CHAPTER – 15
Molecular Basis of Inheritance

1. The central dogma of molecular biology describesthe flow of genetic information from:
   a) DNA → RNA → Protein
   b) RNA → DNA → Protein
   c) Protein → RNA → DNA
   d) DNA → Protein → RNA

2. Which enzyme is responsible for unwinding theDNA double helix during DNA replication?

DNA polymerase
   b) Helicase
   c) Ligase
   d) Topoisomerase

3. The process by which DNA is copied to RNA isknown as:
   a) Replication
   b) Transcription
   c) Translation
   d) Replication

4. Which of the following is NOT a component ofRNA?
   a) Ribose
   b) Thymine
   c) Uracil
   d) Cytosine

5. In the process of translation, the sequence of aminoacids is determined by:
   a) Codons in mRNA
   b) Anticodons in tRNA
   c) Genes in DNA
   d) Enzymes in ribosomes

6. The site of protein synthesis in the cell is the:

a) Nucleus

b) Ribosome

c) Mitochondria

d) Golgi apparatus

7. Which type of RNA carries amino acids to theribosome during translation?

a) mRNA

b) tRNA

c) rRNA

d) snRNA

8. The genetic code is described as:

a) Overlapping

b) Universal

c) Ambiguous

d) Non-overlapping

9. Which enzyme is responsible for synthesizing anew strand of DNA during replication?

a) DNA polymerase

b) RNA polymerase

c) DNA ligase

d) Helicase

10. The region of DNA where transcription begins iscalled the:

a) Exon

b) Intron

c) Promoter

d) Terminator

11. What is the function of the 5' cap and poly-A tailin mRNA?

a) To protect the mRNA from degradation

b) To facilitate mRNA splicing

c) To help in ribosome binding

d) To promote DNA replication

12. Which of the following is a stop codon?

a) AUG

b) UAA

c) UGC

d) CCG

13. The process by which the information in a gene isused to produce a functional product, such as a protein, is known as:

