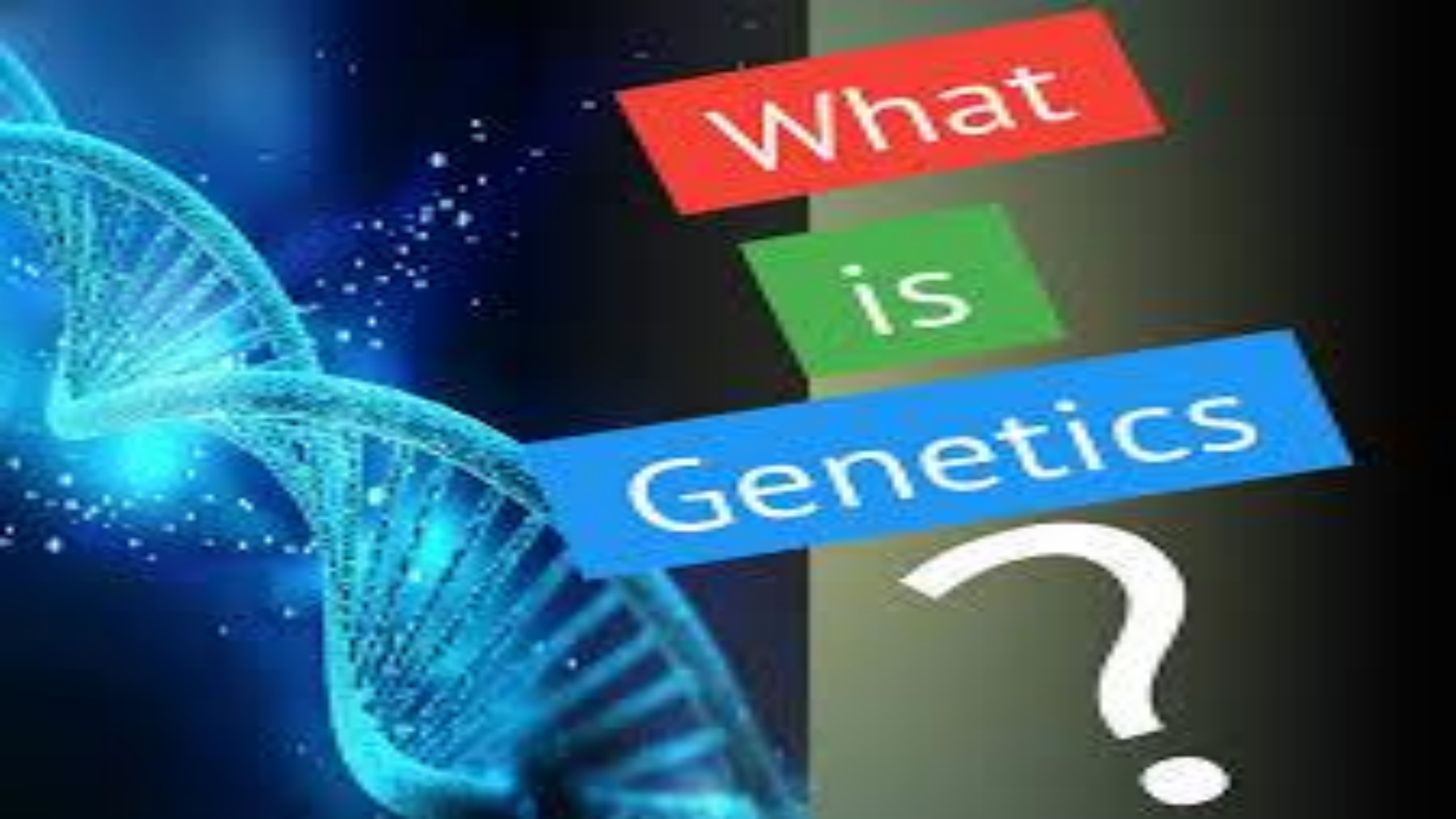
ژنتیک، جلسه اول:

