The Fruit

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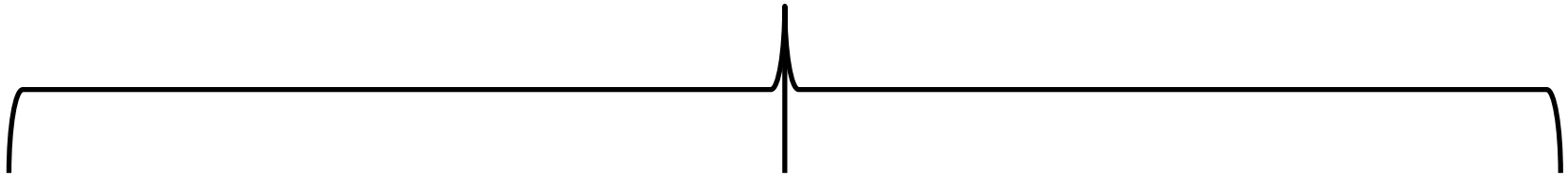
Fruit

Fruit: Ripened ovary of the flower, enclosing seeds.

- **Eucarp (True fruit):** when the fruit is developed only from the ovary. The fruit is called as true fruit. e.g Mango.
- **Pseudo carp:** In some fruits, in place of ovary, some other parts of flower like thalamus, inflorescence, calyx are modified to from a part of fruit. These types of fruit are called false fruits. e.g. Apple, pear.
- **Partheno carp:** The are fruits that from when the ovary ripens into a fruit and there are no seeds inside it, that is, without fertilization of the eggs inside it, e.g. Banana.

Classification of fruit

Fruits are divided in three groups



1. Simple fruits
2. Aggregate fruits
3. Composite fruits

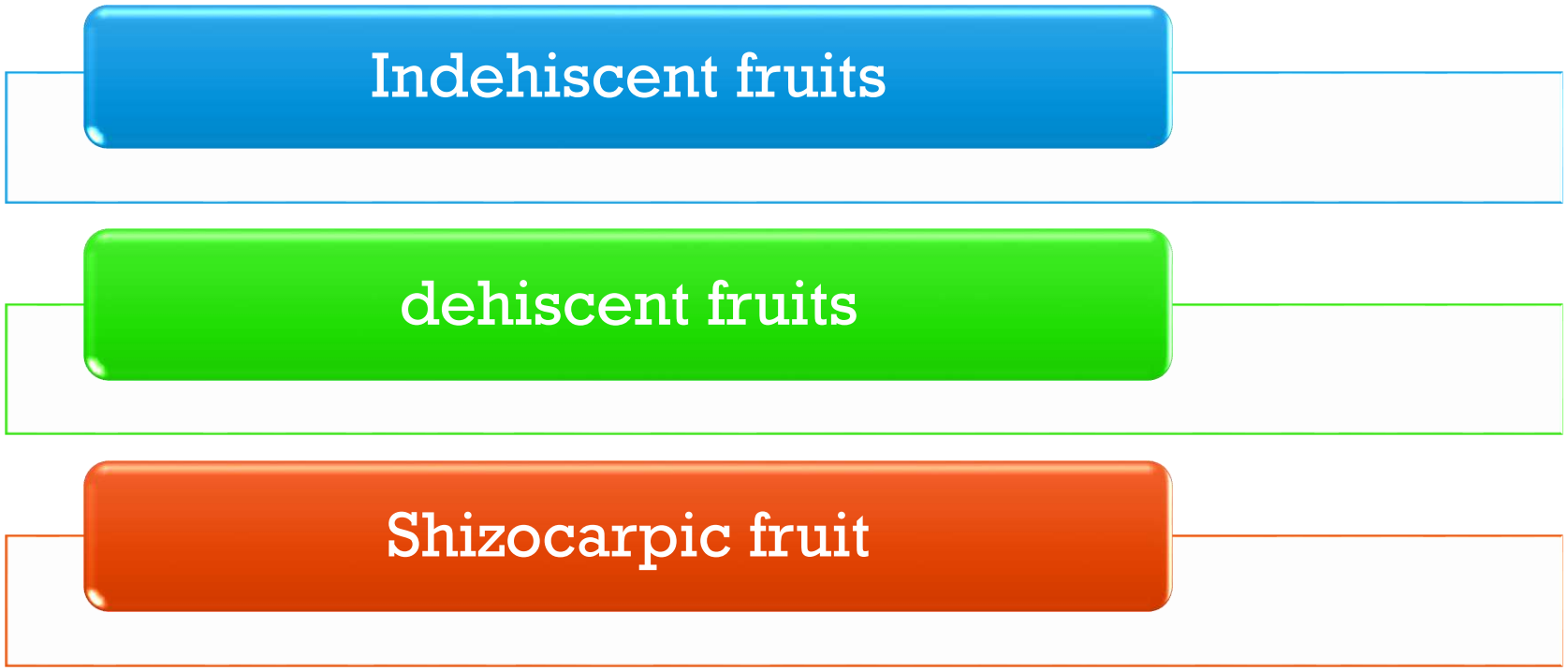
1. Simple fruit: These fruit develop from monocarpellary ovary or multicarpellary syncarpous ovary. Simple fruits are of two types:

A. Dry fruit

B. Fleshy fruit

A. Dry fruit: Pericarp of simple dry fruit is hard and dry and not differentiated into epicarp, mesocarp and endocarp. Such fruits are called dry fruit.

* Simple dry fruits can be divided into following three groups:



A- Indehiscent fruits: These simple dry fruits are generally of small size and single seeded pericarp does not rupture even after maturity

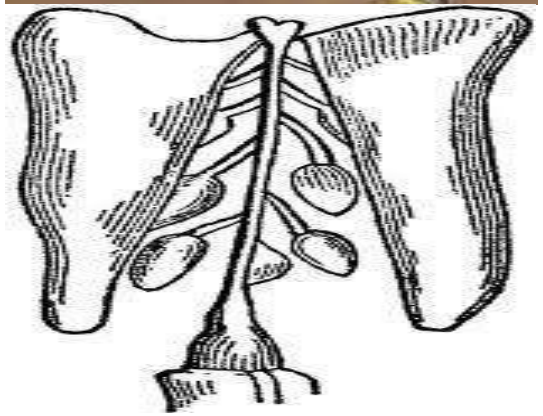
1. Achene e.g. *Mirabilis*.
2. Grain e.g. Rice.
3. Cypsela e.g. Compositae family plants.
4. Sammara e.g. *Holoptelia*.
5. Nut e.g. *Ouercus*.

B- dehiscent fruits: After ripening pericarp are ruptured and seeds are dispersed outside.

1- Legume e.g. Pea.

2- Follicle e.g. Vince.

3- Siliqua e.g. Mustard



4- Capsule: Is found and dehiscence occurs by various methods. Poricidal (poppy), loculicidal (cotton), septifragal (Datura), Septicidal (Lineseed).






C- Shizocarpic fruit: It is a multiseeded fruit. After ripening,it is devided into mericarp and seeds come out after destruction of pericarp.

1) Double samara e.g. samara

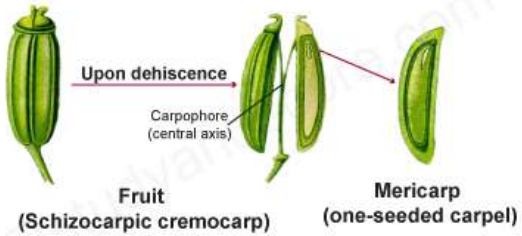
2) Cremocarp e.g. Coriander

3) Carcerulus e.g. *Ocimum*.

4) Regma e.g. Euphorbiceae family.

5) Lomentum e.g. *Tamarind*.

-1-



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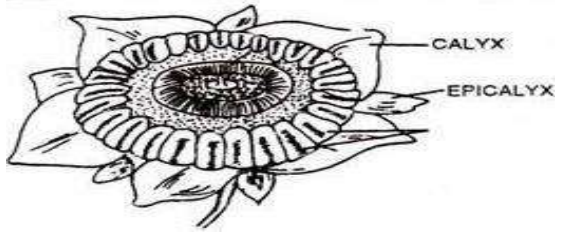

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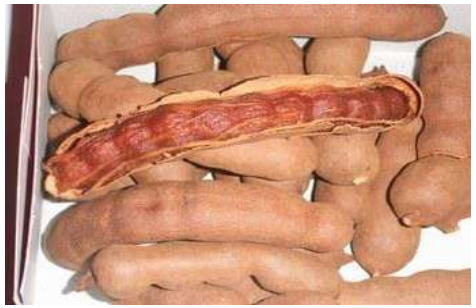

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B. Fleshy fruit: These fruit develop from superior or inferior syncarpous gynoecium.

These may be unilocular or multilocular.

Fleshy fruits are of following types:

1. **Drupe fruit:** These fruit develops from mono or muluticarpellary, syncarpous, superior ovary e.g. Peach

2. Berry: These fruits develop from mono or multicarpellary syncarpous ovary.

- Plants with superior ovary e.g. Tomato.
- Plants with inferior ovary e.g. Banana.

- Pepo: These fruit develops from tricarpellary, syncarpous and inferior ovary. E.g. fruit of Cucurbitaceae family.
- Pome: This fruit develops from bi or multicarpellary syncarpous inferior ovary. E.g. Apple, pear.

2. Aggregate fruit: These fruits develop from multicarplelary apocarpous ovary. Becase in apocarpous ovary, each carpel is separated from one another, therefore it forms a fruitlet.

- These fruits are made up of bunch of fruitlets which is known as etaerio.

1. Etaerio of follicles e.g. *Magnolia*
2. Etaerio of achenes e.g. *Rose*.
3. Etaerio of drupes e.g. *Raspberry*.
4. Etarerio of berries e.g. *Annona*.

