

CHAPTER NO: 9
HEREDITY AND EVOLUTION
MODULE - 1/1

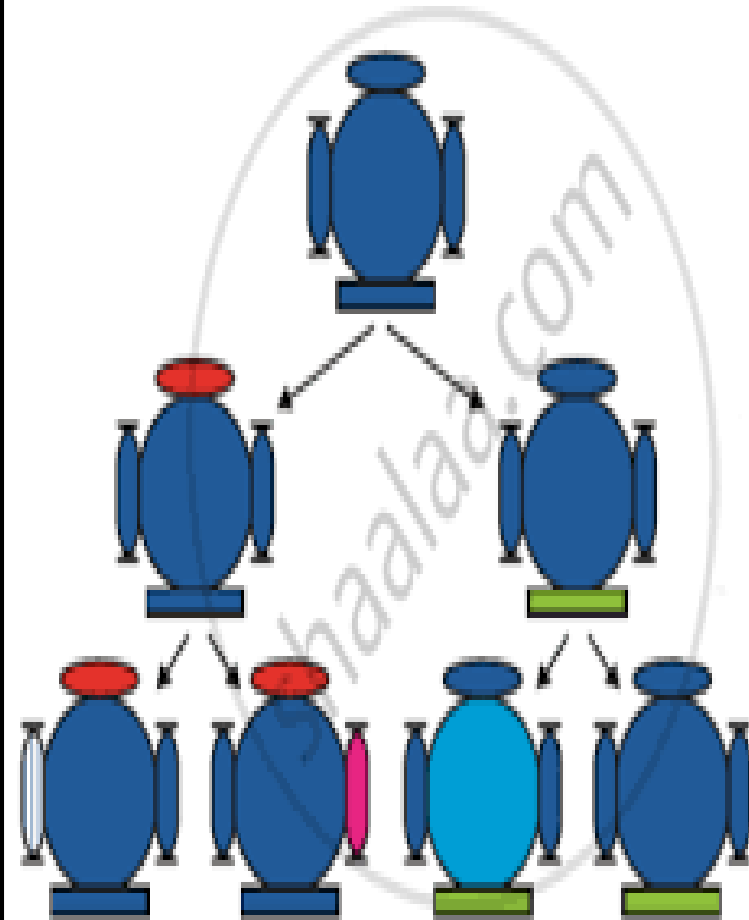
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SUBJECT:SCIENCE
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PLEASE NOTE:

**ACCORDING TO '2020-21' SYLLABUS
PRESCRIBED BY CBSE, FOR CLASS
X-STD, BASIC CONCEPTS OF
EVOLUTION IS DELETED ONLY THE
CONCEPTS OF HEREDITY,
MENDEL'S CONTRIBUTION, LAWS
FOR INHERITENCE OF TRAITS, SEX
DETERMINATION ARE INCLUDED.**

ACCUMULATION OF VARIATION DURING REPRODUCTION

Variations: Variations may be defined as the differences in characteristics shown by the individuals of a species and also by the offsprings or siblings of the same parents. Variations play an important role in *Species* formation. Depending on the nature of variations different individuals would have different kinds of advantages. Bacteria that can withstand heat will survive better in a heat wave. Selection of variants by environmental factors forms the basis for evolutionary processes.



HEREDITY AND VARIATION

Heredity or inheritance are those characters which are transmitted from generation to generation and, is therefore, fixed for a particular individual. The rules of heredity determine the process by which traits and characteristics are reliably inherited.

Free and attached earlobes are two variations found in human populations.



INHERITED TRAITS

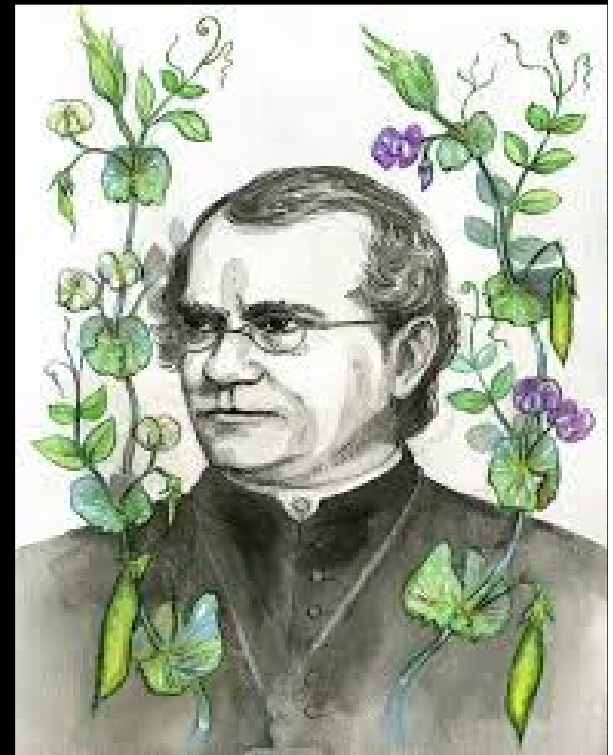
Inherited traits: These are the characteristics transmitted from parent to the offspring.

