HORT-5601

Classification of Horticultural Plants

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Horticultural Classifications

With hundreds of thousands of plants used by mankind, it is impossible to talk about each one individually.

Plants are grouped by common characteristics to help communicate similar ecological adaptation and cultural requirements. For example, *shade* plants indicate plants that are tolerant to various levels of shade. *Xeric* groups plants requiring less supplemental irrigation in our climate. It is important to point out that any classification system will have plants that don't quite fit the groupings. The following are examples of some common classifications used in Horticulture.

Horticultural Classifications

- **Growth Habit**
- **Climate (Fruits)**
- **Climate (Vegetables)**
- **Life Span**
- **Type of Flowers/Flower Sex**
- **Edible portion**
- **Leaf Shedding**
- **Landscape use**
- **Structural development of fruits**

According to Growth Habit

Growth habit refers to the genetic tendency of a plant to grow in a certain shape and to attain a certain mature height and spread.

- ❖ Succulents
- ❖ Herbs
- ❖ Shrubs
- ❖ Trees
- ❖ Plant with climbing / trailing system

Succulents

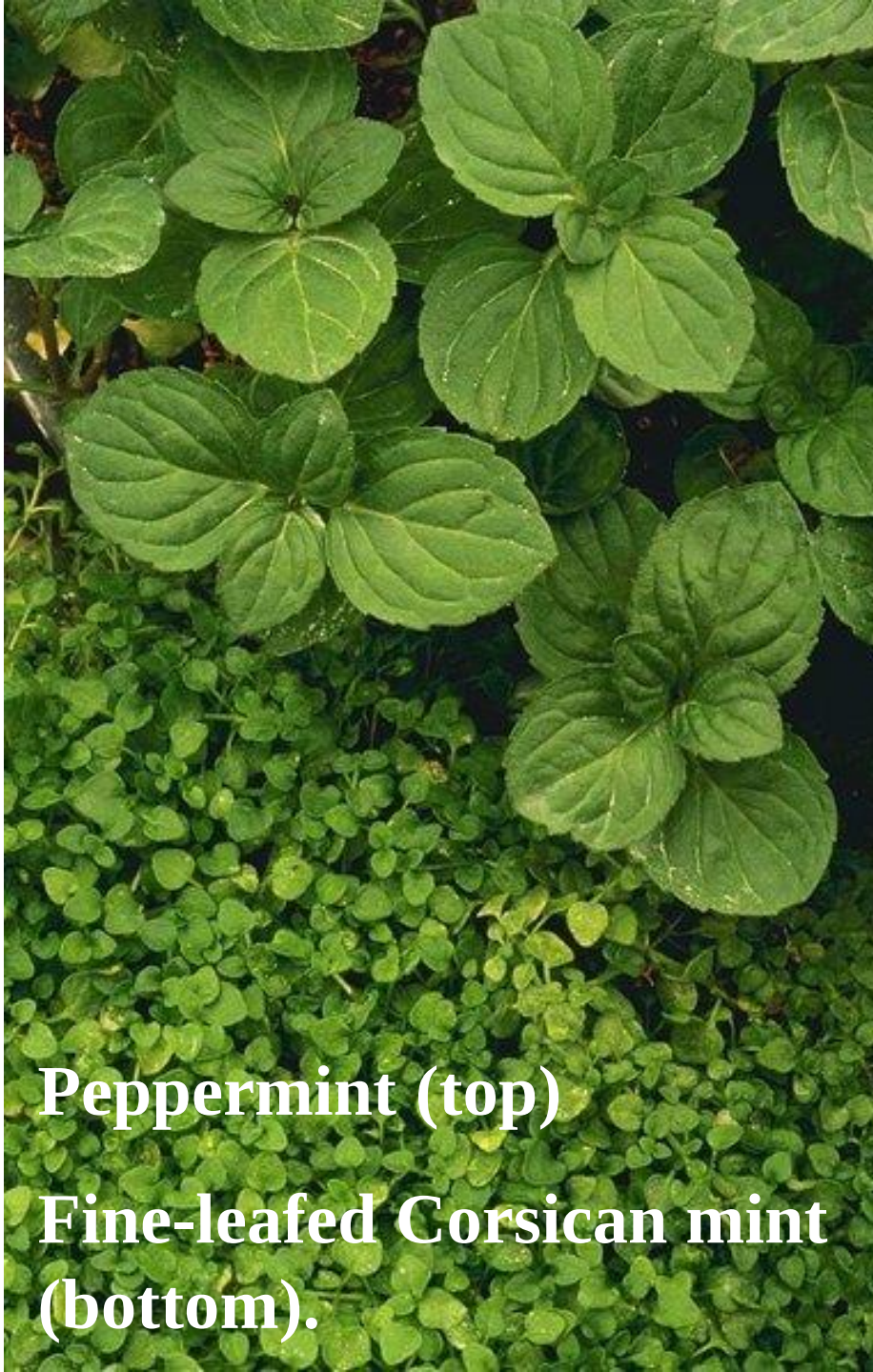
- Foliage plants
- Extremely tender and watery stems and leaf

e.g. ; Purple heart

Herbs

- Self supporting succulents
- Tender stem
- Droopy
- Self supporting
- Most of the vegetables and floral plants are herbs

- e.g.; Mint, Coriander



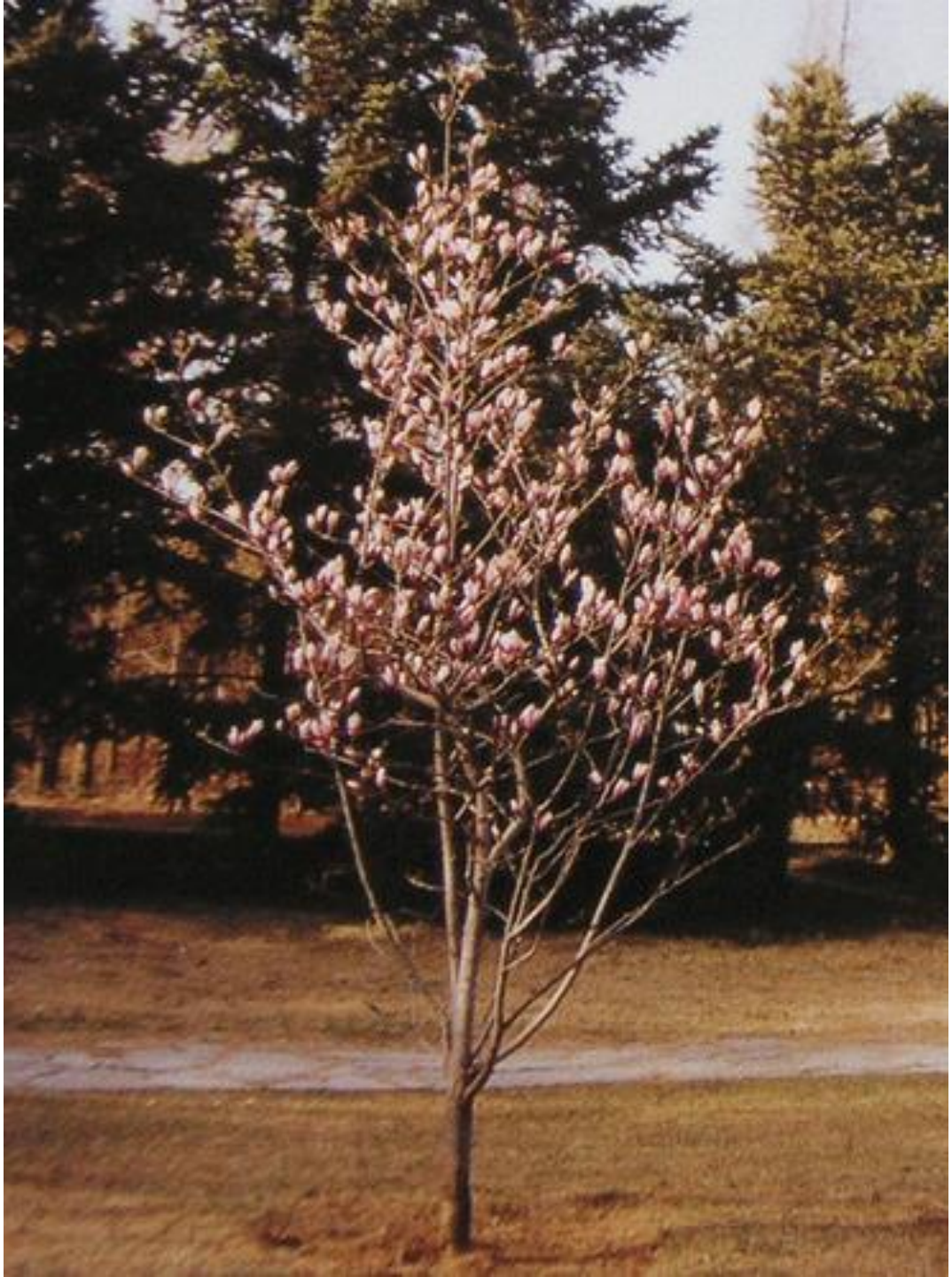
Peppermint (top)

Fine-leafed Corsican mint (bottom).

Shrubs

- Self supporting woody plants
- Typically have multiple-branches from the ground
- A mature height less than 12 feet.

e.g.; Hibiscus, Murva



Trees

- Self supporting woody plant with a single central stem.
- Typically have a single trunk
- Mature height over 12 feet.
- Trees are larger than shrubs
- Distinction between trees and shrubs may be obscured by growth environment and training practice

  e.g. Mango, Alestonia


Kids

Plants with climbing / Trailing System

- Vine
- Liana

Vine

- Climbing plant with a non-woody stem.
- Have a climbing, clasping or self-clinging growth habit.

e.g.; Chalrodanron, Melon, Tomato, Cucurbits

Liana

- Woody plant with a climbing habit

e.g.; Grapes, Bougainvillea

Grapes

Bougainvillea

Classification on the Basis of Climate (Fruits)

Tropical Fruits

Plants originate in tropical climates with a year round summer like growing season without freezing temperatures.

- High humidity
- No frost in winter
- Coastal areas of Sindh and Balochistan

e.g.; Mango, Banana, Litchi, Papaya and pineapple


Litchi


Banana

Subtropical Fruits

Plants cannot tolerate severe winter temperatures but need some winter chilling.

- **Hot summer**
- **Cold winter**

Example: Citrus, Jaman, Guava, Loquat, Figs, and Olives

Guava

Temperate Fruits

- **Mostly deciduous**
- **Require certain amount of chilling**

  e.g Apple, Pear, Peach, Plum, Apricot etc.

