

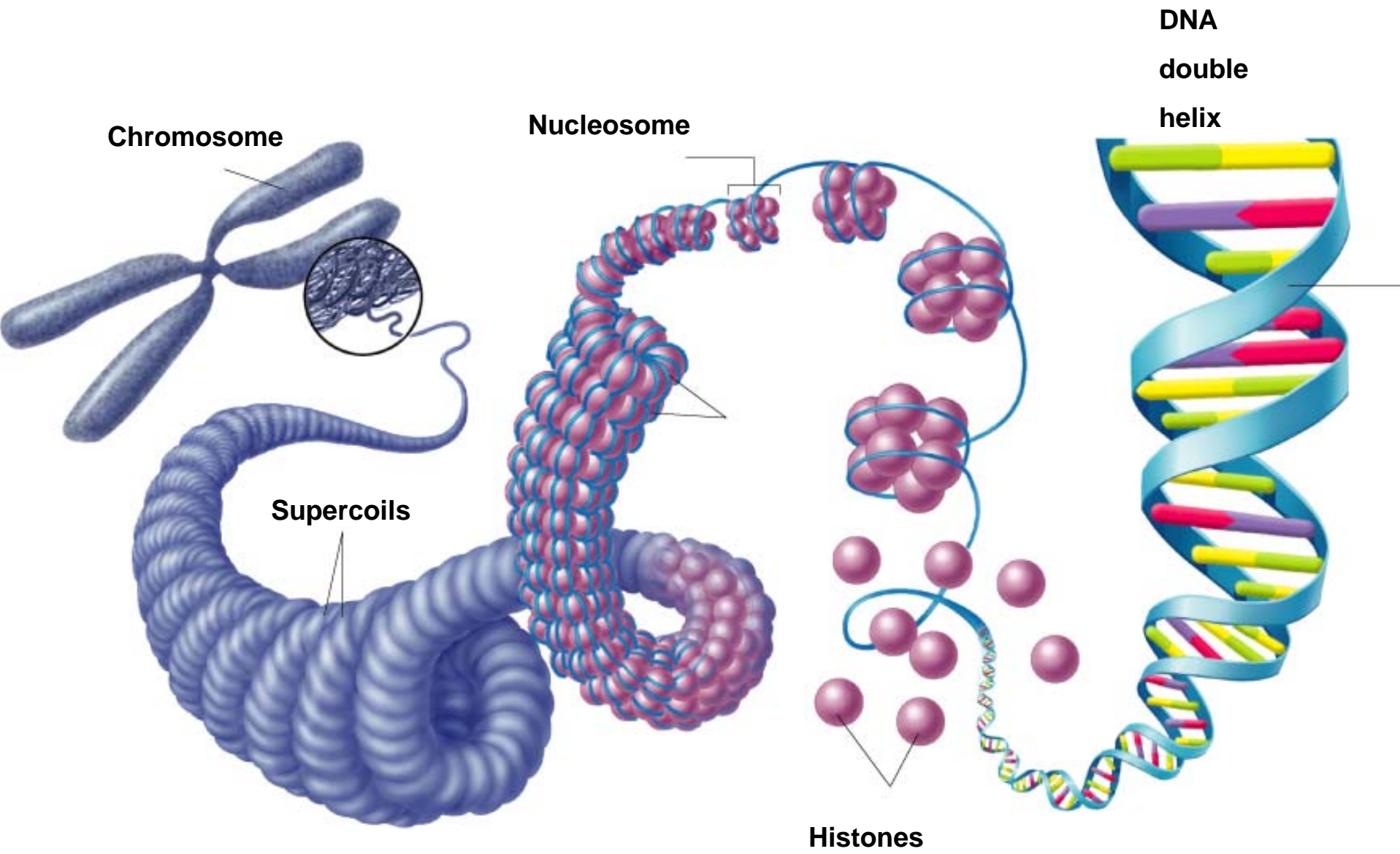
# DNA Replication, Transcription, Translation

Chapter 12-2, 12-3



# DNA structure

- Each human cell has 1 m of DNA
- Chromatin – DNA wrapped around histone proteins
- Nucleosome – beadlike structure that helps to fold DNA
- During mitosis and meiosis DNA forms chromosomes
- Nucleosomes may affect how genes are read and expressed

