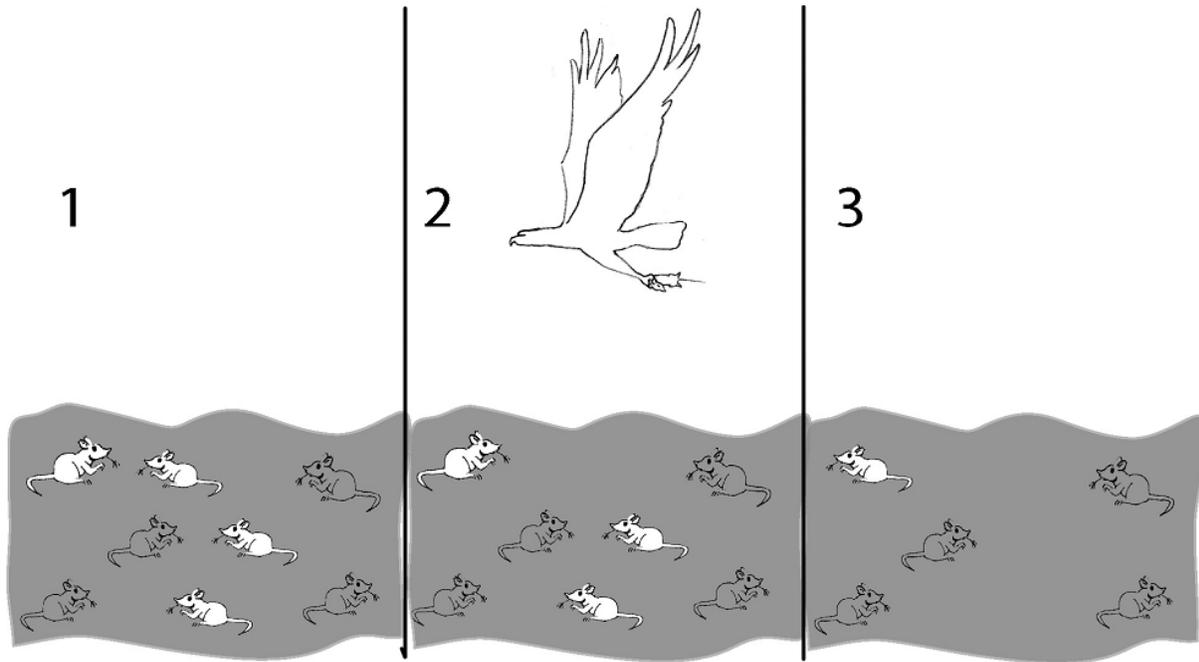


Evolution by Natural Selection WS



1. Describe what is happening in figures 1-3. Is the population of mice different in figure 3 than in figure 1? Explain why.

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

3. The table below gives descriptions of four female mice that live in a beach area which is mostly tan sand with scattered plants. According to the definition given for fitness, which mouse would biologists consider the fittest? Explain why this mouse would be the fittest.

| 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 cm/sec. | 6 cm/sec. | 7 cm/sec. | 5 cm/sec. |

4. If a mouse's fur color is generally similar to its mother's color, what color fur would be most common among the pups?
5. So far you've looked at how the color fur of an organism can be selected for as a favorable trait. What would the environment have to be like if the 4 mice above were not selected based on their fur color but rather their running speed?
6. 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.

Read the following situations below and identify the 5 points of Darwin's natural selection.

1) There are 2 types of worms: worms that eat at night (nocturnal) and worms that eat during the day (diurnal). The birds eat during the day and seem to be eating ONLY the diurnal worms. The nocturnal worms are in their burrows during this time. Each spring when the worms reproduce, they have about 500 babies but only 100 of these 500 ever become old enough to reproduce.



a. What worm has natural selection selected AGAINST?

b. What worm has natural selection selected FOR?

c. Identify the 5 points in the scenario above.

- Population has variations.
- Some variations are favorable.
- More offspring are produced than survive.
- Those that survive have favorable traits.
- A population will change over time.

2) There are 3 types of polar bears: ones with thick coats, ones with thin coats and ones with medium coats. It is fall, soon to be winter. The temperatures are dropping rapidly and the bears must be kept warm, or they will freeze to death. Many of the bears have had ~2 cubs each but due to the extreme temperatures, many mothers only have one cub left.



a. What bear will natural selection select AGAINST?

b. What bear will natural selection select FOR?

c. Identify the 5 points in the scenario above.

