PLANT MORPHOLOGY BASICS

CNPS

Keying With Natives

Presented by Dee Shea Himes

January 2022

Photo by Dee Shea Himes

WHAT IS PLANT MORPHOLOGY?

A study of the
physical form
and
external structures
of plants

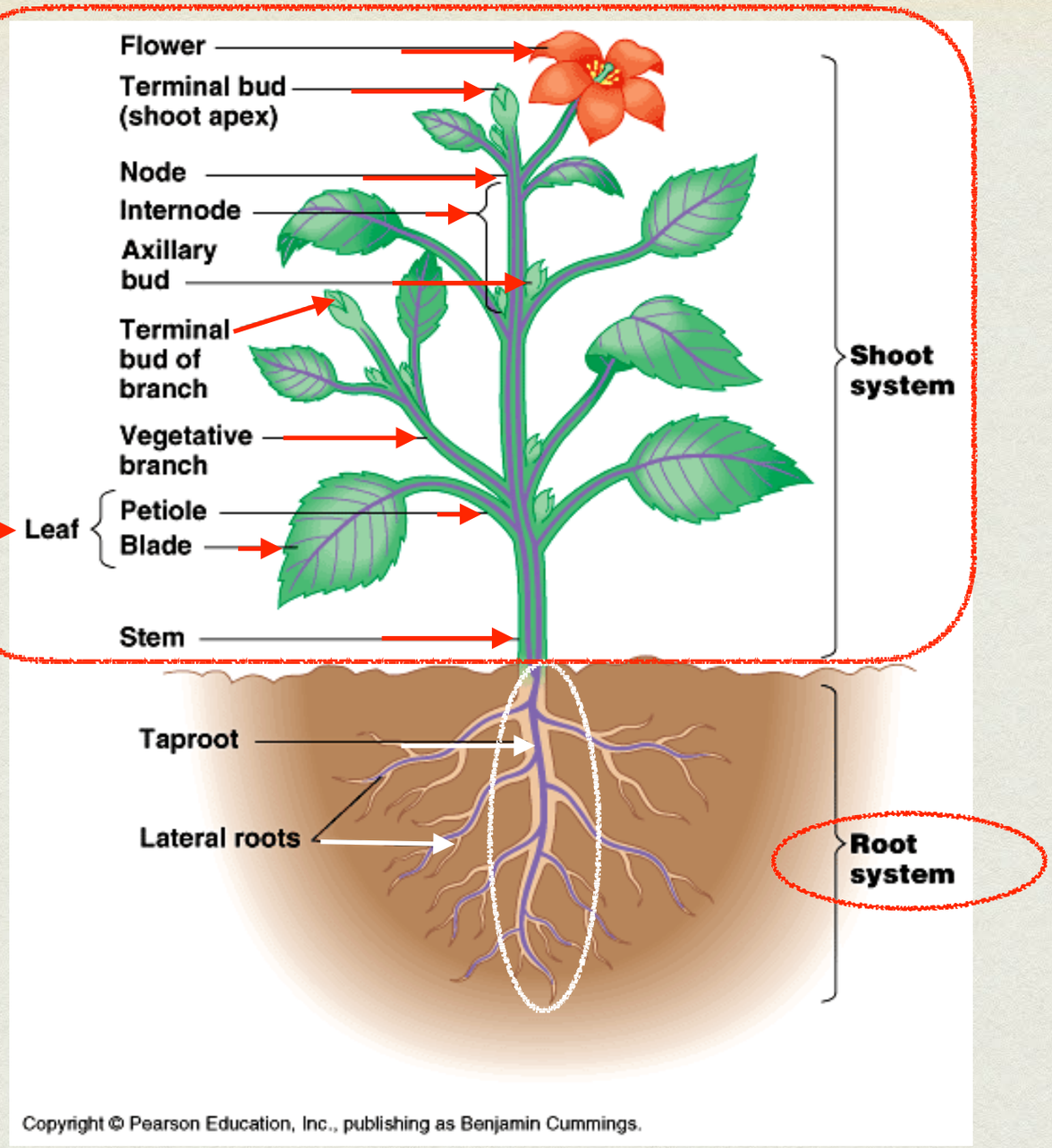
- wikipedia

HAND LENS / LOUPE

TODAY'S SESSION,
YOU WILL GET BASIC UNDERSTANDING OF

- Plant external structures
- Leaf types and features
- Flowering parts
- Basic fruits and seeds types
- Plant glossary
- Look at plant samples

THE PLANT: EXTERNAL STRUCTURE



STEMS & ROOTS...

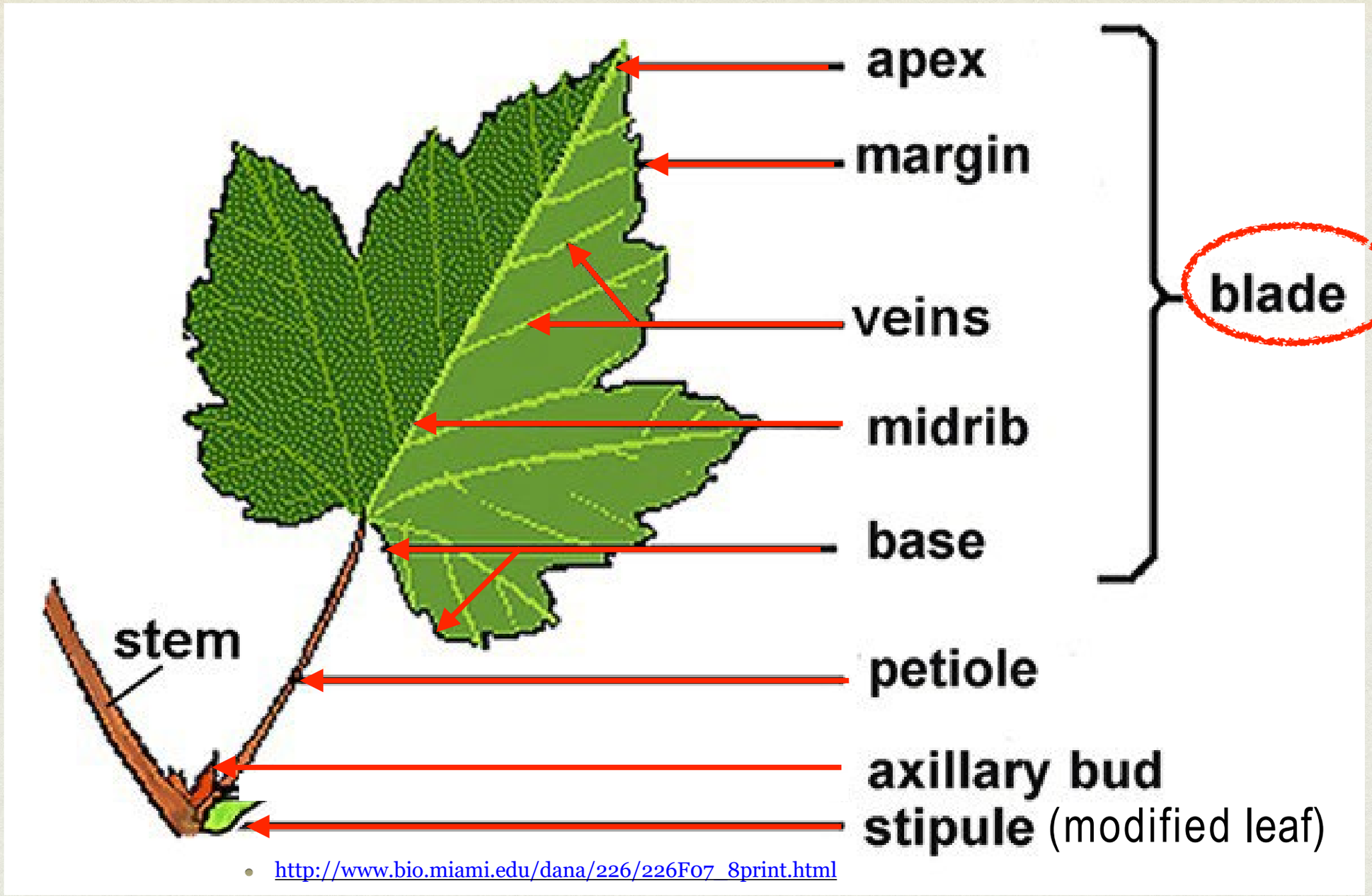
https://vplants.org/portal/plants/glossary/plate01.php

rhyzomatous

adventitious - rooting from non-root tissue

Photo by Dee Shea Himes

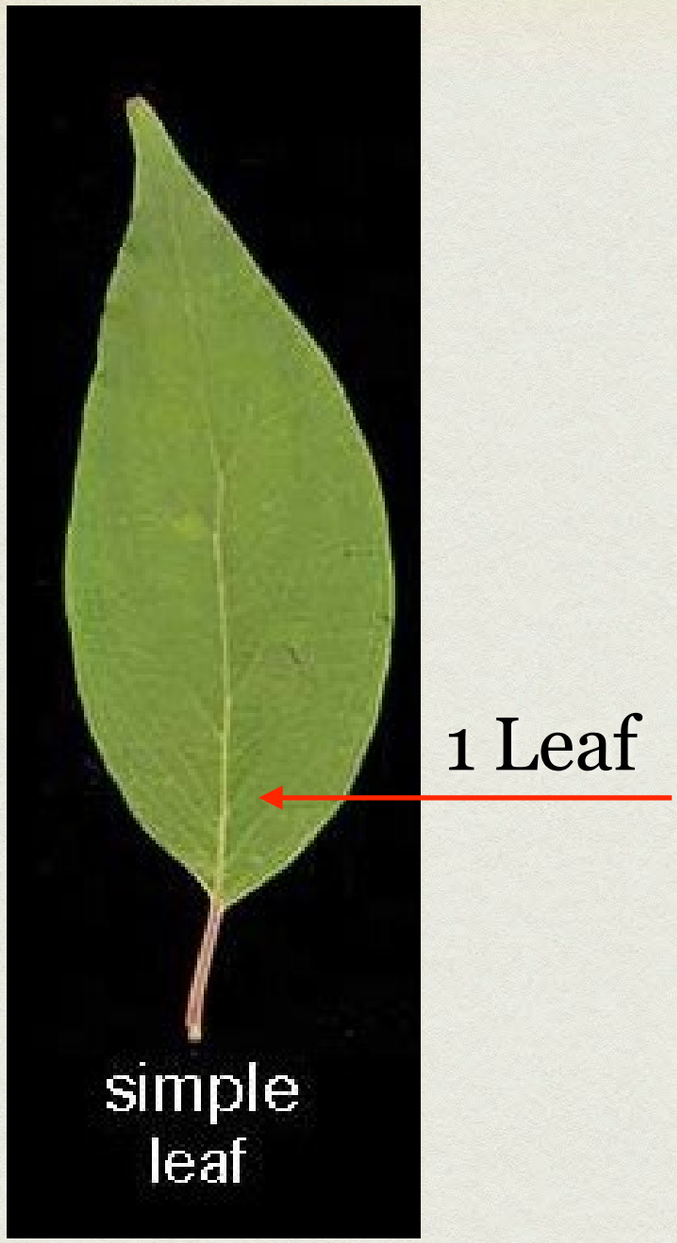
THE LEAF

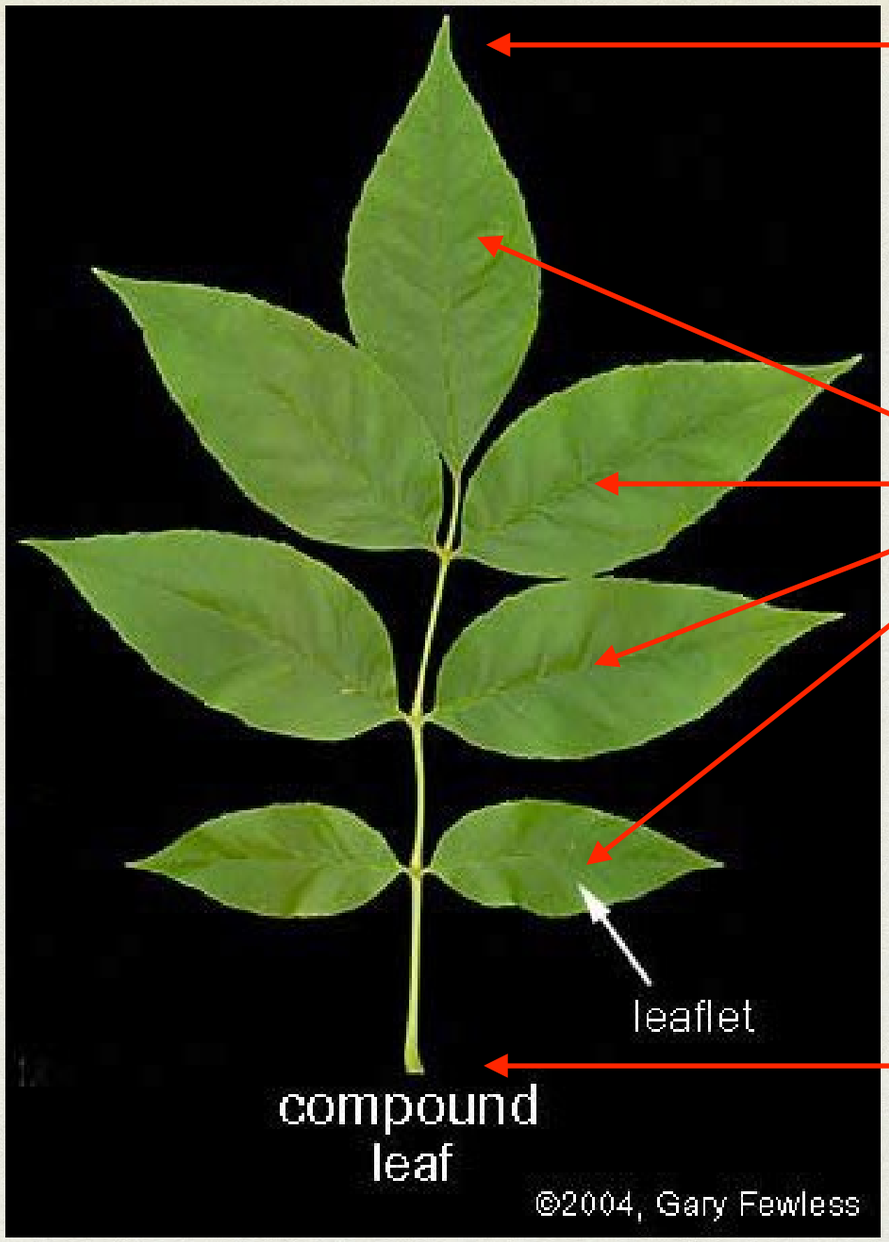


- http://www.bio.miami.edu/dana/226/226F07_8print.html

Photo by Dee Shea Himes

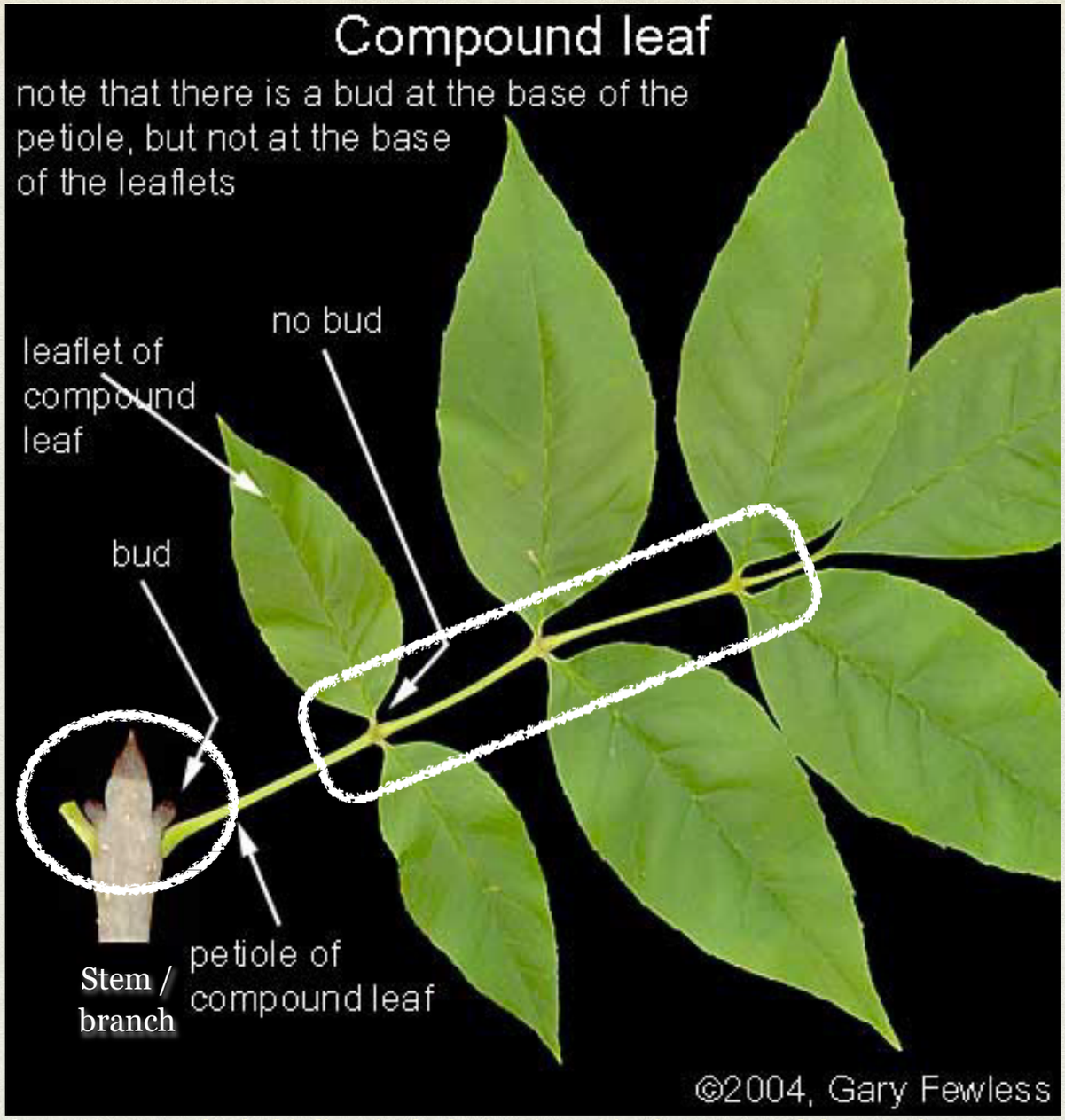
LEAF TYPES





https://www.uwgb.edu/biodiversity/herbarium/trees/simple_compound_leaves01.htm

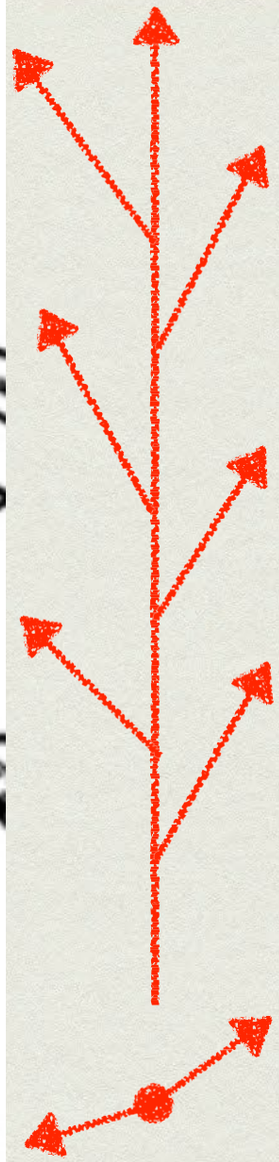
THE COMPOUND LEAF

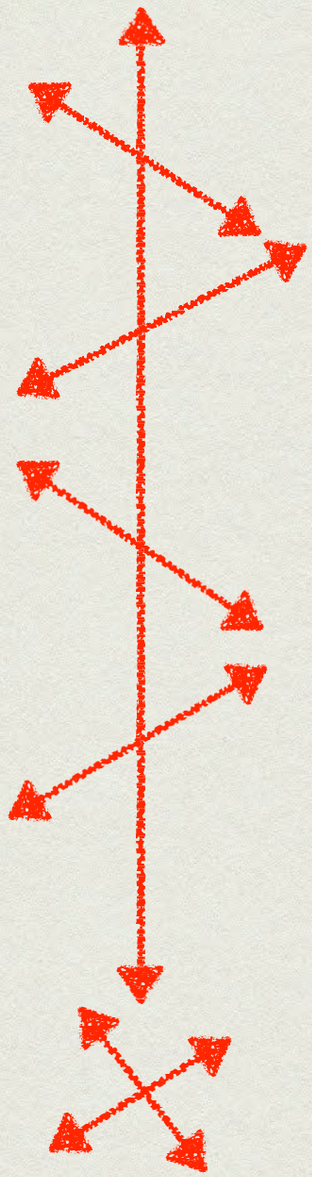


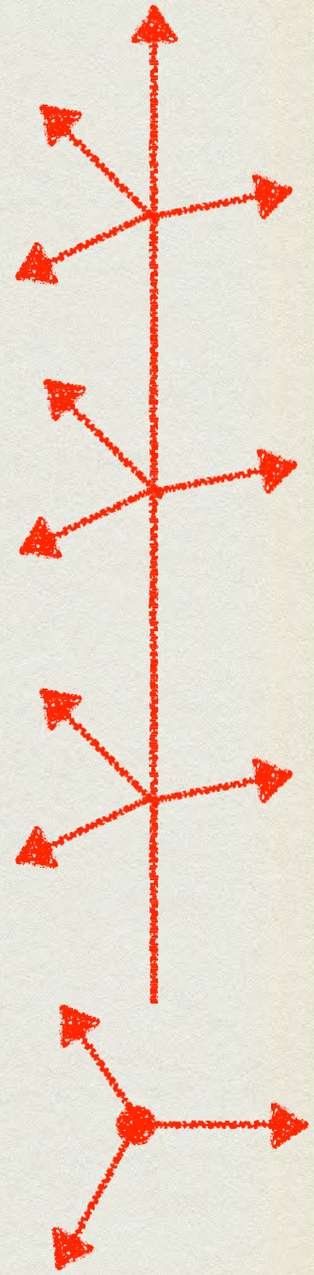
https://www.uwgb.edu/biodiversity/herbarium/trees/simple_compound_leaves01.htm