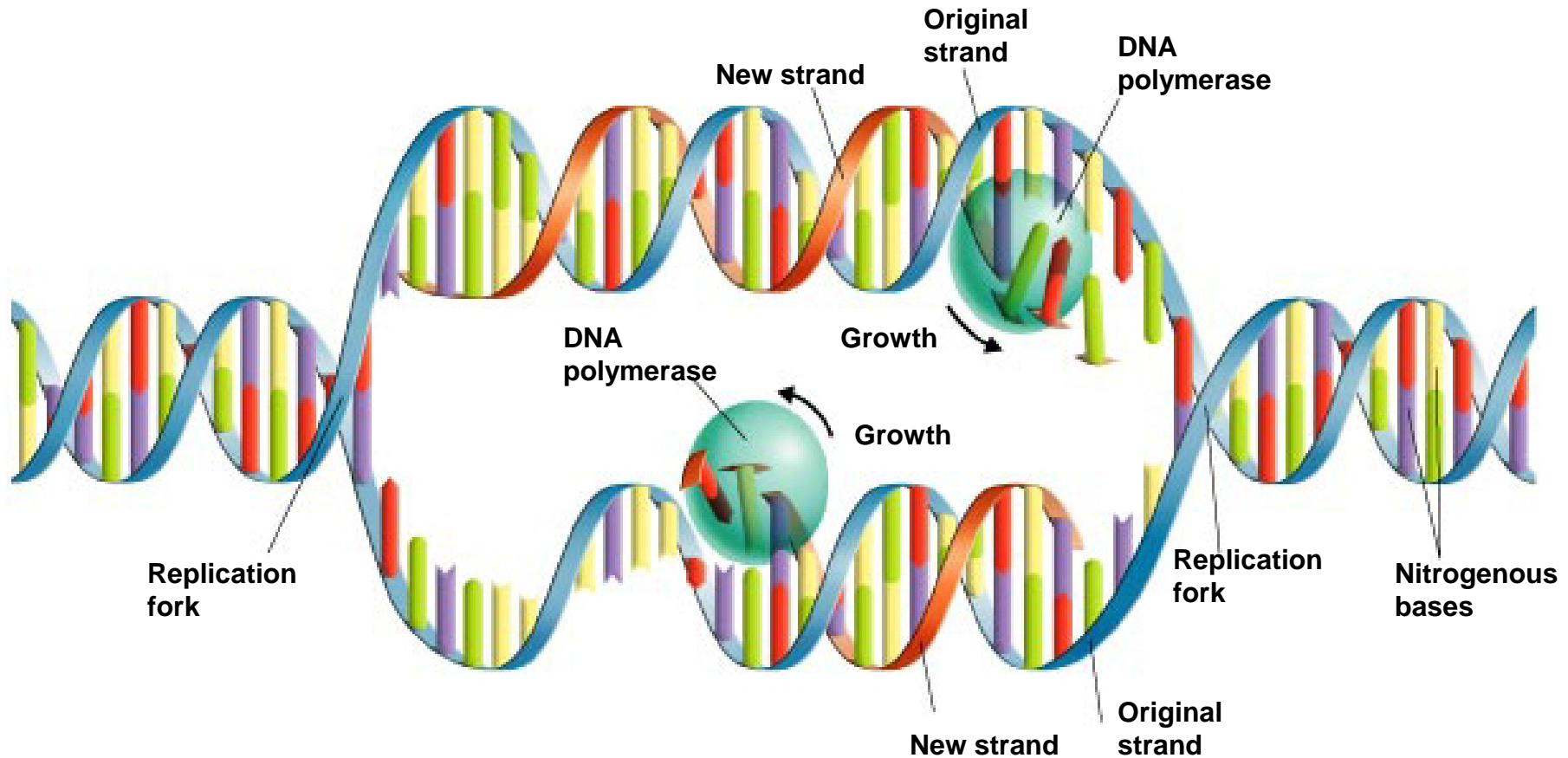


# DNA Replication

- Occurs during S phase of cell cycle
- Makes a second copy of DNA for cell division
- Possible because DNA strands are complimentary
- Each strand acts as a template for a new complementary strand

# DNA Replication

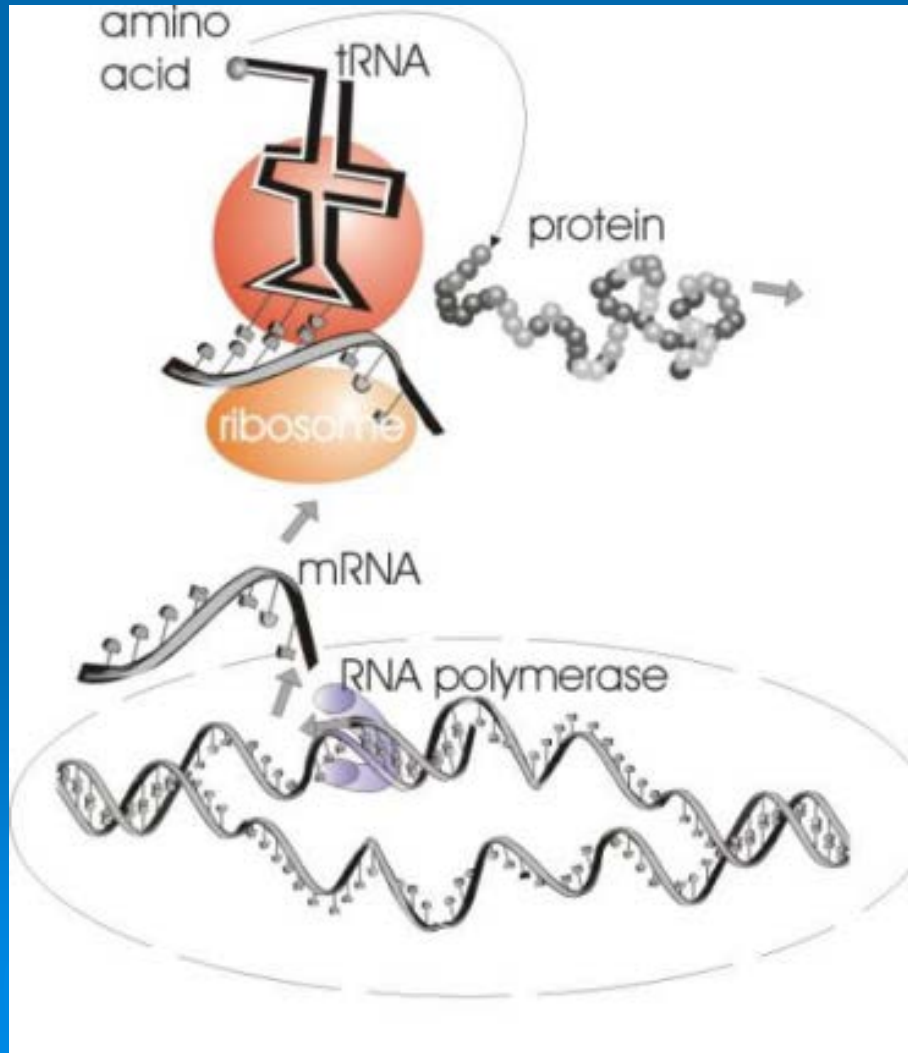
- DNA molecule is duplicated or copied
- DNA polymerase – enzyme that replicates DNA



