**What are the criteria of genetic materials?**

1. **Information:** The genetic material must contain the information necessary to construct an entire organism.
2. **Transmission:** During reproduction, the genetic material must be passed from parents to offspring.
3. **Replication:** Because the genetic material is passed from parents to offspring, and from mother cell to daughter cells during cell division, it must be copied.
4. **Variation:** Within any species, a significant amount of phenotypic variability occurs.

**How the DNA structure revealed and by whom?**

The first essentially correct three-dimensional structure of the DNA molecule was proposed In 1953 James Watson and Francis Crick published a model of DNA structure (the double helix structure).

Their work was based on X-ray crystallography data provided by Maurice Wilkins and Rosalind Franklin.

Although DNA is the genetic material of all living cells, some viruses use RNA as their genetic material.

**What are the components of DNA ?**

Levene concluded correctly that DNA and RNA molecules are made of repeating units of the three components.

Each unit, consisting of a sugar (Pentose sugar) attached to a phosphate group and a base, is called a nucleotide.

How you can identify the identity of each nucleotide.?

* The identity of the base distinguishes one nucleotide from another.

Describe the structure of DNA?

* Two spiraling strand. These two strands run in opposite directions to each other and are therefore [anti-parallel](http://en.wikipedia.org/wiki/Antiparallel_%28biochemistry%29).
* The bases are adenine (A), thymine (T), cytosine (C) and guanine (G).
* A and G are purines (double ringed) while T and C are pyrimidines (single-ringed)
* A and T are connected by **two** hydrogen bonds. G and C are connected by **three** hydrogen bonds.
* The DNA is like a leader the inner steps are nitrogenous base connected by hydrogen bonds and the outer columns are sugar phosphate backbone.
* Nucleotides are connected by phosphodiester bond and the two-unit polymer resulting from this reaction still has a free 5′ phosphate group at one end and a free 3′ hydroxyl group
* the carbon atoms in the sugar are numbered 1′ to 5′, proceeding clockwise from the oxygen atom; the prime symbol (′) indicates that the number refers to a carbon in a sugar rather than a base.

Explain **Chargaff’s Analysis:**

* The four nucleotides were *not present in equal proportions* in DNA molecules after all.
* The proportion of A always equals that of T, and the proportion of G always equals that of C: A = T, and G = C.
* 2. It follows that there is always an equal proportion of purines (A and G) and pyrimidines (C and T).



* The distance between two base pairs is 3.4 A° (Angistrom).
* Each complete turn of the helix is 34 A° (10 base pairs).
* In any segment of the molecule, alternating larger (major grooves) and smaller “minor grooves” are apparent along the axis.
* The double helix measures 20 A° (2 nm) in diameter.





**Polynucleotides**

* The linkage between two mononucleotides consists of a phosphate group linked to two sugars forming a phosphodiester bond
* The phosphate groups link the 3’ carbon of one deoxyribose molecule to the 5’ carbon of the next (3’ – 5’ orientation).
* Joining of two mononucleotides forms a dinucleotide, joining of three nucleotides forms a trinucleotide and so on.

