Patterns of inheritance.

Phenotypic and genotypic variations.

Chromosomal aberrations.

Patterns of inheritance

- Inheritance patterns **describe how genetic variants are distributed in families**. Understanding these patterns is crucial to predicting disease risk in family members of an affected individual. The **phenotype** of an individual is determined by his or her **genotype**. The genotype is determined by alleles that are received from the individual's parents (one from Mom and one from Dad). These alleles control if a trait is "**dominant**" or "**recessive**". Additionally, the location of the alleles in the genome determine if a trait is "**autosomal**" or "**X-linked**".

Variation

- **Variation**, in biology, any difference between cells, individual organisms, or groups of organisms of any species caused either by genetic differences (genotypic variation) or by the effect of environmental factors on the expression of the genetic potentials (phenotypic variation). Variation may be shown in physical appearance, metabolism, fertility, mode of reproduction, behaviour, learning and mental ability.

The forms of variation

- **Genotypic variations** are caused by differences in number or structure of chromosomes or by differences in the genes carried by the chromosomes. Eye colour, body form, and disease resistance are genotypic variations. A variation cannot be identified as genotypic by observation of the organism; breeding experiments must be performed under controlled environmental conditions to determine whether or not the alteration is inheritable.

Genotypic variation

- **Example :**

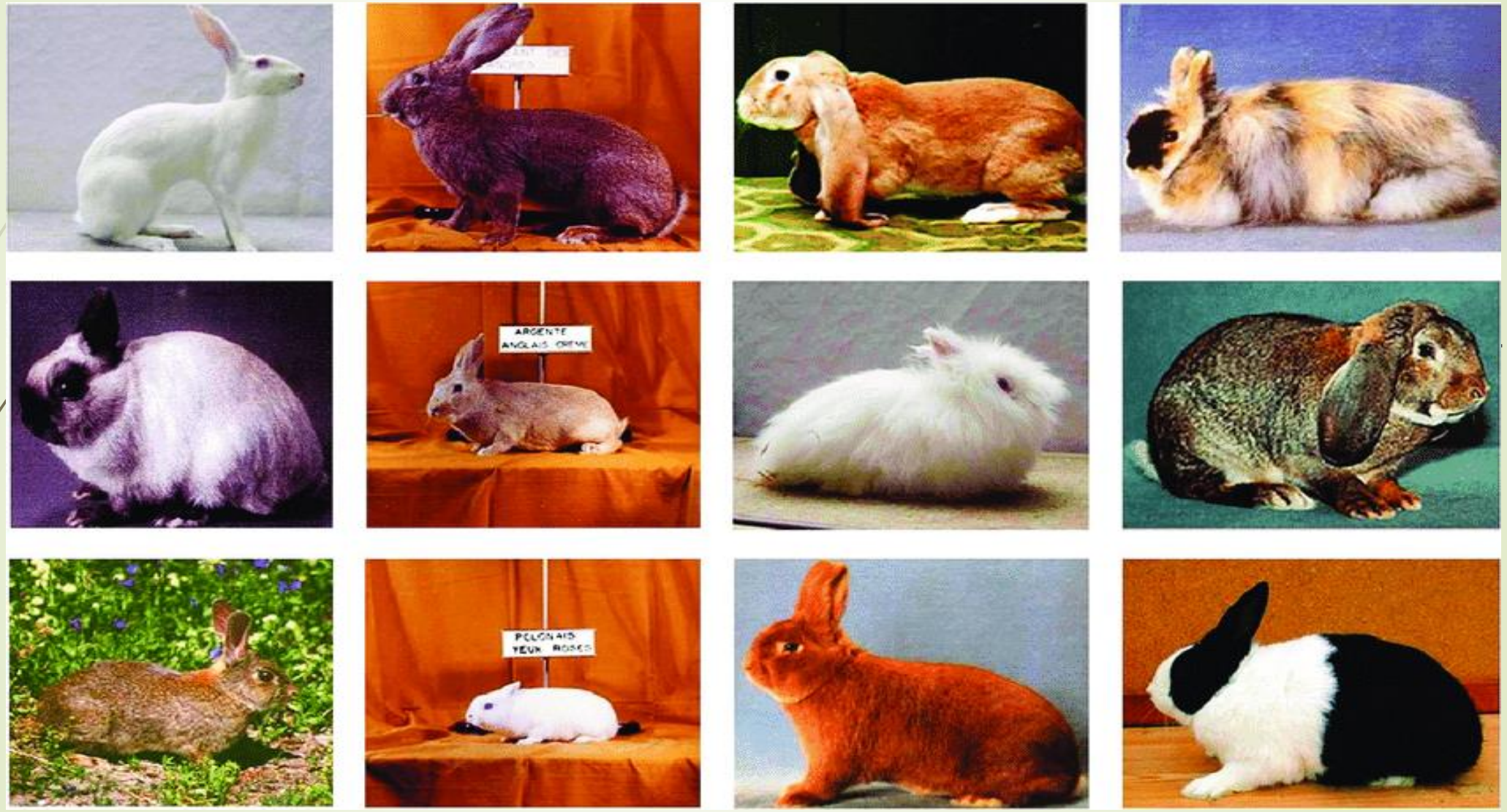
  Sweet corn → Improvement for varieties with large ears, early maturity and sweet taste.