# Structure of RNA

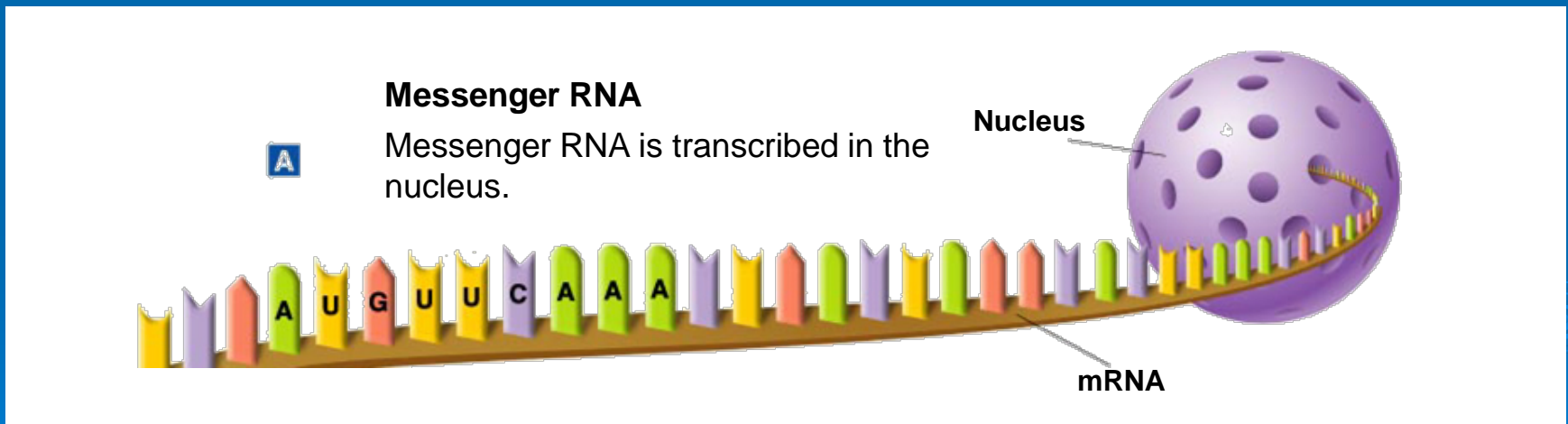
- Made of Nucleotides
- 3 main differences between RNA and DNA
  - Sugar = ribose
  - Single stranded
  - Uracil instead of Thymine
- Disposable copy of DNA
- Used as instructions for making proteins
- Dictates order of amino acids in proteins

