

# MUTATIONS

Mrs. I.GEETHA  
ASSISTANT PROFESSOR  
PG & RESEARCH CENTRE  
OF ZOOLOGY  
II UG ZOOLOGY (R)

# What Are Mutations?

- ◉ **Changes in the *nucleotide sequence of DNA***
- ◉ **May occur in *somatic cells* (aren't passed to offspring)**
- ◉ **May occur in *gametes* (eggs & sperm) and be passed to offspring**

# Are Mutations Helpful or Harmful?

- ◉ ***Mutations happen regularly***
- ◉ ***Almost all mutations are neutral***
- ◉ ***Chemicals & UV radiation cause mutations***
- ◉ ***Many mutations are repaired by enzymes***

# Are Mutations Helpful or Harmful?

- ⊙ **Some type of skin cancers and leukemia result from somatic mutations**
- ⊙ **Some mutations may improve an organism's survival (beneficial)**

# CLASSES OF MUTATION

- ***SPONTANEOUS MUTATION***

- ***INDUCED MUTATION***

## ➤ **SPONTANEOUS MUTATION**

- *they are mainly caused during dna replication or by incorporation of incorrect nucleotide in the growing dna chain .*
- *They occur naturally by changes in DNA sequence during replication.*

# ➤ **INDUCED MUTATION**

- ① *Induced mutation are caused by the changes in DNA brought about by some environmental factor called mutagens.*
- ② *E.g.- UV light,x-rays,gamma rays etc...,*

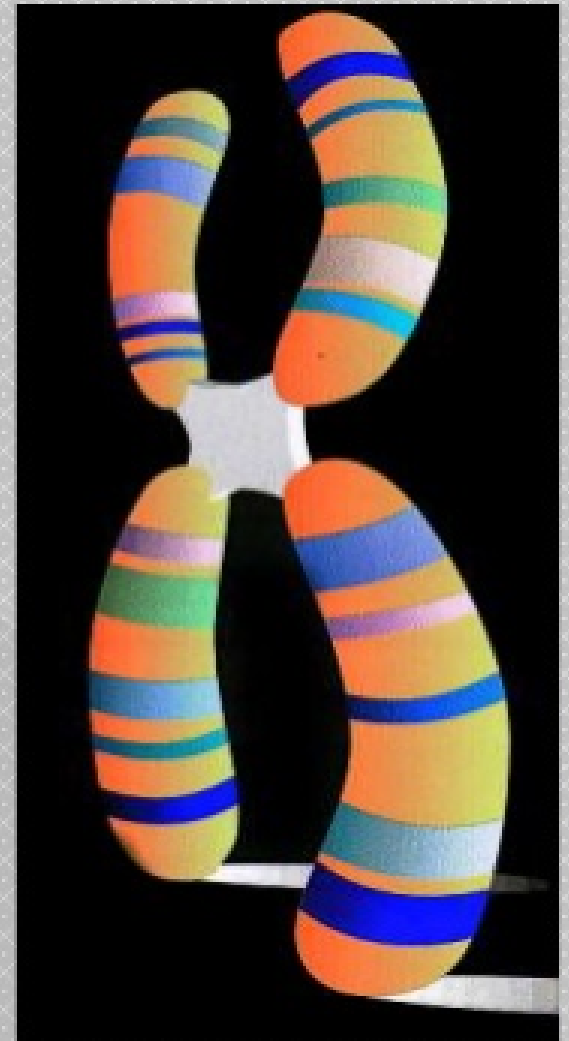
# Types of Mutations



# Chromosome Mutations

© *May Involve:*

- > ***Changing the structure of a chromosome***
- > ***The loss or gain of part of a chromosome***



