

CHAPTER 20

Q.1 Differentiate between S form and R form bacteria.

Ans. Normal pathogenic form of this bacterium forms smooth colonies on a culture dish. So it is called S form. They are virulent. R-form lacks an enzyme needed to manufacture the polysaccharide coat. They form rough colonies. So they are called R form. They are non-virulent.

Q.2 Define transformation?

Ans. Transformation is the transfer of genetic material from one cell to another and can alter the genetic makeed up of the recipient cell.

Q.3 Who discover the transforming principle?

Ans. Oswald Avery, Cohn Macleod and Maclyn McCarty.

Q.4 How was nucleic acid discovered?

Ans. Miescher extracted a white substance from the nuclei of human cells and fish sperm. He called this substance “nuclein” as it was specifically associated with the nucleus. The nuclein was acidic in character. So the nuclein was called nucleic acid.

Q.5 What is the significance of work of Erwin Chargaff?

Ans. He proved that the amount of adenine in DNA always equals the amount of thymine and the amount of guanine always equals the amount of cytosine.

Q.6 Why is RNA primer synthesized?

Ans. The DNA polymerase III can add nucleotides only to a chain of nucleotides that is already paired with the parent strands. Hence DNA polymerase cannot itself initiate synthesis of DNA. Thus another enzyme, primase synthesize an RNA primer.

Q.7 Differentiate between leading strand and lagging strands.

Ans. Leading strand elongates toward the replication fork. In this case, the nucleotides are added continuously to its growing 3 end. Lagging strand elongates away from the replication fork.

Q.8 What is dispersive model of DNA?

Ans. It predicted that parent DNA is completely dispersed and each strand of all the daughter molecules is a mixture of old and new DNA.

Q.9 What is the function of P site (peptidyl site) of ribosome?

Ans. It is the site of the ribosome where peptide bonds are formed.

Q.10 What is the function of A site (aminoacyl site)?

Ans. This site contains successive (next) amino acid with its rRNA.

Q.11 What is promoter?

Ans. Transcription starts at the promoter on the DNA template strand. Promoter is the RNA polymerase binding site.

Q.12 What strange results were obtained by T.H Morgan during his work on Drosophila?

Ans. Morgan obtained one strange result, that all of the white eyed F₁ flies were male. It was not predicted by the Mendel's theory. He tried to explain these unpredicted results.

Q.13 How did Morgan explain the strange results of his cross of white and red eye Drosophila?

Ans. He explained that the gene of white eye trait in Drosophila is present only on the X chromosome. It is absent from the Y chromosome.

Q.14 What are point mutations?

Ans. The mutational changes producing alterations in the sequence of DNA nucleotide which affect the message itself are called point mutation.

Q.15 How does mutation occur?

Ans. Some point mutations occur due to spontaneous pairing errors. These errors occur during DNA replication. Some are result of damage to the DNA. These damages are caused by mutagens.

Q.16 Differentiate between translation and transcription.

Ans. The synthesis of mRNA from DNA is called transcription. The synthesis of protein from mRNA is called translation.

Q.17 Differentiate between template strand or the antisense strand and coding strand or the sense strand.

Ans. Template is the strand which is transcribed during transcription. The opposite strand is called coding or sense strand.

Q.18 What is transcription bubble?

Ans. The DNA stands open up at the place where enzyme is attached with the template strand. It forms transcription bubble.

Q.19 What is translocation?

Ans. During translocation, the ribosome moves (translocates) to next code along the mRNA molecule in the 5' → 3' direction.

Q.20 What are chromosomal aberration?

Ans. The changes in chromosomal number or chromosomal structure are called chromosomal aberration.

Q.21 What are mutagens?

Ans. Some mutations are result of damage to the DNA. These damages are caused by mutagens. The mutagens are usually radiations or chemicals.

Q.22 What is gene expression?

Ans. The central dogma is composed of transcription and translation. These two steps of central dogma are also collectively called gene expression.

Q.23 What is minimal medium?

Ans. Beadle and Tatum placed subcultures of individual fungal cells on a minimal medium. This minimal medium contained only sugar, ammonia, salts, a few vitamins and water.

Q.24 How one gene one enzyme hypothesis was formed?

Ans. Beadle and Tatum concluded that genes produce their effects by specifying the structure of enzymes. So each gene encodes the structure of one enzyme. They called this relationship one-gene / one-enzyme hypothesis.

Q.25 What are terminations or non-sense codes?

Ans. These are three codons UAA, UAG and UGA. They do not code for any amino acid. So they are known as non-sense codon.

Q.26 What is initiation codon?

Ans. It is present at the start of every gene. This initiation codon is AUG. It encodes the amino acid methionine.

Q.27 Are genetic codes universal?

Ans. No, genetic codes are not universal. The study of genetic code of mitochondrial DNA showed that genetic codes are not so universal. For example, UGA codon is normally a stop codon but in mitochondria it codes for tryptophan amino acid.

Q.28 Give two features of Watson and Crick model.

Ans. They proposed that DNA molecule is a simple double helix. Base pairs always consist of purines and pyrimidine bases.

Q.29 Why does adenine not combine with cytosine?

Ans. Adenine can form only two hydrogen bonds. But cytosine form three hydrogen bonds. Therefore, adenine cannot combine with cytosine.

Q.30 What is semi-conservative DNA model?

Ans. The replication in which one strand of the DNA is conserved and the other strand is synthesized according to complementary base pairing is called semi-conservative replication.

Q.31 Give evidence in support of chromosomal theory of inheritance.

Ans. The egg and sperm fuse during fertilization. These two gametes make equal hereditary contributions according to Mendel's model.

Q.32 Differentiate between chromatin and heterochromatin.

Ans. The highly condensed portions of the chromatin are called heterochromatin. The remaining portion which condensed only during cell division is called euchromatin.

Q.33 Define chromosomal theory of inheritance.

Ans. This theory states that gene and chromosome show parallel behaviour so genes are located on the chromosomes.

Q.34 What happens if some chromosome is missing in an organism?

Ans. The presence of all chromosomes is essential for survival. Missing of a part or whole of chromosome can cause serious consequences. It usually causes death.

Q.35 Define karyotype. What does it include?

Ans. The particular arrangements of chromosomes that an individual possesses are called its karyotype. It includes size, shape, position of centromere and number of chromosomes.

Q.36 Differentiate between telocentric and metacentric chromosomes?

Ans. The centromere is present at the ends of the chromatids in telocentric chromosomes. But centromere is present at the middle of the chromatids of metacentric chromosomes.

Q.37 What is nucleosome?

Ans. The double stranded DNA around a core of eight histone proteins after every 200 nucleotides forms a complex known as a nucleosome.

Q.38 How do histone and DNA interact with each other in chromosomes?

Ans. The histones have abundance of the basic amino acids arginine and lysine. So it is positively charged protein, while most of the other proteins are negative charged. Thus histone is strongly attracted to the negatively charged phosphate groups of the DNA.