Introduction to Horticulture

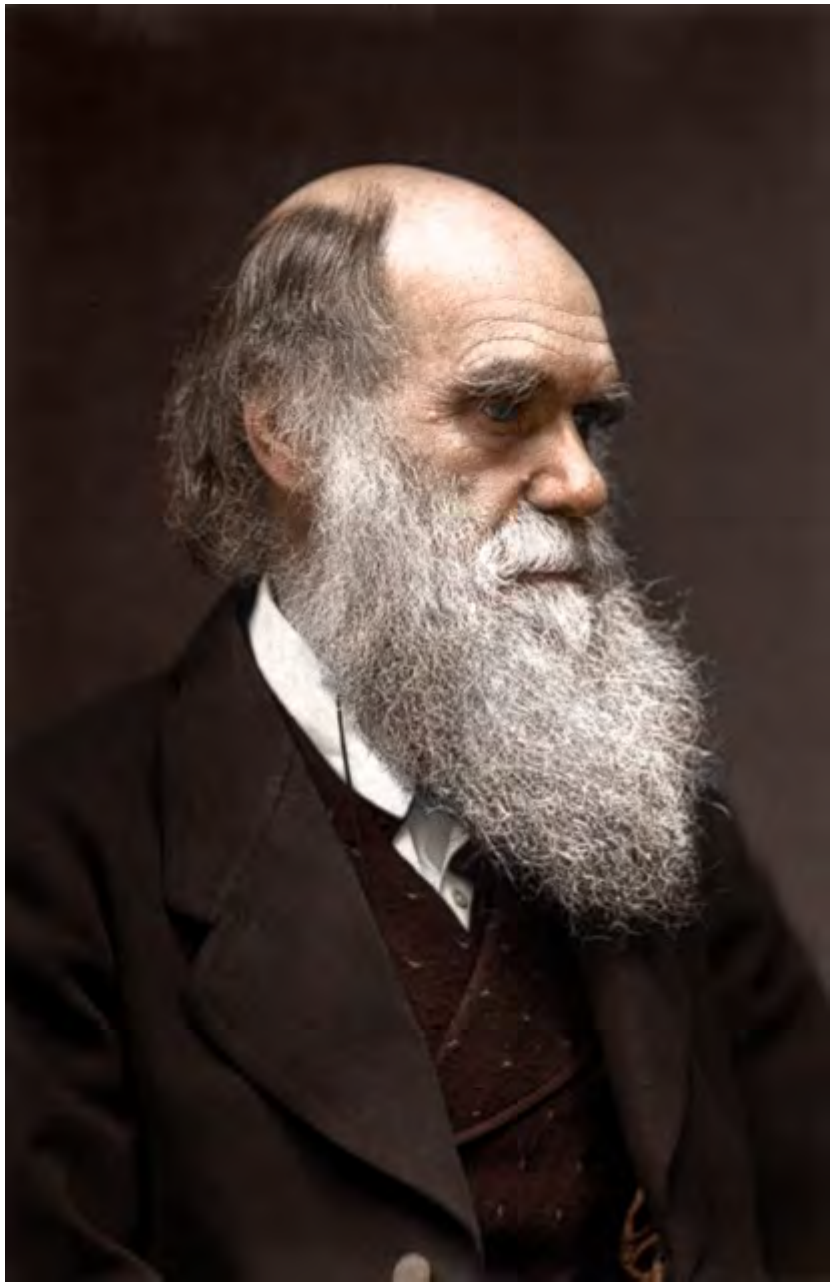
Liz Woodward
Mo Price
San Diego County Master Gardeners
Class of 2010

San Diego Master Gardener
Class of 2016

Horticulture Defined

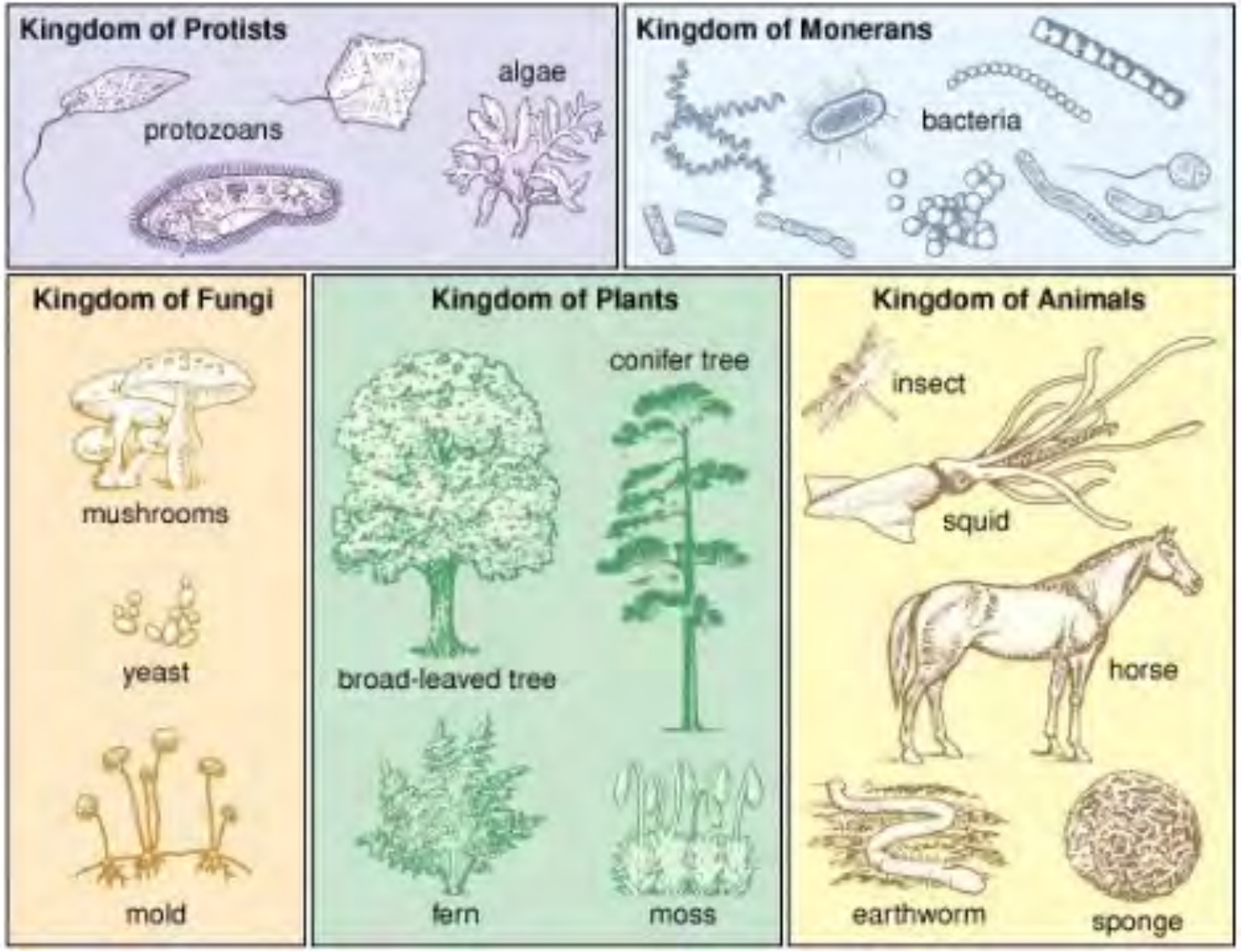
- *hortus* (garden) + *colere* (to cultivate)
- Culture of Gardens vs. Fields of Crops
- Fruits, Vegetables, Ornamentals, Herbs, Specialty Crops

Carl Linnaeus
1707-1778

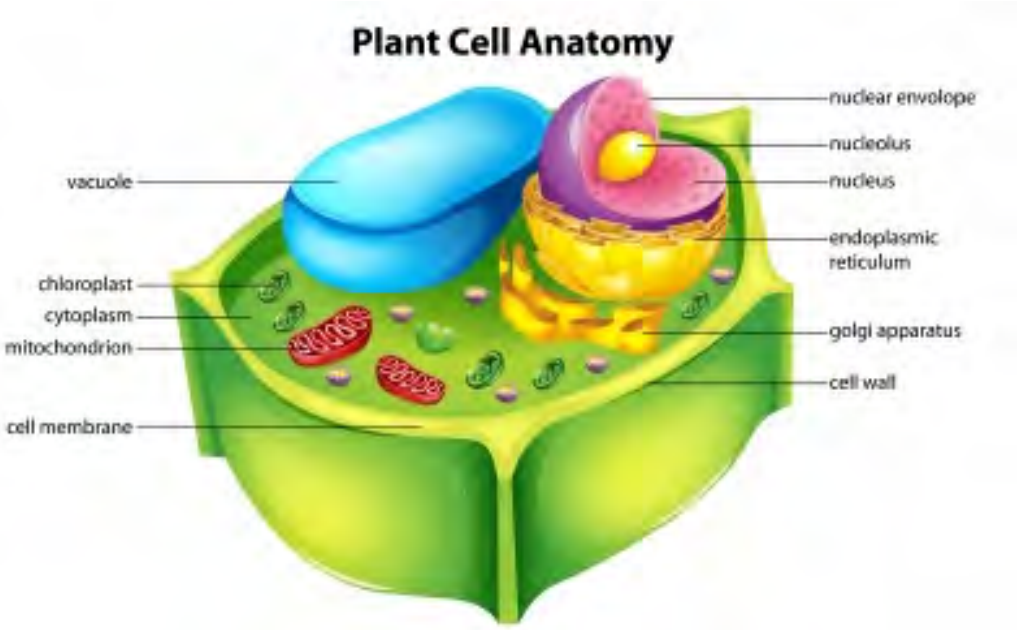


Charles Darwin
1809-1882

5 Kingdoms of Living Organisms

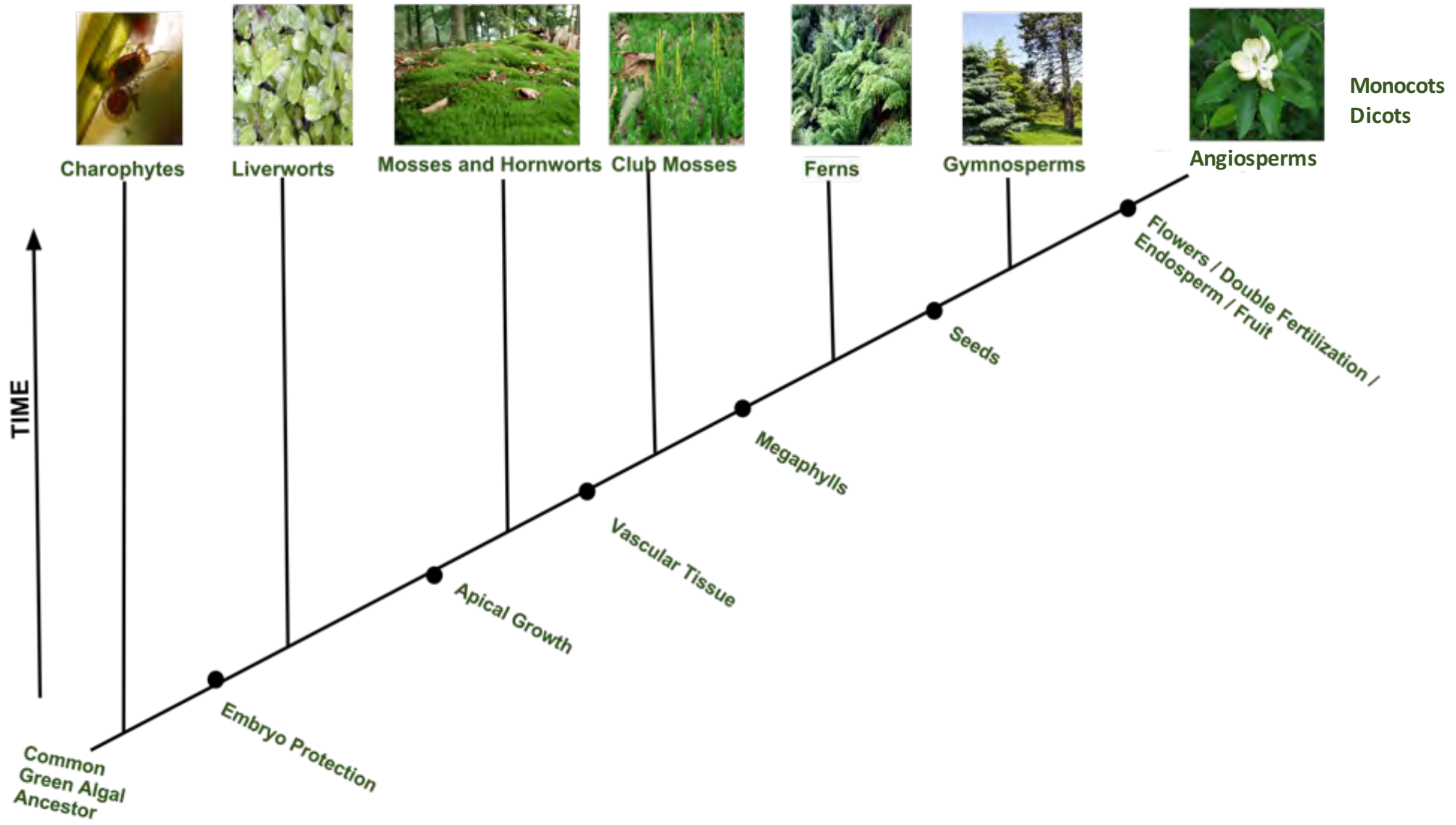


What is a Plant?



- Member of the kingdom Plantae
- Living, immobile, no conscious
- Rigid cell walls made of cellulose
- Can regenerate lost tissues and organs
- Carry out photosynthesis
- They are able to make their own food (autotrophs)

The Evolution of Plants



Monocots

One cotyledon

Veins usually parallel

Vascular bundles usually complexly arranged

Fibrous root system

Floral parts usually in multiples of three

Embryos	Leaf venation	Stems	Roots	Flowers

Dicots

Two cotyledons

Veins usually netlike

Vascular bundles usually arranged in ring

Taproot usually present

Floral parts usually in multiples of four or five

Botanic Nomenclature

Purpose, Pronunciation & Format

Class of 2016
MG Training Support

Why use Botanic Names?

