

Protein Synthesis



Objective: You will be able to describe the structure of a protein.

Do Now:

- Read “Proteins and Cell Functioning” on pages 47 AND 48
- What are the subunits of proteins?
- Why is the sequence of amino acids important?
- Why is the shape of a protein important?

Write one sentence about what you see happening during step 1 of the diagram.

Write one sentence about what you see happening during step 3 of the diagram.

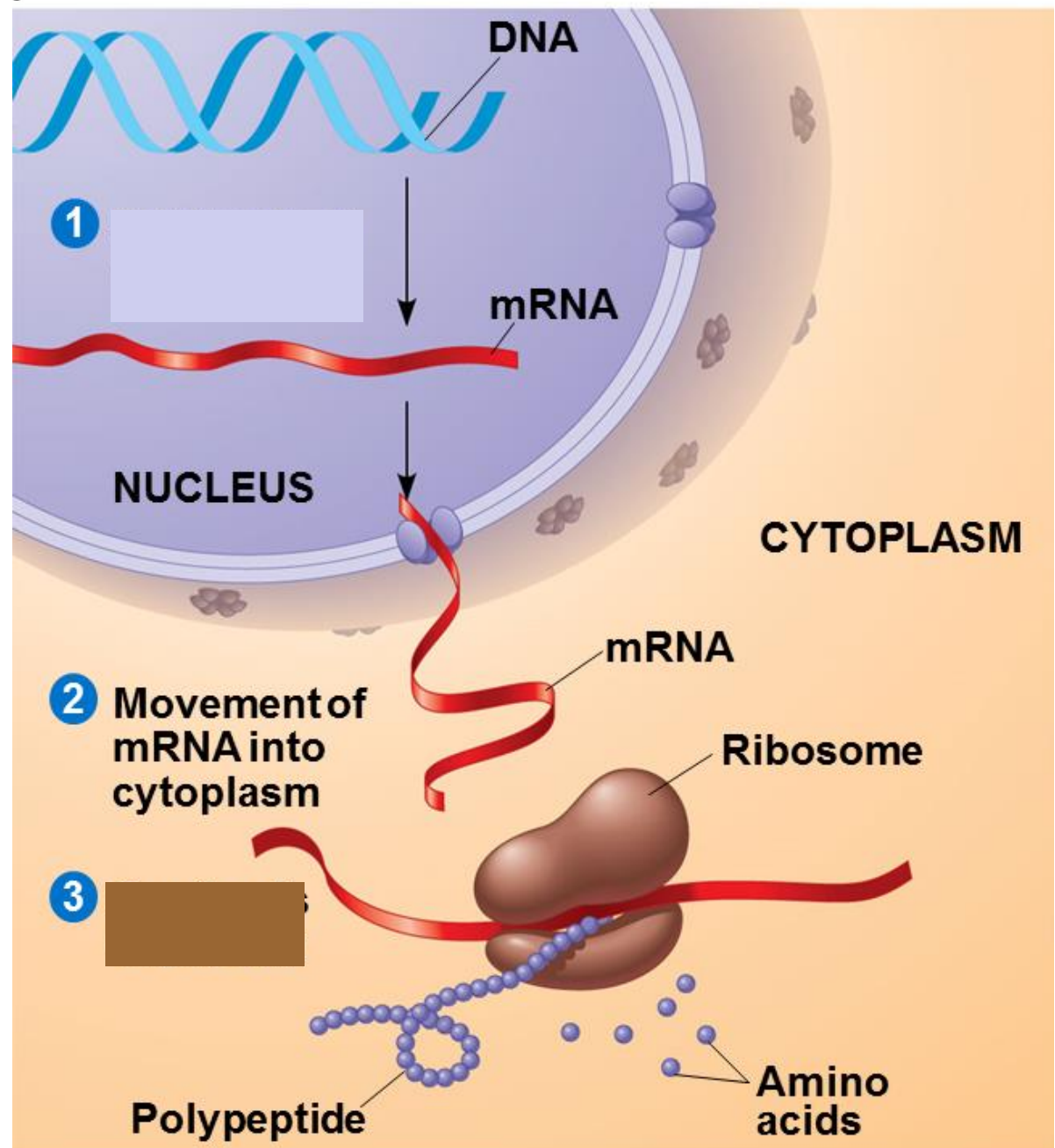
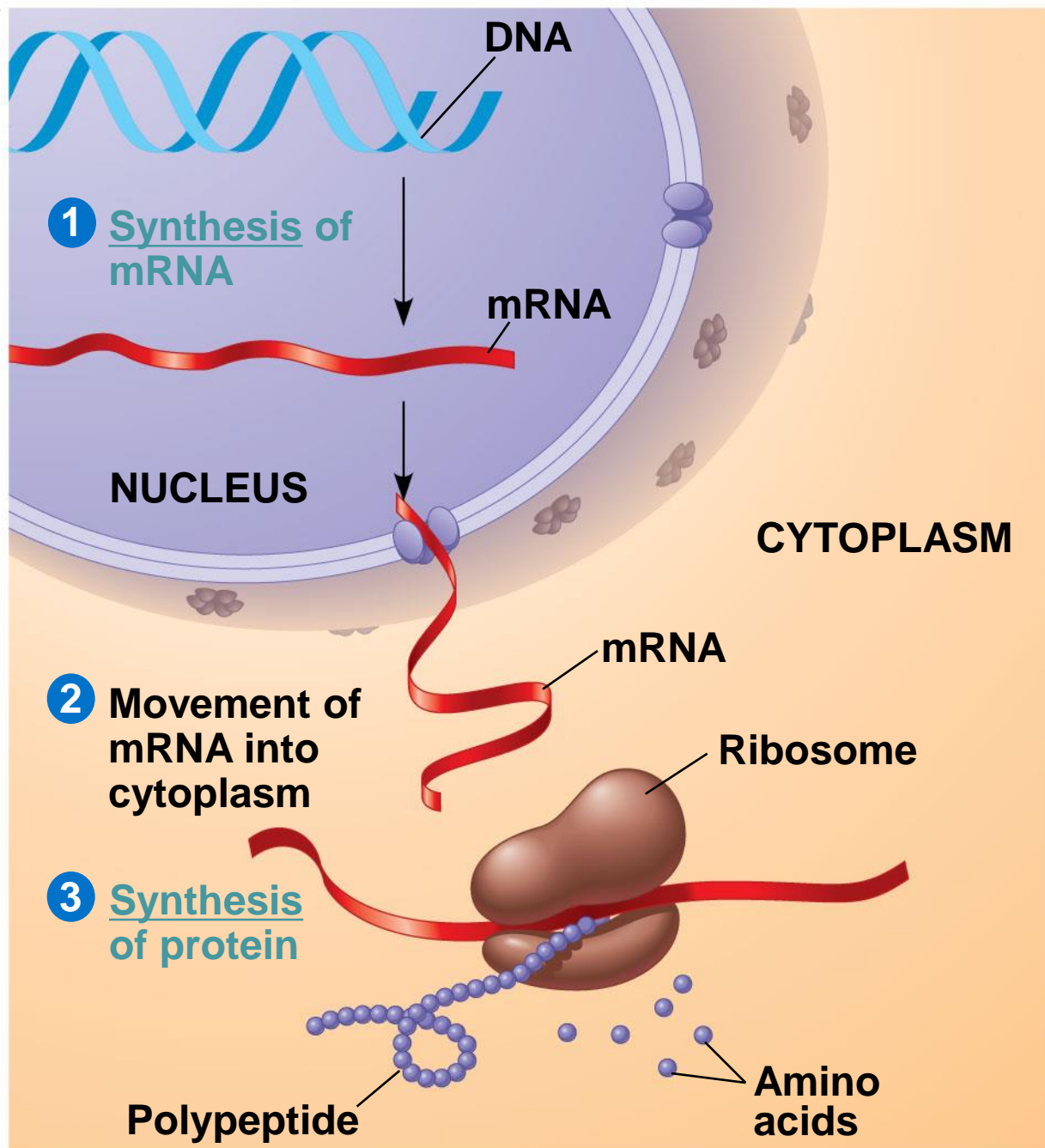


