MAGNOLIA botany

Angiosperm: primitive, ancestral (Not Eudicot, Not Monocot): order Ranales: family Magnoliaceae: ***Magnolia grandiflora*** (southern magnolia)

'evergreen'; spicy odor of blooms; chambered pith; hairy leaves(lower epidermis) & petioles

Mi rogeo

Flowers, Pollen & Pollination; Fertilization & Embryogenesis

Note pollen ‘sac’ on legs

Bees continue to collect pollen from anthers after they’ve fallen onto petal

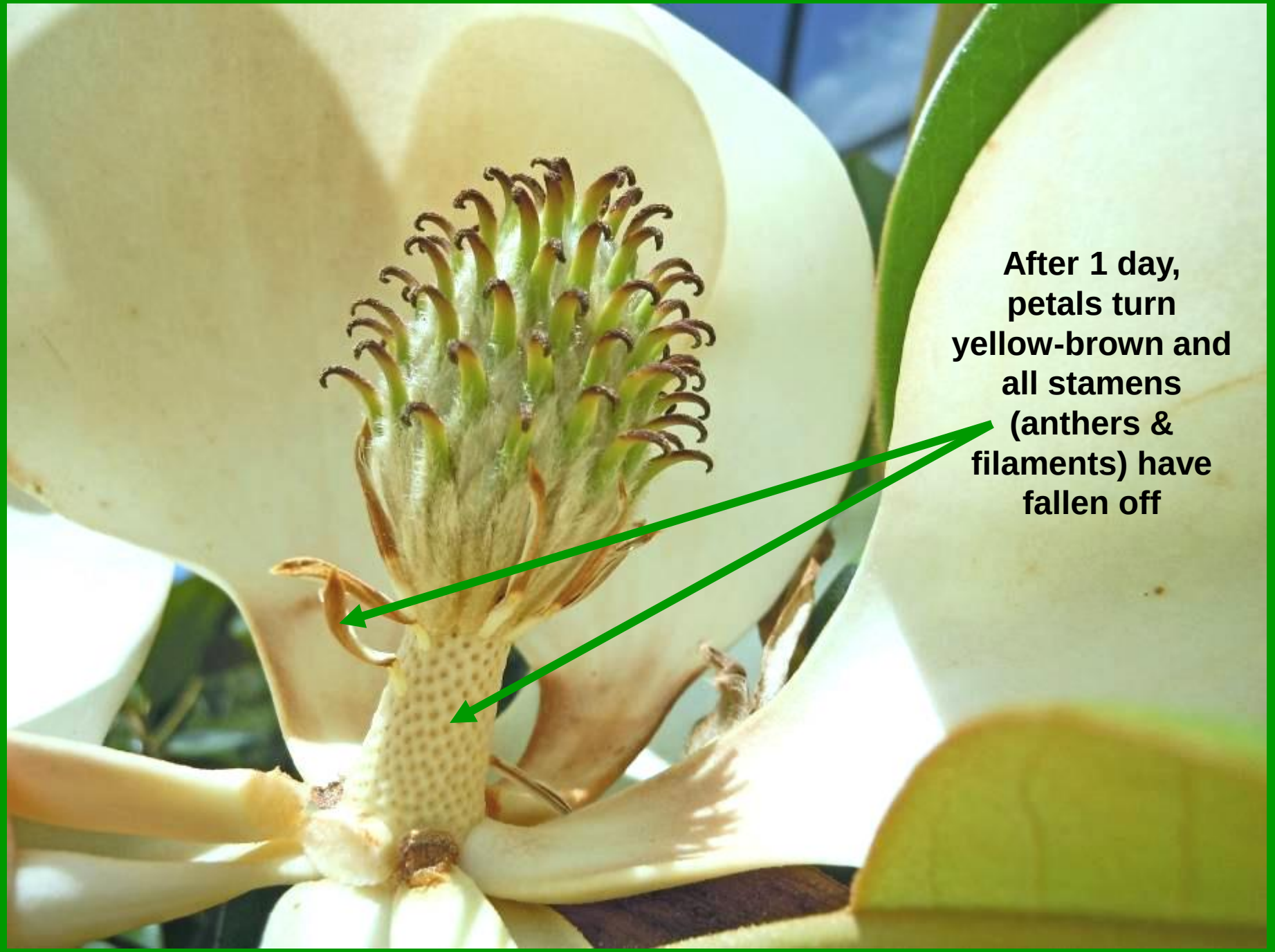
Pistils (w/ Superior unfused ovaries)

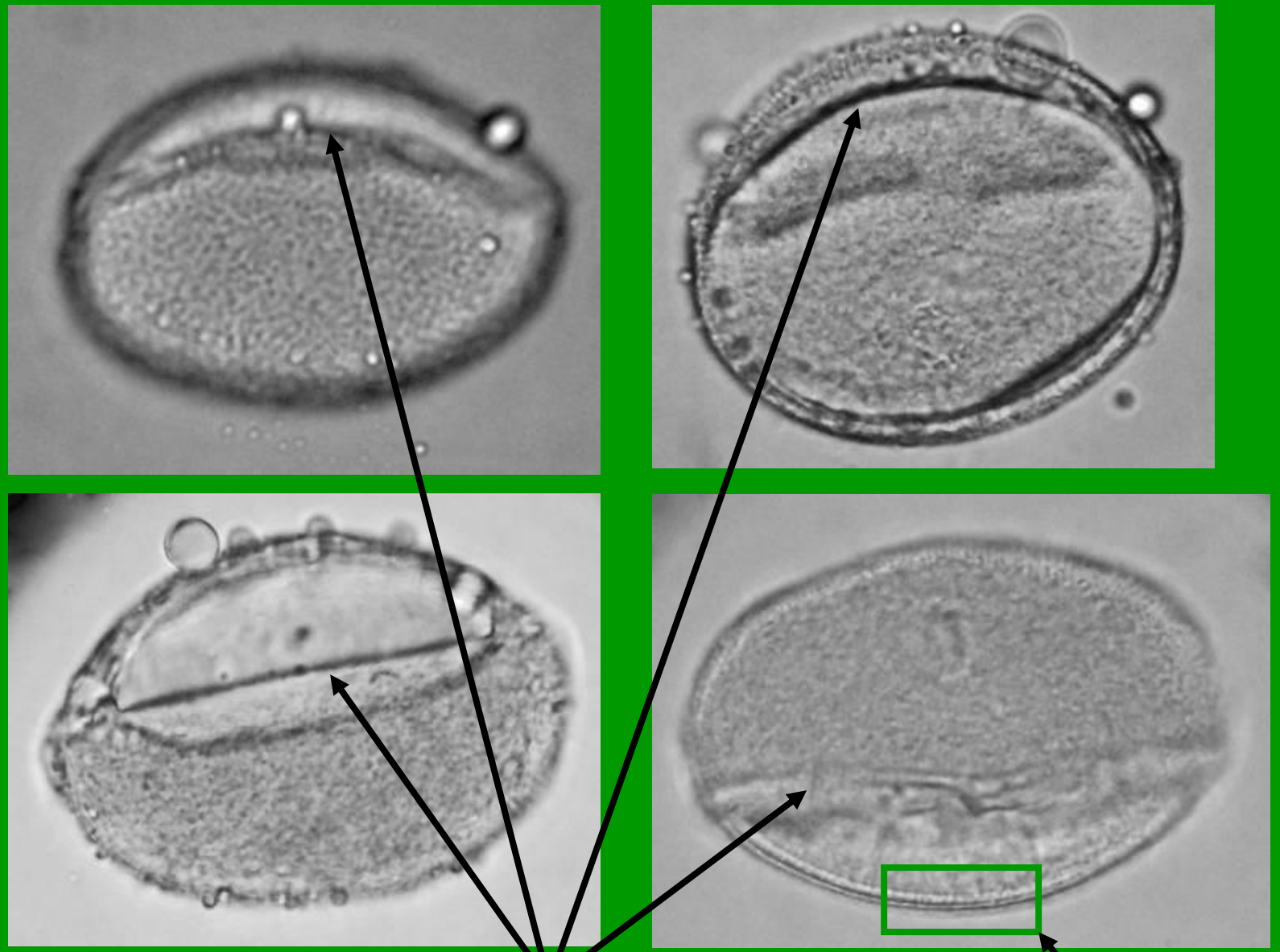
Stamens

Attachment area of Stamens

Petals

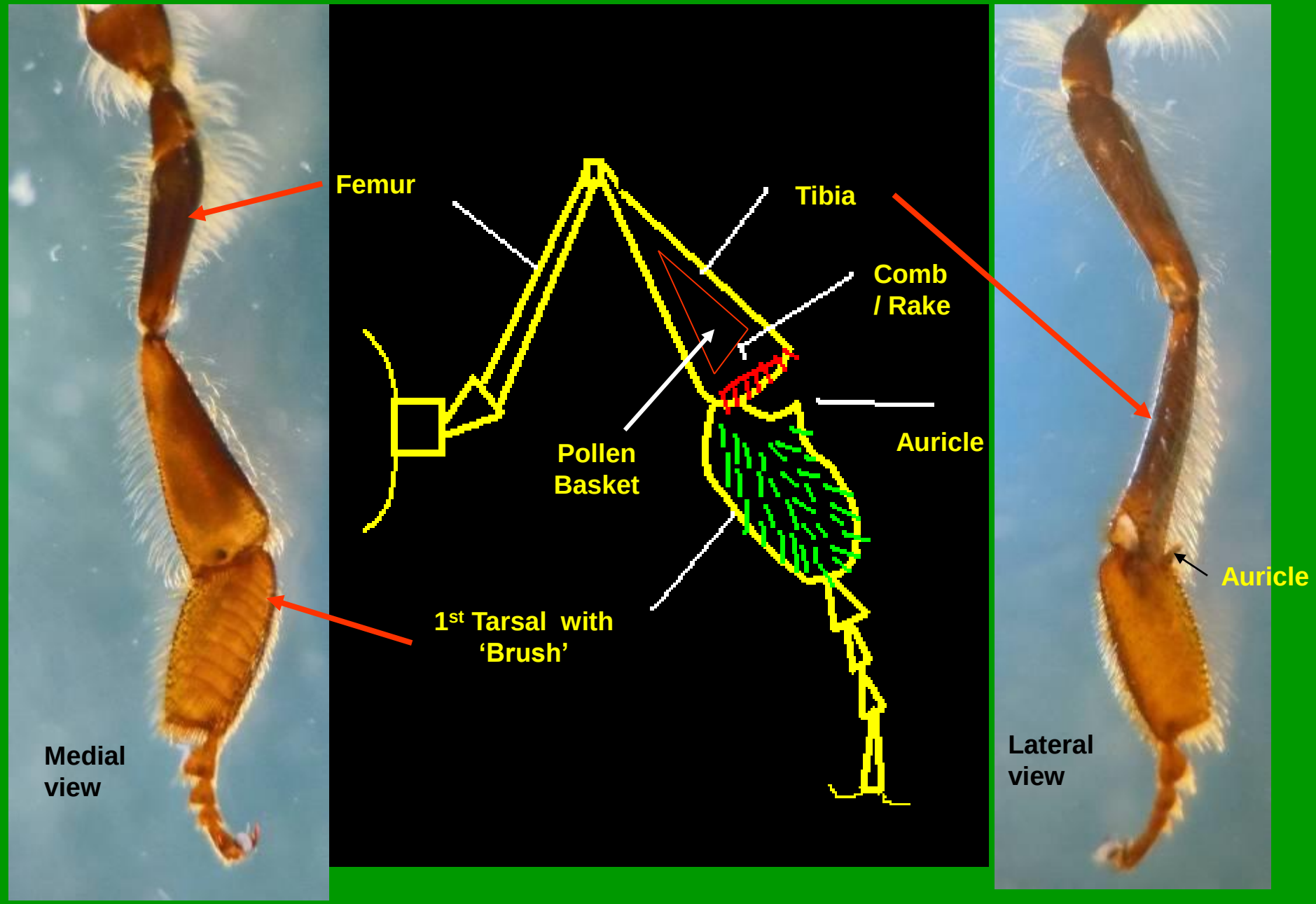
Will produce red seeds when each capsule splits laterally

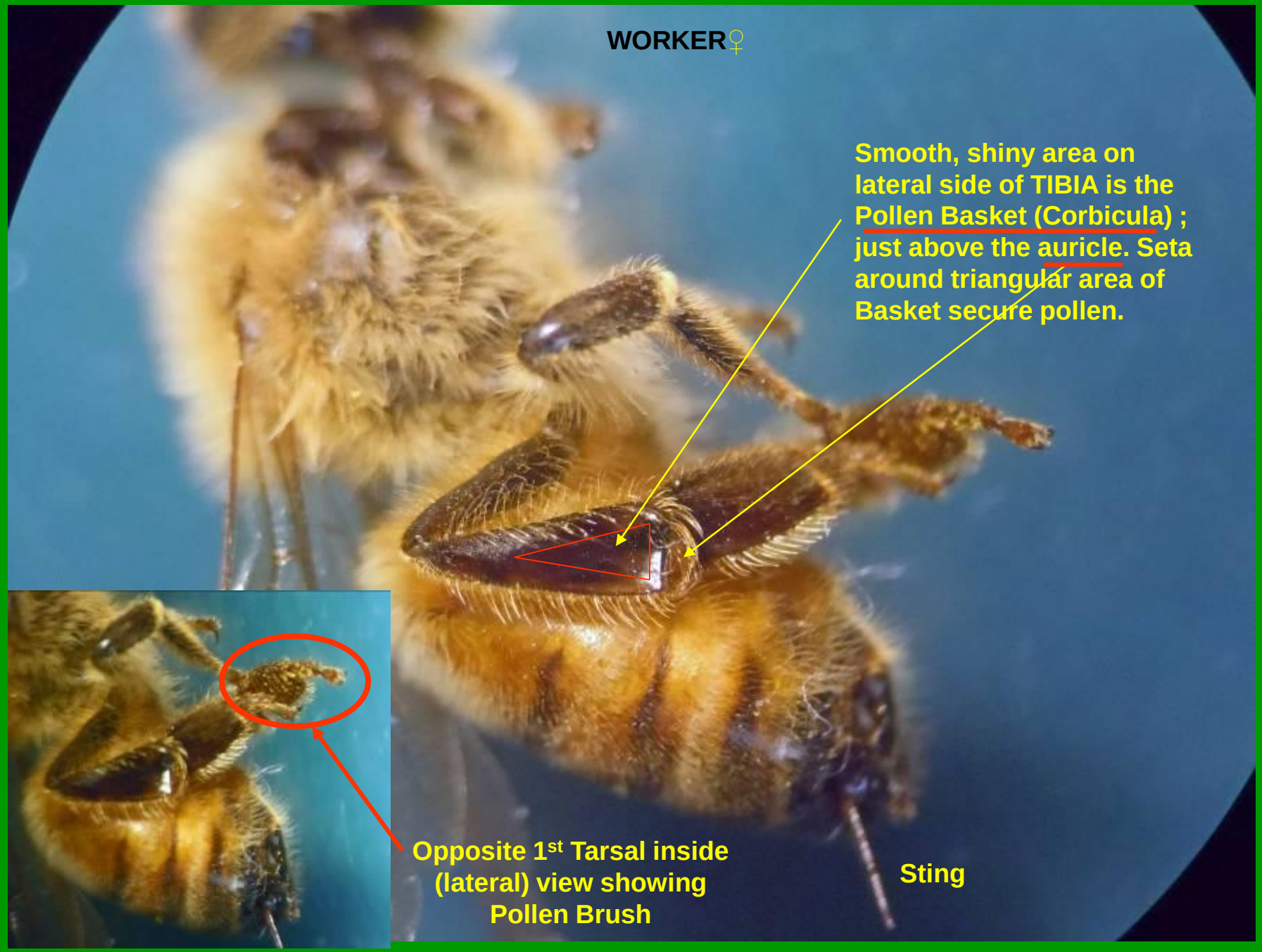

After 1 day, petals turn yellow-brown and all stamens (anthers & filaments) have fallen off

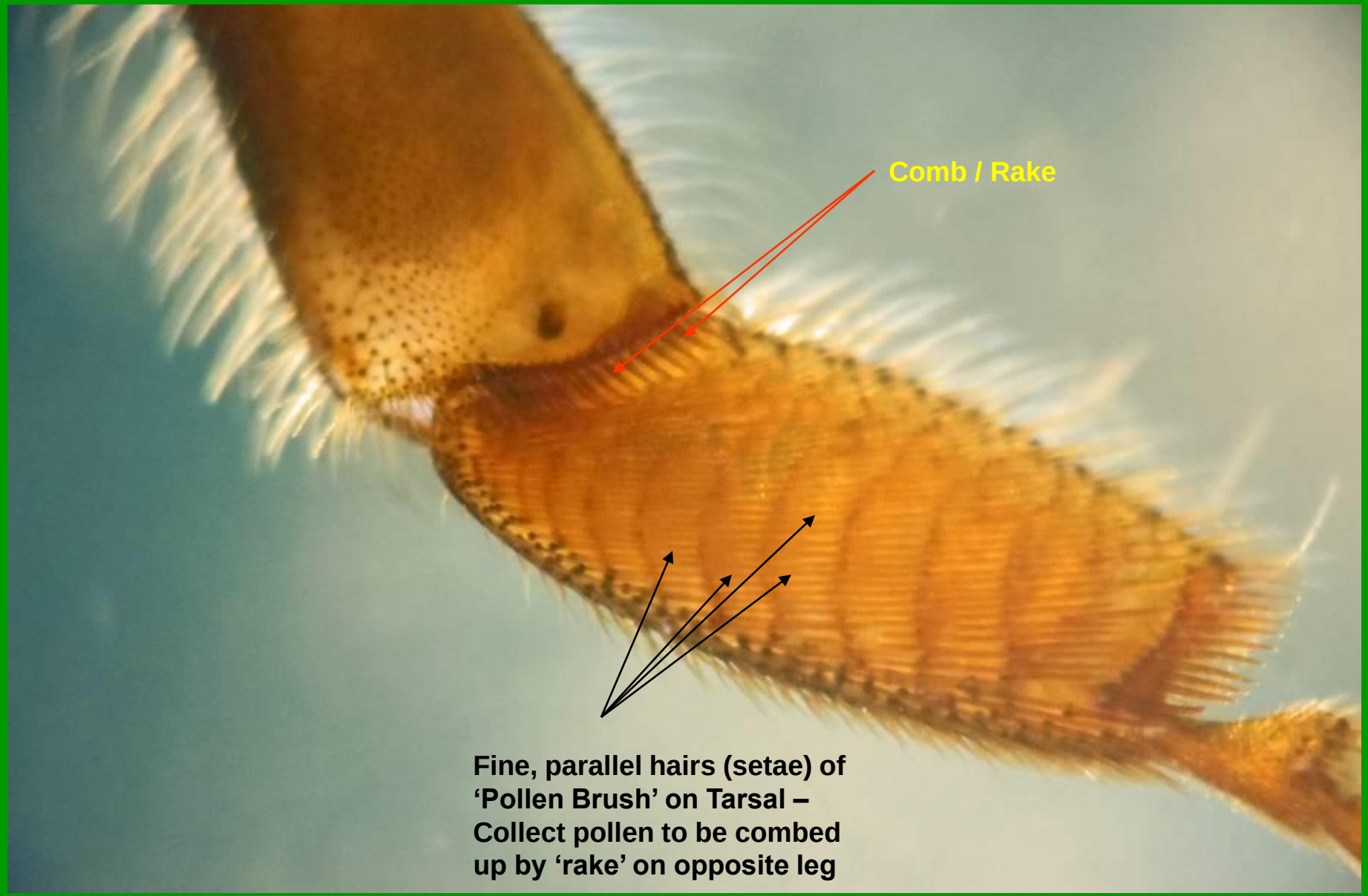


79-81 *u*m Monosulcate Pollen with very fine surface ornamentation and thin Exine