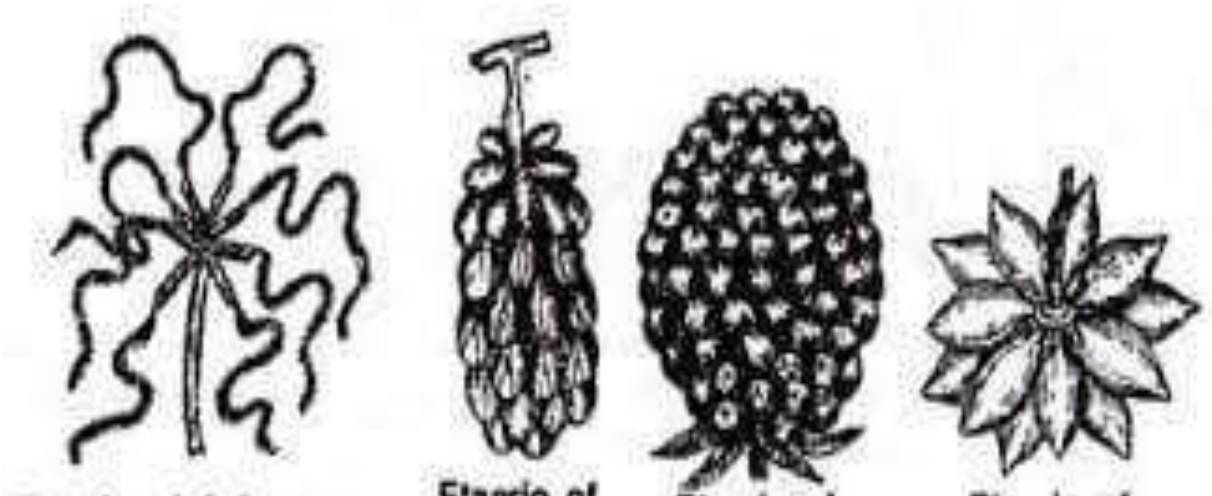

Fig. 93. Aggregate fruits.

3. Compositie fruit: This type of fruit differ from aggregate fruit that in place of single the ovary many ovaries and other floral parts combine together to from fruit.

- In composite fruits, generally whole inflorescence is modified into fruit. These are of two types:-

1- Sorosis e.g. pineapple.

2- Syconus e.g. Ficus.

3- Strobilus e.g Pinus.


Thank you

Lec.3

الساق

THE STEM

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The Stem

The stem: is a part of plant which lies above from surface soil, it has nodes and internodes, leaf, bud and bracts stem arises from plumule.

(Stem function):

- Support for leaves and flower and fruits.
- It performs the transfer process between the organs.
- Making food in some types of stems.

The Stem

(Stem nature):

- Herbaceous: soft non- woody. dying to the ground at the end of the growing season e.g. Graminae.
- Woody: hard in tissuse and possessing secondary Xylem e.g. pinus.

Herbaceous stem

Woody stem

The Stem

Types of Stem:

- Aerial stems which remains above the ground e.g. Rosa.
- Underground stems or (subterranean) the stem grow under the soil. e.g. cynodom.
- Aquatic stems the stems that grow in the water. e.g. Nymphea.

The Stem

Shape of Aerial stem

Angular stem showing many angles in a transverse section e.g (Asparagus)

- Triangular e.g (cyperaceae)
- Quadrangular e.g (Labiatate)

Winged stem: stem to have of longitudinal appendages along its length e.g (Lathyrus)

Cylindrical stem

- **Hollow** e.g (Triticum)
- **Solid** e.g. Bamboo




The Stem

Types of Aerial stem

1. Reduced stem: The stem that are reduced to the form of disc e.g (Carrot).

2. Erect stem: The stem growing up right e. g(wheet).

3. Weak stem:

A): **Climbing stem:** growing to wards upper side by means of tendrils, petioles, adventitious roots. e.g. (vitis).

B): **Twining stem:** stem ascending by coiling on the support without any special device e. g (Abrus).

C): **Creeping stem:** Trailing stem having root throughout its length e.g (Amor phophallus).

D): **Running stem:** horizontal stem, creeping above ground usually rooting and producing plants at the nodes e.g (cynodon).

The Stem


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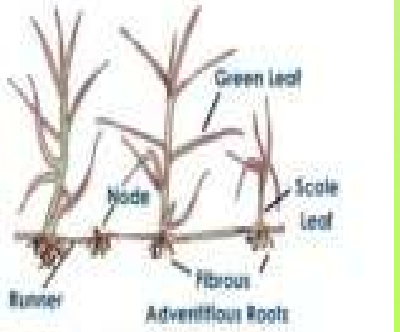
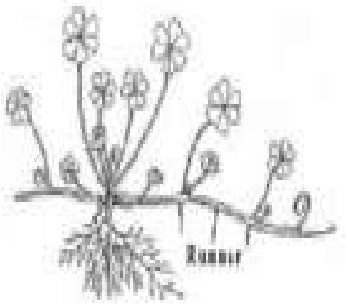

Green Leaf
Node
Scale Leaf
Fibrous
Runner
Adventitious Roots


Runner

The Stem

Modification the stem

Spiny stem
Stem having spines
e.g. (Alhagi)

Tendrils stem
Twisting appendage adapted for climbing
e.g. (vitis)

Leafy stem Cladophyll
Aleaf like flattened, green stem
e.g. (Ruscus)

- Cladodes
  e.g. (Asparagus)
- Phylloclads
  e.g. (opuntia)

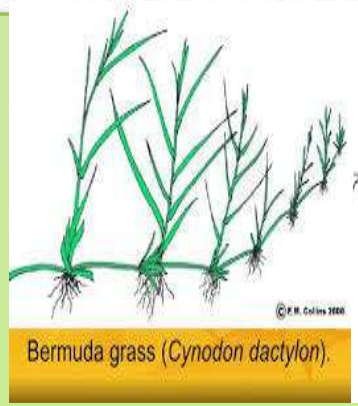


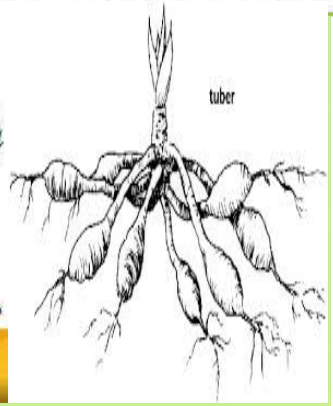
The Stem

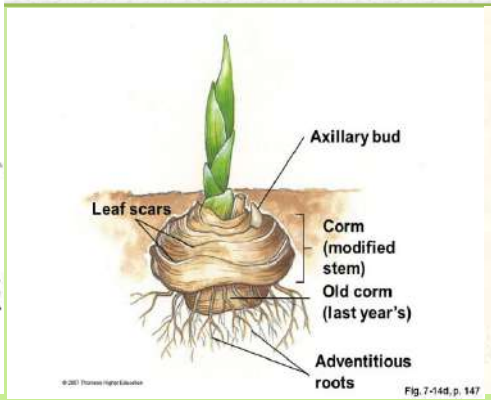
Types of subterranean stems (underground)

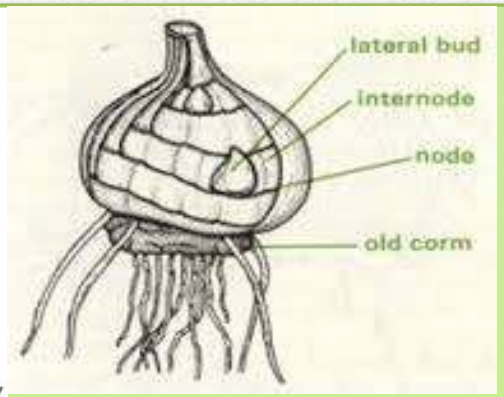
1. **Rhizomes:** underground stem bearing scale like leaves e.g (Ginger).
2. **Tubers:** Tuber thick, enlarged fleshy tip of an underground stem
   e.g (Potato).
3. **Corms:** Corm solid, round, fleshy, underground stem, usually surrounded by membranous scales e.g (Gladiolus).
4. **Bulbs:-** An underground, short, erect stem covered by fleshy leaves
   e.g (Allium cepa).

The Stem


Bermuda grass (*Cynodon dactylon*).







The Stem

Types of Aquatic stems:

1. Floating stem: e.g (Nymphaea).

2. Submerged: e.g (cera to phylum)

The Flower
الزهرة

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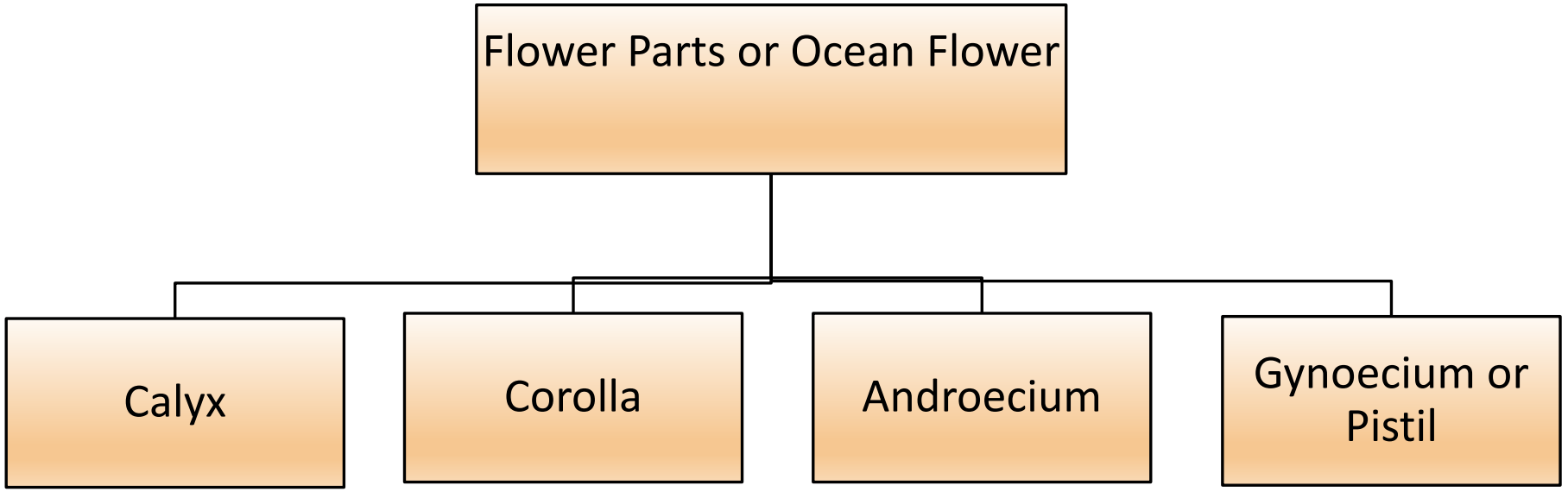
The Flower

the flower : Reproductive structure of angiosperms, consisting usually of sepals. Petals. Stamens, and carpels



