

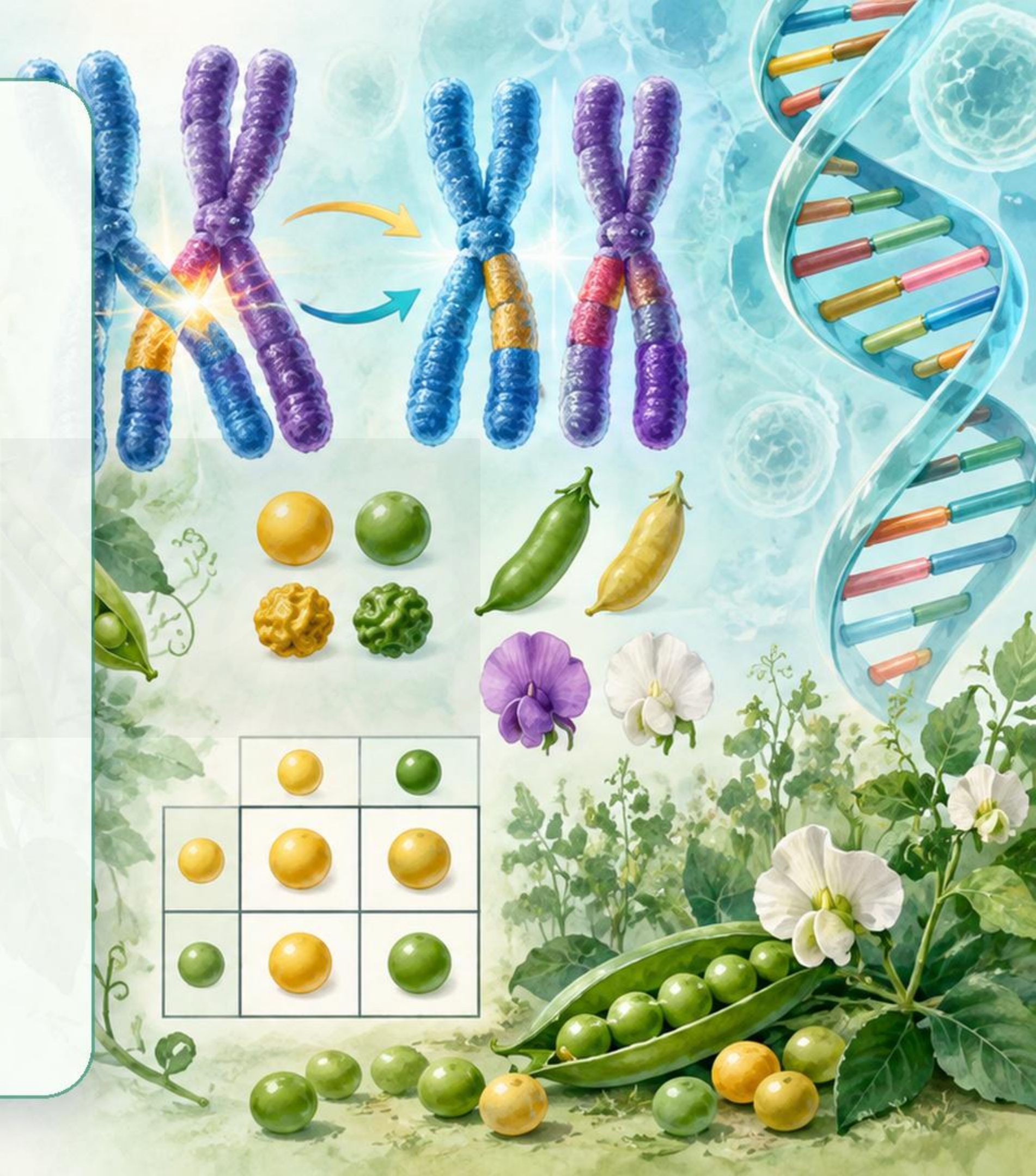
BIOLOGY • CLASS 12

4

CHAPTER

Principles of Inheritance and Variation

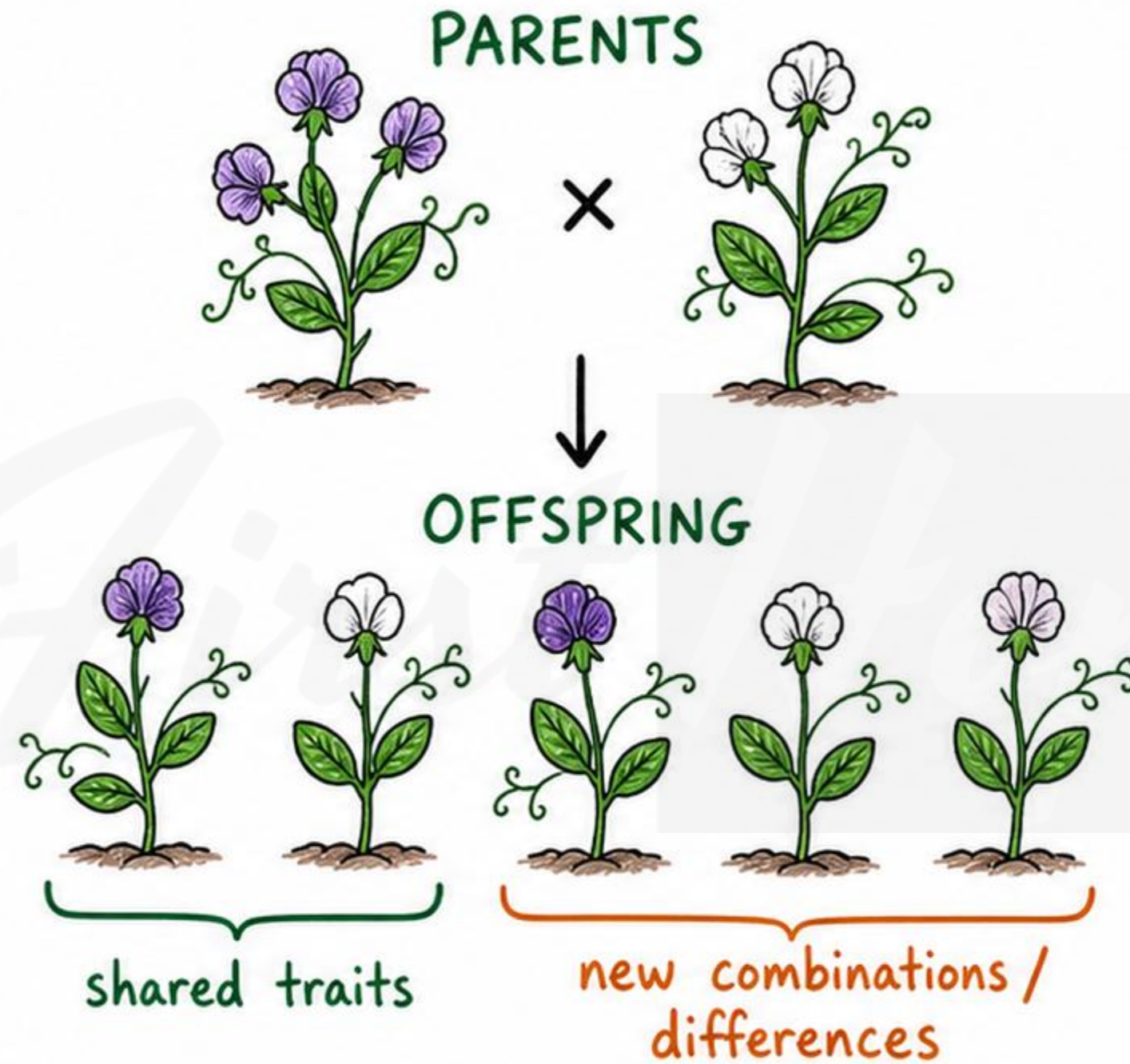
CHAPTER NOTES



GENETICS: INHERITANCE & VARIATION

GENETICS

- Genetics is the branch of biology that studies inheritance and variation.
- **INHERITANCE**: transfer of traits from parents to offspring.
- **VARIATION**: differences seen among offspring and between offspring and parents.



WHY IT MATTERS

- Offspring resemble their parents, but they are not exact copies.
- Variation makes each individual distinct.
- Heredity and variation explain continuity and diversity of life.

