ALAKH sir ke FARREY

HEREDITY

General Terminology :-

Heredity:- Heredity is the passing of characters from parents to offspring or one generation to next.

Variation:- The differences in the characters among the individuals of a species are called variations.

Genetics:- Genetics is a branch of biology which deals with the study of Heredity and variation.

Importance of variations :- ✡✡✡

(1) The great advantages of variations to a species is that it increase the chances of its survival in a changing environment.

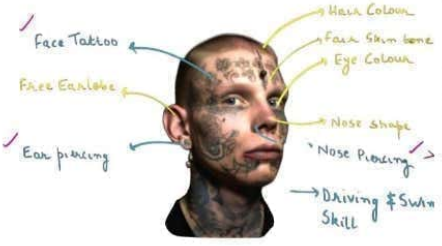
(2) Variations helps in evolution and development of new species.

(3) They form basis of heredity. New characters are produced in the organisms by variations

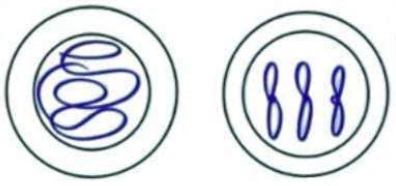
Types of traits :-

Inherited Traits
Acquired Traits

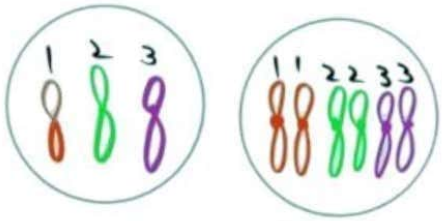
Inherited traits	Acquired traits
These traits can be inherited as well as transmitted to the next generation	These traits are neither inherited nor transmitted to the next generation
These traits are inherited from parents during reproducetion	These traits are acquired after birth
Example – Attached or free earlobe, curly hair, eye colour	Example – Piercing of ear and nose , dancing, singing driving skills, muscular body



some important terms :-

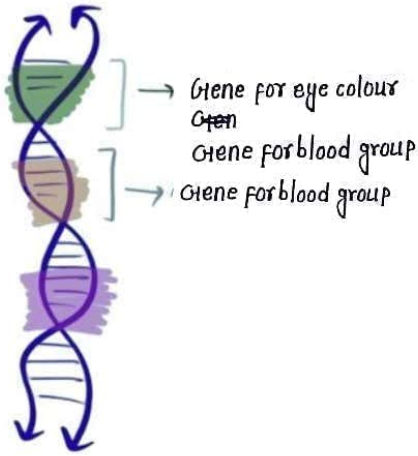


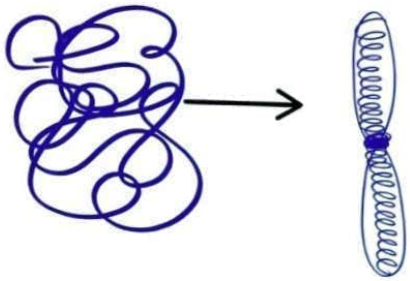
chromatin chromosome



Haploid (Gametes) Diploid ↓2

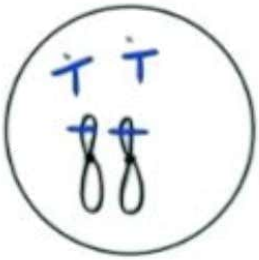
Genes
Dominant allele T W Y
Recessive allele t w y





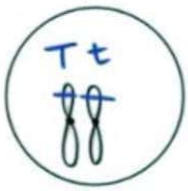
chromatin chromosome

* Homozygous dominant condition (Pure condition)



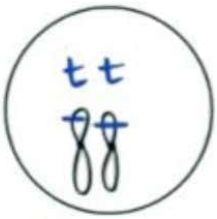
tall

* Heterozygous condition (Hybrid condition)



tall

* Homozygous Recessive condition (Pure condition)



short/dwarf

* Homozygous dominant condition (Pure condition)

Genotype = TT
Phenotype = Tall

* Heterozygous condition (Hybrid condition)

Genotype = Tt
Phenotype = Tall

* Homozygous Recessive condition (Pure condition)

Genotype = tt
Phenotype = Dwarf/short

Mendel and his contribution

- He worked on pea plant (Pisum sativum) and proposed laws of inheritance.
- He choose Garden pea plant as his experimental material because of following property.