- Botanic names use the same language worldwide: Latin
- Botanic names do not have multiple meanings
- Many botanic names have specific meaning

What's in a Latin name?

alba – white
alpestris - alpine
bellus – beautiful
broccolo – flowering top
caerule – dark blue
candicans – hairy or wooly
cereus - waxy
coccineu – scarlet
cordata – heart shaped
crassu – fleshy, thick
dulcis – sweet
edulis – edible
ferox – very thorny
flavens – yellowish
glaber – smooth; without hairs
heli – sun
imbricata – overlapping,like scales
ingens – enormous
obesus – fat
phylla – leaves (pertaining to)
repens – crawling, creeping
ericeus - silky
serpens – creeping, snakelike
vulgaris - common

What do these 3 plants have in common?

- Poison Oak
- Silky Oak
- She Oak

They are NOT oaks.

What do these 3 plants have in common?

- California Pepper
- False Pepper
- Peppercorn Tree

They are all the same plant & native to Peru.

Pronunciation Facts

- Horticulturists don't always agree on pronunciation

- Individual botanists rarely are completely consistent in pronunciation

- People tend to pronounce names the way they first learned them regardless of any subsequently encountered info

Can you say:

Chrysanthemum

?

(kris-AN-the-mum)

Botanic Name Pronunciation

How do you say: Tomato? Basil? Protea?

Alyogyne huegelii?

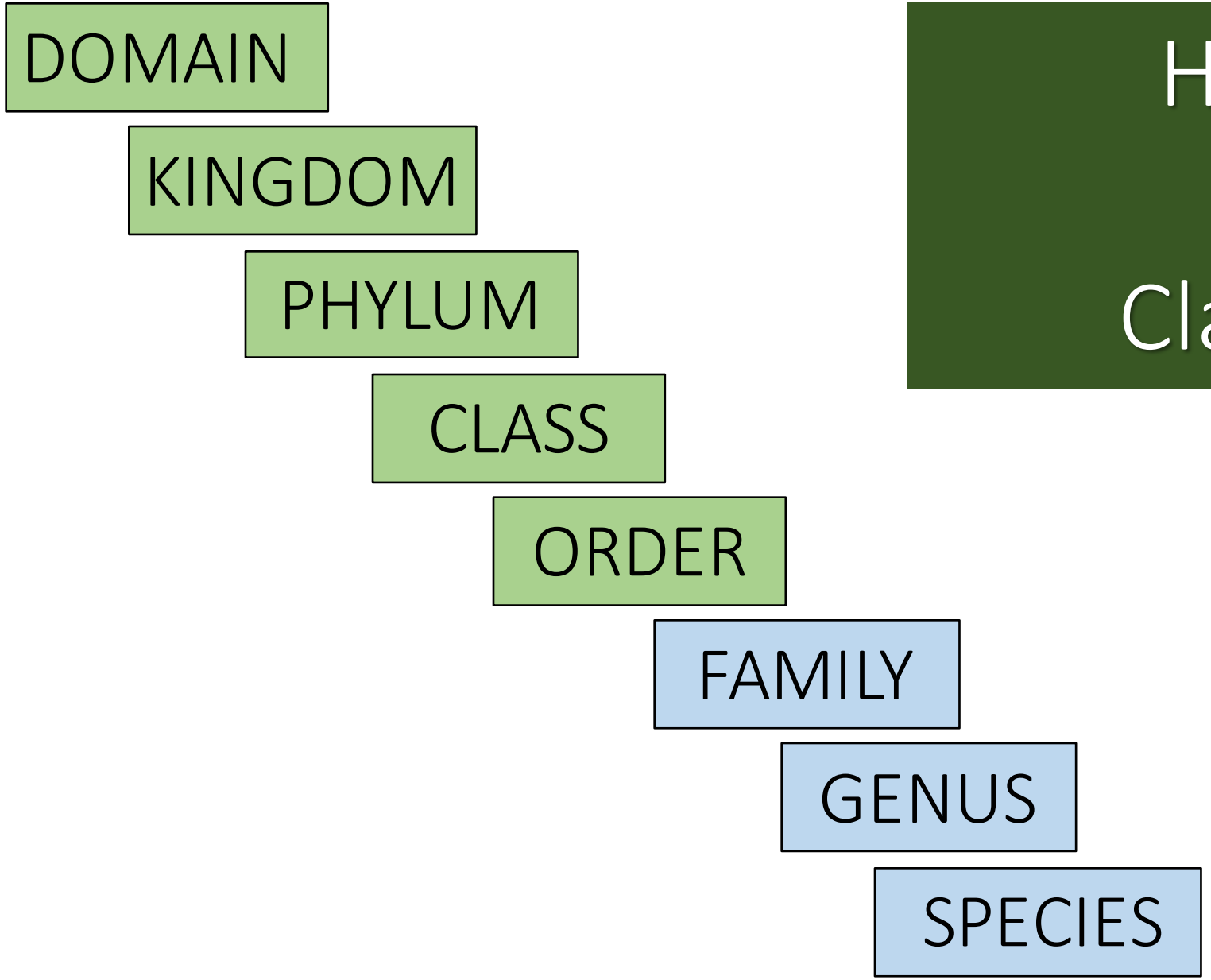
Try this web site: davesgarden.com

PlantFiles: Blue Hibiscus, Lilac Hibiscus, Purple Hibiscus, California Hibiscus

Alyogyne huegelii 'Santa Cruz'

Family: Malvaceae (mal-VAY-see-ee) (Info)
Genus: *Alyogyne* (al-ly-oh-GY-nee) (Info)
Species: *huegelii* (hew-GEL-ee-eye) (Info)
Cultivar: Santa Cruz

Hierarchy of Biological Classification



Format

Family

- 640 Families
- Suffix of: aceae

Genus

- 17,000 Genera
- *Genus is Capitalized & in Italics*

species

- 1,064,400 species
- *species is lowercase & in italics*

‘hybrid’ Var, x

- Countless hybrids, sub-species, variations, trade names, etc.

Plant Family: Lauraceae

Laurus nobilis
Bay Laurel tree

Cinnamomum camphora
Camphor tree

Persea americana
Avocado tree

Lavandula stoechas 'Otto Quast''

Family: Lamiaceae

(lay-mee-AY-see-ee)

- **Mint Family**
- **Flavorful herbs**
- **Many with square stems**

Lavandula

- **Lavender**

(*Genus*) (lav-AN-dew-lah)

stoechas

- **Spanish lavender**

(*species*) (STOW-kass)

'Otto Quast'

- **Name of person who discovered this hybrid**

('Hybrid')

Common Abbreviations

Lavandula stoechas, Lavandula canariensis, Lavandula dentata

or….. *Lavandula stoechas, L. canariensis, L. dentata*

Lavandula sp. – Used when referring to <u>one</u> unknown species of *Lavandula*

Lavandula ssp. – Used when referring to <u>many</u> unknown species of *Lavandula*