Figure 5.25-2

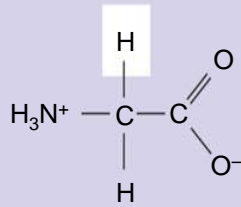


Protein Structure

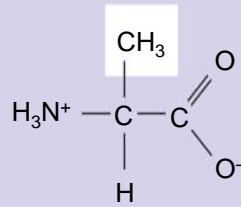
- A protein is made up of hundreds or thousands of amino acids put together
- There are 20 different amino acids
- One protein is different from another because of the order of the amino acids

Amino Acids

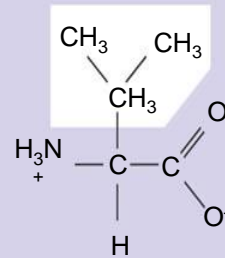
Nonpolar



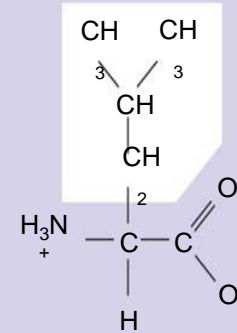
Glycine (Gly)



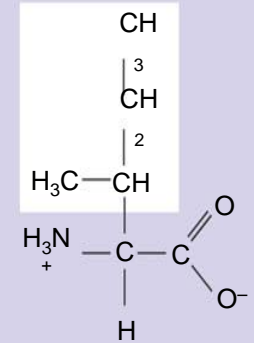
Alanine (Ala)



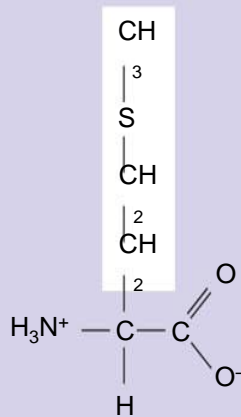
Valine (Val)



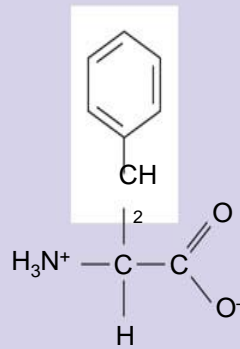
Leucine (Leu)



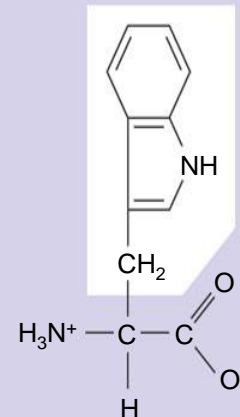
Isoleucine (Ile)



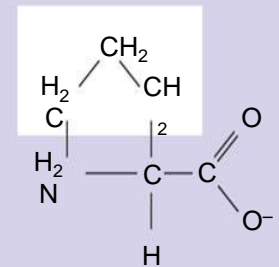
Methionine (Met)



Phenylalanine (Phe)



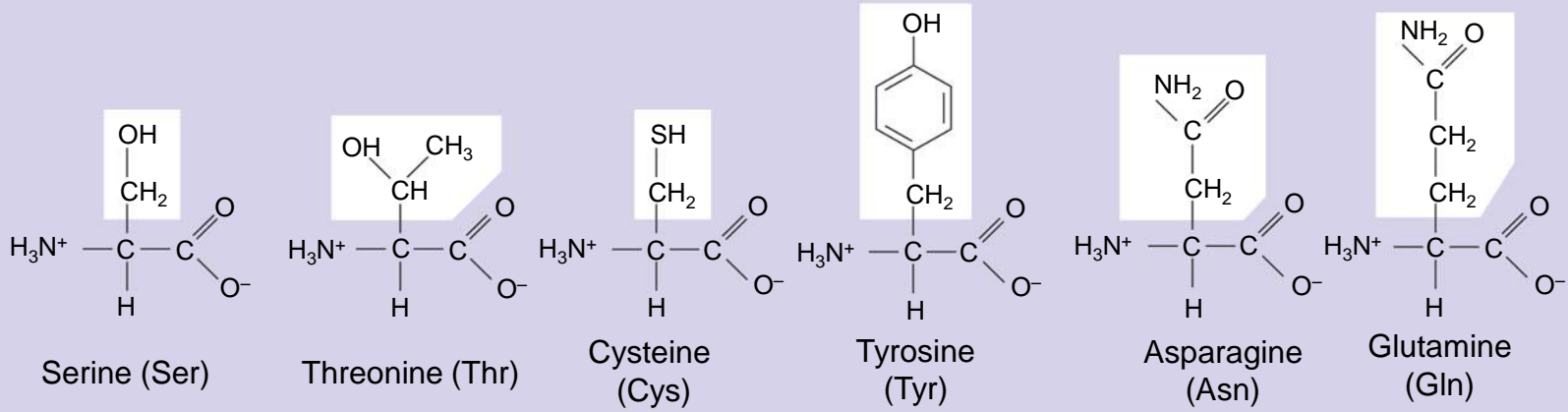
Tryptophan (Trp)



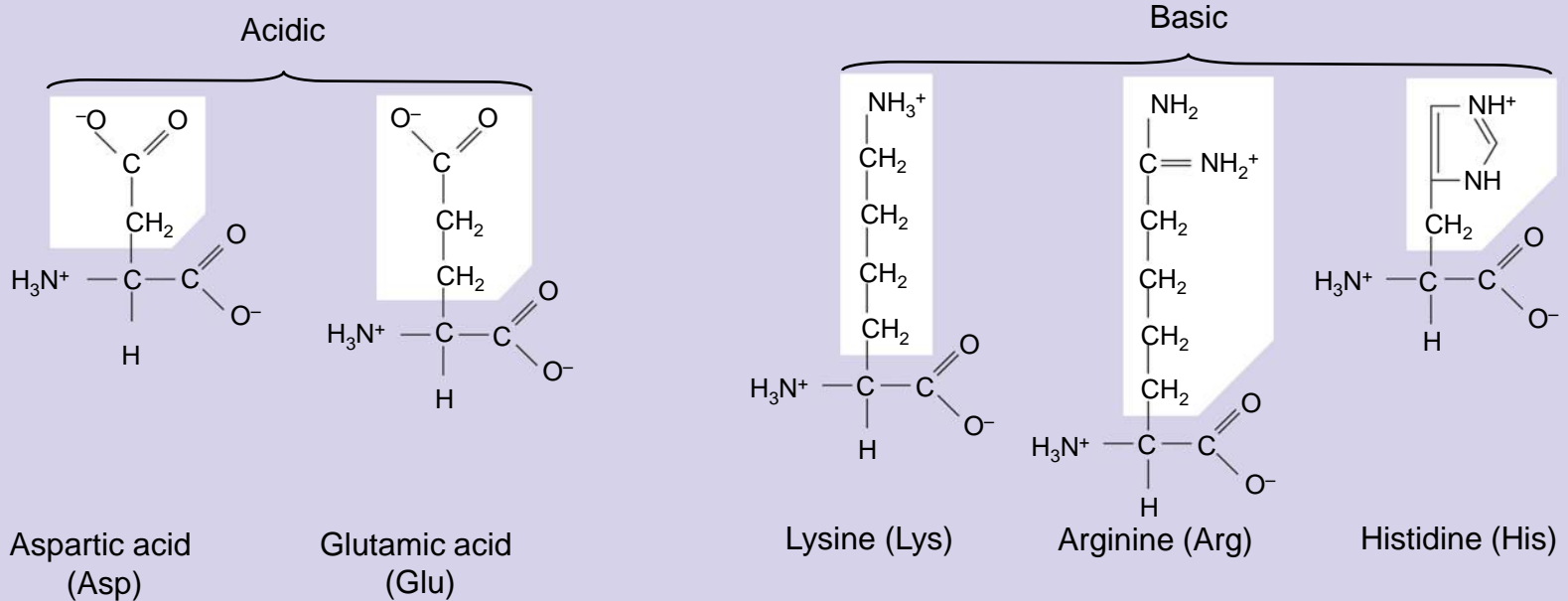
Proline (Pro)

