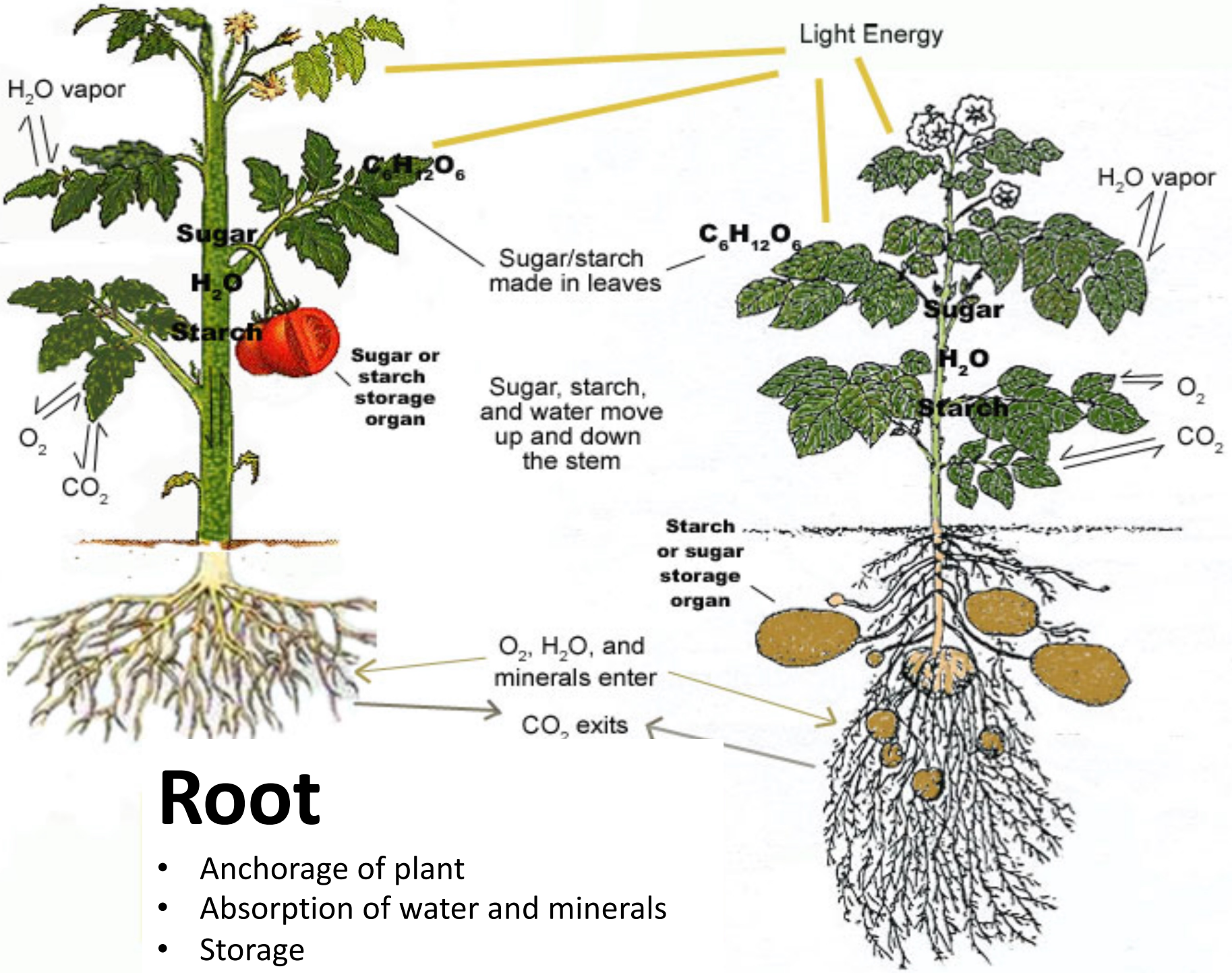
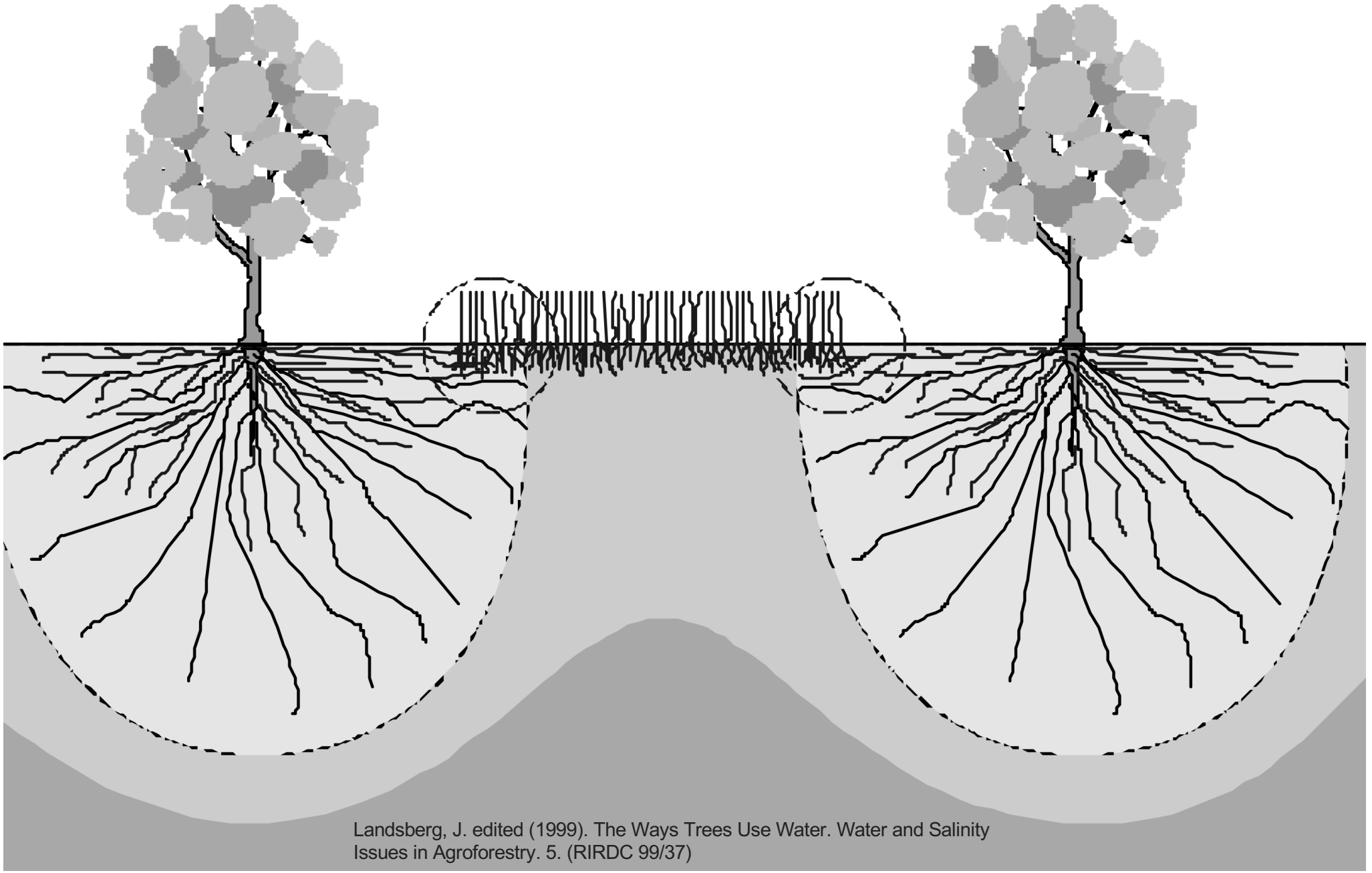
Morphology of Seed Plants



Root

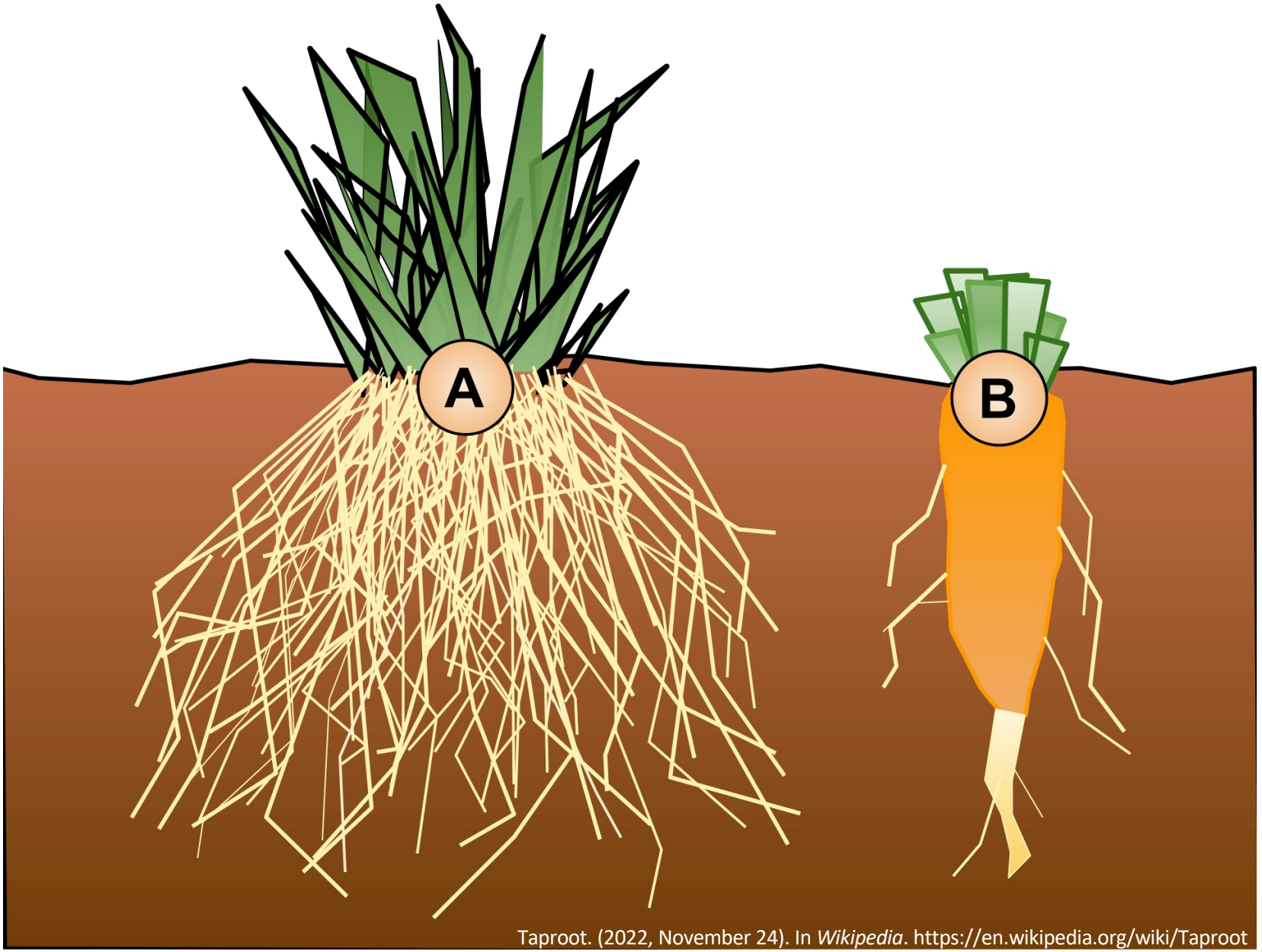
- Anchorage of plant
- Absorption of water and minerals
- Storage

Abou-Hussein, S.D., 2012. *J. Appl. Sci. Res*, *8*, pp.4359-4383.



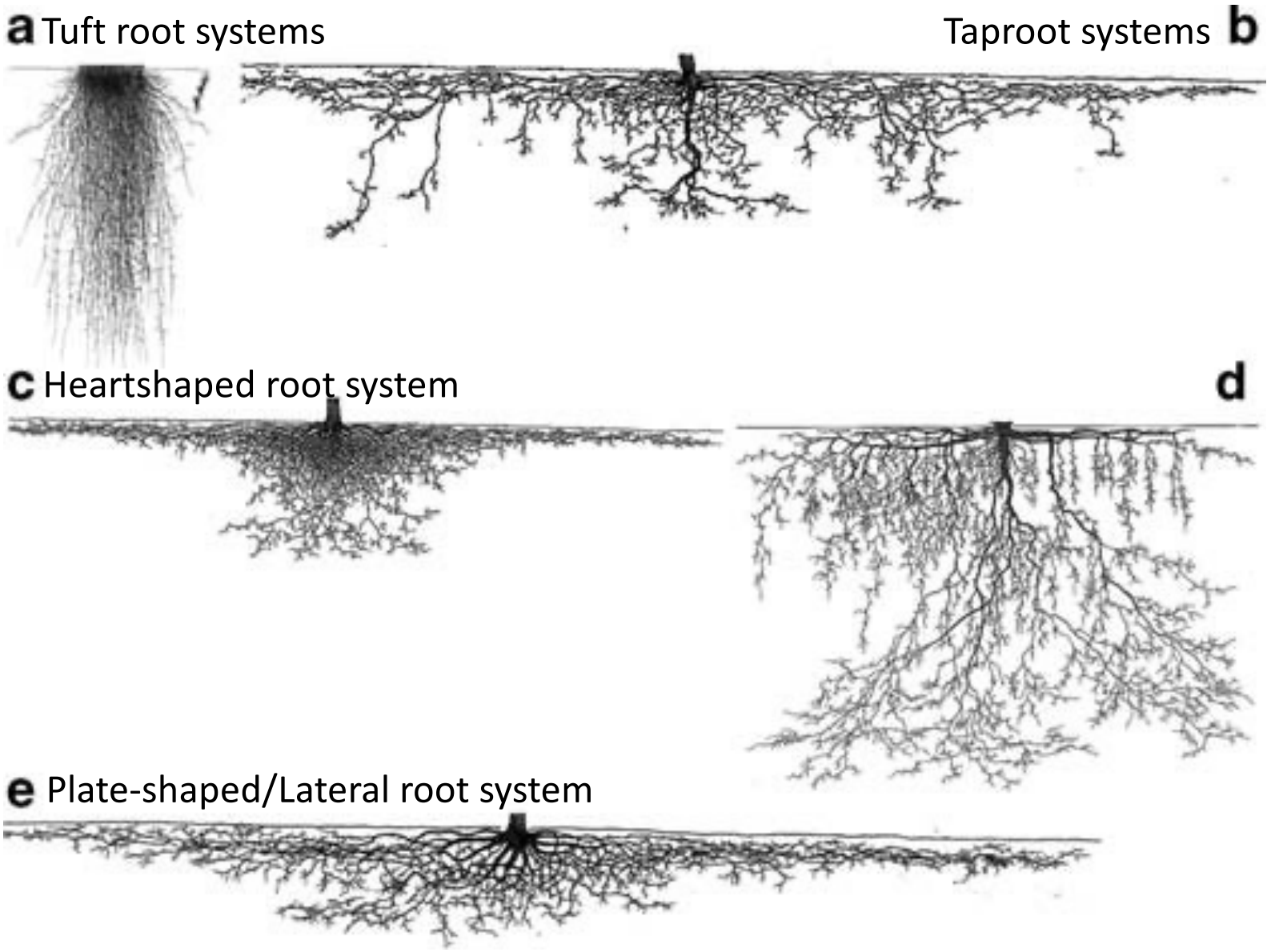
Landsberg, J. edited (1999). The Ways Trees Use Water. Water and Salinity Issues in Agroforestry. 5. (RIRDC 99/37)

Root systems

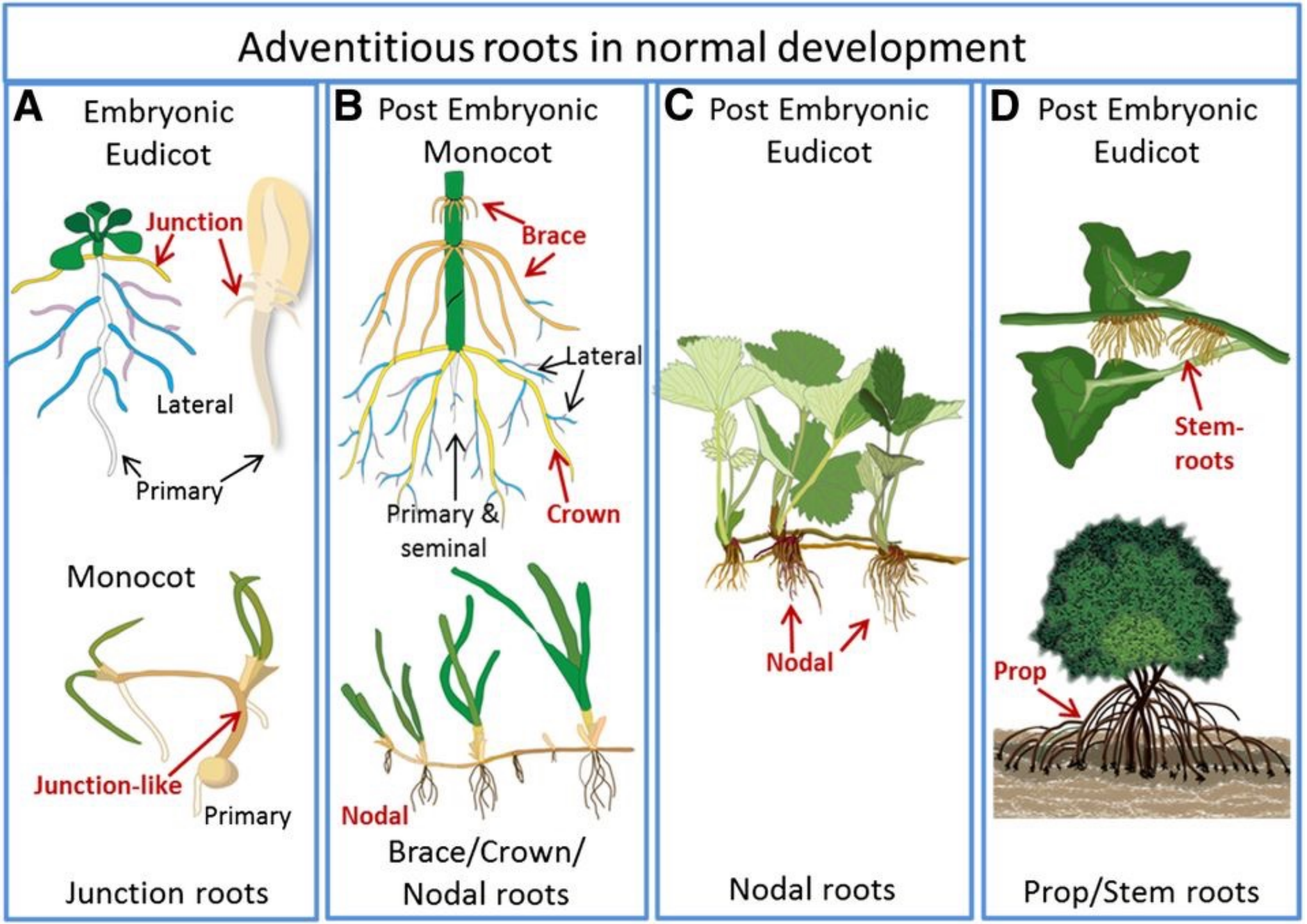


Taproot. (2022, November 24). In *Wikipedia*. https://en.wikipedia.org/wiki/Taproot

