



# Temperate Zone Pomology

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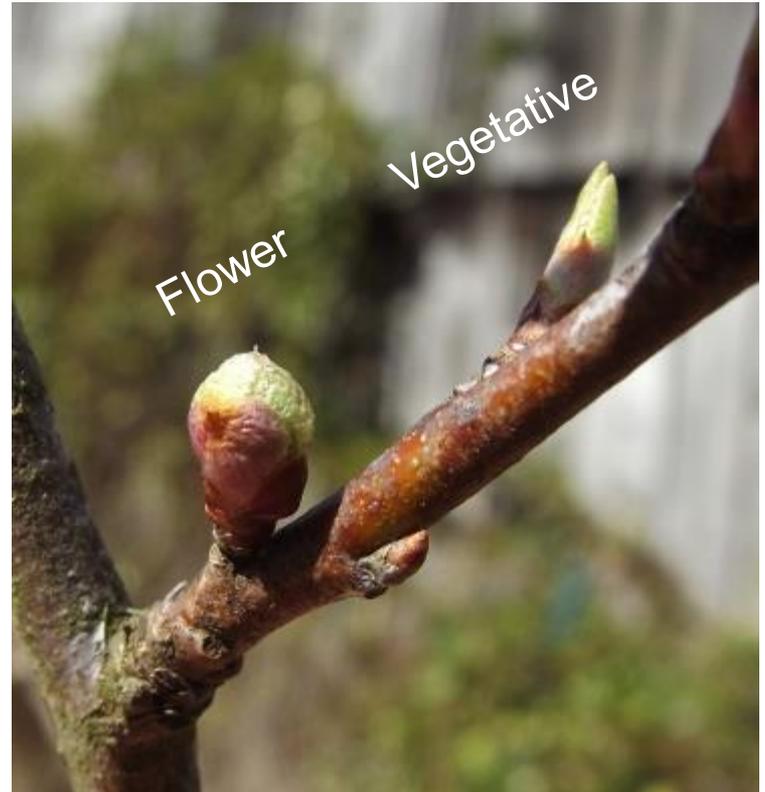
Isfahan University of Technology

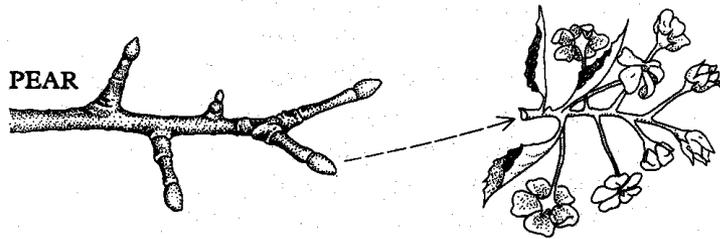
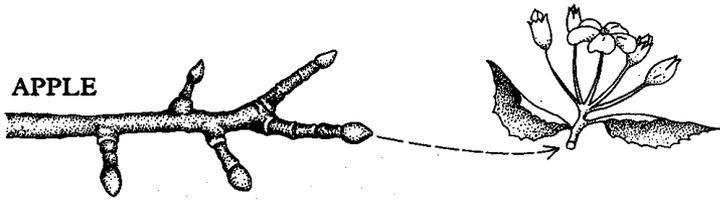
# Buds and Flowers in Fruit Trees



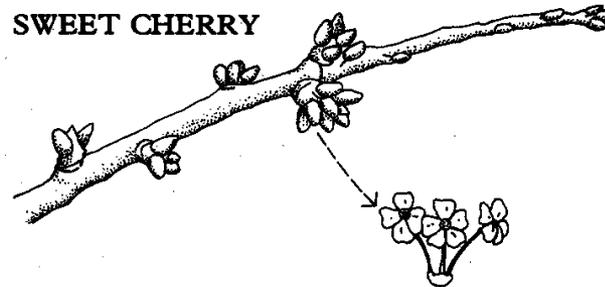
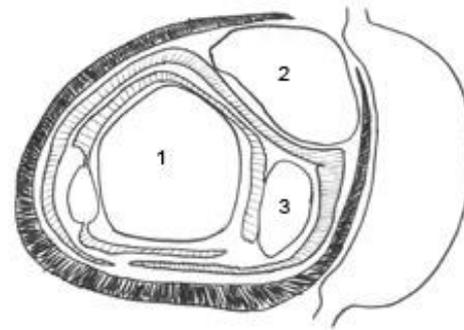
# Buds (Function)

- Vegetative (leaf)
- Flower bud (generative)
  - Simple (Stone fruits)
  - Mix (Pome fruits)
  - Compound (Grape)





## Mixed buds



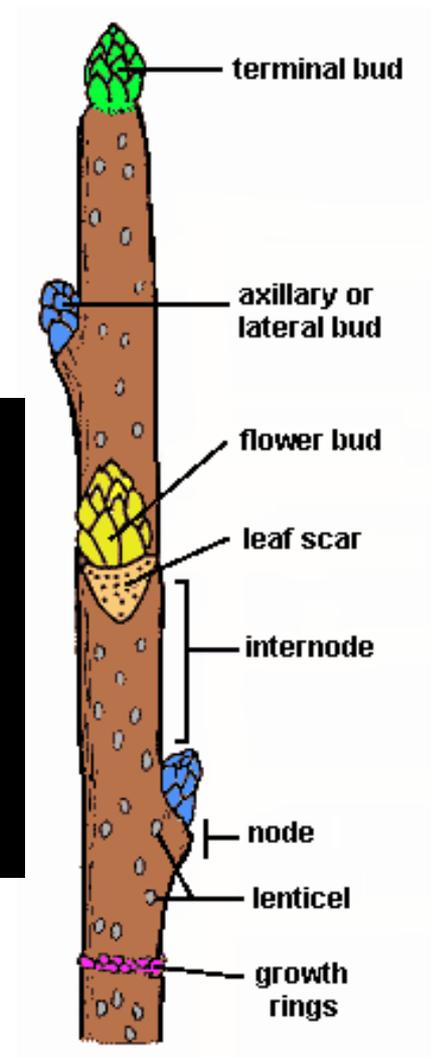
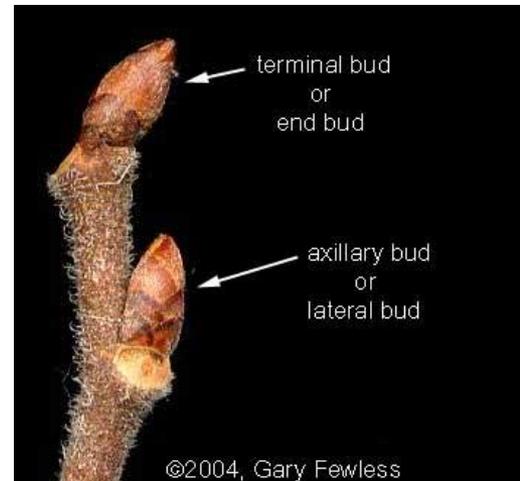
Compound bud

Grape

## Simple buds

# Buds (Position)

- Lateral
  - Vegetative (Pome fruits)
  - Flower (Stone fruits)
- Terminal
  - Vegetative (Stone Fruits)
  - Flower (Pome Fruits)



# Buds (Number of Flower)

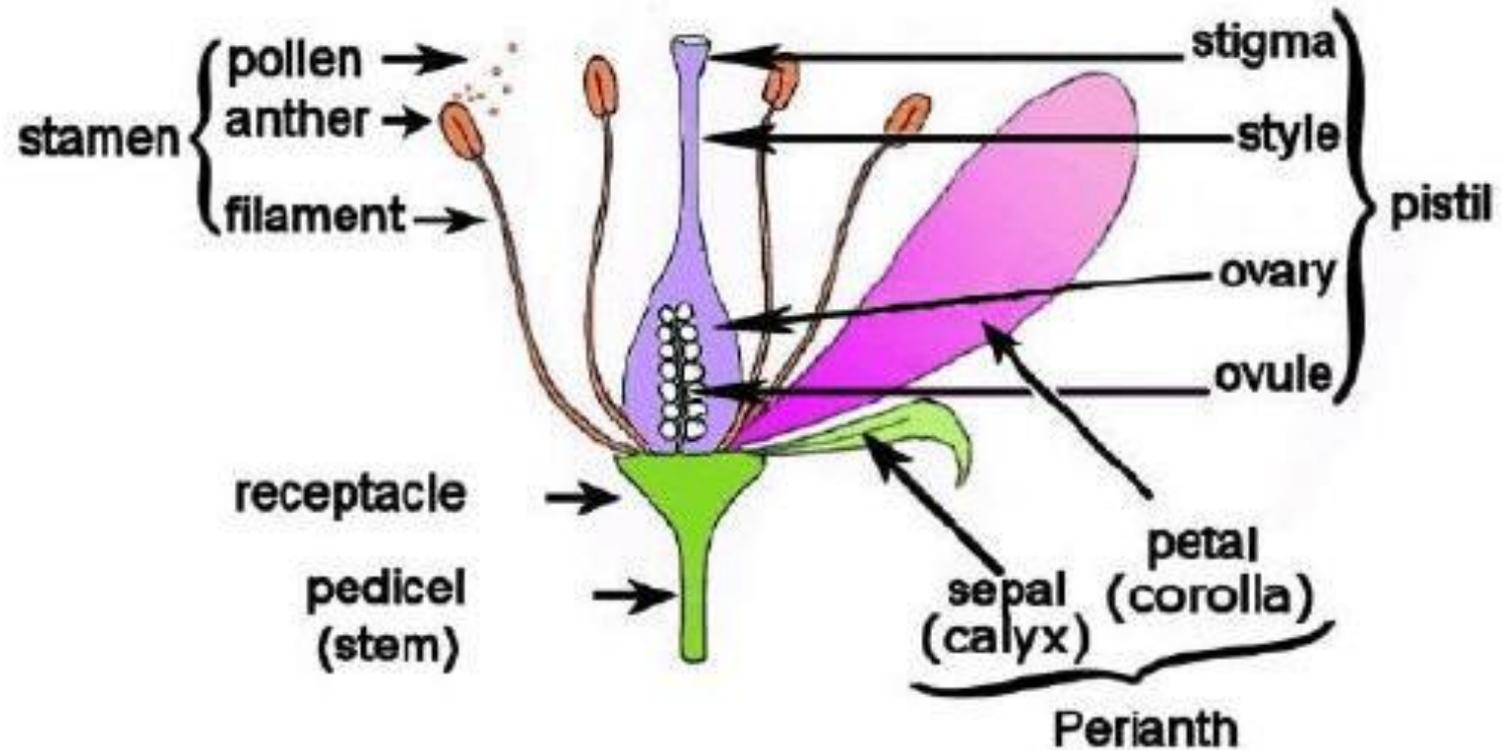
- One flower (Almond, Peach, Quince)



