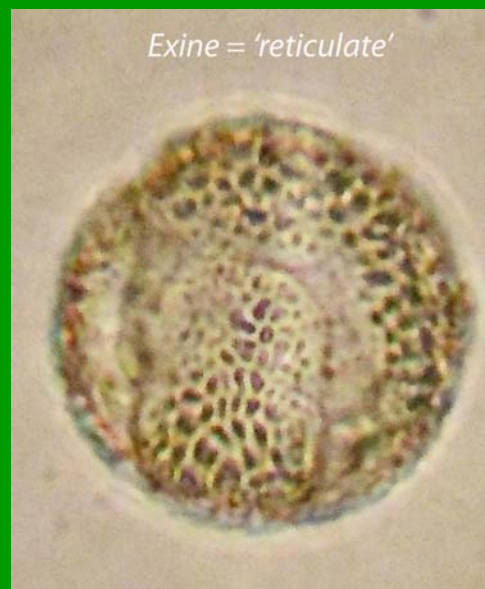


Mi  rogeo

Citrus aurantifolia:
**The 'mexican key
lime'**

Angiosperm; Dicot; Family: Rutaceae



Anther

Filament



Old botanical illustration of citrus



Stigma

Style

Ovary - after pollination and fertilization of egg in ovary = seed



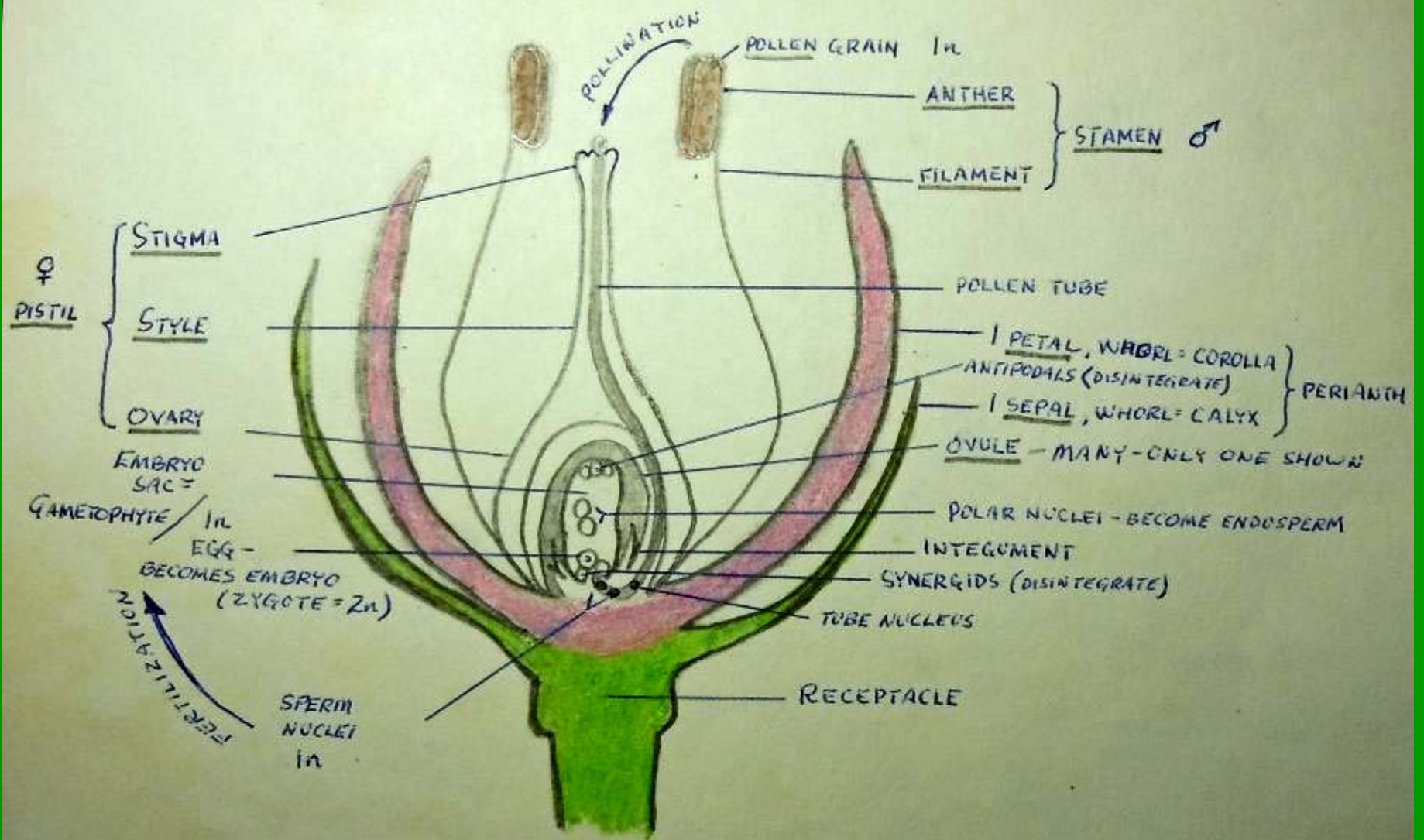
Ovary wall (pistil) becomes fruit enclosing seeds

