Name: _____ Date: _____

How Natural Selection Works

Circle group

Living things of the same kind are not all alike. Look at a group of dogs, beetles, or tomato plants. You will see differences in size, color, speed, and other traits. Some are inherited. That means they are passed from parents to their young.

In the 1800s, a scientist named Charles Darwin said these differences help explain how species change over time. His idea is called natural selection. It is based on a few facts. Living things have more young than can survive. They compete for things they need, like food, water, and space. No two are exactly alike, and some of the differences are inherited.

Here is a made-up example. Beetles lives on a forest floor covered with dark soil. Some beetles are green, and some are brown. Birds hunt the beetles by sight. On the dark soil, the brown beetles are harder to see, so more of them get away. The green beetles get eaten more often.

The brown beetles live longer, on average. So they have more chances to have young, and their young are brown too. After many generations, brown becomes more common in the group. No beetle changed its color. The group changed because the place helped some beetles more than others.

Natural selection does not plan, and it does not make living things better in every way. A trait helps only in a certain place and time. If the soil turned light, brown might be a bad color to have. Over very long times, natural selection and other processes can lead to new species.

Questions

1. What does it mean for a trait to be inherited?

_____

_____

2. What facts is natural selection based on?

_____

_____

3. Why do more brown beetles survive?

_____

_____

4. What happens to the brown color after many generations?

_____

_____

5. Did any beetle change its color? How do you know?

_____

_____

6. Why does the author call the beetle story "made-up"?

_____

_____

7. What would probably happen if the soil turned light?

_____

_____

8. Why does natural selection not make living things better in every way?

_____

_____

Words to know

traits: features of a living thing, such as its size, color, or speed
inherited: passed down from parents to their young
generations: groups of living things born around the same time, one after another
natural selection: the process in which living things with helpful traits survive and reproduce more

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

How Natural Selection Works

Triangle group

Living things of the same kind are not exactly alike. Look at any group of dogs, beetles, or tomato plants, and you will see differences in size, color, speed, and many other traits. Some of these differences are inherited, which means they are passed from parents to offspring.

In the 1800s, the naturalist Charles Darwin proposed that these differences help explain how species change over time. His idea is called natural selection. It rests on a few observations. Living things make more offspring than can survive. They compete for limited resources, such as food, water, and space. Individuals vary, and some of the variations are inherited.

Here is an imagined example. A population of beetles lives on a forest floor covered with dark soil. Some of the beetles are green, and others are brown. Birds hunt the beetles by sight. Against the dark soil, the brown beetles are harder to see, so more of them escape. The green beetles are eaten more often.

The brown beetles live longer on average, so they have more chances to reproduce, and their offspring inherit the brown color. Over many generations, brown becomes more common in the population. No beetle changed its color. The population changed because the environment favored some individuals over others.

Natural selection is not planning, and it does not make living things better in any absolute way. A trait is helpful only in a particular place and time. If the soil turned light, brown might become a disadvantage. Over very long periods, natural selection, along with other processes, can lead to new species.

Questions

1. What does it mean for a trait to be inherited?

_____

_____

2. What observations does natural selection rest on?

_____

_____

3. In the beetle example, why do more brown beetles survive?

_____

_____

4. What happens to the brown color over many generations?

_____

_____

5. Did any beetle change its color, and how do you know?

_____

_____

6. Why does the author call the beetle story an "imagined" example?

_____

_____

7. What would probably happen if the soil turned light?

_____

_____

8. Why is it wrong to say natural selection makes living things better in an absolute way?

_____

_____

Words to know

traits: features of a living thing, such as its size, color, or speed
inherited: passed down from parents to their young
offspring: the young that a living thing produces
population: all the living things of one kind in a place
generations: groups of living things born around the same time, one after another
natural selection: the process in which living things with helpful traits survive and reproduce more

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

How Natural Selection Works

Square group

Living things of the same kind are never precisely identical. Examine any population of dogs, beetles, or tomato plants, and you will notice variation in size, coloration, speed, and countless other traits. Some of these variations are inherited, meaning they are transmitted from parents to offspring.