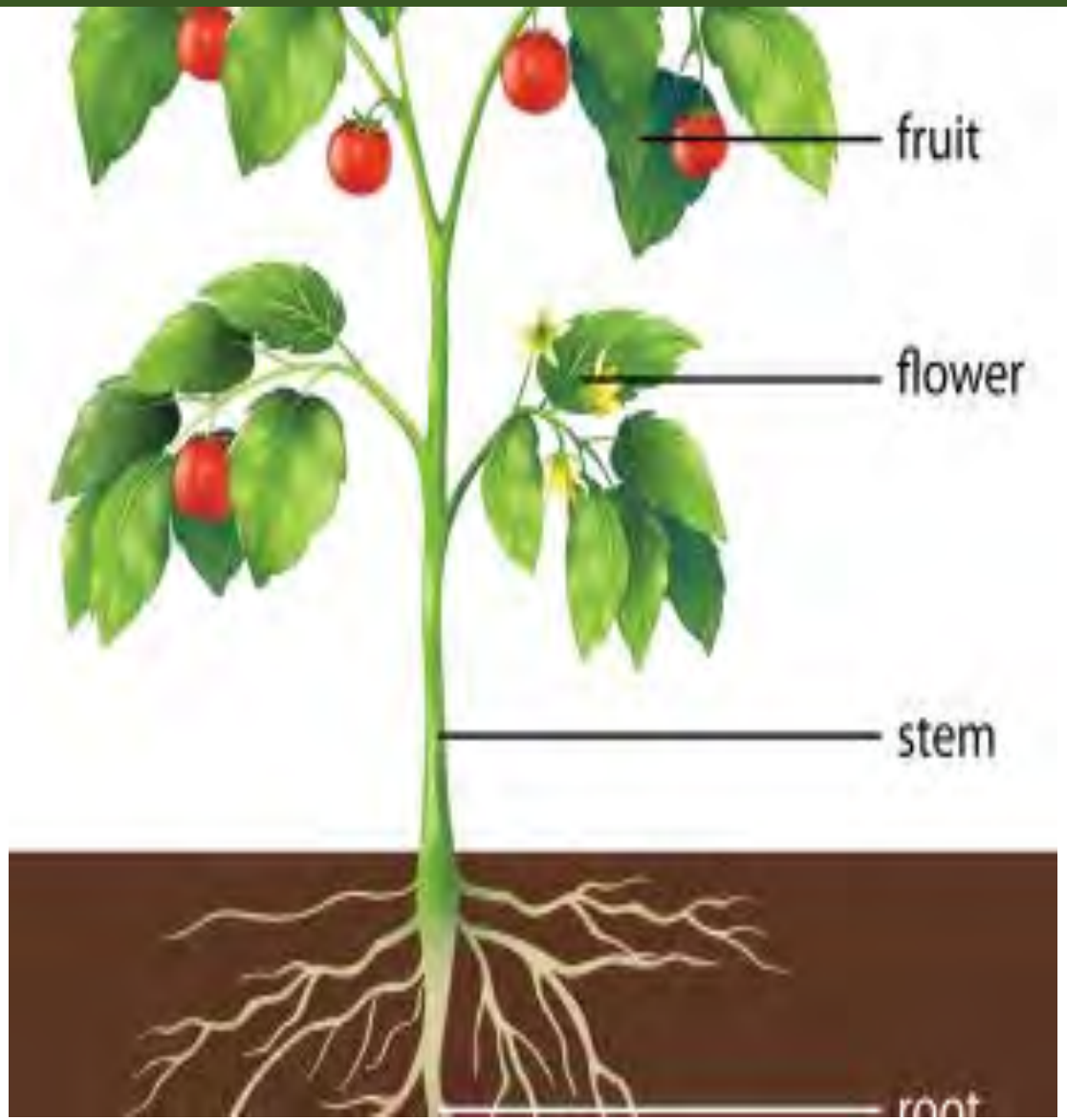
Another Helpful Web Site

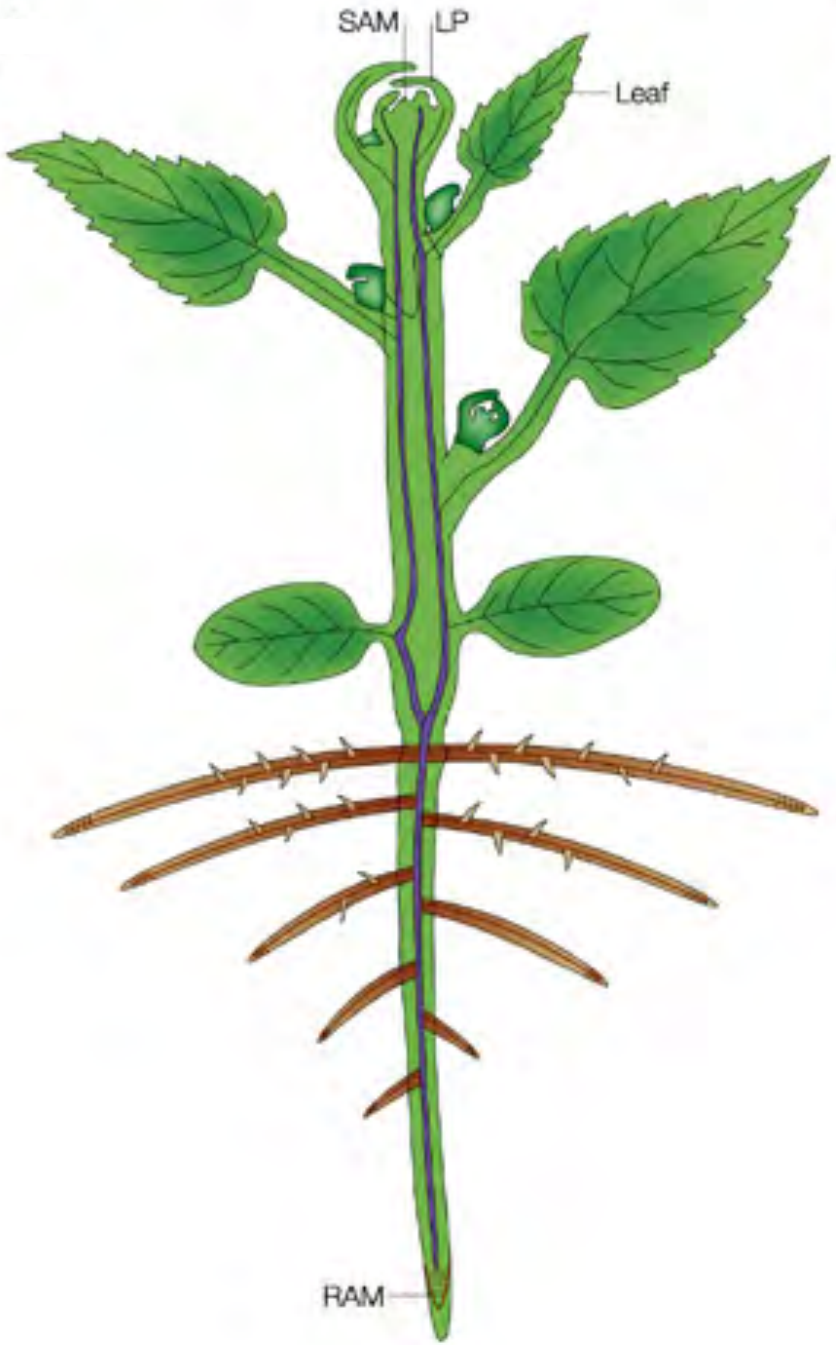
Tropicos.org

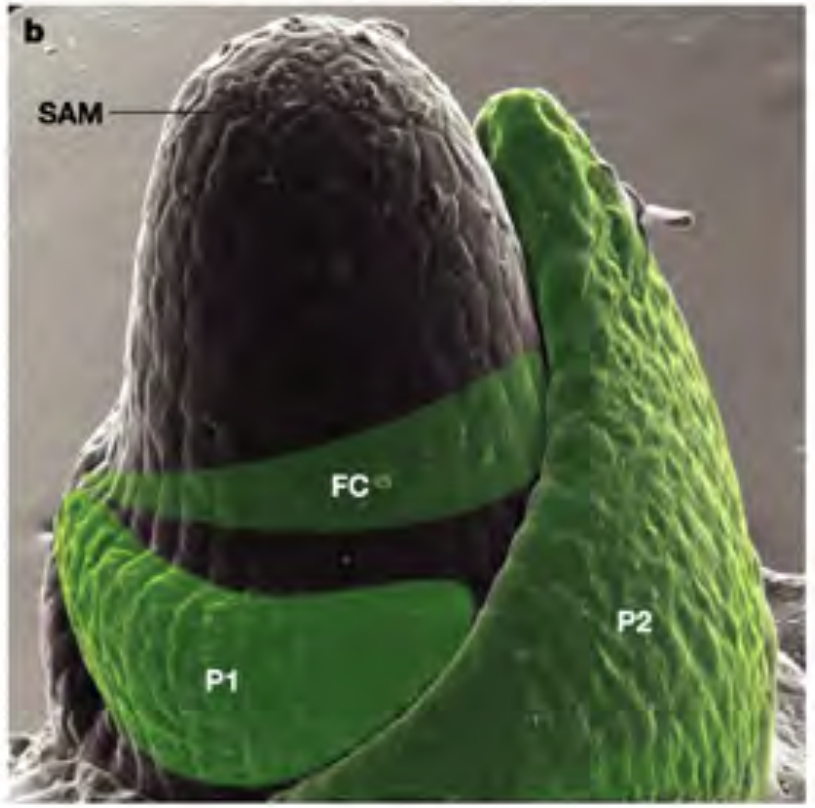
Search for Botanic Names…
all Genera within a Family,
all Species within a Genus, etc.

A Web Site of Missouri Botanical Garden

PLANT STRUCTURE







MERISTEMS

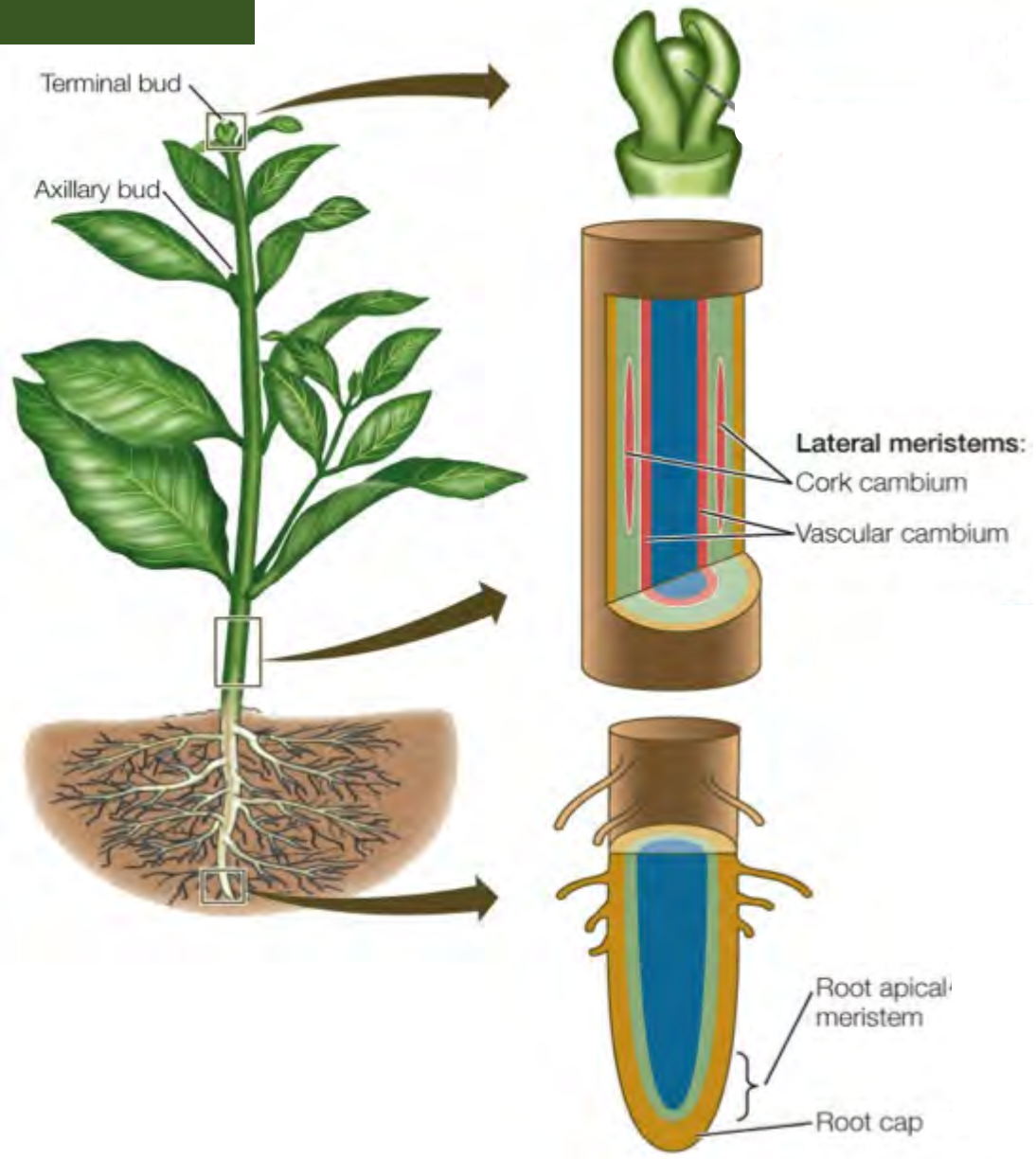
Primary vs. Secondary Growth

Apical Meristems

- Primary growth
- Occurs in roots and shoots
- Increase in length

Lateral Meristems

- Secondary growth
- Occur in cambium & similar tissue
- Common in trees (wood and bark)
- Increase in girth (width)

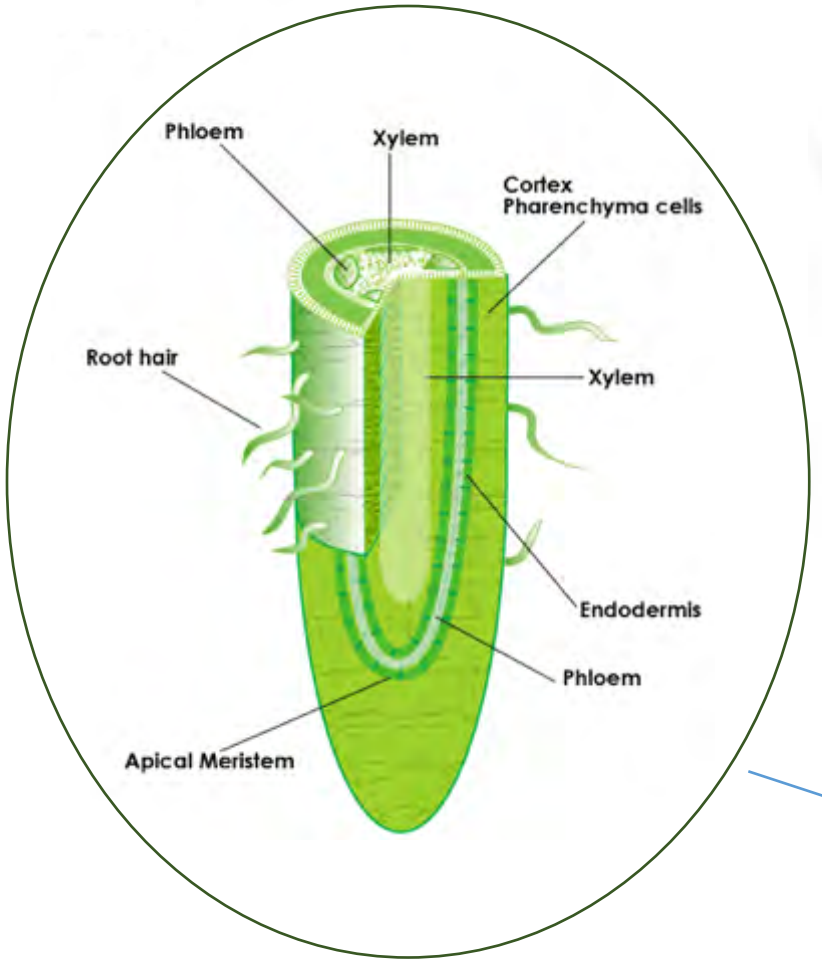


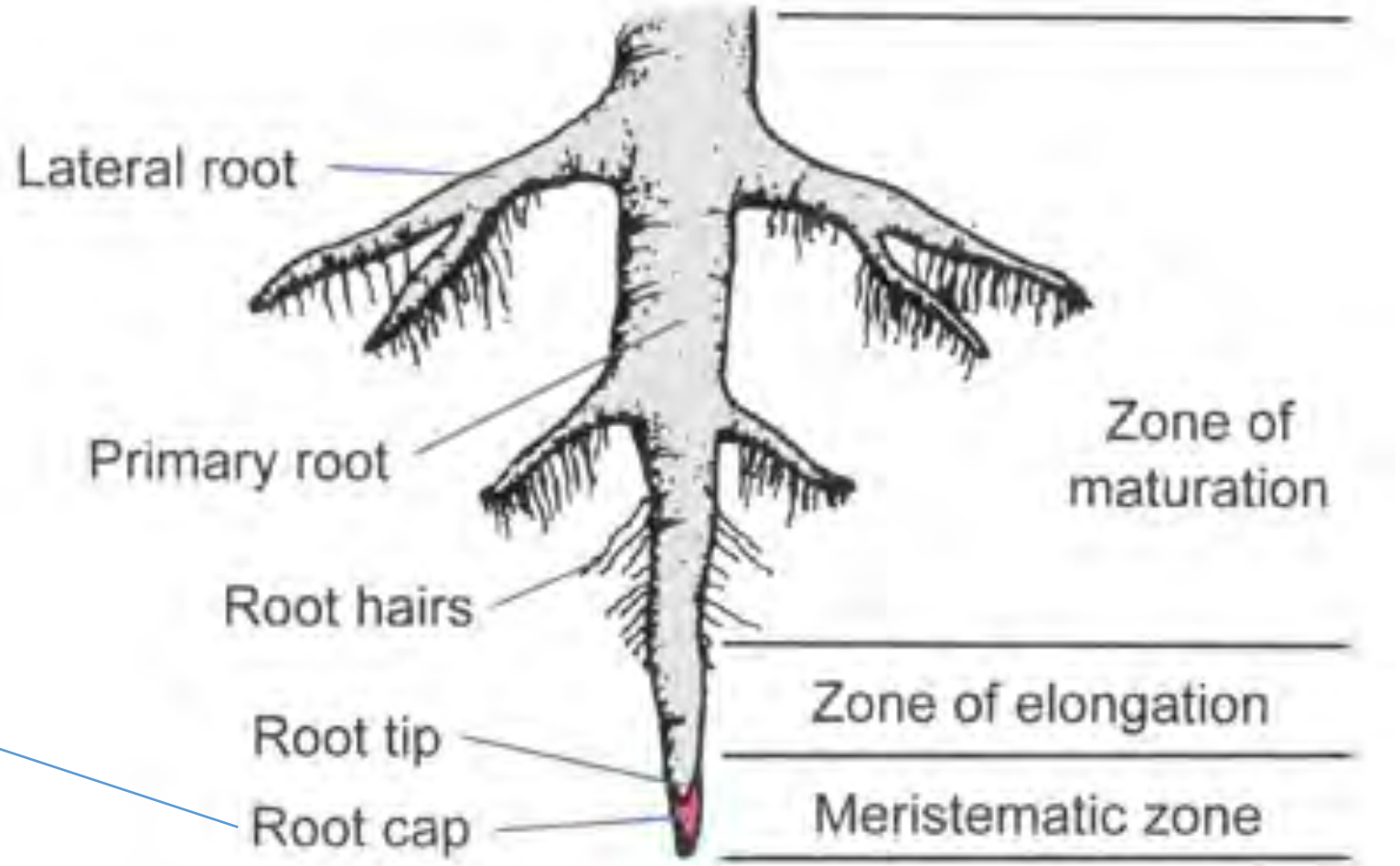
ROOTS

Function of Roots

- Take up water and nutrients
- Store excess food
- Anchor the plant
- Synthesize essential compounds
- Reproductive organ

