Bio-organic chemistry

Lecture #15

Ribonucleic acids (RNA). RNA classification, their structure and physiological role. RNA nucleotides and nucleosides, their structure, chemical properties. Tautomeric transformations of heterocyclic bases that make up nucleosides and RNA nucleotides.

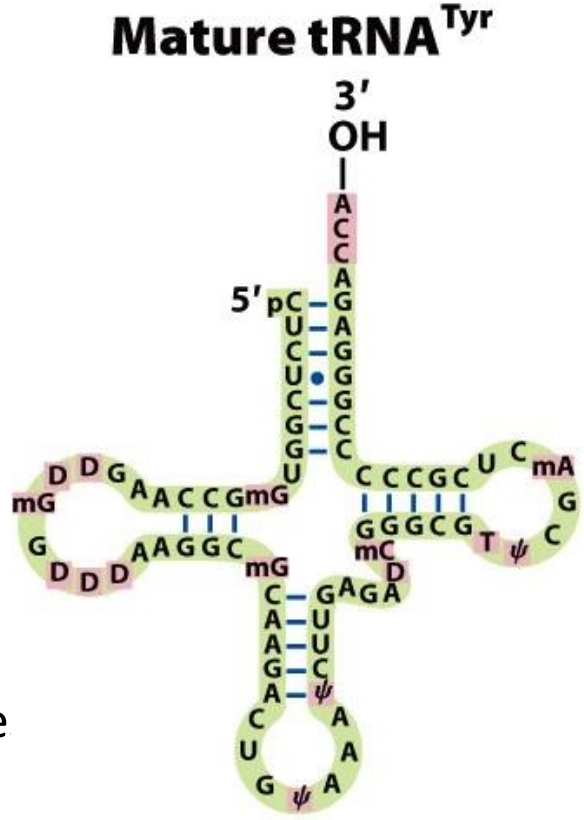
Lecturer:
Dr. Gulnaz Seitimova
Associate Professor

RNA

Usually single stranded
Genetic material of RNA virus
Functional:
- e.g. Translation machinery
  - rRNA (ribosomal RNA)
  - tRNA (transfer RNA)

Regulatory:
- Control of gene expression
  - miRNA (microRNA)

Gene Expression
- mRNA (messenger RNA)
- Copy of 1 gene for translation by ribosome



