

NEET- 2020- 45 Days Crash Course



Date : 5th August 2020



Chapter Name : MORPHOLOGY IN FLOWERING PLANTS



Lecture Outline :

FLOWER
PLACENTATION
AESTIVATION
FRUIT

PLANT FAMILIES
STEM
LEAVES

Flower and its parts

It is specialized modified shoot, which meant for carrying out the sexual reproduction.

1. Attachment of flower:

Sessile

Pedicellate

pedicel is absent.
Ex: Morus,
Adhatoda

pedicel is present
Ex: Dianthus

2. Bracts and bracteoles

Bract

Bracteole

a leaf like structure
present in the axil of
flower or Inflorescence

thin small bract like
structures are present at
some point on the Pedicel
of the flower

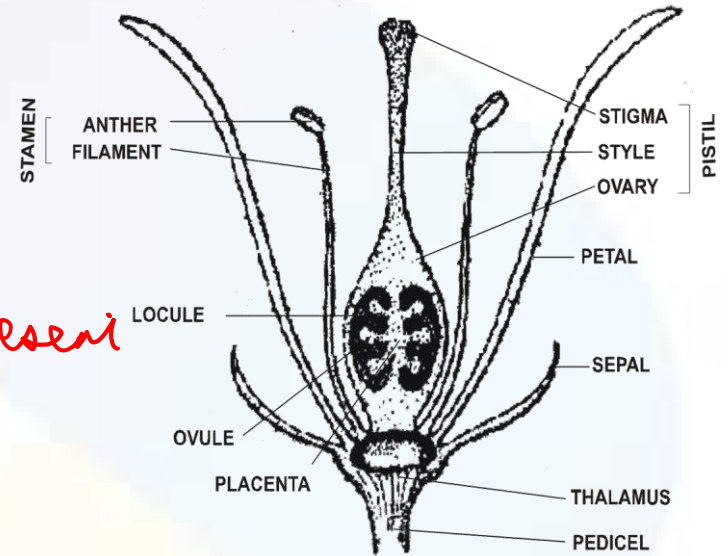
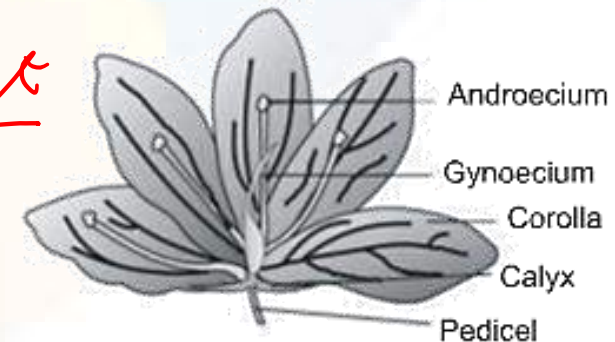


Fig :- V.S. of Flower



Flower types on the basis of symmetry

3. Presence of floral whorl

Complete

Incomplete

four types of floral organs
(Calyx, Corolla, Androecium
and Gynoecium)
Ex: *Solanum nigrum*

absence of any one or more
of the floral organs. Ex:
Euphorbia sps

4. Symmetry:

Actinomorphic (Radial)

Zygomorphic (Bilateral)

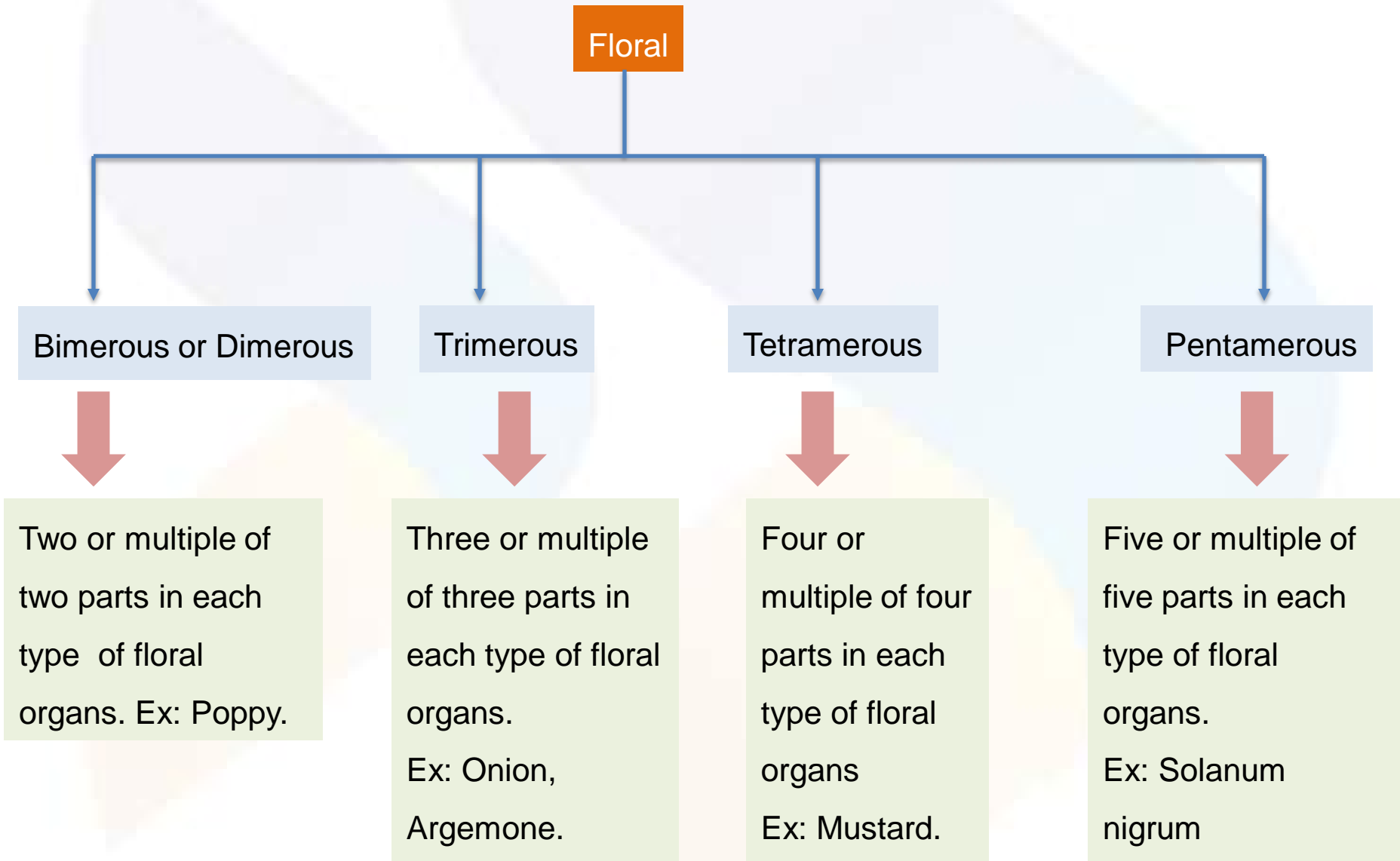
Asymmetrical (irregular)