Classification on the basis of Climate (vegetables)

- **Summer vegetables**
- **Winter vegetables**

Summer vegetables

- **Frost sensitive**
- **Grows above 80 °F (26.66 °C)**

  Cucurbits, Okra

Bitter gourd

Okra

Winter Vegetables

- **Can’t tolerate above 80°F**
- **Can tolerate frost**

e.g.; Radish, Carrot,

Radish

Carrot


Cabbage

Classification on the Basis of Life Span

- Annuals
- Biennials
- Perennials

Climate is a critical factor determining life span of a plant. Annual and biennials can vary in their life spans in different climates

Some plants like tomato and egg plant are perennial in tropical climate and annual in temperate zone due to winter kill

Classification Based on Life Span

❖ **Annuals**

Complete their life cycle (from germination to setting seed) within a SINGLE growing season.
However, the growing season may be from fall to summer, not just spring to fall.
These plants come back from seeds only.
Many vegetables are seasonal herbs are annuals

Summer annuals

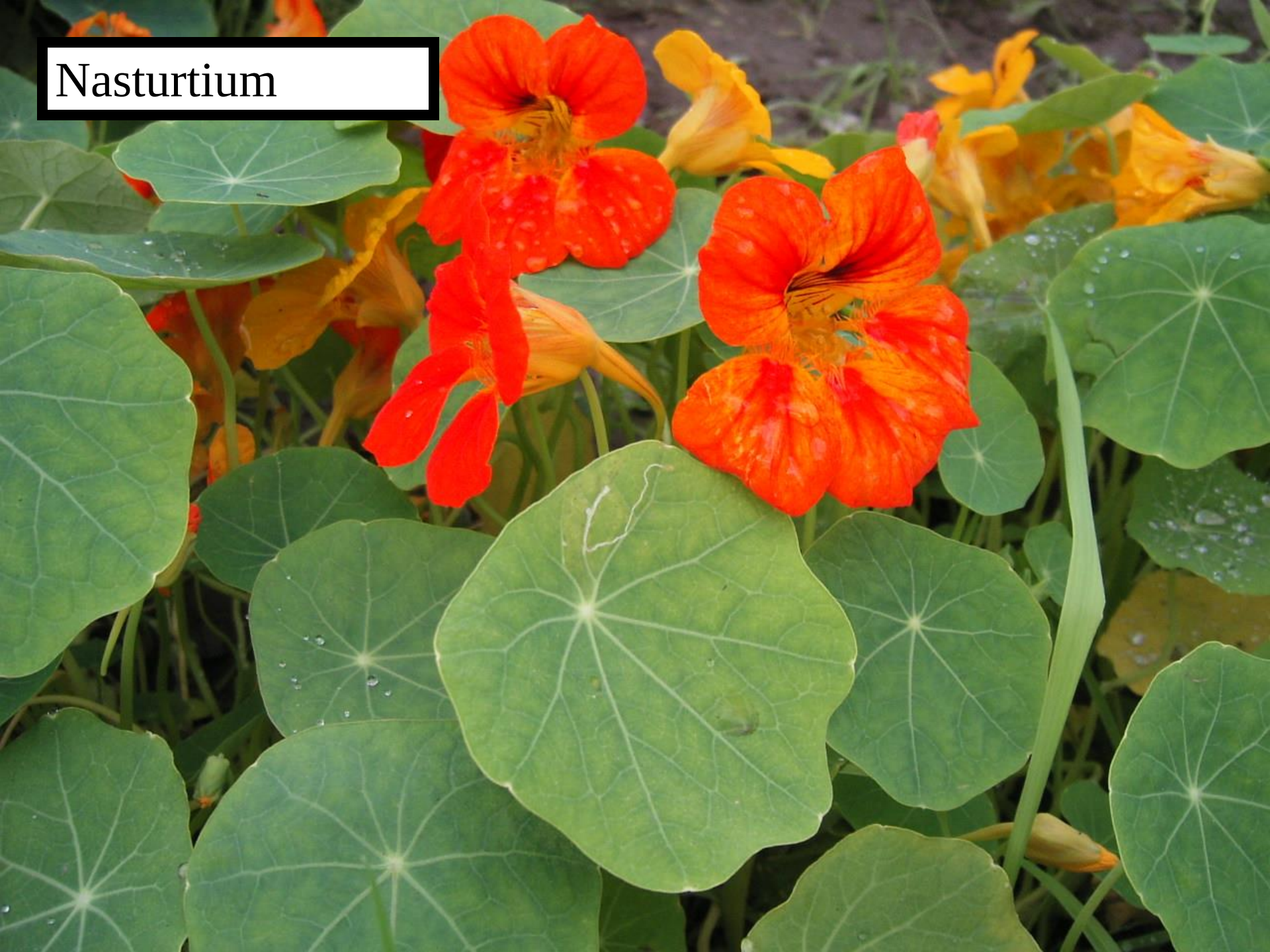
Germinate from seed in the spring and complete flowering and seed production by fall, followed by plant death, usually due to cold temperatures. These are also called warm season annuals.

Examples: Marigolds, Zinnia, Squash, and Crabgrass.

Winter annuals

Germinate from seed in the fall, with flowering and seed development the following spring, followed by plant death. Their growing season is from fall to summer.

Examples: Pansy, Phlox, Dhelia, many weeds in the lawn (such as chickweed and annual bluegrass).


Nasturtium


Zinnia


Marigold

❖ Biennials

- ✓ **Such plants complete their life cycle in two growing seasons.**
- ✓ **First season's growth in entirely vegetative, and is typically characterized by short, low internodes called rosettes**
- ✓ **In second season, it bolts (sends up a flowering stalk with extended internodes bearing flowers and fruits**
- ✓ **Examples: Root vegetables (carrots, beets), leafy vegetables (lettuce, cabbage) and onion**

❖ Biennials

- ✓ **Germinate from seed during the growing season and often produce an over-wintering storage root or bulb the first summer. They flower and develop seeds the second summer, followed by death.**
- ✓ **In horticulture, we grow many biennials as annuals (e.g., carrots, onions, and beets) because we are more interested in the root than the bloom.**
- ✓ **Some biennial flowers may be grown as short-lived perennials (e.g., hollyhocks, Onion, Carrot, Radish).**

❖ Perennials

- **Live through several growing seasons, and can survive a period of dormancy between growing seasons**
- **Above ground part is killed in winter while underground storage structures survive**
- **These plants can be divided into juvenile and mature phases.**
- **These plants regenerate from root systems or protected buds, in addition to seeds.**
- **Example: All fruit tress, ornamental trees and shrubs, some of the herbs and bulbs, asparagus, potato**


Hollyhock

Classification on the basis of Flower Sex

- Monoecious plants
- Diecious plants
- Hermaphrodite

Monoecious plants

Plants having both male and female flowers on the same plants.

e.g. Mango, Jaman, Citrus


Citrus


Mango

Dioecious plants

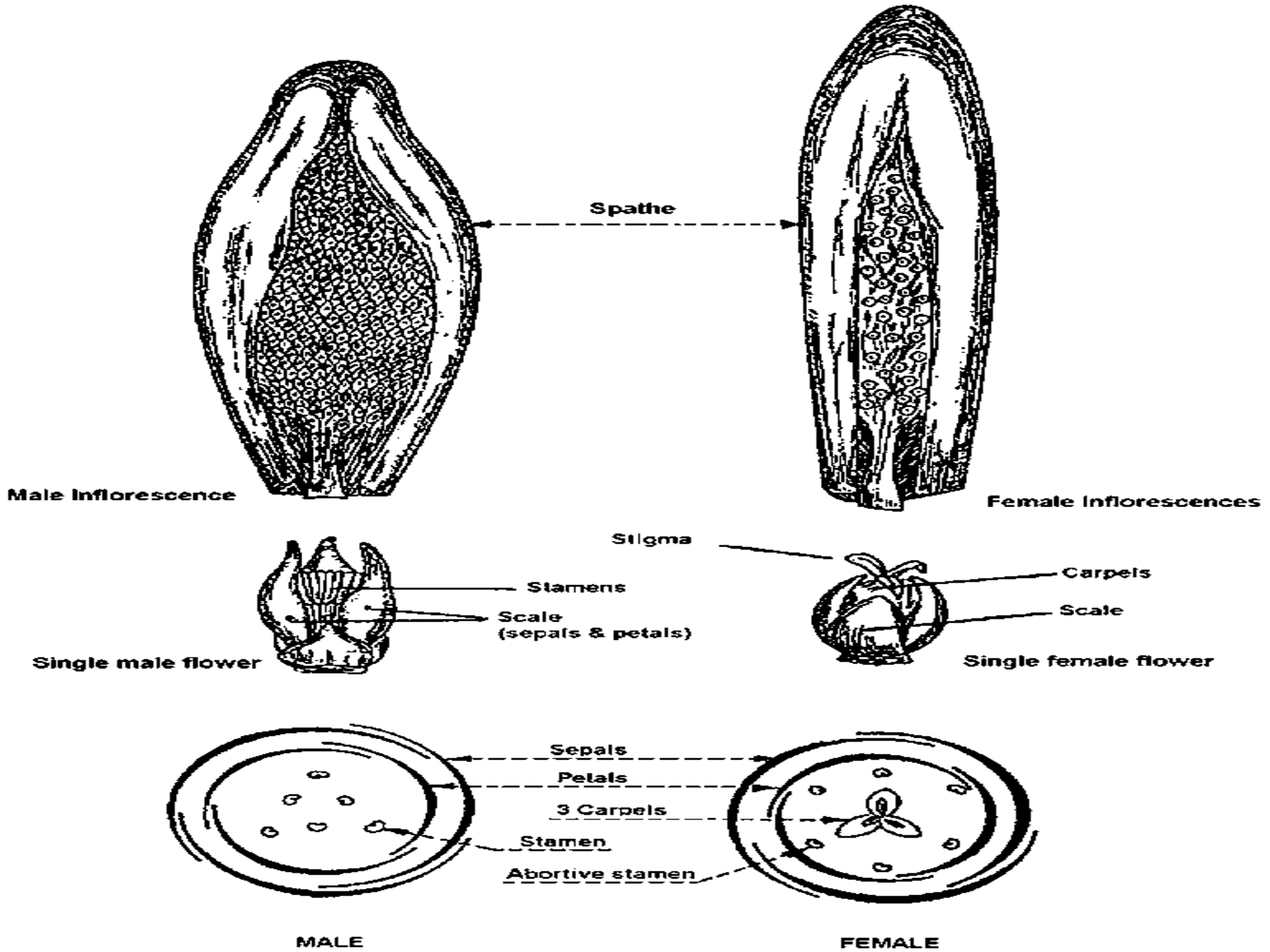
Plants having male and female flowers on different plants

e.g. Date palm, Papaya, Spinach.