**Old
botanical
illustration
of citrus**



**Arab traders
brought from
S.E. Asia to
Mediterranean
and Columbus
brought to
West Indies
on 2nd voyage**

**Note winged
petiole at
base of leaf
blade**

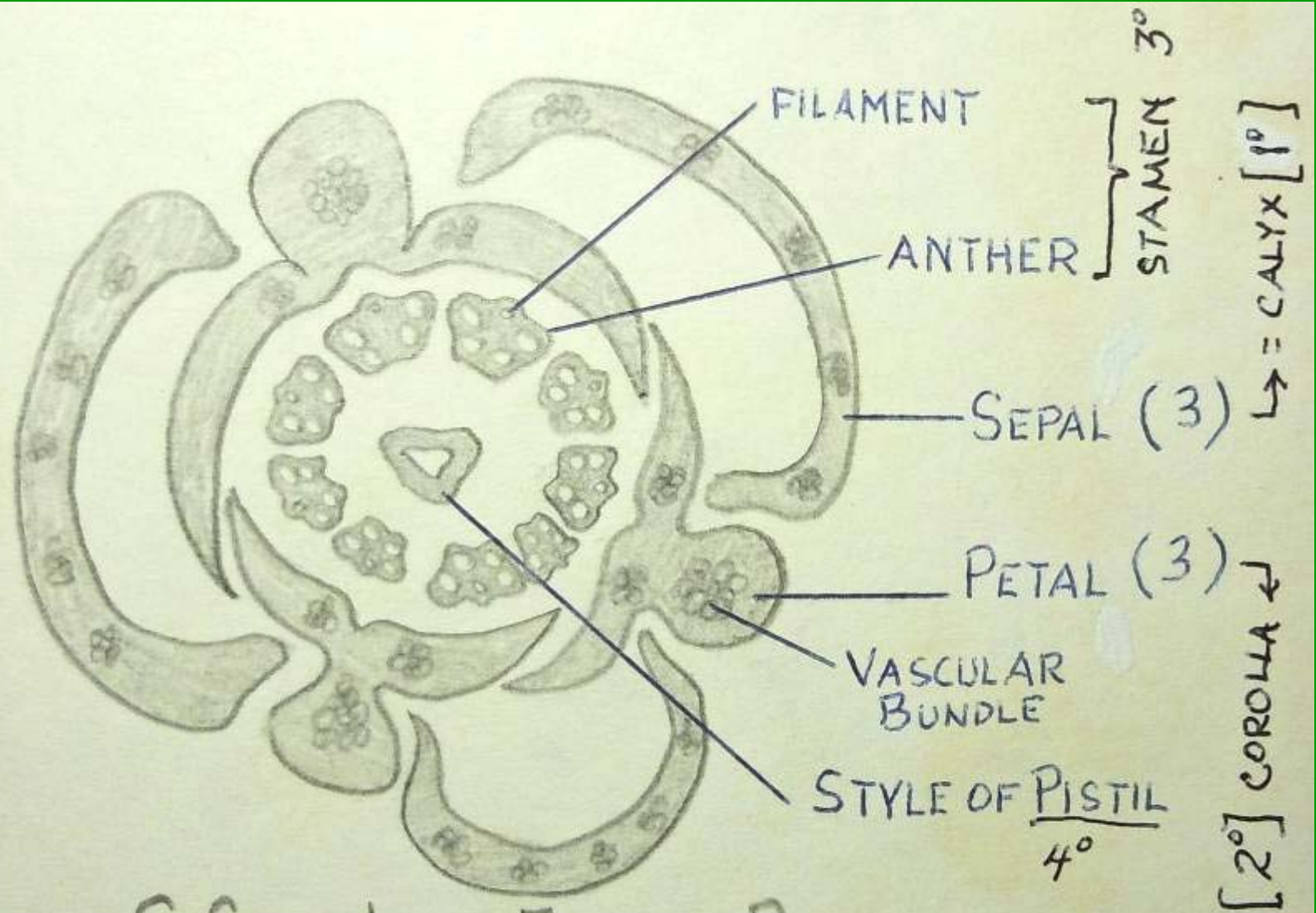


COMPLETE FLOWER
OF ANGIOSPERMS



5 petals

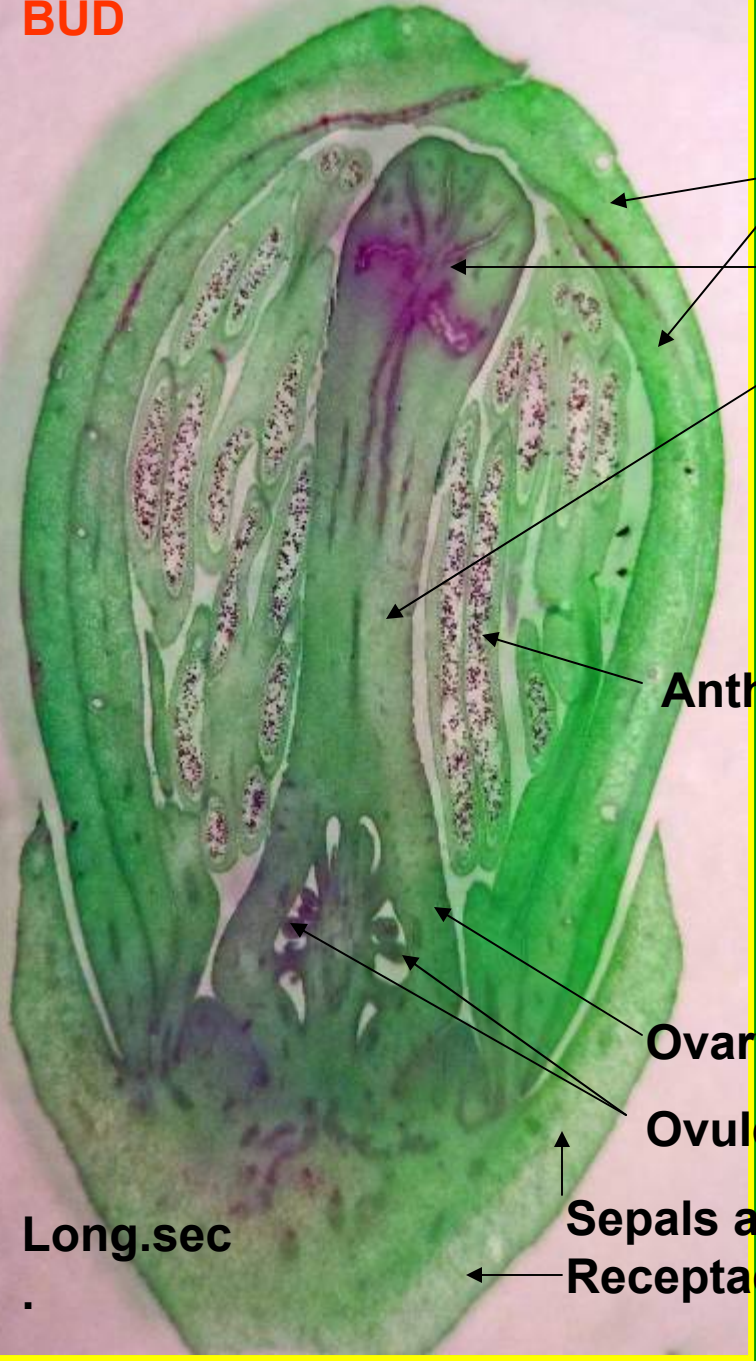
Citrus aurantifolia



C.S. OF LILY FLOWER BUD