LEAF ARRANGEMENTS…

HTTPS://VPLANTS.ORG/PORTAL/PLANTS/GLOSSARY/PLATE02.PHP



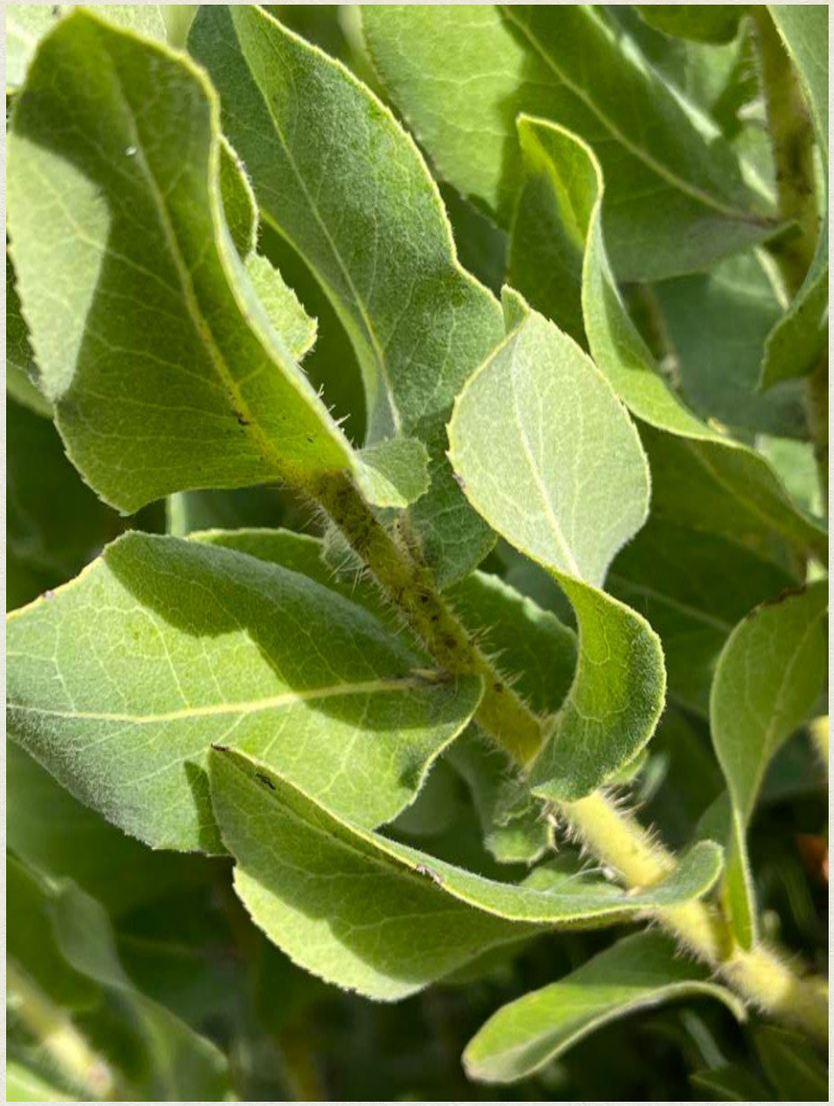




as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

IMBRICATE

HTTPS://VPLANTS.ORG/PORTAL/PLANTS/GLOSSARY/PLATE02.PHP



LEAF COMPOUND TYPES

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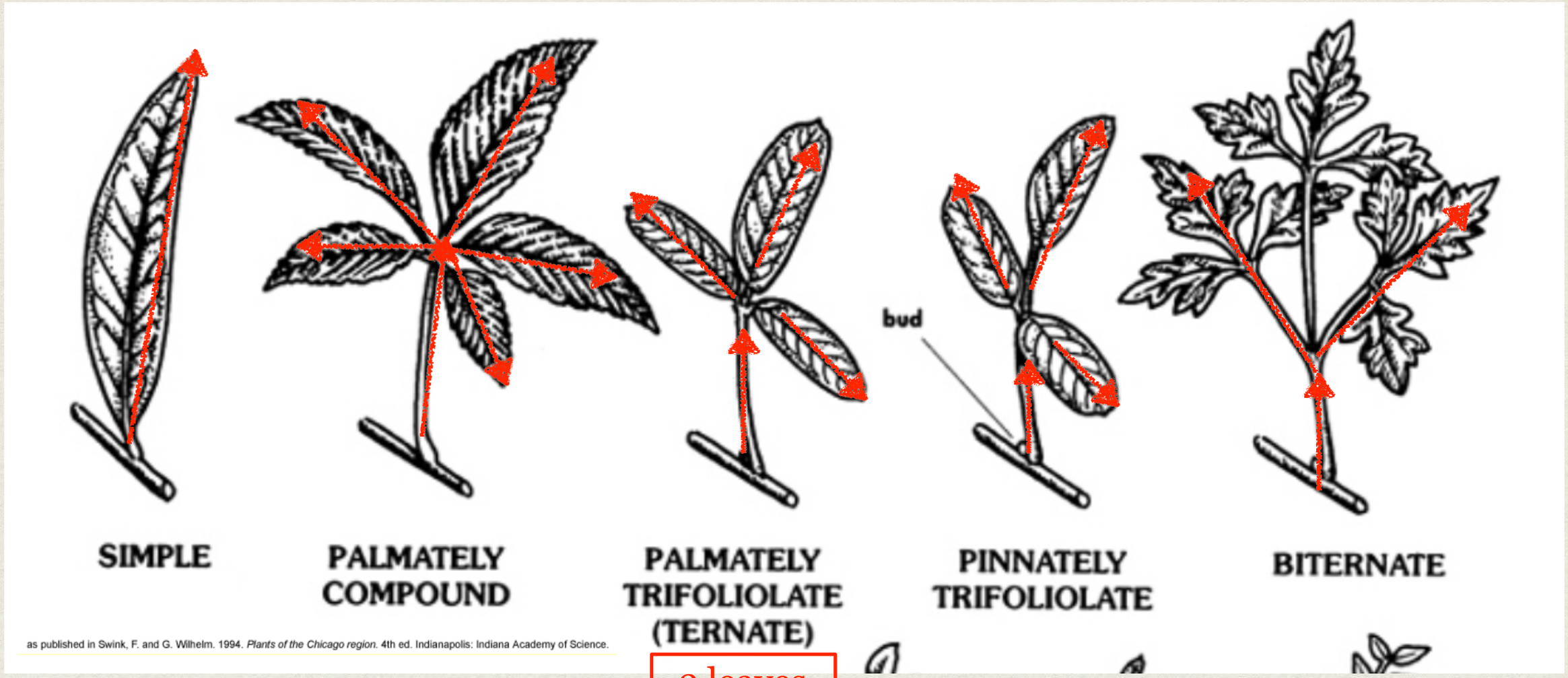
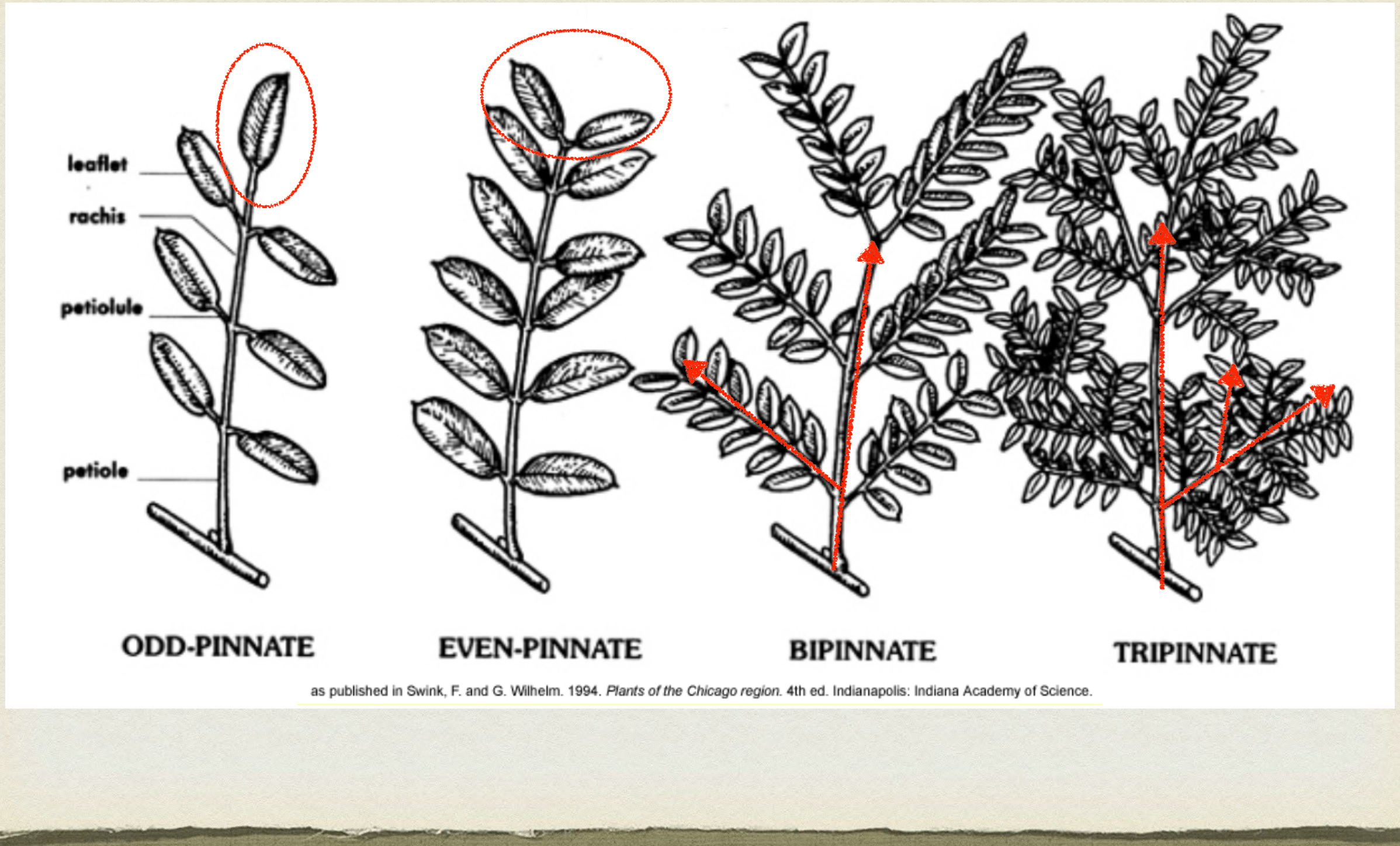


3 leaves

LEAF COMPOUND PINNATE TYPES

HTTPS://VPLANTS.ORG/PORTAL/PLANTS/GLOSSARY/PLATE02.PHP



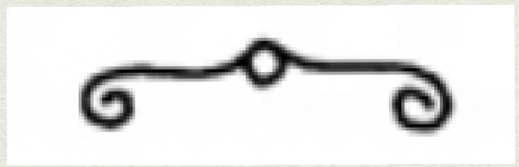
as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

LEAF MARGINS

- Entire
  - Ciliate - fringed with fine hairs

  - Involute - rolled over top

  - Revolute - rolled under bottom



as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

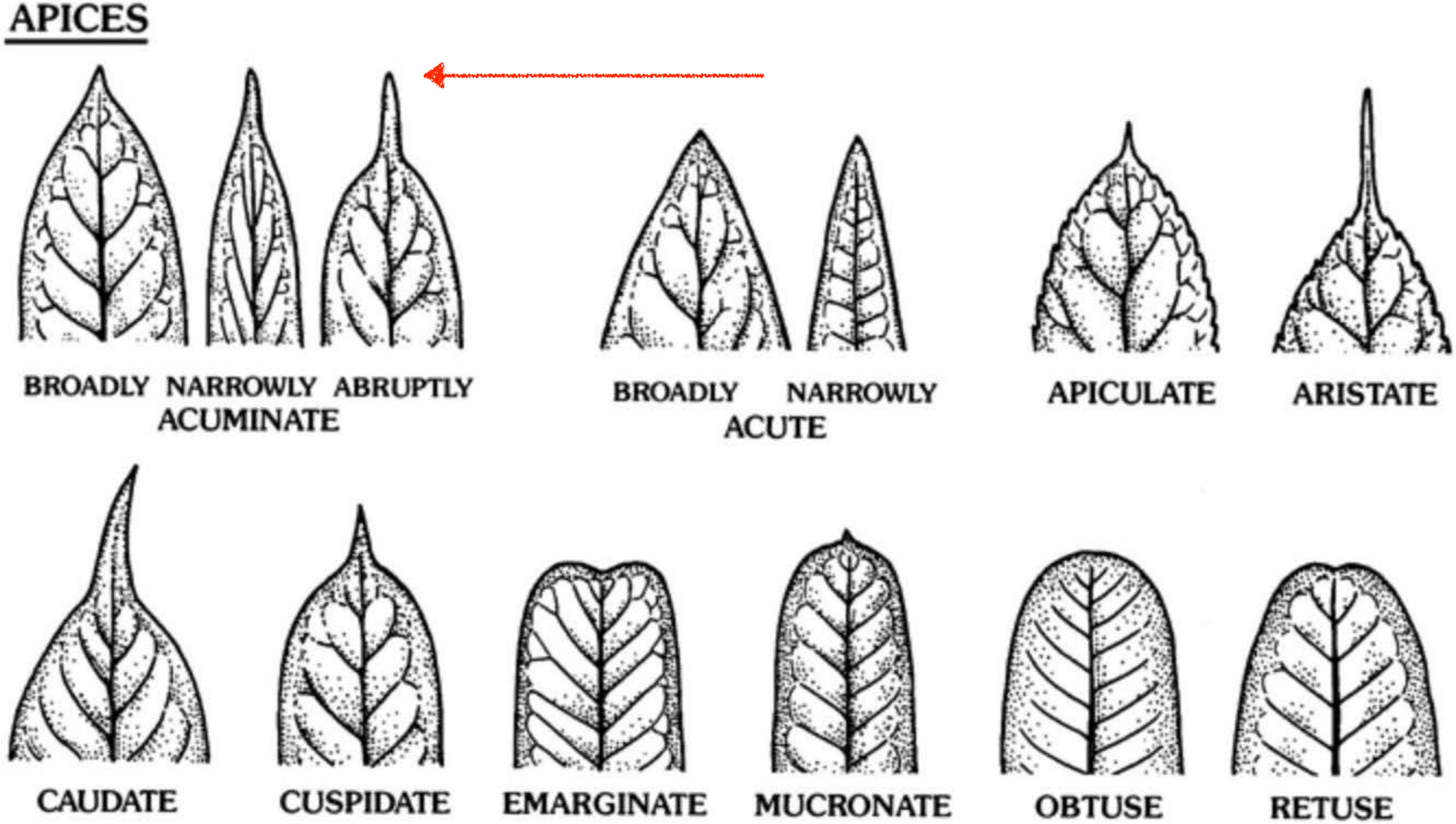
LEAF MARGINS…

HTTPS://VPLANTS.ORG/PORTAL/PLANTS/GLOSSARY/PLATE04.PHP

- Crenate - crenatum, looks like a bunch of CCCCC's.
- Dentate - dentata, tum…, looks like a bunch of DDDD's
- Lobe - lobata
- Serrate - saw-like, toothed pointing forward, seratum, serata,
- Serrulate - multi serrated (finely serrated)
- Sinuate - (strongly wavy)

LEAF APICES (LEAF TIP)

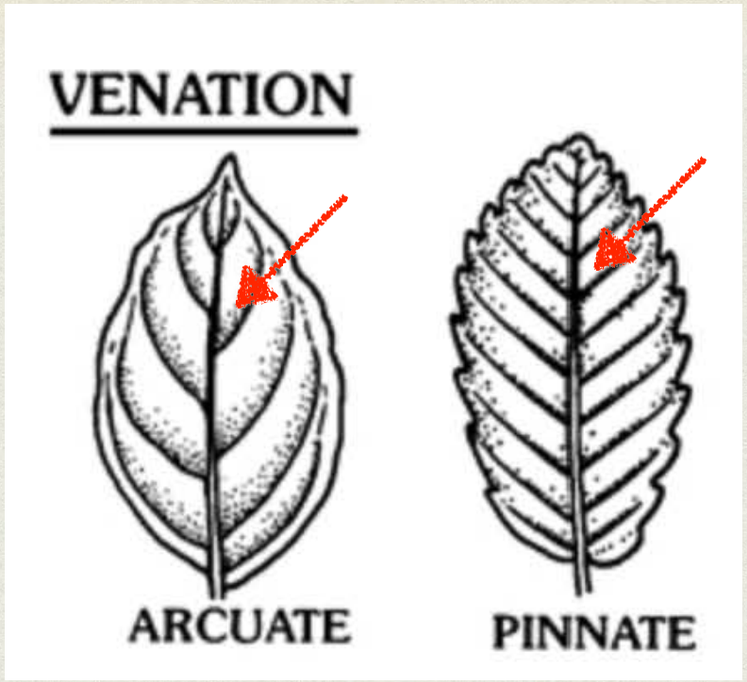
https://vplants.org/portal/plants/glossary/plate05.php



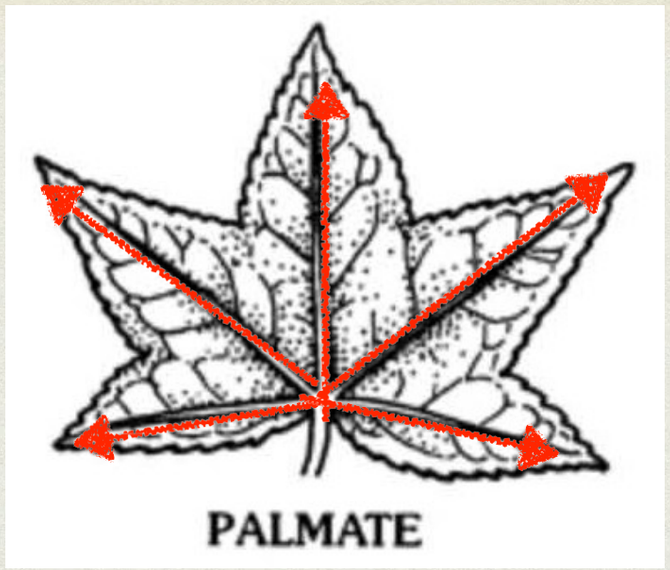
as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

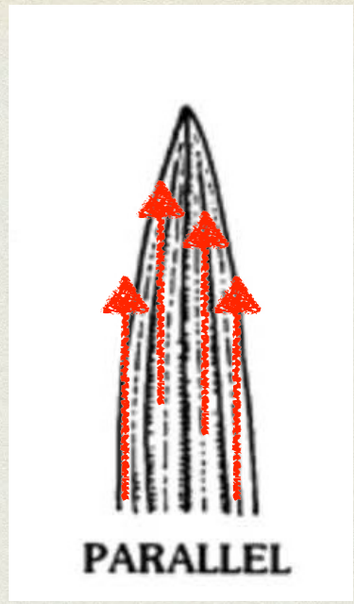
LEAF VENATION

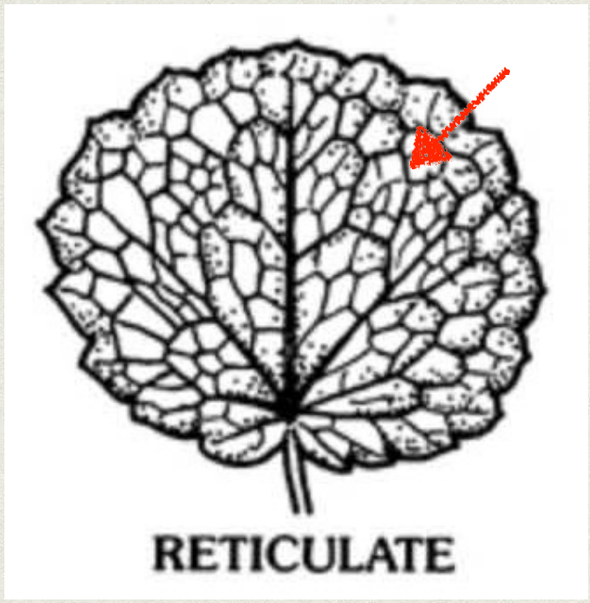
https://vplants.org/portal/plants/glossary/plate05.php



