

Meiosis

My-oh-sis

Mee-oh-sis

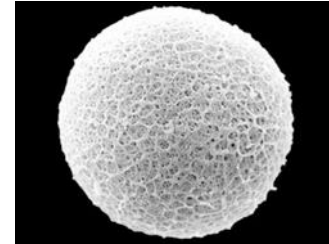
Meiosis

- What are the two types of sex cells in humans?



Sperm and Eggs

Gametes



- Where are gametes located in males and females?

Testes and Ovaries

- How do sex cells (gametes) divide?

Meiosis!!

- Why do gametes divide?

**To reduce the chromosome number from $2n$ to n
(so that fertilization can occur)**

Meiosis results in 4 gametes that are haploid (n)

Gametes and Haploid

So...what does the **n** mean???

n = 23

Gametes are **haploid (n)**

Gametes have **23 Chromosomes**

Aha!

$$2n = 46$$

$$n = 23$$



Think about it...

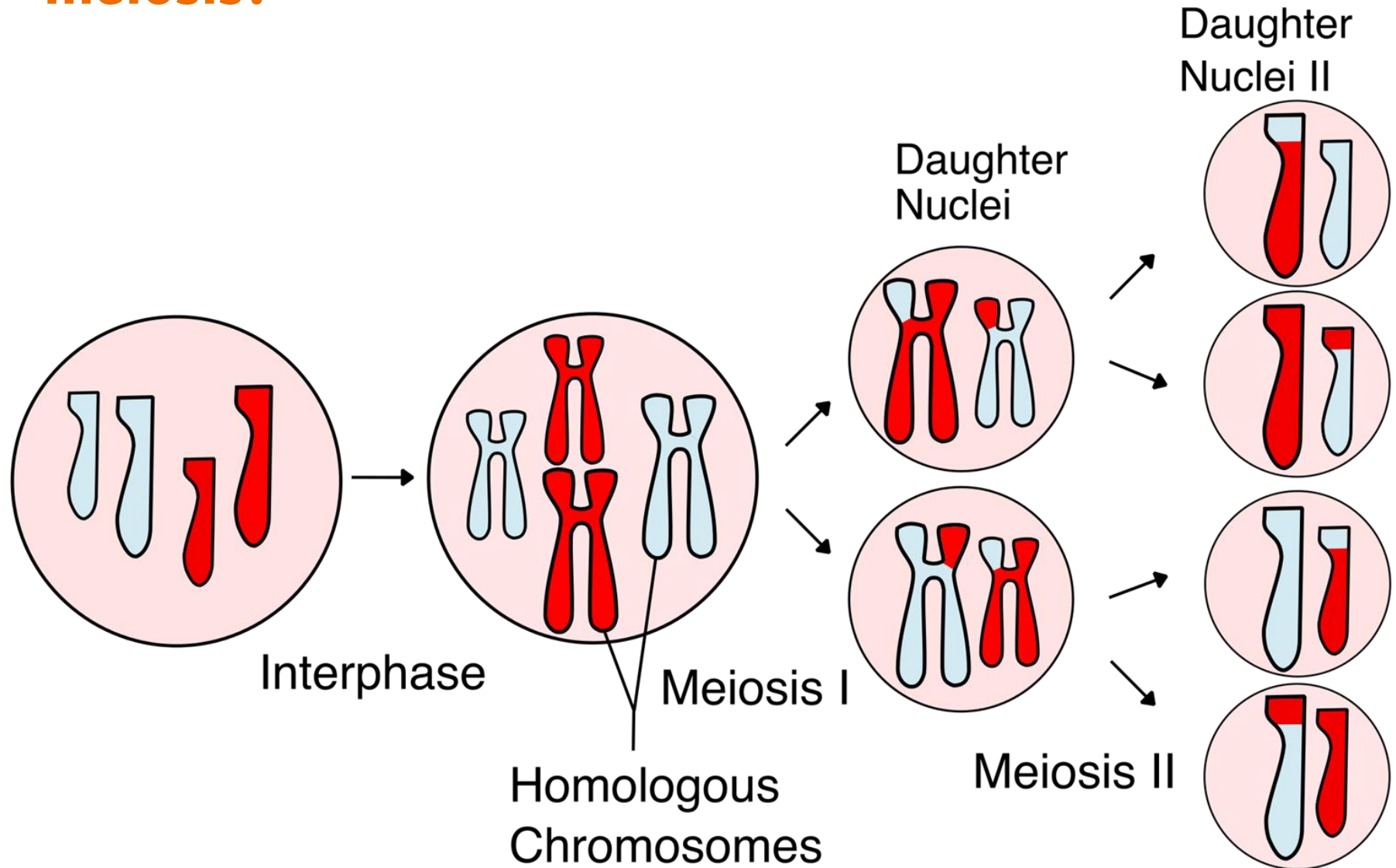
Humans have 46 chromosomes

Body cells are diploid $2n$