Figure 5.17

Polar

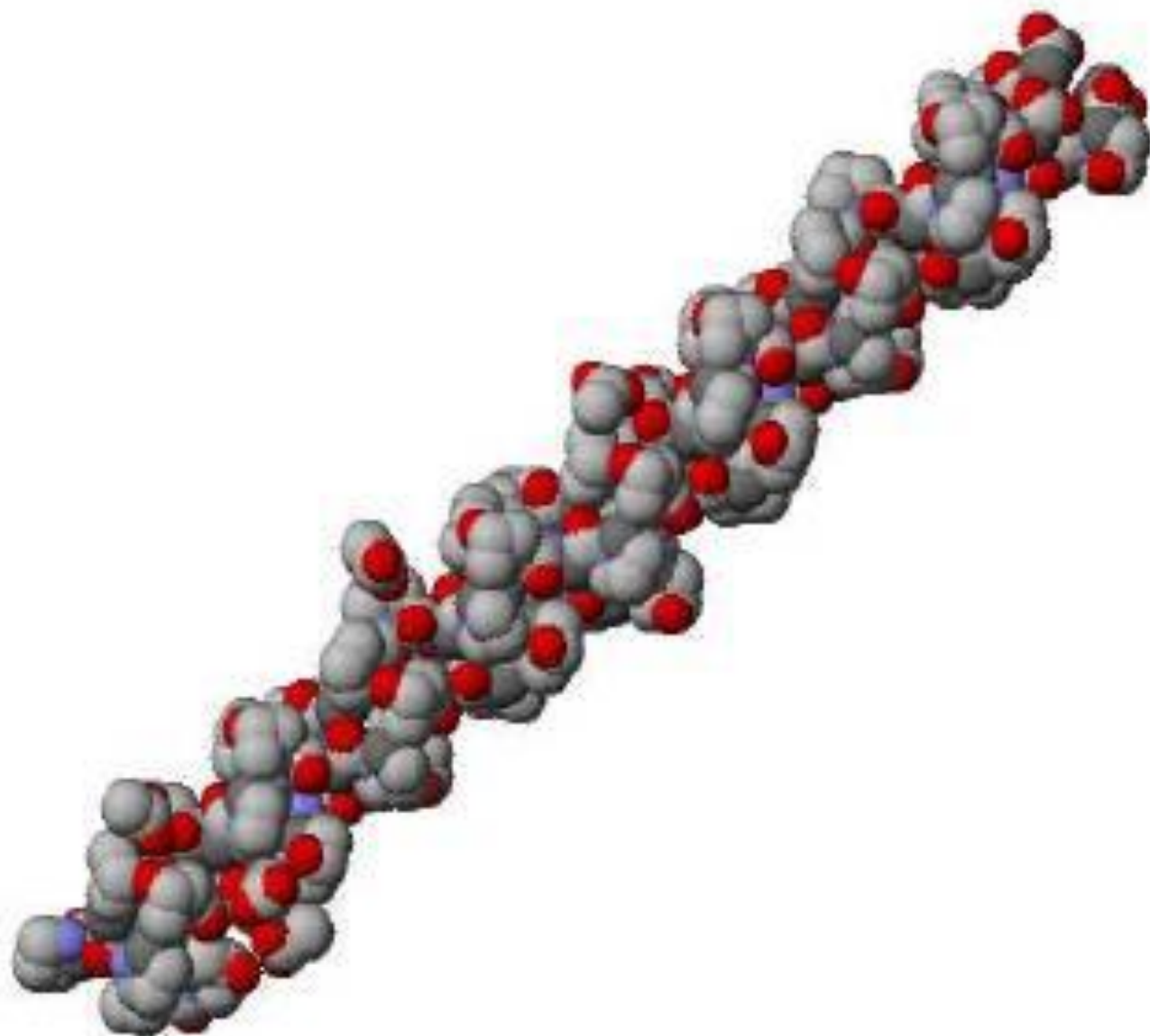


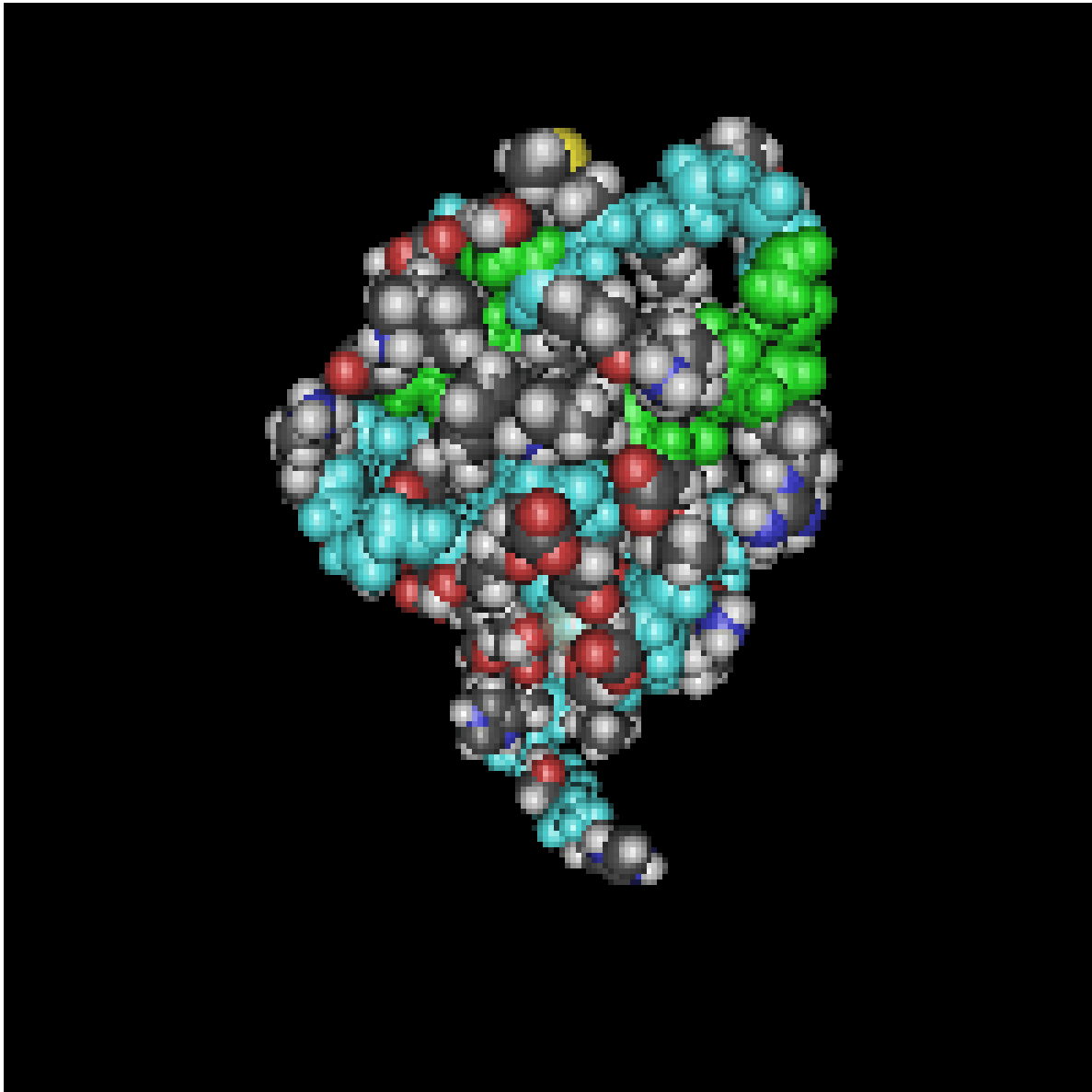
Electrically charged



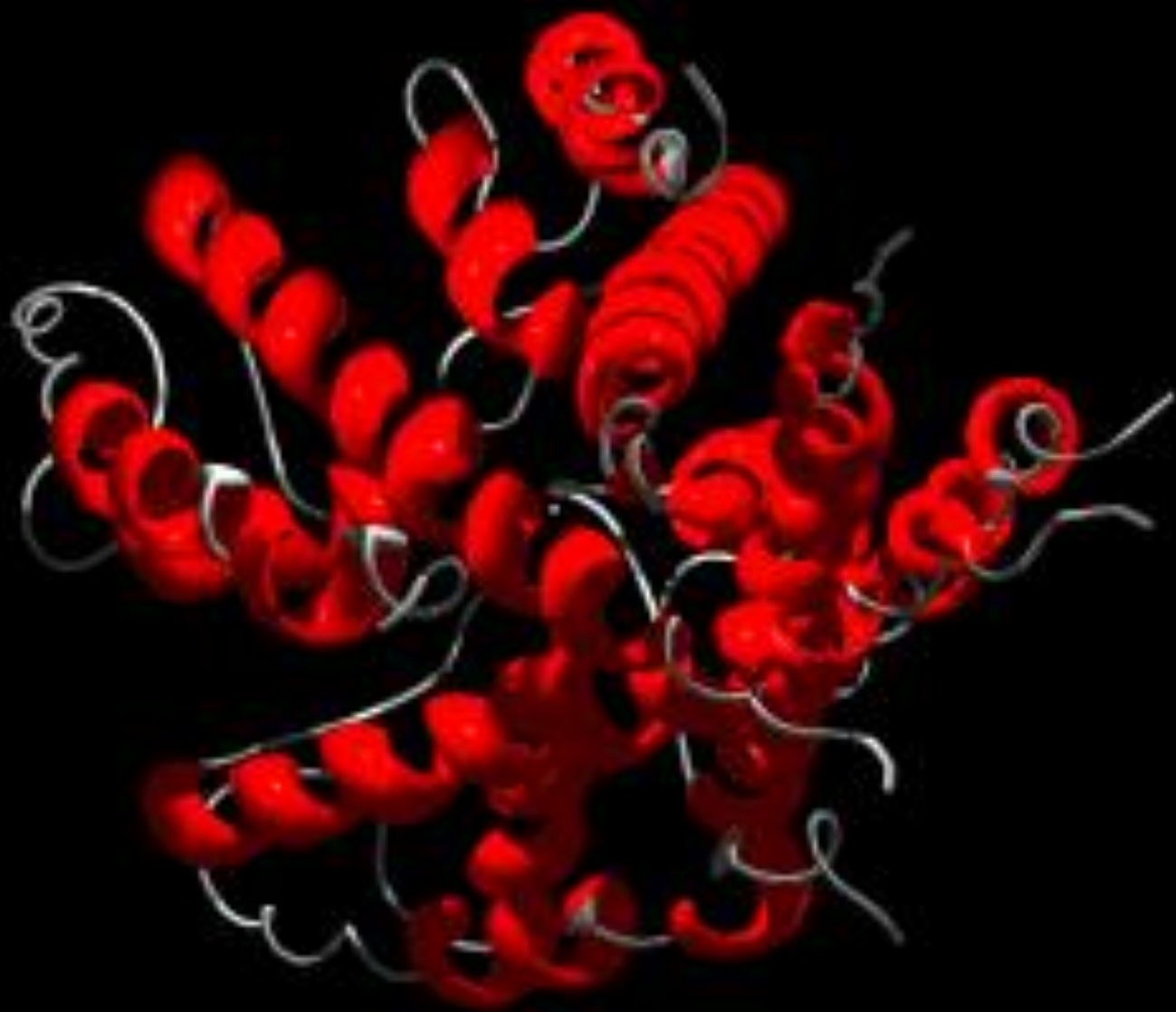
Protein shape

- Placing amino acids in a certain sequence will cause a protein to have a different shape
- The shape of the protein affects its function





1BL8



Build it!

- Use the model kits to build a protein
- You should choose:
 - 5 black sphere
 - 5 Yellow spheres
 - 3 red spheres
 - 1 blue sphere
- Arrange them anyway you want...

Shape and function

- If you change the shape of a protein it will not work in the same way
- You can change the shape of a protein by changing the order of the amino acids
- An example of this is with sickle cell anemia

Changing a protein's shape affects its function