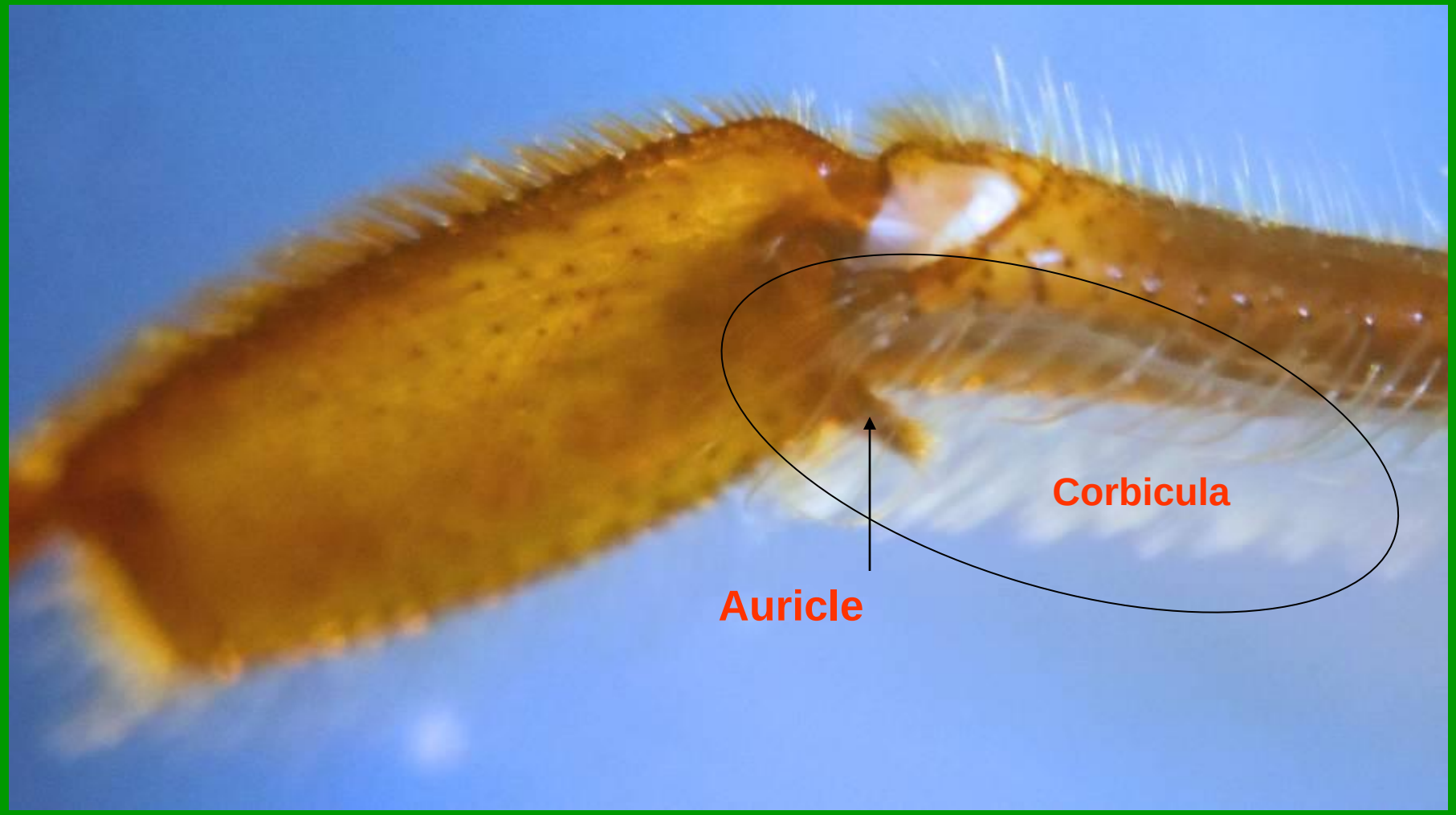
Medial surface of 3rd Leg of Honey Bee showinkg Pollen Packer



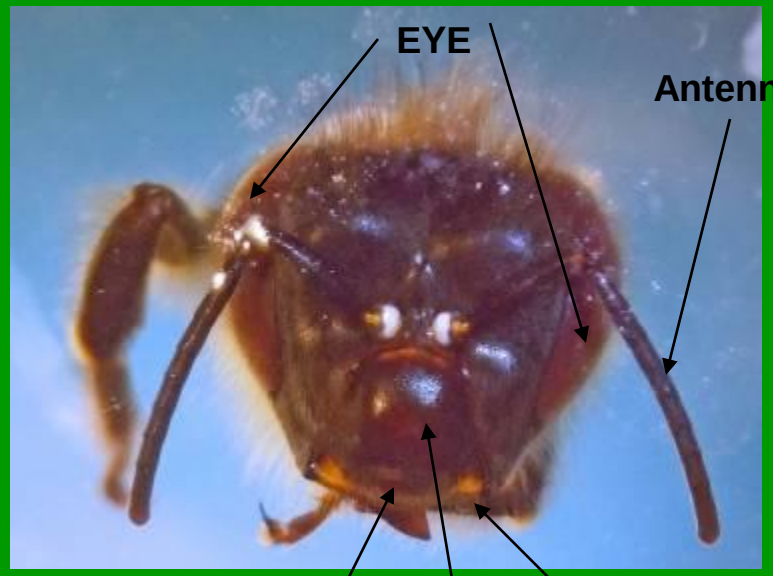

WORKER♀
Smooth, shiny area on lateral side of TIBIA is the Pollen Basket (Corbicula) ; just above the auricle. Seta around triangular area of Basket secure pollen.
Opposite 1st Tarsal inside (lateral) view showing Pollen Brush
Sting



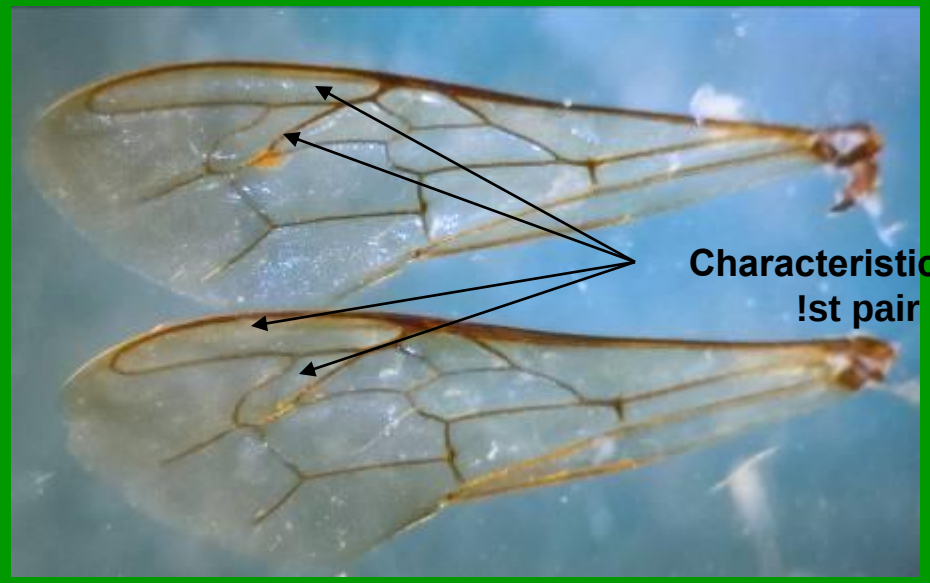
Inside (medial) view of 1st Tarsal segment and Tibia



Outside (Lateral) view of 1st Tarsal segment and Tibia: After Rake pulls pollen from opposite Pollen Brush, the Auricle (with pollen on its surface from the opposte rake) pushes the pollen up into the Pollen Basket of the lower tibia (also called the 'Corbicula')

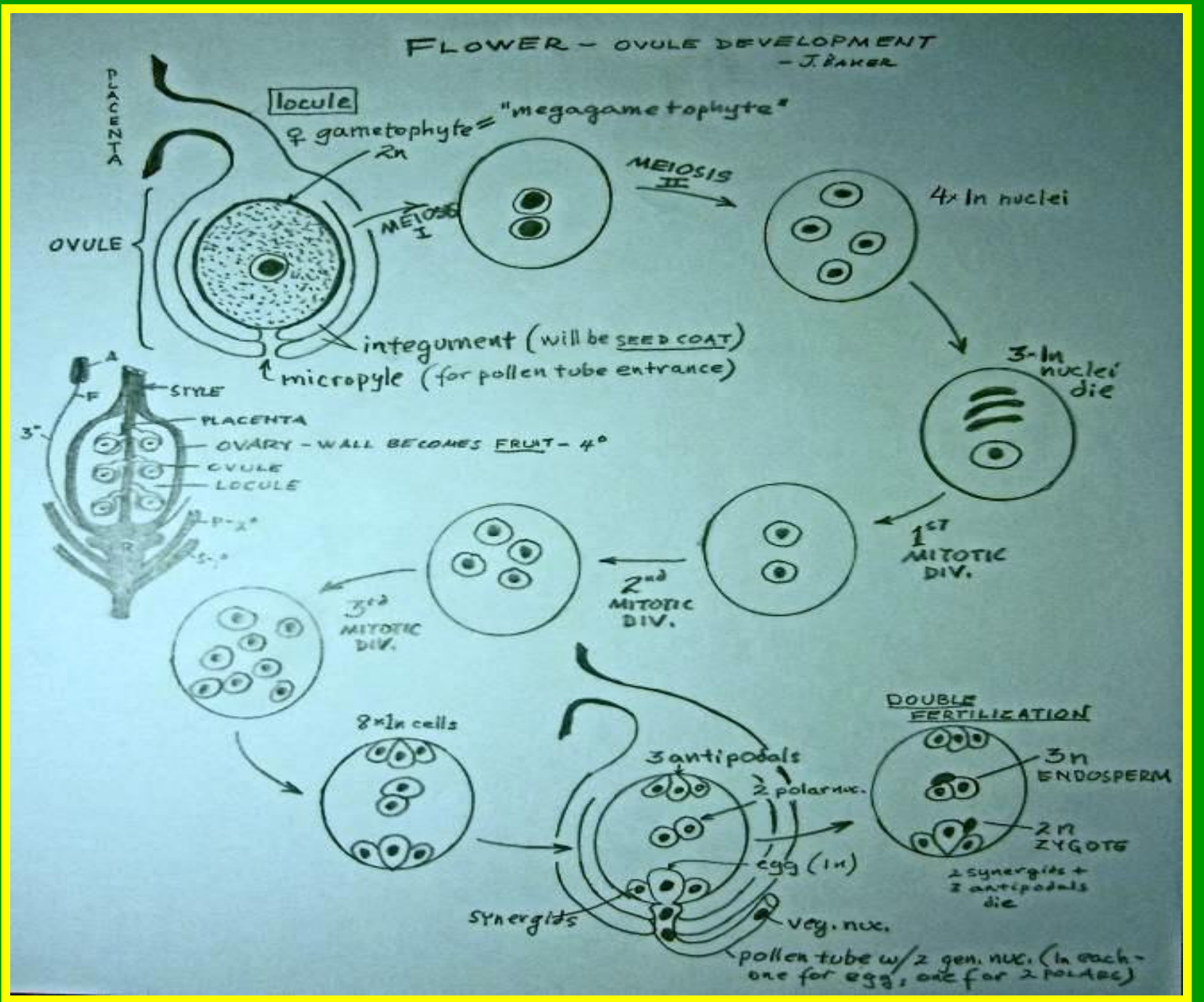


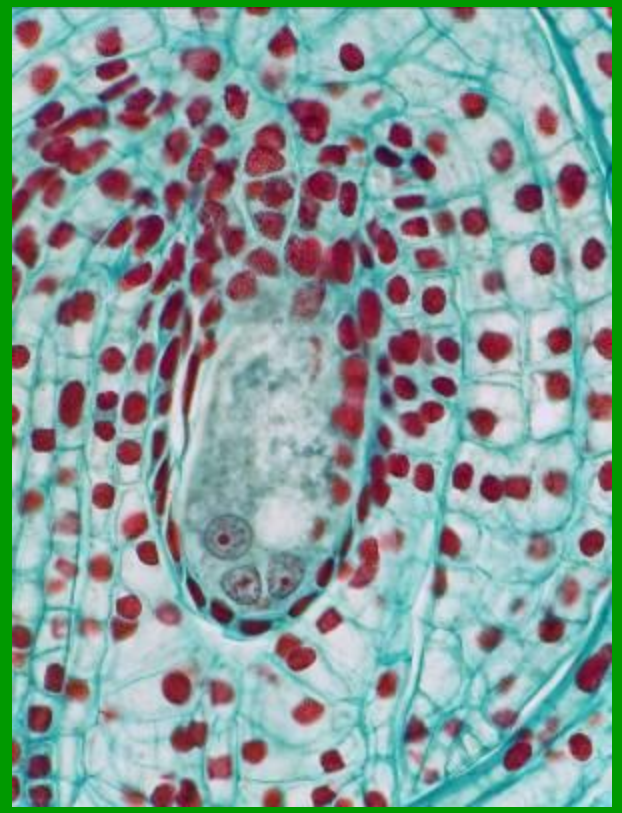
Sting

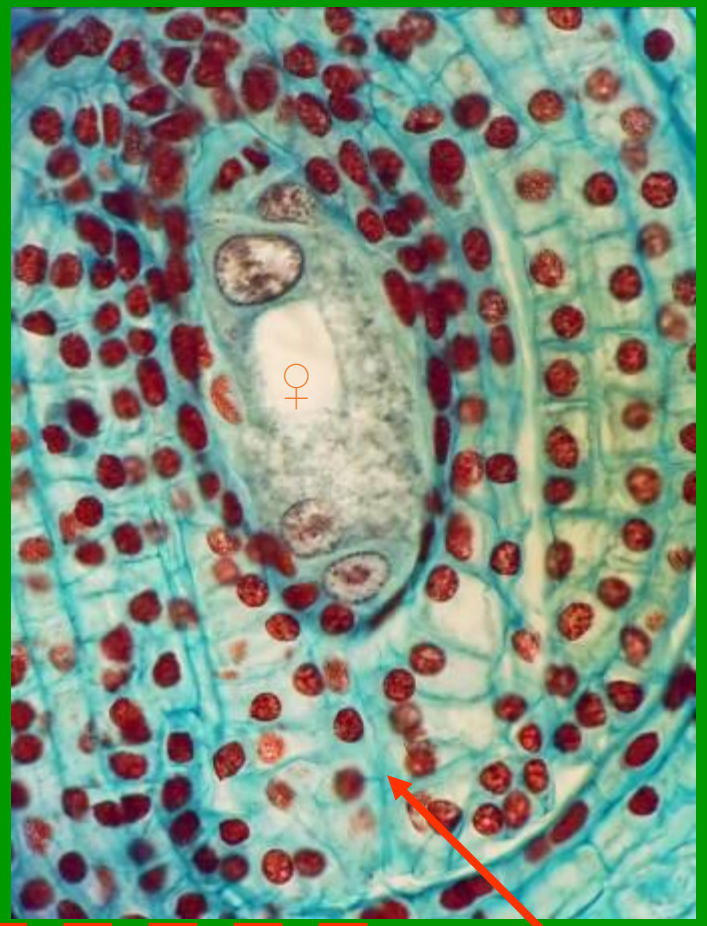


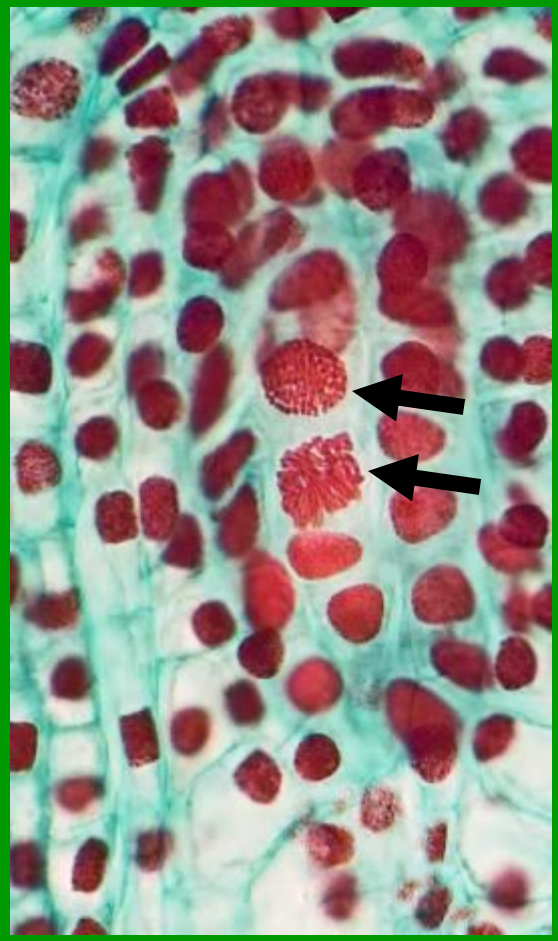
Characteristic wing ‘cells’ of !st pair (Rs & M)

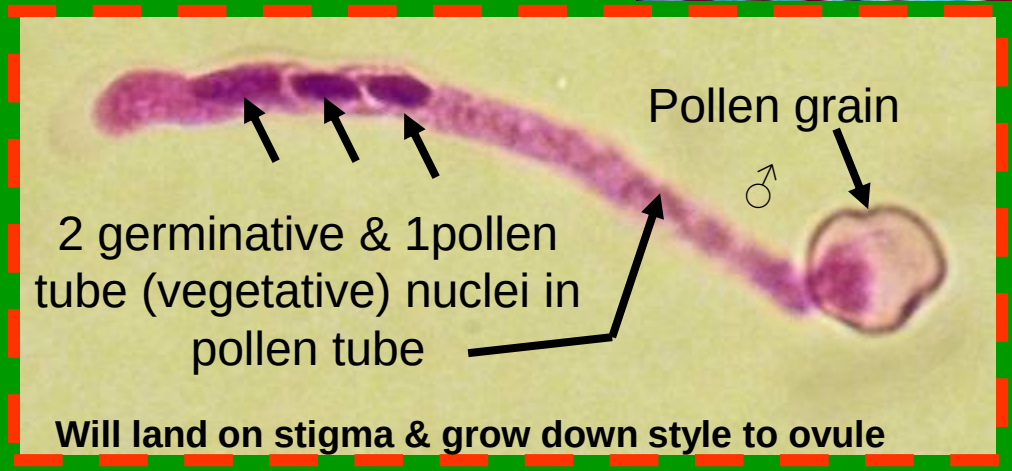
Hymenoptera;Apidae; Apinae; *Apis mellifera* Linn. – the European Honey Bee