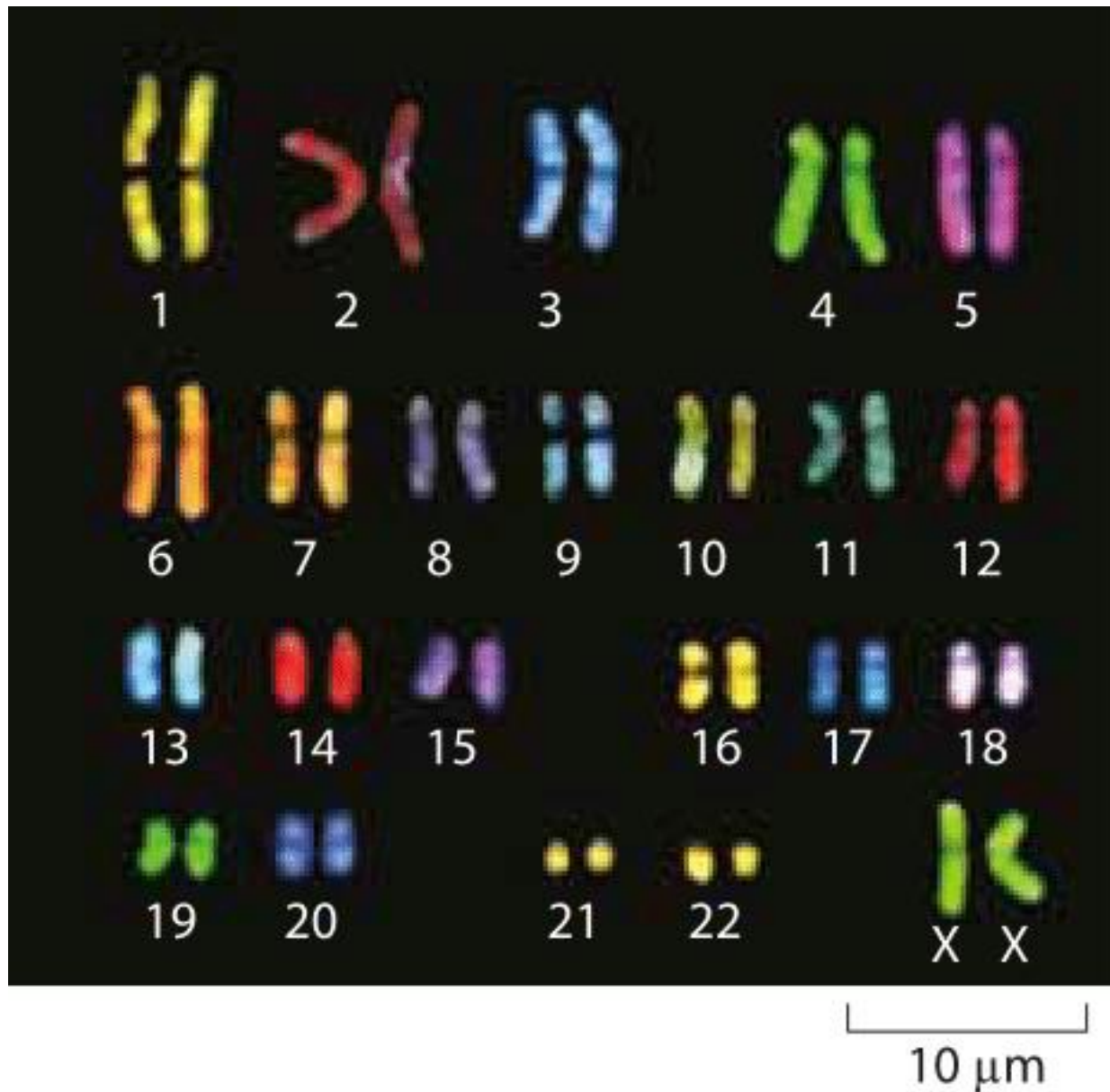
Body cells have 46 chromosomes



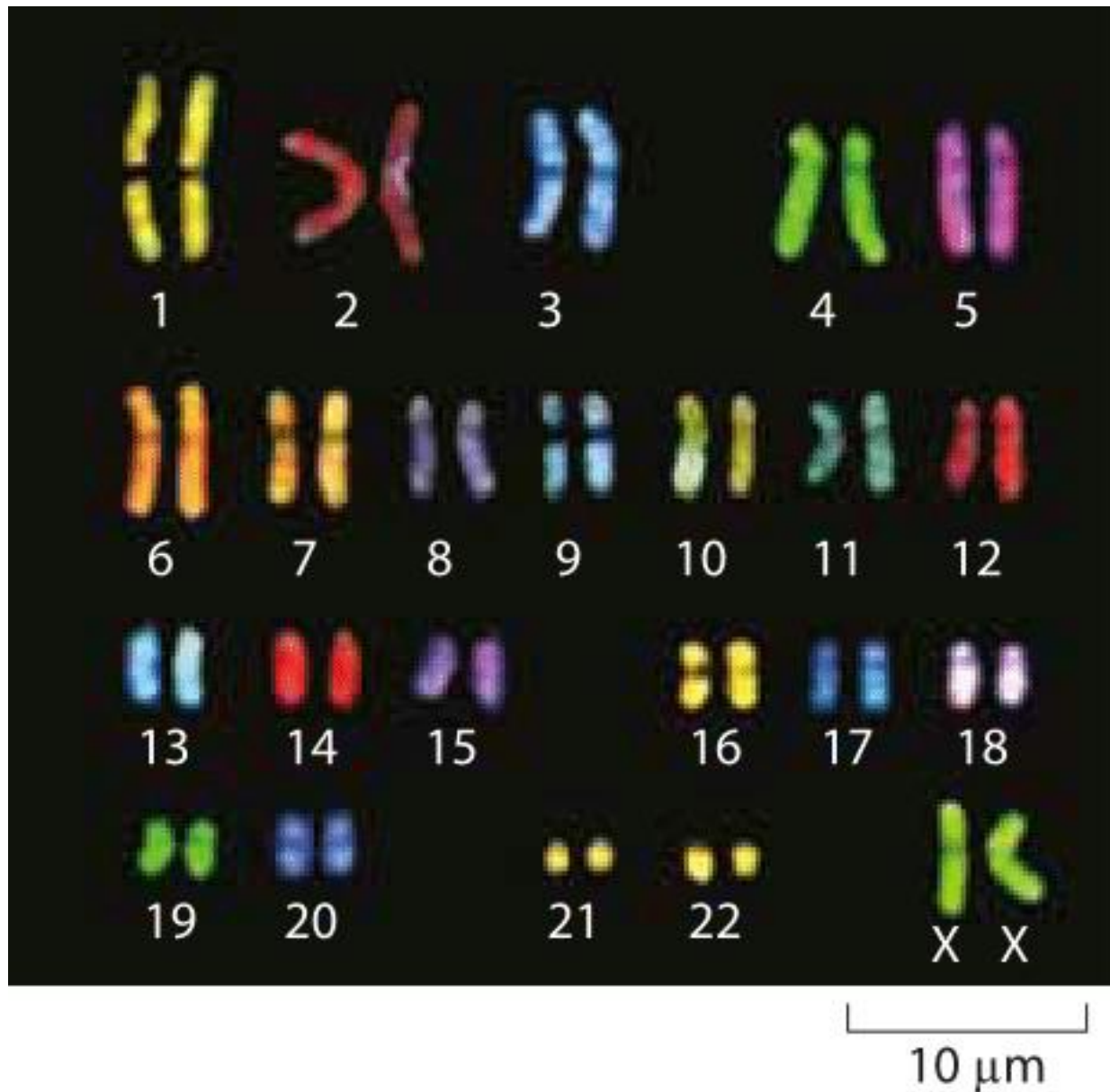
How many gametes are produced at the end of meiosis?



How many pairs of chromosomes does a human have?



How many chromosomes does a human have?



Gametes and Haploid

Why do gametes have only 23 chromosomes?

Fertilization Occurs!