4 LAYERS OF "MODIFIED LEAVES"

BUD



Long.sec

Petals

Stigma

Style

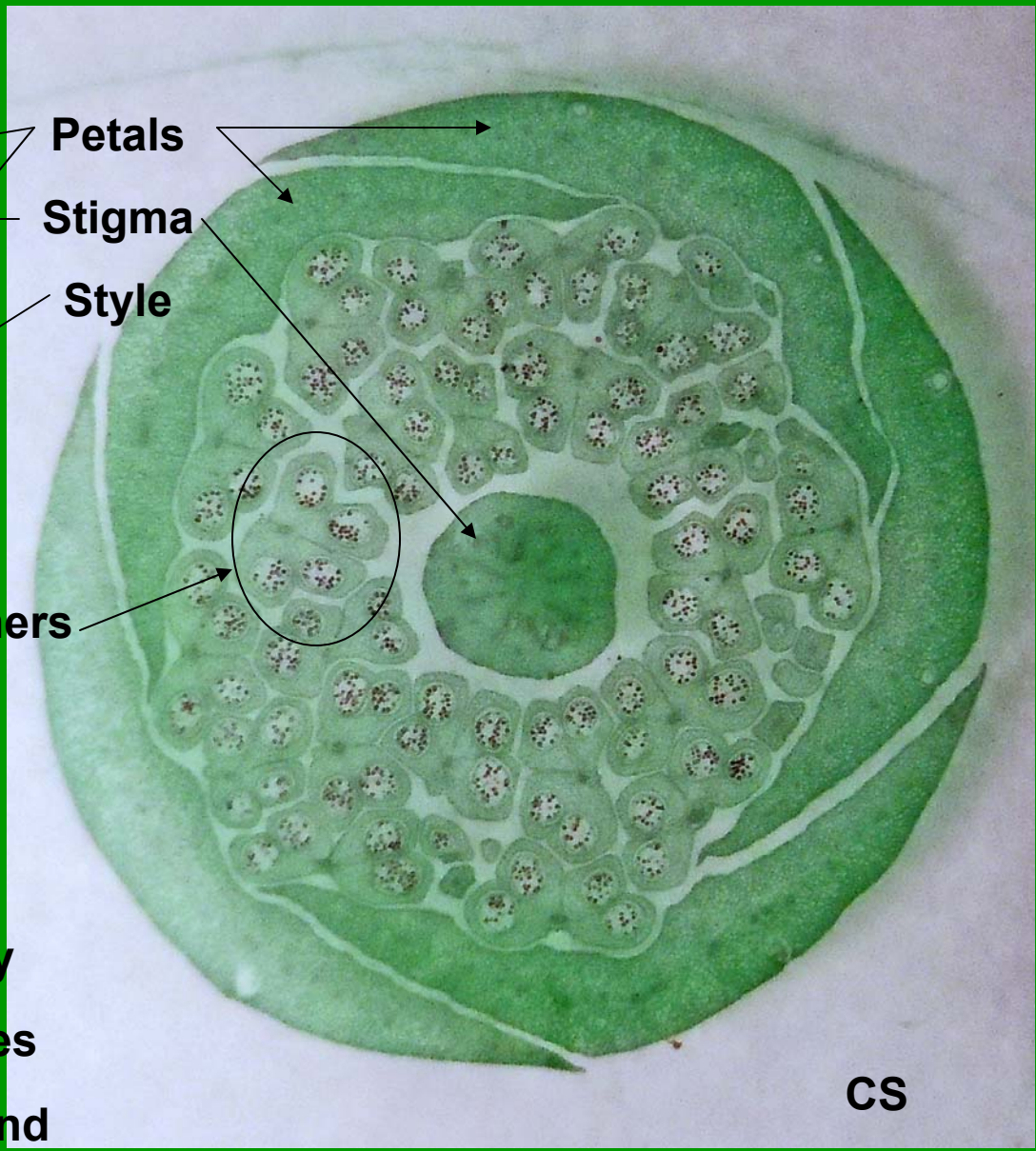
Anthers

Ovary

Ovules

Sepals and

Receptacle



CS

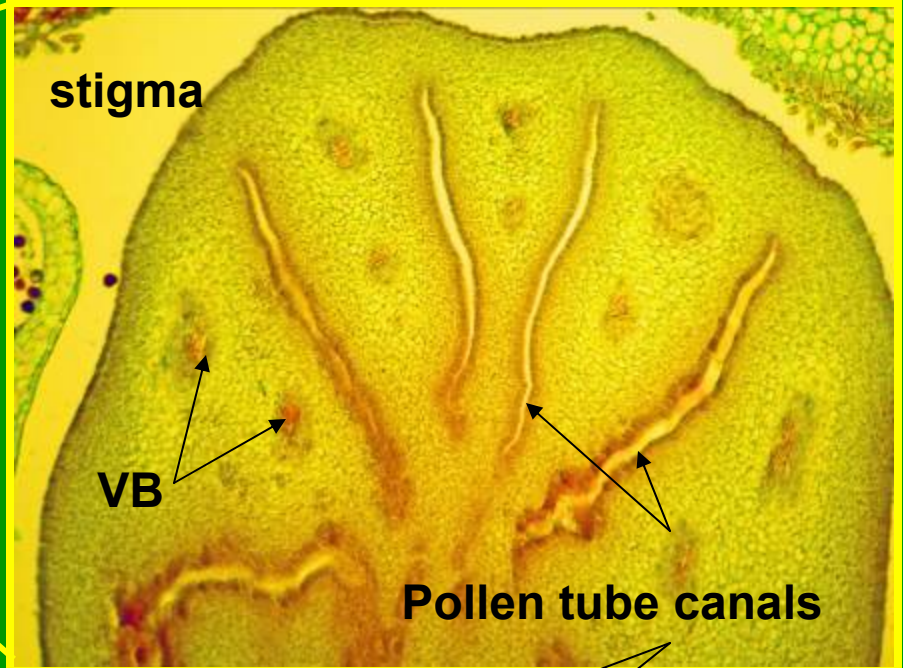
Early Citrus blossom

BUD



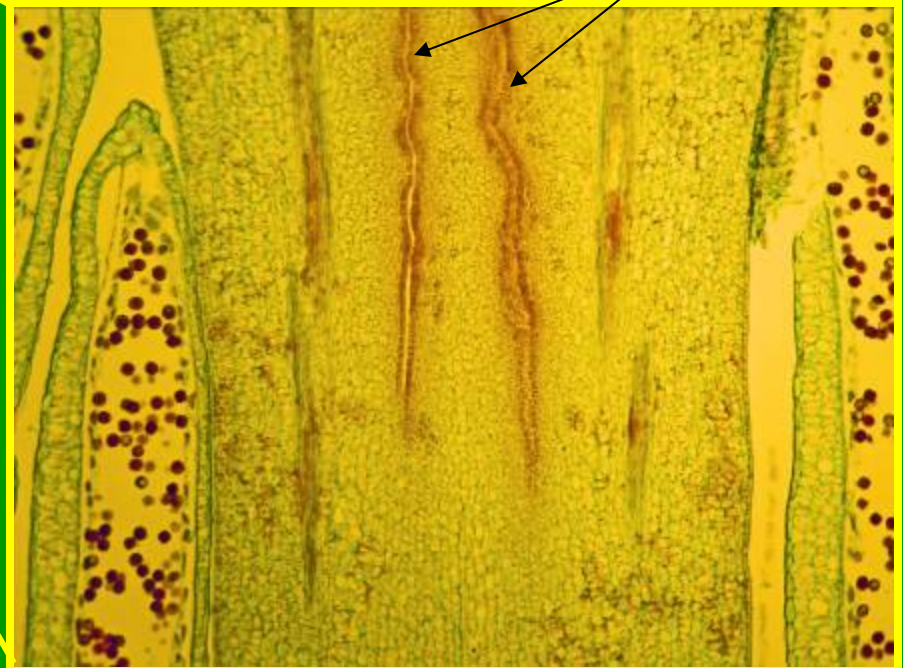
Long.sec

stigma

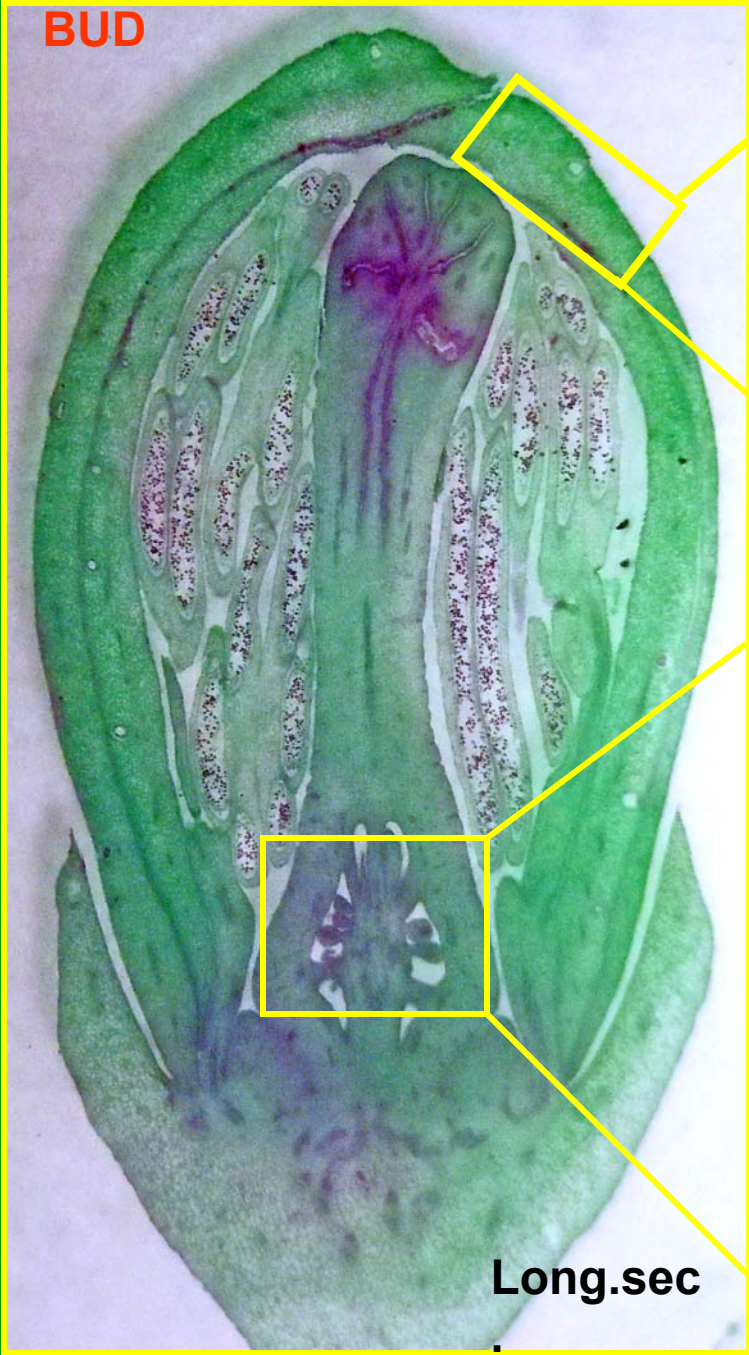


VB

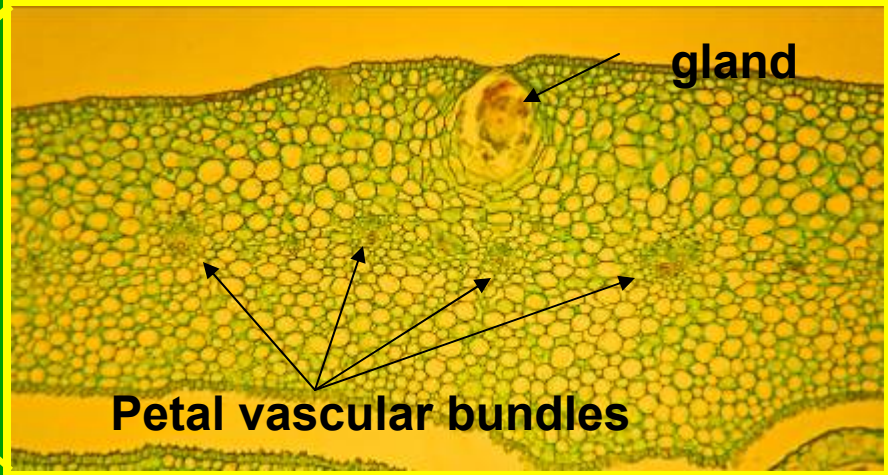