Inherited trait is genetically determined characteristic that distinguishes a person.

These have effects on non-somatic cells which pass to the progeny. Eg: Colour of hair and eye.

RULES FOR THE INHERITANCE OF TRAITS - MENDEL'S CONTRIBUTIONS

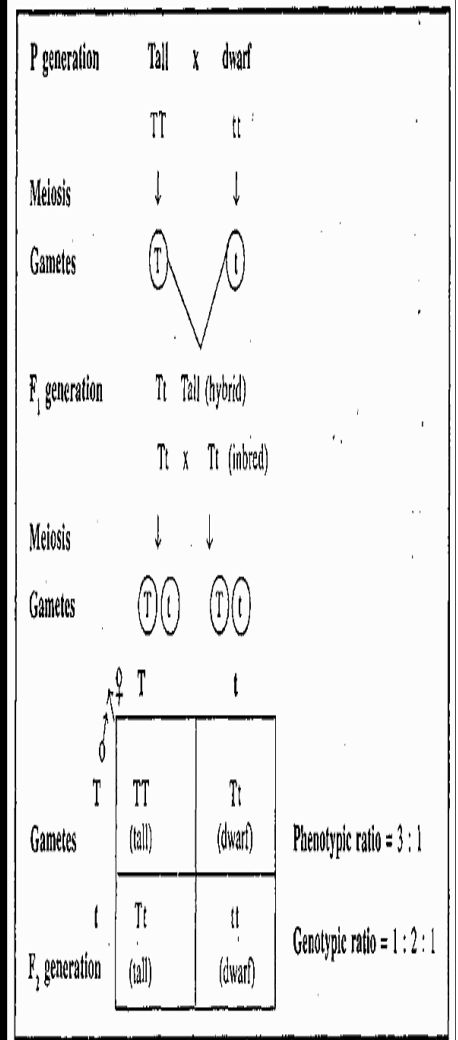
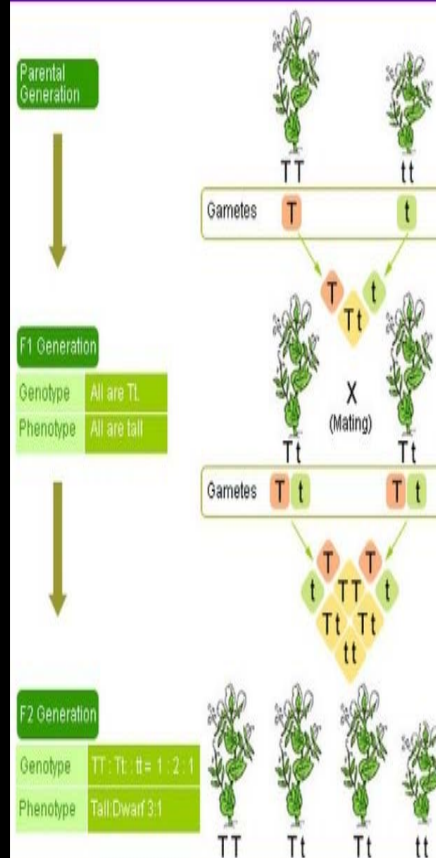
Gregor Johann Mendel (1822–84) known as Father of genetics, proposed the theory of inheritance. He performed his experiments on garden peas and formulated the laws of genetics which explain the manner of inheritance of characters. His paper “Experiments on plant Hybridization” was published in the fourth volume of “Annual Proceedings of Natural History Society of Brunn” in 1886.



MONOHYBRID CROSS

Monoybrid cross: It is a cross made to study simultaneous inheritance of a single pair of Mendilian Factors, in other words, the cross in which only alternative forms of a single characters are taken into consideration. In monohybrid cross Mendel obtained 3-Tall: 1-Dwarf phenotypic ratio and 1: Pure Tall: 2 Hybrid Tall: 1 Dwarf Genotypic ratio.

DIAGRAMMATIC REPRESENTATION OF MONOHYBRID CROSS



DIHYBRID CROSS

Dihybrid cross: Mendel performed crosses involving two characters at a time. A dihybrid cross is a cross made to study the inheritance of two pairs of Mendelian factors of genes, eg, cross between pea variety having yellow cotyledon and round seeds. With another variety having green cotyledon and wrinkled seeds.