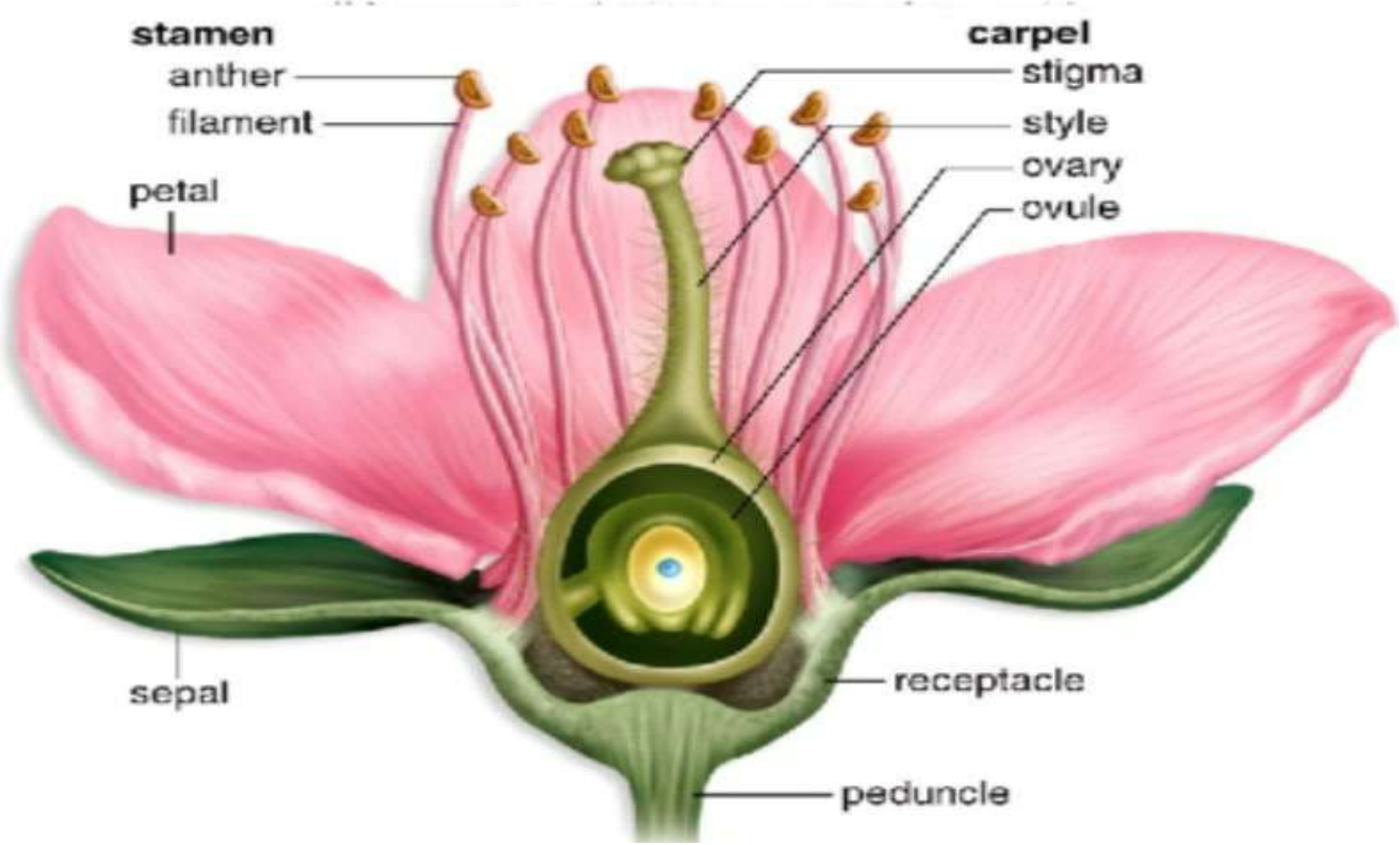
Flower Parts

1. Calyx: The outer whorl of floral leaves (sepals)
Function of calyx
1) Protect the floral part
2) It performs photo synthesis
3) Protect the fruit if the calyx is permanent

2. Corolla: The whorl of petals
function of corolla : Corolla helps attact insects for pollination purposes.

3. Androecium: All stamens of a flower The stamen is composed
A. Filament: Stalk of the stamen
B. Anther: Pollen- bearing portin of stamen

4. Gynoecium or Pistil Group of carpels of the flower The pistil composed
A. Ovary: Ovula- bearing part of the gynoecium.
B. Style: Long portin of gynoecium between ovary and stigma.
C. Stigma: Upper most, Pollen- receptive organ of gynoecium.


stamen
anther
filament
petal
sepal
carpel
stigma
style
ovary
ovule
receptacle
peduncle

(Flower Types)

- **Complete Flower:** Having all the four floral whorls sepals, petals, Androecium and gynoecium.
- **In Complete Flower:** The flower lacking any one of the four whorls.
- **Perfect Flower:** It is flower that contains Androecium and gynoecium its name Bisexual.
- **Imperfect Flower:** It is flower that contains Androecium or gynoecium, it name unisexual.

In Perfect flower
- Staminate Flower
- Pistillate flower

- **Sterille or Neutral flower:** It is the flower that doesnot contain the reproductive organs.
- **Naked Flower:** It is the flower that doesnot contain calyx and corolla.

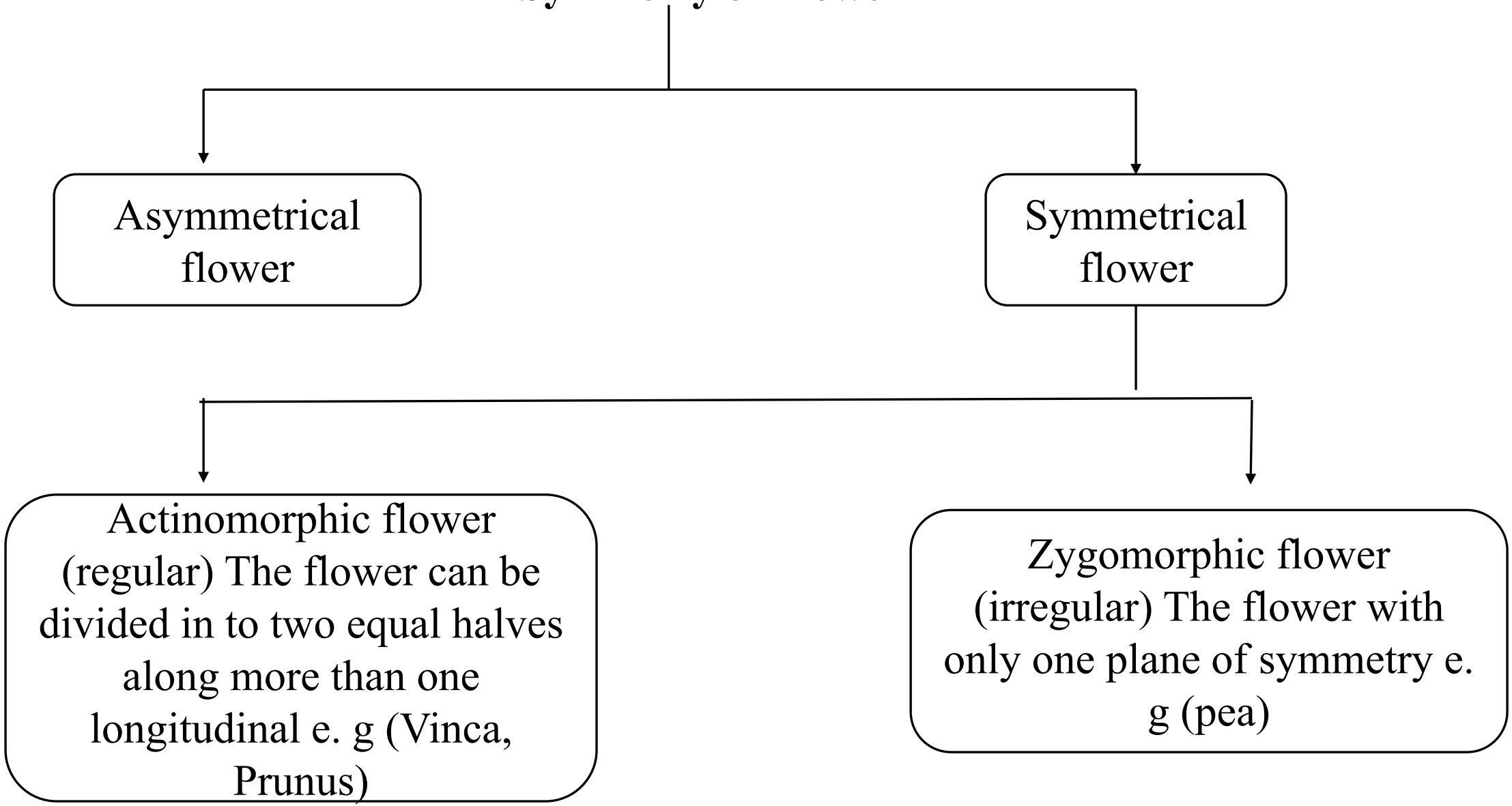
Kinds of Plants (based on the genus of flowers)

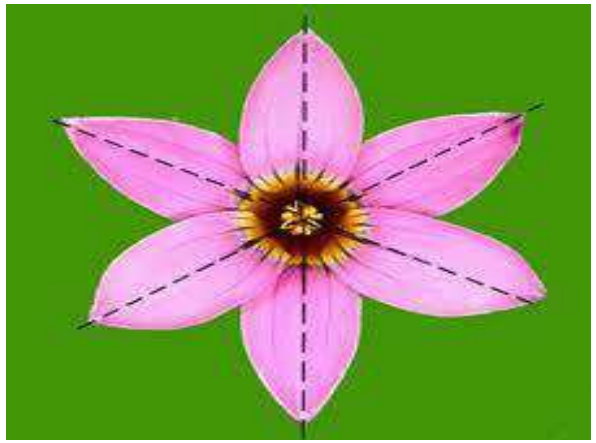
1. Monoecious: having separate male and female flower on the same in dividual e. g (Zea).