Pollen tube canals



BUD

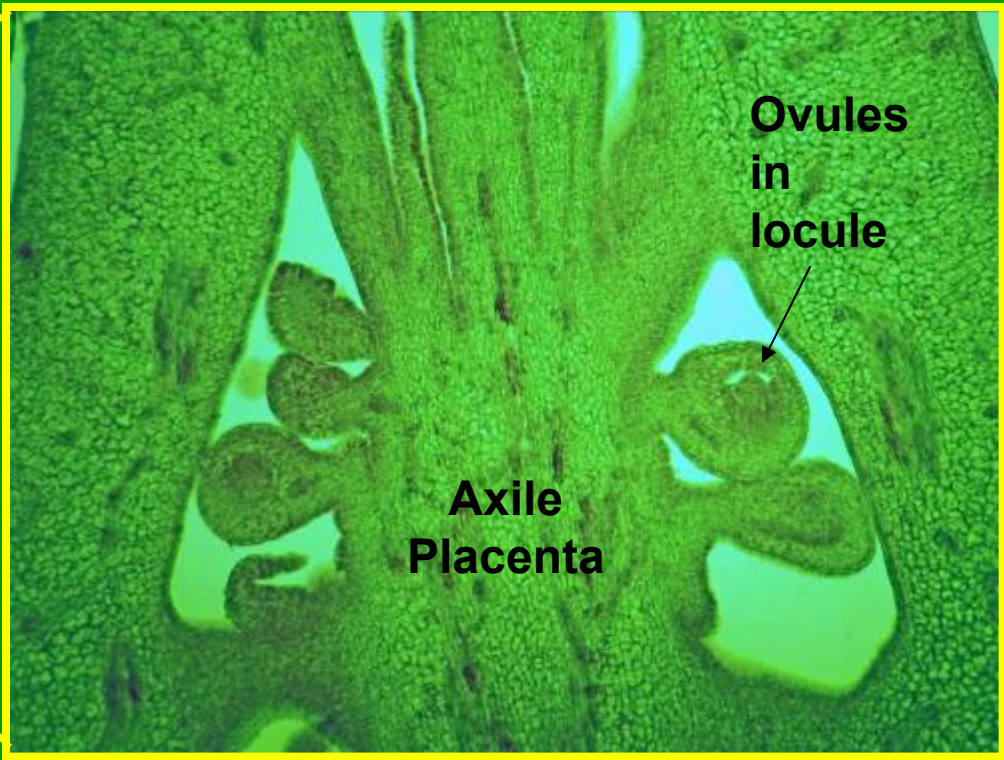


Long.sec



gland

Petal vascular bundles



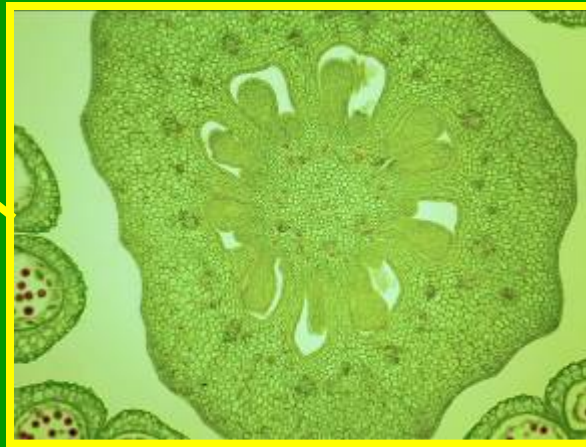
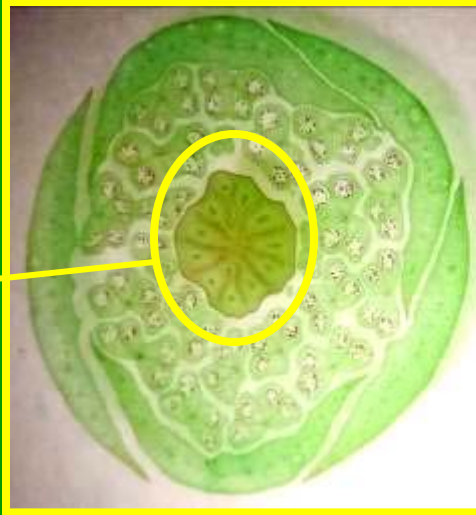
**Ovules
in
locule**

**Axile
Placenta**

BUD



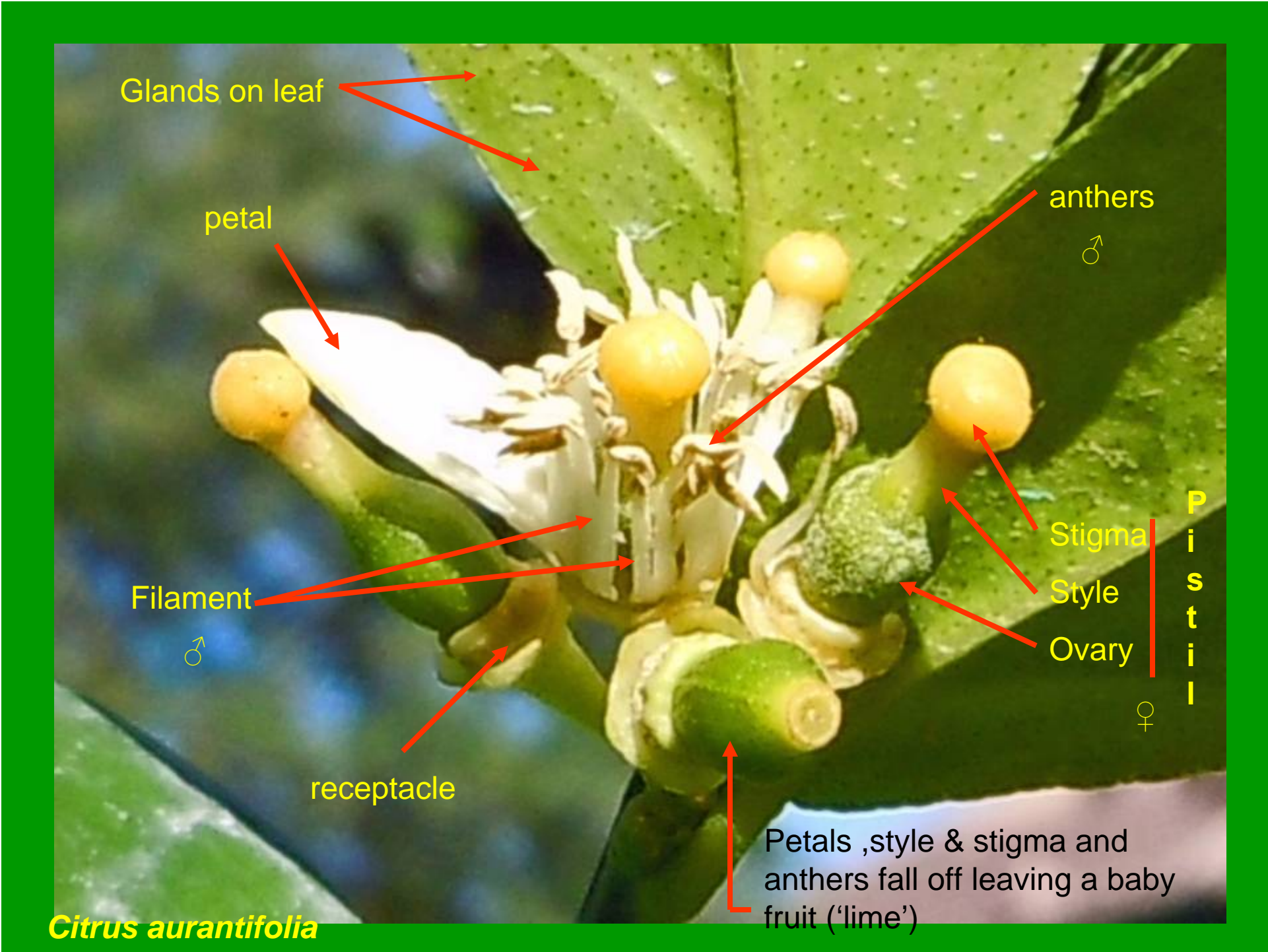
Long.sec



Note winged
petiole at
base of leaf
blade

Citrus sp.:
'Orange
cultivar'





