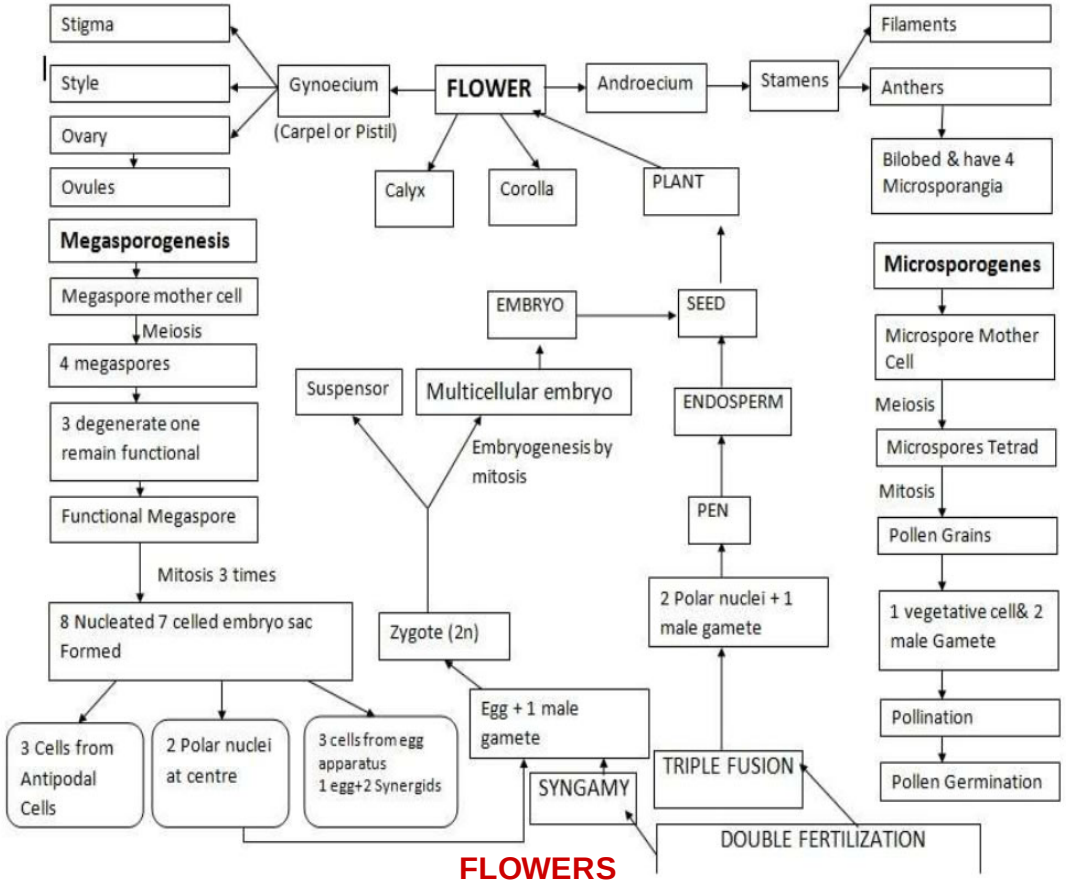
Chapter 2 Sexual Reproduction in Flowering Plants



♦ Site of sexual Reproduction

♦ Male and female reproductive organs are bome on flower

PARTS OF A FLOWER

•Four whorls – calyx (sepals), corolla (petals), androecium (Male reproductive organ), gynoecium (Female reproductive organs) •Function of calyx:protects the bud.