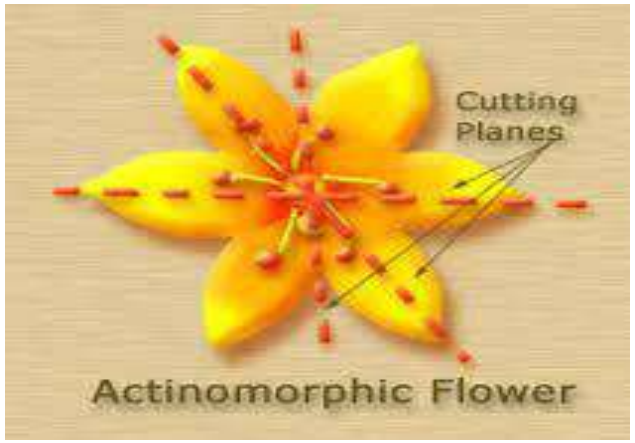
2. Dioecious: it is the plant that contain male flower or female flower e. g (Phoenix).

3. Polygamous: it is the plant that contain unisexual flower and disexual flower e. g (Compositae family).

Symmetry of Flower

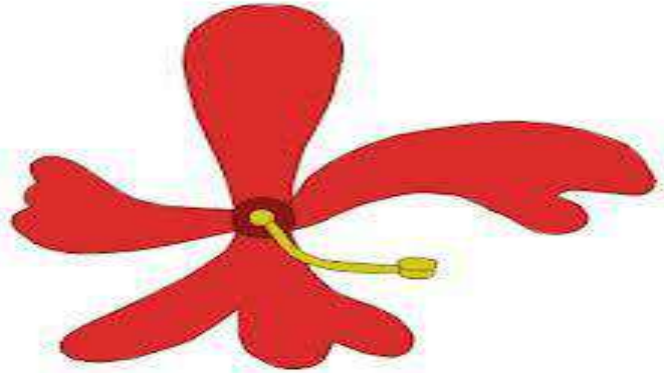






Actinomorphic flower

Zygomorphic flower

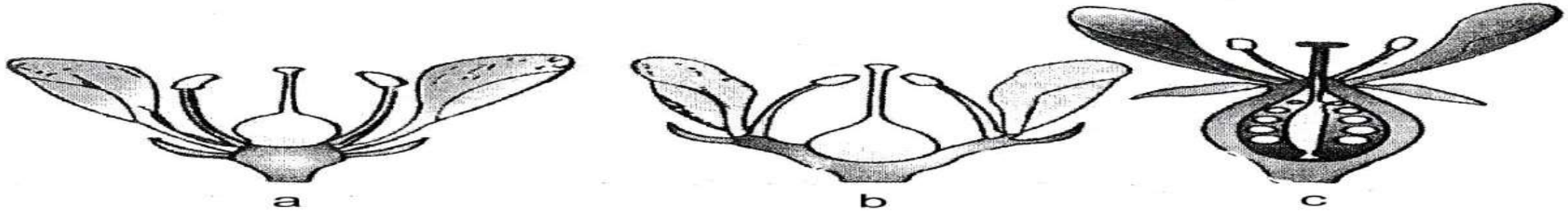


Asymmetrical flower

Torus or Thalamus (Receptical): Tip of the axis bearing floral appendages

The flowers are divided according to their location on the thalamus in to:

Hypogynous	**Perigynous**	**Epigynous**
flower with superior ovary or those having the floral part situated below the ovary e. g (Solanum)	Having sepals, petals stamens, round the gynoecium ovary half superior e. g (*Prunus*)	Flower with inferior ovary or those having the floral parts situated above the ovary e. g (Hamelia)



Position of floral parts on thalamus

(a) Hypogynous, (b) Perigynous, (c) Epigynous

Thank You

Inflorescences Flower

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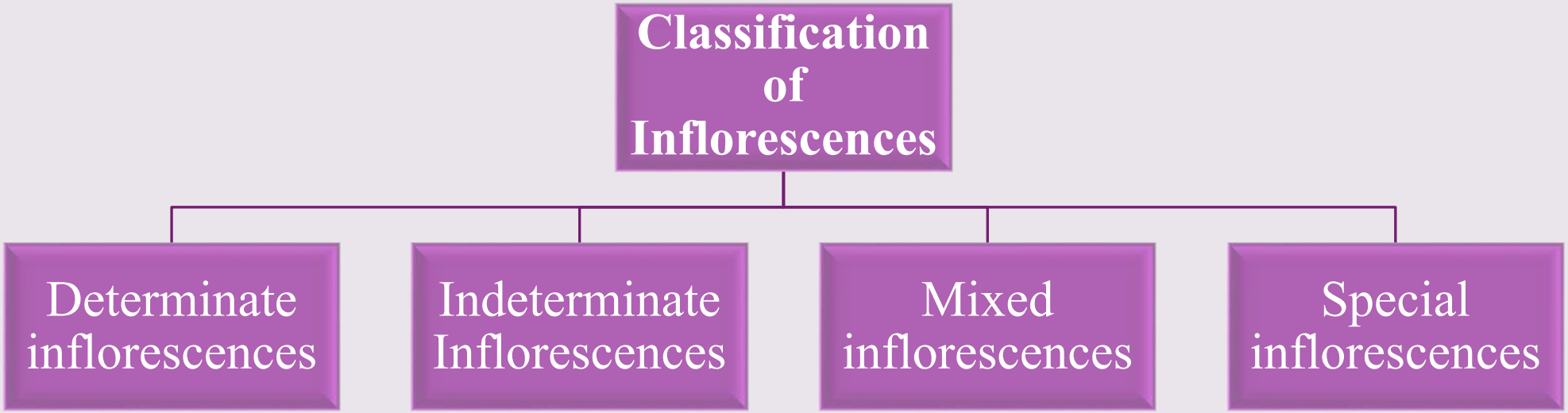
Inflorescences Flower

Inflorescences: arrangement of flower on floral axis is called inflorescences.

Inflorescence Parts

1. Peduncle
2. Rachis
3. Bracts
4. Pedicel
5. Flower



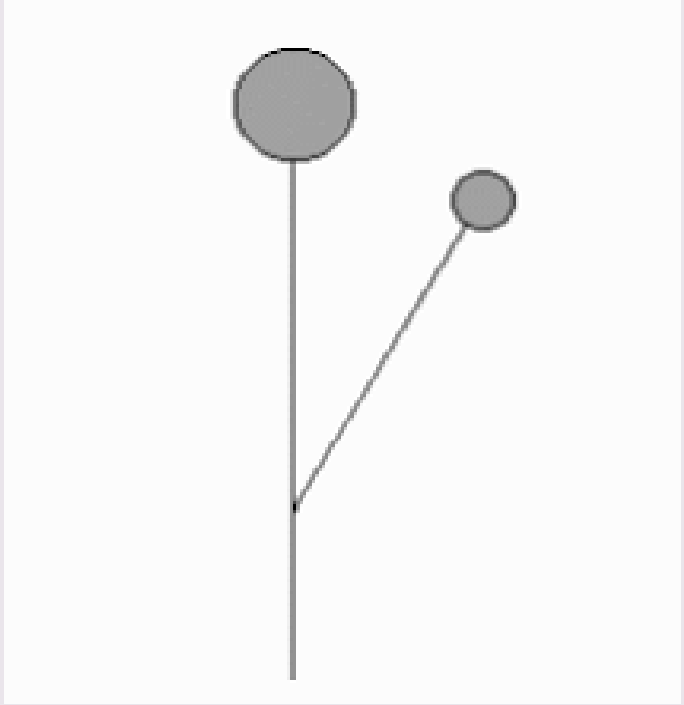
1. Determinate inflorescences:

They are inflorescences that the growth ends in the main axis of them as a result of the formation of the final flower and new flower aris under the final flower.

A. **Monochasium** The peduncle ending in a flower producing lateral branch at a time of ending in flower. It is of two types:

1. **Simple monochasium:** only one flower

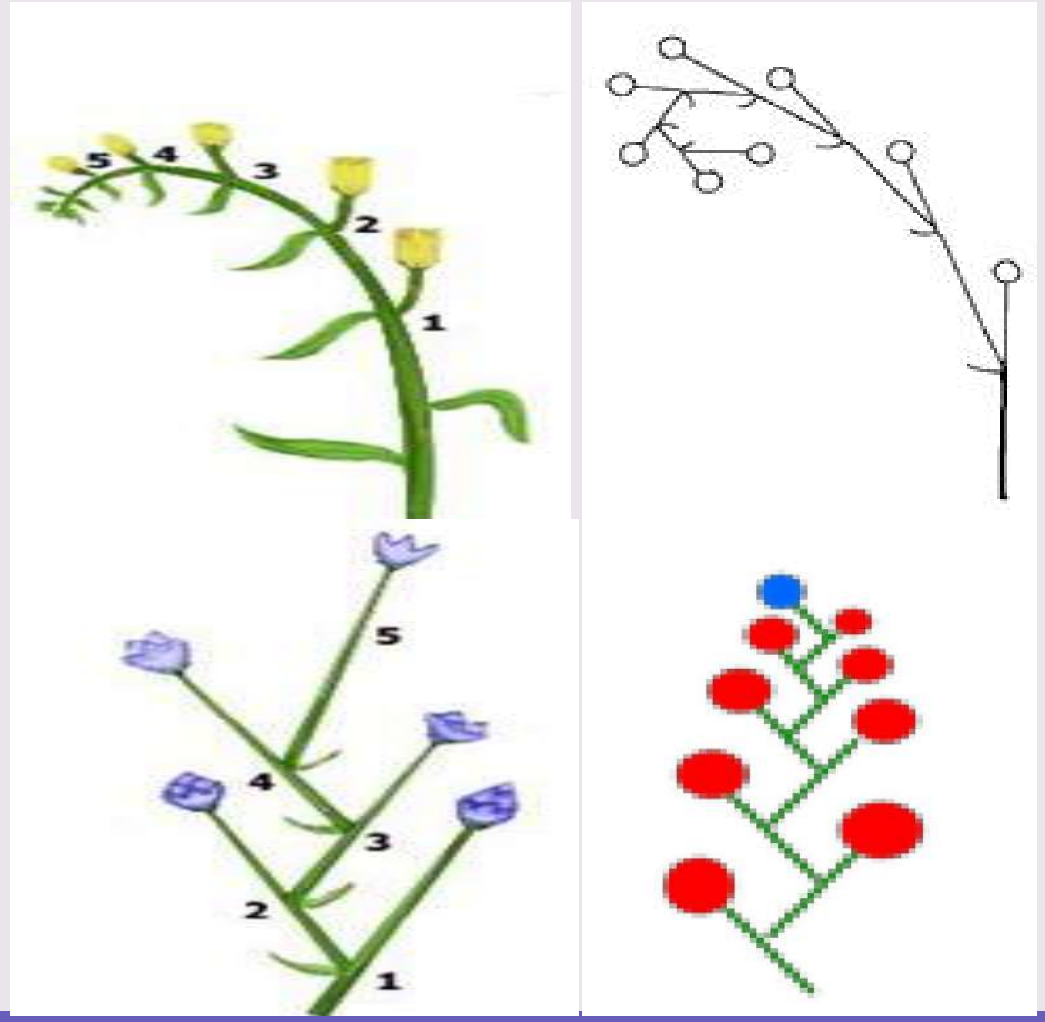
is below the final flower of the inflorescence axis.