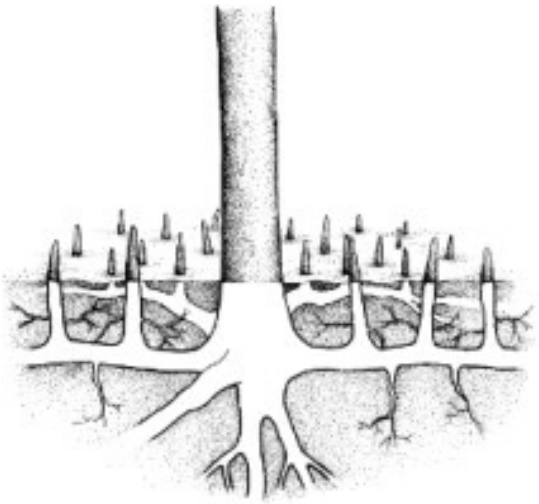
Root systems

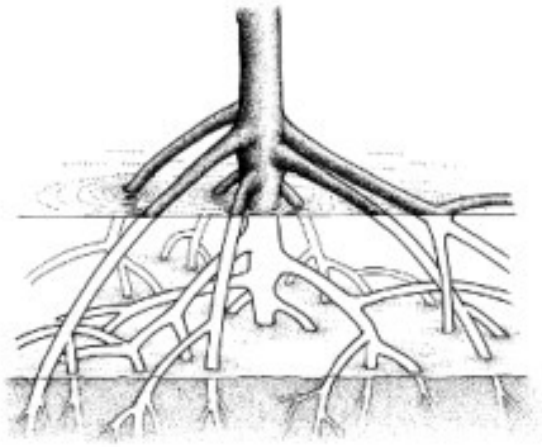


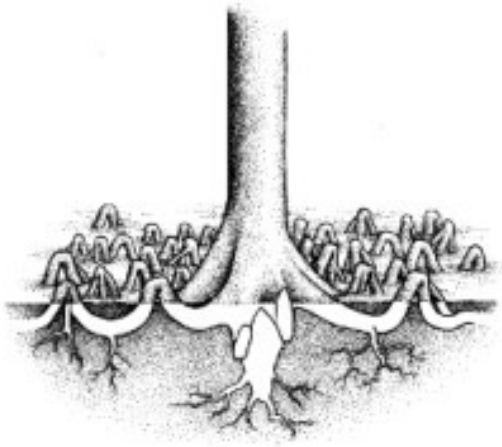
Ghestem, et al. 2011. *Bioscience*, *61*(11), pp.869-879.



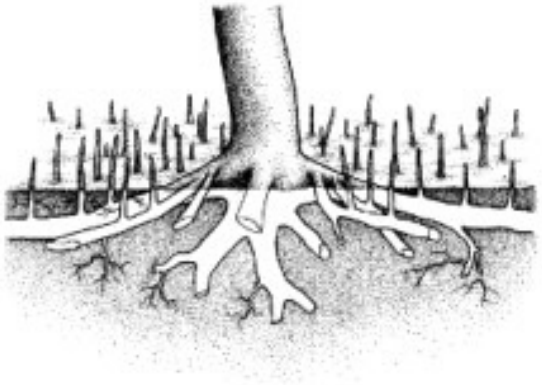
Steffens, B. and Rasmussen, A., 2016. *Plant physiology*, *170*(2), pp.603-617.

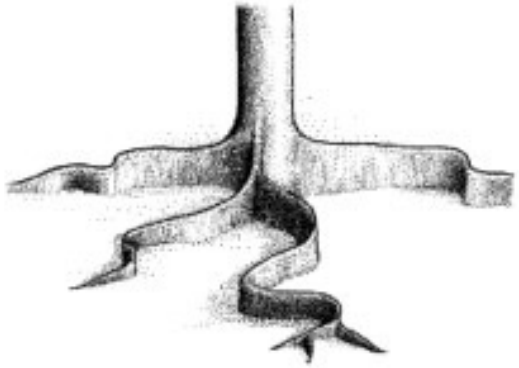


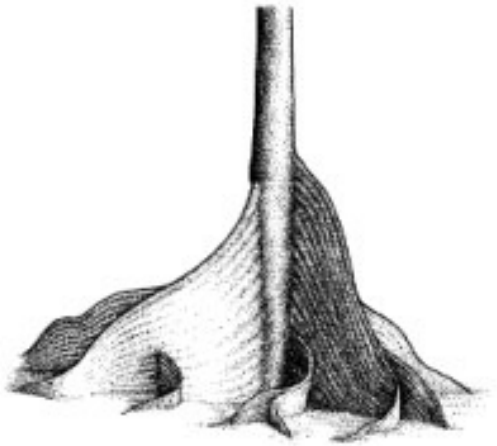




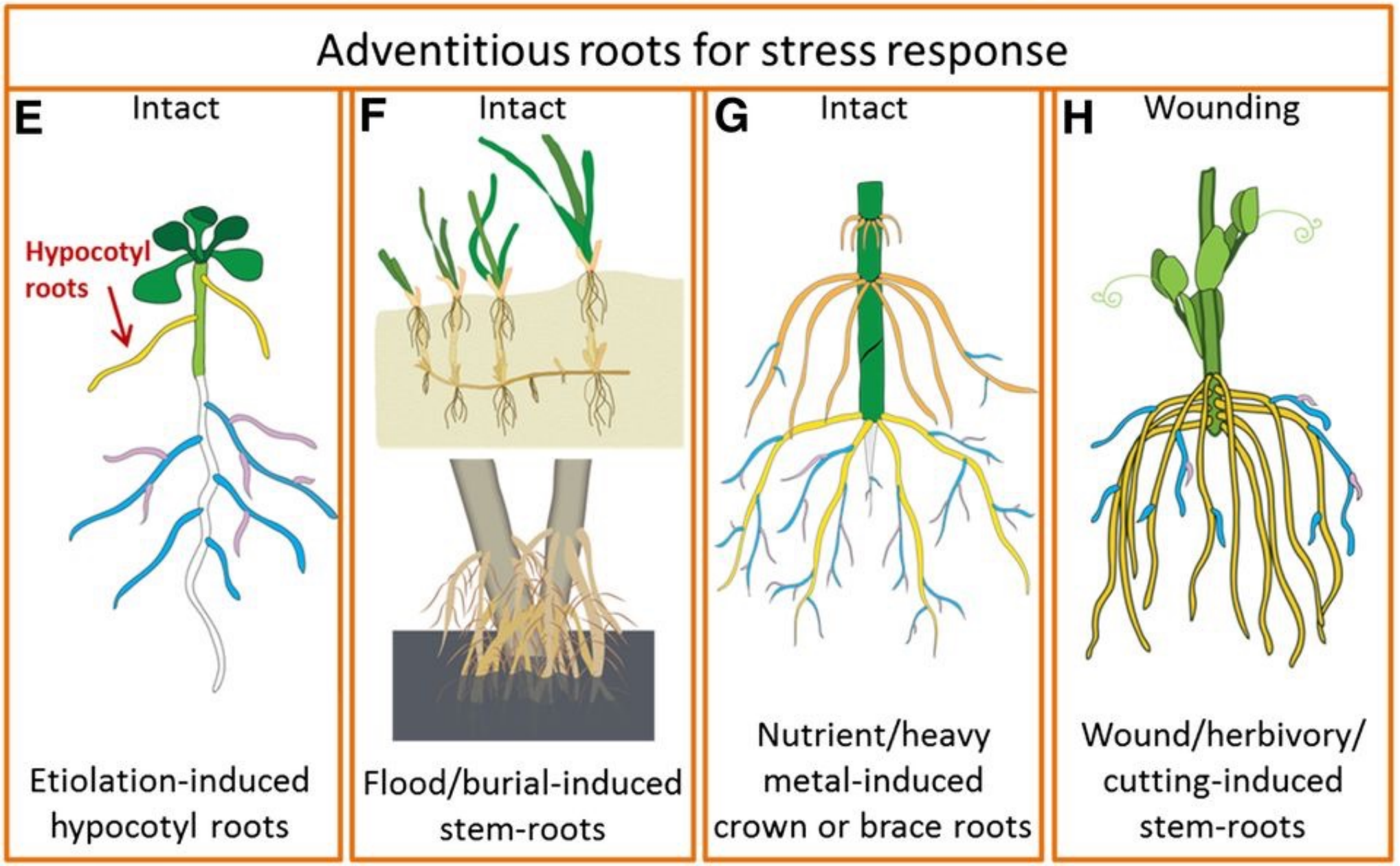
Purnobasuki et al. 2017. *Vegetos*, *30*(2), pp.100-104.



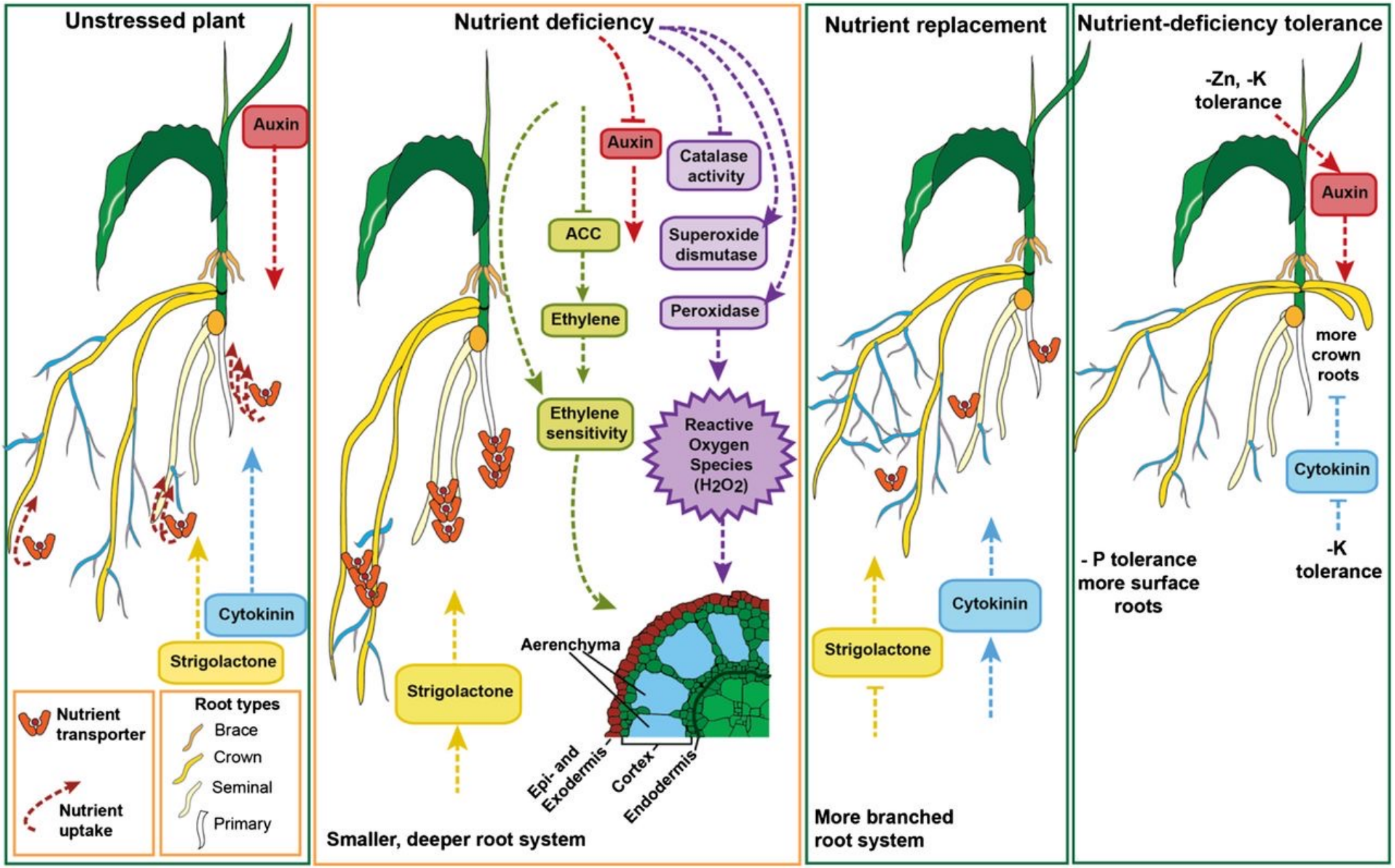




Friedhelm Göltenboth, Kris H. Timotius, Paciencia Po Milan, Josef Margraf edited. 2006. Ecology of Insular Southeast Asia. Elsevier B.V.

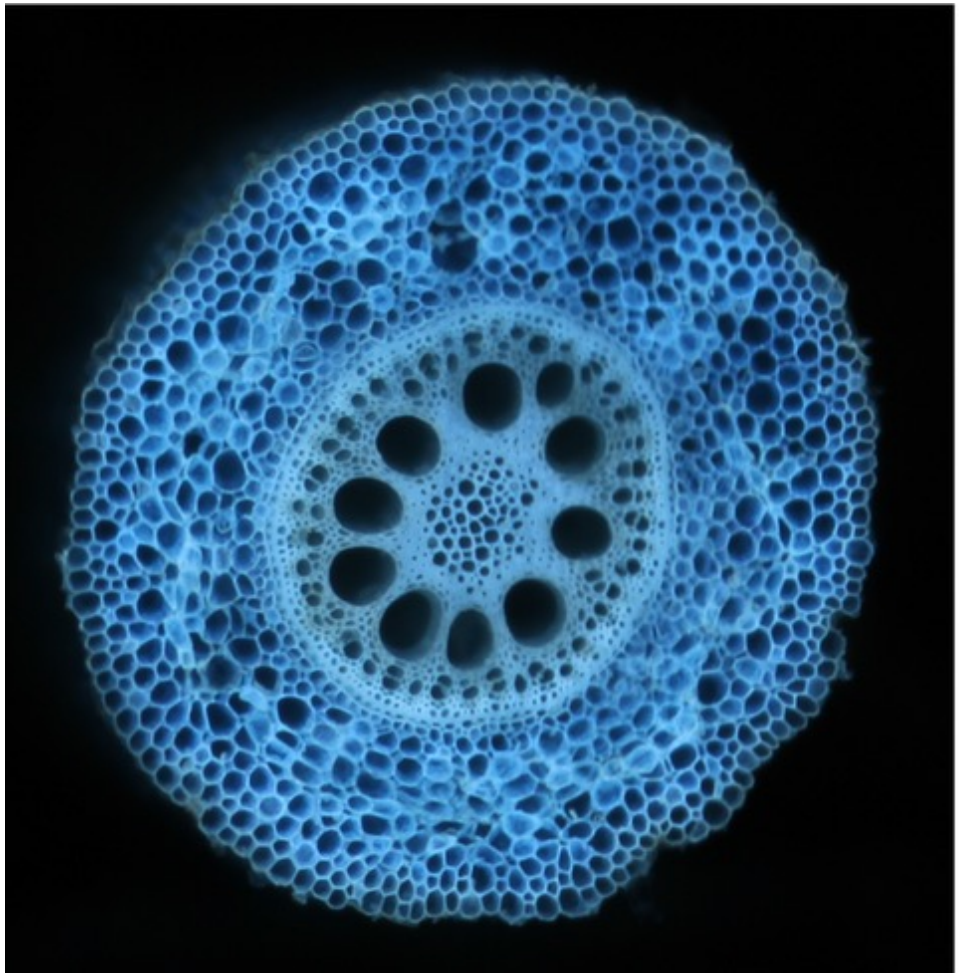


Steffens, B. and Rasmussen, A., 2016. *Plant physiology*, *170*(2), pp.603-617.

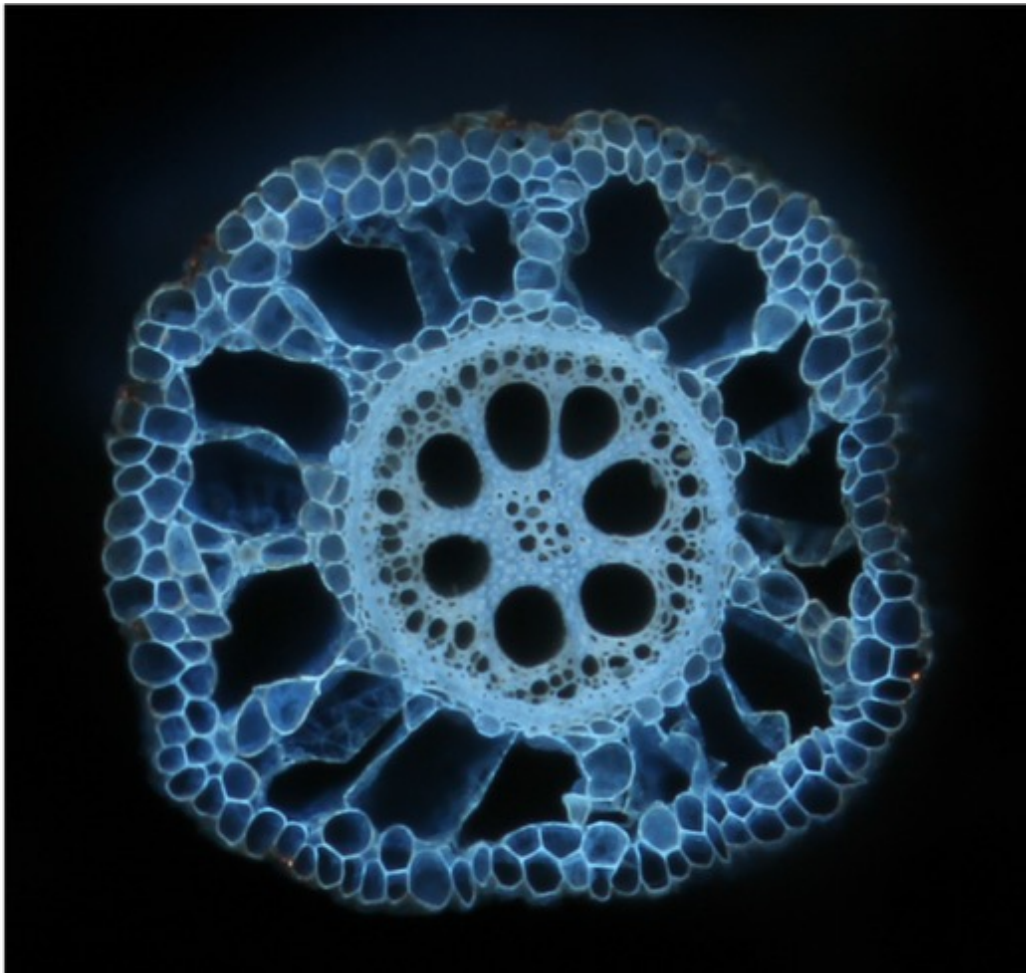


Steffens, B. and Rasmussen, A., 2016. *Plant physiology*, *170*(2), pp.603-617.