Papaya


Female Date palm


Male Date palm


Spathe
Male Inflorescence
Female Inflorescences
Stigma
Stamens
Scale
(sepals & petals)
Carpels
Scale
Single male flower
Single female flower
Sepals
Petals
3 Carpels
Stamen
Abortive stamen
MALE
FEMALE


Male

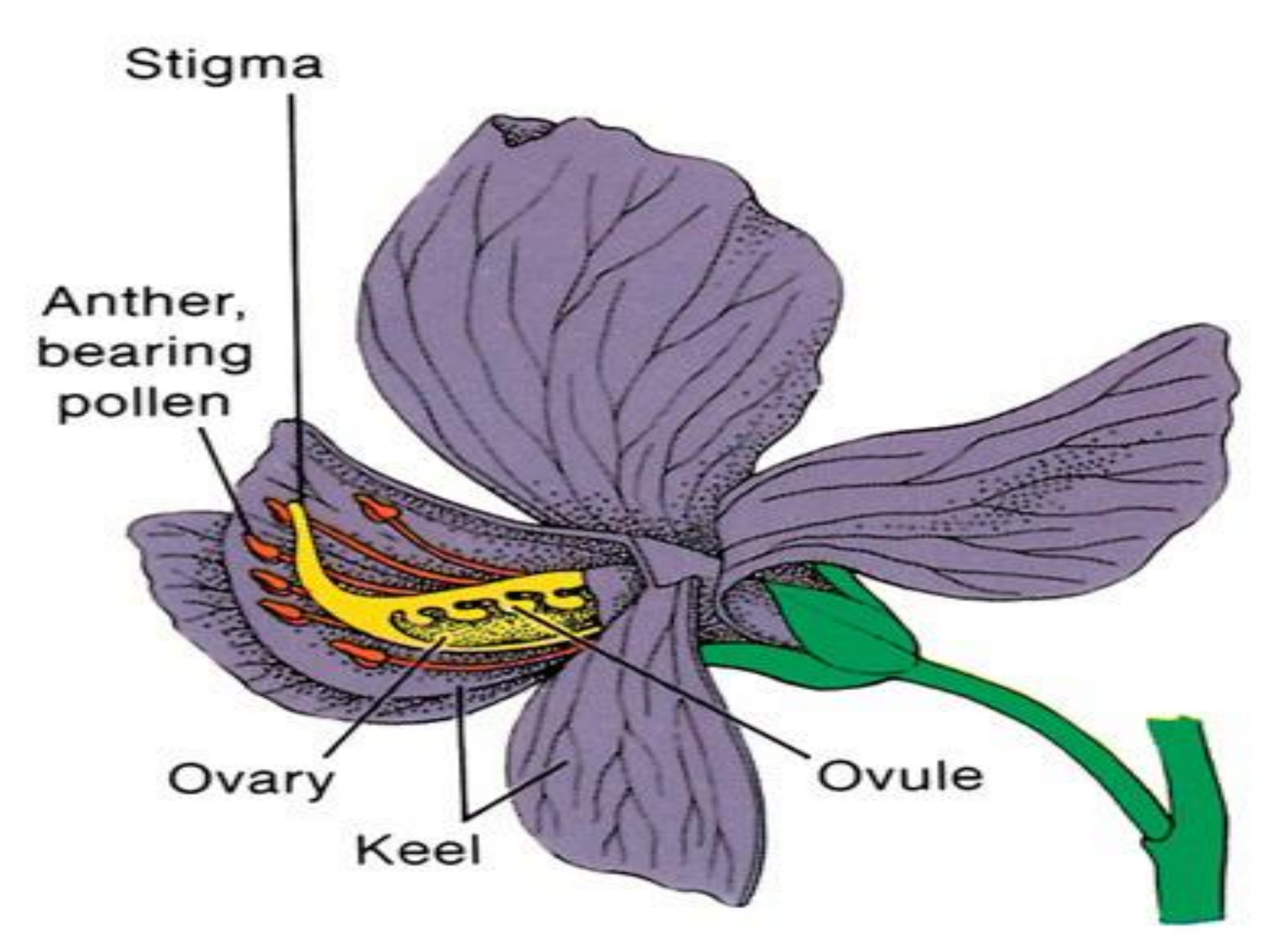

Female

Hermaphrodite

Plants having flowers with both male and female parts in the same flower.

e.g., Pea


Pea flower


Stigma
Anther, bearing pollen
Ovary
Keel
Ovule

Classification on the Basis of Edible Portion

- Root crops
- Leafy crops
- Vine crops
- Flowering crops

Root crops

- Edible portion of plant is root.

  Carrot, Reddish, Turnip


Carrot


Radish


Turnip

Leafy Vegetables

- Edible portion is leaf of the plant

  Cabbage, Spinach, Lettuce, Celery, Brussels sprouts


Lettuce


Spinach

Vines

- Vegetables which grow on vines,

  All cucurbits, like cucumber, bitter gourd,


Pumpkin
Saxon Holt

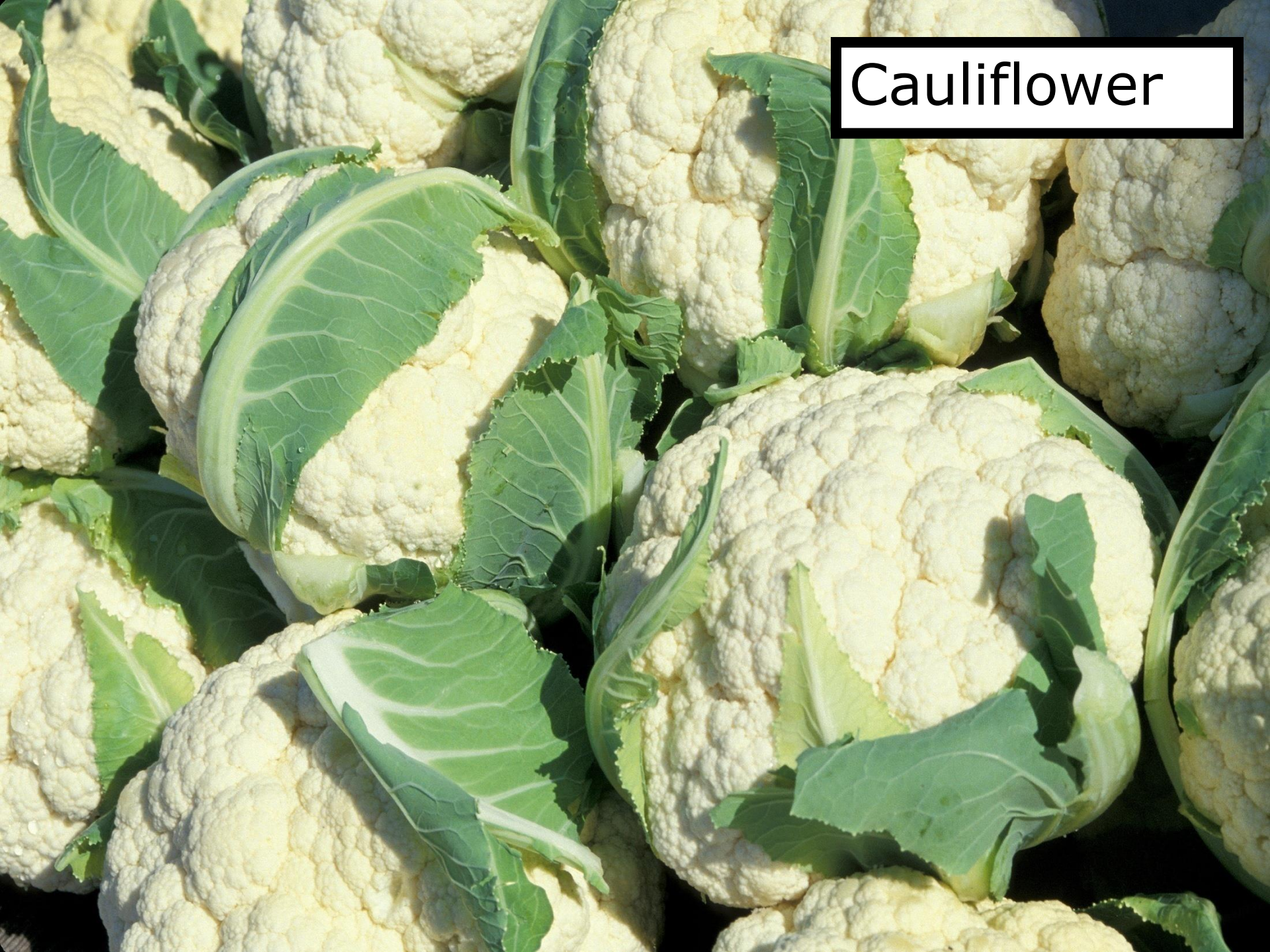

cucumber

Flowers

- Flower head is the edible portion of plant

  Cauliflower, Broccoli


Broccoli


Cauliflower

Classification on the Basis of Leaf Shedding

- **Ever Green**
- **Deciduous**

Ever Green plants

Retain some leaves longer than one growing season

so that leaves are present throughout the year.

Seasonal drop of some of the oldest interior leaves

is a natural part of the life cycle.

e.g.; Alstonia, Mango, Citrus


Mango


Alstonia

Deciduous plants

Plants shed there leaves in approximately the same time annually (Autumn).

e.g.’ Apple. Peach, Pear, Mulberry

Apple tree in winter

Apple tree

Classification on basis of Landscape use

- **Foliage plants** — **Aclypha,**
- **Ground cover** — **Alternanthra,**
- **Hedge** — **Duranata, Jatti Khatti**
- **Trees** — **Mango, Jaman, Pilkhin**
- **Shrubs** — **Murva, Hamelia**
- **Indoor plants** — **Money plant**
- **Palms** — **Chinese palm, Royal palm**
- **Creeper/climbers** — **Tecoma, Honey Suckle, Rangoon creeper**

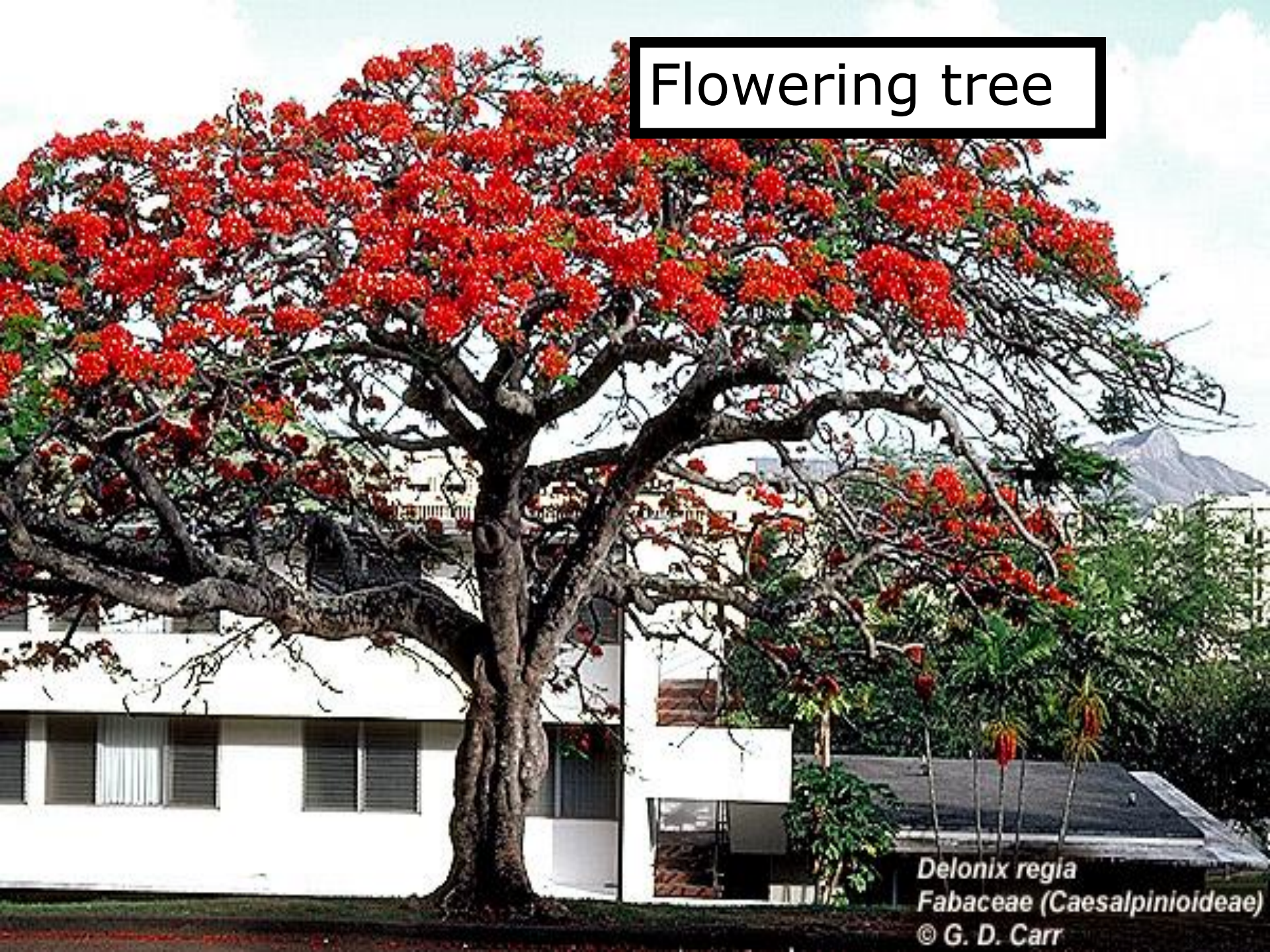
Monstera deliciosa
Indoor plant

Indoor money plant


Lantana Ground cover
© Jardin Mundani ©


Cauliflower


Hedge


Flowering tree
Delonix regia
Fabaceae (Caesalpinioideae)
© G. D. Carr


Palm trees


Palms

CLASSIFICATION OF FRUIT

On the Basis of Structural Development

Systematic Pomology

Describes fruits according to their structural development.

