Morphology of flower

Flowers

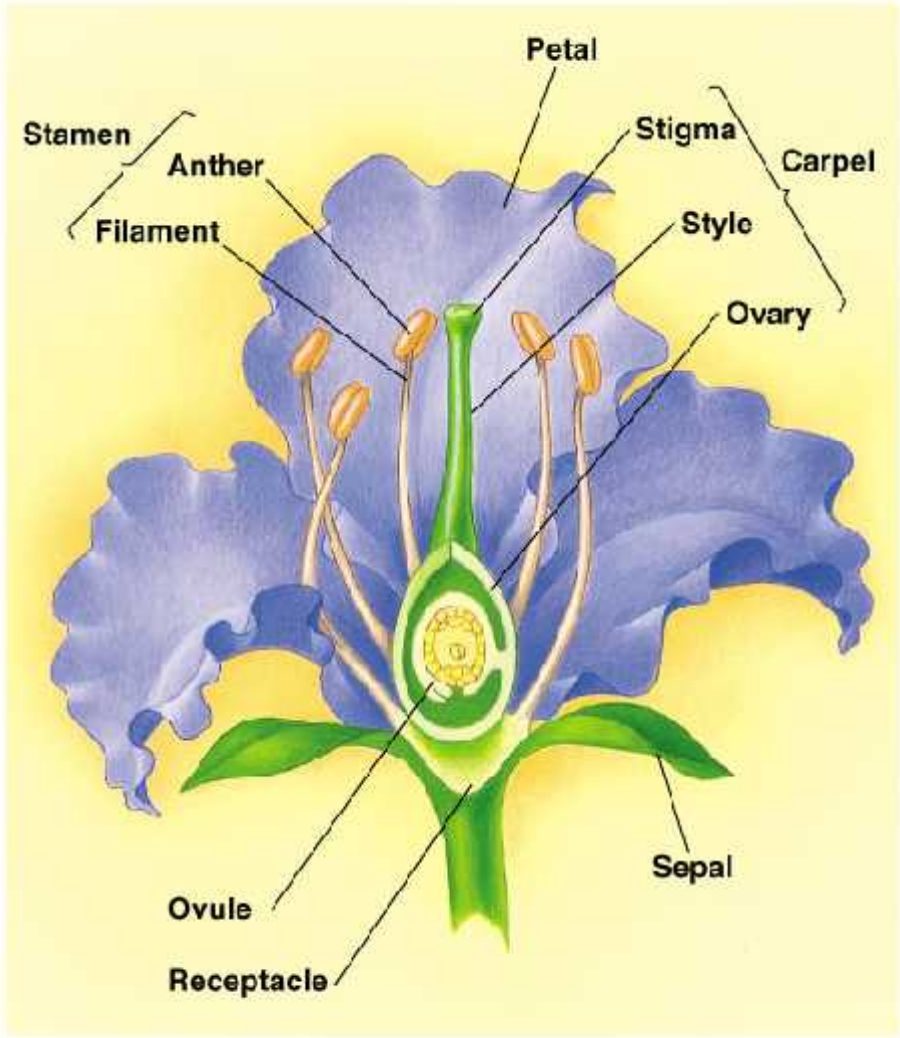
- Floral characteristics are the most commonly used features to identify plants

Flower

- A typical flower is a stem tip bearing two whorls of appendages, two are sterile and two are fertile
- All four whorls are considered to be modified leaves

Flower

- Typical flower
  - 4 main parts
  - Sterile whorls
  - Calyx&corolla
  - Fertile whorls
  - Androecium&Gynoeciu m



Flower Anatomy

Calyx: the outer whorl of **sepals**; typically these are green, but are petal-like in some species.

Flower Anatomy

Corolla: the whorl of **petals**, which are usually thin, soft and colored to attract animals that help the process of pollination.

Flower Anatomy

Androecium (from Greek *andros oikia*: man's house): one or more **stamens**, each with a **filament** topped by an **anther** where pollen is produced.

Pollen contains the male gametes.

Flower Anatomy

Gynoecium (from Greek *gynaikos oikia*: woman's house): all the female parts—the **pistil(s) with ovule(s) inside**.

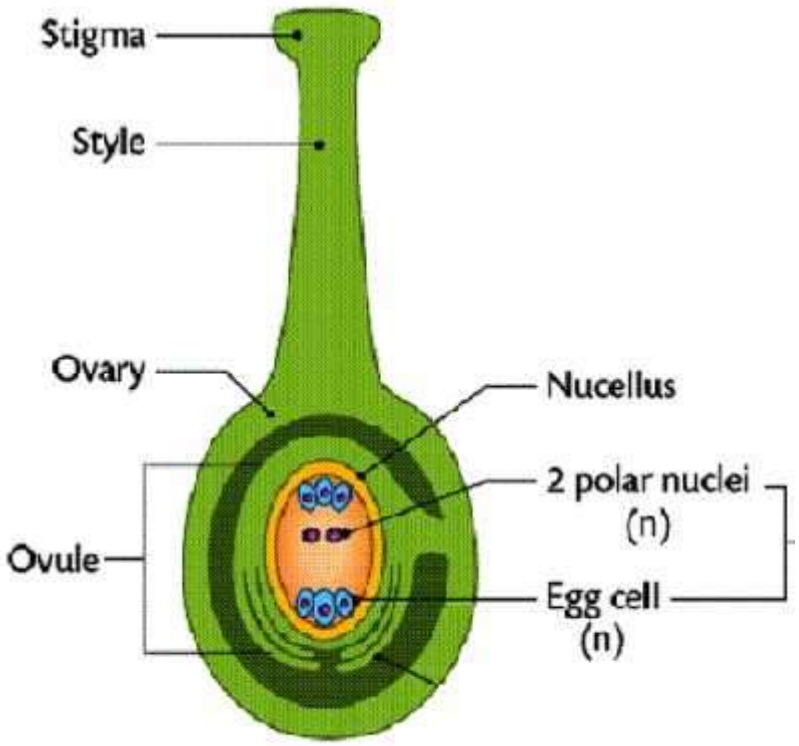
Flower Anatomy

The basic unit of the female reproductive structure is the **carpel**. Each physcial body is called a **pistil**.

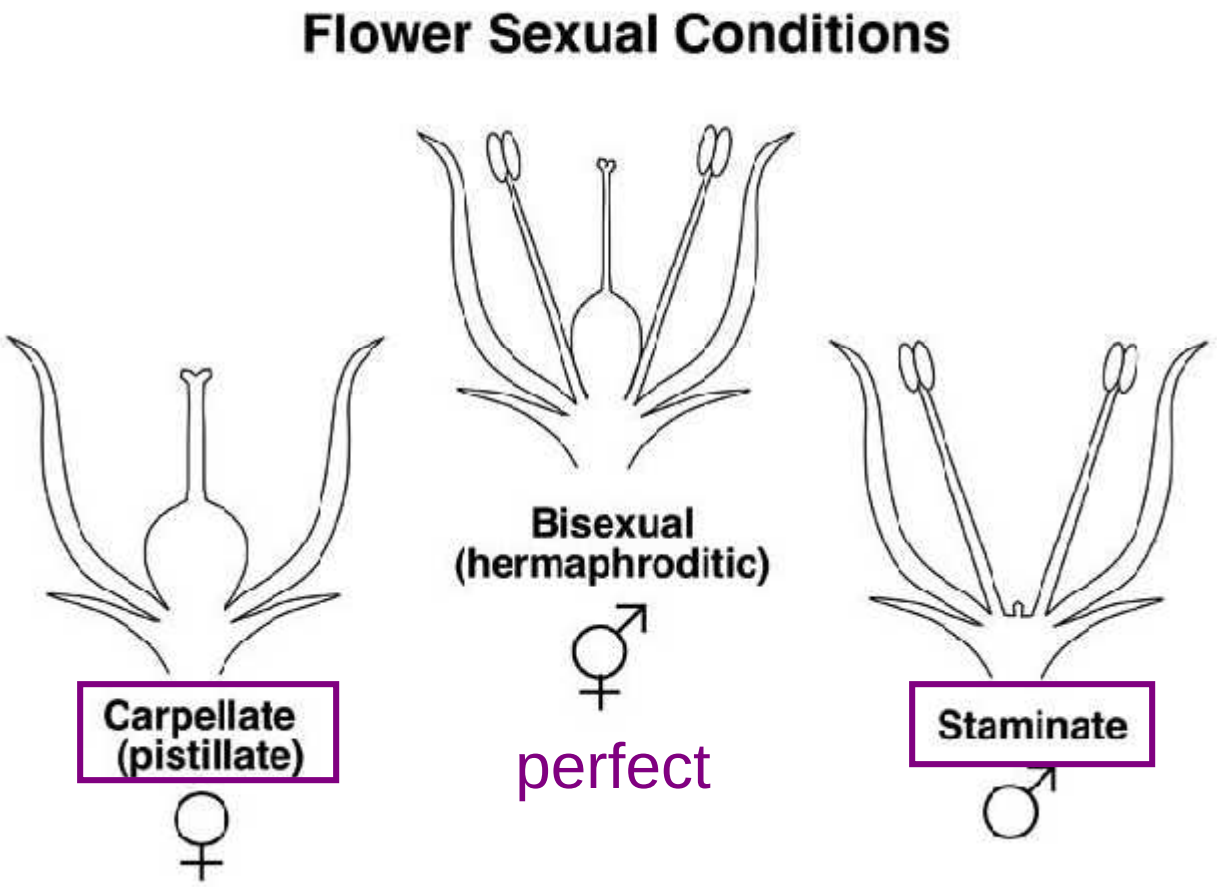
A flower may have a single carpel, which is a *simple pistil* (**unicarpellate**), or several carpels united in one compound pistil (**syncarpous**), or a cluster of un-united carpels/pistils (**apocarpous**)

The sticky tip of the pistil, the **stigma**, is the receptor of pollen.

The supportive stalk, the **style,** becomes the pathway for pollen tubes to grow from pollen grains adhering to the stigma, to the **ovules**, containing the gametes, housed inside the **ovary**.



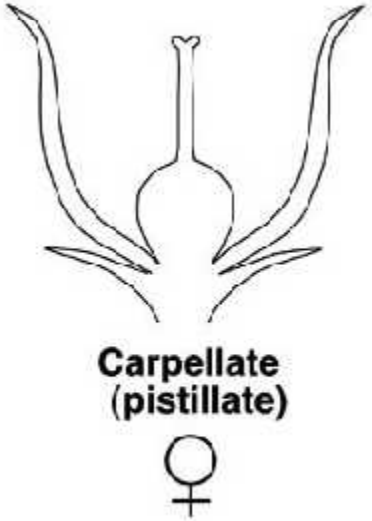
Flower Structure Variation



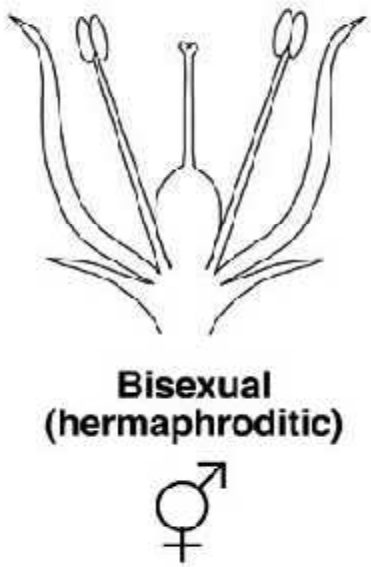
Flower Structure Variation

A flower having sepals, petals, stamens, and pistils is **complete**; if a flower is lacking one or more of these whorls, it is said to be **incomplete**.