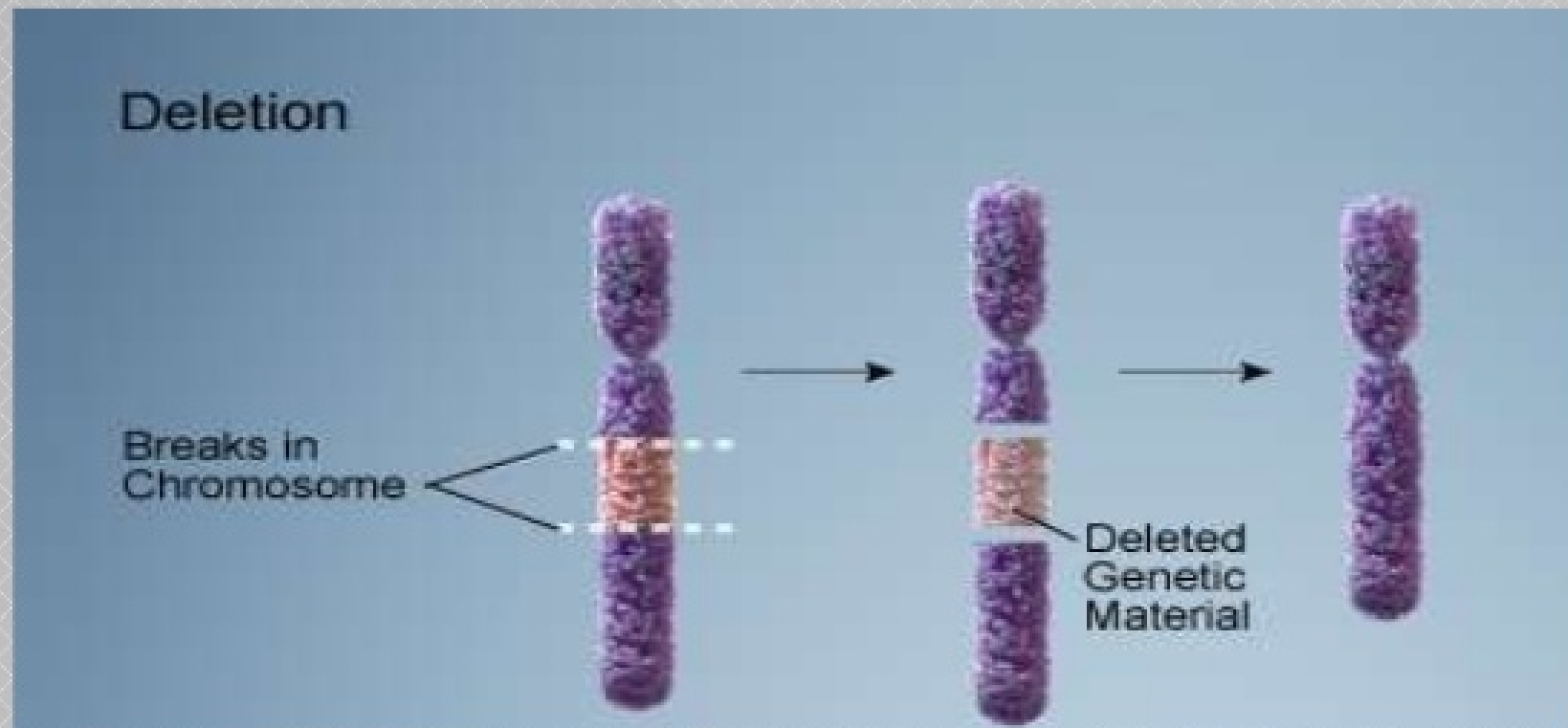
# Chromosome Mutations

● *Five types exist:*

- > ***Deletion***
- > ***Inversion***
- > ***Translocation***
- > ***Nondisjunction***
- > ***Duplication***

