

Morphology of flower

Flowers

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



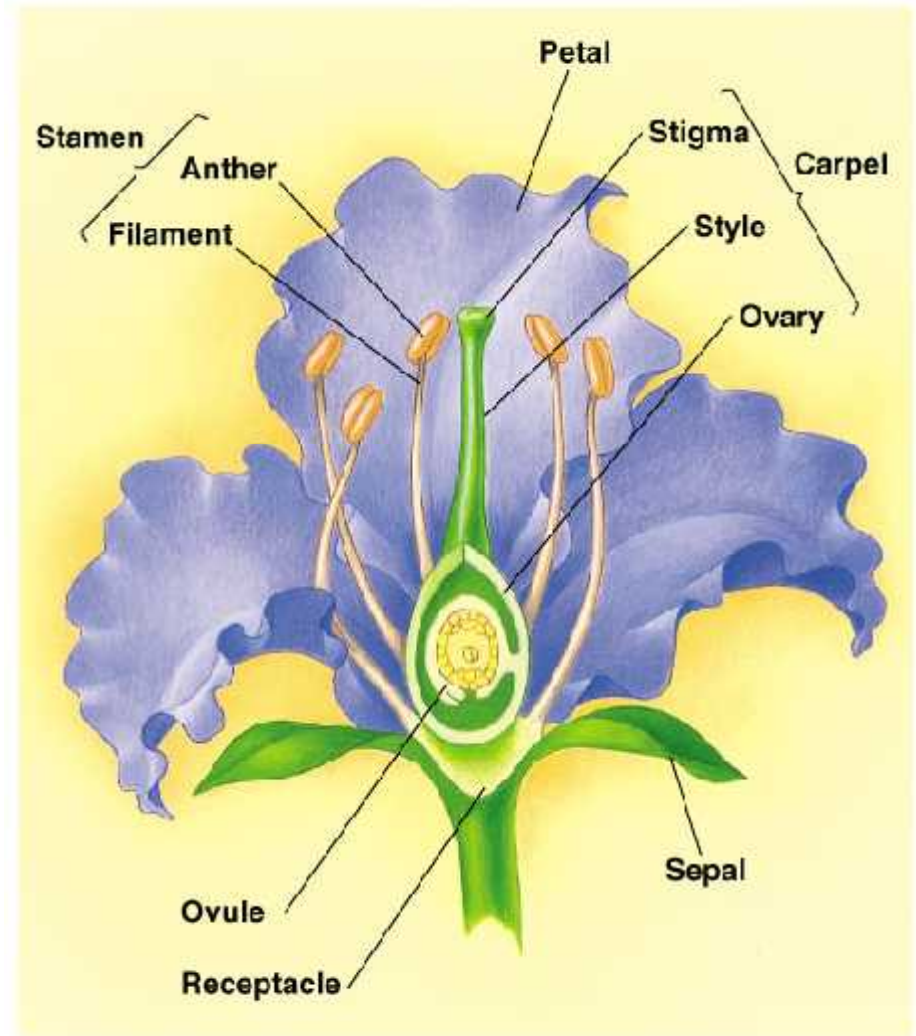
Flower

- 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&Gynoecium



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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.



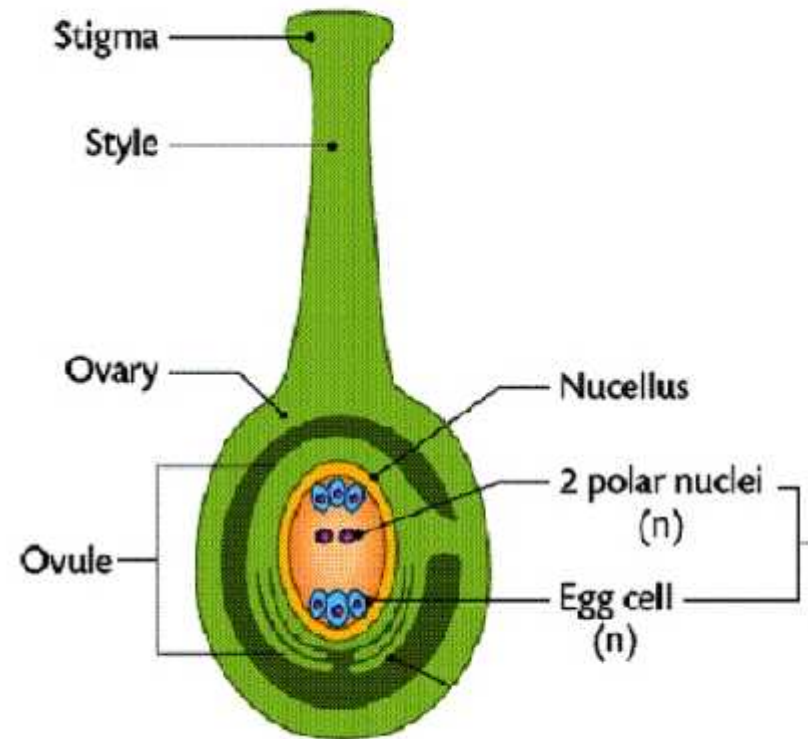
Flower Anatomy

The basic unit of the female reproductive structure is the **carpel**. Each physical 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**)

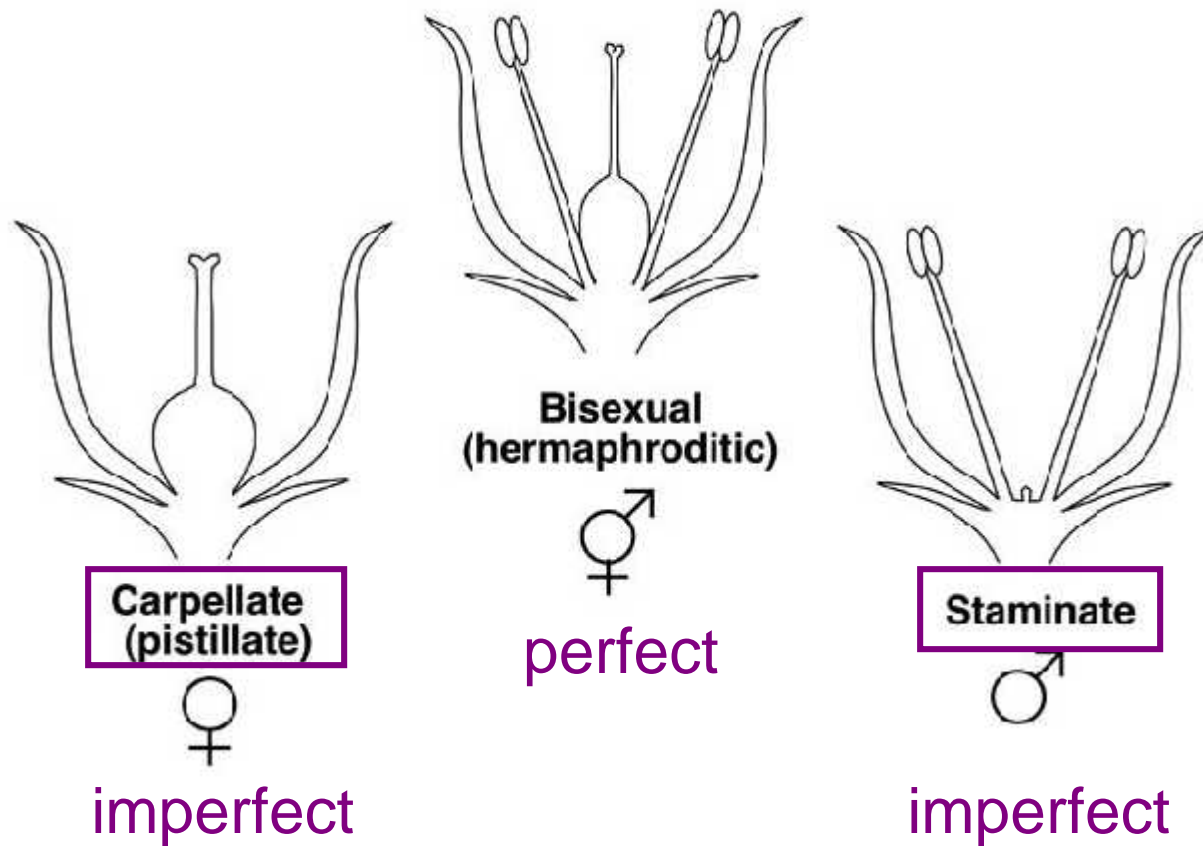
The sticky tip of the pistil, the **stigma**, is the receptor of pollen.

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 Sexual Conditions

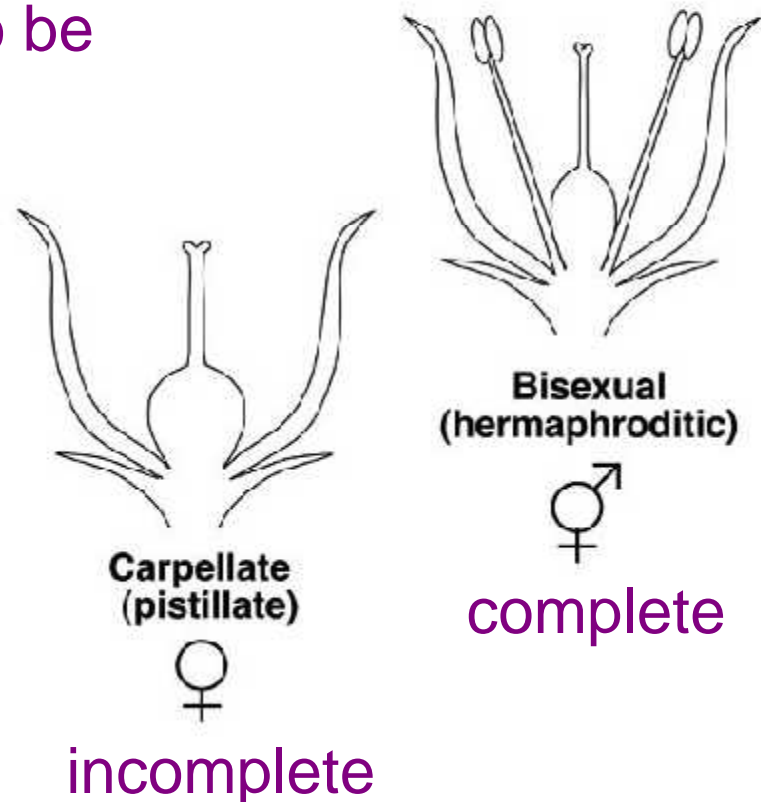


Flower Structure Variation

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**.