HEREDITY

preserves similarities

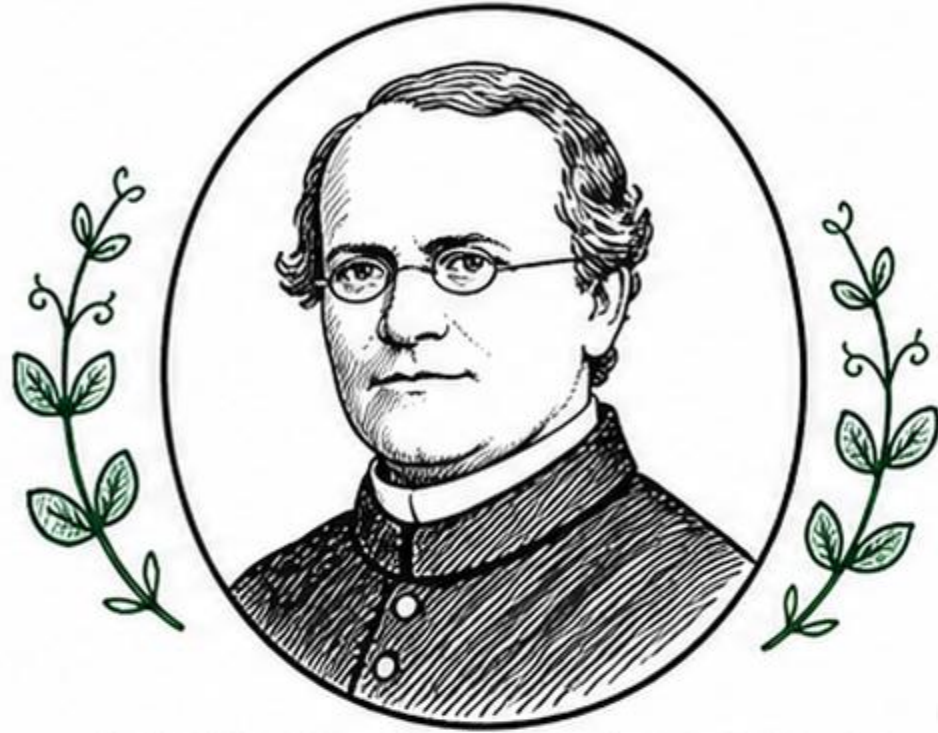


VARIATION

creates differences



MENDEL'S SCIENTIFIC APPROACH



GREGOR JOHANN MENDEL
(1822–1884)

- Austrian monk who studied inheritance.
- Worked with garden pea, *Pisum sativum*.
- Conducted experiments from 1856 to 1863.

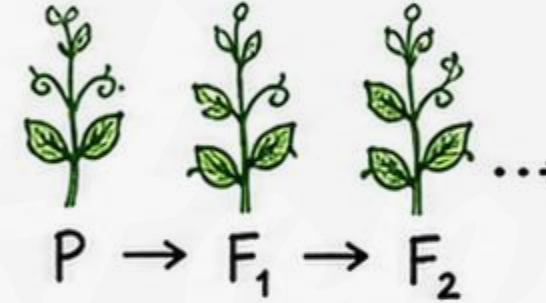
① SELECT contrasting true-breeding parents



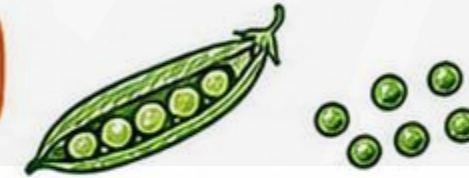
② CONTROL pollination



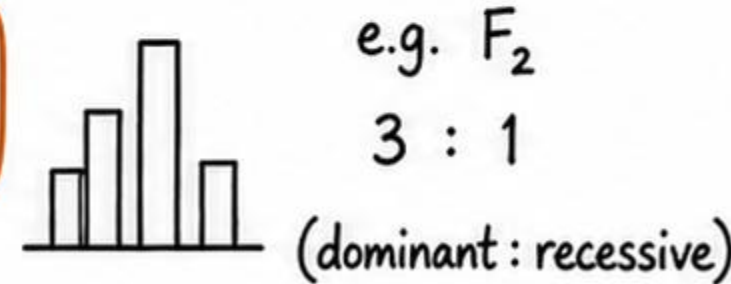
③ FOLLOW traits through generations



④ COUNT many offspring



⑤ ANALYSE results mathematically

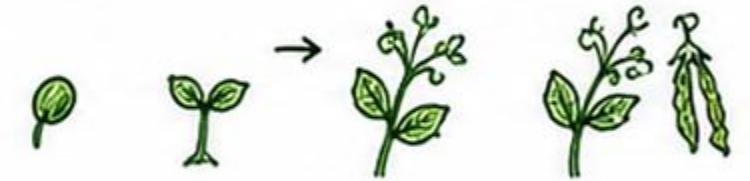


WHY HIS WORK SUCCEEDED

- ★ Pea plants have many clear contrasting traits.



