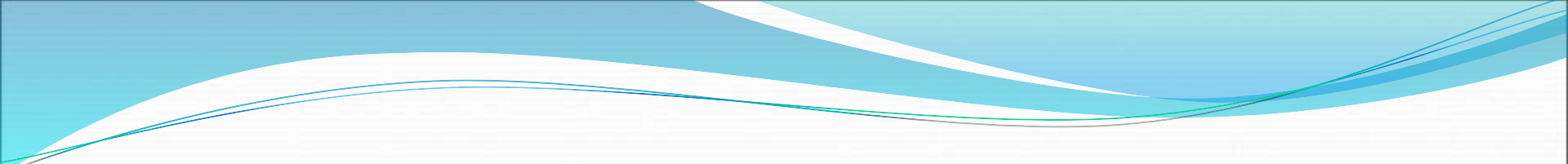



Université Abou Bekr Belkaid – Tlemcen-
Faculté des Sciences de la Nature et de la Vie et des
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Département de Biologie

Genome

Dr. Hamza Reguig Sherazad



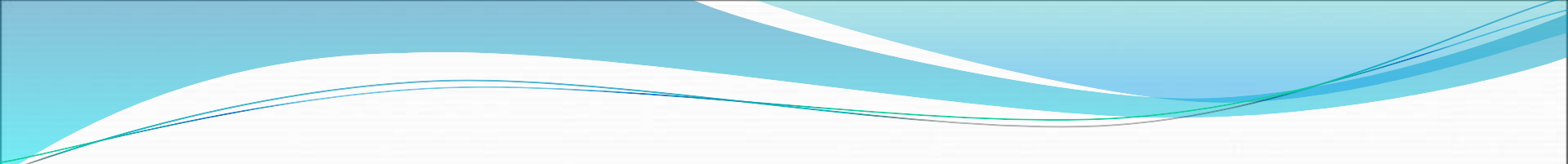
A genome is an organism's complete set of genetic material. Genomics is the study of genomes. In humans, a copy of the genome is found in nearly every cell in the body.



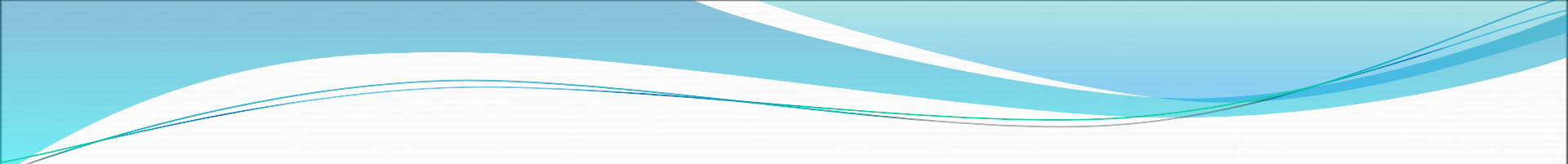
DNA carries the genetic information in the cells of all living organisms. It contains codes for the assembly of amino acids into all the proteins required in the body.




What does a genome do?



The genome contains both genes that provide the instructions for producing proteins (about 2% of the genome) and sequences that do not directly code for proteins (about 98% of the genome), often termed non-coding




The function of the 98% of the genome that does not code directly for proteins is not fully understood, but parts are involved in gene regulation and others are important for maintaining the structure of the genome.



Analysing these regions can be just as important as analysing genes when applying genomics in clinical practice.



How long is a genome?



The length of the genome varies between species and doesn't necessarily reflect the size of the organism from which it came.

The human genome is approximately 3 billion base pairs (3.2 to be exact) in length.



Where is the genome found?

In organisms known as eukaryotes (which includes humans, other mammals, plants and fungi), most of the genome is found in the nucleus of the cell (see figure 1).