2. Compound monochasium: it consists of more than one flower under the final flower of the axis of the inflorescences.

- **Helicoid:** when all lateral branches developed on the same side on peduncle e. g (Datura).

- **Scorpioid:** in it the lateral branch is alternately develop on left and right side e. g (linum).



B. Dichasium: in it peduncle ends in a flower from the basal part of peduncle two lateral branches aris with also end in a flower. Now this same arrangement occur on these lateral branches e. g (Dianthus).

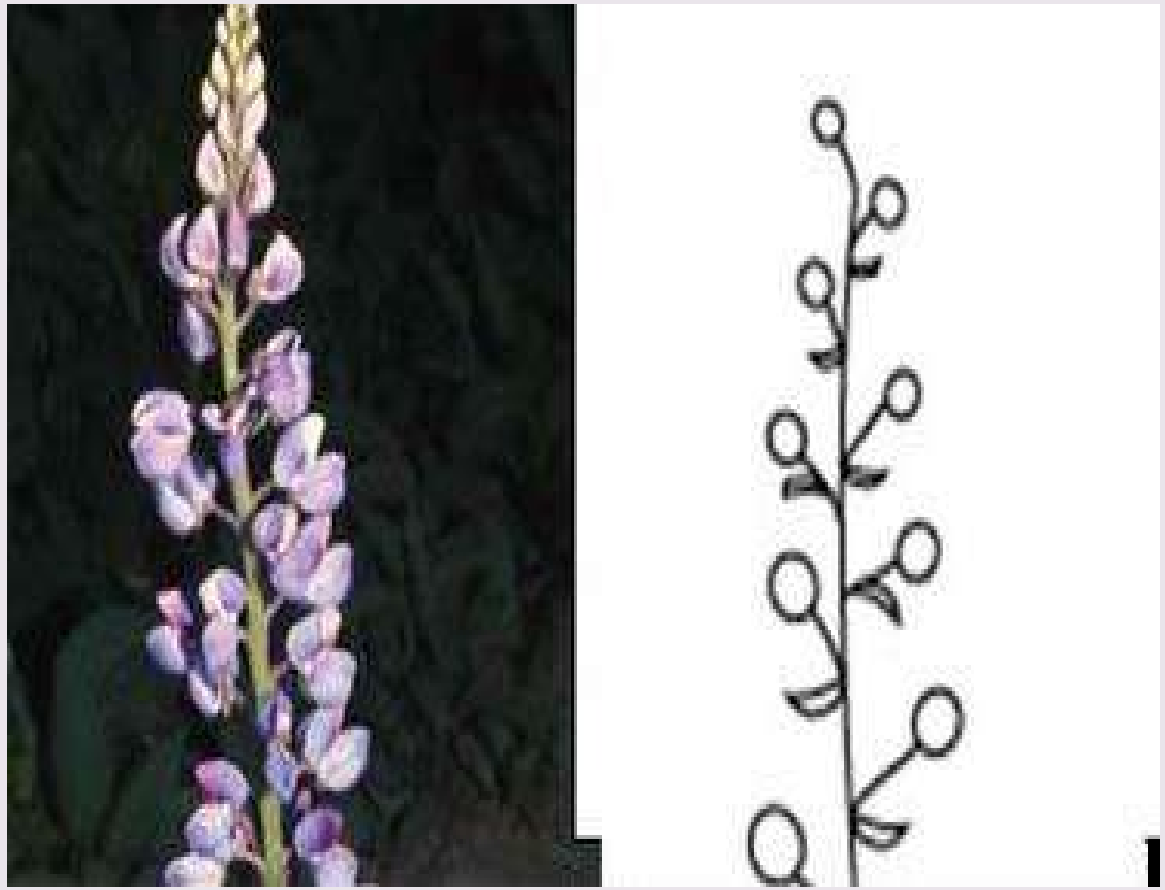
C. Polychasium: in it peduncle ends in a flower and from the base of it many lateral branch arise with also terminates in flower.

This arrangement now also occur on these lateral branches e. g (Cinnamomum).

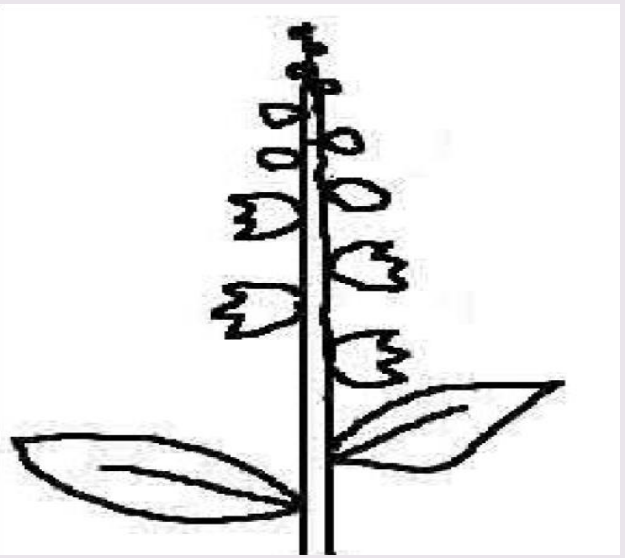
2. Indeterminate Inflorescences

They are inflorescences whose main axis does not stop growing and continues to the top and on which flowers ore formed continuously.

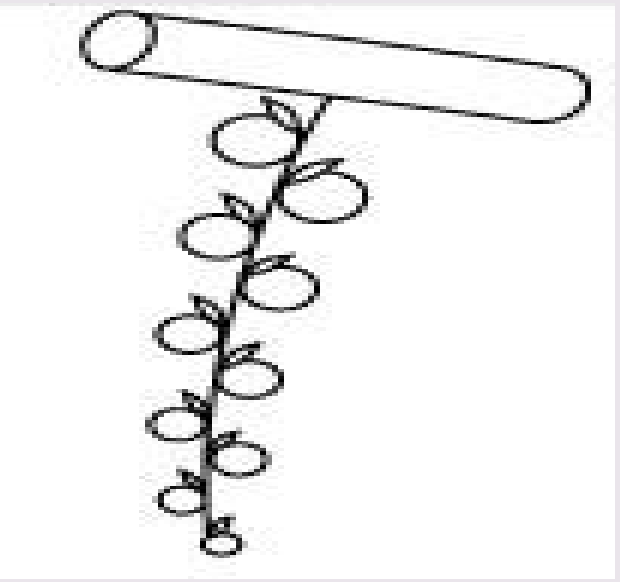
A. Raceme: when peduncle main axis is elongated and flower are pedicellate e. g (Radish).



B. Spike: in it peduncle is elongated but flower are bisexual and sessile e. g (Callistemon)

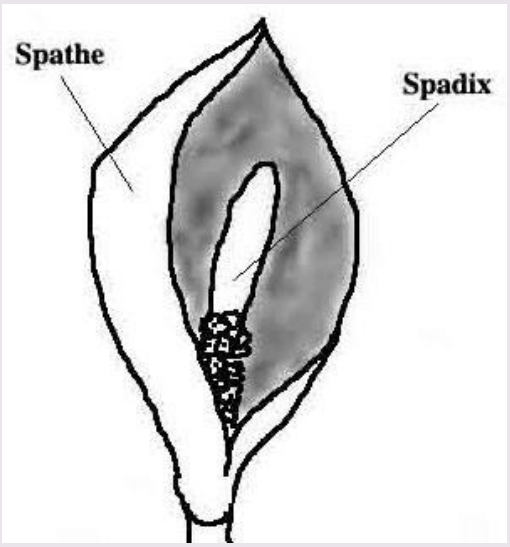


C. Catkin: in it peduncle is thin long and weak and flower are flower are sessile and unisexual. Peduncle is pendulus e. g (Quercus).

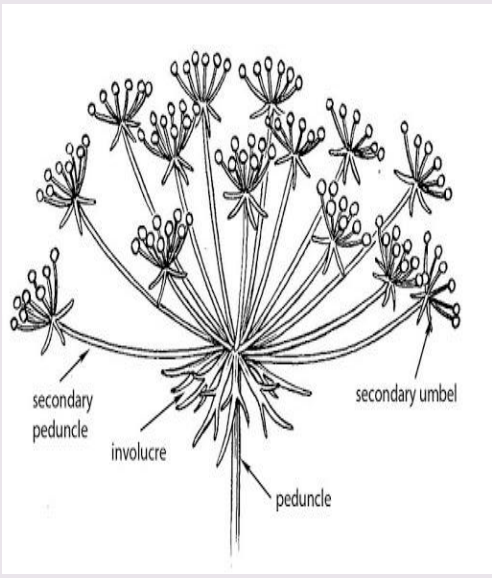


D. Corymb: in it peduncle is short and all flower are present at same level because the lower flower has much long pedicel than the upper one e. g (Nerium).

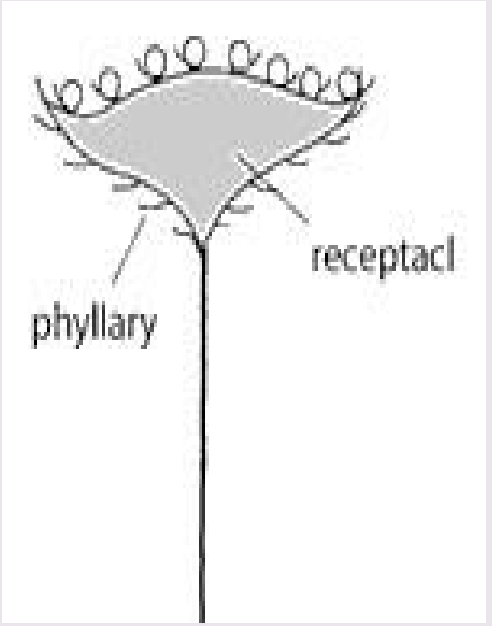
E. Spadix: in it peduncle is thick long and fleshy and have small sessile and unisexual male and female flower covered with one or more green or colour full bracts known as spathe e. g (Musa).