A cyclic flower divided into
two equal vertical halves by
any vertical plane.
Ex: *Ipomea*, Mustard.

A flower divided into two
equal vertical halves by
one plane only.
Ex: Pea

A flower divided into two
equal parts by any vertical
plane.
Ex: *Opuntia*, *Canna*.

Number of floral parts



Position of floral organs on thalamus

* N E E T

1. Hypogynous

Ovary develops at its top called superior ovary while other floral whorls like sepals, petals, stamens are borne successively below. It is called hypogyny Ex: Citrus, Mustard, China rose, Brinjal.

other whorls are below gynoecium

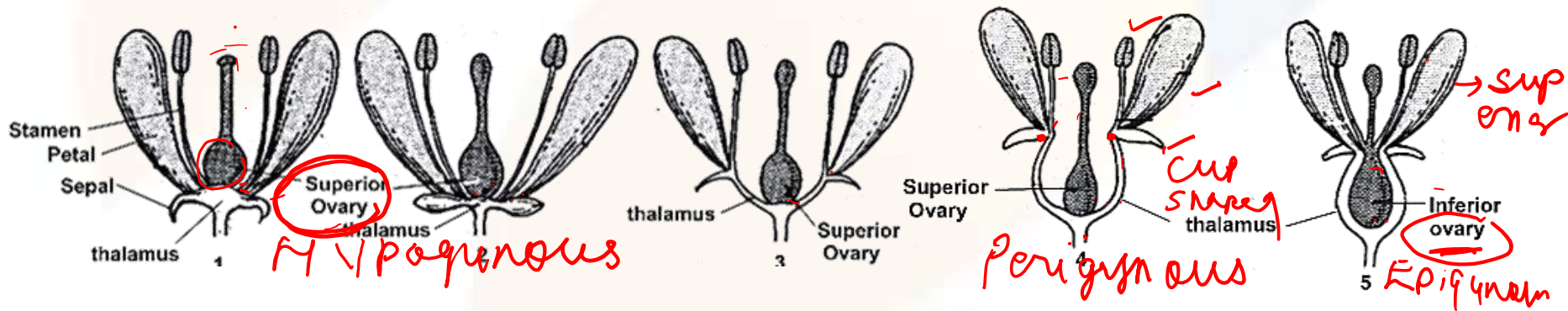
2. Perigynous:

Ovary and other floral organs sepals, petals and stamen lie at the same level This ovary is said to be half inferior. Ex: Leguminosae, Plum, Peach.

3. Epigynous

Ovary is inferior while the other floral organs are borne at the top of the ovary as margin of thalamus grows up ward enclosing the ovary completely and fused with it. Ex: Ray florets of Sunflower, Cucumber, Guava, Coriander.

other whorls are above gynoecium



Arrangement Of Floral Organs

Floral Organs

Spirocyclic

some floral organs are borne in spirals and other organs in whorls. Ex: Ranunculus.

Cyclic

Floral organs are borne on the thalamus in whorls. Ex: Solanum.

Androphore

An elongated part of thalamus between corolla and stamens. Ex: Passion flower.

Gynophore

An elongated part of the flower between Androecium and Gynoecium. Ex: Bauhinia, cleome

Androgynophore

When gynophore associate with androphore - Cleome (Gynandropsis)

Acyclic

When floral organs are borne on the thalamus in spirals. Ex: Nymphaea.

Calyx and its types



An outer most accessory whorl of flower, which provides protection to the other floral parts in the bud condition.



The sepal lie in line with mother axis is called odd sepal. It is either anterior. Ex: Leguminosae or posterior. Ex: Petunia