FLOWER – OVULE DEVELOPMENT
– J. BAKER
PLACENTA
locule
♀ gametophyte = "megagametophyte"
2n
OVULE
MEIOSIS I
MEIOSIS II
4x 1n nuclei
integument (will be SEED COAT)
micropyle (for pollen tube entrance)
3-1n nuclei die
A
F
STYLE
3°
PLACENTA
OVARY – WALL BECOMES FRUIT – 4°
OVULE
LOCULE
1st MITOTIC DIV.
2nd MITOTIC DIV.
3rd MITOTIC DIV.
8x1n cells
3 antipodals
2 polar nuc.
egg (1n)
synergids
veg. nuc.
pollen tube w/ 2 gen. nuc. (1 each – one for egg, one for 2 polars)
DOUBLE FERTILIZATION
3n ENDOSPERM
2n ZYGOTE
2 synergids + 3 antipodals die



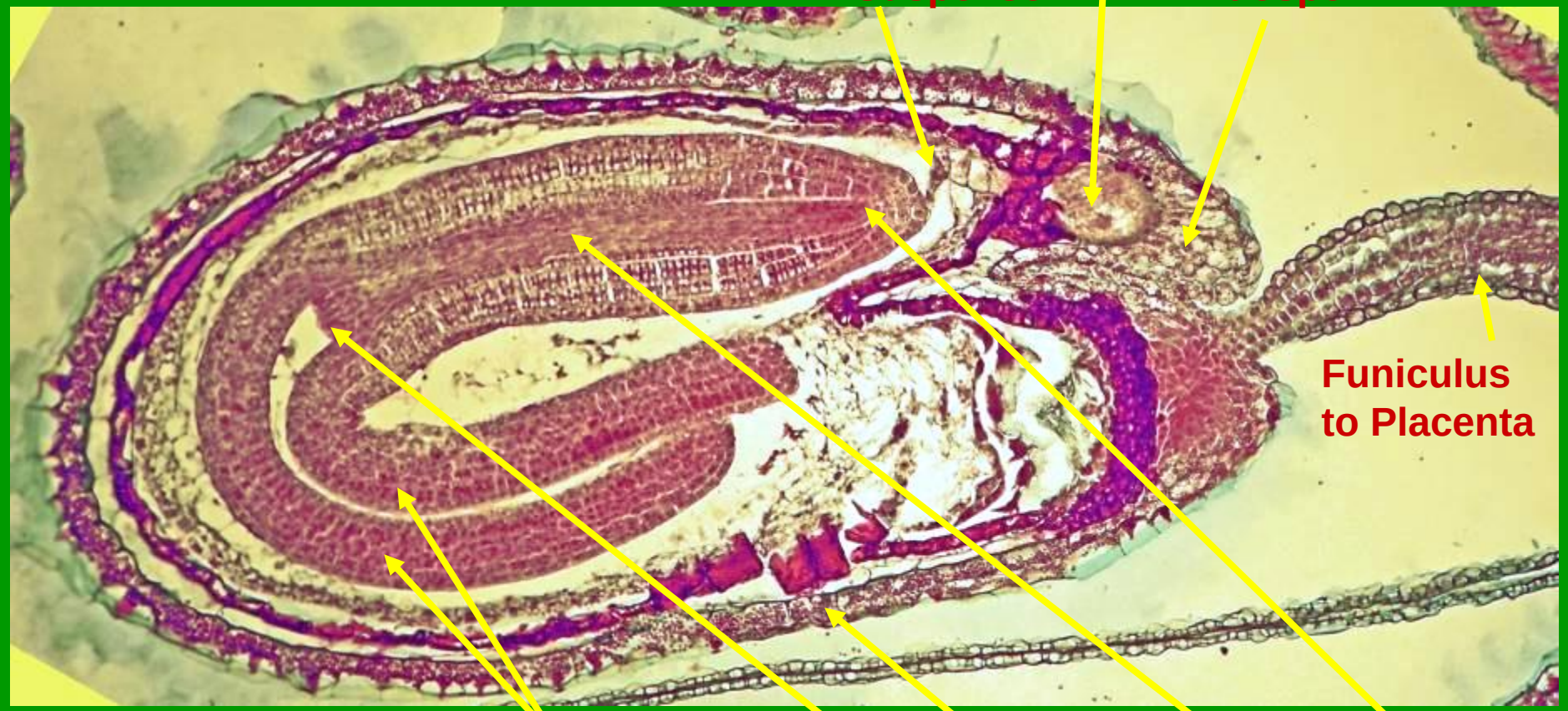


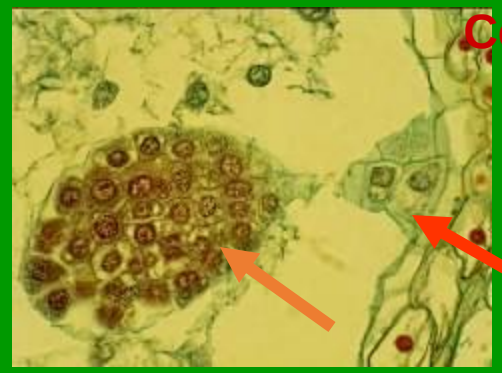




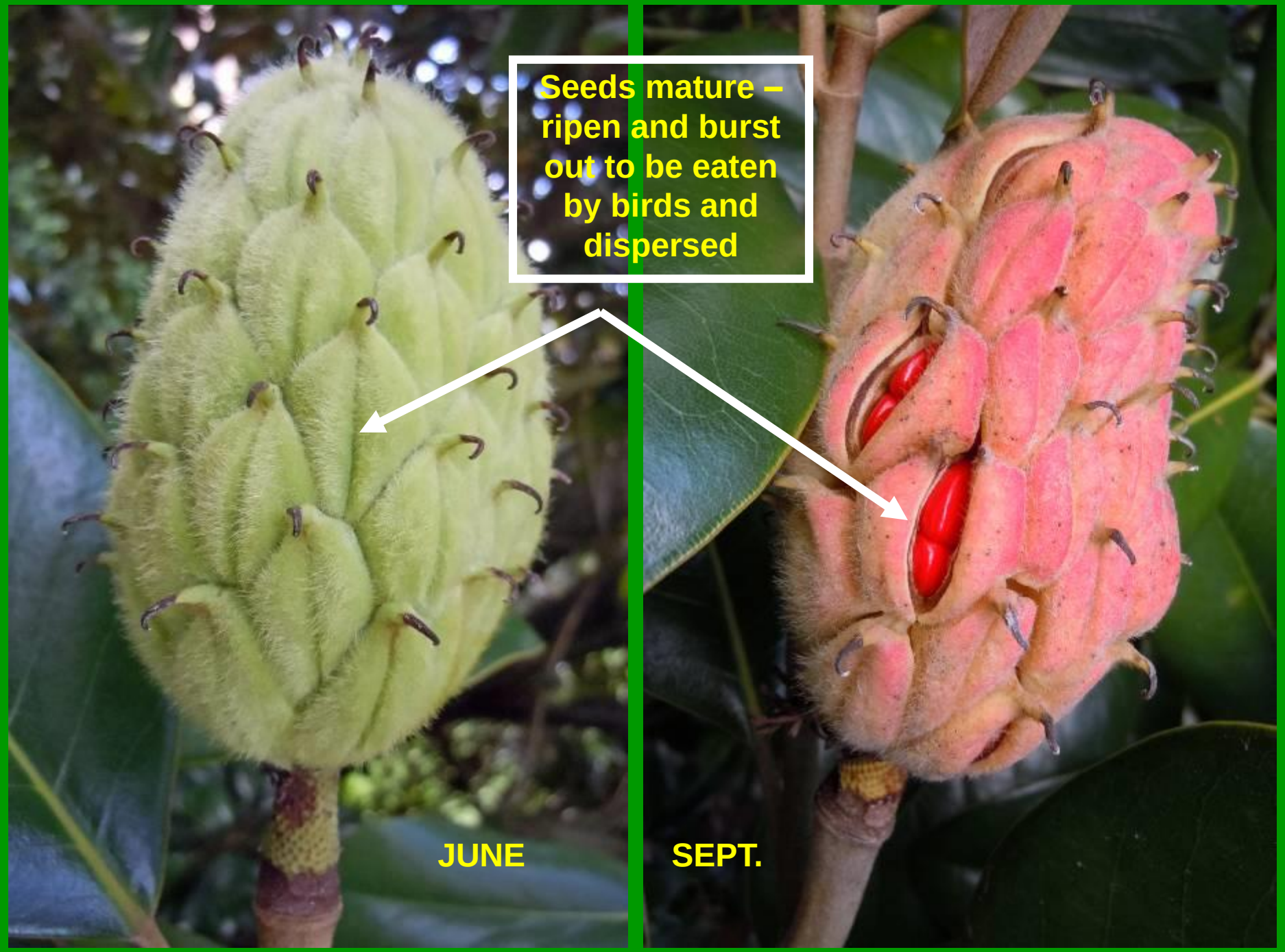
3 views of ovule 4-8 nuclei stage; note chromosomes in mitotic divisions of 1n nuclei in right-hand photo

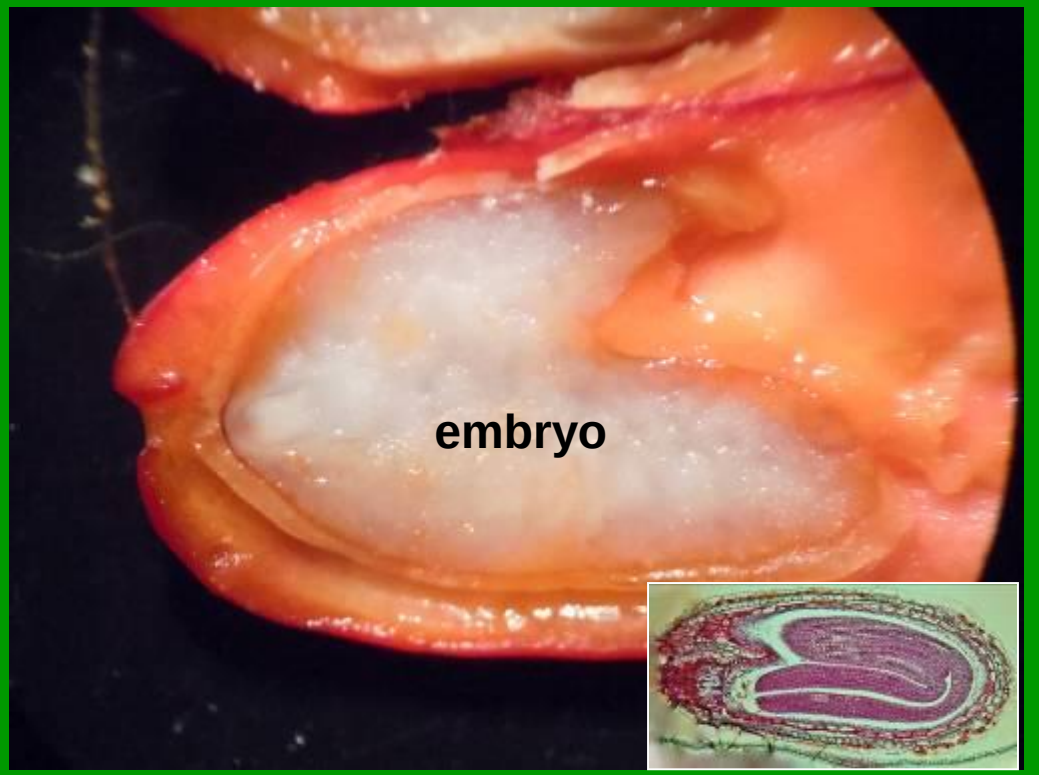
Plant Embryo: Later Stage

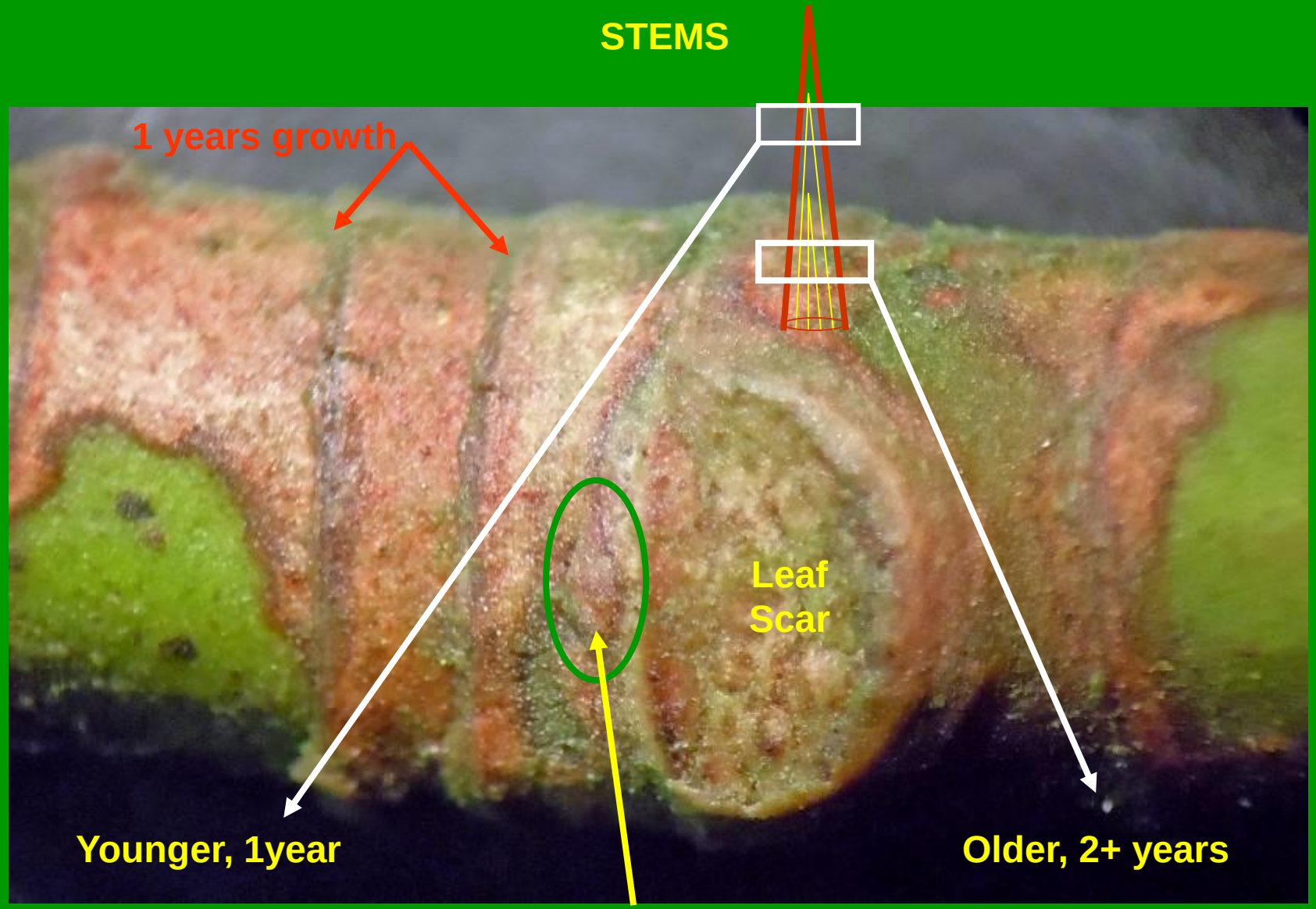


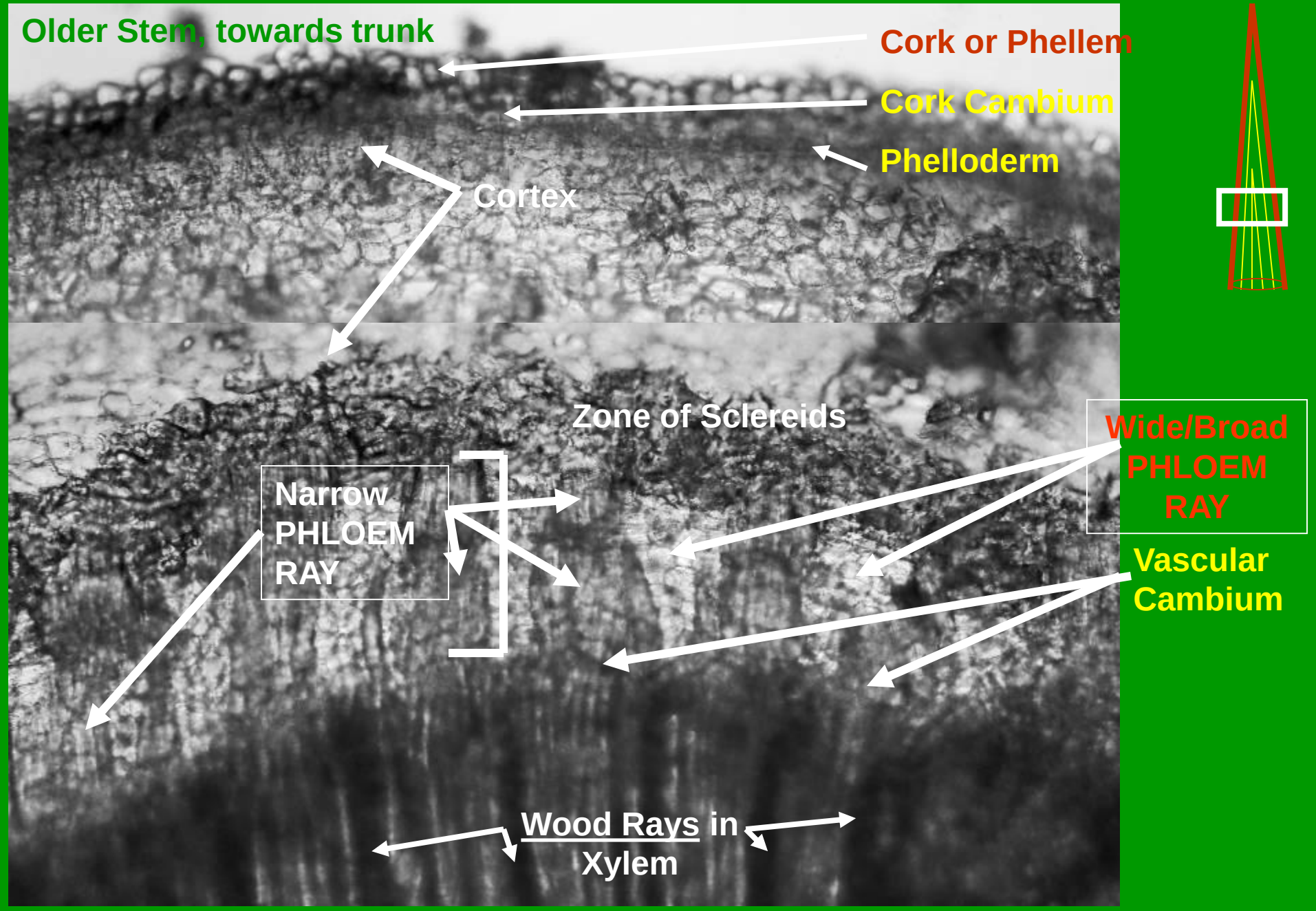


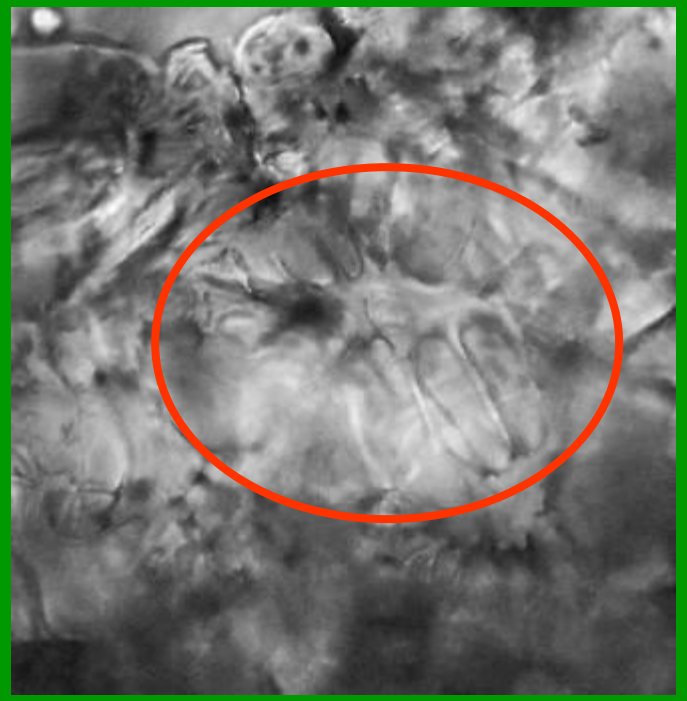
Very early embryo on its suspensor cells