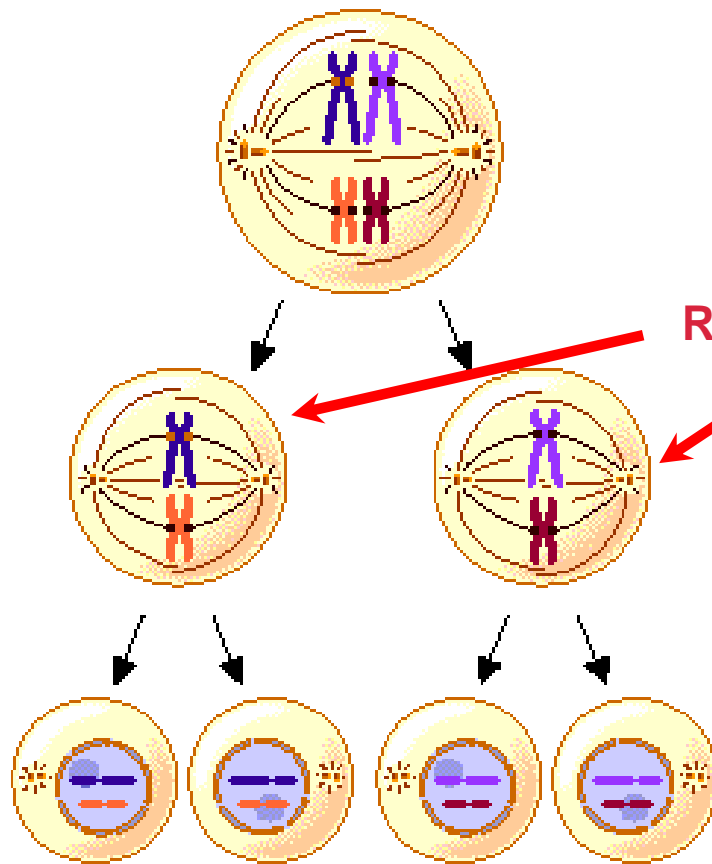
Gamete (egg) 23 Chromosomes

+

Gamete (Sperm) 23 Chromosomes

46 Chromosomes (chromosome number
restored with newly formed zygote)

Phases of Meiosis

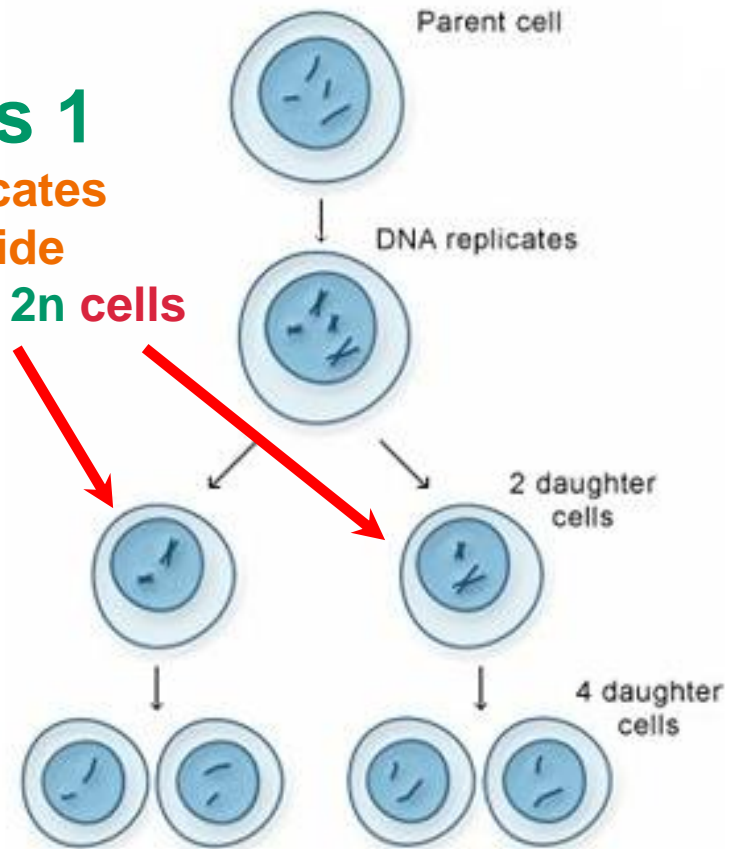


Meiosis 1

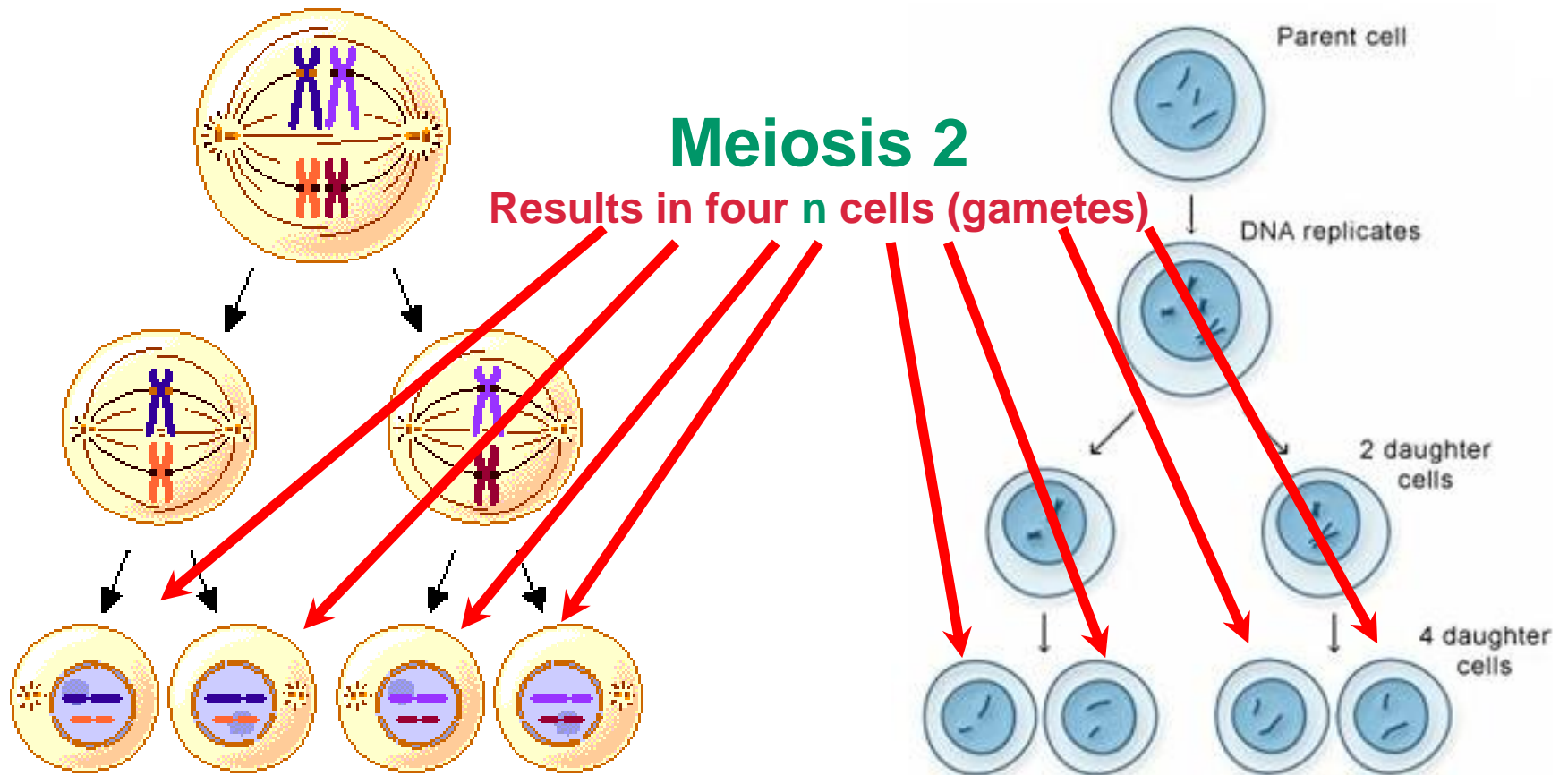
