Then the f was selfed he found that

Then the F was selfed he found that F2 consisted of two different types i. e. Red and White.

The red character was shown in 3/4 individuals in F2while 1/4 were white. Thus Mendel obtained a ratio of 2. 96: 1 i. e. 3: 1 Further; he observed that when white plants from F2were self fertilized bred true.

One third of F2plants having red flowers, bred true while remaining 2/3 individuals segregated into 3 red: 1 white. Mendel's First law of segregation explained with example: In above cross red flowered plant is crossed with white flowered one. (' R' for the gene for red flower and ' r' alternative allele for white flowers).

Thus ' R' and ' r' are allelic genes or alleles. The homozygous red flowered plant is represented as ' RR' and white as ' rr'. The red parent will produce only one type of gamete ' R'. Similarly, white will produce r. Monohybrid ratio involves only one pair of genes affecting one character and giving 3: 1 ratio in F2when dominance is said to be complete.

This can be explained by knowing certain terms.

i) Complete dominance:

Monohybrid ratio is a ratio obtained in F, generation from a cross of the parents differing in respect of single factor when one allele is completely dominant over its other alleles. The appearance of F is similar to one of the parent (dominant). Example: Mendel crossed a round (RR) seeded variety with wrinkled (rr) variety and he observed that F1 was round seeded. On

selling the F1s, he obtained F2 in the proportion of 3 round: 1 wrinkled seeded plants.

ii) Incomplete dominance:

In this case one gene is not completely dominant over its alleles. Hence, hybrid (F,) produce a intermediate effect between the parents. In this case F, genotypic and phenotypic ratios are same i. e. 1: 2: 1.

Example: In 4 O'clock plant (Mirabilis jalapa) red flower is partially (incompletely) dominant over white flower. When red flowered plant is crossed with white, F obtained has pink flowers and F2segregated in the proportion of 1 red: 2 pink : 1 white indicating incomplete dominance of crimson over white flower. Back cross: The cross of F, (hybrid) to one of its parent. Test cross: Test cross is defined as cross of F (hybrid) with recessive parent. Test cross is used to test whether the gametes produced by F is in equal proportion or not. Test cross is always a back cross but back cross may not be the test cross.

Gene: Danish Geneticist Johannsen recognized that there is something in the fertilized egg that determines a character and propound the word ' gene' for it. It is hypothetical unit of inheritance located on a chromosome at fixed position which interacts with cytoplasm. In modern sense an inherited factor that determines the biological character of an organism is called gene. This is functional unit of heredity. Symbols: The alphabet letters were used by Mendel to symbolize the genes. The dominant genes are represented by capital letters (AA) and its recessive allele by corresponding small letters (aa). Another method for the use of symbols is to signify the wild type by a

sign ‘++’ and mutant type by a capital or small letter depending whether mutant dominant or recessive. Allele /Allelomorph: It indicates alternative form of the same gene and are situated at the same locus of homologous chromosomes, e.

g. R and r form allelomorphs for same gene for flower color. Homozygote and heterozygote: Homozygote is an individual derived by the union of two similar gametes containing identical genes at particular locus. It breeds true for that character.

While, heterozygote is an individual derived by the union of two dissimilar gametes containing non identical genes hence it does not breed true. Genotype and phenotype: Genotype is the genetical constitution or make up or heredity particle of an organism which cannot be visualized while pheno-type is an external appearance or visible character of an organism which is produced by interaction of genotype with environment. Dominant and recessive: The character possessed by one of the parent and expressed in F1 (hybrid) is called dominant, while the character which is not expressed by F1 (hybrid) but possessed by one of the parent is called recessive character. The recessive character reappears in F2. Gregor Johann Mendel after studying the behaviour of a single factor pair he studied the behaviour of two factor pairs while working on hybridization in peas.

From his observations and the data obtained he had formulated the second law of inheritance known as the law of independent assortment. 2. Law of independent assortment: The law states that the segregation in one pair of alleles is quite independent of the segregation in another pair of alleles or

when two or more pairs of independent alleles enter into combination in F1, they exhibit independent dominant effects, while formation of gametes the law of segregation operates but the factors assort themselves independently at random and freely. Dihybrid ratio is a phenotypic ratio obtained in F2, generation when the plants differing in respect of two characters were crossed. When dominance is complete in both the factor ratio was modified into 9: 3: 3: 1. Mendel crossed a pea plant having a round seed (R) and yellow cotyledons (Y) with a plant having wrinkled seed (r) and green cotyledons (y). He found that F, plants were round seeded with yellow cotyledons (Rr Yy). When, F, plants were self fertilized and F2generation was raised, four phenotypic classes were observed in which 9/16 were round yellow, 3/16 round green, 3/16 wrinkled yellow and 1/16 wrinkled green.

This constitutes a 9: 3: 3: 1 dihybrid phenotypic ratio. On critical observation of this ratio, it can be seen that any one pair of alleles e. g. round and wrinkled gives monohybrid segregation (3: 1).

Similarly, yellow and green cotyledons appear in 3: 1 ratio. This shows that a dihybrid ratio consists of combination of two monohybrid ratios (3: 1 x 3: 1 = 9: 3: 3: 1). The alleles of each pair segregate and their segregation is at random since a gamete must contain an allele from each pair. F1, individual with RrYy genotype produce 4 types of gametes e. g. Rr, Ry, rY and ry in equal numbers. Each of four (male and female gametes) gives 16 combinations in F, generation with 4 phenotypic classes. Two of them are parental and the other two are recombinants.

This is possible when; (1) alleles segregate (2) they assort at random, and (3) there is no interference of two dominant factors.

Dihybrid Ratio:

It is the phenotypic ratio observed in F2, progeny of a cross between the parents in respect of two pairs of contrasting characters. The progeny segregate in the proportion of 9 : 3 : 3: 1.

Test Cross (Dihybrid):

When F obtained from dihybrid cross from above example viz. Round and yellow (RrYy) crossed with double recessive parent i.

e. Wrinkled and Green (rryy) the F1, produces four gametes viz. RY, Ry, rY and ry while recessive parent will produce only one type of gamete i. e. ry, hence the progeny will show four types in equal proportion i. e.

1: 1: 1: 1.

Trihybrid ratio:

It is the ratio obtained in F1, progeny of a cross between the parents having three pairs of contrasting characters. The F2segregates in the proportion of 27 : 9 : 9 : 9 : 3 : 3 : 3 : 1.

When a homozygous round seeded, having yellow cotyledon and tall plant crossed with homozygous wrinkled seeded, having green cotyledon and dwarf plant the F2, was having appearance similar to the dominant parent and F2, segregated in the proportion of 27 : 9: 9: 9: 3: 3: 3: 1.