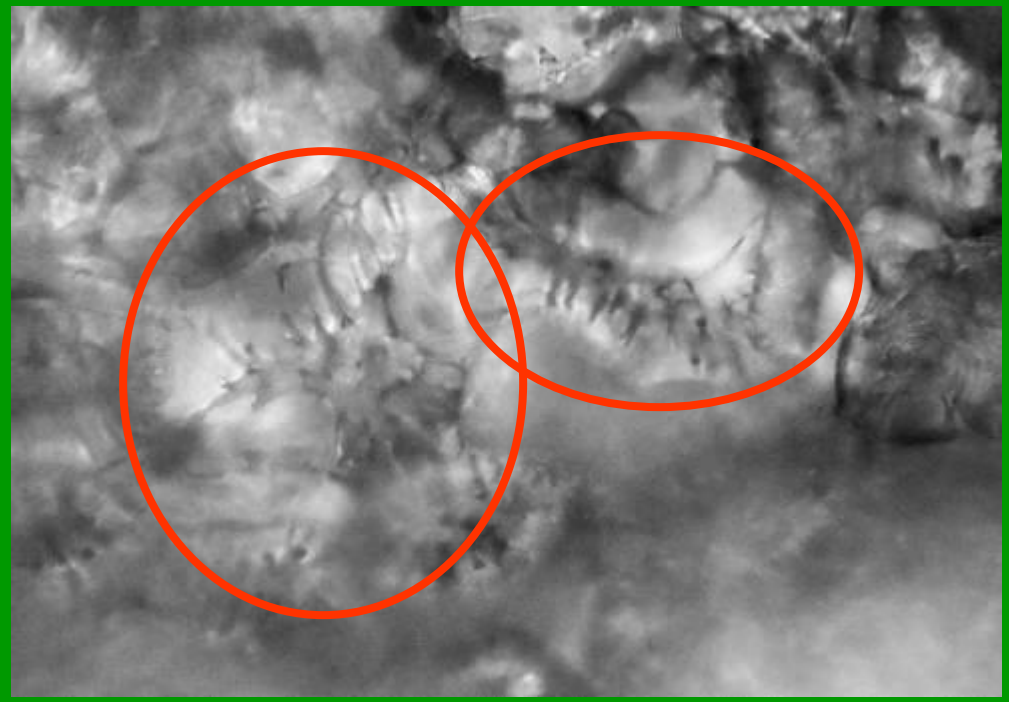

Seeds mature – ripen and burst out to be eaten by birds and dispersed
JUNE
SEPT.

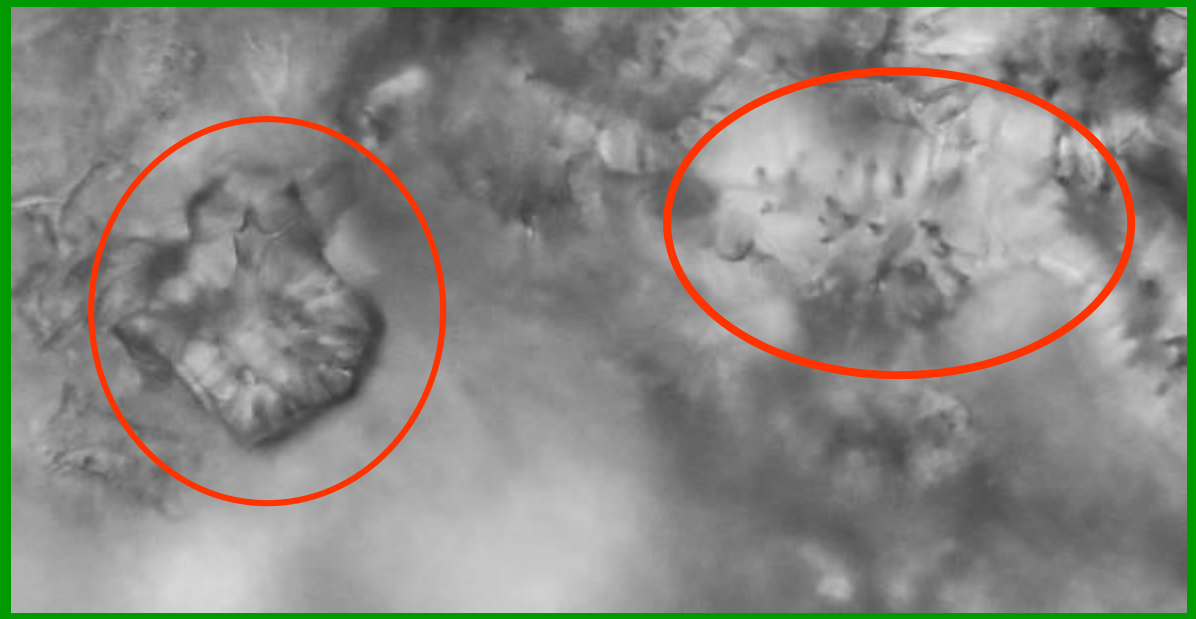

embryo


STEMS
1 years growth
Leaf
Scar
Younger, 1year
Older, 2+ years
Axillary Bud
scale scar

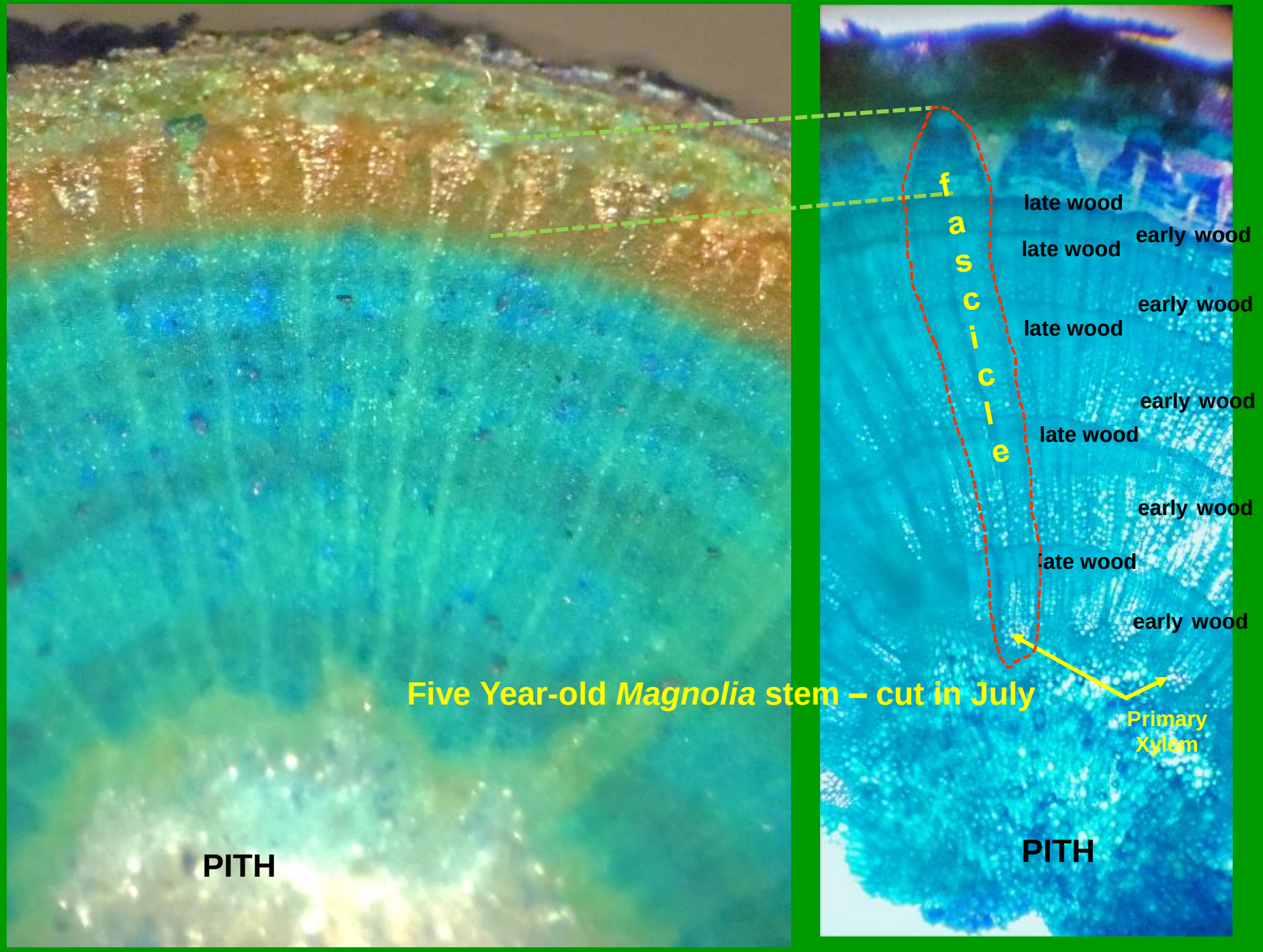

Older Stem, towards trunk
Cork or Phellem
Cork Cambium
Phelloderm
Cortex
Zone of Sclereids
Narrow PHLOEM RAY
Wide/Broad PHLOEM RAY
Vascular Cambium
Wood Rays in Xylem