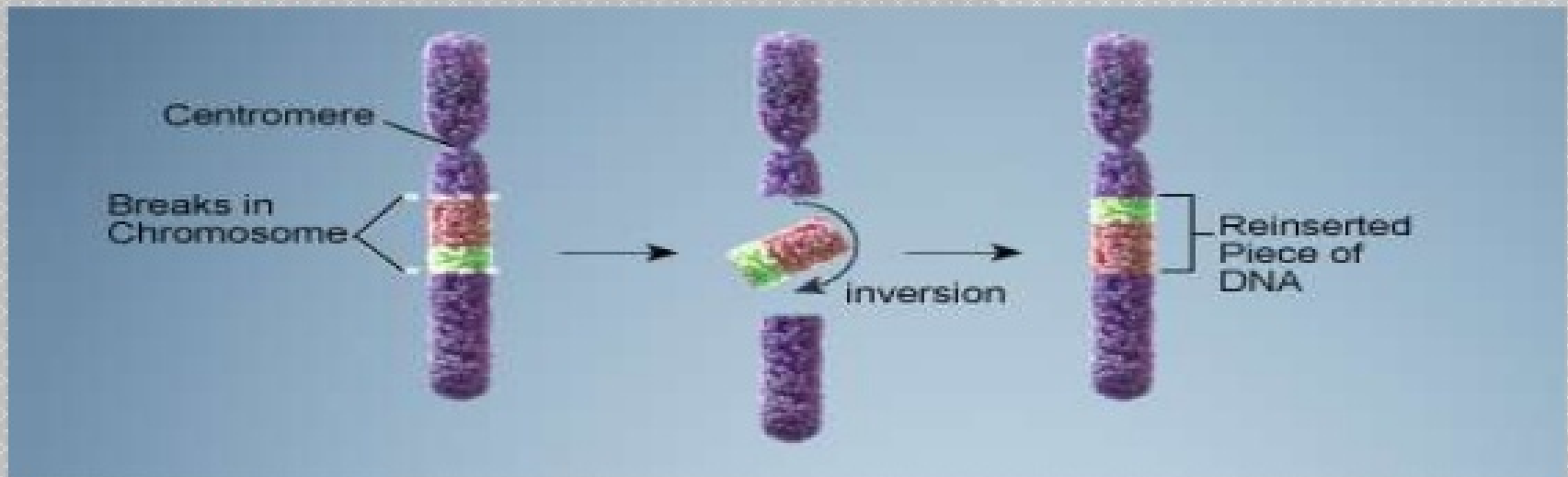
# Deletion

- ***Due to breakage***
- ***A piece of a chromosome is lost***



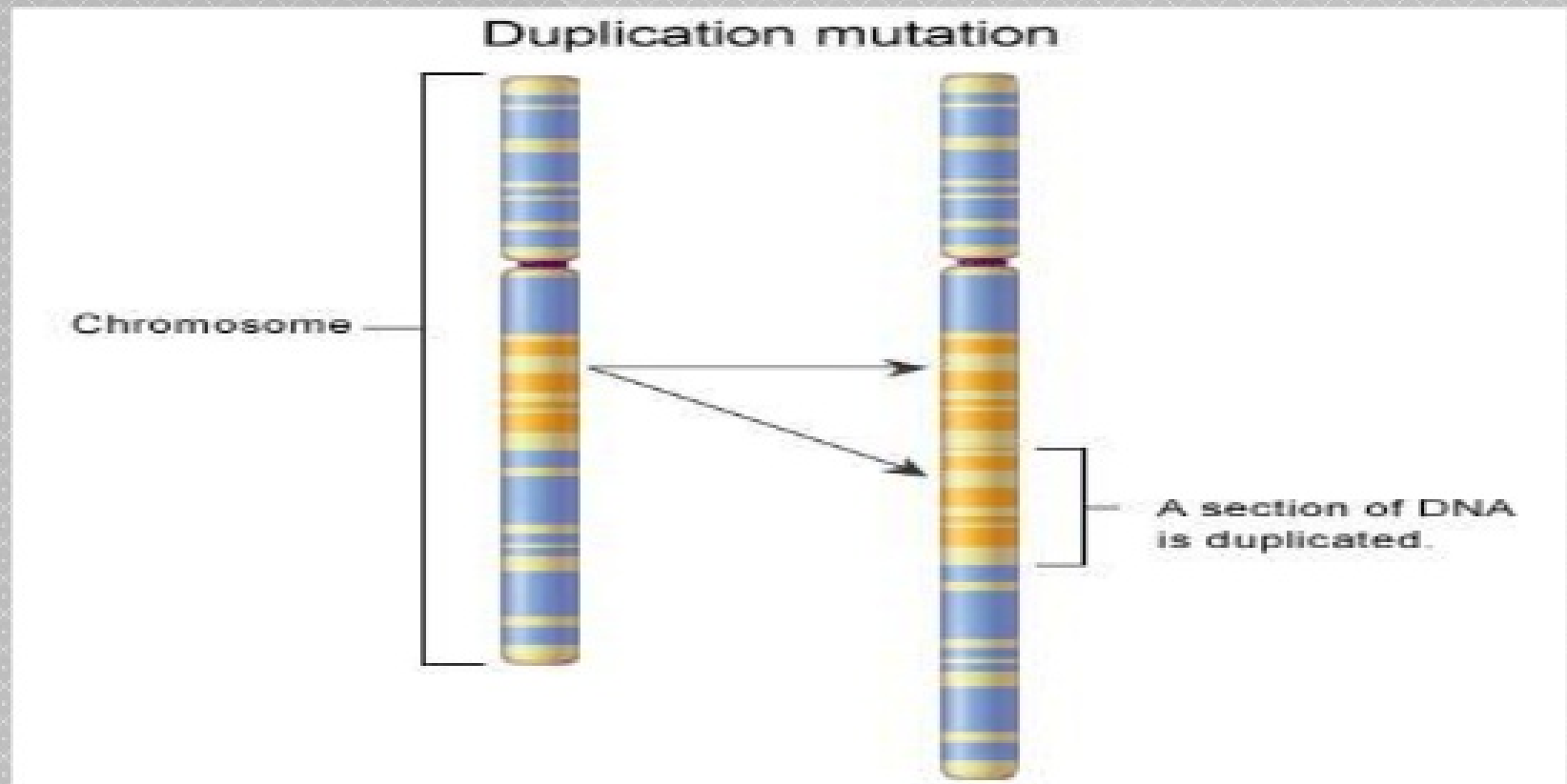
# Inversion

- ***Chromosome segment breaks off***
