Contents

Month of birth of Gregor Johann Mendel

Year of birth of Gregor Johann Mendel

Date of birth of Gregor Johann Mendel

Full date of birth of Gregor Johann Mendel

Gregor Johann Mendel was born in 22 July-1822 in

Village of birth of Gregor Johann Mendel

Then country embodying silisian village as birth of Gregor Johann Mendel

Silisian village Moravia now in Austria .

Current country embodying silisian village

Scientific name of Pea plant

Year of starting of Mendel's experiment

Mendel started his famous experiment in garden pea (Pisum sativum) during the year of 1856-1864.

Year of publishment of Mendel's experiment

Journal of publishment of Mendel's experiment

Mendel published the result of his experiment in the Annual Proceedings of Natural History Society Brunn in 1866. His title was Experiment in plant hybridization.

Title of mendel's experiment published in annual proceedings of natural history society brunn

Plant chosed by Mendel for next experiment other than Pea

Mendel also repeated similar kind of experiment on another plant Hieracium a member of Asteraceae but he became unsuccessful.

Family of Hieracium in Mendel's experiment

Year of death of Mendel

Mendel died in 1884 perhaps feeling him as a scientific failure person.

Scientists who discovered the results of Mendel

Country of hugo de vries

Country of Carl Correns

Country of Tschemark

Mendel's work remained unseen for about 34 years; later on three different scientists re-discovered his work in 1900. Hugo de Varies Holland, Carl Correns Germany and Erich von Tschermark Austria repeated Mendels work independently but reached on the same conclusion as same as that of Mendel. Since then they regarded Mendel as a father of Genetics.

Reasons of selecting Pea plant for Mendel's experiment

Reasons for selecting Pea by Mendel

Annual plant having short life span

Having large number of contrasting characters.

Bisexual plant with large size flowers.

No need of additional take and care except at the time of pollination.

Easy to emasculation (removal of male part or anther before opening the flower).

Strictly self pollinating plant as stamens and pistil are covered by keel but can produce fertile Hybrids by cross pollination.

Number of pairs of contrasting characters selected in Mendel's experiment

Sven pairs of contrasting characters were considered on Pea by Mendel

List of seven pairs of contrasting characters selected in Mendel's experiment

Contrasting characters of seed shape in Mendel's experiment

Contrasting characters of seed color in Mendel's experiment

Contrasting characters of flower color in Mendel's experiment

Contrasting characters of flower position in Mendel's experiment

Contrasting characters of pod colour in Mendel's experiment

Contrasting characters of pod shape in Mendel's experiment

Contrasting characters of plant height in Mendel's experiment

Seven pairs of contrasting

Characters

Dominant

Traits

Seed shape

Seed color

Flower color

Flower position

Pod color

Pod

shape

Plant height

round yellow purple axial (side) greeninflated tall Recessive

Traits

wrinkled green

white terminal (tips)

yellow constricted

short

Mendel's Hybridization Experiment

When he wanted to breed, or cross, one plant with another, Mendel opened the petals of a flower and removed the male organs

Emasculation in Mendel's hybridization experiment

i.e. emasculation

He then dusted the female organ with pollen from the plant he wished to cross it with.

Cross-pollination

Pollen

grains

Transfer

pollen

Female part

Male parts

P1 generation in Mendel's experiment

The original parents, the true breeding plants, are known as the P1 generation.

The offspring of the parent plants are known as the F1 generation. The offspring of two F1 plants crossed with each other to produce F2 generation.

P1

Short pea plant Tall pea plant

F1

All tall pea plants

F2

3 tall: 1 short

Monohybrid cross

Number of contrasting characters in monohybrid cross

When two organisms are crossed by considering only one pair of contrasting characters, then it is known as monohybrid cross. Example a cross made by considering plant height, colour of the seed, colour of the flower etc. Mendel crossed Pure Tall Pea Plant [TT] with pure dwarf pea plant [tt] and achieved following results.

