Principles of inheritance&variation-3 (Incomplete dominance)

XII BIOLOGY

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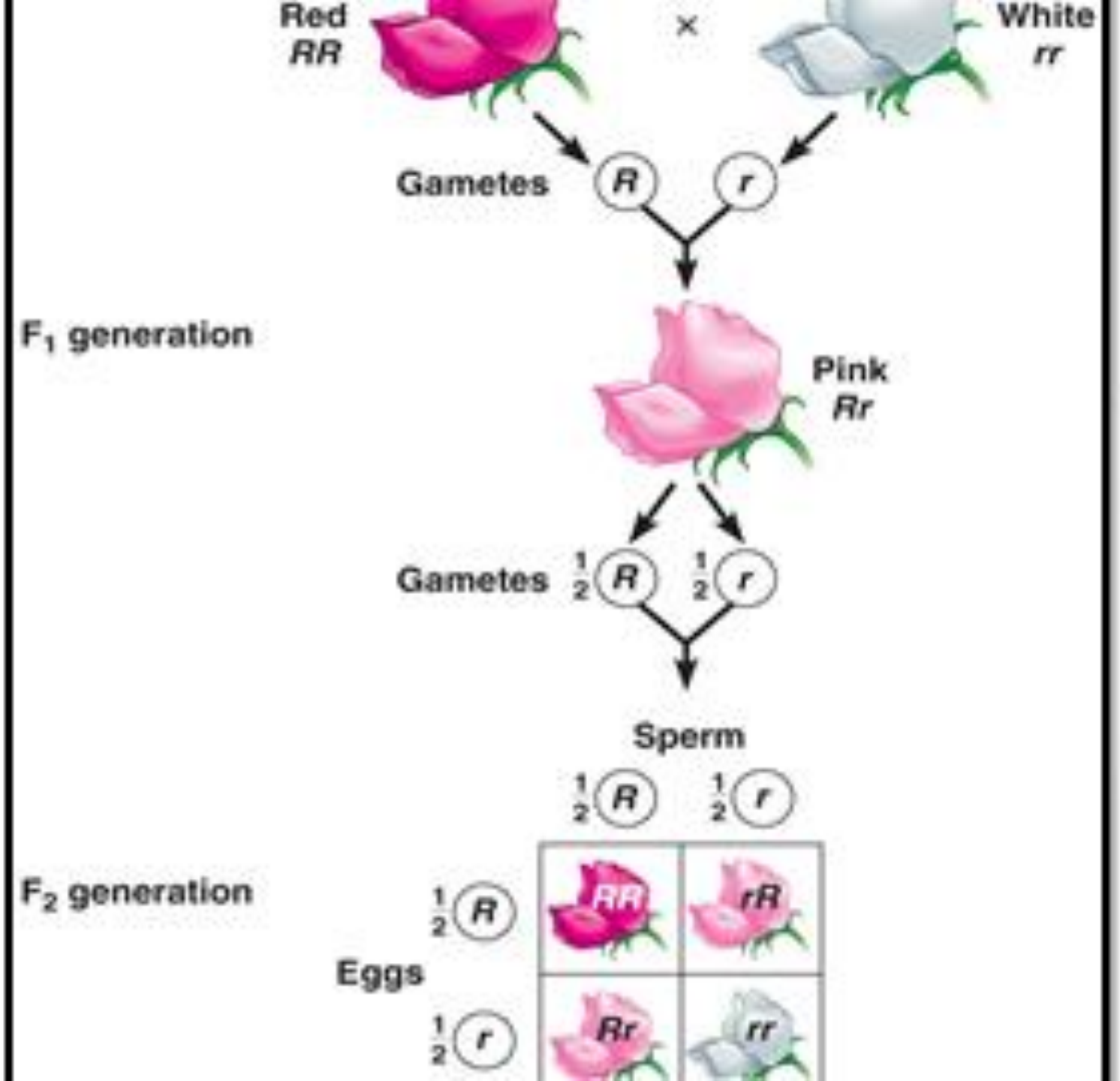
Discovered by Carl correns

-In this case dominant factor is unable to express its character completely ,result is intermediate type in next generation which is different from both the parents is known as incomplete dominance.

-this is not blending because it recovered in 2nd generation

Example- Mirabilis jalapa (4 o'clock/Gul c'bans), Antirrhinum maius (Dog flower/ sanp dragen .Andalusian foul/feather foul

In a cross between true-breeding red-flowered (RR) and true breeding white-flowered plants (rr), the F 1 (Rr) was pink. When the F 1 was self-pollinated the F 2 resulted in the following ratio 1 (RR) Red: 2 (Rr) Pink: 1 (rr) White. Here the genotype ratios were exactly as we would expect in any Mendelian monohybrid cross, but the phenotype ratios had changed from the 3: 1 dominant : recessive ratio.



Phenotypic ratio	Red	Pink	White
	1	2	1
Genotypic ratio	RR	Rr	rr
	1	2	1

Then Why Dominance!!!

- Every gene, as you know by now, contains the information to express a particular trait.
- In a diploid organism, there are two copies of each gene, i.e., as a pair of alleles. Now, these two alleles need not always be identical, as in a heterozygote.
- One of them may be different due to some changes that it has undergone which modifies the information that particular allele contains.
- Let's take an example of a gene that contains the information for producing an enzyme.
- Now there are two copies of this gene, the two allelic forms. Let us assume (as is more common) that the normal allele produces the normal enzyme that is needed for the transformation of a substrate S.
- Theoretically, the modified allele could be responsible for production of –

  (i) the normal/less efficient enzyme, or

  (ii) a non-functional enzyme, or

  (iii) no enzyme at all

CO-DOMINANCE

Till now we were discussing crosses where the F1 resembled either of the two parents (dominance) or was in-between (incomplete dominance).