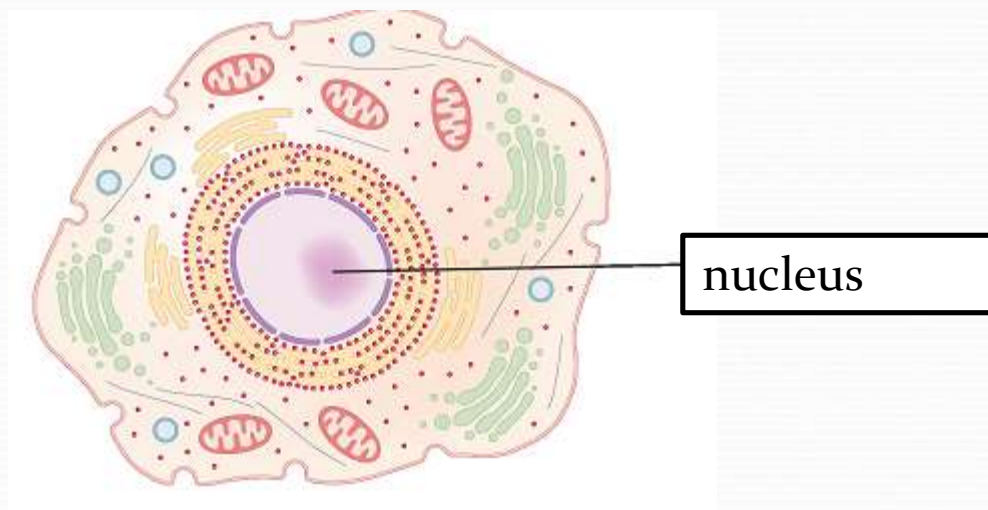
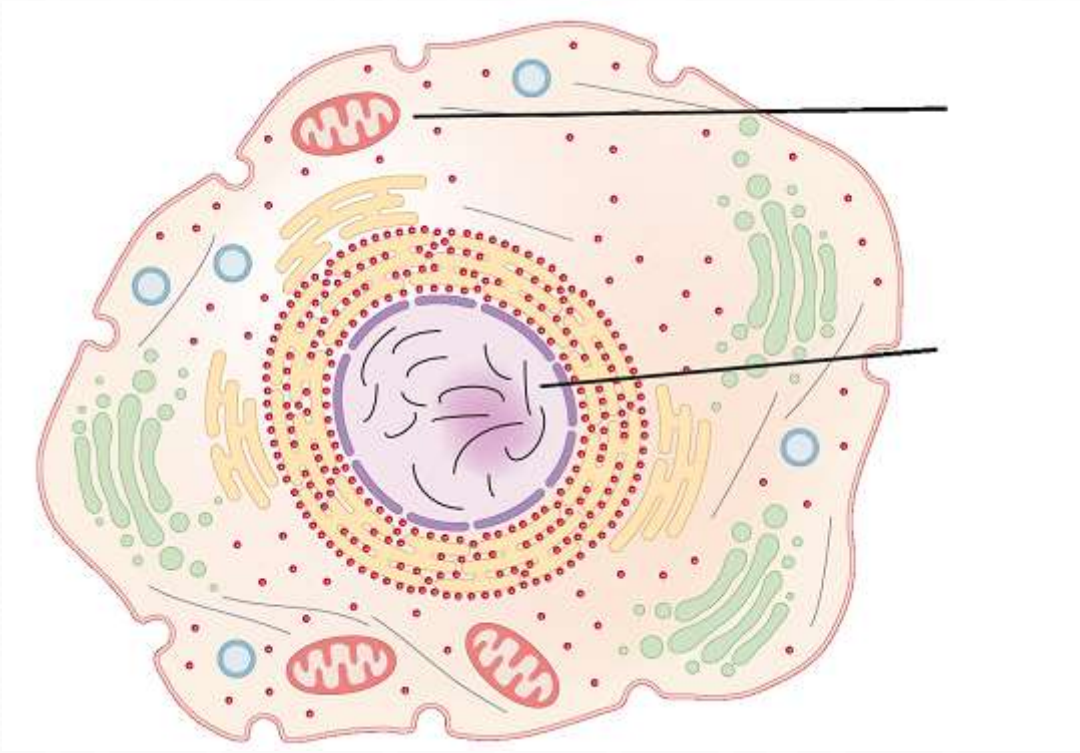


Figure 1: Cell nucleus where most of the eukaryotic genome is found



How is the genome organised ?