Alternates Opposite

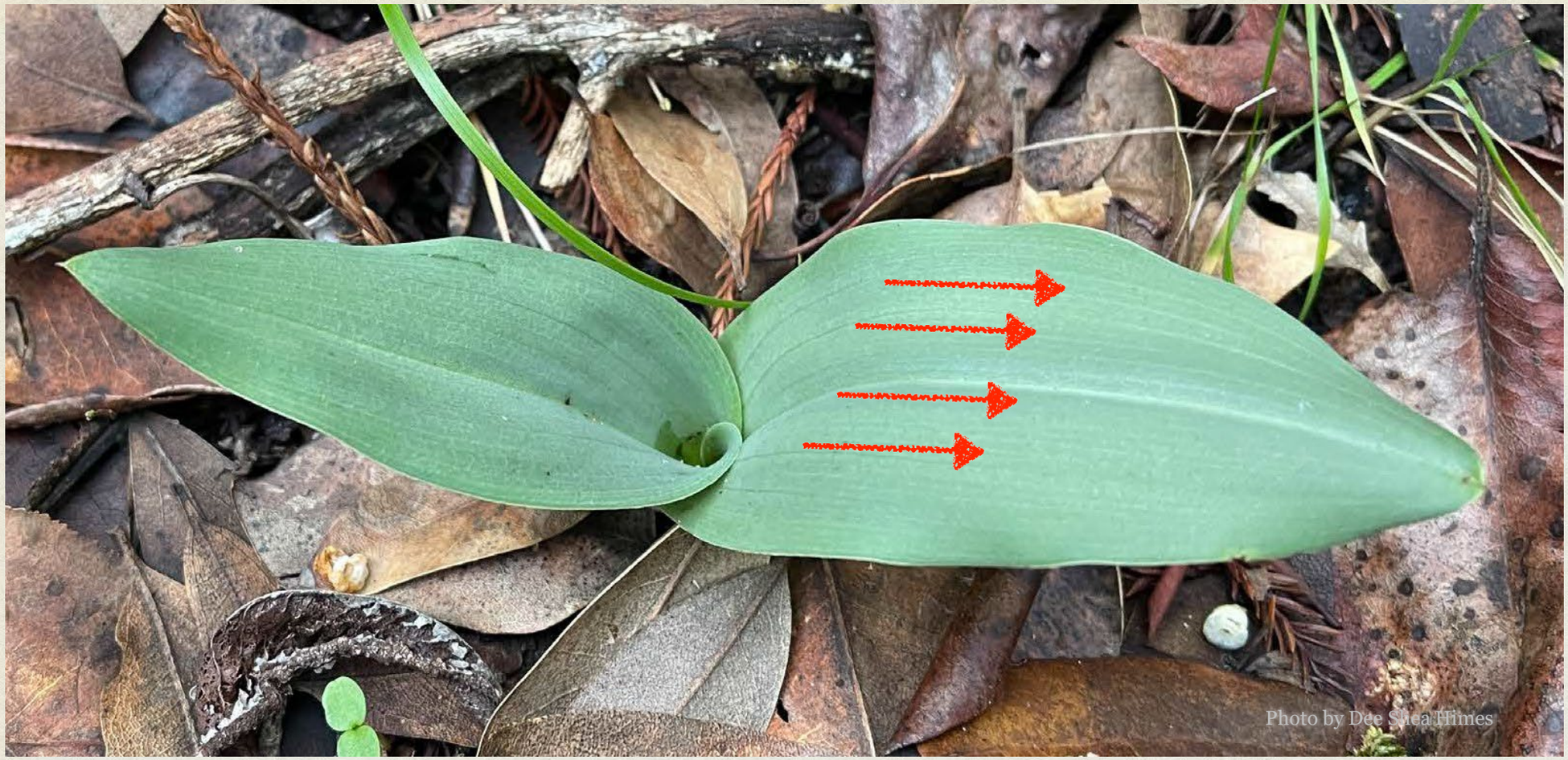






as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

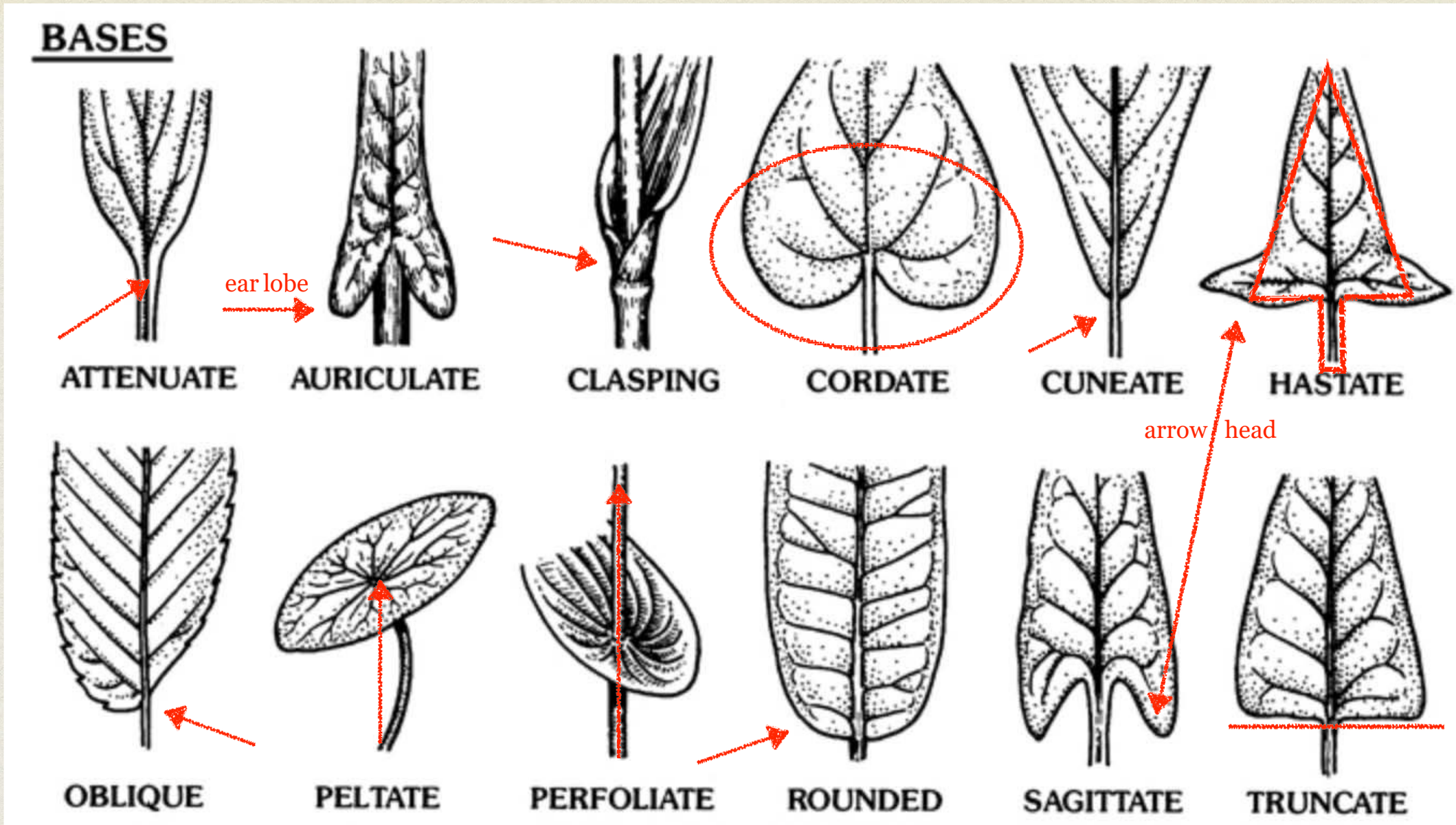
PARALLEL VEINS - MONOCOTS



Piperia transversa

LEAF BASES

https://vplants.org/portal/plants/glossary/plate05.php



as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

LEAF SURFACES…

HTTPS://VPLANTS.ORG/PORTAL/PLANTS/GLOSSARY/PLATE06.PHP

a**d**axial - top surface

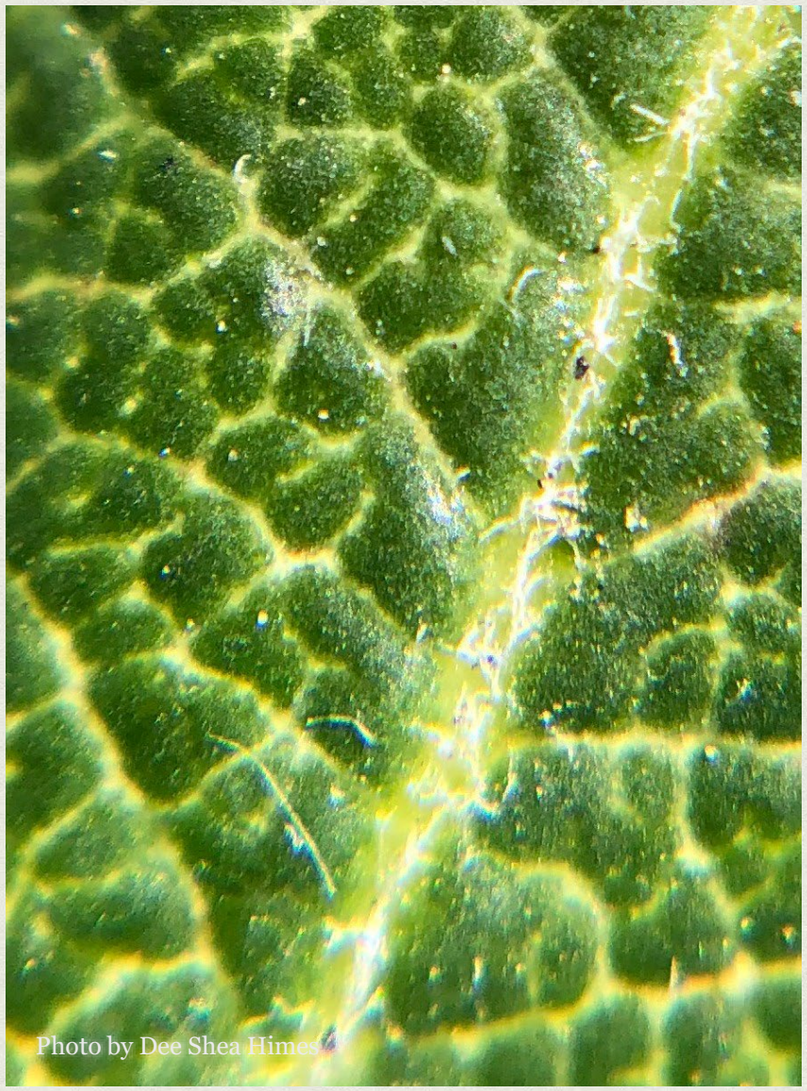


Photo by Dee Shea Himes

a**b**axial - under (**bottom**) surface

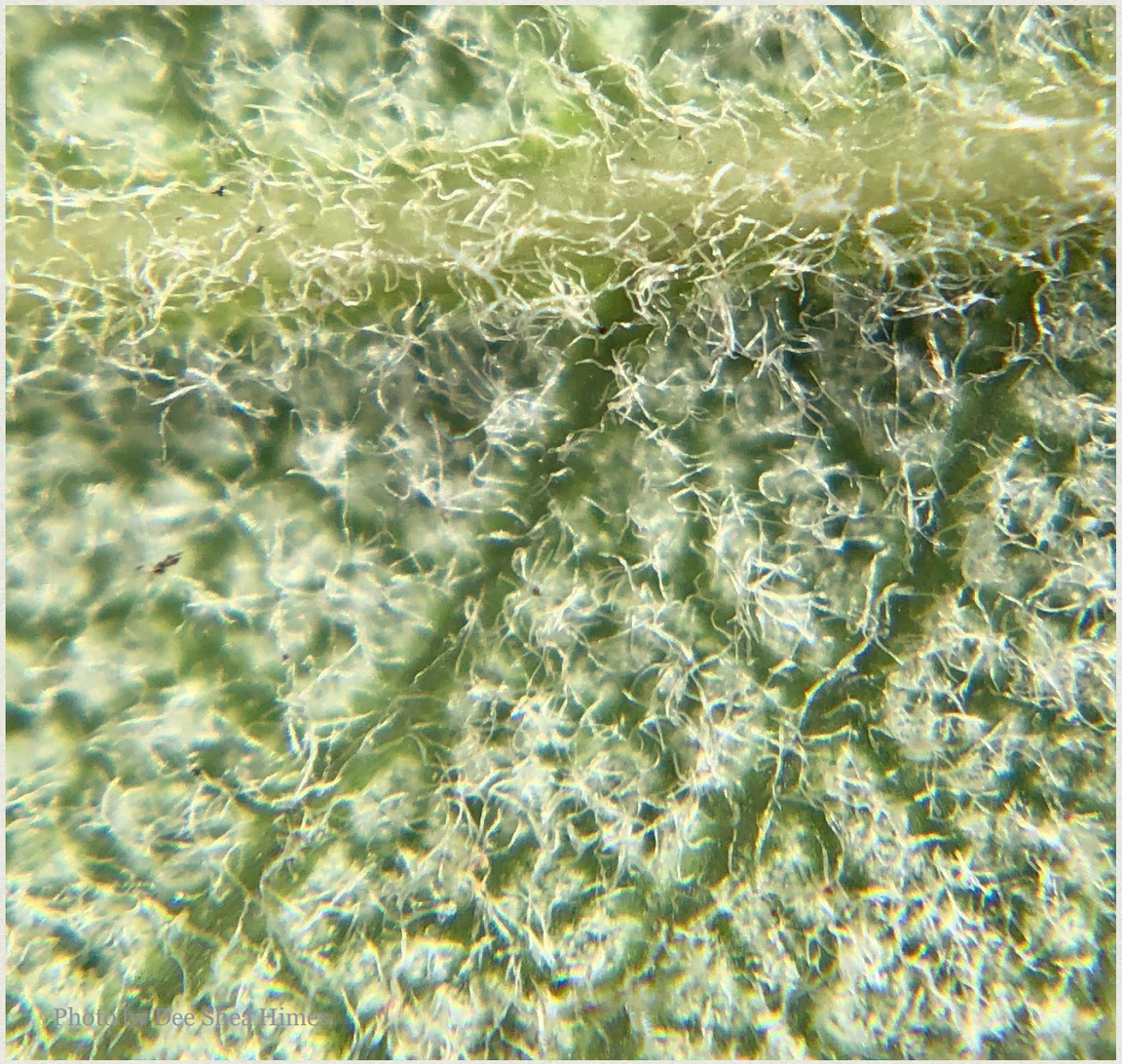


Photo by Dee Shea Himes

LEAF SURFACES, +30 TYPES

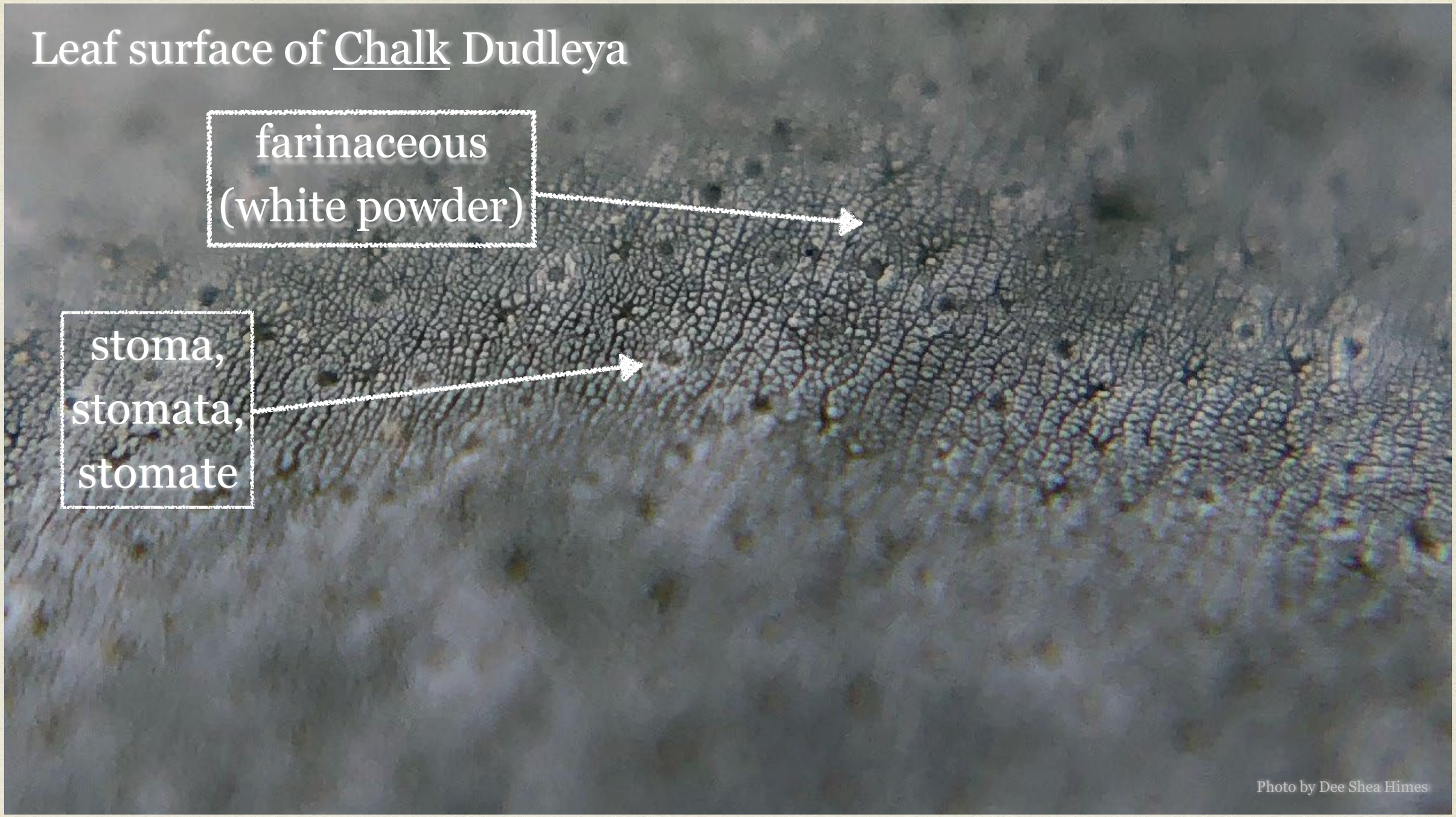
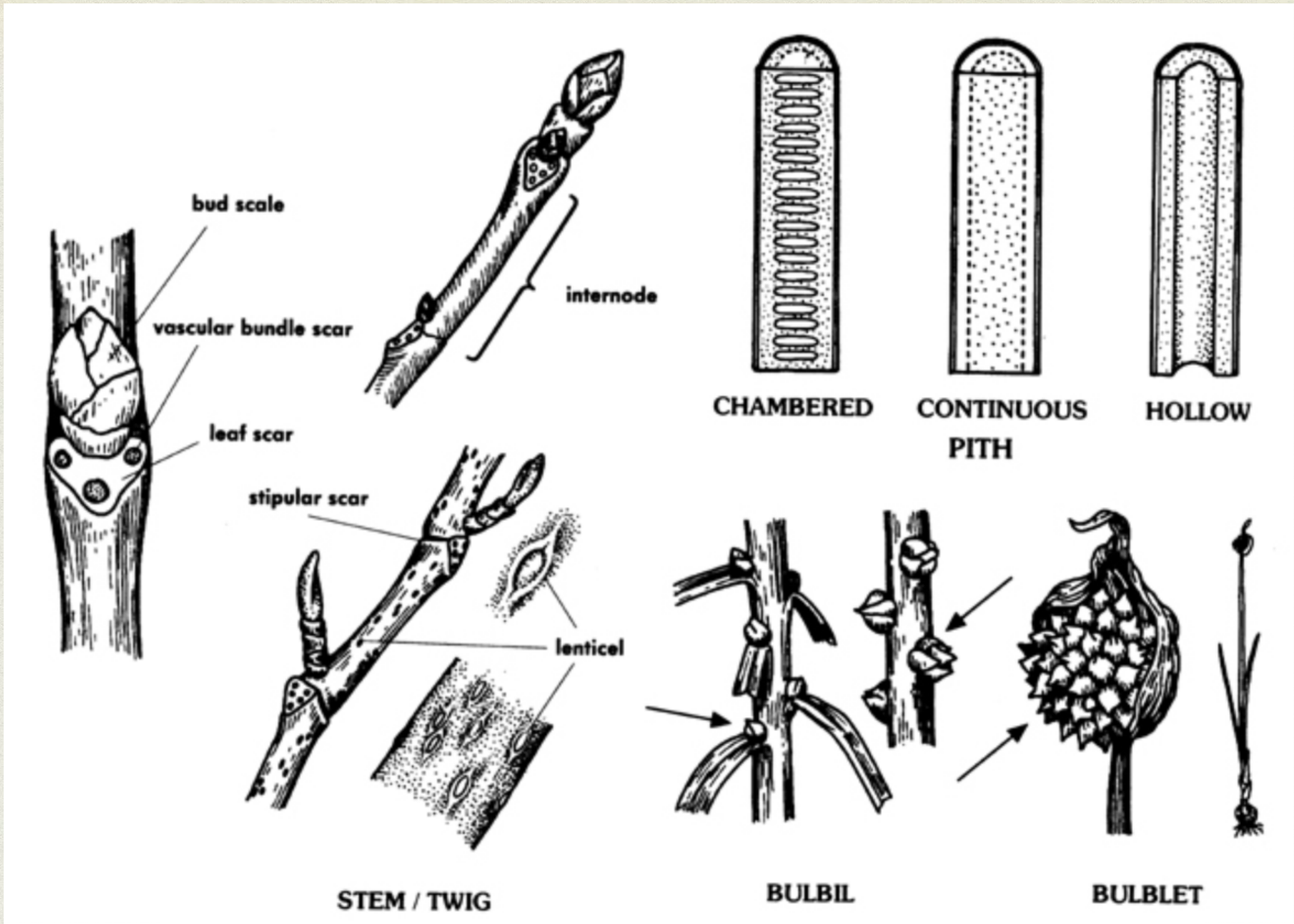


Photo by Dee Shea Himes

STEM AND LEAF PARTS, AND VARIATIONS…

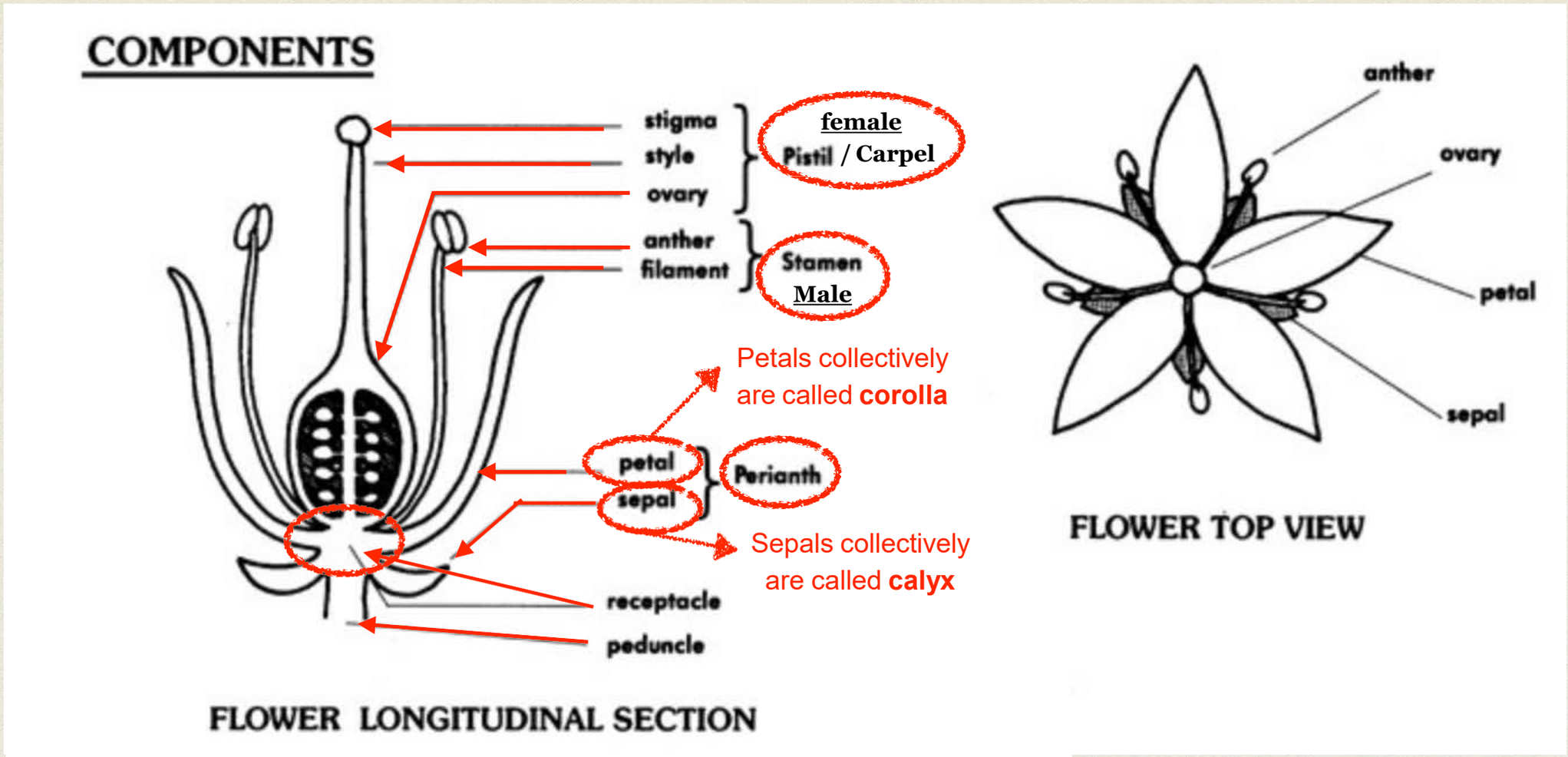
https://vplants.org/portal/plants/glossary/plate07.php



