GENETIC ORGANIZATION OF PROKARYOTIC AND EUKRYOTIC

An organism's genome is defined as the complete haploid genetic complement of a typical cell .The genome is the ultimate source of information about an organism.

Genes are units of genetic information present on the **DNA** in the **chromosomes and chromatin. Genome** is all the DNA contained in an organism or a cell, which includes the chromosomes plus the DNA in mitochondria (and DNA in the chloroplasts of plant cells).

EUKARYOTIC GENOME ORGANIZATION

1. Multiple genomes: nuclear, plastid: mitochondria, chloroplasts

3. Multiple linear chromosomes

4. Monocistronic transcription units

5. Discontinuous coding regions (introns and exons)

6 Large amounts of non-coding DNA

7. Transcription and translation take place in different compartments

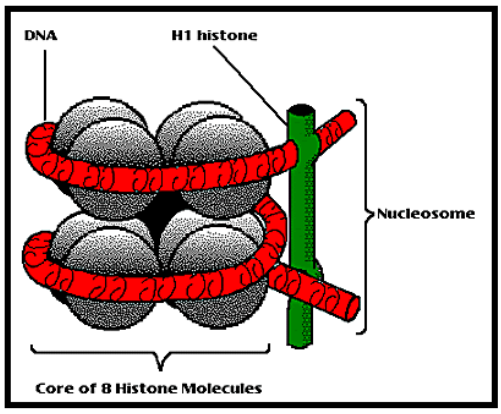
8. Variety of RNAs: Coding (mRNA, rRNA, tRNA), Non-coding

9.. Often diploid genomes and obligatory sexual reproduction

10.Standard mechanism of recombination: meiosis

11..Chromatin is made up of 35% DNA,60% DNA ,5% RNA and is dispersed in nuclear matrix in the form of network of chromatin treads .Information in DNA is reading using with histones and non histones (associated with gene regulation)

12.Histones: are main structural proteins in eukaryotes.i t has positively charged amino acids which helps histones to bind to DNA and help in packing of DNA molecule. Nucleosome has octamer of histones H2A,H2B,H3,H4 & a strand of DNA having 146 base pair wrapped tightly around this.DNA strand linking 1 nucleosome to another is called linker DNA



PROKARYOTIC GENOME ORGANIZATION

1.It is circular,, double stranded piece of DNA..Commonly referred to as Nucleoid .Length varies widely but is generally few million base pairs.

2. Nucleoid is composed of 60% DNA and small amounts of RNA and protein.

3. Nucleoid proteins help to maintain the supercoiled

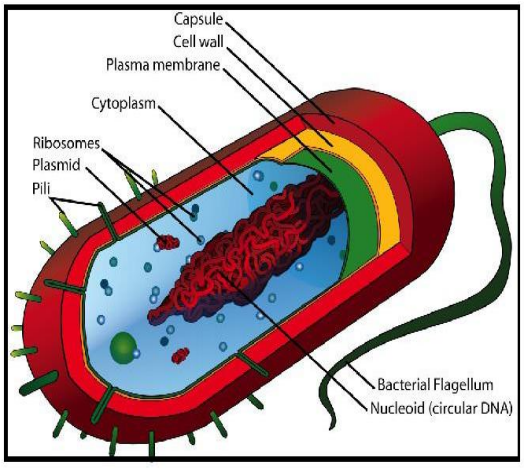
4.DNA supercooling refers to over or under winding of a DNA strand.

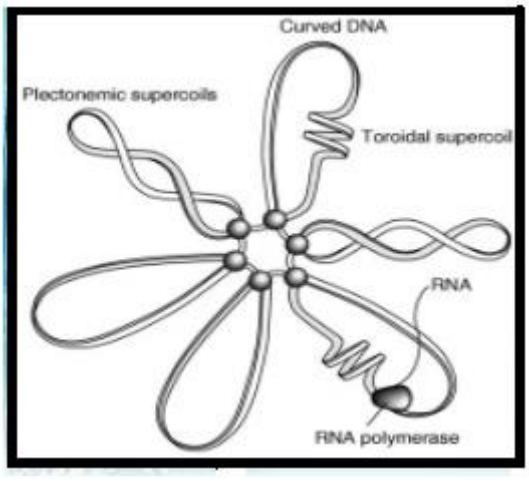
5. It is important for DNA packing within all cells.

6 Structures-toroid and plectoneme

7.In prokaryotes, plectonemic super coils are predominant because of circular DNA and small amount of genetic material.

8.Not associated with histones.





Similarity between Prokaryotic and Eukaryotic chromosome

1.The chromosome of both prokaryotes and eukaryotes contains the genetic material DNA

2.The Chemical of both composition and structural organisation of DNA

3.Both genetic materialis facilliated by transcription and translation

4.The genetic material contains both coding and non coding sequences

5.In both groups.the methylation of DNA in chromosome causess its inactivation.

6. Both group contains extra –chromosomal genetic materials(Plasmid in prokaryotes and DNA of mitochondria and chlroplasts in eukaryotes .

Difference between Prokaryotic and Eukaryotic chromosome

Sl. No.	Prokaryotic Chromosome	Eukaryotic Chromosome
1	The typical chromosome formation is absent in prokaryotes.	In eukaryotes, the genetic material is organized as distinct structural entities called the Chromosomes.
2	Only a single chromosome per cell	Always two to many chromosomes per cell.
3	The prokaryotic chromosome is comparatively shorter	Eukaryotic chromosomes are larger than that of prokaryotes.
4	Prokaryotic chromosome contains a covalently closed circular DNA (cccDNA).	Each eukaryotic chromosome contains a linear DNA with two ends.
5	Prokaryotic chromosomes codes for few proteins.	Codes for a large number of proteins.

6	Chromosome occupies freely in the center of the cell and not covered by the nucleus.	Chromosomes are always enclosed in the nucleus.
7	Due to the absence of nucleus, the prokaryotic chromosomes stay in direct contact with the cytoplasm.	Eukaryotic chromosomes are separated from the cytoplasm by the nuclear membrane.
8	Prokaryotic chromosome sometimes associated with the mesosomes of the plasma membrane.	Eukaryotic chromosome cannot be associated with the plasma membrane. They always stay away from the plasma membrane.
9	The DNA is not associated with histone proteins in prokaryotic chromosomes.	DNA is associated with histone proteins in eukaryotes.
10	Nucleosomes are not formed in prokaryotes.	In eukaryotes, the association of DNA with the
11	Prokaryotic chromosome contains only a single origin of replication (Ori).	Eukaryotic chromosome contains many origin or replications.
12	In prokaryotes, the replication of DNA can occur at any stage of the life cycle.	In eukaryotes, the genetic material will only replicate at the S phase of cell cycle.
13	The negative charge of prokaryotic chromosomes are nullified by Mg2+ ions	The negative charge of the eukaryotic DNA is nullified by histone proteins (positively charged).
14	Telomere is absent since the chromosome is circular.	Telomere is present in the tip of eukaryotic chromosomes.
15	Structures like centromere, Kinetochore, secondary constriction and chromosomal arms are not formed in prokaryotic chromosomes.	Eukaryotic chromosomes contain centromere, kinetochore and chromosomal arms.

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