Contrasting characters used by Mendel in his experiment of monohybrid cross

Phenotype of pea plants in F1 generation in Mendel's hybridization experiment

In this cross all F1-plants became tall.

He allowed to self pollination of these F1 hybrids then two types of plants were produced in F2-generation i.e. 75% plants became tall and remaining 25% plants became dwarf.

Percentage of tall plant at the second filial generation of Mendel's monohybrid cross

Percentage of dwarf plants at the second filial generation of Mendel's monohybrid cross

The ratio of Tallness and dwarfness became 3:1 The characteristic dwarf plants was absent in F1 generation but reappeared in F2 generation.

Ratio of tallness to dwarfness in second filial generation in Mendel's mono hybrid cross

1

Dominant trait in Mendel's Monohybrid cross

Recessive character in Mendel's Monohybrid cross

From this experiment Mendel reasoned that the dwarf character must have present in F1 generation but it failed to express in F1 generation and it was termed as recessive character. The trait observed in F1 generation was called as dominant trait.

Internal factors of trait control in Mendel's law of genetics

Mendel concluded that each organism has two internal factors that control each of its traits (phenotypic character)

Phenotypical ratio in monohybrid cross in Mendel's law of Genetics

The observed ratio 3:1 was phenotype and actual internal ratio 1:2:1 was genotype.

Mendelian factors in Mendel's experiment

Now days these Mendelian factors are called genes (Johannsen-1909). We now know that these factors are genes and that they are located on chromosomes. Genes exist in alternative forms. We call these different gene forms alleles.

Alleles in Mendel's experiment

Location of Genes in cell

An organism's two alleles are located on different copies of a chromosome one inherited from the female parent and one from the male parent

Tall plant Short plant

T T T

F1

All tall plants

t t t

T

t

Pure red RR X Pure white rr

Mendel's Dihybrid Cross:

When two organisms are crossed by considering two pairs of contrasting characters then it is termed as dihybrid cross.

Contrasting characters considered by Mendel in dihybrid cross

In Mendel's dihybrid cross he made a by considering plant height and flower colour.

Genotypical expression of pea plants in Mendel's dihybrid cross

He crossed pure tall pea plant having pure red flower (TTRR) with pure dwarf pea plant having pure white flower (ttrr).

Phenotype of pea plants in F1 generation in Mendel's dihybrid cross

In F1-generation all became tall plants with red flowers.

Phenotypical ratio of pea plants in F2 generation in Mendel's dihybrid cross

On self crossing of these F1-hybrids four types of plants were produced in F2-generation in the ratio of 9:3:3:1 [tall red: tall white: dwarf red: dwarf white].

Genotypical ratio of pea plants in F2 generation in Mendel's dihybrid cross

But the actual genotype was 1:2:1:2:4:2:1:2:1.

Statement of law of dominance

a. Law of Dominance: It states that when two organisms are crossed by considering only one pair of contrasting characters then only one character of the contrasting pair is expressed in first generation. The character which is expressed in F1 generation is called dominant character and that of another hidden character is called recessive character.

Dominant character in law of dominance

Recessive character in law of dominance i

Source of Law of dominance

It can be explained by monohybrid cross.

Law of segregation: Mendel's universal law.

Term for law of segregation

Statement of Mendel's law of segregation

It states that the F1-hybrids consist of both dominant and recessive genes. Although they remain together for a long period of time they never intermix with each other but separate or segregate at the time of gamete formation hence each gamete receives only one gene either dominant or recessive.

Source of law of segregation

It can be expressed by monohybrid cross.

[C] Law of independent assortment:

Statement of independent assortment

It states that when two organisms are crossed by considering two or more pair of contrasting characters then inheritance of one pair of character is independent to another pair of characters.

Source of independent assortment

It is the result of dihybrid cross.

Exception of independent assortment

Exception of this law is linkage.