A



B

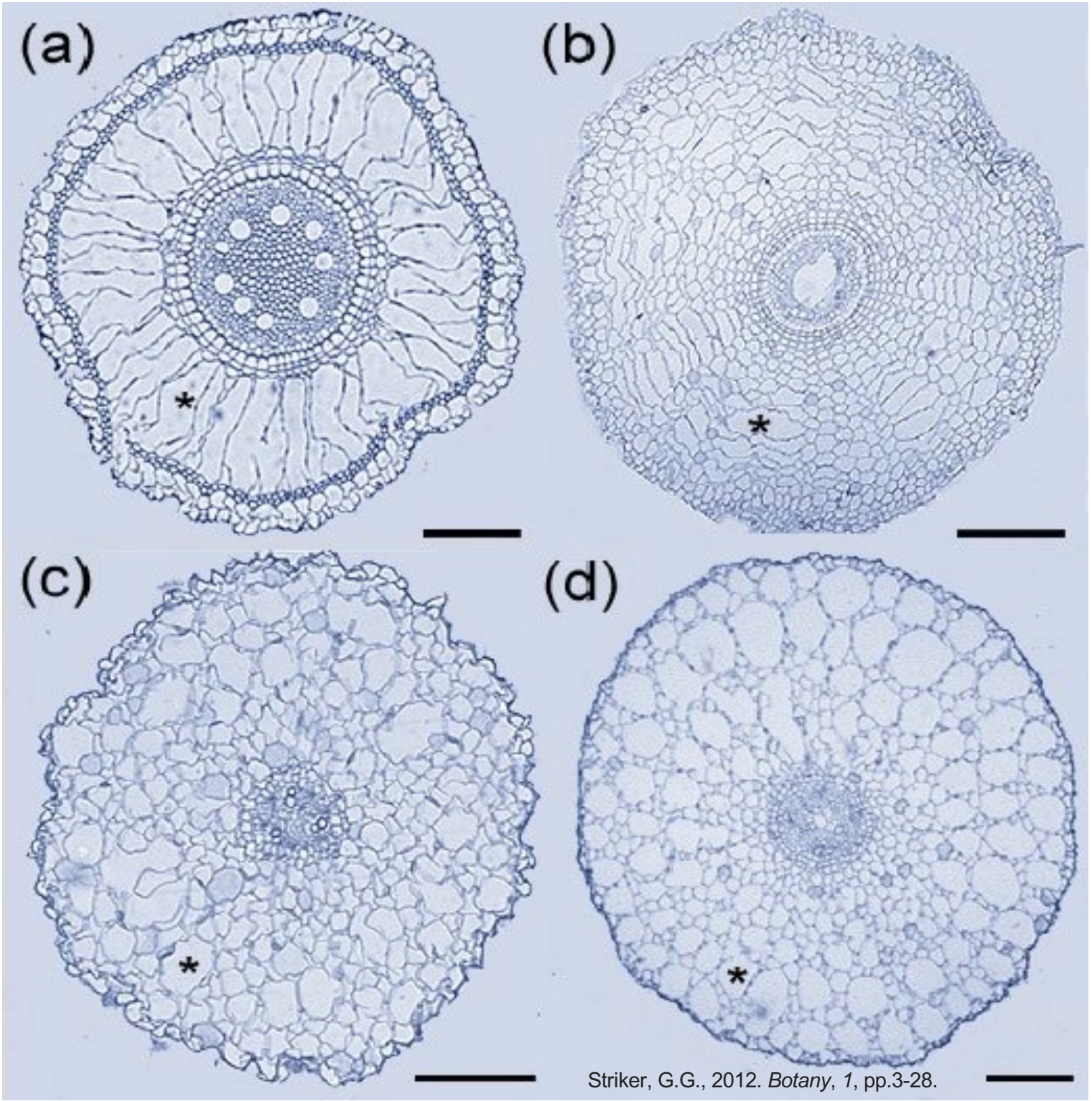


https://plantscience.psu.edu/research/labs/roots/projects/finished-projects/bread-project/root-cortical-aerenchyma

Saengwilai, P., 2013. Root traits for efficient nitrogen acquisition and genome-wide association study of root anatomical traits in maize (Zea mays L.). PhD dissertation. The Pennsylvania State University. USA.

Paspalum dilatatum

Cyperus eragrostis

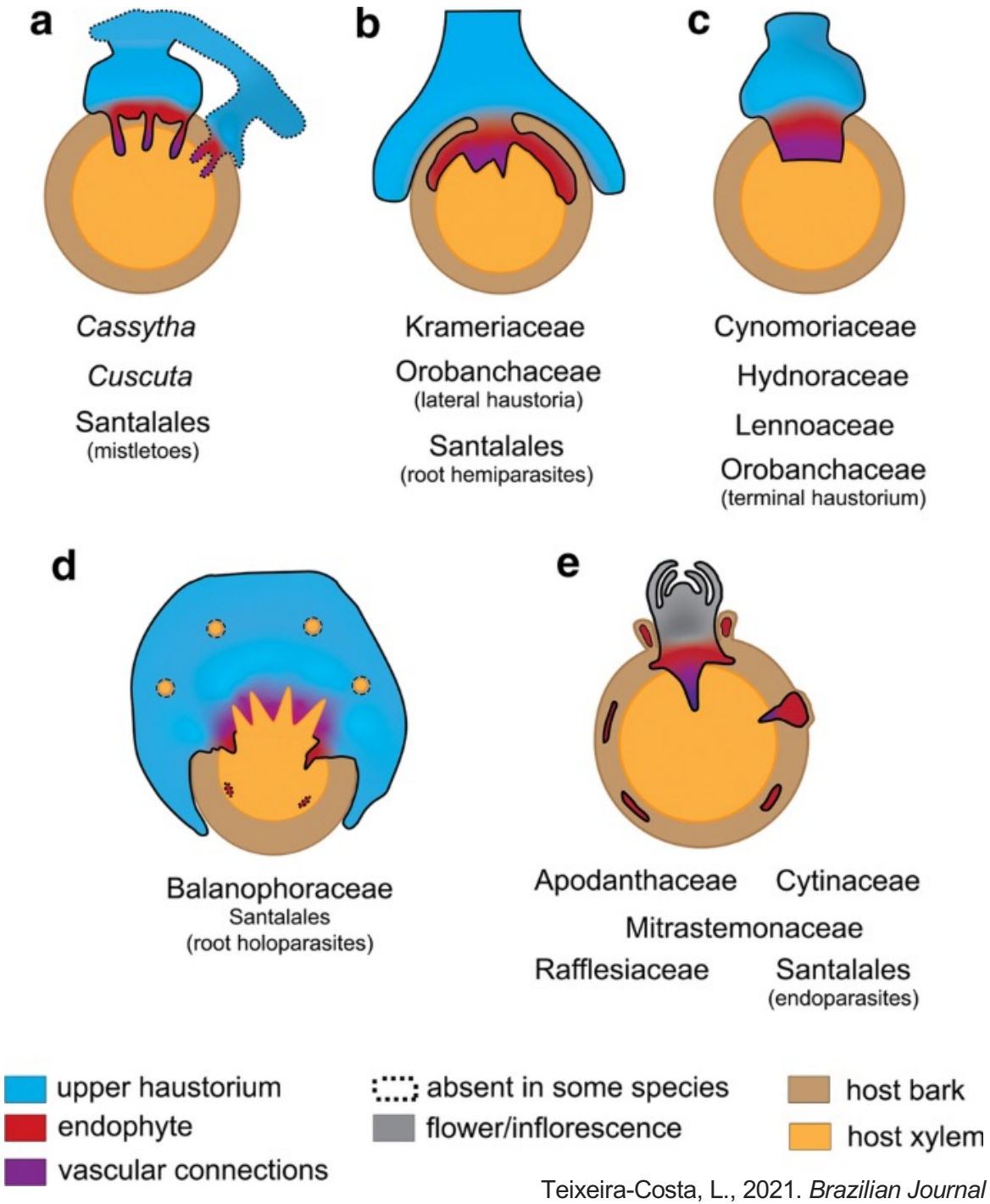


Lotus tenuis

Rumex crispus

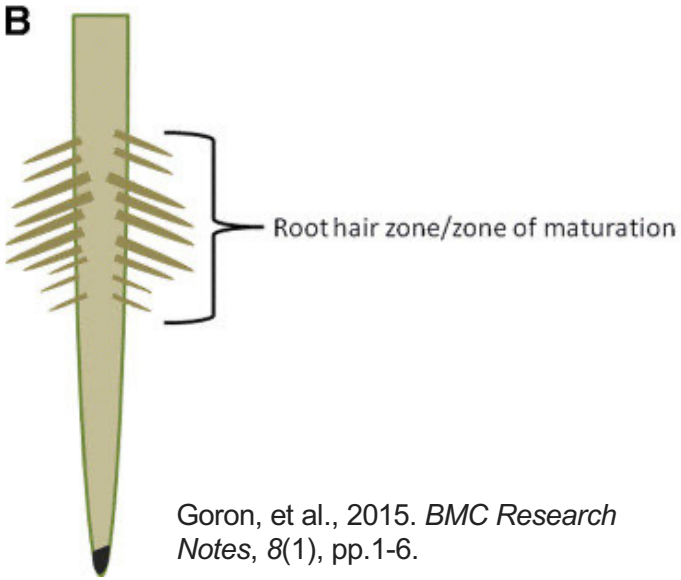
Striker, G.G., 2012. *Botany*, *1*, pp.3-28.

Haustorium



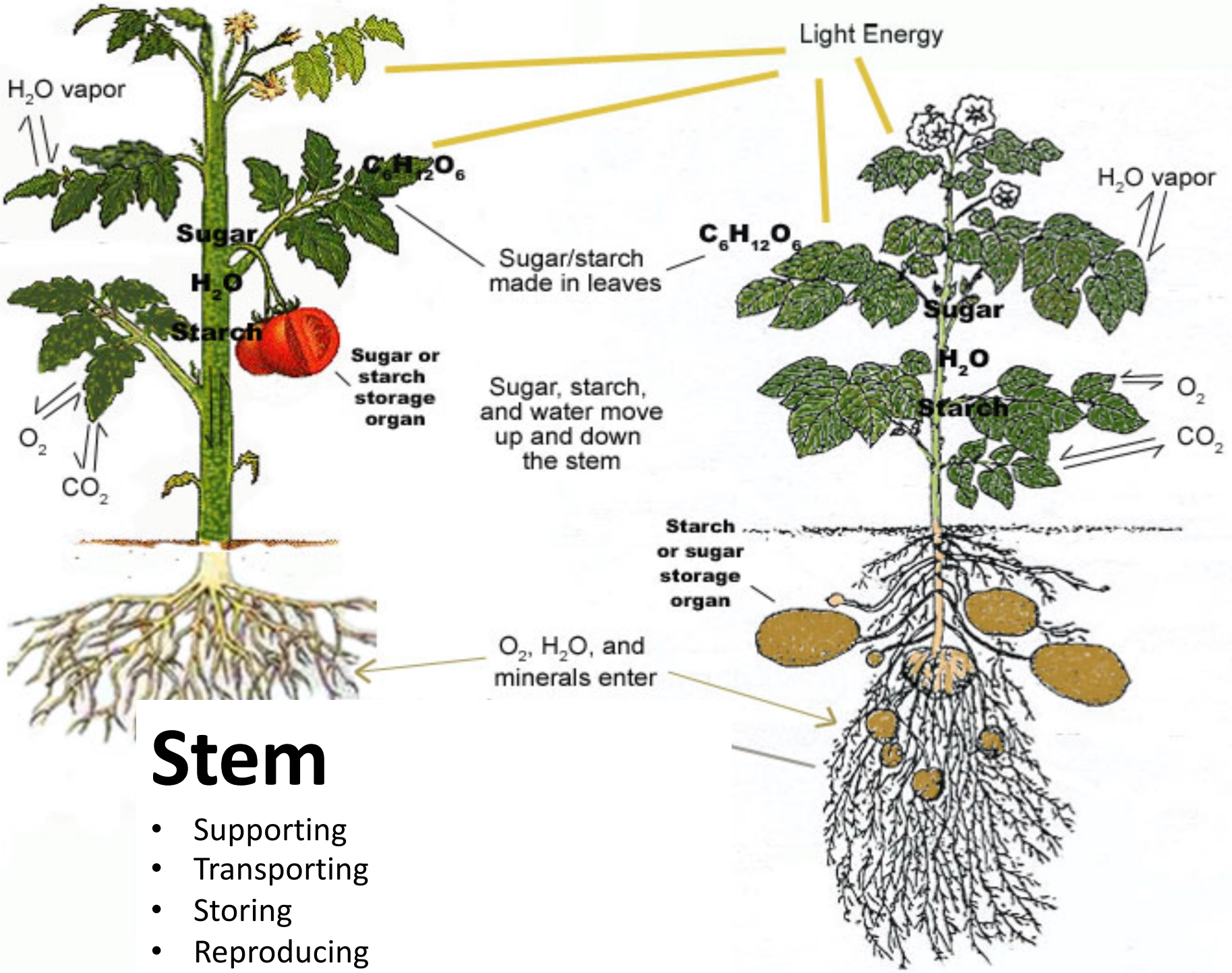
Teixeira-Costa, L., 2021. *Brazilian Journal of Botany*, *44*(1), pp.165-178.

Root hairs



Goron, et al., 2015. *BMC Research Notes*, *8*(1), pp.1-6.

Karas, et al. (2009) *Plant physiology* 151, no. 3 1175-1185.

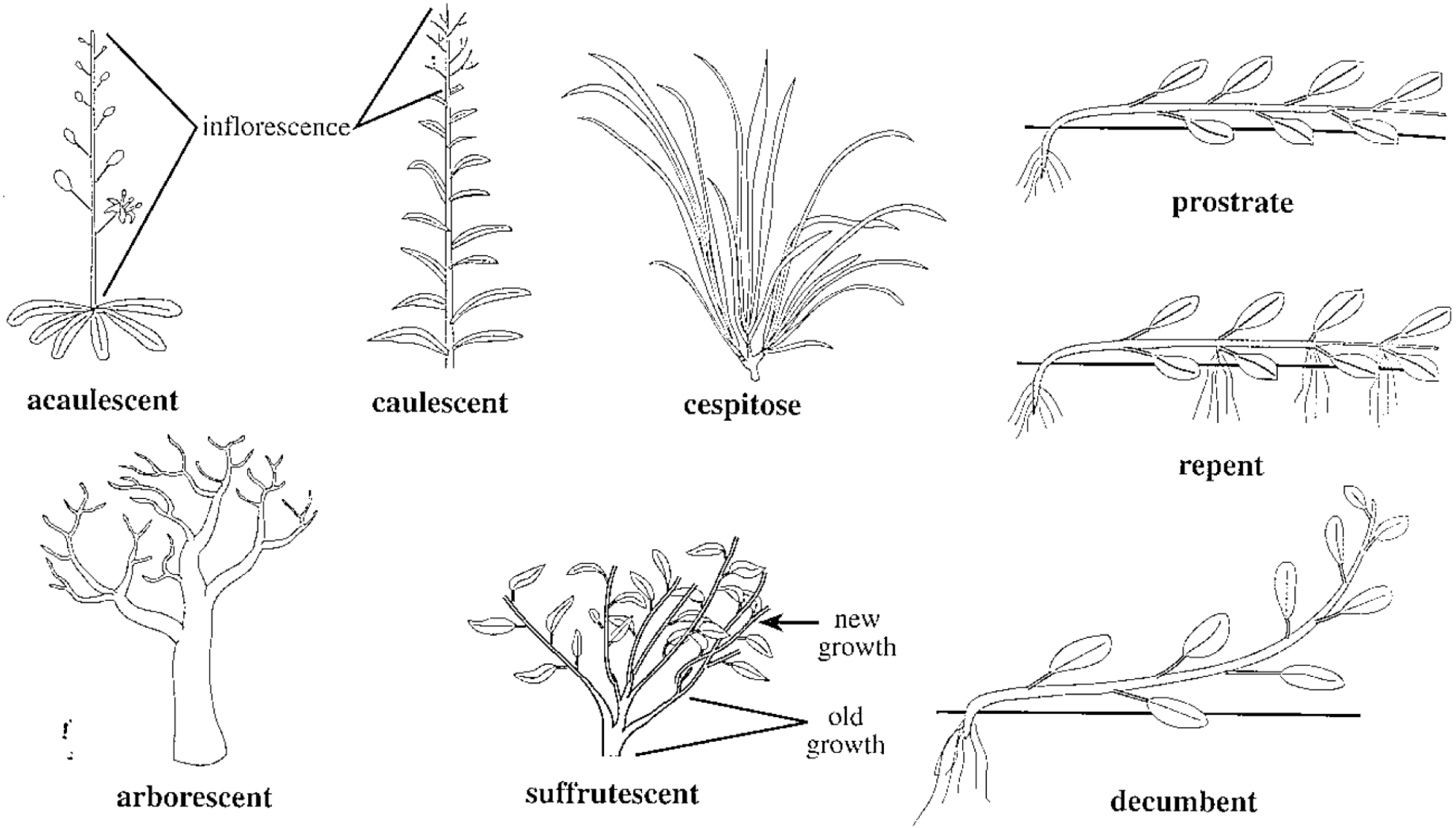


Stem

- Supporting
- Transporting
- Storing
- Reproducing

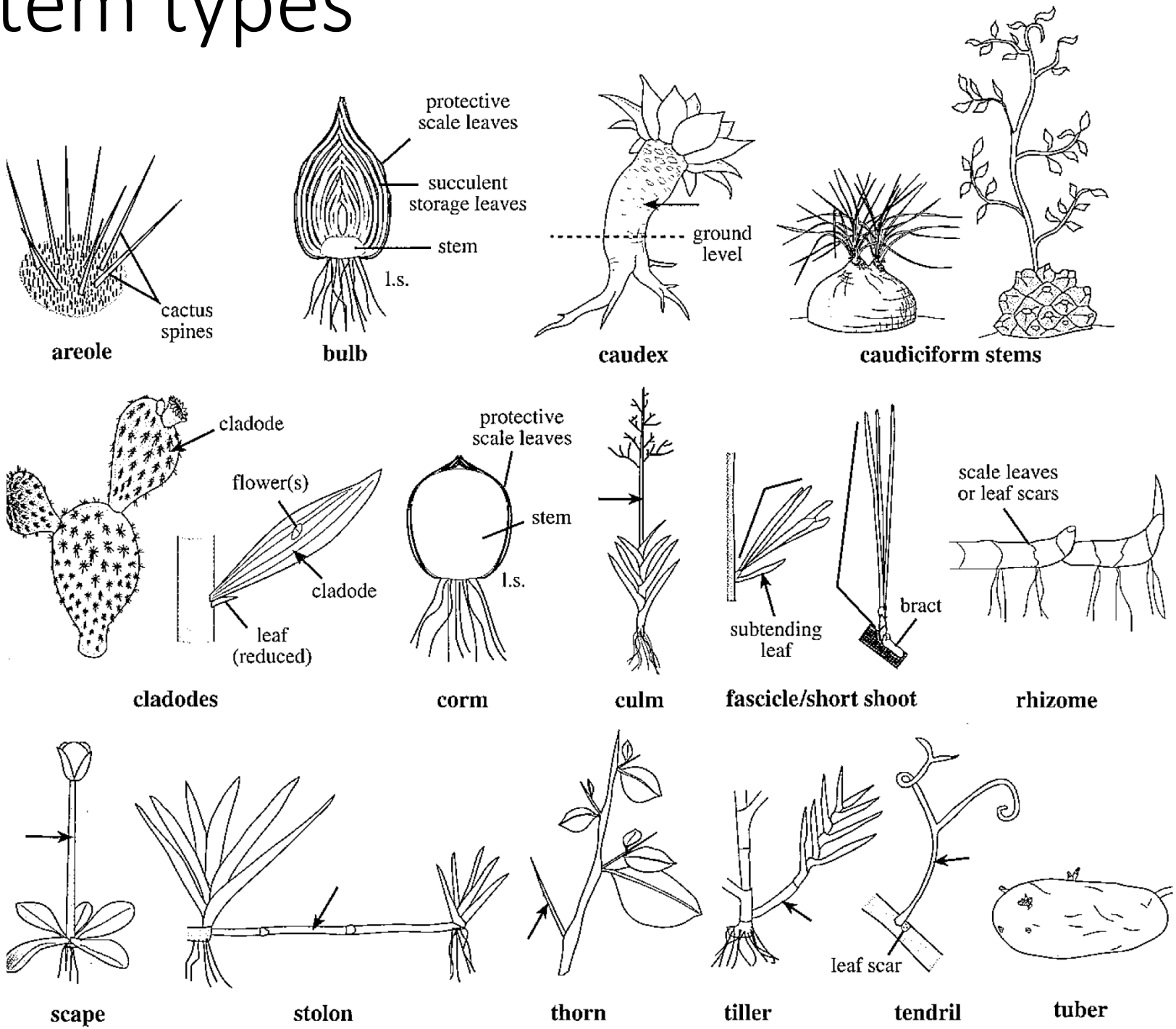
Abou-Hussein, S.D., 2012. *J. Appl. Sci. Res*, *8*, pp.4359-4383.

