Monohybrid Inheritance problems

Aim

• Know about patterns of monohybrid Inheritance.
  3.1 Interpret patterns of monohybrid inheritance.
  3.2 Predict ratios of offspring characteristics in a monohybrid cross.
  3.3 Evaluate the risks of inheriting genetic diseases.

Questions

Q1 Some forms of albinism, a genetic disorder, may be due to a single gene mutation. The allele for albinism is recessive to the allele for no albinism. A woman is heterozygous for albinism. Her male partner is homozygous for the ‘normal’ allele.
   a) Does the woman suffer from the condition?
   b) What percentage of their children are likely to be carriers?
   c) Explain what is meant by the term ‘symptomless carrier’.

Q2 If parents are aware of a genetic disease within the family they may consult a genetic counsellor. If the method of inheritance for the disease is understood, then examination of the genetic family tree, sometimes called a pedigree diagram, will let the counsellor advise on the likelihood of any children inheriting the disease. The family tree in Figure 1 shows the occurrence of sickle cell anaemia within one family.

![Pedigree diagram showing the occurrence of sickle cell anaemia within one family.]

   a) Look at the family tree above and using suitable symbols suggest what the genotype of individual 6 might be. Give a reason for your answer.
   b) If individuals 7 and 8 have children, state what proportion of their children would be expected to be carriers of the sickle cell anaemia allele.

Q3 Huntington’s disease (HD) causes cells in the brain to degenerate. A person with the disease gradually loses control of his/her physical movements and mental abilities. The HD gene codes for a protein that occurs in the brain. The HD allele produces a non-functioning protein and is dominant to the allele for the functioning protein.
   a) What is the chance of a mother who is heterozygous for the condition passing it on to a child?
   b) A couple who both have the condition would like to have children. Explain what proportion of their children are likely to inherit the disease.