Example #1

Sexual dimorphism is when there is a phenotypic difference between the male and female sexes. Usually we equate beauty with feminine--but that is not always the case, especially with birds. A female peacock has brown feather that do not drag behind her--she needs to blend into her environment and make swift movements to protect her young. The male peacock however has evolved a different strategy. According to experts, female peacocks choose mates based on the color of the feathers and the overall physical prowess of the animal. The brightness of the plumage might signal to the female that the male has high-quality genes. This would make him ideal for reproduction; therefore the males with the brightest colors and displays are often selected. In reality, not all males have bright, large tails, and this was especially true thousands of years ago. As females began to select the brightest male for sexual partners; the peacocks will less impressive tails were less likely to mate and reproduce. However there is a trade-off, if the peacocks' feathers were too long, too cumbersome and too flashy, it would attract predators...basically if you weren't sexy enough, you wouldn't attract a mate, but if you were too sexy and flashy, you would attract more mates **and** more predators.

Based on the scenario above--identify the four steps of natural selection:

1. Organisms produce more offspring than can survive:

2. Variation exists in the population:

3. Beneficial variations help organisms survive:

4. Overtime, beneficial variations of will be passed on increase in the next generation:

Identify the mode of Natural Selection that is occurring: _____

Draw a graph to show the mode of natural selection (label the variations):

Is the beneficial adaptation a structural (anatomical), physiological or behavioral adaptation? Explain:

Is the adaptation driven by an abiotic or biotic force? _____

Explain your answer:

Identify and explain the evolutionary force(s) driving evolution (population size, migration, mutation, sexual selection, and/or natural selection):

Calculate the rate of evolution in this population using Hardy-Weinberg Equation

$p + q = 1$ $p^2 + 2pq + q^2 = 1$ p = dominant allele q = recessive allele

A biologist is studying a population of peacocks, she finds measures the peacocks tails and has determined that long tails are a dominant trait. The longest tails are created from a homozygous dominant individual. She finds that approximately 12% of the population has the shortest tails.

Determine the percent of the dominant allele?

Determine the percent of the recessive allele?

What percent of the population is homozygous dominant?

What percent of the population is heterozygous?

What percent of the population is homozygous recessive?

25 years after her initial study, she visits the same population of peacocks and finds that 14% of the individual still have short tails.

Determine the percent of the dominant allele?

Determine the percent of the recessive allele?

What percent of the population is homozygous dominant?

What percent of the population is heterozygous?

What percent of the population is homozygous recessive?

Is Microevolution occurring within this population? Explain why/why not.

Is Macroevolution occurring within this population? Explain why/why not.

Example #2

When you think of the American Southwest, you probably think of cacti both big and small. Well if you were to visit the American Southwest today, you might be disappointed with the lack of variation among cactus species--especially right off the major highways. In 1926, Route 66 was the nation's first major highway to allow visitors to visit the southwest. Like many tourists--they wanted to take home a memento of their travels. Many people would pull over and begin looking for their own living souvenir. Since many of the tourists did not have the necessary tools to extract a spiny cactus out of the soil--they usually had to make a conscious decision about what type of cactus they should dig up. The cacti with too many spines were seen as too difficult to dig out and the visitors didn't likely have gloves to protect their hands. The cacti with too few spines were seen as "homely" and were often overlooked. Therefore, the tourists found a cactus that was between these two extremes. Over the last century, the phenotypic variation within these small cacti has changed (at least in areas accessible by these highways.)

Based on the scenario above--identify the four steps of natural selection:

1. Organisms produce more offspring than can survive:

2. Variation exists in the population:

3. Beneficial variations help organisms survive:

4. Overtime, beneficial variations of will be passed on increase in the next generation:

Identify the mode of Natural Selection that is occurring: _____

Draw a graph to show the mode of natural selection (label the variations):

Is the beneficial adaptation a structural (anatomical), physiological or behavioral adaptation? Explain:

Is the adaptation driven by an abiotic or biotic force? _____

Explain your answer:

Identify and explain the evolutionary force(s) driving evolution (population size, migration, mutation, sexual selection, and/or natural selection):

Calculate the rate of evolution in this population using Hardy-Weinberg Equation

$p + q = 1$ $p^2 + 2pq + q^2 = 1$ p = dominant allele q = recessive allele

The amount of cacti spines is determined by a dominant allele. A cacti that is homozygous dominant has a higher than average rate of spines. At the turn of the 20th century, it is believed that 35% of the cacti population had lower than average rate of spines (homozygous recessive).

Determine the percent of the dominant allele?

Determine the percent of the recessive allele?

What percent of the population is homozygous dominant?

What percent of the population is heterozygous?

What percent of the population is homozygous recessive?

A recent study shows that 78% of the cacti population had lower than average rate of spines.

Determine the percent of the dominant allele?

Determine the percent of the recessive allele?

What percent of the population is homozygous dominant?

What percent of the population is heterozygous?

What percent of the population is homozygous recessive?

Is Microevolution occurring within this population? Explain why/why not.

Is Macroevolution occurring within this population? Explain why/why not.