Biodiversity - Natural Selection Analysis



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1. Analyze the four principles at work in evolution and explain how they interact with each other to produce evolutionary change.

2. Evaluate the role of selection in the evolution of the poison dart frog and analyze how different types of selection (e.g. stabilizing, directional, disruptive) have influenced its evolution -

Poison dart frogs are known for their bright colors, which often serve as a warning to predators that they are toxic. However, some populations of poison dart frogs have evolved to have even brighter colors, as a result of directional selection. Suppose you are studying two populations of poison dart frogs that live in different habitats. The first population lives in a dense rainforest, where there is a lot of shade and low light levels. The second population lives in a sunny open meadow, where there is a lot of direct sunlight. You observe that the poison dart frogs in the rainforest are mostly green and brown, with relatively dull colors compared to other populations of poison dart frogs. In contrast, the poison dart frogs in the meadow are mostly bright red and orange, with very bold and striking colors. You suspect that the difference in habitat has led to a type of selection on the coloration of the poison dart frogs. To test this hypothesis, you collect data on the survival rates of the different color morphs in each population.

You find that in the rainforest, the green and brown morphs have higher survival rates, since their camouflage helps them blend in with the foliage and avoid predators. In contrast, the red and orange morphs in the meadow have higher survival rates, since their bright colors help them advertise their toxicity and deter predators.

Sample Population 1

A. Create a Graph to Explaining your findings





3. Evaluate the following population of orchids -

In a population of orchids, the flowers can be either white or pink. White flowers are the ancestral trait, while the pink flowers result from a mutation. A team of researchers found that pollinators are more attracted to orchids with a shade of pink that is not too light or too dark. Therefore, they hypothesize that stabilizing selection is acting on the pink coloration of the flowers. They sampled 100 orchids from the population and found that 30 had white flowers, 30 had red flowers, and 40 pink flowers. When they returned to the population a year later, they found 13 white flowers, 20 red flowers, and 67 pink flowers.

Based on this data, what can you infer about the type of selection on the pink coloration of the orchids?

A. Create a Graph to Explaining your findings





4. After a few years, researchers observe that the yellow and red frogs are becoming more common, while the green frog is becoming more common. They conduct a study to investigate whether the selection pressures from the predator are causing disruptive, stabilizing, or directional selection in the poison dart frog population. The Graph is right. Explain their findings and identify the type of selection.



Type of Selection: _____

Short, Constructed Response Questions:

5. Compare and contrast natural selection and genetic drift and evaluate their relative contributions to the evolution of species, using the poison dart frog and the chimpanzee as examples.

6. Evaluate the concept of coevolution and analyze its role in shaping the relationship between the chimpanzee and the fig tree, including the adaptations that have resulted in both species.

7. Compare and contrast convergent evolution and divergent evolution and evaluate their relative contributions to the evolution of the platypus/duck & Darwins finches