Types

1. Caducous: Falling down immediately after opening of flower. Ex: Poppy

2. Deciduous: Falling down at the time of withering of flower. Ex: Mustard.

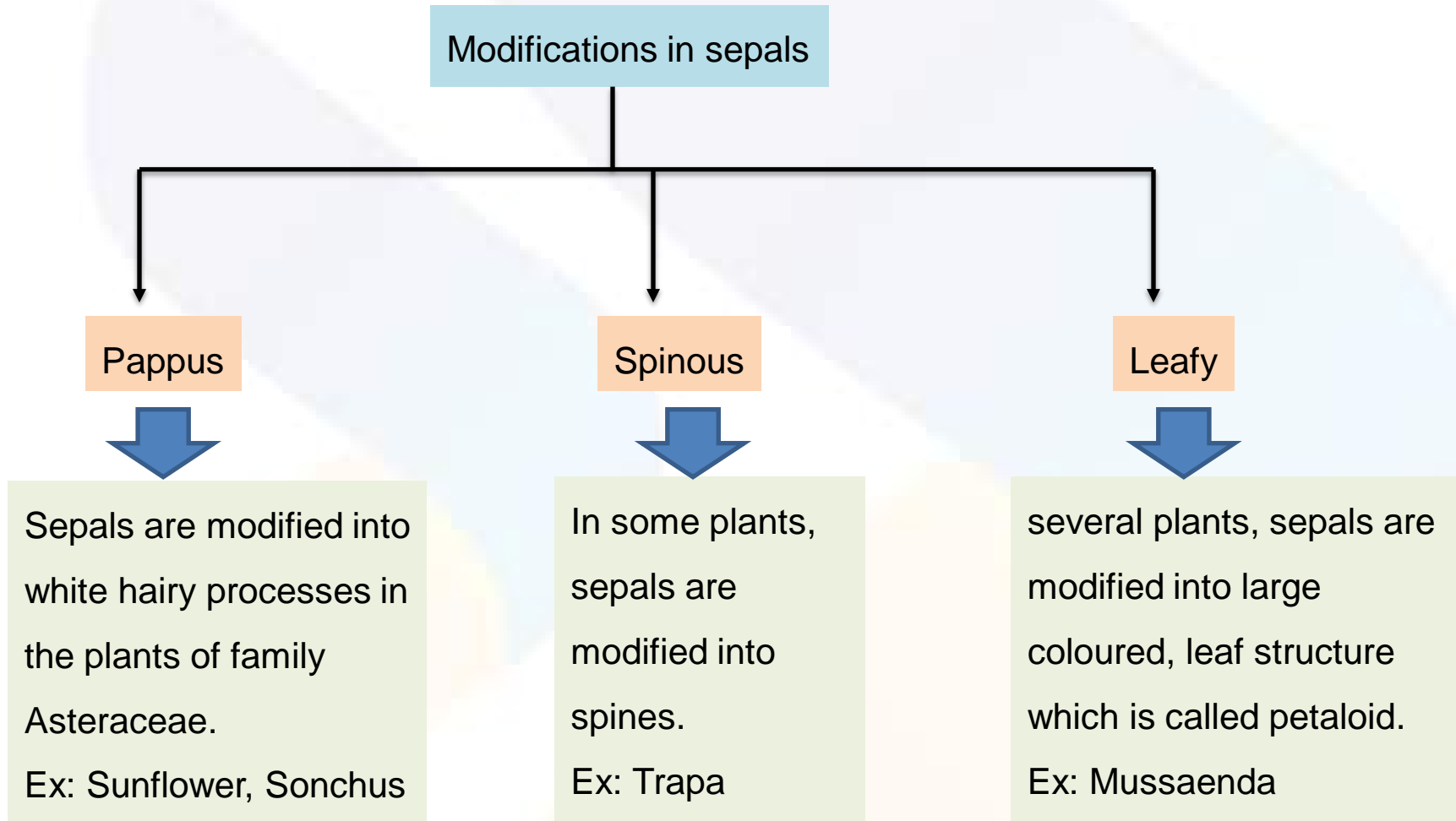
3. Persistent: Sepals persisting in the fruit. Ex: Rose. It is of two types

(a) Accrescent: Calyx grow along with the fruit. Ex: Physalis, Shorea robusta.

(b) Marcescent: Calyx remain small and dried up form before being shed.

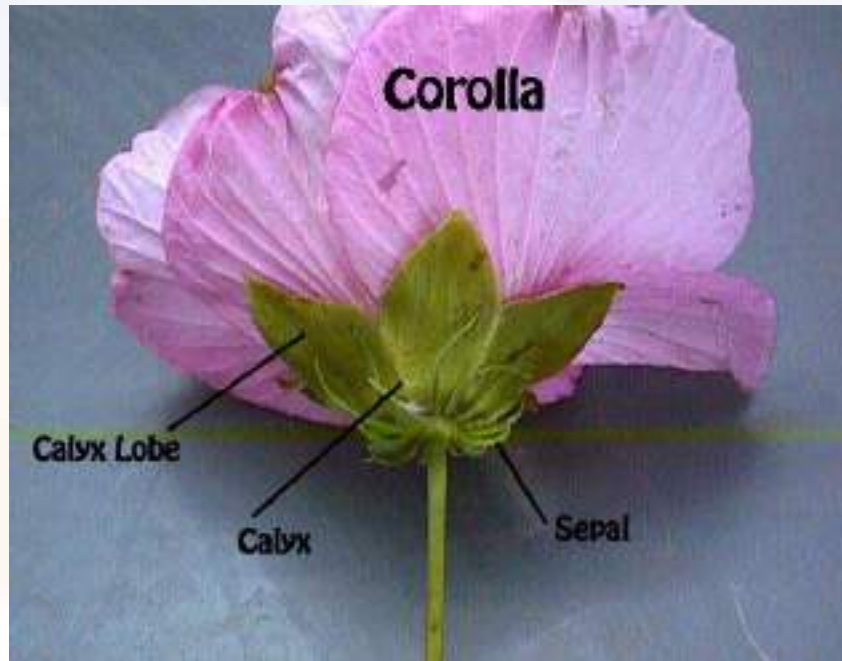
Ex: Guava

Modifications in sepals



Corolla

It is a second accessory whorl of floral parts, which consists of petals. The latter are usually coloured help to attract the pollinator. Corolla are either Polypetalous or gamopetalous.



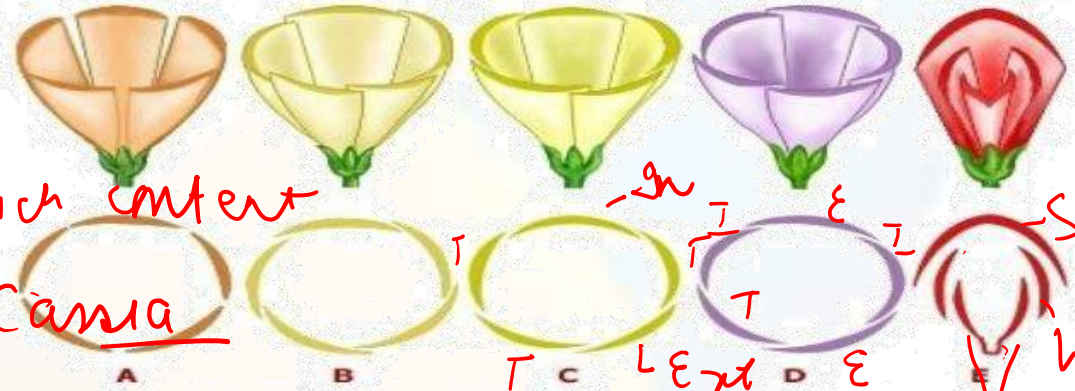
Aestivation - I

It is the arrangement of accessory floral organs (Petals & sepals) in relation to one another in the floral bud. It is of following types

1. **Twisted or contorted:** One margin of a petal overlaps regularly the margin of an adjacent petal and vice-versa. Ex: China rose

2. **Imbricate:** One petal External one internal and in the remain three petals; one margin external while the other margin is internal. Ex: Cassia

3. **Vexillary (Papilionaceous):** In which posterior petal (standard) overlapping the two lateral petals (wings) the latter overlapping the two anterior petals (keel). Ex: Pea, Beans.