True Fruits

The fruits which develop from the ovary or edible portion develops from ovary. Grapes, Banana, Citrus.

False Fruits

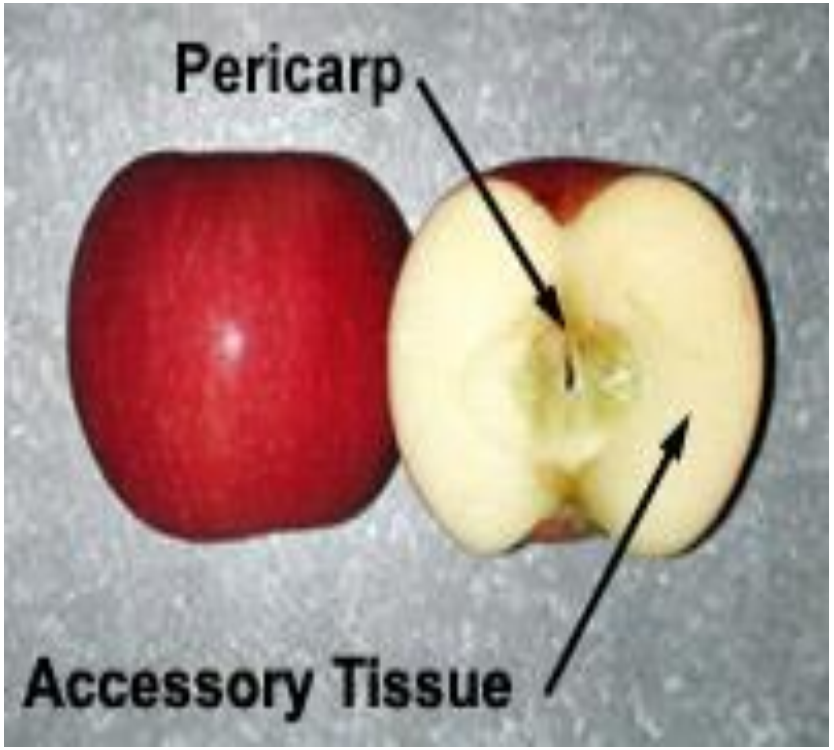
The fruits in which edible portion develops from other parts of flower rather than ovary. Apple, Pear etc.

Pome Fruits

These are false fruits where edible part is thalamus e.g. Apple, Pear, Quince

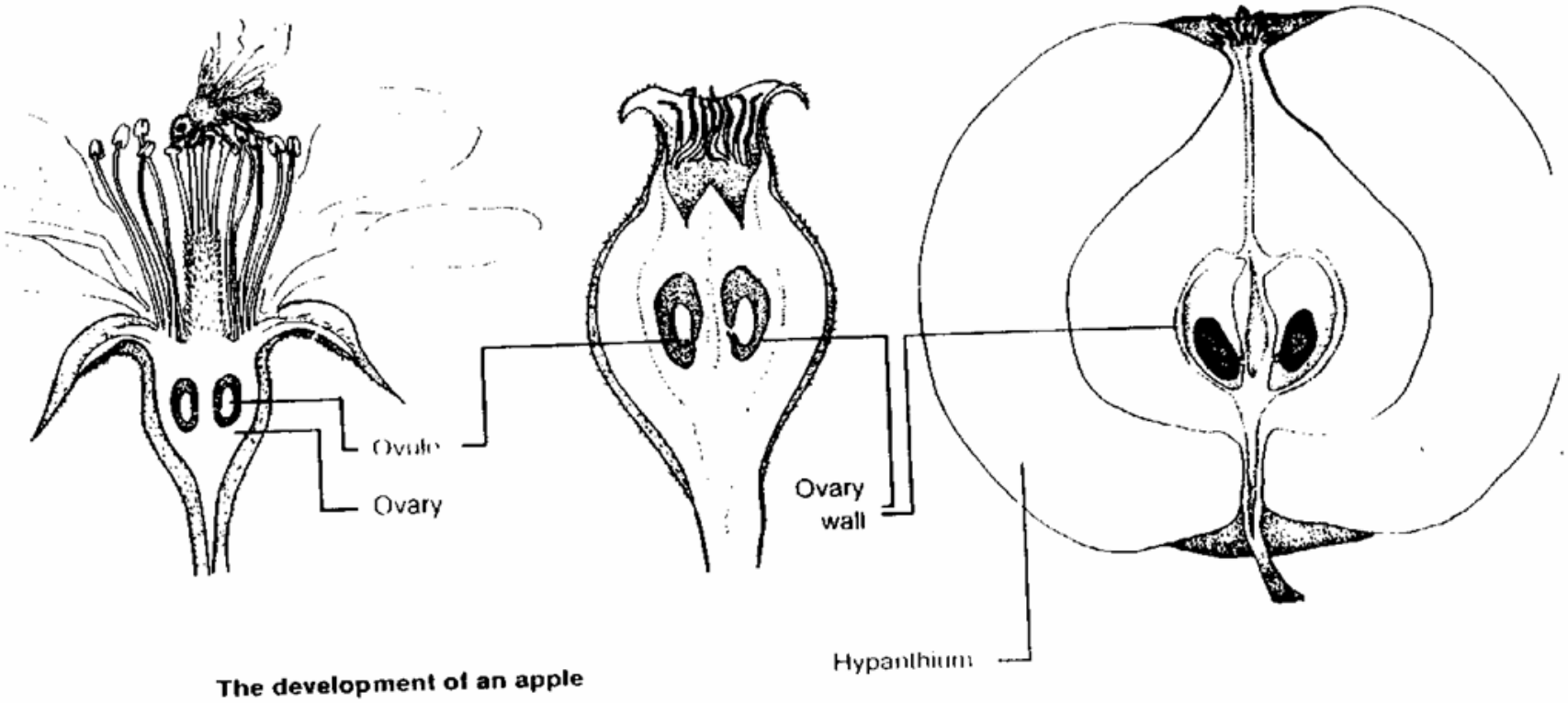
Pome

- **Paper-like pericarp containing a thickened, fleshy receptacle or hypanthium. (apple, pear, pomengranate)**



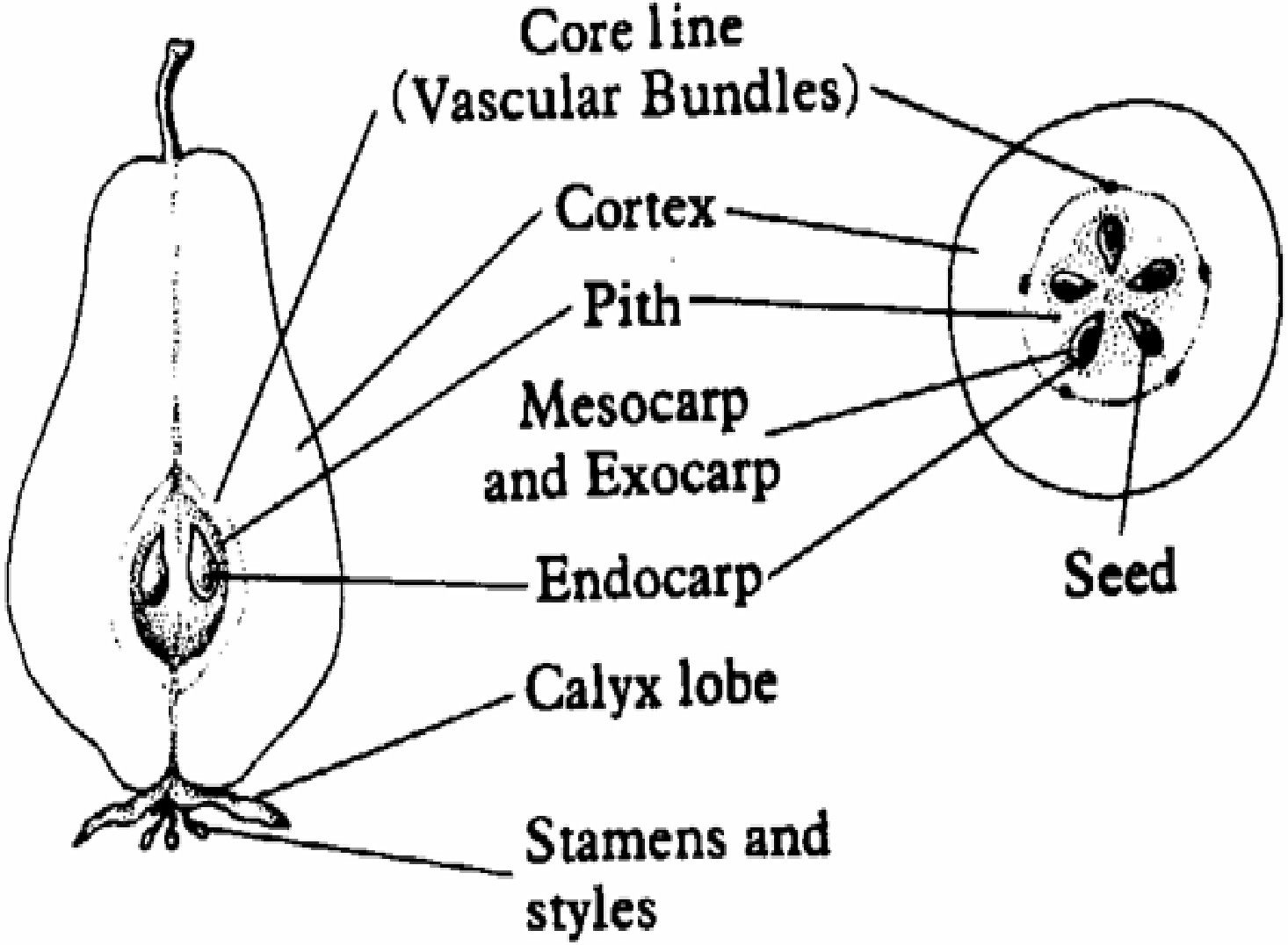
Fleshy fruit: Pomes

Leathery carpels
Edible portion is receptacle



The development of an apple

POME


Core line
(Vascular Bundles)
Cortex
Pith
Mesocarp
and Exocarp
Endocarp
Calyx lobe
Stamens and
styles
Seed