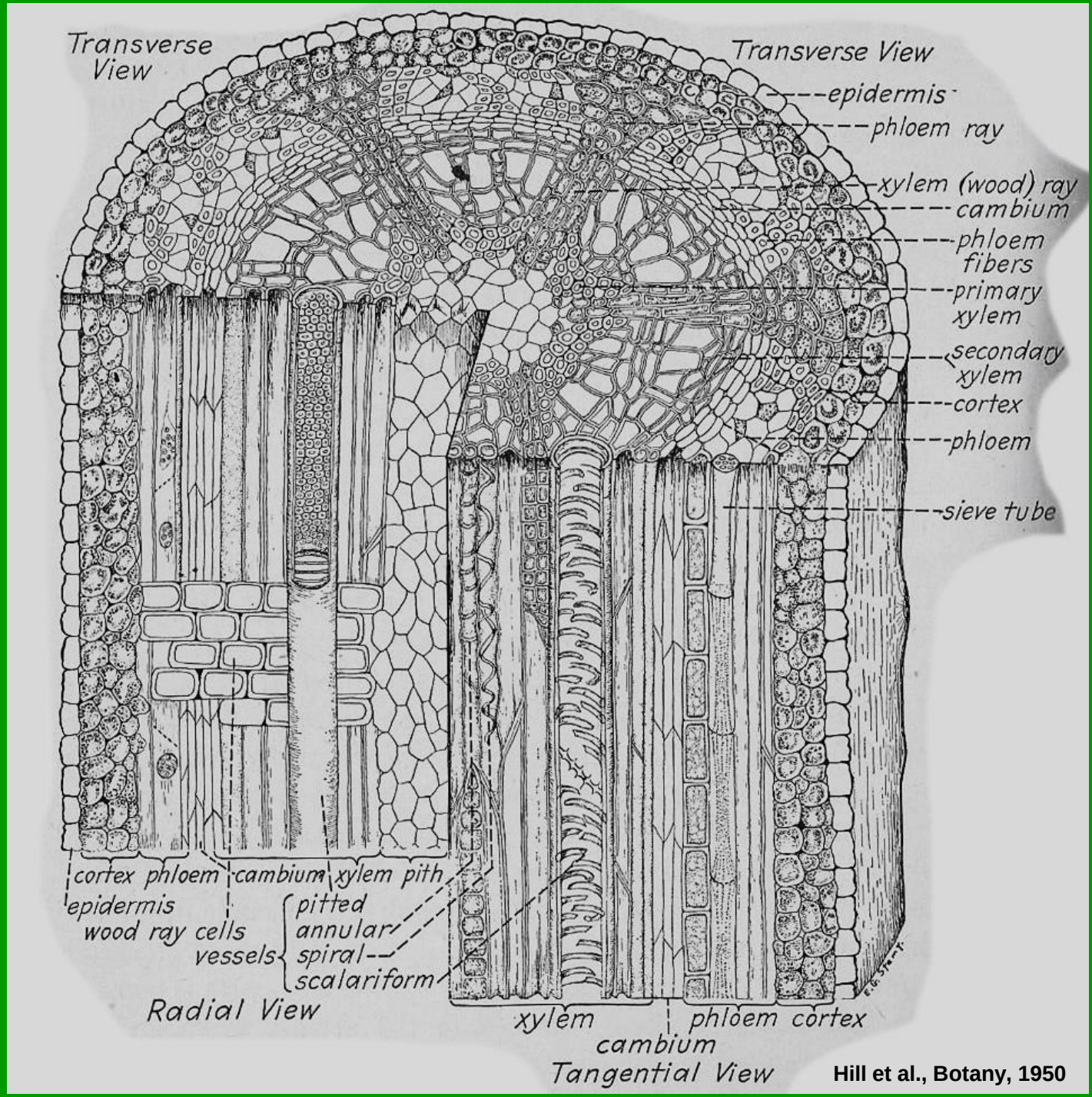




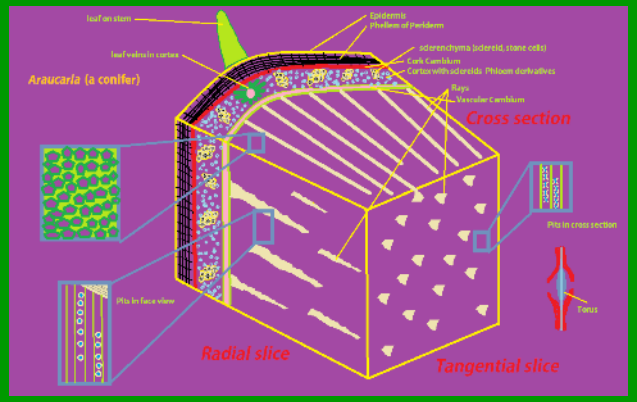
Sclereids in zone above primary Phloem

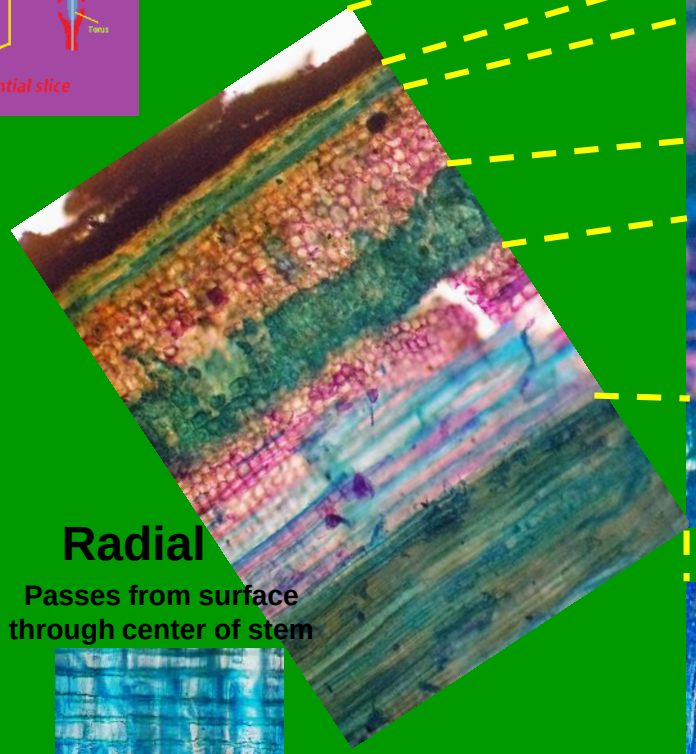


Five Year-old *Magnolia* stem – cut in July



Hill et al., Botany, 1950

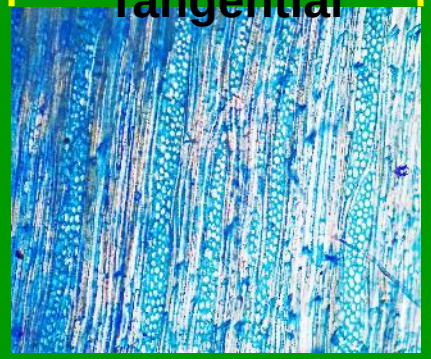




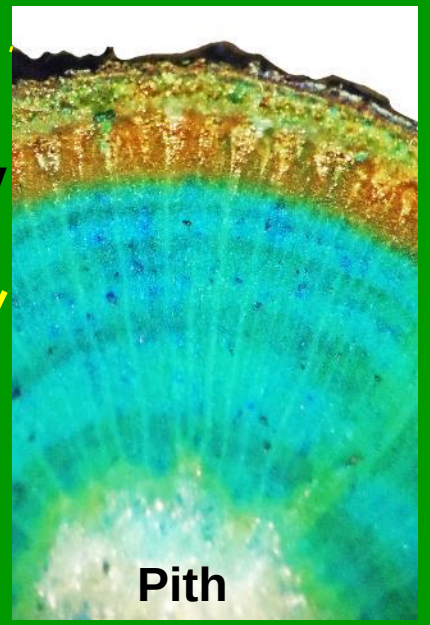
Radial

Passes from surface through center of stem

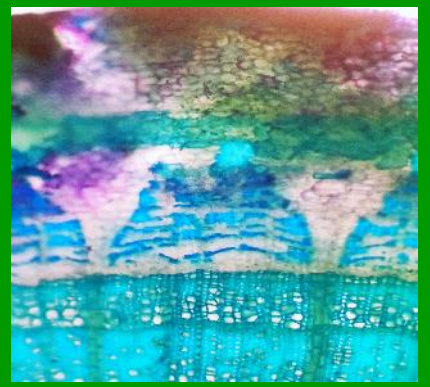
Tangential

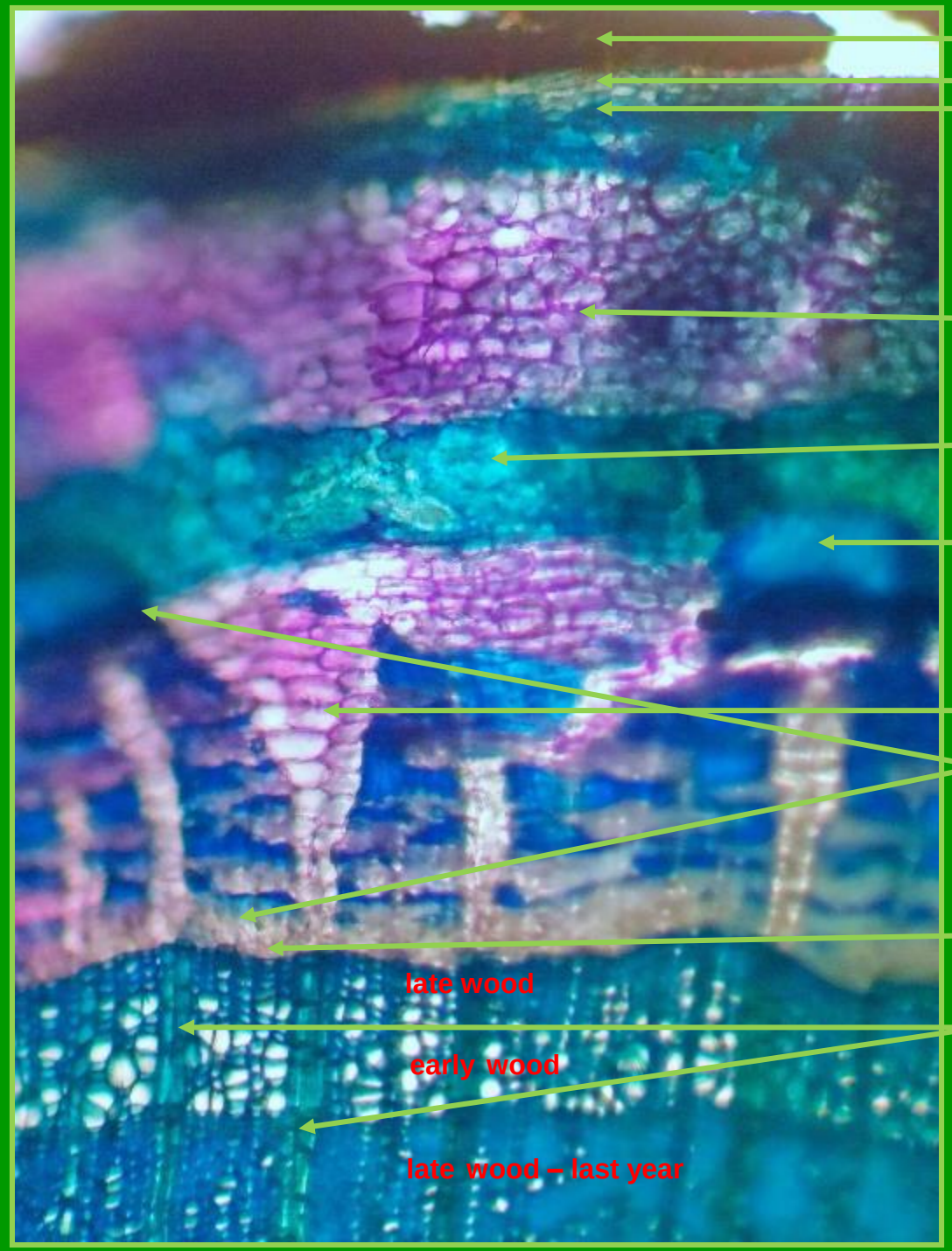


Transverse or Cross Section



Pith





Phellem –outer cork or ‘bark’
Phellogen or cork cambium
Phelloderm- a parenchyma
Periderm

Cortex

Sclerenchyma or phloem fibers- continuous

Slerenchyma fibers of vascular bundle

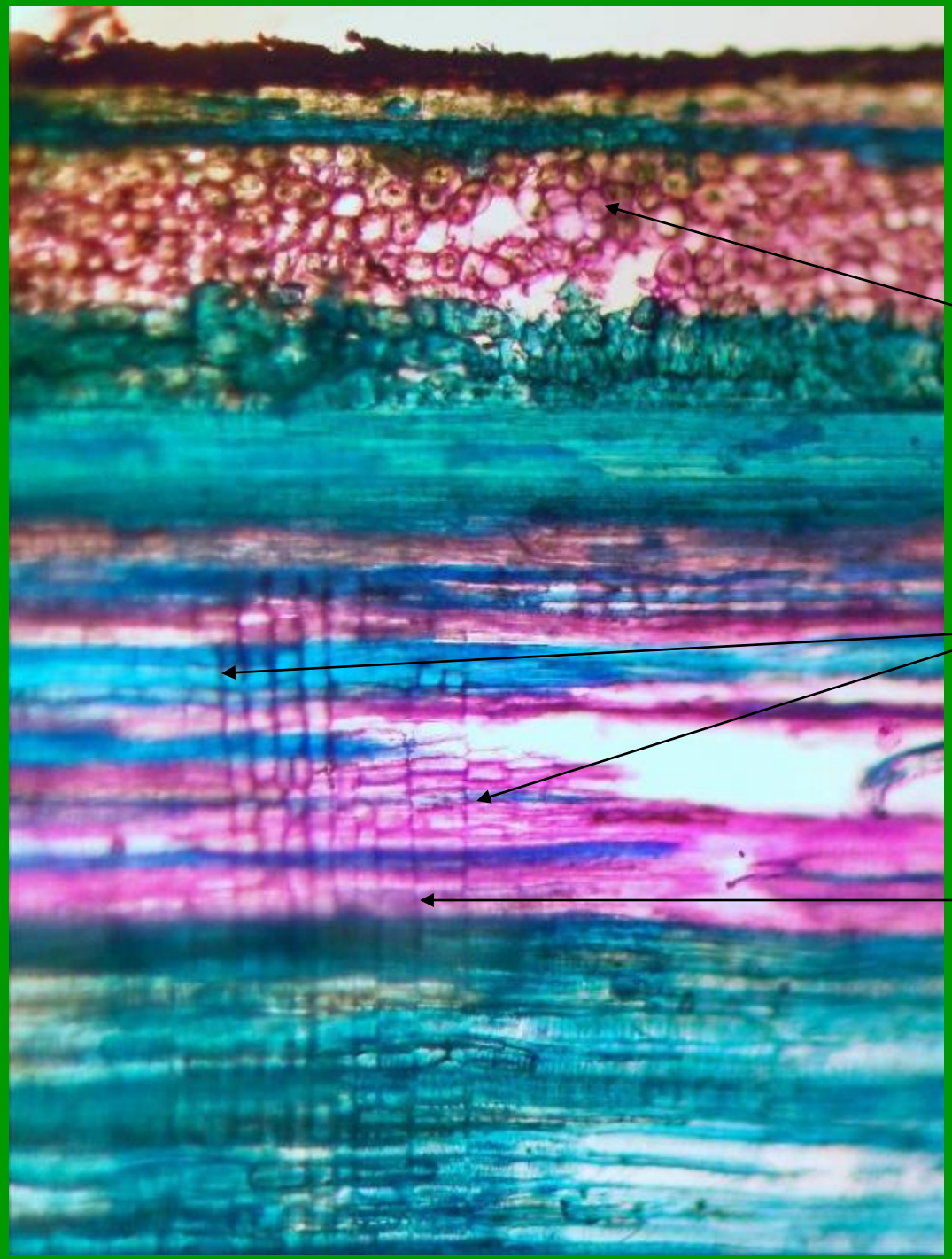
Wide phloem RAY

Annual Phloem Layers of narrow phloem
RAYS - squashed

Vascular Cambium

Xylem RAYS

Cross section



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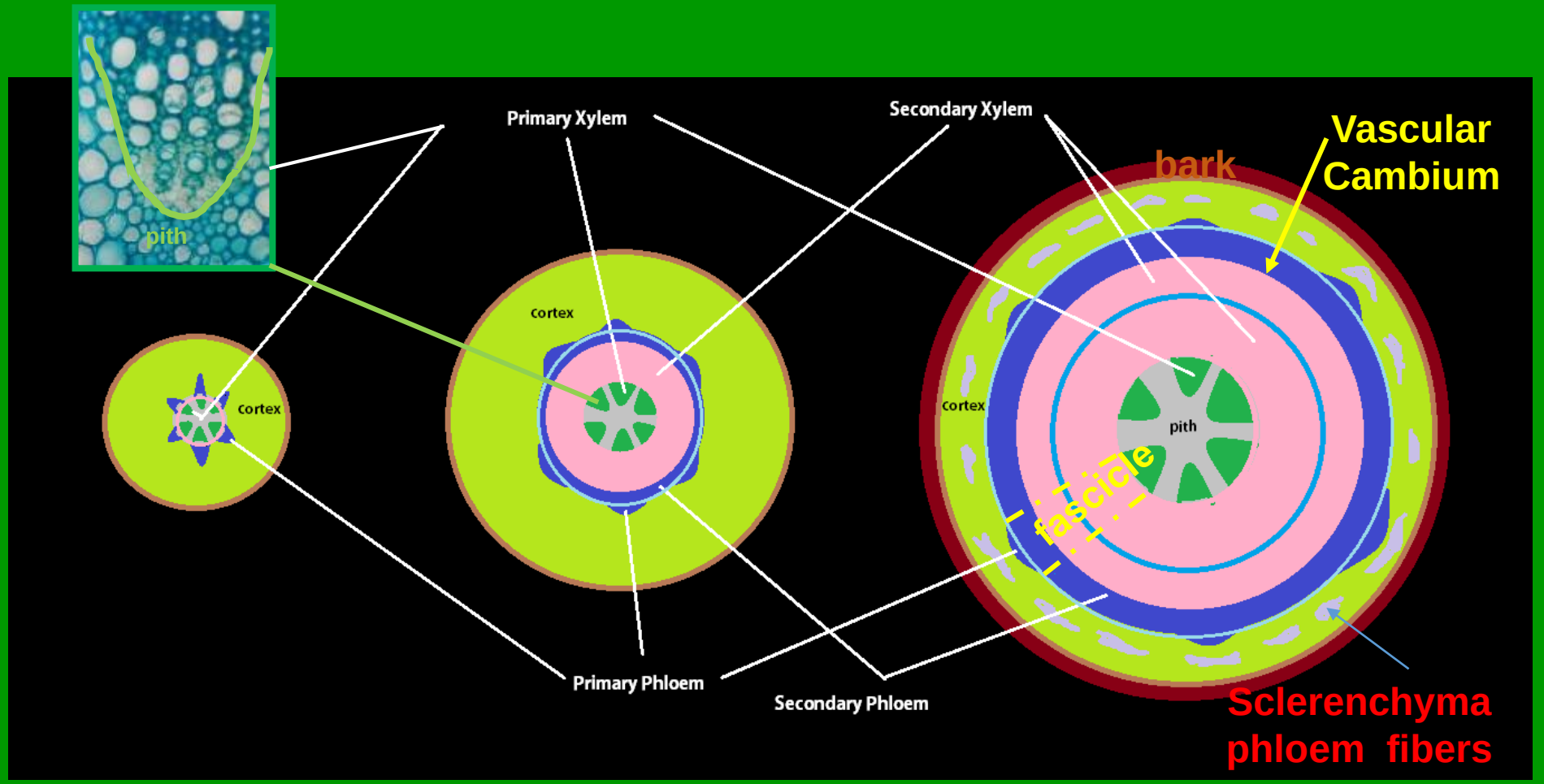
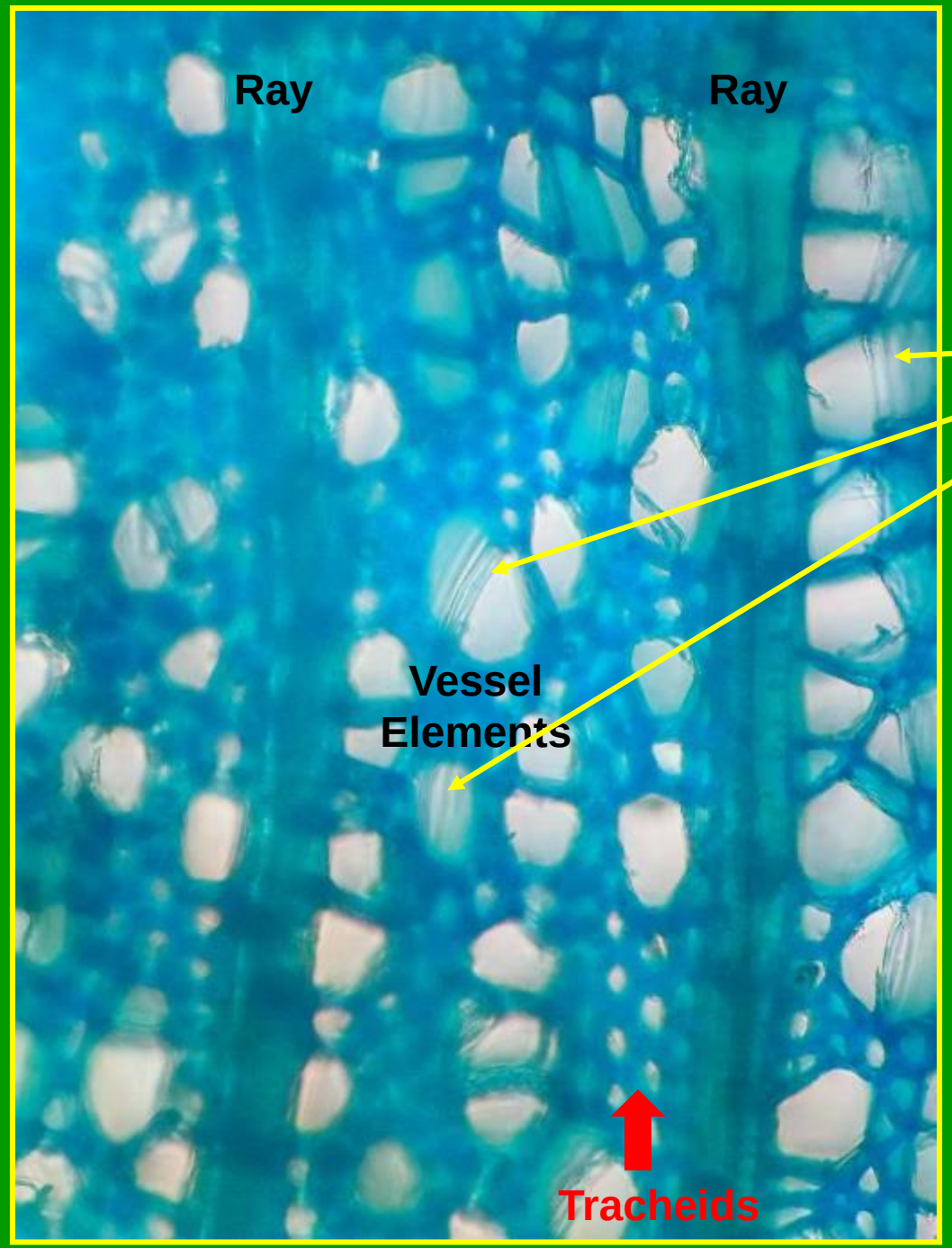
Vascular Cambium