Different types of aestivation of calyx and corolla
A, Valvate, B, Twisted, C, Imbricate, D, Quincuncial, E, Vexillary

→ 1 + 2 + (2) ✓
largest standard Lateral, wings Smallest keel fused

AKSTIVATION

TRICKS

Valvate →

V C C M - mustard
calotropis Mustard
apple

Twisted →

C L C - cotton
China Rose Lady's finger

Imbricate →

Mulochia has GG rich
Guemhar DNA
Casei

Verrucate →

Pea PB Sindhur
Bear

Quincuncial →

Duranta, Ranunculus, Mun
and

Aestivation - II

4. Quincuncial: Two petals external, two internal, and fifth with one margin external while its other margin is internal.

Ex: Duranta, Ranunculus, Morraya

5. Valvate: Margins of adjacent petals touch each other without overlapping.

Ex: Mustard, Calotropis



Eustand apple

Valvate Calotropis

6. Induplicate Valvate: It is a type of valvate aestivation in which margins of petals are turned towards innerside. Ex: Impomoea

Types of Corolla - Regular: Polypetalous

A. Regular: Polypetalous

Cruciform

Four clawed petals are arranged & forms a cross.

Ex: Mustard



Cruciform

Caryophyllaceous

Five clawed petals with limbs horizontally bent. Ex: Dianthus

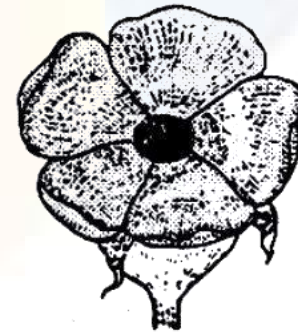


Caryophyllaceous

Rosaceous

Five or more sessile-clawed petals are arranged like a saucer.

Ex: Rose



Rosaceous

Types of Corolla – Irregular:Polypetalous

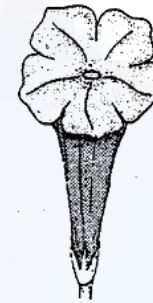
B. Irregular: Polypetalous

Papilionaceous/Butterfly: Zygomorphic-polypetalous corolla has five unequal petals arranged like a butterfly called standard/ vexillum & overlaps two smaller lateral petals called wing. Ex: Pea

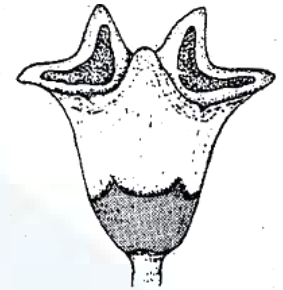
C. Regular: Gamopetalous

Regular Gamopetalous types in corolla

1. Infundibuliform or funnel shaped: Gamopetalous corolla having funnel shape. Ex: Petunia



Infundibuliform



Campanulate

2. Bell shaped or Campanulate: Five petals fused to form bell shaped corolla. Ex: Cuscuta, Campanula

3. Wheel-shaped or Rotate: With short tube having limbs placed transversely like spoke of wheel.

Ex: *Solanum nigrum*



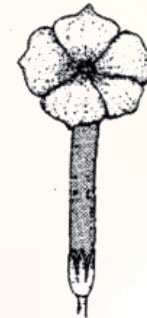
Rotate



Tubular

4. Tubular: Corolla is modified into tube like structure. Ex: Disc floret of sunflower

5. Salver form or Hypocrateri form: Tubular with spreading lobe. Ex: Ixora, Mussenda



salver shaped



Urceolate

6. Urceolate: Urn shaped Ex : Bryophyllum

Irregular Gamopetalous types in corolla

D. Irregular: Gamopetalous

Ligulate or strap-shaped

Gamopetalous corolla form tongue like structure.

Ex: Ray floret of sunflower.



Ligulate



Bilabiate Ringent

Bilabiate

Corolla is bilipped.

Bilabiate Ringent

Gamopetalous corolla is differentiated into two equal parts of upper and lower lips.
Ex: Ocimum, Salvia

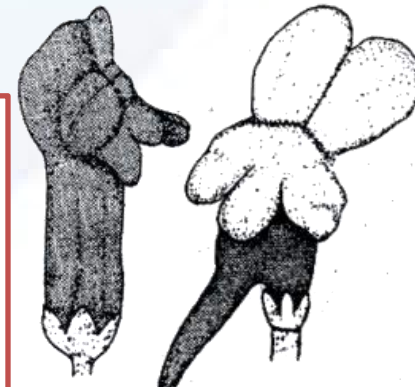
Bilabiate Personate

Corolla is bilipped but the mouth is closed by a projection of the lower lip.
Ex: Antirrhinum.

Spurred

One or more petals are drawn out like a beak

Ex: Larkspur



Bilabiate personate

spurred

Androecium

- Male reproductive organ of flower and it consists of one or more stamens. Stamen is a part of flower, which produces pollen. Each stamen is made up of a stalk like filament and knob like Anther and connective.
- Usually each Anther has two lobes. It is called **Dithecous**. Ex: Most of the plants. In some plants, Anther has only one lobe. It is known as **Monothealous**. Ex: China rose (Malvaceae family). Each lobe has two chambers called pollen sacs & pollen grains are found in it.