no stamens present = incomplete



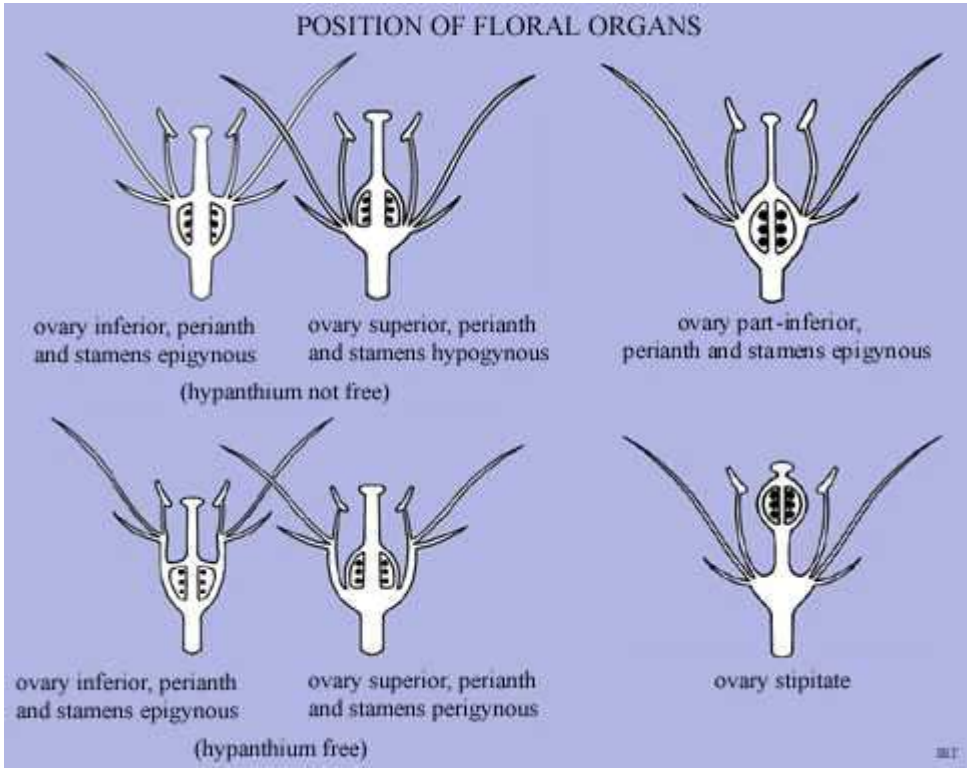
incomplete



complete

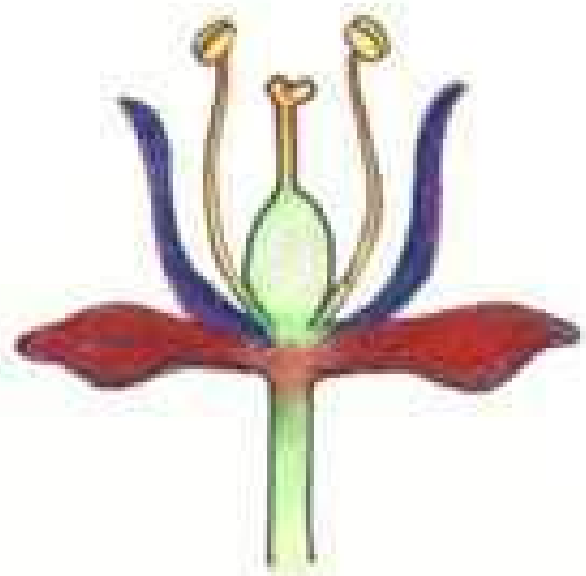
Insertion of Floral Parts

- The position of the gynoecium in relation to all the other floral parts is the basis for the terminology used in keys and taxonomic descriptions



Insertion of Floral Parts

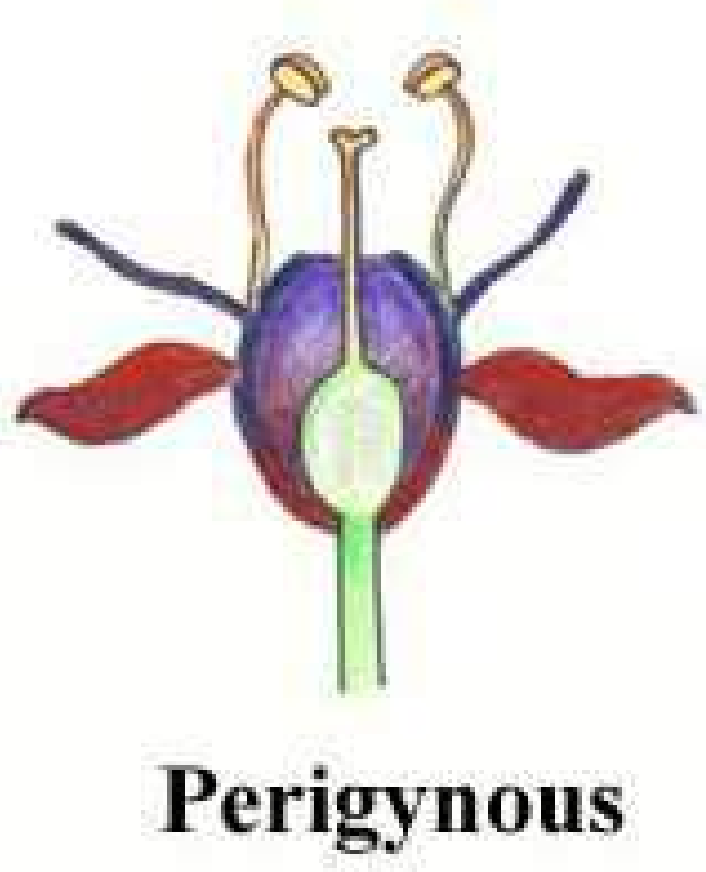
- Hypogynous: the sepals, petals, and stamens are inserted under the carpel
  - Ovary is said to be ***superior***



Hypogynous

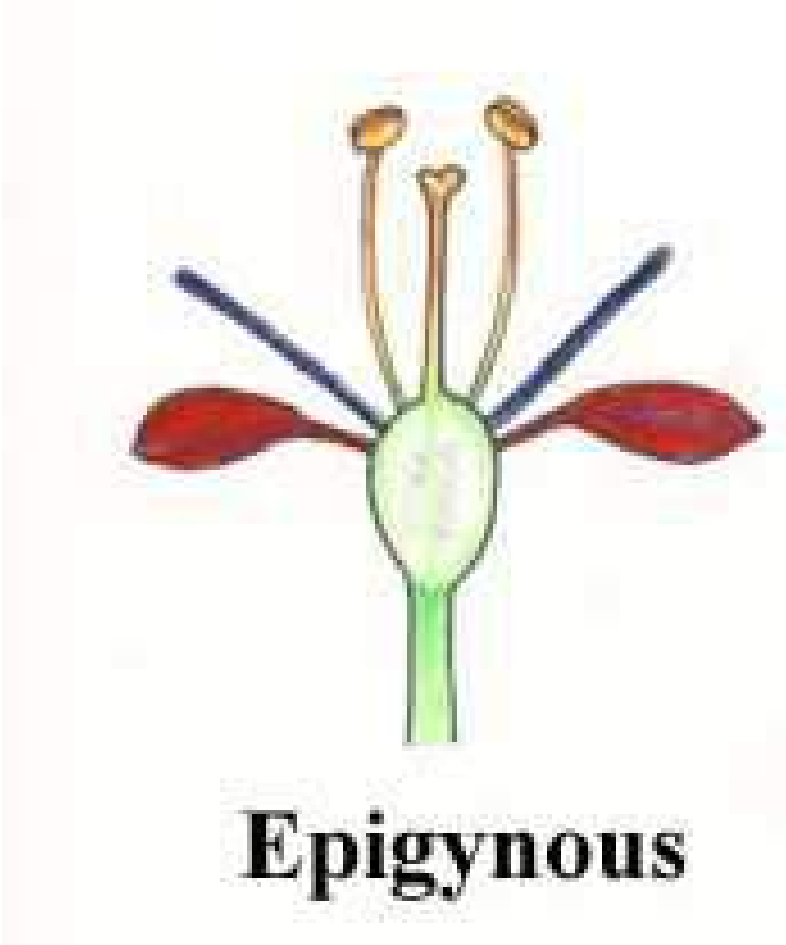
Insertion of Floral Parts

- In a ***perigynous*** flower, the sepal, petals, and stamens are fused together to form a cup called the ***hypanthium***
  - The gynoecium sits inside the cup but is not fused to it
  - Ovary is said to be ***superior***



Insertion of Floral Parts

- In a ***epigynous***flower, the sepals, petals, and stamens arise from a point above the ovary
  - Ovary is said to be ***inferior***



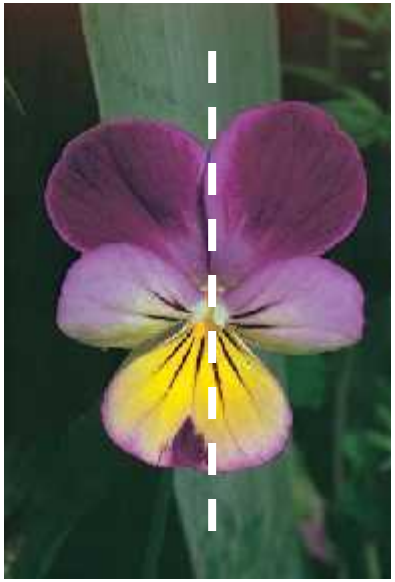
Pollen Dispersal by Animals

Bees, Beetles, Bats, Birds, Butterflies, etc…

Symmetry

Flowers that are **actinomorphic** have "radial symmetry", meaning they can be divided into symmetrical halves by more than one longitudinal plane passing through the axis.

Zygomorphic flowers are "yoke shaped" or have"bilateral" symmetry, where flowers can be divided by only a single plane into two mirror-image halves.



Presence or Absence of Parts

Terms Applied to Individual Flowers

- Perfect (=bisexual): flower with both stamens and carpels

Grape flower with stamens and carpels

Presence or Absence of Parts

Terms Applied to Individual Flowers

- Imperfect (=unisexual): missing stamens or carpels, but not both

Presence or Absence of Parts

Terms Applied to Individual Flowers

- Staminate (=male): unisexual flower with just stamens present

Imperfect staminate flower; stamens only, no carples

Presence or Absence of Parts

Terms Applied to Individual Flowers

- Carpellate (=female): unisexual flower just carpels present

Imperfect carpellate flower; carpel only; no stamens

Presence or Absence of Parts

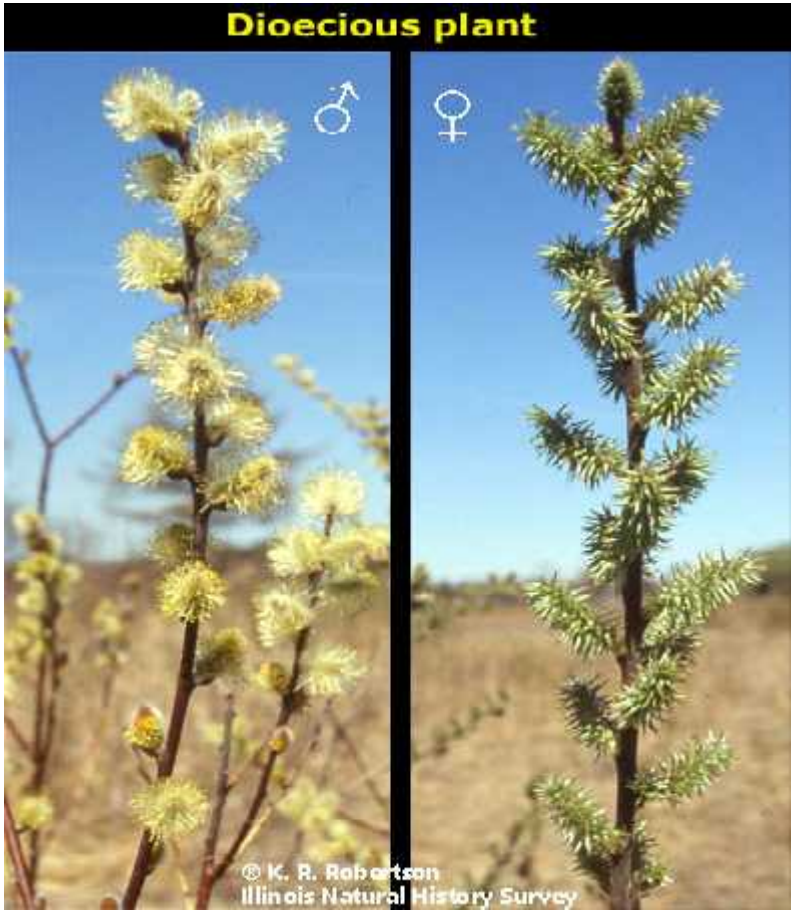
Terms Applied to Plants with Imperfect Flowers