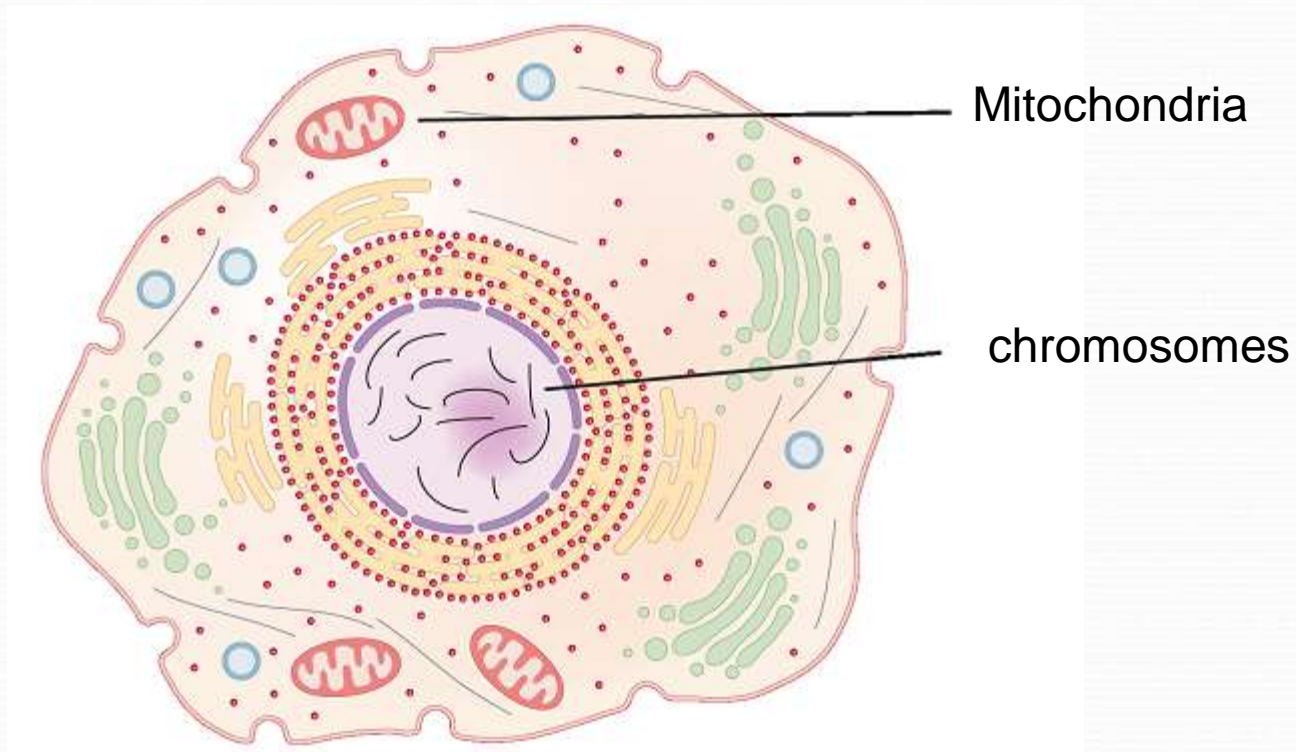


Figure 2: A cell with nucleus at its centre containing chromosomes

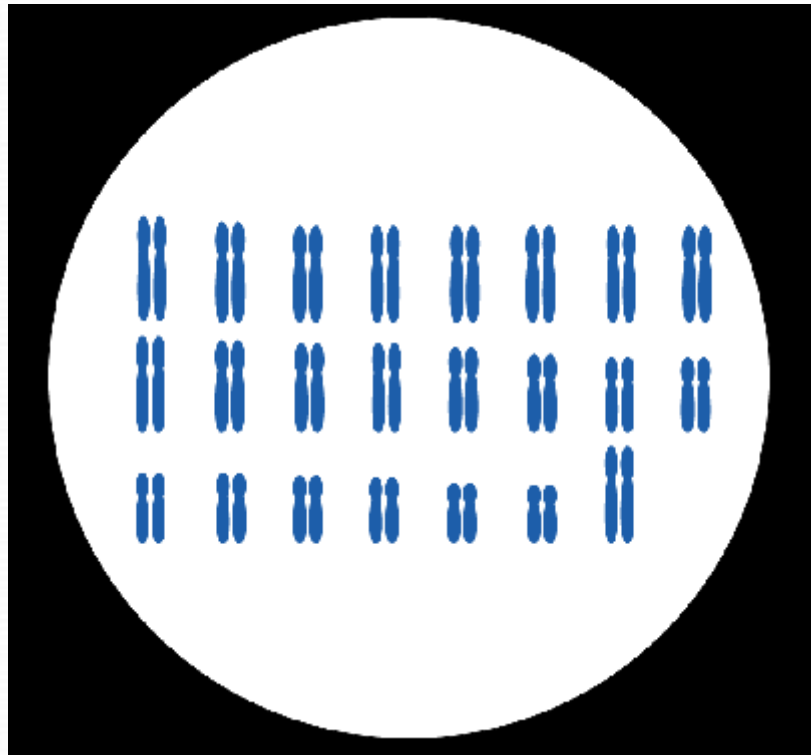
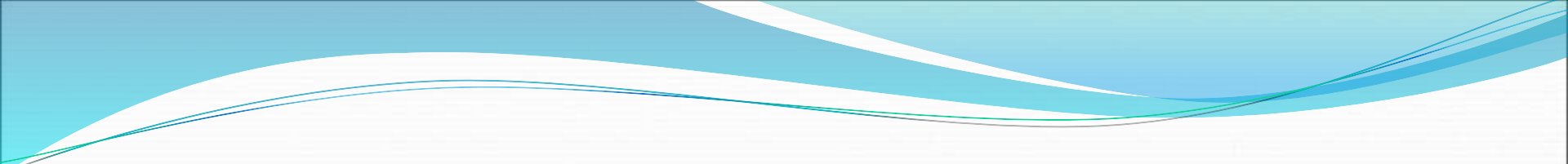


Figure 3: Schematic of human chromosomes showing them lined up in pairs size order, with the sex chromosome pair last




DNA outside the nucleus




Cells also contain structures called mitochondria (see figure 2), which are rather like the cell's batteries, vital for turning energy from food into a form that can be used by cells.

There are many thousands of mitochondria within each cell, especially in muscle and the brain.



These structures also contain a small amount of DNA, which forms less than 0.0005% of the total genome, about 16 thousand base pairs.



Although it is only a small part of the genome, it is essential: without a functional mitochondrial genome, **the cell will die.**

Mitochondrial DNA is present as a complete circle, and it does not consist of homologous pairs like nuclear DNA.

Unlike nuclear DNA, which is inherited from both the mother and the father, mitochondrial DNA is only inherited from the mother.