The classical example of dihybrid cross given in the next slide is the use of two pairs of characters namely the seed shape and seed colour. The plants with yellow and round seeds (pure) were crossed with those having green and wrinkled seeds (pure). The F1 seeds were yellow and round. When these F1 seeds were grown into plants, F2 seeds obtained which showed all the four combinations in the following phenotypic ratio:

1. Yellow and round seeds: 9
2. Yellow and wrinkled seeds: 3
3. Green and round seeds: 3
4. Green and wrinkled seeds: 1

Genotype: It is the gene complement of an individual.

















Phenotype: It is the external manifestation of gene products brought to expression.

DIHYBRID CROSS

Cross of F₁ Generation

round, yellow 

round, yellow 

	R _Y	R _y	r _Y	r _y
R _Y	RRYY 	RRYy 	RrYY 	RrYy 
R _y	RRYy 	RRyy 	RrYy 	Rryy 
r _Y	RrYY 	RrYy 	rrYY 	rrYy 
r _y	RrYy 	Rryy 	rrYy 	rryy 

Dihybrid Cross

	R _Y	R _y	r _Y	r _y
R _Y	RRYY	RRYy	RrYY	RrYy
R _y	RRYy	RRyy	RrYy	Rryy
r _Y	RrYY	RrYy	rrYY	rrYy
r _y	RrYy	Rryy	rrYy	rryy

Round/Yellow: 9

Round/green: 3

wrinkled/Yellow: 3

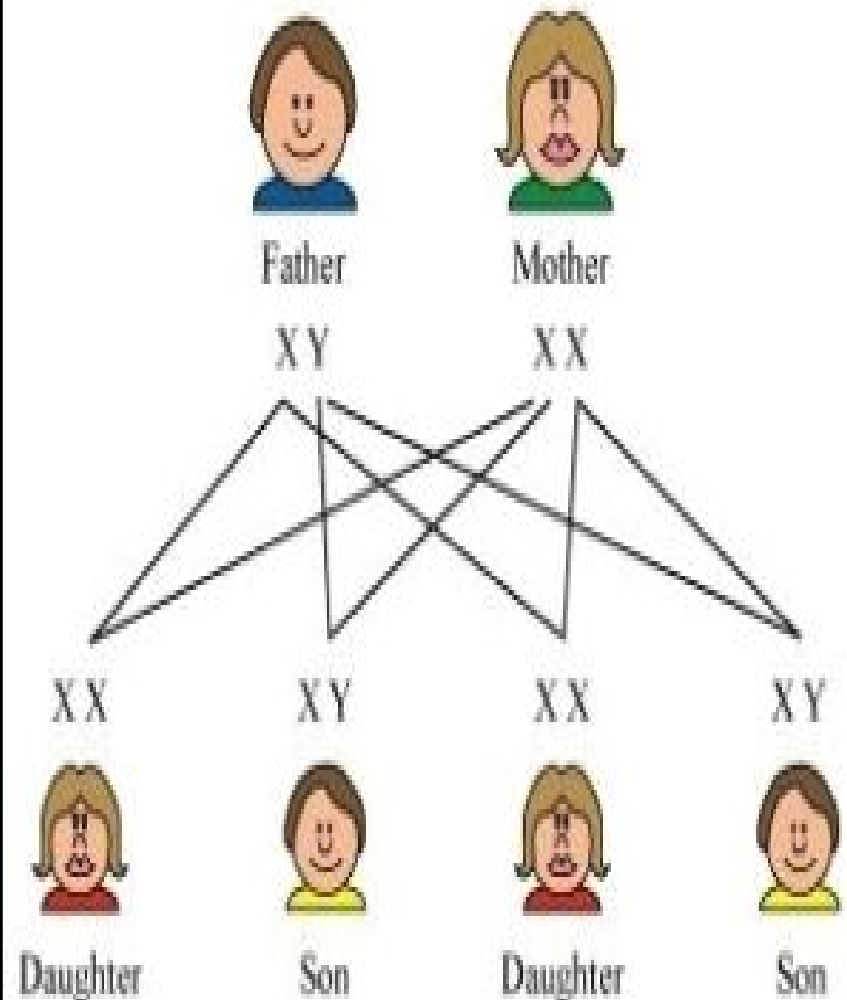
wrinkled/green: 1

9:3:3:1 phenotypic ratio

SEX DETERMINATION

Sex Determination: Different species use different strategies for sex determination, some organisms rely on environmental cues (temperature), in some animals such as snails, individuals can change sex, indicating that sex is not genetically determined.

In human beings, the sex of the individuals is largely genetically determined, thus the sex of the children will be determined by what they inherit from their father. A child who inherits an X-chromosome from her father will be girl and one who inherits a Y-chromosome from him will be a boy.





THANK YOU