**Normal
hemoglobin**

**Sickle-cell
hemoglobin**

Questions

1. What components make up proteins?
2. How is one protein different from another protein?
3. What directly affects the function of a protein?
4. Why do people have curly hair, wavy hair or straight hair?

Objective: You will be able to explain the processes of transcription and translation.

Do Now:

Read “Protein Synthesis” on p. 48

What is function of the “messenger” molecule?

What is the role of the “transfer” molecule?

KEEP YOUR BOOK OPEN WHEN DONE

Overview of protein synthesis

Step 1: Transcription:

The DNA is “read” to make the mRNA

Step 3: Translation:

The mRNA is “read” to make the protein

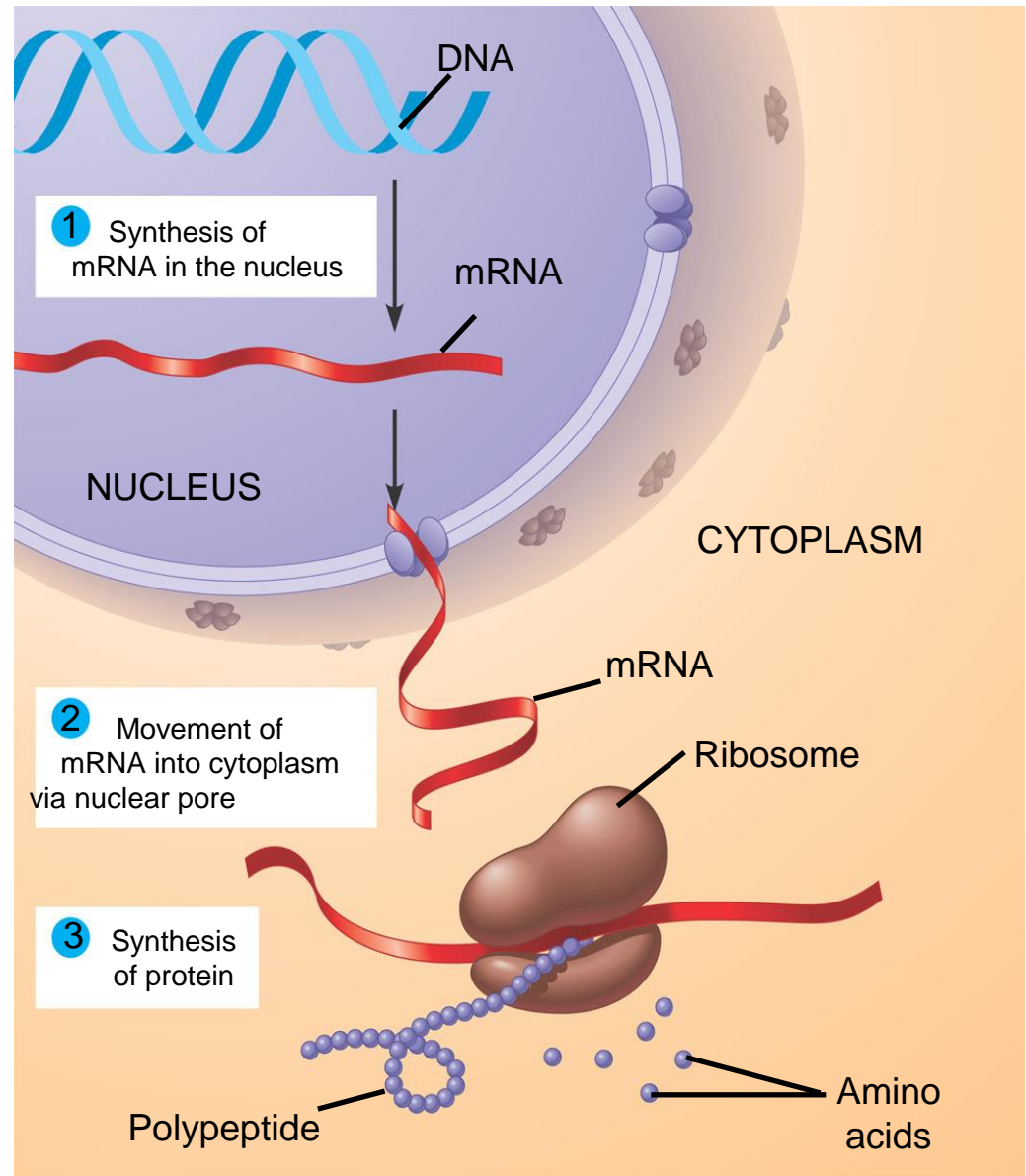
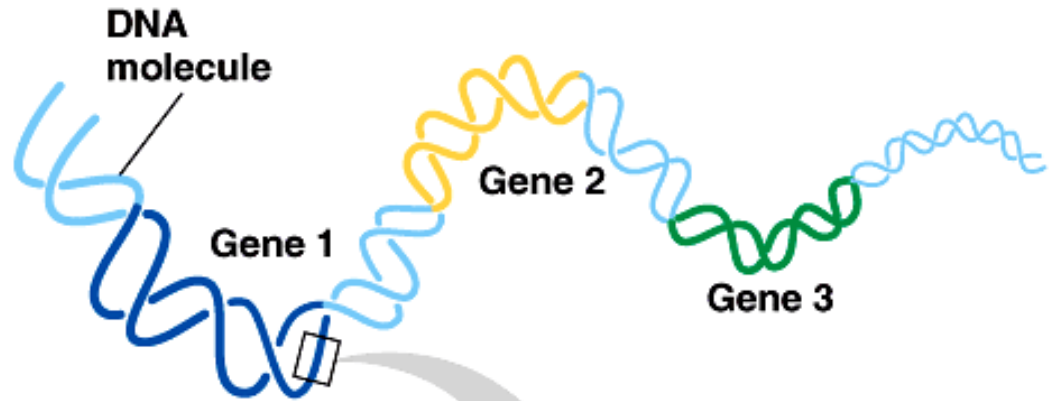


