LS1201

Introduction to Biology II

Assignment - 2

Pedigree Analysis

Submitted to: Dr. Prof. Jayasri Das Sharma (DBS)
By: Priyanshu Mahato (*pm21ms002@iiserkol.ac.in*)
Roll No.: pm21ms002
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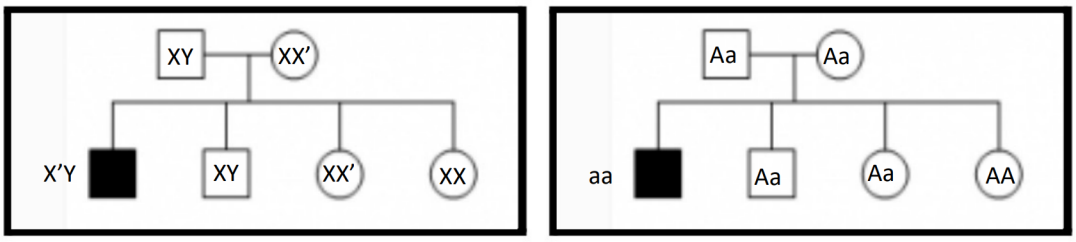
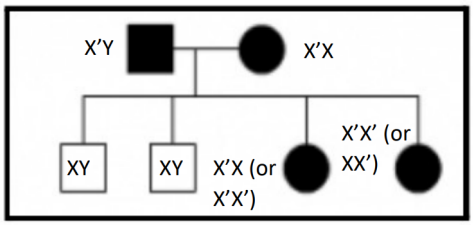
1 Question 1



The answer should be *Recessive Trait* as the trait is skipping a generation. Since the trait is not present in the parents but is visible in the F1 generation, the parents must be heterozygous. The parents were carriers and did not show the trait as a phenotype. But the individual was affected only when the mutated alleles were present as a homozygous pair (as in the single offspring of the F1 generation). The trait might be either autosomal or sex-linked, but in both cases, it is recessive.

2 Question 2

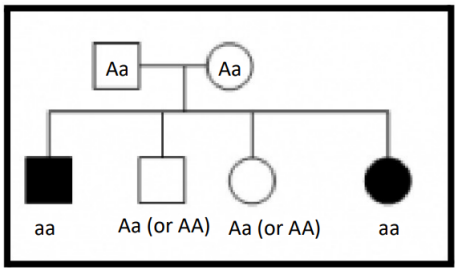


The pattern of inheritance is *Sex Linked Dominant* as observing that out of 4 children, only the daughters have been affected and sons are unaffected, it may be assumed that the trait in question is indeed, a sex-linked dominant trait. It would be either sex influenced or sex linked inheritance.

Father would be X^HY(affected) and the mother would be X^HX(affected). All the possible progeny genotypes would be X^HX(affected daughter), X^HX^H(affected daughter), X^HY(affected son), XY(normal son).

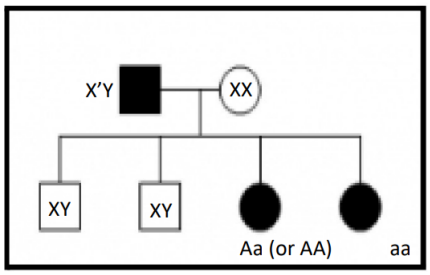
There is also a possibility of the trait being Autosomal Dominant. Clearly, both the parents are affected and in the minimal requirement for autosomal dominant case, is that both parents must be heterozygous for the trait. Thus, both the parents may be Aa. The resulting progeny may have genotype: AA (or Aa) – affected individuals and aa (unaffected individuals).

3 Question 3



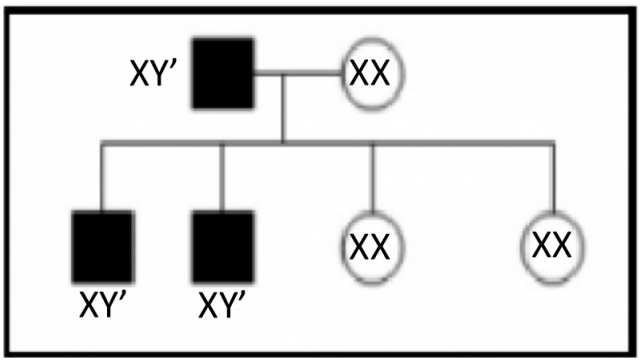
The trait in question is clearly an Autosomal Recessive Trait. There is no pattern of inheritance influenced by sexuality or the inheritance is equal in boys and girls, so it will be autosomal recessive with parents having Aa genotype so the progenies will be AA(normal), Aa(normal), aa(affected).

4 Question 4



The trait in the question is Sex Linked Dominant. There is an influence of sexuality in the inheritance pattern as only girls are affected, so it is indeed sex-linked. Since the mother is not a carrier, it is a sex-linked *Dominant*.
Father: X^HY, Mother: XX
Possible progenies: X^HX(affected daughter), XY(normal son)

5 Question 5



The trait is Y-linked. It is clearly affecting only the males, and the father (XY') transfers the Y' to both the sons and they are thus affected too (XY').

It is Y-linked because it is passed on from the father to the sons and an allele present on the Y chromosome doesn't always have a counterpart on the X chromosome and the Y chromosome is always passed on from father to son as a son can get his Y chromosome only from his father.

Thank You!