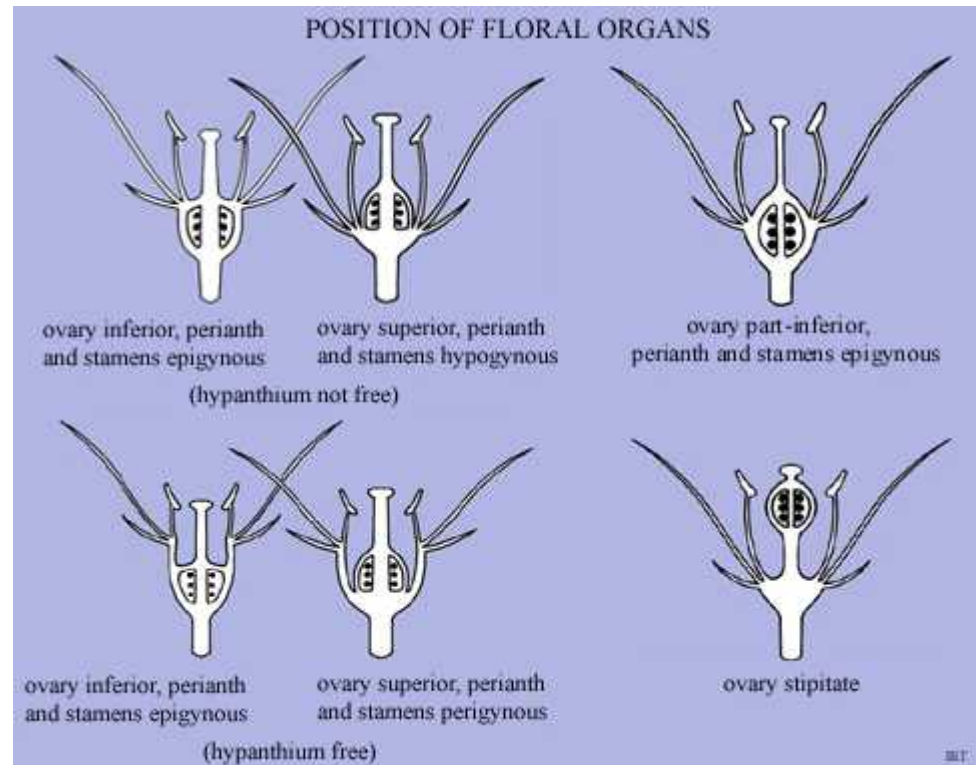


no stamens present = incomplete



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

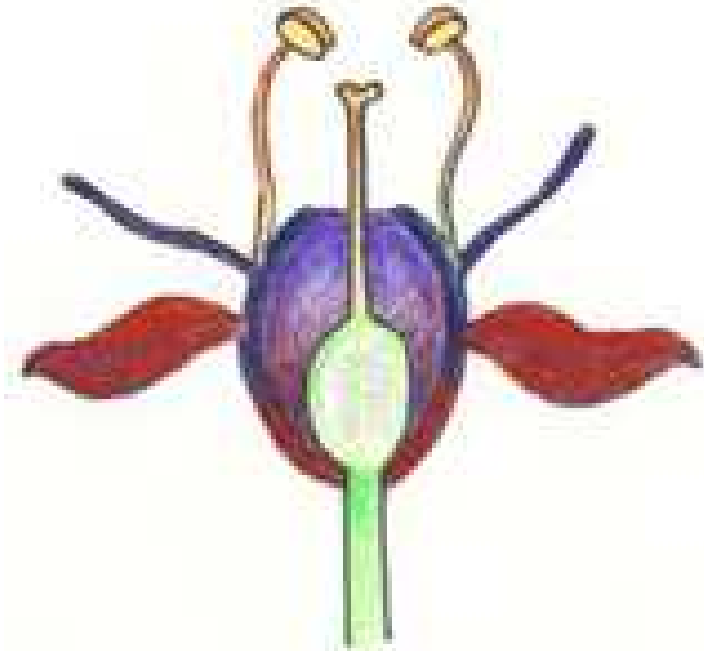
- Hypogynous: the sepals, petals, and stamens are inserted under the carpel
 - Ovary is said to be *superior*



Hypogynous

Insertion of Floral Parts

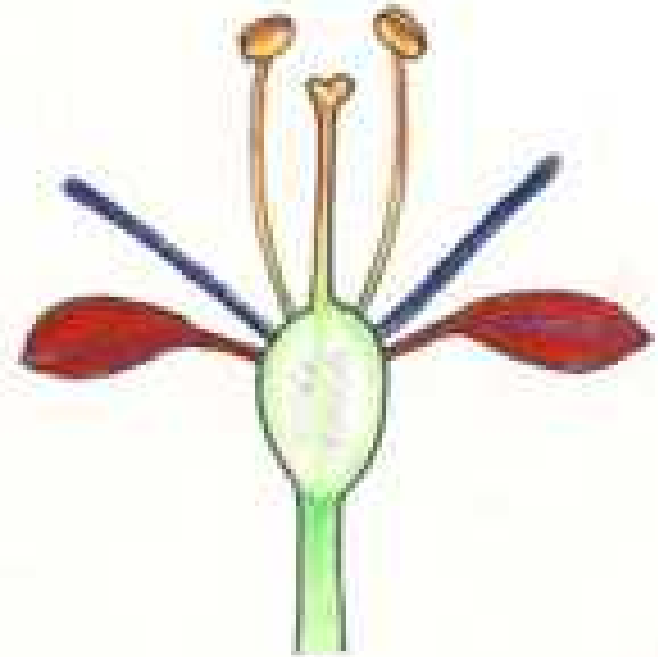
- In a ***perigynous*** flower, the sepal, petals, and stamens are fused together to form a cup called the ***hypanthium***
 - The gynoecium sits inside the cup but is not fused to it
 - Ovary is said to be ***superior***



Perigynous

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***



Epigynous

Pollen Dispersal by Animals

Bees, Beetles, Bats, Birds, Butterflies, etc...

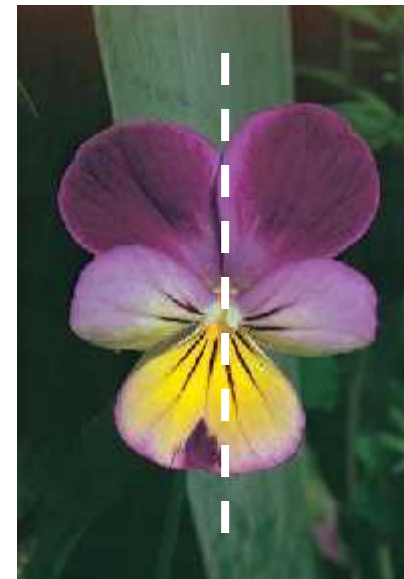


Symmetry

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 carpels

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



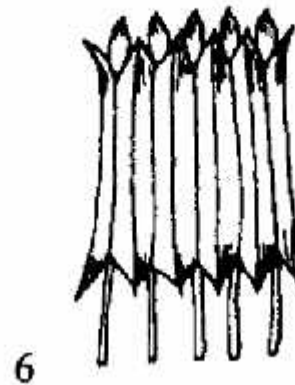
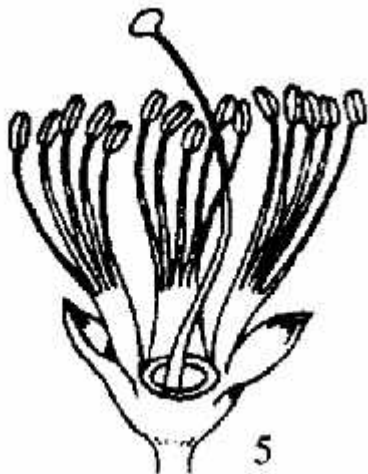
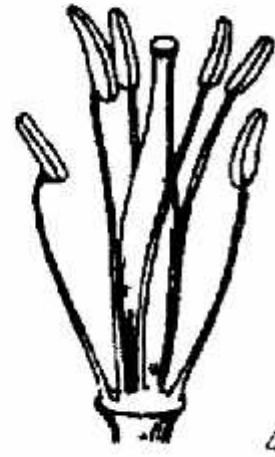
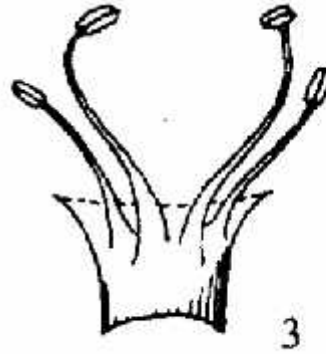
- ★androecium

