



Pedigree Analysis

Purpose

To identify specific individuals in a pedigree, to determine the genotype of the individuals, and to determine the pattern of inheritance of the given trait.

Concepts

- Pedigree analysis
- Dominance and recessiveness

Background

Traits in humans are often difficult to study for several reasons. Unlike fruit flies, which produce large numbers of offspring very quickly, humans reproduce slowly and usually produce only one offspring at a time. So traits in humans must be studied through *population sampling* and *pedigree analysis*. In this activity, pedigree analysis is used to study human traits.

A pedigree shows a family's pattern of inheritance for a specific trait. In a pedigree each person is assigned a number and each generation is represented by a *Roman numeral*. Therefore, each person is identified by a Roman numeral and a number. Females are represented by *circles* and males by *squares*. *Shaded symbols* indicate individuals who have the trait in question. (*Note: Shaded symbols do not always indicate recessiveness; if the trait being studied is dominant, those who are dominant will be shaded.*) In some pedigrees, if a person is heterozygous (a carrier) for a trait, the symbols are half shaded. In many cases, by studying a family's pedigree, the genotypes of most, if not all, of the members can be determined.

Materials

- Pedigree Analysis Worksheet
- Pencil

Safety

There are no particular safety concerns for this activity, but follow all normal laboratory safety rules.

Procedure

Follow the directions on the Pedigree Analysis Worksheet.

Pedigree Analysis Worksheet

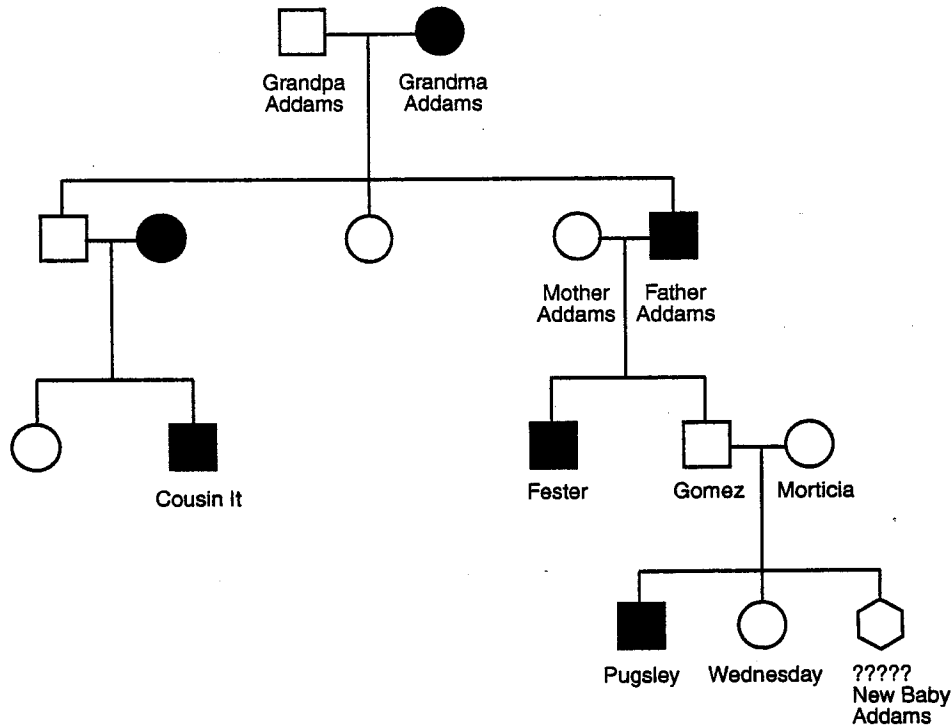
Part A

Gomez and Morticia Addams are expecting a new baby! They have come to your genetic counseling firm to find out the probability that it will have webbed feet, a trait that runs in the family.

1. Observe the following pedigree. Number the generations and each person on the pedigree.
2. Determine the genotypes of the individuals in the pedigree wherever possible. Write the genotypes on the pedigree.
3. Determine the probability that new baby Addams will have webbed feet.

The Addams Family Pedigree for Webbed Feet

B = normal feet
b = webbed feet



Part B

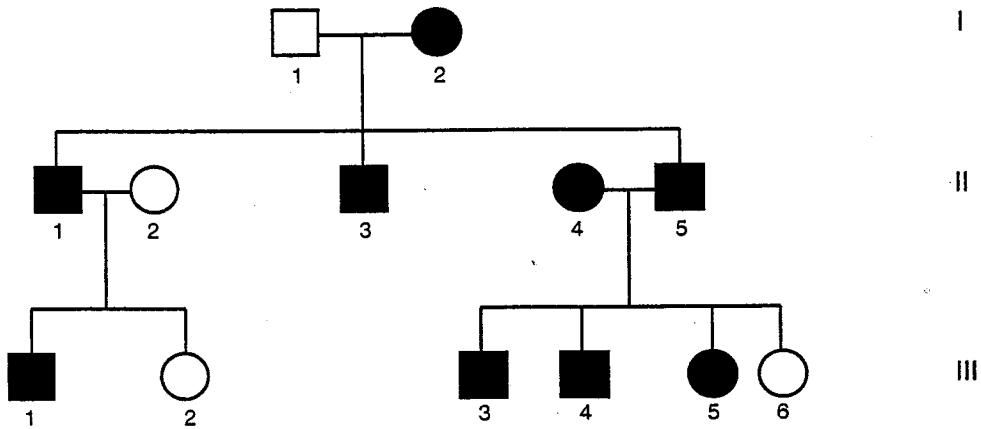
1. Draw the following pedigree. Albinism is a recessive trait.

"One couple has a son and daughter with normal pigmentation and a son that is an albino. Another couple has one son and two daughters with normal pigmentation. The daughter from the first couple has three children with the son of the second couple. Their son and one daughter have albinism; their other daughter has normal pigmentation."

2. Label the generations and each individual in the pedigree.
3. Determine the genotypes of as many individuals as possible.

Part C

1. Observe the following pedigree for tongue-rolling.



Answer the following questions

1. The ability to roll the tongue into a U-shape is determined by a single gene. Determine if you can roll your tongue.
yes _____ no _____
2. Do any of the children in generation II have the same phenotype as their father?
3. In which generation do children appear with the same phenotype as individual I-1?
4. Individuals II-4 and II-5 have the same phenotype. Three of their children have the same phenotype, but one, III-6, does not. What genotypes must individuals II-4 and II-5 be to produce children with these phenotypes? Explain.
5. Is tongue-rolling a dominant or recessive trait? Explain.