Berry Fruits or Fleshy fruit or Berries

- **These are true fruits which develop from the ovary walls.**
- **One pistil (carpel)**
- **One or many seed**
- **Entire pericarp is fleshy. (Grape, tomato, Kiwi fruit, Persimmon)**

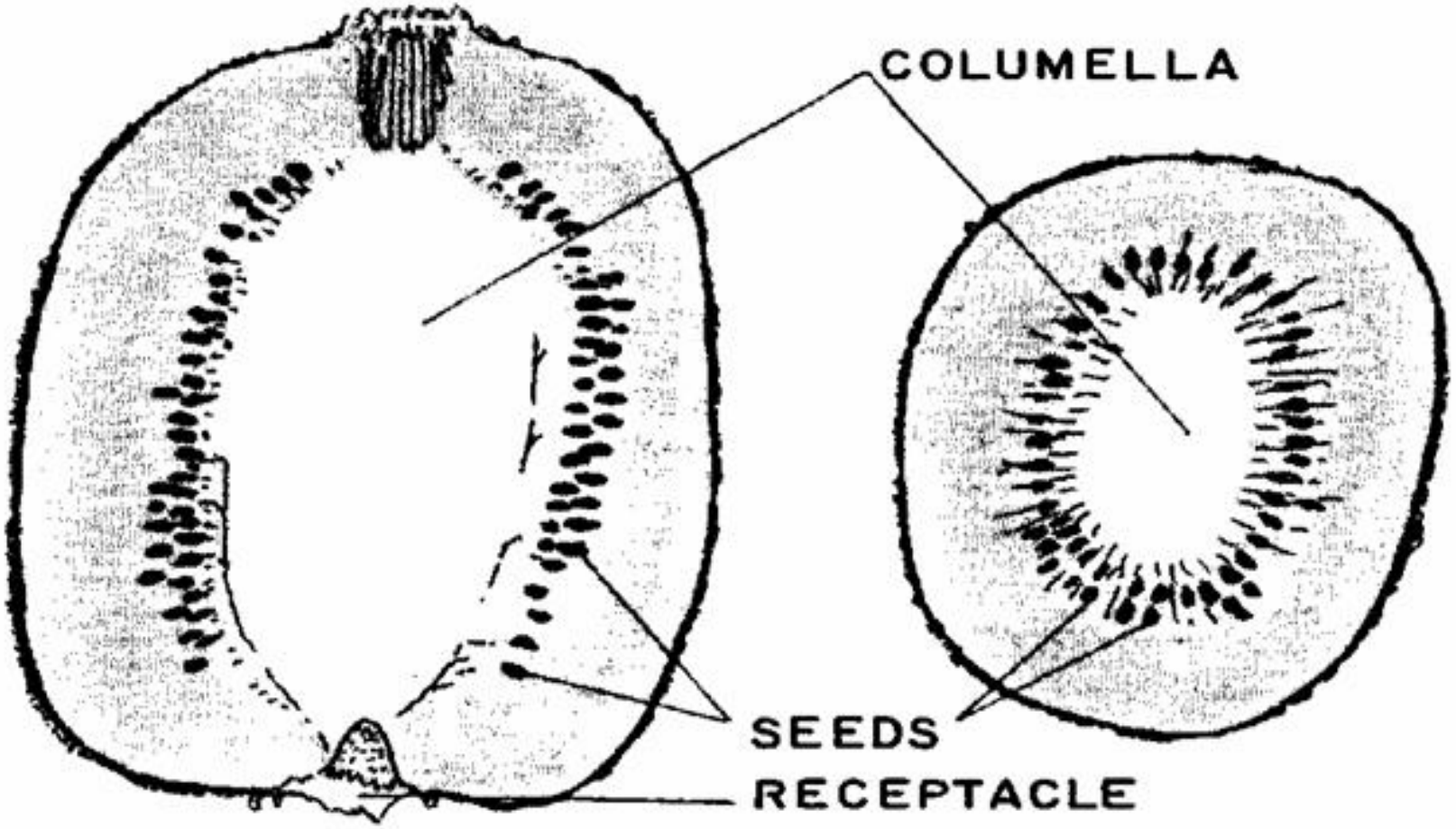


Figure 1.37
Longitudinal (left) and cross (right) sections of a mature kiwifruit. Each locule radiating from the columella represents a fused carpel.

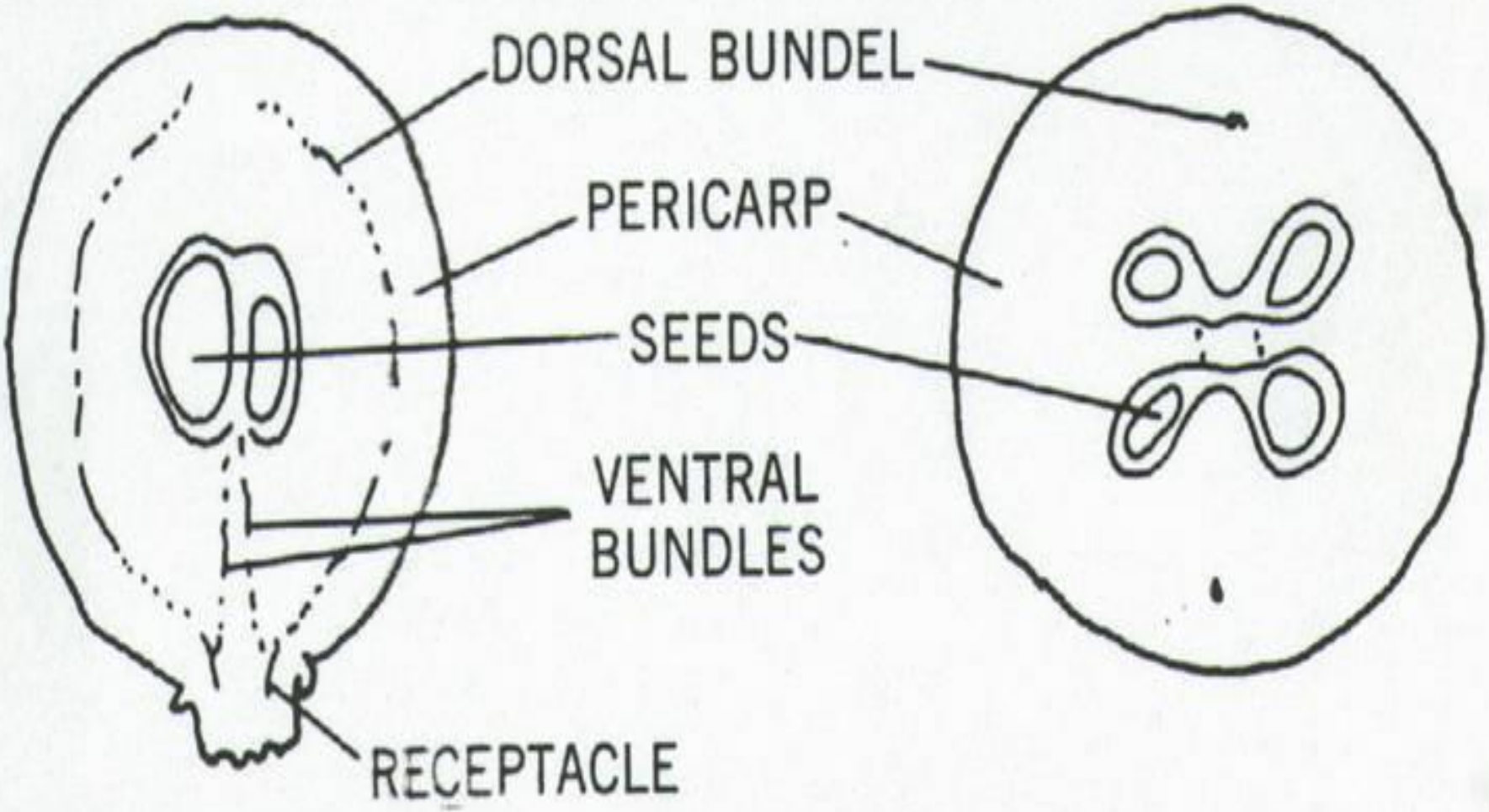
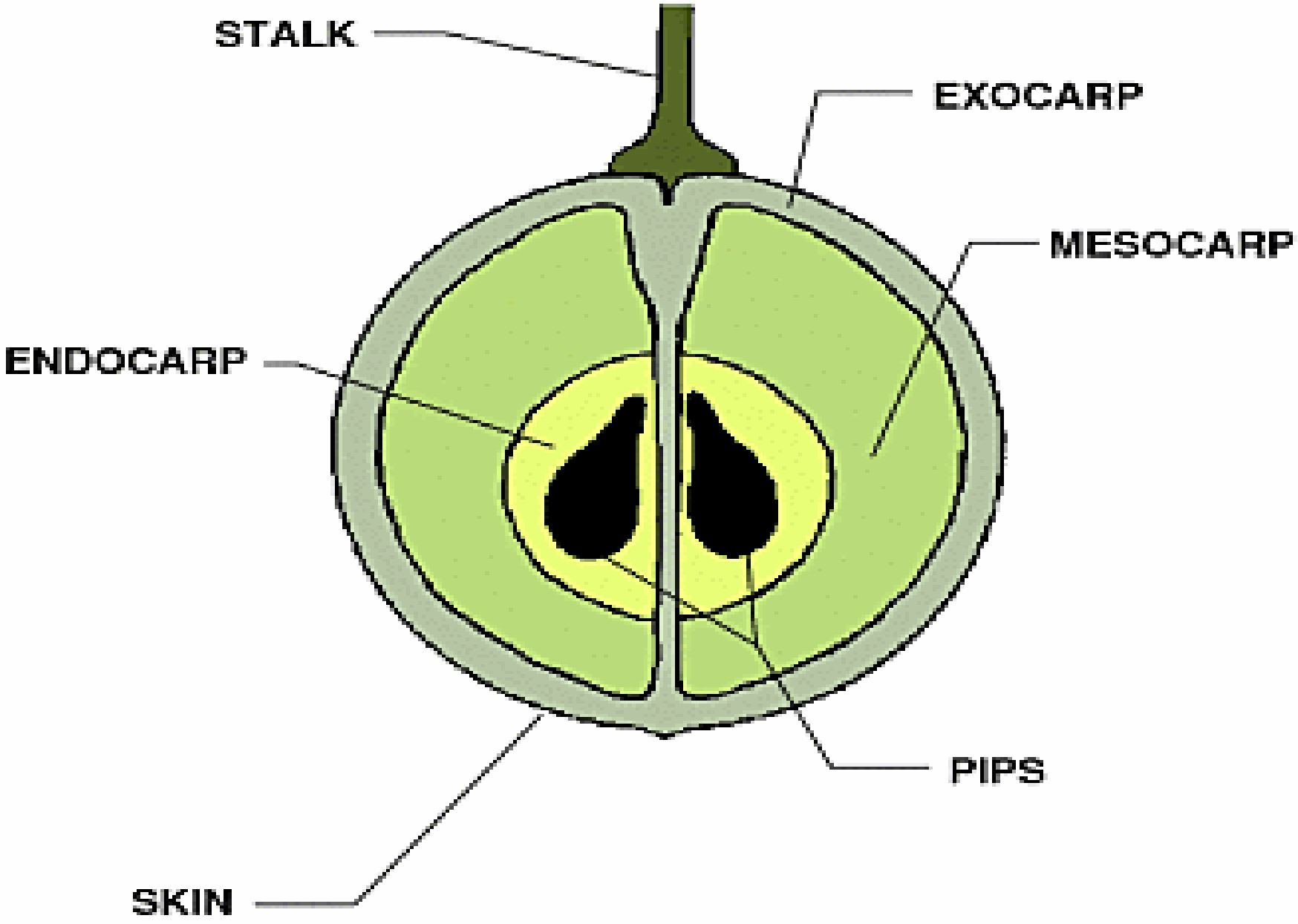