- ***Segment flips around backwards***
- ***Segment reattaches***



# Duplication

- ***Occurs when a gene **sequence** is repeated***



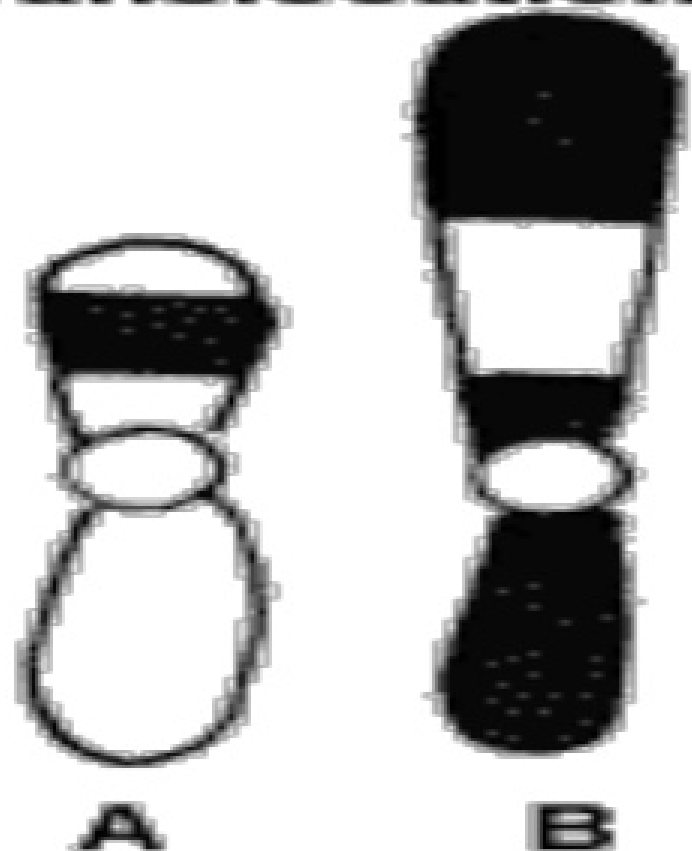
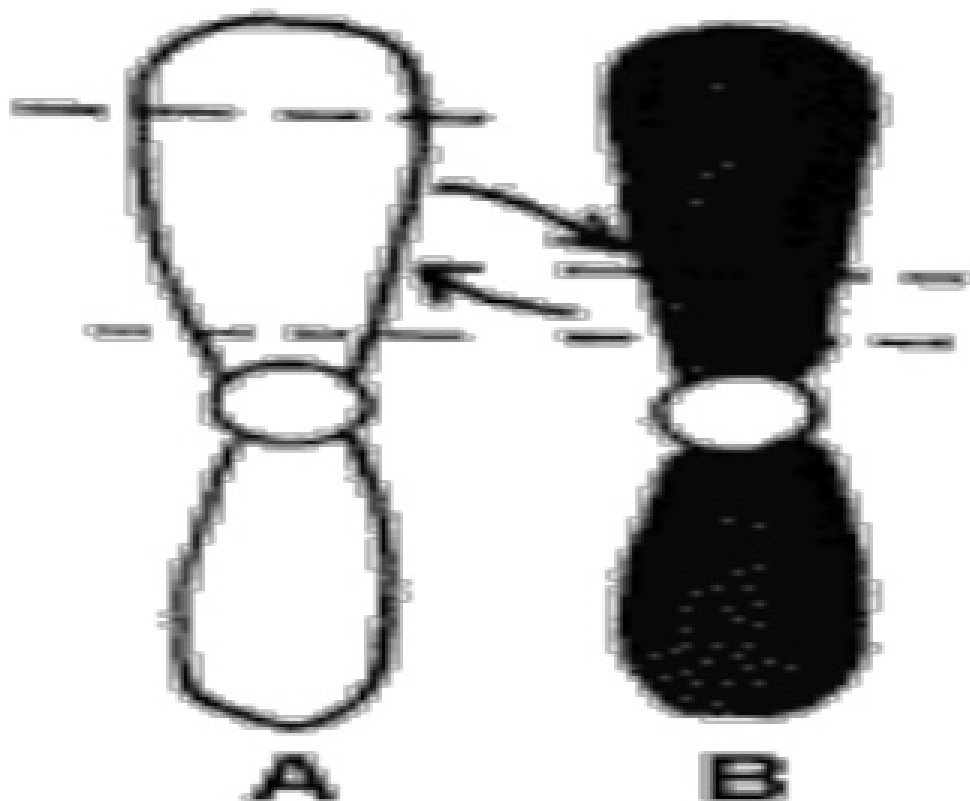
# Translocation