- Monoecious: any plant that has both staminate and carpellate flowers

Presence or Absence of Parts

Terms Applied to Plants with Imperfect Flowers

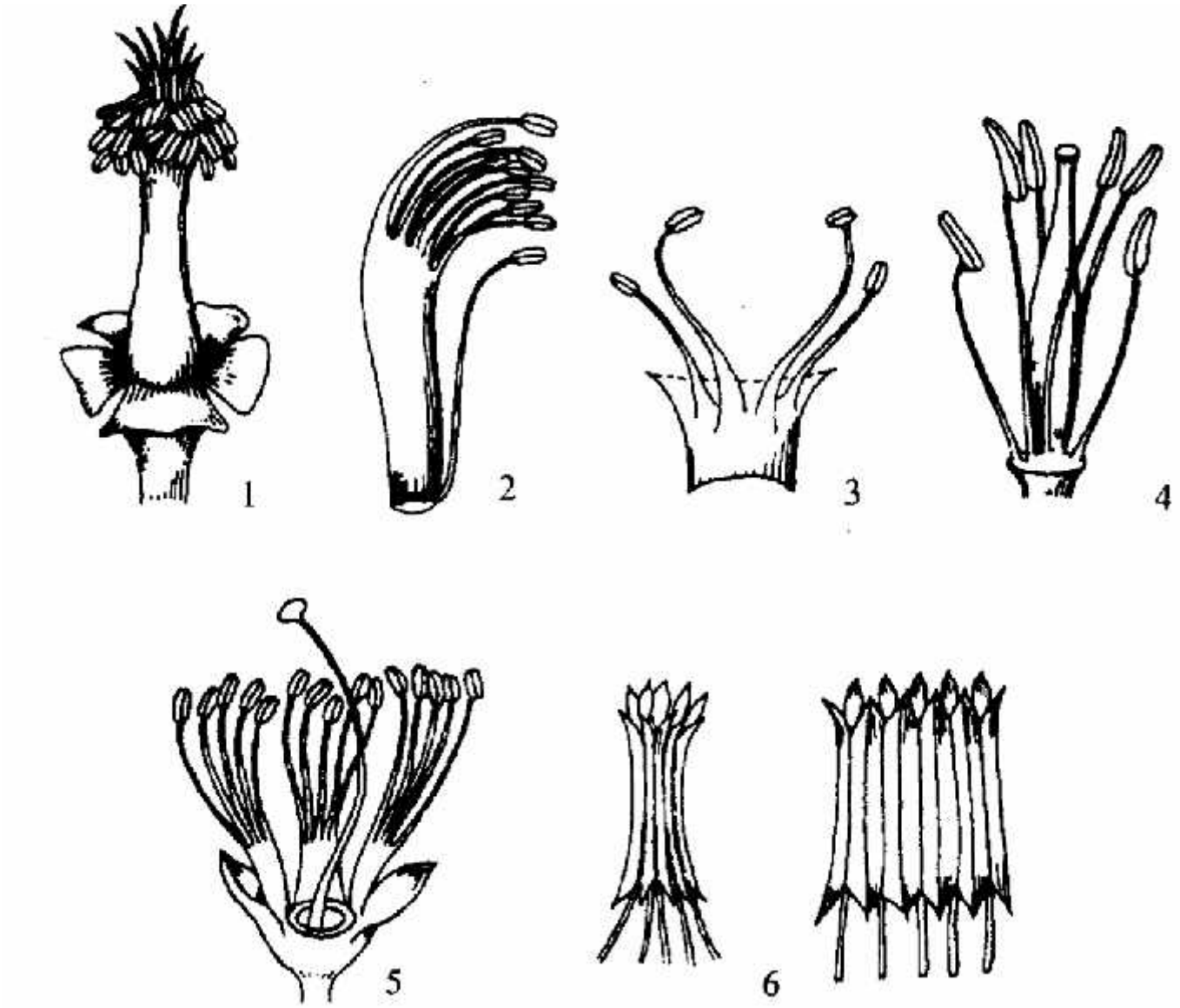
- Dioecious: plant that has either staminate flowers or carpellate flowers, but not both



- ★androecium
- { filament
- { anther

- Types

- distinct stamen
- didynamous ~
- tetradynamous ~
- monadelphous ~
- diadelphous ~
- polyadelphous ~
- syngenesious ~



