5 different ones

Science, Biology

Biology Biology Is it possible for a female carrier to have a daughter who has hemophilia? Explain your answer using terms such assex-linked inheritance, sex-linked genes, dominant, recessive, and X and Y chromosomes.

Answer. Hemophilia is a sex linked disorder and like most sex linked conditions, it is linked to the X chromosome. It is a recessive disease which results due to the lack of clotting factors VIII and IX. This can be explained as the genes for both of these factors are present on the X chromosome (Tomlinson 2005; VanPutte et al 2011).

For a female to suffer from hemophilia, she should have defective alleles on both the X chromosomes. If only one X chromosome is affected, she is a carrier. On the other hand, a male suffers from the disease if he has only one allele due to the presence of only one X chromosome in males. The mating of a female carrier with a normal male will not result in any of the daughters suffering from hemophilia. However, there is a fifty percent probability that the daughter may also be a carrier (VanPutte et al 2011).

2. Choose a specific trait such as eye color, and explain the meaning of homologous chromosomes.

Answer. A normal cell of the human body has 46 chromosomes. The karyotype of a human cell during mitosis reveals that each chromosome is accompanied by another chromosome and these two chromosomes have a similar shape and size. This pair of similar chromosomes is referred to as homologous chromosomes and thus the humans have 23 pairs of homologous chromosomes (Campbell et al 2010).

The homologous chromosomes have genes of the same trait. This means that the gene for a particular biological feature is present at the same place

on homologous chromosomes. For example, the trait of eye color would be present at the same location on both the chromosomes. Thus, genes of the same trait lie at the same level on the homologous chromosomes (Campbell et al 2010).

3. How does the process of meiosis produce new combinations of genes? Why is this important?

Answer. The process of meiosis is important for the reduction of the diploid number of chromosomes to haploid. There are two cell divisions during meiosis and the changes in the offspring result due to the genetic material coming from both the parents. The separation of the chromosomes followed by the reduction of the diploid number to haploid occurs during this process. Along with this, alterations are made in the haploid number during the process of meiosis. This results in new combinations of genes (Khanna 2008).

Crossing over as well as fertilization which is unsystematic and the grouping of chromosomes independently is responsible for the production of new genes. This is significant for the purpose of selection as well as evolution (Khanna 2008). The purpose of meiosis is to accomplish the process of sexual reproduction and if this process would not occur, cloning would result as occurs in asexual reproduction. The new traits that result due to meiosis assist in the birth of offspring that can adapt with the changing environment (Starr et al 2010).

4. Describe one type of condition where a person is born with an abnormal number of chromosomes.

Answer. Down syndrome which is one of the most frequent condition with an

abnormal number of chromosomes, results due to the presence of an additional chromosome at the twenty first position. It is referred to as trisomy 21 and occurs due to nondisjunction of chromosomes. The risk factors for Down syndrome include raised maternal age at the time of conception (Hatfield 2007).

The clinical features of the condition include mental retardation, altered growth of the body and cardiac as well as pathologies of the eye. The skin and hair of the patients is dry and they may have short hands and increased space between the first and the second toes. It is not conditional that all the patients present with all of the clinical features. The signs and symptoms vary from one individual to another (Hatfield 2007).

5. Examine the cross between a black-coated Labrador and a chocolate-coated Labrador as is shown on page 102 of your text. Using correct biological terms explain how 50% of the offspring have the probability of being chocolate-coated.

The trait of being chocolate colored is recessive and both the alleles of chocolate color need to be present for the offspring have this color. If the black coated Labrador is homozygous and it mates with a chocolate colored Labrador, the offspring would only be black colored as the trait of black color is dominant. On the other hand, the mating of a black coated Labrador and a chocolate coated Labrador can result in 50 percent of the offspring having chocolate color if the black coated Labrador is heterozygous. The probability becomes 50 percent in this case because one of the allele for the brown color comes from the brown coated Labrador and the other one comes from the black coated Labrador. The black coated Labrador has one recessive

allele of brown color and thus, there is a chance in fifty percent of the offspring to have this allele. Thus, the fifty percent probability is dependent upon the allele derived from the heterozygous black coated Labrador (Bijlani 2001).

References

Bijlani, R. L. (2001). Fundamentals of physiology: A textbook for nursing students. New Delhi: Jaypee Brothers Medical Publishers.

Hatfield, N. T. (2007). Broadribbs introductory pediatric nursing. Philadelphia, Pa: Lippincott Williams & Wilkins.

Khanna, P. (2008). Cell and molecular biology. New Delhi: I. K. International Pub. House.

Campbell, N. A., Simon, E. J., & Reece, J. B. (2010). Essential biology with physiology. San Francisco, CA: Pearson Banjamin Cummings.

Starr, C., Evers, C. A., & Starr, L. (2010). Biology: Today and tomorrow without physiology. Belmont, CA: Brooks/Cole/Cengage Learning.

Tomlinson, D. (2005). Pediatric oncology nursing: Advanced clinical handbook ; with 203 tables. Berlin: Springer.

VanPutte, C., Regan, J., & Russo, A. (2011). Anatomy & physiology. New York: McGraw-Hill.