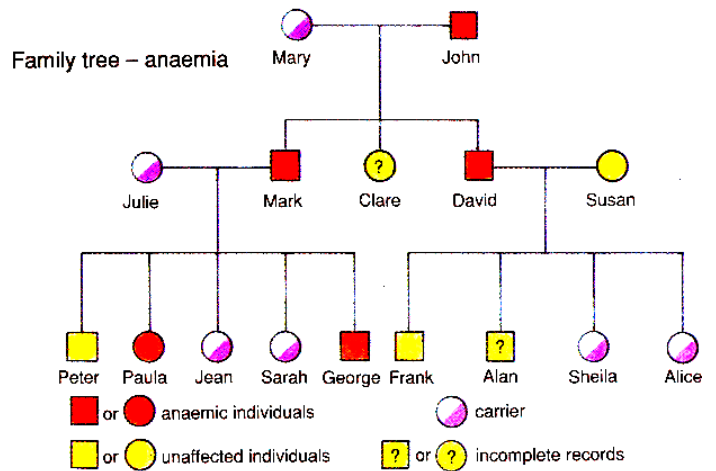


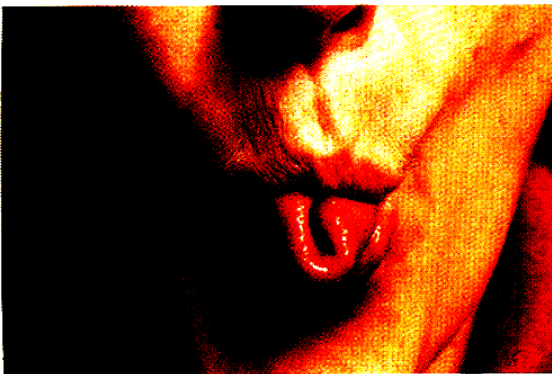
NIS Grade 9 Genetics



- 1** A blood disorder leading to a form of anaemia has been found to be inherited. Investigation of the medical records of a particular family yielded the following information, though in some cases the records gave no information regarding the presence or absence of the symptoms.
- What is meant by the term 'carrier'? In your answers to each of the following questions explain your reasoning clearly.
 - What is the likely genotype of Alan?
 - What is the probability that Clare is a carrier?
 - If Frank was to have children with a woman with the same genotype as Sarah, what proportion of any sons might be expected to be anaemic?



- 2** Some people can roll their tongues into a U-shape.



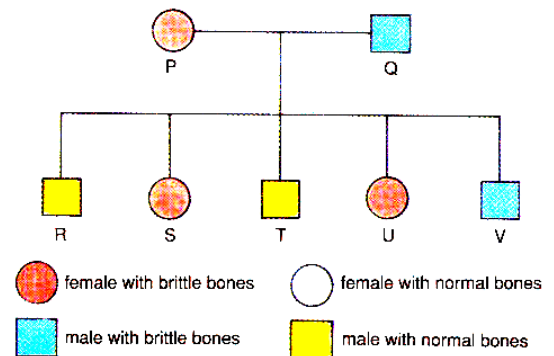
The tongue-rolling characteristic

Tongue-rolling is controlled by a dominant gene **R**. Of three children in a family, two were tongue-rollers, the other was not. Of the parents, one was a tongue-roller, the other was not.

- By means of a diagram, show the genetic make-up of this family in respect of tongue-rolling.
 - Three of the grandparents were not tongue-rollers.
 - What was the phenotype of the fourth grandparent?
 - What were the possible genotypes of the fourth grandparent?
- 3** Huntington's chorea is a rare but very serious inherited disease caused by a dominant gene, **H**. The effects of the disease do not appear until the age of about 30 years.
- A woman of 25 is planning to start a family, but the woman's father has Huntington's

chorea and is heterozygous for the condition. There is no history of the disease in her mother's family.

- What are the chances of the woman having Huntington's chorea?
 - What advice might be given to the woman by a genetic counsellor about the desirability of starting a family?
 - By means of a diagram, explain the reasoning on which the advice is based.
- 4** Humans sometimes grow up with bones that are brittle and easily break. This condition is passed on from parents to their children, as shown in the family tree below.



Inheritance of brittle bones

- What is the sex of the child labelled U?
- Does the child have brittle bones?
- Which is recessive, normal or brittle bones?
- Are the two parents homozygous or heterozygous?
- The gene for brittle bones is **B**. The gene for normal bones is **b**. What are the possible genotypes for children S and T?

5. (a) In a strain of soybeans, high oil content (H) in seeds is dominant to low oil content (h) and four seeds in a pod (F) is dominant to two seeds in a pod (f). A farmer crosses two soybean plants, both with high oil content and four seeds in a pod. The offspring have a phenotypic ratio of 9 : 3 : 3 : 1.

- (i) Identify the genotypes of the soybean plants with high oil content and four seeds in a pod that were used in the cross. [1]
- (ii) Determine the genotypes of the gametes and offspring using a Punnett grid. [2]
- (iii) Identify the phenotypes of each part of the phenotypic ratio. [2]

Ratio	Phenotypes
9	
3	
3	
1	