Cohesion of stamen

Fusion

Polyandrous

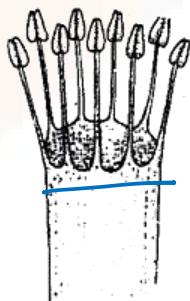
Stamen
free
Ex: Papaya



Polyadelphous

Monadelphous

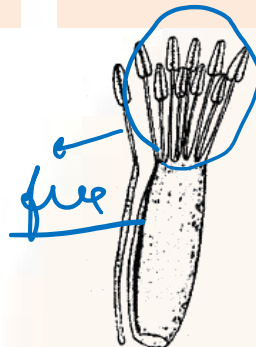
stamen is
fused by
means of their
filaments in
one bundle.
Ex: China rose



Monadelphous

Diadelphous

filaments are
fused into two
bundles & the
anther remain
free.
Ex: Pea



Diadelphous

Polyadelphous

filaments are
united into
more than two
bundles but
anthers are
free.
Ex: Lemon
Citrus



Syngenesious

Syngenesious

Stamens
are fused
by Anther
only. The
filaments
are free.
Ex:
Sonchus



Synandrous

Synandrous

Stamen
are united
by both
their
Anthers as
well as
filaments.
Ex:
Cucurbita

Adhesion of stamen

Fusion with other floral parts

Epipetalous

stamen are fused to the petals.

Ex: China rose, Solanum, Brinjal

Epiphyllous

stamens are united to parianth. ($S + P$)

Ex: Asphodelus, Lily

Gynandrous

stamens are attached to Carpels, either throughout their whole length or by their anthers only.

Ex: Calotropis

LENGTH OF FILAMENT

Didynamous

Out of four stamens, two long and two short filamented stamens.
Ex: Ocimum.

Tetradynamous

Four long and two short.
Ex: Mustard.

Inserted

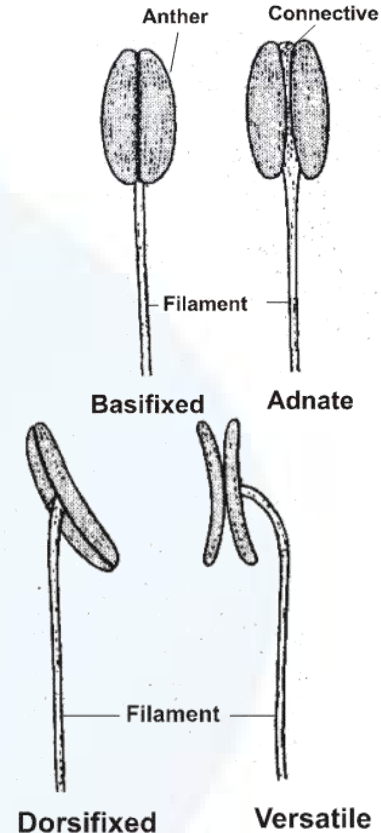
Stamens shorter than the corolla of flower are known as Inserted. Ex: Ixora.

Exserted

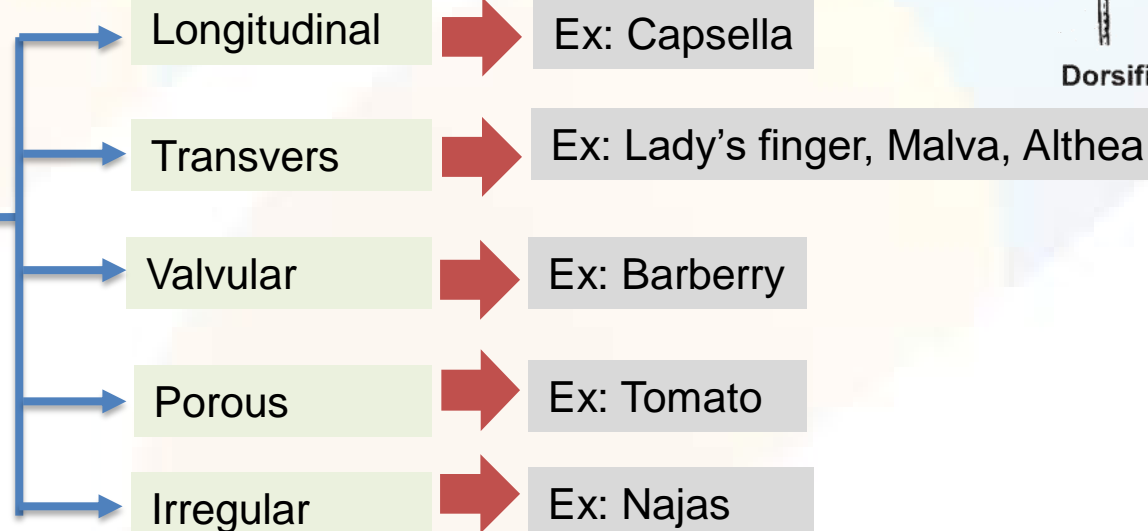
Stamens protrude out of the corolla of flower are termed as exerted.
Ex: Passion flower

Attachment of filament to the anther

1. Dorsifixed: The filament is firmly fixed to the back of the Anther.
Ex: *Bauhinia variegata*.
2. Basifixed: The filament is fixed to the base of the anther. Ex: Mustard
3. Adnate: The filament Joins throughout the length of the Anther.
Ex: *Ranunculus*, *Magnolia*, *Nymphaea*
4. Versatile: The filament is attached to the back of the Anther and the Anther can swing freely. Ex: Grasses



DEHISCENCE OF ANTHER



Gynoecium

→ It is female reproductive organ of flower. Which is made up of one or more carpels.

CARPEL

It is a structural unit of compound pistil, which is leaf like and bears ovules at its margins.

It consists of swollen ovary, a stalk like style and terminal receptive part stigma

When gynoecium bears only one carpel. It is called Monocarpellary, two- bicarpellary, three- tricapellary, many-polycarpellary

COHESION OF CARPELS

Apocarpous

Carpels free. Ex: Ranunculus, Rose, Lotus

Syncarpous

Carpels more than two and fused. Ex: mustard, tomato

NUMBER OF LOCULES

chambers in the ovary

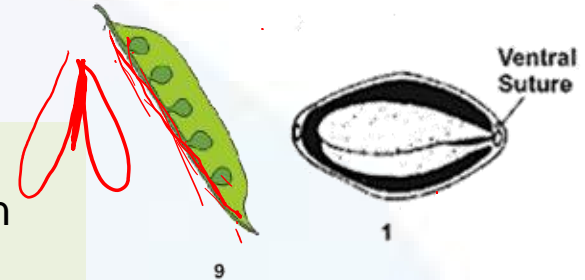
Ovary has locules and may be unilocular, bilocular, trilocular, tetralocular, pentalocular or multilocular

Placentation – Marginal, Parietal and Axile

The arrangement of ovules on placenta with in the ovary is called placentation. It is types.