Root Anatomy





Types of Roots

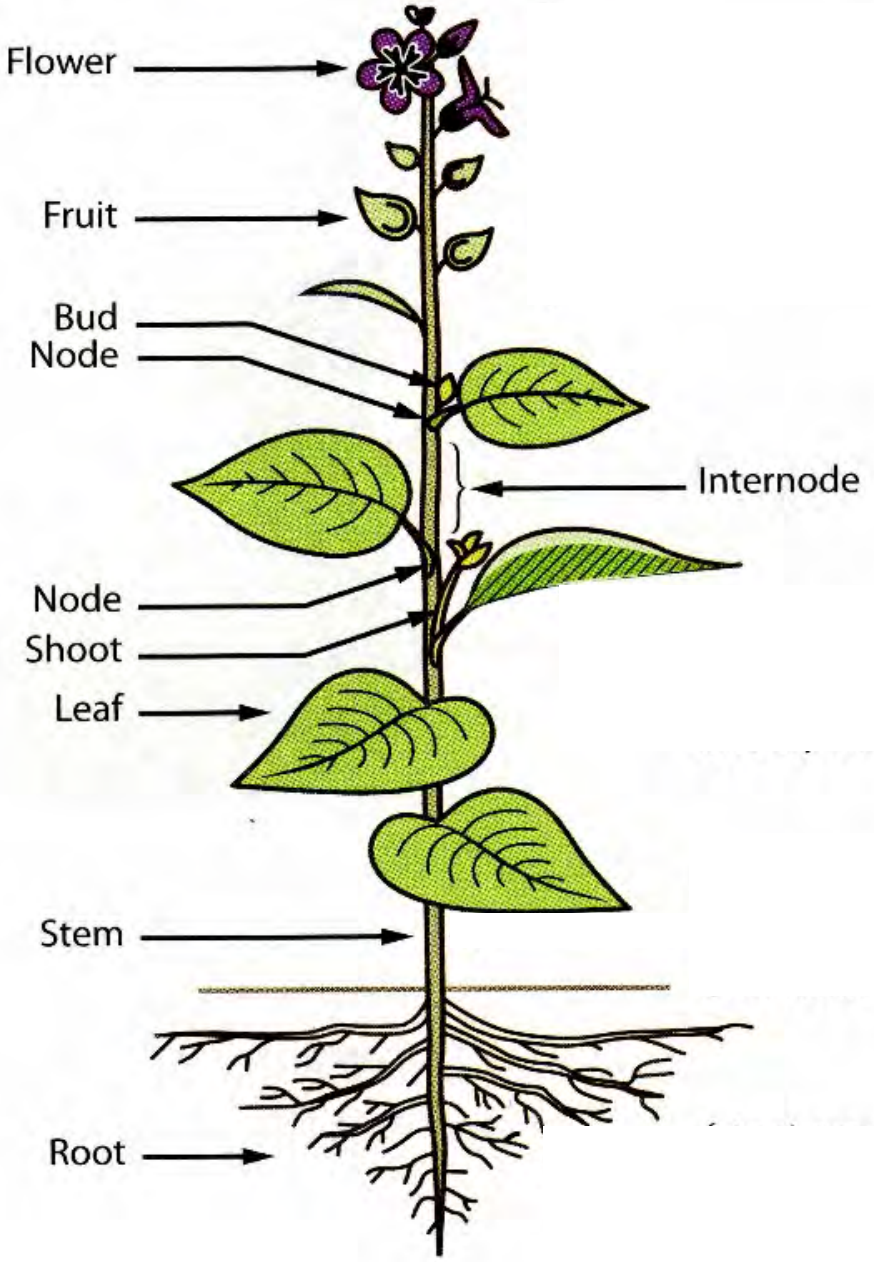
Taproot –absorbs water deep in the ground (root vegetables, trees)

Fibrous roots stay close to the top of the soil (bedding plants, tomato)

Adventitious roots help anchor plant or help plant climb (strawberries, ivy, some grasses)

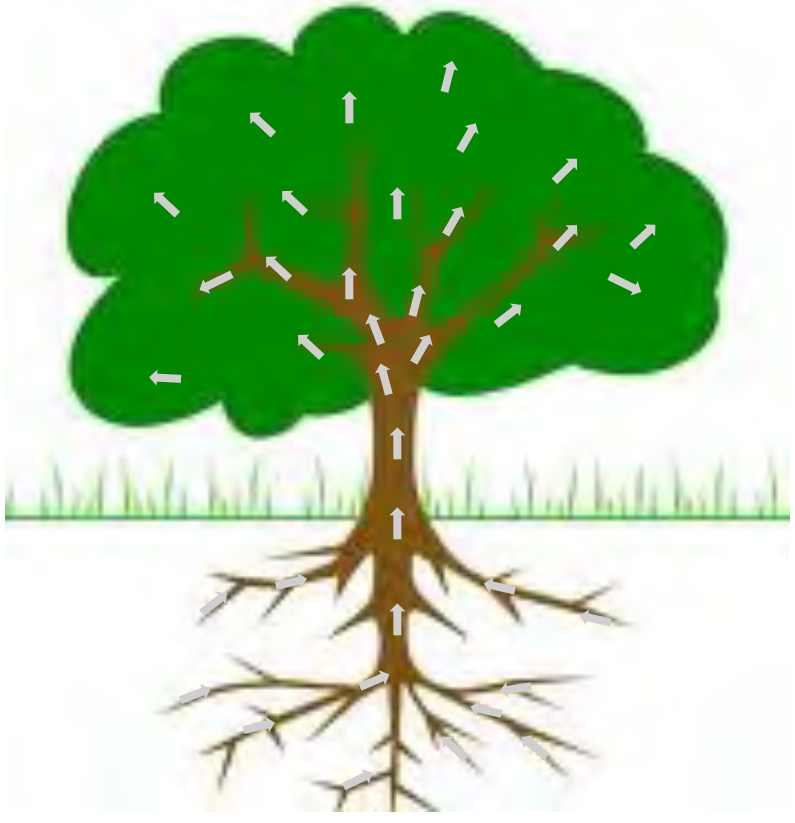

STEMS

Structure of a Seed Plant

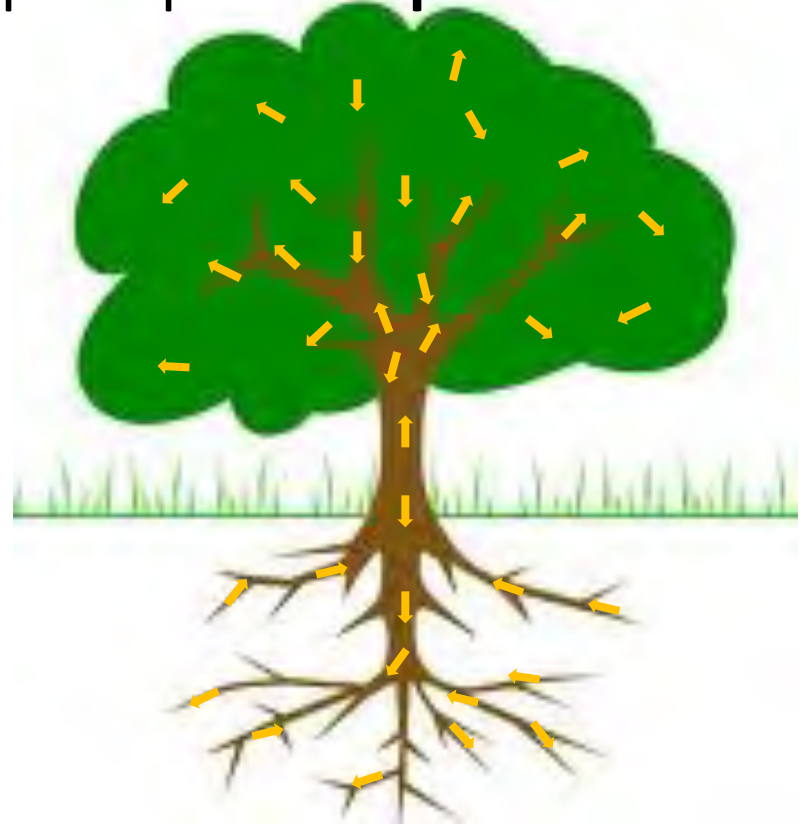


Plant Vascular Tissue

Zylem tissue conducts water & dissolved mineral nutrients from the roots **upward.**

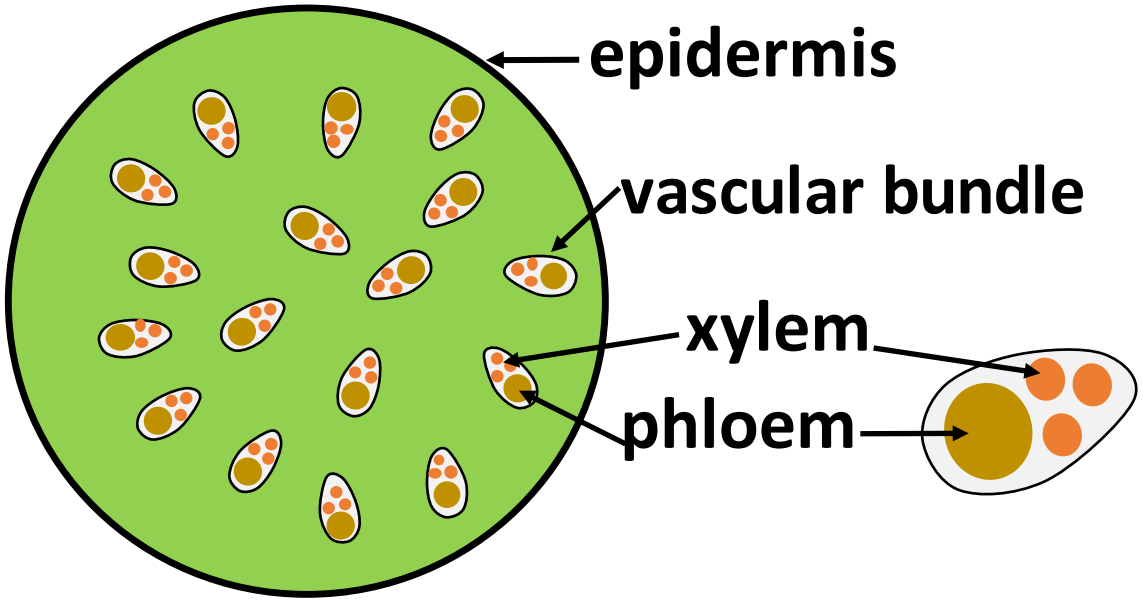


Phloem tissue conducts photo-synthetically produced food & other compounds from the leaves to other plant parts – **up & down**.



Plant Vascular Tissue – Monocot Cross Section

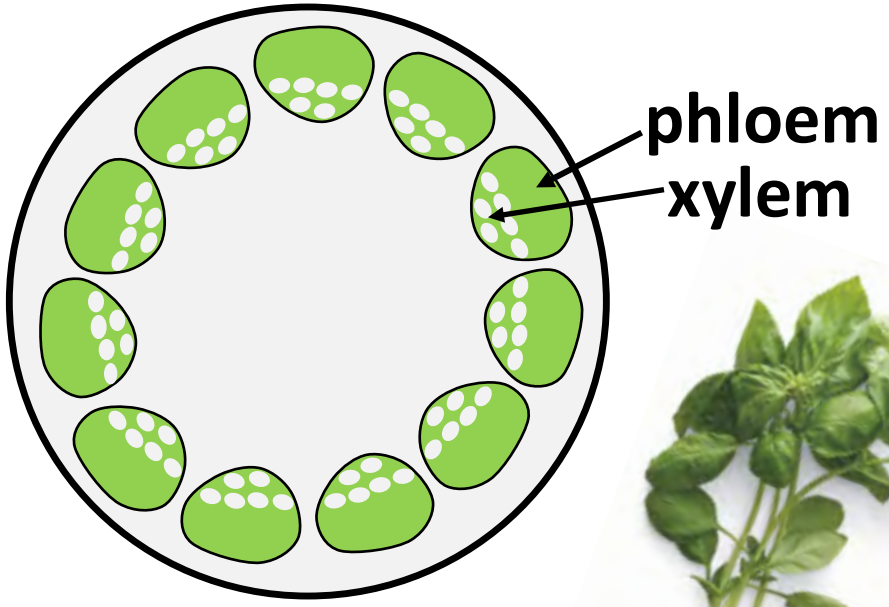
Monocot



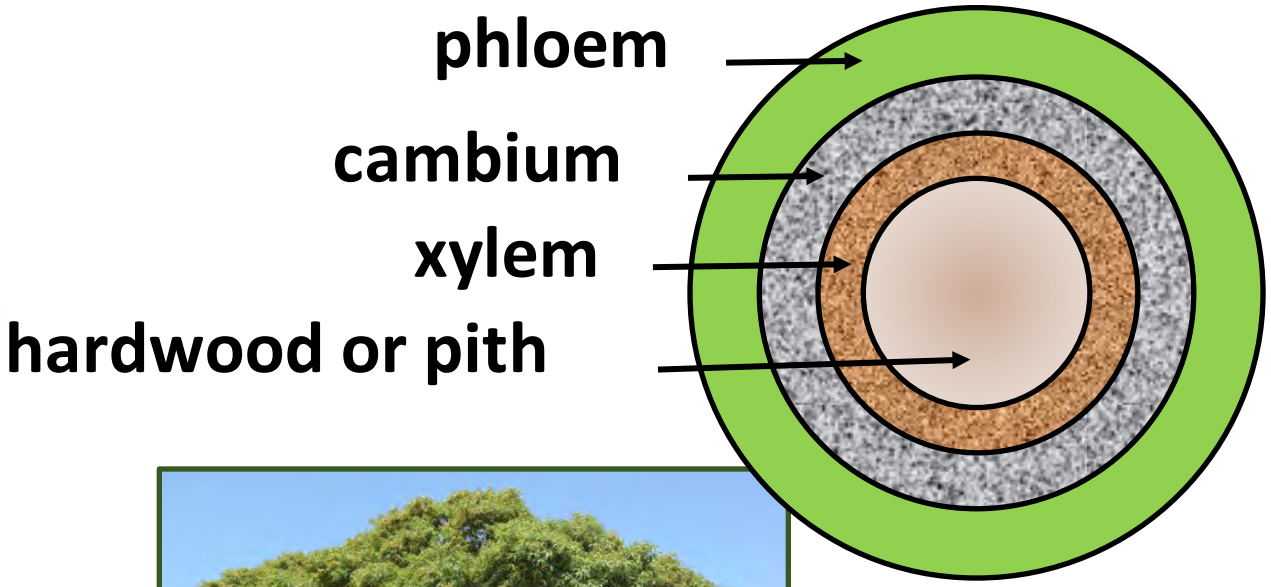
Lily's, grasses, palms, etc.