RNA Secondary Structure

RNA single stranded
Can form base pairs internally

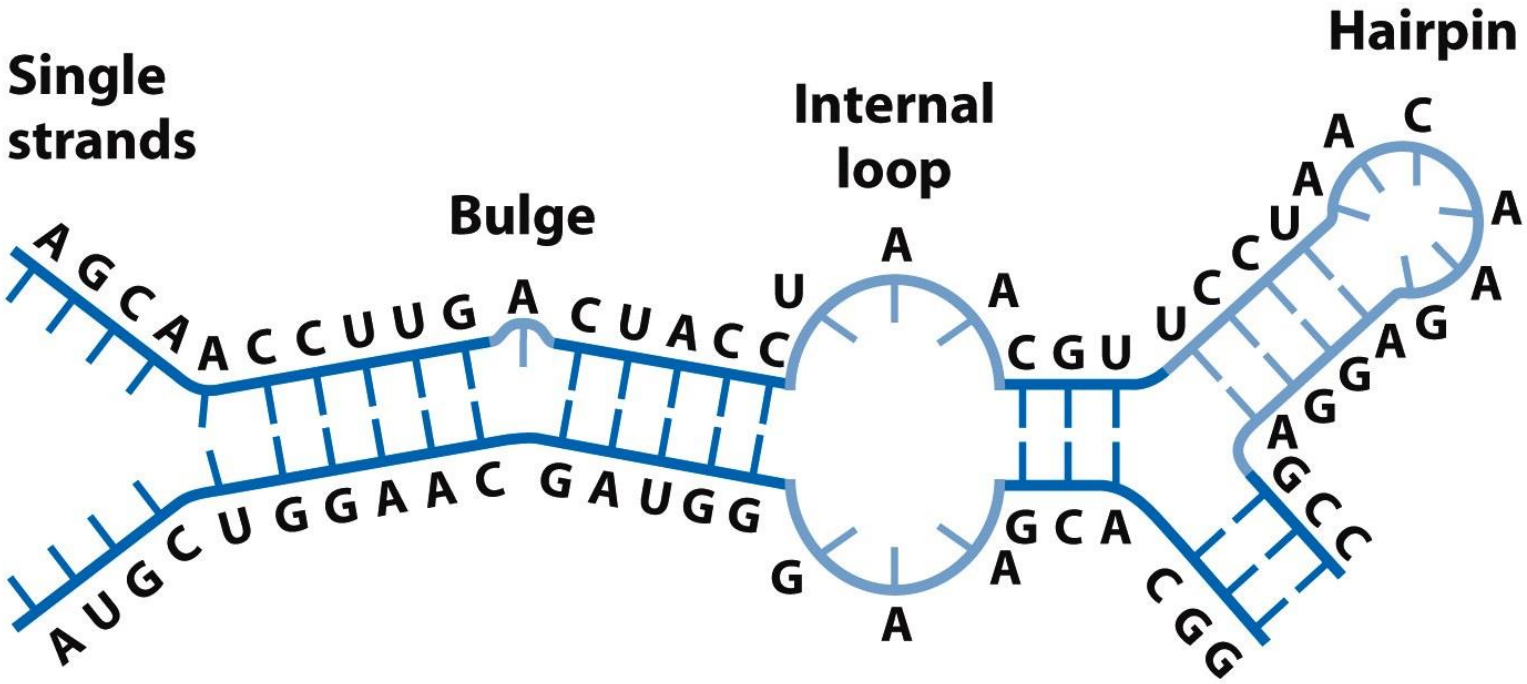


Figure 8-23a