Xylem RAYS

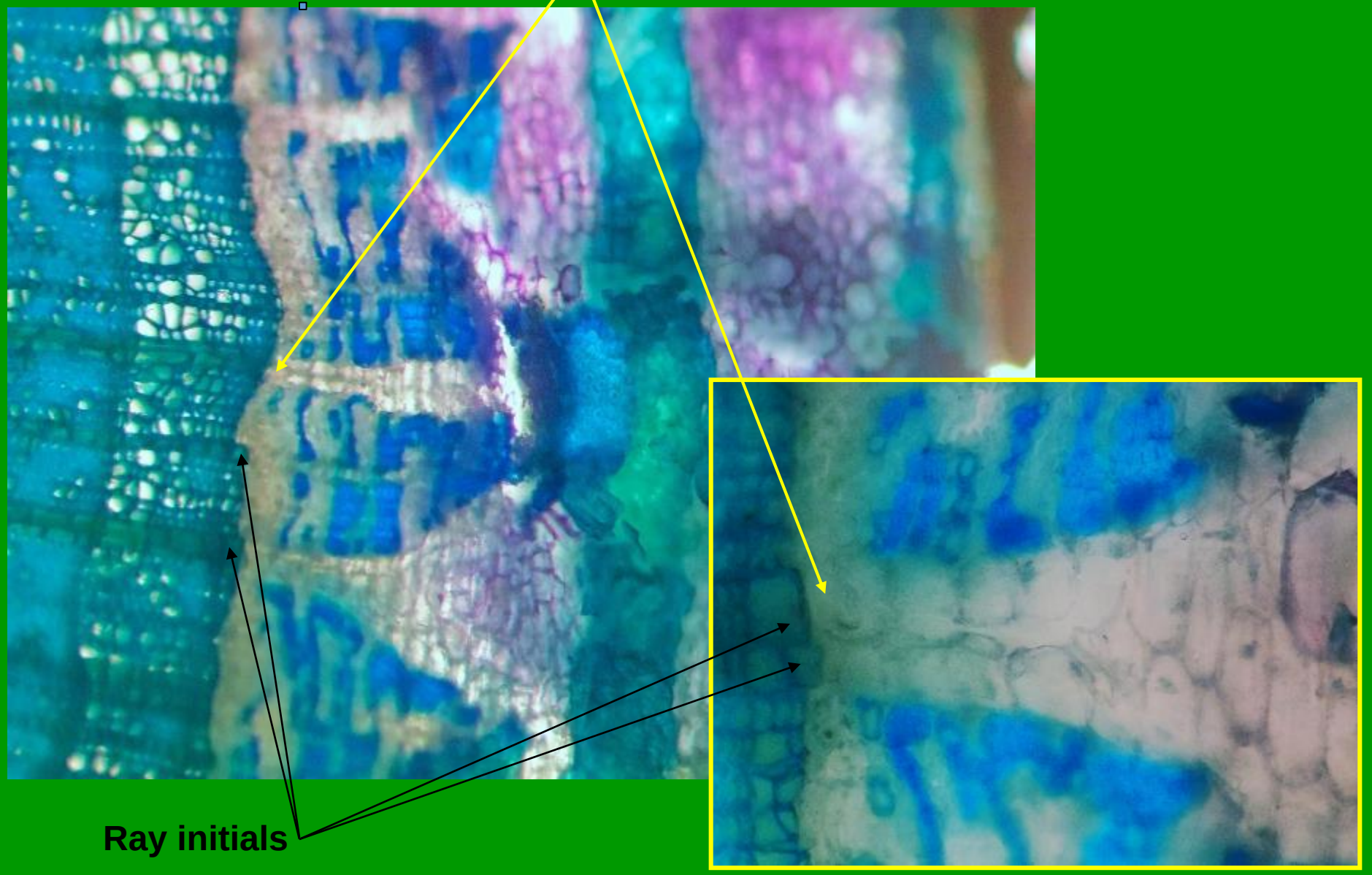
Radial Section



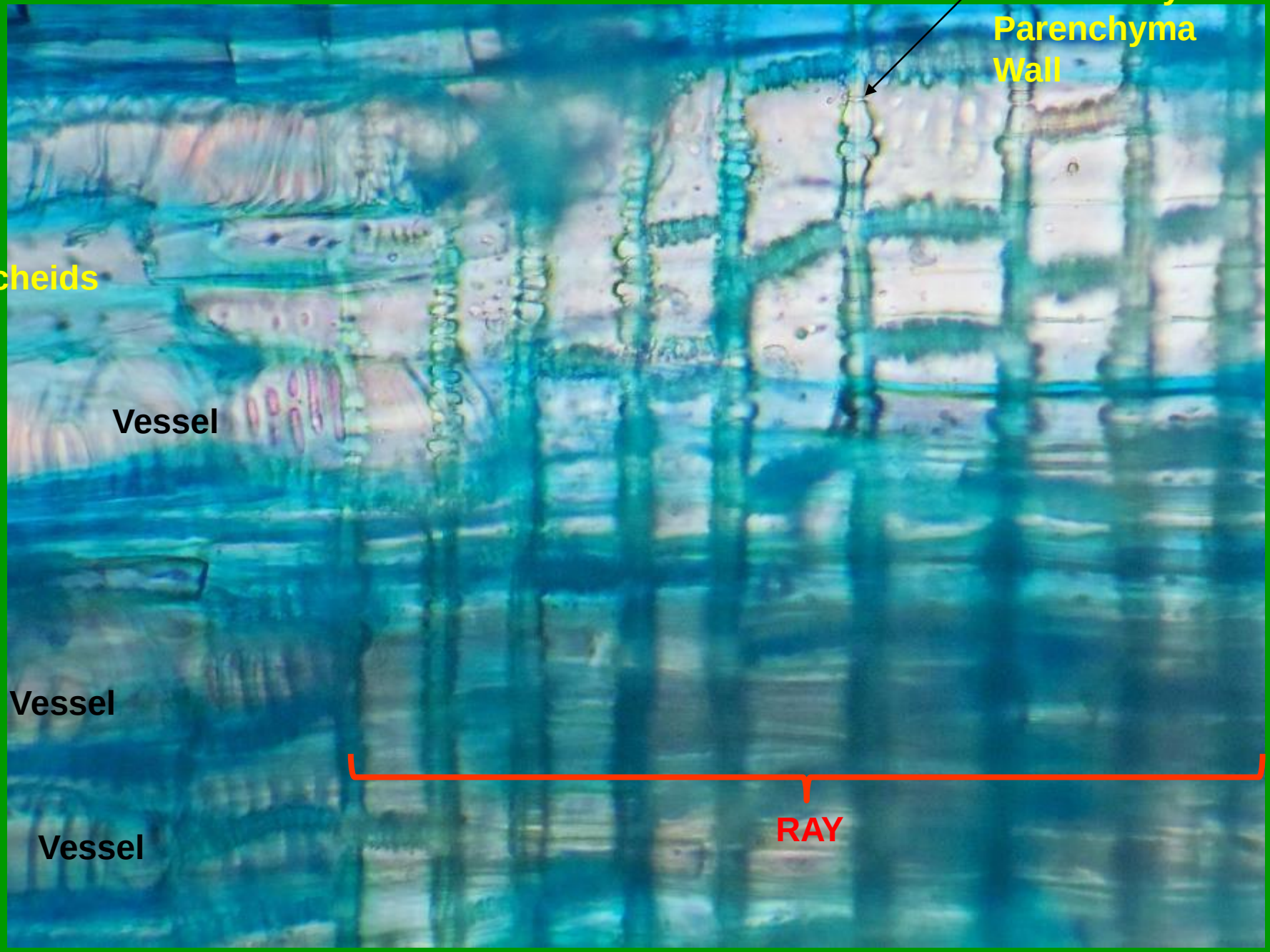
Origin of secondary Xylem & Phloem in Dicots **(after Bowes, 1996)**

