

ORGANISATION OF MAMMALIAN GENOME

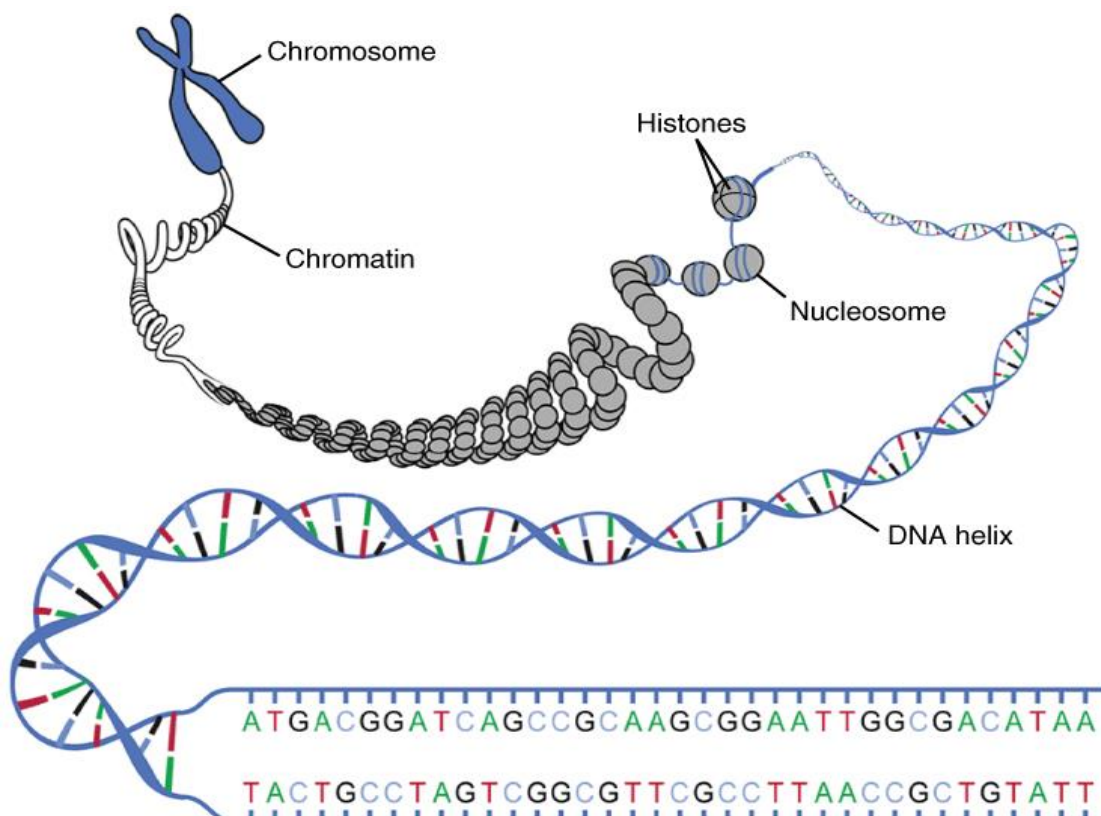
Definition:

A genome is an organism's complete set of DNA, including all of its genes. Each genome contains all of the information needed to build and maintain that organism. In humans, a copy of the entire genome—more than 3 billion DNA base pairs—is contained in all cells that have a nucleus.

Eukaryotic Genome:

- ✓ Located on several Chromosomes.
- ✓ Relatively Low Gene Density (50 genes per mm of DNA in humans)
- ✓ Contour length of DNA from a single human cell = 2 meters
- ✓ Approximately 10^{11} cells = total length 2×10^{11} km
- ✓ Distance between sun and earth (1.5×10^8 km)
- ✓ Human chromosomes vary in length over a 25 fold range
- ✓ Carry Organelles Genome as well.

DNA is associated with basic proteins(histones), form long chromatin fibers. Chromatin fibers form a network, enclosed in a double layered nuclear envelop, condenses into chromosomes during cell division. A **chromatid** is one half of a replicated chromosome. Prior to cell division, chromosomes are copied and identical chromosome copies join together at their centromeres. Each strand of one of these chromosomes is a **chromatid**. Joined **chromatids** are known as sister **chromatids**.



