

Chromosomes: What are, types and parts

15 June 2025 | By Dr. Kyle Muller

All **human beings are unique**. Some of the features that allow us to differentiate ourselves are our sex, eye color, hair color, skin tone, body content and facial features. Considering this, it is common to ask ourselves questions like why are we so different from each other if we are all of the same species? And what makes us the physical characteristics we have? All this diversity is **result of genetic variation** which is the genetic difference between the members of a population.

The information contained in our genes is responsible for our appearance. This remains grouped and correctly encoded thanks to chromosomes. Without chromosomes we would not inherit characteristics of our parents and our DNA and genes would be scattered and would have trouble doubling during mitosis and meiosis.

What are chromosomes

The chromosomes are **biological structures that compact DNA in genes**. In addition to being the molecular units responsible for keeping the DNA grouped and coded, they also store it and transmit the genetic information of parents to descendants in each new generation.

Chromosomes can have **form of threads, double or small holes** although its form changes depending on the phase of the cell cycle in which they are. These chromosomes are **formed by**:

- Dextyribonucleic acid (DNA).
- Various proteins such as histones.

All living beings have a **Number of specific chromosomes** for its species inside their cells. This is known as chromosomal endowment and regulates the characteristics and functioning of individuals of the same species. For example:

- In the case of **prokaryotic cells**: Chromosomes are scattered in the cytoplasm.
- In the case of **eukaryotic cells**: Chromosomes are found inside the cell nucleus in the form of chromatin; which is an association of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) that has the appearance of thin and tangled threads. Discover the difference between the eukaryotic and prokaryotic cell in this article that we recommend.

For the cell division process to develop successfully it is necessary that **Chromosomes remain intact**. When genetic material is divided or groups irregularly or deficient, mutations occur that may have serious consequences such as embryonic development problems or diseases such as leukemia.

The **Human beings have 46 chromosomes** distributed in 23 pairs. 22 pairs constitute non-sexual or autosomes chromosomes; And the remaining couple is the sex chromosomes or heterochromosomes: chromosomes "x" and "x" if it is a woman and chromosomes "x" and "y" if it is a man.

The gametes or **sex cells have no chromosomal load** Complete, in fact, they are the only human cells like that. These only have half of chromosomes, and when two of them are joined (ovule and sperm respectively) the resulting cells have a complete chromosomal load inherited in equal parts by both parents.

Types of chromosomes

On this occasion we will classify chromosomes according to three criteria: according to the position of the centromere, according to their form and according to their function.

Types of chromosomes according to the centromere position

The centromere is the **narrower and condensed region** of a chromosome. It joins its sister chromatids and separates it in two sections with specific arms. According to the position of its centromere, a chromosome can be:

- **Telocentric chromosome:** It is the one whose centromere is located in one of its ends and, therefore, the chromosome has only one arm.
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- **Acrocentric chromosome:** It is the one whose centromere is much closer to one telomer than of the other and, therefore, the chromosome has a very short and a very long arm.
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- **Submetacentric chromosome:** It is the one whose centromere is located very close to the center of the chromosome, but slightly closer to one end than the other.
- **Metacentric chromosome:** It is the one whose centromere is exactly located in the center of the chromosome. It forms two arms of equal lengths.

Types of chromosomes according to their form

Depending on its physical form, a chromosome can be linear or circular.

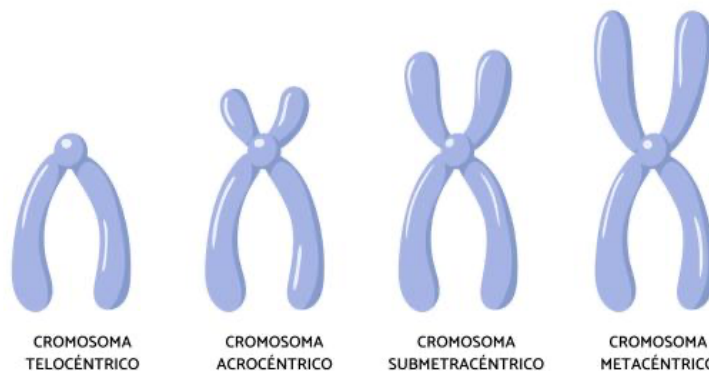
- **Linear chromosomes:** They are those who possess **Linear DNA chains** that are ordered in pairs inside the cells. Most chromosomes of eukaryotic cells are of this type.
- **Circular chromosomes:** They consist of **A single circular DNA molecule** and some associated proteins. They are smaller than linear chromosomes and are found in prokaryotic organisms and mitochondria and chloroplasts of eukaryotic organisms.

Types of chromosomes according to their function

In organisms that reproduce sexually there are two types of chromosomes: non -sexual and sexual.

- **Somatic chromosomes:** Also called autosomal chromosomes or autosomes are all those that are not involved in determining the sex of individuals. In the case of the human being, the chromosomes pairs from 1 to 22 are autosomal chromosomes.
- **Sex chromosomes:** also called heterochromosomes or alosomes are those who are responsible for **Determine sex** of individuals. In the case of the human being, the pair of chromosomes 23 is the one that dictates the sex of people.

TIPOS DE CROMOSOMA SEGÚN LA POSICIÓN DEL CENTRÓMERO



Parts of a chromosome

The chromosomes have four fundamental parts: chromatids, centromere, arms and telomeres.

Chromatids

The chromatids are **identical spiralized chains of DNA**. They are formed by microfilaments called chromonemas and small granules or knots called chromomers. Two longitudinal chromatids with the same type and number of genes form a linear chromosome.

Centromer

The centromere is the narrow and condensed region that **joins the two chromatids of a linear chromosome**. In addition, it helps to keep chromosomes aligned during cell division and allows them to interact with the fibers of the acromatic spindle during mitotic and meiotic anaphes. It also correctly performs the respective chromosomal movements of these phases. **On them there are protein structures** called knetocoros. These are anchored to the microtubules of the mitotic spindle during mitosis and allow both halves of the chromosome to the opposite poles of the cell.

Arms

The arms are the **two segments** resulting from the horizontal division of chromatids by the centromere. In acrocentric and sub -metacentric chromosomes the arms have **different lengths**. To facilitate your study, the shortest arms are designated with the letter "P" and the longest arms are designated with the letter "Q".

Telomeres

Telomeres correspond to **ends of linear chromosomas**. They are DNA sections that do not encode any protein or provide genetic information. Its function is to protect the extremes of chromosomes and prevent them from fraying and disorganizing.

Related to the subject, you may be interested in knowing about genetic recombination: what is and types.