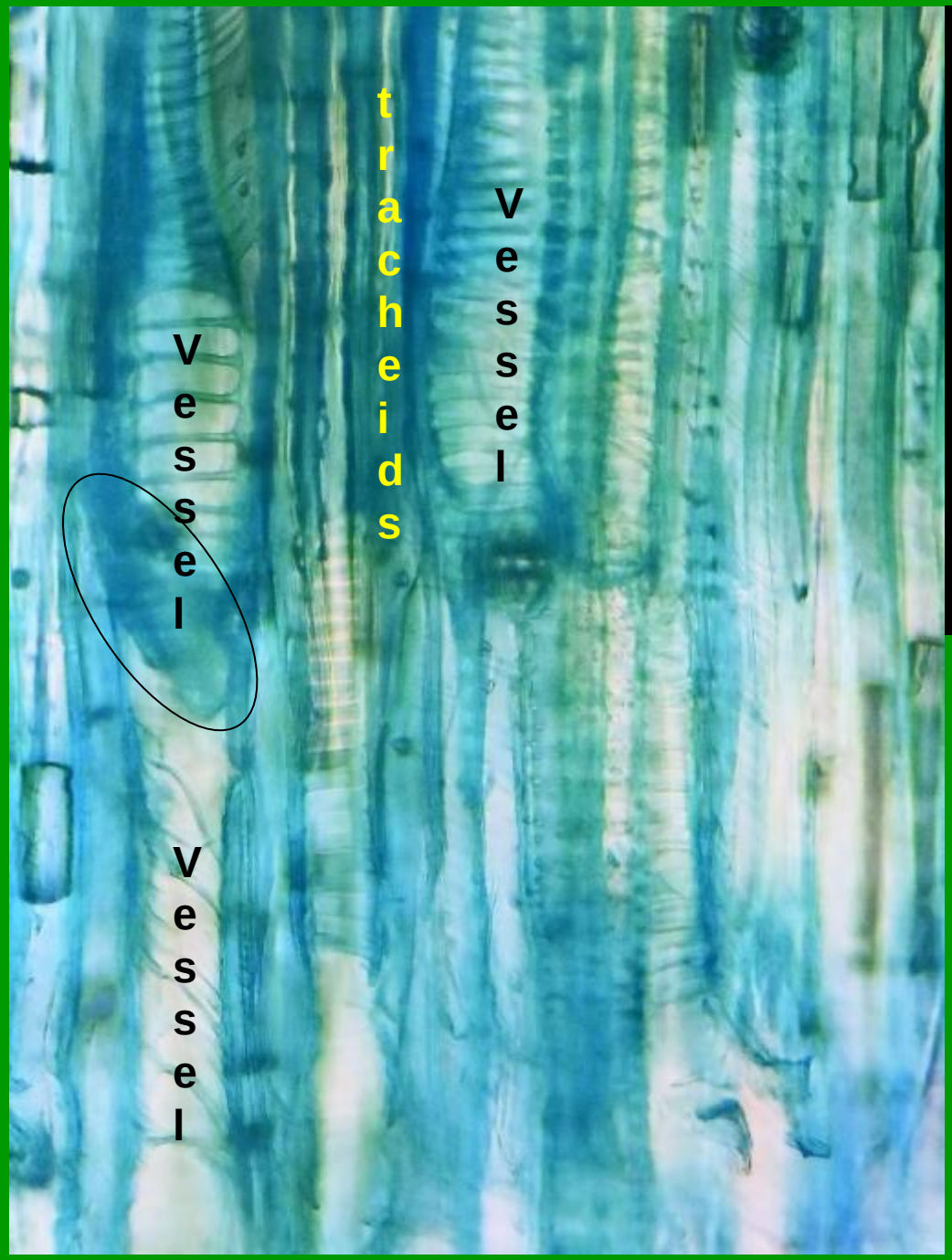

Ray
Ray
Vessel
Elements
Tracheids

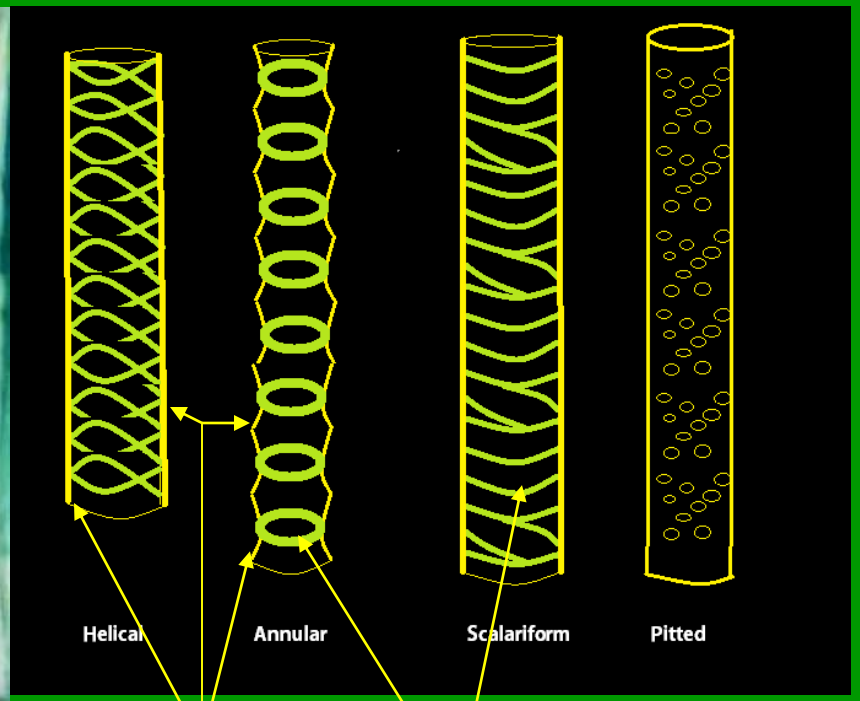

Parallel vents at end of
Vessel Element of Dicot


Vascular cambium
Ray initials

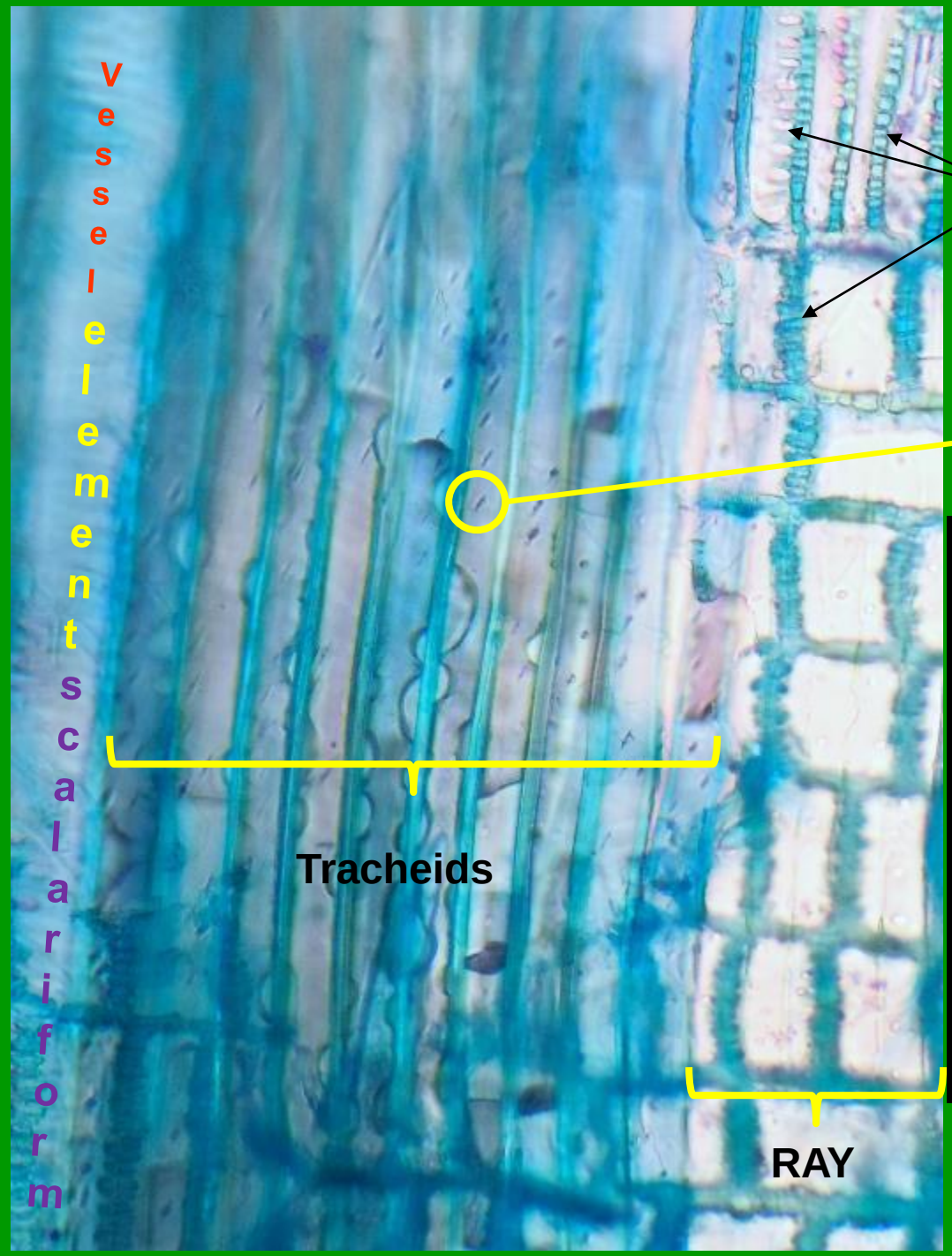
Radial section





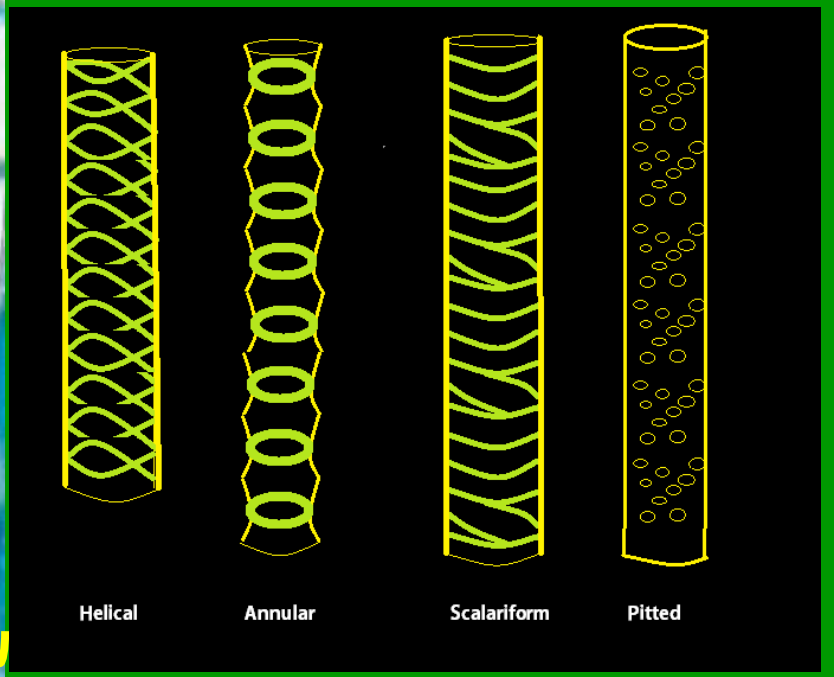


Radial section

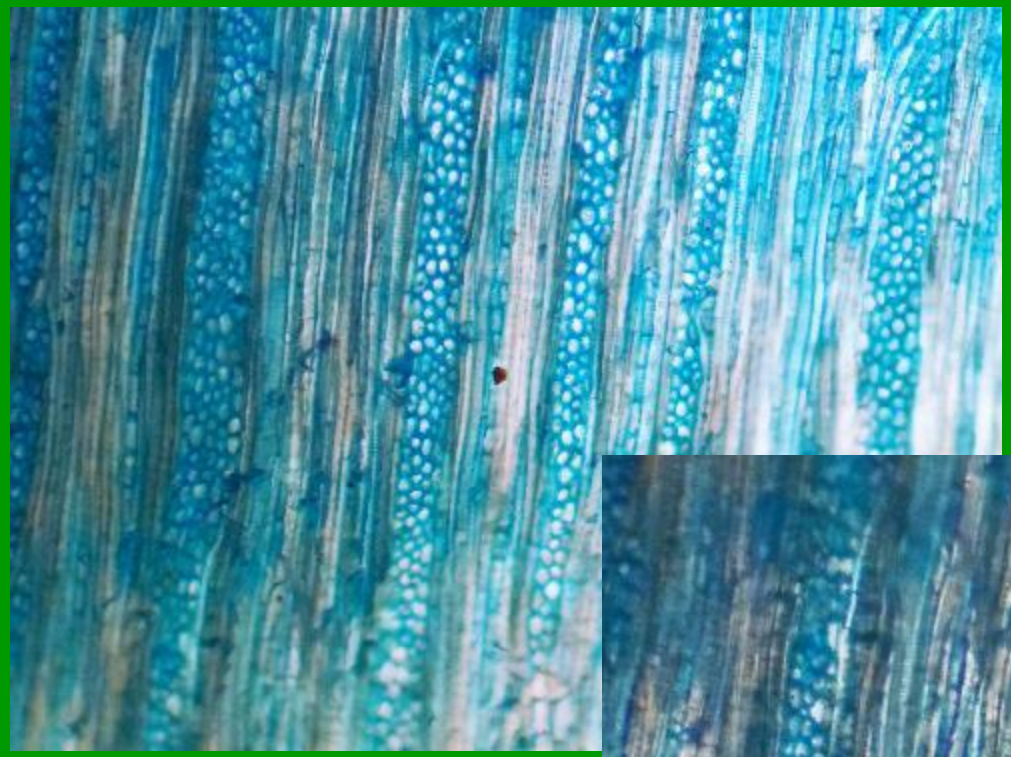


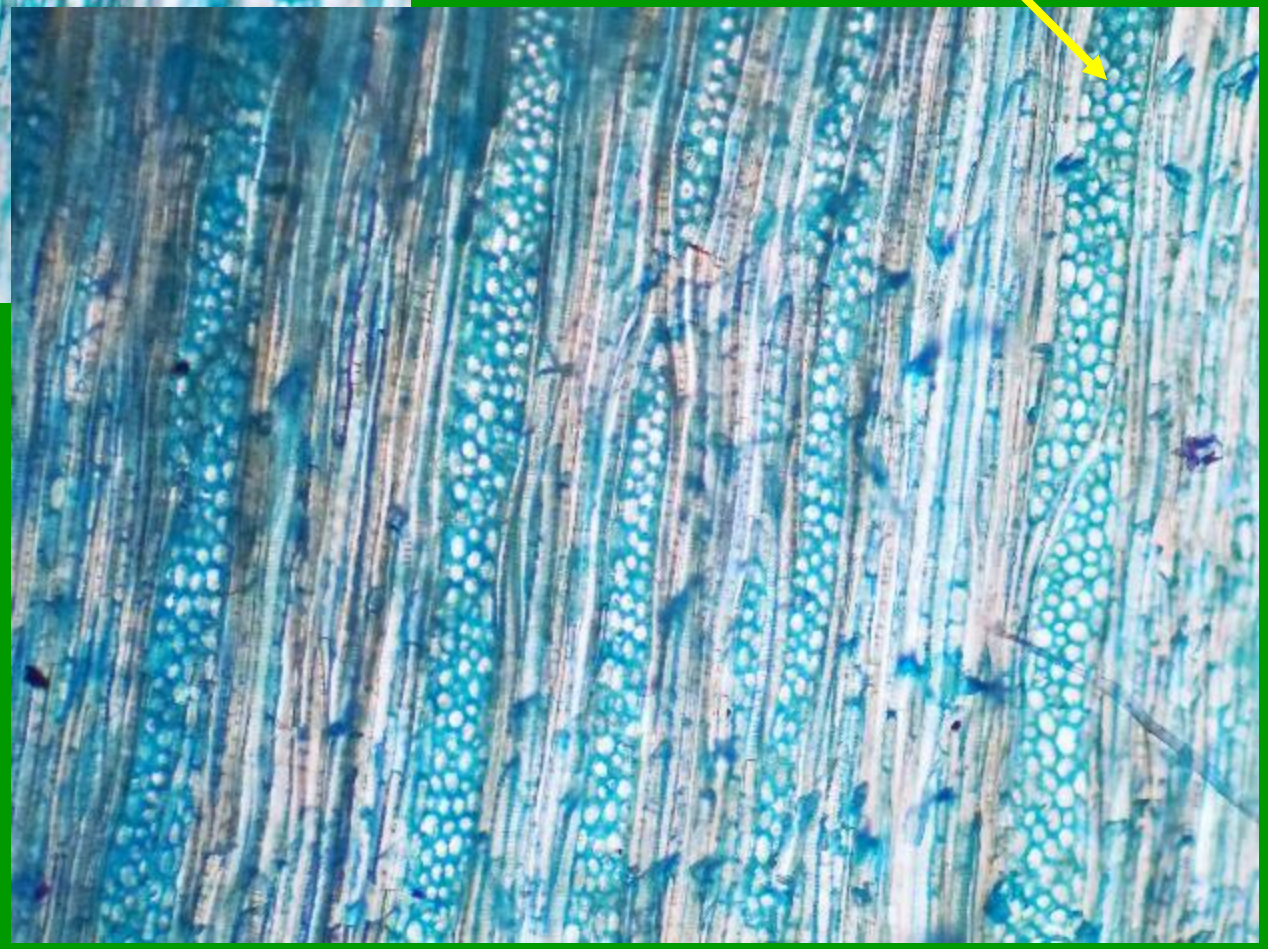
Pores / Plasmodesmata in ray walls

Bordered Pit in Tracheid

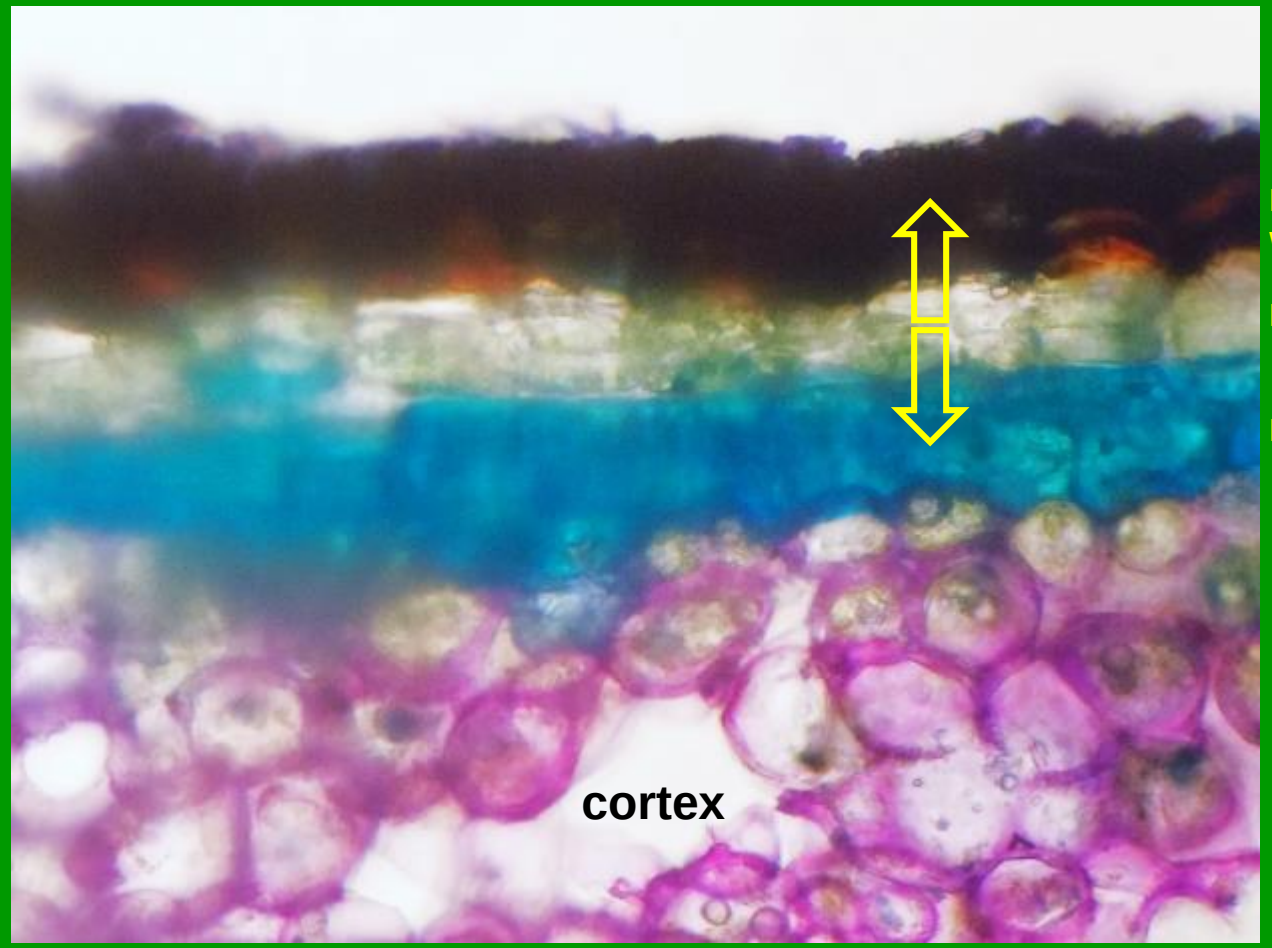


Radial section





Tangential sections showing rays in end view

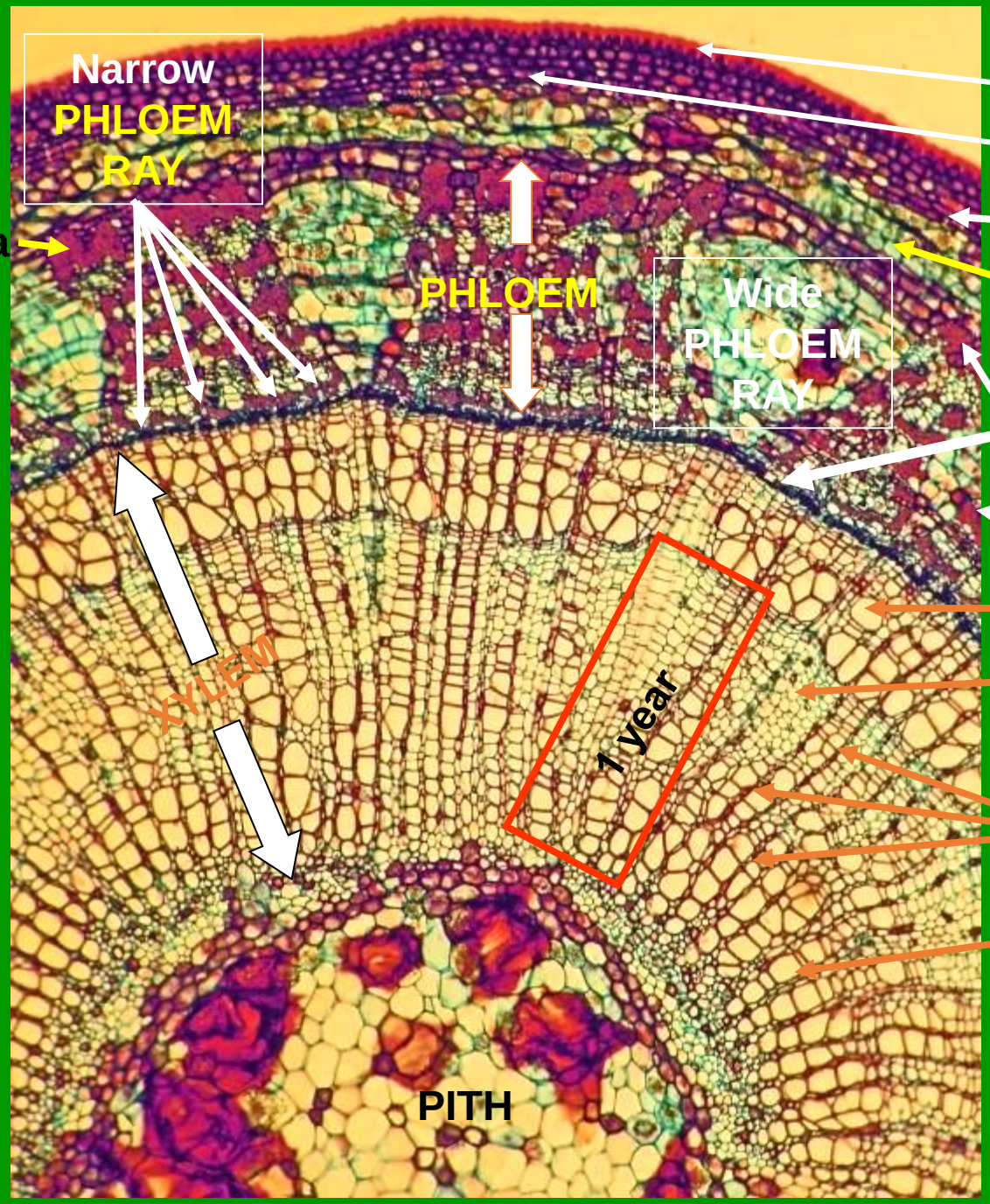


Phellem –outer cork or ‘bark’ with tannin

Phellogen or cork cambium

Phelloderm- a parenchyma

Periderm



Epidermis & Cuticle

Cork Cambium

Phelloderm

b a r k

Cortex

Vascular Cambium

Sclerenchyma fibers

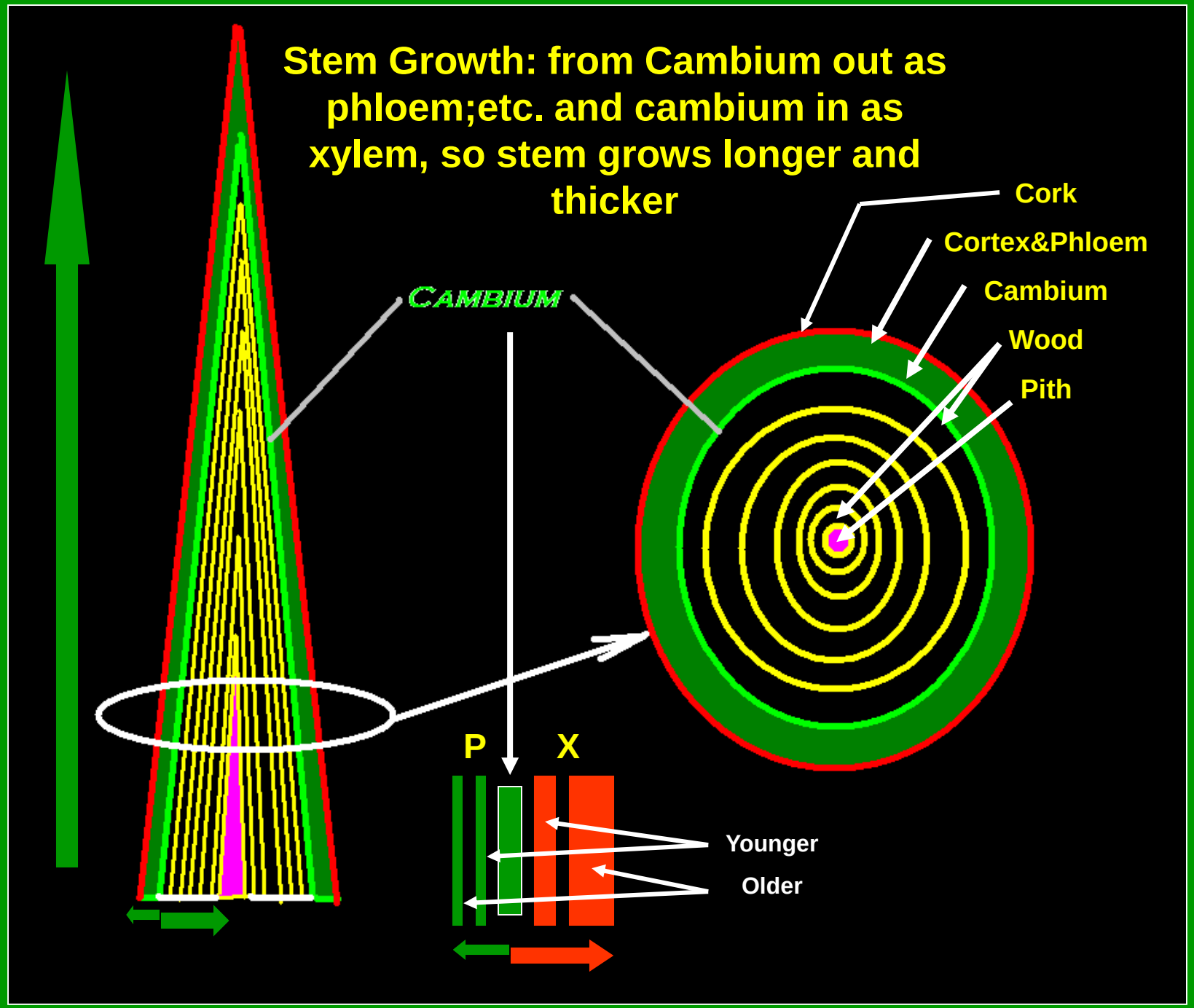
Spring (when cut)

Previous Summer

Wood Ray in Xylem

Previous Spring

Basswood, *Tilia* : for comparison 1.5 years

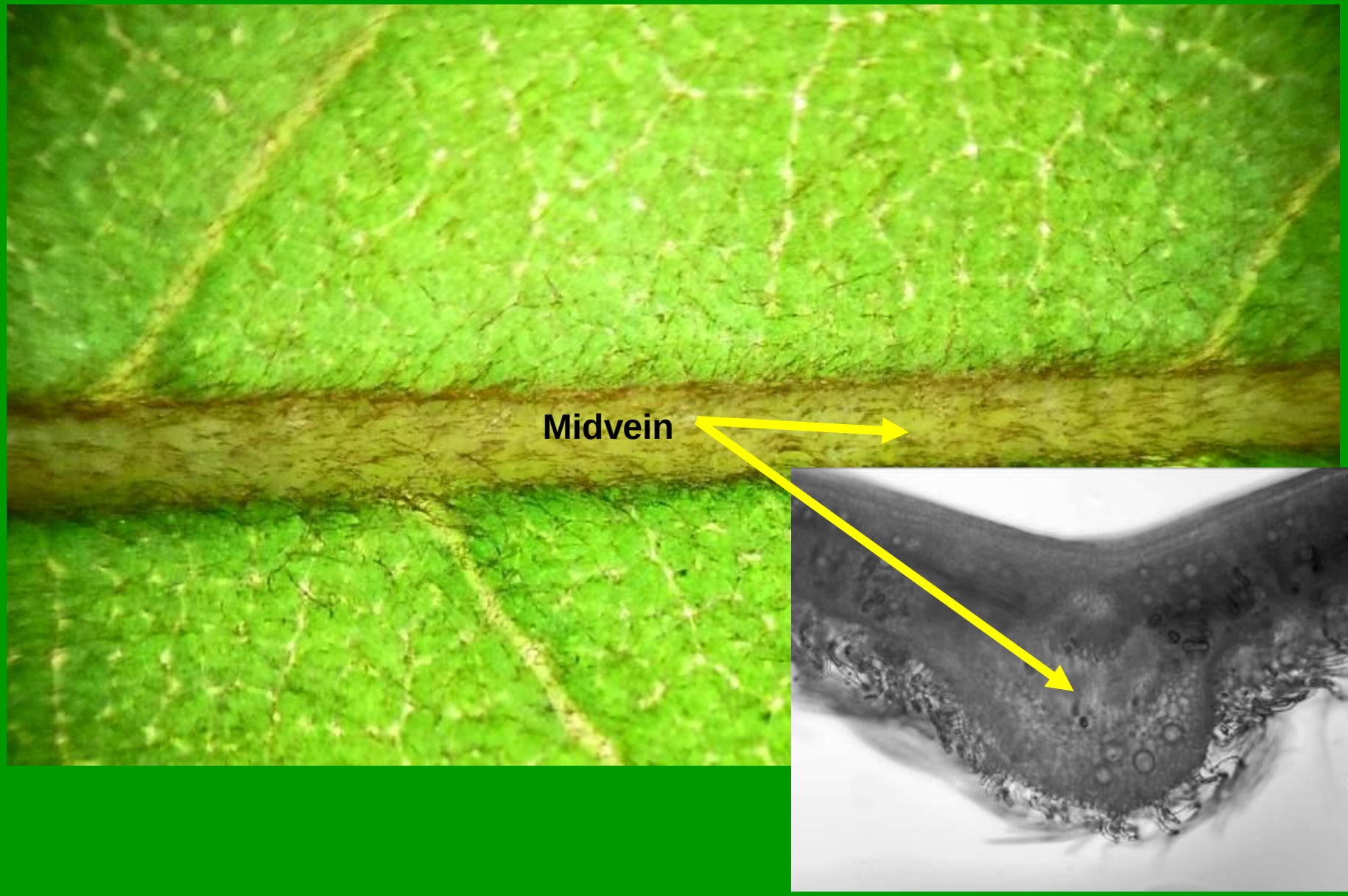

Stem Growth: from Cambium out as phloem;etc. and cambium in as xylem, so stem grows longer and thicker
Cork
Cortex&Phloem
Cambium
Wood
Pith
CAMBIUM
P
X
Younger
Older