Plant Vascular Tissue – Dicot Cross Section

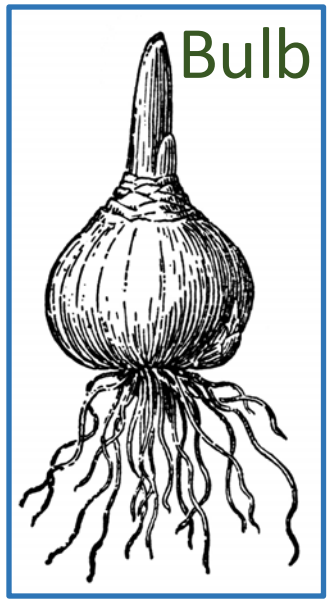
Herbaceous

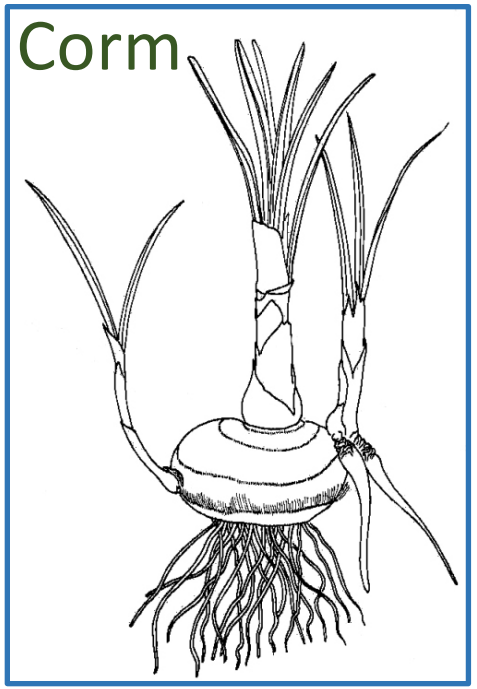


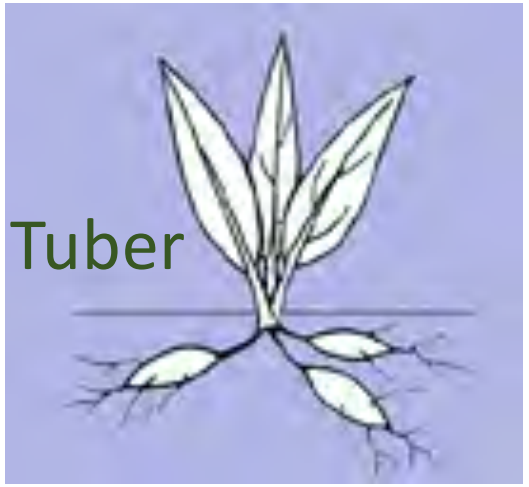
Woody



Stem Modifications: *Vegetative Spread*





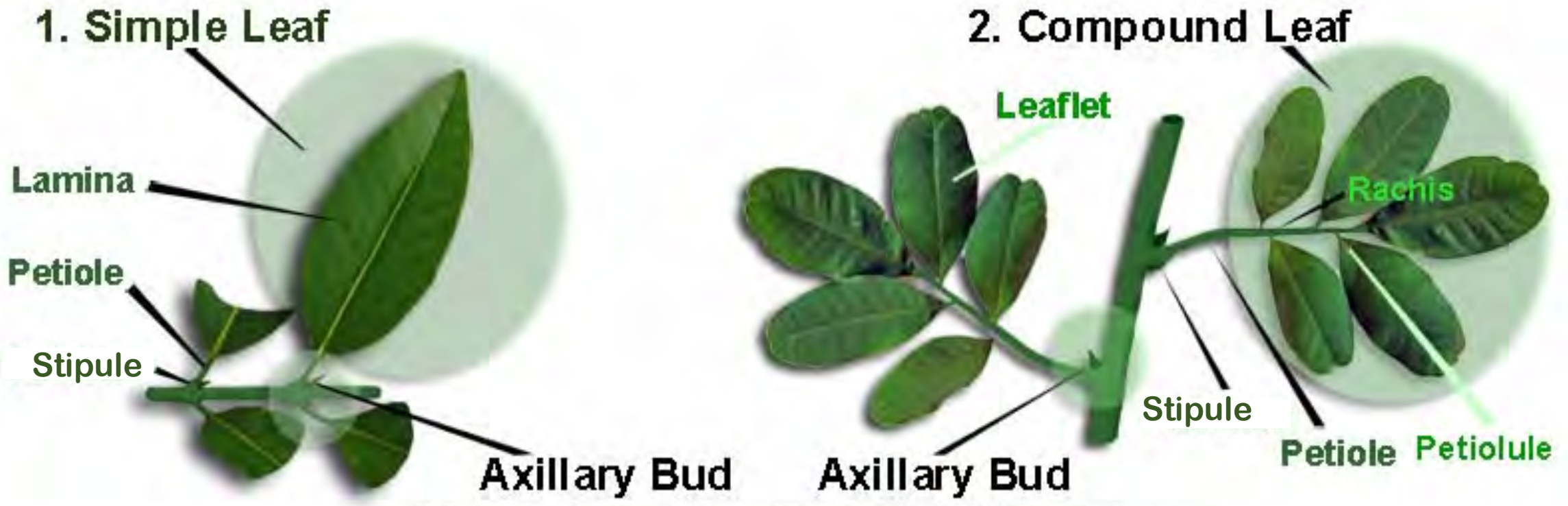


Stem or Leaf?

Acacia aphylla

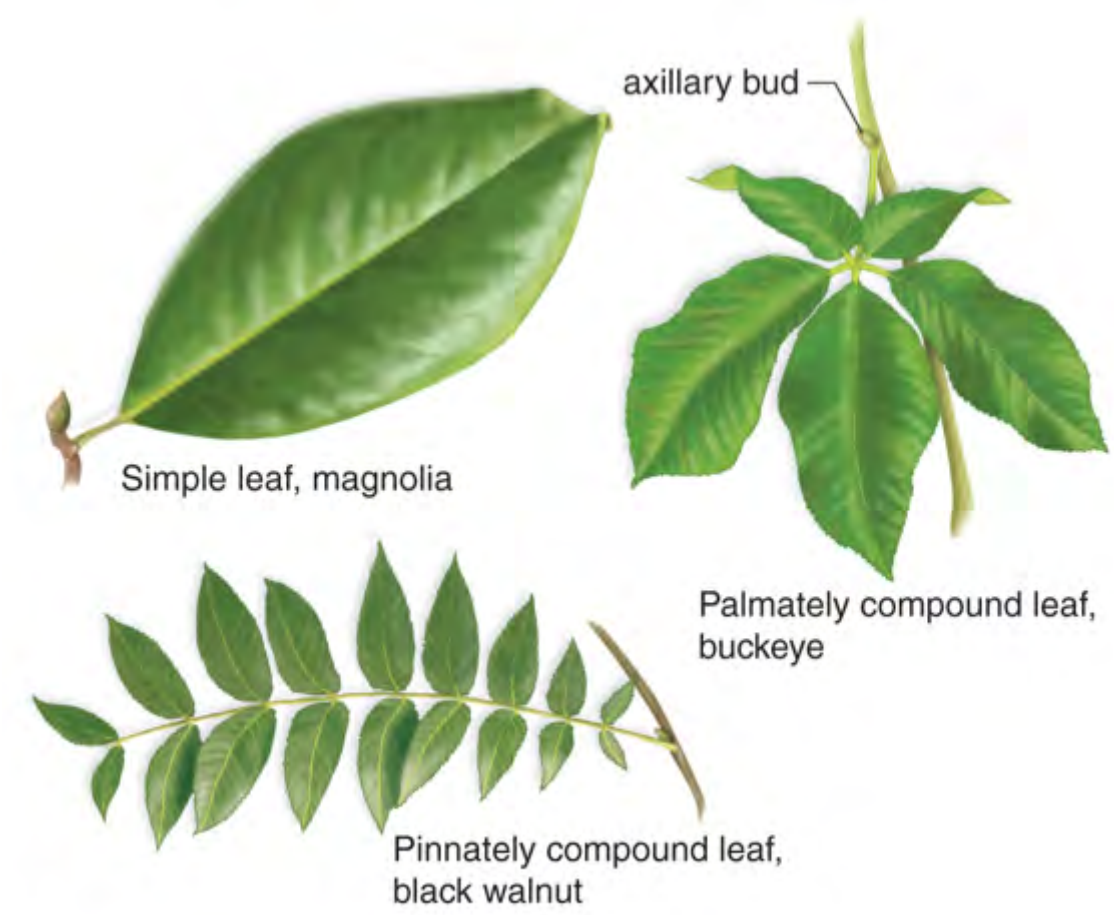
Opuntia sp.