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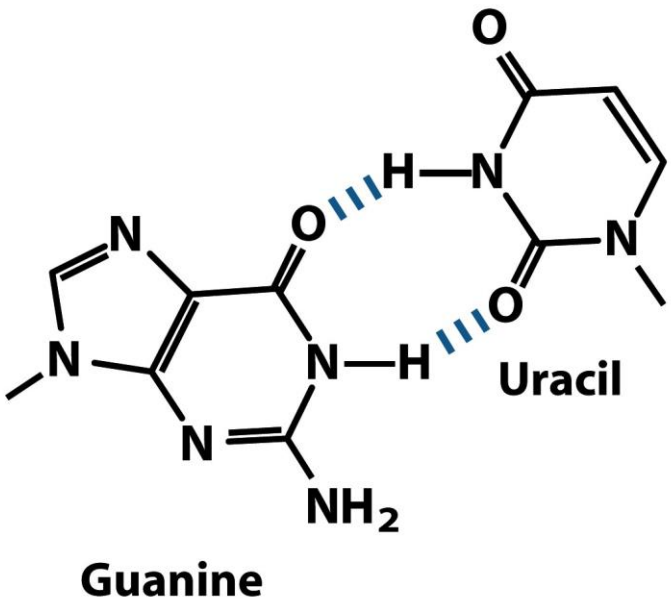
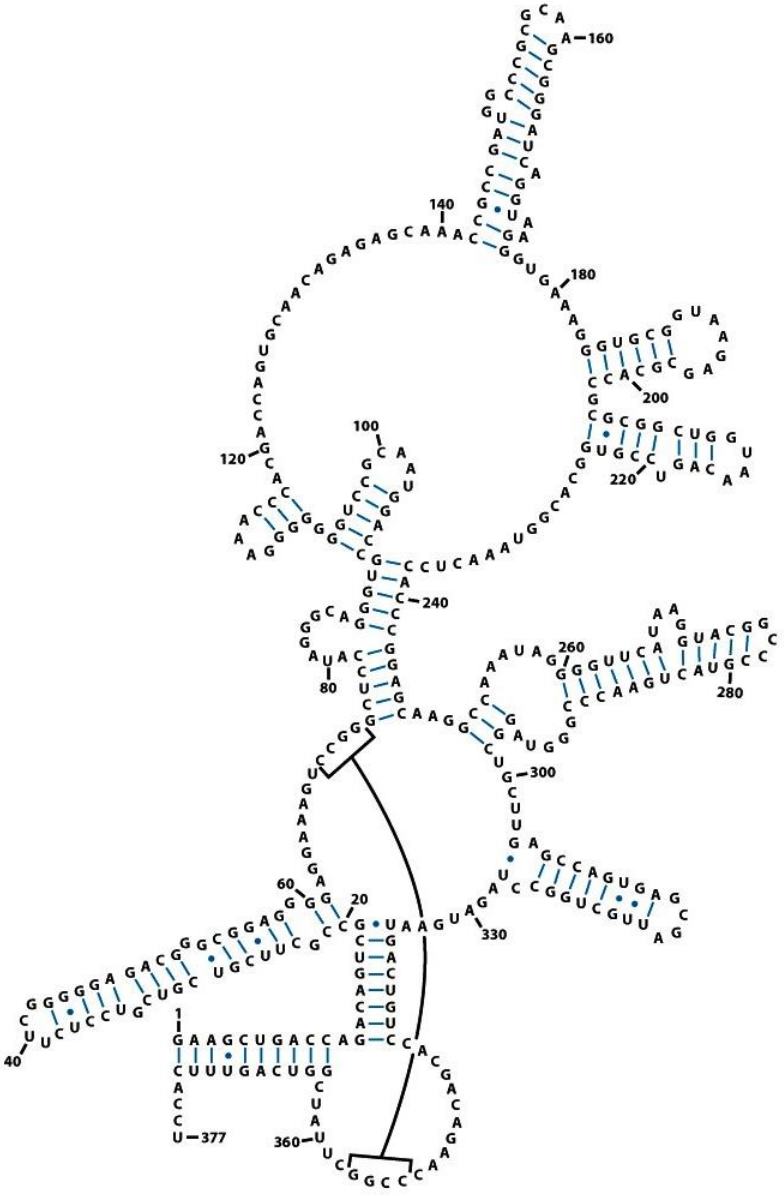
RNA Secondary Structure

