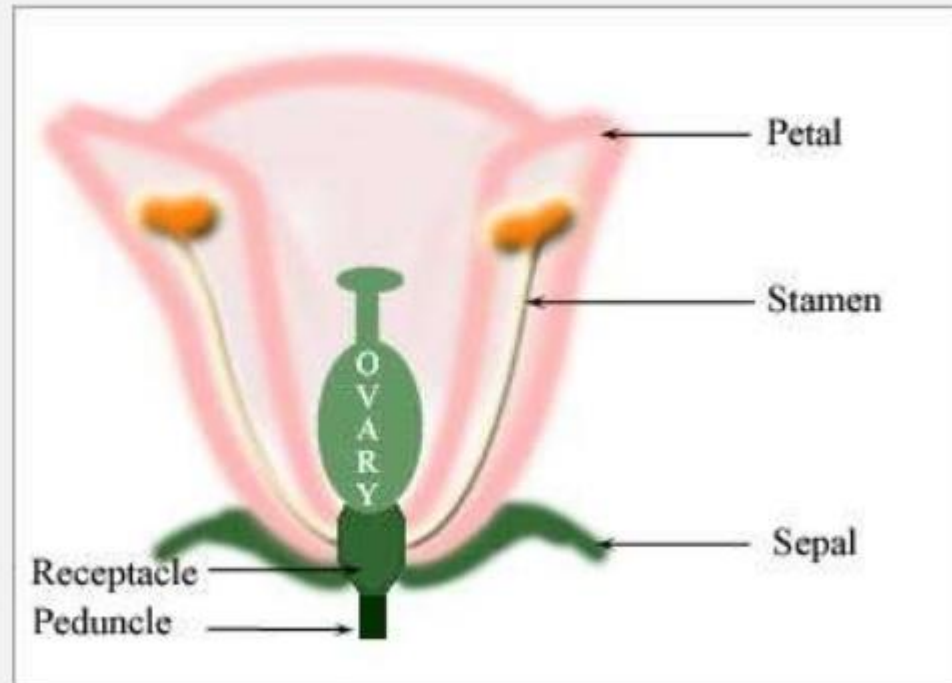
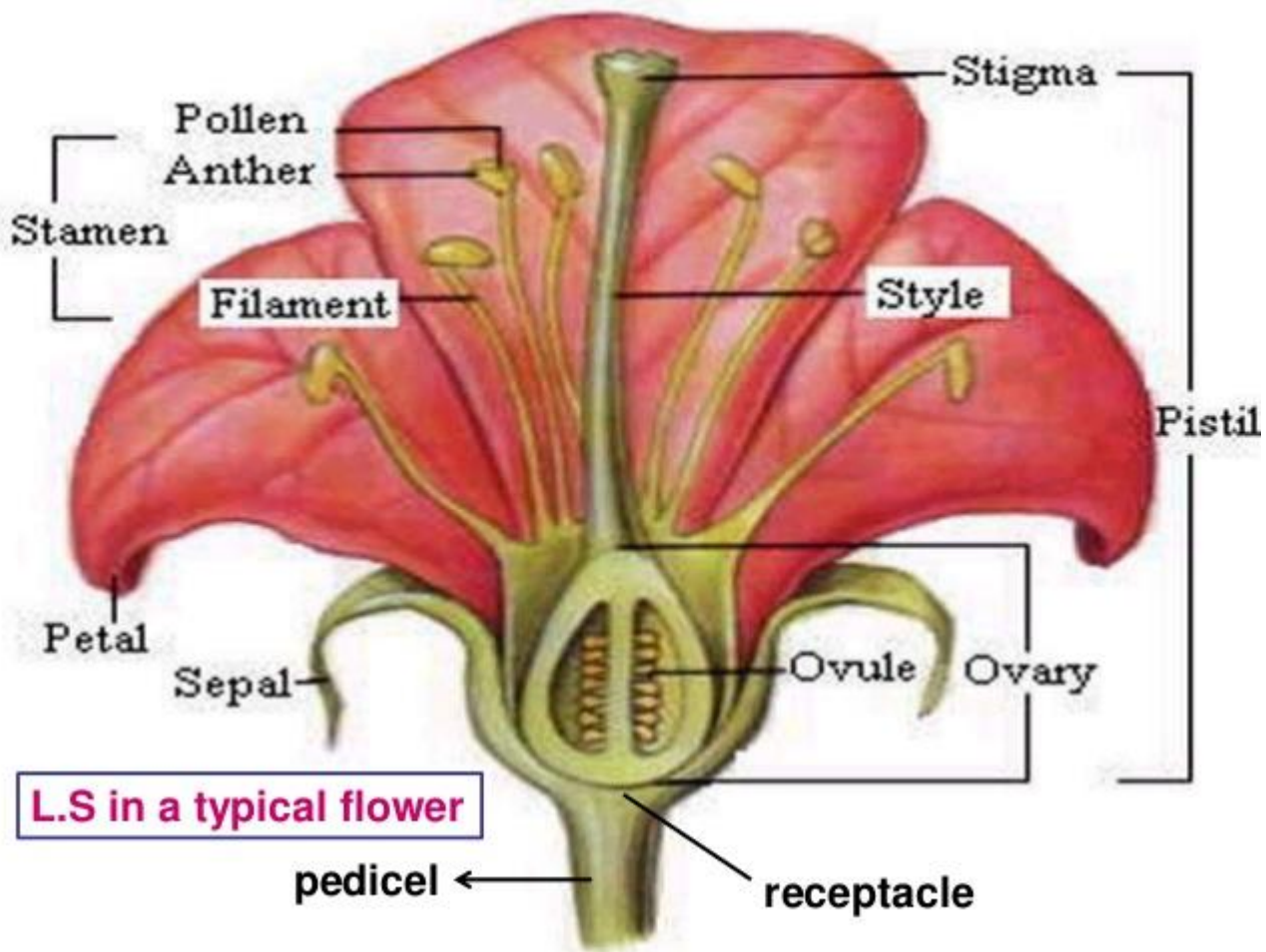