-But, in the case of co-dominance the F1 generation resembles both parents.(Heterozygous condition)

-In incomplete dominance effect of one allele is more pronounced

-Both phenotypic &genotypic ratio are same in both incomplete/co dominance

EXAMPLE-Coat colour of cattle,AB BLOOD GROUP,Carrier of sickel cell anemia

MULTIPLE ALLELISM AND CO-DOMINANCE

Mother: AO+-
Father: BO--

	A+	A-	O+	O-
B-	AB+-	AB--	BO+-	BO--
O-	AO+-	AO--	OO+-	OO--

Possibilities: AB+ AB-
B+ B-
A+ A-
O+ O-

MULTIPLE ALLELISM AND CO-DOMINANCE

MULTIPLE ALLELES

-More than two alternative forms of one genes known as multiple alleles which are located on same locus of homologous chromosome

-it is due to mutation

-diploid organism contain two allele and gamete only one

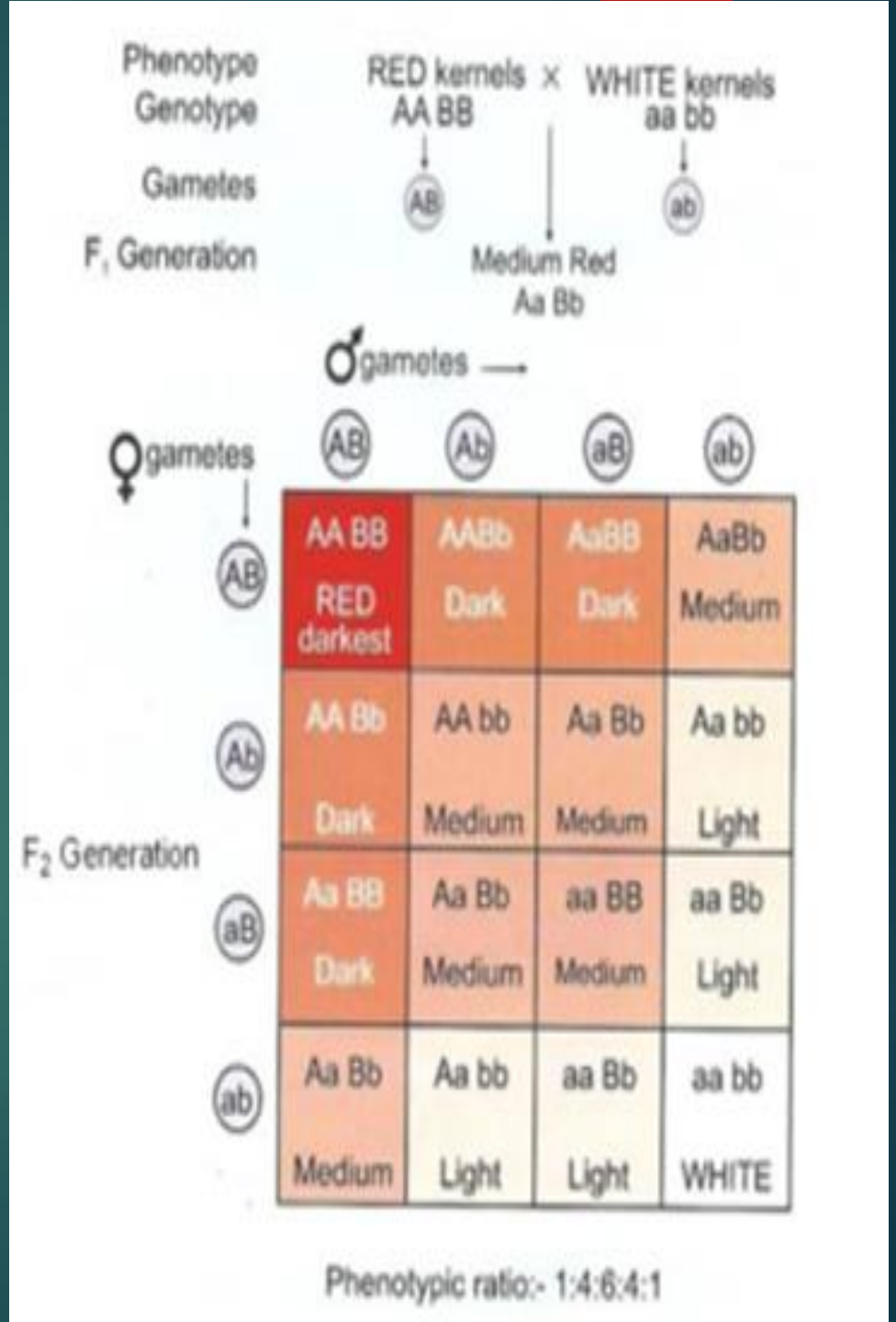
-many alleles of a gene in a population but organism have only two allele of a gene

PLEIOTROPY

- A single gene product may produce more than one effect.
- E.g. starch synthesis/size of starch grain and shape of seeds are controlled by one gene in pea.
- Flower colour and seed colour are controlled by one gene.

Polygenic inheritance

when one characteristic is controlled by two or more genes. Often the genes are large in quantity but small in effect. Examples of human polygenic inheritance are height, skin color, eye color and weight.




Thank you!