- Chromatin is the complex combination of DNA and proteins that makes up chromosomes.
- The major proteins involved in chromatin are histone proteins(Lysine arginine); although many other chromosomal proteins have prominent roles too.
- ▣ The functions of chromatin is to package DNA into smaller volume to fit in the cell, to strengthen the DNA to allow mitosis and meiosis and to serve as a mechanism to control gene expression and DNA replication.

Chromatin and Condensed Chromosome Structure

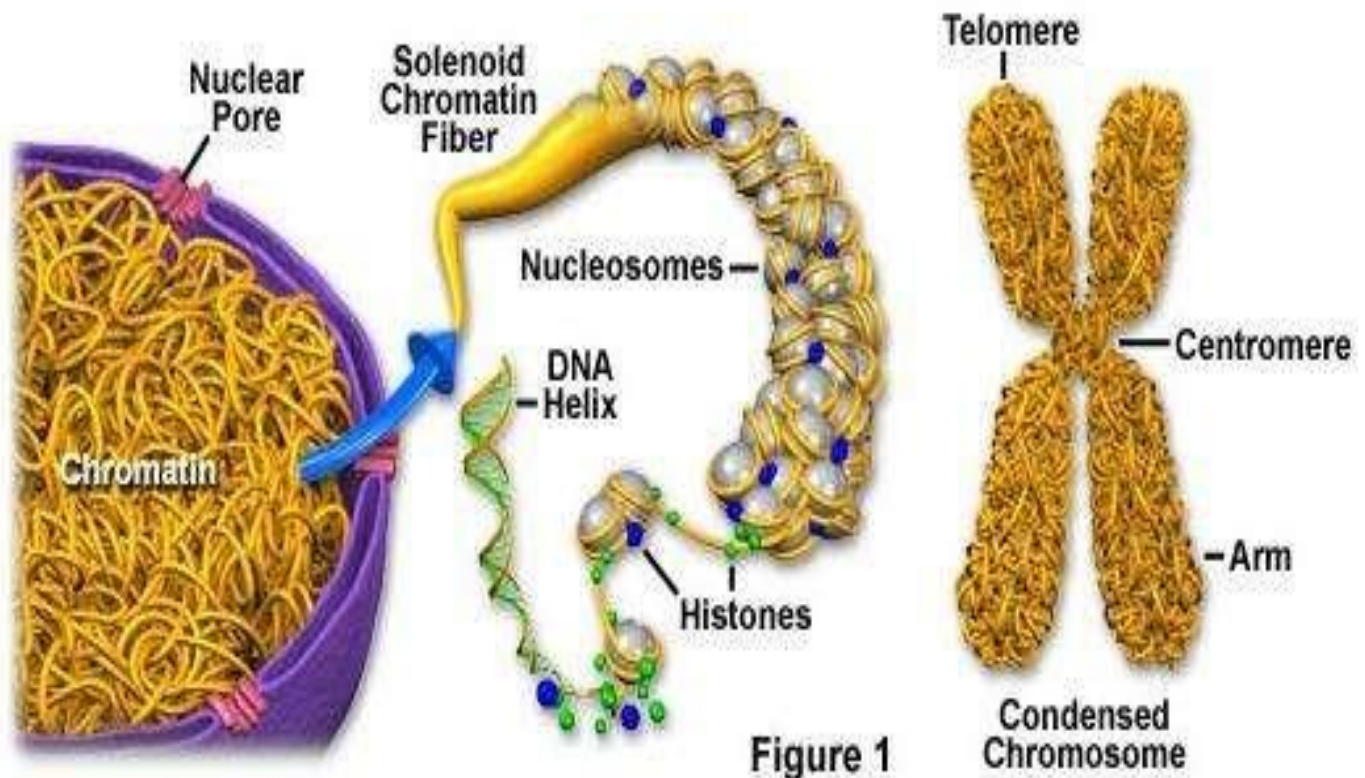


Figure 1

Gene:

A piece of DNA (or in some cases RNA) that contains the primary sequence to produce a functional Biological Gene product (RNA, Protein)

Noncoding Regions (Non coding DNA)

➤ Regulatory regions (Ribosomal rRNA, mRNA and tRNA)

RNA polymerase binding site

Transcription factor binding sites