- $\geq$  Two flower (Apple 5-6; Pear 7-8; Cherry 2-4)

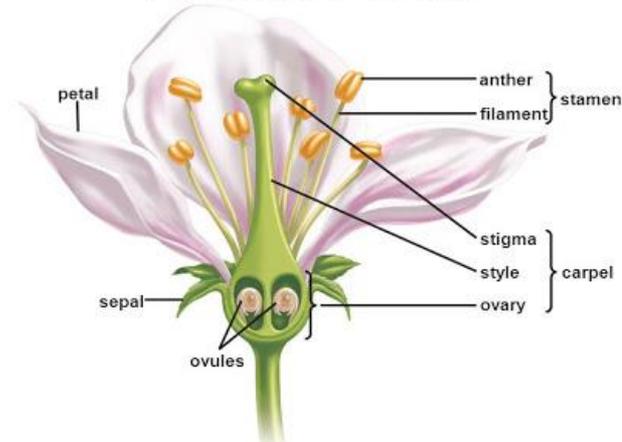


# Parts of a Flower



# Flower

A Complete Flower



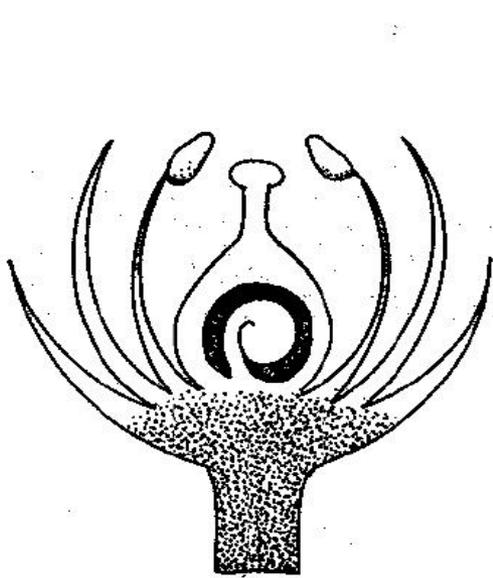
(a) A representative dicot flower

- Complete flower
- Incomplete flower
- Perfect flower (Hermaphrodite, Bisexual)
- Imperfect (Monosexual) (Staminate – Pistillate)

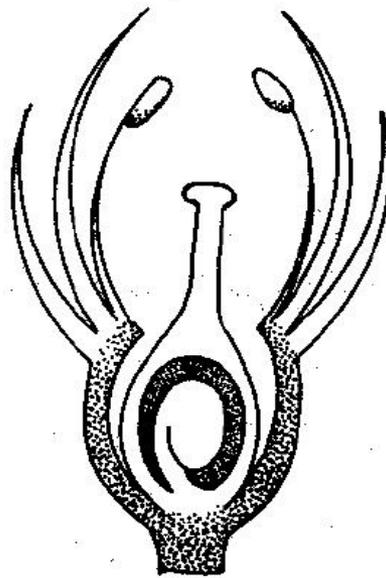
# Tree (sexuality)

- Hermaphrodite ♀♂
- Monoecious ♀ and ♂
- Dioecious ♀ or ♂
- Andromonoecious ♀♂ and ♂
- Gynomonoecious ♀♂ and ♀
- Trimonoecious ♀♂ and ♀ and ♂