F. Umbel: an inflorescence in which the flower stalks of different flower are of more or less equal length, arise from the same point. At the base of flowers stalks. There is whorl of bracts froming the involucre e. g (Nerium).

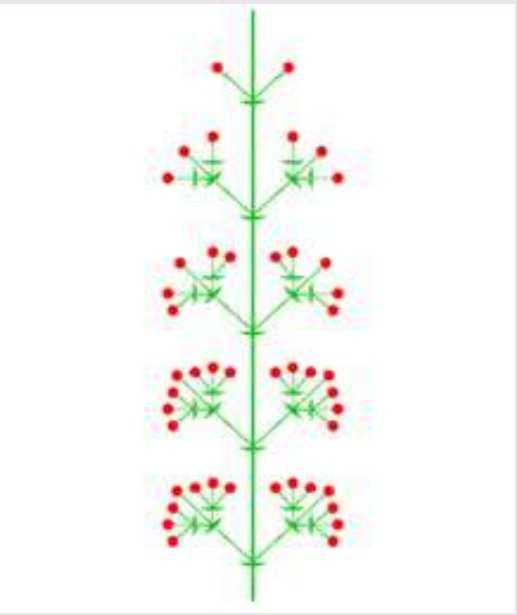


g. Capitulum: in it the growth of peduncle is retarded and it become broad. Flattened concave or convex on it small flower are found. e.g (Compositae).



3.Mixedinflorescences: They are inflorescences with limited branches and unlimited growth.

A. **Thyrse inflorescences** it is an inflorescence whose top continues to give unlimited flowers while the lateral branches are limited e. g (Ricinus).



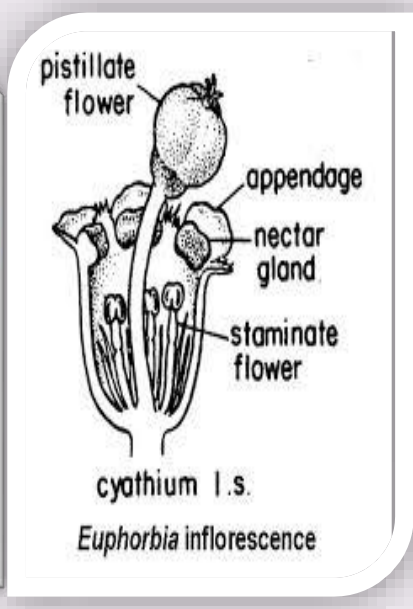
B. Verticilate inflorescences:

Whorled dichasial cymes arranged at the nodes of an elongate axis e. g (Lamiaceae) or A much condensed cyme with appearance of whorl but in reality arising in axils of opposite leaves.

4. Special inflorescences

Cyathium

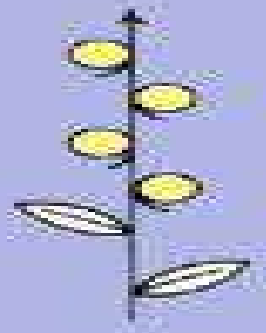
Inflorescence consists of Cuban- shap envelop consisting of union of beans single central female flower with a complex triple- carple pistil surrounded by male flower



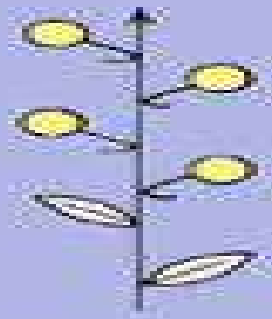
Syconium

Inflorescences centered with hollow, fleshy pear structure with terminal opening called ostiole. The upper part is lined with male flower the lower part is female flower and at the botton are sterile flower e. g (ficus)

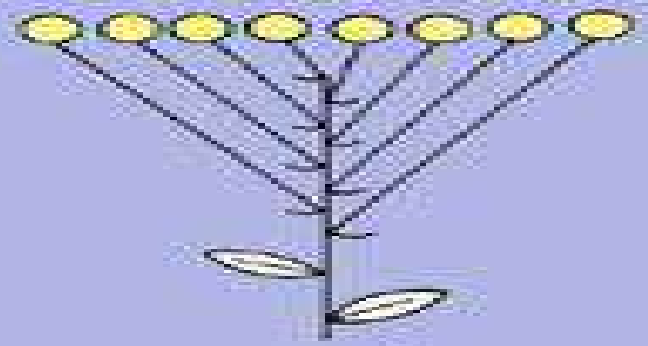
INFLORESCENCE TYPE



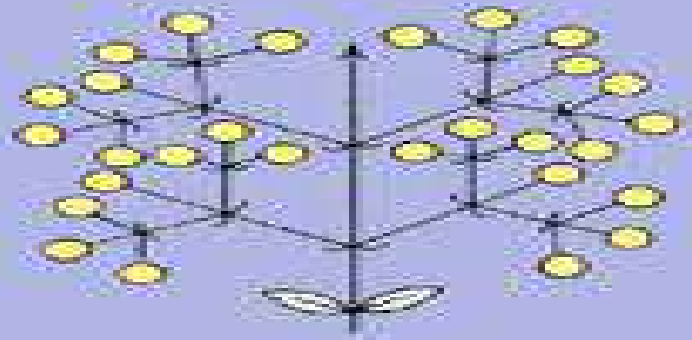
spike



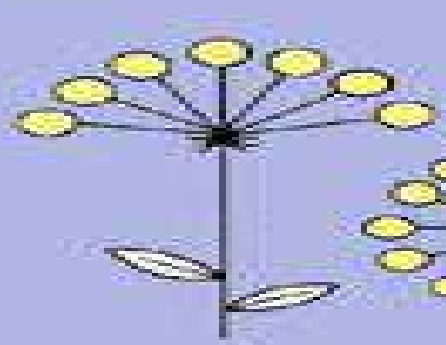
raceme



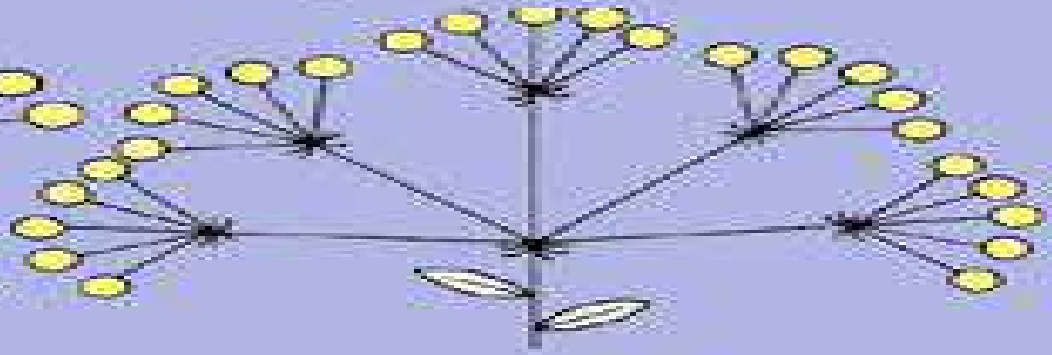
corymb



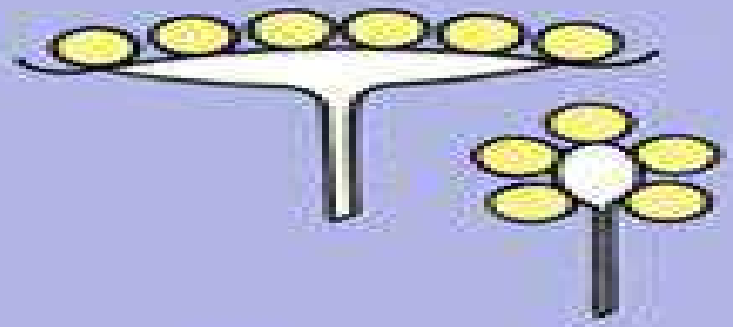
thyrse



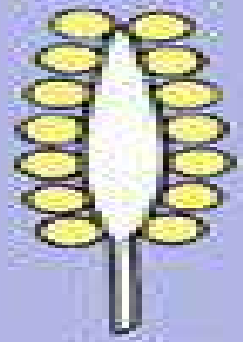
umbel



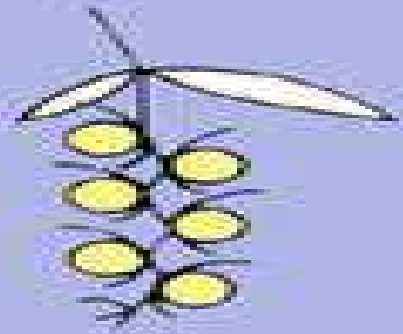
compound umbel



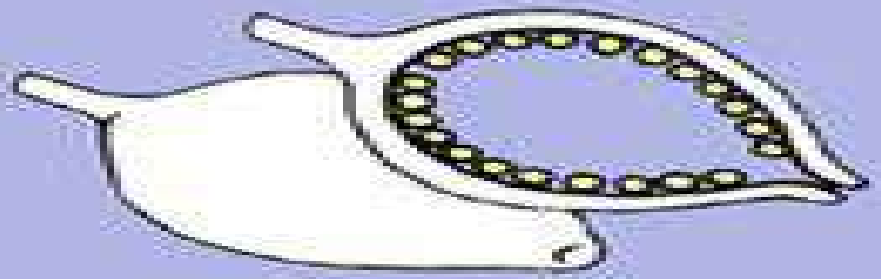
heads (capitula)