- -
- } filament
anther

- Types

- distinct stamen
- didynamous ~
- tetradynamous ~
- monadelphous ~

diadelphous ~
polyadelphous ~
syngenesious ~



Type of Stamen

1. Monadelphous stamen

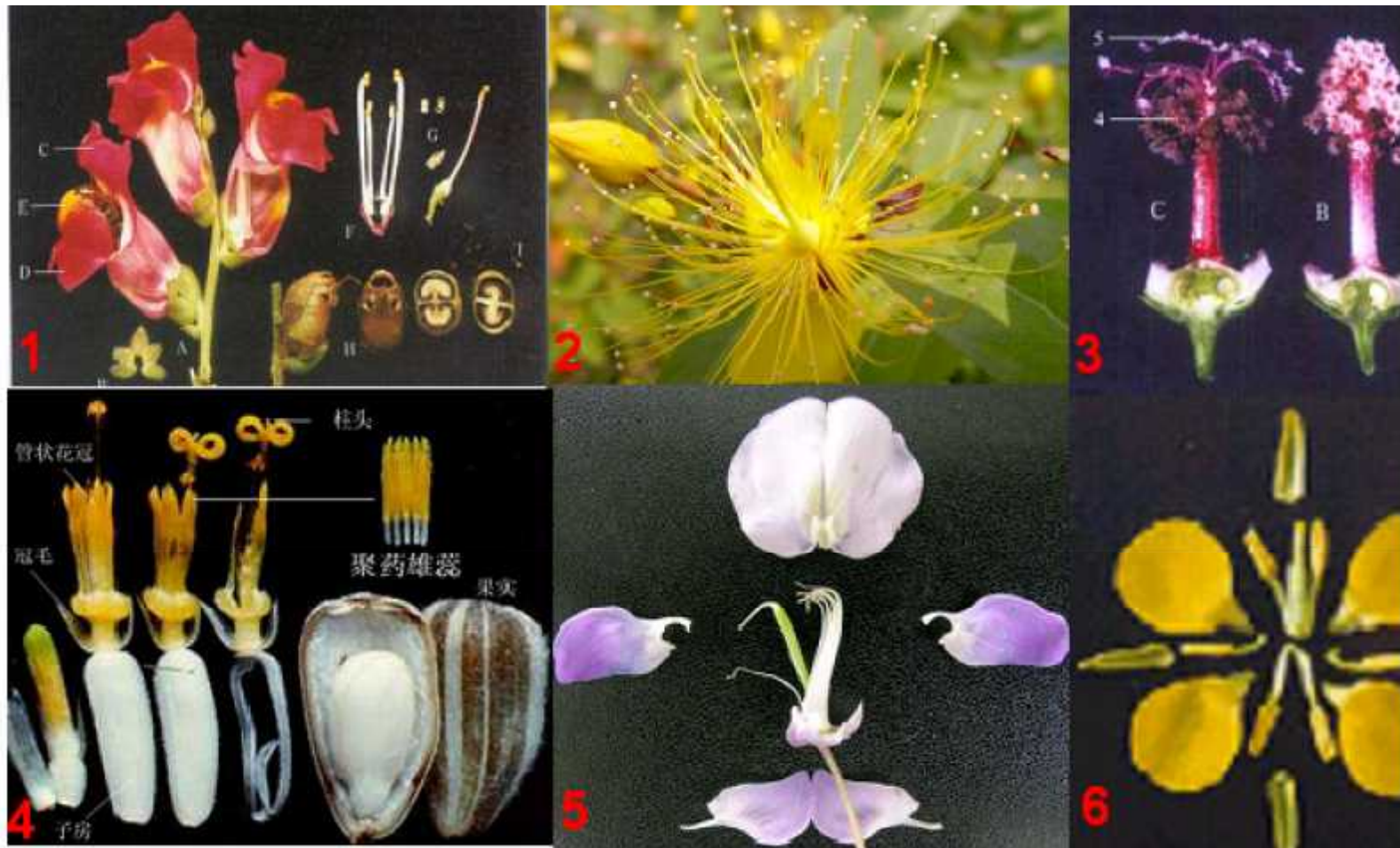
2. Diadelphous stamen

3. Didynamous stamen

4. Tetradynamous stamen

5. Polyadelphous stamen

6. Syngenesious stamen

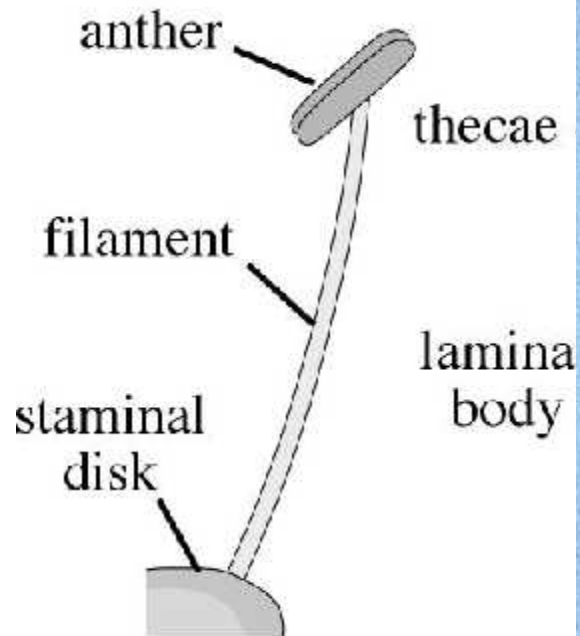


Type of Stamen

1. Didynamous stamen
2. Polyadelphous stamen
3. Monadelphous stamen
4. Synanthalous stamen
5. Diadelphous stamen
6. Tetradynamous stamen

Androecium:

