

# Genetics

2<sup>nd</sup> stage – College of Veterinary Medicine

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## Lec-1-

### Genetic Terms

1. **Haploid** - the condition of having only one set of chromosomes per cell (n)
2. **Diploid** - the condition of having two sets of chromosomes per cell (2n)
3. **Gamete** - a haploid (n) sex cell in plants and animals (egg or sperm)
4. **Zygote** - diploid (2n) cell resulting from the union of two gametes in sexual reproduction
- 5 **Chromosome** - structures within the nucleus of eukaryotic cells composed of chromatin and visible at cell division (condensed chromatin).
6. **Chromatin** - the complex of DNA, RNA and proteins that makes up uncondensed eukaryotic chromosomes.
7. **Homologous chromosomes** - chromosomes that are similar in morphology (shape and form) and genetic constitution. In animals one set comes from the father and the other from the mother.
8. **Chromatids** - one of the two halves of a duplicated chromosome
9. **Centromeres** - specialized constricted region of a chromatid, that contains the kinetochore; sister chromatids are joined at the centromere during cell division
10. **Recombination** - exchange of genetic material between chromosomes .
11. **crossover** - the breaking and rejoining of homologous (non-sister) chromatids during early prophase I of meiosis, resulting in recombination
12. **Synapsis** - the pairing of homologous chromosomes during prophase I of meiosis.
13. **Disjunction** - separation of homologous chromosomes (or sister chromatids) during anaphase.
14. **Genotype** - the genetic make-up (the assemblage of alleles) of an individual.

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15. **Phenotype** - the physical or chemical expression of an organism's genes.
16. **Gene** - a discrete unit of hereditary information that usually specifies a protein; a region of DNA (locus) located on a chromosome that specifies a trait (characteristic).
17. **Alleles** - genes governing variations of the same characteristic (trait) that occupy corresponding positions (loci) on homologous chromosomes; alternative forms of a gene.
18. **Dominant allele** - an allele that is always expressed when present, regardless of whether the organism is homozygous or heterozygous for that gene.
19. **Recessive allele** - an allele that is only expressed when the organism is homozygous for that allele and not expressed when heterozygous (when paired with a dominant allele).
20. **Homozygous** - possessing a pair of identical alleles for a particular locus (gene).
21. **Heterozygous** - possessing a pair of unlike alleles for a particular locus (gene).
22. **Carrier** - a heterozygous individual not expressing a recessive trait but capable of passing it on to its offspring.
23. **Parent generation (P)** - the generation that supplies gametes to the filial generation.
24. **Filial generation (F)** - the generation that receives gametes from the parental generation.
25. **Hybrid** - an offspring resulting from the mating between individuals of two different genetic constitutions.
26. **Dihybrid cross** - a genetic cross that takes into account the effect of alleles at two separate loci (two different genes).

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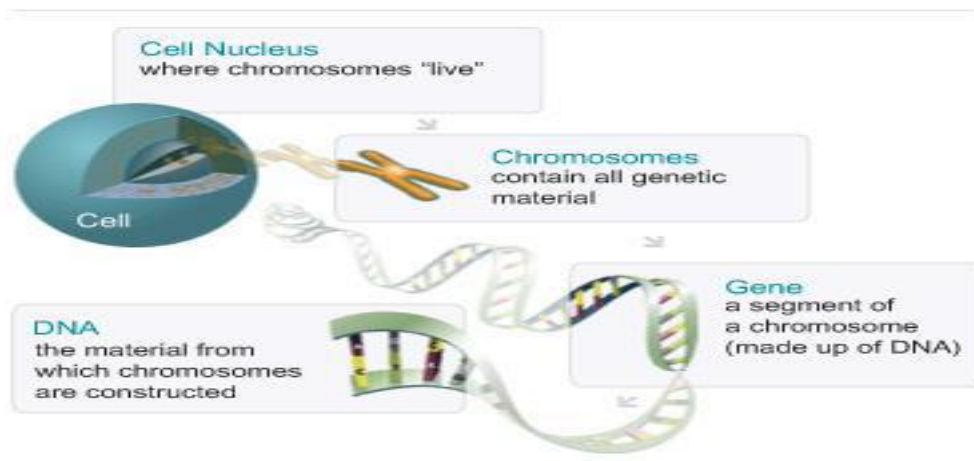
**27. Monohybrid cross** - a genetic cross that takes into account the effect of alleles at a single locus (single gene).

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- **What is genetics?** – “Genetics is the study of **heredity**, the process in which a parent passes certain **genes** onto their children.”

- What does that mean? – Children **inherit** their biological parents’ genes that express specific **traits**, such as some physical characteristics, natural talents, and genetic disorders.

**Gregor Johann Mendel(1822-1884) is the father and pioneer of genetics**



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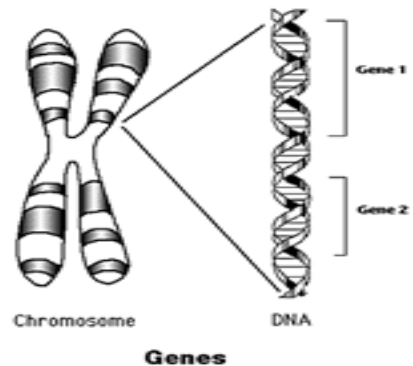
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## Heredity

- describes how some traits are passed from parents to their children .
- The traits are expressed by genes, which are small sections of DNA that are coded for specific traits .
- Genes are found on chromosomes .
- Humans have two sets of 23 chromosomes—one set from each parent.
- Heritable units of information about traits
- Parents transmit genes to offspring
- Each gene has a specific **locus** on a chromosome

## Genetic Information

- **Gene** - basic unit of genetic information. Genes determine the inherited characters.
- **Genome** - the collection of genetic information.
- **Chromosomes** - storage units of genes.
- **DNA** - is a nucleic acid that contains the genetic instructions specifying the biological development of all cellular forms of life



## Genes Alleles and Loci

An **allele** is a gene that has more than one form. Each of the forms is referred to as an allele. For example, the gene for red flowers and the gene for white flowers are two different alleles.

A **locus** (plural: **loci**) is the location of a gene on a chromosome.

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- The gene for red flowers and the gene for white flowers are two different alleles at the same locus.

-A single chromosome can have a gene for white flowers or a gene for red flowers but not both.

-There are two **loci** illustrated below, one is for flower color and the other is for stem length. Flower color has five **alleles** and stem length has two.

## Homologous Chromosomes, Genes, and Alleles

- Chromosome pair:
  - “homologous chromosomes”
- pair has genes at the same loci
  - “alleles”
  - may be the same or different

