Answer the following questions to help you develop an explanation about alpha-thalassemia and its relationship to malaria in humans.

Questions

1. Do the data from the studies in Papua New Guinea and Kenya support the hypothesis that individuals who have thalassemia might have some advantage over other individuals when living in an area where malaria is common? Explain.

2. Depending on their genotype, individuals with nonfunctional alpha-globin alleles may have symptoms that range from mild to more serious, including anemia, fatigue, enlarged spleen, liver problems, or even death. If the alpha-globin mutations are passed from parent to child, and individuals with four nonfunctional alpha-globin alleles die, how is the mutation maintained in the population?

3. The human population shows variation for alpha-thalassemia. How did the variation arise?

4. A common misconception related to evolution is that individuals develop mutations because the mutations fulfill some “need” or the individuals gain some benefit. In this case, this reasoning would suggest that individuals develop a mutation in the alpha-globin gene because they want or need protection from malaria. On the basis of your understanding of evolution and natural selection, explain why this reasoning is faulty.

5. In certain environments, did alpha-thalassemia affect an individual’s ability to survive and reproduce? Explain.