(7) Transcription and Translation

Objectives:

1. Compare and contrast:
    a. Transcription and DNA replication
    b. DNA and RNA
    c. DNA polymerase and RNA polymerase
2. Transcription: Details of process including start and stop sites, components, and application
3. Coupling of transcription and translation
4. Difference between prokaryotic and eukaryotic RNA: including methods of RNA processing and coupling of transcription and translation
5. Translation: 4 components, details of process, and inhibitors of translation, and application

- Fig. 7-1: Flow of genetic information
- **transcription** - DNA → RNA
- **translation** - RNA → protein

I. How transcription differs from DNA replication:

1. Uses RNA polymerase
2. RNA strands do not remain hydrogen bonded to the DNA template after being transcribed
3. Only one strand of the DNA molecule is transcribed for a specific gene
4. RNAs are only copied from regions of the DNA that contain genes

DNA polymerase vs. RNA polymerase

DNA POLYMERASE	RNA POLYMERASE
1. DNA replication	1. Transcription
2. Catalyzes linking of deoxyribonucleotides	2. Catalyzes linking of ribonucleotides
3. Needs RNA primers to start DNA synthesis (needs 3'-OH end)	3. Does not need primer to start RNA synthesis
4. Has proof-reading capabilities (1 error in 10^7)	4. Does not have proof-reading capabilities (1 in 10^4)

Two types of Nucleic acids: DNA and RNA

DNA	RNA
1. Deoxyribonucleotides (G, A. T, C) Sugar = deoxyribose	1. Ribonucleotides (G, A, U, C) Sugar = ribose
2. Thymine pairs with adenine	2. Uracil pairs with adenine
3. Double-stranded helix	3. Single-stranded
4. Cannot fold into various structures	4. Can fold into 3-D structures
5. Functions solely as information storage	5. Convey information; structural and catalytic functions