LEAVES

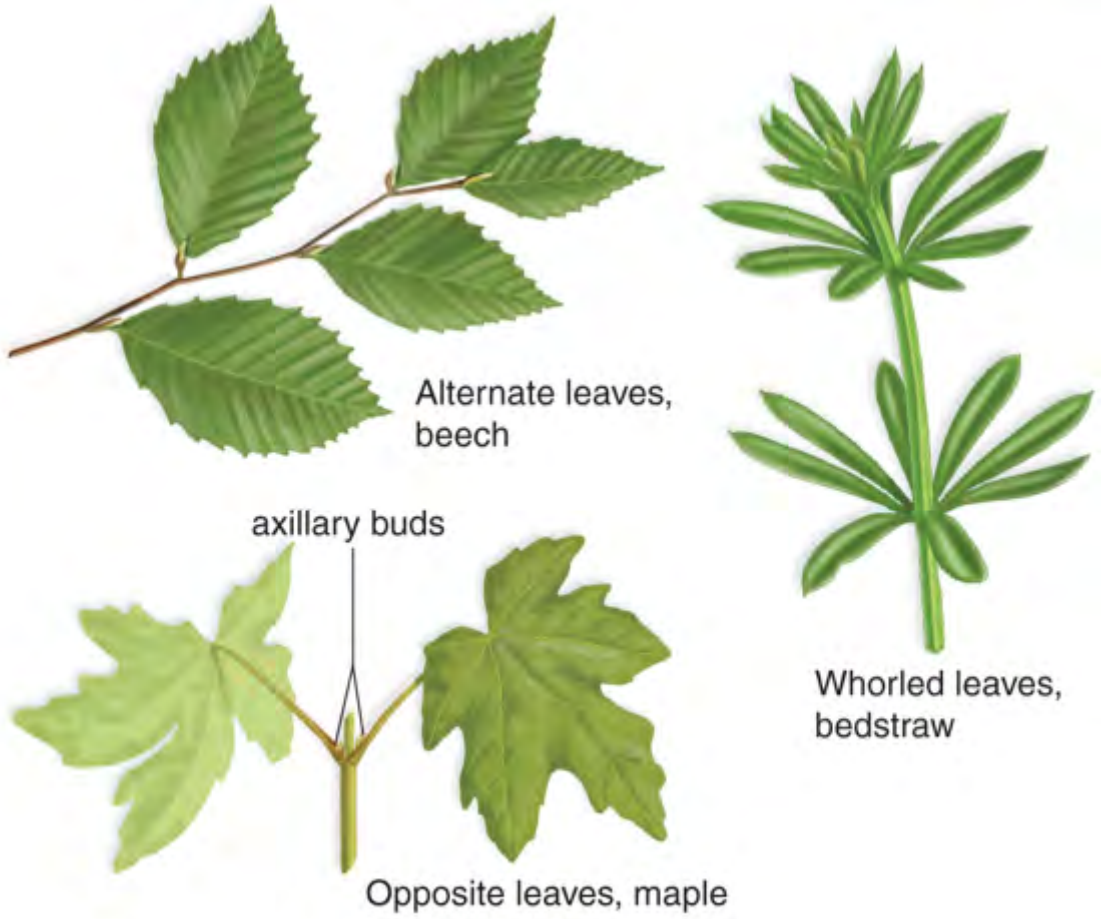


Parts of a Leaf

Leaf Arrangements

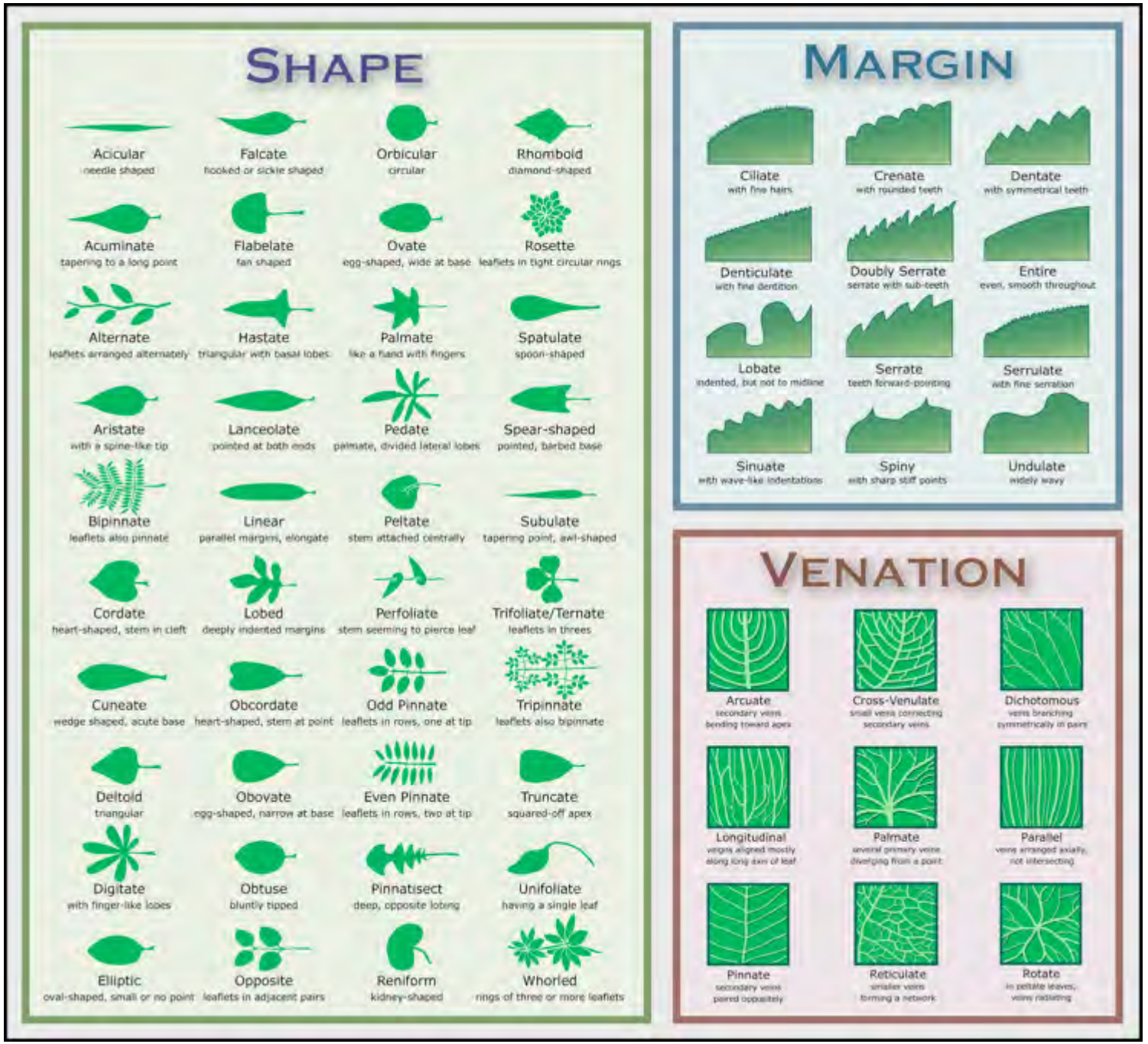


a. Simple versus compound leaves

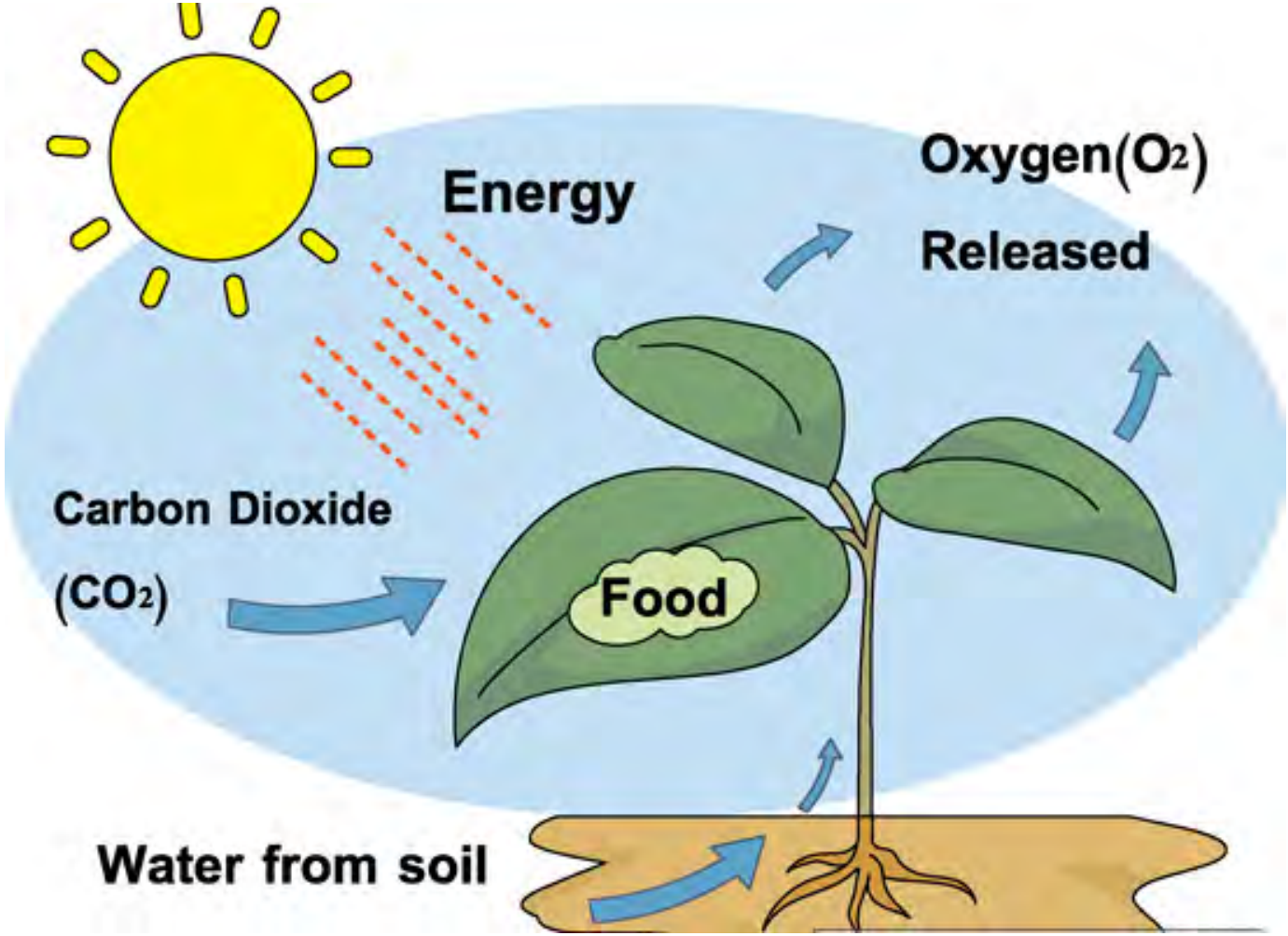


b. Arrangement of leaves on stem

Leaf Key


SHAPE
Acicular
needle shaped
Falcate
hooked or sickle shaped
Orbicular
circular
Rhomboid
diamond-shaped
Acuminate
tapering to a long point
Flabelate
fan shaped
Ovate
egg-shaped, wide at base
Rosette
leaflets in tight circular rings
Alternate
leaflets arranged alternately
Hastate
triangular with basal lobes
Palmate
like a hand with fingers
Spatulate
spoon-shaped
Aristate
with a spine-like tip
Lanceolate
pointed at both ends
Pedate
palmate, divided lateral lobes
Spear-shaped
pointed, barbed base
Bipinnate
leaflets also pinnate
Linear
parallel margins, elongate
Peltate
stem attached centrally
Subulate
tapering point, awl-shaped
Cordate
heart-shaped, stem in cleft
Lobed
deeply indented margins
Perfoliate
stem seeming to pierce leaf
Trifoliate/Ternate
leaflets in threes
Cuneate
wedge shaped, acute base
Obcordate
heart-shaped, stem at point
Odd Pinnate
leaflets in rows, one at tip
Tripinnate
leaflets also bipinnate
Deltoid
triangular
Obovate
egg-shaped, narrow at base
Even Pinnate
leaflets in rows, two at tip
Truncate
squared-off apex
Digitate
with finger-like lobes
Obtuse
bluntly tipped
Pinnatisect
deep, opposite lobing
Unifoliate
having a single leaf
Elliptic
oval-shaped, small or no point
Opposite
leaflets in adjacent pairs
Reniform
kidney-shaped
Whorled
rings of three or more leaflets
MARGIN
Ciliate
with fine hairs
Crenate
with rounded teeth
Dentate
with symmetrical teeth
Denticulate
with fine dentition
Doubly Serrate
serrate with sub-teeth
Entire
even, smooth throughout
Lobate
indented, but not to midline
Serrate
teeth forward-pointing
Serrulate
with fine serration
Sinuate
with wave-like indentations
Spiny
with sharp stiff points
Undulate
widely wavy
VENATION
Arcuate
secondary veins bending toward apex
Cross-Venulate
small veins connecting secondary veins
Dichotomous
veins branching symmetrically in pairs
Longitudinal
veins aligned mostly along long axis of leaf
Palmate
several primary veins diverging from a point
Parallel
veins arranged axially, not intersecting
Pinnate
secondary veins paired oppositely
Reticulate
smaller veins forming a network
Rotate
in peltate leaves, veins radiating

