

## Genetics Section 8.7

### I. Mutations

\*Mutation = *any change of DNA in a gene*.

-Mutations can be caused by *errors* in replication, transcription, cell division, or by external agents.

#### A. Mutation in gametes.

1. Mutations can affect **reproductive cells** by *changing the sequence of nucleotides within* a sperm or ovum.
2. If the **mutated gamete** takes part in fertilization, the **altered gene** would become part of the *genetic makeup of the offspring*.

3. The mutation can produce a *new trait* or it may result in *problems in the cell*.
4. In some cases, gene mutations may have *positive effects* for a species.

#### B. Mutations in somatic cells.

1. Damage to a body cell may impair the *function of the cell*.

Ex: A cell in the stomach may lose its ability to make HCL acid needed for digestion, or skin cells may lose elasticity.

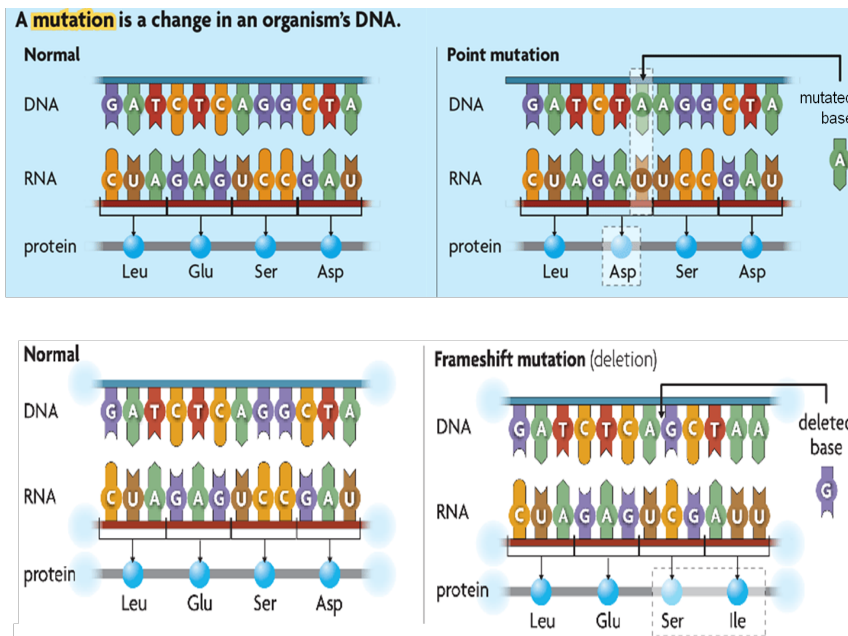
2. When the damaged cell *replicates and divides*, the new cell may affect the genes that control cell division, thus this can cause *cancer*.

## II. There are two types of mutations: *chromosomal or gene*

### A. Gene function can seriously be affected by mutations in individual genes. There are two types:

- 1) Point mutation - a change in *single* nucleotide
- 2) Frameshift mutations - involve the *addition or deletion* that alters every codon (set of nucleotides) from the point of the mutation on; it can completely change the *protein product* produced by a gene.

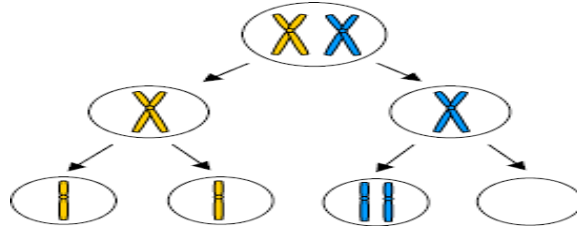
In general, point mutations are *less harmful* than frameshift, because only one codon is affected



**Remember:** Whole chromosomes, individually or in sets.

- ***Nondisjunction*** - a type of mutation that involves whole chromosomes. When ***homologs fail to separate during meiosis***.

-Depending on the gamete fertilized there are ***more or less*** the normal number of chromosomes present in an organisms cell.



### 3. Mutations may or may not affect phenotype.

- Some **gene mutations** change **phenotype**.
- A mutation may cause a ***premature stop*** codon.
- A mutation may change ***protein shape*** or **the active site**.
- A mutation may change ***gene regulation*** .

### III. Causes of Mutations

- A.
1. **Replication** errors can cause **mutations**.
  2. **Mutagens**, such as UV ray and chemicals, can cause mutations.
  3. Some **cancer drugs** use mutagenic properties to kill cancer cells.

### B. Repair of DNA

- 1) The enzyme, **DNA Polymerase**, proofreads the DNA and replace incorrect nucleotides with correct nucleotides.
- 2) These repair mechanisms work well, but are **not perfect**. So, some nucleotides remain **uncorrected**.

