Lab#2 – Angiosperm Morphology

<u>Main objective for this lab</u>: To learn the different reproductive parts of plants.

angiosperm – one of a group of plants whose seeds are borne within a mature ovary (fruit)
morphology – the study of form and its development

<u>Lab #2a</u> deals with the **reproductive** parts of a plant - the flowers, fruits, and seeds.

<u>Objectives</u> for this lab include:

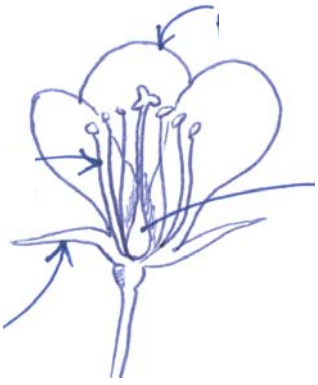
- to learn to recognize and name:
  - the parts of a flower
  - ovary position types
  - the descriptions of floral symmetry
  - types of inflorescences (**inflorescence** - the flowering part of a plant; flower cluster)
  - descriptive terms for the fusion of flower parts
  - descriptive terms for the presence or absence of flower parts
  - fruit morphology
  - fruit types

whorl – a ring-like arrangement of similar parts arising from a common point or node

Parts of a flower:

- <u>peduncle</u> – the stalk of a solitary flower <u>OR</u> of an inflorescence
- <u>pedicel</u> – the stalk of a single flower <u>in</u> an inflorescence
- <u>sepals</u> – the outermost (first) whorl of the flower
- <u>petals</u> – the second whorl of the flower
- <u>calyx</u> – the collective term for all of the sepals of a flower
- <u>corolla</u> – the collective term for all of the petals of a flower
- <u>perianth</u> – the calyx and corolla of a flower, collectively

<u>peduncle</u> **<u>pedicel</u>**

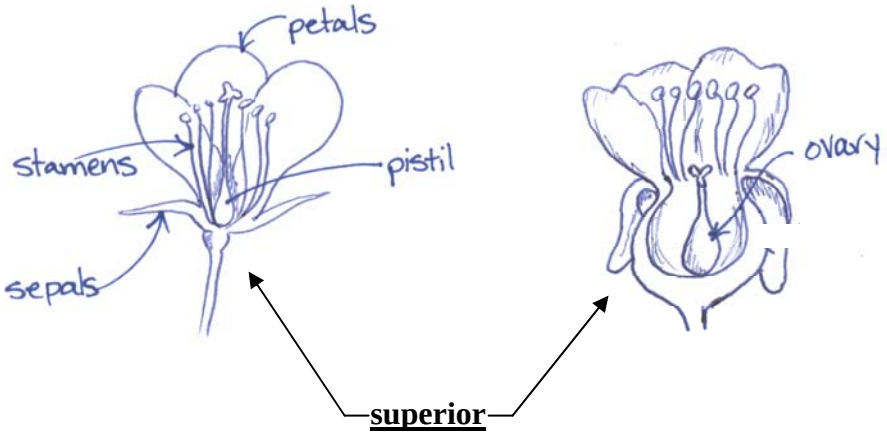


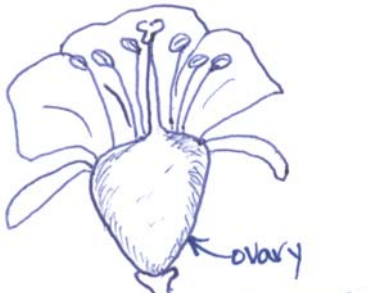
- <u>stamen</u> – one of the group of male reproductive organs of a flower
  - <u>anther</u> – the pollen-bearing portion of the stamen at the apex
  - <u>filament</u> – the stalk of the stamen supporting the anther
- <u>androecium</u> – the collective term for all of the stamens of a flower

- gynoecium (or pistil if the ovary is completely fused) – the collective term for all of the female reproductive parts of a flower
  - ovary – the expanded basal portion of the pistil that contains the ovules (immature seeds)
  - style – the narrow portion of the pistil connecting the stigma to the ovary
  - stigma – the portion of the pistil that is receptive to pollen
- bract – reduced leaf-like structure at the base of a flower or inflorescence
- tepal – a segment of a perianth that is not differentiated into a calyx and corolla
- receptacle – the end of the stem, which bears the flower parts

Ovary position:

- superior – describes the flower having the stamens, petals, and sepals attached **below** the ovary
- inferior – describes the flower having the stamens, petals, and sepals attached **to the top of** the ovary





Floral symmetry:

- actinomorphic – (regular) radially symmetrical; a line drawn through all planes of the structure will produce a mirror image on either side and all flower parts are of similar size and arrangement

- zygomorphic – (irregular) bilaterally symmetrical; a line drawn through only one plane of the structure will produce a mirror image on either side and all flower parts are not similar in size and arrangement

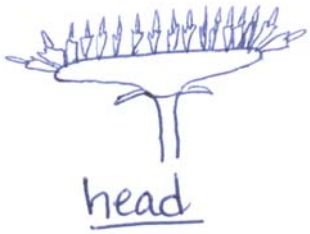
Inflorescence types:

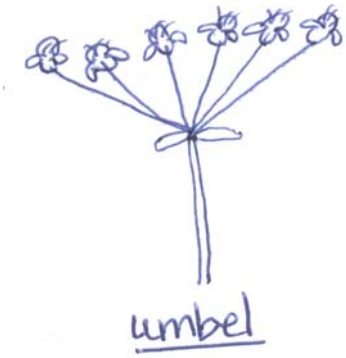
- solitary – flowers occurring singly, not in a cluster (ex. tulip)
  - spike – an unbranched, elongated axis with sessile (directly attached) flowers
    - raceme – an unbranched, elongated axis with flowers on pedicels
    - panicle – a branched raceme
      - spikelet – small spike of one to many flowers subtended by two bracts (glumes) (ex. grasses)

raceme & panicle

Inflorescence types: (cont.)