Plant Developmental Biology

FLOWER



L.S in a typical flower



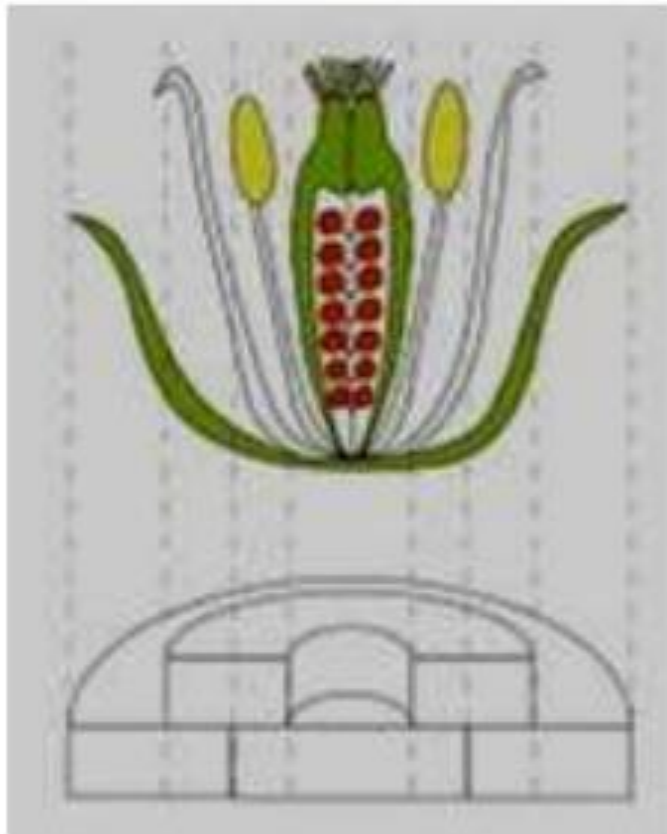
Typical flower “Complete flower”

Consists of:

