RNA & PROTEIN SYNTHESIS

12 FEBRUARY 2014

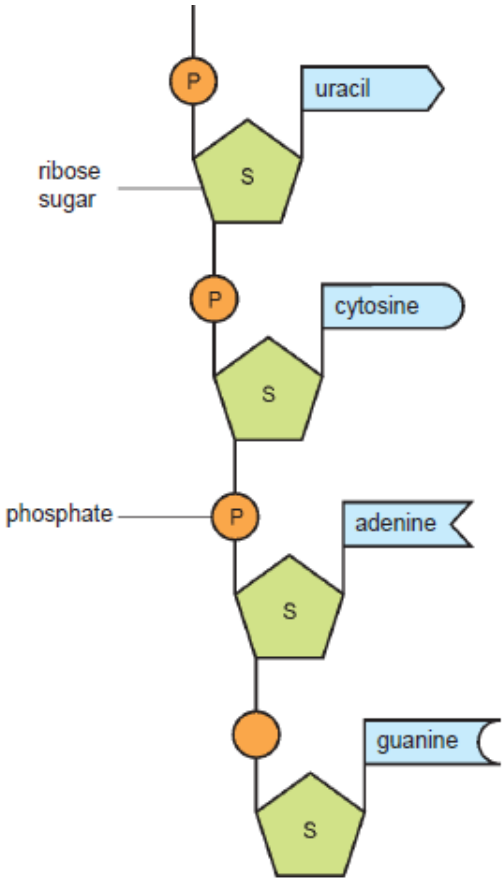
Lesson Description

In this lesson we:

- State the location of RNA
- Describe the structure of RNA as follows:
- Compare DNA and RNA
- Define protein synthesis.
- Describe the involvement of DNA and RNA in protein synthesis

Summary

Structure

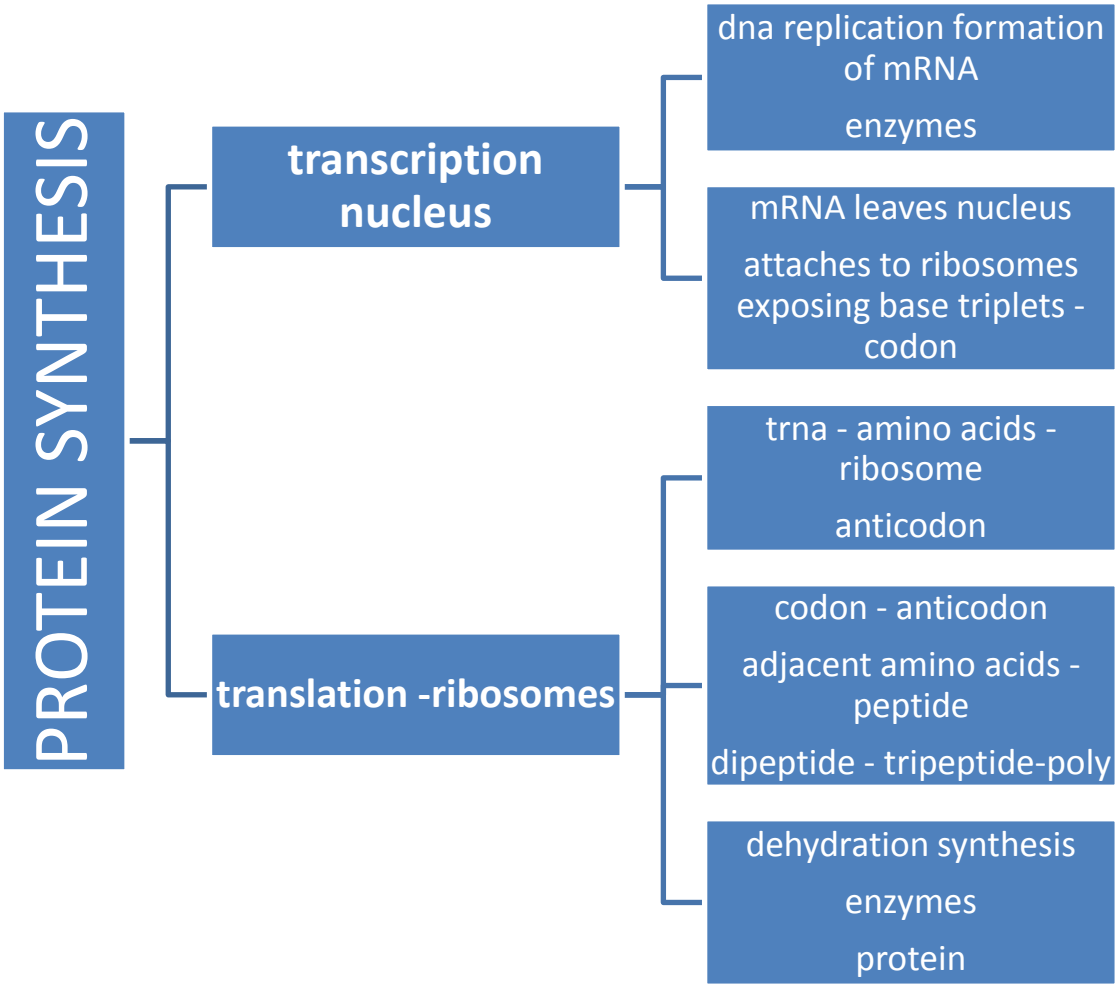


(Structure of RNA from Life Sciences for all, Grade 12, Figure 4.14, Page 193)

Types

- mRNA
- tRNA
- ribosomal RNA

Protein Synthesis



Test Yourself

Select the most correct answer from the options given. Write down only the correct letter

Question 1

Which of the following statements are characteristic of RNA?

