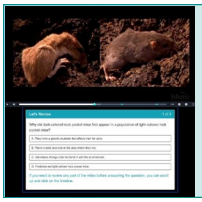


Interactive Assessment for Natural Selection and Adaptation

hhmi | BioInteractive

Interactive Video
Embedded Questions

MODULE 1 QUESTIONS

Time Stop 5:20 min

Let's Review

1 of 3: Why did dark-colored rock pocket mice first appear in a population of light-colored rock pocket mice?

A. They have a genetic mutation that affects their fur color.
The rock pocket mice that Dr. Nachman catches in the film have a mutation in a gene that leads to the dark fur color.

B. There is dark lava rock in the area where they live.
The dark rock environment doesn't cause dark-colored rock pocket mice to appear. The environment provides an advantage to them, and their dark progeny, once they arise.

C. Individuals change color to blend in with the environment.
Individual rock pocket mice cannot change their fur color to camouflage themselves. Recall that genes encode traits.

D. Predators eat light-colored rock pocket mice.
Predation doesn't *cause* dark-colored rock pocket mice to appear. Predation selects against light-colored mice, causing dark-colored mice to increase in the population.

2 of 3: Why do dark-colored rock pocket mice on dark lava flows have white bellies?

A. There is no selection for dark bellies by visual predators.
The color of a rock pocket mouse's belly is not visible to a predator and therefore is not under strong selection pressure. There is no selection for either dark- or light-colored bellies.

B. Mutations causing dark bellies do not occur.
There is no reason to assume that mutations causing dark bellies have not occurred. However, without selection, the dark-belly trait has not become common.

C. There is a reproductive advantage to having a dark belly.
If there were a reproductive advantage to having a dark belly, you would expect to see mice with dark bellies. All dark-colored mice have white bellies.

D. White bellies are an important part of camouflage.
A white belly, if visible, would be a disadvantage on a dark lava flow. But since a rock pocket mouse's belly is rarely exposed, it is not a factor in the animal's ability to avoid predation.

3 of 3: Mutations are *always*

A. good.
Whether a mutation is favored, neutral, or detrimental depends on the conditions the organism lives in.

B. bad.
Whether a mutation is favored, neutral, or detrimental depends on the conditions the organism lives in.

C. neutral.
Whether a mutation is favored, neutral, or detrimental depends on the conditions the organism lives in.

D. a change in an organism's DNA.
Mutations are rare genetic changes that can be neutral, beneficial, or detrimental depending on an

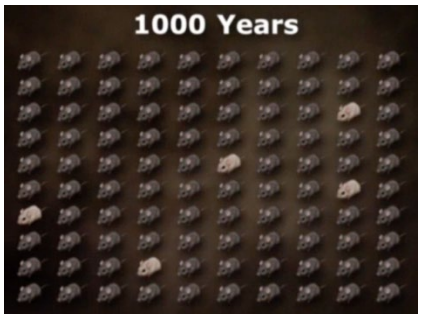
individual's circumstances. A mutation that causes dark-colored fur is good for a rock pocket mouse living on black lava and bad for one living in the sandy desert.

MODULE 2 QUESTIONS

Time Stop 7:17 min

Let's Review

1 of 1: When dark-colored fur gives mice a 1% competitive advantage and 1% of the population begins with dark fur, in about 1,000 years, 95% of the population will have dark fur. Which of the following statements is true?



A. Dark-colored rock pocket mice, in this population, have fewer offspring than light-colored rock pocket mice.
Dark-colored rock pocket mice have a reproductive advantage, so they would have more offspring than light-colored mice.

B. If dark-colored rock pocket mice had a competitive advantage of 0.1%, it would take more than 1,000 years for 95% of the population to have dark fur.
A small evolutionary advantage can lead to large changes in a population. The larger the advantage, the faster the changes occur.

C. If dark-colored mice had a competitive advantage of 5%, it would take more than 1,000 years for 95% of the population to have black fur.
A competitive advantage of 5% would lead to 95% of this population becoming dark in less than 1000 years.

D. If dark-colored mice had a competitive advantage of 10%, it would take more than 1,000 years for 95% of the population to have black fur.
A more advantageous mutation (10%) would lead to 95% of this population becoming dark in about 100 years.

MODULE 3 QUESTIONS

Time Stop 9:45 Min

Let's Review

1 of 2: What does Dr. Carroll mean when he says "while mutation is random, natural selection is not"? (Note: More than one answer is correct.)

A. Mutations are caused by changes in the environment.
Mutations occur at random independently of the environment.

B. Natural selection can favor some mutations and not others.
On dark lava flows, natural selection favors mice with mutations for dark-colored fur and not mice with light-colored fur.

C. Selection can change depending on the environment.
On dark lava flows, natural selection favors dark-colored mice and on light sand it favors light-colored mice.

D. Mutations for advantageous traits are more likely to be passed on to the next generation.
Natural selection can shape populations depending on which mutations and traits are passed on from one generation to the next.

2 of 2: Nachman examined dark-colored mice from two different populations living hundreds of miles apart. The mice looked nearly identical. Their dark color was caused by two different genes. What does this tell you? (Note: More than one answer is correct.)

A. Dark-colored fur evolved only once in rock pocket mice.
If the mice had the same mutation, it would imply a single evolution of dark color. Instead, Nachman describes evolution occurring “again and again” on the lava flows.

B. There are at least two genes involved in creating dark-colored mouse fur.
Two different mutations giving rise to dark-colored fur have been found in two genes, which means that both genes are involved in fur color.

C. Dark fur color evolved independently on each lava flow.
Since each population has a different mutation, the two mutations must have occurred independently.

D. Different mutations in two different genes cannot generate the same phenotype.
In this case, two mutations in two different genes caused the same phenotype: dark-colored fur.

E. Under similar conditions, natural selection can favor similar adaptations.
Dark-colored fur has evolved multiple times in rock pocket mouse populations. Once a mutation that causes dark fur arises in a population, similar selection pressures favor similar dark phenotypes on dark lava flows.