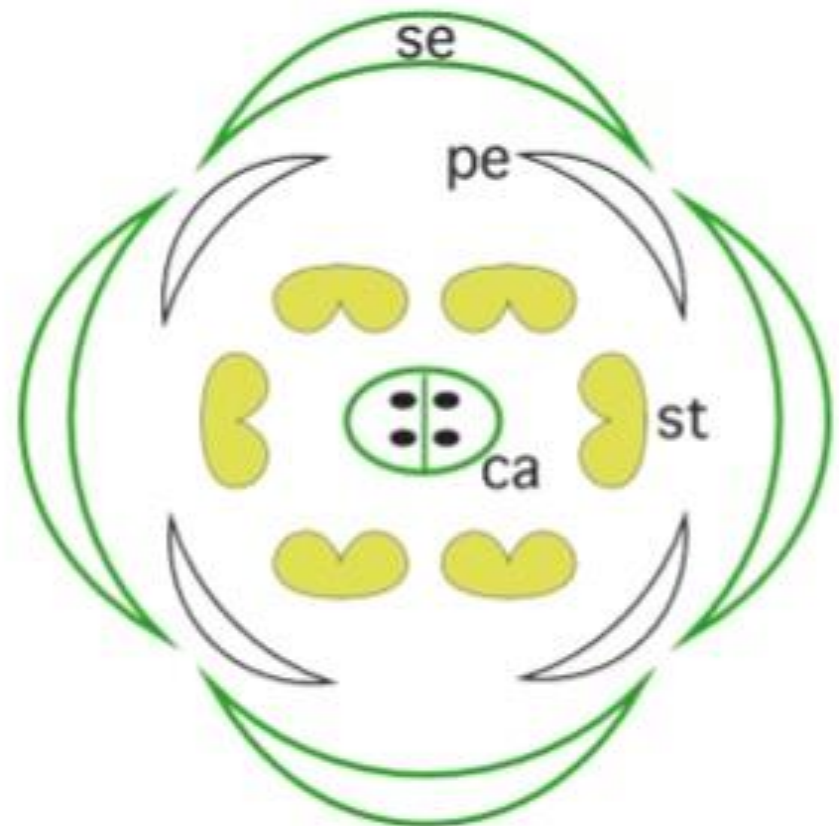
- 1- **Calyx:** composed of sepals.
- 2- **Corolla:** composed of petals.
- 3- **Androecium:** composed of stamens.
- 4- **Gynaecium:** composed of carpels.

Incomplete flower

- When some floral parts as sepals or petals are absent.



Side view



Top view

Bracts & Bracteoles

Bract

accessory leafy structures
from its axils arises a flower

present

Bracteate flower

absent

Ebracteate flower

Bracteoles

scale like leaves
accompanying the flower

present

Bracteolate flower

absent

Ebracteolate flower

Involucre: when bracts or bracteoles are present in crowded form in one or more whorls.

Kinds of Flowers

Flowers are classified according to:

- 1-The arrangement of the floral leaves on the flower axis.
- 2-The number of whorls present.
- 3-The number of segments in different whorls.
- 4-The presence of all floral parts.
- 5-The symmetry of all floral leaves.
- 6-The presence or absence of sexual organs.

- 1- The arrangement of the floral leaves on the flower axis.
- 1.A- Cyclic flowers:
- The floral leaves of each whorl alternate with those of the next.



c- Unisexual (imperfect):

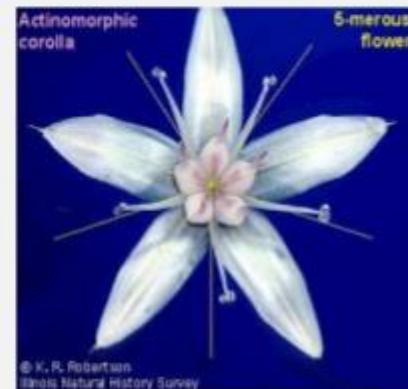
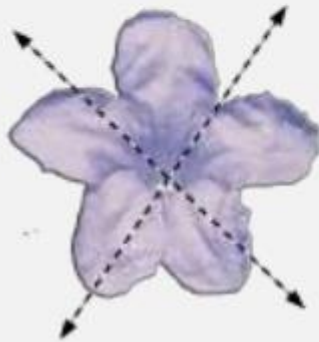
- only one of the sexual organs is present and functioning

i) **Staminate**: only male organ is present

ii) **Pistillate**: only female organ is present

6- According to the symmetry of all floral leaves:

- **a- Regular or actinomorphic:**
 - The segments in each whorl are all alike
 - The flower can be divided by a number of radial longitudinal cuts into equal halves.