Glands on leaf

petal

Filament

receptacle

anthers

Stigma

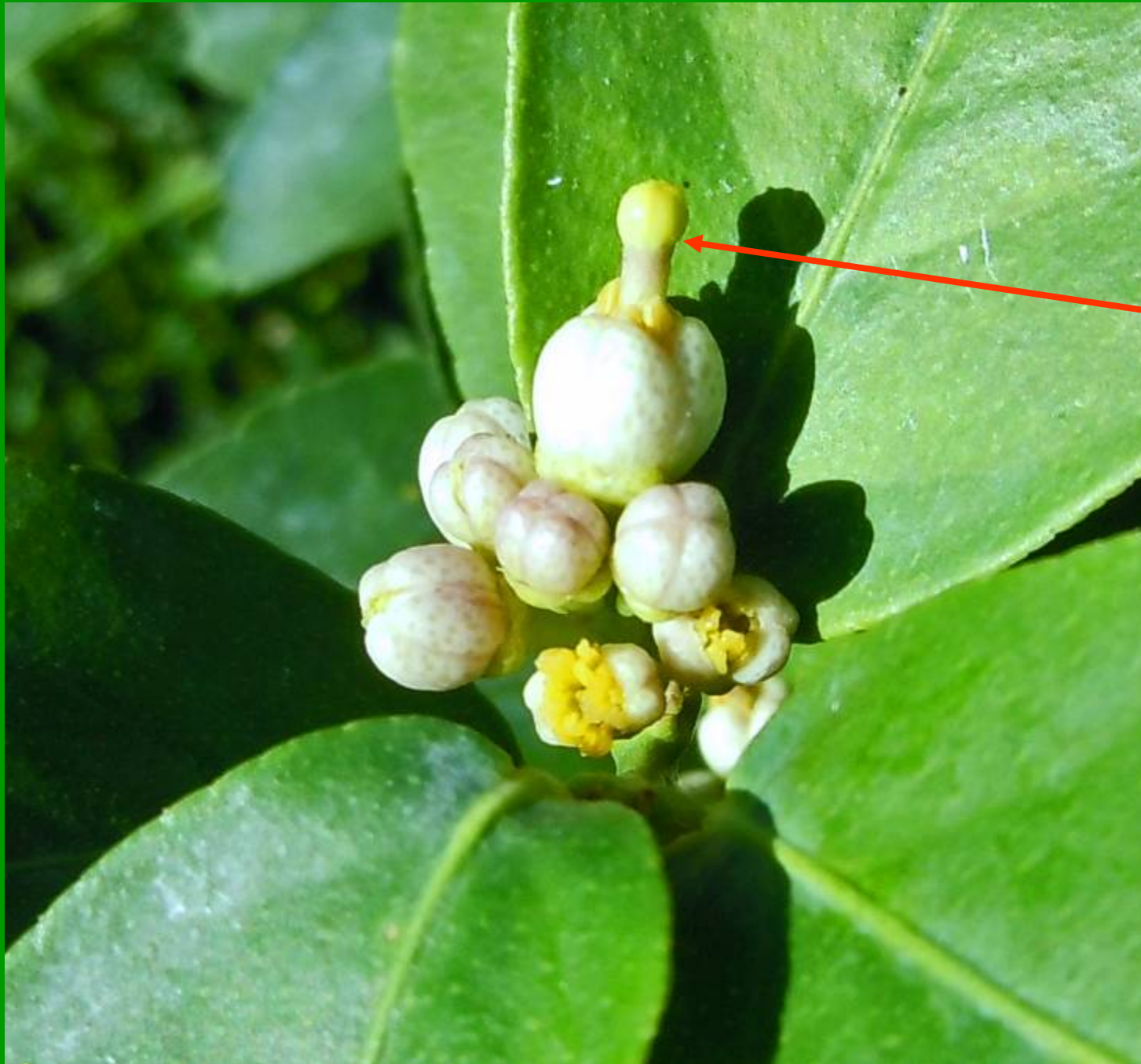
Style

Ovary

P
i
s
t
i
l

Petals, style & stigma and
anthers fall off leaving a baby
fruit ('lime')

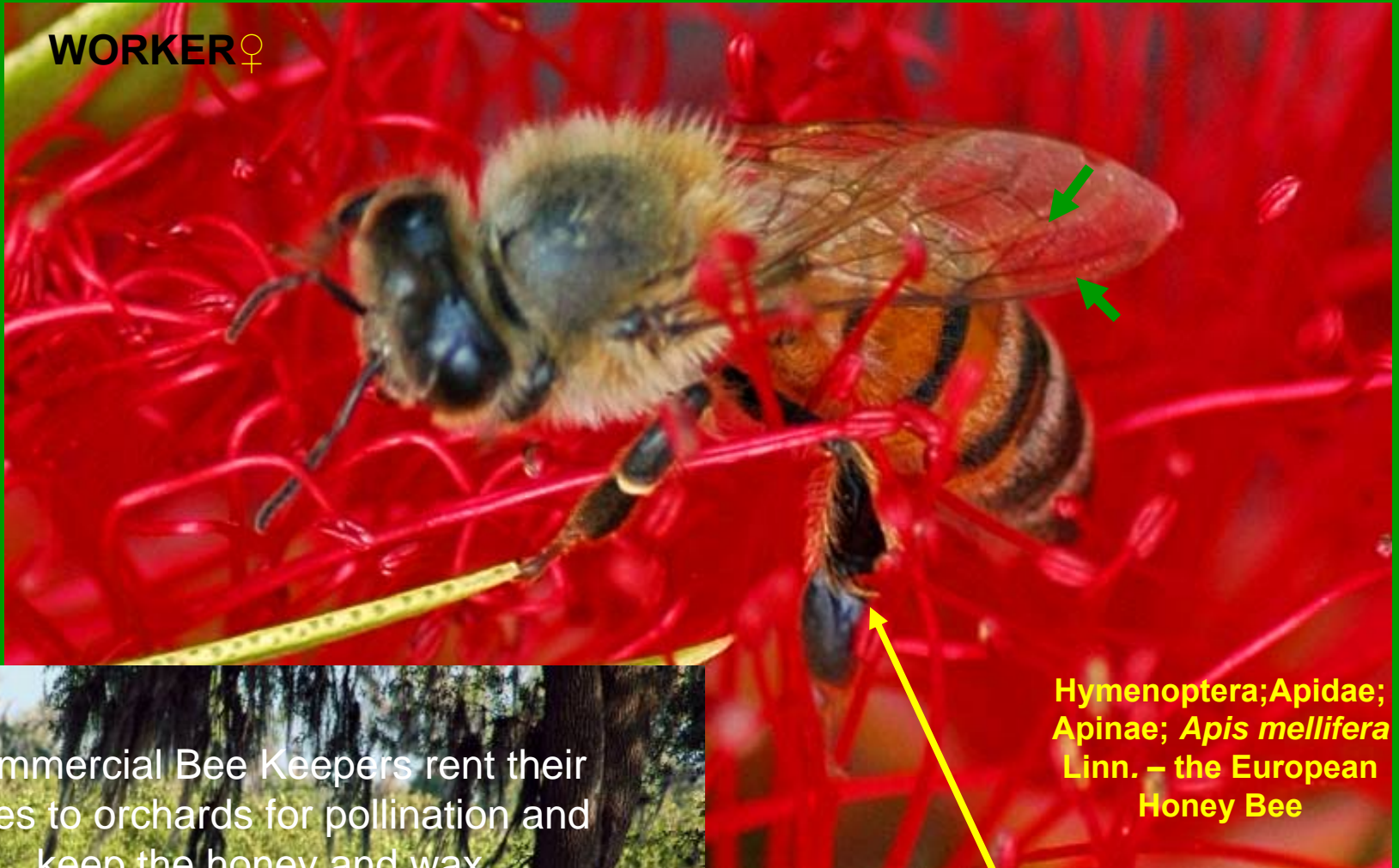
Citrus aurantifolia



Style & stigma expand above petals before anthers so bees can deposit pollen on stigma from another flower (cross pollination; genetic variability))

