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Gene Pools and Natural Selection

Subject Outline terms and phrases

natural selection, adapted, selection pressure, frequency of alleles, genetic drift

1. Define the term **gene pool**.

2. What reasoning did Thomas Malthus use to show that not all offspring in natural populations survive to reproduce?

3. State why most natural populations of organisms do not increase in size, but remain fairly constant from one year to the next.

4. List four factors that restrict the size of a natural population.

5. Explain why genetic variability is an advantage to a population.

6. (a) State one example of a genetically controlled characteristic that may *increase* an individual *human's* chances of survival and reproduction.

(b) State one example of a genetically controlled characteristic that may *decrease* an individual *rabbit's* chances of survival and reproduction.

7. List the five points that Darwin used to explain the theory of evolution by natural selection.

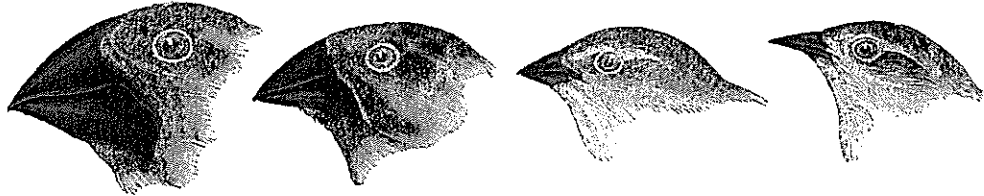
- (1) _____
- (2) _____
- (3) _____
- (4) _____
- (5) _____

8. Explain how a strain of bacterium resistant to the antibiotic streptomycin could evolve by natural selection. In your answer you should use the following terms:
mutation, genetic variation, selecting agent, selection pressure, survival, reproduction, favourable gene, change in the gene pool.

9. (a) What is meant by a large gene pool?

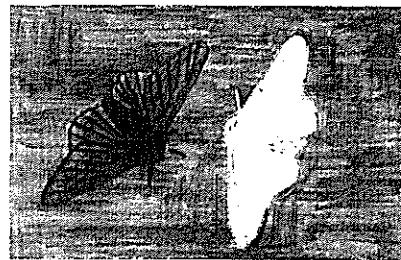
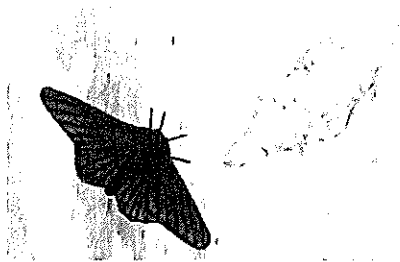
(b) Explain why a population with a large gene pool is more likely to survive selection pressures.

10. In 1831 Darwin sailed on the Beagle as the ship's naturalist. He was particularly fascinated by the distribution of finches on the Galapagos Islands to the west of South America. Darwin found a number of different species of finch and he noticed that each species seemed to be restricted to one island or a small number of neighbouring islands. Differences between the species included such features as beak shape which seemed to be suited to the food available to the particular species. From these observations Darwin began to formulate an idea of how the different species of Galapagos finches could have developed in such a way as to ensure that each species was well suited (adapted) to its own environmental conditions.



Use the example of the Galapagos Island finches to outline the reasoning that Darwin used to explain how the finches developed in such a way as to ensure that each species was well suited (adapted) to its own environmental conditions.

11. One of the classic examples of natural selection involves the peppered moth *Biston betularia*. This moth is found in England in two main shades. One is light with patches of darkness (hence the name 'peppered') and the other is dark in colour. Before the Industrial Revolution almost all the moths were light in colour and dark ones were extremely rare.



Explain how the proportion of darker moths increased and the proportion of paler ones decreased over many generations after the Industrial Revolution.

12. State three processes that could cause the frequency of alleles in a population to alter.

13. Explain the term **genetic drift**. Use a diagram to illustrate your answer.

14. Explain how evolutionary changes are affected by factors such as:

(a) sexual reproduction.

(b) genetic drift.