- **b- Irregular**

- one or more whorls are not alike.
- **1- Asymmetric:**
- all the segments of the flowers are irregularly arranged and not alike.
- Cannot be divided into equal parts.



Asymmetrical

- **2- Zygomorphic (%)**
- When the flower can be divided only in one plane into equal halves.



Zygomorphic



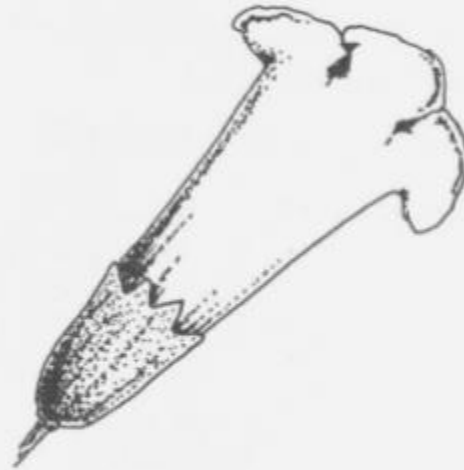
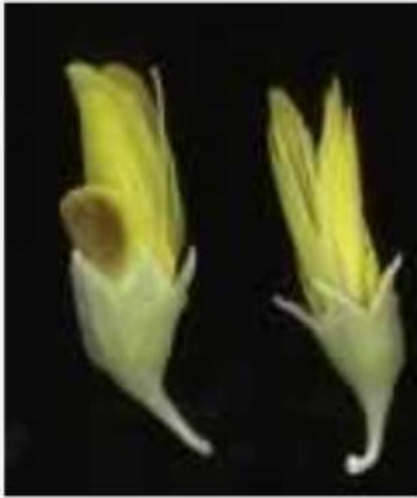
Calyx



- The outermost whorl of the floral series.
 - Formed of **sepals**.
 - Arranged in single whorl
- **Colour:** green but in some cases brightly coloured when petals are absent to attract insect.
- **Size:** large sometimes very small, reduced to membranous or represented by hairs.
- **Function:** protects the essential organs especially in the bud stage.

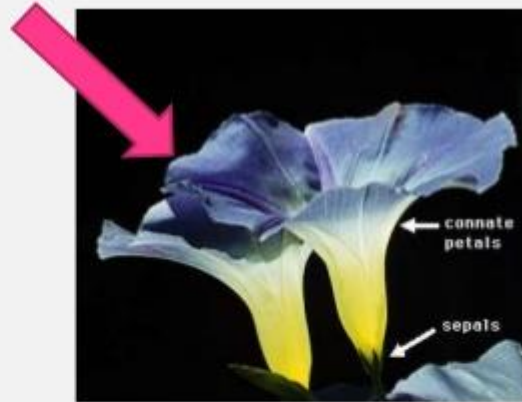


Polysepalous Calyx
(free sepals inserted on the receptacle)



Gamosepalous Calyx
(united sepals)

Corolla

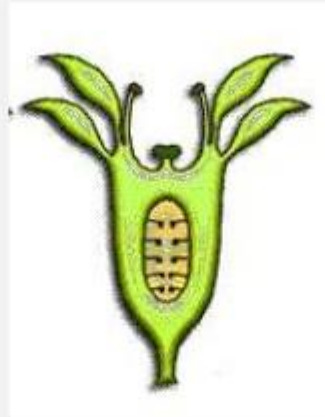


- Second whorl after the calyx.
- Consists of **petals** mostly arranged in a single whorl.
- **Size:** larger than sepals.
- **Function:** Attract pollen grain carrying insects.