# Protein Synthesis



# Types of RNA

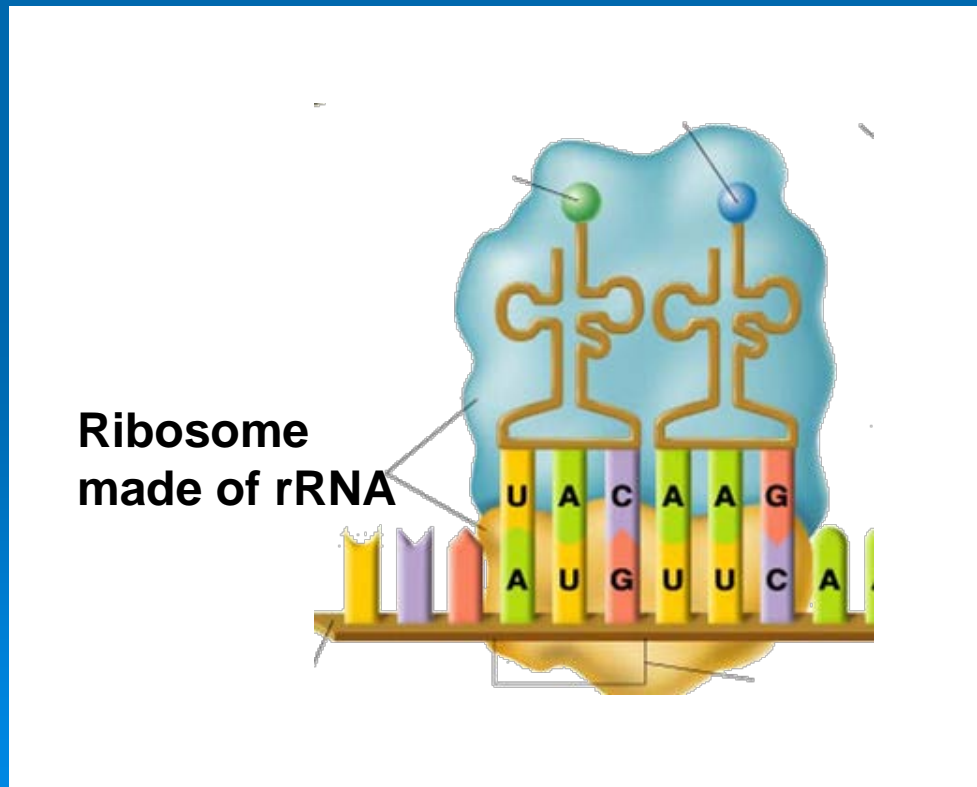
- Messenger RNA (mRNA)– carry the copy from the nucleus into the cytoplasm





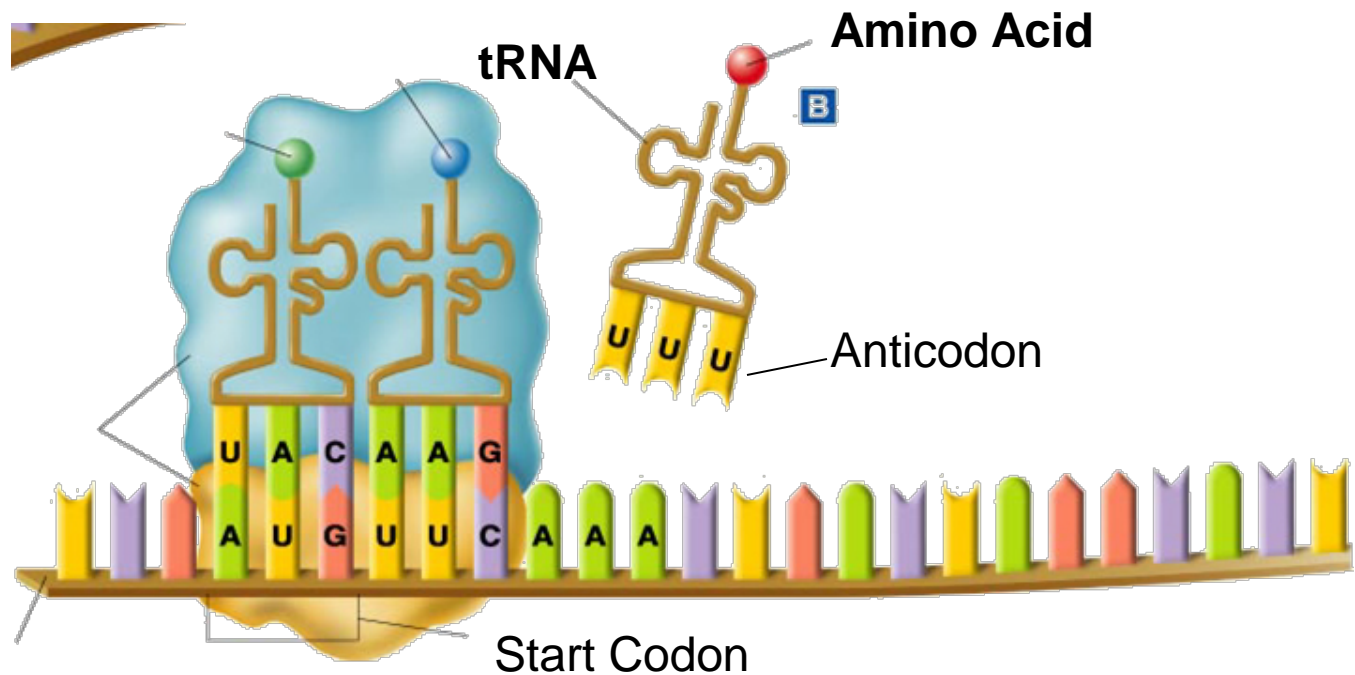
# Types of RNA

- Ribosomal RNA (rRNA)– make up the ribosome



# Types of RNA

- Transfer RNA (tRNA) – carries the amino acid to the ribosome to be added to the protein

