

MOLECULAR BIOLOGY
GENE AND GENE CONCEPT

1. Generally a gene is
1) a part of DNA 2) a protein 3) DNA + protein 4) a part of RNA
2. The term gene is coined by
1) Johanson 2) T H Morgan 3) G.J.Mendel 4) Carl Correns
3. Gene theory was proposed by
1) Jacob and Monad 2) T H Morgan 3) Seymour Benzere 4) Francis crick
4. A gene is made up of
1) DNA 2) RNA 3) DNA or RNA 4) polypeptide
5. According to the fine structure of a gene proposed by Seymour Benzer, the units are
1) purines and pyrimidines 2) adenine and thymine 3) cistron, muton and recon 4) nucleotides
6. Which of the following is wrongly matched?
1) cistron – functional unit of a gene
2) recon – unit of recombination of a gene
3) muton – unit of mutation of a gene
4) exon – unit of split gene which does not carry information
7. The segment of DNA that takes part in crossing over is
1) Muton 2) Recon 3) Replicon 4) Cistron
8. This part of DNA which codes for protein is
1) cistron 2) exon 3) intron 4) codon
9. A cistron is a unit of
1) Gene 2) muton 3) recon 4) replicon
10. The cistrons of a prokaryotic gene transcribe
1) mono cistronic mRNA 2) Dicistronic mRNA 3) polycistronic mRNA 4) Hn-RNA
11. The concept of split genes is found in
1) Virus 2) E.coli 3) Eukaryotes 4) prokaryotes
12. A split gene consists of
1) exons 2) introns 3) exons and introns 4) cistron, muton and recon
13. Split genes were discovered by
1) Watson and Crick 2) Lederberg and Tatum 3) Jacob and Monad 4) P,A Sharp and R.J Roberts
14. The portion of an eukaryotic gene which is transcribed but not translated is
1) exon 2) intron 3) cistron 4) codon
15. The expression of a eukaryotic gene in terms of mRNA is
1) monocistronic 2) dicistronic 3) tricistronic 4) polycistronic
16. The information for the synthesis of a polypeptide in eukaryotic gene is present in
1) intronic segments 2) exonic segments 3) both a & b 4) none
17. The splicing of Hn RNA helps in
1) removal of exons 2) removal of coding segments
3) removal of introns 4) removal of coding exons

18. The exonic segments are reunited by the enzyme
 1) RNA primase 2) RNA polymerase 3) RNA liases 4) RNA ligases
19. The strain of Neurospora that grows on a minimal medium is
 1) prototroph 2) autotroph 3) Auxotroph 4) heterotroph
20. The mutant strain of Neurospora that fails to grow on a minimal medium unless supplemented with nutrients is called
 1) auxotroph 2) phototroph 3) heterotroph 4) autotroph
21. The hypothesis proposed by G.W. Beadle and E.L. Tatum based on their experiments in Neurospora Crassa is
 1) one gene- one enzyme 2) one gene- one polypeptide
 3) one gene- one product 4) one gene- one function
22. Which among the following is more correct?
 1) one gene – one enzyme 2) one gene – one protein
 3) one gene – one polypeptide 4) one gene – one nucleotide

PROTEIN SYNTHESIS

23. Central Dogma is not connected with the synthesis of
 1) DNA 2) mRNA 3) polypeptide 4) amino acids
24. Which one of these cannot be directly synthesized from DNA?
 1) Another DNA 2) mRNA 3) Protein 4) tRNA
25. The various types of protein synthesis are thoroughly studied in
 1) Chlorella 2) E.coli 3) Agrobacterium 4) Neurospora
26. DNA \xrightarrow{A} DNA \xleftarrow{B} mRNA \xrightarrow{C} polypeptide. In this A,B,C, D represent the enzymes respectively as
 1) transcription, translation, replication, reverse transcription.
 2) Replication, transcription, translation, reverse transcription
 3) Replication, translation, transcription, reverse transcription
 4) translation, Replication, transcription, reverse transcription
27. DNA \xrightarrow{A} DNA \xleftarrow{B} mRNA \xrightarrow{C} polypeptide. In this A,B,C, D represent the enzymes respectively as
 1) DNA dependent DNA polymerase, DNA dependent RNA polymerase, Peptidyl synthetase, RNA dependent DNA polymerase
 2) DNA dependent DNA polymerase, , Peptidyl synthetase, RNA dependent DNA polymerase, DNA dependent RNA polymerase
 3) DNA dependent RNA polymerase, Peptidyl synthetase, RNA dependent DNA polymerase, DNA dependent DNA polymerase,
 4) DNA dependent DNA polymerase, DNA dependent RNA polymerase, RNA dependent DNA polymerase, Peptidyl synthetase
28. Three types of RNA involved in comprising the i) structural and functional core for protein synthesis, ii) serving as a template for translation, and iii) transporting amino acid, respectively are:
 1) mRNA, tRNA and rRNA 2) tRNA, mRNA and rRNA
 3) rRNA, mRNA and tRNA 4) rRNA, tRNA and mRNA