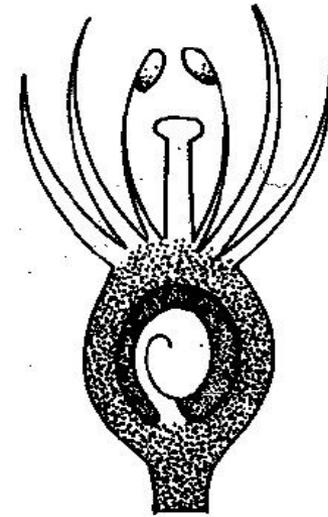
# Ovary Position



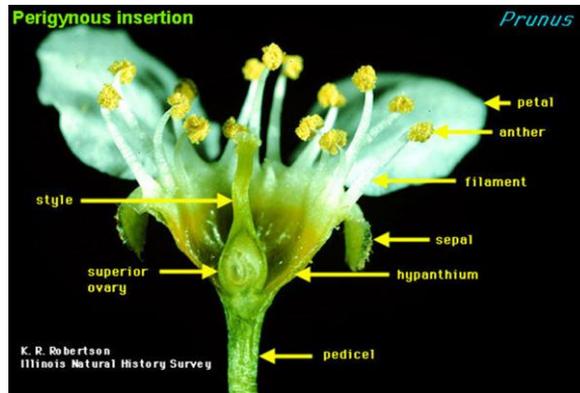
**Hypogynous**  
Superior Ovary



**Perigynous**  
Half Inferior Ovary



**Epigynous**  
Inferior Ovary



# Hypogynous

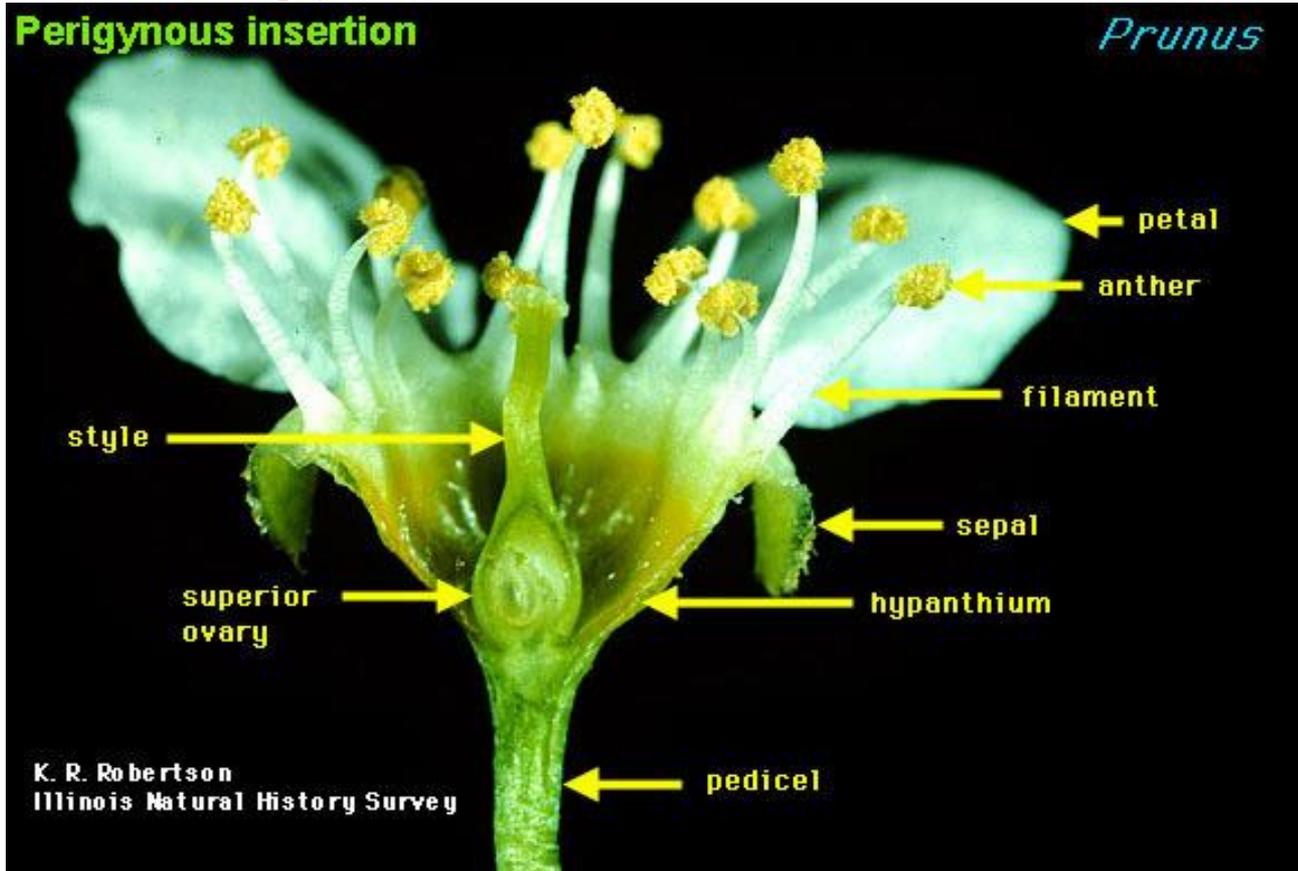


# Perigynous

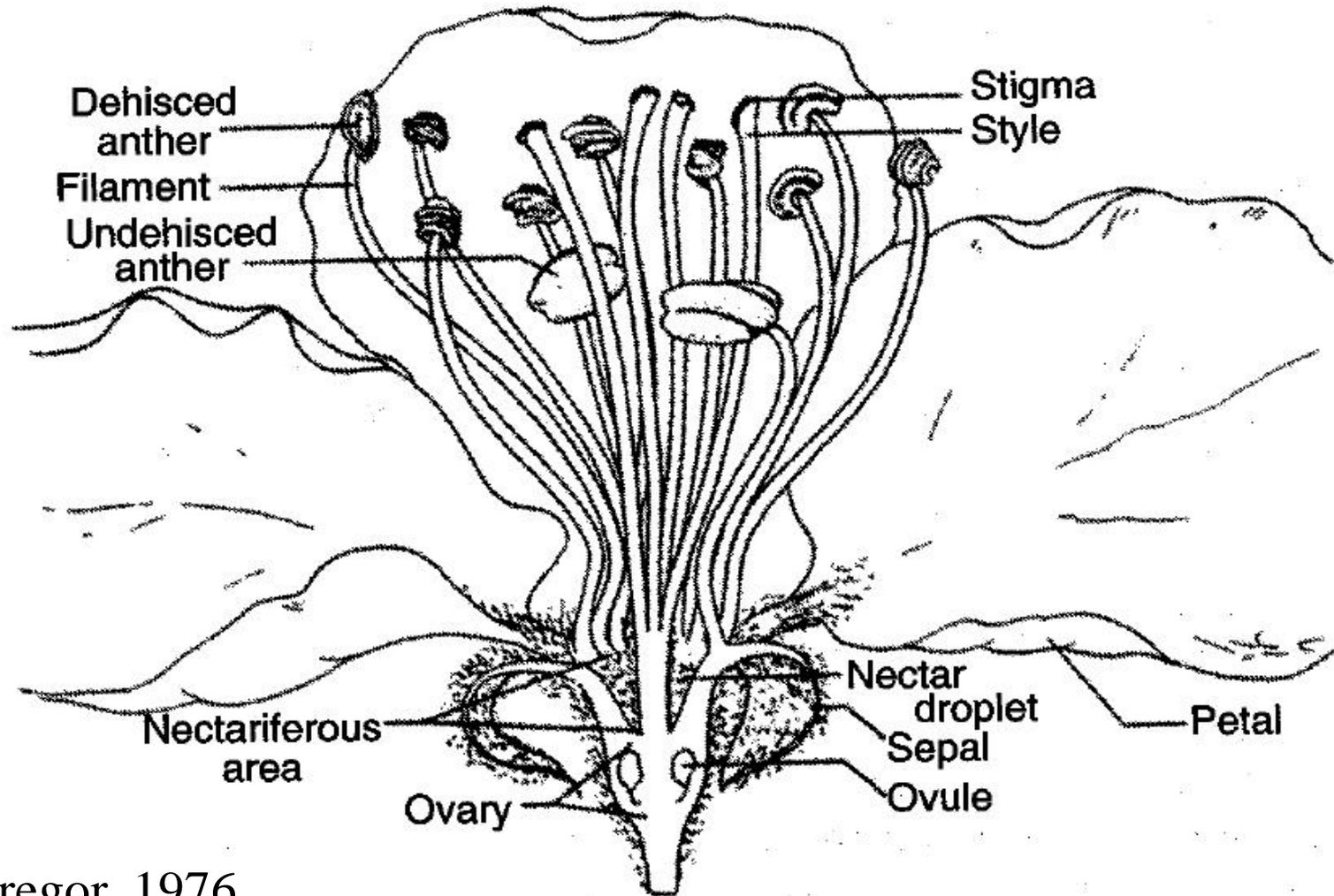
Perigynous insertion

*Prunus*

- Floral tube
- Fused base of sepals, petals & stamens

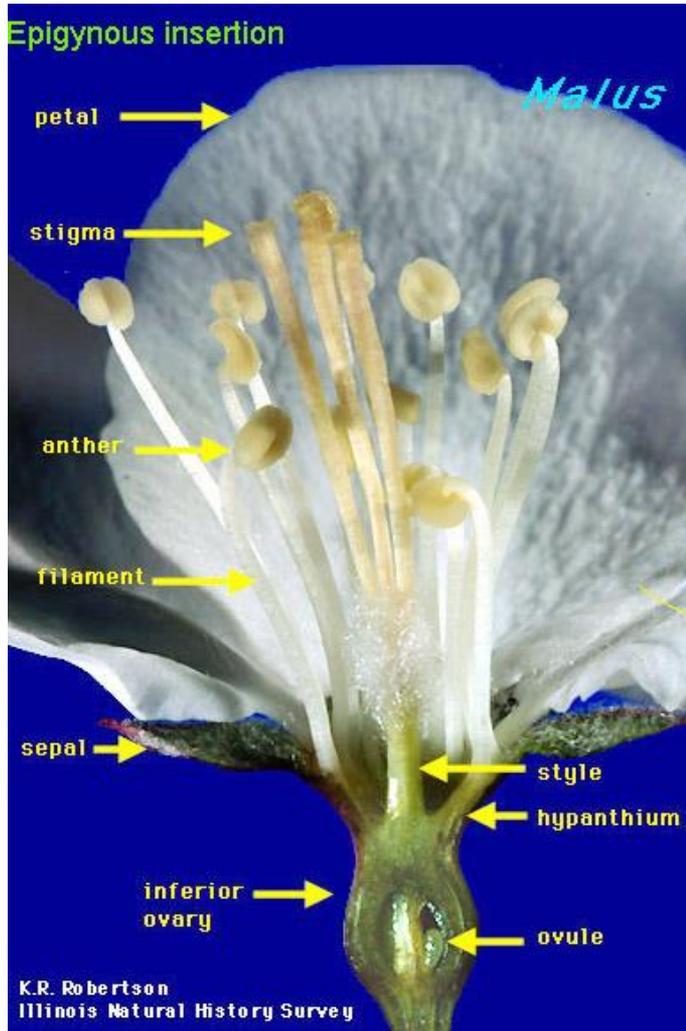


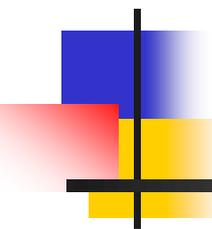
# Epigynous



McGregor, 1976

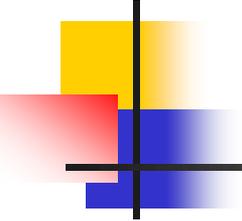
# Epigynous Flower





# Inflorescences

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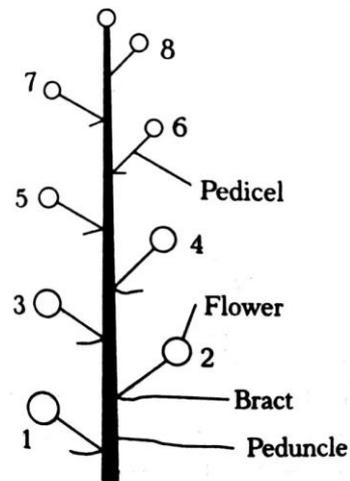
# Solitary Flowers

- Some species of plants produce solitary flowers.
- Solitary flowers are borne singly and separate from one another.
- Quince, Almond, apricot

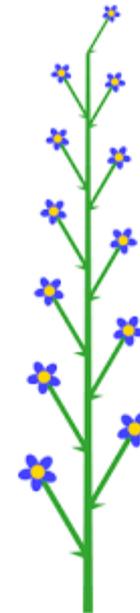


# Racemose

- Indeterminate
- Lower flowers open first



(a) Simple raceme



# Common Inflorescences

- Raceme
- Panicle
- Spike
- Catkin
- Umbel
- Corymb
- Head
- Spadix



Spike



Cyme



Catkin



Capitulum



Raceme



Corymb



Umbel

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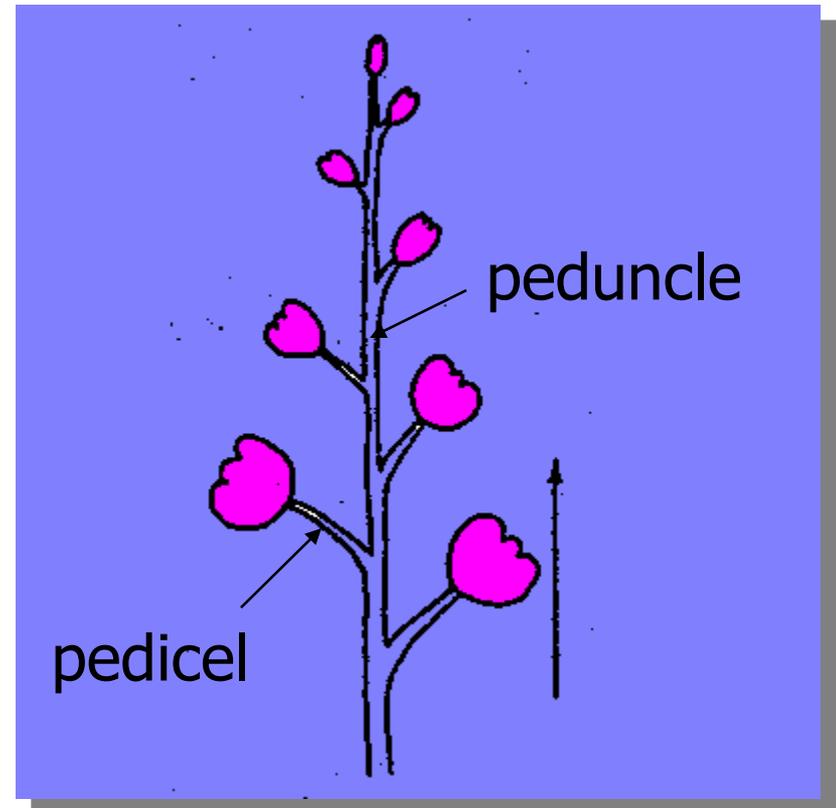
Compound umbel