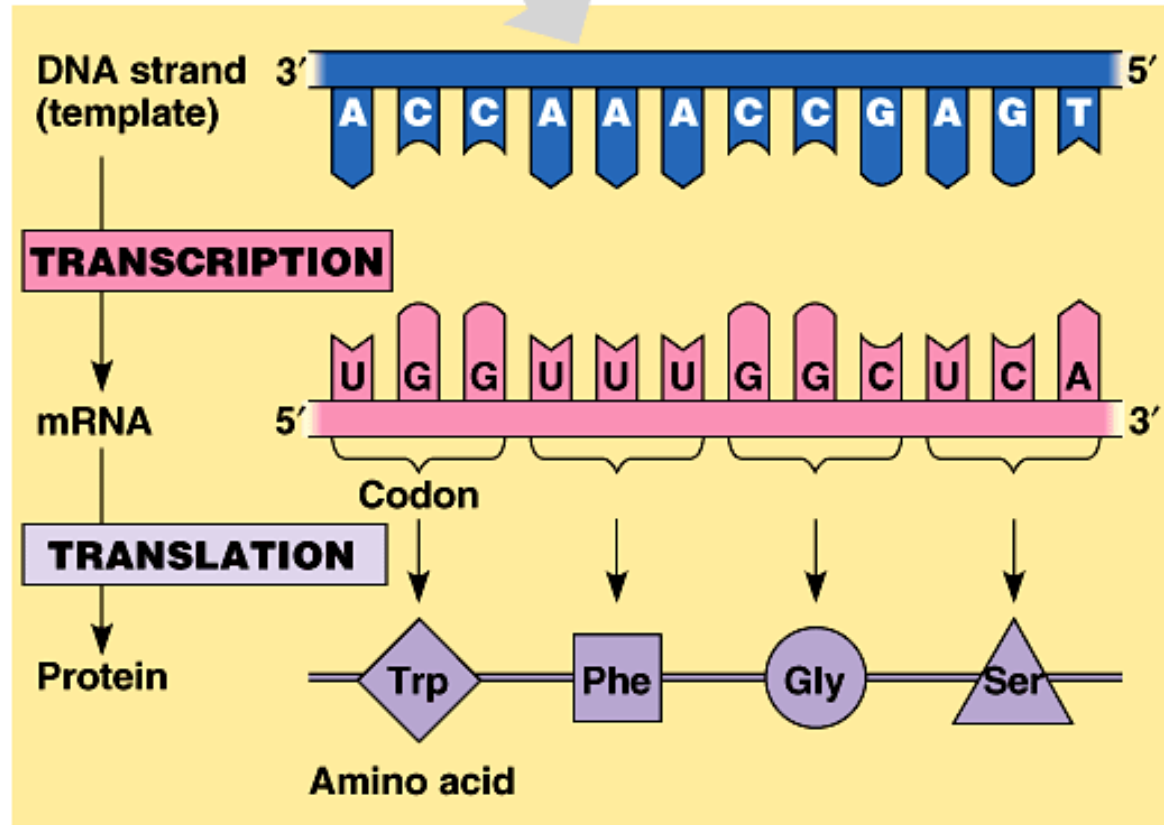
Figure 5.25

Figure 17.3 The triplet code

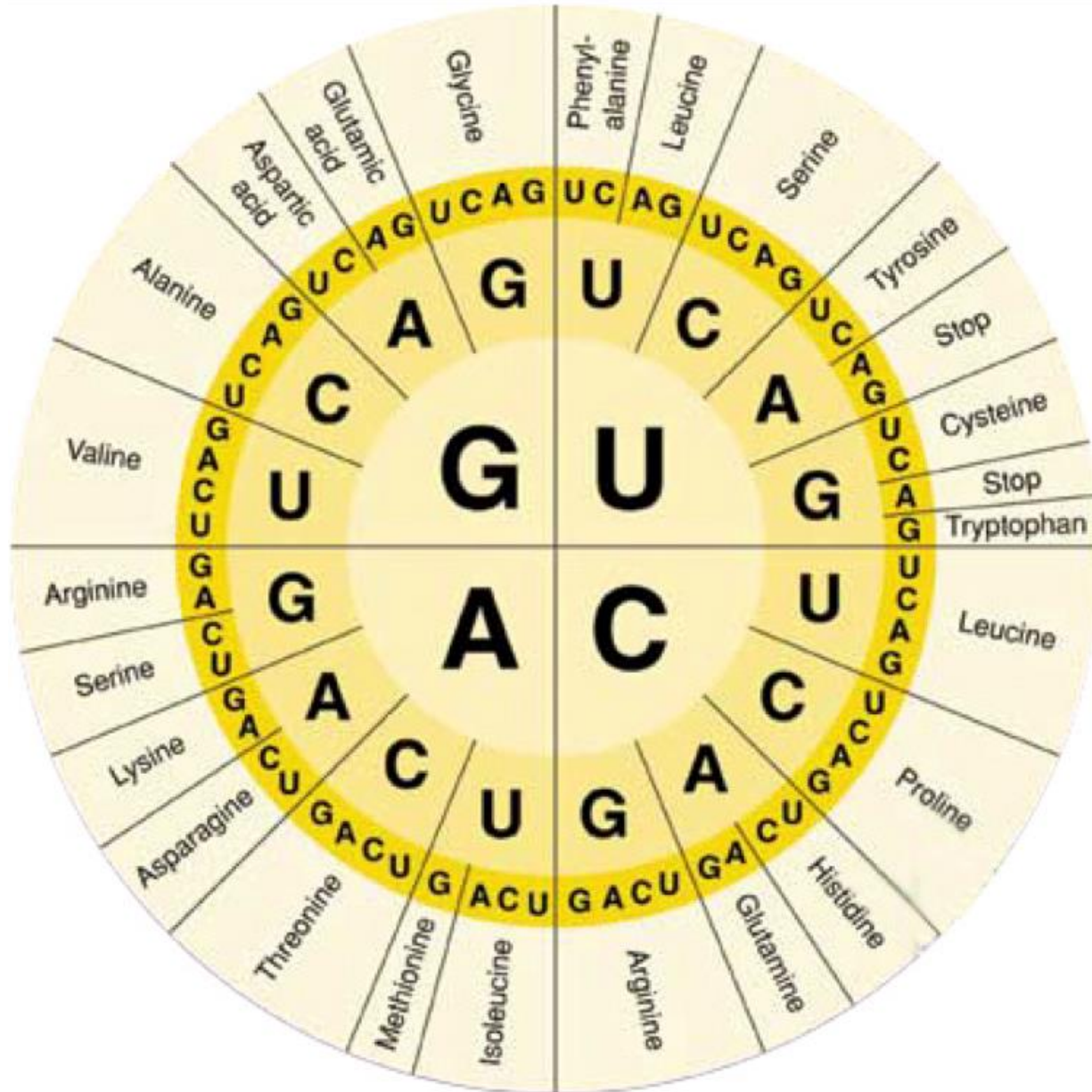
Take a few minutes and LIST what you see happening in the diagram



- When the mRNA is transcribed, it creates a triplet code
- This is because you need to a “code” that calls for each of the 20 amino acids



The dictionary of the genetic code



Paired Activity

- Create a polypeptide that is **8 amino acids** long
 - Choose any amino acids that you want, but it must have a start and stop codon
- Begin by listing the DNA, then the mRNA codon, then the amino acid

DNA: TAC - TTA

mRNA: AUG - AAU

Amino Acid: MET -

Objective: You will be able to list the steps of translation.