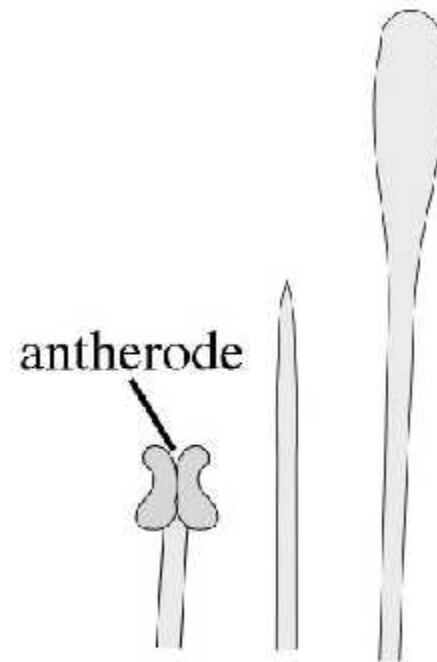
Stamen Types / Parts



filamentous

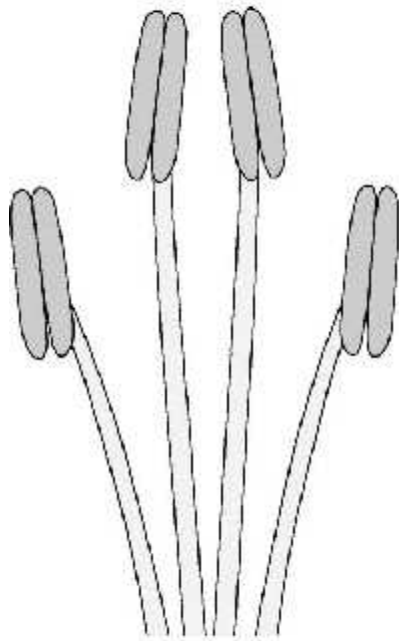


laminar

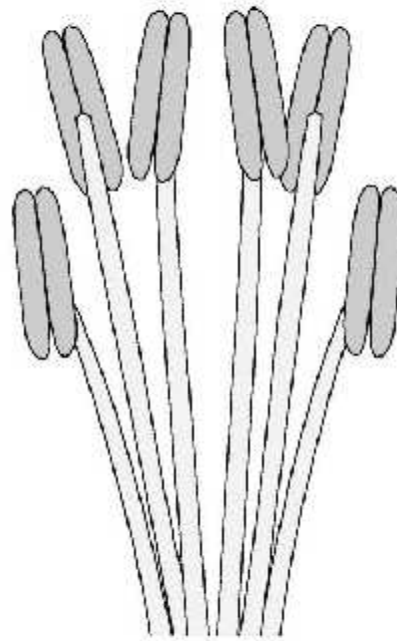


staminodia

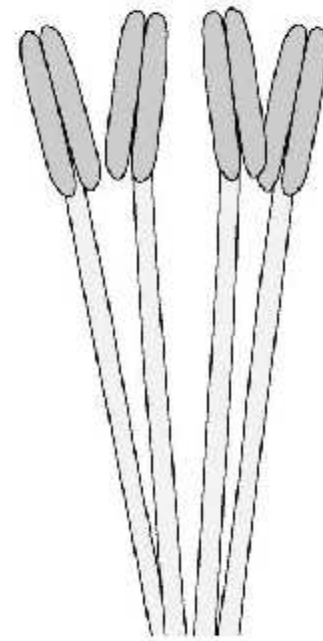
Stamen Arrangement



didynamous



tetradynamous



didymous

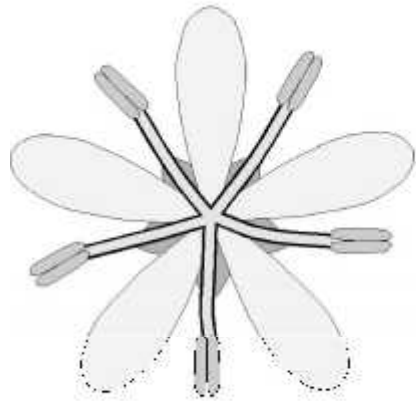


tetradynamous

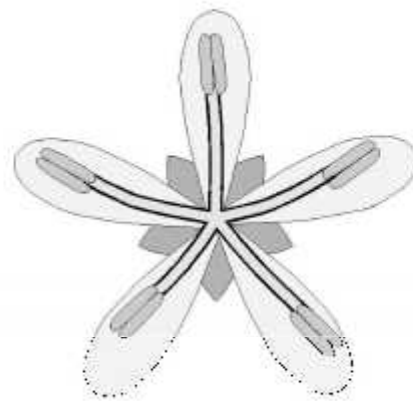


didynamous

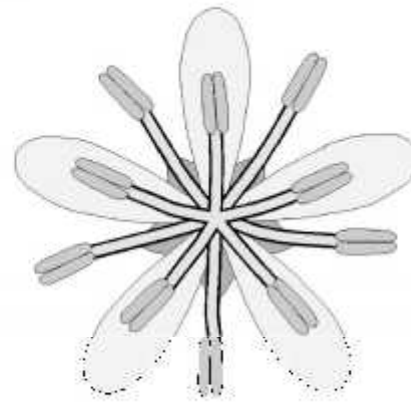
Stamen Cycle/Position



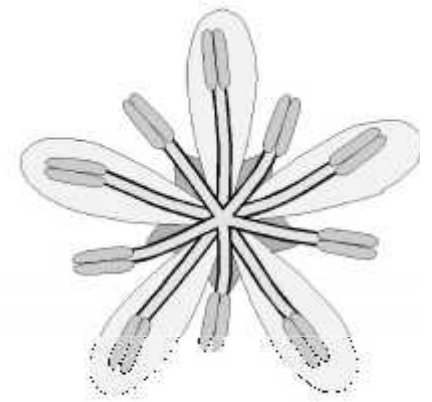
**antisepalous
(alternipetalous)**



**antipetalous
(alternisepalous)**



**diplostemono
us**

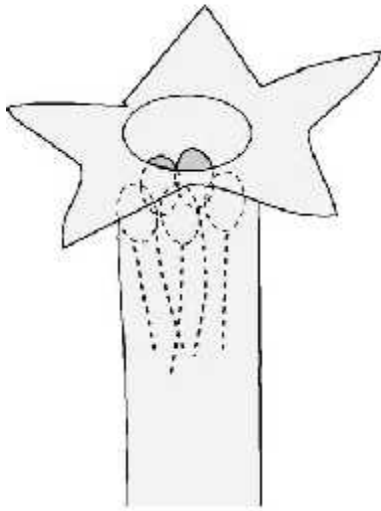


**obdiplostemono
us**

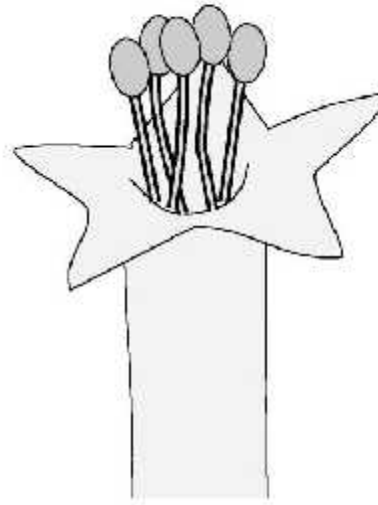
uniseriate

biseriate

Stamen Insertion

