

# Difference Between Parental Type and Recombinant Type Chromosomes

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## Key Difference - Parental Type vs Recombinant Type Chromosomes

Chromosomes are threadlike structures where the DNA is packaged in their nuclei. In a diploid cell, there are 23 pairs of chromosomes (total of 46 chromosomes). In gametes, only 23 chromosomes are found. Hence they are haploid cells. Meiosis is one type of cell division occurs during the gamete formation in sexual reproduction. In one phase of meiosis, homologous chromosomes pair up with each other and make bivalents. Segments of homologous chromosomes contact with each other and make chiasmata. When sister chromatids crossover with each other, chiasmata are formed. Chiasmata formation is important for exchanging genetic materials between homologous chromosomes in meiosis. When homologous chromosomes exchange their segments of chromosomes or genetic materials, those chromosomes are known as recombinant chromosomes. When homologous chromosomes do not exchange their genetic material due to the absence of crossover between homologous chromosomes, those chromosomes are similar to parent chromosomes. The **key difference** between parental type chromosomes and recombinant type chromosomes rely on the occurrence or absence of crossover between homologous chromosomes. **Crossover does not occur in parental type chromosomes while crossover occurs in recombinant type chromosomes.**

## What are Parental Type Chromosomes?

DNA or genetic material can be exchanged when chiasmata are formed between non-sister chromatids of homologous chromosomes. This occurs during the meiosis and it is the process called crossover. However, crossing over between homologous chromosomes is not a frequently occurring process. When crossover does not occur, homologous chromosomes separate into gametes without exchanging their genetic materials. Therefore daughter cells get chromosomes that are similar to parental chromosomes.

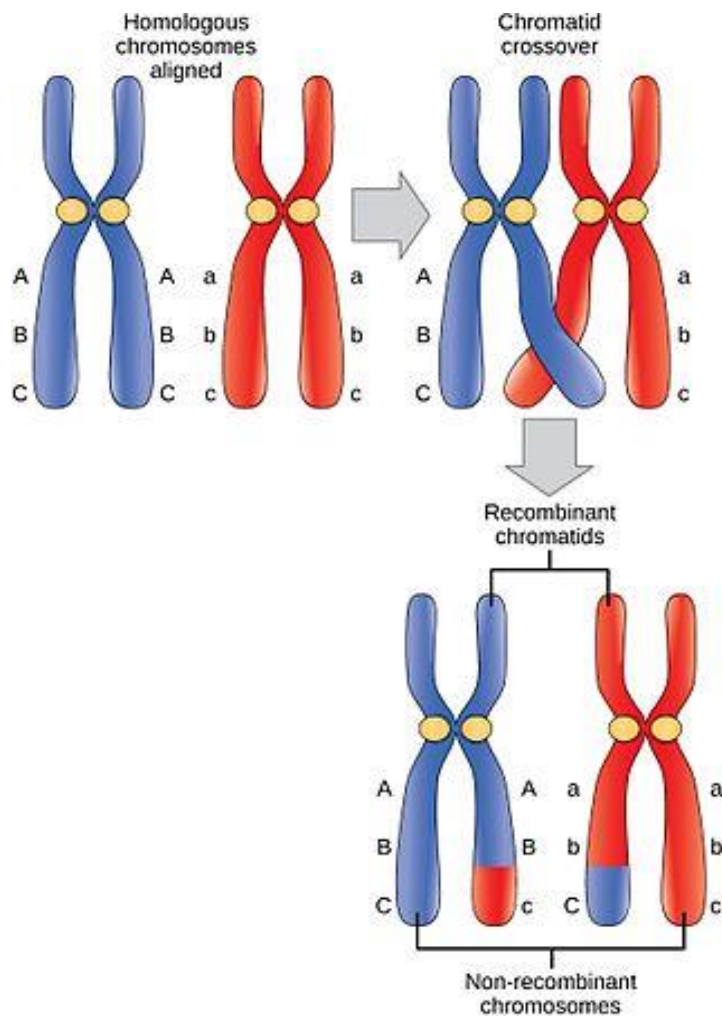
The allelic combinations remain same as they were in the parental chromosomes. Hence, there is no difference between the gene combinations of

the parental and daughter cell chromosomes. Resulting offspring phenotypes resemble the parents.

## **What are Recombinant Type Chromosomes?**

Chromosomal crossover is the process that exchanges genetic material between homologous chromosomes. This occurs mainly during the meiotic cell division. When homologous chromosomes exchanged their genetic material, the resulting chromosomes bear new gene combinations. Hence they are known as recombinant chromosomes.

Recombinant chromosomes are responsible for genetic variations between offsprings. Crossover is a normal process and it is an important process in sexual reproduction. Hence, the formation of recombinant chromosomes is not considered as a mutation. It does not result in a big change in genetic information due to the exchange of allelic positions between matching chromosomes unlike [translocation](#) (a type of [mutation](#) which occurs between non-homologous chromosomes) because crossover usually occurs when matching region of one homologous chromosome breaks and reconnect with the other matching region of the homologous chromosome.



**Figure 01: Recombinant Chromosomes**

Recombinant chromosomes result in offspring phenotypes which do not resemble parental phenotypes. They cause genetic diversity among the organisms.

## What are the Similarities Between Parental Type and Recombinant Type Chromosomes?

- Both are DNA molecules.
- Both are types of chromosomes.
- Both responsible for the inheritance of traits from parent to offspring.

## What is the Difference Between Parental Type and Recombinant Type Chromosomes?

<b>Parental Type vs Recombinant Type Chromosomes</b>	
Parental type chromosomes are the chromosomes that are similar to parental chromosomes due to the absence of crossing over between homologous chromosomes.	Recombinant type chromosomes are the chromosomes that produce due to crossing over between homologous chromosomes.
<b>Allel Combinations</b>	
Parental type chromosomes do not produce new combinations of alleles on the chromosomes.	Recombinant type chromosomes produce new combinations of alleles on the chromosomes.
<b>Occurence</b>	
Parental type chromosomes are more frequent.	Recombinant type chromosomes are less frequent.
<b>Genetic Variation</b>	
Parental type chromosomes do not cause genetic diversity.	Recombinant type chromosomes cause for genetic diversity.
<b>Genetic Materials</b>	
Parental type chromosomes do not consist of genetic materials of both homologous chromosomes.	Recombinant type chromosomes consist of genetic materials of both homologous chromosomes.

## **Summary - Parental Type vs Recombinant Type Chromosomes**

Crossing over between homologous chromosomes gives the chance of exchanging genetic materials between homologous chromosomes. When the crossover occurs, it produces recombinant chromosomes. Hence, daughter cells receive new combinations of chromosomes. On the other hand, when crossover does not occur, there is no possibility of exchanging genetic materials between homologous chromosomes. Hence, the resulting chromosomes will be similar to parental chromosomes. Daughter cells will receive chromosomes which are resembled parental chromosomes. The

conversion of parental chromosomes into recombinant chromosomes is totally dependent on the crossing over. This is the difference between Parental Type and Recombinant Type Chromosomes.

**Reference:**

- 1.'CROSSING-OVER and RECOMBINATION FREQUENCY', Genetics. [Available here](#)
- 2.“Chromosomal crossover.” Wikipedia, Wikimedia Foundation, 26 Dec. 2017. [Available here](#)

**Image Courtesy:**

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