- **Colour**: usually brightly coloured, this colour may be due to the following pigments.
- **Anthocyanins** (red, blue and violet depending on the pH of the cell sap).
- **Flavone derivatives** (yellow colour).
- **Pigments** such as carotin, xanthophyll (yellow, orange and red colours).
- The white colour is due to the reflection of light from the intercellular spaces of the mesophyll but not to pigments.



Hypogynous



Epigynous

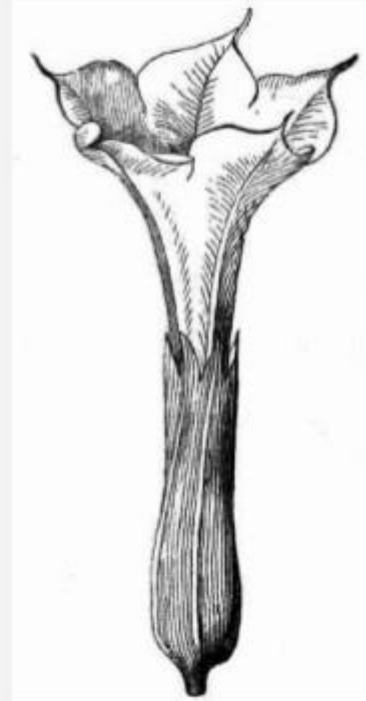


Perigynous

Insertion of the floral parts on
the receptacle



Polypetalous corolla
(free petals)



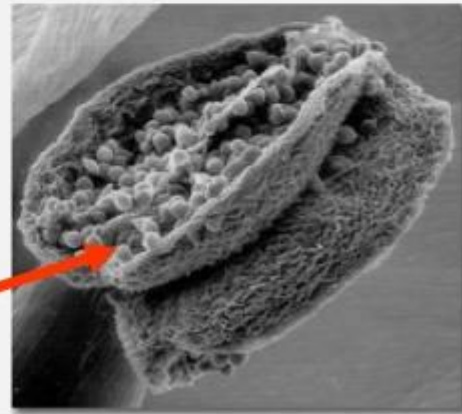
Gamopetalous corolla
(united petals)