Panicle

# Raceme

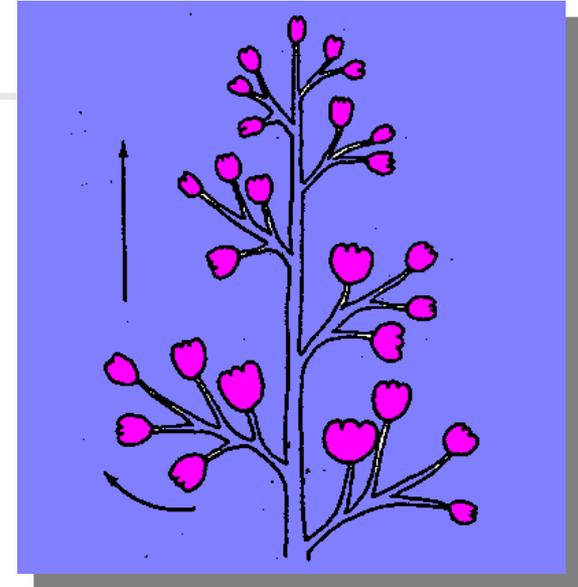
- Individual flowers have pedicels.
- Pedicels can vary in length from species to species.
- Lower flowers open first.
- Indeterminate.



Raceme

# Panicle

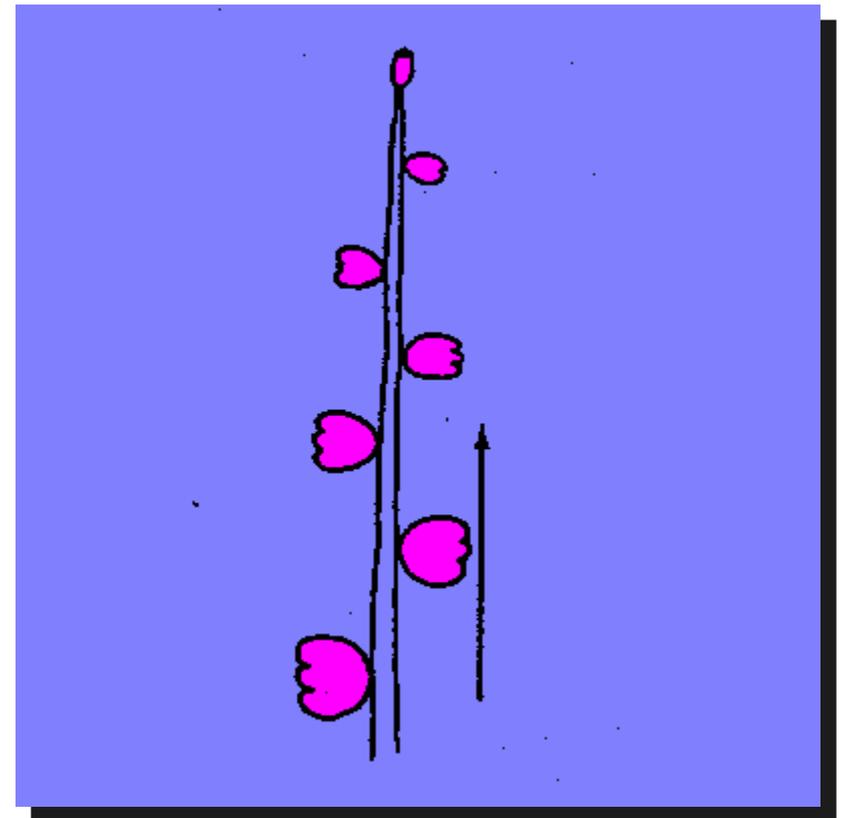
- A highly branched inflorescence consisting of many, repeating units.
- Indeterminate.
- Pistachio



*A panicle of  
Racemes*

# Spike

- Individual flowers are sessile (without pedicels).
- Banana



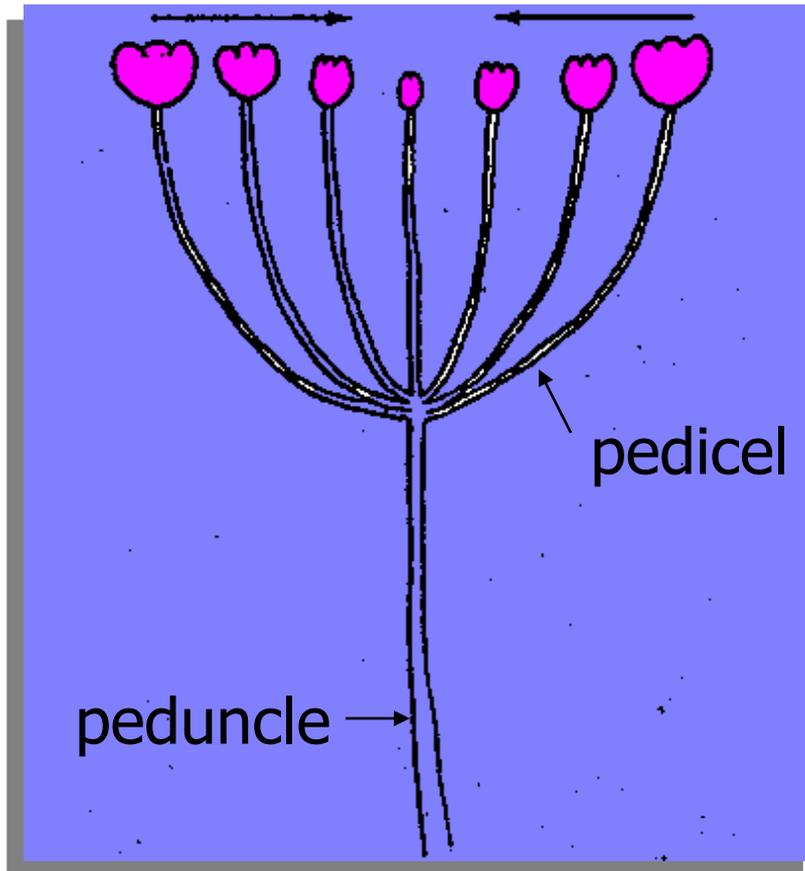
spike

# Catkin

Walnut and Filbert (Male Flower)



# Umbel



- Individual flower pedicels all originate from the same spot on the peduncle.
- Outer flowers open first.

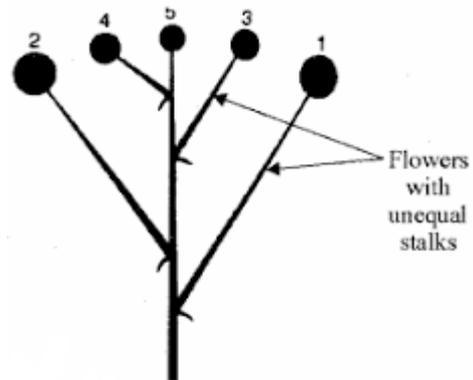
# Umbel



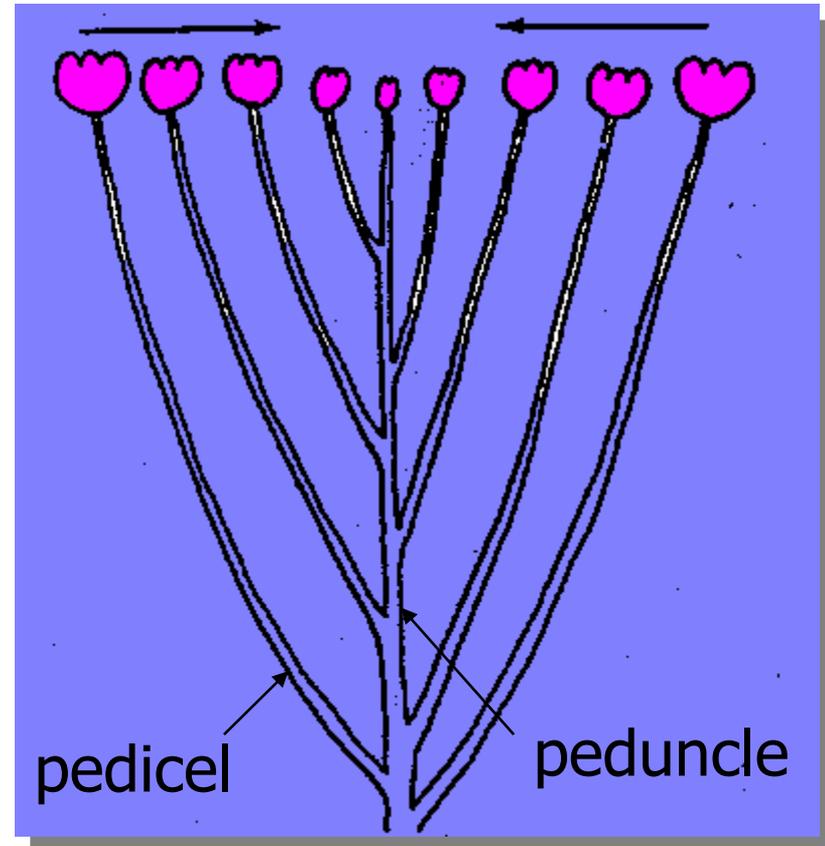
Allium

# Corymb

- Somewhat similar to the umbel.
- Individual flower pedicels are attached to the peduncle at different points.
- Often flat-topped.
- Outer flowers open first.
- pear