spadix



catkin



syconium

Thank you

Compound Leaf
الورقة المركبة

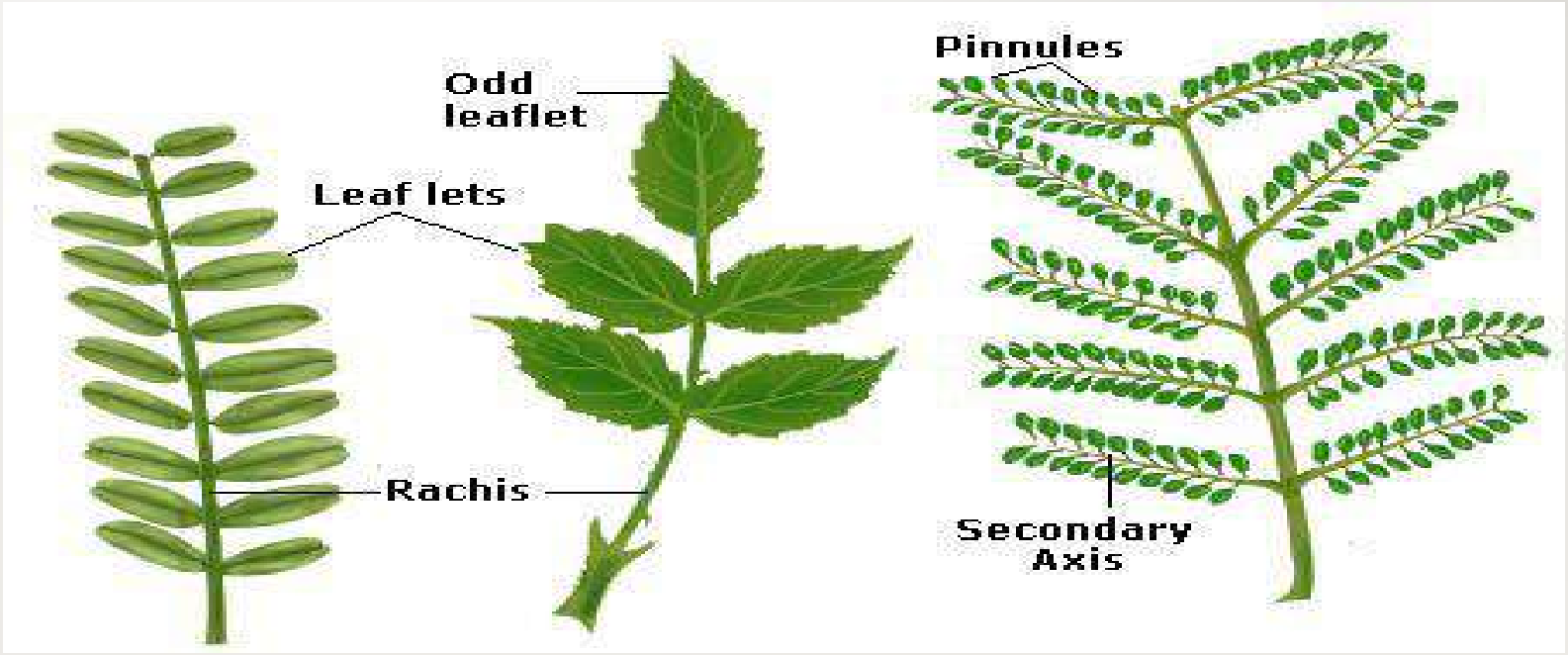
ا.م .د. منى عمر
م .د. نور نبيل
م.د. حنان امير
م.م زبيدة محمود
م.م. هبة عمار

Compound Leaf

*** Simple Leaf:**
A leaf blade is made of only one piece e.g. Apple Leaves.
*** Compound Leaf:**
A leaf made up of two or more leaflets, e.g. pea

*** Parts of a Compound Leaf:**

1. Petiole
2. Rachis
3. Petiolule
4. Rachilla
5. Leaflet
6. Stipel



Types of compound Leaf

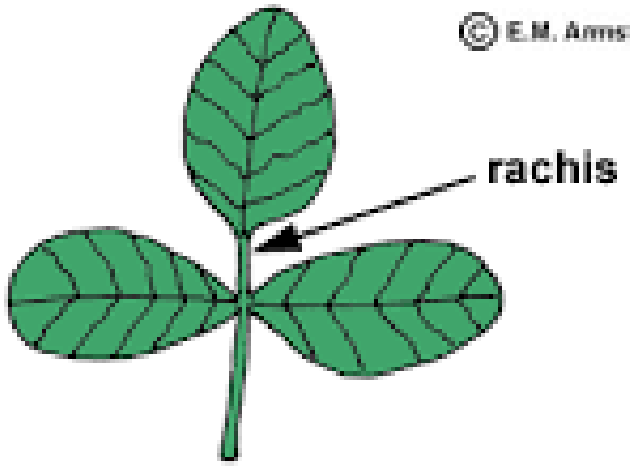
The compound leaf is divided according to the method of connection of the leaflets to the Rachilla into two types:

1. palmately Compound Leaf:

Leaflets are attached on the upper end of petiole.

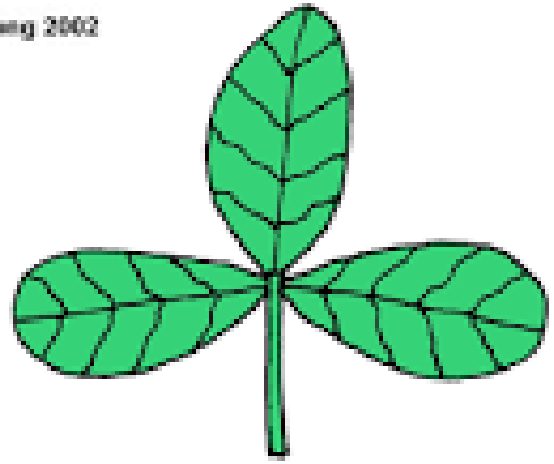
Types of Palmately Compound Leaf

- **Unifoliate:** When single Leaflet is found, e.g. *Citrus*.
- **Bifoliate:** When two Leaflets are present, e.g. *Albizia.*
- **Trifoliate:** When three Leaflets are attached, e.g. *Oxalis.*
- **Tetrafoliate:** When four Leaflets are attached to the petiole, e.g. *Marsilea.*
- **Multifoliate:** When more than four Leaflet are found, e.g. *silkcotton.*



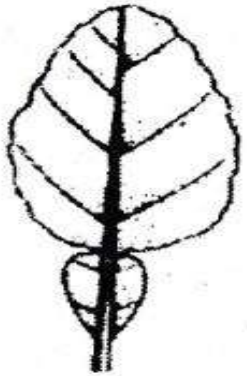
pinnately trifoliate

e.g. *Toxicodendron*
(poison oak)

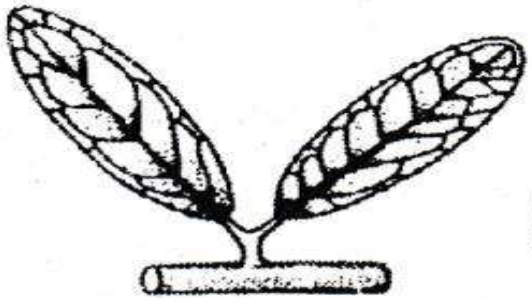


palmately trifoliate

e.g. *Rhus trilobata*
(basket bush)

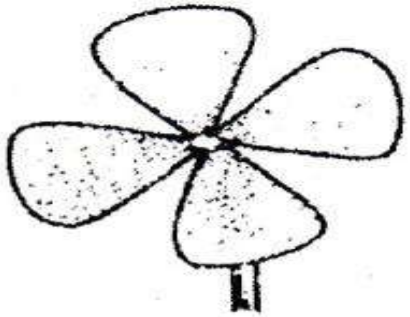


Unifoliate
compound leaf

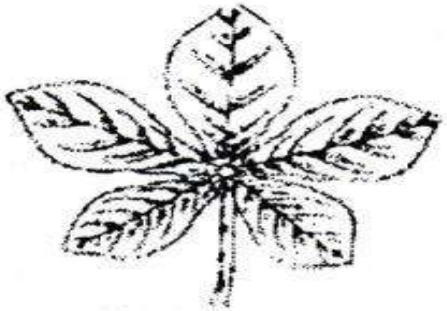


Bifoliate
compound leaf

Trifoliate
compound leaf



Quadrifoliate
compound lea



Multifoliate
compound leaf

2. Pinnately compound leaf:

The leaf are attached along the mid axis of the compound leaf e.g. *Phoenix.*
Divided into types according to the end of the leaf:

- **Unipinnate:**

Having Leaflets on each side of an axis, e.g. *cassia*

- if the number of Leaflet is even, then leaf is known as paripinnate, e.g. *Sesbanin.*
- if the number of Leaflet is odd, it is known as imparipinnate, e.g. *Rosa*
- .

- **Bipinnate:**

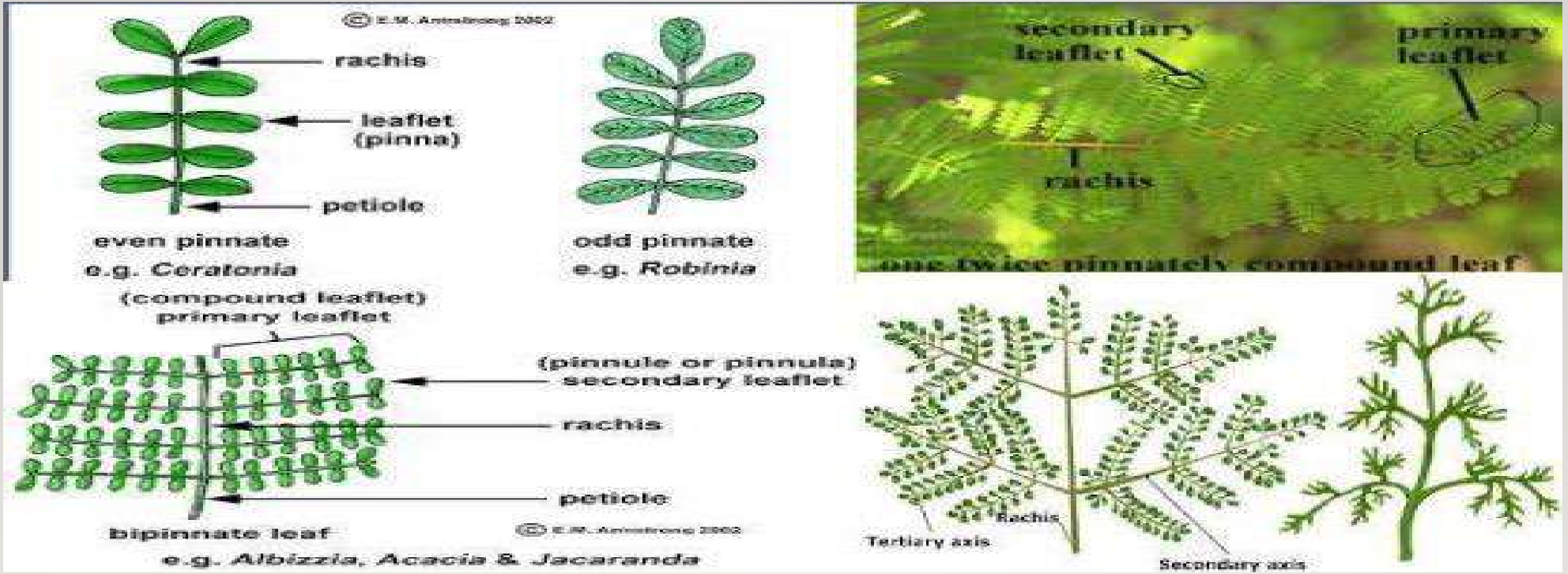
A twice pinnate compound leaf e.g. *Acacia.*