Citrus aurantifolia

WORKER ♀



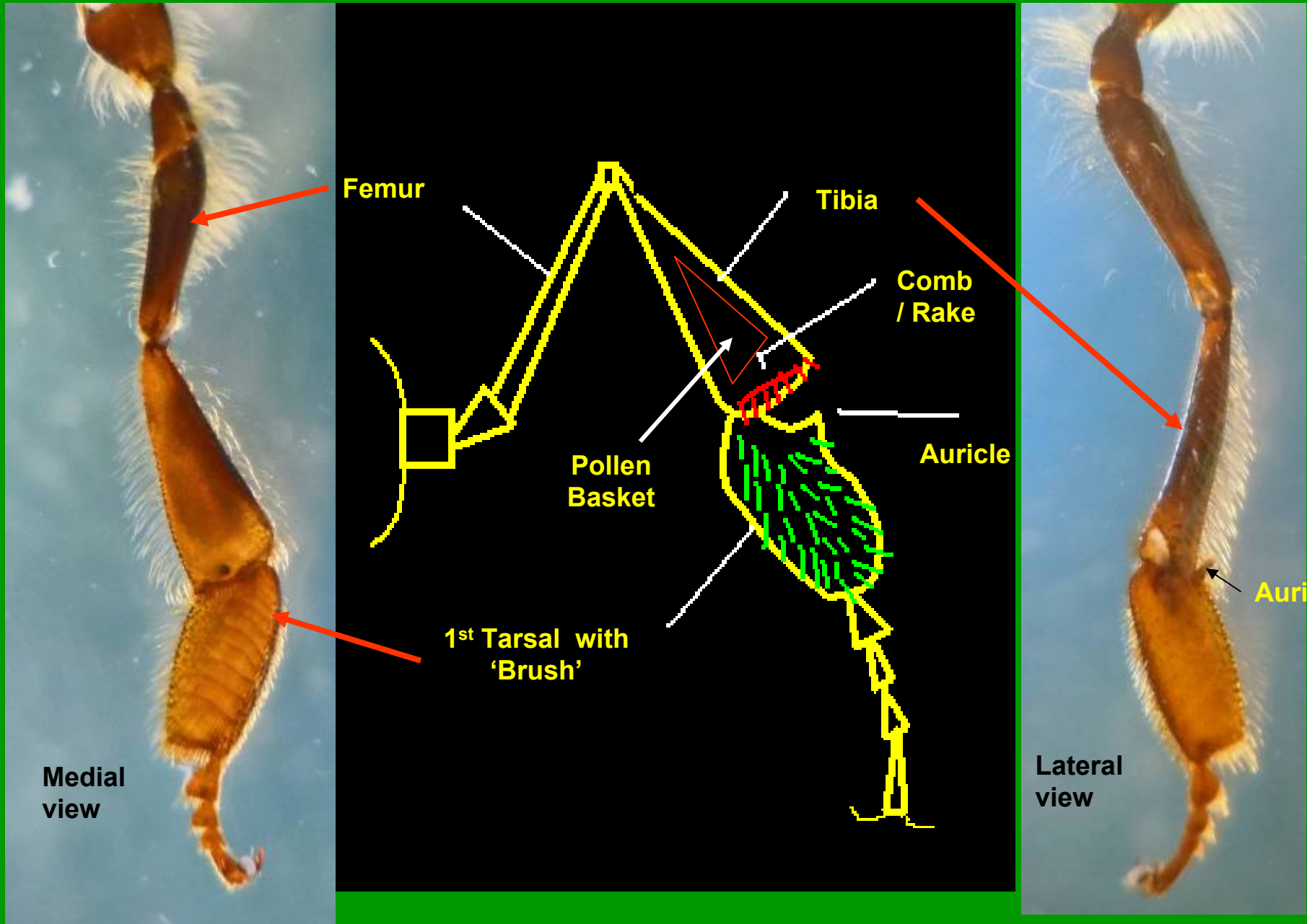
Hymenoptera; Apidae;
Apinae; *Apis mellifera*
Linn. – the European
Honey Bee

'Pollen Packer' on 3rd leg

Commercial Bee Keepers rent their hives to orchards for pollination and keep the honey and wax.



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



Medial view

Lateral view

Femur

Tibia

Comb / Rake

Pollen Basket

Auricle

1st Tarsal with 'Brush'