The forms of variation

- **Phenotypic variations** also include stages in an organism's life cycle and seasonal variations in an individual. These variations do not involve any hereditary alteration and in general are not transmitted to future generations; consequently, they are not significant in the process of evolution.

Phenotypic variations are the physical differences

Phenotypic variation in domestic and wild rabbits



Sources of Variation:

The following factors are the sources for variation:

- Gene mutation
- Chromosomal aberration
- Recombination
- Hybridization
- Isolation
- Natural selection
- Genetic drift
- Founder principle
- Migration and gene flow

Sources of Variation:

Gene Mutation:

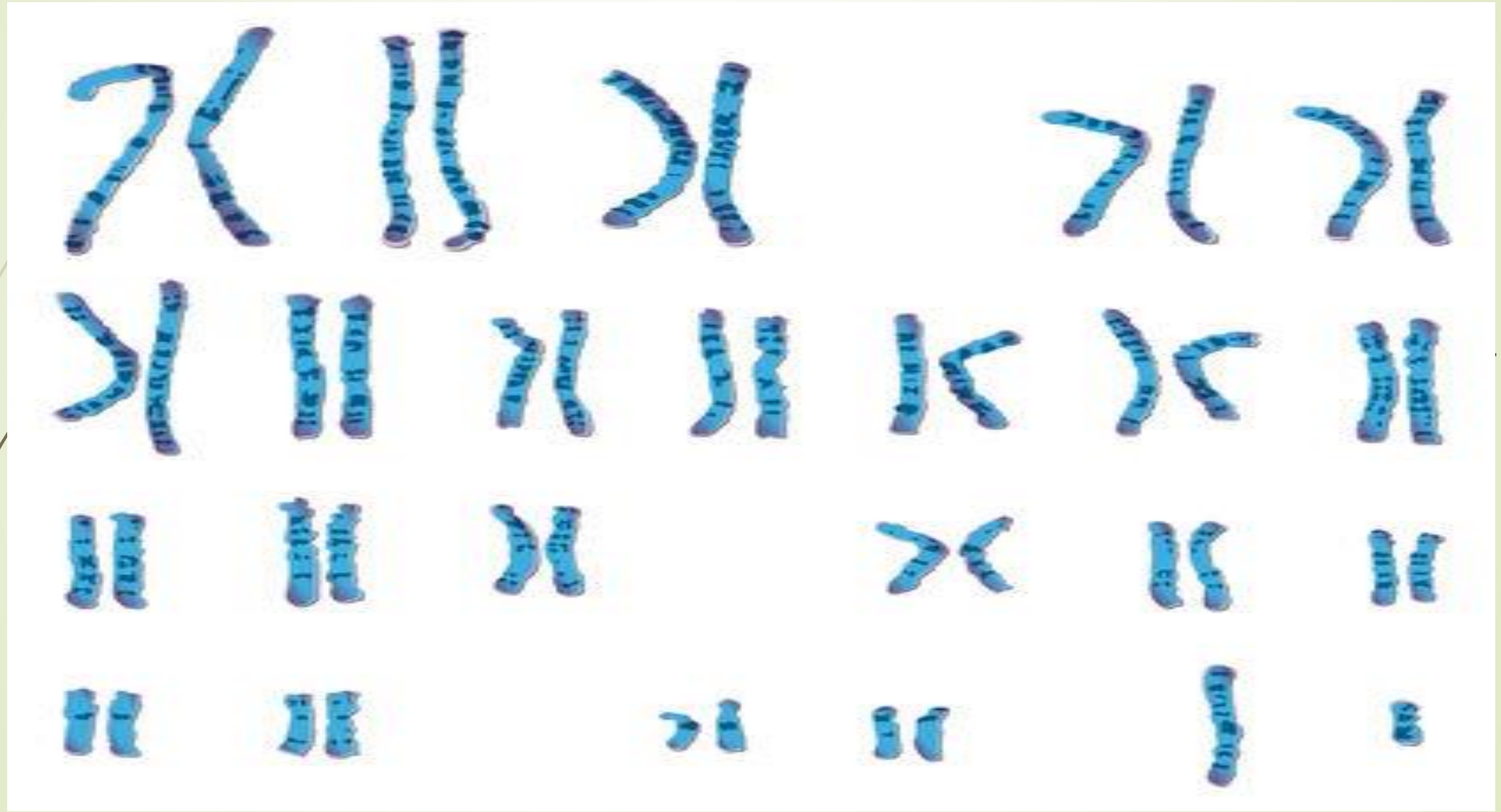
- Sudden change in the genetic make upon of an individual is called gene mutation. This mutation produces a different phenotype characters. Thus mutation produces variation.