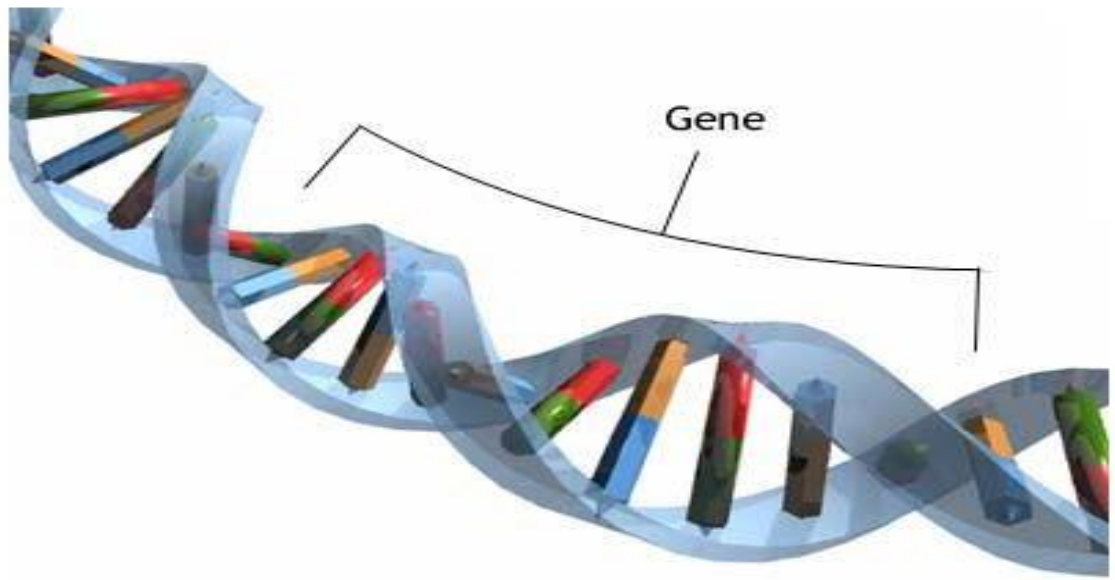
ژنتیک و اهمیت آن


What
is
Genetics
?

HEREDITY & GENETICS

Definitions

- **Heredity** = the inheritance of traits
- **Genetics** = the study of mechanisms of heredity.
- **Genes**: A portion of a DNA strand that functions as a hereditary unit, is located at a particular site on a specific chromosome, and codes for a specific protein or polypeptide



What is Genetics

Genetics is a branch of biology that deals with characteristics that are inherited from one generation to the next.

Genetics is the study of genes.

Branches of Genetics

1. Cytogenetics
2. Molecular genetics
3. Biochemical genetics
4. Cancer genetics
5. Immunogenetics
6. Developmental genetics
7. Behavioral genetics
8. Population genetics

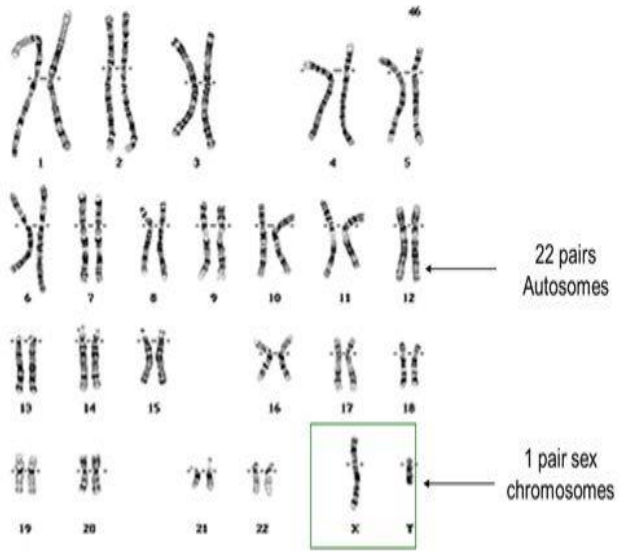
ژنتیک، جلسه دوم:

اشاره ای به تاریخچه ژنتیک و ژنتیک مندلی

HISTORY OF GENETICS

History of Genetics

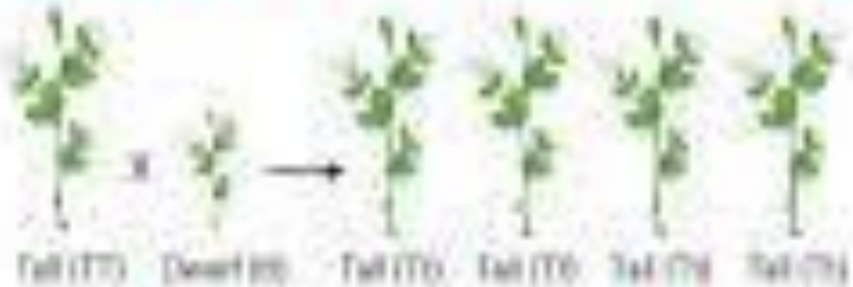
1. 1865: Gregor Mendel (Austrian monk) presented results of 10 years of experimentation on pea plants.
2. Late 1800's: increased research in microscopy and cytology (study of cells) recognized each chromosome transferred (contribution from parent).
3. 1903: chromosomes in gametes (sex cells) found to be involved in reproductive cycle.