(i) Double-stranded helix

(ii) Sugar molecule is ribose

(iii) Found in the nucleus and cytoplasm

(iv) Has the nitrogenous bases Adenine, Thymine, Cytosine, Uracil

A (ii) and (iii) only

B (i), (iii) and (iv) only

C (ii), (iii) and (iv) only

D (i), (ii), (iii) and (iv)

Question 2

The stages in Protein synthesis occur in the following order

A Transcription, DNA replication, translation

B DNA replication, transcription, translation

C DNA replication, translation, transcription

D Translation, transcription, DNA replication

Question 3

DNA and RNA are similar in the sense that…

A Both have uracil

B Both have phosphate

C Both have ribose sugars

D Both occur in the nucleus only

Question 4

The bond that forms between two adjacent amino acids is a …

A Ester link

B Peptide bond

C Weak hydrogen bond

D Strong hydrogen bond

Question 5

The substance that is released when two amino acids combine to form a dipeptide is ….

A water

B oxygen

C glucose

D carbon dioxide

Question 6

Provide the correct biological term for each of the following

a.) The process in protein synthesis where mRNA is formed

b.) The nitrogenous base that replaces Thymine in RNA

c.) The type of sugar found in RNA

d.) The exposed base triplets on a tRNA molecule

e.) The monomers of proteins

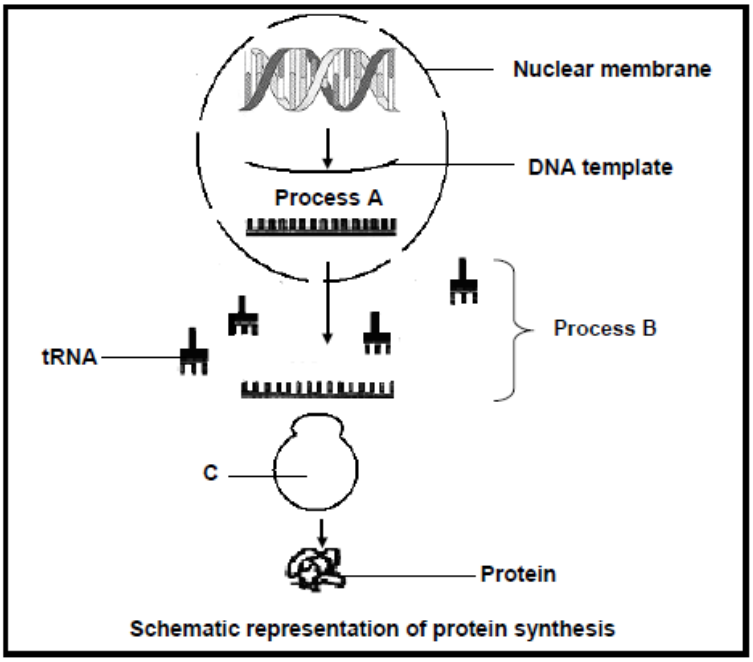
Improve your Skills

Question 1

Tabulate the differences between DNA and RNA

Question 2

The diagram below represents protein synthesis. Study the diagram and answer the questions that follow.



Schematic representation of protein synthesis

2.1 Name the following processes:

(a) A

(b) B (2)

2.2 Describe how the mRNA is made from the DNA template during process A.

2.3 Write down the numbers 1 to 3 and next to each number the nitrogenous bases that will complete the table.

	Base sequence on DNA	Codon on mRNA	Anticodon on tRNA	Amino acid
(a)	CAA	1	2	Valine
(b)	3	GCA	CGU	Alanine

Question 3

The questions below are based on protein synthesis.

3.1 Describe the role of DNA during transcription in protein synthesis. (4)

3.2 The diagram below shows the sequence of nitrogenous bases of a small part of a strand of DNA which codes for part of a protein molecule.

CGG TAT CCT

Write down the mRNA codon sequence that reads from left to right from the DNA sequence above. (3)

3.3 The table below shows the tRNA anticodons and their corresponding amino acids

ANTICODONS OF tRNA	AMINO ACIDS
CAA	Valine
CCC	Glycine
CGU	Alanine
AAA	Phenylalanine
UUA	Asparagine
UAC	Methionine
GGU	Proline
ACC	Tryptophan
UCA	Serine

Select and write down from the table above, the amino acids (in the correct sequence) that would be required for the base sequence of mRNA shown below. (3)

(10)

Question 4

The manufacture of proteins involves an elaborate sequence of events. Describe this elaborate process in a mini essay. (20)

Links

- Learn Xtra Live 2013 – RNA Structure & Protein Synthesis http://www.youtube.com/watch?v=OdxTJDZlzlU&list=PLOaNAKtW5HLRVviGcDRDLzfezhqXdLygU&index=2
- From RNA to Protein Synthesis: http://www.youtube.com/watch?v=NJxobgkPEAo