Corymb of *Iberis amara*



corymb

# Corymb

- *Pyrus calleryana*

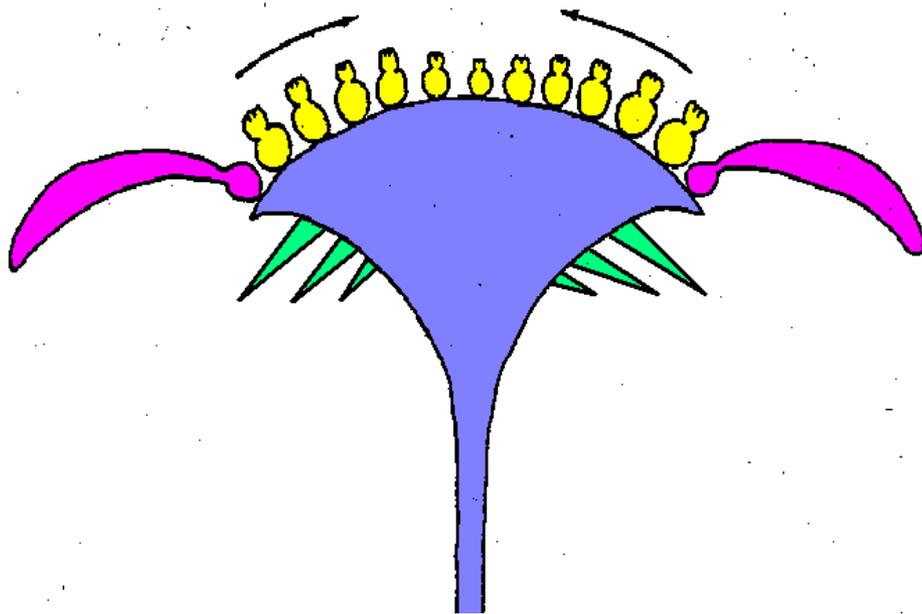


# Spadix

Date Palm



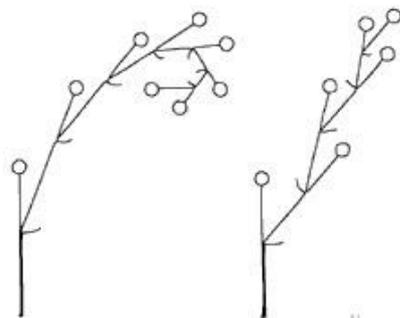
# Head



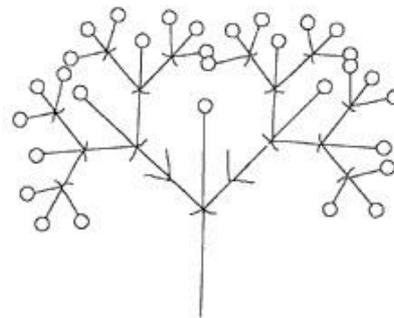
# Cymose

- Determinate
- The inner or upper flowers open first

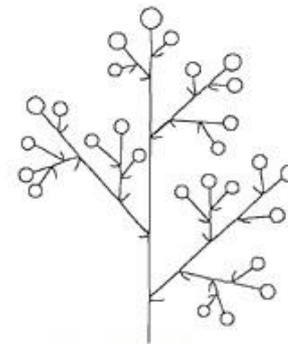
cymose



monochoasial cymes



dichasial cyme

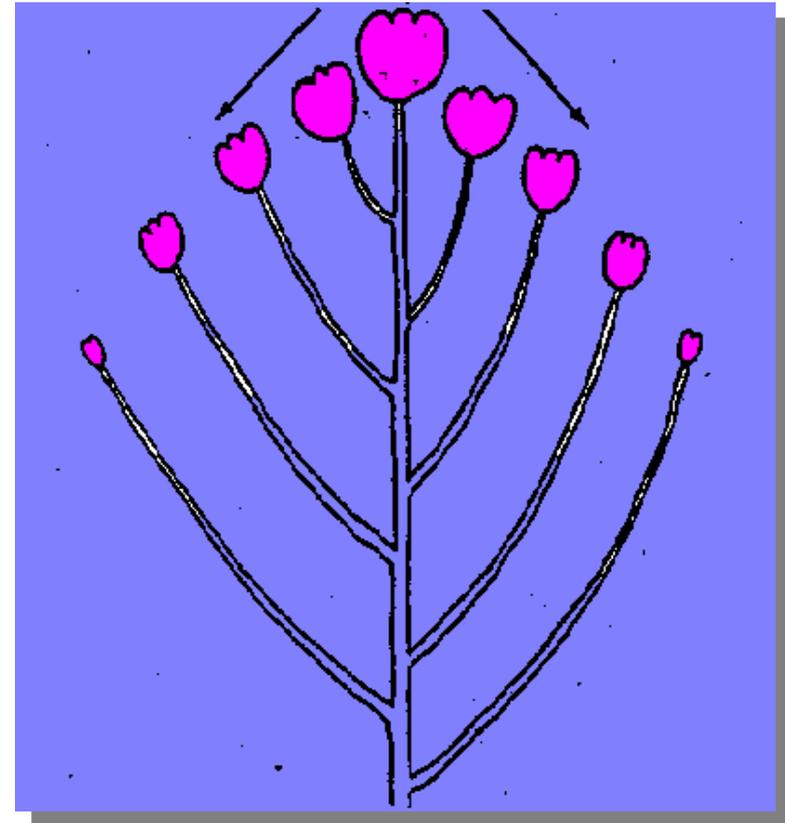


Polychasial cyme  
(panicle)