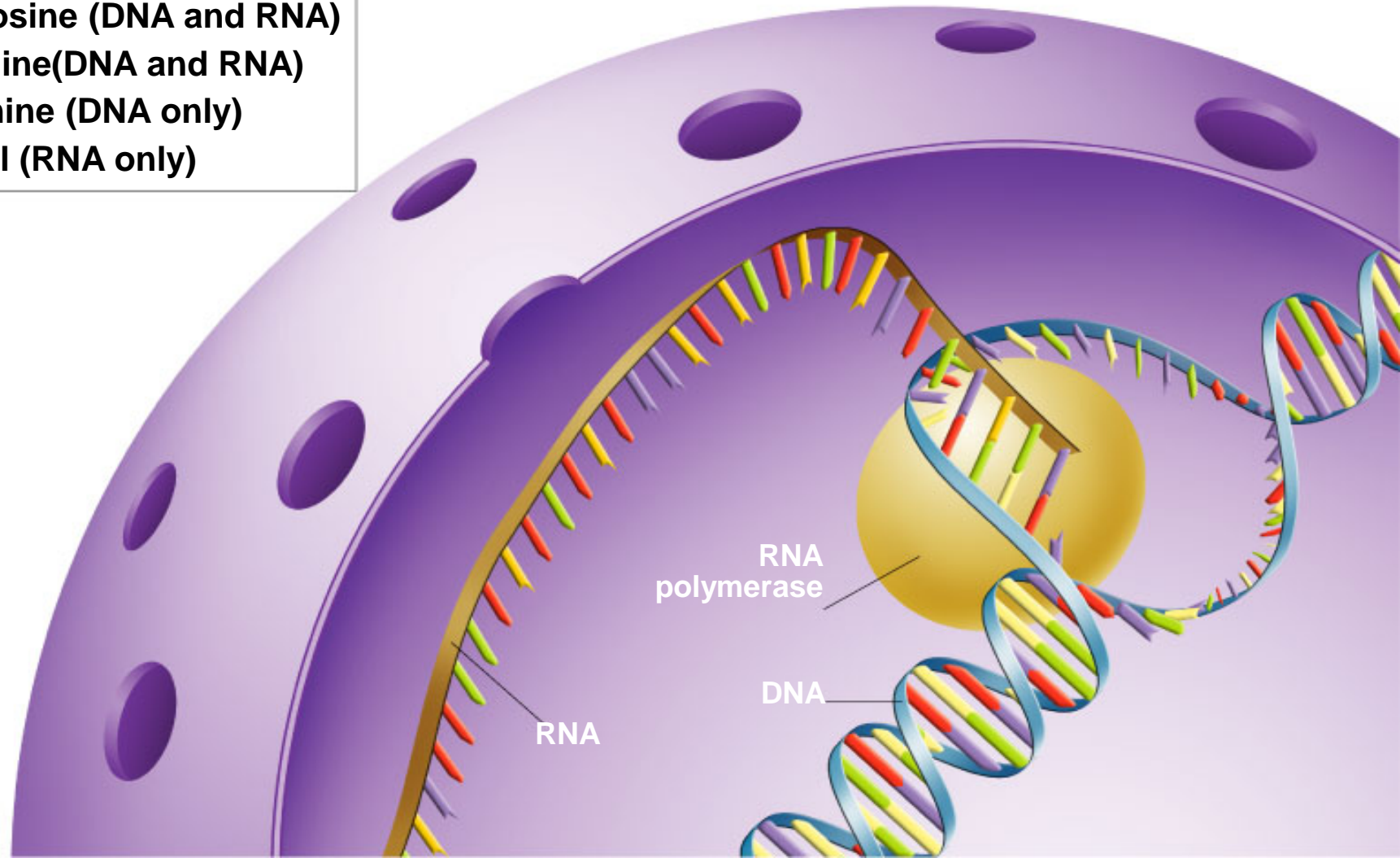


# Transcription


- RNA copy is made from a DNA template
- Uracil is used instead of Thymine
- Takes place in the nucleus
- RNA polymerase = protein that makes RNA
- RNA polymerase binds to promoter region on DNA