29. The transcription is the --- property of DNA
 1) Autocatalytic 2) heterocatalytic 3) replication 4) mutation
30. The synthesis of mRNA from DNA is called ----
 1) Translation 2) transcription 3) transfusion 4) translocation
31. In Eukaryotes, the mRNA is transcribed from DNA with the help of the enzyme
 1) RNA primase 2) RNA poly I 3) RNA poly II 4) RNA poly III
32. The synthesis of DNA from RNA template is called
 1) Transcription 2) translation 3) transformation 4) reverse transcription (Teminism)
33. RNA directed DNA synthesis was first reported in a
 1) Retro virus 2) TMV 3) HIV 4) Polio virus
34. DNA sequence of ATTCGATG is transcribed as
 1) AUUCGAUG 2) UAAGUAC 3) CAUCGAU 4) GUAGCUUA
35. Transcription occurs along --- direction of a DNA template strand forming an mRNA in the ---- direction.
 1) 5' to 3'; 5' to 3' 2) 5' to 3'; 3 to 5' 3) 3' to 5'; 5' to 3' 4) 3' to 5'; 3' to 5'
36. What sequence in the template strand of DNA corresponds to the first amino acid inserted into protein?
 1) TAC 2) AUG 3) UAG 4) AAA
37. The elongation of RNA polynucleotide chain always takes place
 1) in 5' → 3' direction with new nucleotide always added at 3' site
 2) in 3' → 5' direction with new nucleotide always added at 5' site
 3) in any direction along the entire length of single DNA strand
 4) on both strands of DNA molecules
38. The nucleotides on mRNA are
 1) complementary to transcription unit of sense strand of DNA
 2) complementary to anticodons on tRNA
 3) similar to transcription unit of sense strand of DNA except thymidine nucleotide
 4) similar to transcription unit of antisense strand of DNA except thymidine nucleotide
39. If a segment of an mRNA has a sequence 5' GUACCGAUCG 3', which of the following could have been the template DNA molecule?
 1) 3' CAUGGCUAGC 5' 2) 5'GTACCGATCG3' 3) 5'CATGGCTAGC3' 4) 5'CGATCGGTAC3'
40. During transcription mRNA is synthesized in ---- direction and the template strand of DNA is read in ---- direction and during translation mRNA is read in ---- direction.
 1) 5' → 3', 3' → 5' and 5' → 3' 2) 5' → 3', 5' → 3' and 5' → 3'
 3) 3' → 5', 3' → 5' and 3' → 5' 4) 3' → 5', 5' → 3' and 5' → 3'
41. In protein synthesis, translation involves
 1) decoding of triplet codons of tRNA by mRNA 2) decoding of triplet codons of mRNA by tRNA
 3) decoding of triplet codons of rRNA by tRNA 4) synthesis of mRNA from DNA
42. Which of the following statement is wrong with respect to chain initiation step of protein synthesis in E.coli
 1) 5' end of mRNA attaches to 30S ribosome with the help of IF₃
 2) Formyl methionine tRNA decodes AUG with the help of IF₂
 3) 50S ribosome attaches to the initiation complex with the help of IF₁
 4) This process derives the energy from ATP