Type of Stamen

1.Monadelphous stamen

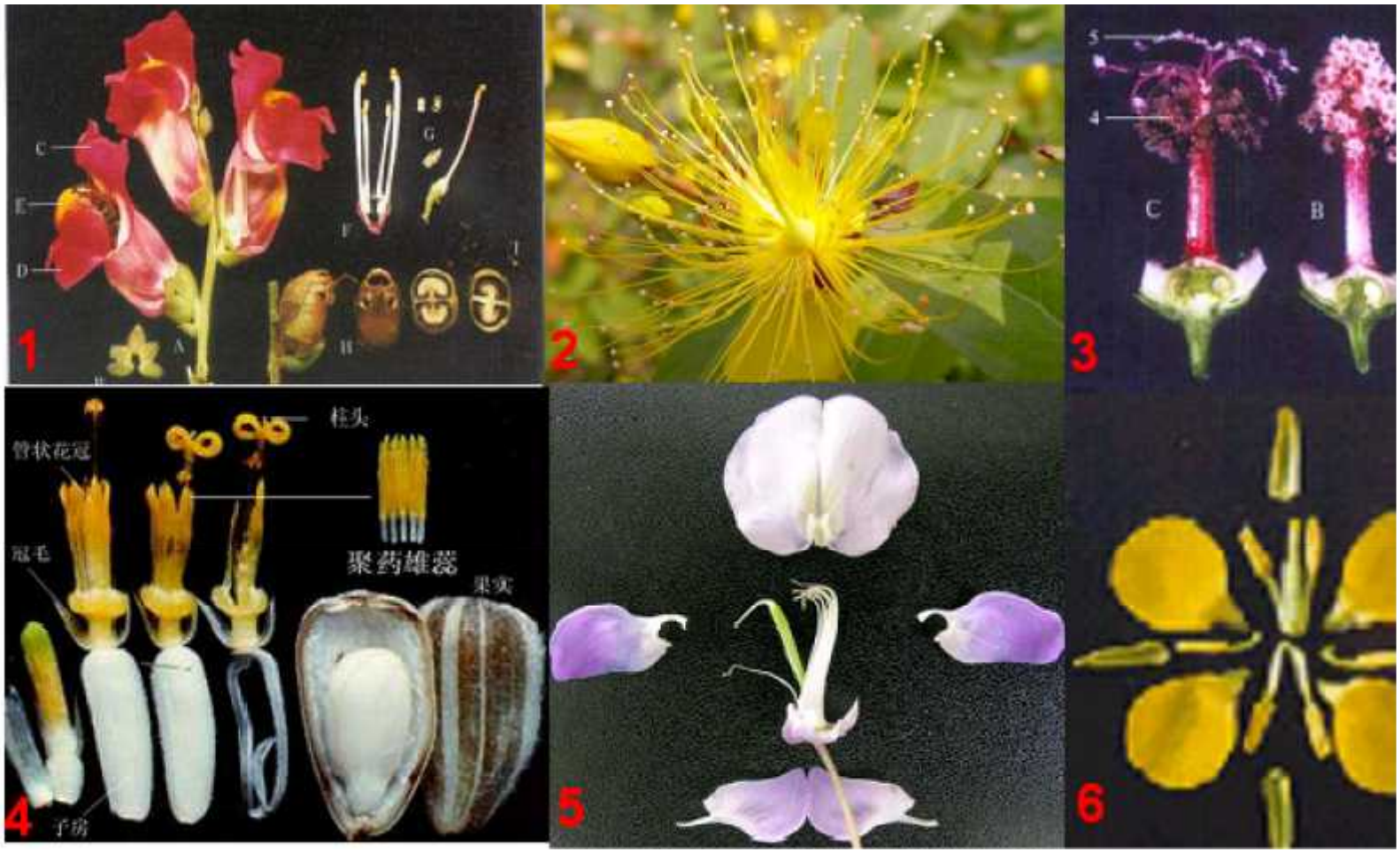
2.Diadelphous stamen

3.Didynamous stamen

4.Tetradynamous stamen

5.Polyadelphous stamen

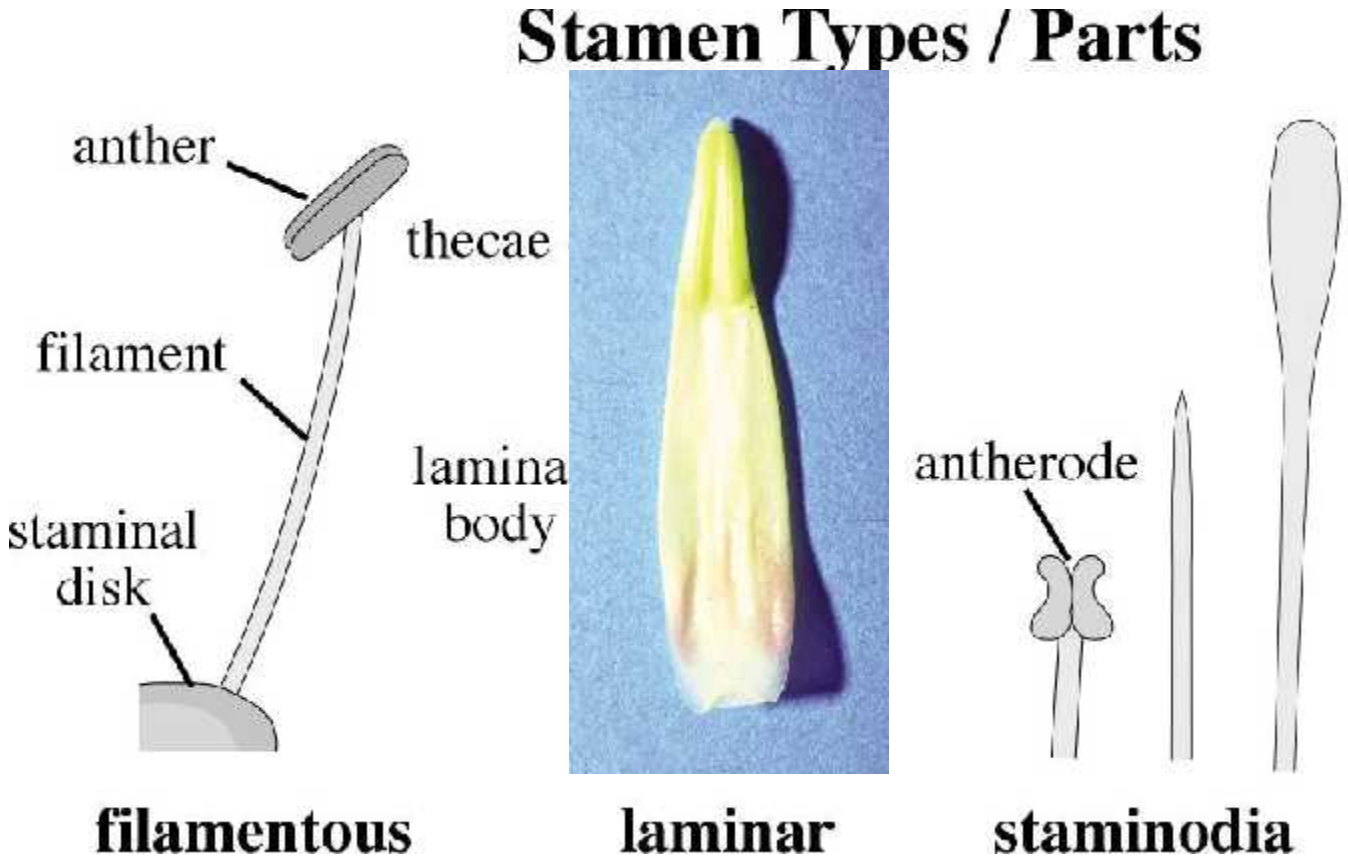
6.Syngenesious stamen



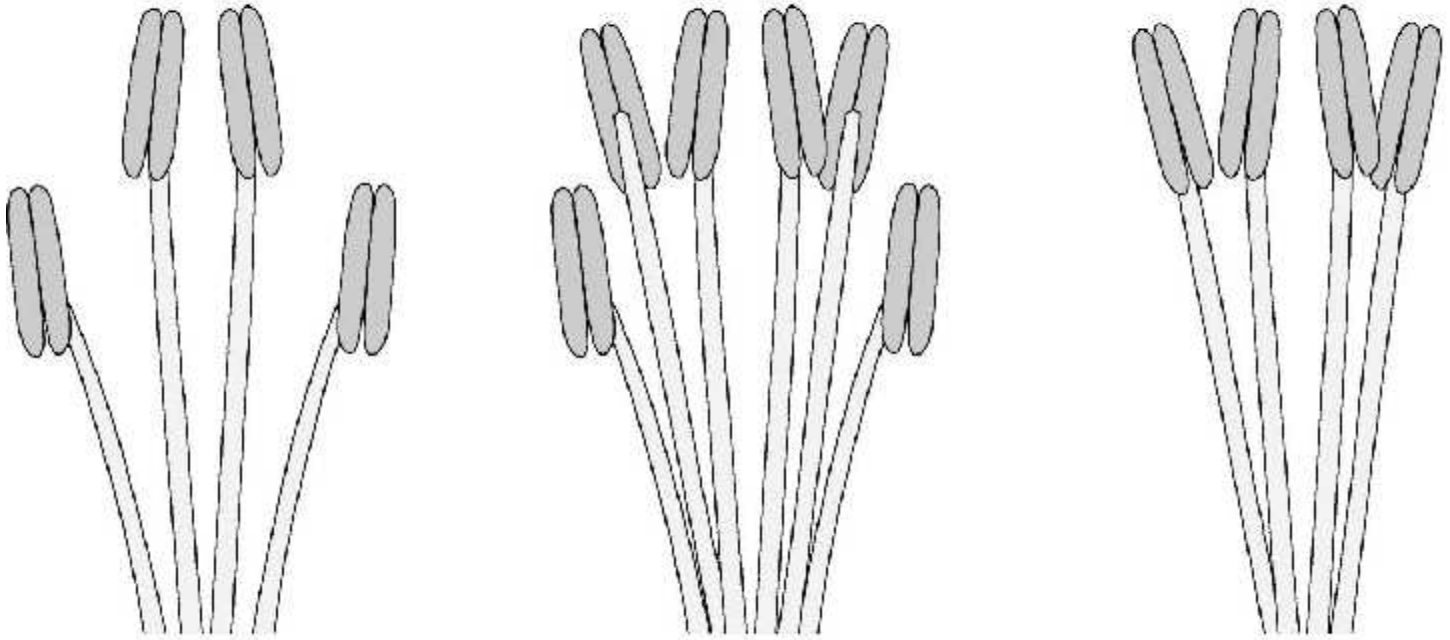
Type of Stamen

1.Didynamous stamen2.Polyadelphous stamen 3.Monadelphous stamen 4.Synantherous stamen 5.Diadelphous stamen 6.Tetradynamous stamen

Androecium:


Stamen Types / Parts
anther
thecae
filament
lamina
body
staminal
disk
antherode
filamentous
laminar
staminodia

Stamen Arrangement

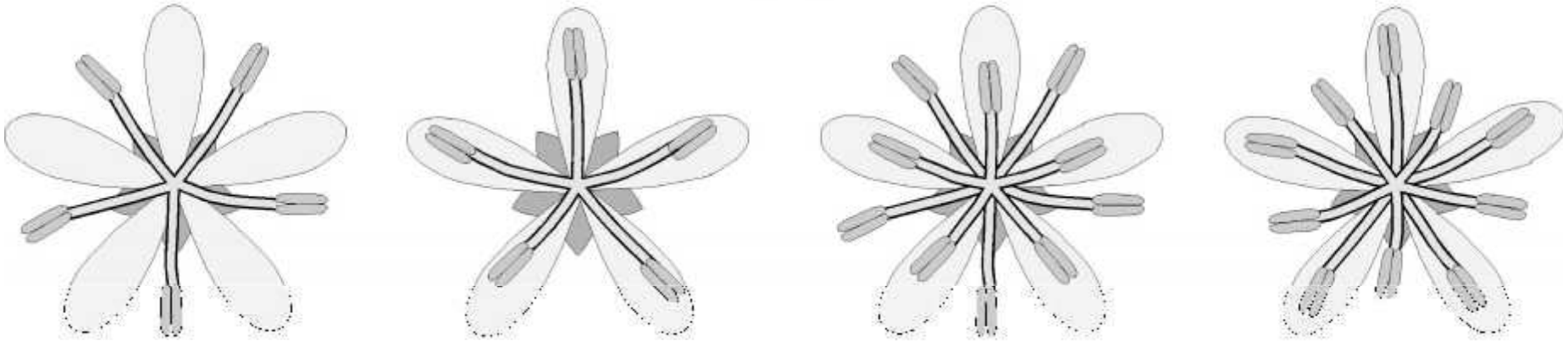


didynamous tetradynamous didymous

tetradynamous

didynamous

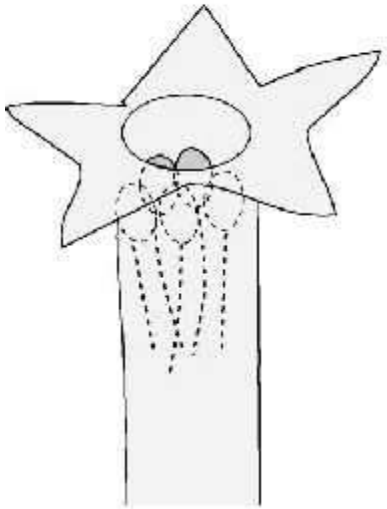
Stamen Cycly/Position



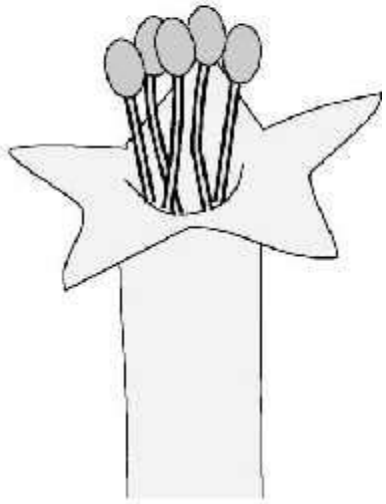
antisepalous (alternipetalous) | **antipetalous (alternisepalous)** | **diplostemonous** | **obdiplostemonous**

