

Science 9

Biology

From DNA to Genes

Section 2.3

DNA Structure

DNA (deoxyribonucleic acid) is made up of two strands of smaller molecules. The strands are made up of smaller units called nucleotides. A nucleotide is composed of a sugar molecule, a phosphate molecule, and a nitrogenous base molecule. Each nucleotide has one of four different nitrogenous bases:

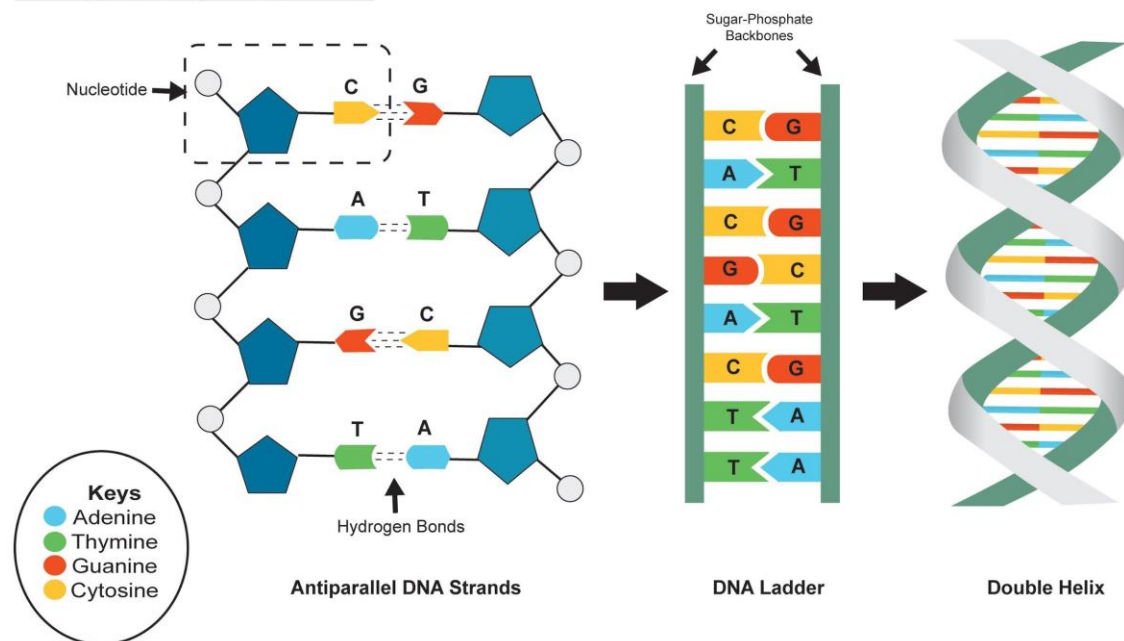
Adenine (A)

Thymine (T)

Cytosine (C)

Guanine (G)

Pairing of nitrogenous bases



Pairs of these bases form each rung of the DNA ladder.

Adenine always pairs with Thymine and cytosine always pairs with Guanine. These are sometimes referred to as base pairs.

DNA has the ability to replicate or copy, itself. Each DNA molecule splits between the pairs of bases like a broken zipper.

New bases join up with the bases on each of the open sides of the ladder to form two identical DNA molecules. Since adenine (A) always pairs with thymine (T) and cytosine (C) always

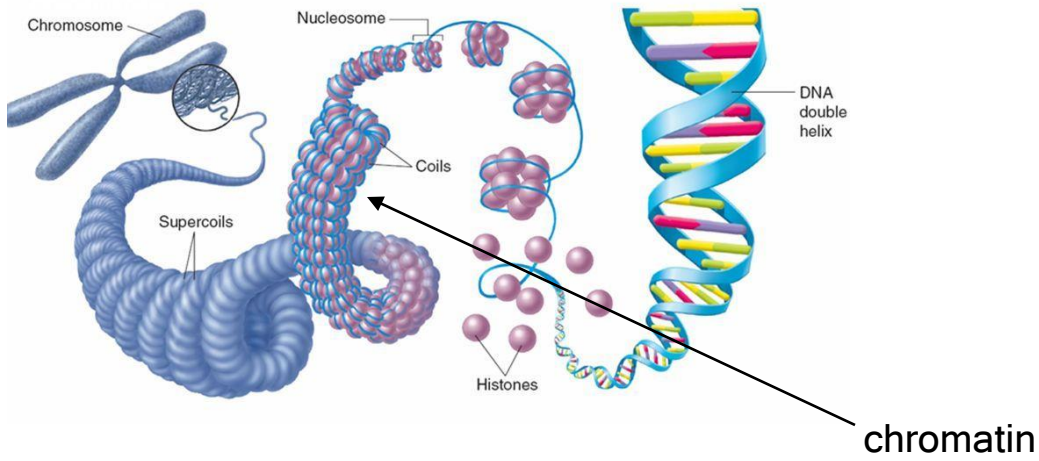
pairs with guanine (G), the two new DNA molecules are identical.

The Genetic Code

The bases in a DNA code are like characters in a code. DNA has a four character code (A,T, G, C). These bases combine to form "three-letter words" called codons that are three bases long. Each three-letter word codes for the production of one of twenty different amino acids. Amino acids are small molecules that are the building blocks of protein. Different combinations of amino acids form different proteins. Proteins determine the characteristics of organisms. All the three-letter words (i.e., codons) in a cell's DNA form the instructions for all the body's cells to follow. This is the genetic code of all living organisms. It is sometimes called the "blueprint of life".

DNA and Chromosomes

■ Eukaryotic Chromosome Structure



DNA To Genes

Prior to cell division, DNA replicates and then winds itself up like a ball of yarn to produce chromosomes. Chromosomes are made from DNA and proteins. The DNA molecule is organized into short sections called genes that code for making proteins. The instructions for making a protein are determined by the order of the bases. All of an organism's genes are called the genome. The human genome is contained in the 23 pairs of chromosomes in the nucleus of almost every cell in the body.

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