43. Chain elongation step of protein synthesis in prokaryotes requires
- 1) EF – TU, EF- TS, peptidyl transferase, EF-G and GTP
 - 2) EF – TU, EF- TS, peptidyl synthetase, EF-G and GTP
 - 3) eEF₁, eEF₁ B, peptidyl tranferase, eEF₂ and GTP
 - 4) eEF₁, eEF₁ B, peptidyl tranferase, eEF₂ and ATP
44. Which of the following factors are labelled as translocase that helps in the movement of ribosome on mRNA?
- 1) EF – TU and EF- TS
 - 2) EF-G and eEF₂
 - 3) eEF₁ and eEF₁B
 - 4) 23S and 28S rRNA
45. During chain elongation of protein synthesis
- 1) The amino group of first amino acid condenses with the carboxylic group of the second amino acid
 - 2) The carboxylic group of first amino acid condenses with the amino group of the second amino acid
 - 3) The amino group of first amino acid participates in peptide formation
 - 4) The amino group of second amino acid does not participate in peptide formation
46. The enzyme that activates the amino acids during protein synthesis is
- 1) peptidyl synthetase
 - 2) Transformylase
 - 3) amino acyl tRNA synthetase
 - 4) peptidyl transferase
47. Activation of amino acid during protein synthesis requires
- 1) GTP
 - 2) ATP
 - 3) ADP
 - 4) AMP
48. Aminoacyl synthetase enzyme takes part in the
- 1) attachment of mRNA to 30S ribosome
 - 2) synthesis of amino acids
 - 3) activation of amino acid
 - 4) hydrolysis of ATP to AMP
49. In the initiation complex formed during protein synthesis, met-tRNA is
- 1) bound to the P site
 - 2) bound to the A site
 - 3) bound to EF 1- GTP
 - 4) bound to eEF2-GTP
50. Peptidyl and aminoacyl sites are associated with
- 1) 30S subunit of ribosome
 - 2) 50S sub unit of ribosome
 - 3) unpaired CCA sequence of tRNA
 - 4) aminoacyl synthetase loop of tRNA
51. During translation the ---- site within the ribosome holds the growing amino acid chain, while the ---- site holds the next amino acid to be added to the chain
- 1) A, P
 - 2) P, A
 - 3) A, B
 - 4) B, A
52. Enzymes catalyzing peptide formation are located in
- 1) smaller unit of ribosome
 - 2) larger unit of ribosome
 - 3) tRNA
 - 4) mRNA
53. peptide bond formation occurs during protein synthesis with the help of the enzyme
- 1) Amino acyl tRNA synthetase
 - 2) Peptidyl transferase
 - 3) Peptidyl synthetase
 - 4) transformylase
54. A synthetic mRNA of repeating sequence 5' CA CA CA CA CA CA CA CA... is used for a cell-free protein synthesizing system like the one used by Nirenberg. If we assume that protein synthesis can begin without the need for an initiator codon, what product or products would you expect to occur after protein synthesis?
- 1) one protein, with an alternating sequence of two different types of amino acids
 - 2) one protein, consisting of a single type of amino acid
 - 3) two proteins with an alternating sequence of two different types of amino acids
 - 4) one protein with an alternating sequence of three different types of amino acids

55. Find the sequence of binding of the following aminoacyl tRNA complexes during translation to a mRNA transcribed by a DNA segment having the base sequence 3¹ TAC ATG GGT CCG 5¹ – choose the answer showing the correct order of alphabet
- | | | | |
|-----|-----|-----|-----|
| AUG | UAC | CCG | GGU |
| (A) | (B) | (C) | (D) |
- 1) A,B,C,D 2) B,A,C,D 3) A,B,D,C 4) B,A,D,C
56. A fragment of DNA nucleotide arrangement 5'ATGGCAGCTTAT....3'. What will be the anticodons in tRNAs which will translate the codons produced by this part of DNA:
- 1) 5'/UAC3', 5'/CGU3', 5'/CGA3', 5'/AUA3'. 2) 3'/UAC5', 3'/CGU5', 3'/CGA5', 3'/AUA5'.
 3) 5'/AUG3', 5'/GCA3', 5'/GCU3', 5'/UAU3'. 4) 3'/AUG5', 3'/GCA5', 3'/GCU5', 3'/UAU5'.
57. If the gene has a sequence of AAATGCGCGCGA, the mRNA formed against it and the sequence of bases in corresponding anticodon will be
- 1) UUUACGCGGCU and AAAUGCGCGCGA
 2) AAAUGCGCGCGA and UUUACGCGGCU
 3) TTTACGCGCGCT and UUUACGCGGCU
 4) UUUACGCGGCU and TTTACGCGCGCT
58. A messenger RNA is 336 nucleotides long, including the initiator and termination codons. The number of amino acids in the polypeptide translated from this mRNA is
- 1) 335 2) 112 3) 111 4) 110
59. A polypeptide just released by a ribosome from an mRNA has 75 amino acids. What would be the number of nucleotides in the coding region of mRNA including the initiation codon and termination codon?
- 1) 225 2) 228 3) 222 4) 25
60. The reading frame of mRNA having 1002 nucleotides translated into a nascent polypeptide having amino acids numbering
- 1) 333 2) 666 3) 999 4) 1001
61. The termination of polypeptide chain synthesis is brought about by
- 1) UUG, UAG and UCG 2) UAA, UAG and UGA
 3) UUG, UGC and UCA 4) UCG, GCG and ACC
62. Consider the statements given below and find the answer among the options given below.
 Statement A: UAA, UAG and UGA codons in mRNA terminate the synthesis of polypeptide chain
 Statement B: UAA, UAG and UGA codons are not recognized by tRNA
- 1) Both statements A and B are correct and B is not the reason for A
 2) Both statements A and B are correct and B is the reason for A
 3) Statement A is correct and B is wrong
 4) Statement A wrong and B is correct
63. Which of the following statement is wrong with respect to chain termination step of protein synthesis?
- 1) RF₁ recognizes the codons UAA and UAG
 2) RF₂ recognizes the codons UAA and UGA
 3) RF₃ recognizes the codons UAA, UGA and UAG
 4) eRF recognizes the codons UAA, UAG and UGA
64. A polysome is formed by
- 1) many codons on a mRNA 2) many ribosomes attached to mRNA
 3) a cluster of 80S ribosomes 4) many mRNAs being attached to a ribosome
65. The ions required for the formation of polyribosome are
- 1) Ca⁺⁺ 2) Na⁺ 3) K⁺ 4) Mg⁺⁺