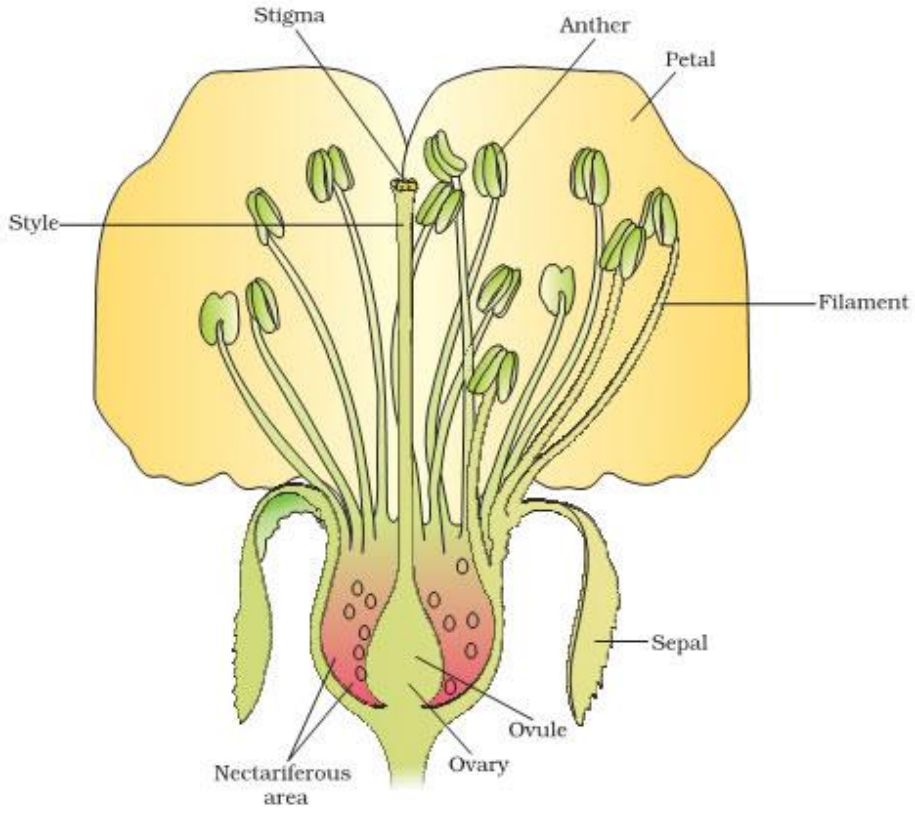
•Function of corolla :attracts insects by its colour

Male Reproductive Organ

♦ Androecium consists of Stamens.

♦ Stamen consists of Stamens.

♦ Ather bilobed 4 Microsporangle.



Refer fig. 2.1 of NCERT (L.S. OF A FLOWER WITH DIFFERENT PARTS)

MICROSPOROGENESIS

The process of formation of micro spores from pollen mother cell through meiosis is called microsprogenesis.

Tapetum :Inner most layer of wall of microsporangium .Cells have dense cytoplasm. Generally have more than

one nucleus .Nourishes the developing pollen grain

Microspore mother cell (2n)Meiosis

↓

Microspore (n)

↓

Pollen grains (n)