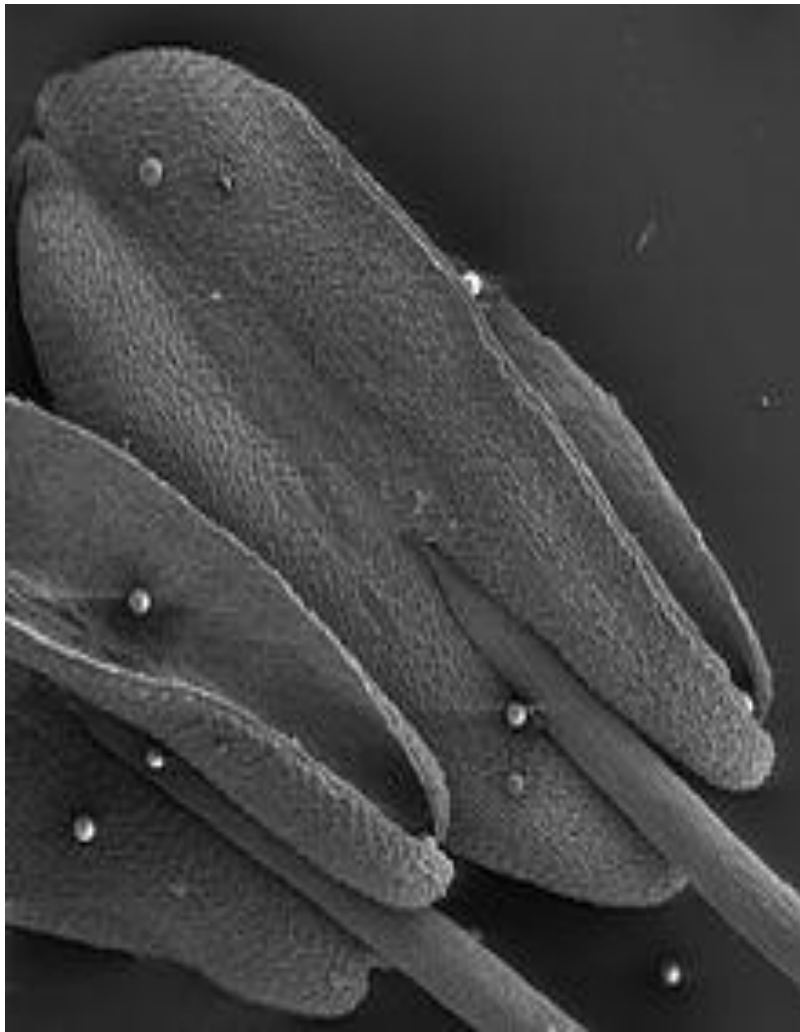
3-Androecium



- It is the male sexual organ.
- One, two or more whorls of stamens, sometimes numerous.
- The stamens are situated within or above the corolla

Pollen grains





Scanning electron microscope image of [*Pentas lanceolata*](#) anthers, with pollen grains on surface

Androecium

Points to be studied concerning the androecium

1-Types of Androecium

2-Cohesion of stamens

3- Insertion & adhesion of stamens on the floral parts

4- Attachment of the anther to the filament

Types of Androecium

1- According to the length of the filament



Didynamous

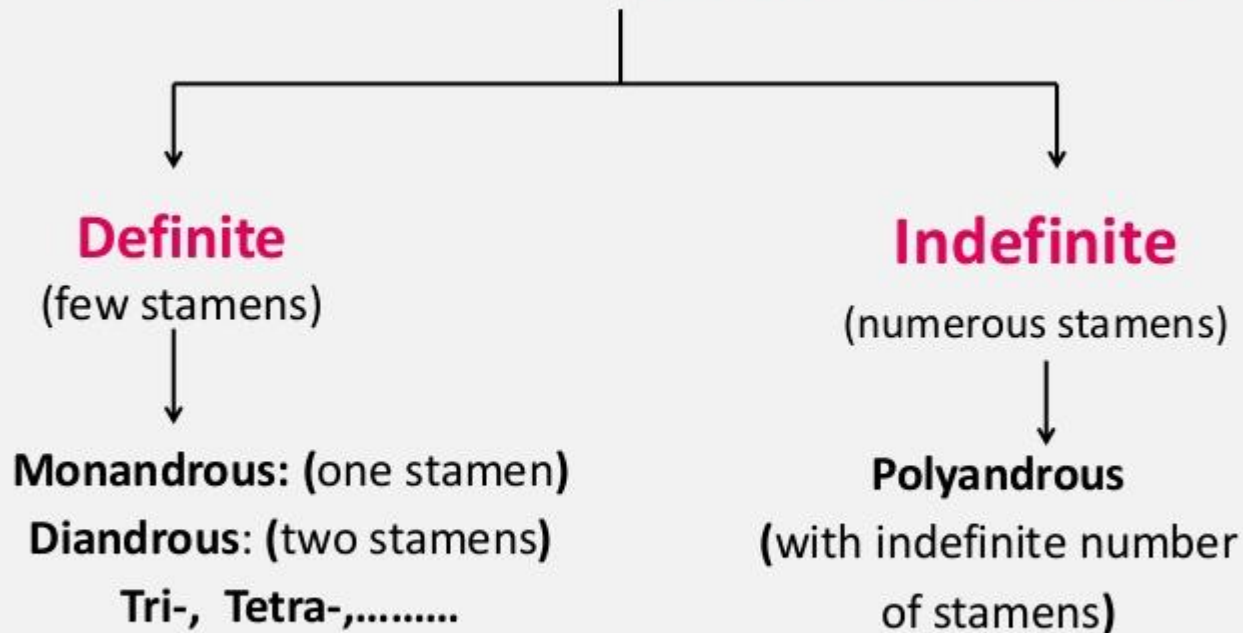
(two long and two short stamens)





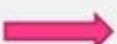

Tetradynamous

(four long and two short stamens)

