

Topic 1.3 Assessment

Check Your Understanding Answers

Understanding Key Ideas

1. Mutations cause permanent changes to DNA. Mutations are a key source of variation in genes and provide new alleles.
2. If all sparrows have exactly the same size of beak, then they are in direct competition with one another for food resources. However, since some have smaller beaks and others have larger beaks, they are able to partition the food resources up and most individual sparrows should be able to find food and survive.
3. An abiotic (non-living) environmental condition can be said to select for certain characteristics in some individuals and select against different characteristics in others. In this way, the environment exerts selective pressure on a population. Selective pressure may result from biotic factors as well, such as predators, parasites, and competition for resources.
4. Natural selection is the process that results when the characteristics of a population of organisms change over many generations. This change, or evolution, happens because individuals with certain inherited traits are more successful in specific local environmental conditions and, as a result, may pass on their alleles to the next generation through reproduction. After many generations an adaptation has occurred.
5. Natural selection is a process that results when the characteristics of a population or organisms change because individuals with certain inherited traits survive specific local environmental conditions and, through reproduction, pass on their traits to their offspring. Natural selection takes place in the example presented in this question because populations of insects contain, among their vast numbers of individuals, considerable variation in their genetic material, primarily as the result of mutations. Some members of the population may have the gene(s) to resist pesticides. These insects have a selective advantage in the population. In other words, the insects that have this resistance are more likely to survive and reproduce, thus potentially passing on this now-helpful mutation to their offspring.
6. Yes, the mice would possibly become two separate species because they are now geographically isolated from each other and cannot interbreed. The birds would not become two separate species because they can fly over the river, are not geographically isolated, and can continue to interbreed.
7. The different islands all have specific local conditions to which the lizards have adapted. These different lizards have undergone adaptive radiation, in which there is diversification from a common ancestor based on different conditions.
8. The different types of mutagens are physical, such as X-rays and UV radiation, and chemical, such as nitrites and gasoline fumes.
9. The wild mustard plant (*Brassica oleracea*) has been modified by selective breeding to create many common food crops, such as kale, broccoli, Brussels sprouts, and cabbage. The consequences can be

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BC Science Connections 10 Teaching Notes Topic 1.3 How can natural and artificial selection influence changes in populations?

positive in that we have different types of vegetables to eat. The consequences could be negative if the breeding results in low genetic variation within a population.

Connecting Ideas

10. The more these types of products are used, the more chance there is of bacteria developing resistance to them.

Making New Connections

11. a) During the dry years (years 1, 4, and 6), the beak depth is larger. During the wet year (year 8), the beak depth is smaller.
b) Birds with deep beaks gather more food and pass along their genes that code for large beak depth to their

offspring in drought years, when the seed size is large. Birds with less deep beaks gather more food and pass along their genes that code for less deep beaks to their offspring in wet years, when the seed size is small.