Sources of Variation:

Chromosomal Aberration:

- Each cell of a species contains specific number of chromosome and genes are arranged in a specific sequence in the chromosome. The changes occurring in the chromosomes are called chromosomal aberration or chromosomal mutation.

Chromosomal Aberrations



Mutation:

A mutation is a change that occurs in our DNA sequence, either due to mistakes when the DNA is copied or as the result of environmental factors such as UV light and smoking and radiation.

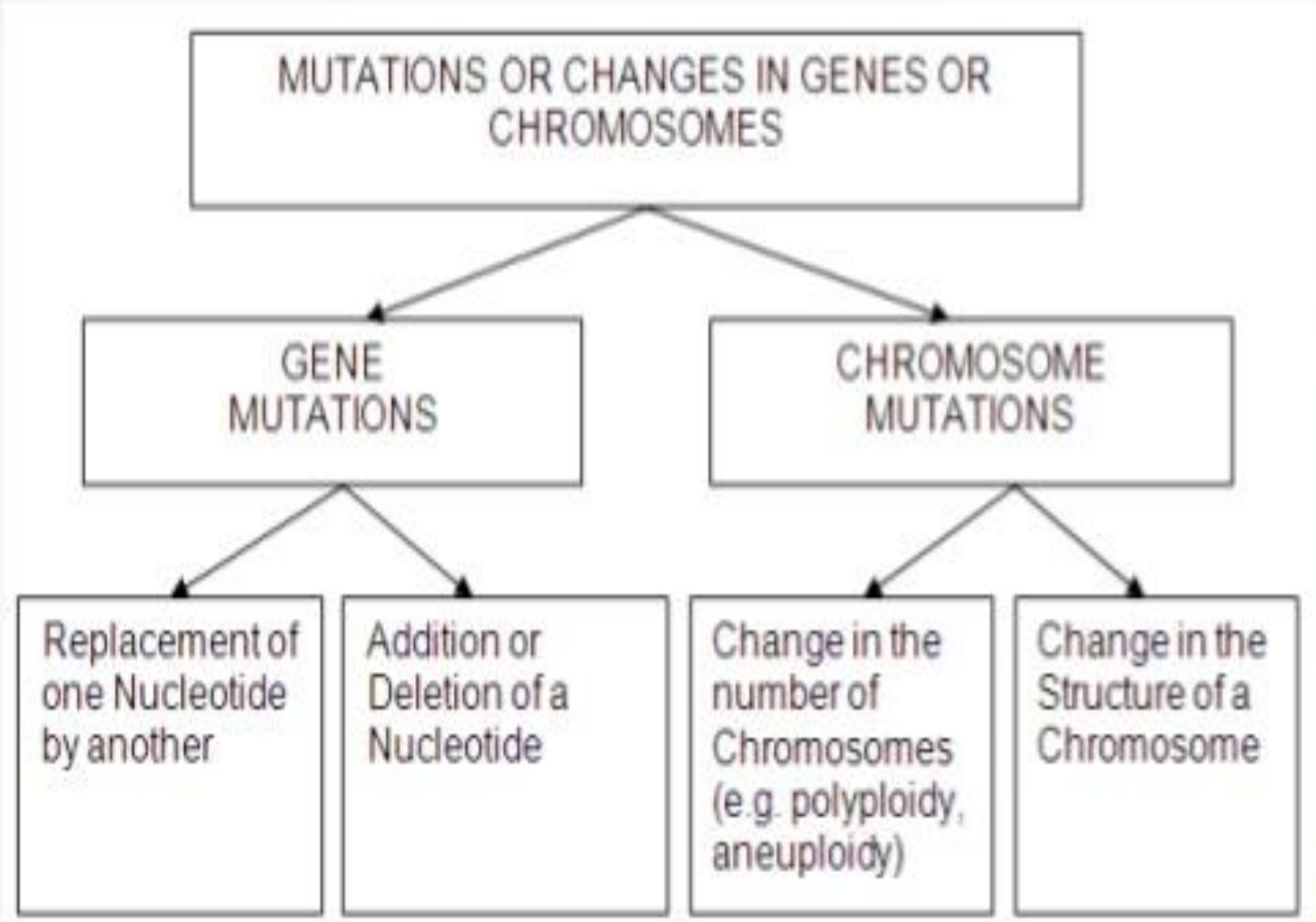
Mutation:

- However, mutation can also disrupt normal gene activity and cause diseases, like cancer[?]
- **Cancer** is the most common human genetic disease; it is caused by mutations occurring in a number of growth-controlling genes. Sometimes faulty, cancer-causing genes can exist from birth, increasing a person's chance of getting cancer.

Types of mutations

- The DNA sequence of a gene can be altered in a number of ways. Gene mutations have varying effects on health, depending on where they occur and whether they alter the function of essential proteins. The types of mutations include:

TYPES OF MUTATION



Thank you for your attention!