During the 1800s, the naturalist Charles Darwin proposed that such variation helps explain how species change over time, a mechanism he called natural selection. His reasoning rested on several observations. Living things produce more offspring than can possibly survive. They compete for limited resources, including food, water, and space. Individuals vary, and some of that variation is inherited.

Consider an imaginary illustration. A population of beetles inhabits a forest floor covered with dark soil; some of the beetles are green, while others are brown. Birds hunt the beetles by sight, and against the dark soil the brown beetles are considerably harder to detect, so a greater proportion of them escape, whereas the green beetles are devoured more frequently.

Because the brown beetles survive longer on average, they have more opportunities to reproduce, and their offspring inherit the brown coloration. Across many generations, brown becomes increasingly common within the population. Significantly, no individual beetle altered its color; the population changed because the environment favored certain individuals over others.

Natural selection involves no planning, and it does not make organisms superior in any absolute sense. A trait is advantageous only within a particular place and time: if the soil were to become light, brown coloration might become a disadvantage. Over immensely long periods, natural selection, together with other processes, can give rise to entirely new species.

Questions

1. What does it signify that a trait is inherited?

_____

_____

2. On which observations did Darwin base the idea of natural selection?

_____

_____

3. In the illustration, what accounts for the higher survival of brown beetles?

_____

_____

4. How does the population's coloration change across many generations?

_____

_____

5. Did any individual beetle alter its color? Support your answer with the passage.

_____

_____

6. Why does the author label the beetle scenario an "imaginary illustration"?

_____

_____

7. Predict the likely outcome if the soil became light.

_____

_____

8. Why is it inaccurate to claim natural selection makes organisms superior in an absolute sense?

_____

_____

Words to know

traits: features of a living thing, such as its size, color, or speed
inherited: passed down from parents to their young
offspring: the young that a living thing produces
population: all the living things of one kind in a place
generations: groups of living things born around the same time, one after another
natural selection: the process in which living things with helpful traits survive and reproduce more

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: How Natural Selection Works

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: How Natural Selection Works

Easier · 261 words · Flesch-Kincaid grade 4.3

1. It is passed from parents to their young.
2. Living things have more young than can survive, they compete for things they need, no two are exactly alike, and some differences are inherited.
3. On the dark soil, birds have a harder time seeing them, so more of them get away.
4. It becomes more common in the group.
5. No. The group changed because the place helped some beetles more than others.
6. It is invented to show how the idea works. It is not about a real group of beetles.
7. Brown might become a bad color to have, because birds could see brown beetles more easily.
8. A trait helps only in a certain place and time. A trait that helps in one place can hurt in another.

Triangle: How Natural Selection Works

This passage · 263 words · Flesch-Kincaid grade 7.4

1. It is passed from parents to offspring.
2. Living things make more offspring than can survive, they compete for limited resources, individuals vary, and some of the variations are inherited.
3. Against the dark soil they are harder for birds to see, so more of them escape.
4. It becomes more common in the population.
5. No. The population changed, because the environment favored some individuals over others.
6. It is made up to show how the idea works. It is not a record of a real group of beetles.
7. Brown might become a disadvantage, because brown beetles would be easier for birds to see.
8. Whether a trait helps depends on the place and time. A trait that helps in one environment can be a disadvantage in another.

Square: How Natural Selection Works

Harder · 270 words · Flesch-Kincaid grade 12.7

1. It is transmitted from parents to offspring.
2. Living things produce more offspring than can survive, they compete for limited resources, individuals vary, and some variation is inherited.
3. Against the dark soil they are harder for birds to detect, so a greater proportion escape.
4. Brown becomes increasingly common.

5. No. The population changed because the environment favored certain individuals over others.
6. It is invented to demonstrate how the mechanism works, not a record of an actual beetle population.
7. Brown coloration might become a disadvantage, since brown beetles would be easier for birds to detect.
8. Whether a trait is advantageous depends on the place and time; a trait that helps in one environment can be a disadvantage in another.