# Cyme



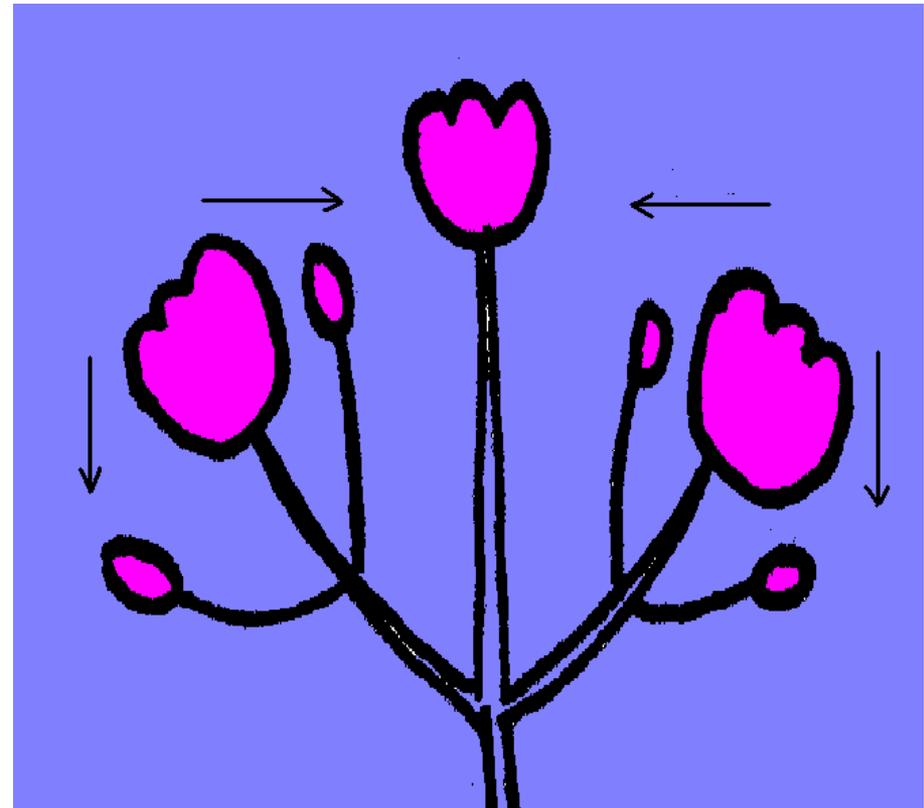
Apple



cyme

# Cyme

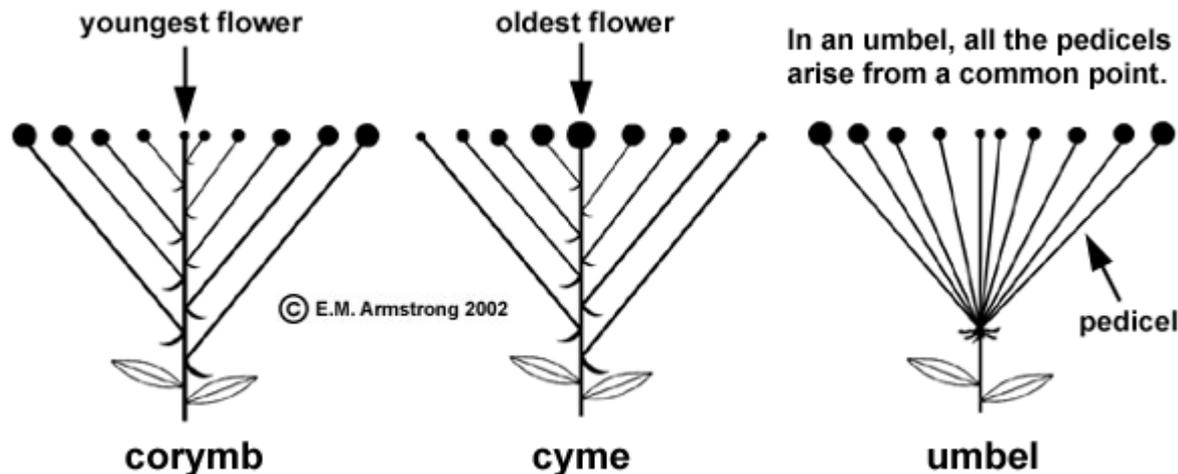
- Cymes are often compound as shown in the illustration to the right.



compound cyme

# Corymbs vs. Cymes

- Often these two types of inflorescences can look a lot alike.
- Remember that corymbs are indeterminate, they continue to elongate as the season progresses. Cymes are determinate and do not continue to elongate as the growing season progresses. Also, the *inner* flowers of cymes open first.



# Types of Fruits

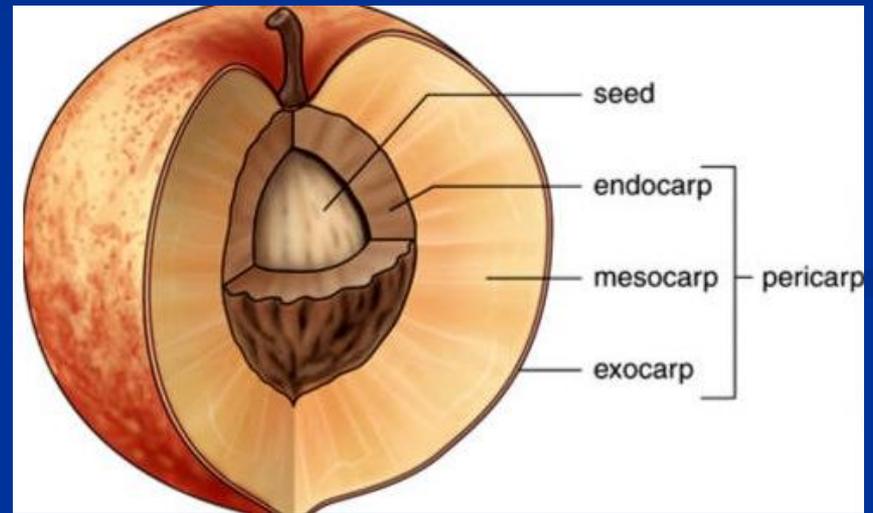
# Types of fruit

■ Fruits are classified as:

A. Simple

B. Aggregate

C. Multiple



## ■ Simple fruits

- Develop from a single ovary containing one or more carpels
- Fleshy and dry
- Dry
  - Indehiscent
  - Dehiscent
- Fleshy fruits include:
  - a. Drupe –ex. cherries and peaches
  - b. Pome – ex. apples
  - c. Berry – ex. Grape
  - d. Hesperidium ex. orange
  - e. Pepo – ex. cucumber

# Nut

- Ovary wall is tough and woody.

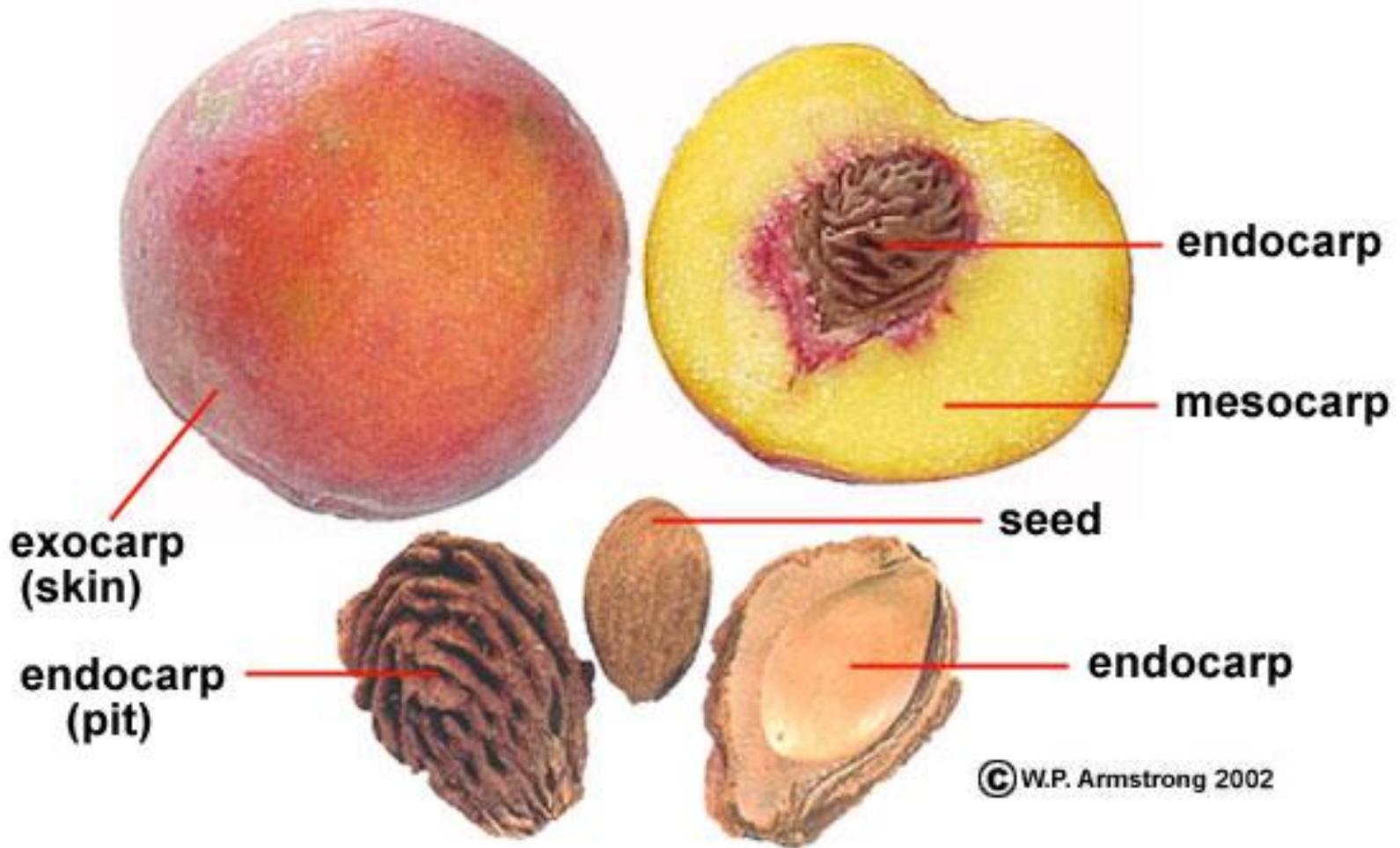


# Fleshy Fruits

- Fruit is generally moist and often edible.
- Drupe
- Pome
- Berry
- Hesperidium

**Drupe** (or **stone fruit**) is an fruit in which an outer fleshy part (exocarp, or skin; and mesocarp, or flesh) surrounds a single shell (the pit, stone, or pyrene) of hardened endocarp with a seed (kernel) inside. (plum, apricot, peach, almond, cherry)