uniseriate | **biseriate**

Stamen Insertion

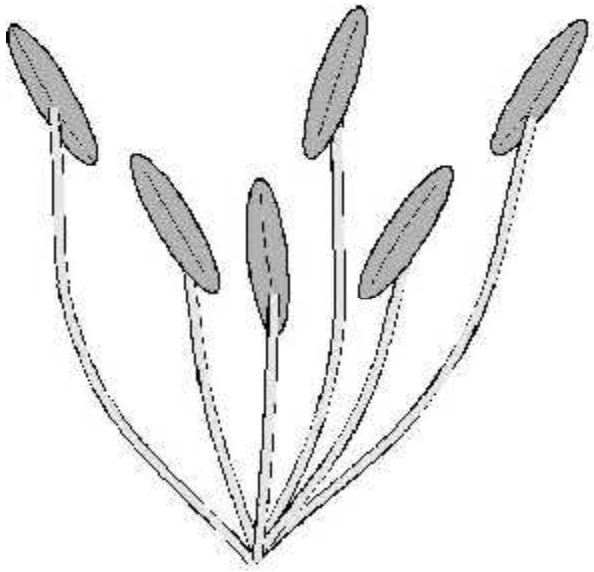


inserted

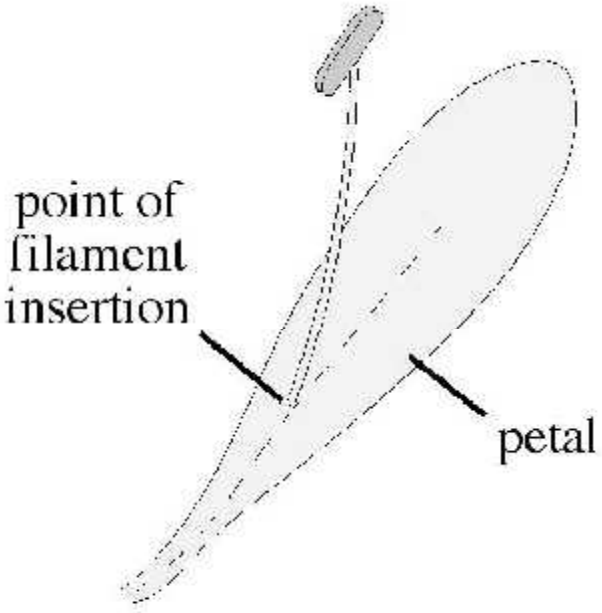


exserted

Androecial / Stamen Fusion

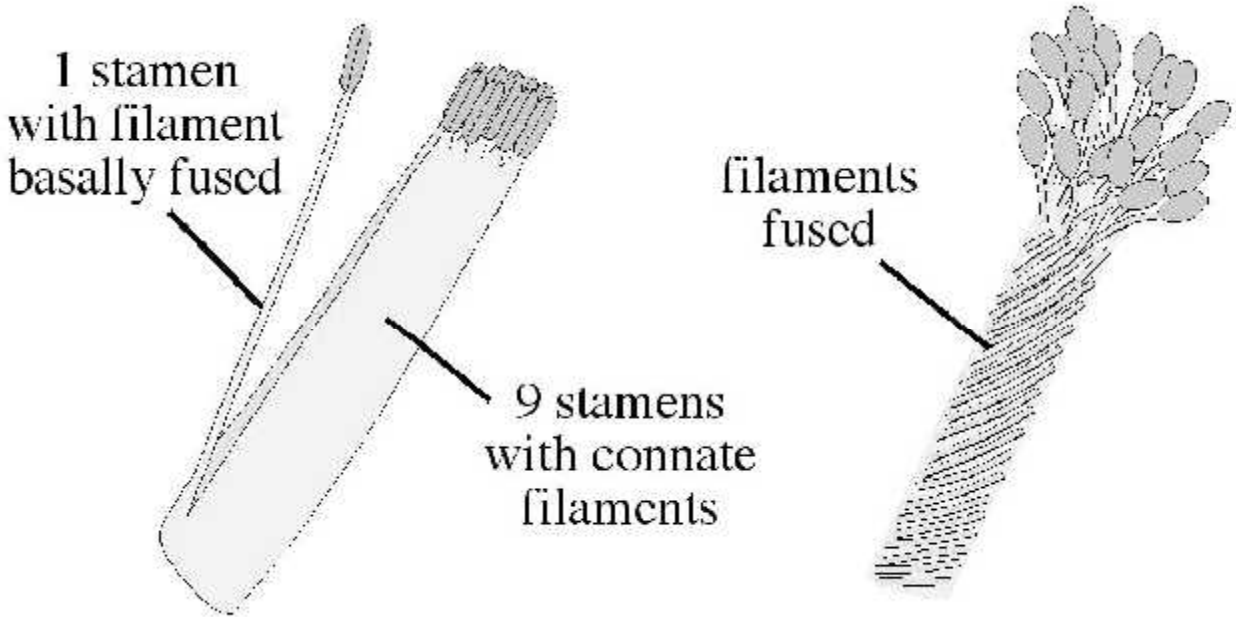


apostemonous



epipetalous

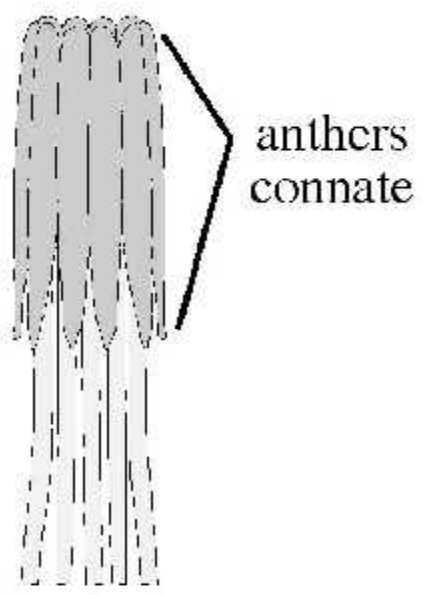
Androecial / Stamen Fusion



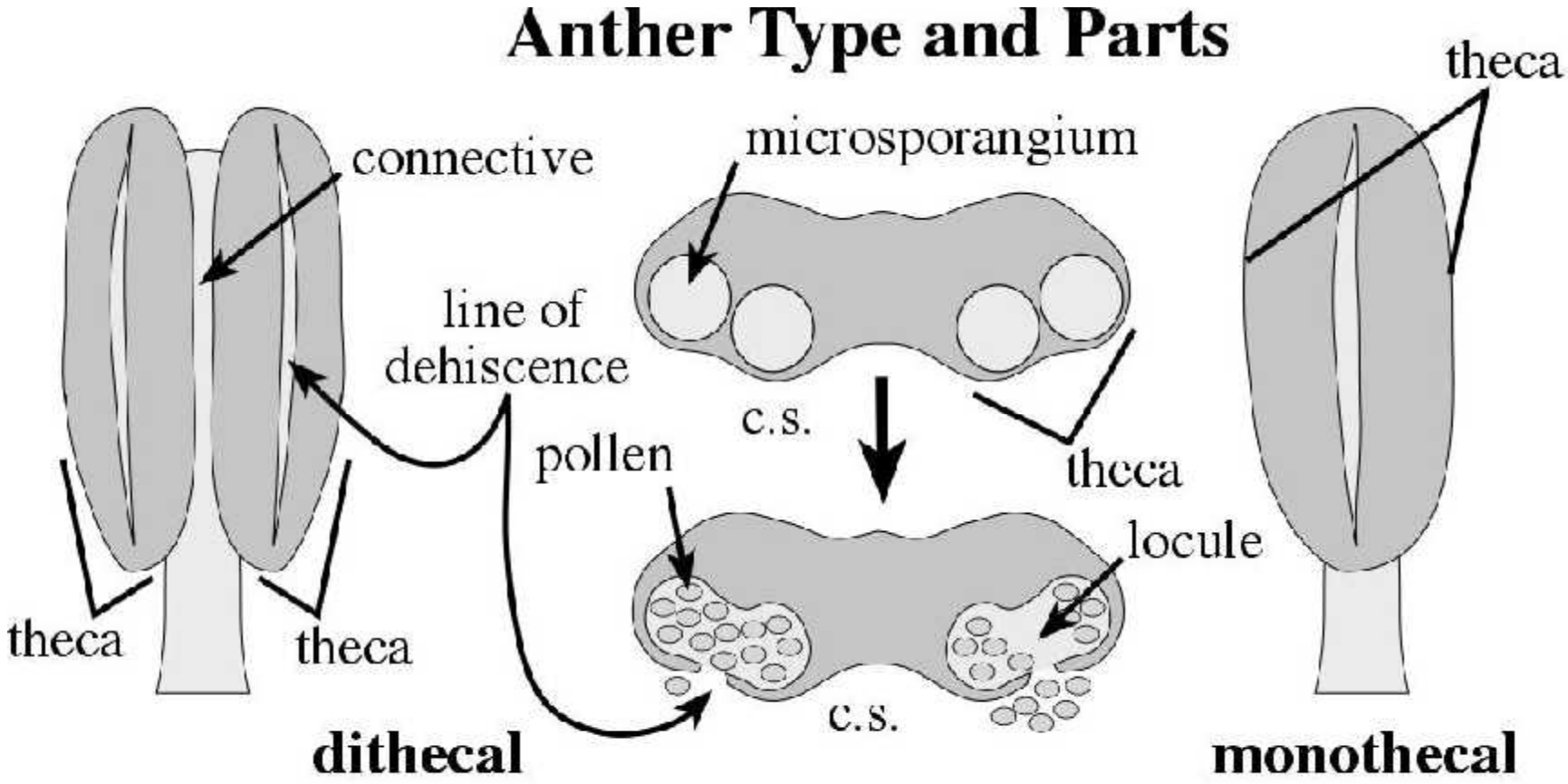
diadelphous

monadelphous

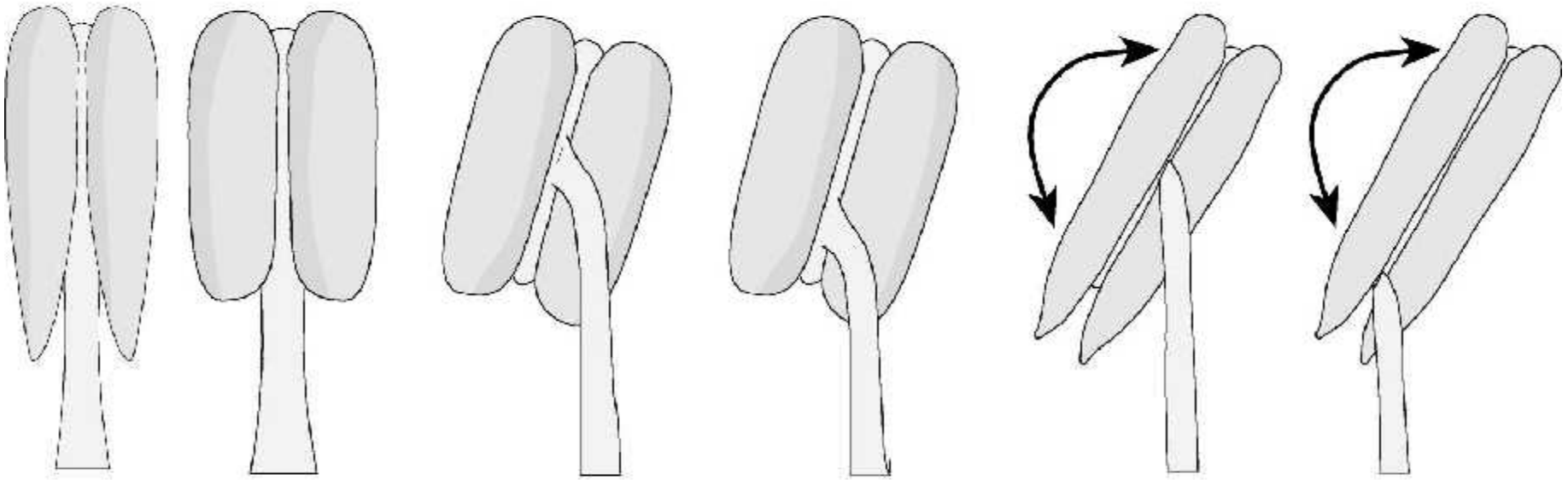
Androecial / Stamen Fusion



syngenesious


Anther Type and Parts
connective
microsporangium
theca
line of
dehiscence
c.s.
pollen
theca
locule
theca
theca
c.s.
dithecal
monothecal