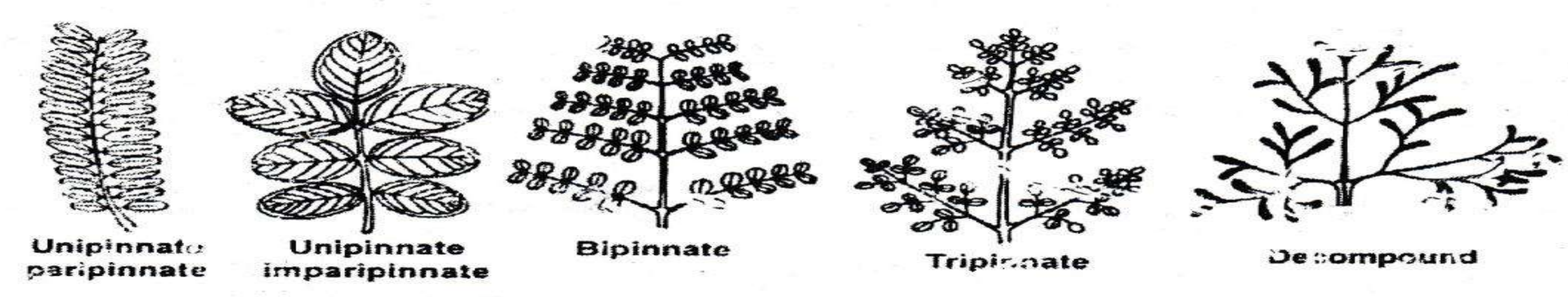
- **Tripinnate:**

Atrice pinnate compound leaf e.g. *Moringa.*

- **Decompound:**

A compound leaf, which is more than thrice pinnate e.g. *Carrot*.


rachis
leaflet (pinna)
petiole
even pinnate
e.g. Ceratonia
odd pinnate
e.g. Robinia
secondary leaflet
primary leaflet
rachis
one twice pinnately compound leaf
(compound leaflet) primary leaflet
(pinnule or pinnula) secondary leaflet
rachis
petiole
bipinnate leaf
e.g. Albizzia, Acacia & Jacaranda
Rachis
Tertiary axis
Secondary axis


Unipinnate paripinnate
Unipinnate imparipinnate
Bipinnate
Tripinnate
Decompound

- **Modification of Leaves**

1. **Spiny Leaves:** Leaves or any part of leaflet are modified into pointed spine e.g. *Asparagus*

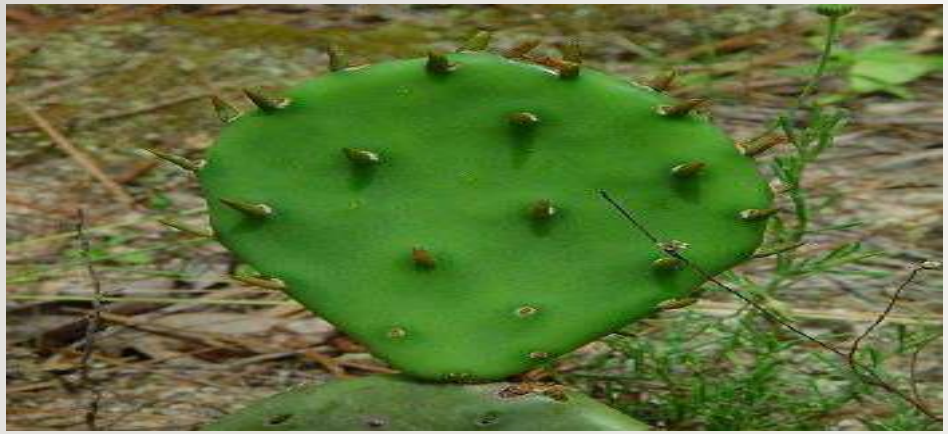
2. Tendril Leaves: Whole Leaf is modified into thin thread like structure which is called leaf tendril e.g. *Lathyrus aphaca*.

3. Succulent Leaves: The Leave s are modified into lubricated organs that store water and nutrients. e.g. *Allium cepa*.

4. Reduced Leaves: The petiole becomes foliar and performs the function of phytosynthesis while the blade is reduced e.g. *Vachellia nilotica*.

5. Insectivorous Leaves: Leaves of some plants are modified to pitcher shape. e.g. *Nepenthes*.

Insectivorous Leaves,



Spiny

Tendril

Types of Leaves

1. Cotyledons
2. prophylls
3. Scaly Leaves
4. Foliage Leaves
5. Floral Leaves

* **The original floral leaves**

- Sepals
- Petals
- Stamens
- Pestil or Carpels

- **Extra floral Leaves**

- **Bract:** Are the leaves which is present in flower axis.

- **Bracteole:** There are like structure found on pedical.

- **Involucre:** The whorl of bract surrounding peduncle is called involucre.

- **Glume:** Small, dry, scaly bracts are called Glumes.

- **Spath:** In flowers when large bract completely encloses whole inflorescence.

Venation of Leaf

Venataion: The arrangement of veins and veinlets in Leaves (Lamina).

- **Venation is of two types**

1. **Reticulate:** When the pattern of the veins in the lamina of the Leaf is like a network, e.g. dicots.

*** Unicostate or pinnate:** In this type of venation have only one principal vein e.g. Mango

*** Multicostate:** In this type of venation many principal veins arising from the tip of petiole and proceed towards tip of lamina. e.g. *Zizyphus*

Multicostate

Unicostate or pinnate

Parallel: When the veins run parallel to each other in the Lamina of the leaf, e.g. monocots.

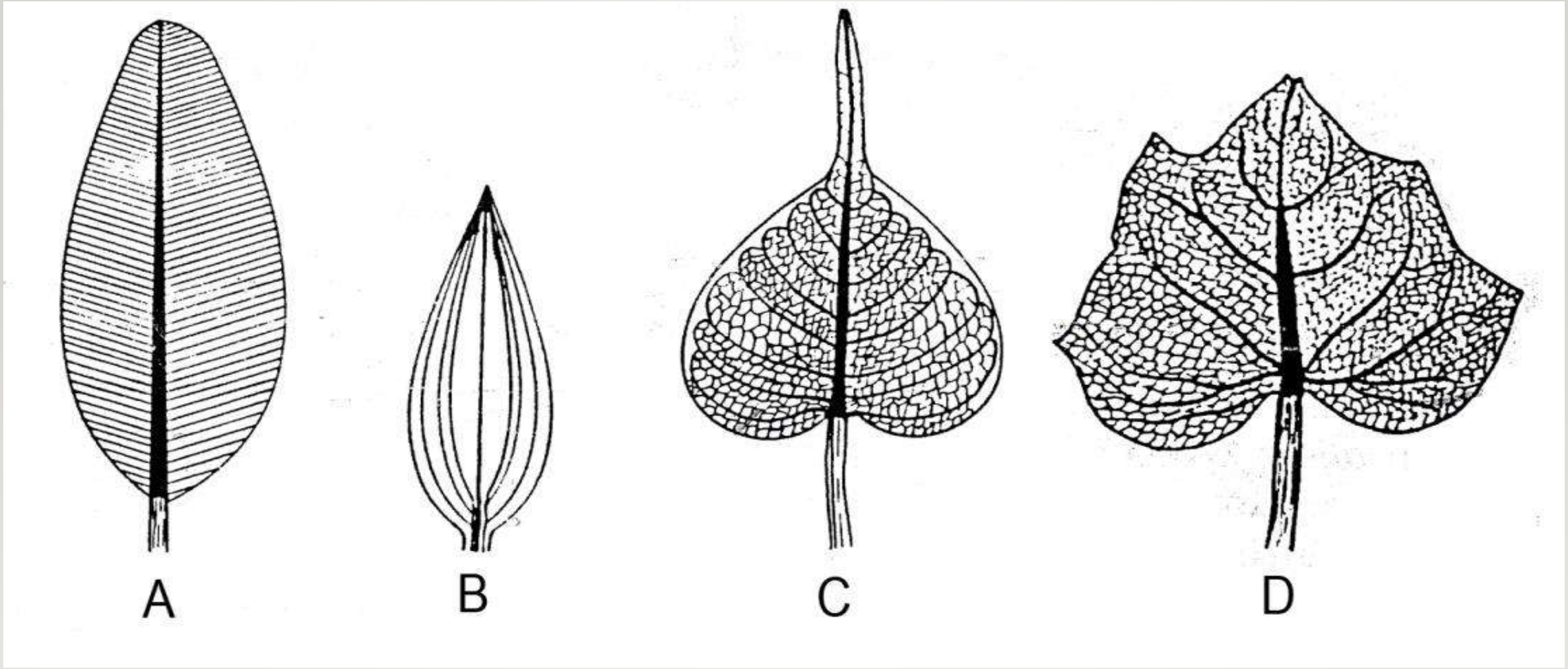
They are of two types:

- **Unicostate or pinnate:** If only one principal vein is present, it is called unicostate, e.g Banana

- **Multicostate or Palmate:** If several principal veins are present it is called multicostate, e.g. *Coconut*.

Unicostate or pinnate

Multicostate or Palmate



A. Unicostate parallel **B. Multicostate parallel** **C. Unicostate reticulate** **D. Multicostate reticulate**


Thank You