	Property	Advantages of properties
a.	Short life cycle	Results of experiments were obtained in less time.
b.	Annual Plant	Many generations can be studied within a short period of time
c.	Choice of cross or self fertilization	Mendel could conduct experiment as per his desire.
d.	7 pairs of allelic characters	Large number of choice for experiments
e.	Large number of offspring	Good number of data for statistical analysis.

GENE	ALLELES	
Character	Dominant Trait	Recessive Trait
Seed shape	Round	Wrinkled
Seed colour	Yellow	Green
Flower colour	violet	White
Pod shape	Full	Constricted
Pod colour	Green	Yellow
Flower position	Axial	Terminal
Stem length	Tall	Dwarf

Monohybrid Cross :-

It is a cross in which only one character in studied at time.

Phenotypic ratio

Phenotypic ratio in F_2 Generation

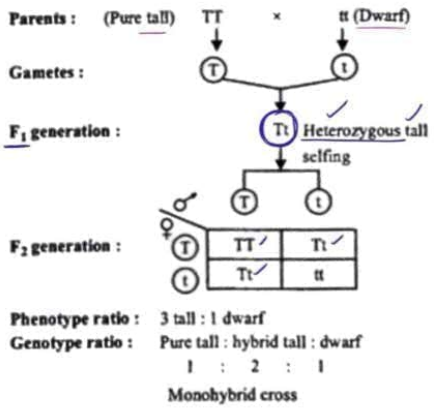
3:1

Genotypic ratio

Genotypic ratio in F_2 Generation

TT : Tt : tt

1 : 2 : 1



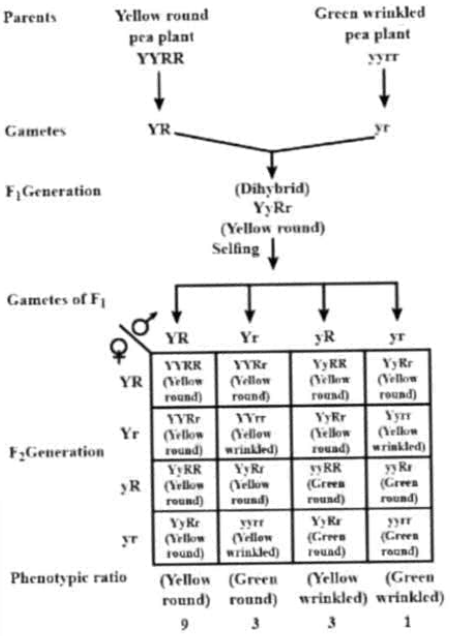
Dihybrid Cross :-

A cross in which study of inheritance of two pairs of contrasting traits.

Phenotypic Ratio

Phenotypic ratio in F_2 Generation

9:3:3:1



MENDEL'S LAW OF INHERITANCE

Based on Monohybrid Cross

(1) Laws of Dominance

When an inherited pair of two alleles is heterozygous the allele that is express is called dominant while the other is called Recessive.

(2) Laws of Segregation

(Laws of Purity of gametes)

During the gamete formation, copies of genes or alleles are divided or segregated such that each gamete receives only one allele.

Based on Dihybrid Cross

(3) Law of independent assortment

Alleles of two or more different genes get assorted into gametes independently of one another.

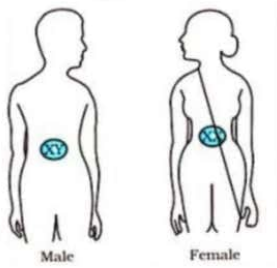
Factors affecting sex Determination

Non-Genetically

- Environmental cues - In turtles, alligators, crocodile, which fertilized eggs are kept determines sex.
- In snails, individuals can change sex.

Genetically

- In humans, genes/chromosomes inherited from parents decides the sex of the offspring.



