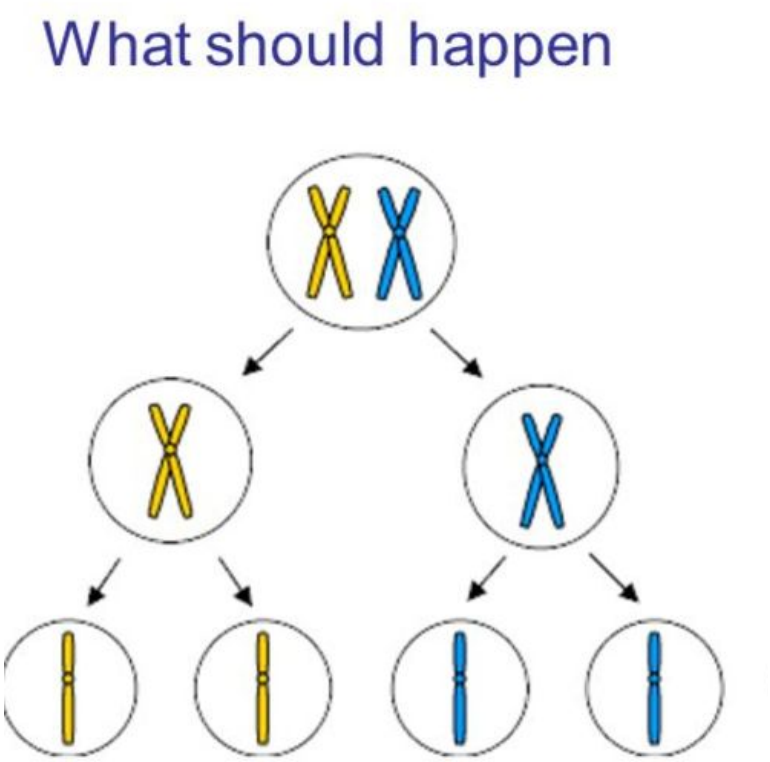
Objective

Evaluate ways mutations can alter genetic materials.

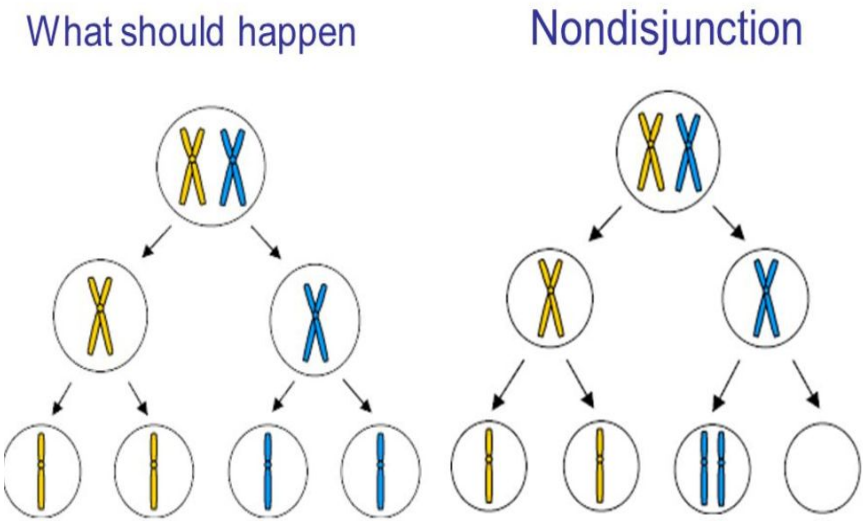
- **Mutation**- changes in the chromosome structure
- Mutations are the source of genetic variation in a populations and species
- Mutations can occur in any cell.
- Only mutation in gametes can be passed to offspring

How do chromosomal abnormalities occur?

- When sperm and egg cells form each chromosome and its homolog separate in an event called **disjunction**.



- If chromosomes fail to separate properly in an event called **<u>nondisjunction</u>**
- One new gamete ends up receiving both chromosomes and the other receives none
- After fertilization can have monosomy or Trisomy



Chromosomal Mutations

Pieces of chromosomes may be deleted, duplicated, inverted, or swapped among different chromosomes.