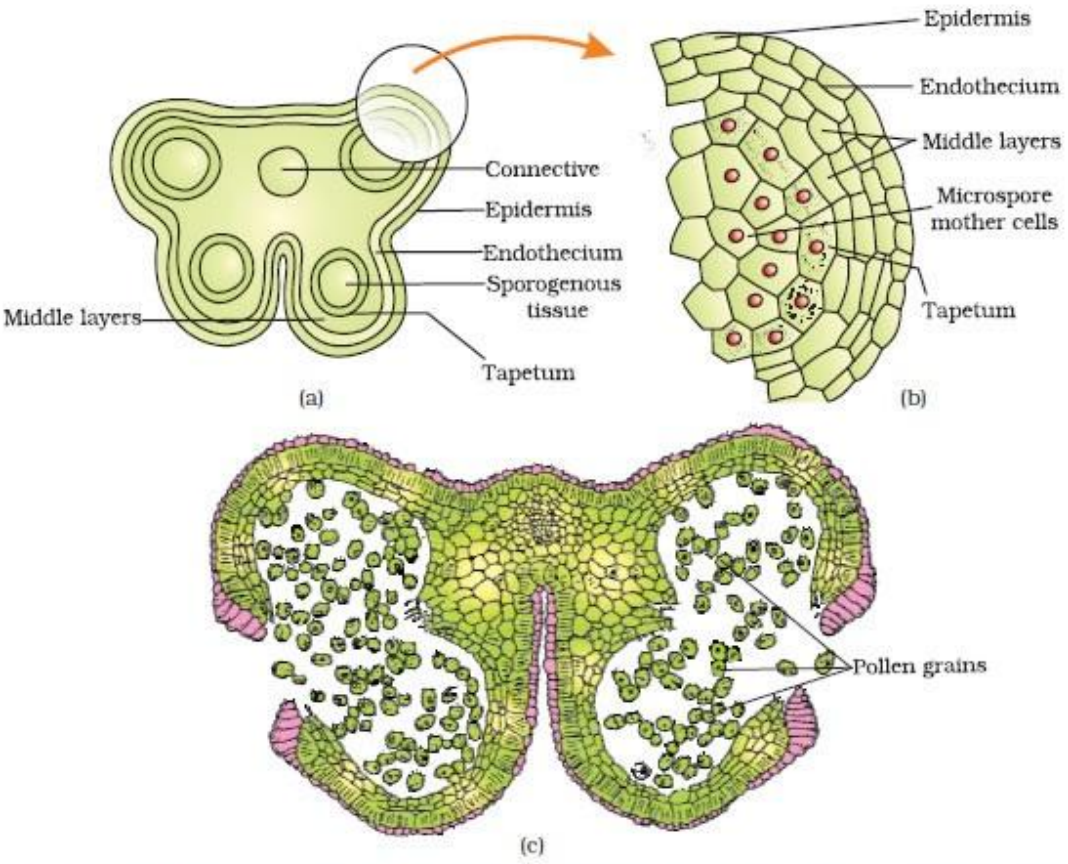


Figure 2.3 (a) Transverse section of a mature anther; (b) Enlarged view of one microsporangium showing wall layers; (c) A dehisced anther

Pollen grains

have two outer walls;

i) Exine

ii) Intine

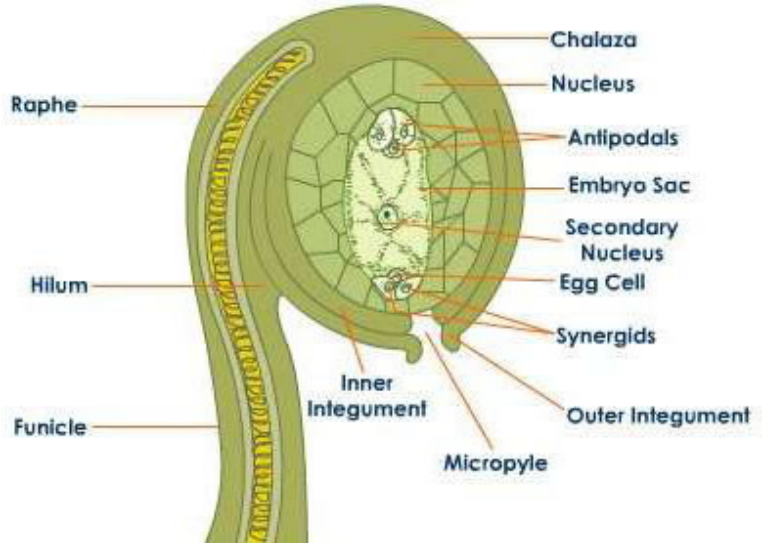
♦ Exine is mase of spropollenin..(Hardest natural substance). Intine is made of cellulose and pectin.

♦ Mture llen grains have two cells – large vegetative cell & small generative cell.

♦ Generative cell froms to male gameetes by mitotic division.

♦ Pollen grains (Refer fig 2.7 of text book)shed in 2-celled / 3 celled stage)

See Fig 2.5 a and b page 23



Gynoecium / carpel (the female reproduuctive organ)

(Structure of anatropous ovule)**Megasporangium**

♦ Each Carpel consists of ovary ,style & stigma.

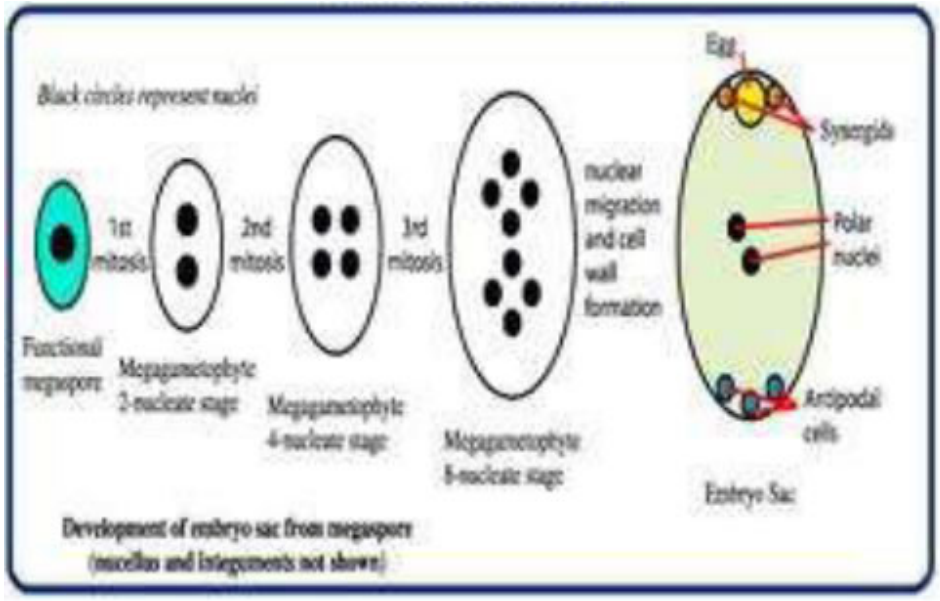
♦ Ovules are attached to ovary by plaxenta.