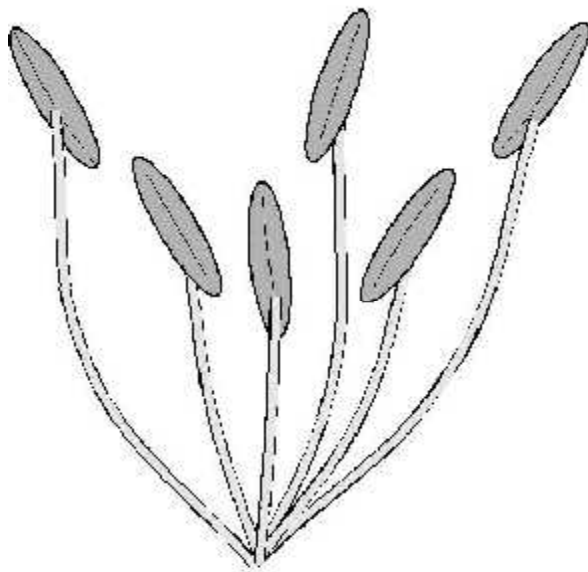


inserted

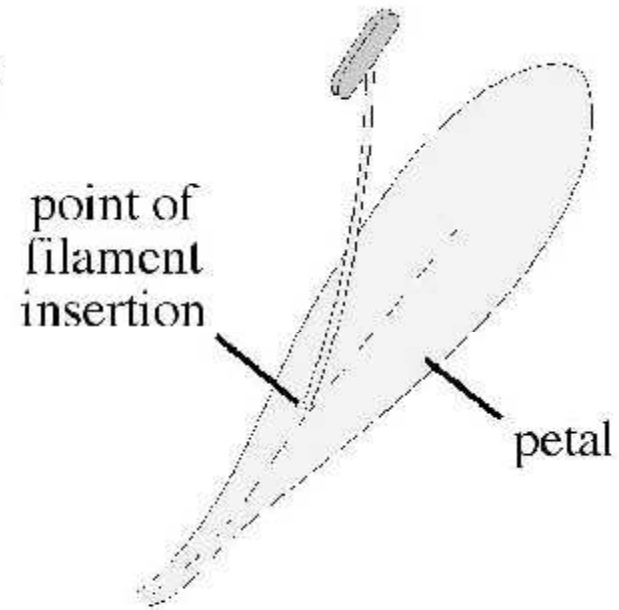


exserted

Androecial / Stamen Fusion

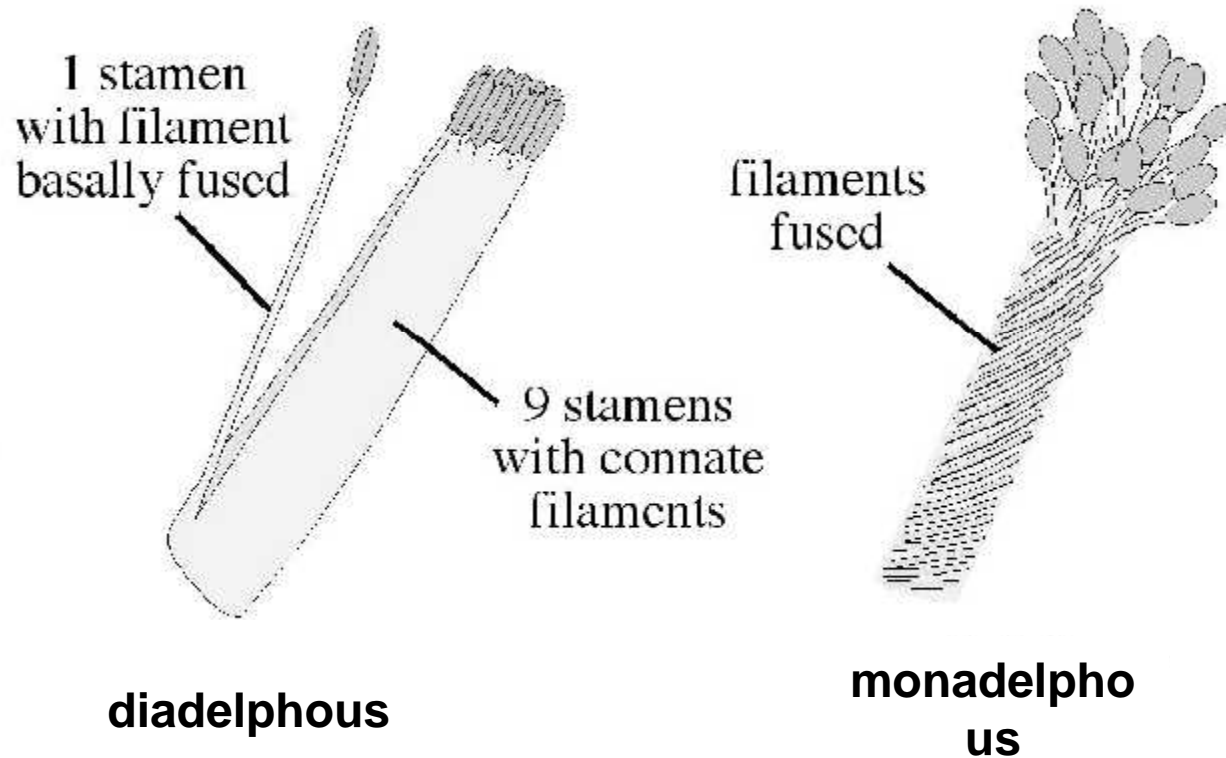


apostemonous

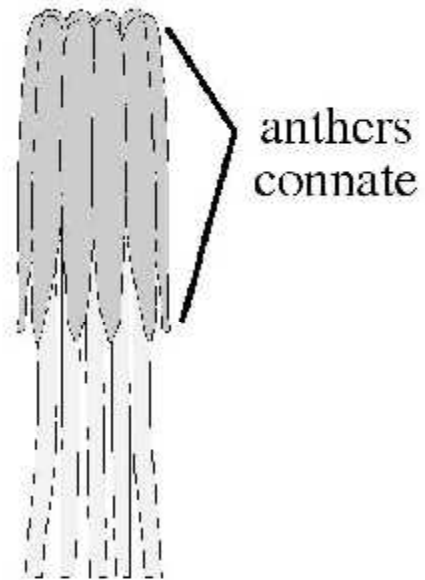


epipetalous

Androecial / Stamen Fusion

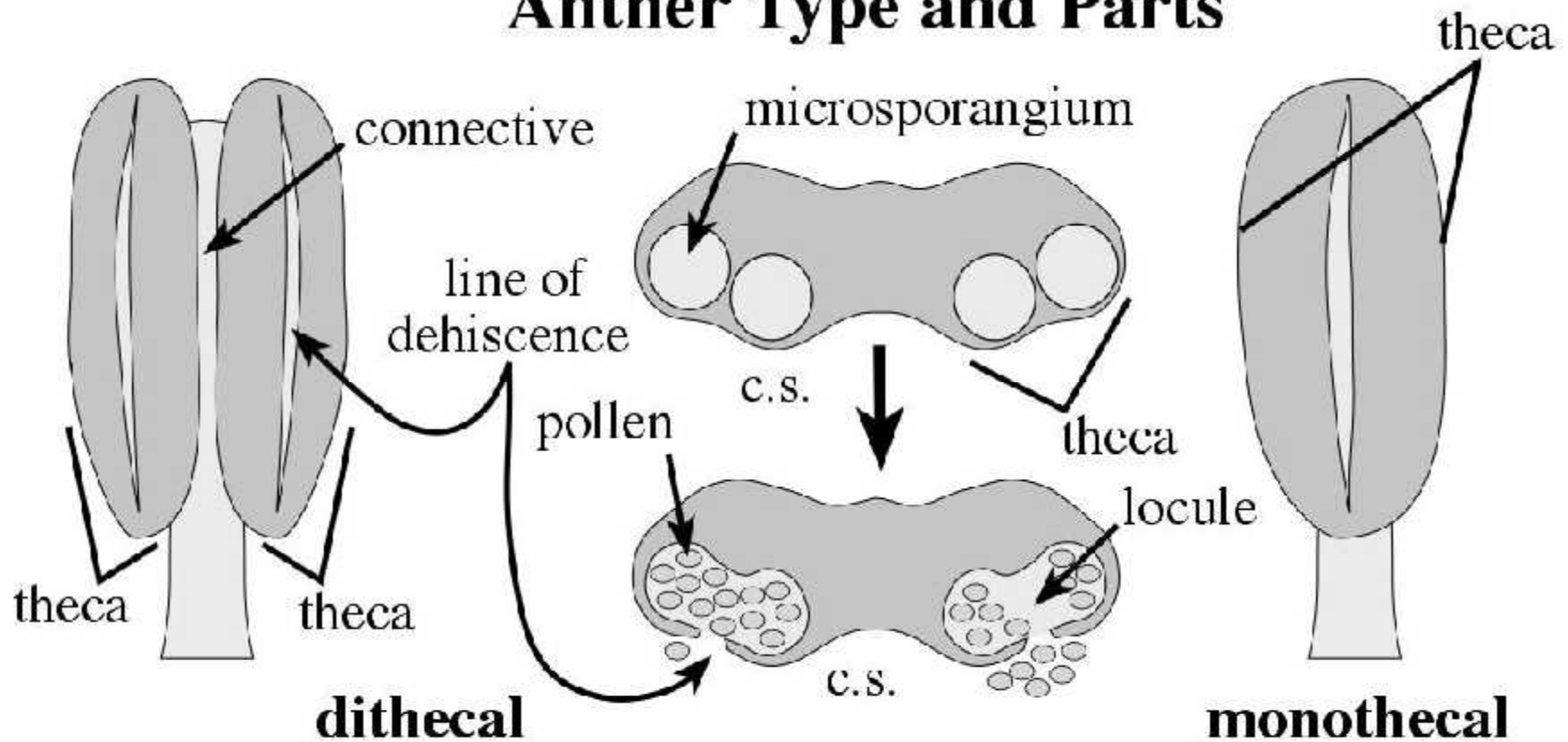


Androecial / Stamen Fusion

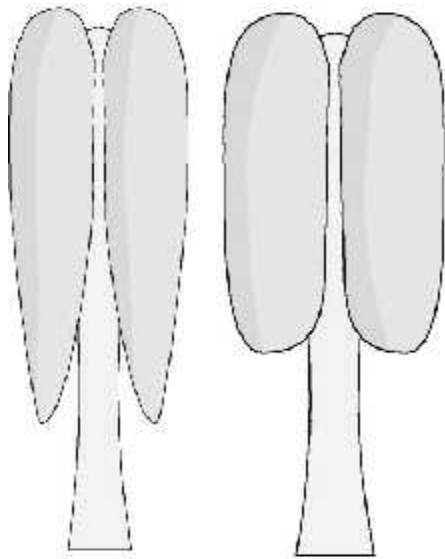


syngenesious

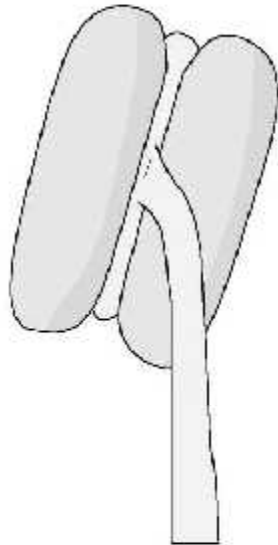
Anther Type and Parts



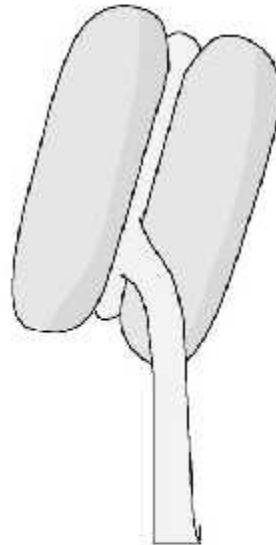
Anther Attachment



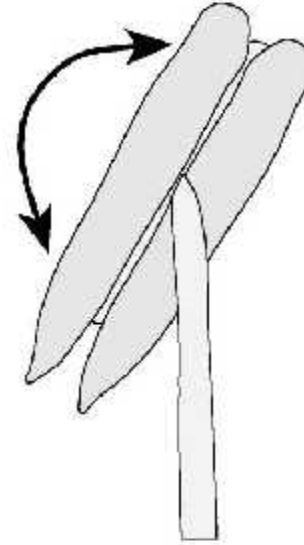
basifixed



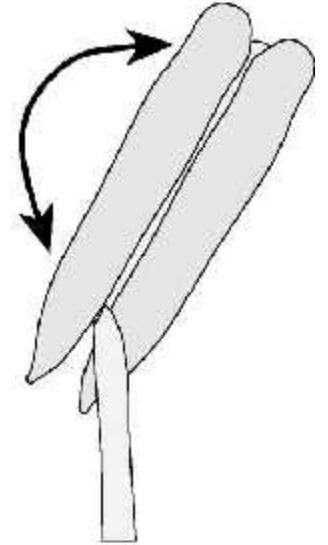
dorsifixed



subbasifixe
d



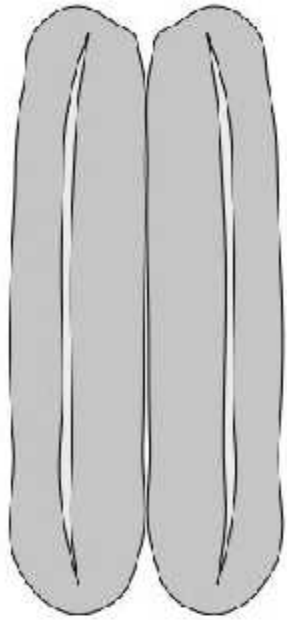
dorsifixe
d



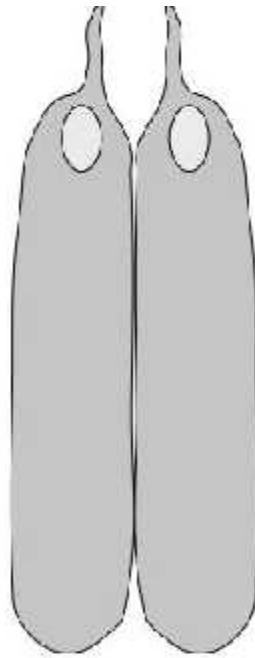