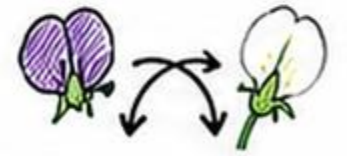
- ★ They have a short life cycle and produce many seeds.



- ★ Self-pollination gives pure lines; cross-pollination can be controlled.



Self-pollination
(pure lines)



Cross-pollination
(controlled)

Careful experiments + large numbers + mathematics → laws of inheritance

SEVEN CONTRASTING PEA TRAITS

Mendel selected pea varieties with clear, opposite forms of the same character.

1	STEM HEIGHT			Tall Dwarf	5	POD COLOUR			Green Yellow
2	FLOWER COLOUR			Violet White	6	SEED SHAPE			Round Wrinkled
3	FLOWER POSITION			Axial Terminal	7	SEED COLOUR			Yellow Green
4	POD SHAPE			Inflated Constricted					

CHARACTER = heritable feature | TRAIT = contrasting form of a character

CONTROLLED CROSS IN PEA

① CHOOSE PARENTS

select plants with desired contrasting traits.



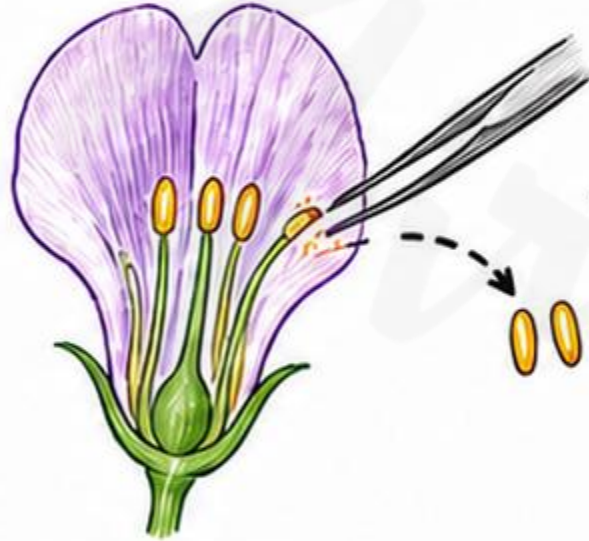
Parent A
(e.g., purple)



Parent B
(e.g., white)

② EMASCULATION

remove anthers from the chosen bisexual female flower before anther dehiscence.



Bisexual female
flower

③ BAGGING

cover the flower to stop unwanted pollen.



④ DESIRED POLLINATION

when the stigma is receptive, dust pollen from the selected male parent.



Selected
male parent

⑤ REBAG & LABEL

cover again and allow seeds to develop.



Cross:
 $A \text{♀} \times B \text{♂}$

ARTIFICIAL HYBRIDISATION:

controlled crossing of selected parents.

If the female parent has unisexual flowers, emasculation is not needed; bagging is still used.

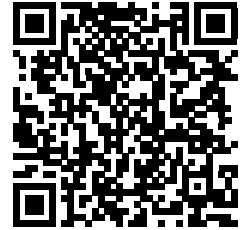


FREE PREVIEW

[Click here to visit our website](#)

SCHOOL NOTES & NCERT SOLUTIONS

Complete notes and
NCERT solutions are
available on
FirstHope app only.



[Scan or click here](#)

Click here to get the app



Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram



[Scan or click here](#)

@FirstHope_CBSE_Notes

Instagram

@firsthope.school

[Click here to follow >](#)

YouTube channel

@firsthope.school

[Click here to watch >](#)

FirstHope website

firsthope.co.in

[Click here to visit our website >](#)

CBSE / Class 9 / Class 10 / Class 11 / Class 12

Preview notes and NCERT solutions. Full PDFs in the FirstHope app.