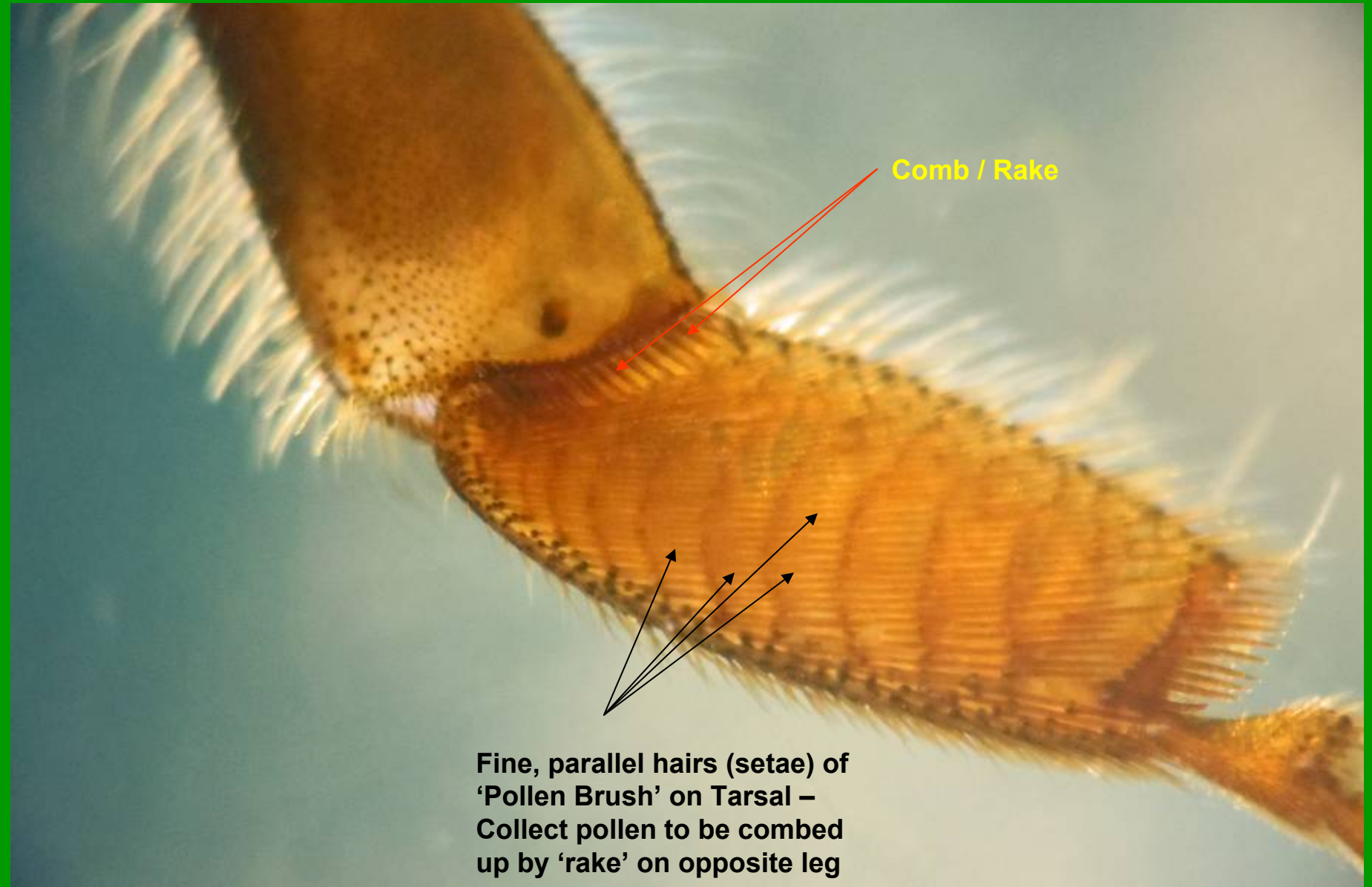
Auricle

WORKER ♀

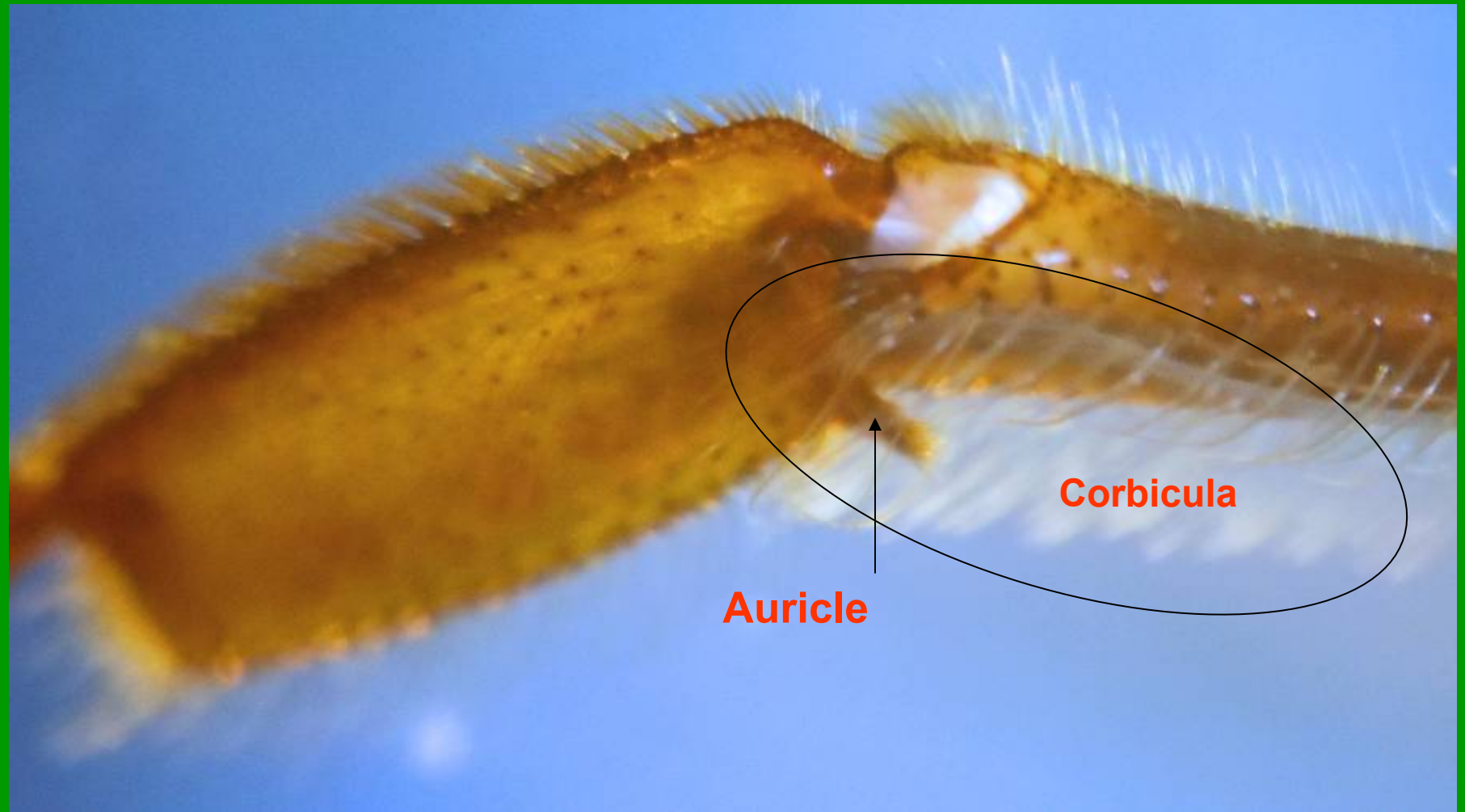
Smooth, shiny area on lateral side of TIBIA is the Pollen Basket; just above the auricle. Seta around triangular area of Basket secure pollen.



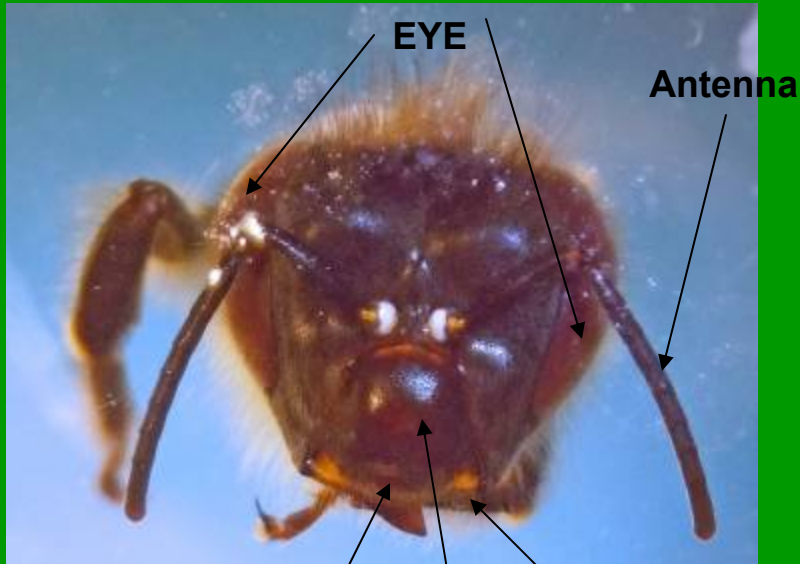
Opposite 1st Tarsal inside (lateral) view showing Pollen Brush



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 opposite rake) pushes the pollen up into the **Pollen Basket** of the lower tibia (also called the '**Corbicula**')



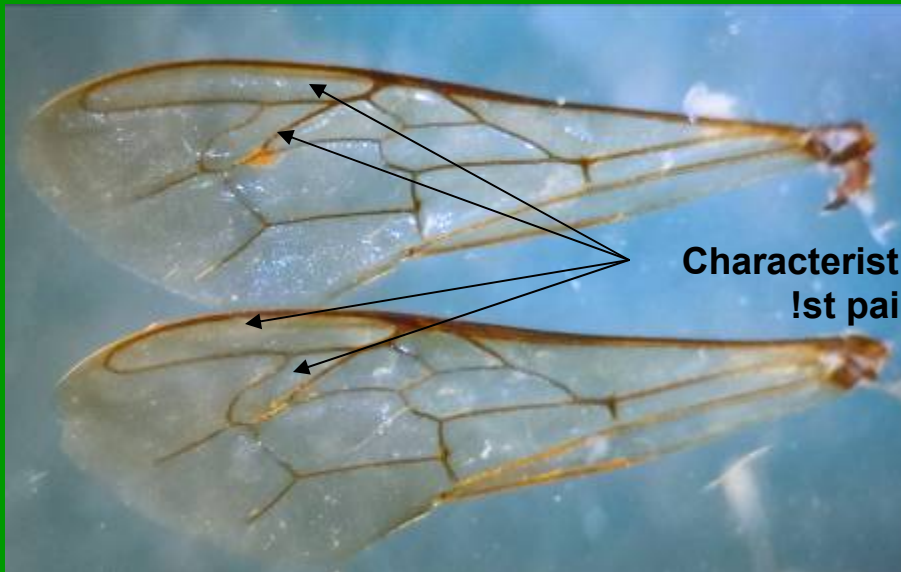
EYE

Antenna

Labrum, Clipeus & Mandible



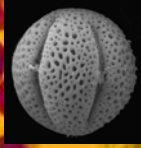
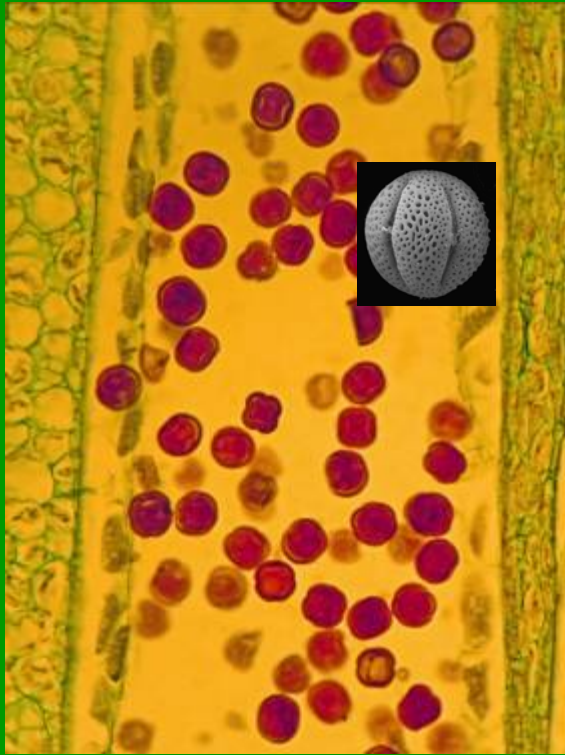
Sting



Characteristic wing 'cells' of
1st pair (Rs & M)