Stem habits

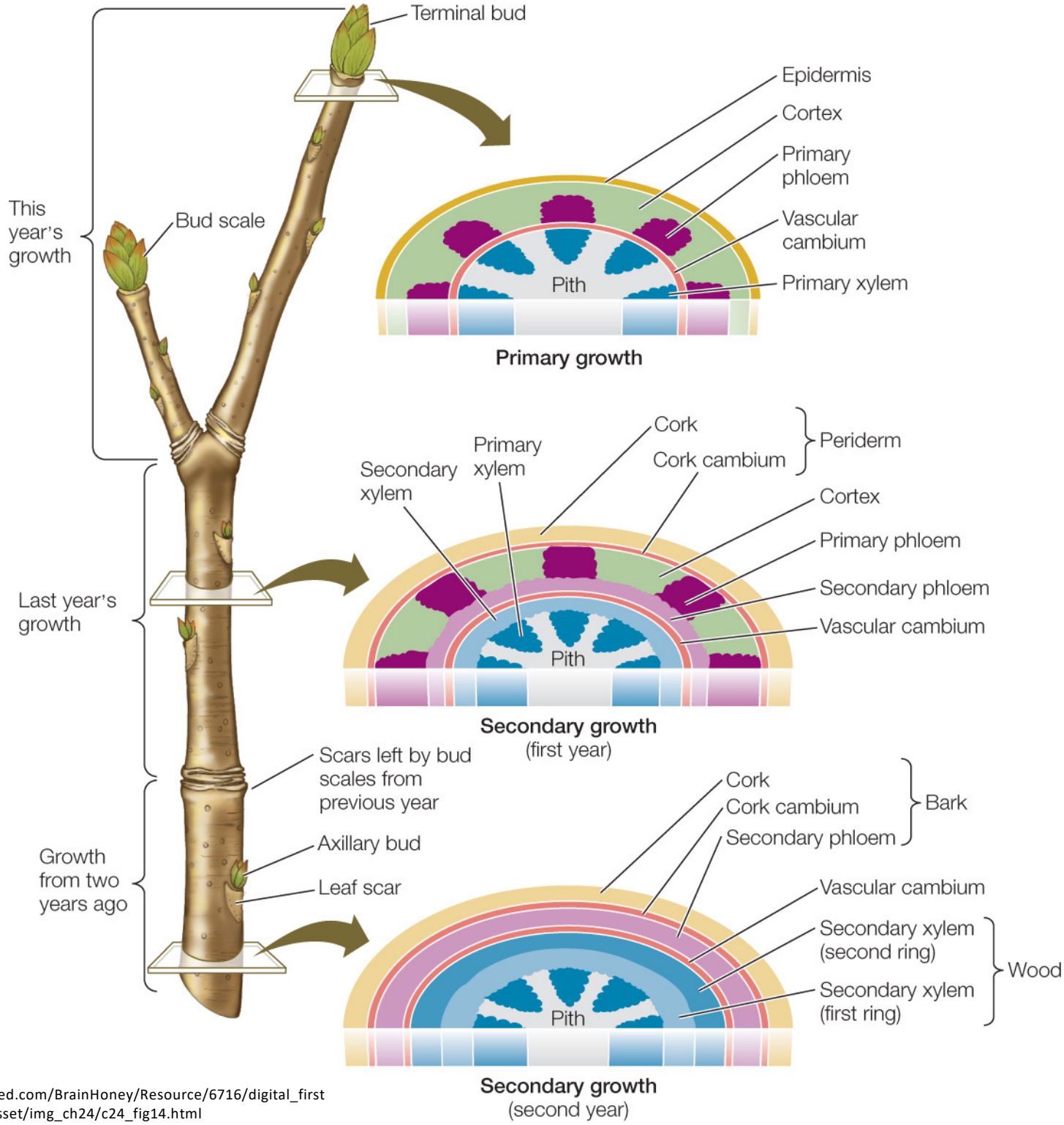


Simpson, M.G., 2019. *Plant systematics*. Academic press.

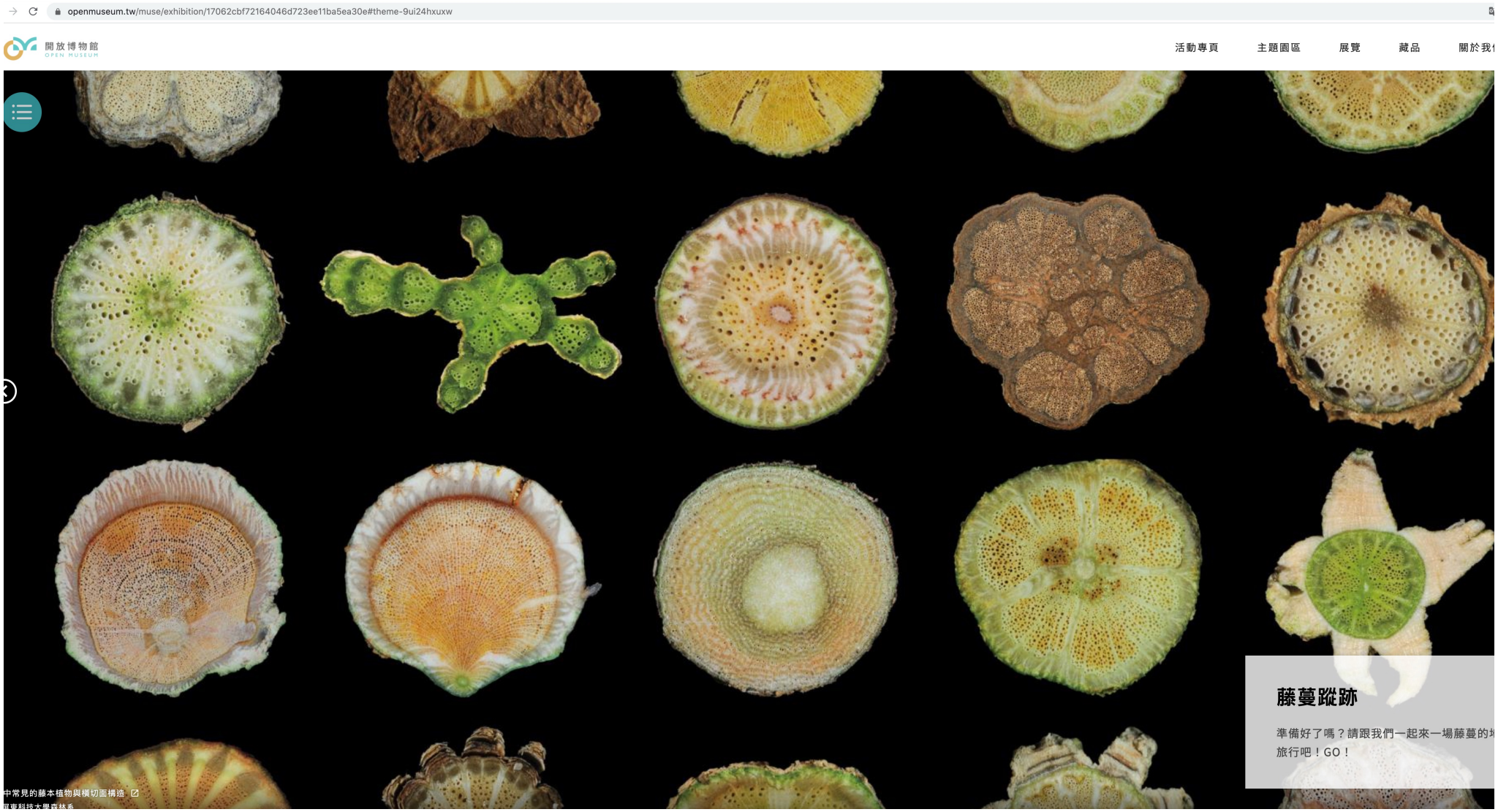
Stem types



Simpson, M.G., 2019. *Plant systematics*. Academic press.

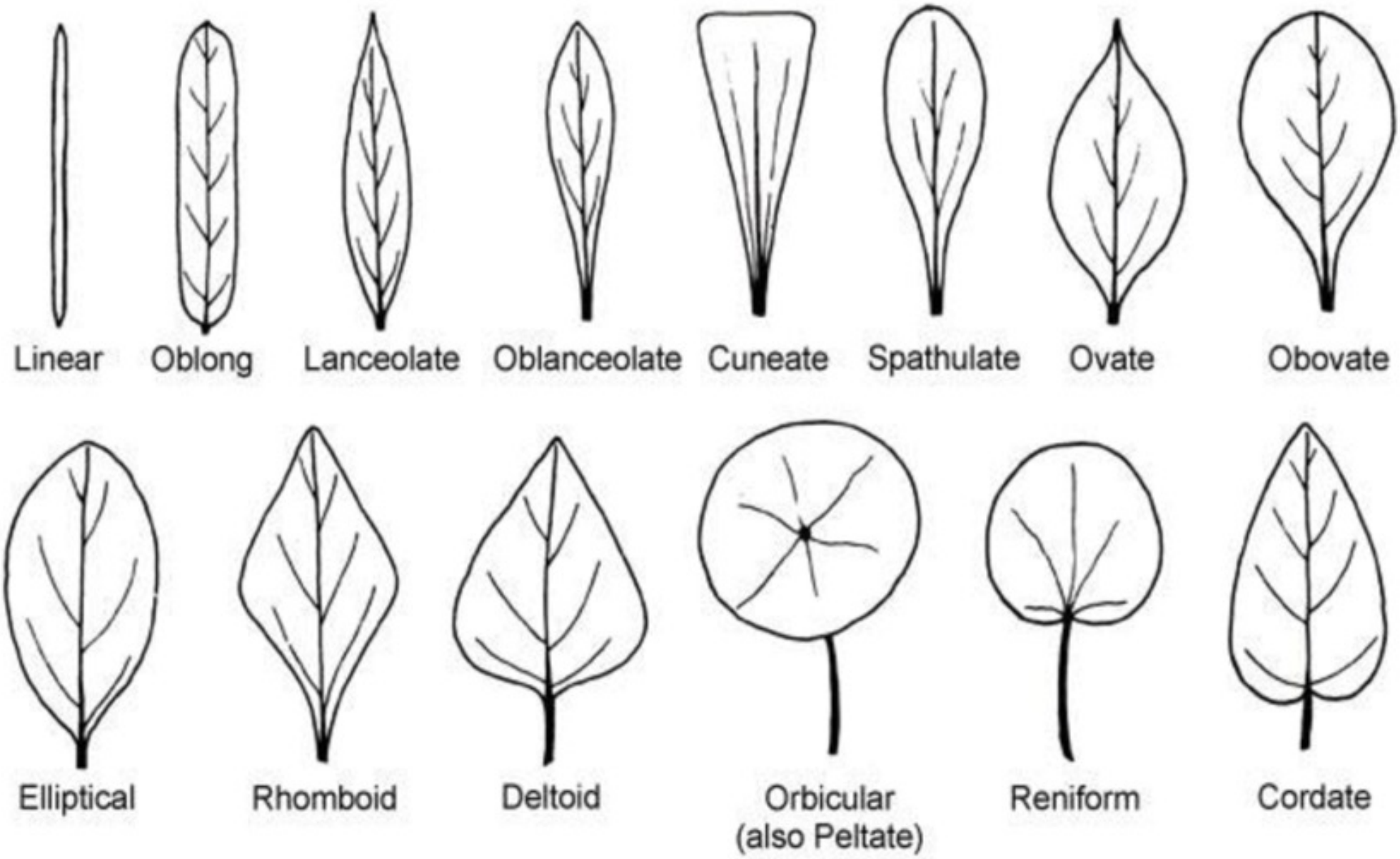


https://www.macmillanhighered.com/BrainHoney/Resource/6716/digital_first_content/trunk/test/hillis2e/asset/img_ch24/c24_fig14.html



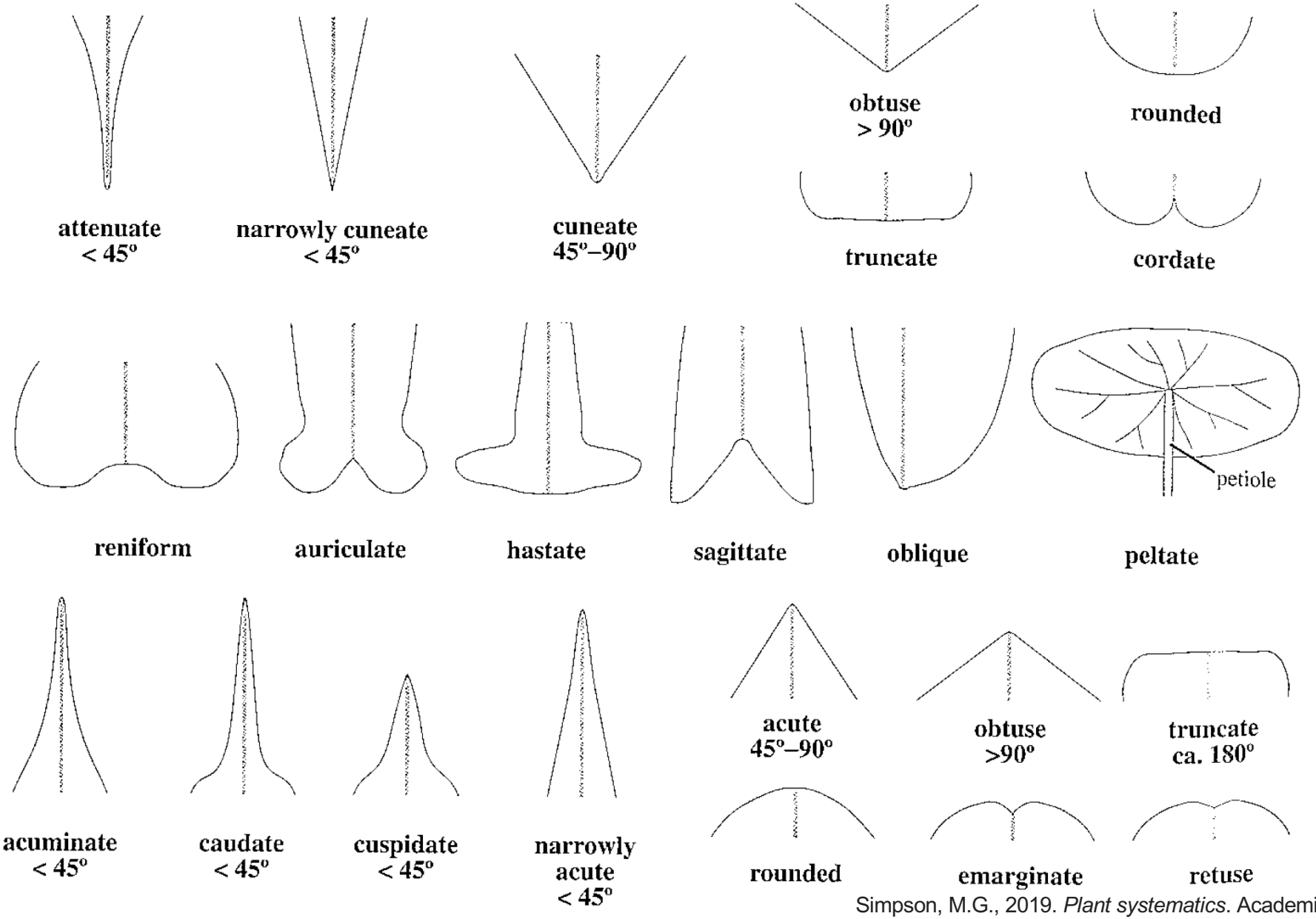
https://openmuseum.tw/muse/exhibition/17062cbf72164046d723ee11ba5ea30e