DNA Replicates

Cells Divide

Results in two $2n$ cells



Phases of Meiosis



Why Sexual Reproduction?

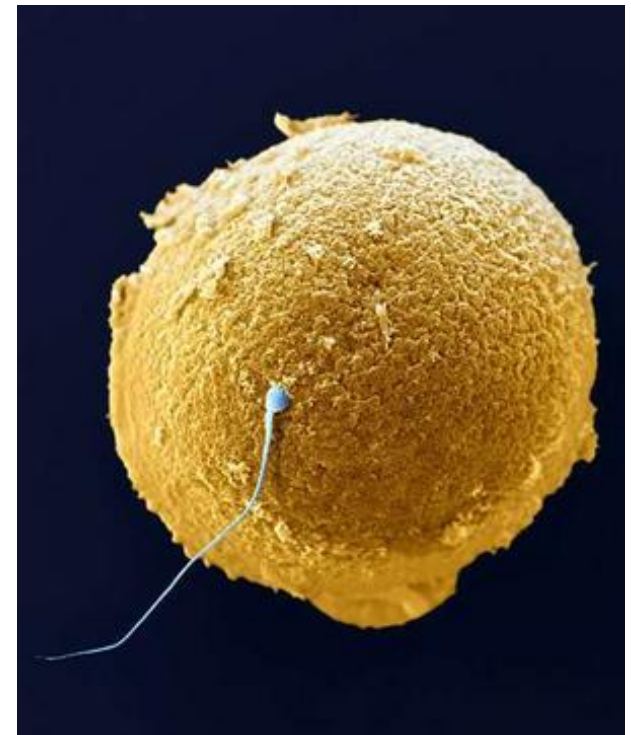
No set determination on which sperm will fertilize the ovum (egg)!

- **Genetic Variation!**

- What is genetic variation?
- Why is it important?