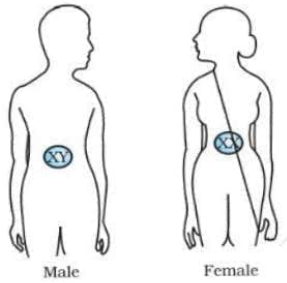
Sex determination

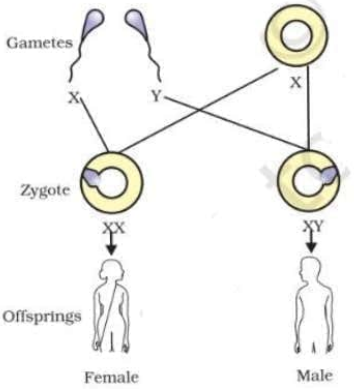
(i) If a sperm with X chromosome fertilises the egg then the zygote will have XX chromosome in the 23rd pair.

(ii) A zygote with XX chromosome will develop into a girl child.

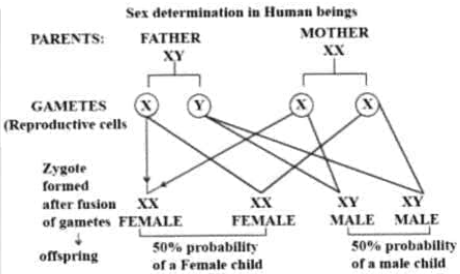
(iii) If a sperm with Y chromosome fertilises the egg then the zygote will have XY chromoses on the 23rd pair

(iv) A zygote with XY chromosome will develop into a male child.





Sex determination in human beings



HEREDITY (CYQ)

Question-1) (i) Which one of the given statements is incorrect?

(a) DNA has the complete information for a particular characteristic.
(b) DNA is the molecule responsible for the inheritance of characters from parents to offspring.
(c) change in information will produce a different protein.
(d) characteristics will remain the same even if protein changes.

(ii) What are chromosomes? Explain how the original number of chromosomes present in the parent are restored in progeny.

(CBSE 2021, 2022, 2023, 2024)

Question-2) (i) What is heredity?

(ii) How many pairs of chromosomes are present in human beings?

(CBSE 2016, 2017, 2018, 2020, 2021)

Question-3) (i) Why did Mendel carry out an experiment to study inheritance of two traits in garden-pea?

(ii) List pairs of visible contrasting characters of garden pea plants used by Mendel for his experiments stating the dominant and recessive characters in each pair.

(CBSE 2020, 2024)

Question-4) Mendel crossed pea plants with two pairs of contrasting characters as given below.

RRYY X rryy
Round, yellow Wrinkled, Green

He observed 4 types of combinations in F_1 generation. which of the combinations were new? By which method did he obtain F_2 generation? Write the ratio of the parental combinations obtained and what conclusions were drawn from this experiment.

(CBSE 2023, 2024)

Question-5) CBQ

A green stemmed rose plant denoted by GtGt and a brown stemmed rose plant denoted by gg are allowed to undergo a cross with each other.

(i) List your observations regarding.
(a) colour of stem in their f_1 progeny.
(b) Percentage of brown stemmed plants in F_2 progeny if plants are self-pollinated.
(c) Ratio of GtGt and Gtg in the F_2 progeny.
(iii) Based on the findings of this cross, what conclusion can be drawn?

Question-6) In some families, either rural or urban, females are tortured for giving birth to a female child. They do not seem to understand the scientific reason behind the birth of a boy or a girl.

Women have a perfect pair of sex chromosomes. But men have a mismatched pair in which one is normal sized while the other is a short one.

(i) Justify the statement that the sex of a newborn child is determined by what they inherit from their father, not the mother, with the help of a flow diagram.

(ii) How is the sex of a newborn individual determined in different species of animals except human beings? Give two examples to support your answer.

(CBSE 2021, 2022, 2023, 2024) CBQ

Question-7) (i) "Sexual reproduction gives rise to more viable variations than asexual Reproduction". Justify this statement.

(ii) Explain how the viable variations affect the evolution of those organisms that reproduce sexually as compared to asexually reproducing organisms

(2019, 2023)