The Chromosome

The chromosome is a structural unit that consists of a molecule of DNA associated with proteins. Eukaryote chromosomes condense during mitosis and meiosis and form structures visible through a microscope. They are made of DNA (deoxyribonucleic acid), RNA (ribonucleic acid), and proteins. The majority of the proteins are histones, small positively charged molecules. Chromosomes carry the genes, the functional structures responsible for the characteristics of each individual.

Karyotype

The ordering and systematic classification of the chromosomes by pairs, size, and position of the centromere. The chromosomes that are seen in a karyotype are found in the metaphase of mitosis. Each one of them consists of two sister chromatids united by their centromeres.

1

CHROMATINS
There are two types: euchromatin, lightly packed, and heterochromatin, more densely packed. The majority of nuclear chromatin consists of euchromatin.

Carrier of Genes

In the DNA, certain segments of the molecule are called genes. These segments have the genetic information that will determine the characteristics of an individual or will permit the synthesis of a certain protein. The information necessary for generating the entire organism is found in each cell, but only the part of the information necessary for reproducing this specific type of cell is activated. The reading and transmission of the information for use outside the nucleus is performed by messenger RNA.

2

THE FRAMEWORK
Each one of the rosettes consists of loops stabilized by the "scaffolding" of other proteins. These loops help to condense the chromatin.

6
loops
IN EACH ROSETTE

30
rosettes
IN EACH TURN OF THE SPIRAL

6
nucleosomes
IN EACH TURN

3

SOLENOID
A group of six nucleosomes that form each turn inside the loops

0.0000012 inch
(0.00003 mm)
DIAMETER OF EACH SOLENOID

SPACER DNA
The nucleosomes are united by chains of base pairs of DNA 0.0000004 inch (0.00001 mm) long.

PEARL NECKLACE
If the DNA chain is stretched and observed under a microscope, it resembles beads on a string. Nevertheless, DNA chains are generally found pressed very tightly around the nucleus.

60
base pairs
THE AMOUNT OF DNA BETWEEN NUCLEOSOMES

4

NUCLEOSOME
A group of eight histone molecules with two DNA spirals twisted around them. The "tails" of the histones seem to interact with the molecules that regulate genetic activity.

NITROGEN BASES

CIRCULAR CHROMOSOME OF BACTERIA

PROKARYOTE CELL
Prokaryote cells do not have a cellular nucleus, so the DNA is found in the cytoplasm. The size of the DNA differs according to species. Prokaryotes are almost all unicellular organisms belonging to the domains of the archaea and bacteria.