Terminal Bud
& Scale
Thick, leathery
leaves: 6 inches
long
Petiole
(hairy)

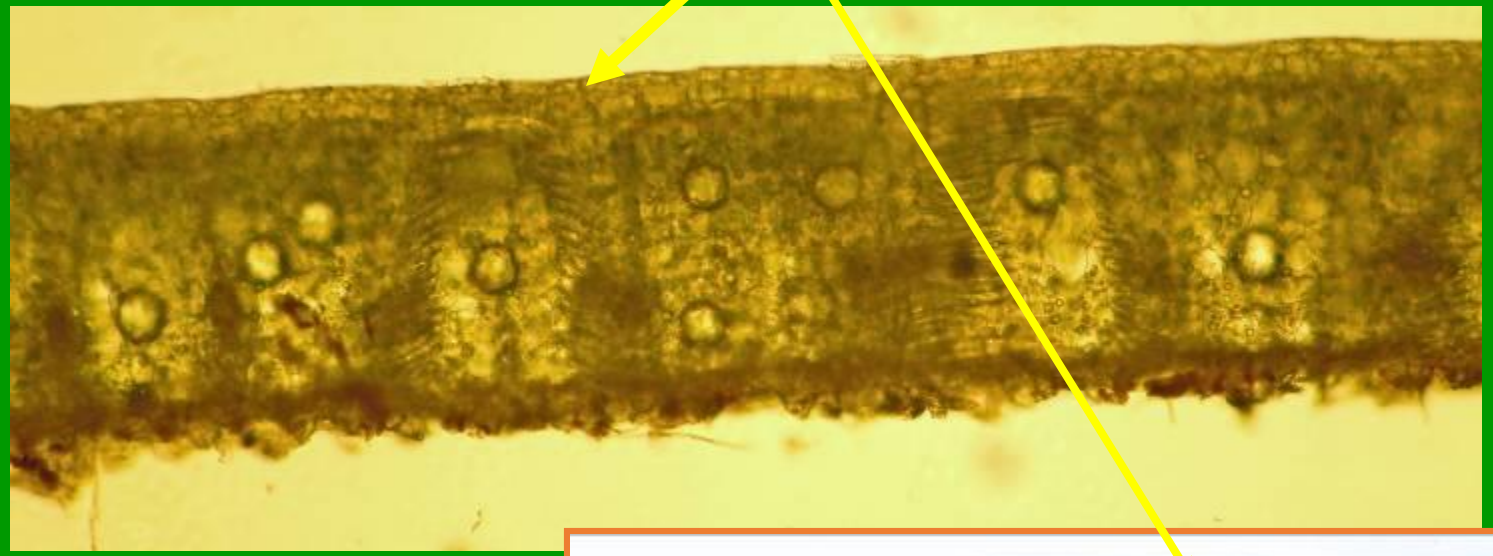

Darker, older leaves:
note thick waxy
cuticle on upper
surface(adaxial)

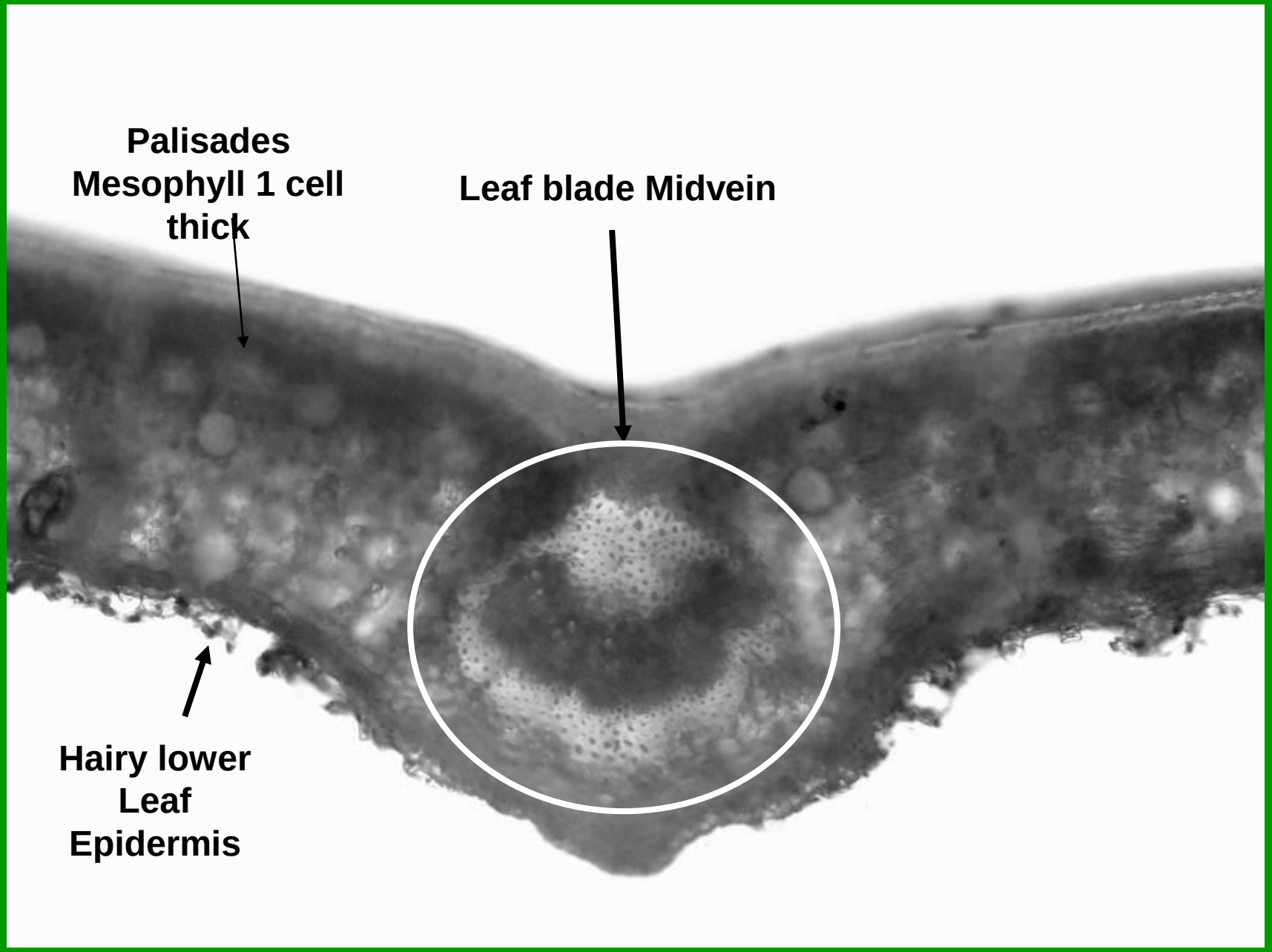
Dorsal, Top, ‘Adaxial’ view of leaf, note efficient coverage by secondary & tertiary Veins: ‘netted’

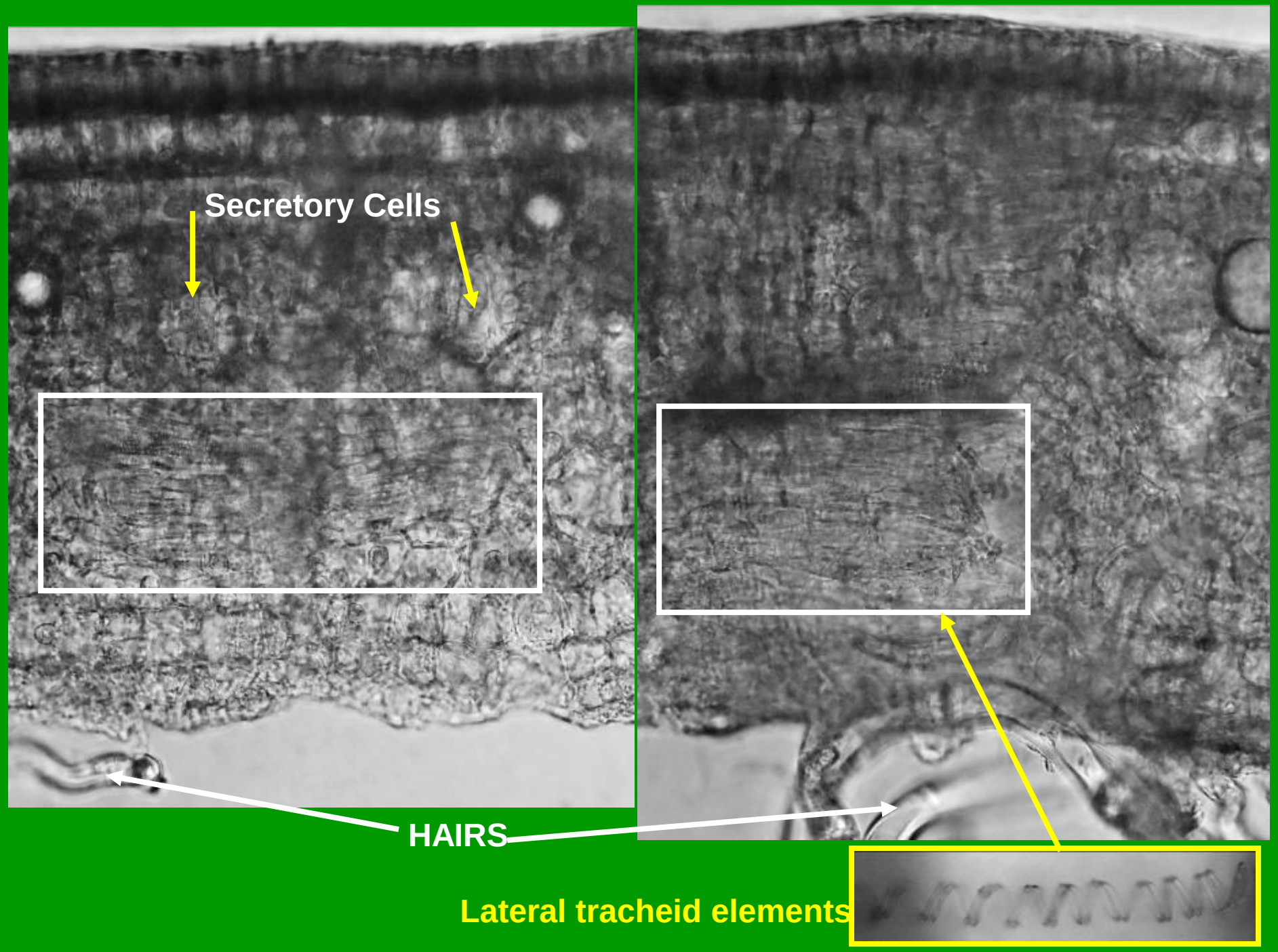
Ventral, ‘Abaxial’ view of Leaf : note *hairs* and dull, thin *cuticle*

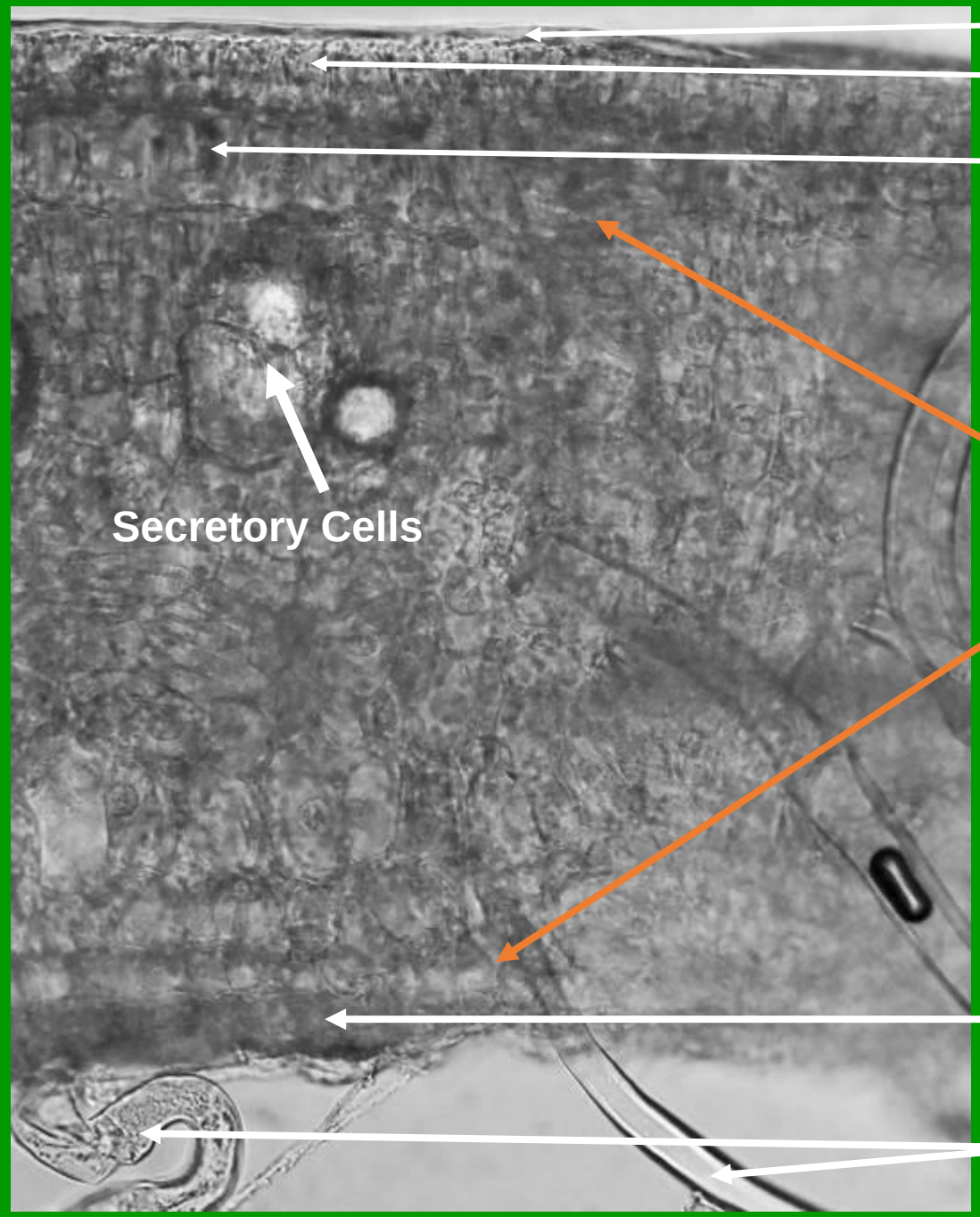


Leaf Blade hand section w/ thick
‘upper’ cuticle (shiny)




Palisades Mesophyll 1 cell thick
Leaf blade Midvein
Hairy lower Leaf Epidermis


Secretory Cells
HAIRS
Lateral tracheid elements



Cuticle

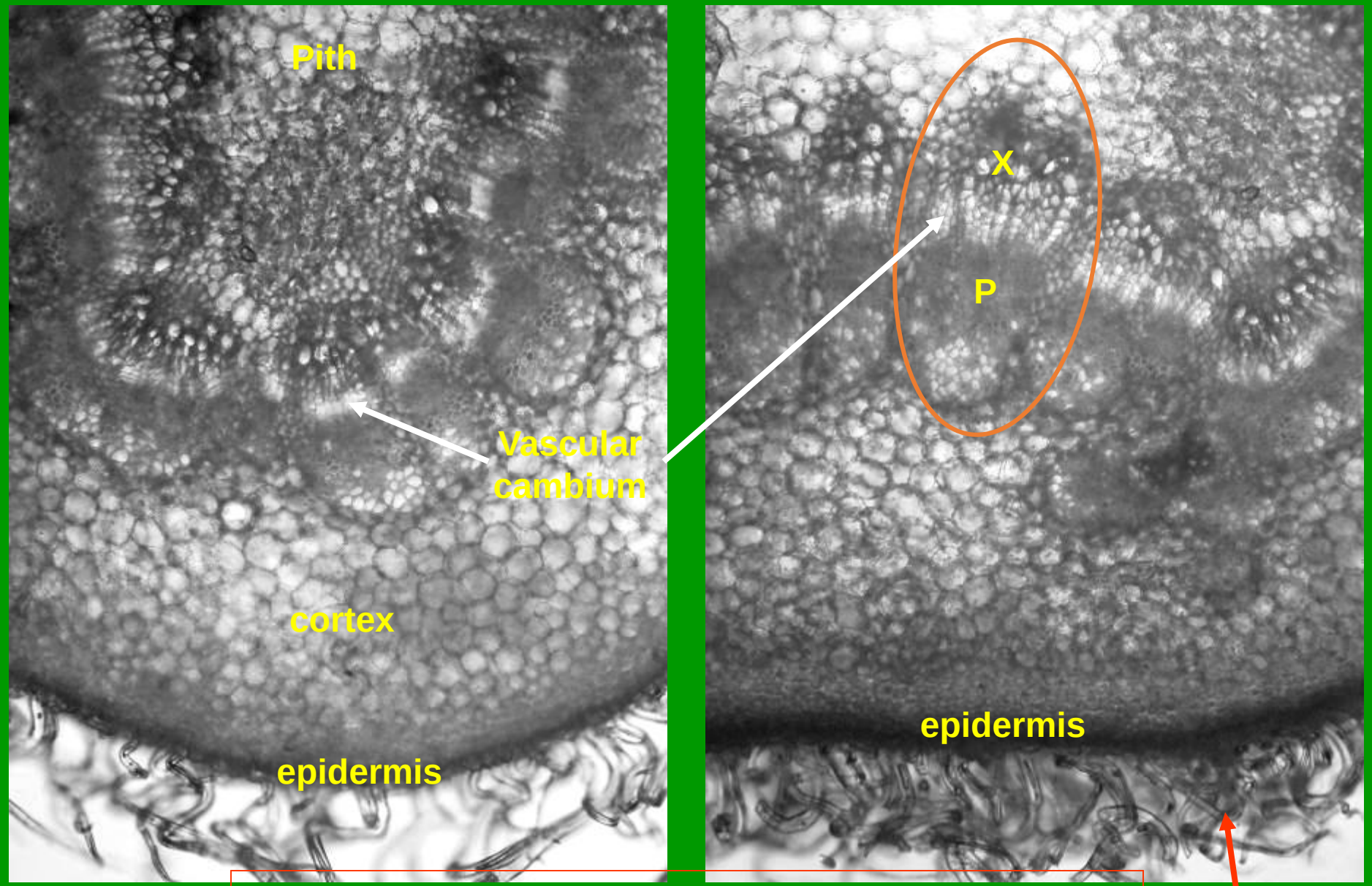
Upper Epidermis

Single cell thick
Palisades Mesophyll

Mesophyll

Lower Epidermis

Hairs (Trichomes) are
Multicellular & Uniseriate



Parts of 2 sections through petioles of leaf: note distinct but coalescing vascular bundles (blue oval) and trichomes or hairs