Types of Mutations

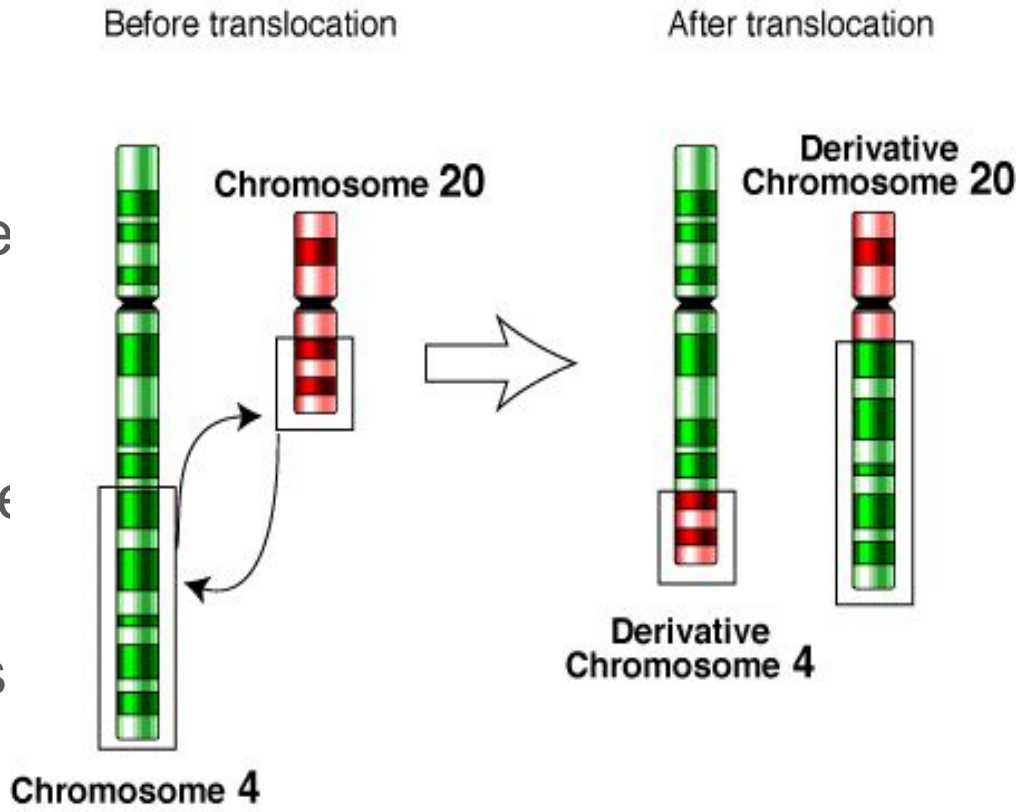
1. Gene Rearrangements
2. Point Mutations
3. Insertion Mutation
4. Deletion Mutation
5. Frameshift Mutations

Missense- Changes the amino acids in the resulting proteins

Silent- Does not change the resulting proteins

Gene Rearrangements

- Move an entire gene to a new location.
- Often disrupt the gene's function because the gene is exposed to new regulatory controls.
- Portion of the chromosome containing a gene may be rearranged during meiosis



- Genes sometimes move as part of a transposon (a DNA sequence that can change its position within a genome) sometimes creating or reversing mutations and altering the cell's genome size.
- Other times, the portion of the chromosome containing a gene may be rearranged during meiosis.

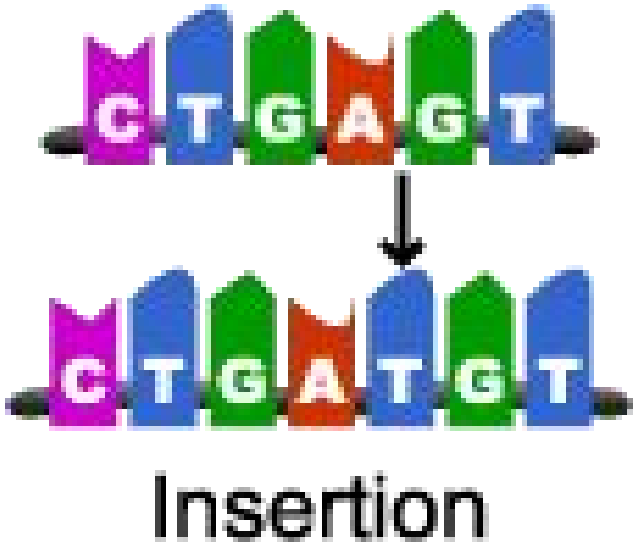
Point Mutations

In a point mutation, a single nucleotide changes.

Point mutation

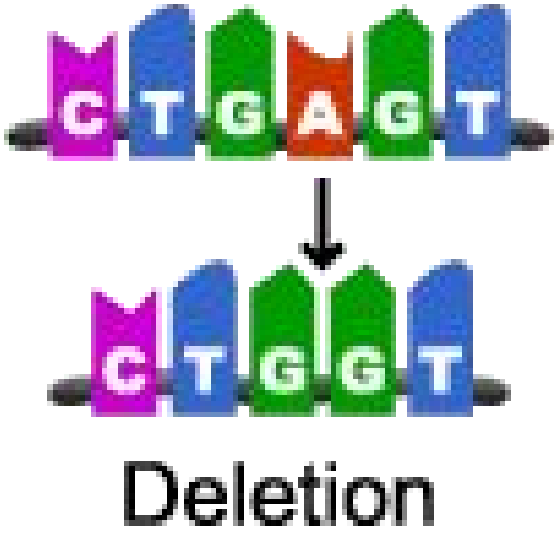
Insertion Mutation

A sizable length of DNA is inserted into a gene.



Deletion Mutation

Segments of a gene are lost (often during meiosis).



Because the genetic message is read as a series of triplet nucleotides, insertions and deletions of one or two nucleotides can upset the triplet groupings (codons used to make proteins).

Frameshift Mutation

A mutation that causes a gene to be read in the wrong three-nucleotide sequence.