Do Now:

Read “Translation” on p. 303-305

When does the polypeptide stop growing?

The dictionary of the genetic code

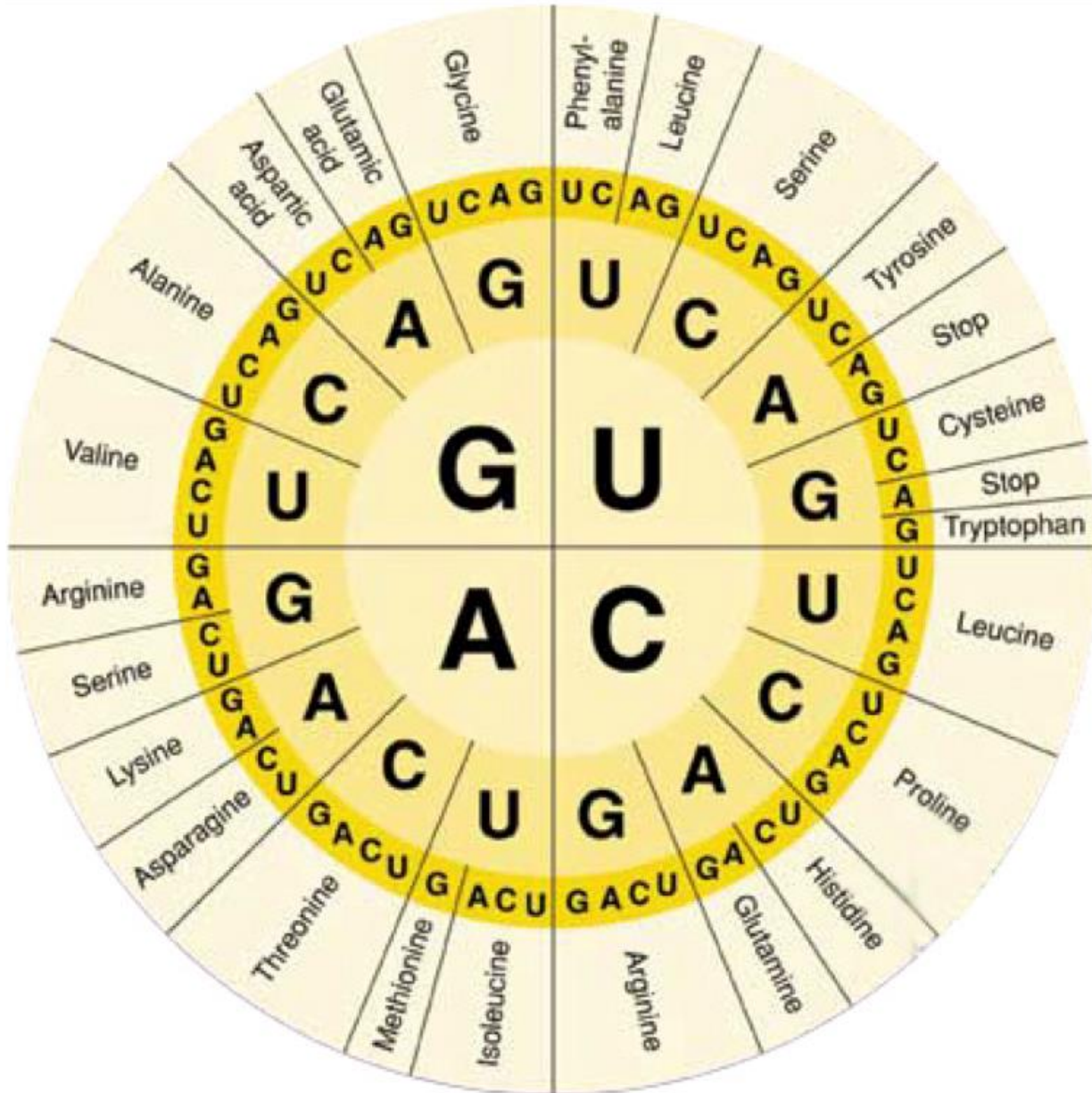


Figure 17.3 The triplet code

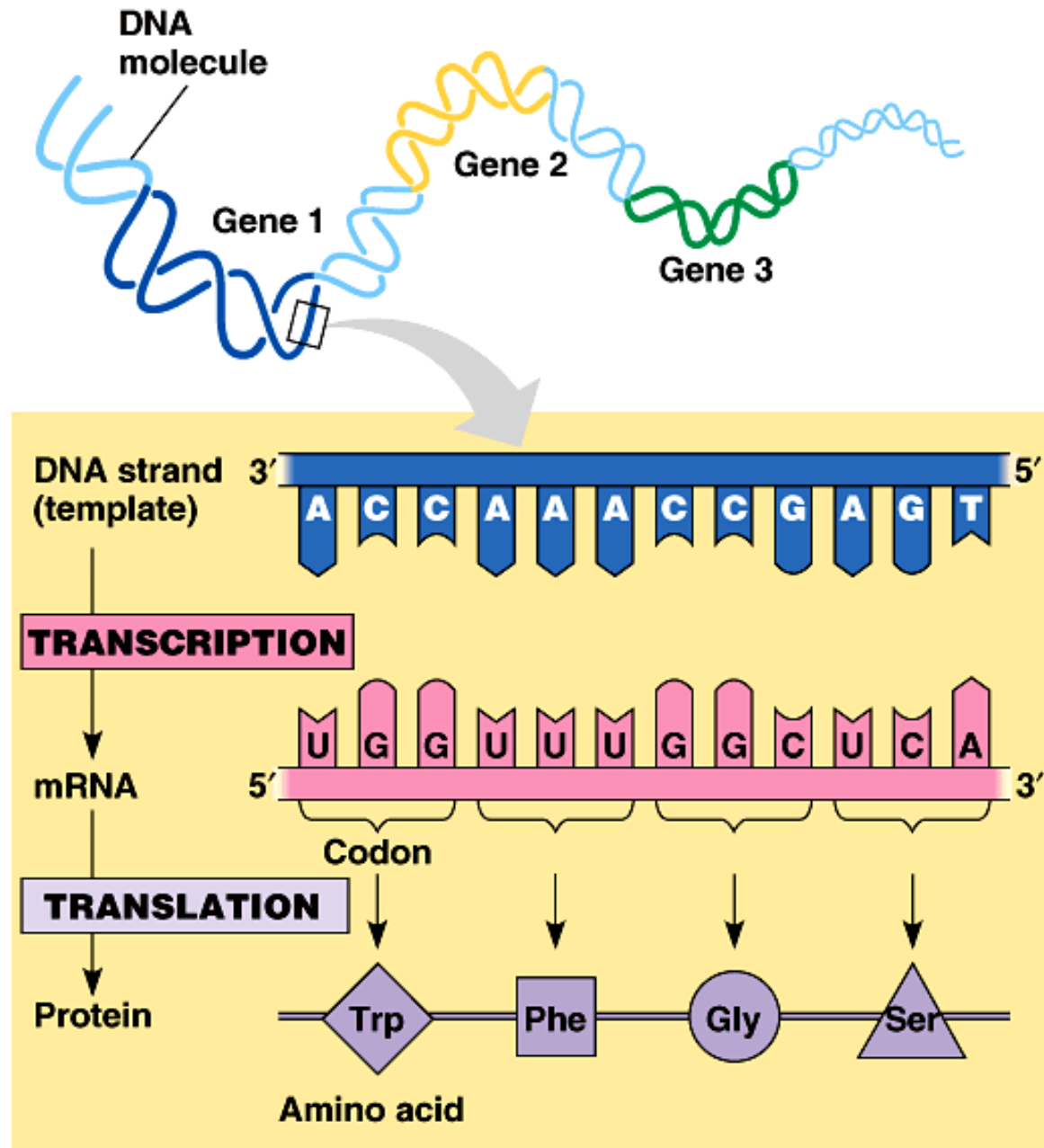


Figure 17.12 Translation: the basic concept