Anther Attachment



basifixed

dorsifixed

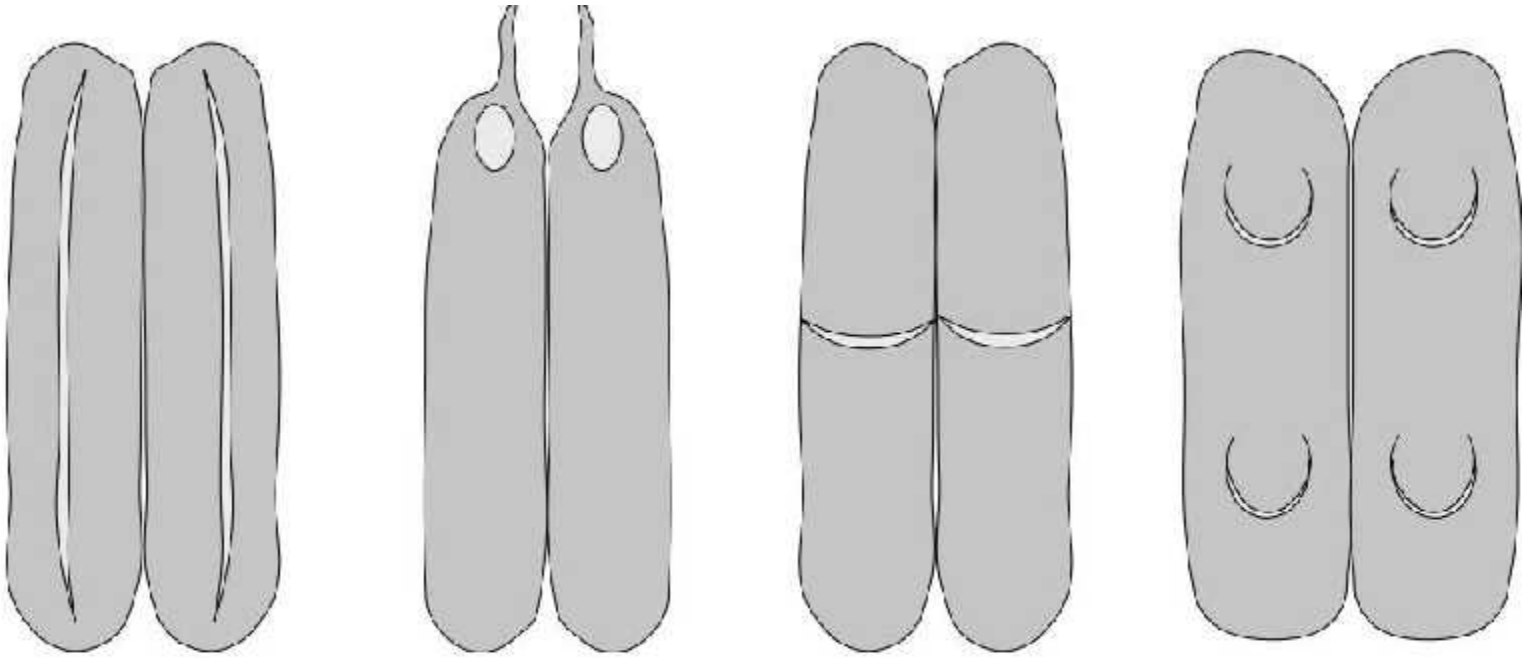
subbasifixed

dorsifixed

basifixed

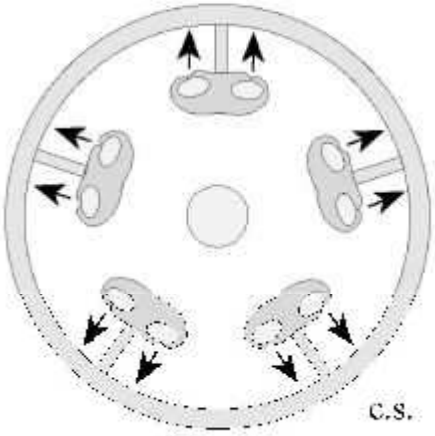
versatile

Anther Dehiscence Types

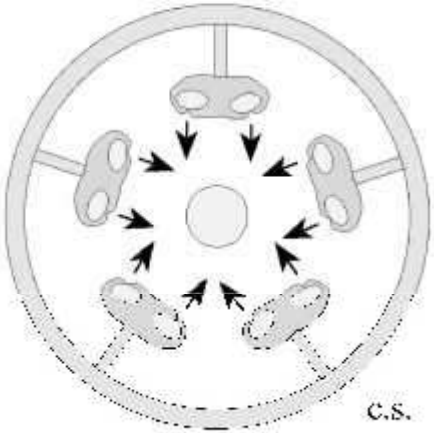


longitudinal **poricidal** **transverse** **valvular**

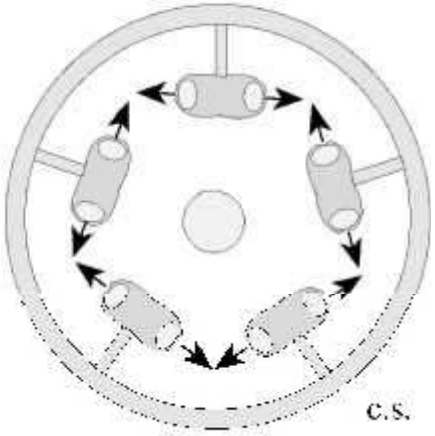
Anther Dehiscence Direction



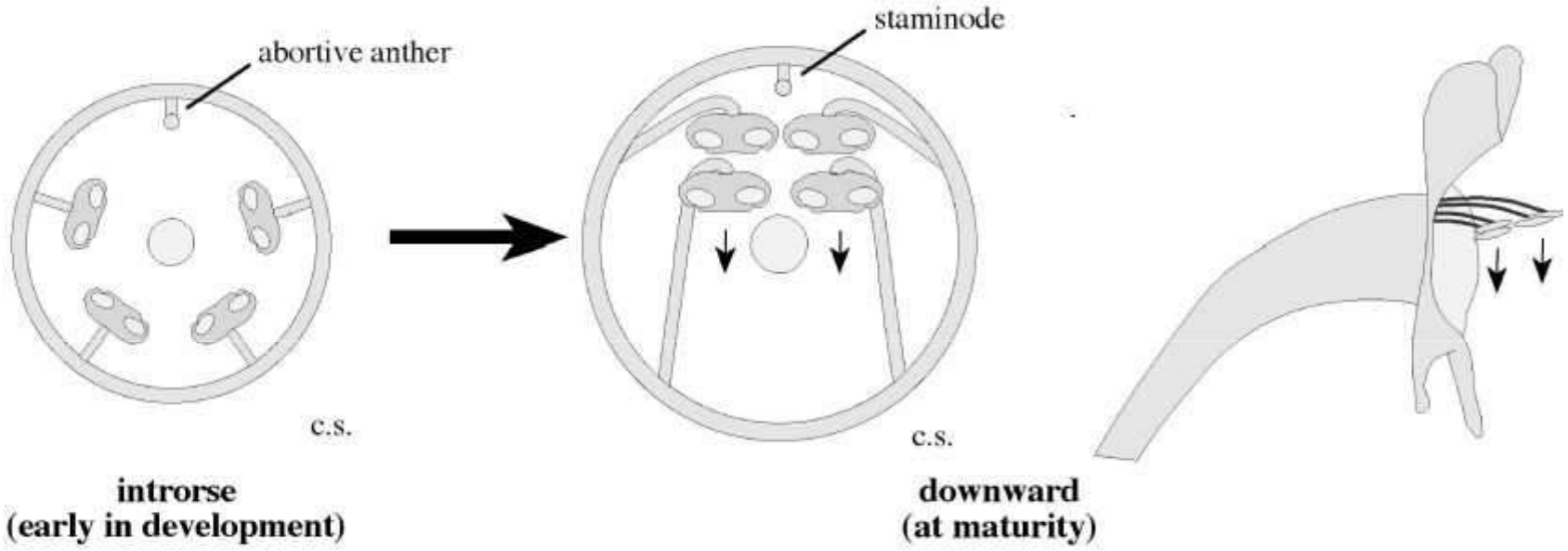
extrorse



introrse



latrorse



could also be upward

Gynoecium

= all female parts of a flower

Pistil

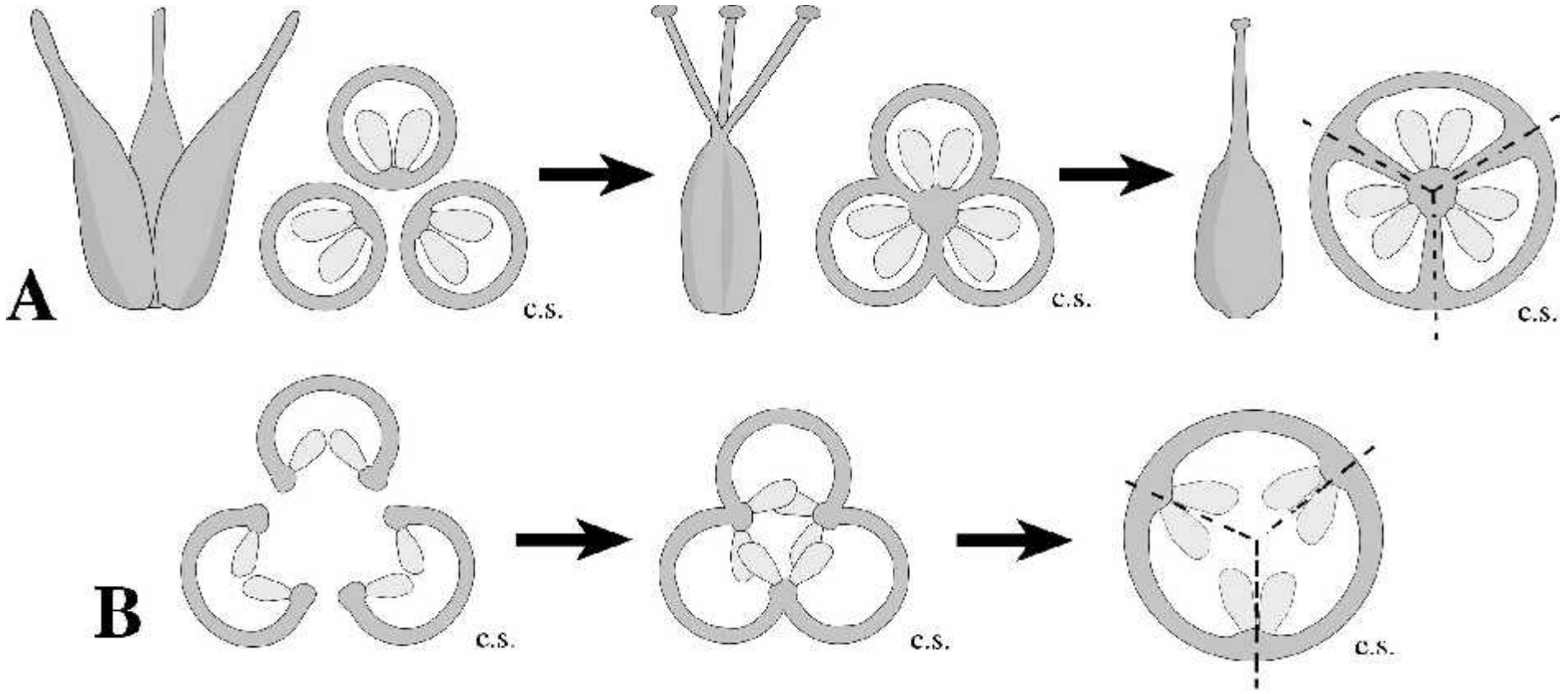
= structure consisting of ovary, style(s), and stigma(s)

Carpel

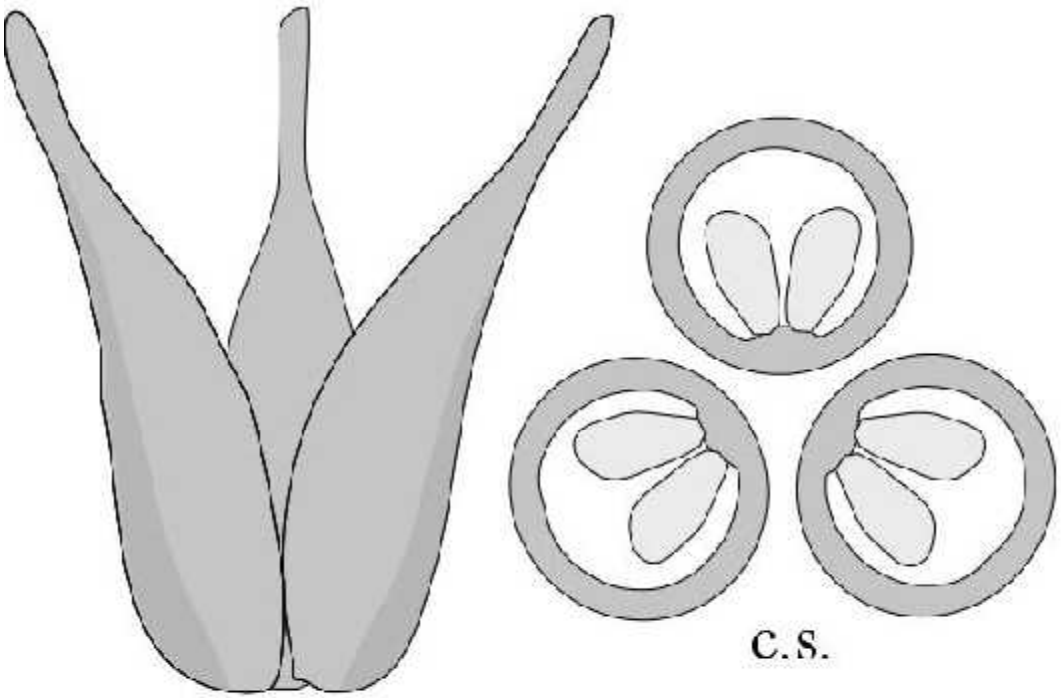
= conduplicate megasporophyll

Carpel can be unit of pistil, if pistil compound (composed of >1 carpel)

Gynoecial Development/Fusion:



Gynoecial Fusion:

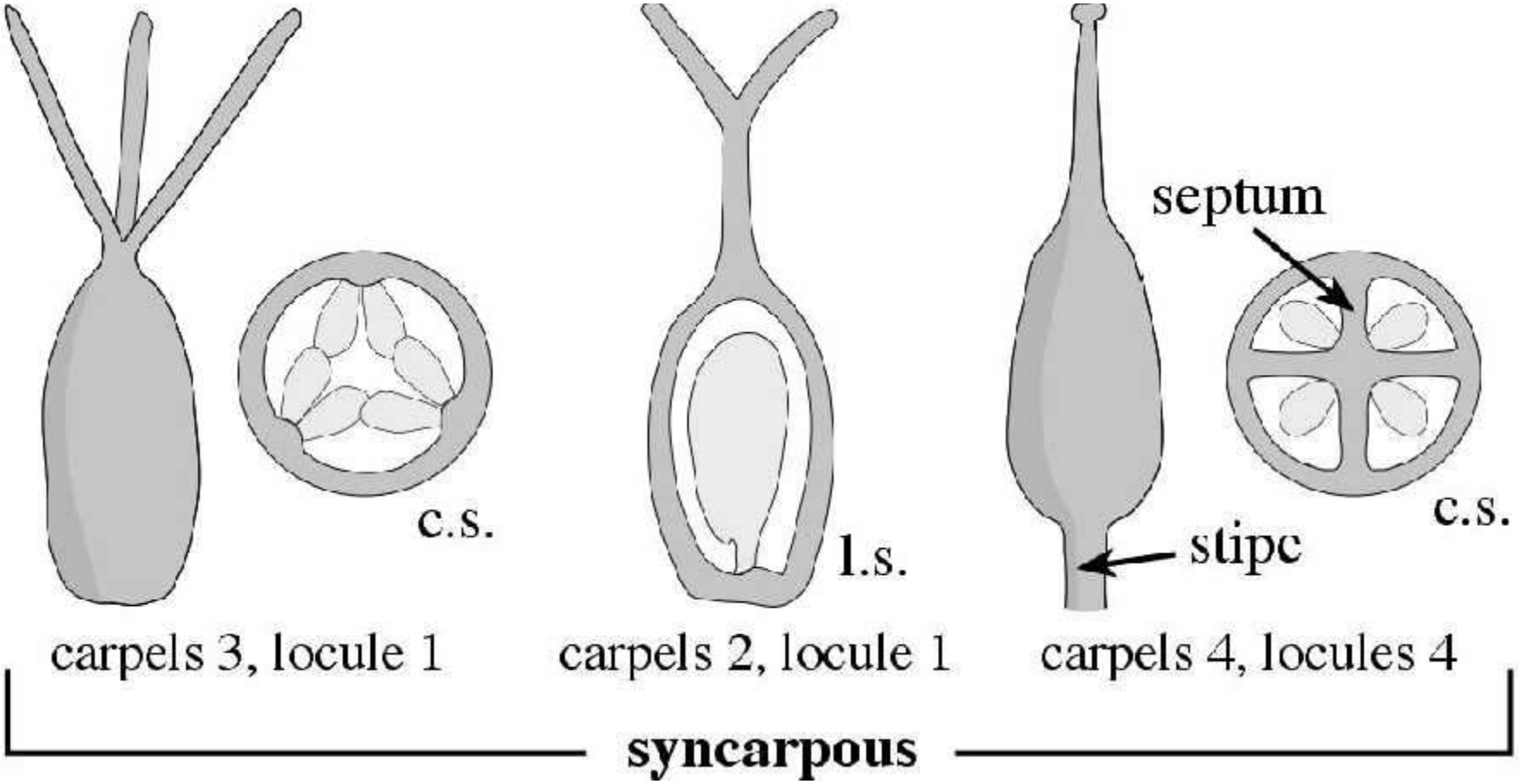


carpels 3, locule 1 per carpel

apocarpous

Crassula argentea **Crassulaceae**

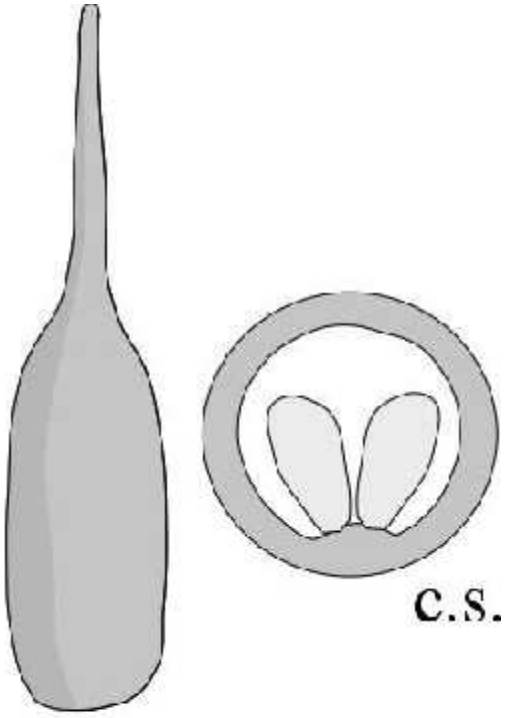
Gynoecial Fusion:



Gynoecial Fusion:

syncarpous

Gynoecial Fusion:

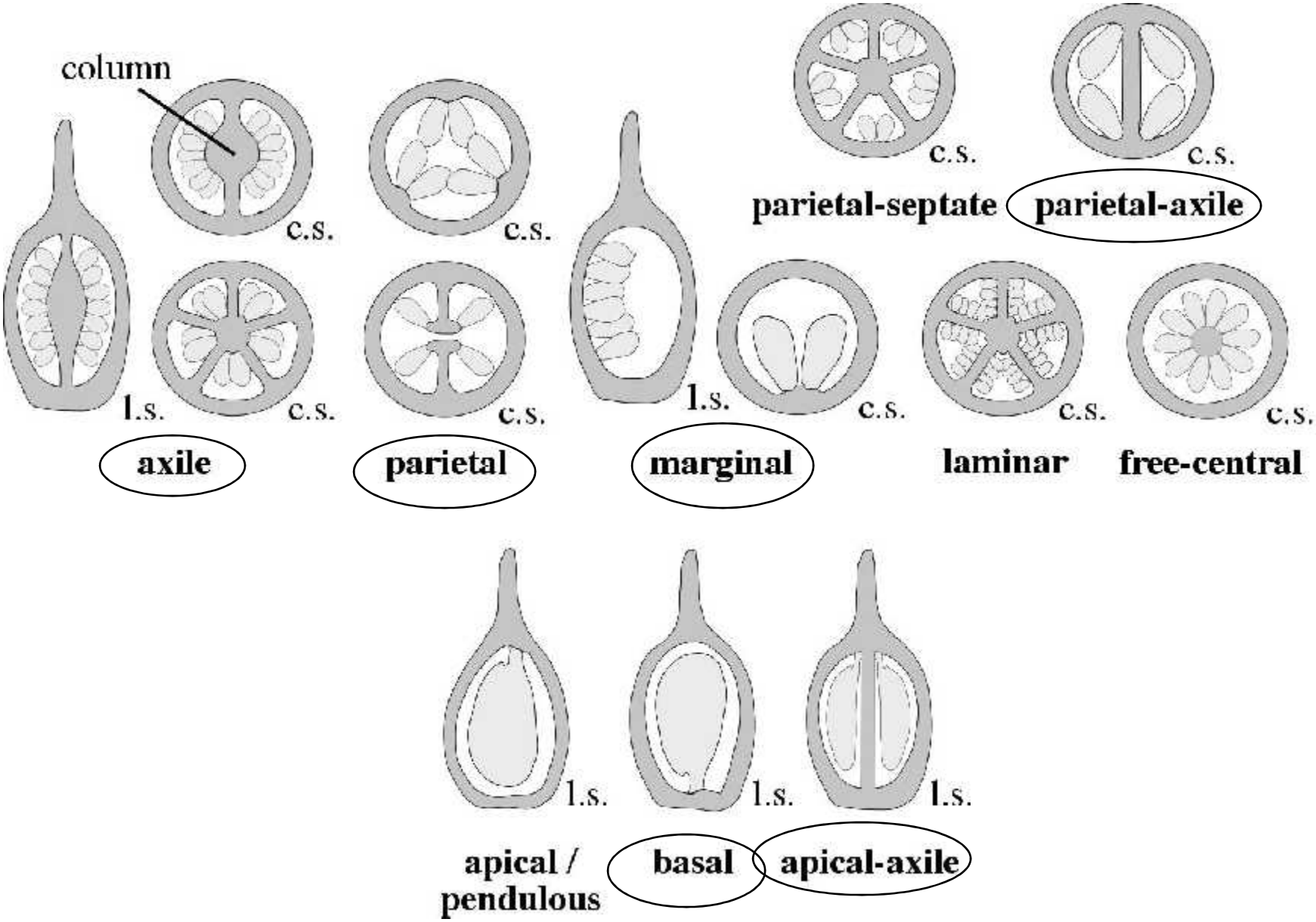


carpel 1, locule 1

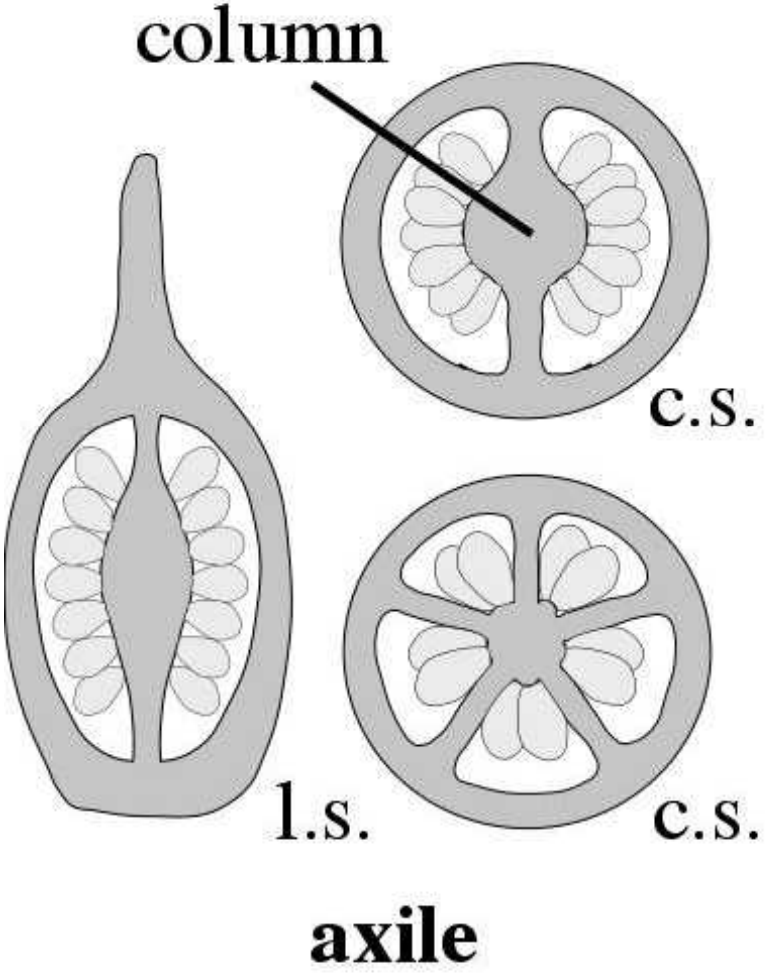
unicarpellous

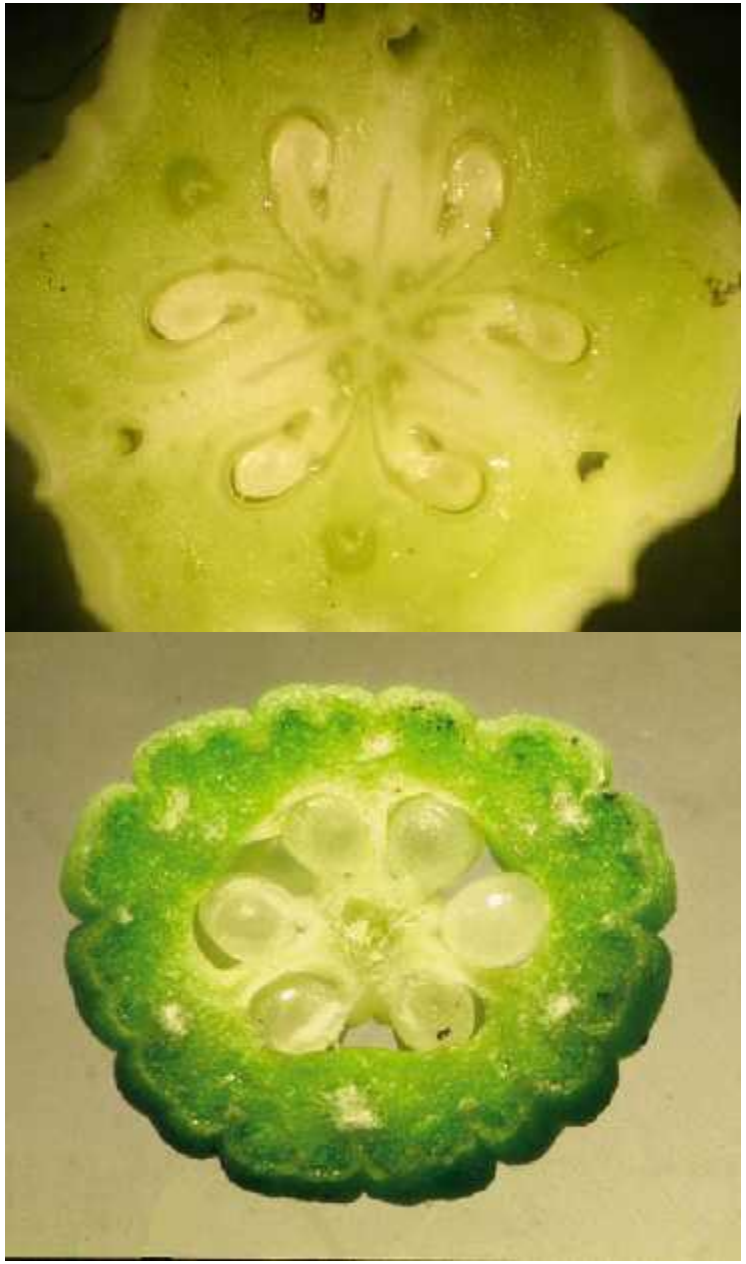
Erythrina caffra **Fabaceae**

Placentation

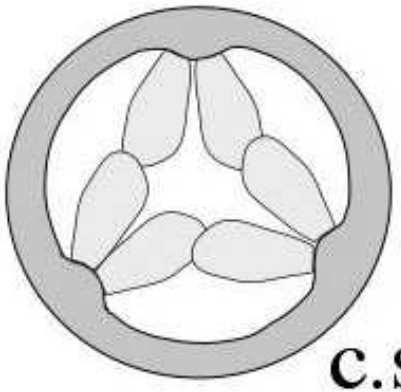


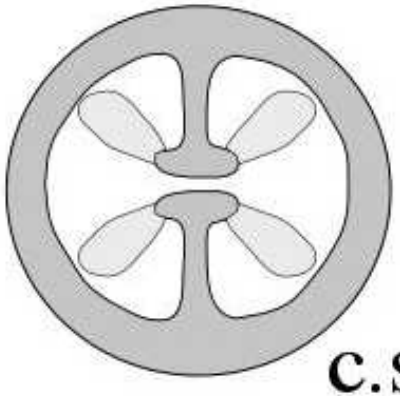
Placentation





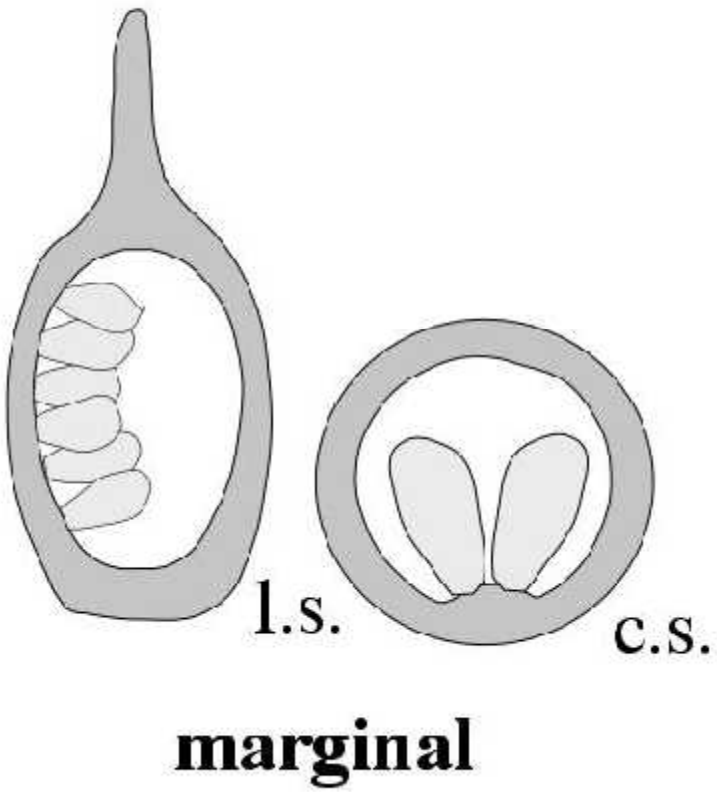
Placentation



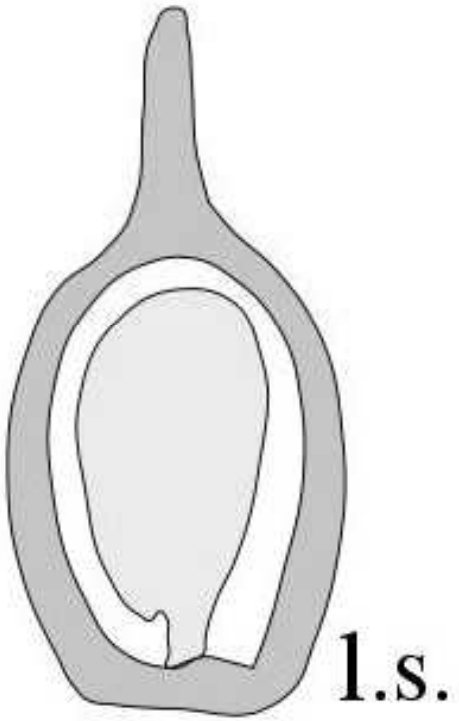


parietal

Placentation

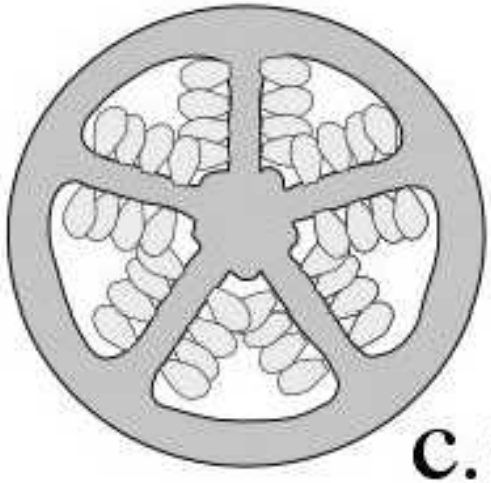


Placentation



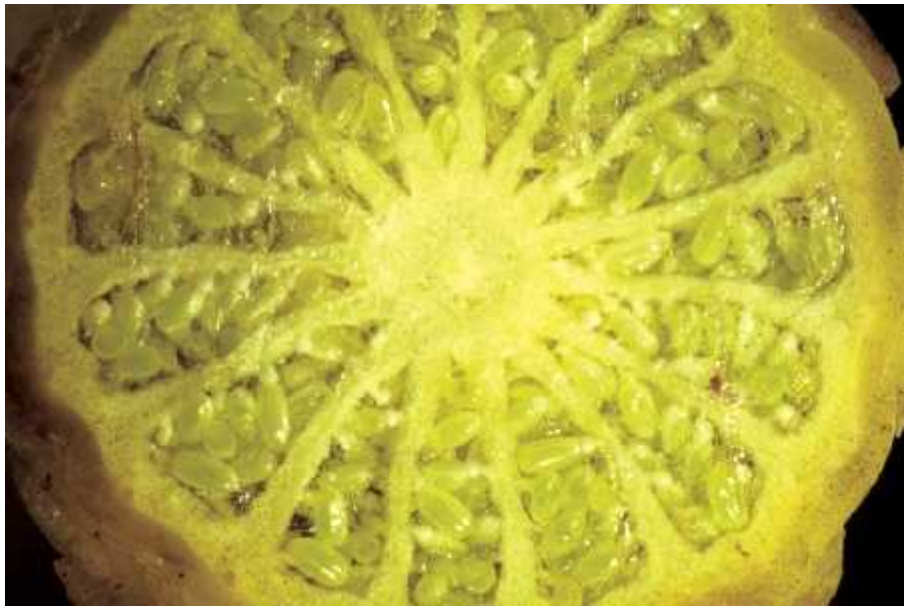
basal

Placentation

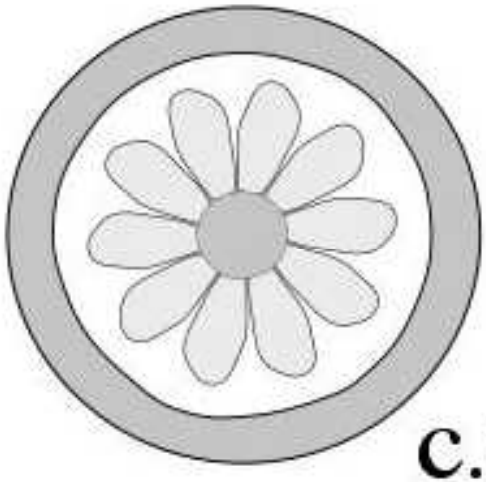


C.S.

laminar



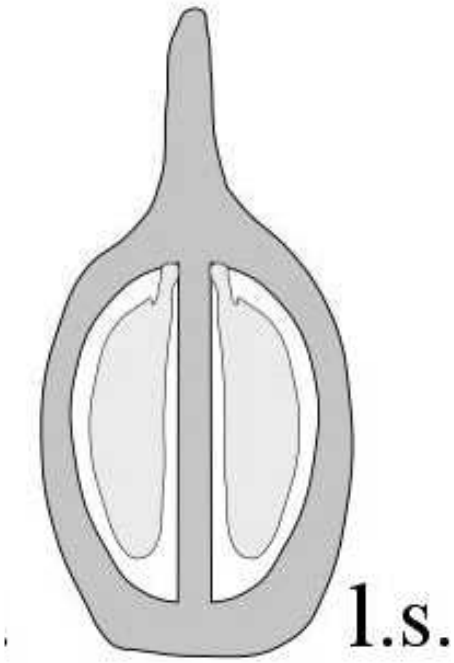
Placentation



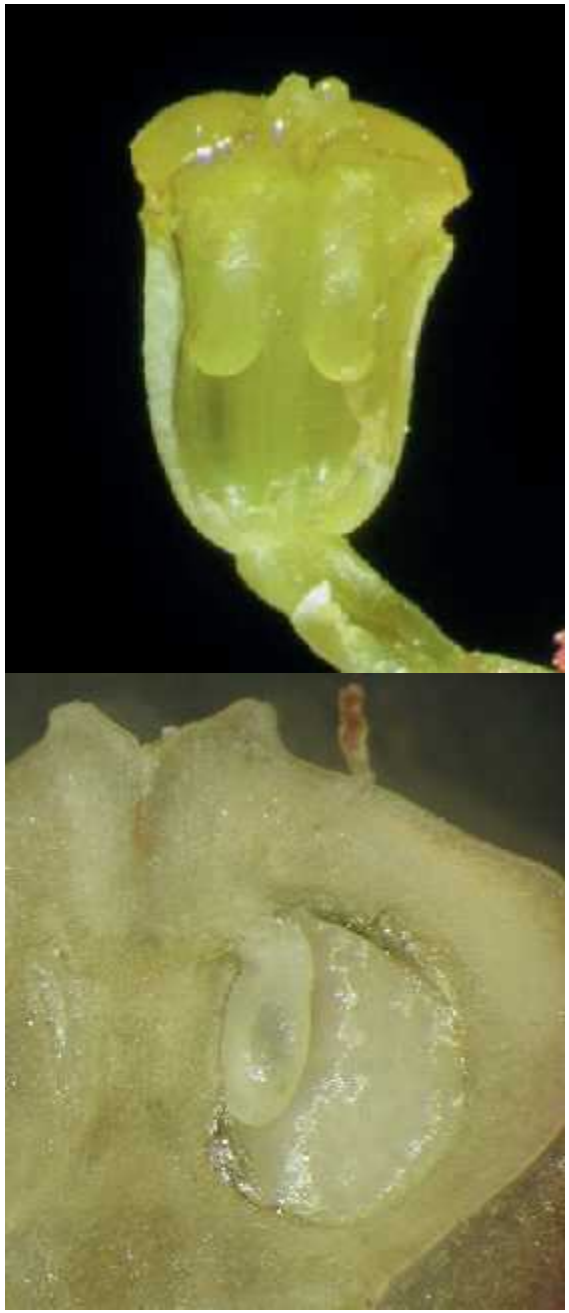
C.S.

free-central

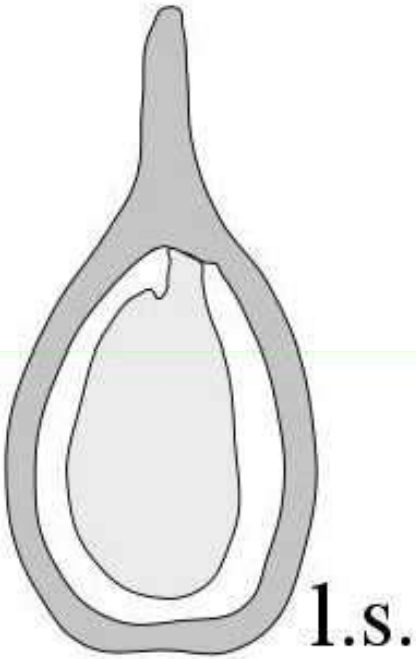
Placentation



apical-axile

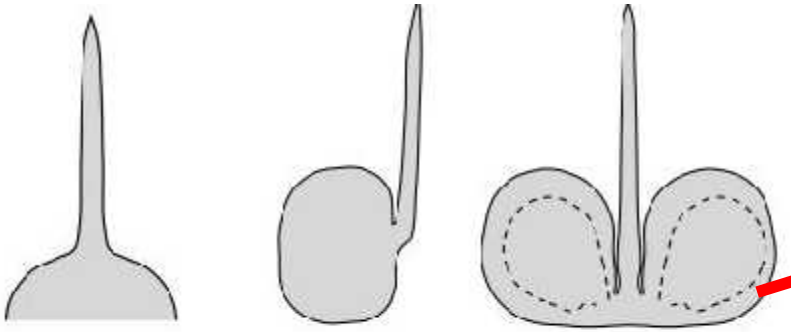


Placentation



apical / pendulous

Style Position



terminal lateral gynobasic

Verbena rigida
Verbenaceae

***Fragaria* sp.**
Rosaceae

Borago officinalis
Boraginaceae

Stigma Types

discoid globose linear plumose