as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

FLOWER PARTS: ANGIOSPERM - EUDICOT

HTTPS://VPLANTS.ORG/PORTAL/PLANTS/GLOSSARY/PLATE09.PHP



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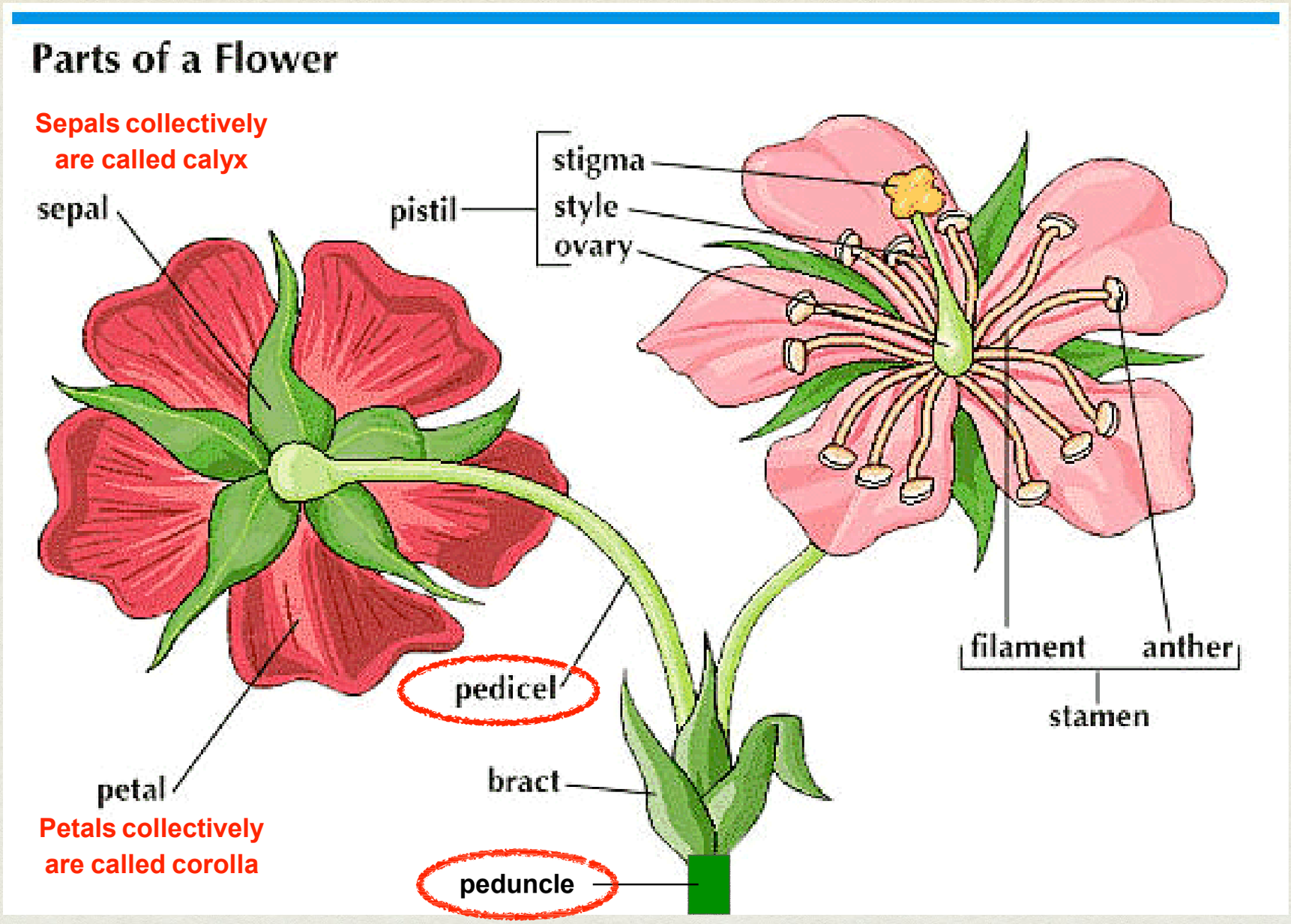
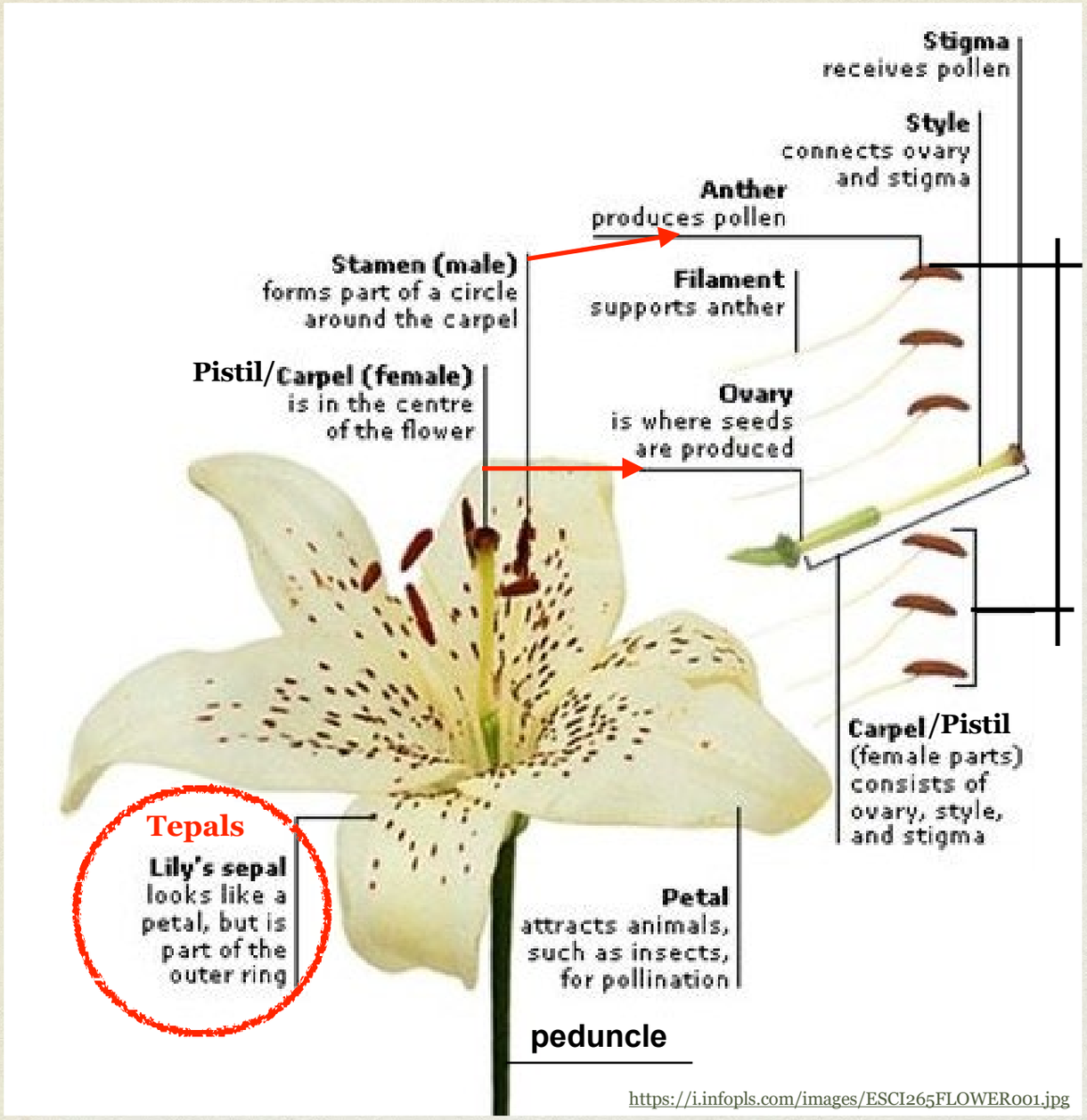
FLOWER PARTS: ANGIOSPERM - EUDICOT



https://media1.britannica.com/eb-media/06/63306-004-0406576D.gif

FLOWER PARTS:
ANGIOSPERM - MONOCOT - LILIACEAE



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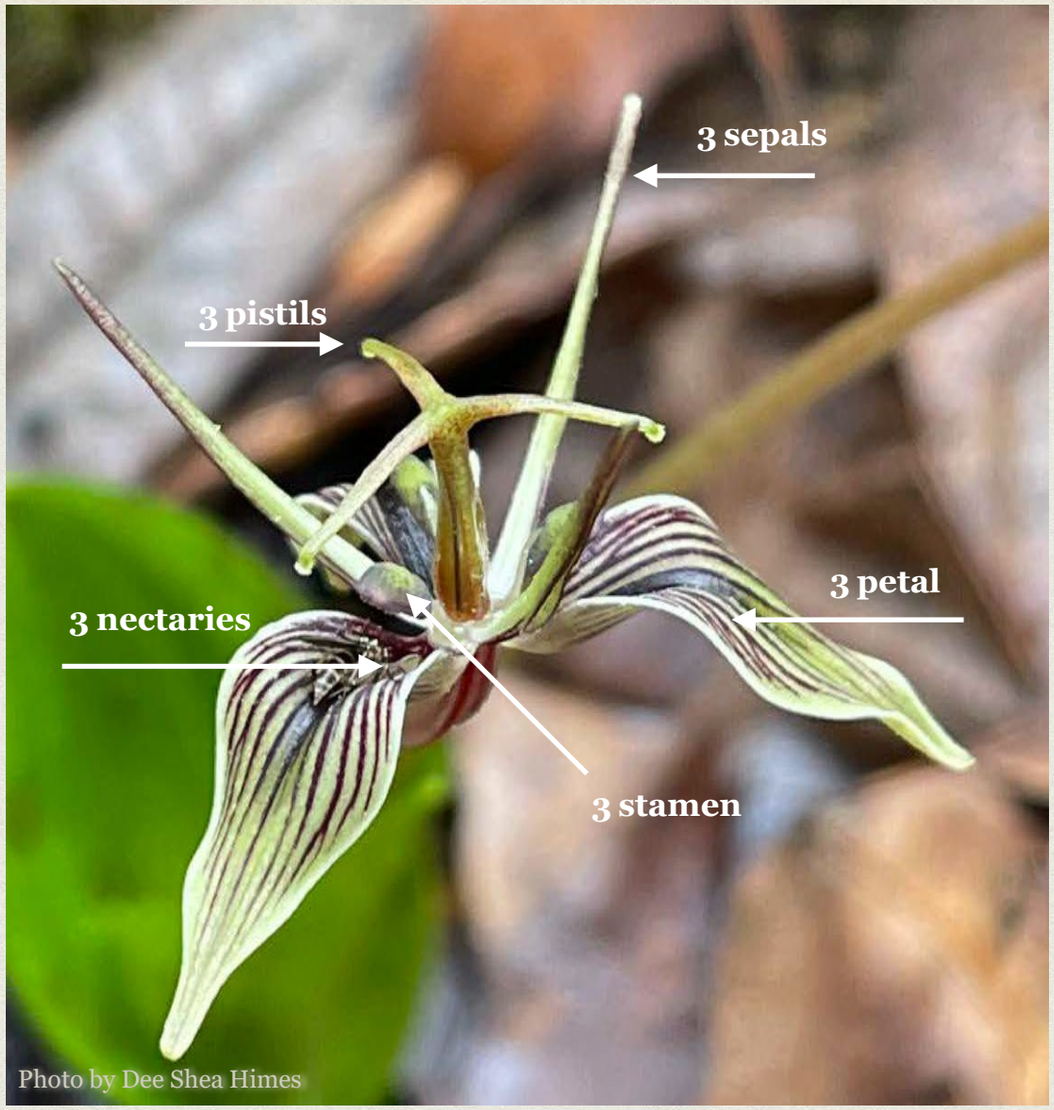
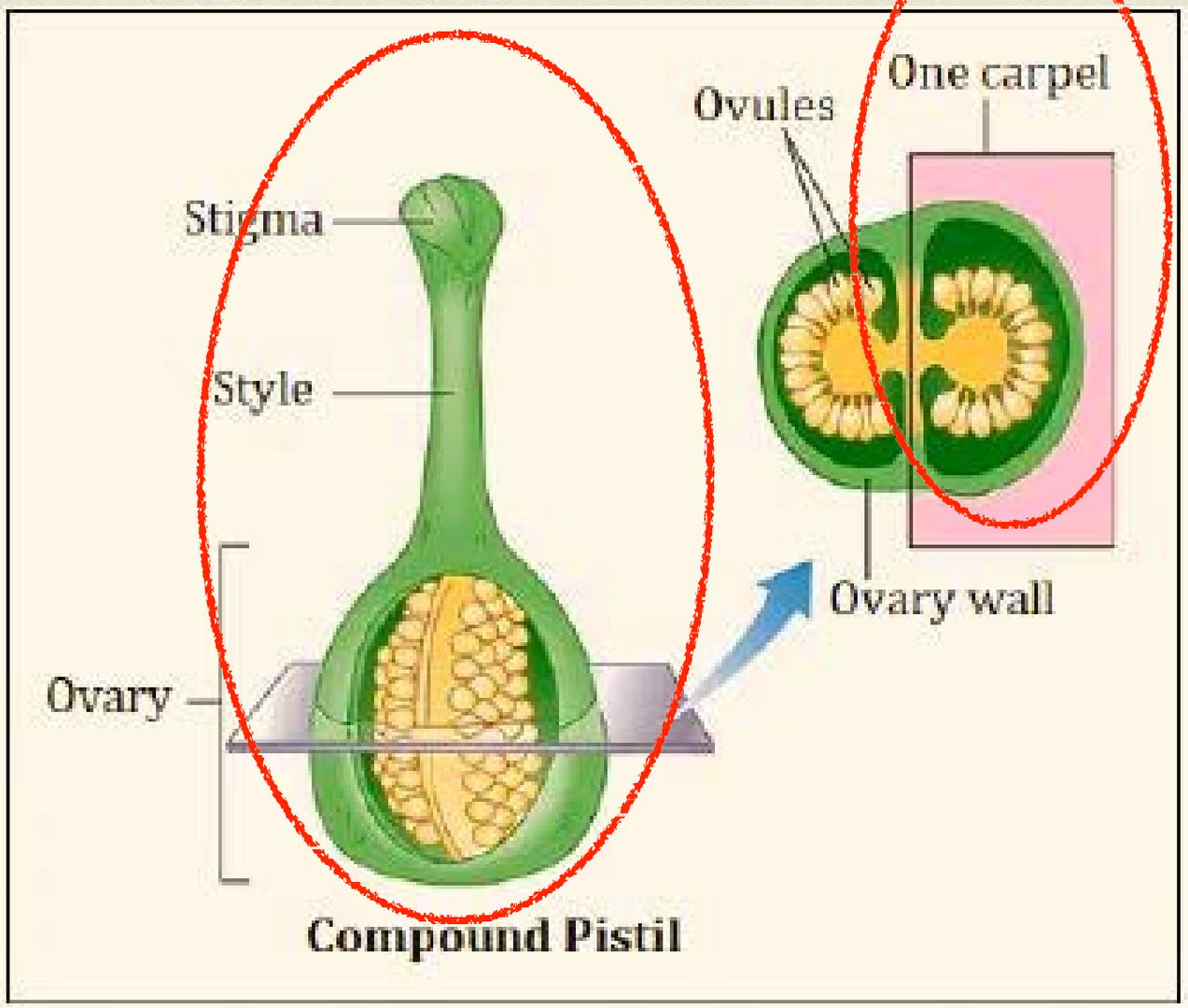


Photo by Dee Shea Himes

PISTIL AND CARPEL



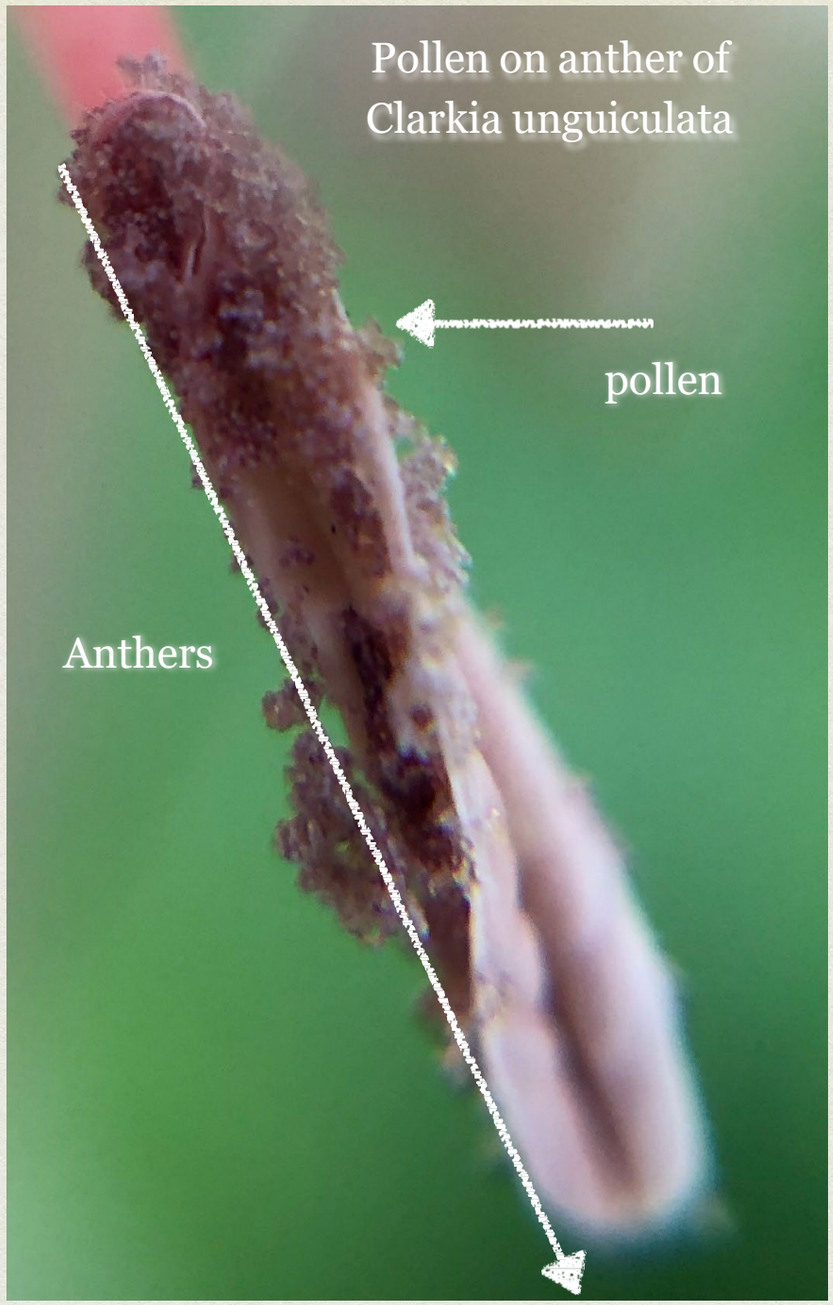
https://24hoursofbiology.com/carpel-and-pistil-differences-and-comparisons/

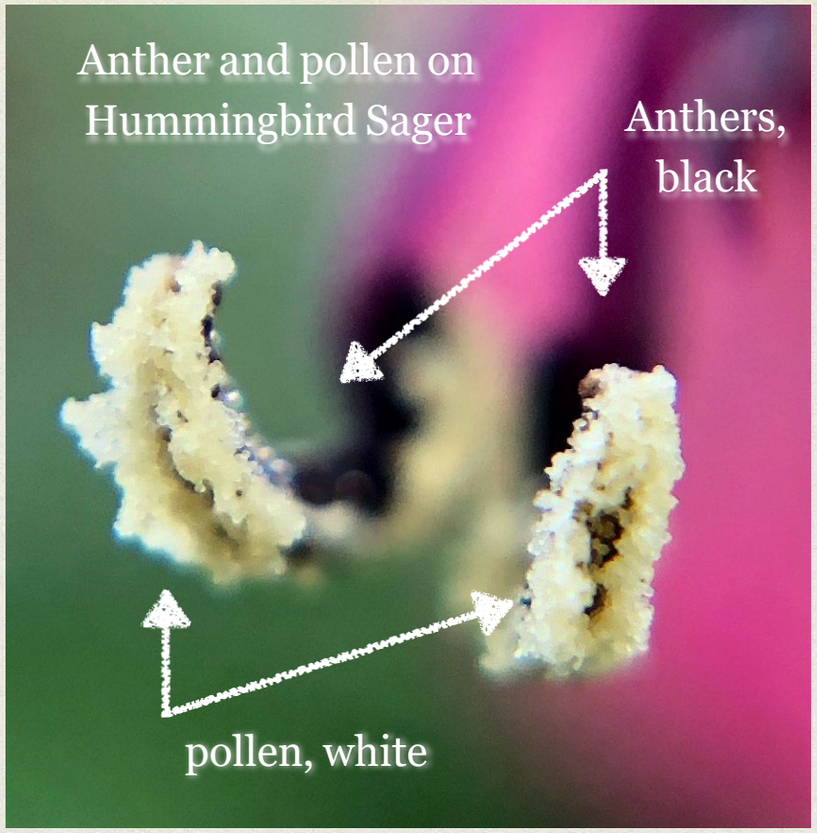
Pistil / Carpel
(used interchangeable)
contains:
Stigma
Style
Ovary

A flower can have a simple pistil / carpel or can be compound depending on genus/ species.

