

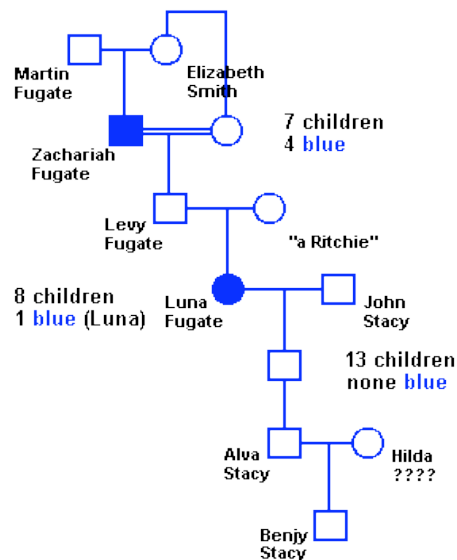
The Blue People Of Troublesome Creek, KY



Introduction:

Hereditary methemoglobinemia (met-H) is a human genetic disease that is inherited as an autosomal recessive. The gene is located on chromosome 22. People afflicted with this genetic disorder have skin that is literally purple-blue in color and dark purple lips. The hemoglobin in their blood has a reduced ability to carry oxygen, which produces the blue color of their skin. The dominant, normal allele is responsible for the production of an enzyme (protein), called diaphorase that reduces the hemoglobin so it can be reused and pick up more oxygen. The recessive mutant allele produces a dysfunctional enzyme that does not reduce the hemoglobin. Blue people seem to be able to continually breakdown and produce new hemoglobin by biosynthesis and live a relatively normal life.

Fugate Pedigree:



The image on the previous page shows the pedigree of the "blue people" family tree indicating the phenotypes of all the individuals in the family. Circles are females and squares are males. If the shape is shaded then that individual has the disorder. Unshaded shapes do not have the recessive phenotype, meaning that they may be carriers of the mutant diaphorase allele (heterozygous) OR may be homozygous dominant with two normal alleles.

Your challenge is to determine the genotypes of each individual on the family tree.

Note: not all offspring are shown on this pedigree. For example Martin Fugate and Elizabeth Smith had 7 children, 4 of which were blue. Levy Fugate and Ms. Ritchie had 8 children, 1 of which was blue. Luna Fugate and John Stacey had 13 children. Use this information to help you solve the problem.

If B stands for the normal gene and b for the "blue" gene, BB and Bb are normal and bb is "blue," write the genotypes for the individuals in the pedigree. If it is impossible to tell if the second gene is dominant or recessive, use a "?".

1. Martin Fugate ____
2. Elizabeth Smith ____
3. Zachariah Fugate ____
4. Levy Fugate ____
5. "a Ritchie" ____
6. Luna Fugate ____
7. John Stacy ____
8. Alva Stacy ____
9. Hilda ????
10. Benjy Stacy ____