Review

* Proteins make up all **living** materials
* Proteins are composed of **amino acids** – there are **20** different amino acids
* Different **proteins** are made by **combining** these 20 amino acids in different combinations
* Proteins are manufactured (made) by the **ribosomes**

Function of proteins:

* Help fight **disease**
* Build new body **tissue**
* **Enzymes** used for digestion and other chemical reactions are proteins

(Enzymes **speed up** the **rate** of a reaction)

* Component of all **cell membranes**

Making a Protein—First Step

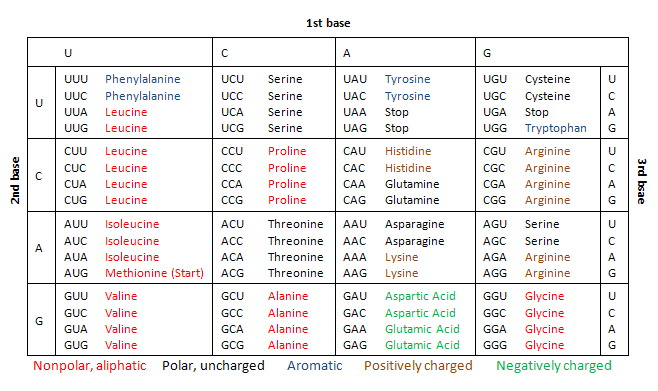
* **First Step:** **Copying** of genetic information from **DNA** to **RNA** called **Transcription**
* **Why?** DNA has the **genetic code** for the **protein** that needs to be made, but proteins are made by the ribosomes—ribosomes are outside the **nucleus** in the **cytoplasm**.
* DNA is too **large** to leave the nucleus (**double** stranded), but RNA **can leave** the nucleus (**single** stranded).
* Part of DNA temporarily **unzips** and is used as a **template** to assemble **complementary** nucleotides into **messenger RNA** (mRNA).
* mRNA then goes through the **pores** of the nucleus with the DNA **code** and attaches to the **ribosome**.

**Making a Protein—Translation**

* **Second Step:** **Decoding** of mRNA into a **protein** is called **Translation**.
* **Transfer RNA** (tRNA) carries **amino acids** from the cytoplasm to the **ribosome**.
* These amino acids come from the **food we eat**. Proteins we eat are broken down into individual **amino acids** and then simply **rearranged** into new **proteins** according to the needs and directions of our **DNA**.

Translation, cont.,

* A series of **three** adjacent **bases** in an mRNA molecule codes for a specific amino acid—called a **codon**.
* A triplet of nucleotides in tRNA that is **complementary** to the **codon** in mRNA—called an **anticodon**.
* Each tRNA codes for a **different** amino acid.
* mRNA carrying the **DNA instructions** and tRNA carrying **amino acids** meet in the **ribosomes**.
* Amino acids are joined together to make a **protein**.
  + Polypeptide = **Protein**



**2nd Base**

**3rd Base**

**1st Base**