E.g. Lilies - 3 carpels
Apiaceae - 2 carpels

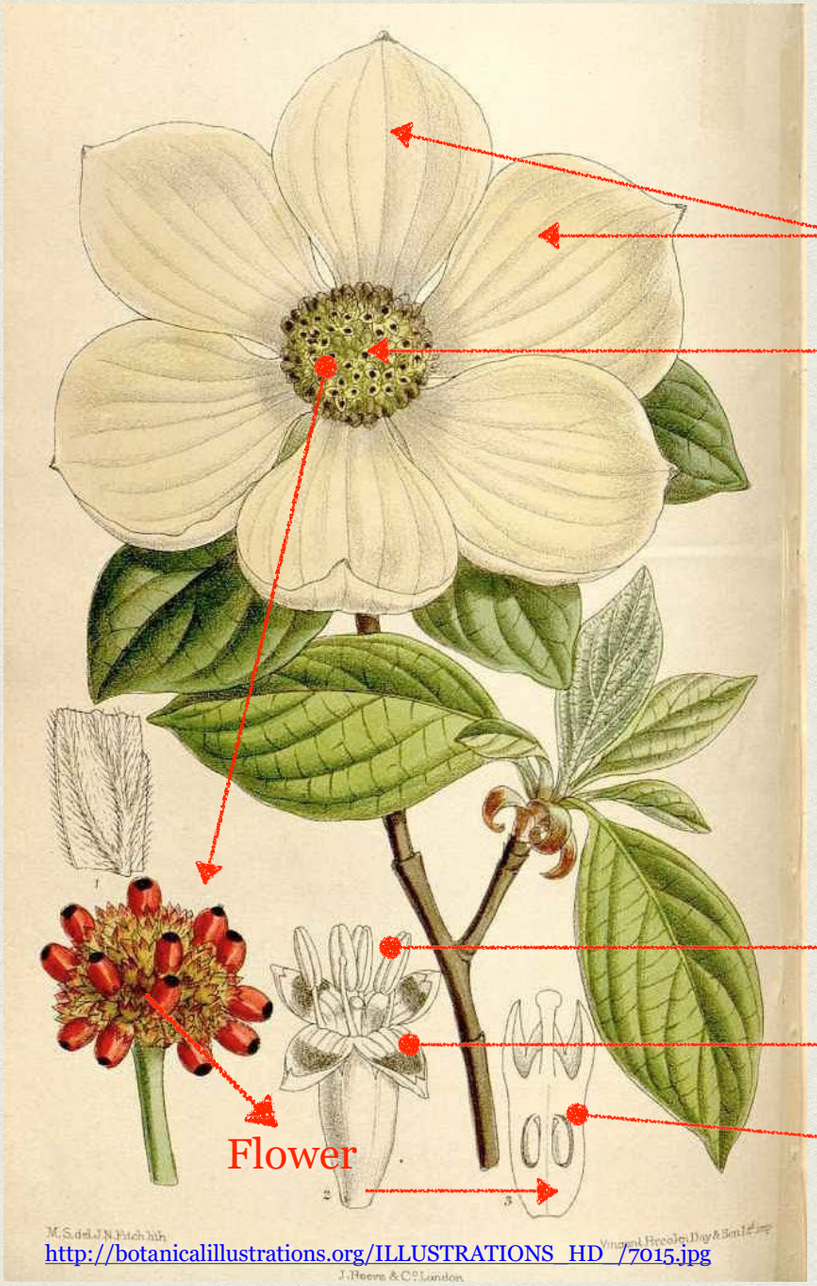
FLOWER PARTS:
CLOSER LOOK AT ANTHER, POLLEN





Photos by Dee Shea Himes

FLOWER PARTS:
BRACTS, LOOKING LIKE PETALS - MODIFIED LEAVES



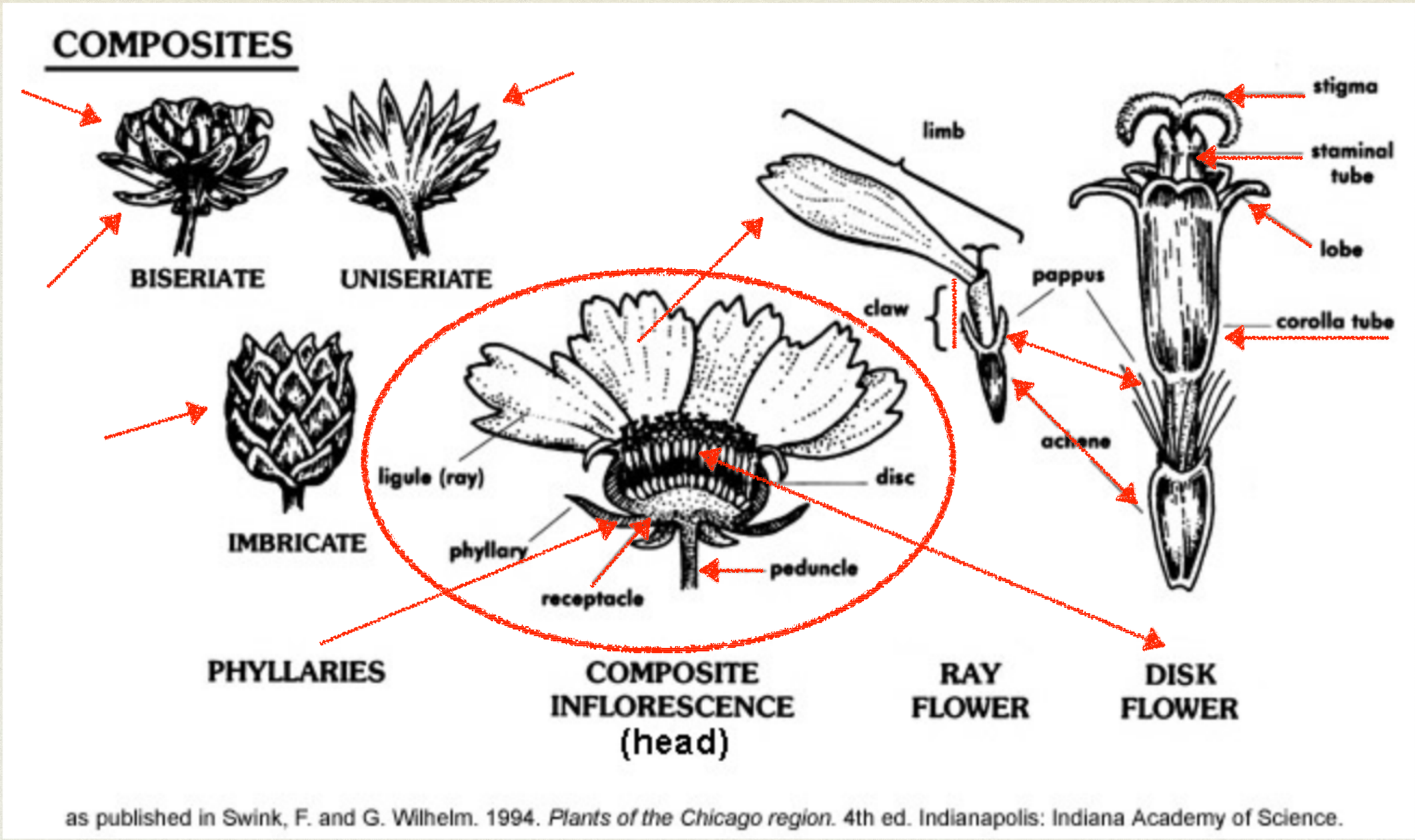
http://botanicalillustrations.org/ILLUSTRATIONS_HD_/7015.jpg

- dogwoods
- poinsettia
- bougainvillea

https://www.thedailygarden.us/garden-word-of-the-day/bracts

FLORAL PARTS OF COMPOSITES

https://vplants.org/portal/plants/glossary/plate12.php



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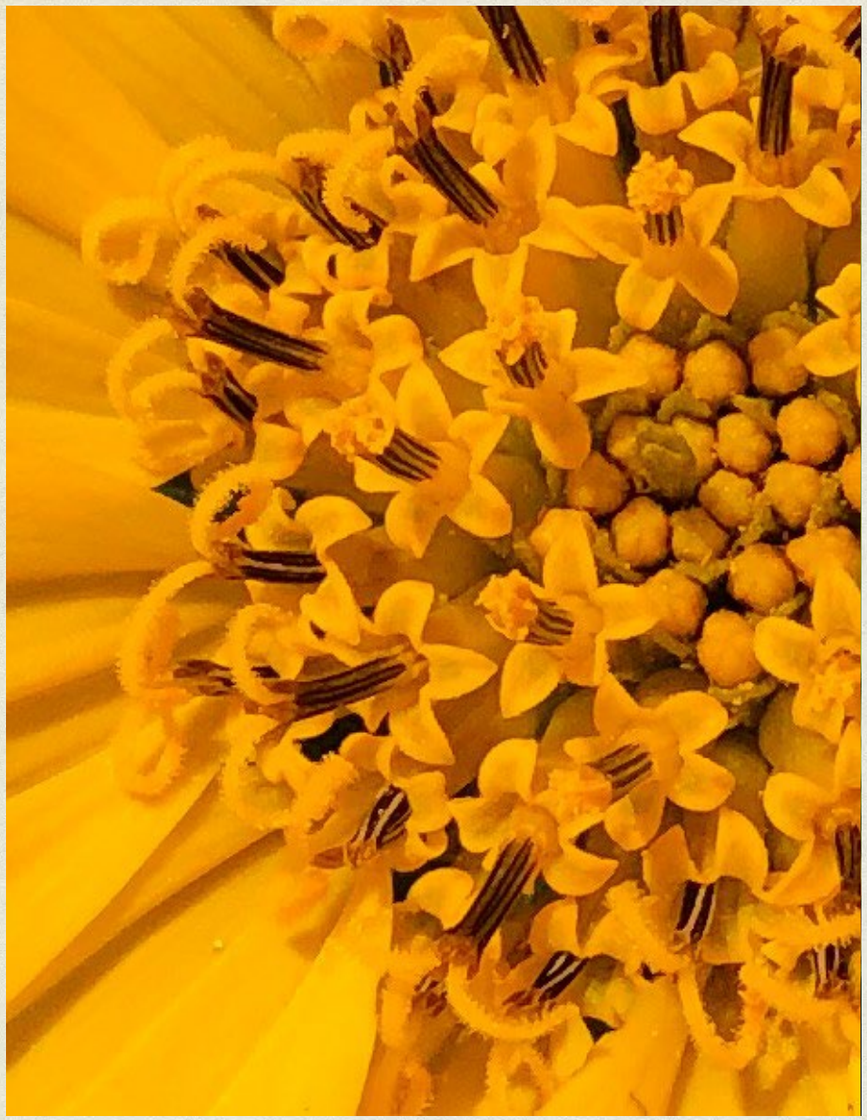
DISCS AND RAYS

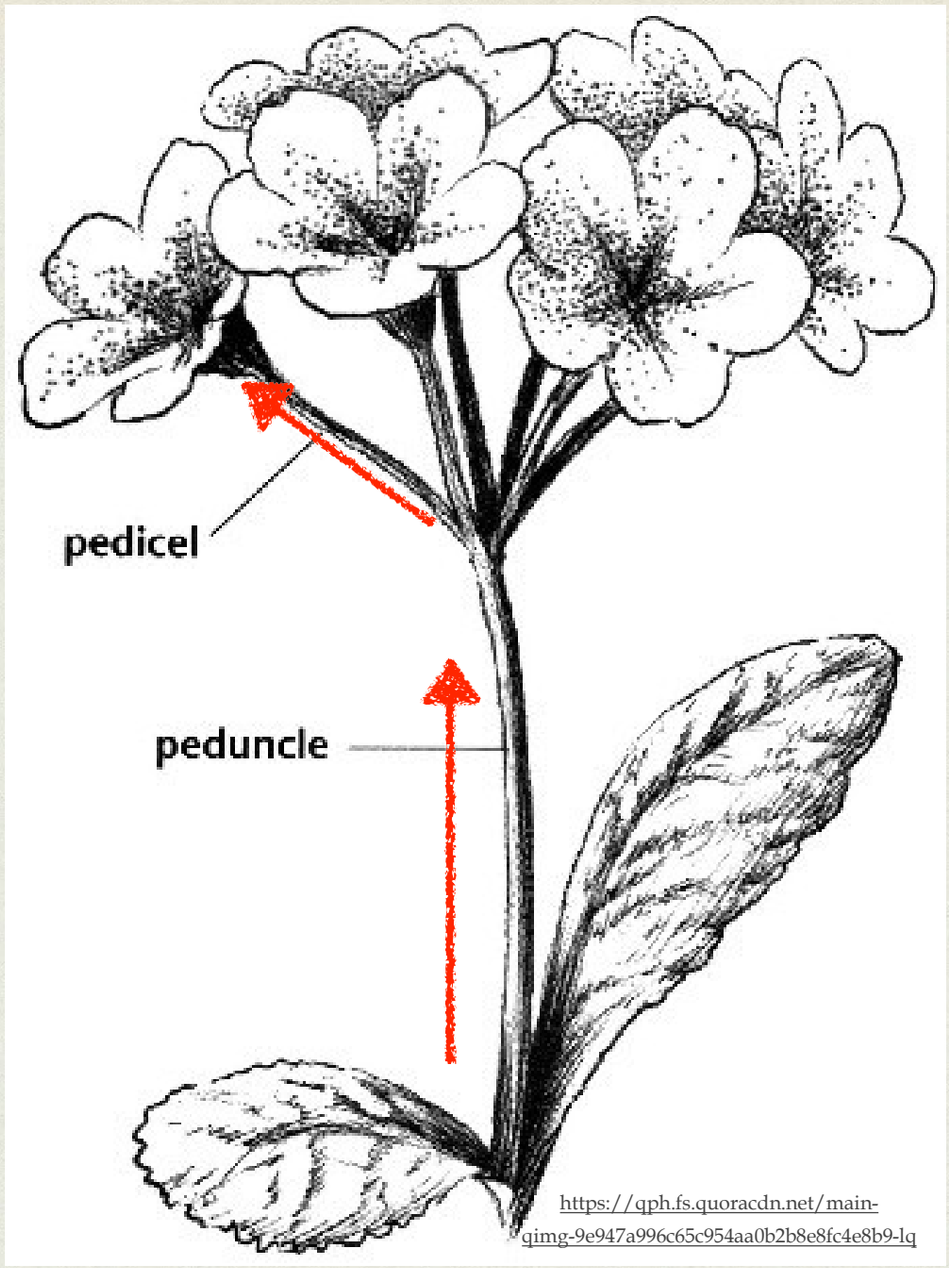


Rays and discs

disc flowers only (rayless)

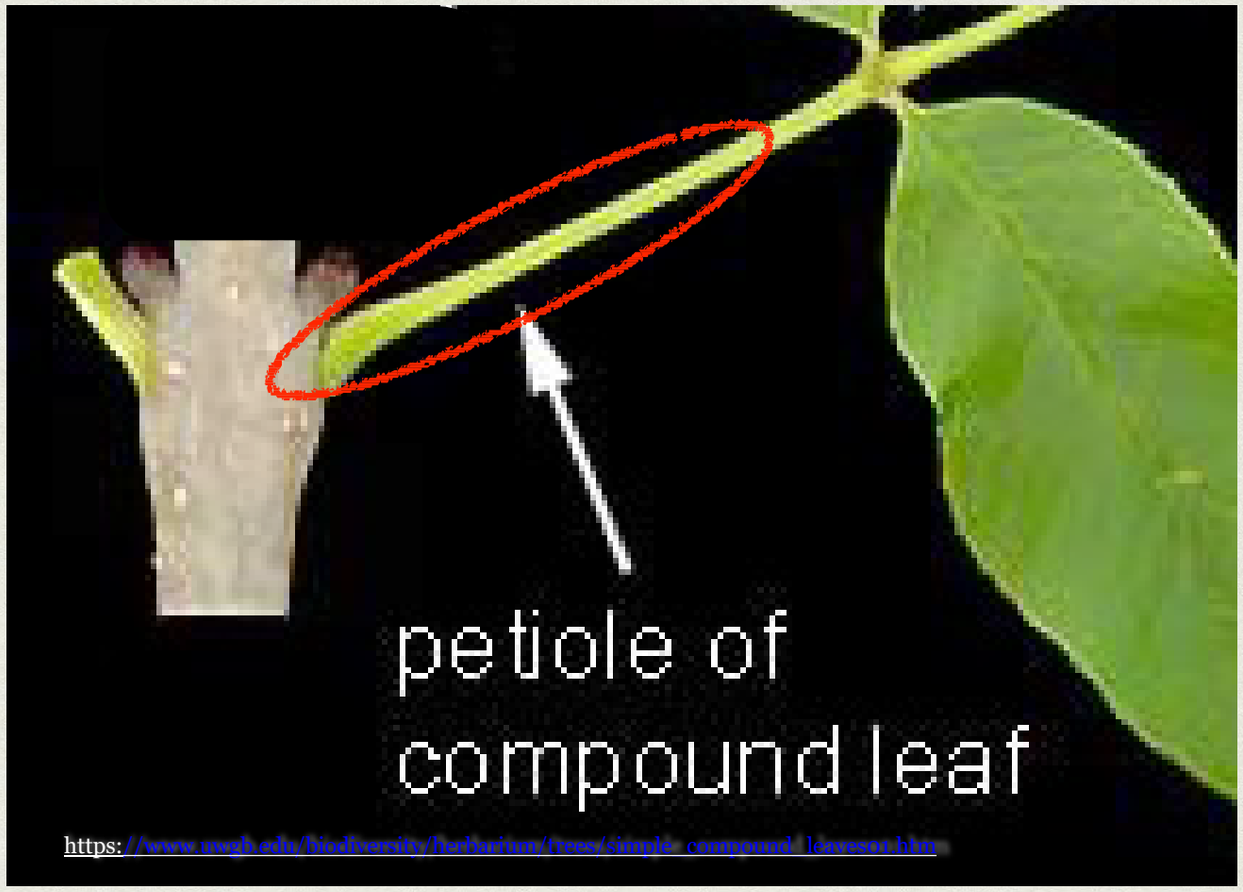
Photos by Dee Shea Himes

FLOWER STEMS…



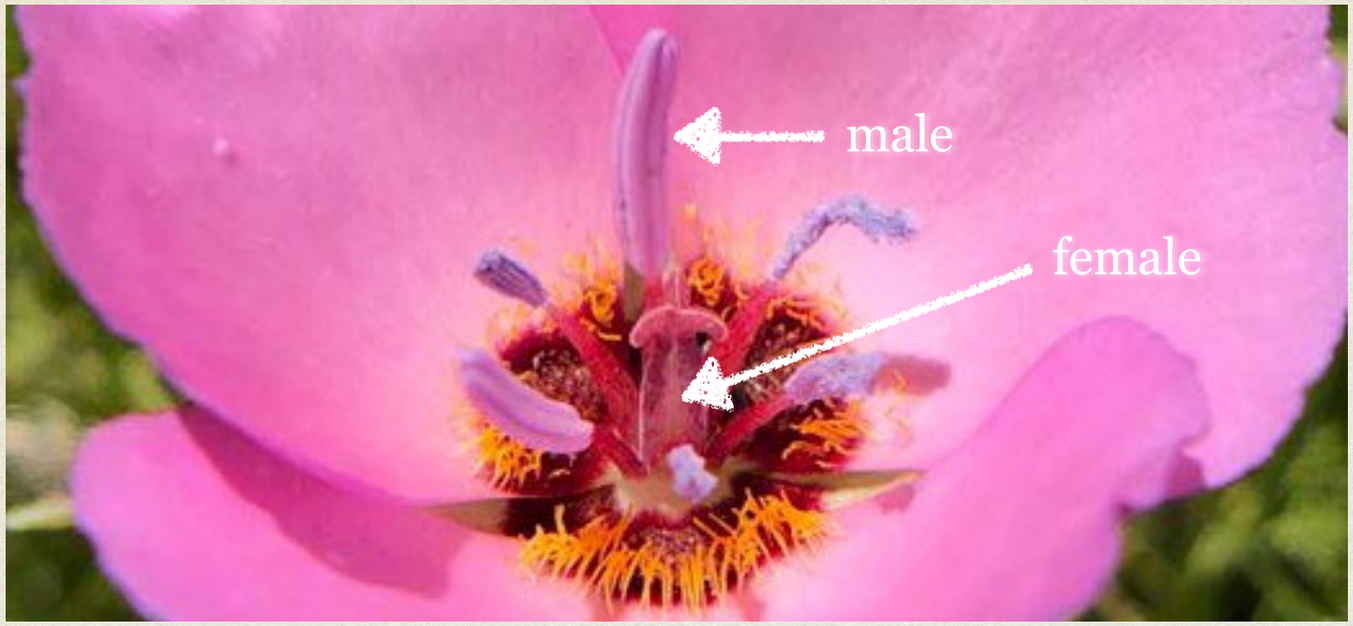
https://qph.fs.quoracdn.net/main-qimg-9e947a996c65c954aa0b2b8e8fc4e8b9-lq

Don’t forget
leaf attachment is…
Petiole



https://www.uwgb.edu/biodiversity/herbarium/trees/simple_compound_leaveson.htm

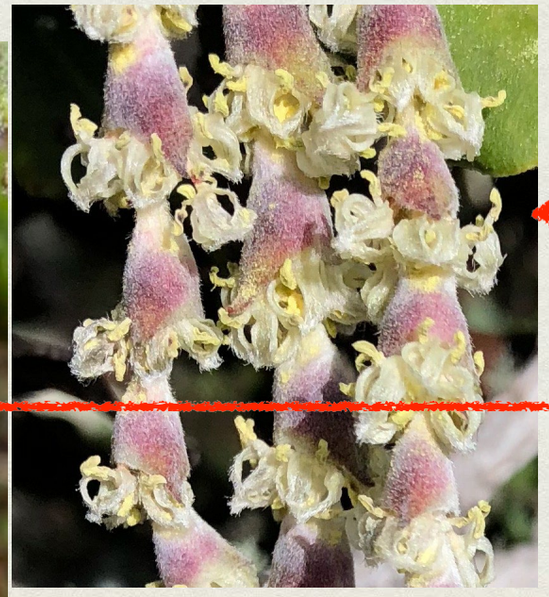
PERFECT / IMPERFECT FLOWER
COMPLETE / INCOMPLETE FLOWER



Photos by Dee Shea Himes

- Perfect / Complete flower
  - Having both male and female reproductive parts in a flower.
- Imperfect / Incomplete flower
  - Having either male (staminate) or female (pistillate) flowers.

