

Complementary genes




Complementary genes

When one of two or more genes that when present together produces effects qualitatively distinct from the separate effect of any one of them, it is called as a complementary gene.


It can also be written as follows:

The complementary gene is a interaction of two dominant non inter-allelic gene in which each gene have its own effect but when come together to interact a new trait is developed and the Mendelian ratio 9:3:3:1 is changed to 9:7 due to complementation of both genes.



Bateson and punnet studies the inheritance of flower color in sweet pea plant *Lathyrus odoratus*. There are two varieties of of pea plant one producing red flower and the other white flower.

The red color is due to the presence of pigment anthocyanin. The anthocyanin is produced from a colour less substance called chromogen by the action of enzyme. Thus for the production of red color both enzyme and chromosomes are needed.



Dominant gene C is responsible for the production of chromogen. When this gene is recessive c the chromogen is not produced.

Similarly, another dominant gene A is responsible for producing enzyme. Which converts the chromogen into anthocyanin. When this gene is recessive “a” the enzyme cannot be produced.

Gene C for chromogen.

Gene A for enzyme

Chromogen + enzyme produced anthocyanine (red)

Red flowers is produced by the interaction between both dominant genes C and A. C or A cannot red color independently.

A homozygous white flower sweet pea plant (CCaa) is crossed with another white flower pea plant (ccAA). The F1 plants have red flowers.

When red hybrid plants (CcAa) are crossed , in F2 generation red and white flowers produced in ration 9:7.

Flower color in sweet pea

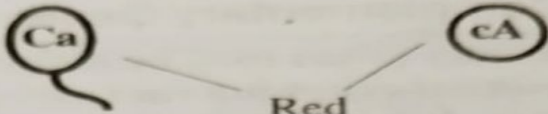
P CCpp X ccPP

F₁ CcPp

CcPp X CcPp (Crossing 2 F₁s)

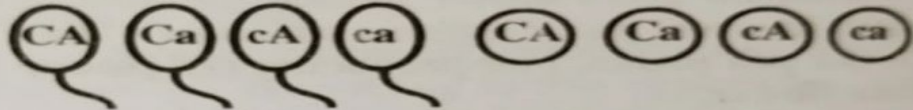
F ₂	CP	Cp	cP	cp
CP	CCPP	CCPp	CcPP	CcPp
Cp	CCPp	CCpp	CcPp	Ccpp
cP	CcPP	CcPp	ccPP	ccPP
cp	CcPp	Ccpp	ccPp	ccpp

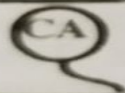
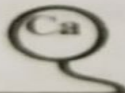
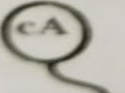
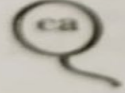
P : White CCaa x White ccAA

Gametes : 

F₁ : Red CcAa

F₁ Plants are crossed : Red CcAa x Red CcAa

Gametes : 

Gametes	CA	Ca	cA	ca
	CCAA Red	CCAa Red	CcAA Red	CcAa Red
	CCAa Red	CCaa White	CcAa Red	Ccaa White
	CcAA Red	CcAa Red	ccAA White	ccAa White
	CcAa Red	Ccaa White	ccAa White	ccaa White