basifixed

versatil
e

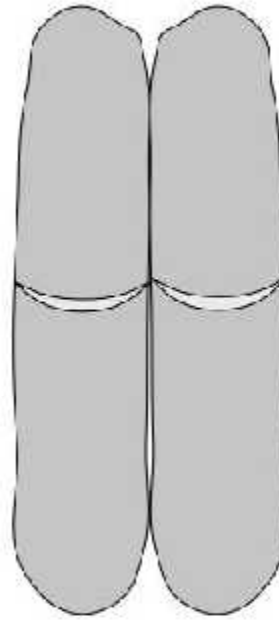
Anther Dehiscence Types



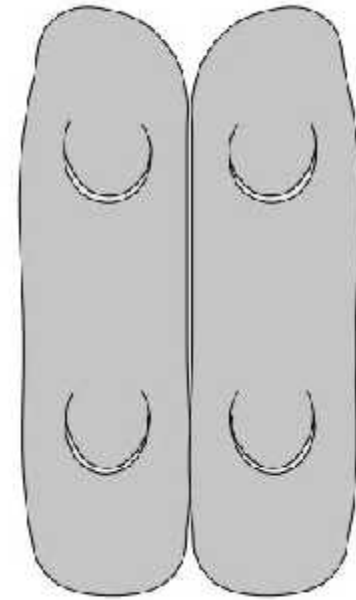
longitudinal



poricidal

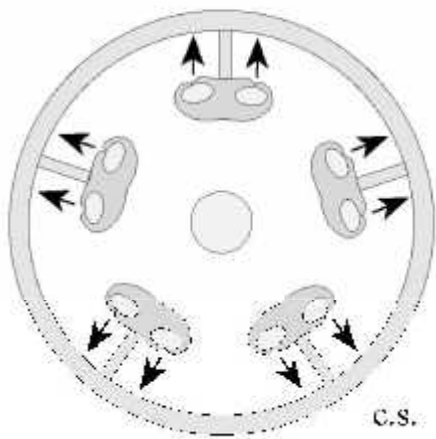


transverse

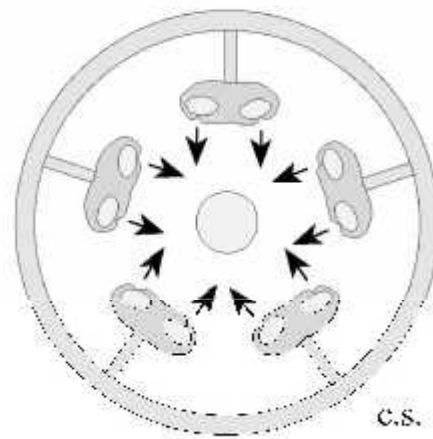


valvular

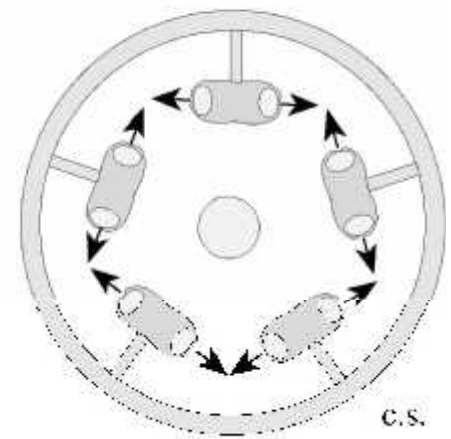
Anther Dehiscence Direction



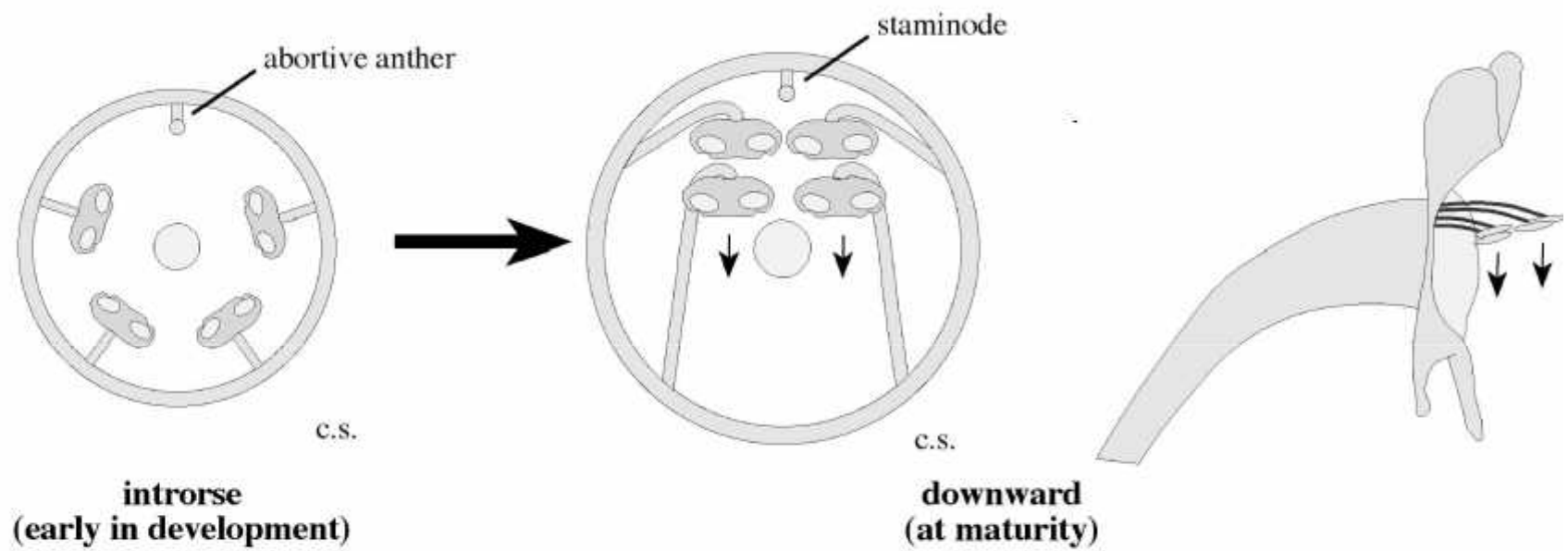
extrorse



introrse



latrorse



Gynoecium

= all female parts of a flower

Pistil

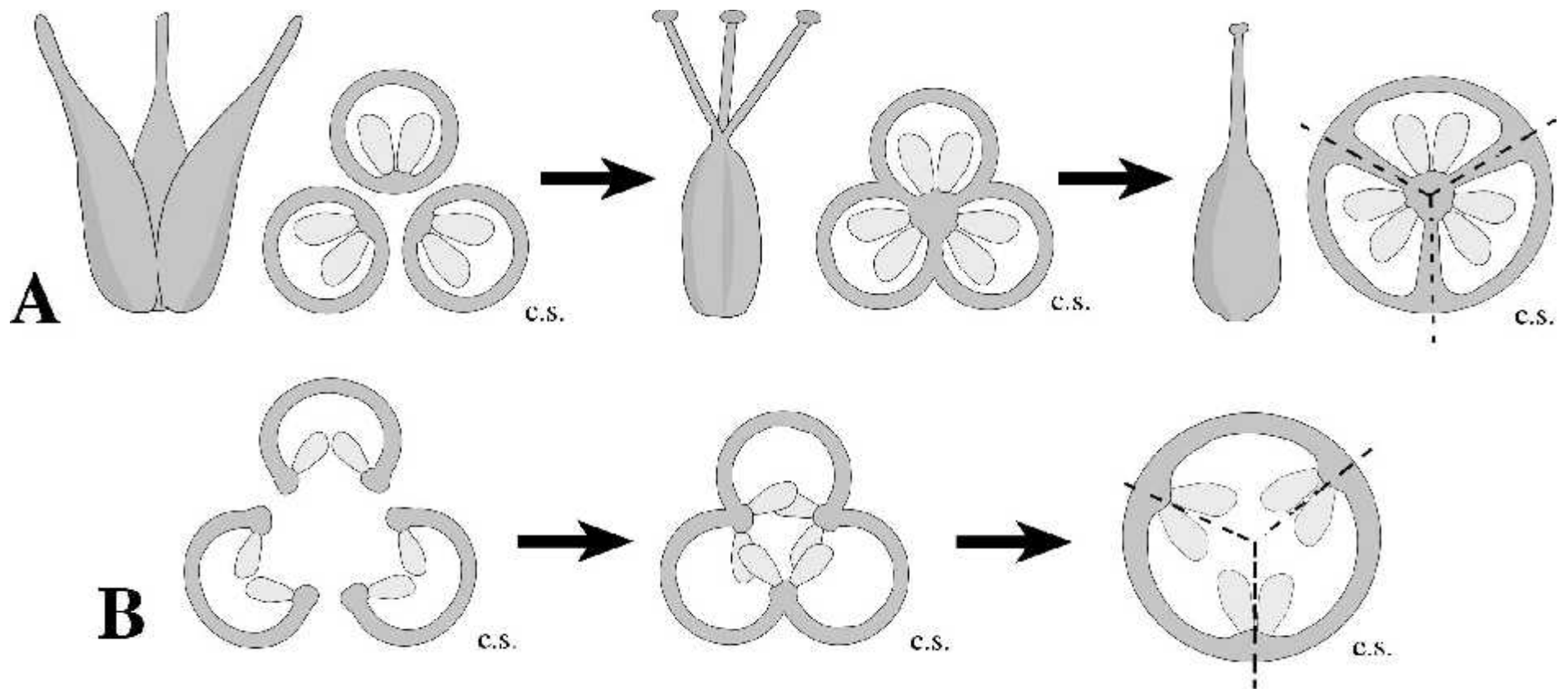
= structure consisting of ovary, style(s), and stigma(s)

Carpel

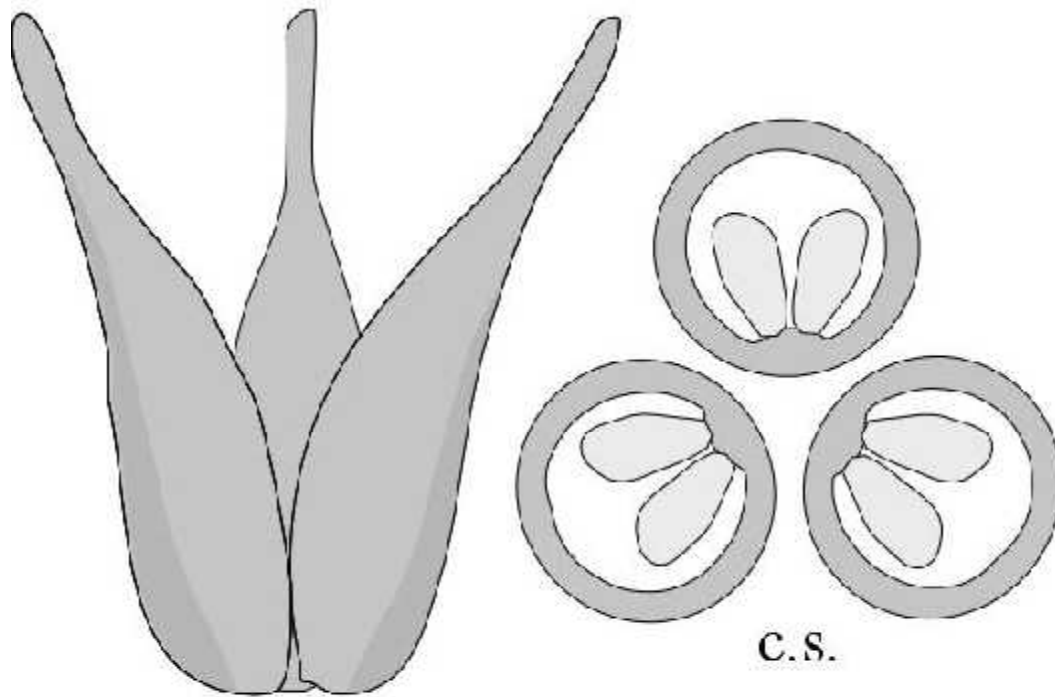
= conduplicate megasporophyll

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

Gynoecial Development/Fusion:



Gynoecial Fusion:



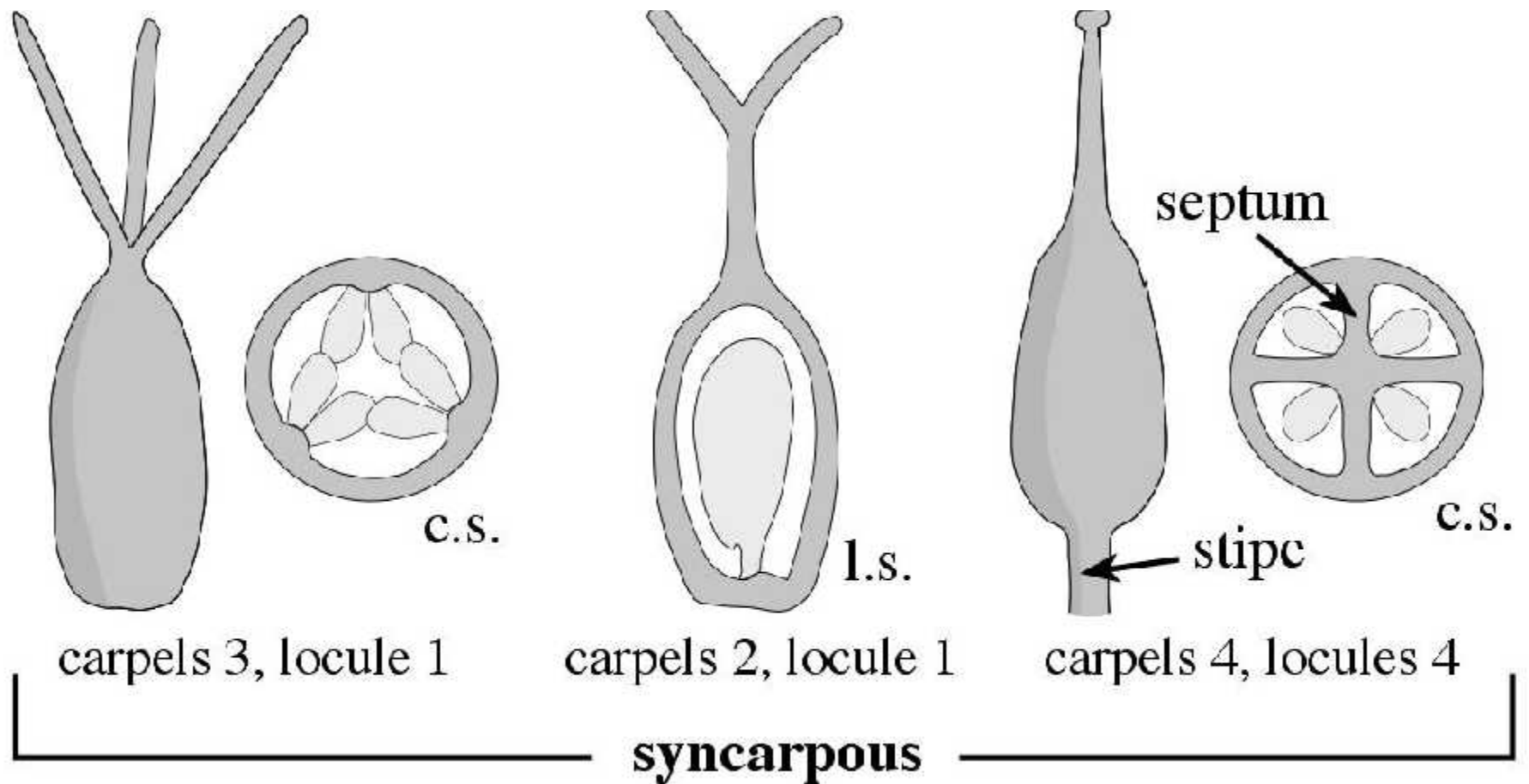
carpels 3, locule 1 per carpel

apocarpous



Crassula argentea Crassulaceae

Gynoecial Fusion:

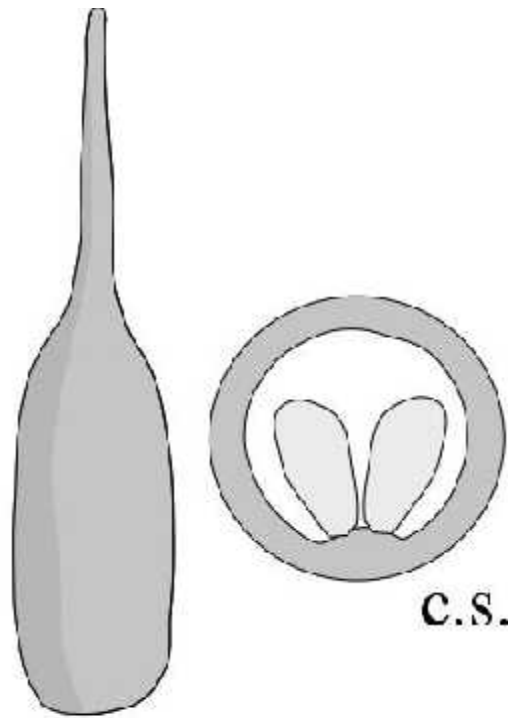


Gynoecial Fusion:



syncarpous

Gynoecial Fusion:



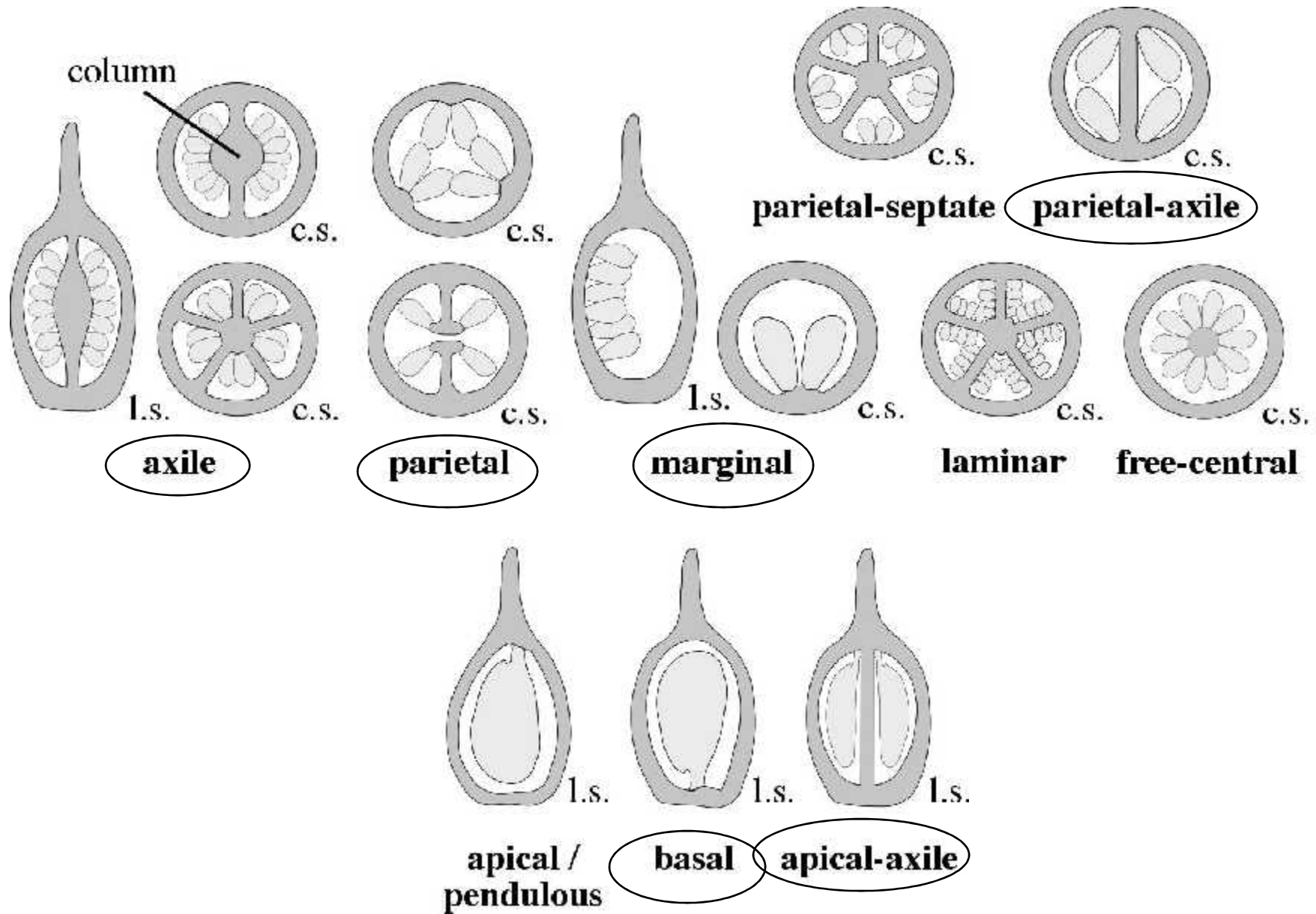
carpel 1, locule 1

unicarpellous

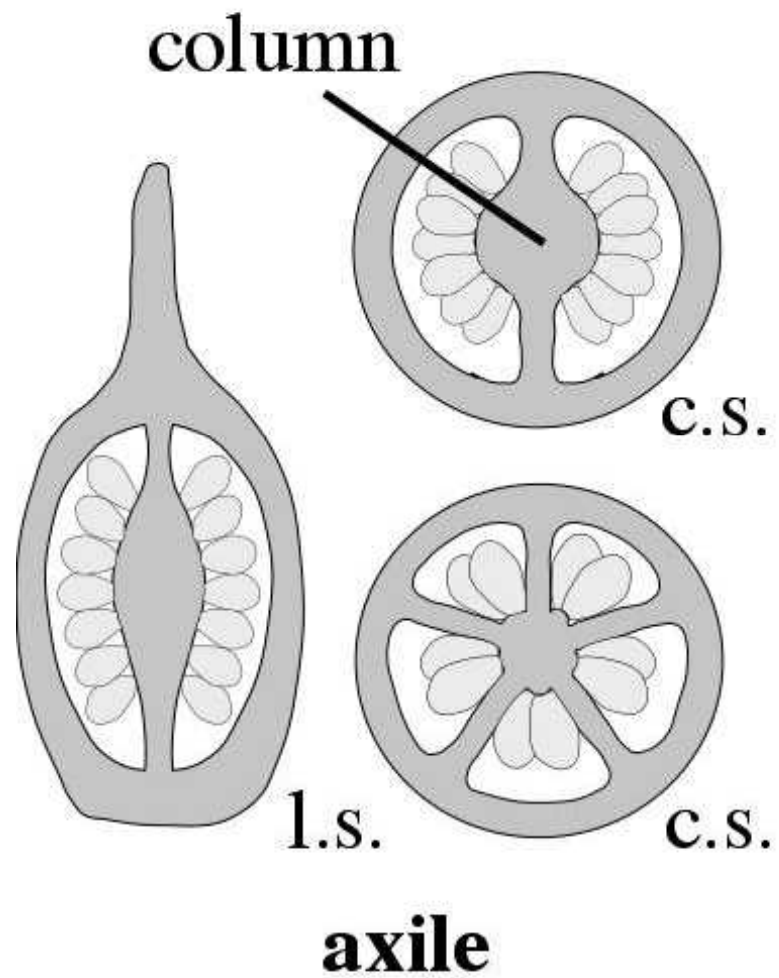


Erythrina caffra Fabaceae

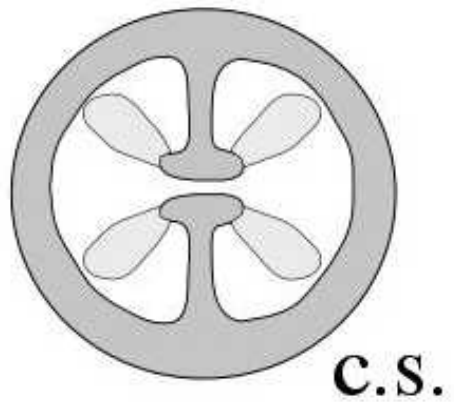
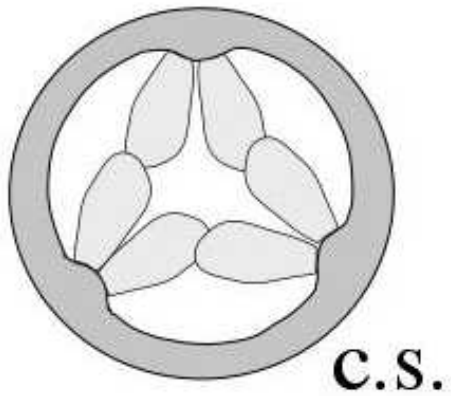
Placentation