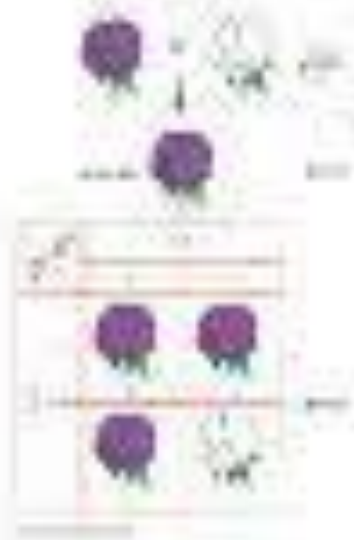
Gregor Mendel studied genetics using pea plants.

Traits that Mendel observed:

Law of Dominance



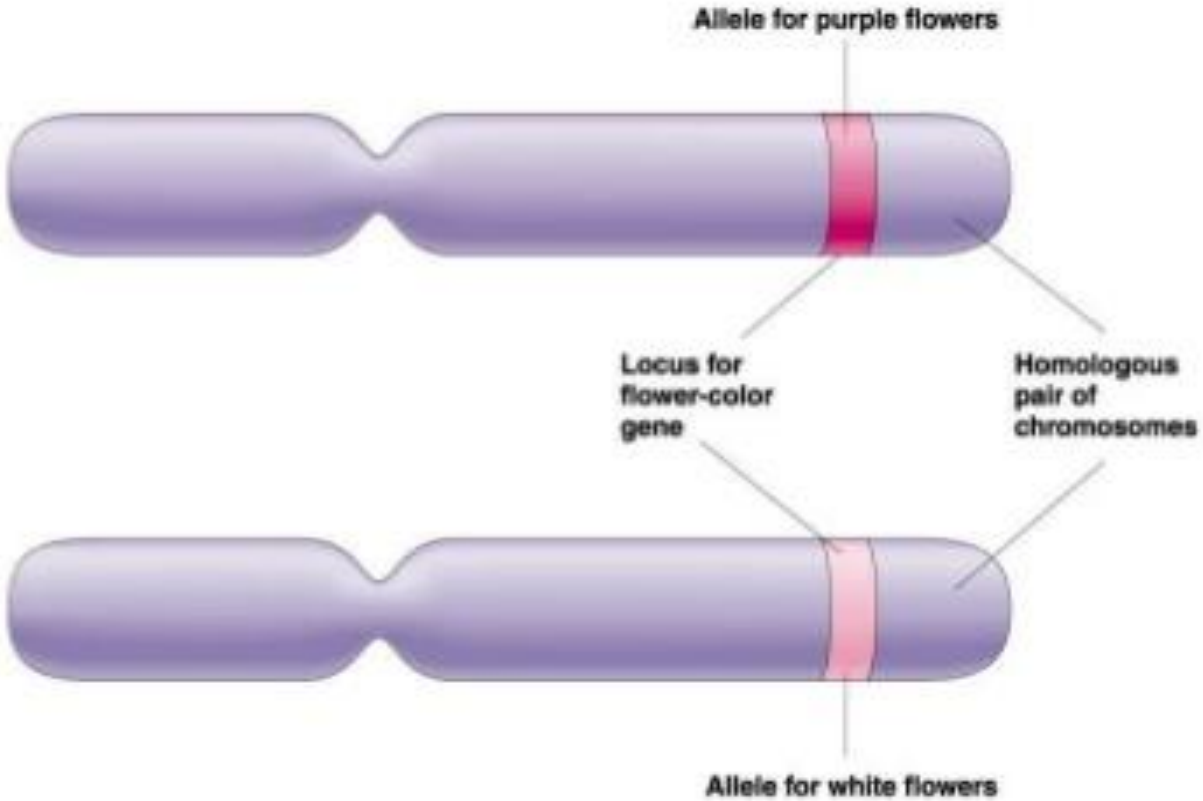
Law of Segregation



Law of Independent Assortment

3.1 U.3 The various specific forms of a gene are alleles.

Allele is one specific form of a gene, differing from other alleles by one or a few bases only and occupying the same gene locus as other alleles of the gene.