♦ Funicle – stalk of ovule .

♦ Hilum, a region where funicie is attached.

♦ Micropyle a pore for entry of pollen tube & to imbibe water.

Anatropous ovule



Megasporogenesis

Megaspore mother cell (2n)
Meiosis

↓

4 Megaspores (n)
(3 megaspores degenerate, 1 remains functional)

↓

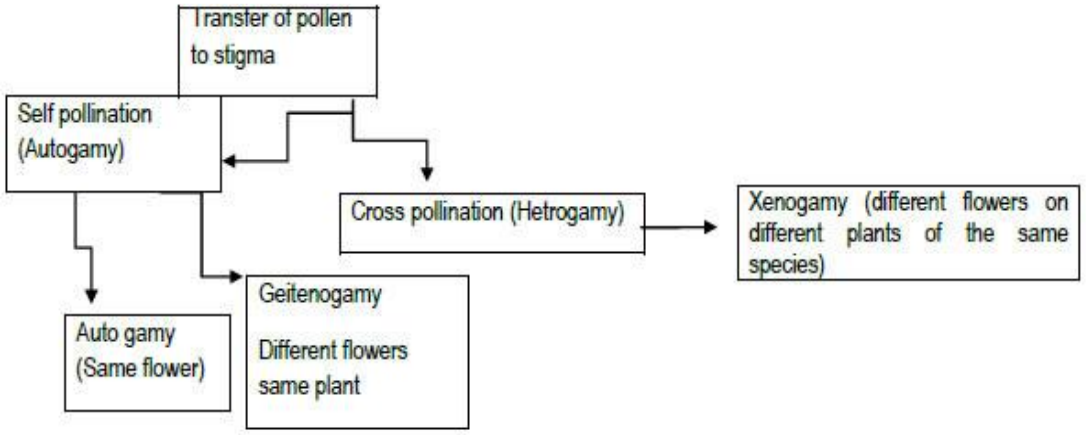
Funtional Megaspore (n) (Divides 3times by mitosis)

↓

8 Nucleated Embryo Sac formed

↓	↓	↓
2 polar nuclei at center(n each)	3 cells at chalazal end called antipodals(n)	3 cells group at micropylar end -the egg cell(n) & 2 synergids(n)

POLLINATION– transfer of pollen from anther to stigma. Agents of pollination –air, water, insect.bat,bird,man



Double fertilization

♦ Pollen grains geminate on stigma & pollen tube grows through style.

♦ Pllen tube reaches micropyle & releases two male gametes into embryo-sac Fertilisation is the process of fusion of male& female gametes (n+n) to form a diploid (2n) zygote.

Syngamy :Fusion of one male gamete(n) with egg (n) ⟶ Zygote(2n)Produced First Fusion ⟶ Fusion of two Polar Nuclei(n+n=2n) ⟶ Second fusion ⟶ Male Gamete(n) Fuses with the fusion product of the two polar nuclei(3n) Third Fusion ⟶ fusion of male gamete with egg cell.

♦ **Double** fertilzation

i)Fusion of male gamete with egg – First fertilization ,SYNGAMY

ii)Fusion of fusion product of polar nuclei with male gamete – Second fertilization .TRIPLE FUSION Refer fig 2.13 in NCERT

Post fertilisation changes:

Stages of embryo development after fertilization:

1. Zygote divides by mitosis into suspensor & embryo cells

2. Suspensor cell forms a globular basal cell which remains embedded in the endosperm & a multicellular suspensor bearing the embryo

3.Globular embryo becomes heart-shaped & then mature embryo with radicle, plumule &Cotyledons

♦ Primary endosperm nucleus – divides repeatedly to form endosperm, food for the embryo.

♦ Mature ovary becomes fruit.

♦ Mature ovule becomes seed.

♦ True Fruit develops only from the ovary, e.g. mango, tomato

False Fruit develops from parts of the flower other than the ovary e.g. apple, peach etc.