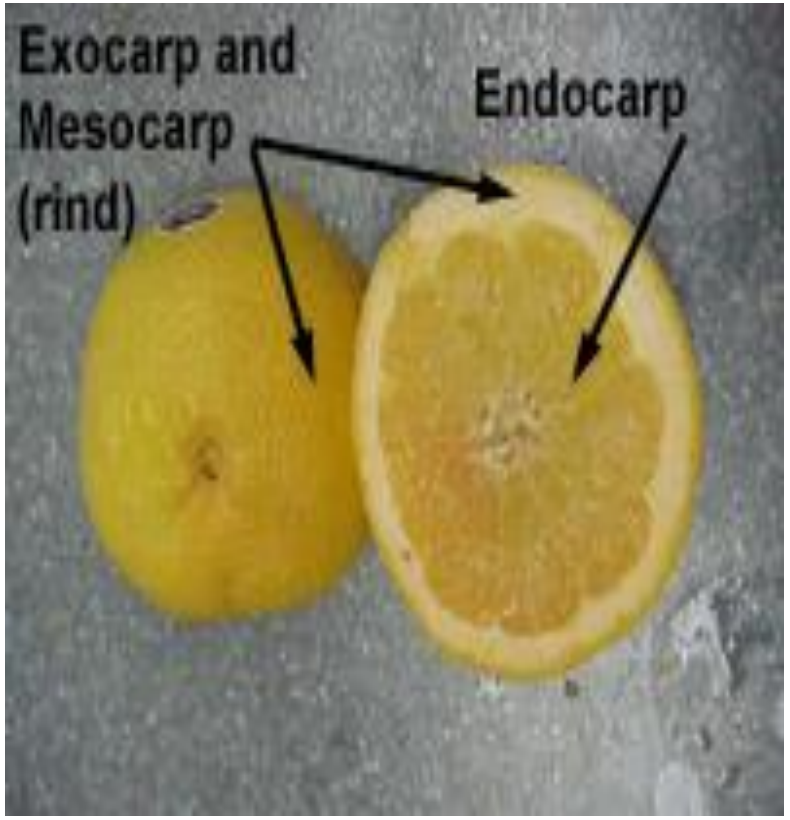
Figure 1.34

Longitudinal (left) and cross (right) sections of a bicarpellate grape berry.


STALK
EXOCARP
MESOCARP
ENDOCARP
PIPS
SKIN

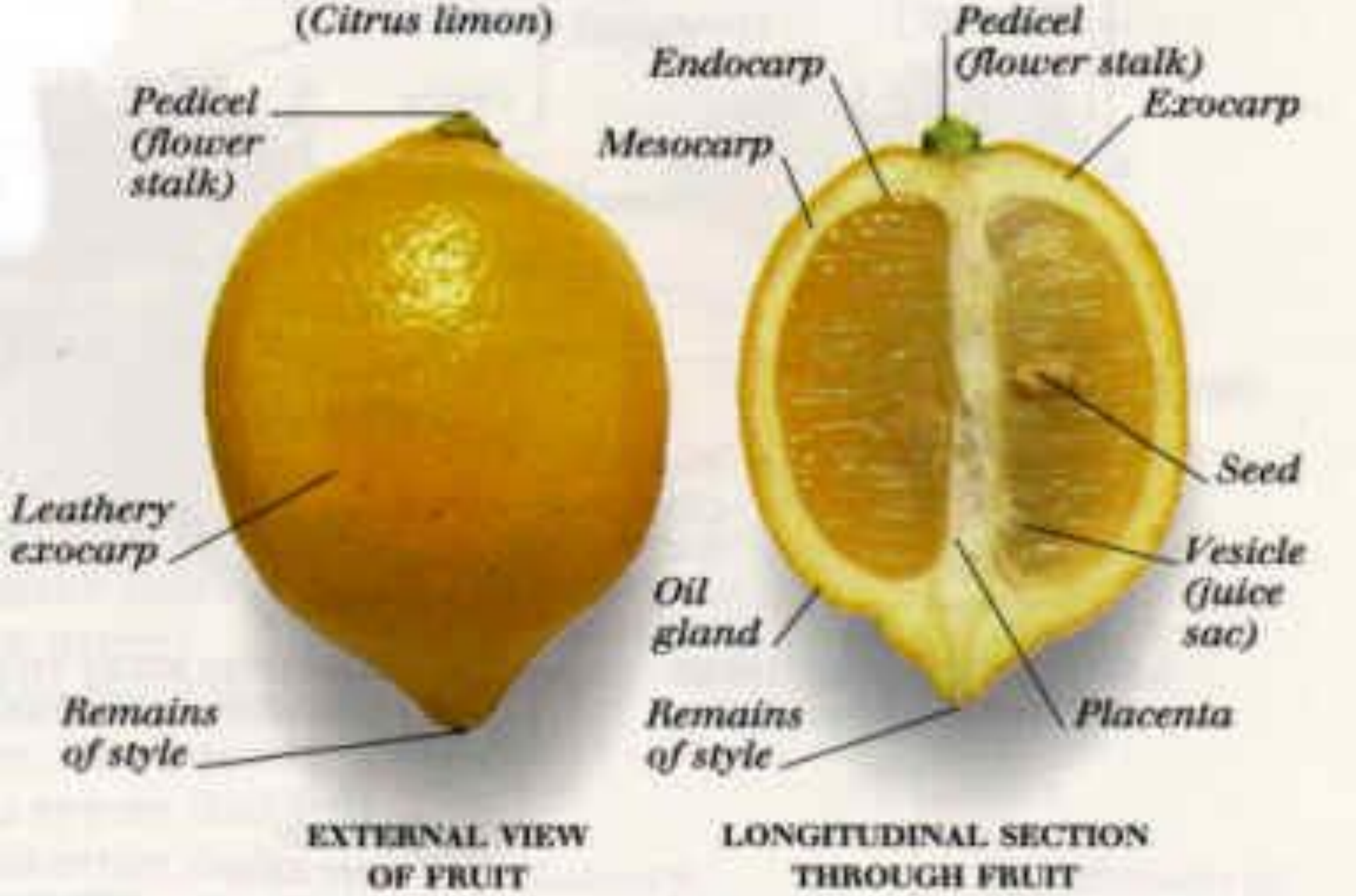
Hesperidium

- **Type of berry, with the exocarp and mesocarp as a hard rind and the endocarp composed of juice vesicles. (citrus-orange, lemon, lime)**



HESPERIDIUM (A TYPE OF BERRY)

Lemon
(*Citrus limon*)



EXTERNAL VIEW OF FRUIT

LONGITUDINAL SECTION THROUGH FRUIT

Simple Fruit

The fruit derived from a single flower with a single ovary (pistil) is called simple fruit.

Multiple Fruit

- Fruit derived from several or multiple flowers clustered along a common axis. (Mulberry, Fig, Pineapple)


Pineapple Fruit


Pineapple near maturity

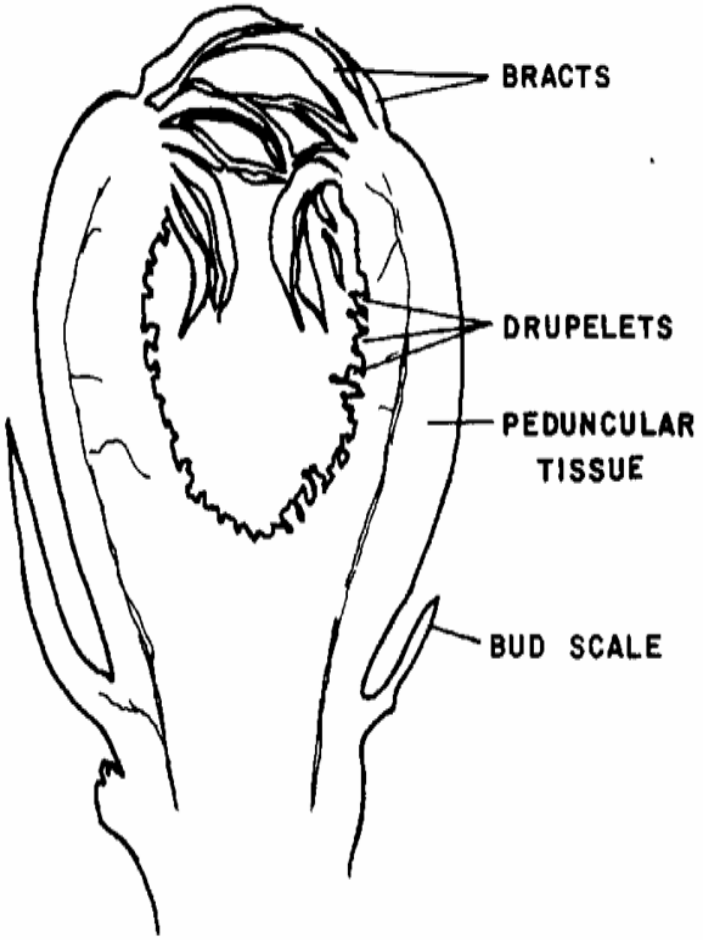


Figure 1.32
A multiple fruit of a young fig, a syconium. The true fruits are the drupelets, each surrounded by a fleshy sepal.