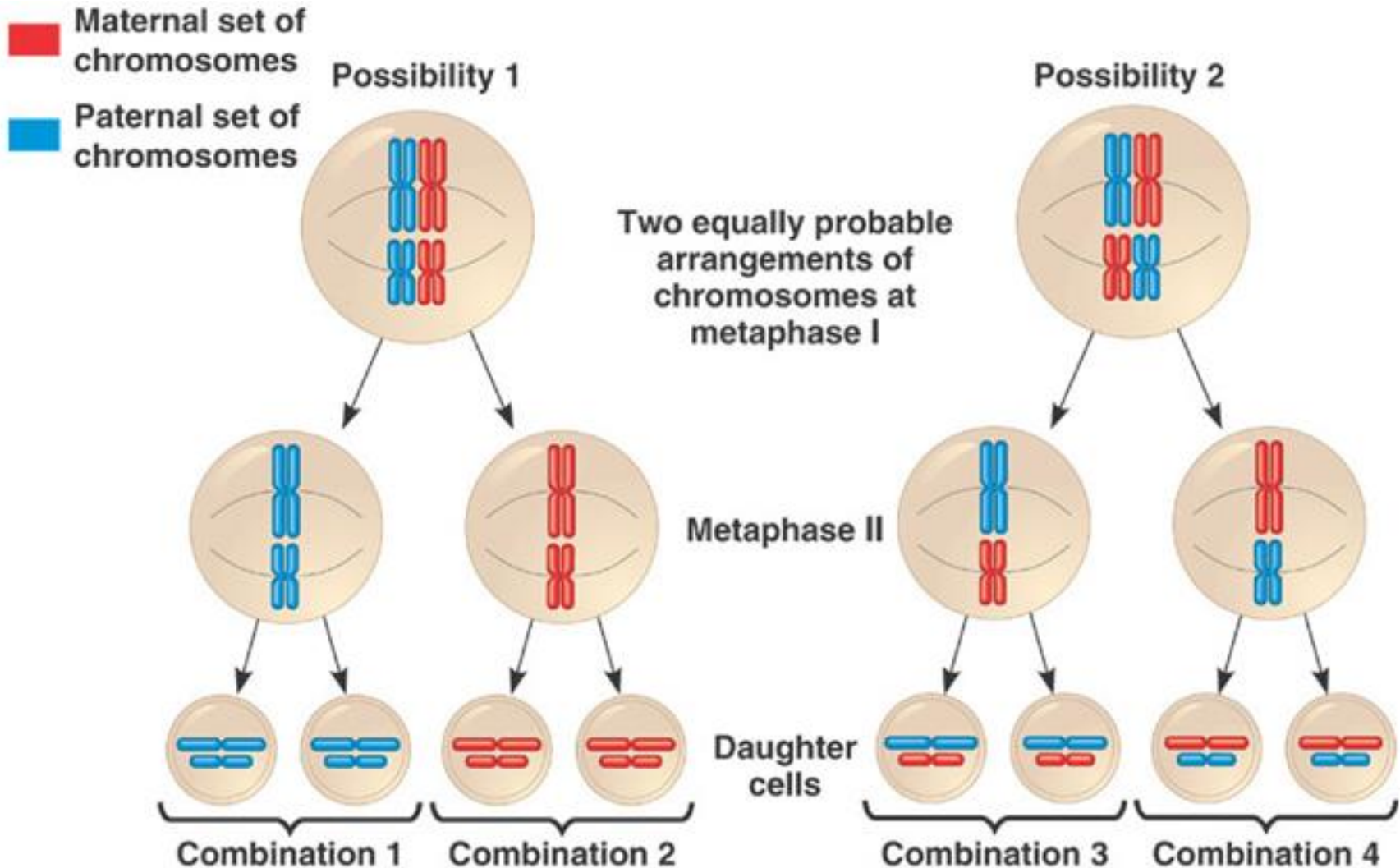
- **How does this occur?**

- **Random Fertilization**
- **Independent Assortment (in Meiosis)**
- **Crossing Over (in Meiosis)**



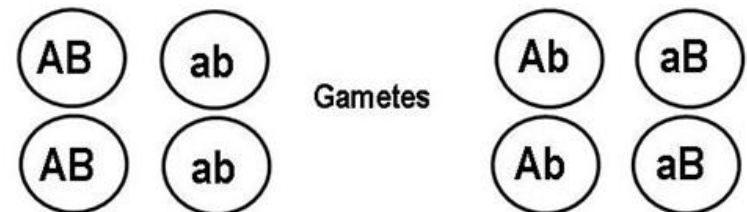
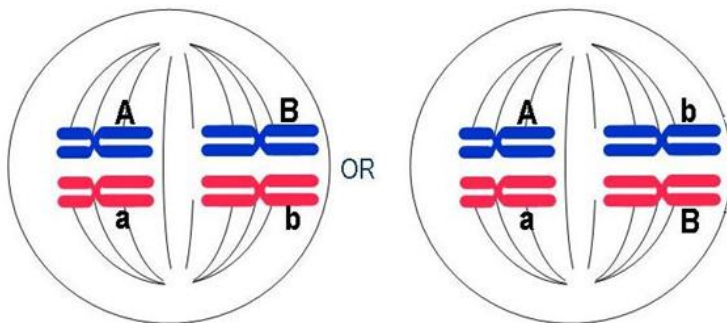
Independent Assortment

What do you notice?