MONOECIOUS / DIOECIOUS FLOWER

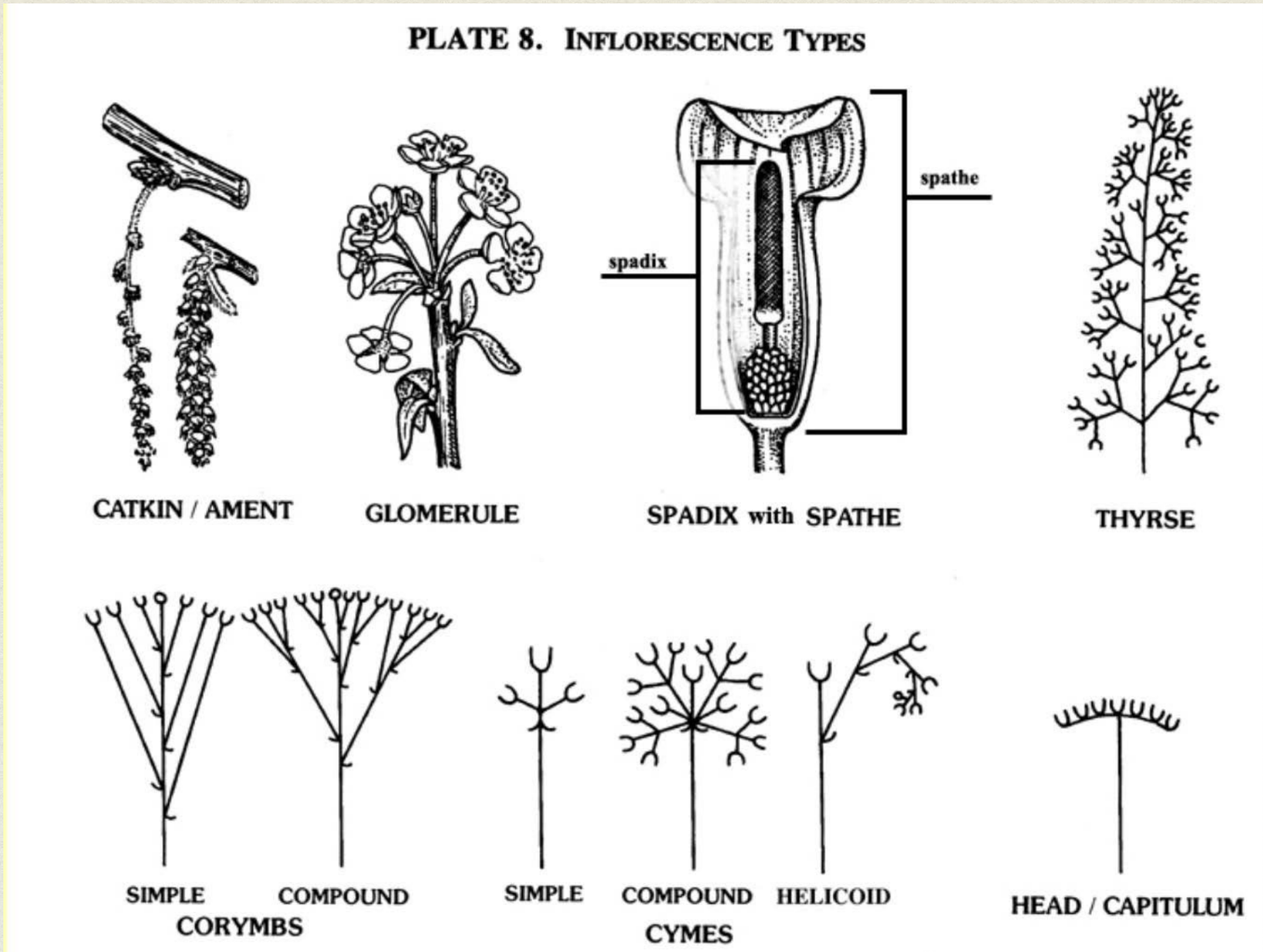


- **Hermaphrodite -** all flowers on the same plant are (complete flowers) bisexual, having both male and female reproductive parts on the same flower.
- **Monoecious -** one house (same plant)
  - Pistillate (male) flowers and staminate (female) flowers on same plant
- **Dioecious -** two houses (two plants)
  - Pistillate plant having only male flowers
  - Staminate plant having only female flowers

Photos by Dee Shea Himes

INFLORESCENCE TYPES…

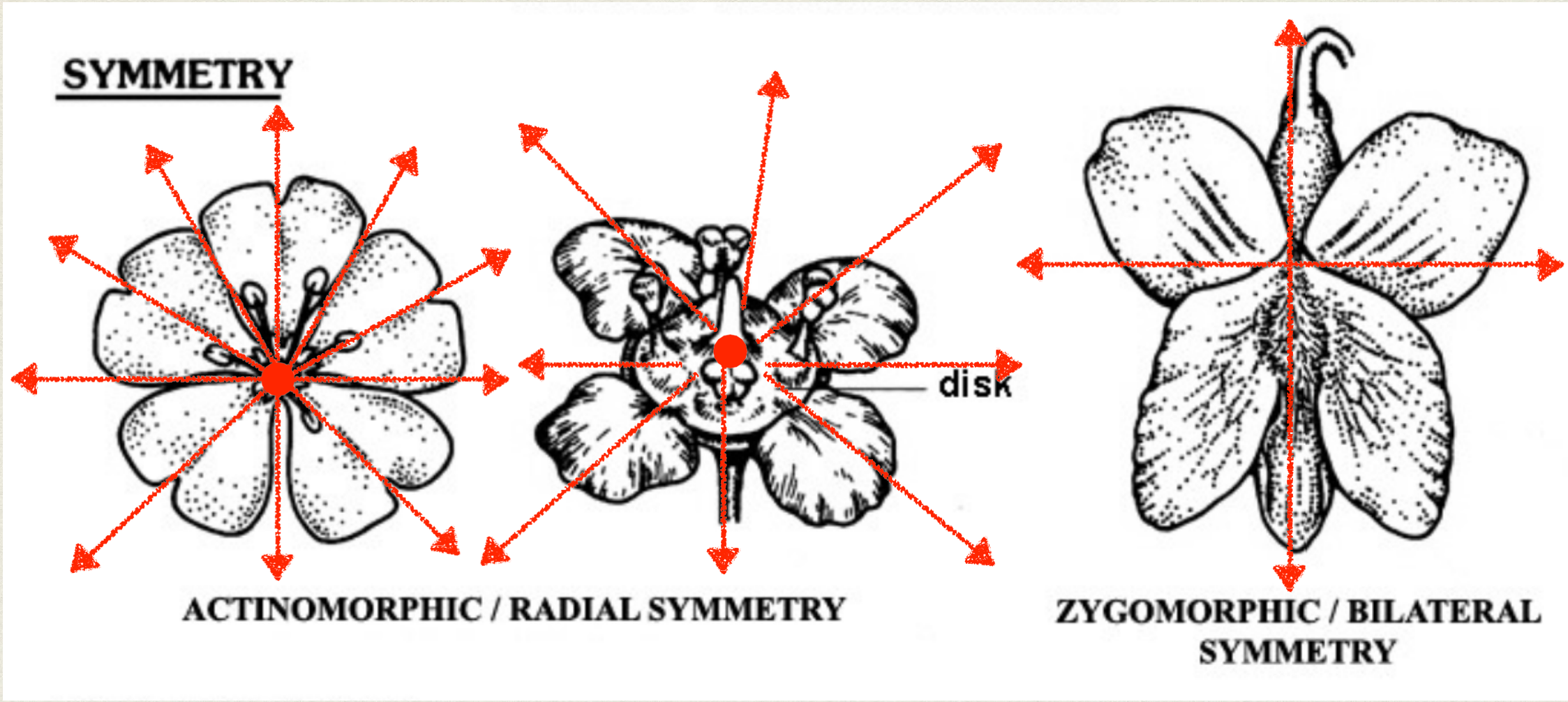
https://vplants.org/portal/plants/glossary/plate08.php



modified from Swink, F. and G. Willhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

FLOWER SYMMETRY

https://vplants.org/portal/plants/glossary/plate09.php

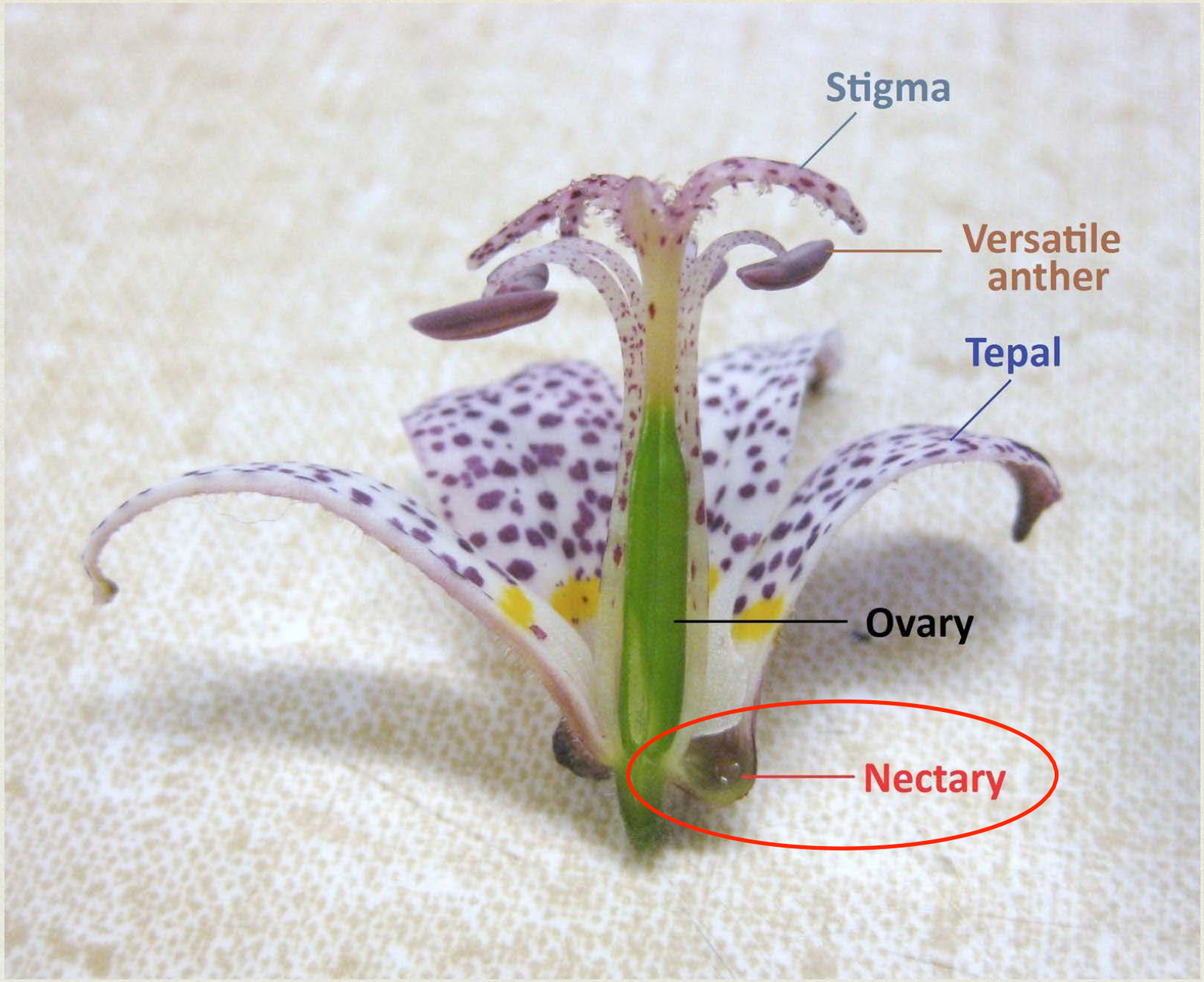


modified from Swink, F. and G. Willhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

f

LOCATION OF NECTARY

- Nectaries are glands that produce nectar to attract pollinators.
- Nectar guides are markings, lines, or patterns that guides pollinators to the nectar or to locate “landing pads”.
- Located inside base of flowers or various parts to make pollinator rub against anthers to pick up and distribute pollen to stamens.
- The reward for the hard work of pollination.



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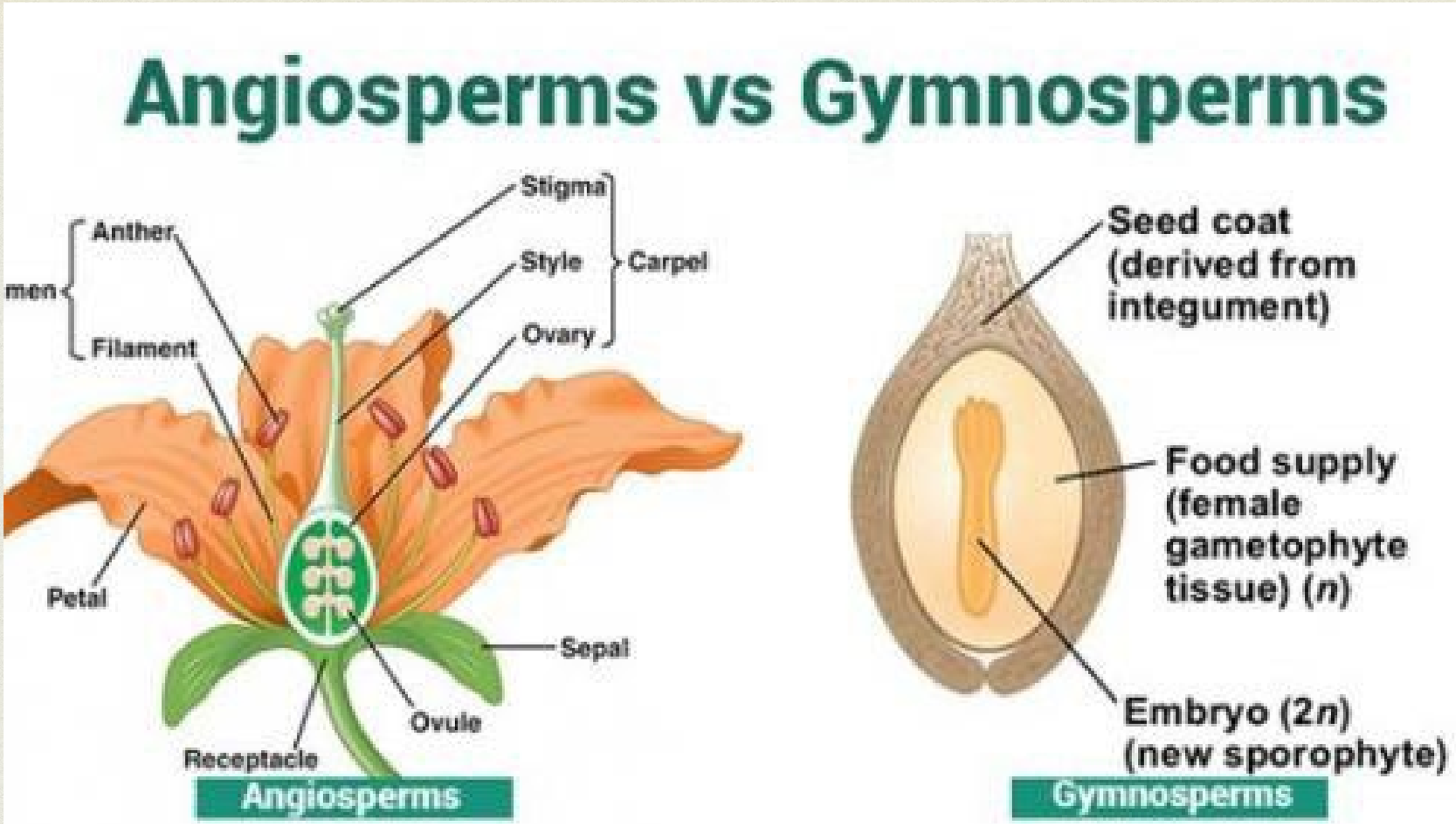
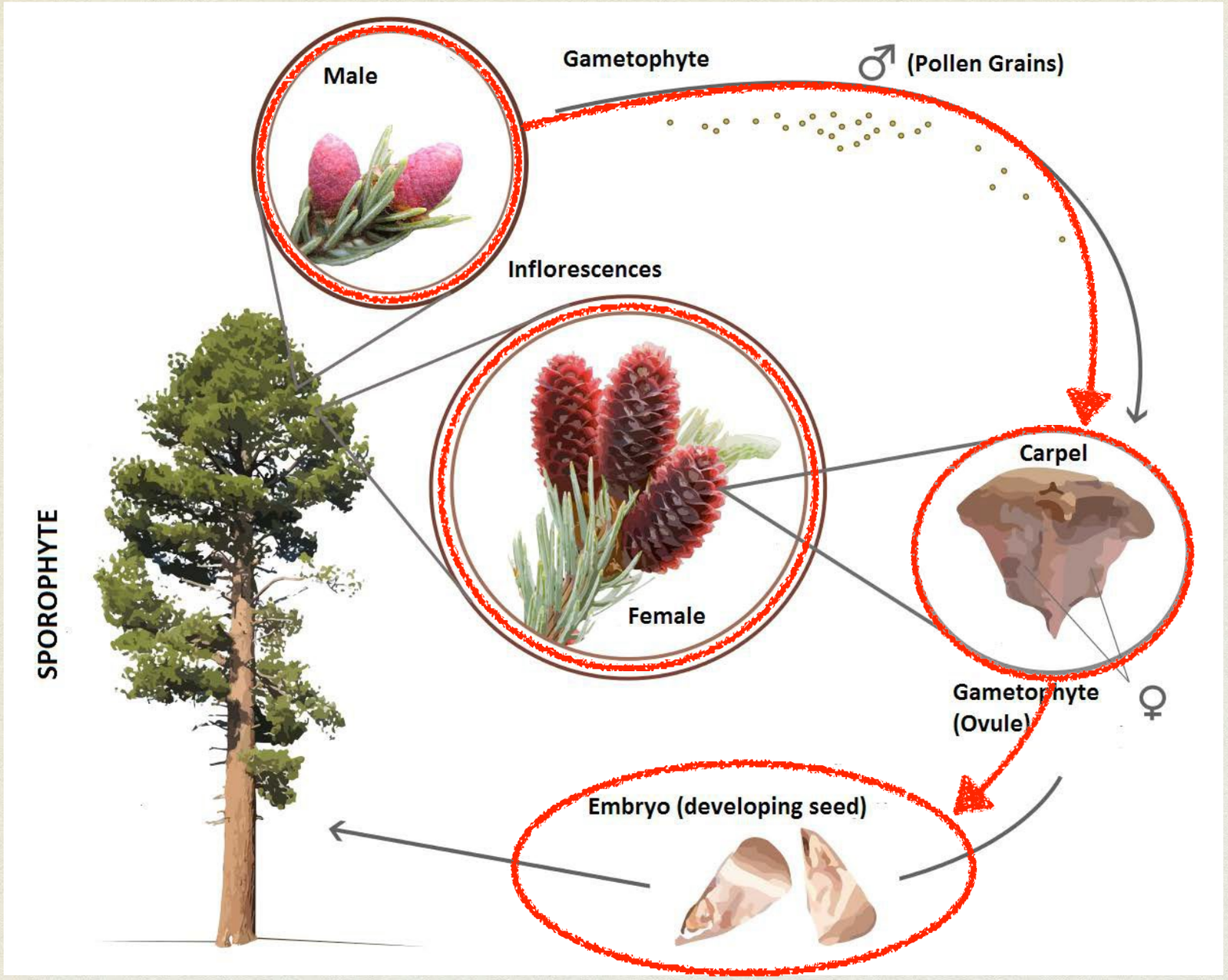
FLOWER PARTS:
ANGIOSPERMS VS GYMNOSPERMS



https://media.proprofs.com/images/QM/user_images/1883405/1504863690.jpg

FLOWER PARTS: GYMNOSPERM - CONIFERS



https://commons.wikimedia.org/wiki/File%3AGymnosperm_life_cycle_(en).png

MANY TYPES OF CONES

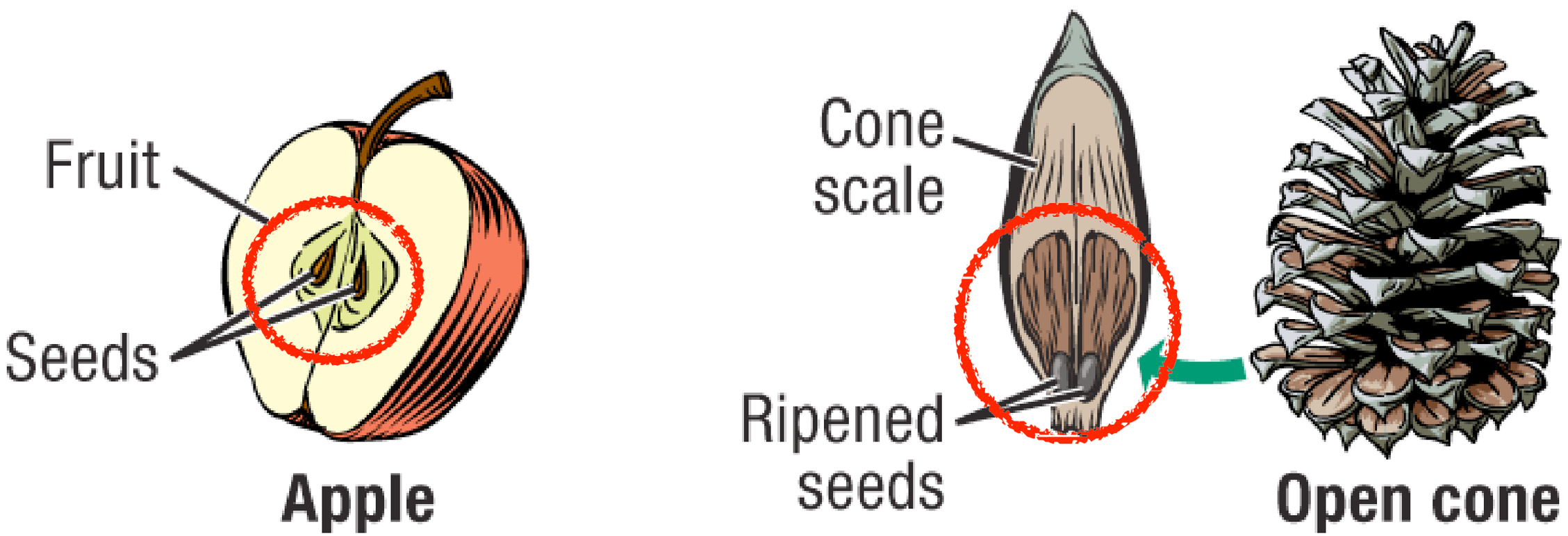
Photo by Dee Shea Himes

SEEDS: ANGIOSPERMS VS GYMNOSPERMS

ANGIOSPERM SEEDS AND FRUIT

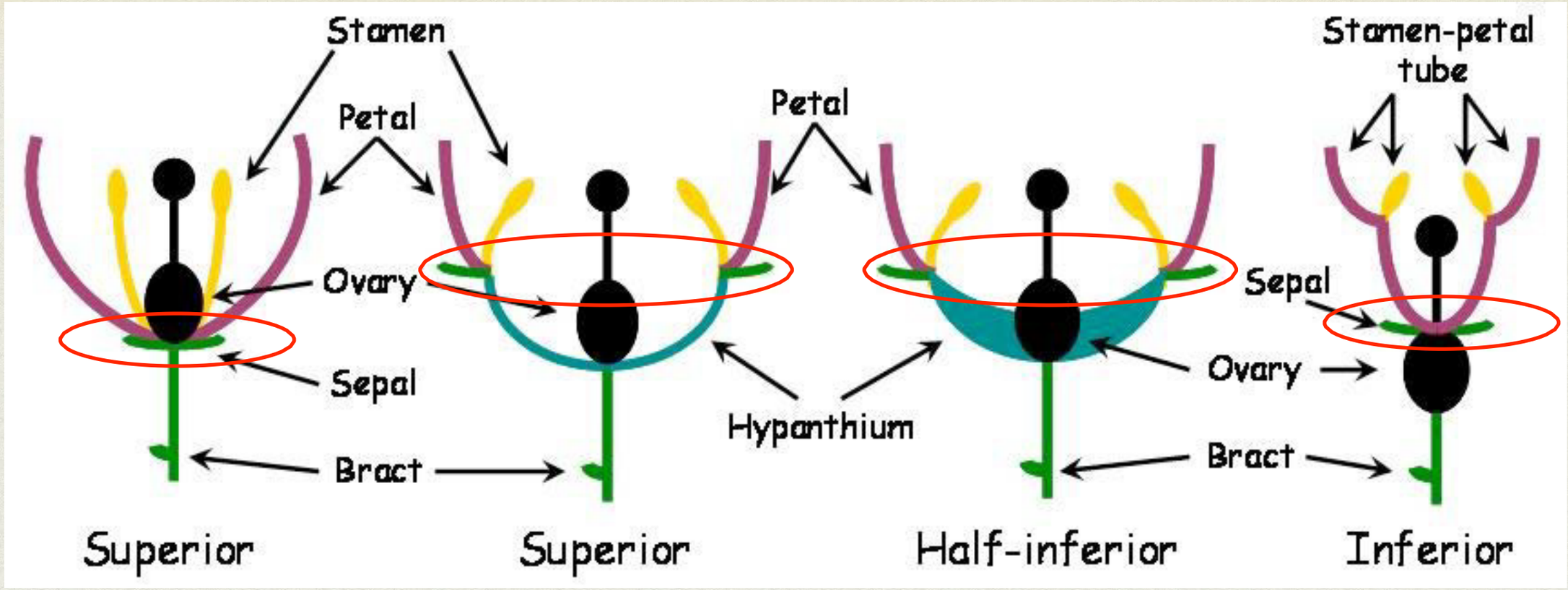
VS.