Leaf shapes



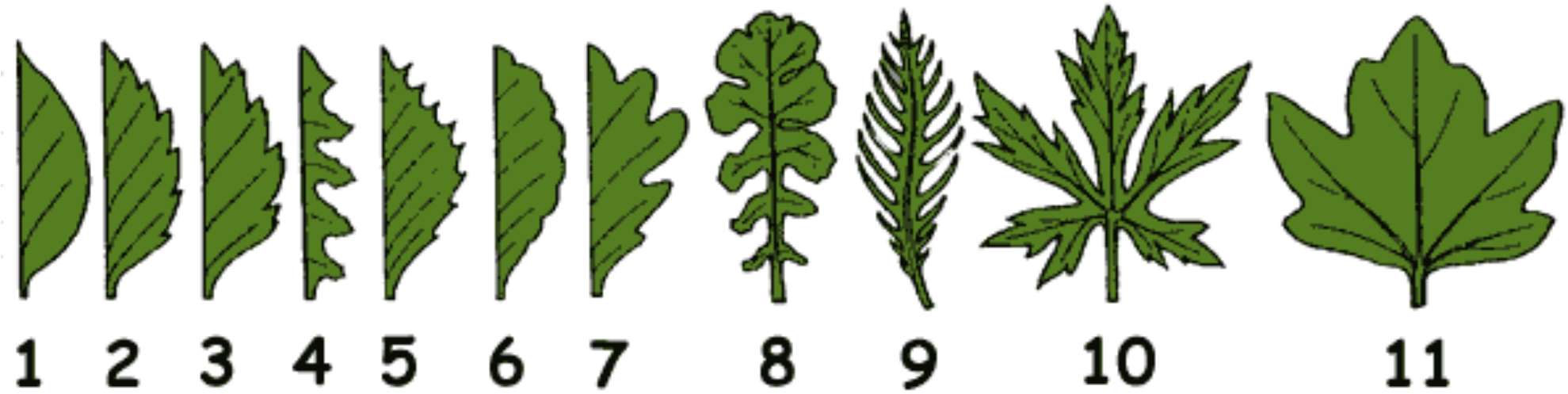
https://www.researchgate.net/profile/Yeni-Herdiyeni/publication/295685020/figure/fig1/AS:380006564941824@1467612033666/Examples-of-leaf-shapes.png

Bases and apices



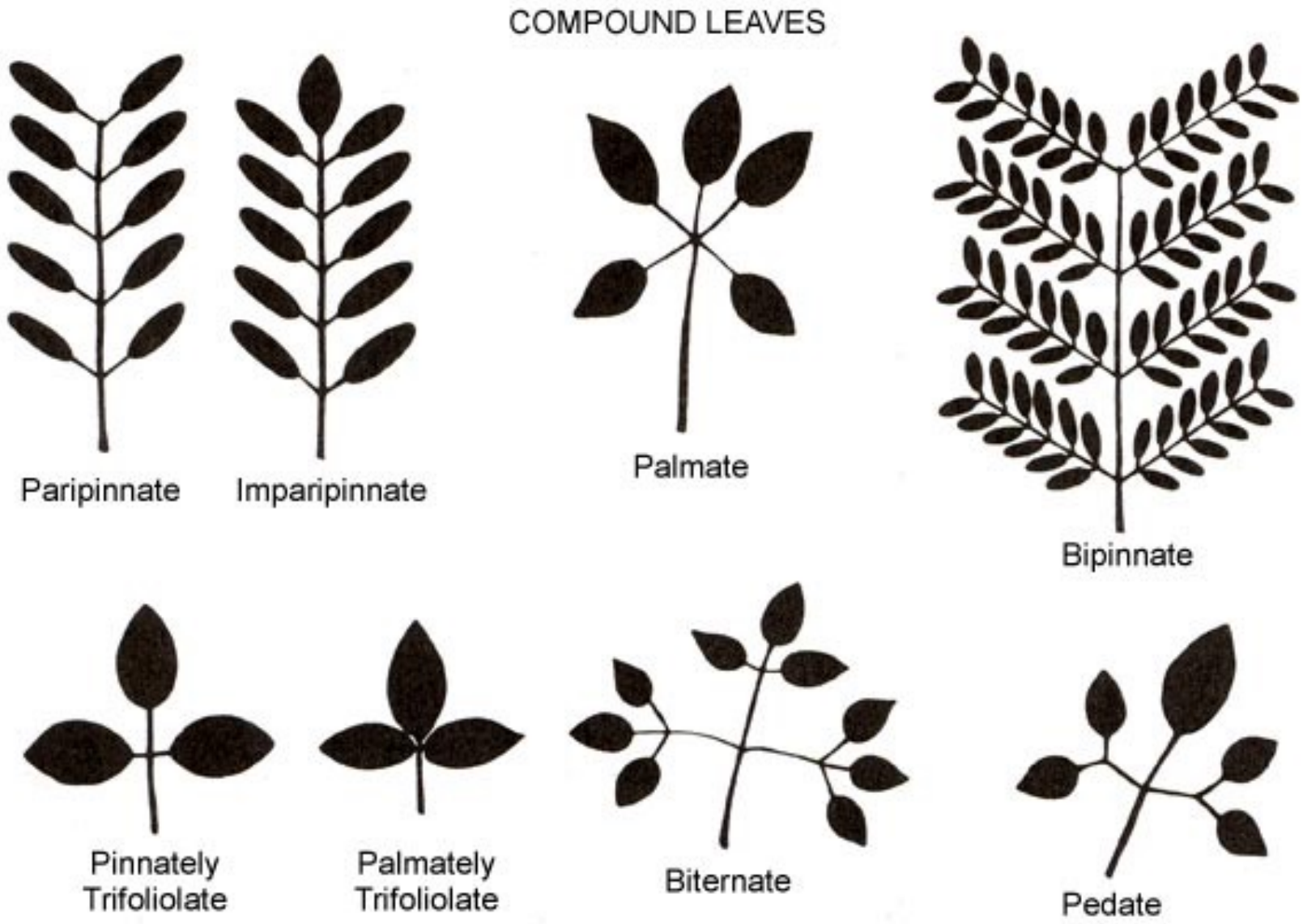
Simpson, M.G., 2019. *Plant systematics*. Academic press.

Leaf margin

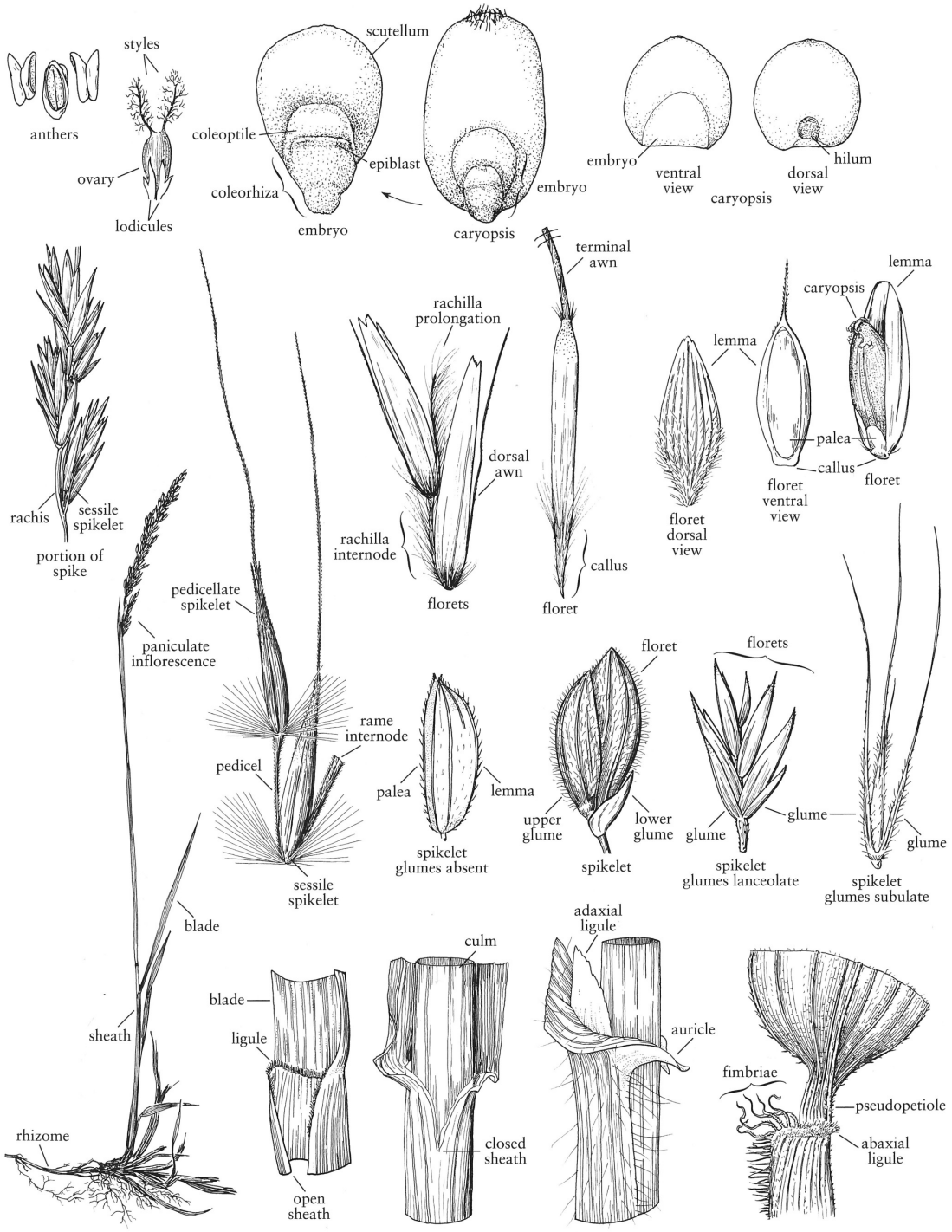


1. Smooth (entire). 2. Serrate. 3. Double serrate. 4.Saw-shaped. 5. Toothed. 6.Crenate. 7. Lobed. 8. Parted. 9. Pinnately (like a feather) incised. 10. Palmately (like a hand) incised. 11.Palmately (like a hand) lobbed.

https://www.vcbio.science.ru.nl/images/blad/leafmargin.gif



https://eflora.library.sydney.edu.au/glossary/image/compound_leaves.jpg

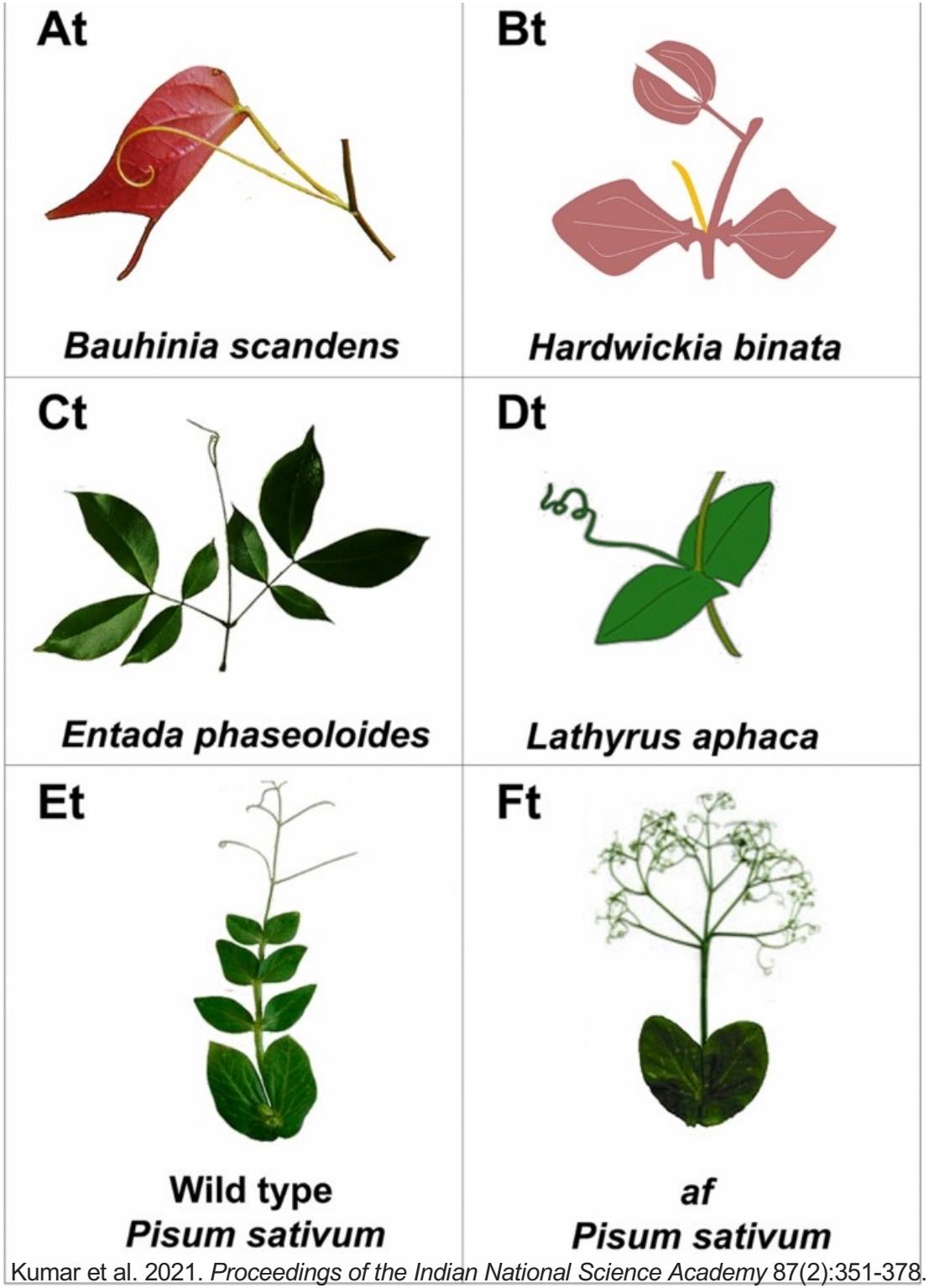


POACEAE

Flora of North America
http://floranorthamerica.org/w/images/b/bf/FNA24_P01_Poaceae_pg_5.jpeg

Heracleum lanatum

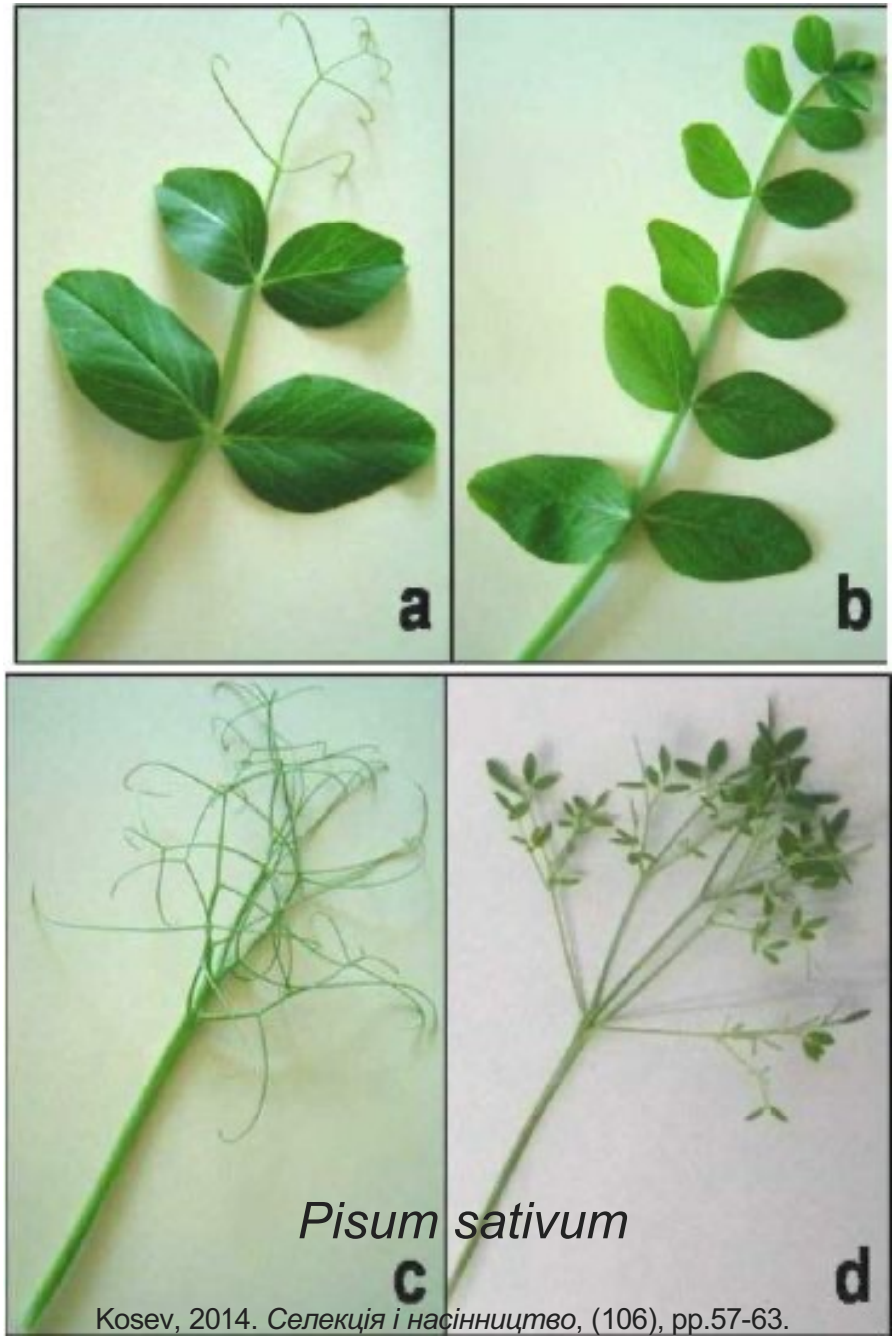
Kaplan, D.R., 2001. *American Journal of Botany*, *88*(10), pp.1711-1741.



Kumar et al. 2021. *Proceedings of the Indian National Science Academy* 87(2):351-378.