- catkin – consisting of a dense spike or raceme of apetalous (without petals), unisexual flowers (ex. willow, *Salix*)
- head – dense cluster of flowers (ex. asters)
- umbel – flat-topped or convex inflorescence having the flowers arising from a common point





Descriptive terms for the fusion of flower parts:

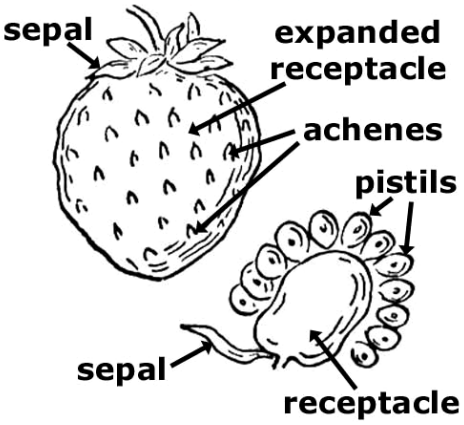
- free – not attached to other organs
- fused – attached to other organs
  - connate – fusion of like parts (ex. fusion of staminal filaments into a tube)
  - adnate – fusion of unlike parts (ex. fusion of the stamens to the corolla)
- sympetalous – petals partially or completely fused

Descriptive terms for the presence or absence of flower parts:

- complete – flower having all four whorls of parts (sepals, petals, stamens, pistils)
- incomplete – flower lacking one or more parts

- perfect (hermaphroditic) – flower having both male and female reproductive parts
- imperfect – flower having either stamens or pistils, but not both
- monoecious – plant having both staminate and pistillate, imperfect flowers on the same plant
- dioecious – plant having one or the other staminate or pistillate flowers on a plant (some have the staminate and others have the pistillate flowers)

Fruit morphology:



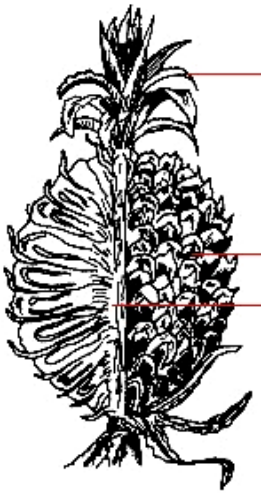
- carpel – another term for a "simple pistil" (formed from one modified leaf)
- locule – the chamber or cavity of an ovary containing the seed
- pericarp – the wall of the fruit
- seed – a ripened ovule

Fruit types:

- fruit – the mature (or ripened) ovary or ovaries of a seed-bearing plant
- accessory fruit – fruit derived from non-ovary tissue (ex. strawberry, which is formed from the receptacle)

Fruit Identification Categories { (1)fleshy/dry, (2)dehiscent/indehiscent, (3)single/multiple seeds }

- samara – dry, indehiscent (not opening), **winged** fruit
- nut – dry, indehiscent fruit, **not fused** to the ovary wall, and fruit is hard and tough
- achene – small, dry indehiscent fruit that **develops from the receptacle**, fruit wall not particularly hard and tough (ex. sunflower)
- caryopsis – a dry, one-seeded, indehiscent fruit in which the seed is fused to the pericarp (ex. grasses); a grain
- legume – fruit dry and dehiscent (opening) at maturity, composed of a single carpel opening along **two lines of dehiscence** (ex. beans)
- capsule – a dry, dehiscent fruit composed of **more than one carpel**
- drupe – fleshy with a **single ovary and only one seed** (ex. peach, olive, almond)
- pepo – fleshy fruit with a single ovary, multiple seeds, and with a **hard rind** (ex. watermelon)
- berry – fleshy fruit with a single ovary, multiple seeds, and **lacking a hard rind** (ex. tomato)
- *pome – fleshy, with multiple seeds and fruit surrounded by a **fleshy receptacle** (ex. apple)



Beyond a "simple" fruit

- multiple fruit – fruit formed from multiple flowers crowded on a single axis; see handout (ex. pineapple)
- aggregate fruit – fruit formed from one flower with many ovaries/fruits (ex. raspberry); a strawberry is also an aggregate fruit

Summary of Flower and Fruit Terms

PARTS OF A FLOWER
peduncle
pedicel
sepals
petals
calyx
corolla
perianth
stamen
anther
filament
androecium
gynoecium
pistil
ovary
ovule
style
stigma
bract
tepal
receptacle

OVARY POSITION
superior
inferior

FLORAL SYMMETRY
actinomorphic (radial)
zygomorphic (bilateral)

INFLORESCENCE TYPES
solitary
spike
raceme
panicle
spikelet
catkin
head
umbel

FUSION OF PARTS
free
fused
connate
adnate
sympetalous

PRESENCE OR ABSENCE OF PARTS
complete
incomplete
perfect
hermaphroditic
imperfect
monoecious
dioecious

FRUIT MORPHOLOGY
carpel
locule
pericarp
seed

FRUIT TYPES
fruit
accessory fruit
samara
nut
achene
caryopsis
legume
capsule
drupe
pepo
berry
pome
multiple fruit
aggregate fruit