

Section 12.3- RNA and Protein Synthesis

Standards

At the end of this lecture you should know:

- 1d. The central dogma of molecular biology outlines the flow of information from transcription of RNA in the nucleus to translation of proteins on ribosomes in the cytoplasm.
- 4a. The general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA
- 4b. How to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA
- 5a. The general structures and functions of DNA, RNA, and proteins.

Review Questions

1. Compare and contrast the make up of DNA and RNA.

2. What is the purpose of transcription?

Fill In Notes

_____ are coded DNA instructions that control the production of _____ within the cell.

List the first step in decoding genetic messages.

_____ molecules contain coded information for making _____.

I. The Structure of RNA

- A. RNA consists of a long chain of _____.
- B. List the 3 parts of RNA.

C. How is it possible for a single gene to produce hundreds or thousands of RNA molecules?

II. Types of RNA

- A. RNA molecules are involved in _____.
- 1. The assembly of _____ into _____ is controlled by RNA.
- B. List the 3 Types of RNA and their functions in protein synthesis.

III. Transcription

- A. Creating a complimentary RNA molecule from a nucleotide sequence of DNA is called _____.
- B. What is the role of the enzyme RNA polymerase?
- C. Name the location on a DNA strand where RNA polymerase binds to begin transcription.

Lecture Notes

IV. RNA Editing

- A. _____ are sequences of DNA not involved in coding for proteins.
- B. _____ are sequences of DNA that are "expressed" and code for proteins.
- C. DNA is copied forming a pre-mRNA strand. What happens next to create the final mRNA strand?

V. The Genetic Code

- A. _____ are made by joining amino acids into long chains called _____.
- B. The "language" of mRNA instructions is called the _____.
 - 1. The genetic code is read _____ letters at a time.
 - 2. Each three-letter "word" in mRNA is called a _____.
- C. Using Fig. 12-17. Determine the amino acid for the given codon: CAU _____

VI. Translation

3. What is the purpose of translation?

- A. The _____ is the organelle where proteins are assembled.
- B. The decoding of an mRNA message into a polypeptide chain (protein) is known as _____.
- C. In what part of the cell does transcription occur?
- D. In what parts of the cell does translation occur?

4. Compare and contrast the roles of a codon and an anticodon.

- E. rRNA makes up part of the _____ (organelle).
- F. tRNA carries _____ to the ribosome.
 - 1. tRNA has complimentary 3 bases to mRNA's codon called an _____.
 - 2. Describe the interaction between an mRNA codon and a tRNA anticodon.
- G. When will a polypeptide chain stop growing?

5. What does protein synthesis mean and what 2 processes make up protein synthesis?

VII. The Roles of RNA and DNA

- A. Compare and contrast the roles of DNA and RNA in protein synthesis.

Genes and Proteins

- A. Genes code for the making of proteins. Why are proteins important?

Summary/Thinking Map

Create a flow map showing the steps of transcription using the following headings:

RNA polymerase binds to promoter
RNA polymerase copies DNA
mRNA codons formed

RNA polymerase stops copying DNA
mRNA leaves nucleus

mRNA strand formed
RNA polymerase "unzips" DNA

Create a flow map showing the steps of translation using the following headings:

amino acids bind together
tRNA anticodon binds to mRNA codon
polypeptide chain formed
tRNA carries amino acid to ribosome

polypeptide chains form proteins
mRNA attaches to ribosome
peptide bonds formed between amino acids

Key Vocabulary

Define the Key Vocabulary for this section. Be sure to number and underline your Key Vocabulary word.