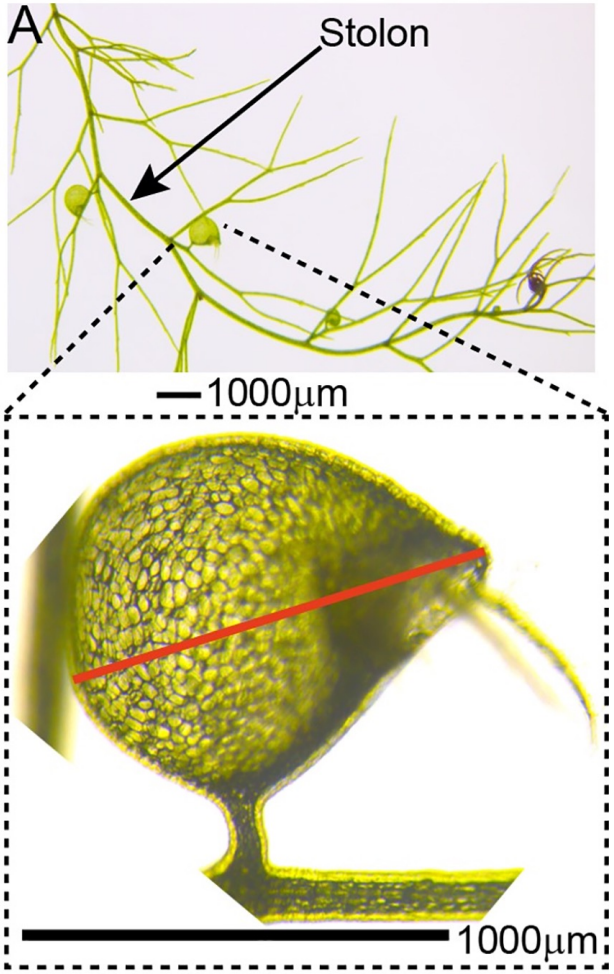
Fabaceae

- Stipule
- Tendril



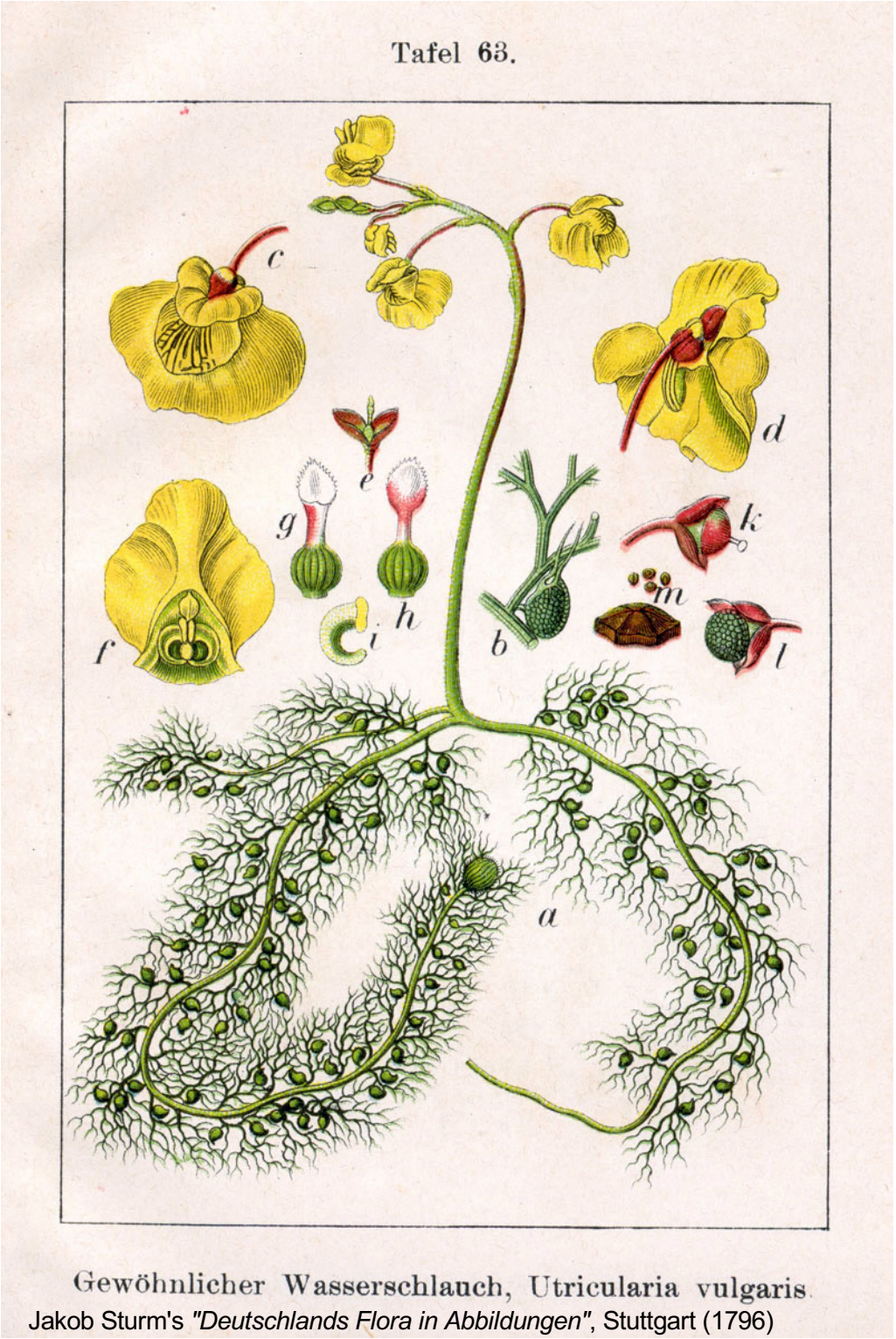
Kosev, 2014. *Селекція і насінництво*, (106), pp.57-63.

Utricularia sp.



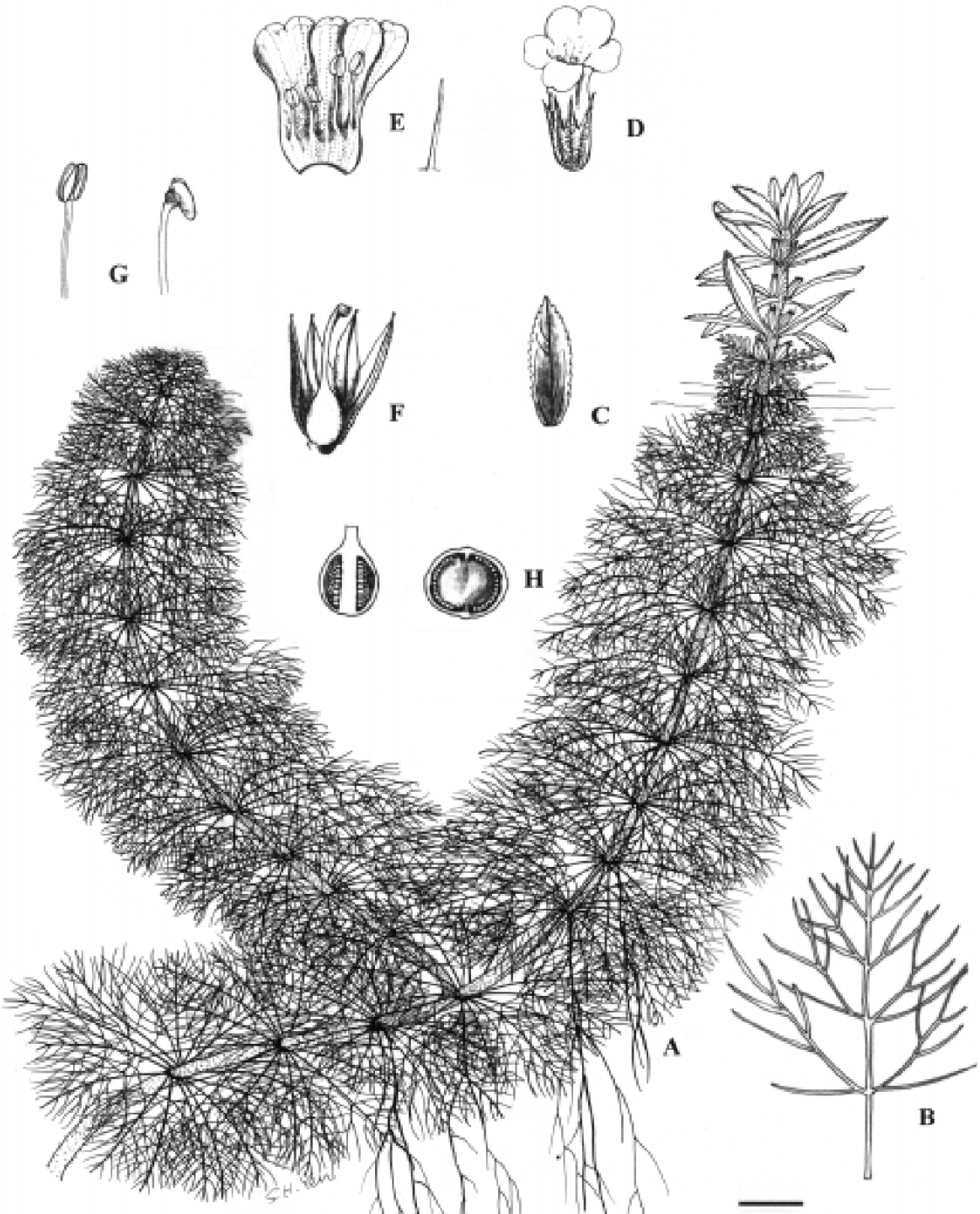
Lee, et al. 2019. *PLoS biology*, *17*(10), p.e3000427.

- lack a root system

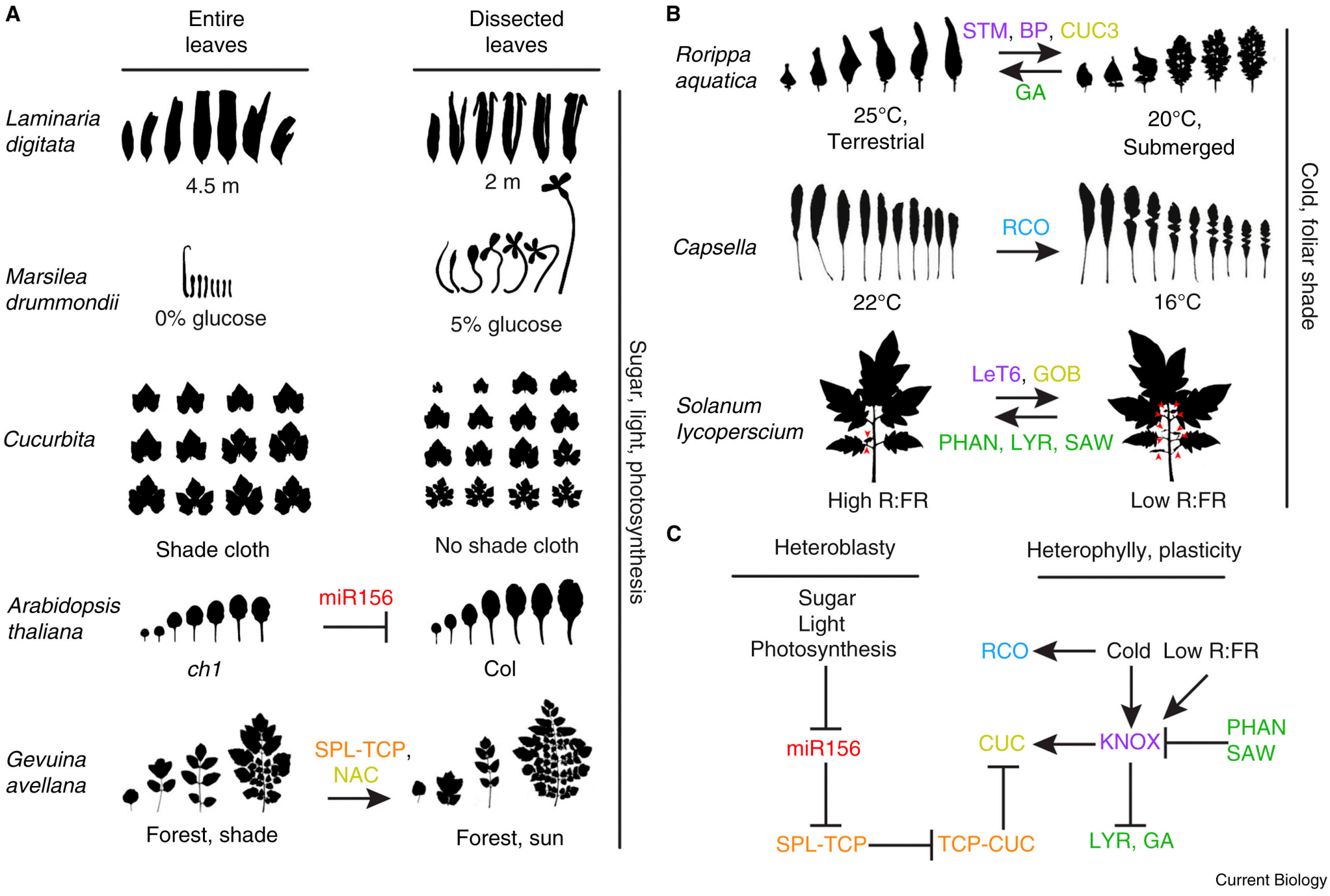


Jakob Sturm's *"Deutschlands Flora in Abbildungen"*, Stuttgart (1796)

- **Aquatic plants**
  - Leaf shapes vary in many cases

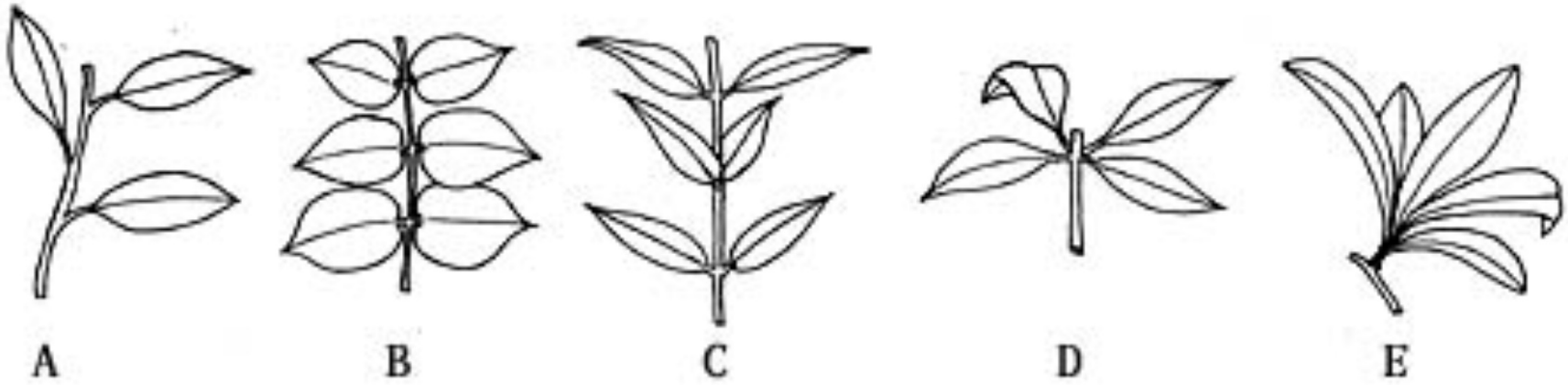


Yang & Yen. 1997. *Botanical Bulletin of Academia Sinica* 38: 285-295 異葉石龍尾 *Limnophila heterophylla*

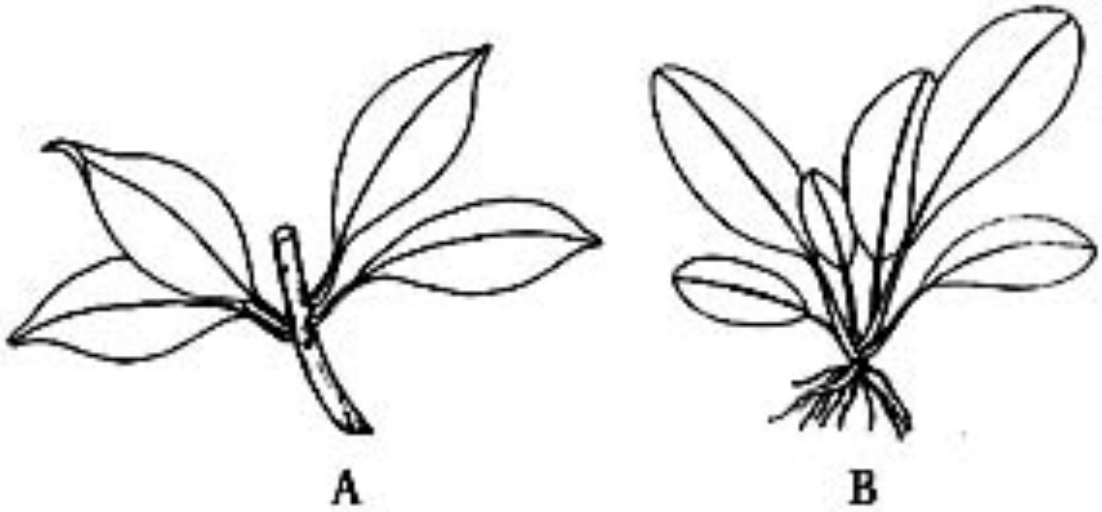


Chitwood and Sinha, 2016. *Current Biology*, *26*(7), pp.R297-R306.

Leaf arrangement



附圖7　葉序



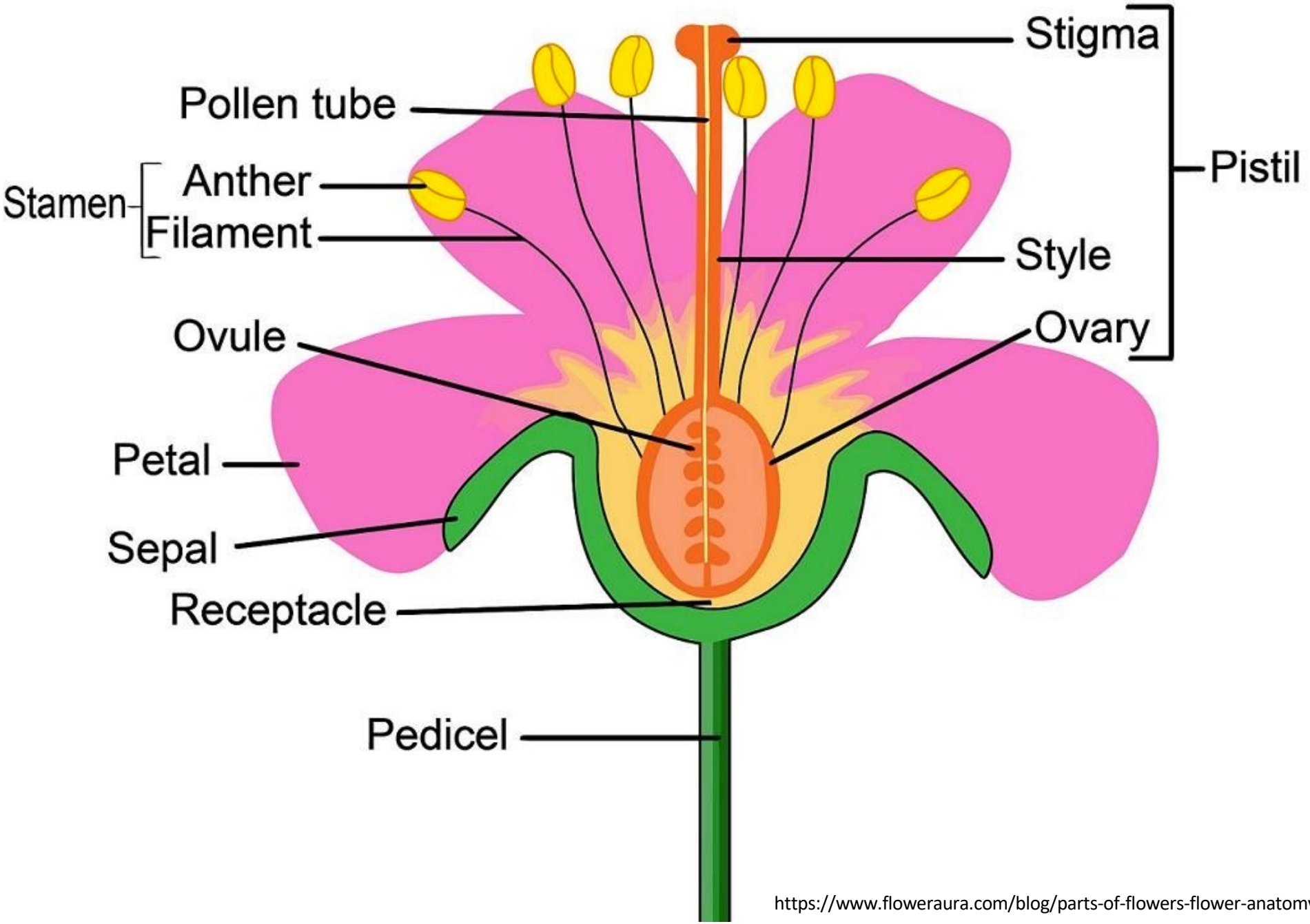
附圖8　莖生葉與基生葉

楊遠波，劉和義 ，呂勝由。1999. 臺灣維管束植物簡誌：第貳卷. 行政院農業委員會. 臺北。臺灣

https://en.wikipedia.org/wiki/Fragaria#/media/File:103_Fragaria_vesca_L.jpg

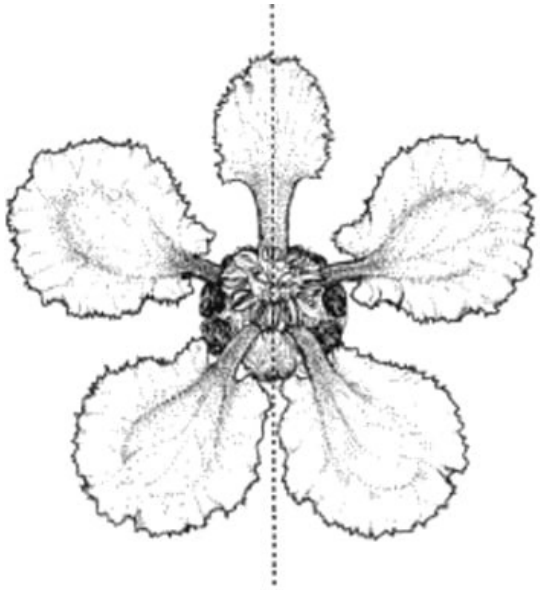
Amédée Masclef - Atlas des plantes de France. 1891 *Fragaria vesca* L.