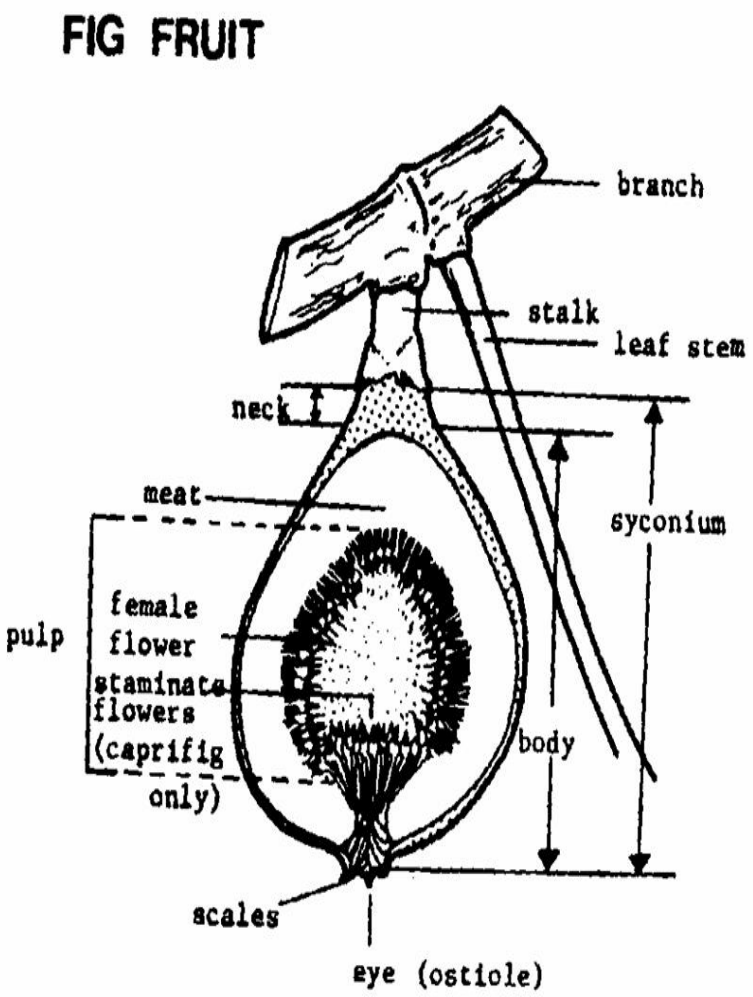
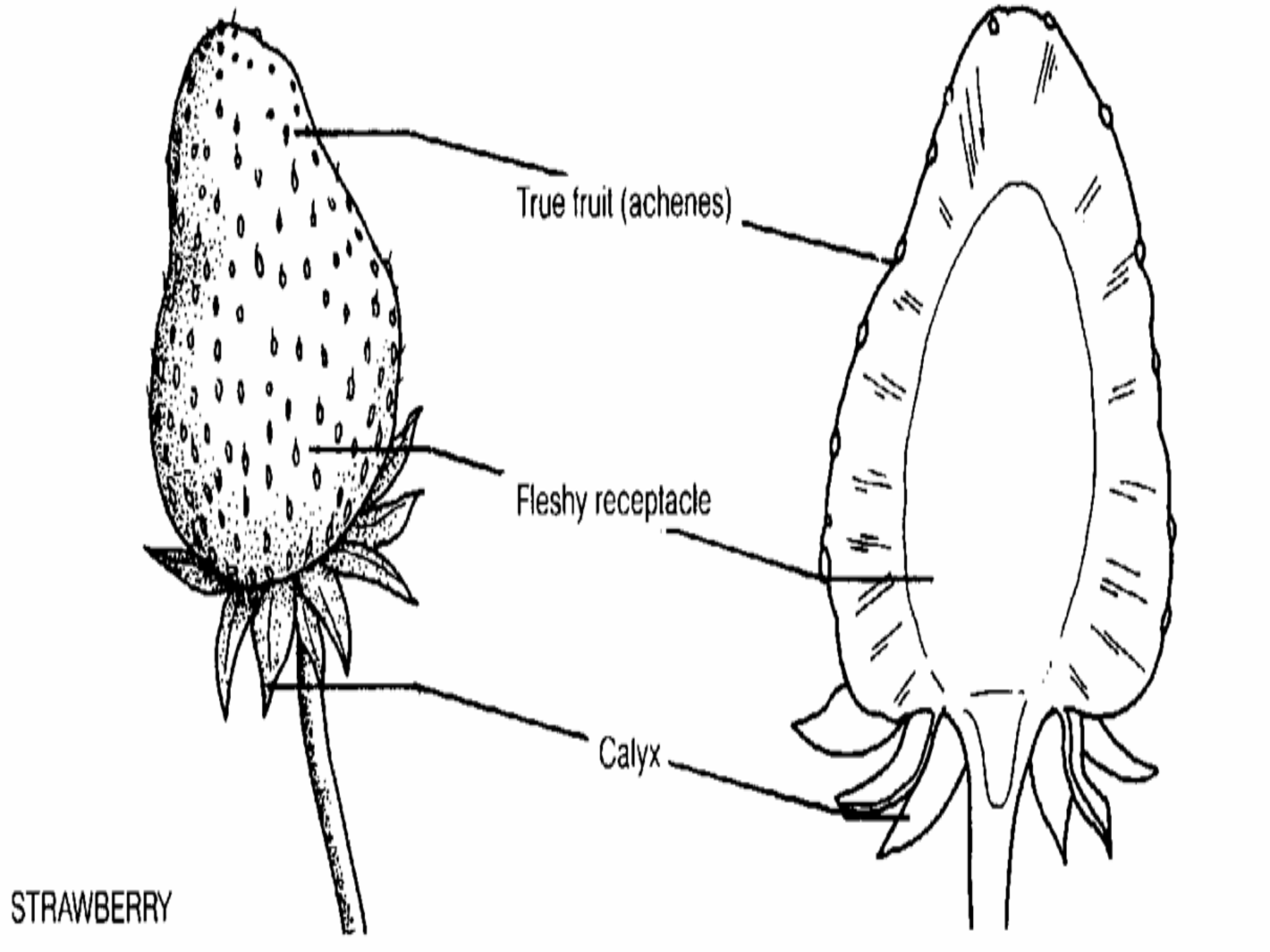



Fig fruit

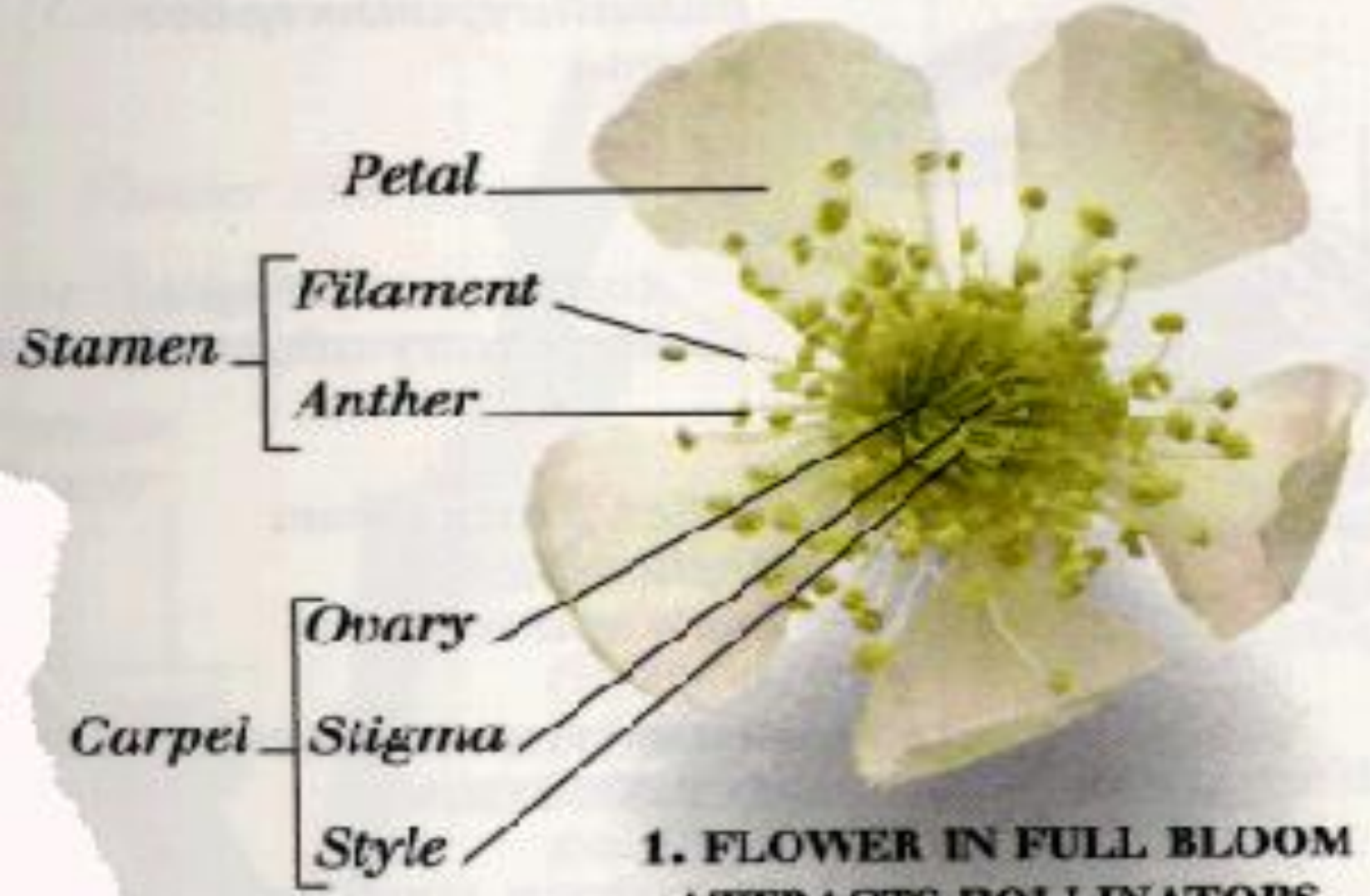
Aggregate Fruit

- A fruit derived from a single flower with many pistils. (Blackberry, Strawberry, Raspberry)


True fruit (achenes)
Fleshy receptacle
Calyx
STRAWBERRY

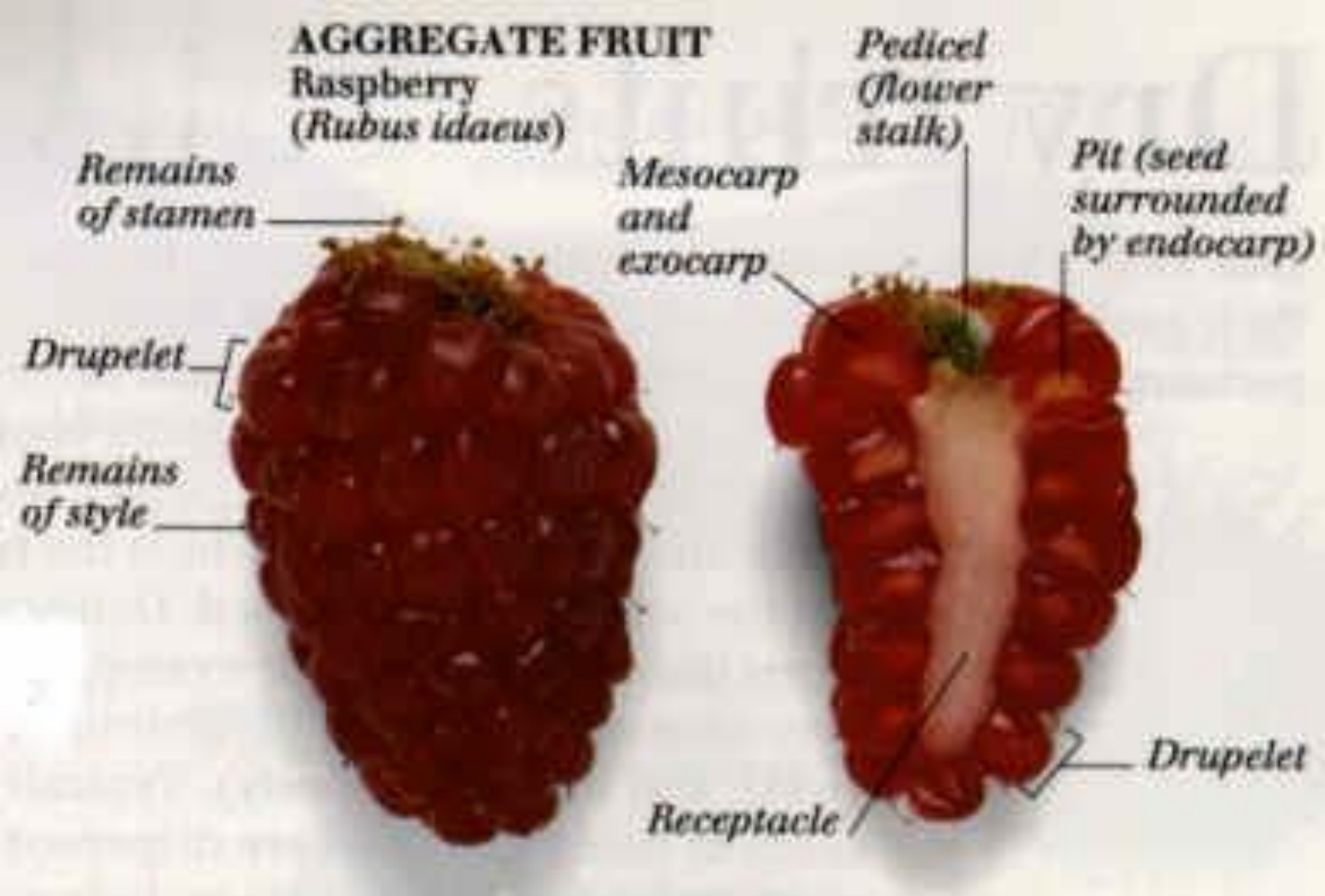

Strawberry
at fruiting

Blackberry
(*Rubus fruticosus*)



