DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : BIOLOGY
DPP No. : 7

Topic :- MOLECULAR BASIS OF INHERITANCE

1. (C) Transformation was discovered by F Griffith (1928). He isolated the DNA as genetic material that inherit the genetic information between two generations by using two straing of Pneumococcus bacteria which infect mice. i.e., a type III S(smooth) and type II R(rought) strain.

2. (A) Statement (A) is wrongly matched because transcription is a process of mRNA synthesis from a DNA template. It involved three main events. i.e., initiation (binding of RNA polymerase to as DNA), elongation (development of a short stretch of DNA) and termination (recognition of the transcription termination sequence and the release of RNA polymerase).

3. (B) Satellite DNA forms the minor peak after centrifugation of DNA. These are repetitive DNA sequences that do not code for any protein. They show high degree of polymorphism and heritable from parents to children, thus from the basis of DNA fingerprinting.

4. (C) The correct order or organisation of genetic material from largest to smallest is as follows
   Genome, chromosome, gene, nucleotide.
   Genome It is the total genetic material of an individual.
   Chromosome It is a packed and organised structure containing most of the DNA of a living organism.
   Gene It is a segment of DNA that encodes for a protein.
   Nucleotide It is one of the structural components, or building blocks, of DNA and RNA.

5. (D) Chargaff's rule is not applicable to RNA. He is the generalisations formulated about DNA structure. The rule states that DNA from any cell of all organisms should have a 1 : 1 ratio (base pair rule) of pyrimidine and purine bases, i.e., the amount of guanine is equal to thymine. Further complementary base pairing is sometimes, visible in RNA as well (in doubled stranded RNAs of viruses). Hence option (A) is not taken into consideration.

6. (B) The use of radioactive thymidine to detect the semiconservative mode of replication of newly synthesised DNA in the chromosomes was performed on Vicia faba by Taylor and colleagues in 1958. This experiment proved that the DNA in chromosomes replicates semiconservatively. Hence, the option (B) is correct.

7. (B) Cistron is the segment of DNA which determines the synthesis of complete polypeptide. Thus, it is considered as equivalent to a structural gene. Therefore, option (B) is correct and other are incorrect.
   Concept Enhancer Eukaryotic structural gene is monocistronic whereas prokaryotic structural gene is polycistronic.
   Muton Smallest unit of DNA in which mutation occurs.
   Recon Smallest unit of DNA for recombination.

8. (C) Bacterial cell use their 23 srRNA as an enzyme during protein synthesis. This is the only non-proteinaceous enzyme known so far.

9. (C) A molecule that can act as a genetic material must be unstable structurally and chemically. The criteria that a molecule must fulfill to act as a genetic material are as following :

(i) It should be able to replicate

(ii) It should be chemically and structurally stable

(iii) It should provide the scope for slow changes, i.e., mutations which are required for evolution.

(iv) It should be able to express itself in the form of 'Mendelian characters'

10. (A) DNA dependent RNA polymerase catalyses transcription on one strand of the DNA called a template strand.

A template can be considered as one of those strands of DNA which decodes its information directly through RNA polymerase. This information is then restored within the RNA molecule and transferred outside the nucleus for protein synthesis within the cytoplasm.

11. (B) Lac operon is an inducible operon. Lactose is the substrate for the enzyme β-galactosidase and it also regulates switching on and off of the operon. Hence, it is termed as inducer.

12. (A) A zinc finger is a small protein structural unit that is characterised by the coordination of one or more Zn ions in order to stabilise the folds.

13. (D) In prokaryotes, several ribosomes may attach to single mRNA and form a chain called polyribosomes or polysomes.

14. (D) AUG is the start codon. It also codes for amino acid called methionine which is the first amino acid in a polypeptide chain. UAA, UAG and UGA are stop codons and are meant for termination of polypeptide chain during protein synthesis.

15. (A) There are three main types of RNA, i.e., rRNA, tRNA and mRNA. rRNA is the most abundant form of RNA ; because it is responsible for coding and protein synthesis in the cell and associated with ribosomes. mRNA provides the templete for translation. tRNA brings amino acids and reads the genetic code.

16. (C) Bacteria lack a cell nucleus. Due to their primitive nature they lack a well marked S-phase. In bacteria DNA replication occurs before fission.

Concept Enhancer : Bacterial cell cycle is divided into the B, C and D periods. The B period extends from the end of cell division to the beginning of DNA replication. DNA replication occurs during the C period. The D period refers to the shape between the end of DNA replication and the division of bacterial cell into two daughter cells.

17. (D) Spliceosome is a large molecular complex found in nucleus of eukaryotic cells of plants, animals and fungi, etc. It is assembled from snRNAs and protein complexes that plays an important role in splicing of introns. Spliceosome is absent in cells of bacteria.

18. (C) The association of H_1 histone with nucleosome indicates that DNA remains in its condensed from.

Concept Enhancer In eukaryotes, DNA packaging is carried out with the help of histone proteins. Nucleosome is the unit of compaction. Its core consists of four pairs of histones (H_2A, H_2B, H_23 and H_4). The linker DNA, consisting of H_1 histone connects two adjacent nucleosomes.

They together constitute chromosome. It gives rise to a chromatin fibre after further condensation.

19. (B) The final proof that DNA is the genetic material came from the experiments of Alfred Hershey and Martha Chase (1952). Griffith's experiment proved the existance of genetic material while Avery, MacLeod and McCarty worked to determine the biochemical nature of transforming principle.

Concept Enhancer Hershey and Chase during their experiment, grew viruses in two mediums, one containing ^{32}P and other ^{36}S, when these were allowed to infect bacteria, they observed that viruses containing ^{32}P DNA were radioactive. Hence, DNA not protein coat entered bacterial cells from viruses.

20. (C) 33 codons will be altered if the 901st base is deleted and RNA has only 998 bases instead of 999 bases.
Bases left after deletion of 901st base in RNA= 999 – 901= 98
Number of codon present in 98 = 33
(Approximately as three codons code for one amino acid).

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	C	A	B	C	D	B	B	C	C	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	A	D	D	A	C	D	C	B	C