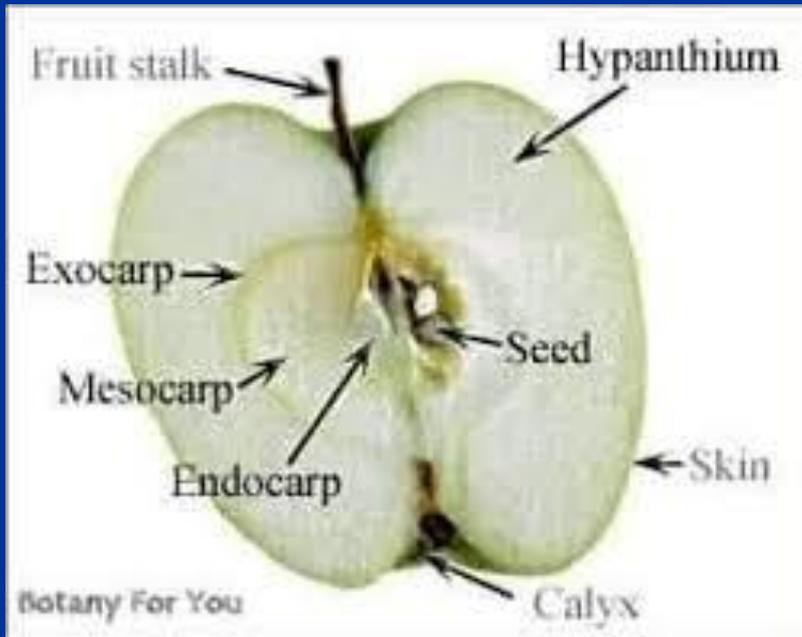
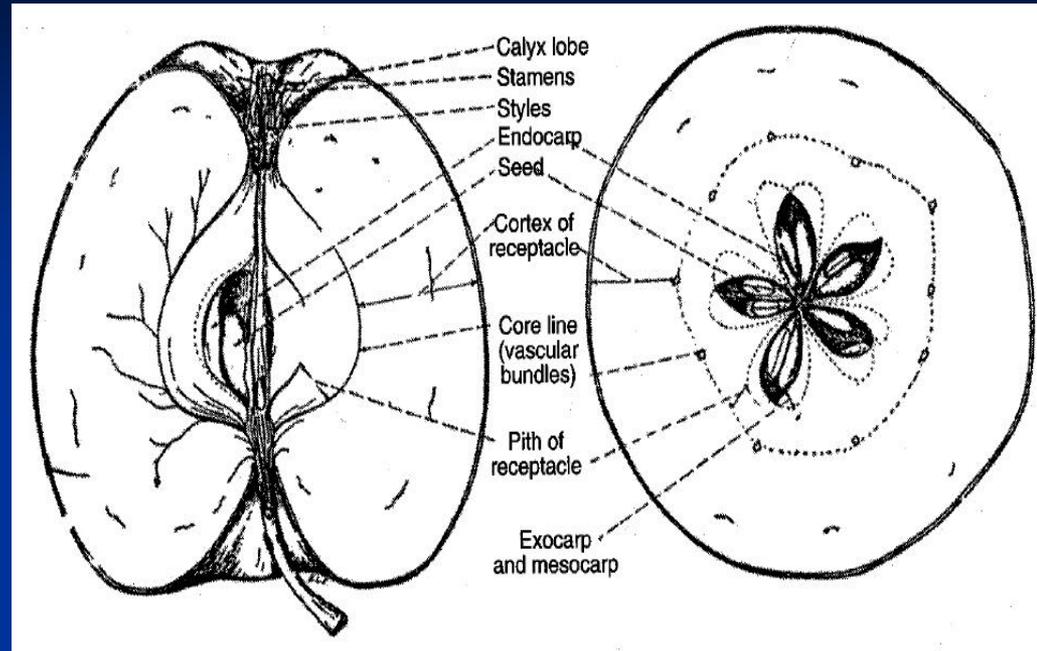




**Drupe (fleshy fruit with a stony endocarp)**

The pome is a fleshy fruit in which the carpels are surrounded by an enlarged hypanthium.  
(Pear, Apple, Quince)

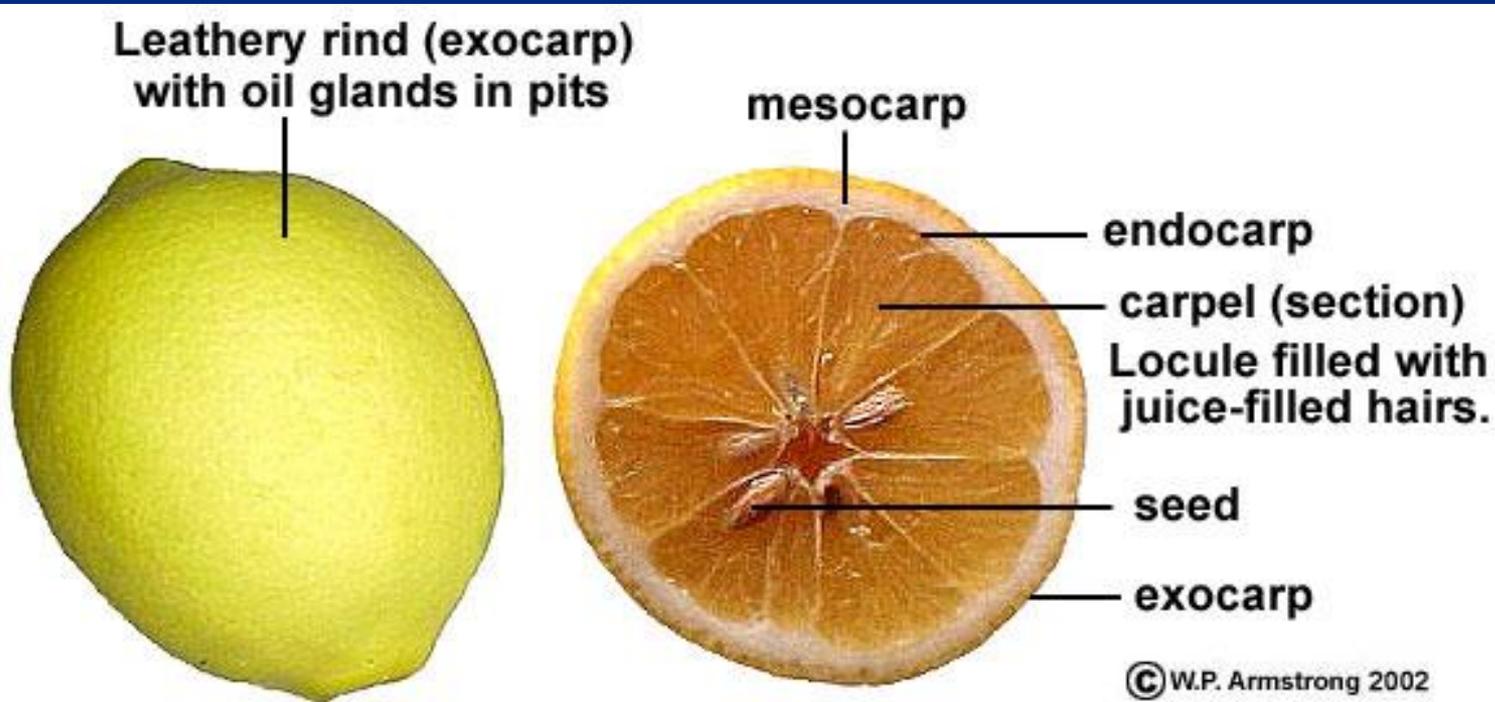




# Berry: Grape, Blueberry, Blackberry



# Hesperidium: orange, lemon, grapefruit



Hesperidium (berry with a leathery rind)  
e.g. lemon (*Citrus lemon*)

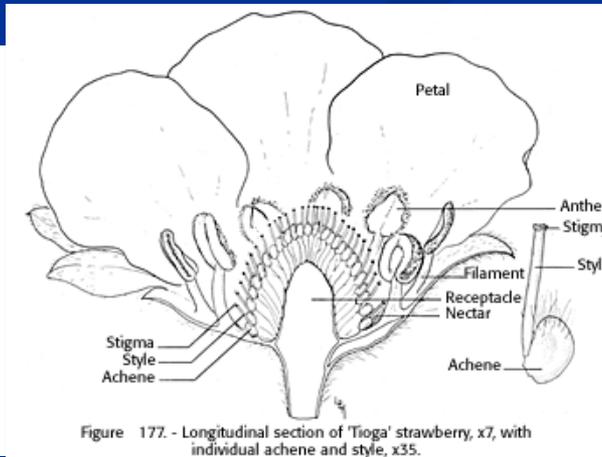
# Multiple Fruits

- Fruit composed of mature ovaries from several flowers.
- Example: pineapple



# Aggregate Fruits

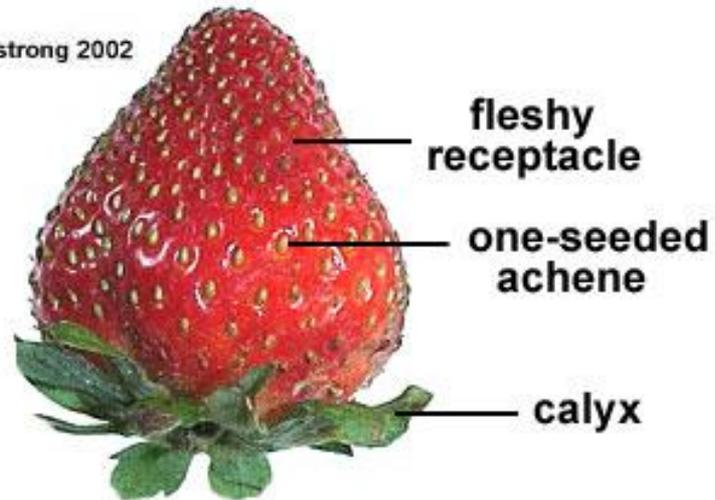
- Fruit composed of mature ovaries from separate pistils of one flower
- Example: strawberry



