Weekly Homework 3

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About ribosomes

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This homework will discuss and present some basic concepts about ribosomes. We will illustrate what they are, their structure and their main function inside a cell. It is well known that ribosomes were discovered by the Romanian scientist George Palade, during his stay in the United States. Palade was also an alumnus from the University of Bucharest, but his breakthrough happened after he left Romania. For these particles, ribosomes, he and his associates managed to obtain the Nobel Prize in 1974.

In order to define these particles called ribosomes, we must first mention where they are. Ribosomes can be found only in the part of the DNA in charge of coding the active proteins. There are also some other parts of the DNA that are noncoding DNA and some other that do not need to be activated. Starting with ribosomes' composing elements, they are formed from RNA (ribonucleic acid) and proteins. By reading the RNA, ribosomes manage to synthesize the corresponding proteins (which are in nuce a string or a sequence of amino acids - depending on the sequence, each protein encodes a different function). Moving forward, each ribosome has two major parts entitled in an intuitive manner: the large subunit and the small subunit. Both of these parts contain of course both RNA (ribosomal RNA since it is inside the ribosome) and proteins, but they differ in a couple of aspects. While the large subunit has the purpose of binding with its implicit small subunit, the transmission RNA and the actual sequences of amino acids, the small subunit is the one in charge of securing the connection with the messenger RNA. Depending on the location of the ribosome (either freely floating or bound to a membrane), they release the corresponding synthesized

protein.

The process of synthesizing proteins takes place by using both ribosome's components: the RNA and the aminoacids sequences and it has two steps: transcription and translation. Between the small subunit and the large subunit, the messenger RNA is formed and each part from it will be moved forward to the second step. In this step, each ribosome's RNA part will be connected with the complementary base from one of the DNA's strands by an enzyme called RNA polymerase, thus creating the messenger RNA. Afterward, the mRNA goes inside the large unit for the translation step where the transmission RNA is found. Each of these tRNAs is looking for their complementary base (composed of three nucleobases) and when they found their corresponding portion in the newly created mRNA, they transfer forward their amino acid sequence. Due to the tRNA's help, the newly synthesized protein is then merged with the rest of the growing peptide chain.

Some other interesting aspect is how we can decode what aminoacid each tRNA is transmitting based on the chosen codon (those three consecutive nucleobases from the mRNA). There is the so-called mRNA Codon Chart, a two-dimensional 4x4 matrix in which each cell represents the aminoacid created from each row, each column and a variation for the third parameter.

This being said, these are the basic information about ribosomes, their components and what are they useful for. Ribosomes play this significant role in synthesizing proteins, which basically are critical components to each one of us' body structures and functions.