

10.3 Gene Pools & Speciation

Question Paper

Course	DP IB Biology
Section	10. Genetics & Evolution (HL Only)
Topic	10.3 Gene Pools & Speciation
Difficulty	Hard

Time allowed: 10
Score: /5
Percentage: /100

Question 1

In a population of fruit flies, *Drosophila melanogaster*, there are several alleles that code for eye colour.

In one particular population there are four alleles, red, white, cherry and apricot.

The table below shows the allele frequencies of each of the alleles in this population.

Some of the data is missing.

Allele type	Frequency
red	0.44
white	0.25
cherry	
apricot	0.18

Which of the following statements is a correct conclusion that can be made from this data?

- A. The red eye colour allele is dominant to the rest of the eye colour alleles
- B. The apricot eye colour allele is the least common allele in the population
- C. Most of the fruit flies in this population show the red eye phenotype
- D. The phenotype frequencies are totally unknown

[1 mark]

Question 2

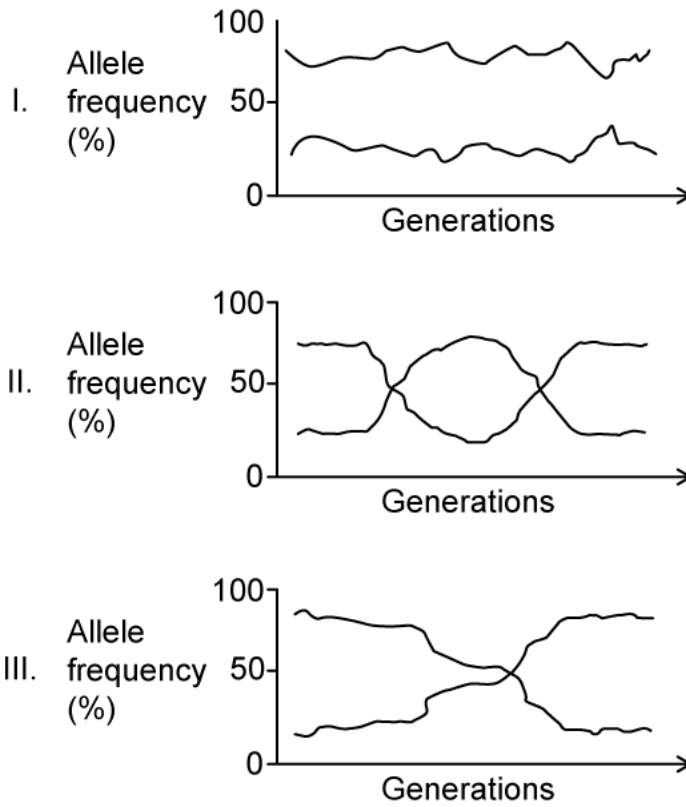
Which of the following does **not** describe the process of natural selection?

- A. A species of antelope where the population has stronger muscles after the individuals with weak muscles are eaten by predators
- B. When a bacteria is exposed to a new type of antibiotic the exposure causes the bacteria to become resistant
- C. Sharks adapting to store more oxygen in their blood because the sharks with less oxygen were more likely to die
- D. Dark peppered moths increasing in number during the industrial revolution in response to increased predation of the light colour moths

[1 mark]

Question 3

The three graphs below show how the allele frequencies of two alleles in three different populations changed over several generations.



Which of the graphs show changes in allele frequency that suggest that evolution is taking place?

- A. II. only
- B. II. and III. only
- C. III. only
- D. I., II. and III.

[1 mark]

Question 4

From the three examples listed below, which describe the occurrence of speciation?

- I. Two plant populations of the same species are pollinated by different species of insect that are active at different times of the day. There is no overlap between when the two insect species are active. Mutations occur within the two populations leading to them to become genetically distinct from each other.
- II. A small number of lizards float on a wooden log and start a new population on another island. Mutations occur within the two populations leading to them to become genetically distinct from the original population.
- III. A mutation occurs that causes a small population of a species of plant to become tetraploid instead of the usual diploid cells.

- A. II. only
- B. I. and II. only
- C. I. and III. only
- D. All of I., II. and III.

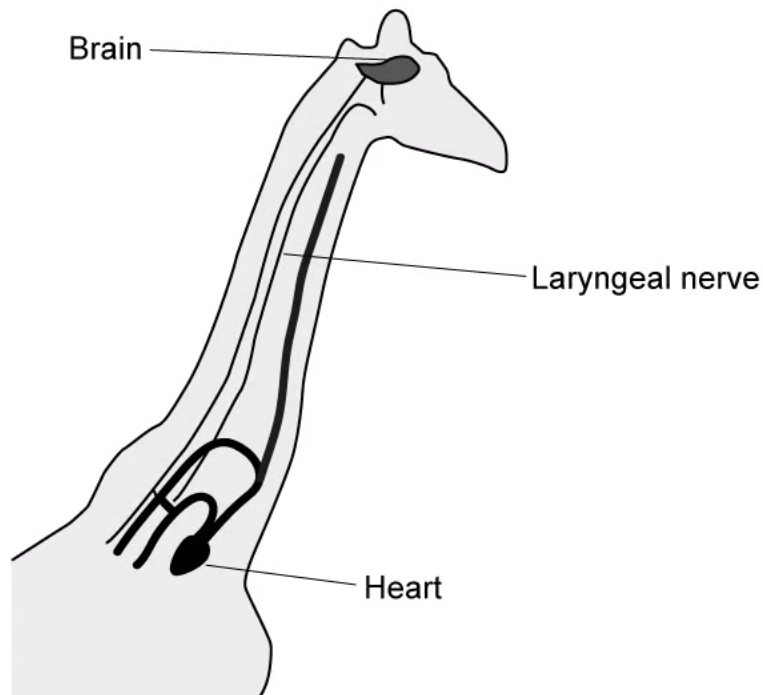
[1 mark]

Question 5

Back in evolutionary history, the ancestors of giraffes used to have much shorter necks. At this time they possessed a nerve called the laryngeal nerve that travels from an area just below the brain into the brain. At this time the nerve looped under a blood vessel that was quite close to the brain and this allowed the nerve to be short and send impulses very quickly.

Over time as the giraffe evolved to develop a longer neck, the laryngeal nerve also grew longer. Although it still started just below the brain and sent impulses to the brain, the restriction of looping under the blood vessel near the heart prevented the nerve from avoiding growing with the neck of the giraffe.

The image below shows the structure of the laryngeal nerve in the giraffe.



Which of the statements below correctly describes the evolution of the giraffe laryngeal nerve?

- A. The evolution of the laryngeal nerve provides evidence for the concept of punctuated equilibrium.
- B. The evolution of the laryngeal nerve is an example of stabilising selection.
- C. The evolution of the laryngeal nerve provides evidence for the concept of gradualism.
- D. The evolution of the laryngeal nerve provides evidence against natural selection because natural selection would never allow for such a flawed, inefficient structure to develop.

[1 mark]