# Transcription

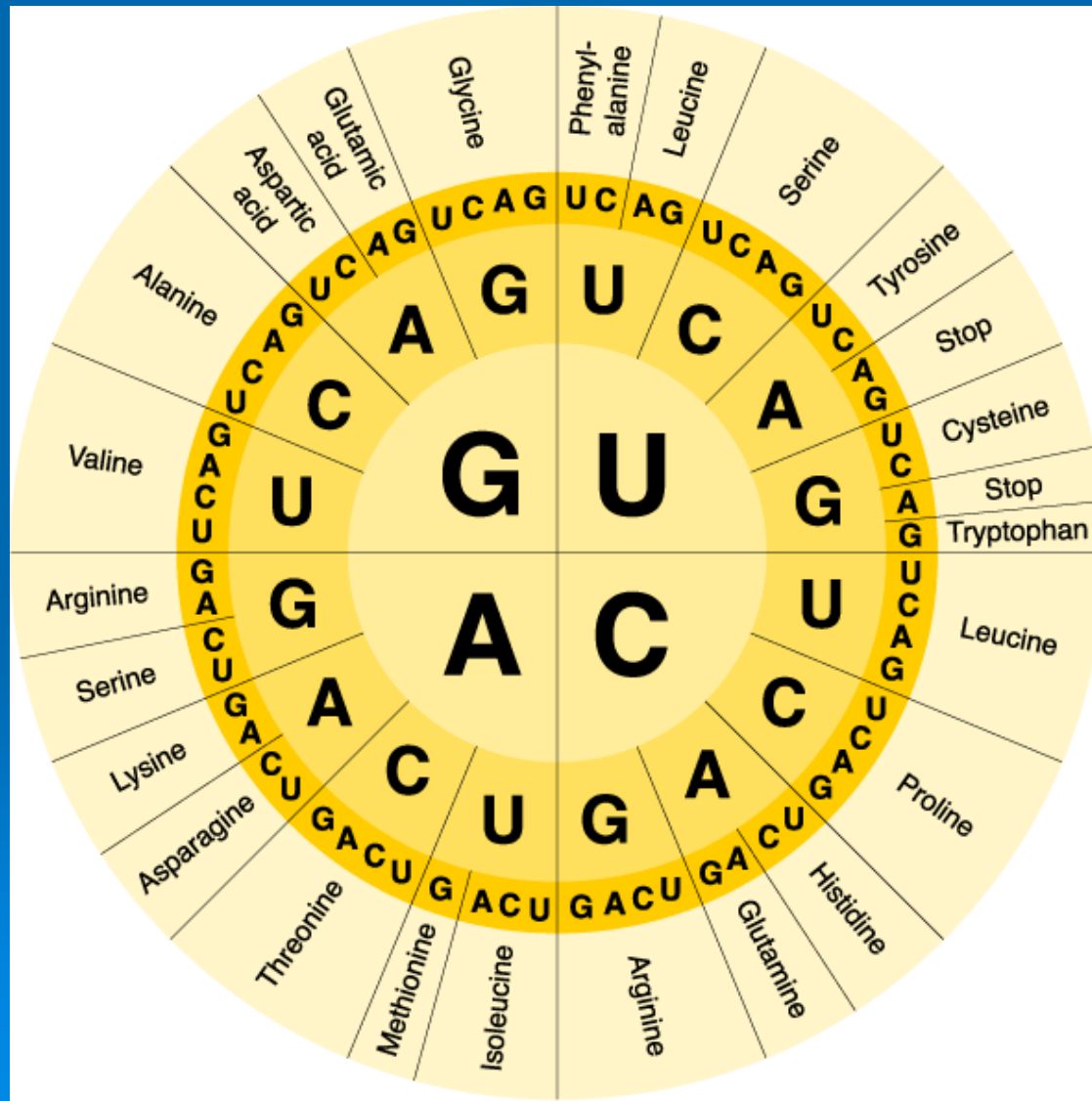
- Adenine (DNA and RNA)
- Cytosine (DNA and RNA)
- Guanine (DNA and RNA)
- Thymine (DNA only)
- Uracil (RNA only)



# Genetic Code

- Protein = polypeptide = chain of amino acids
  - Codon = 3 nucleotides
  - Each codon codes for an amino acid
  - 64 possible codons
  - 20 different amino acids
- 