Seeds two types:

i) Albuminous (with Endosperm)

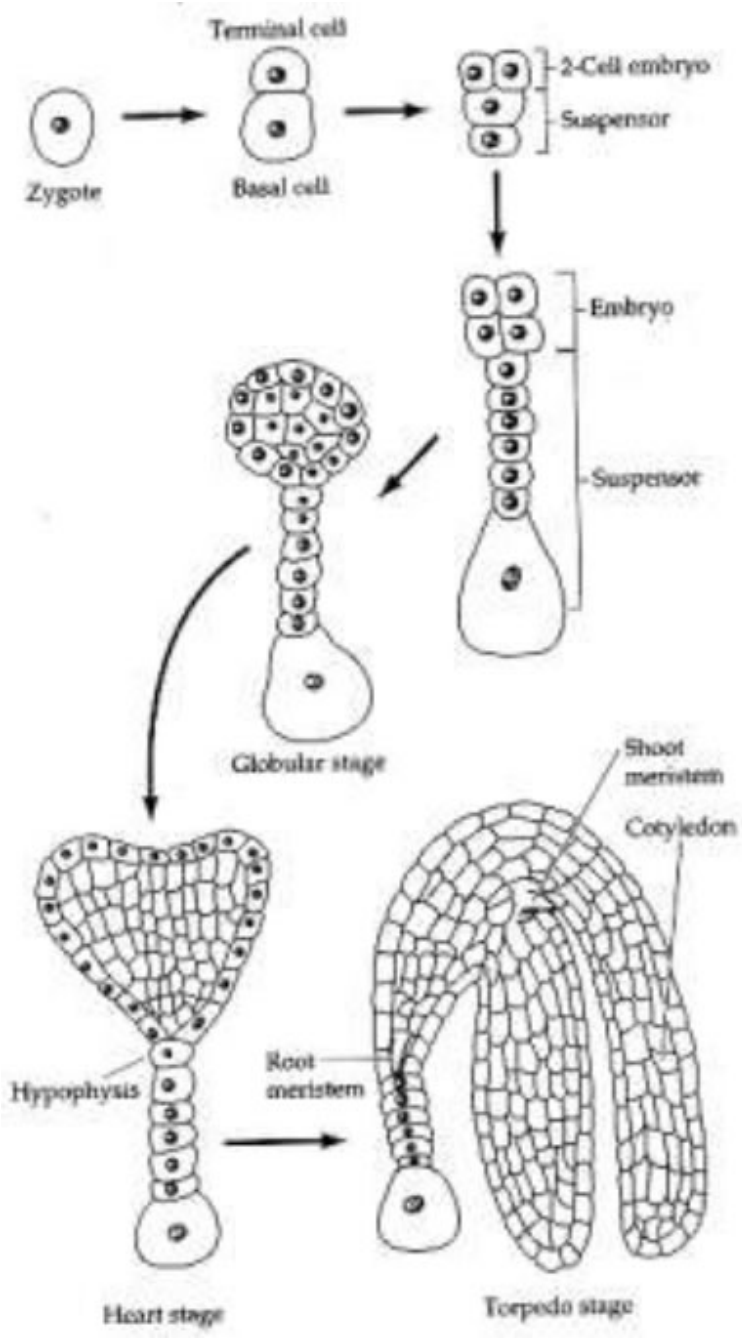
ii) Non albuminous(without Endosperm)

Special mechanism of reproduction:-

I) Apomixis- Production of seeds without fertilisation e.g.species of Astereceae and grasses.

ii) Polyembryony- Occurrence of more than one embryo in a

seed e.g.Orange.



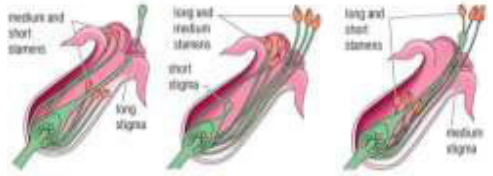
Outbreeding devices:

Continued self-pollination result in **breeding depression.** Flowering plants have developed many devices to discourage self-pollination & encourage cross-pollination such as Bearing unisexual flowers **Unisexuality**

Anther & stigma mature at different times **Dichogamy** Anther & stigma placed at different positions **Heterostyly** Pollen grains of a flower do not erminate on the stigma of the same flower **Self incompatibility** **Artificial Hybridisation** Heterostyly Types of cross-pollination performed by man for crop improvement. Achieved by

i) Emasculation i.e. removal of anthers from the flower bud of a bisexual flower before the anther dehisces using a pair of forceps and

ii) Bagging i.e. covering the emasculated flowers with a bag of suitable size to protect them from contamination with unwanted pollen



If flower is unisexual, emasculation is not needed. Flower bud bagged & when the stigma becomes receptive, pollination is done using desired pollen & the flower is rebagged Pollen –pistil InteractionPollen –pistil Interaction

i) All the events from pollen deposition on the stigma until the entry of the pollen tube into the ovule are together called pollen-pistil interaction.

ii) It is a dynamic process involving pollen recognition by stigma/pistil for compatible pollen by accepting them and if incompatible rejecting them.