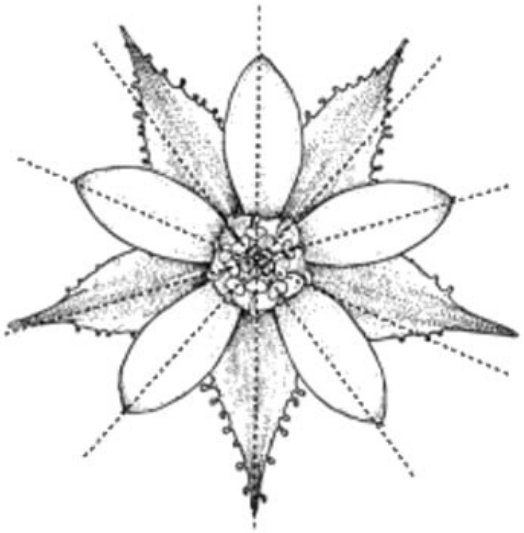
Flowers

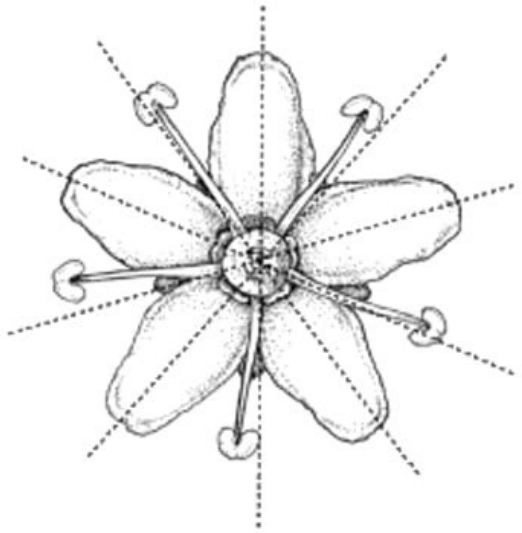


https://www.floweraura.com/blog/parts-of-flowers-flower-anatomy-101

Flowers

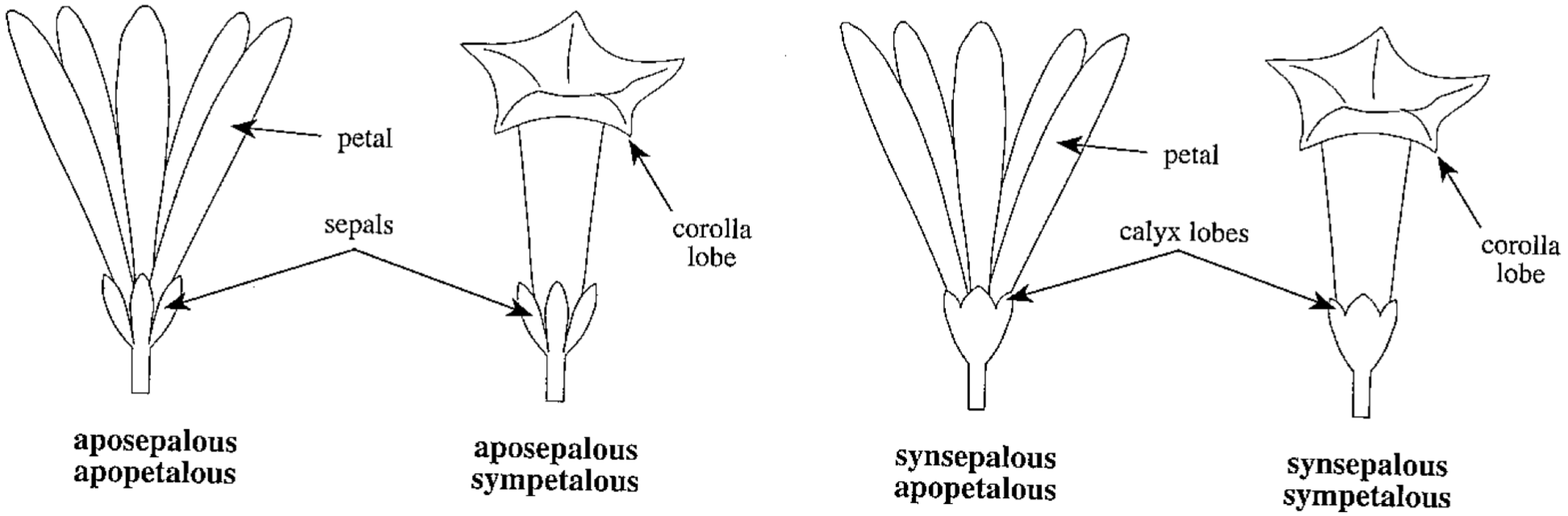






Zhang, et al. 2010. *PNAS*, *107*(14), pp.6388-6393.

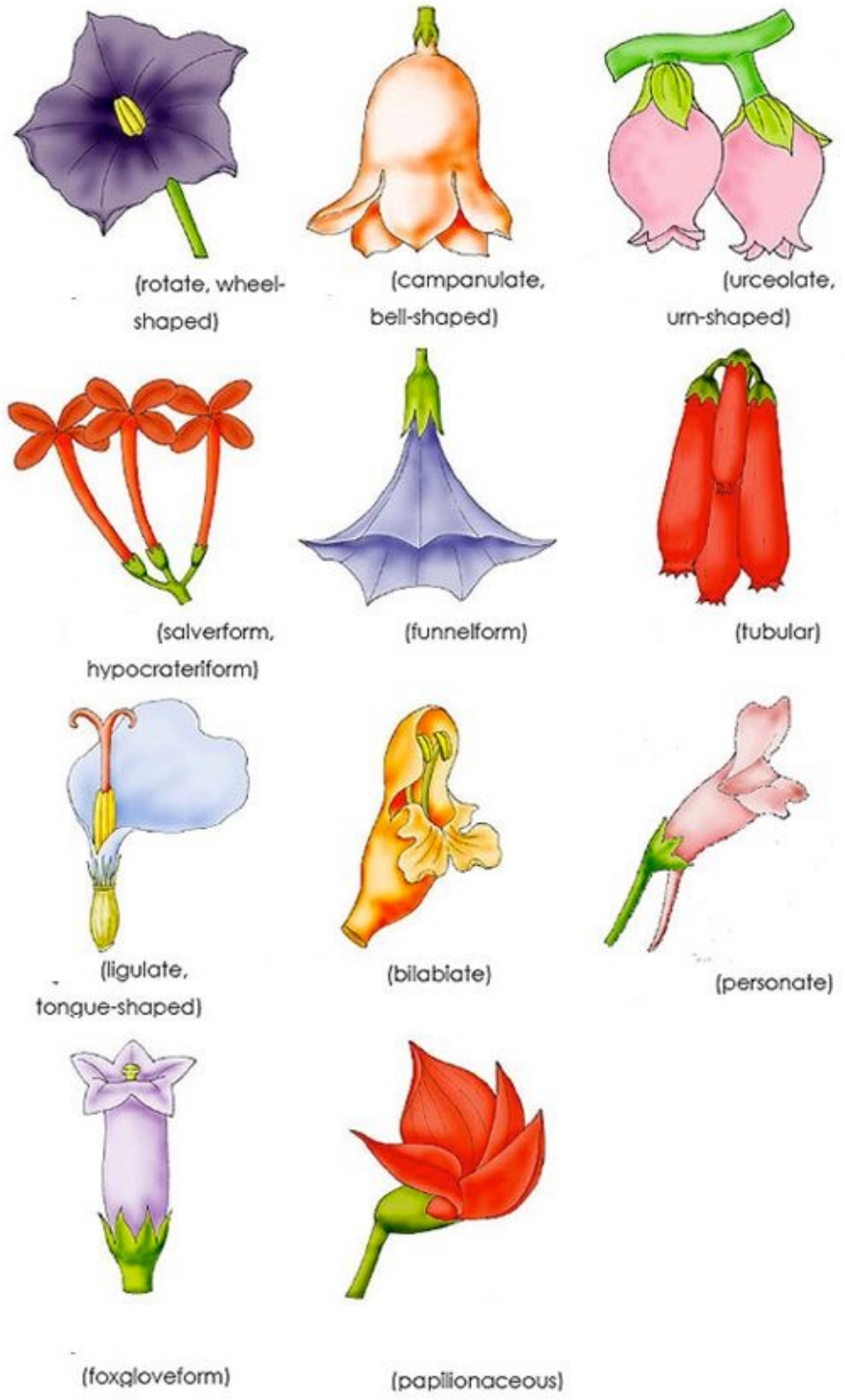
Flowers



Simpson, M.G., 2019. *Plant systematics*. Academic press.

Flowers

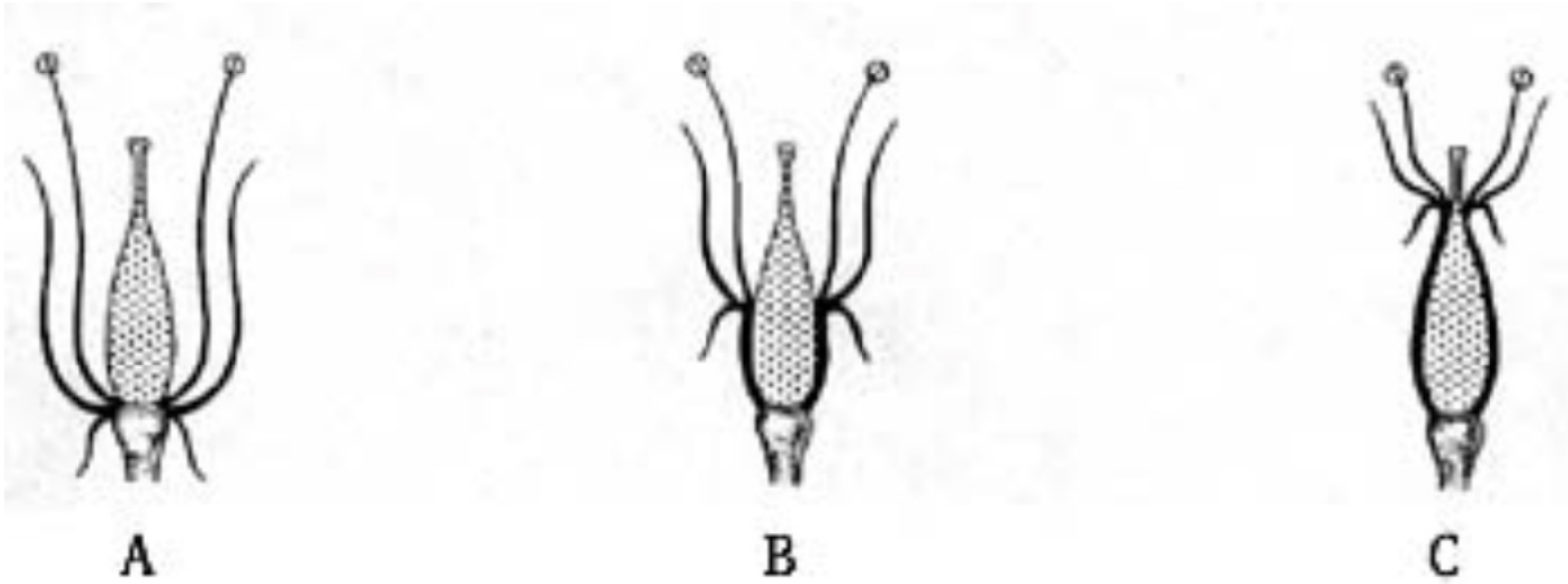
Corolla shapes



https://i.pinimg.com/originals/68/80/0e/68800e049f85c1db5a85b1ab930fe832.jpg

Flowers

Ovary position



Hypogynous flower

Perigynous flower

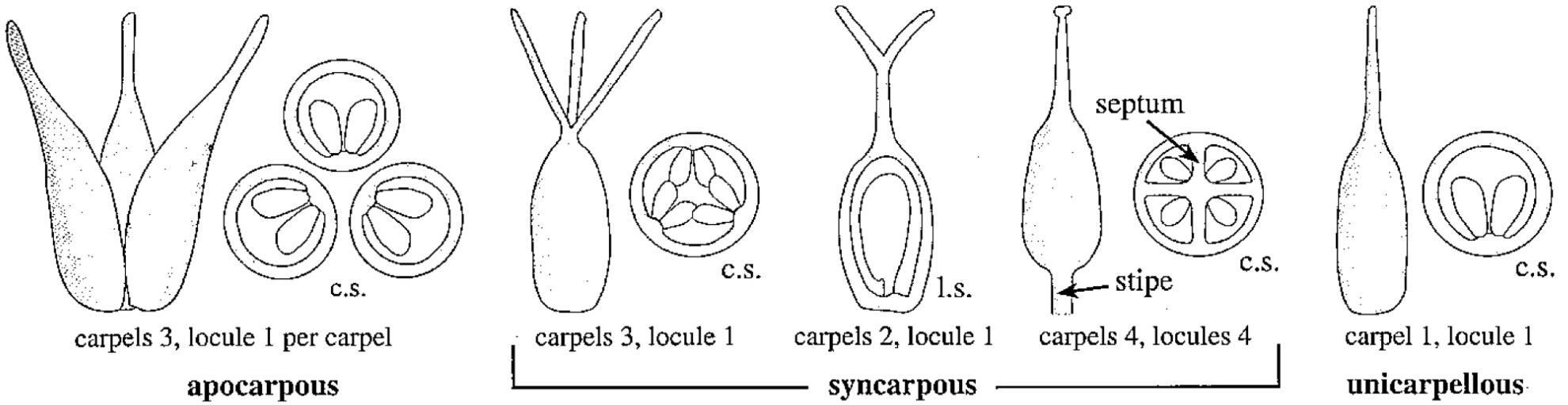
Epigynous flower

楊遠波，劉和義 ，呂勝由。1999. 臺灣維管束植物簡誌：第貳卷. 行政院農業委員會. 臺北。臺灣

https://en.wikipedia.org/wiki/Fragaria#/media/File:103_Fragaria_vesca_L.jpg

Amédée Masclef - Atlas des plantes de France. 1891 *Fragaria vesca* L.

Carpels

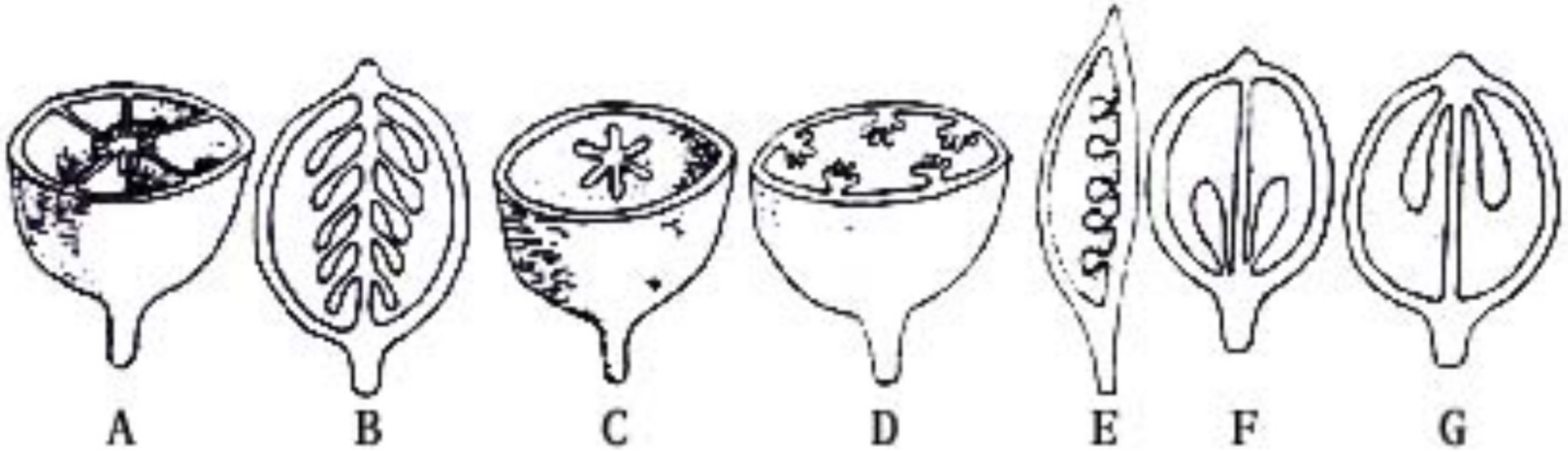


Simpson, M.G., 2019. *Plant systematics*. Academic press.