- Population has variations.
- Some variations are favorable.
- More offspring are produced than survive.
- Those that survive have favorable traits.
- A population will change over time.

3) In ostriches, there are 2 types: ones that run fast and those that run slowly. The fast birds can reach up to 40 miles an hour. Jackals love to eat ostrich, and they can reach speeds of up to 35-40 miles per hour. A flock of ostrich will lay ~ 10 eggs (each mother only lays 1), but many rodents break into the eggs and eat the fetus before they hatch.



a. What ostrich will natural selection select AGAINST?

b. What ostrich will natural selection select FOR?

c. Identify the 5 points in the scenario above.

- Population has variations.
- Some variations are favorable.
- More offspring are produced than survive.
- Those that survive have favorable traits.
- A population will change over time.

4) There are two types of rabbits: those that strictly eat grass and those that strictly eat berries and flowers. A drought occurs one year, and the plants have difficulty producing any extras (flowers, berries, etc.). They can only try and keep themselves green. The rabbits have had babies all year long but many are eaten by foxes or hawks. Due to the drought, many have starved to death.



a. What rabbit will natural selection select AGAINST?

b. What rabbit will natural selection select FOR?

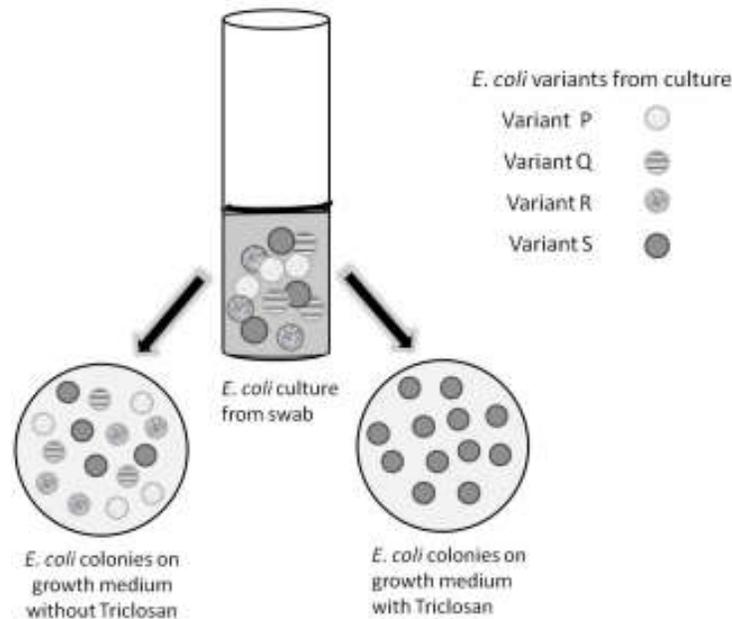
c. Identify the 5 points in the scenario above.

- Population has variations.
- Some variations are favorable.
- More offspring are produced than survive.
- Those that survive have favorable traits.
- A population will change over time.

Evolution and Selection for Resistance

A desktop was swabbed to collect bacteria. *E. coli* were found and were grown as shown on two different plates: one with and one without Triclosan (an antibiotic).

1 – Desk Swab Results



1. How many genetic variants of *E. coli* were present in the culture from the initial swab?
2. What variants of *E. coli* are found on the dish without Triclosan?
3. What variants of *E. coli* are found on the dish with Triclosan?
4. What happened to the other variants of *E. coli* on the dish with the medium containing Triclosan?
5. Based on its effect on *E. coli*, why is Triclosan used as a cleaning agent?

For the following questions, use these terms in your explanation:

Mutation, variation, trait, favorable, select/selection, reproduce, evolve

10. For the past 10 to 25 years, farmers have planted crop seeds that have been genetically modified to withstand treatment with a common weed killer called Roundup®. This allows the farmers to spray their fields to get rid of weeds without harming their crops. Recently, more and more farmers have discovered that their fields have Roundup®-resistant pigweed growing along with their crop. Use what you've learned in this activity to explain how this came about.

11. Many popular products from hand soap to clothing advertise that they have antibacterial activity. Most microbiologists recommend against their routine use in our daily lives. Similarly, antibiotic use for a viral infection is not recommended. How can you explain this using your knowledge from this activity?