Photosynthesis

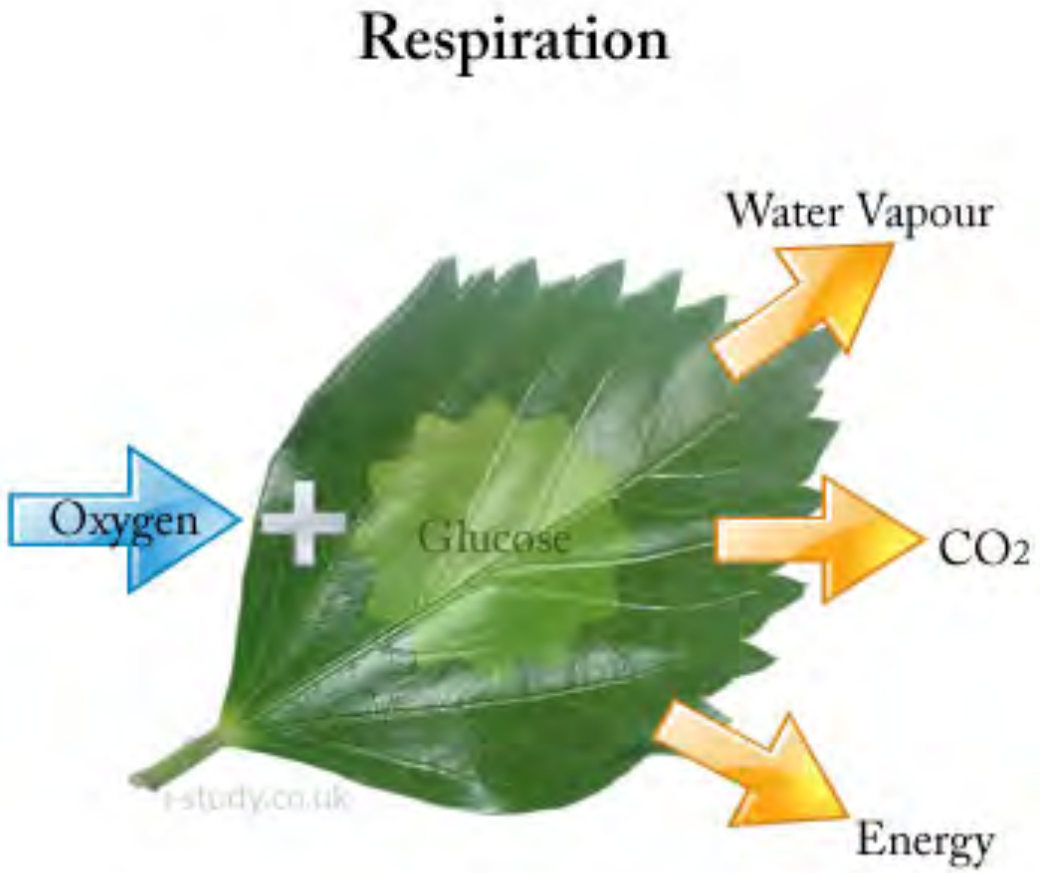


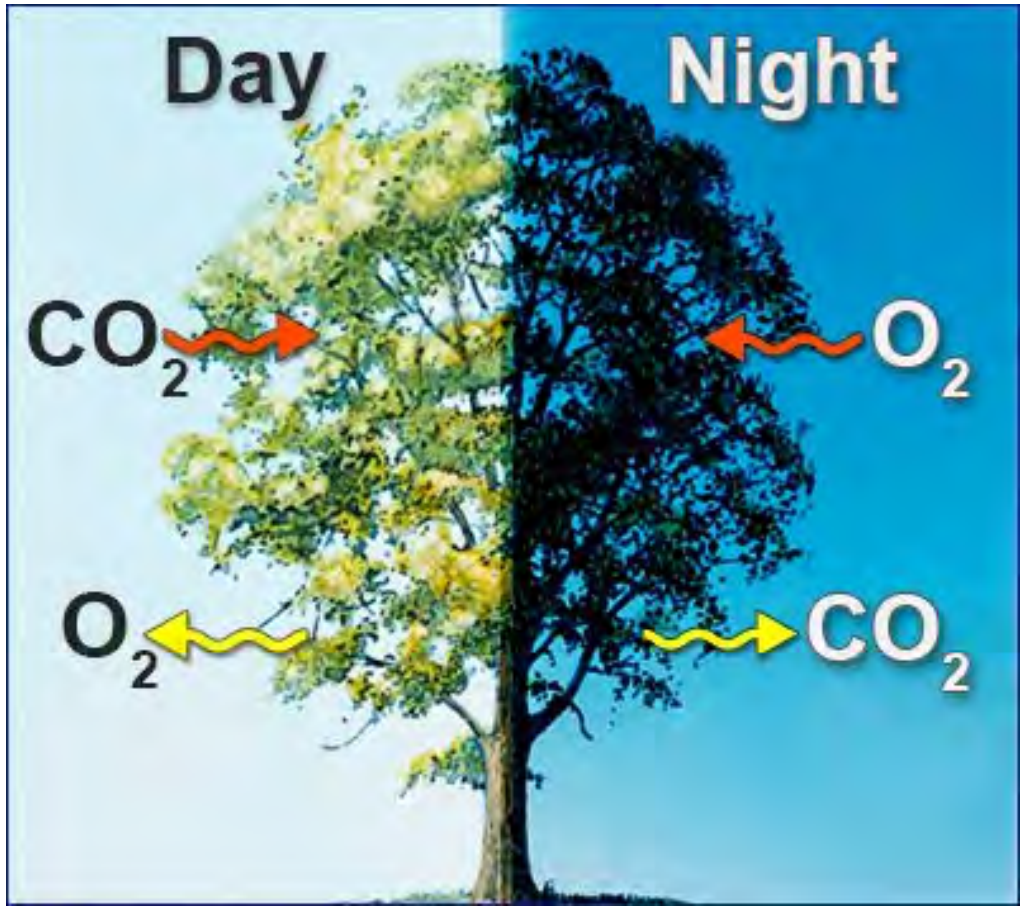
Photosynthesis

$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

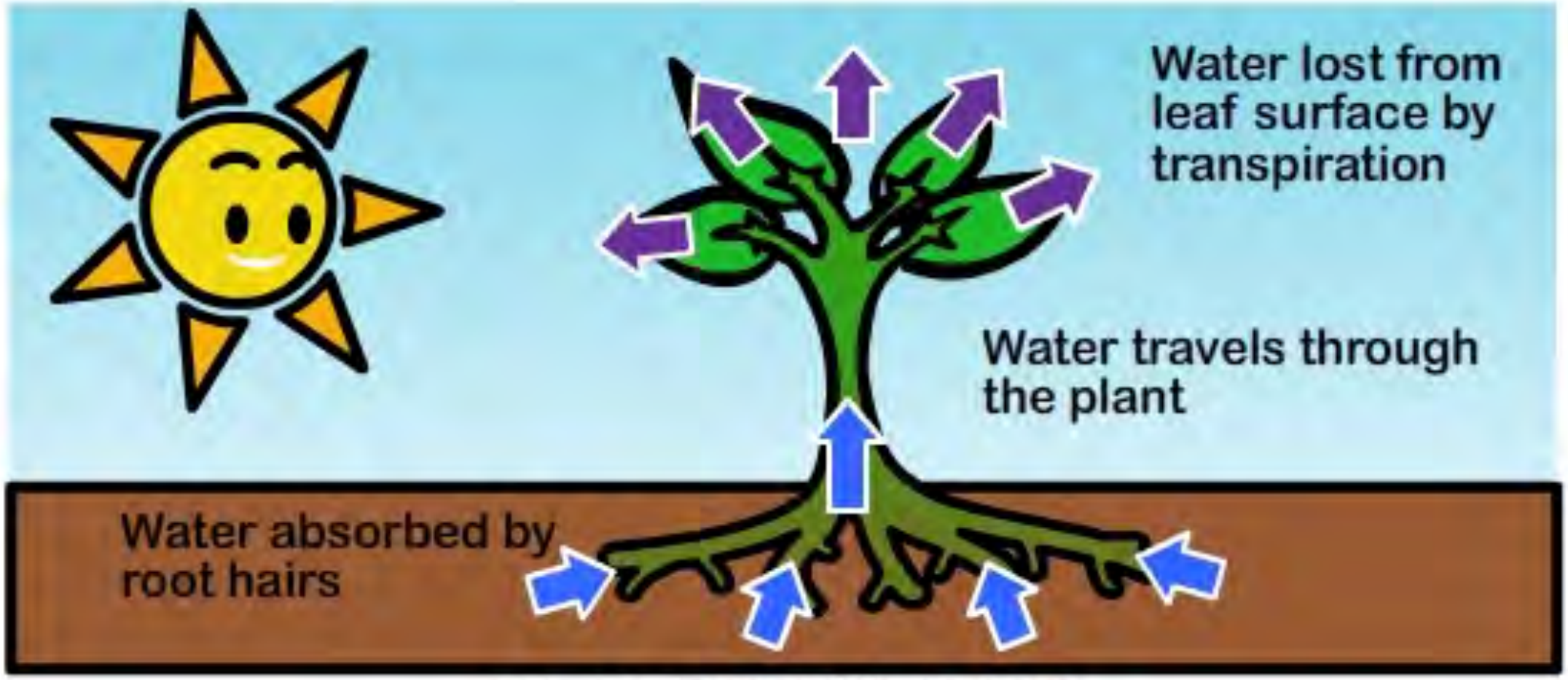
carbon dioxide + water → glucose + oxygen

Respiration



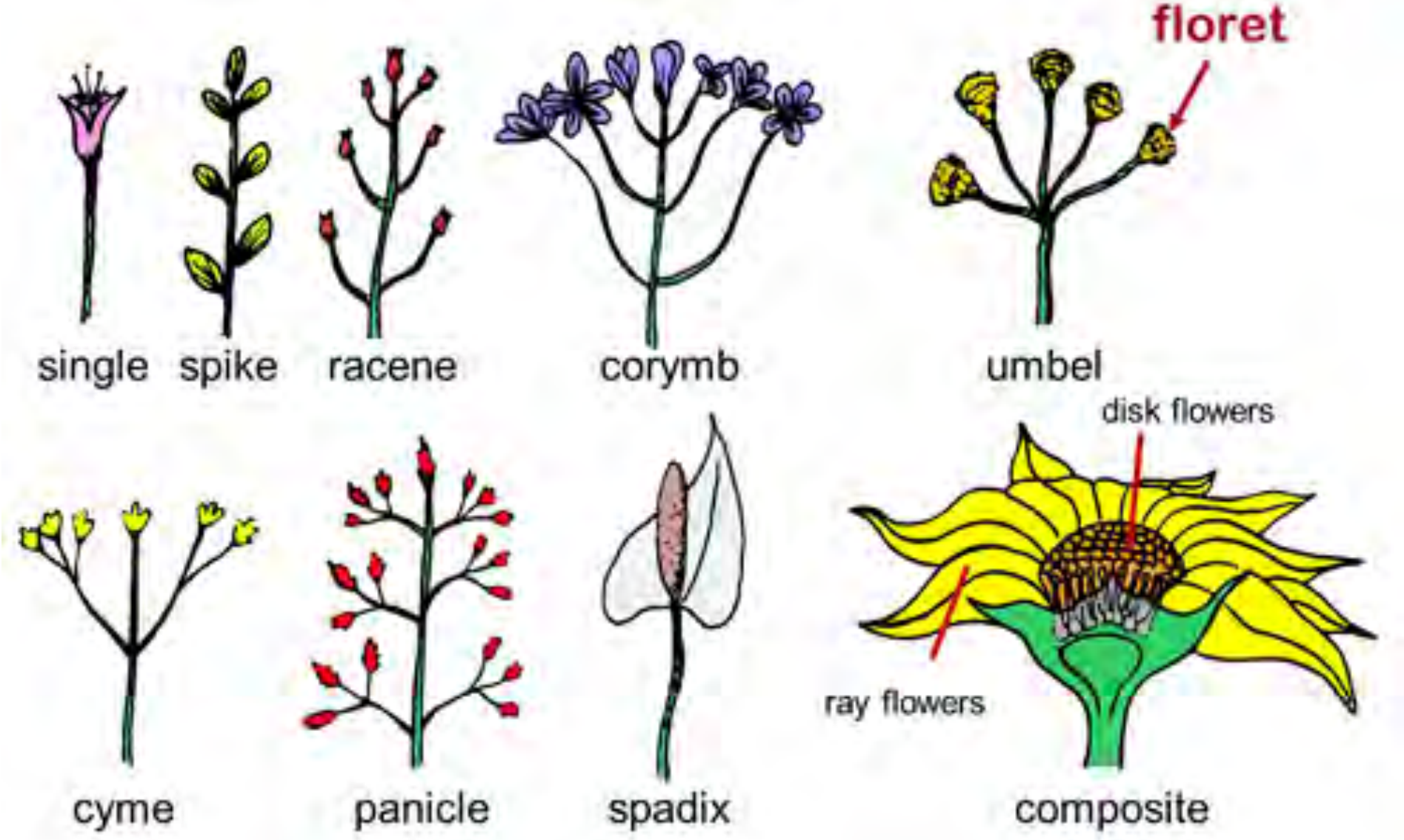


Transpiration




FLOWERS

Flower Forms



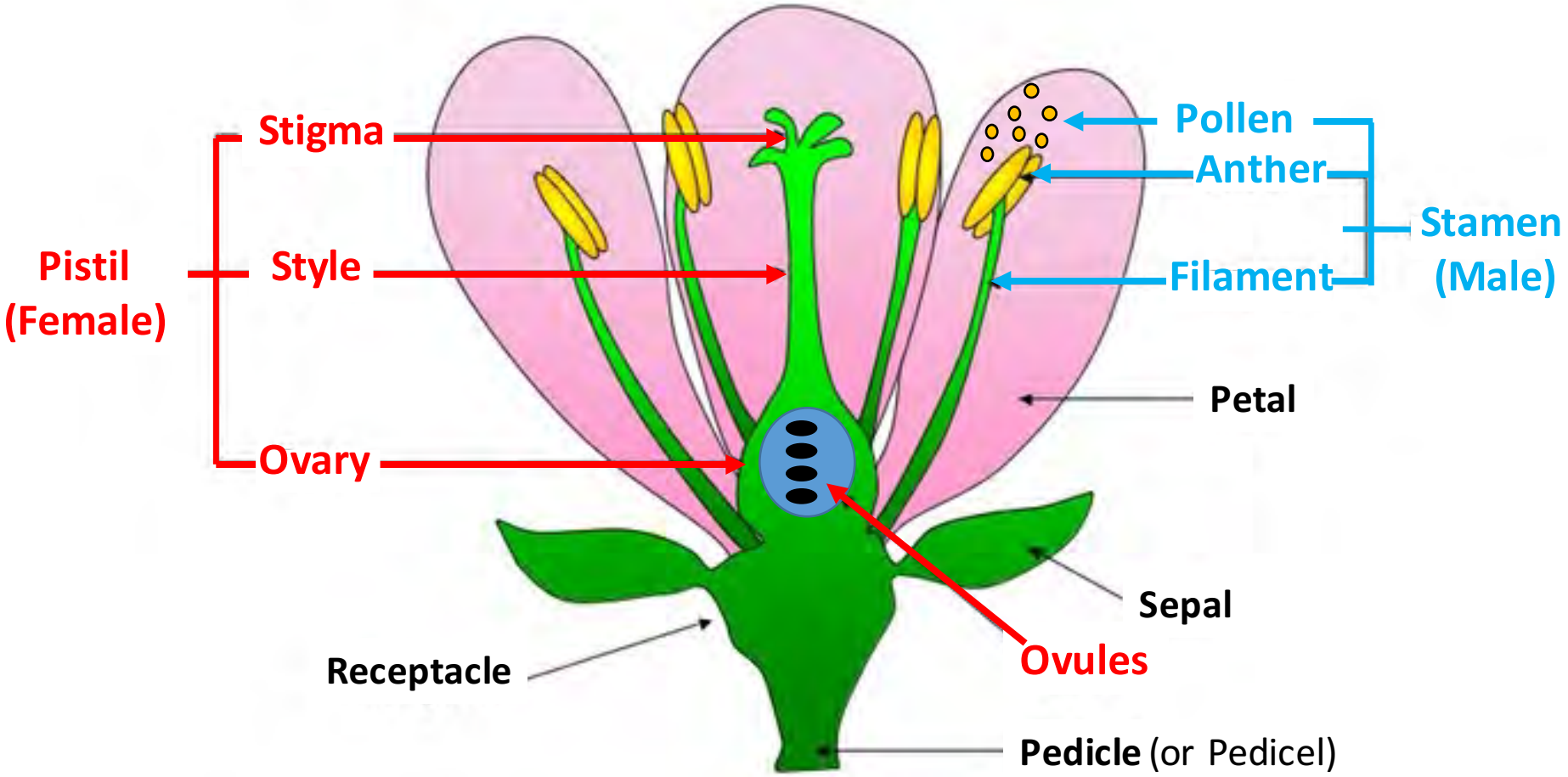
Lantana
Inflorescence

Why Do Plants Have Flowers?

Platycerium sp.
Staghorn fern

Amorphophallus paeoniifolius 'Black Stathe‘
Elephant foot yam

Perfect Flower



A Perfect flower has the Pistil & Stamen on the same flower.