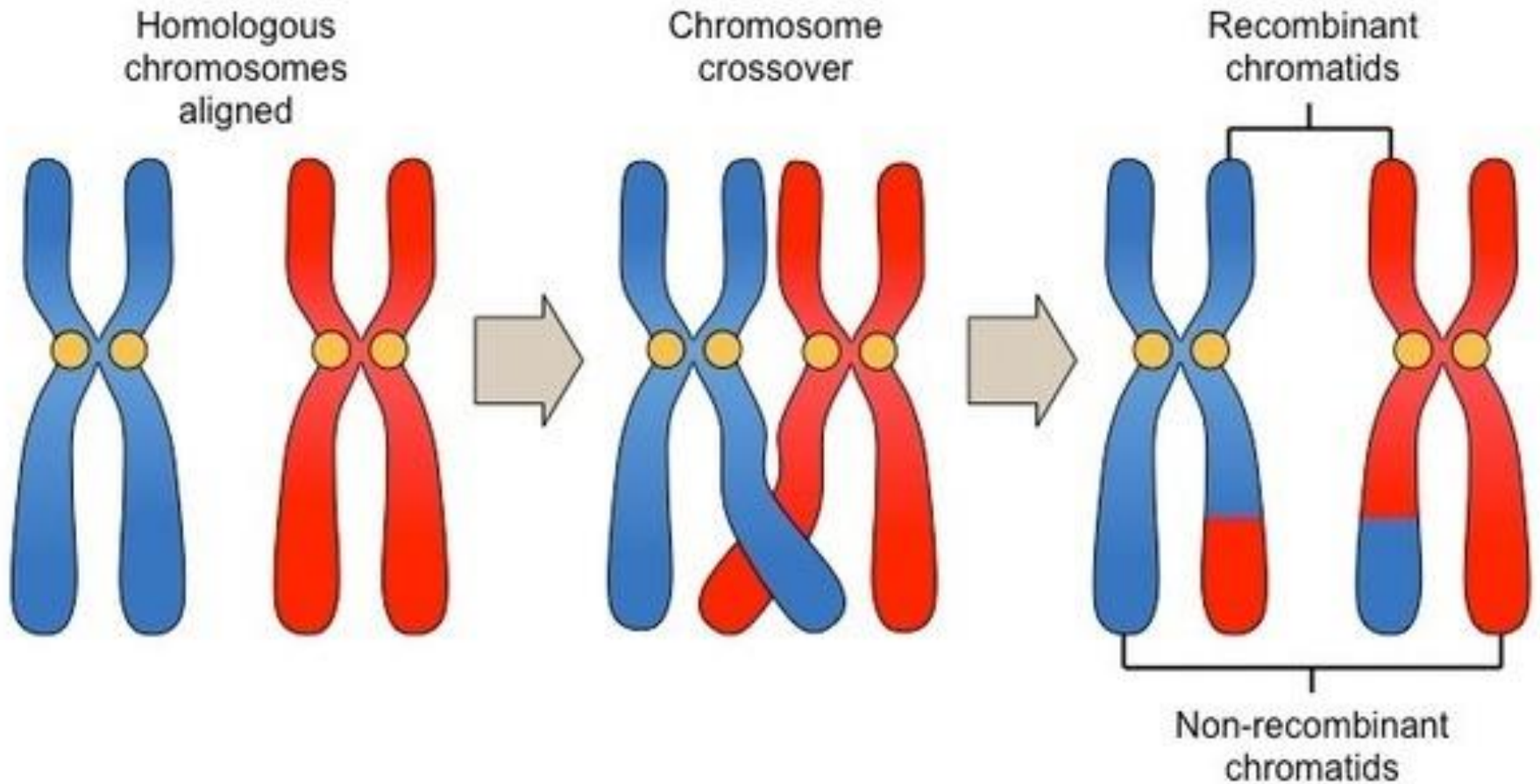


Independent Assortment

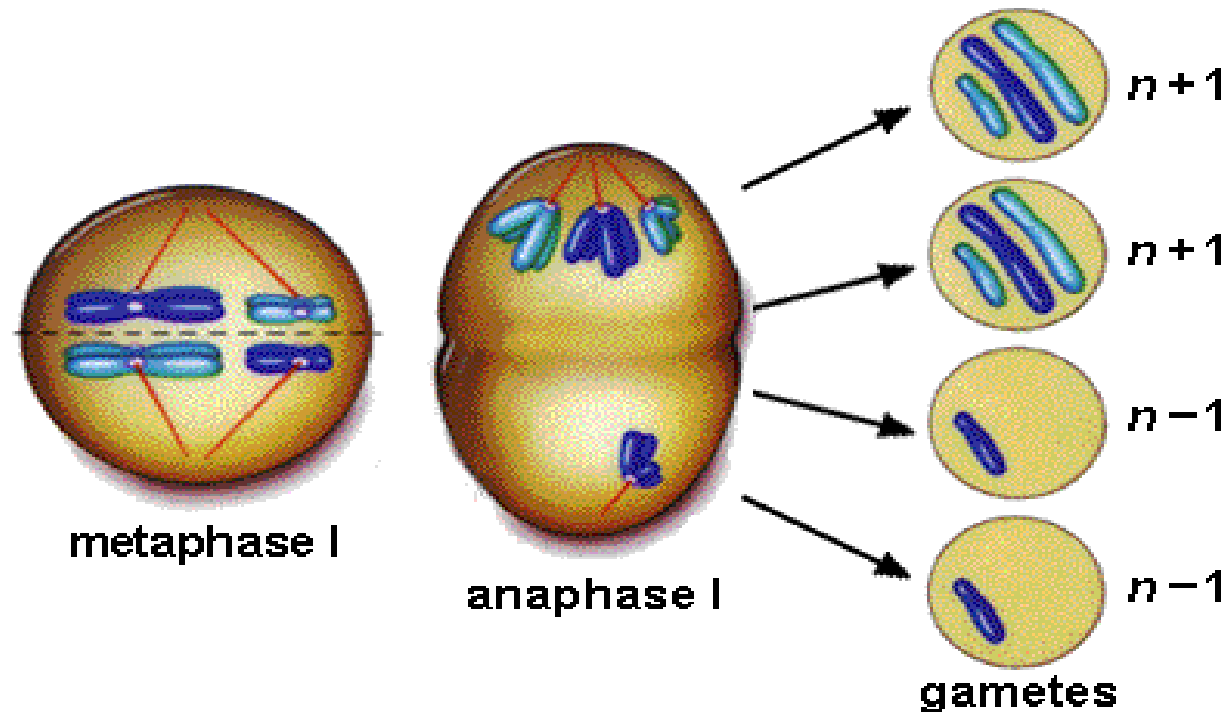
- How does this happen?
- **How does it increase genetic variation?**
 - Alleles of different genes separate **independently** of one another during **meiosis**.
 - Pairs of chromosomes line up randomly during **metaphase** resulting in gene pairs separating into different cells.