a) Gene expression
b) DNA replication

c) RNA splicing

d) Protein folding

14. In eukaryotes, the initial RNA transcript ismodified by:

a) Adding a 5' cap

b) Adding a poly-A tail

c) Splicing out introns

d) All of the above

15. What is the primary function of ribosomal RNA(rRNA)?

a) To carry genetic information

b) To catalyze peptide bond formation

c) To transport amino acids

d) To regulate gene expression

16. Which of the following statements about DNAreplication is true?

a) It is a semi-conservative process

b) It is a conservative process

c) It occurs in the cytoplasm

d) It only occurs in the S phase of cell division

17. The primary structure of a protein refers to its:

a) Amino acid sequence

b) Alpha-helix and beta-sheet formations

c) 3D shape

d) Quaternary structure

18. During transcription, the DNA strand that is usedas the template for RNA synthesis is called the:

a) Coding strand

b) Non-coding strand

c) Sense strand

d) Antisense strand

19. The enzyme that joins Okazaki fragments on thelagging strand during DNA replication is:

a) DNA polymerase

b) Ligase

c) Helicase

d) Primase

20. Which of the following is an example of a pointmutation?

a) Deletion

b) Insertion

c) Substitution

d) Duplication

21. What is the role of tRNA during translation?

a) To provide the template for mRNA

b) To transport amino acids to the ribosome

c) To catalyze the formation of peptide bonds

d) To transcribe DNA into mRNA

22. The process by which introns are removed andexons are joined together is called:

a) Splicing

b) Capping

c) Polyadenylation

d) Replication

23. Which molecule carries genetic information fromthe nucleus to the cytoplasm?

a) mRNA

b) tRNA

c) rRNA

d) DNA

24. A change in the nucleotide sequence of DNA iscalled a:

a) Mutation

b) Codon

c) Gene

d) Polypeptide

25. The process of synthesizing a complementaryDNA strand from an RNA template is known as:

a) Transcription

b) Translation

c) Reverse transcription

d) Replication

26. Which of the following correctly pairs a type ofRNA with its function?

a) mRNA - carries amino acids

b) tRNA - carries genetic information

c) rRNA - forms part of the ribosome

d) snRNA - translates proteins

27. The genetic code is read in sets of how manynucleotides?

a) One

b) Two

c) Three

d) Four

28. Which of the following is a feature of prokaryoticgene expression?

a) mRNA splicing

b) Transcription and translation are coupled

c) Presence of introns

d) Complex promoter regions

29. Which of the following is NOT a component ofthe central dogma of molecular biology?

a) Replication

b) Transcription

c) Translation

d) Mutation

30. The concept that one gene controls the expressionof another gene is known as:

a) Epistasis

b) Codominance

c) Incomplete dominance

d) Pleiotropy

31. In which organelle does the process of translationoccur?

a) Nucleus

b) Ribosome

c) Mitochondria

d) Endoplasmic reticulum

32. The term used to describe the total set of proteinsexpressed by a genome is:

a) Proteome

b) Transcriptome

c) Genotype

d) Phenotype

33. A mutation that results in a premature stop codonis known as a:

a) Missense mutation

b) Nonsense mutation

c) Silent mutation

d) Frameshift mutation

34. The genetic code is described as redundant. Thismeans:

a) Multiple codons can code for the same aminoacid

b) Each codon codes for a unique amino acid

c) Some amino acids are coded by multiple genes

d) Codons can be read in multiple frames

35. Which of the following mutations is most likely tohave a major effect on a protein?

a) Silent mutation

b) Missense mutation

c) Nonsense mutation

d) Neutral mutation

36. Which term refers to the process of adding amethyl group to DNA, affecting gene expressionwithout altering the sequence?

a) DNA methylation

b) Histone modification

c) RNA editing

d) Transcriptional activation

37. The primary role of the lac operon in bacteria isto:

a) Regulate the synthesis of amino acids

b) Regulate the breakdown of lactose

c) Control the replication of DNA

d) Facilitate protein folding

38. Which of the following statements about introns istrue?

a) They are coding sequences in mRNA

b) They are spliced out during RNA processing

c) They are translated into proteins

d) They are found only in prokaryotes

39. The term for a segment of DNA that codes for afunctional RNA or protein is:

a) Exon

b) Intron

c) Promoter

d) Operator

40. The sequence of nucleotides in a gene that istranscribed into RNA is called a:

a) Coding sequence

b) Regulatory sequence

c) Intergenic region

d) Terminator

41. In eukaryotes, the primary function of thenucleolus is:

a) DNA replication

b) rRNA synthesis

c) Protein synthesis

d) Lipid metabolism

42. The process of using a DNA template to make acomplementary RNA strand is known as:

a) Transcription

b) Translation

c) Replication

d) Reverse transcription

43. Which term describes the transfer of genetic material from one organism to another in bacteria?

a) Conjugation

b) Transformation

c) Transduction

d) Mutation

44. Which of the following does NOT occur duringDNA replication?

a) RNA primer synthesis

b) DNA proofreading

c) RNA splicing

d) DNA polymerization

45. In which type of cells does post-transcriptionalmodification of mRNA primarily occur?

a) Prokaryotic cells

b) Eukaryotic cells

c) Archaea

d) Viruses

46. What is the purpose of the DNA ligase enzyme inDNA replication?

a) To unwind the DNA helix

b) To add nucleotides to the growing DNA strand

c) To join Okazaki fragments on the lagging strand

d) To synthesize RNA primers

47. Which type of mutation results from a single nucleotide change that does not alter the amino acidsequence?

a) Missense mutation

b) Nonsense mutation

c) Silent mutation

d) Frameshift mutation

48. The genetic code is said to be universal because:

a) It is the same in all organisms

b) It is unique to each organism

c) It only applies to prokaryotes

d) It varies between species

49. The site on a ribosome where tRNA binds duringtranslation is called the:

a) A site

b) P site

c) E site

d) S site

50. Which of the following accurately describes aframeshift mutation?

a) Addition or deletion of a nucleotide

b) Substitution of one nucleotide for another

c) Change in a single codon

d) Replacement of one amino acid

Answer Key for Chapter 15 (Molecular Basis ofInheritance)

1	2	3	4	5
A	B	B	B	A
6	7	8	9	10
B	B	D	A	C
11	12	13	14	15
D	B	A	D	B
16	17	18	19	20
A	A	D	B	C
21	22	23	24	25
B	A	A	A	C
26	27	28	29	30
C	C	B	A	A
31	32	33	34	35
B	A	B	A	B
36	37	38	39	40
A	B	B	A	A
41	42	43	44	45
B	A	B	C	B
46	47	48	49	50
C	C	A	A	A