66. Select the correct statement among the following
- 1) The polypeptidases synthesized by different ribosomes of a polysome are different in their arrangement of amino acids
 - 2) The polypeptides synthesized by different ribosomes of a polysome are same in their arrangement of aminoacids
 - 3) The ribosome close to the 5' end of mRNA will have longer polypeptide chain than the one at 3' end
 - 4) During protein synthesis mRNA molecule first binds to larger subunit of ribosome and smaller subunits binds later
67. Certain events occurring during protein synthesis are listed below. In which of the options the events are in correct order?
- A) N-formyl methionine tRNA joins with the initiation codon
 - B) Transcription of mRNA
 - C) mRNA attaches to 30S subunit of ribosome
 - D) 50S subunit of ribosome joins to 30S subunit of ribosome
 - E) Entry of second tRNA to A site of ribosome
 - F) Formation of first peptide bond
 - G) Movement of ribosome along the mRNA
- 1) C-D-B-A-E-F-G 2) B-C-A-D-E-F-G 3) B-A-C-D-E-G-H 4) C-A-B-D-H-E-F
68. Arrange the following steps involved in the synthesis of a protein in the correct order.
- i) A complementary RNA copy of DNA is made
 - ii) The DNA double helix unwinds
 - iii) mRNA binds to ribosome
 - iv)The amino acids of two adjacent tRNA form a peptide bond
 - v) mRNA leaves the nucleus
 - v) An anticodon of tRNA recognizes a mRNA codon
- 1) i, ii, iii, v, vi, iv 2) ii, i, iii, v, iv, vi 3) ii, i, iii, iv, vi, v 4) ii, i, v, iii, vi, iv
69. The replacement of any one-nucleotide base in a codon changing the specificity for amino acid is
- 1) Mis-sense mutation
 - 2) non-sense mutation
 - 3) silent mutation
 - 4) frame shift/Gibberish mutation
70. The following antibiotic inhibits the protein synthesis by interfering with the transfer of amino acids to ribosomes:
- 1) Chloromycetin
 - 2) Streptomycin
 - 3) Actinomycin
 - 4) Tetracyclin

LAC OPERON CONCEPT

71. The Lac Operon is an example of:
- 1) Constitutive gene operon
 - 2) Inducible gene operon
 - 3) negative gene operon
 - 4) house keeping gene operon
72. House keeping genes
- 1) Produce antibodies
 - 2) produce hormones
 - 3) constantly operate the cellular activity
 - 4) activated in the presence of inducer
73. The mRNA produced by lac operon in E.coli
- 1) Is monocistronic
 - 2) Is polycistronic
 - 3) Consists of exons and introns
 - 4) Undergoes splicing before translation
74. Which of the following is the correct sequence of genes in a Lac operon?
- 1) Regulator gene - Operator gene – Promoter gene – Structure genes Z,Y,A
 - 2) Regulator gene - Operator gene –Repressor gene – Structure genes A,Y,Z
 - 3) Promoter gene - Structural genes Z,Y,A - Operator gene – Regulator gene
 - 4) Regulator gene - Promoter gene, Operator gene — Structural genes Z,Y,A