- ⦿ ***Involves two chromosomes that aren't homologous***
- ⦿ ***Part of one chromosome is transferred to another chromosome***

# Translocation

**Before  
Translocation**

**After  
Translocation**



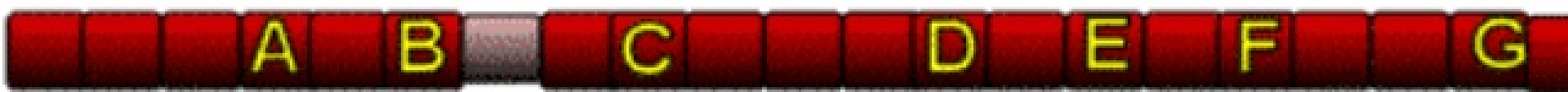
**Chromosomes**

# Nondisjunction

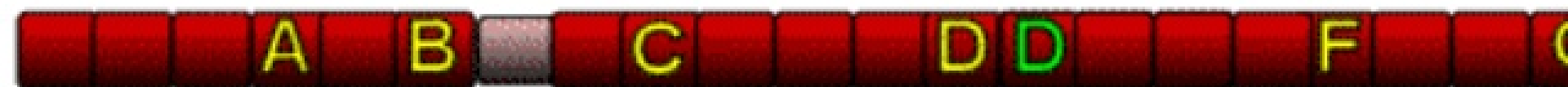
- ⊙ **Failure** of chromosomes **to separate** during meiosis
- ⊙ Causes gamete to have **too many or too few chromosomes**
- ⊙ **Disorders:**
- ⊙ **Klinefelter's Syndrome** – XXY chromosomes
  - > **Down Syndrome** – three 21<sup>st</sup> chromosomes
  - > **Turner Syndrome** – single X chromosome