1. Marginal

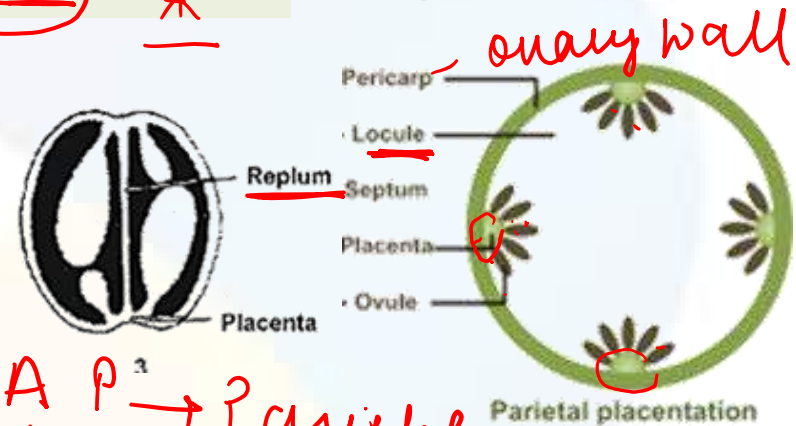
It is found in monocarpellary gynoecium. In which placenta developing along the junction of the two margins of the carpel on which one or two alternate rows of ovules occur. Ex: Pea *



2. Parietal

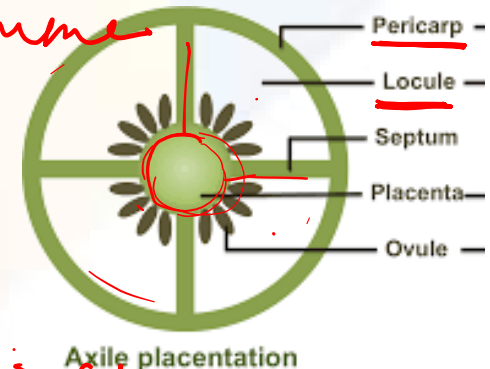
Periophery

Ovary is one chambered Ex: Radish, Papaya. Parietal placentation is found in family Cruciferae. In which a false septum called replum develops between the two parietal placentae resulting the ovary becomes bilocular mustard, Argemone



3. Axile placentation

The ovary is partitioned into two or more chambers. Placentae occur in the central region where the septa meet so that on axile column bearing ovules is formed. Ex: Potato.

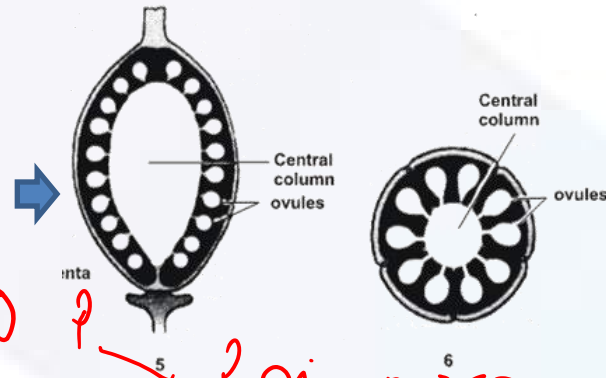


Mustard ← M A P → *Parietal*
↓
Argemone
Tomato ← T L C → *Chinarose*

Placentation - Free central, Basal and Superficial

4. Free central

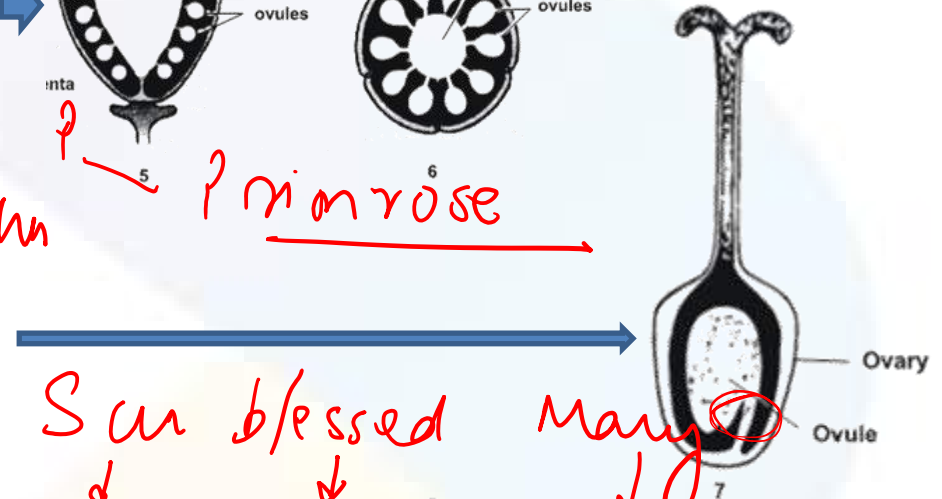
The ovules are borne around a central column, which is not connected with the ovary wall by any septum. Ex: Dianthus, Primrose



Free of ?
Dianthus Primrose

5. Basal

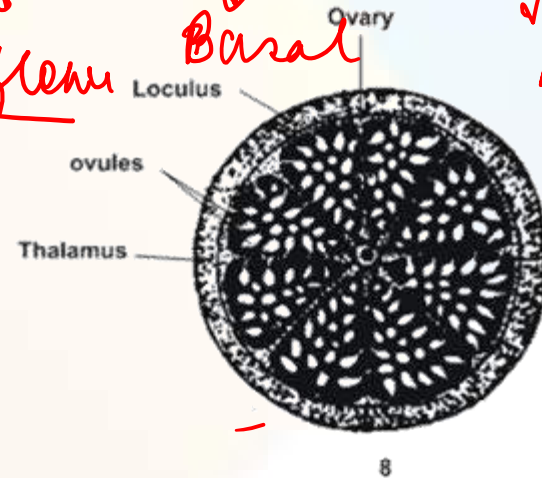
Ovary is unilocular and the placenta develops at the base of ovary on thalamus and bears a single ovule. Ex: Sunflower, Marigold.