# Genetic code

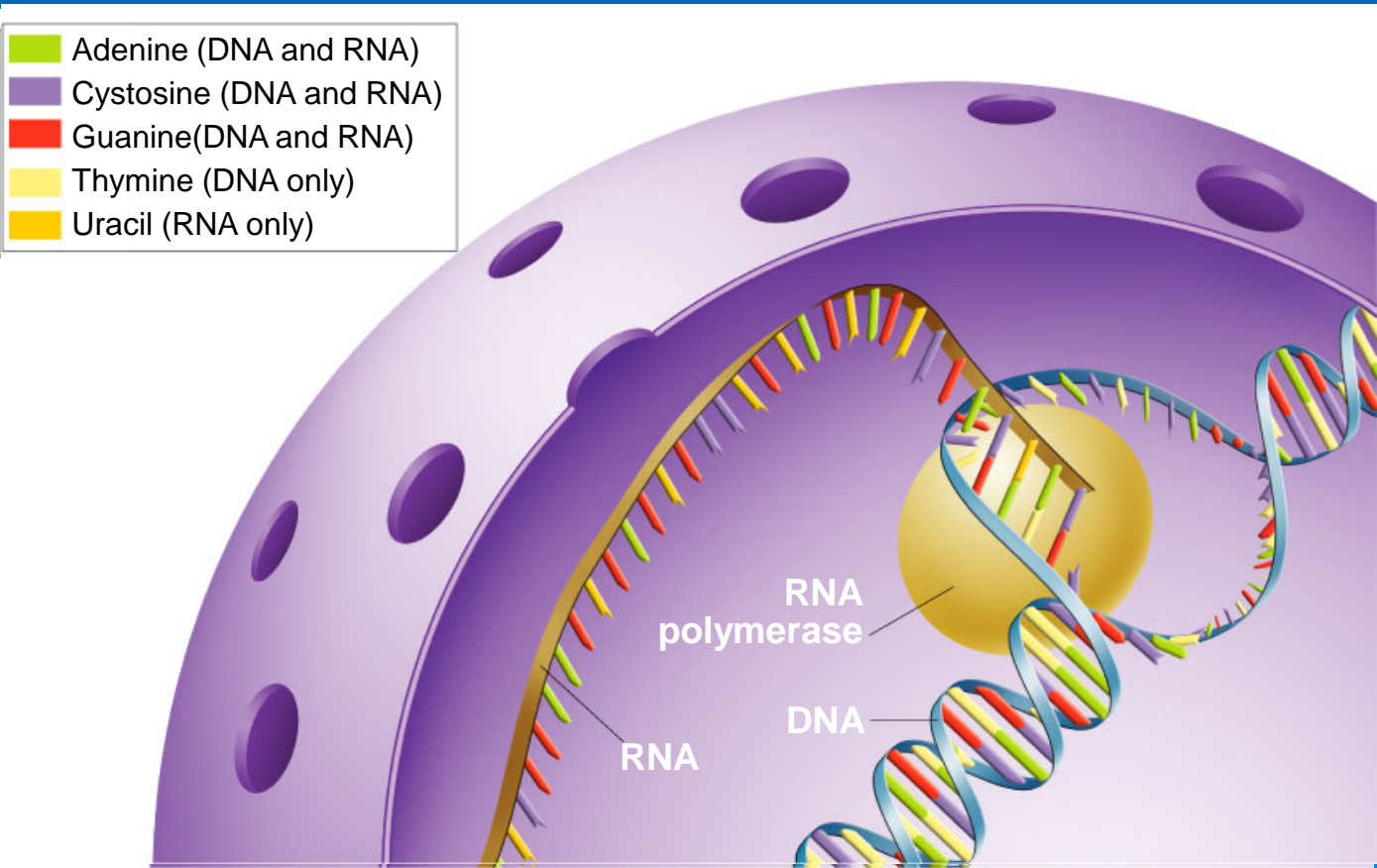


# Translation

- Occurs in the cytoplasm
- Ribosome attaches to mRNA
- reads mRNA codons
- tRNA carries amino acids to ribosome
- tRNA anticodons match with mRNA codons
- Ribosome forms peptide bonds between amino acids
- [http://www-class.unl.edu/biochem/gp2/m\\_biology/animation/gene/gene\\_a1.html](http://www-class.unl.edu/biochem/gp2/m_biology/animation/gene/gene_a1.html)

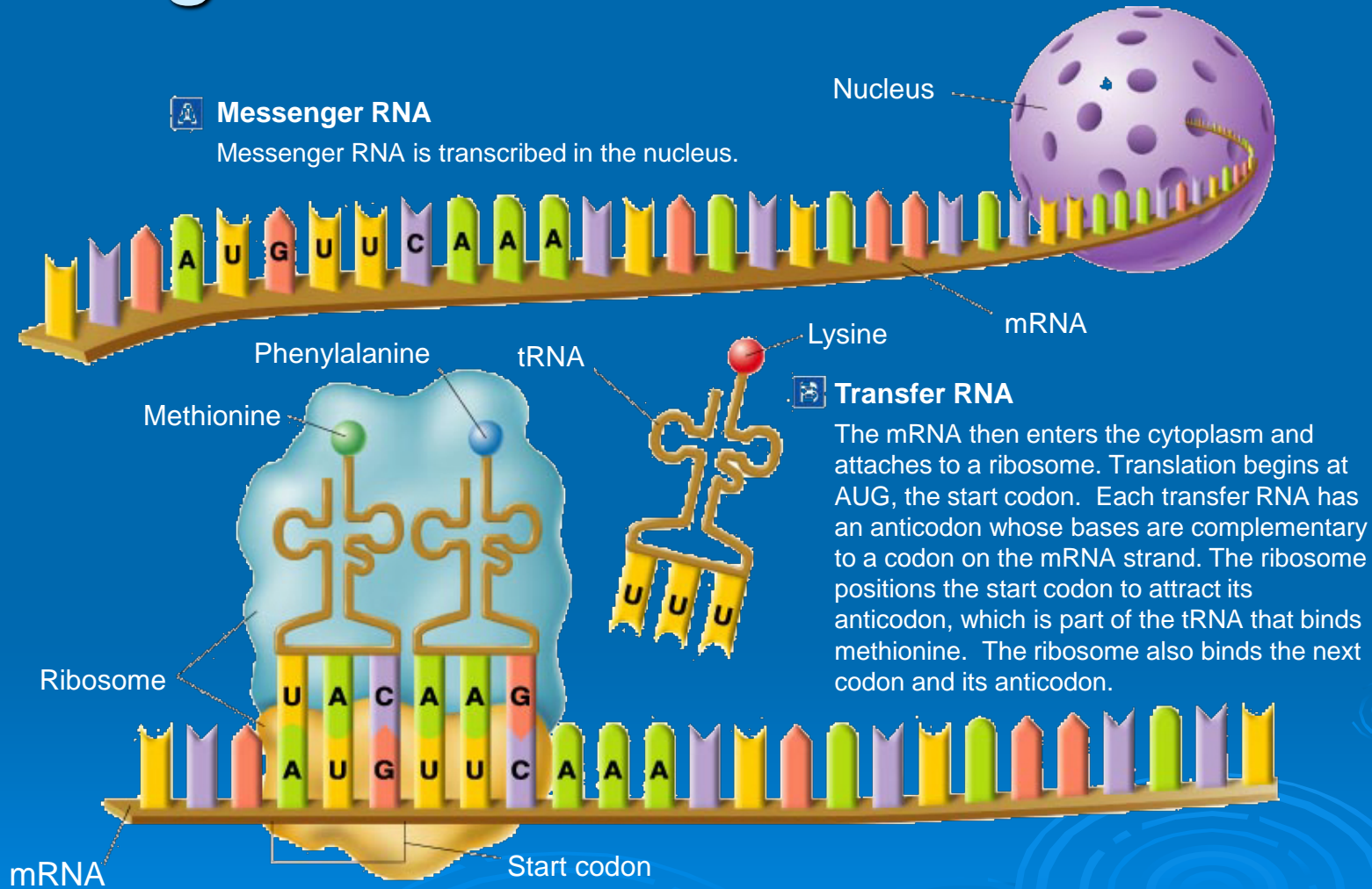
<http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/translation.swf>