Many functional RNAs have secondary structure
G-U basepairs allowed





DNA Sequencing

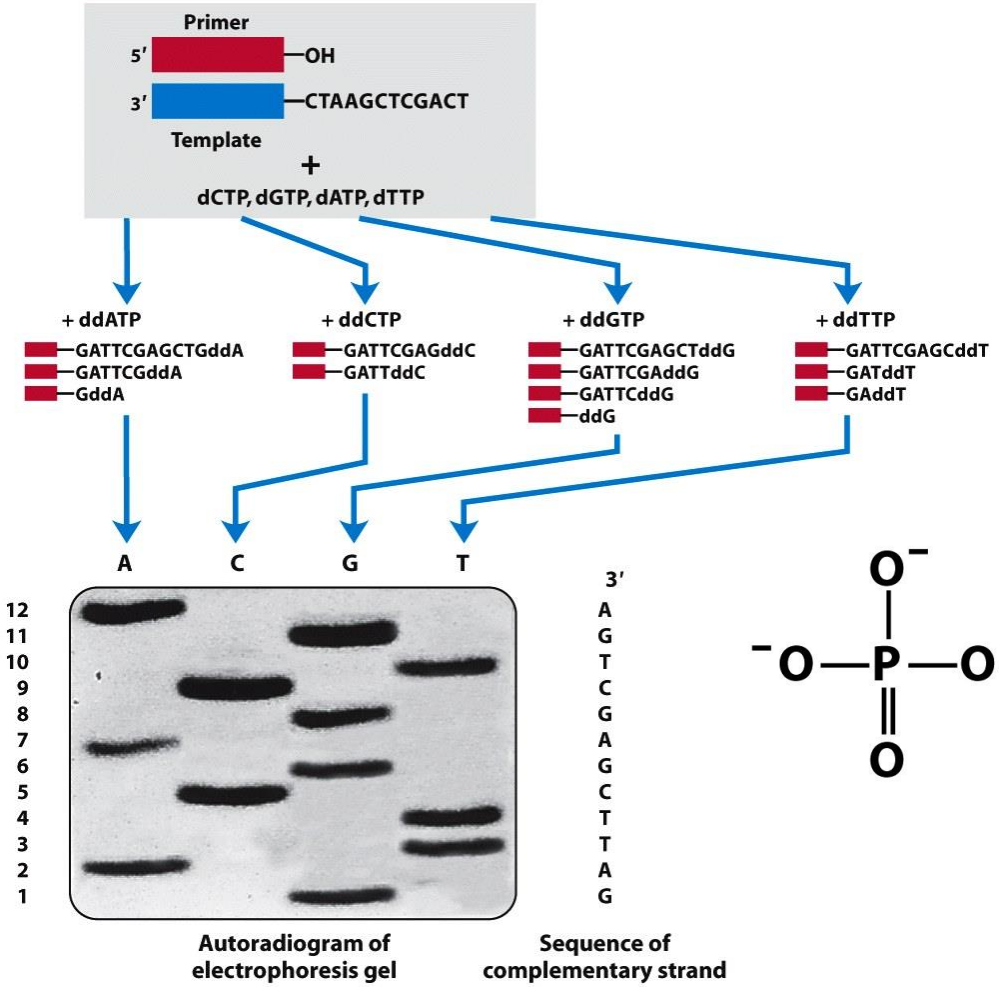


Figure 8-33c
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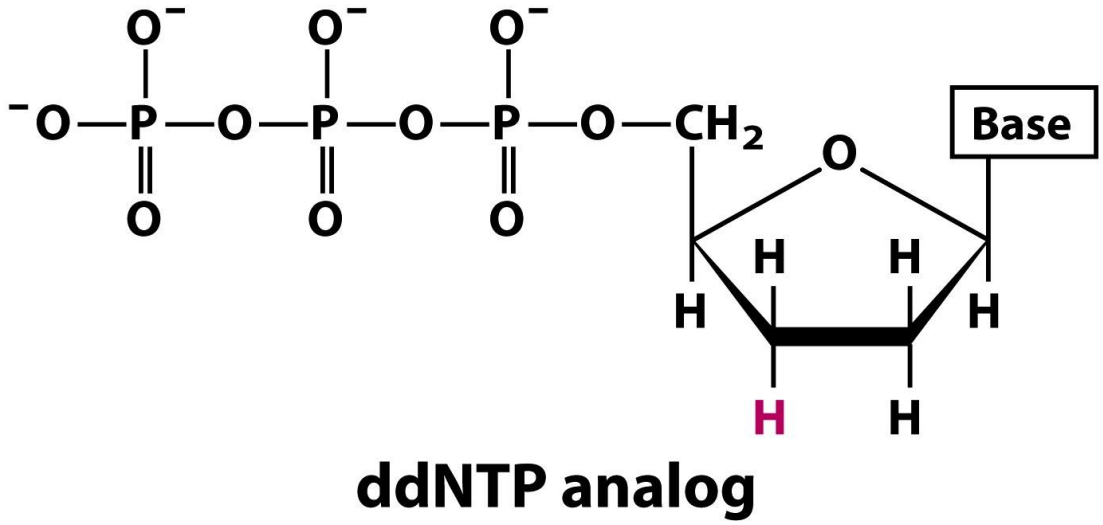