GYMNOSPERM SEEDS



https://2.bp.blogspot.com/-QRPK8EGe4vs/UOU9uJ608ZI/AAAAAAAABhI/ZKOW1uZVVZw/s1600/Angiosperms%20and%20Gymnospserms%20Differences.gif

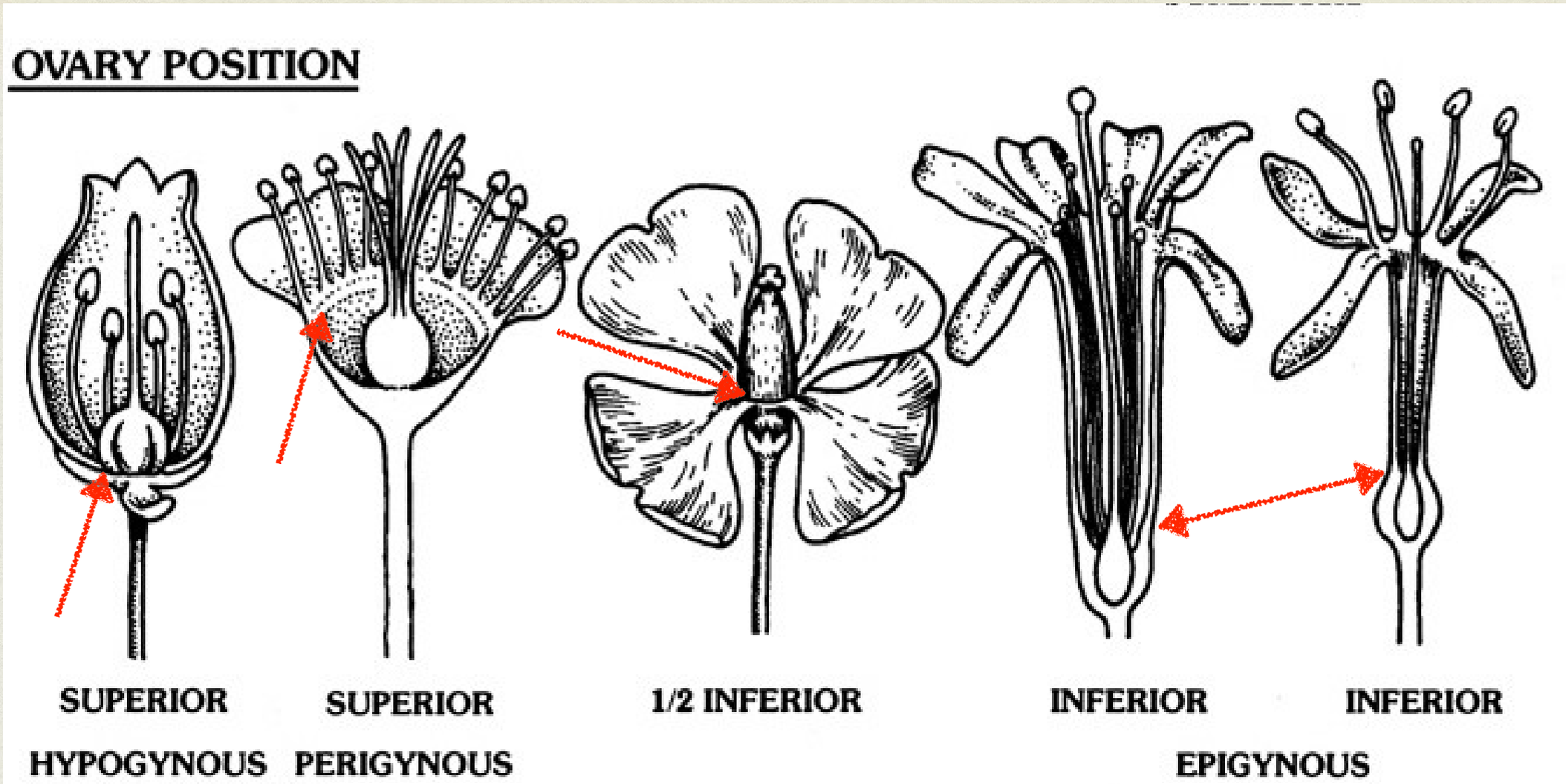
OVARY POSITION
SUPERIOR, INFERIOR, HALF-INFERIOR



http://1.bp.blogspot.com/-eFLRhtM7QXU/TwxXLEzlpAI/AAAAAAAAAHs/yCUtVgnCjTc/s1600/Picture6.jpg

OVARY POSITION

https://vplants.org/portal/plants/glossary/plate09.php



below around above

INFERIOR OVARY

Photo by Dee Shea Himes

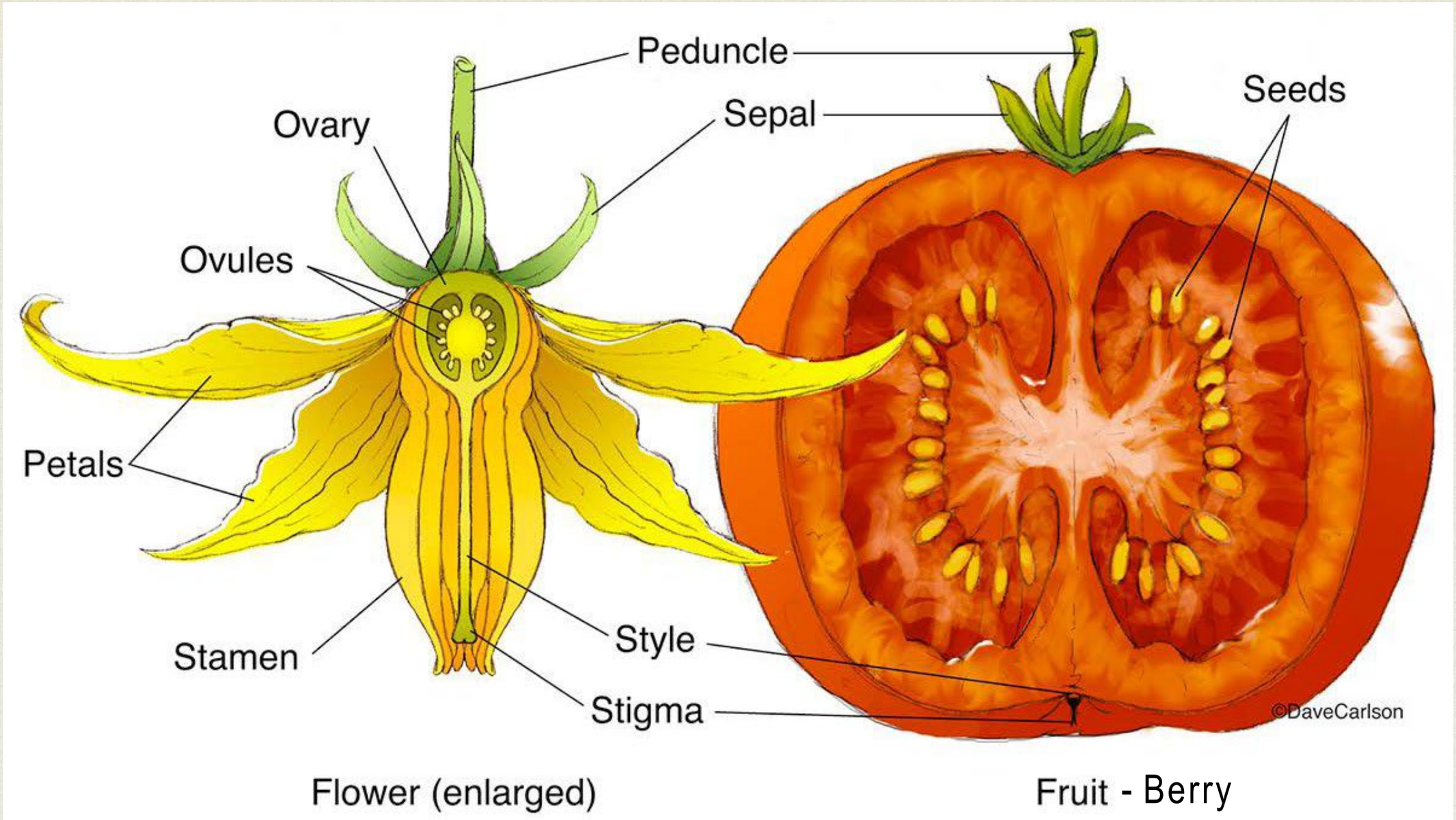
INFERIOR OVARY

Photo by Dee Shea Himes

Sepals,
pistils,
stamens
are above the ovary

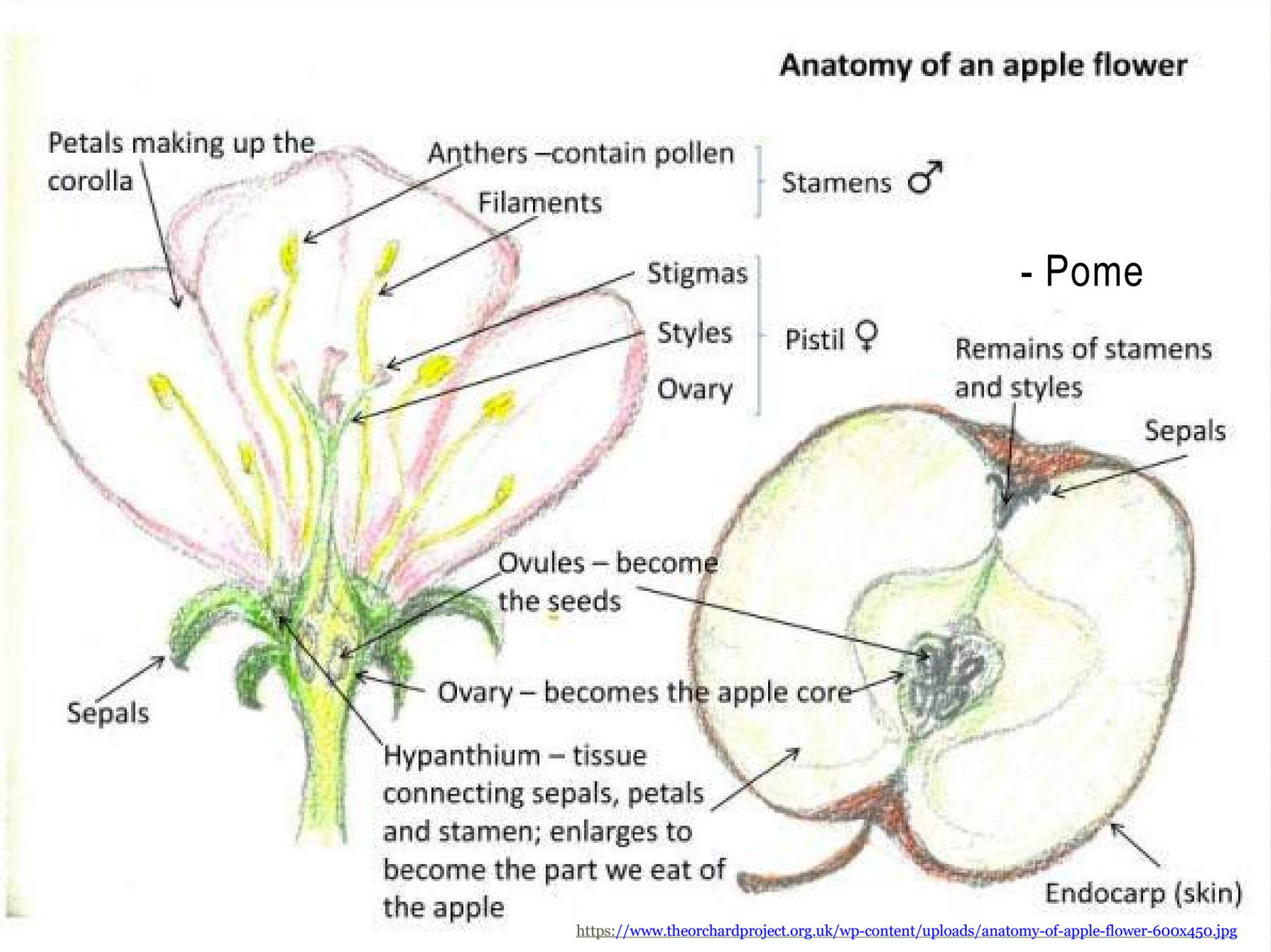
ovary that is
enclosed by the
hypanthium

FLOWER TO FRUIT
SUPERIOR OVARY



https://www.carlsonstockart.com/images/xl/Tomato-Flower-Fruit-Anatomy.jpg

FLOWER TO FRUIT

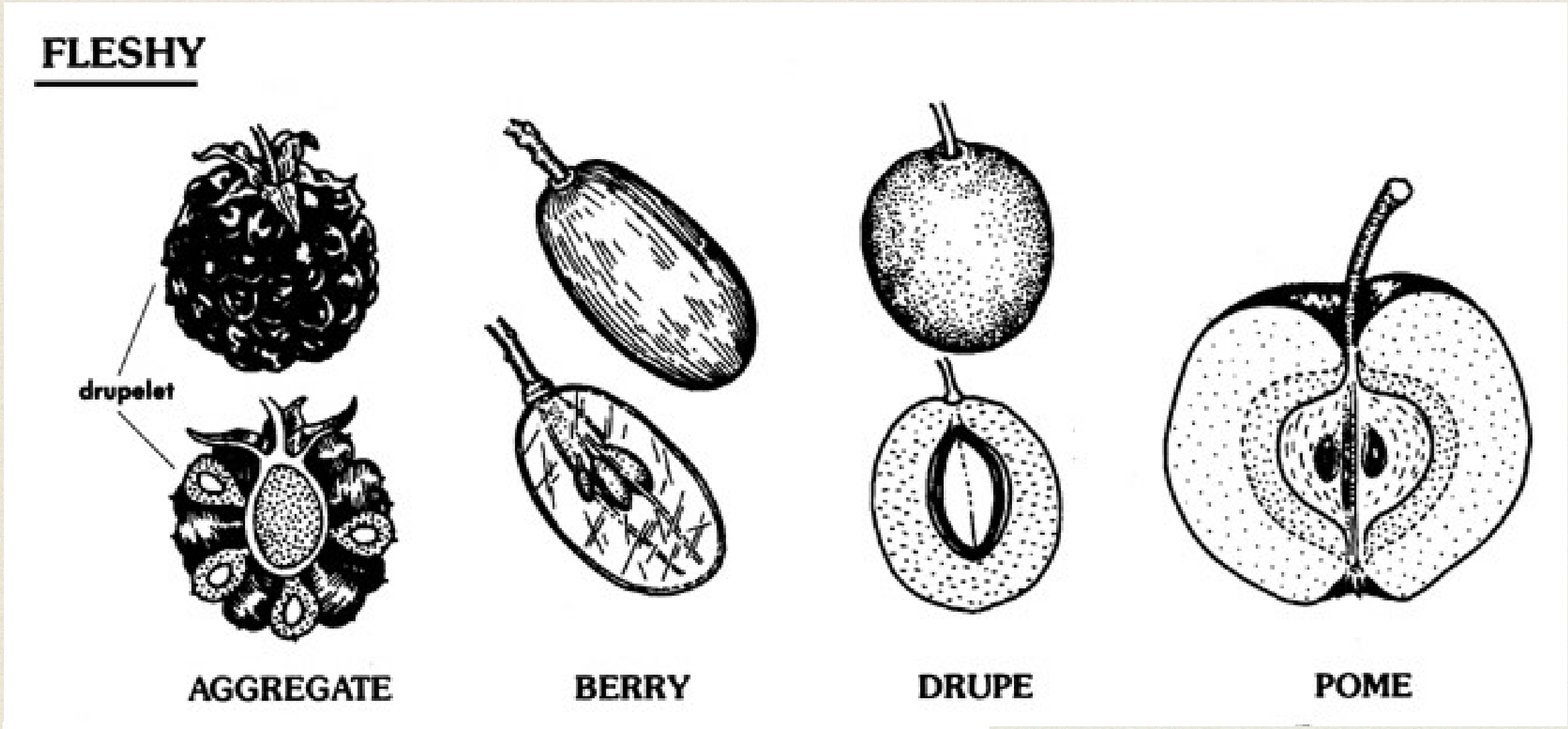


- Pome

https://www.theorchardproject.org.uk/wp-content/uploads/anatomy-of-apple-flower-600x450.jpg

Basic Fruits and Seeds, fleshy

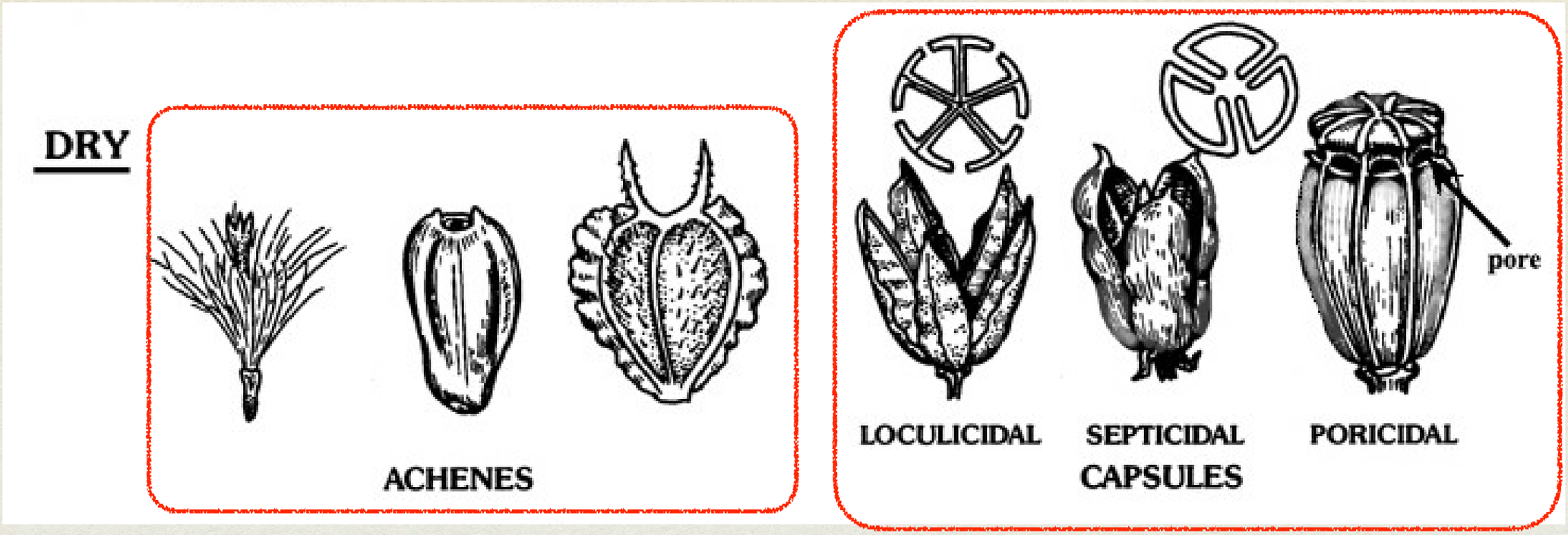
https://vplants.org/portal/plants/glossary/plate11.php



modified from Swink, F. and G. Willhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

Basic Fruits and Seeds, dry

https://vplants.org/portal/plants/glossary/plate11.php



modified from Swink, F. and G. Willhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

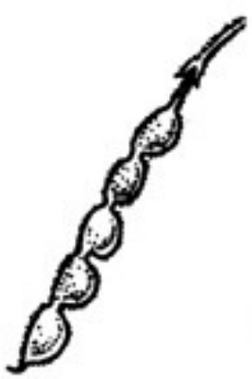
Basic Fruits and Seeds, dry

https://vplants.org/portal/plants/glossary/plate11.php

CIRCUMSCISSILE

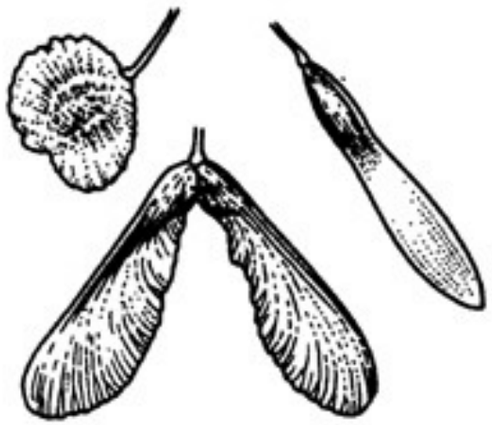
FOLLICLE

LEGUME



LOMENT

ACORN



SAMARAS

SCHIZOCARP

SILICLE

SILIQUE

modified from Swink, F. and G. Willhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