- Adenine (DNA and RNA)
- Cystosine (DNA and RNA)
- Guanine(DNA and RNA)
- Thymine (DNA only)
- Uracil (RNA only)





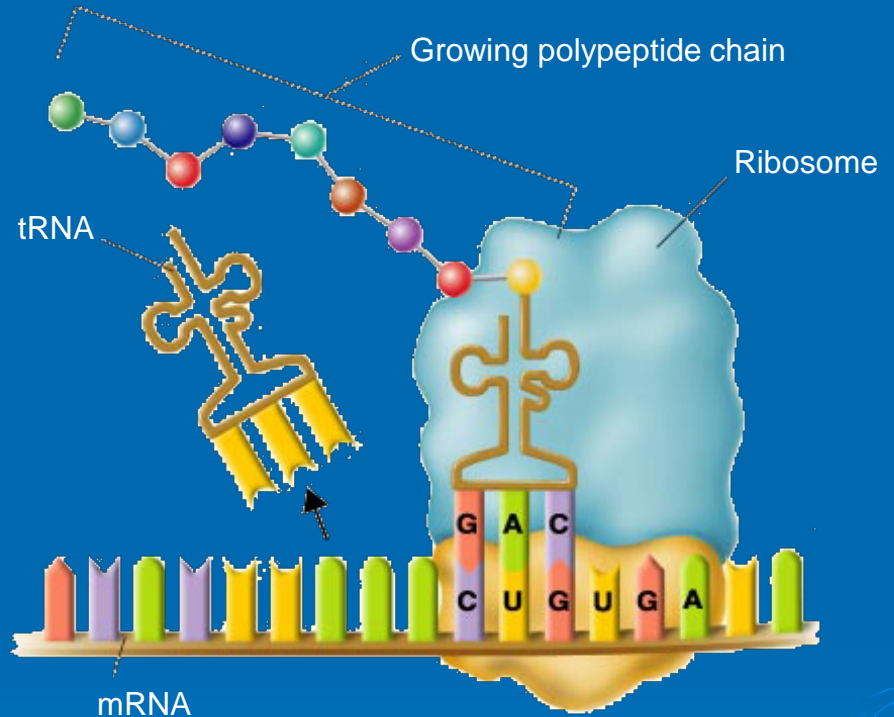
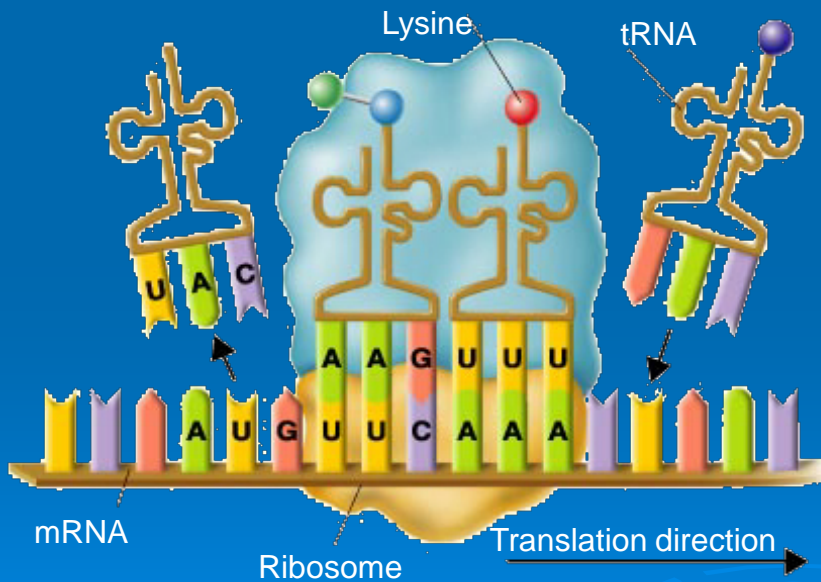
# Figure 12–18 Translation



# Figure 12–18 Translation (continued)

## The Polypeptide “Assembly Line”

The ribosome joins the two amino acids—methionine and phenylalanine—and breaks the bond between methionine and its tRNA. The tRNA floats away, allowing the ribosome to bind to another tRNA. The ribosome moves along the mRNA, binding new tRNA molecules and amino acids.



## Completing the Polypeptide

The process continues until the ribosome reaches one of the three stop codons. The result is a growing polypeptide chain.