© W.P. Armstrong 2002

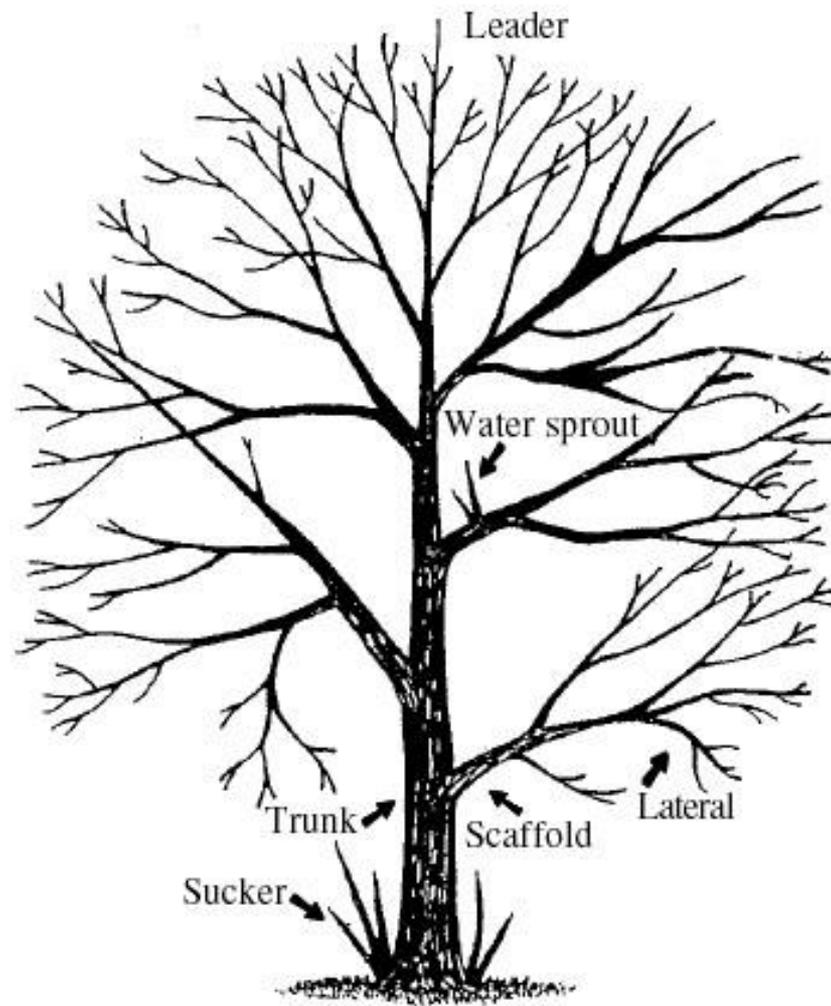


**Strawberry Flower**

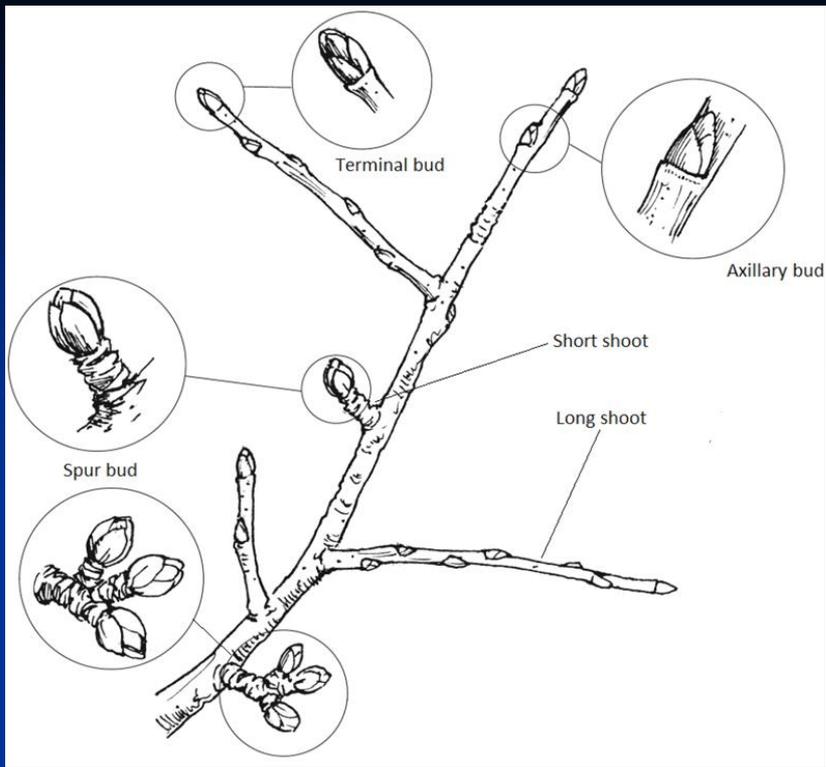


**Aggregate Fruit**  
Many one-seeded achenes  
produced by a single flower.

**Hybrid Strawberry (*Fragaria ananassa*)**



Typical above-ground tree framework



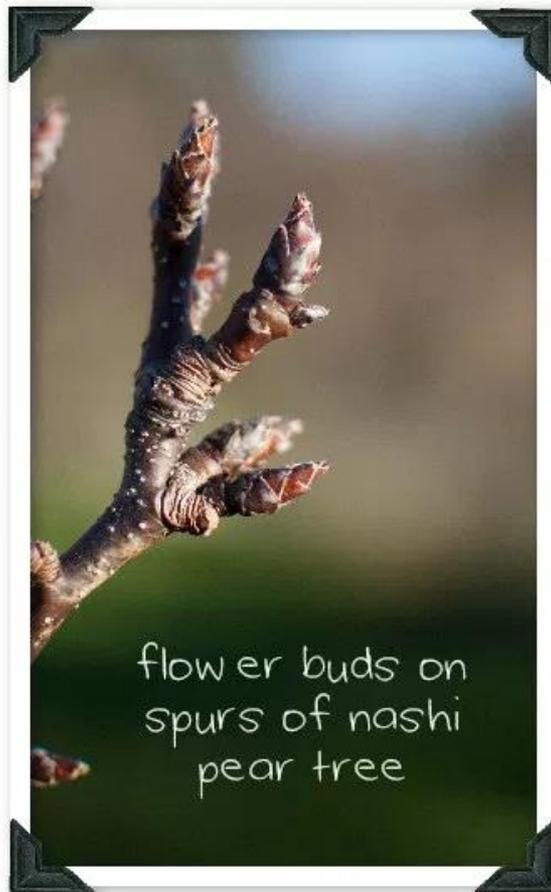
# Spur



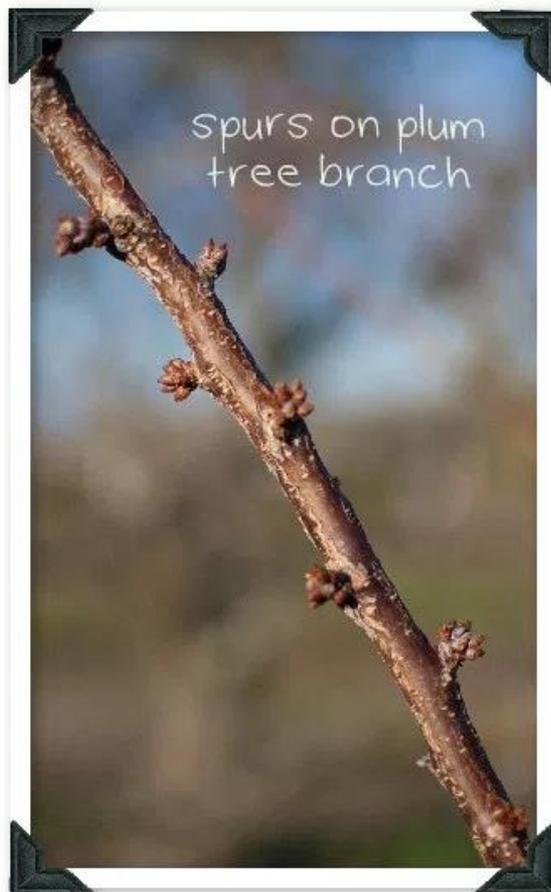


flower  
bud on  
spur

leaf bud on  
apple tree



flower buds on  
spurs of nashi  
pear tree



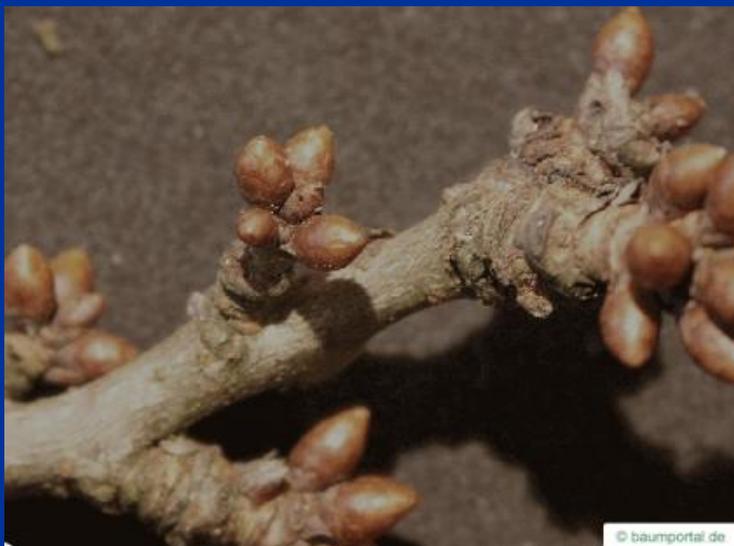
spurs on plum  
tree branch



Almond



Apple



Cherry



Plum