Mendel's Laws

Law of Dominance: if the two alleles at a locus differ, then one, the **dominant allele**, determines the organism's appearance; the other, the **recessive allele**, has no noticeable effect on the organism's appearance

Law of Segregation: the two alleles for a heritable character separate (segregate) during gamete formation and end up in different gametes

Law of Independent Assortment: each pair of alleles segregates independently of other pairs of alleles during gamete formation

ژنتیک، جلسه سوم:

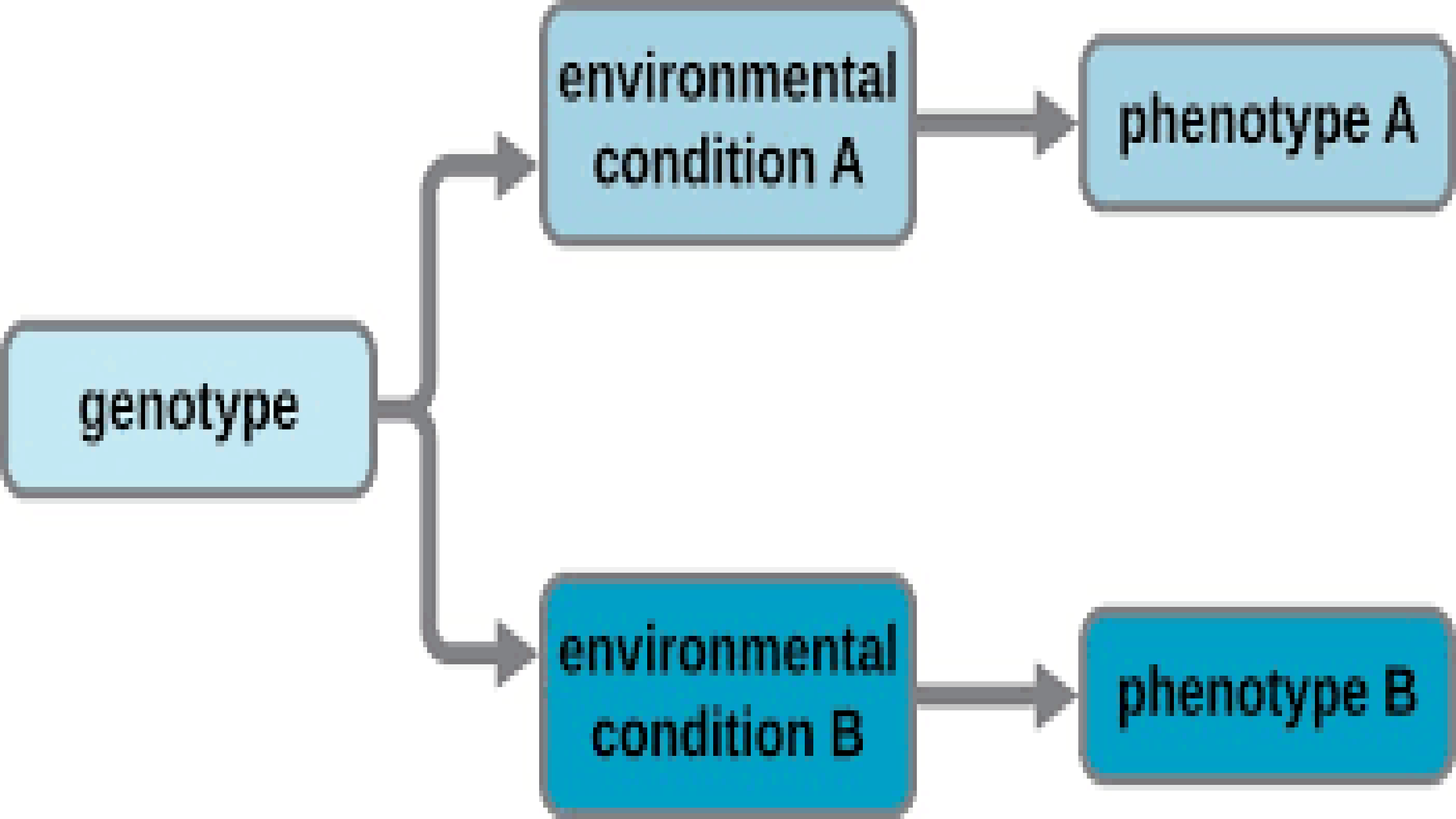
فنوتیپ، ژنوتیپ

Qualitative vs. Quantitative Traits

Qualitative	Quantitative
➢ Few genes	➢ Polygenes
➢ Low environmental Influence	➢ High environmental Influence
➢ Distinct classes	➢ No distinct classes