Figure 8-33b
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DNA Sequencing

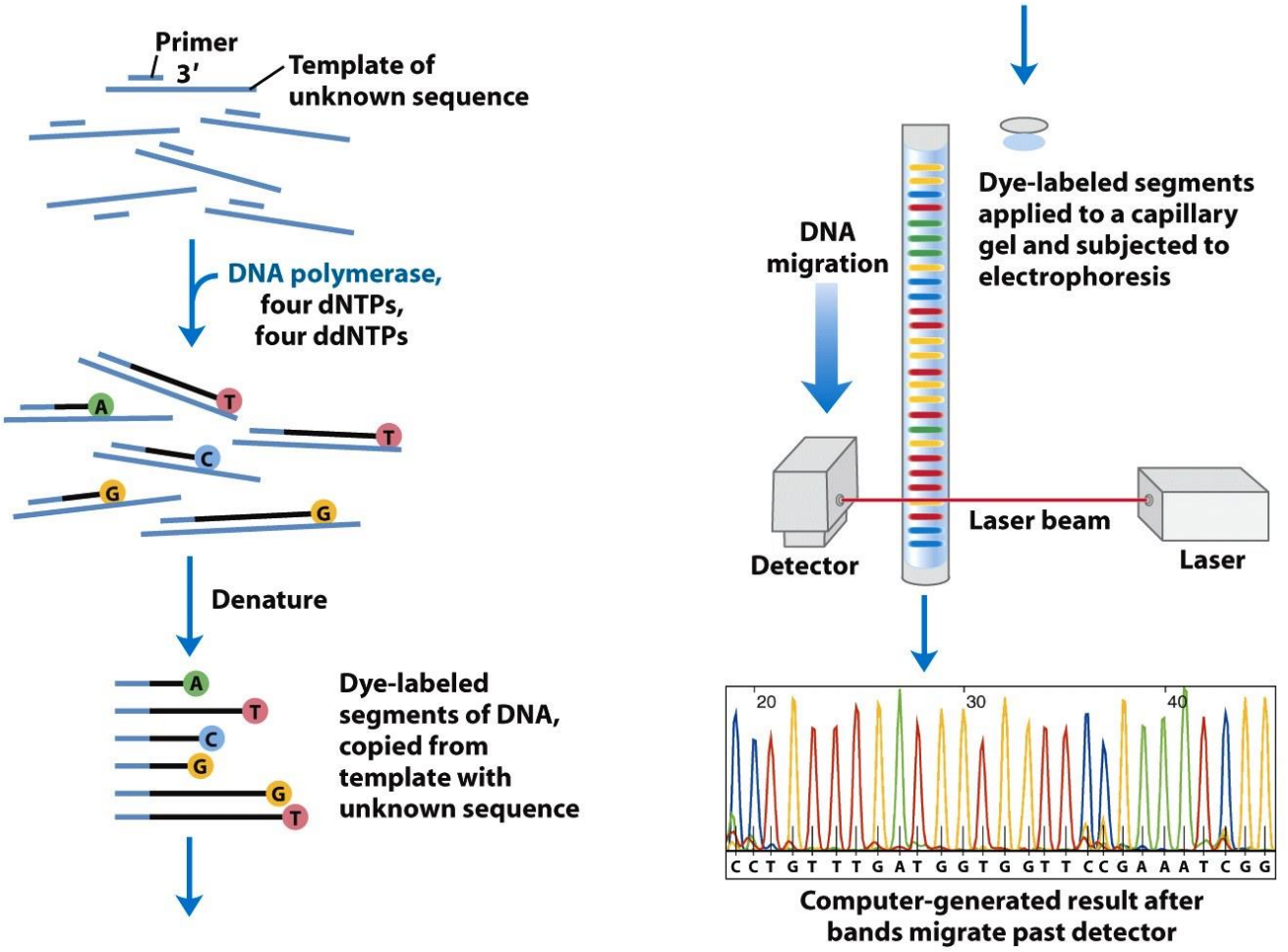

Figure 8-34
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- Nucleic acids store, transmit, and help express hereditary information
- The amino acid sequence of a polypeptide is programmed by a unit of inheritance called a **gene**
- Genes are made of DNA, a **nucleic acid** made of monomers called *nucleotides*

- There are two types of nucleic acids
  - **Deoxyribonucleic acid (DNA)**
  - **Ribonucleic acid (RNA)**
- DNA provides directions for its own replication
- DNA directs synthesis of messenger RNA (mRNA) and, through mRNA, controls protein synthesis
- *Protein synthesis occurs on ribosomes*

