

Proteins and DNA

Question: What are proteins and amino acids?

Answer: Proteins constitute the major part of the solid material in our bodies. Muscles, for instance, get both their firmness and mobility from proteins. In all cells of the body it is proteins that handle the chemical processes that are going on, utilizing the foodstuffs for the purposes of the living organism. For example, when you eat sugar, it is converted by different proteins to carbon dioxide and water through a series of chemical reactions. Together these reactions collect the energy we need to be able to move our muscles and for all other activities that consume energy. One particular protein is responsible for each transformation, so a great many proteins are necessary.

Proteins are manufactured in the cells as very, very long “strings of pearls”, with amino acids being the pearls. In one protein there are from around a hundred to several thousand “amino acid pearls”. There are of twenty species of amino acids. They form a kind of alphabet, making it possible to build innumerable different proteins. These strings of pearls fold in manners that are determined by the order of the amino acids in them. Thus proteins get different shapes, and those shapes determine their properties. Therefore, one protein can take care of one function and another protein can take care of another different function.

Question: What is DNA and how is it copied?

Answer: DNA is the genetic material. It contains the information that describes the proteins that should be made. Like proteins DNA is similar to a string of pearls, but in this case, there are only four kinds of pearls. The letters A, C, G and T represents the four kinds. Their order in the string describes the proteins to be made. The DNA sequence is translated into proteins in a somewhat complex process that corresponds to reading the “DNA letters” in groups of three. Each group of three corresponds to one amino acid in the protein. For instance AAA corresponds to the amino acid lysine; CGG corresponds to arginine. The structure of DNA allows a solution to the problem of precisely copying the information: For each string of DNA there is a complementary string. The two strings are intertwined like the strands of a rope. This is done in a very systematic manner: Each time there is an A in one strand there is a T in the other, and each time there is a G in one there is a C in the other.

To understand how DNA is copied think of a zipper. When the DNA is copied to be partitioned into two new cells, the process begins in one end of the zipper. It opens a little bit and at the same time pieces of complementary strand is formed for each of the halves that are freed. Always A is put in opposite T and G opposite C. In this way two new strands are formed that are exact copies of the original. The strands in each new duplex are intertwined during formation.