

## Get Ready to Crack CSIR-NET 2021 (Most Important Questions On Inheritance Biology)

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1.In Griffith's experiments, a harmless variant of S. pneumoniae became pathogenic when mixed with a heat-killed pathogenic variant as a result of

A. conjugation

B. transduction

C. mutation

D. transformation

2.In an important experiment, bacteriophages were allowed to infect bacteria. In the first trial, the phages used contained radioactive DNA, and radioactivity was detected in the bacteria. Next, other phages containing radioactive protein were allowed to infect bacteria, and no radioactivity was detected in the bacteria. When the investigators compared the results of these two trials, a conclusion was drawn that A. viral DNA can be transduced, not viral protein

B. bacteriophages cannot infect bacteria

C. DNA is made of nucleotides

D. genes carry information for making proteins

3.A geneticist raised a crop of T2 bacteriophages in a medium containing radioactive phosphorus, so that the DNA of the bacteriophages was labelled with radioactivity. The labelled phages were then allowed to infect nonradioactive bacteria. In a few hours, these bacteria burst open, releasing many bacteriophages. Some of these phages contained labelled

A. DNA

B. RNA

C. protein

D. DNA and protein only

4.Scientists have discovered how to put together a bacteriophage with the protein coat of phage T2 and the DNA of phage T4. If this composite phage were allowed to infect a bacterium, the phages produced in the host cell would have

A. the protein of T2 and the DNA of T4

B. the protein of T4 and the DNA of T2

C. the protein and DNA of T2

D. the protein and DNA of T4

5. Chargaff found that for DNA

A. the ratio of A to C is close to 1:1 and the ratio of G to T is close to 1:1

B. the ratio of A to T is close to 1:1 and the ratio of G to C is close to 1:1

C. the ratio of A to G is close to 1:1 and the ratio of T to C is close to 1:1

 $\mathsf{D.} \mathsf{A} + \mathsf{T} = \mathsf{G} + \mathsf{C}$ 

6.The X-ray diffraction studies conducted by \_\_\_\_\_ were key to the discovery of the structure of DNA.

A. Barbara McClintock

B. Rosalind Elsie Franklin

C. Meselson and Stahl

D. Erwin Chargaff



7.Which of the following is correct?

- A. A forms 2 hydrogen bonds with G; T forms 3 hydrogen bonds with C
- B. A forms 3 hydrogen bonds with T; G forms 2 hydrogen bonds with C
- C. A forms 2 covalent bonds with T; G forms 3 covalent bonds with C
- D. A forms 2 hydrogen bonds with T; G forms 3 hydrogen bonds with C

8.If reciprocal cross do not yield equal results it suggests that characters are

- A. X-linked
- B. Autosomal
- C. Extra-chromosomal
- D. None

9. During crossing over, exchange of genetic material takes place between

- A. Two chromatids
- B. Two chromosomes
- C. the non-sister chromatids of the paired chromosomes
- D. Two sister chromatids of each homologue

10.Extranuclear inheritance is due to which organelle

- A. Ribosome
- B. Centriole
- C. Plastid
- D. Nucleus

#### ###ANSWERS###

- 1. D
- 2. A
- 3. A
- 4. D
- 5. B
- 6. B
- 7. D
- 8. C
- 9. C
- 10. C

Solutions:

Solution 1: In Frederick Griffith's experiments, a harmless variant of Streptococcus pneumoniae became pathogenic when mixed with a heat-killed pathogenic variant as a result of transformation. Transformation refers to the horizontal gene transfer in which bacteria take up foreign naked DNA from the environment. Therefore, in this experiment, the non-virulent R strain becomes pathogenic by taking up the genetic material released in the medium from heat-killed virulent strain S strain when they were mixed.

Solution 2: Viral DNA can be transduced in which genes from a host cell (a bacterium) are incorporated into the genome of a bacterial virus (bacteriophage) and then carried to another host cell when the bacteriophage initiates another cycle of infection. Since no radioactivity was detected in bacteria when radioactively labelled



protein-containing bacteriophages were infected, therefore only DNA is transferred during bacteriophage infection, not protein.

Solution 3:Nucleic acids contain a sugar-phosphate backbone along with an attached nitrogenous base. Since, labelled phosphorus has been added, so that the DNA of the bacteriophages were labelled with radioactivity. Enterobacteria phage T2 (T2 bacteriophage) is a virus that infects and kills Escherichia coli and its genome consists of linear double-stranded DNA, with repeats at either end. Therefore, some of the released bacteriophages contained labelled DNA.

Solution 4:Since, the composite phage contained DNA of T4 phage, newly synthesized phages will have both protein and DNA of T4 phage because DNA of T4 phage will contain genes that encode the protein of T4 phage only, not T2 phage.

Solution 5: Erwin Chargaff discovered that DNA of organisms contains equal amounts of adenine and thymine and equal amounts of guanine and cytosine. Therefore, the ratio of A to T is close to 1:1 and the ratio of G to C is close to 1:1.

Solution 6:The x-ray diffraction studies conducted by Rosalind Elsie Franklin were key to the discovery of the structure of the DNA. While Barbara McClintock discovered and characterized transposable elements.

Solution 7: Adenine forms two hydrogen bonds with thymine while guanine forms three hydrogen bonds with cytosine. Since the helix does not have enough space (20 Å) for two purines to fit within the helix and too much space for two pyrimidines to get close enough to each other to form hydrogen bonds between them. Also only A-T and C-G there is the possibility to form hydrogen bonds between them. These relationships are often denoted as Watson-Crick base pairing.

Solution 8: Reciprocal cross is a concept of crossing a pair of parents with the sexes reversed. If the reciprocal cross does not yield an equal result in suggests that the characters are extra-chromosomal because the female parent has the same chromosomal DNA but different extra-chromosomal DNA in the two crosses.

Solution 9: Non-sister chromatids of paired chromosomes exchange genetic material during crossing over. Sister chromatids are the duplicated chromosome itself and they contain the same alleles. Non-sister chromatids are the chromatids of the homologous chromosome but they may contain different alleles. And crossing over results in the recombination of different alleles.

Solution 10:Plastid are means of extranuclear inheritance in plants. Ribosomes and centrioles are not inherited, they are synthesised de novo in daughter cells. And nuclear inheritance occurs due to genetic material acquired in the nucleus from the antecedent.



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