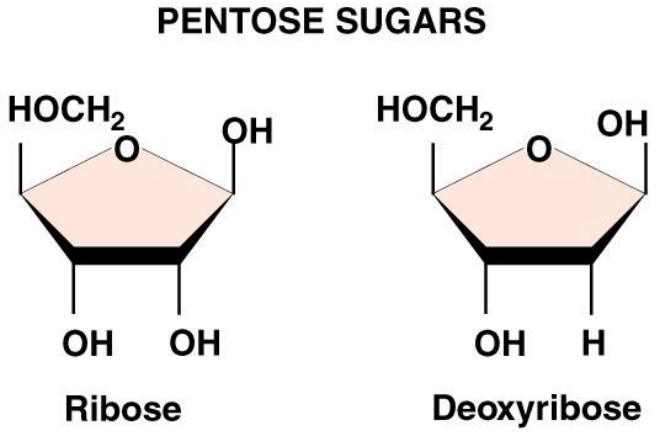

Figure 5.25-1

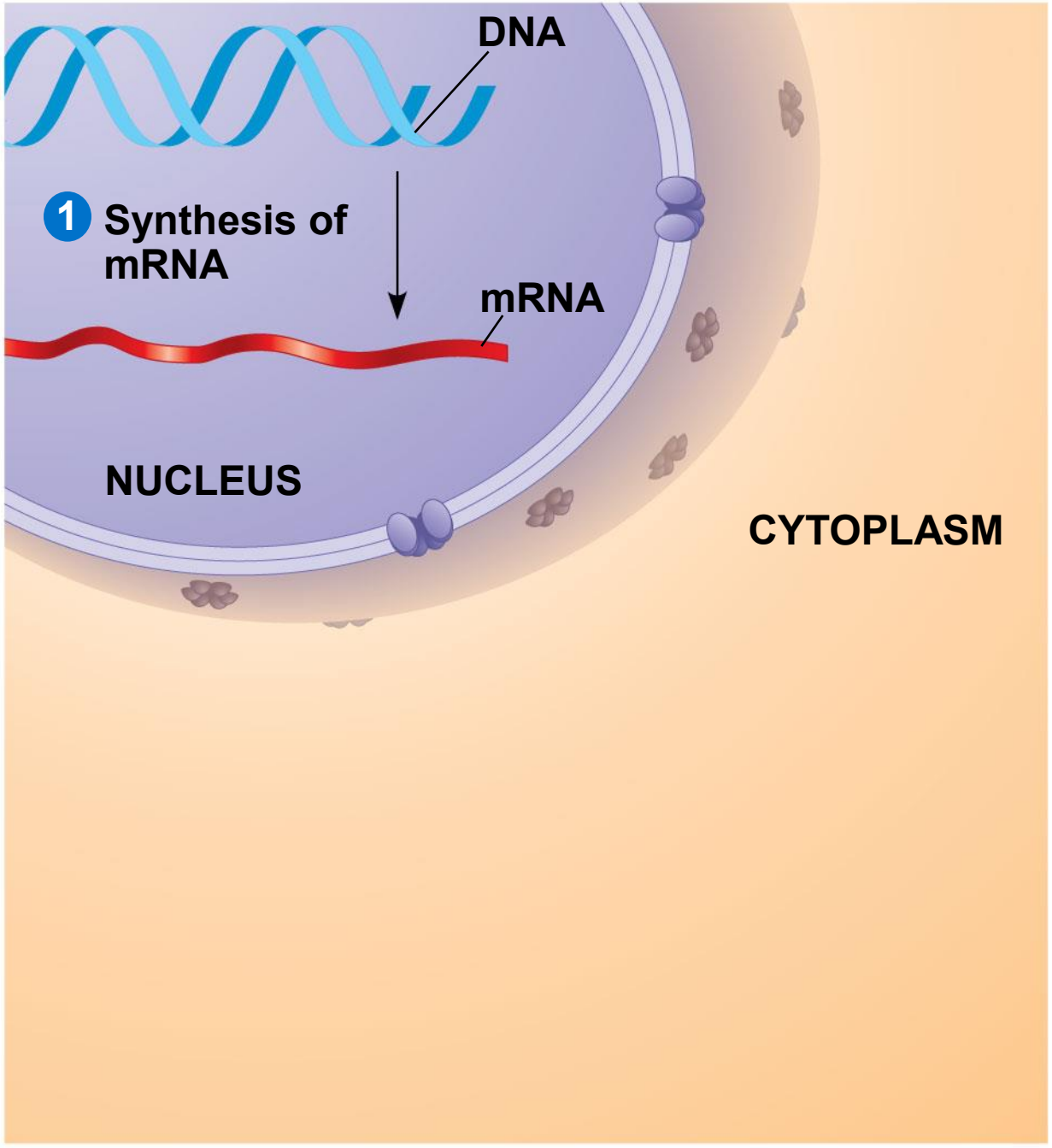