Crossing Over



Mistakes in Meiosis

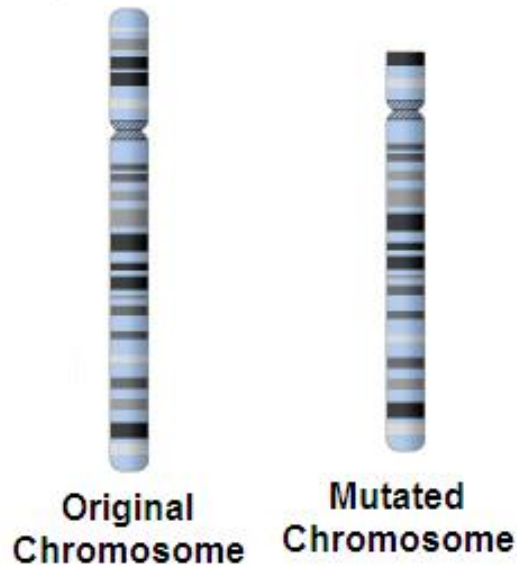


This is called **Nondisjunction**

Chromosomes did not separate correctly

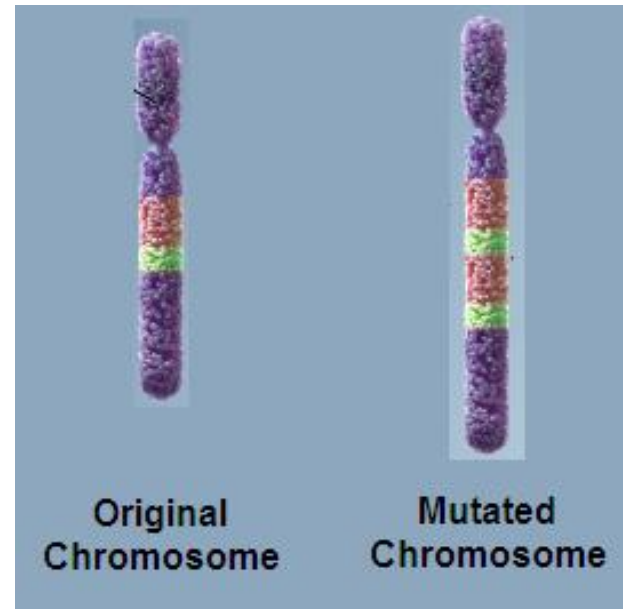
- What does **n** mean again???

Mistakes in Meiosis



Deletion

Chromosome fragment
was lost



Duplication

Chromosome fragment
inserted twice

Mistakes in Meiosis



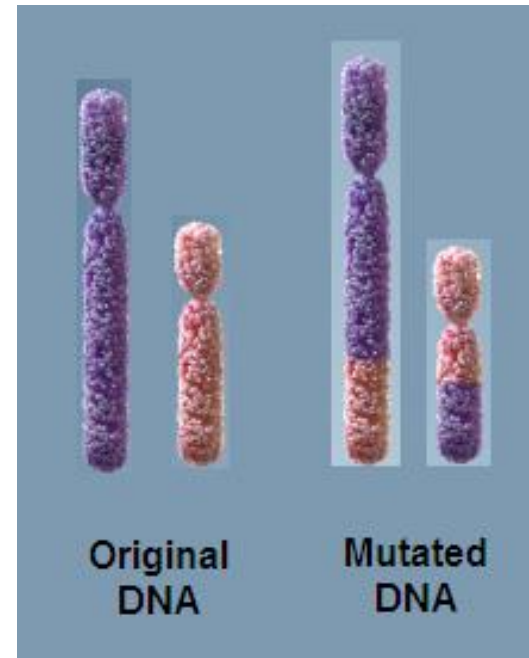
Original
Chromosome



Mutated
Chromosome

Inversion

Chromosome
fragment inserted
backward



Translocation

Chromosome fragment
moves from one
chromosome to another