Lab -3-

Drosophila mutations

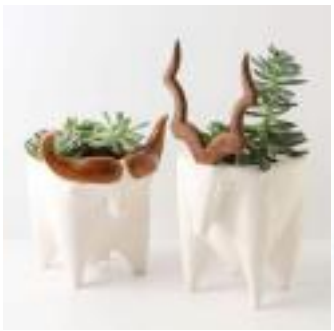
2.1- Mutation: heritable changes in the sequence of the genetic material (DNA) of an organism. It can occur at **nitrogenous base** due to substituation or adding or deleting one or few bases, or **at chromosomal level**. Finally appearance new phenotype differs from wild type.

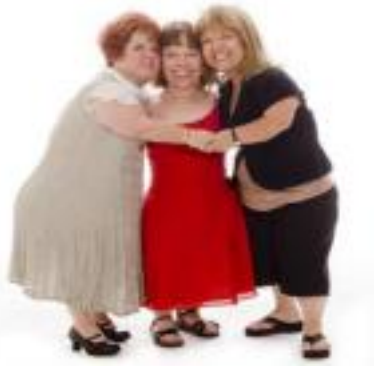
Mutations can result during cell division, exposure to mutagens or a viral infection .

Mutagen: any agent capable of change changes in the sequence of the genetic material (DNA),it may be physical or chemical agent.

2.2- Types of mutations

1- **Spontaneous mutation**: occurs naturally in the absence of exogenous chemical or physical agents. the common causes of spontaneous mutations are errors made during DNA replication. **Achondroplasia or (dwarfism)** .People with **achondroplasia** have short stature, with an average adult height of 131 centimeters for males and 123 centimeters for females.. If both parents of a child have achondroplasia, and both parents pass on the mutant gene, then it is very unlikely that the homozygous child will live past a few months of its life.





2 - **Induced Mutation**: occurs result from the influence of mutagen.

Chemicals (EMS, ect.) Physical (X-RAY, GAMA RAY, UV-radiation).

3-Conditional mutation: affect the phenotype only under certain conditions.

Organisms can be protected by avoiding the exposure to these trigger symptoms. For example X-linked that encoded to Glucose-6-phosphate dehydrogenase. **Glucose-6-phosphate dehydrogenase (G6PD)** deficiency is a genetic disorder that occurs most often in males. This condition mainly affects red blood cells, which carry oxygen from the lungs to tissues throughout the body. In affected individuals, a defect in an enzyme called glucose-6-phosphate dehydrogenase causes red blood cells to break down prematurely. This destruction of red blood cells is called **hemolysis**. **Hemolytic anemia** is most often triggered by bacterial or viral infections or by certain drugs (such as some antibiotics and medications used to treat malaria). Hemolytic anemia can also occur after eating **fava beans** or **inhaling pollen** from fava plants (a reaction called **favism**).

Glucose-6-dehydrogenase deficiency is also a significant cause of mild to severe jaundice in newborns. Many people with this disorder, however, never experience any signs or symptoms.

2.3: Drosophila mutation

Table 1.2**: Drosophila mutation**

Characteristic	**Mutation type**	**Chromosome number**	**Mutation symbol**	**Wild type**	
Vestigial wing	Recessive	II	vg	**vg^+**	Single mutation
Dumpy wing	Recessive	II	dp	**dp^+**	
Ebony body	Recessive	III	e	**e^+**	
White -eye	Recessive	I	w	**w^+**	
Ebony-vestigial	Recessive	II, III	evg	**ev^+g^+**	Double mutation
Ebony-dumpy	Recessive	II, III	edp	**ed^+p^+**	

Drosophila melanogaster has been important in mutation studies **because this organism has very low chromosome number.** The haploid (n) number of

chromosome is 4, and the chromosomes are designed X (1), 2, 3, and 4 (figure 2-3).

The **2, 3, and 4** chromosomes are the same in both sexes and are referred to as **autosomes** to distinguish them from the **X and Y sex chromosomes**. Drosophila females are characterized by two **X chromosomes(XX)**, while males have an **X and Y chromosomes (XY).**

Figure 3-3 *Drosophila melanogaster* Chromosomes.