Genotype and Phenotype

- The **genotype** is the genetic makeup of an organism.
  - If an individual has two identical alleles of a certain gene, the individual is **homozygous** for the related character.
  - If an individual has two different alleles of a certain gene, the individual is **heterozygous** for the related character.
- The **phenotype** is the appearance of an organism.
  - Thus, genotype determines phenotype.


genotype
environmental condition A
environmental condition B
phenotype A
phenotype B

ژنتیک، جلسه چهارم:

انواع الل

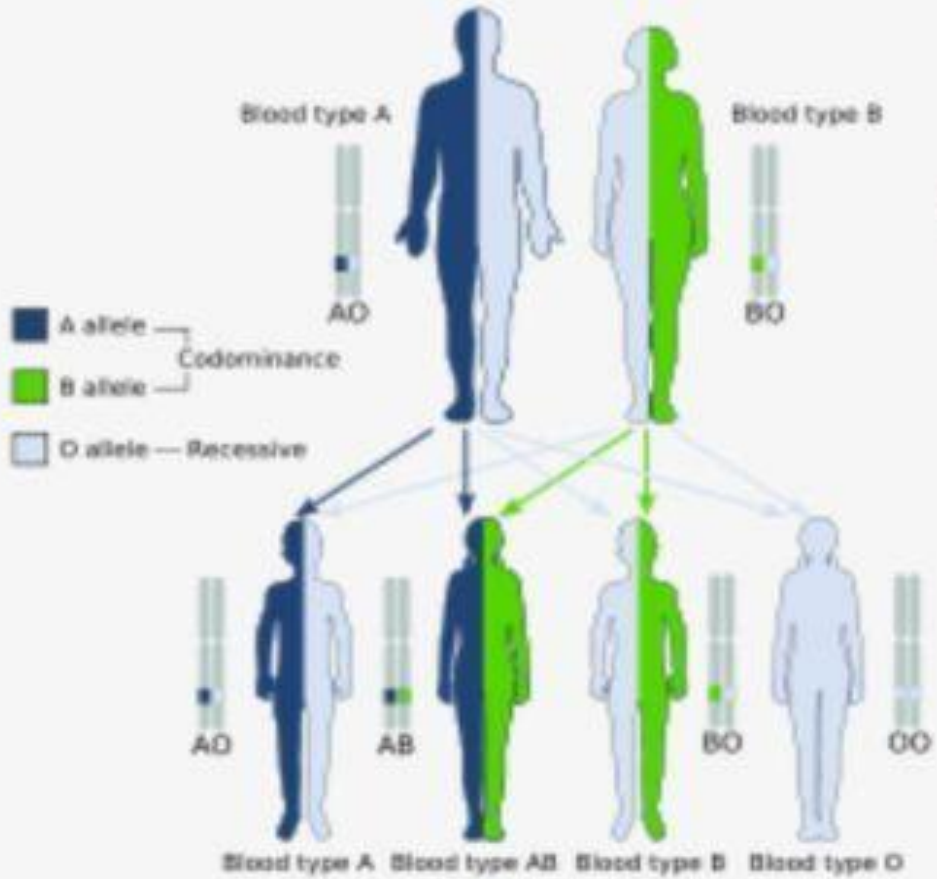
Alleles

different forms of the same gene

Paths of Inheritance

Path Type	Characteristics
Mendelian	1 allele is dominant and 1 allele is recessive
Codominant	2 alleles – both are equally expressed
Incomplete dominance	2 alleles – if heterozygous, alleles blend together
Multiple alleles	More than 2 alleles possible for a trait (but each person gets 2)
Polygenic	A traits is controlled by more than one gene in a person

Multiple alleles



Multiple alleles are gene alternatives, such as the ABO blood type in the human population.

A B O

Incomplete Dominance

Neither allele is dominant

When an organism is heterozygous for a trait, it will show a third phenotype

The third phenotype is a blend of the other two

In this example, the letter A represents the gene

R and Y represent the different alleles