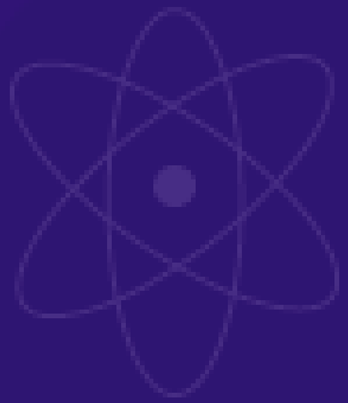
Ch. 11: Mendelian Genetics

Character - A heritable feature that varies among individuals, such as flower color.



Trait - Each variant for a character.

True-Breeding - Through self-pollination the plants produce only the same variety as the parent plant.

Hybridization - The mating, or crossing, of two true-breeding varieties.

P Generation - True-breeding parents.

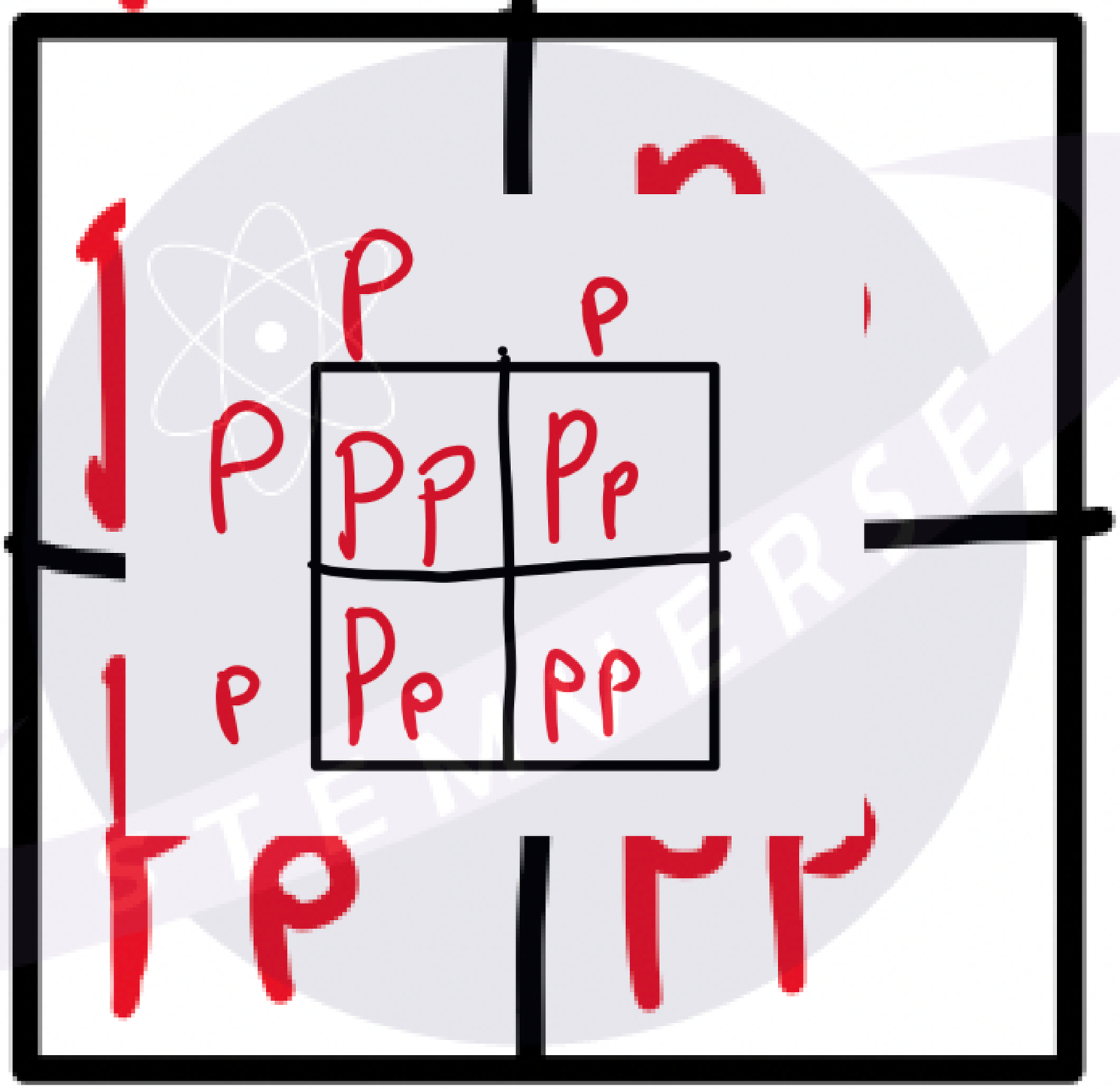
F1 - Hybrid offspring of P generation.

F2 - Hybrid offspring of F1 parents.

Allele - Alternate versions of a gene.

The Law of Segregation - States that the two alleles for a heritable character separate during gamete formation and end up in different gametes.

Punnet Square - A handy diagrammatic device for predicting the allele composition of all offspring resulting from a cross between individuals of known genetic makeup.



Homozygote - Organism with a pair of identical alleles for a gene encoding a character (Homozygous for that gene).

Heterozygote - Organism with a pair of two different alleles for a gene (Heterozygous for that gene).

Phenotype - A organisms observable traits & appearance.

Genotype - A organisms genetic makeup.

Testcross - breeding an organism of unknown genotype with a recessive homozygote.

Dihybrids - Individuals heterozygous for the two characters being followed in the cross (Ex. YyRr).


YR
yr
YR
YYRR
YyRr
yr
YyRr
yyrr


YR
Yr
yR
yr
YR
YYVR
YYRr
YyRR
YyRr
Yr
YYRr
YYrr
YyRr
Yyrr
yR
YyRR
YyRr
yyRR
yyRr
yr
YyRr
Yyrr
yyRr
yyrr

Law of Independent Assortment - States that two or more genes assort independently, that is, each pair of alleles separate independently of an other pair during gamete formation.

Probability laws govern Mendelian inheritance:

Multiplication Rule - States that to determine the probability of one event & the other occurring, we multiply the probability of one event by the probability of the other event.

Addition Rule - The probability that any one of two or more mutually exclusive events will occur is calculated by adding their individual probabilities.

Inheritance patterns are often more complex than predicted by simple Mendelian genetics:

Relationship among alleles of a single gene	Description	Example
Complete dominance of one allele.	Heterozygous phenotype same as that of homozygous dominant.	
Incomplete dominance of either allele.	Heterozygous phenotype intermediate between the two homozygous phenotypes.	
Codominance	Both phenotypes expressed in heterozygotes.	$I^A I^B$
Multiple Alleles	In the population some genes have more than two alleles.	ABO blood group alleles: $I^A I^B, i$
Pleiotropy	One gene affects multiple phenotypic characters.	Sickle-cell disease

Epistasis - the phenotypic expression of a gene at one locus alters that of a gene at a second locus.

Polygenic Inheritance - An additive effect of two or more genes on a single phenotypic character.

Multifactorial - Many factors, both genetic and environmental, collectively influence phenotype.

Many human traits follow the Mendelian pattern of inheritance:

Pedigree - A family tree describing the traits of parents and children across the generations.

Carriers - Phenotypically normal heterozygotes that may transmit their recessive allele to their offspring.