75. Match the operon genes of E.coli and their functions given under column I and II. Identify the correct matching.

Column I(operon genes)		Column II(functions)	
A	Structure genes	i	Binding site for repressor gene
B	Operator gene	ii	Codes for repressor protein
C	Promoter gene	iii	Codes for enzyme/ proteins
D	Regulator gene	iv	Binding site for RNA polymerase

- | | A | B | C | D |
|----|-----|-----|-----|-----|
| 1) | i | iii | ii | iv |
| 2) | ii | i | iii | iv |
| 3) | iv | i | ii | iii |
| 4) | iii | i | iv | ii |

76. The operator gene

- | | |
|------------------------------------|-------------------------------|
| 1) Produces repressor | 2) binding site for repressor |
| 3) Binding site for RNA polymerase | 4) binding site for inducer |

77. The gene that takes part in polypeptide synthesis is ---.

- | | | | |
|--------------|-------------|--------------|--------------------|
| 1) Repressor | 2) promoter | 3) regulator | 4) structural gene |
|--------------|-------------|--------------|--------------------|

78. The Lac-Y gene codes for

- | | |
|------------------------------|------------------------------------|
| 1) Repressor | 2) Beta galactosidase |
| 3) Beta galactoside permease | 4) beta galactoside transacetylase |

79. Which among the following is wrongly matched?

- | | |
|---------------------------------------|----------------------------------------------|
| 1) Lac Z gene – β galactosidase | 2) Lac y gene – β galactoside permease |
| 3) Lac A gene – Transacetylase | 4) Operator gene – Repressor protein |

80. The inducer of Lac operon in E.coli is

- | | | | |
|--------------|-------------|--------------|------------|
| 1) repressor | 2) promoter | 3) regulator | 4) lactose |
|--------------|-------------|--------------|------------|

81. The environmental factor that triggers transcription from operon is

- | | | | |
|-------------|------------|--------------|--------------|
| 1)repressor | 2) inducer | 3) regulator | 4) inhibitor |
|-------------|------------|--------------|--------------|

82. In Lac operon RNA polymerase binds to

- | | | | |
|--------------|-------------|--------------|--------------------|
| 1) repressor | 2) promoter | 3) regulator | 4) structural gene |
|--------------|-------------|--------------|--------------------|

83. The Pribnow box is a part of

- | | | | |
|--------------|-------------|--------------|--------------------|
| 1) repressor | 2) promoter | 3) regulator | 4) structural gene |
|--------------|-------------|--------------|--------------------|

84. The Pribnow box is represented by

- | | | | |
|-----------------|-----------------|-----------------|---------------|
| 1) 5' ATATTA 3' | 2) 5' AATAAT 3' | 3) 5' TATAAT 3' | 4) 5' TATAA3' |
|-----------------|-----------------|-----------------|---------------|

85. The Hogness box is present in

- | | | | |
|----------------|---------------|-----------|-------------|
| 1) Prokaryotes | 2) Eukaryotes | 3) Nostoc | 4) Bacteria |
|----------------|---------------|-----------|-------------|

86. The part of the RNA polymerase responsible for recognizing the active strand of DNA is

- | | | | |
|----------|---------|--------|---------------|
| 1) Sigma | 2) core | 3) rho | 4) Pribnowbox |
|----------|---------|--------|---------------|

87. Operator gene of Lac operon is turned on when lactose molecule binds to

- | | | | |
|------------------|------------------|-------------------|----------------------|
| 1) Promoter site | 2) operator site | 3) regulator gene | 4) repressor protein |
|------------------|------------------|-------------------|----------------------|

88. The Lac operon "switches off"

- 1) in the absence of repressor protein
- 2) in the presence of lactose
- 3) when repressor protein combines with operator gene
- 4) when repressor protein combines with promoter gene

89. According to Lac operon concept, repressor proteins are produced by

- 1) Promoter gene
- 2) regulator gene
- 3) operator gene
- 4) structural genes

90. With reference to lac operon concept, which among the following statements are correct?

- A) Lac operon is an example for transcriptional control
 - B) When lactose is absent in the medium lac operon is in 'switched off' condition
 - C) Promoter gene is the site for binding of repressor protein
 - D) Operator and promoter genes do not code for any enzymes
- 1) A and B
 - 2) B and C
 - 3) A, c and D
 - 4) A,B and D