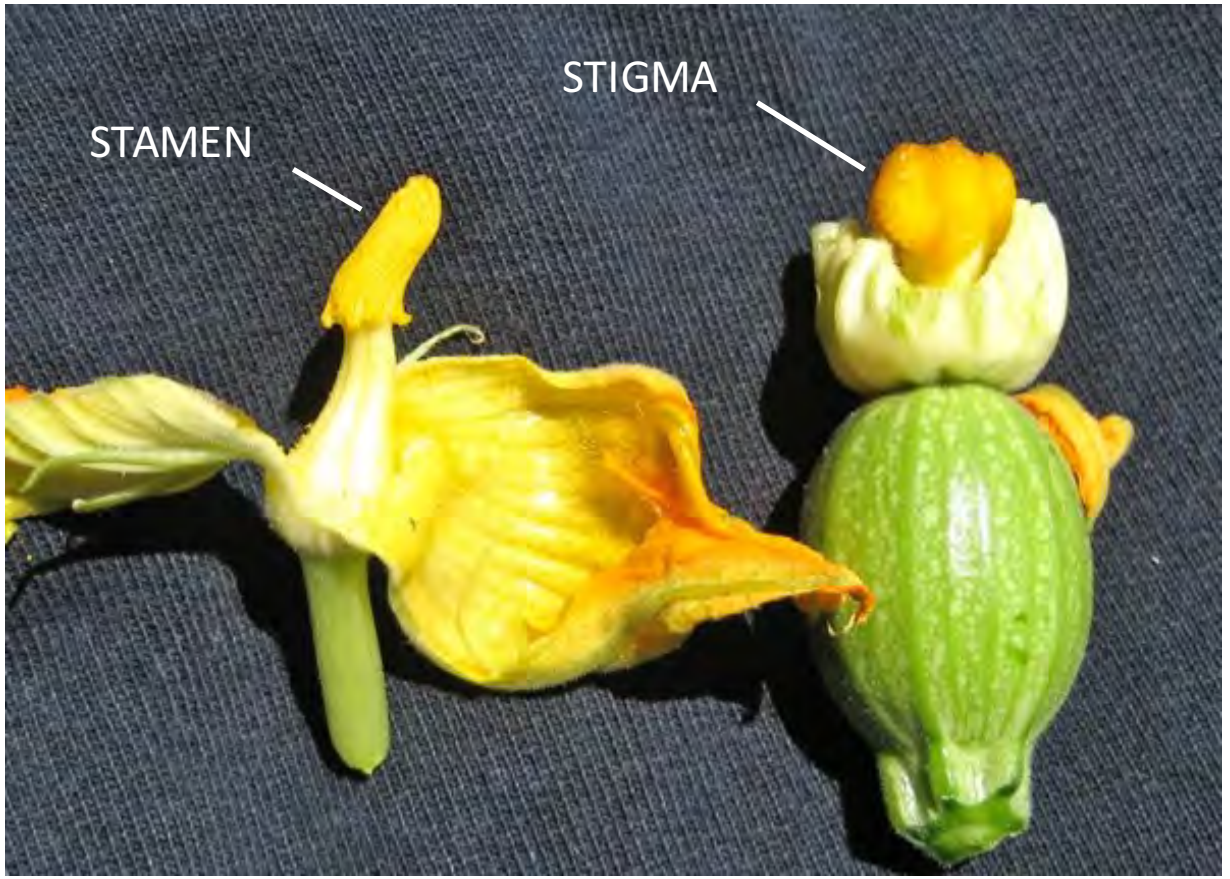
Imperfect Flower

Female - Pistillate

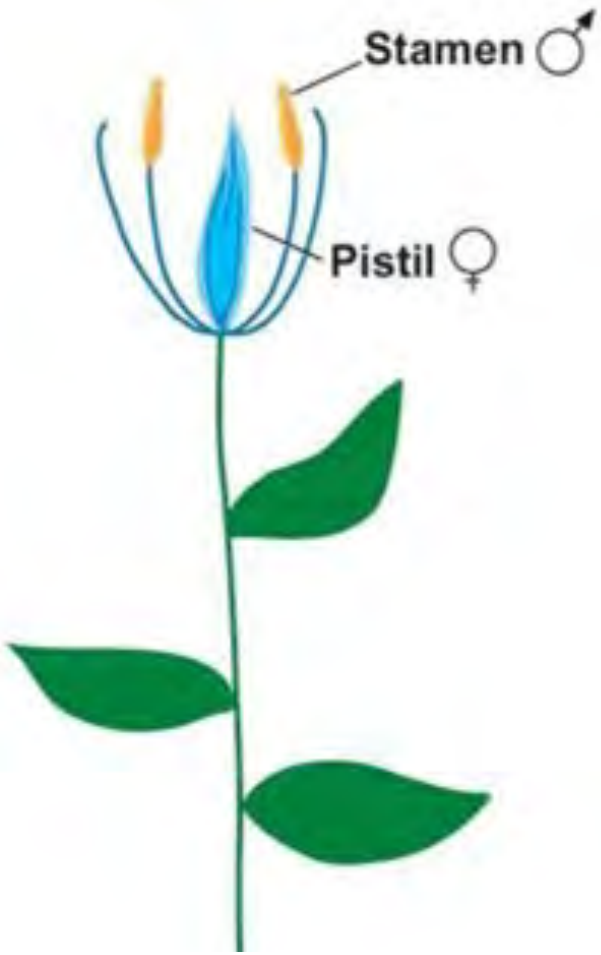
Male - Staminate

An Imperfect flower has a Pistil or Stamen, but not on the same flower.

Sex and the Zucchini



4 Common Situations



Flower Type: **Perfect**
Plant Type: **Bisexual/ Hermaphroditic**

Flower Type: **Imperfect**
Plant Type: **Monoecious**

Flower Type: **Imperfect**
Plant Type: **Dioecious**
Male Plant: **Staminate**

Flower Type: **Imperfect**
Plant Type: **Dioecious**
Female Plant: **Pistillate**

Flowers & Their Fruit

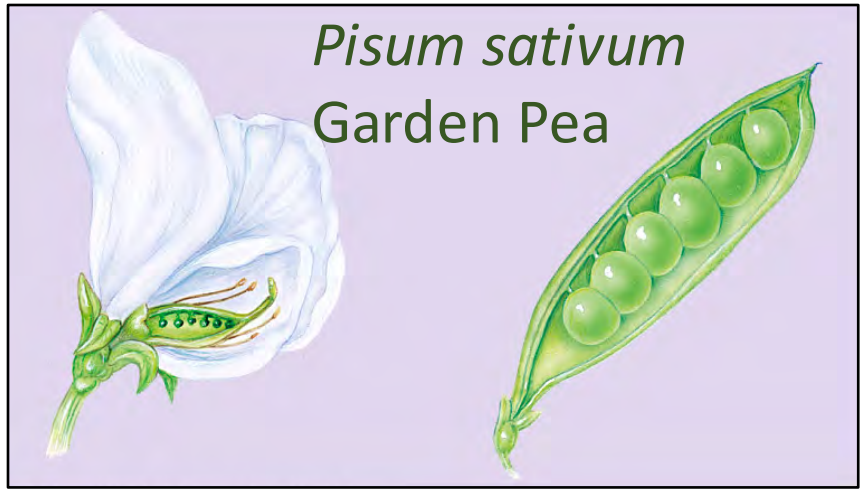
Solanum lycopersicum
Tomato

Macadamia sp.

Kigelia africana
Sausage Tree

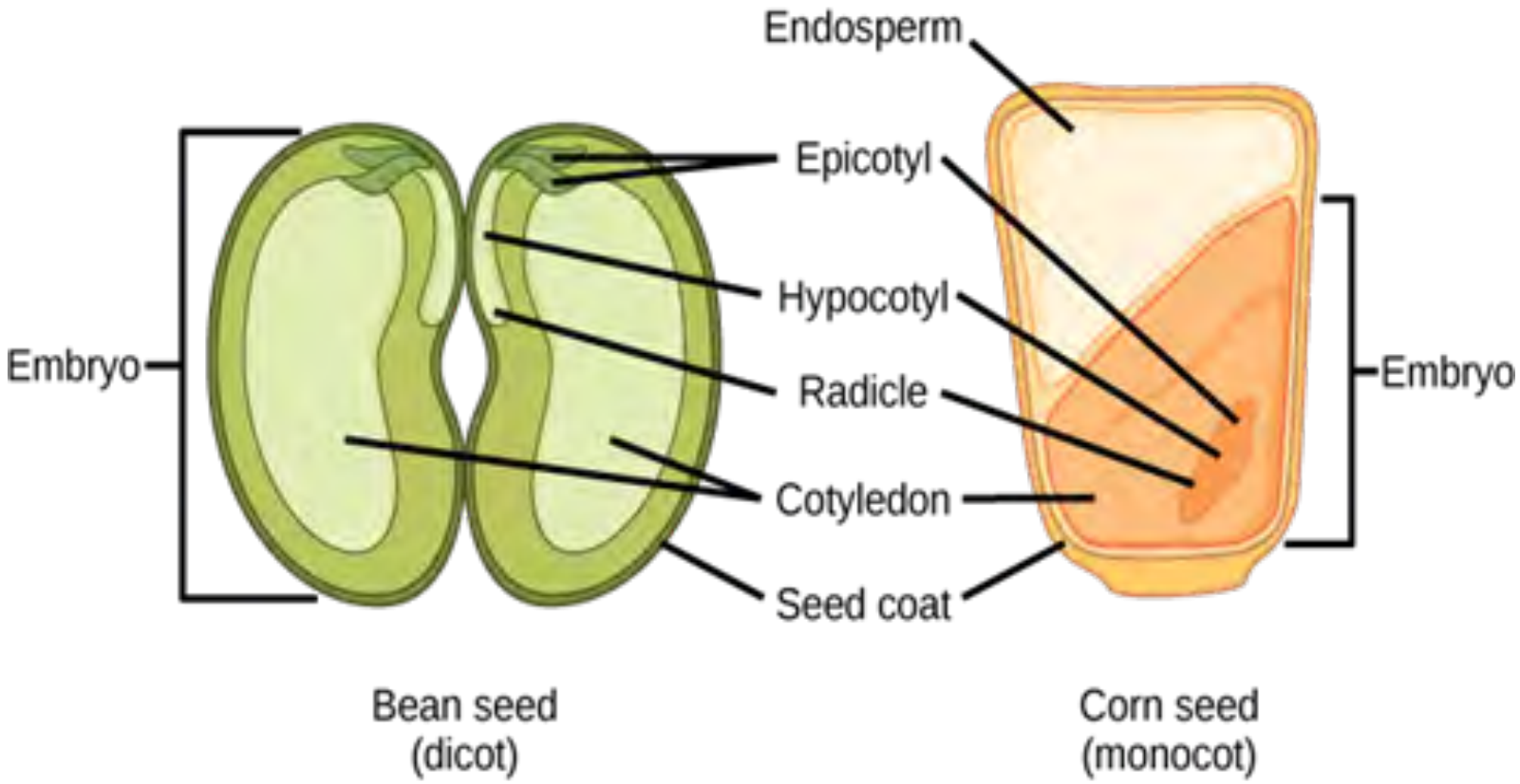
Musa sp.
Banana

Pisum sativum
Garden Pea



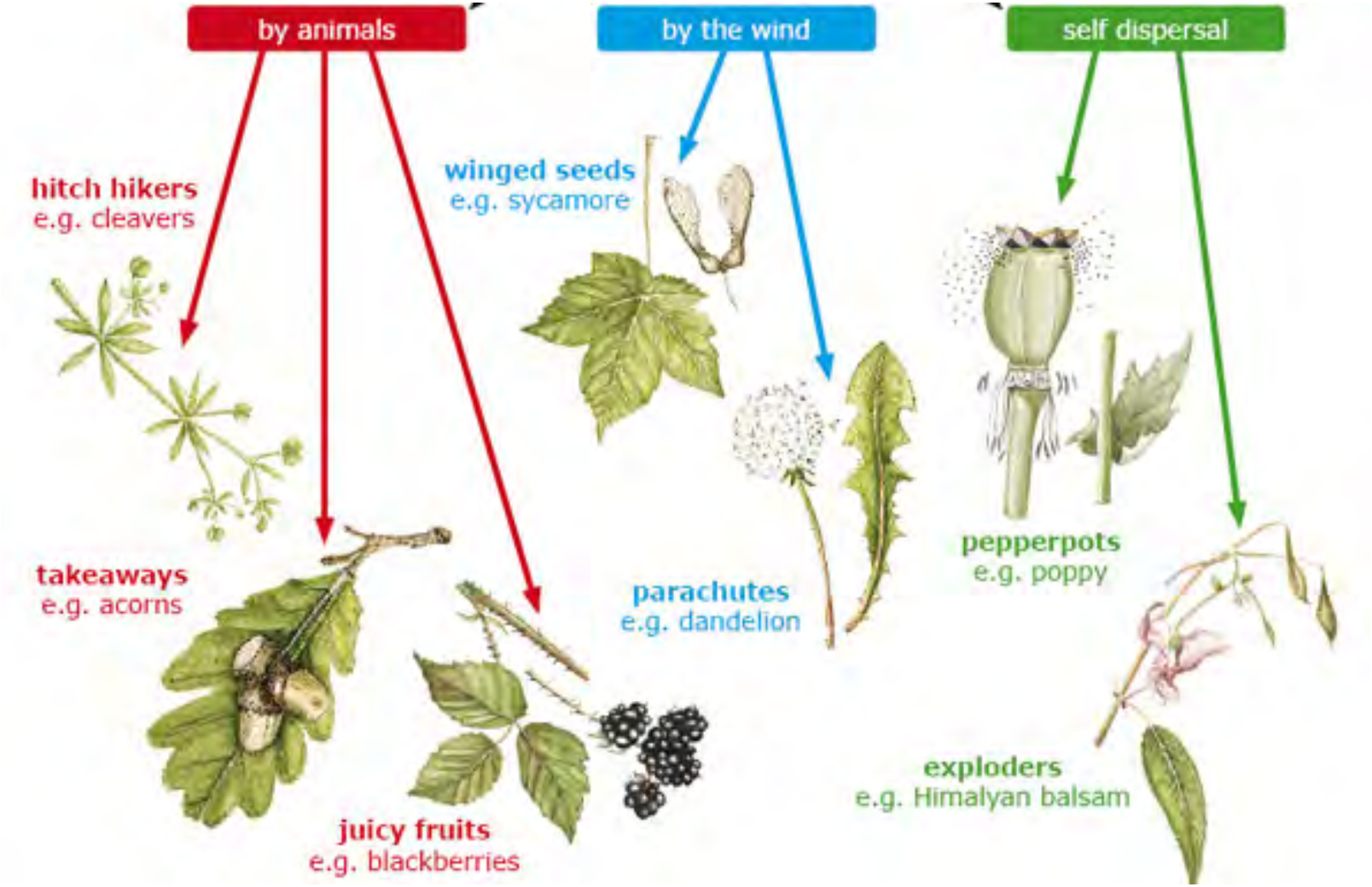

SEEDS

Anatomy of a Seed



Types of Seeds

Seed Dispersal



Classification of Plants

- Growth Habit – annuals, perennials, biennials
- Structure or Form – woody, herbaceous, vine, shrub, tree
- Leaf Retention – evergreen, deciduous
- Climatic Adaptation – tropical, subtropical, temperate
- Use – ornamental, edible, native

What's That Bloomin' Thing?

Class of 2016

MG Training Support

Purpose

- Learn to identify common plants in S.D. County
- Increase your knowledge of Plant Families

Procedure

- You will be given a presentation schedule
  - Be prepared at least one week ahead to allow time for additional presentations
  - You can swap your plant/date with another trainee's plant/date

Have Fun & Keep it Simple!

Procedure

- Oral presentation will be four minutes maximum.
- Report only the distinguishing, significant, unusual, and fascinating aspects of your plant.
- **Provide a written 1-2 page report to be uploaded to the Training Website.**

Have Fun & Keep it Simple!

Procedure

- You can do the following:
  - Bring plant samples
  - Do a PowerPoint
  - Draw your flower

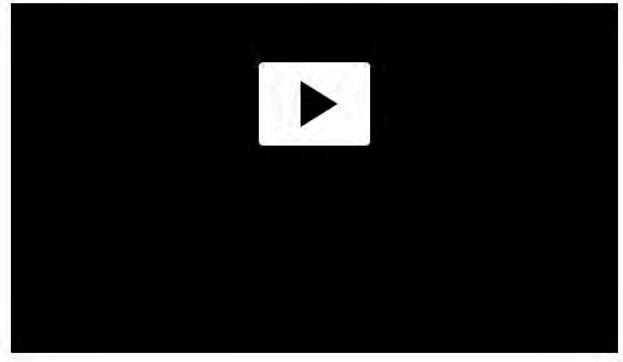
Have Fun & Keep it Simple!

WHAT'S THAT BLOOMIN' THING?

Purpose & Procedure

Plant List

VIDEO



SETTING UP YOUR VMS ACCOUNT | DECEMBER 18, 2015

MORE VIDEOS →

"What's That Bloomin' Thing?"

The End

Class of 2016

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