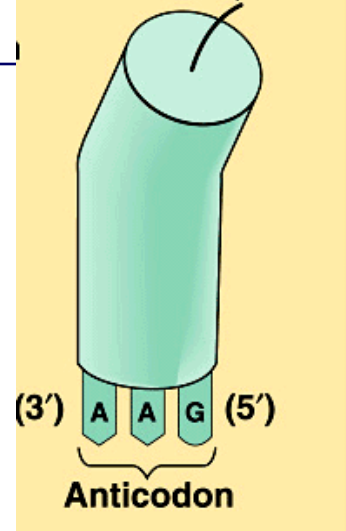
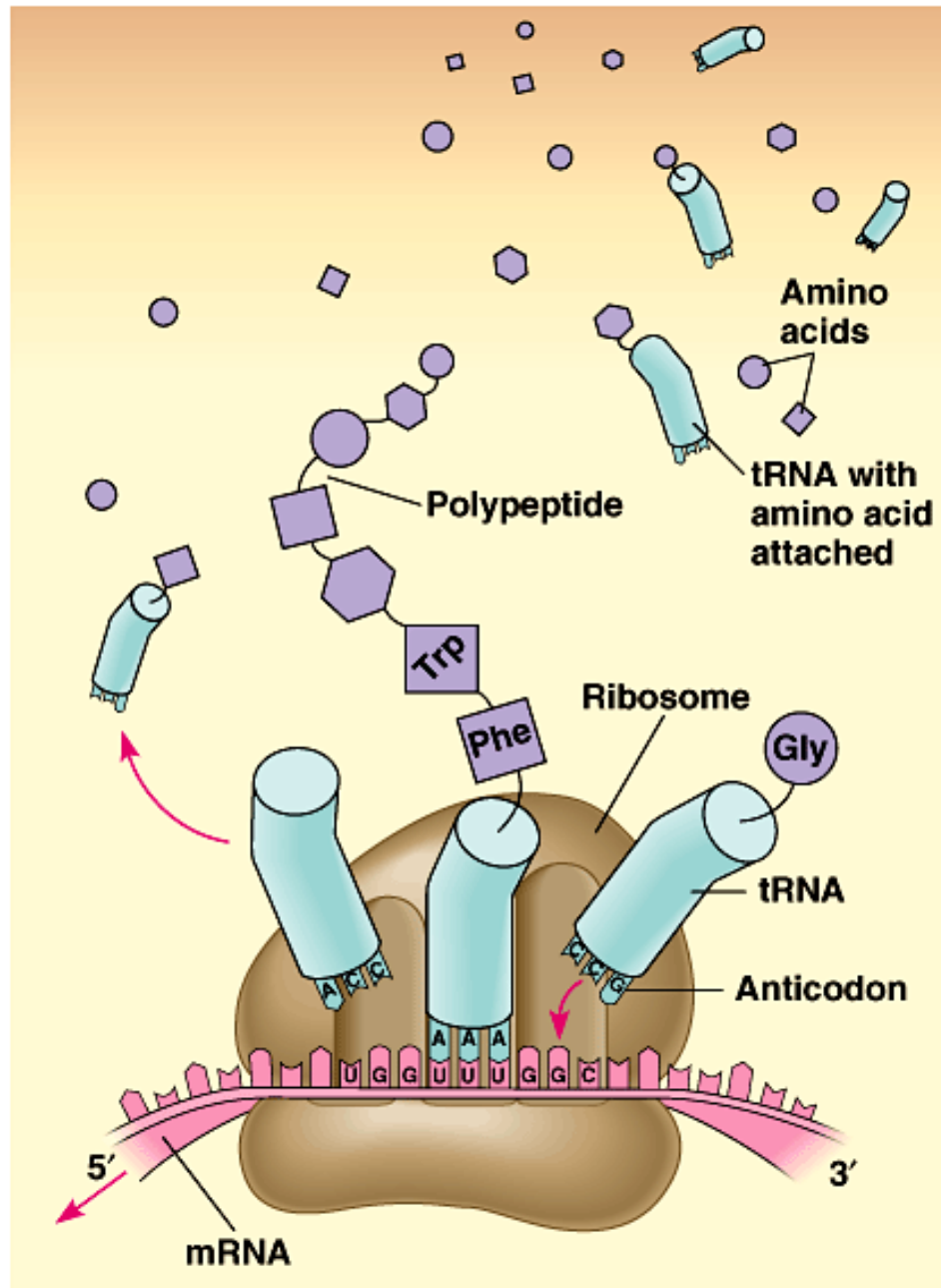
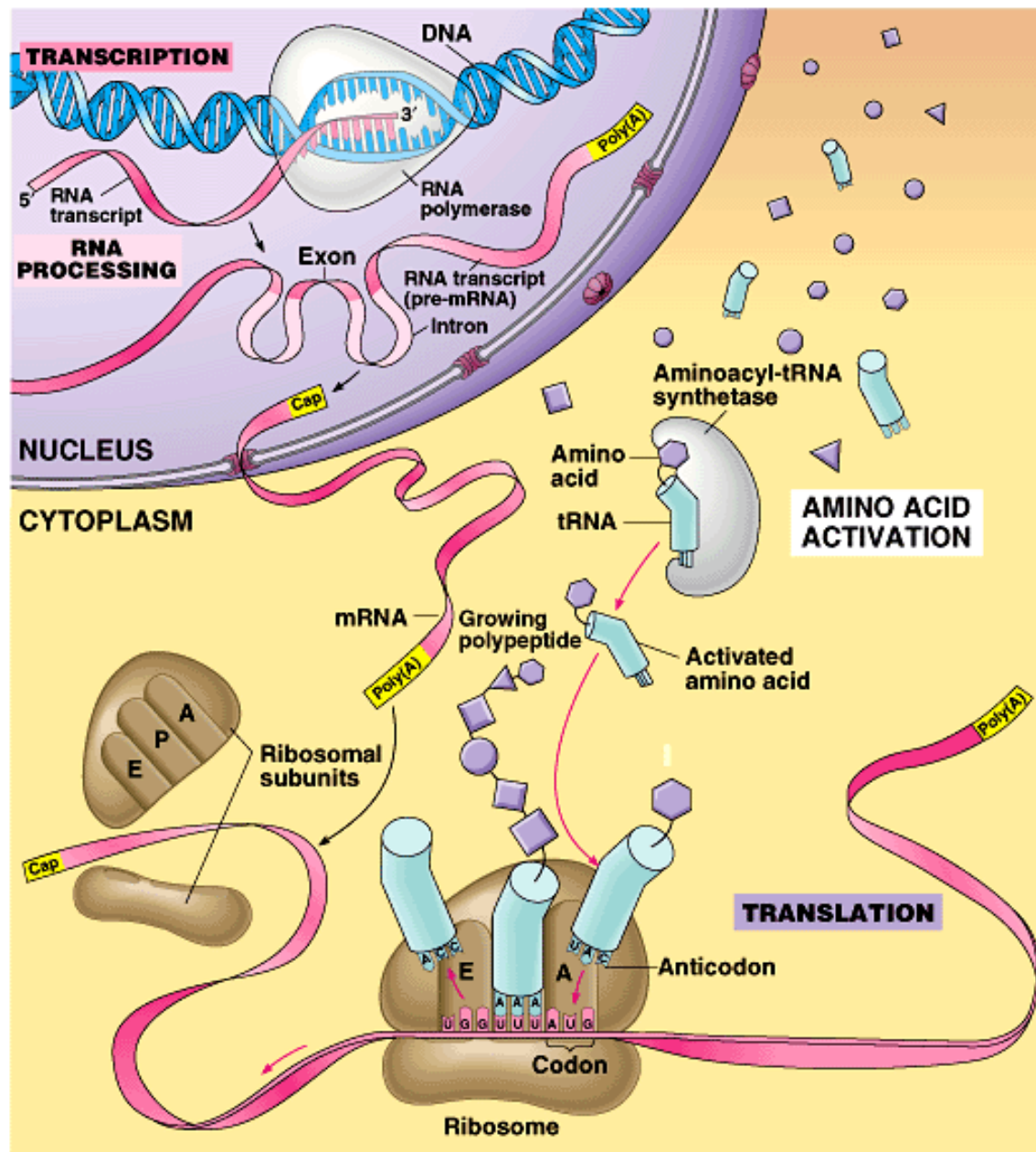


Figure 17.25 A summary of transcription and translation in a eukaryotic cell



Objective: You will be able to answer Regent's questions on protein synthesis.