San blessed Mary
Sun flower Basal Marigold

6. Superficial

The ovules develop on the septa, if present. Superficial placentation is found in both monocarpellary (Ex: Butomus) and Syncarpous



PLACENTATION TRICKS

Apical - I L C - China Rose
 Tomato Lemon

Parietal - M A P
 Mustard Argemone Parietal

Free Central - Free DP
 Dianthus → Primrose

Basal - Sun Blessed Mary
 Marginal → Pea Surfin Basal Marigold

Style

Style

Terminal

It originates from tip of ovary. Ex: Petunia.

Lateral

Arising from side of ovary. Ex: Mango

Gynobasic

Arising from mid basal part of ovary. Ex: Salvia, *Ocimum*

STIGMA

part of Gynoecium, which receive pollen grains.

(i) Capitate

(ii) Discoid

(iii) Plumose

(iv) Bifid

(v) Knob like

(vi) Drum-shaped

(vii) Dumbell shaped

(viii) Dome shaped

(ix) Sticky

(x) Linear

(xi) Radiate hood like

Thalamus

It is the swollen and broaden part of flower, which lies at the tip of pedicel and bears floral organs

It is similar to a dwarf shoot in which growth is definite and the internodes are very short. Rarely internodes become elongated as



Anthophore: Internode between calyx and corolla is elongated. Ex: Silene.



Androphore: Between corolla and Androecium. Ex: Passiflora.

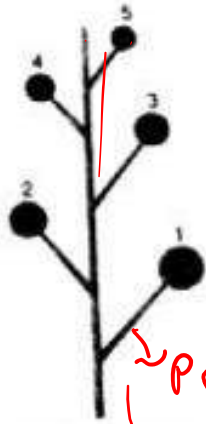


Gynophore: Between androecium and Gynoecium. Ex: *Cleome gynandra*.

Sometimes the thalamus is prolonged into gynoecium to form central axis called Carpophore. Ex: Coriander

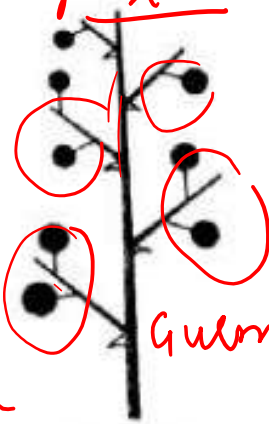
Racemose inflorescence

Youngest at apex → tip does not have flower, Monopodial
 Acropetal



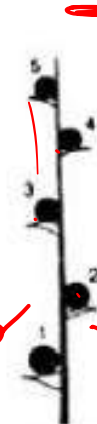
Raceme

Pedicel



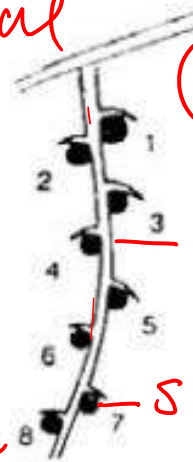
Panicle

Gulmhor



Spike

Sessile

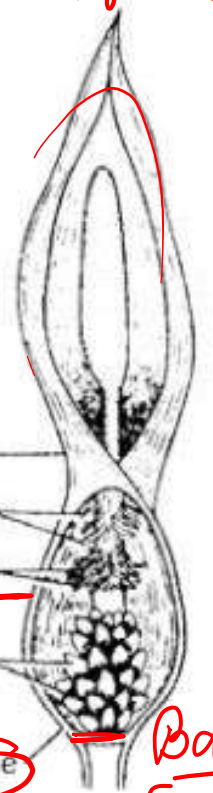


Catkin

Spikelet eg wheat

Pendulous axis

Sessile



Spathe (bract)