Placentation



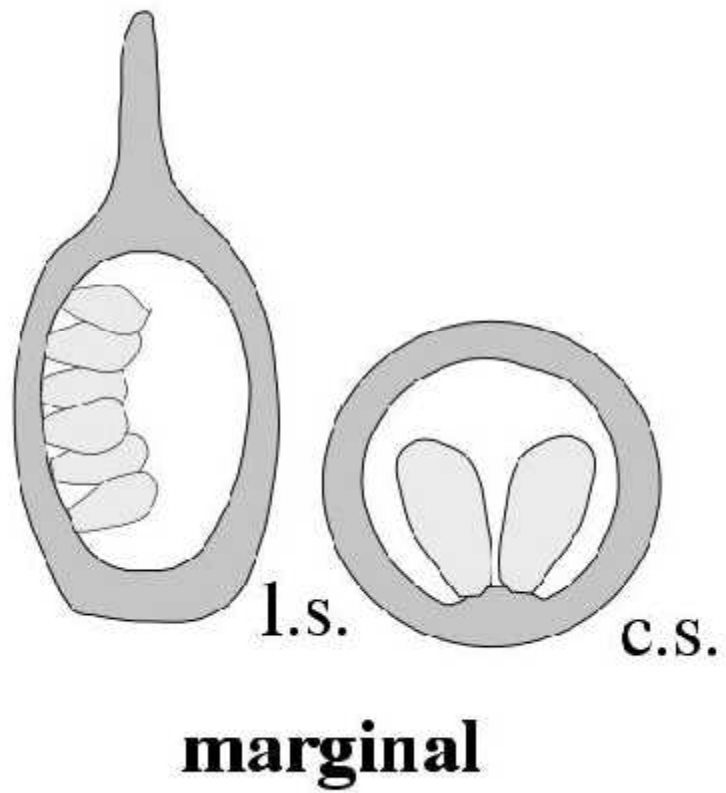
Placentation



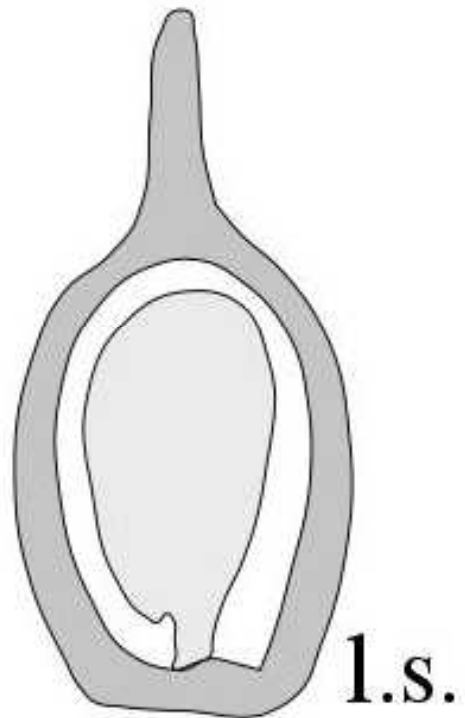
parietal



Placentation



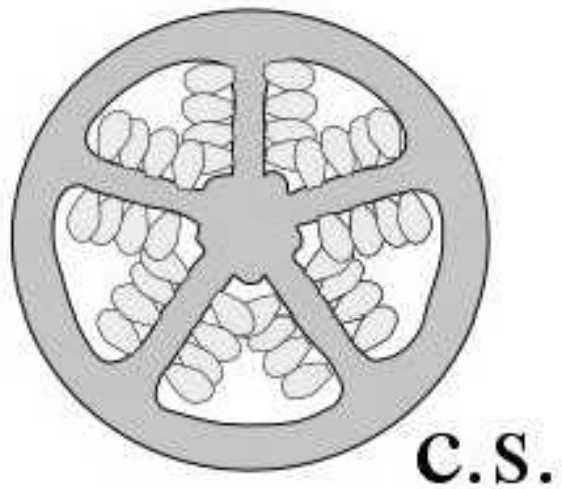
Placentation



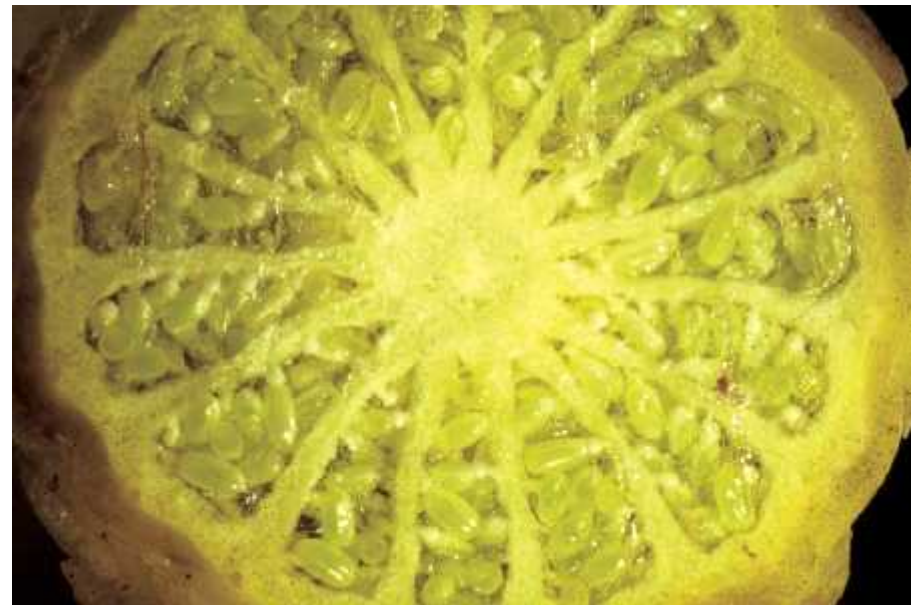
basal



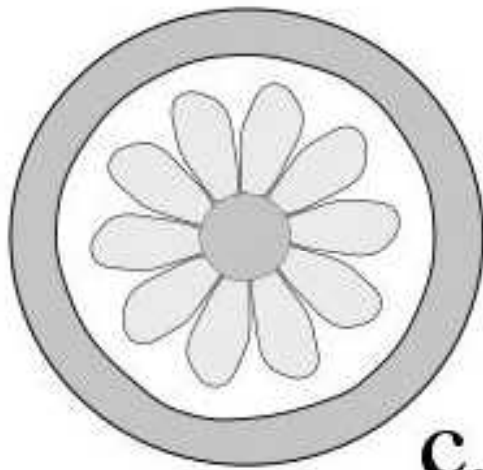
Placentation



laminar



Placentation

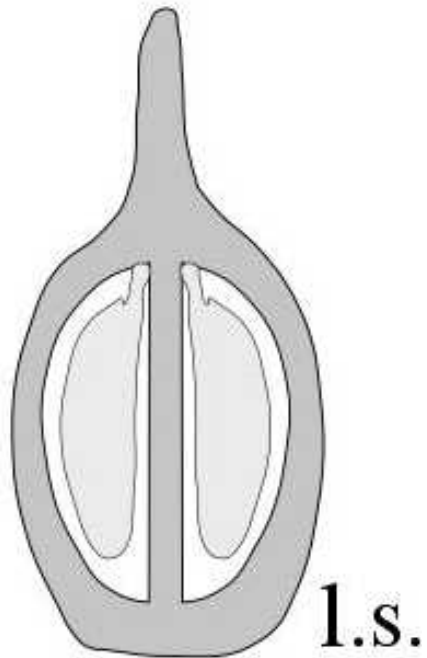


C.S.

free-central



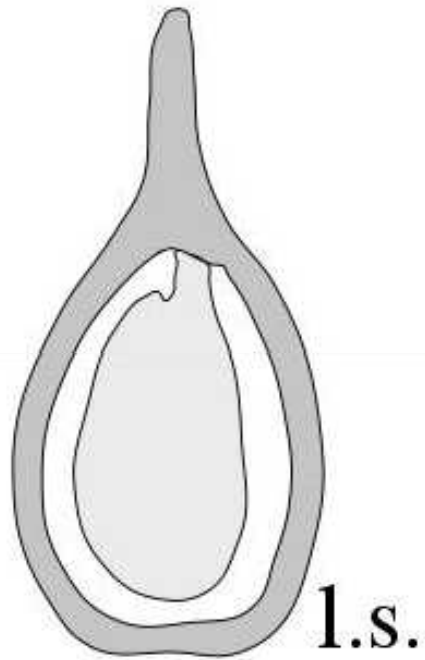
Placentation



apical-axile



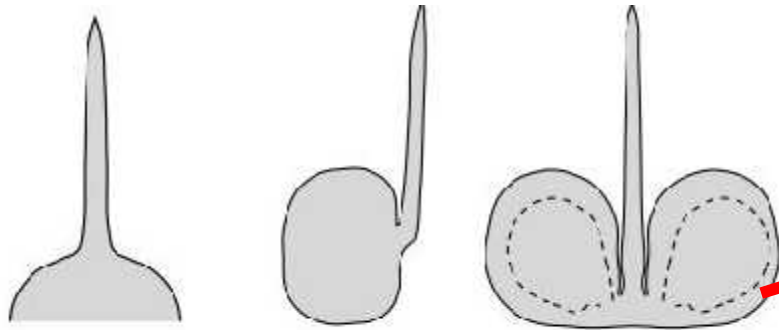
Placentation



**apical /
pendulous**



Style Position



terminal lateral gynobasic



Verbena rigida
Verbenaceae

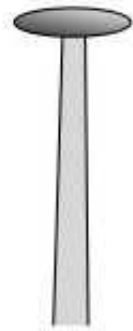


Borago officinalis
Boraginaceae



Fragaria sp.
Rosaceae

Stigma Types



discoid globose linear plumose