1. FLOWER IN FULL BLOOM ATTRACTS POLLINATORS

AGGREGATE FRUIT
Raspberry
(*Rubus idaeus*)



EXTERNAL VIEW OF FRUIT

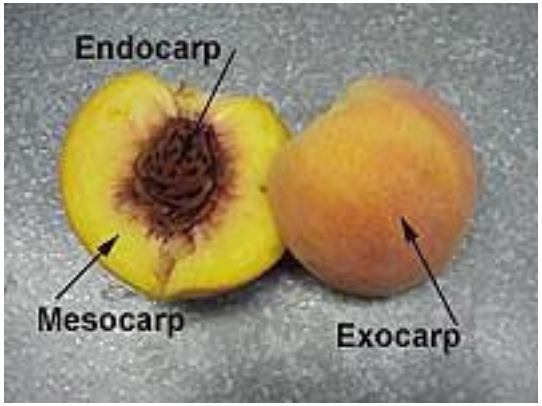
LONGITUDINAL SECTION THROUGH FRUIT

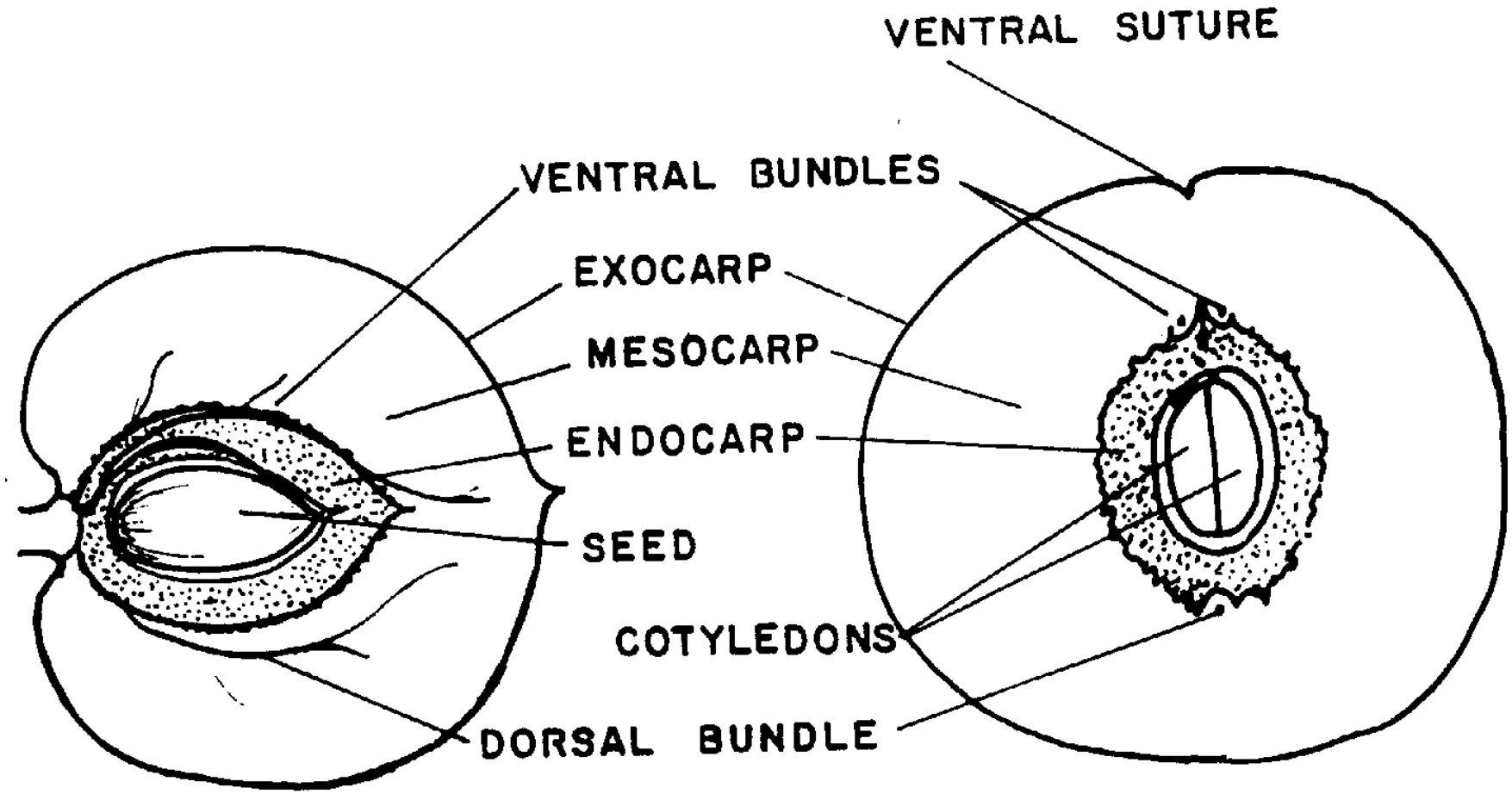
Nut

- Nuts are edible seeds
- Similiar to an achene, but one seeded by abortion and partially (acorn) or entirely
  enclosed by a husk.
  (pecan, walnut, almond)

Drupe or Stone

- **A single-seeded fruit**
- **a skin-like exocarp (fuzzy or smooth)**
- **fleshy mesocarp**
- **a hard stony endocarp. (peach, cherry, plum, apricot, coconut)**




VENTRAL SUTURE
VENTRAL BUNDLES
EXOCARP
MESOCARP
ENDOCARP
SEED
COTYLEDONS
DORSAL BUNDLE

- **Skin = exocarp**
- **Eatable portion (flesh) = mesocarp**
- **Pit = endocarp**

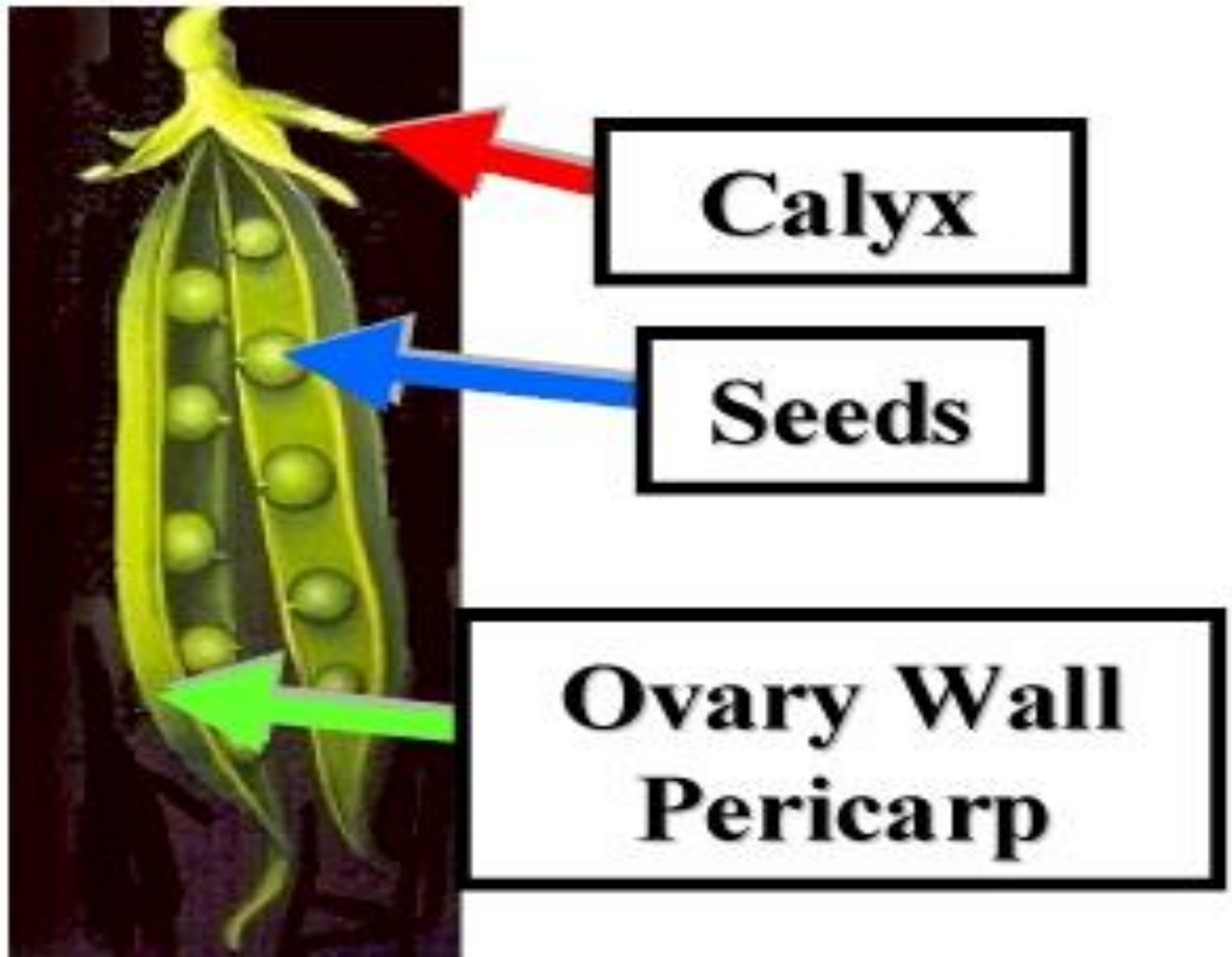
Legume Or Pod

- **Contains one locule that splits along two sutures. (bean, pea, peanut, mimosa)**

Pea fresh

Follicle

- **Contains one locule that splits along one or more suture. (larkspur, sweet gum, magnolia)**


Calyx
Seeds
Ovary Wall
Pericarp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Cauliflower
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Capsule

- **Contains three or more locules that split along three or more sutures. (okra, golden rain tree, tallow tree)**