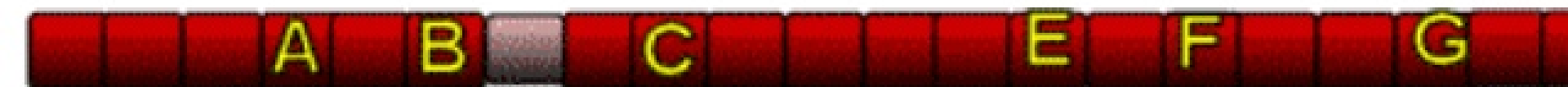
# Original Chromosome



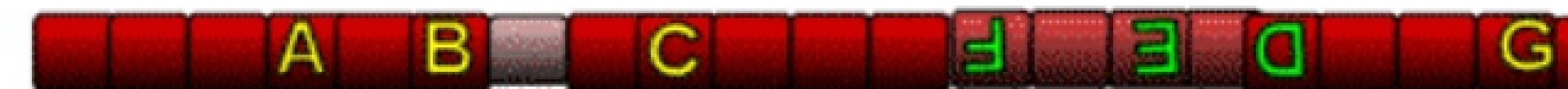
# Duplication



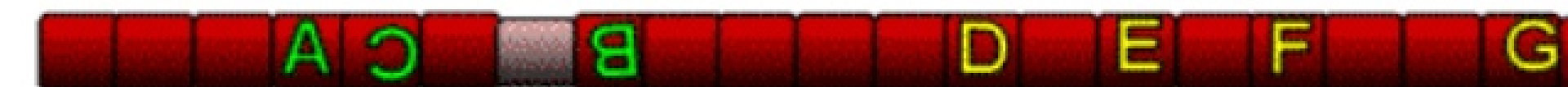
# Deletion



# Inversion



# Inversion



# Gene Mutations

- ◉ ***Change in the nucleotide sequence of a gene***
- ◉ ***May only involve a single nucleotide***
- ◉ ***May be due to copying errors, chemicals, viruses, etc.***

# Types of Gene Mutations

## ● **Include:**

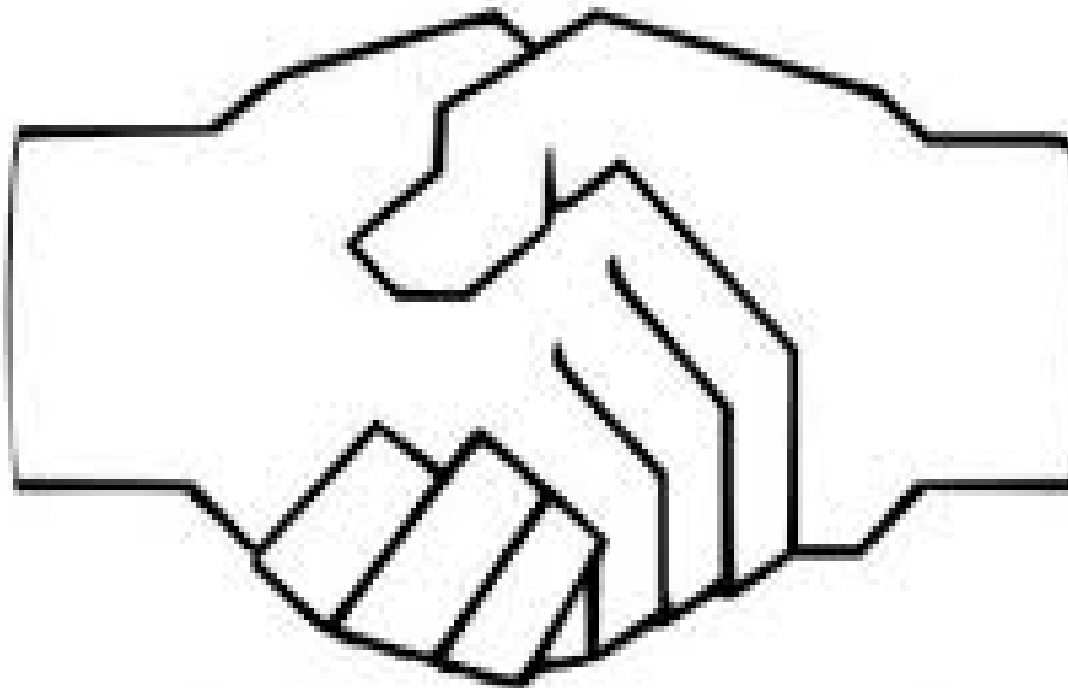
- > ***Point Mutations***
- > ***Substitutions***
- > ***Insertions***
- > ***Deletions***
- > ***Frameshift***

# Point Mutation

- ① **Change of a *single* nucleotide**
- ② **Includes the deletion, insertion, or substitution of *ONE* nucleotide in a gene**

# Frame shift Mutation

- ◉ ***Inserting or deleting one or more nucleotides***
- ◉ ***Changes the “reading frame” like changing a sentence***
- ◉ ***Proteins built incorrectly***



**THANK YOU**