Figure 5.25-2

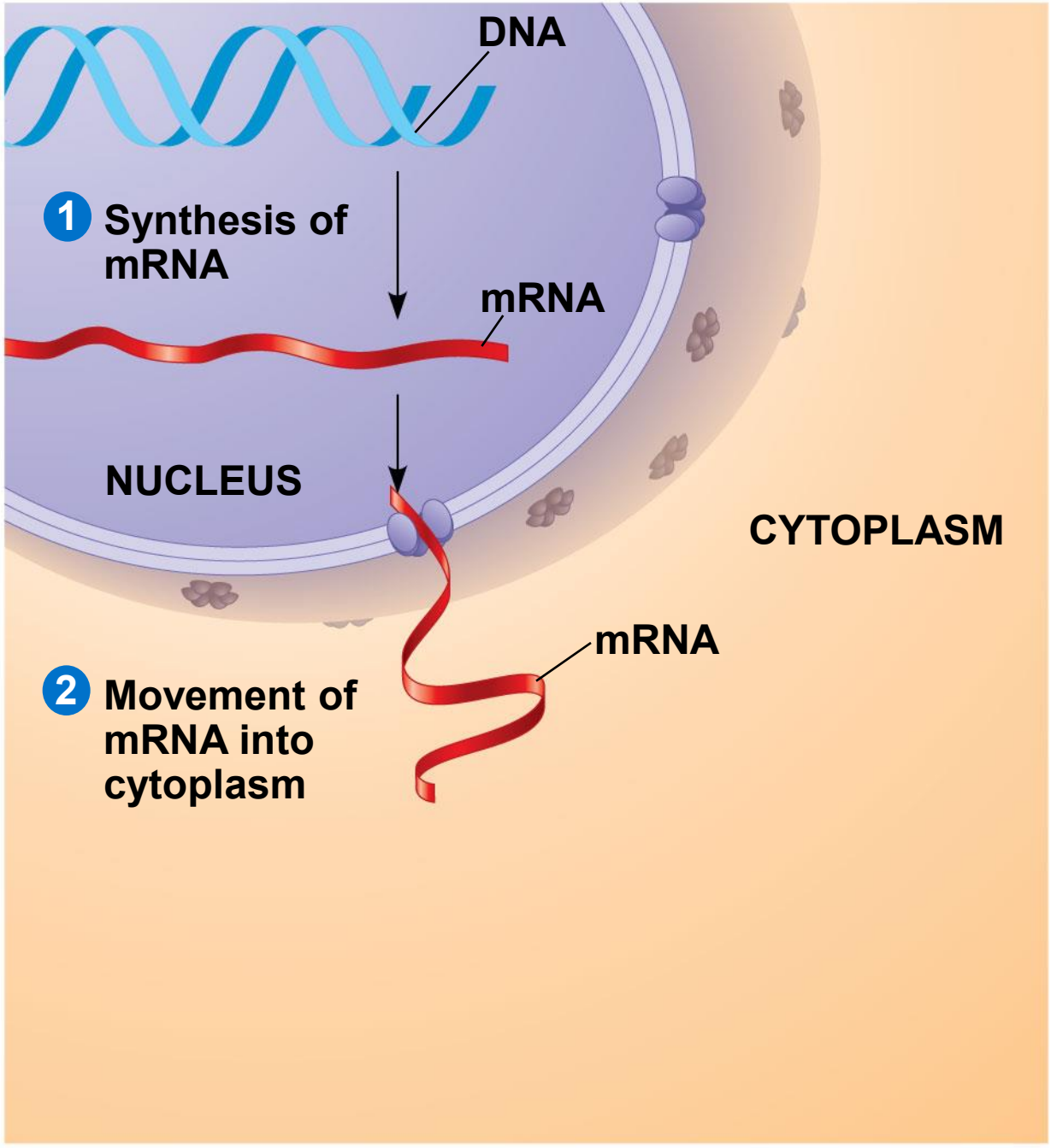

Figure 5.25-3