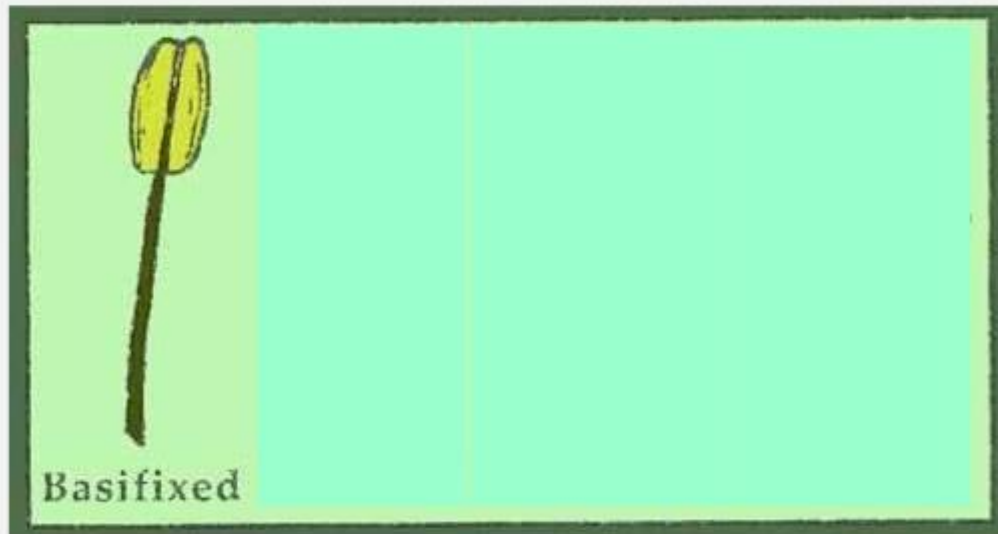
2- According to the **Number of stamens**



Insertion & Adhesion of stamens

- Adhesion may occur between stamens and various floral parts.
 - between stamens and petals  **Epipetalous**
 - between stamens and sepals  **Episepalous**
 - between stamens and gynoecium  **Gynandrous**
 - Anthers are adherent to stigma  **Gynostegium**

Attachment of the anther to the filament

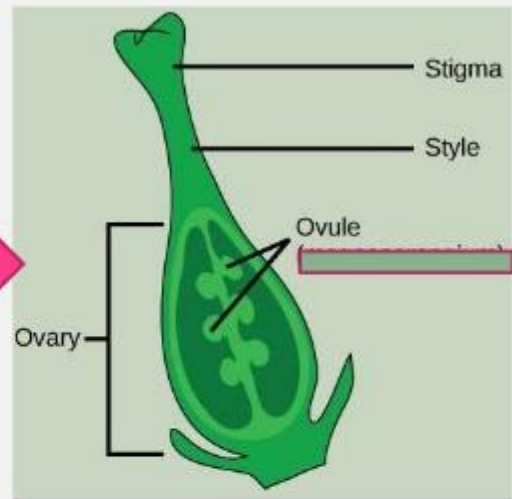




Lily anthers attached to stamens **dorsi fixed**

Gynoecium

**Carpel
(pistil)**



- It is the female sexual organ.
- Consists of one or more carpels.
- Described as : **mono-carpellary**
bi-carpellary
or **poly-carpellary**

Types of Gynoecium

I- Apocarpous

(The carpels are free)



II- Syncarpous

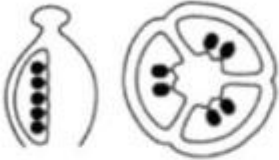
(The carpels are united together)



Placentation

- It is the position or arrangement of placenta in the ovary.
- The ovules are normally arranged on double parallel cords

Placentation



axile

TYPES OF PLACENTATION

- In botany, the term placentation most commonly refers to the arrangement of placentas inside a flower or fruit. Plant placentation types include:
- **Basal placentation:** The placenta is at the base (bottom) of the ovary.
- **Apical placentation:** The placenta is at the apex (top) of the ovary.
- **Parietal placentation:** The placentas are in the ovary wall within a non-sectioned ovary.
- **Axile placentation:** The ovary is sectioned by radial spokes with placentas in separate locules.
- **Free central placentation:** The placentas are in a central column within a non-sectioned ovary.