Do Now:

Read all of p. 306

Why can proteins be seen as microscopic tools?

Objective: You will be able to differentiate between the different types of mutations.

Do Now:

Mutations

- Are changes in the DNA
- Can only be passed on to offspring if they occur in a sex cell
- Point mutation is a where only one or a few bases are affected

Figure 17.23 The molecular basis of sickle-cell disease: a point mutation

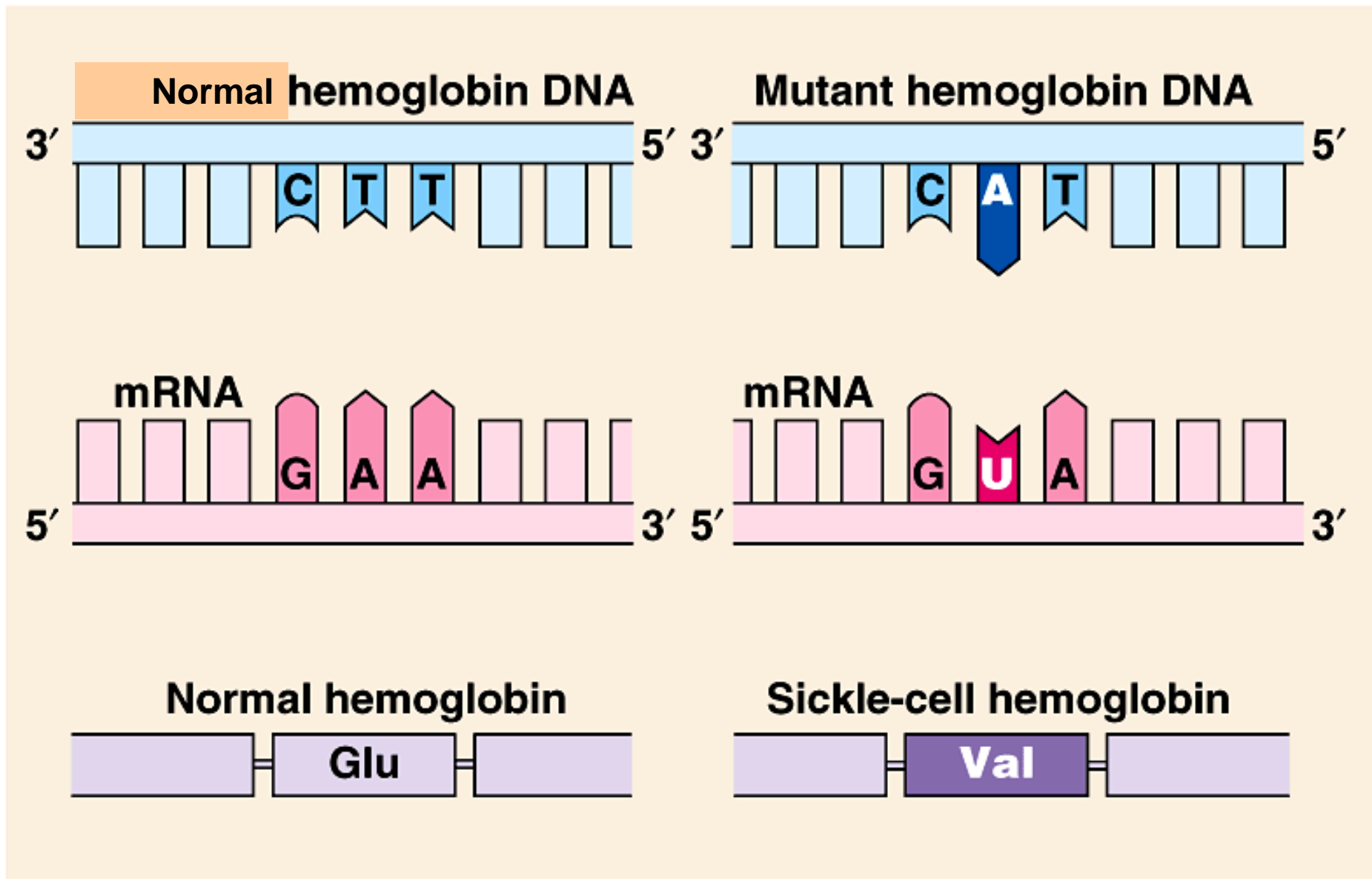
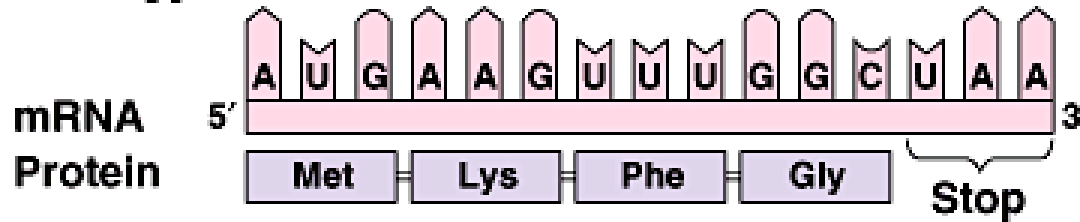


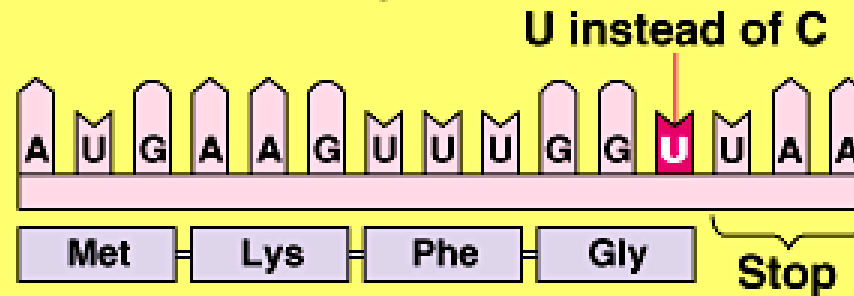
Figure 17.24 Categories and consequences of point mutations: Base-pair

Wild type

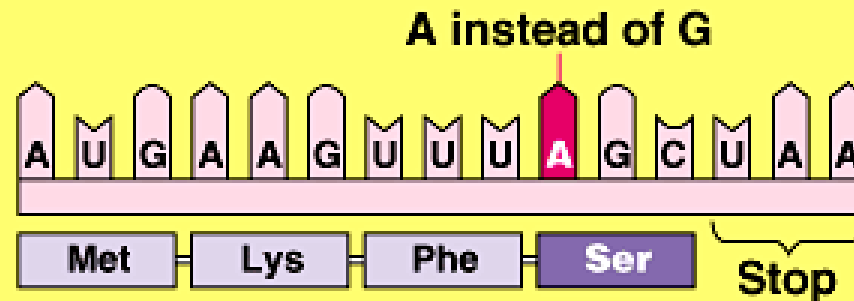


Base-pair substitution

No effect on amino acid sequence



Missense



Mutations

- Are spontaneous and random
- Naturally happen
- Increase in mutations by things like radiation, smoking, etc...

Review

Vocabulary

Pictures

Major facts

Test Questions