Sterile hairs

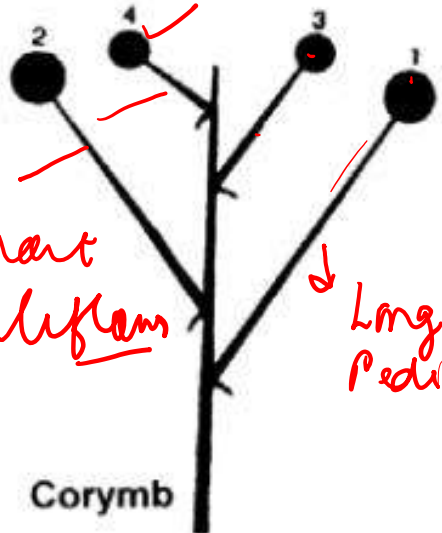
Naked male flowers

Female flower

Bisexual
 eg Must, Radish

Branched Bisexual
 Raceme

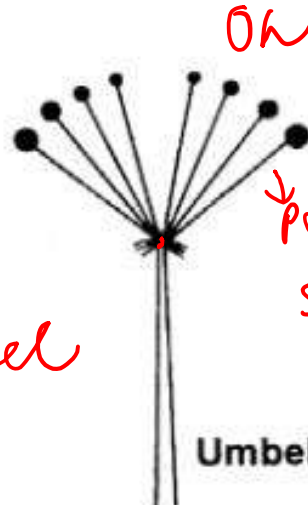
Unisexual
 Marus



Corymb

Short cauliflorous

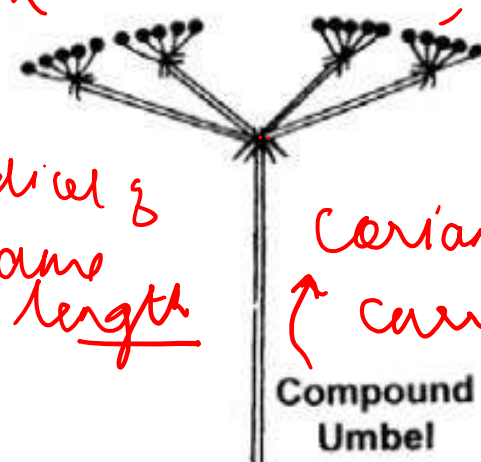
Long pedicel



Umbel

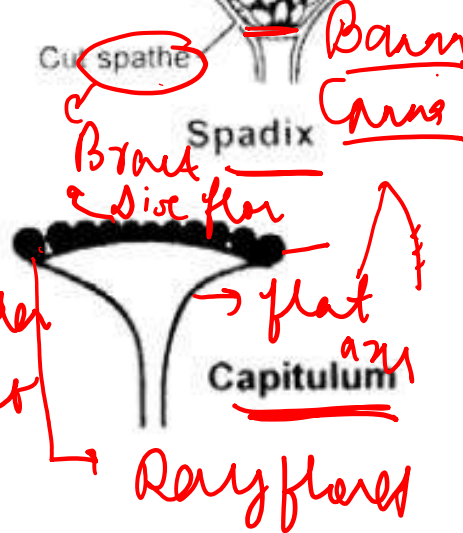
Ohian

Pedicel of same length



Compound Umbel

Coriander curvat



Spadix

Capitulum

Cul spathe

Bract

Side flower

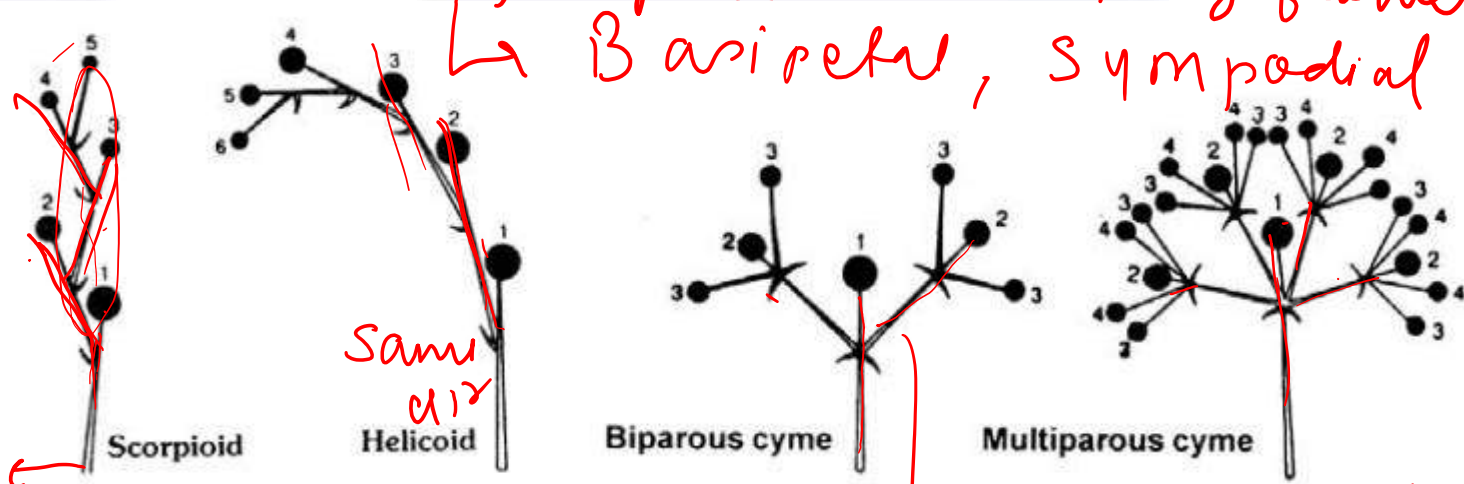
flat axis

Many flowers

Bamboo
 Canis

Cymose Inflorescence

↳ tip terminated by flower
 ↳ Basipetal, sympodial



Uniparous
 cyme

2 branches
 eg Bougainvillea

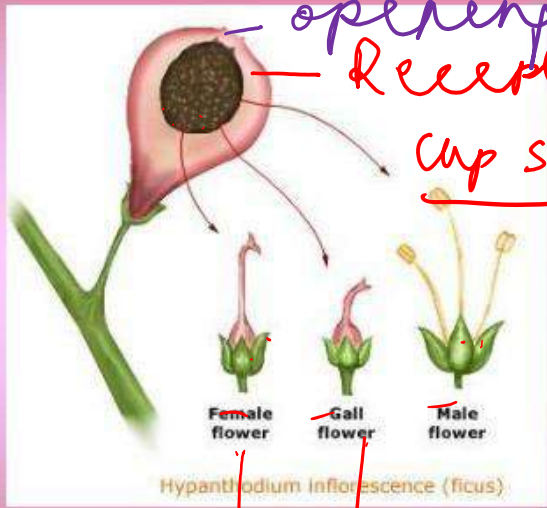
multiple
 branches

↓
Calotropis

Helicoid → Dalia, Atropa
 Scorpioid → Ranunculus

Hypanthodium Inflorescence

HYPANTHODIUM



Cup-shaped receptacle formed by the condensation of the rachis of closely placed cymes. The receptacle forms a vessel with a terminal opening and flowers inside it in cymose groups e.g. *Ficus*

e.g. Fig (Anyed)
Ficus carica

→ Female ✓

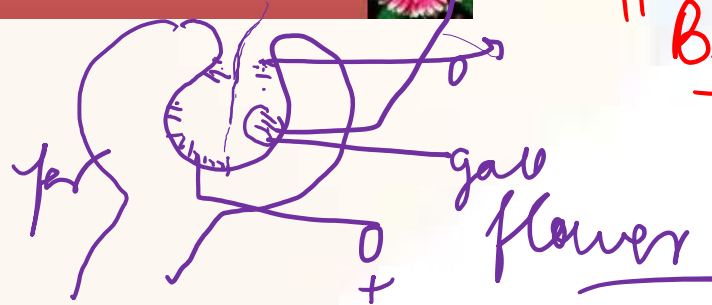
→ Male ✓

→ Gall flowers

lateral style

Pollinated by a wasp
"Blastophaga"

Pollinated
formed by
fig



FRUIT

- Fertilized and ripened ovary
- it consists of pericarp (fruit wall).
- Study of fruits is called Pomology.

Fruits

True fruits or Eucarps

develop from
superior ovary no
additional floral parts
fused with them
Ex: Mango.

False fruits or Pseudocarps

develop from inferior
ovary. Additional
floral parts are fused
with pericarp.
Ex: Apple. (*Thalamus*)

Parthenocarps

developed without
fertilization hence
functional seeds are
absent.
Ex: Banana.