SCREWBEAN MESQUITE

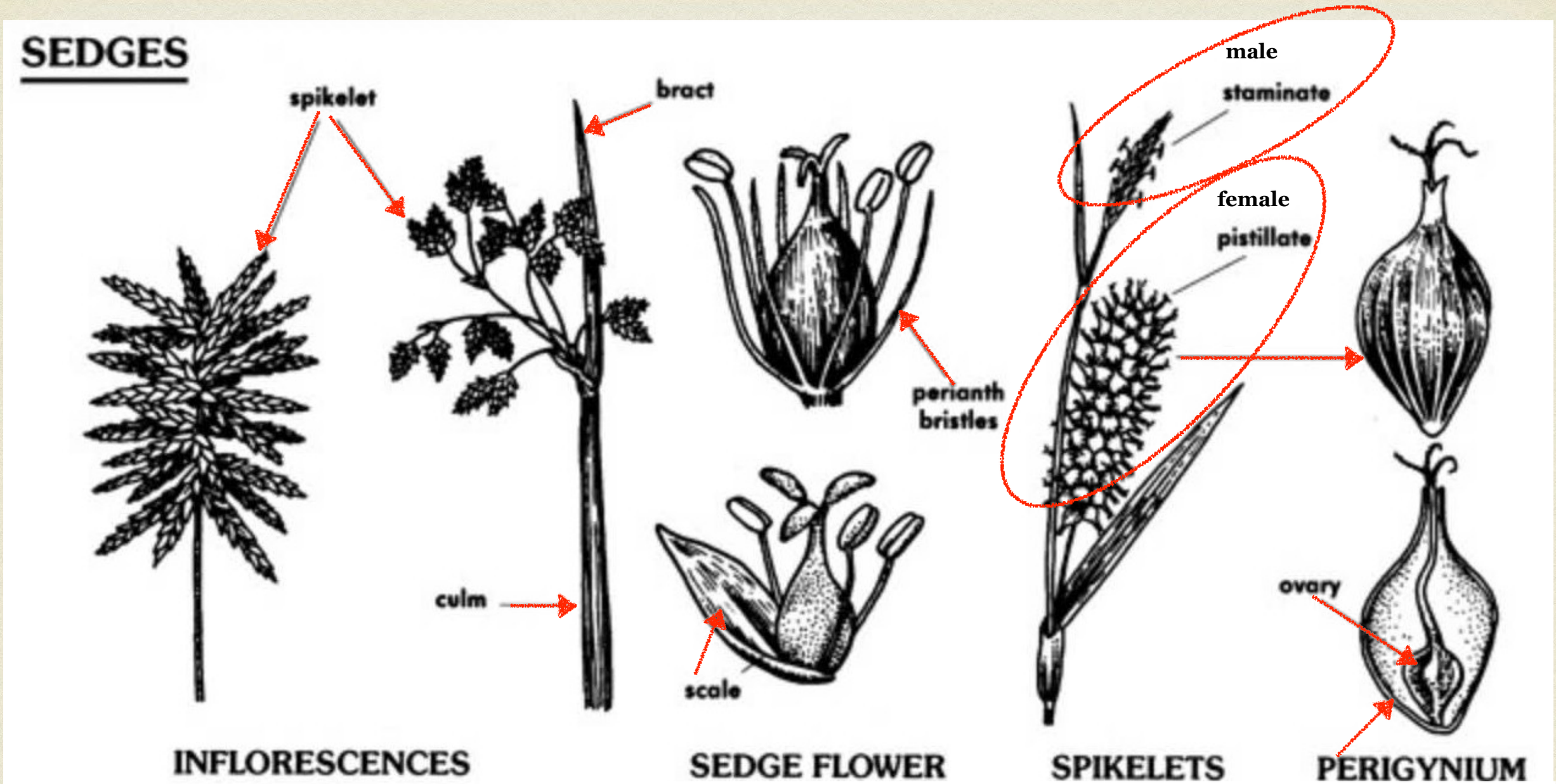
Prosopis pubescens

tightly coiled

Photos by Dee Shea Himes

SEDGES

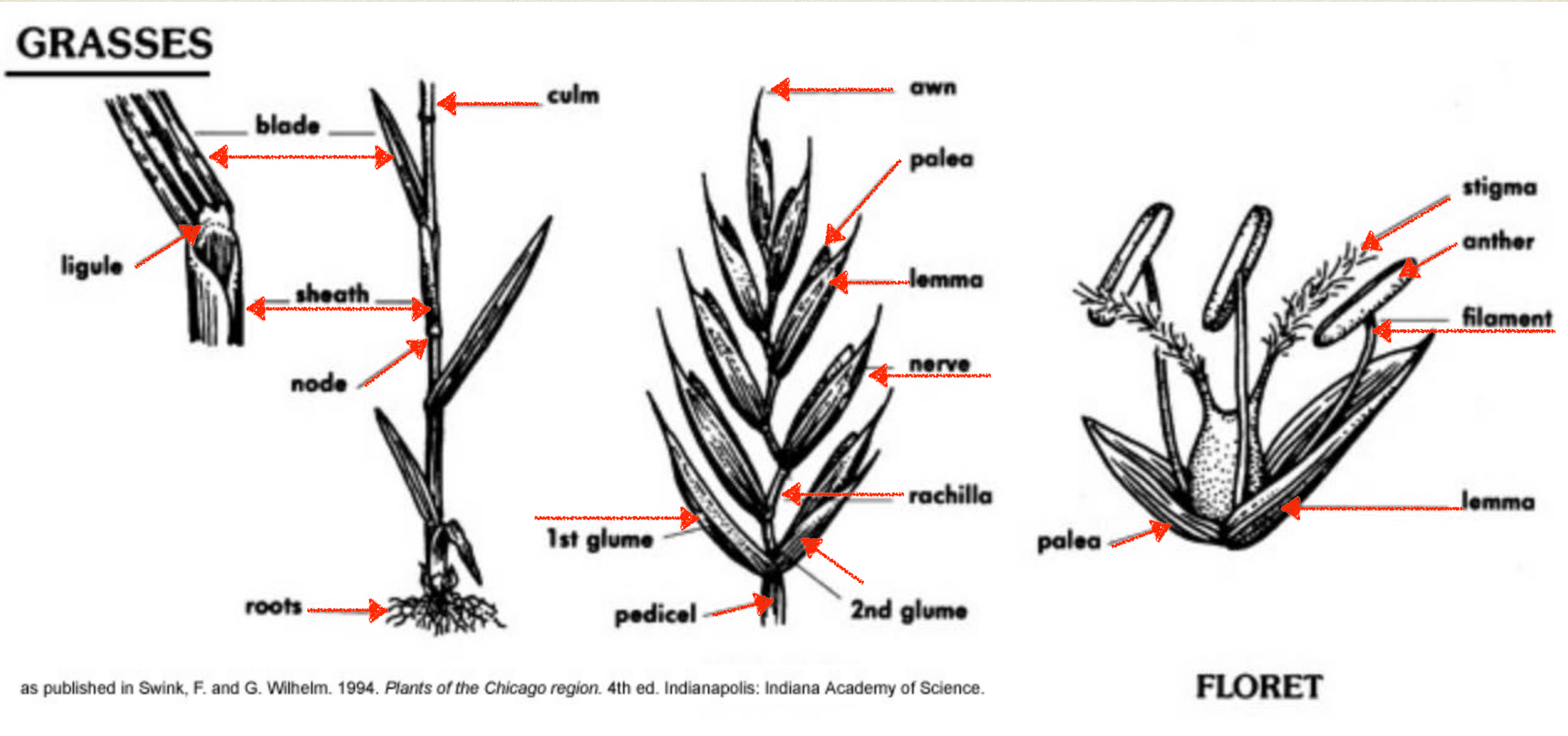
https://vplants.org/portal/plants/glossary/plate12.php



as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region.* 4th ed. Indianapolis: Indiana Academy of Science.

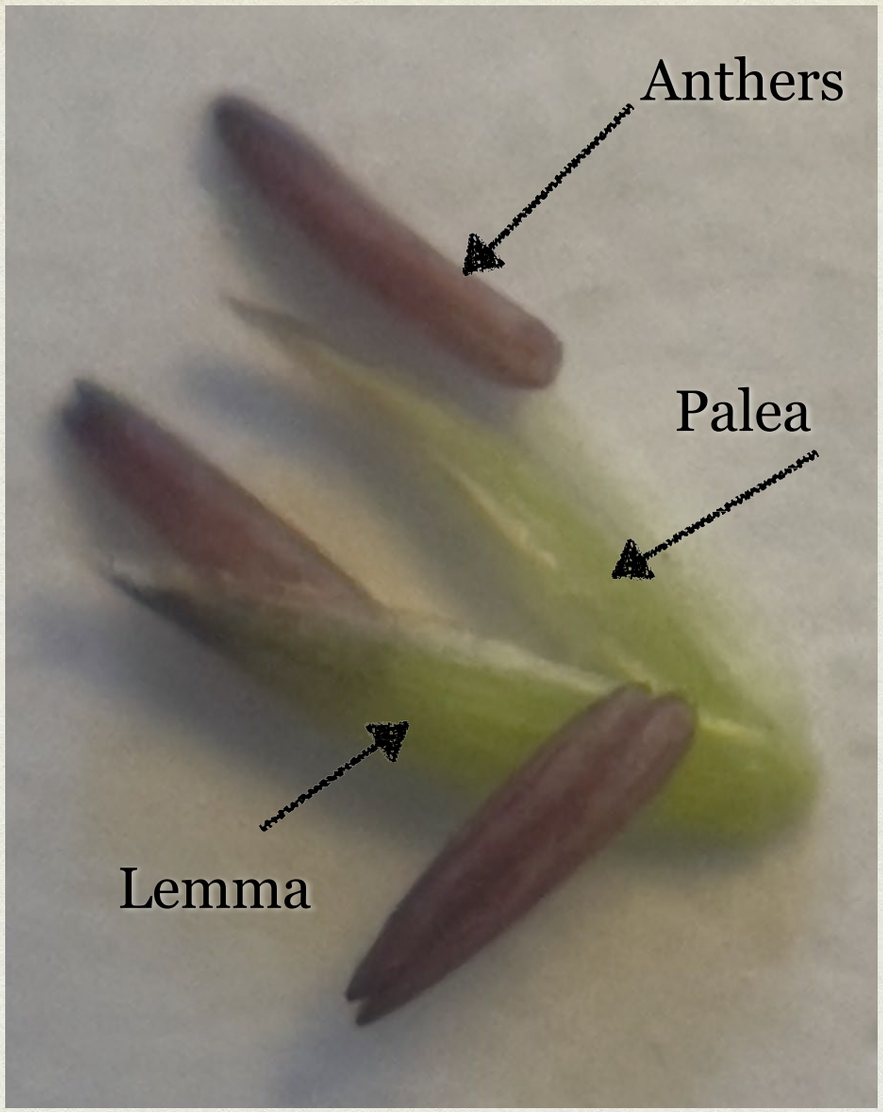
GRASSES

https://vplants.org/portal/plants/glossary/plate12.php



as published in Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago region*. 4th ed. Indianapolis: Indiana Academy of Science.

MELICA SSP.



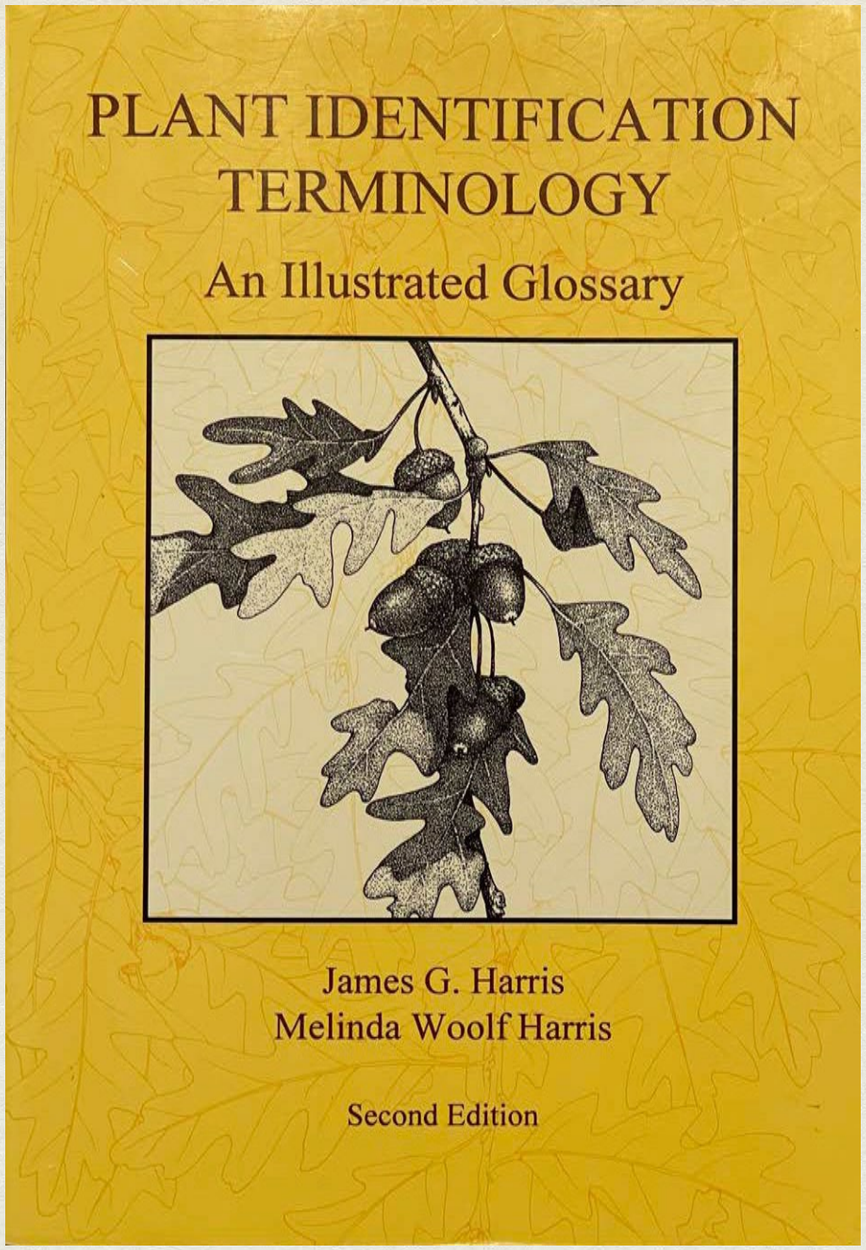
Photos by Dee Shea Himes

VIRTUAL PLANT GLOSSARY

http://vplants.org/portal/plants/glossary/plate_all.php

Plate 1: Stem and Root Types.
Plate 2: Leaf Composition, Parts, and Types.
Plate 3: Leaf Shapes.
Plate 4: Leaf Margins.
Plate 5: Leaf Apices, Venation, and Bases.
Plate 6: Surface Features.
Plate 7: Stem and Leaf Parts, and Variations.
Plate 8: Inflorescence Types.
Plate 9: Floral Morphology.
Plate 10: Corolla Types.
Plate 11: Fruit Types.
Plate 12: Sedges, Grasses, and Composites.

PLANT IDENTIFICATION TERMINOLOGY AN ILLUSTRATED GLOSSARY



PLANT IDENTIFICATION TERMINOLOGY
AN ILLUSTRATED GLOSSARY
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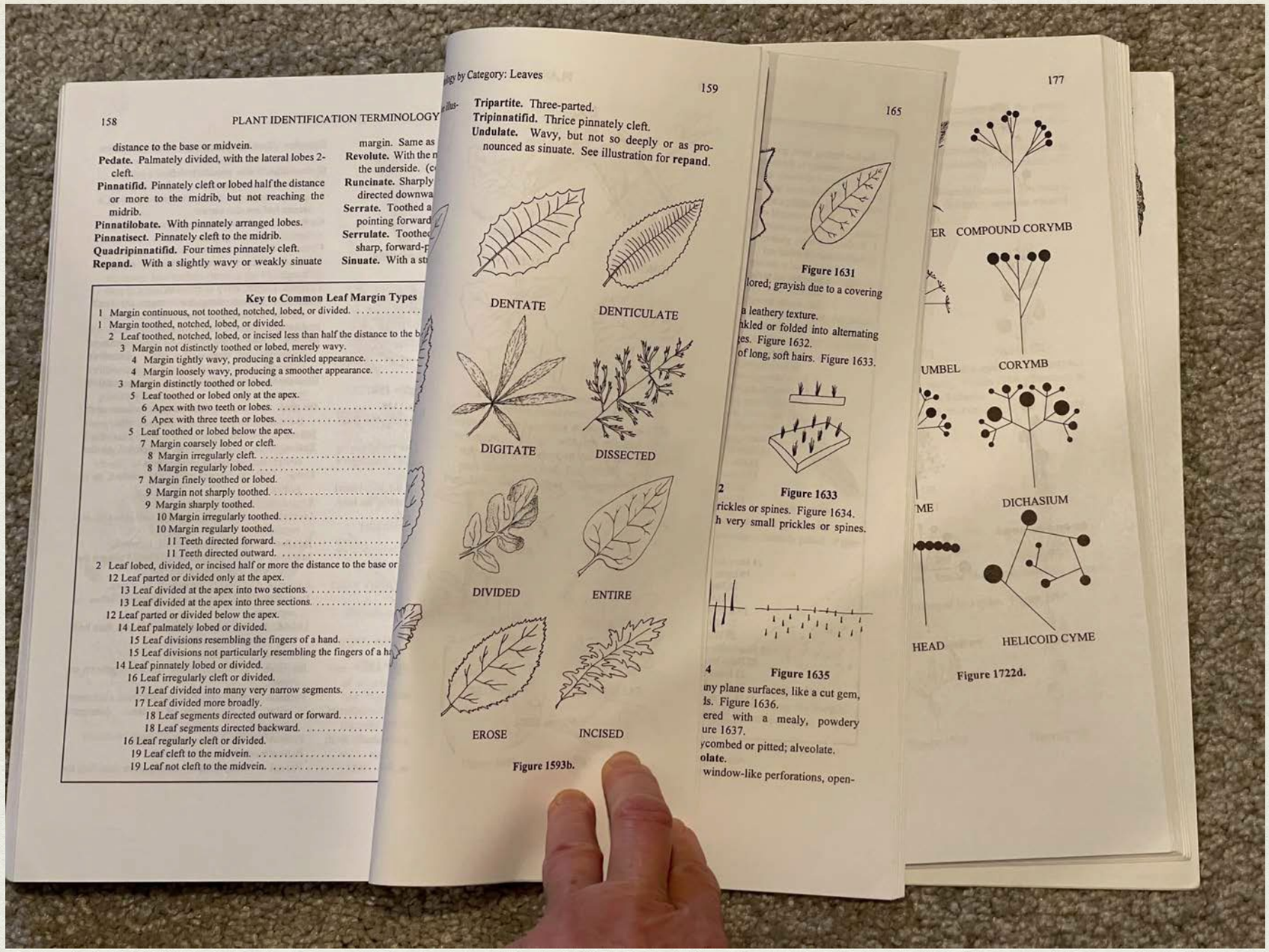
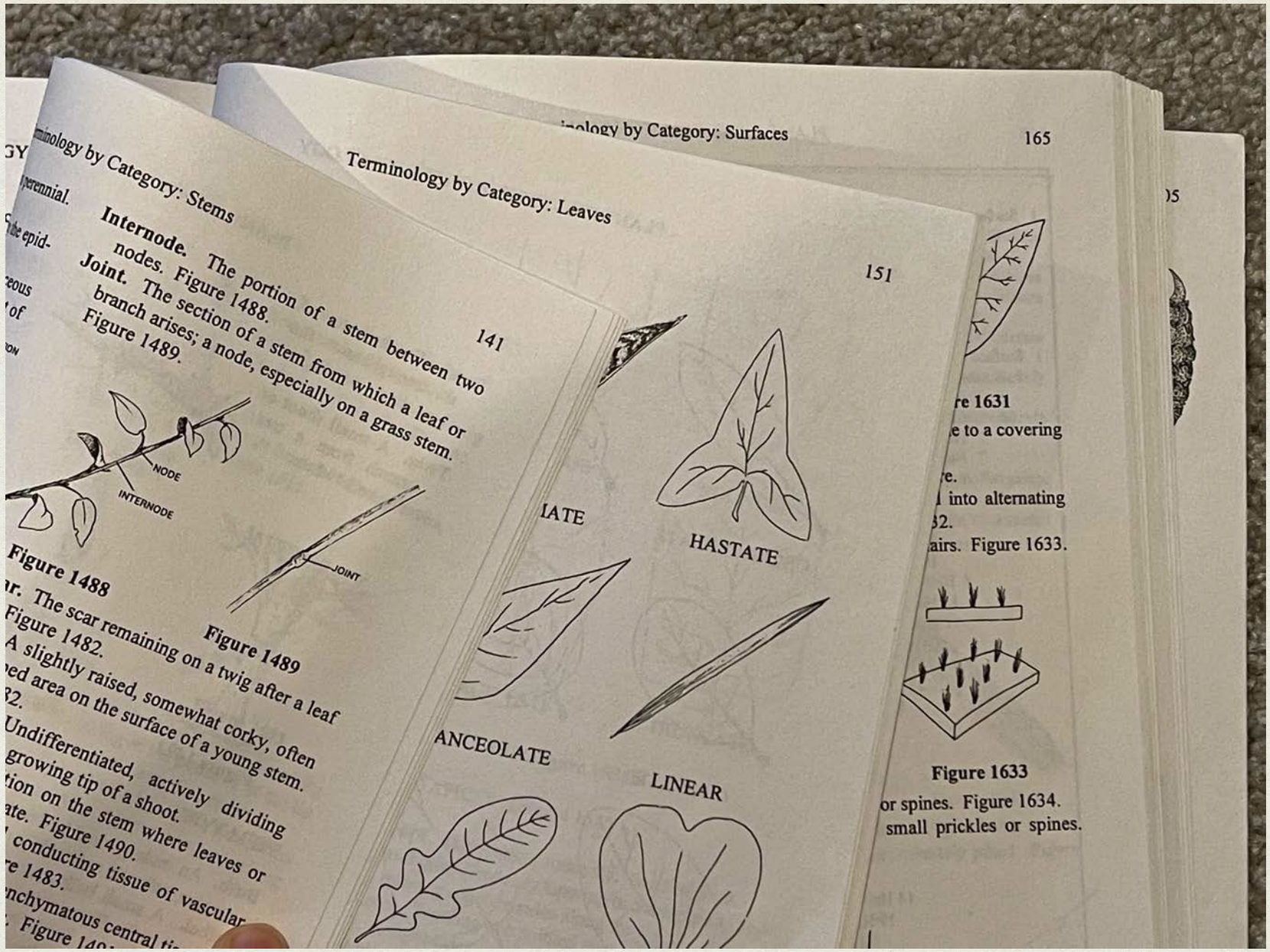


PLANT IDENTIFICATION TERMINOLOGY
AN ILLUSTRATED GLOSSARY



RESOURCES & CITATIONS

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- Primrose drawing, pedicel and peduncle
- https://qph.fs.quoracdn.net/main-qimg-9e947a996c65c954aa0b2b8e8fc4e8b9-lq

- Nectaries
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- https://commons.wikimedia.org/wiki/File%3AGymnosperm_life_cycle_(en).png

- Proprofs.com
- https://media.proprofs.com/images/QM/user_images/1883405/1504863690.jpg

- Angiosperm vs gymnosperm seed and fruit
- https://2.bp.blogspot.com/-QRPK8EGe4vs/UOU9uJ608ZI/AAAAAAAABhI/ZKOW1uZVVZw/s1600/Angiosperms%20and%20Gymnospserms%20Differences.gif

- Ovary positions
- http://1.bp.blogspot.com/-eFLRhtM7QXU/TwxXLEzlpAI/AAAAAAAAAHs/yCUtVgnCjTc/s1600/Picture6.jpg

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CITATIONS

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- Flower to Apple: The Orchard Project, UK
- https://www.theorchardproject.org.uk/wp-content/uploads/anatomy-of-apple-flower-600x450.jpg

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