Citrus sinensis (L.) Histoire et culture des orangers A. Risso et A. Poiteau. – Paris Henri Plon, Editeur, 1872

Flowers

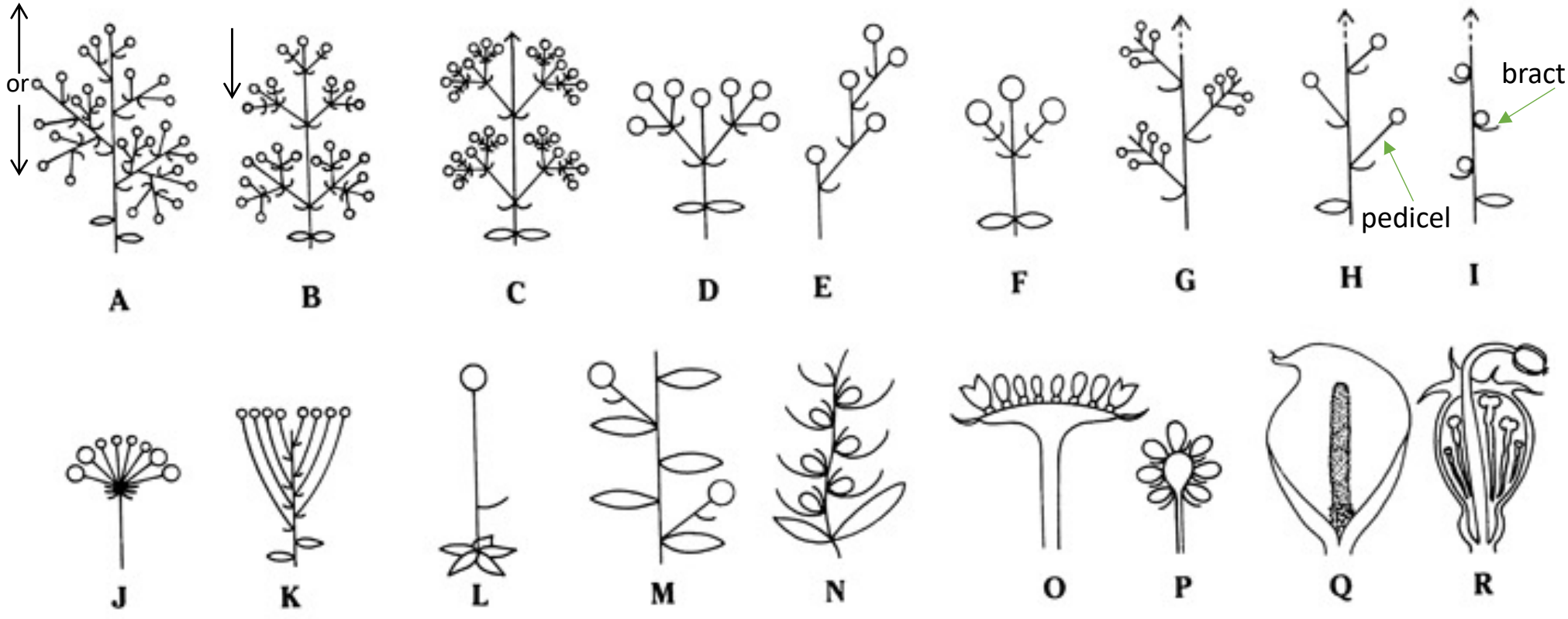
Placentation



Axile Axile Free-central Parietal Marginal Basal Apical

楊遠波，劉和義 ，呂勝由。1999. 臺灣維管束植物簡誌：第貳卷. 行政院農業委員會. 臺北。臺灣

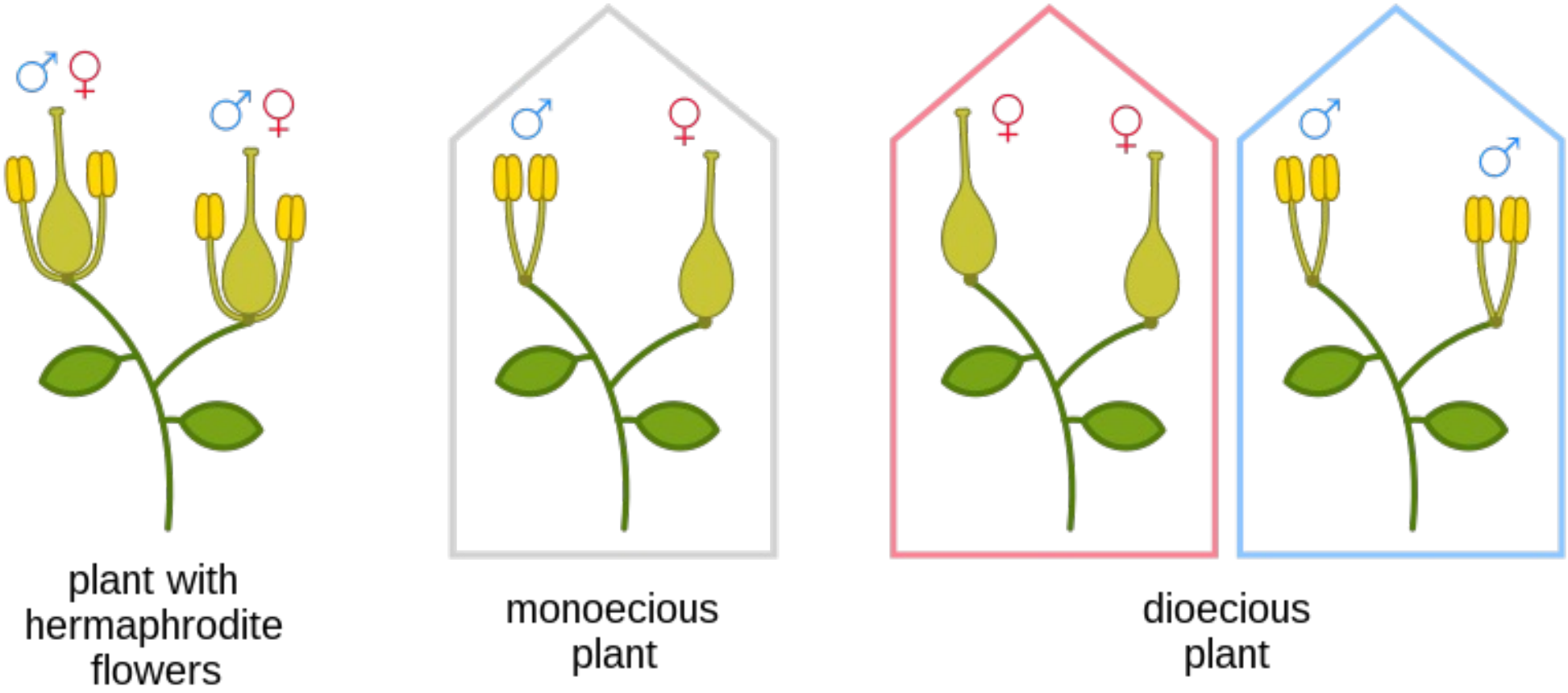
Inflorescences



A, panicle; B, thyrsoid; C, thyrse; D, dichasium; E, monochasium; F, triad; G, panicle-like; H, raceme; I, spike; J, umbel; K, corymb; L, solitary on a scape; M, solitary in axils of leaves; N, spikelet; O, head with expanded receptacle (in L.S.), as in many Asteraceae; P, head with small receptacle (in L.S.); Q, spadix; R, cyathium (in L.S.).

https://plantnet.rbgsyd.nsw.gov.au/PlantNet/NSWflora/glossimages/Fig17.png

Monoecious, diecious, hermaphrodite

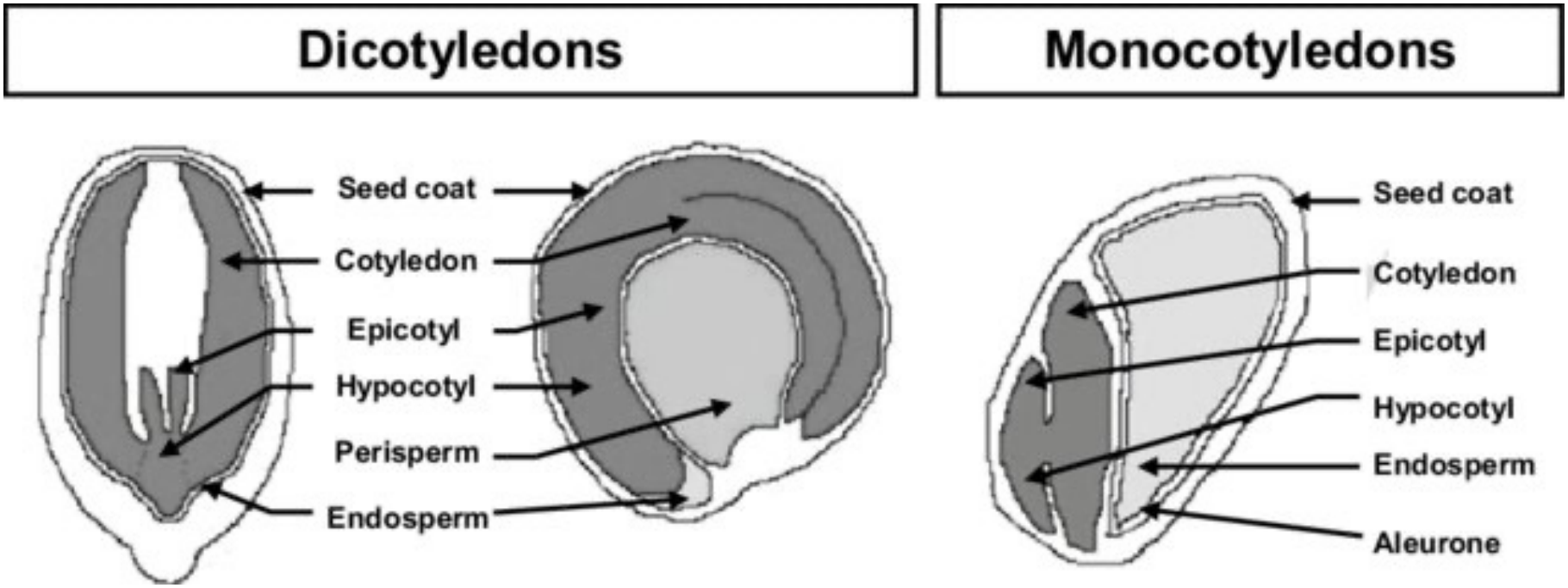


https://commons.wikimedia.org/wiki/File:Monoecy_dioecy_en.svg

Pollination mechanisms

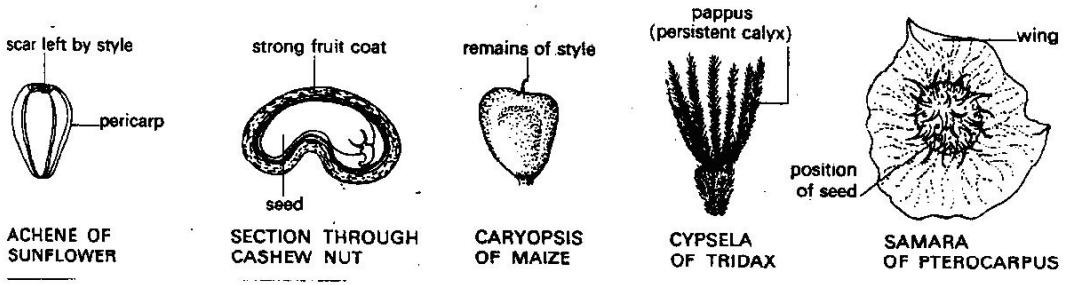
- Cross pollination: The transfer of pollen from one flower to the stigma of another.
  - Insect/Entomophilic pollination
  - Wind/Anemophilous pollination
  - Water/Hydrophilous pollination

Seeds/Fruits



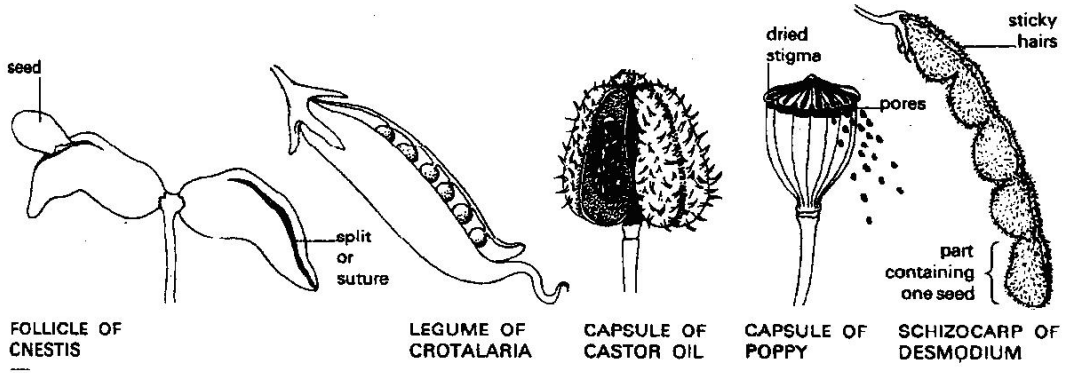
Catusse, et al. 2012. Proteomics reveals a potential role of the perisperm in starch remobilization during sugarbeet seed germination. In *Seed Development: OMICS Technologies toward Improvement of Seed Quality and Crop Yield* (pp. 27-41). Springer, Dordrecht.

Fruits

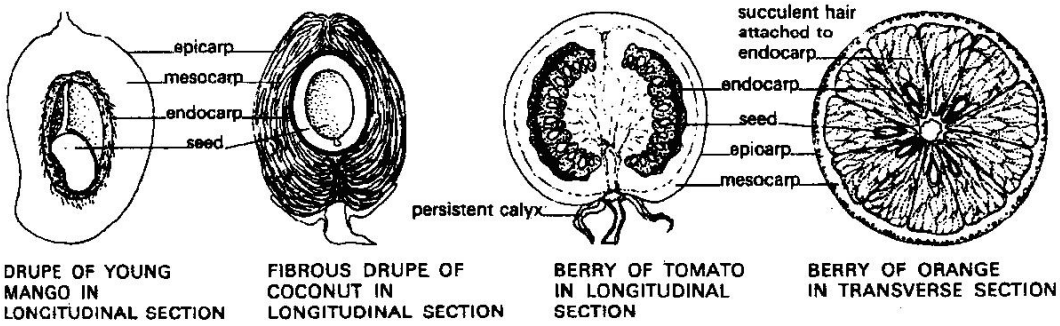


not

(A) Dry indehiscent fruits: these fruits are dry and do split when mature



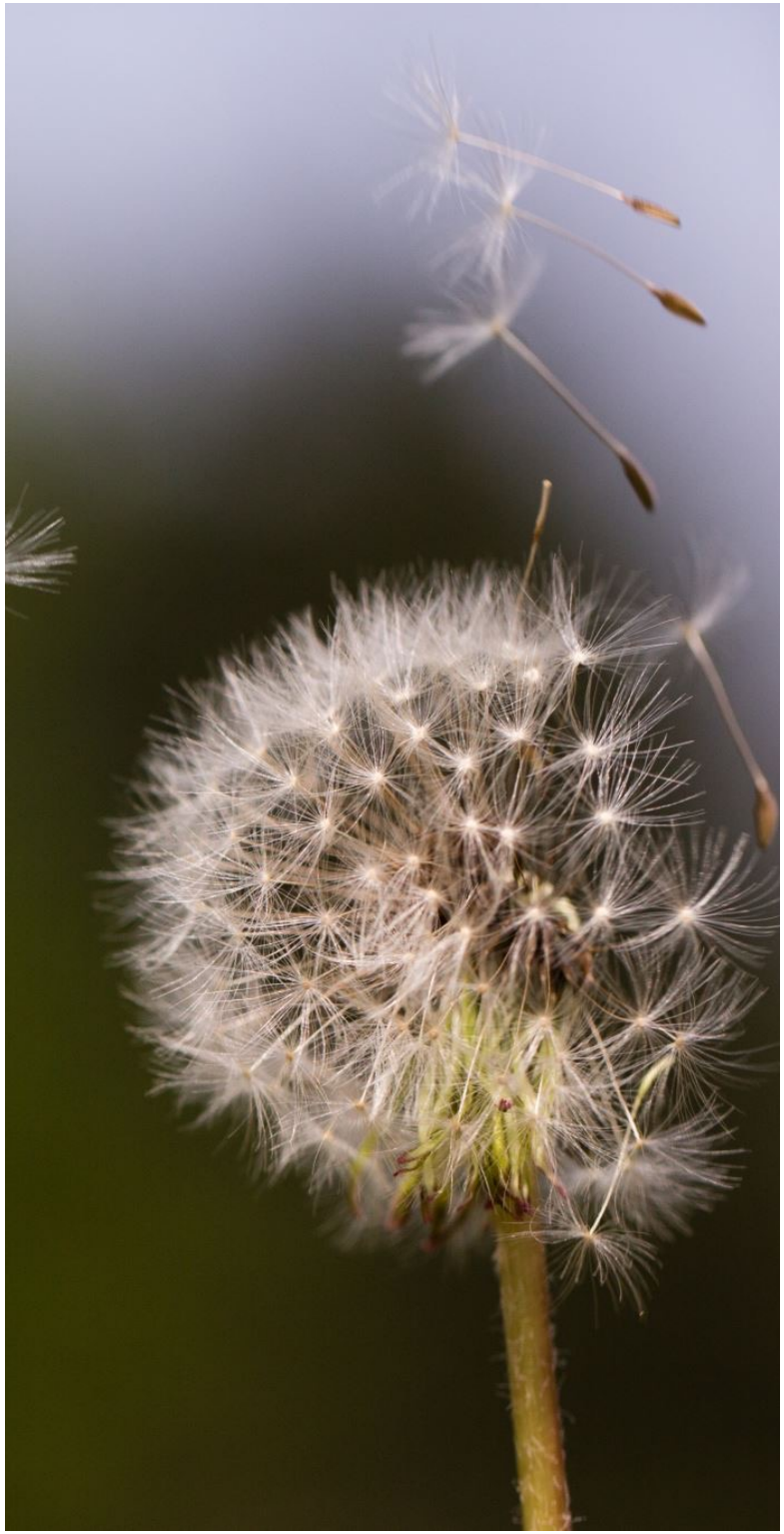
(B) Dry dehiscent fruits: these fruits are dry and split when mature



(C) Succulent fruits: these are fruits with a fleshy pericarp

Figure 3.1 Types of Fruits: dry and indehiscent (A), dry and dehiscent (B), succulent (C)

https://learning.uonbi.ac.ke/courses/SBT204/scormPackages/path_2/31_fruit.html



Fruits/Seeds/Seedlings dispersal

- Wind dispersal
- Water dispersal
- Animal dispersal

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