General characteristics of DNA

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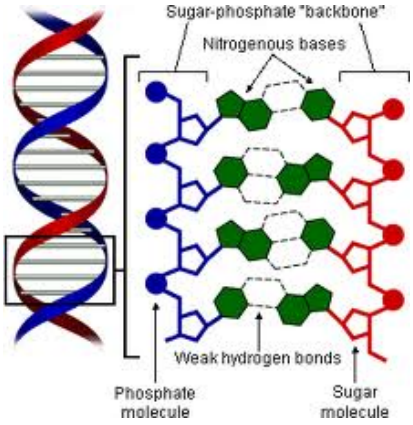
The Genetic Material in Detail

DNA is a nucleic acid and also called as deoxyribonucleic acid. It contains the genetic instructions which help for the functions and development of all living organisms.



Structural details

DNA has nucleotide bases and known as a polymer because it has sugar-phosphate as a backbone chain and with this nitrogenous bases are attached. Purine always pairs with pyrimidine. The adenine and guanine are purines and the cytosine and thymine are pyri midines. So adenine pairs with thymine through two bonds of hydrogen and cytosine pairs with guanine with three bonds of hydrogen. These two chains usually form a right handed helix (B-helix) and run in opposite directions which are termed as anti-parallel.

Base pair of double helix

The sodium salt of duplex DNA at about 90% hydration is 20A wide with one turn of the helix every 34 A and containing 10 base pairs. With this we can come to know that the spacing between base pairs of about 3.4 A. This is known as the structure of DNA or B configuration. When we keep this in a physiological solution the B-structure changes with 10.4 base pairs per turn of the helix.

Degree of hydration and base sequence are the other configurations for duplex DNA. The right handed helix, A-structure, has 11 base pairs per turn, and the C-structure has 9.3. This left handed helix is explained for the crystalline structure of the DNA sequence. In vivo, DNA exists mostly in the B-form-a "relaxed" state.

Sequence decides the transition between A and B forms of DNA. Mixed A and B forms are favored by the purine rich strand and the complementary pyrimidine rich strand. Methylation of cytosine makes the transition from B to Z form.

Because of specific base pairing adenine amount equals the thymine amount and the guanine amount equals the cytosine amount.

Summary:

So we can summarize the DNA characteristics as,

- Cytosine, Adenine, Guanine, and Thymine are the 4 bases of DNA.
- The double helical structure of DNA forms because of the two DNA strands winding around a helix axis in a right-handed spiral.
- The two polynucleotide chains are antiparellel.
- The backbone of DNA made up of sugar and phosphate looks like the railing of a spiral staircase.
- Purines bind with pyrimidines only.
- The 2 DNA strands are complementary.

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