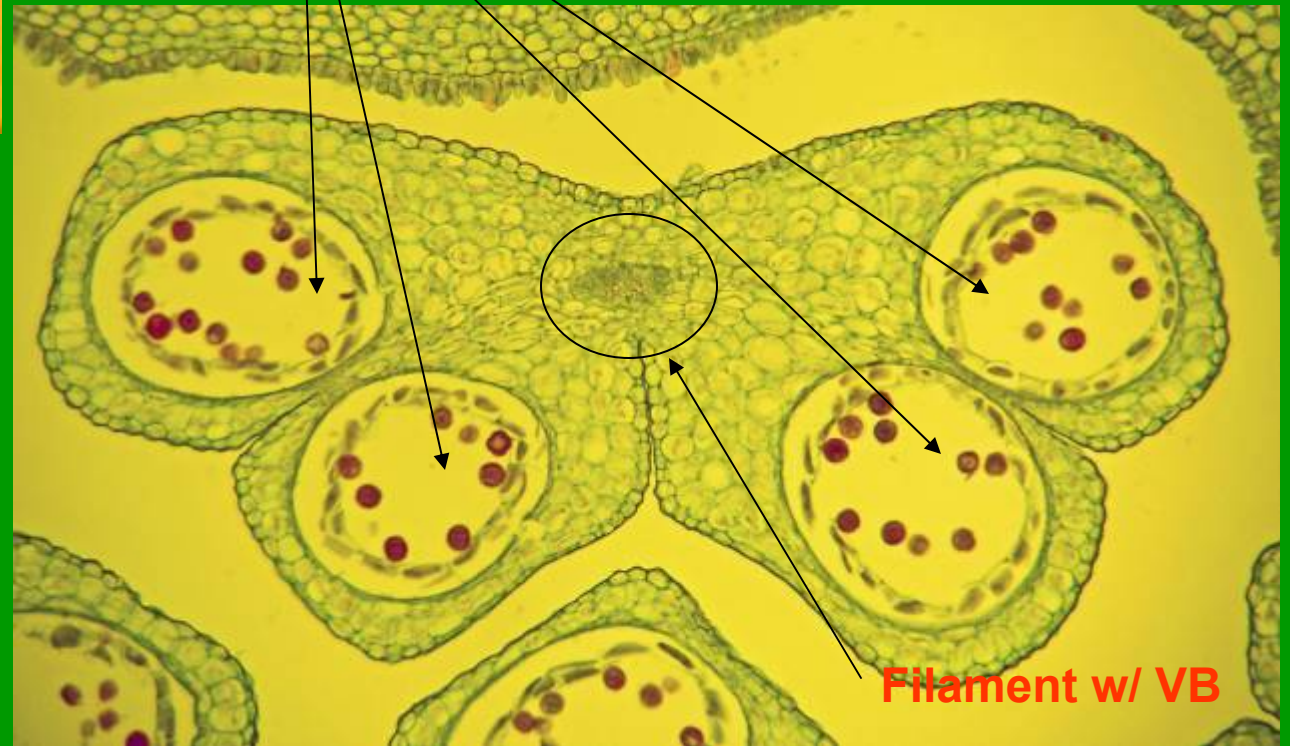
Hymenoptera; Apidae;
Apinae; *Apis mellifera*
Linn. – the European
Honey Bee

Stamen: Anthers & their Filaments



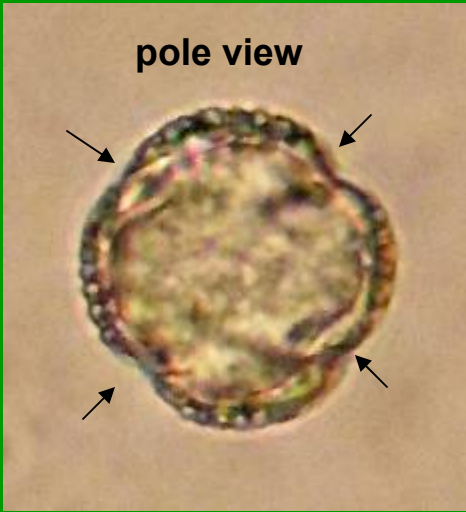
4 Chambers of Anther filled with Pollen

LS

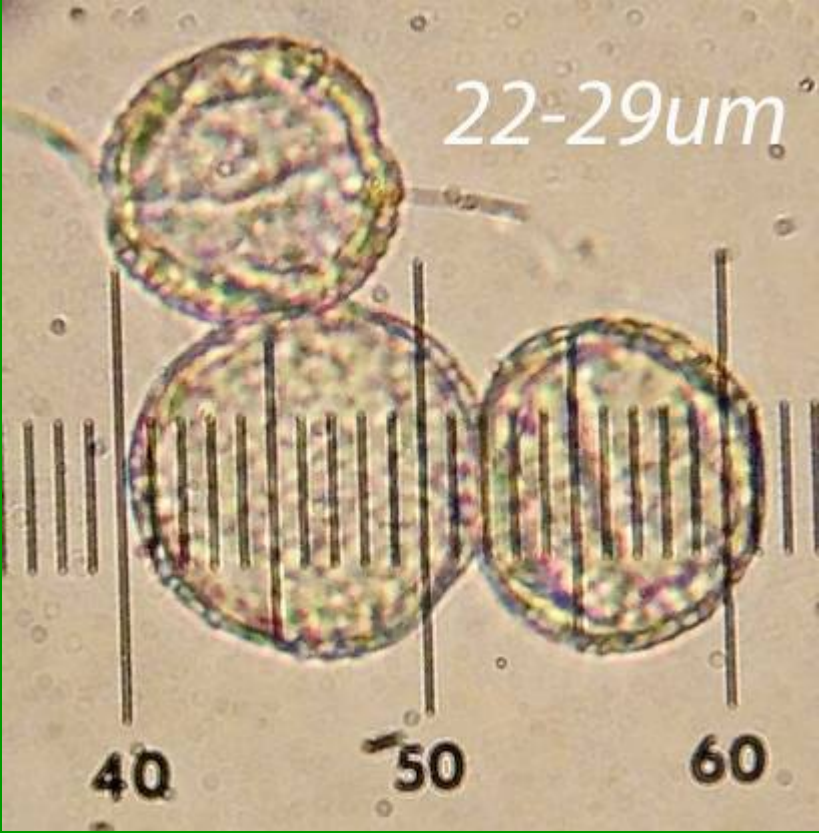


CS

Filament w/ VB



Pollen grains have a reticulate pattern on their exine and 4 sulci or furrows on their side



Arrows = sulci or furrows

@450X, 11 divisions of micrometer = 27.3 microns

Citrus aurantifolia

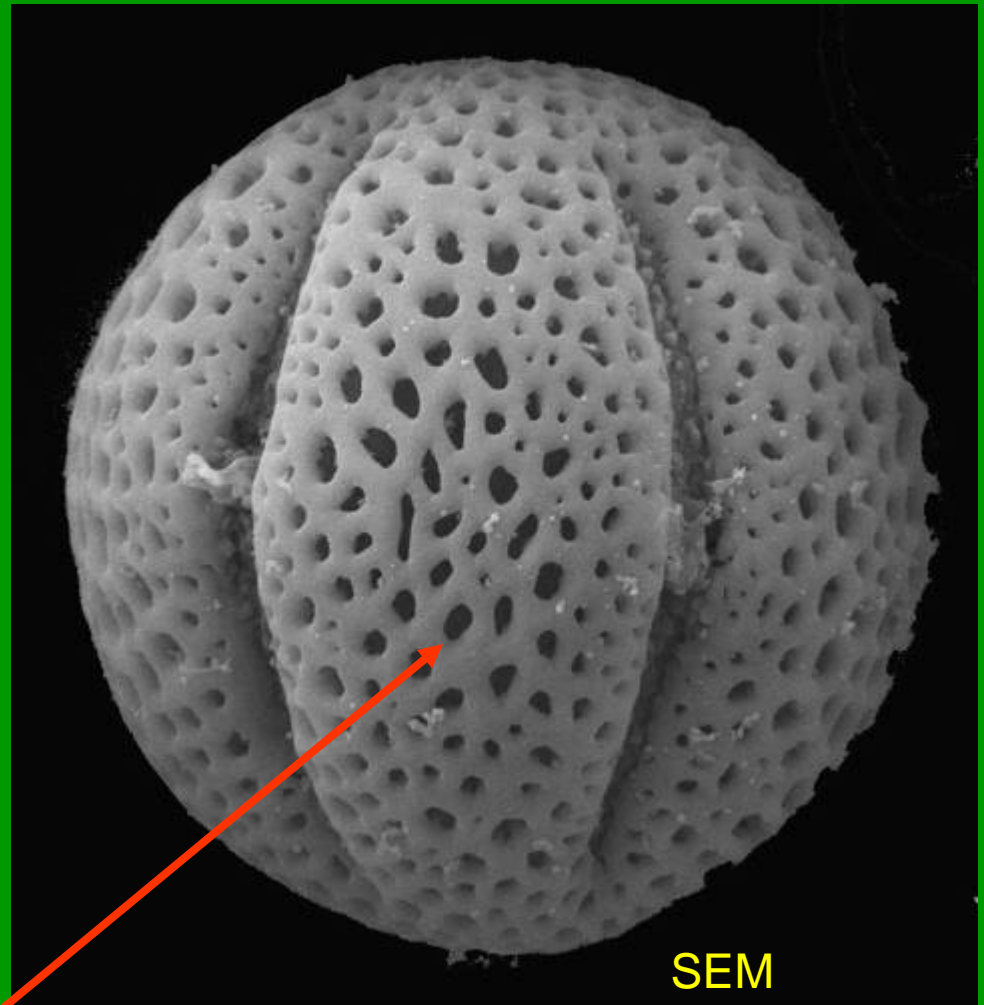
Equatorial views

29 μm

Exine = 'reticulate'



light microscope



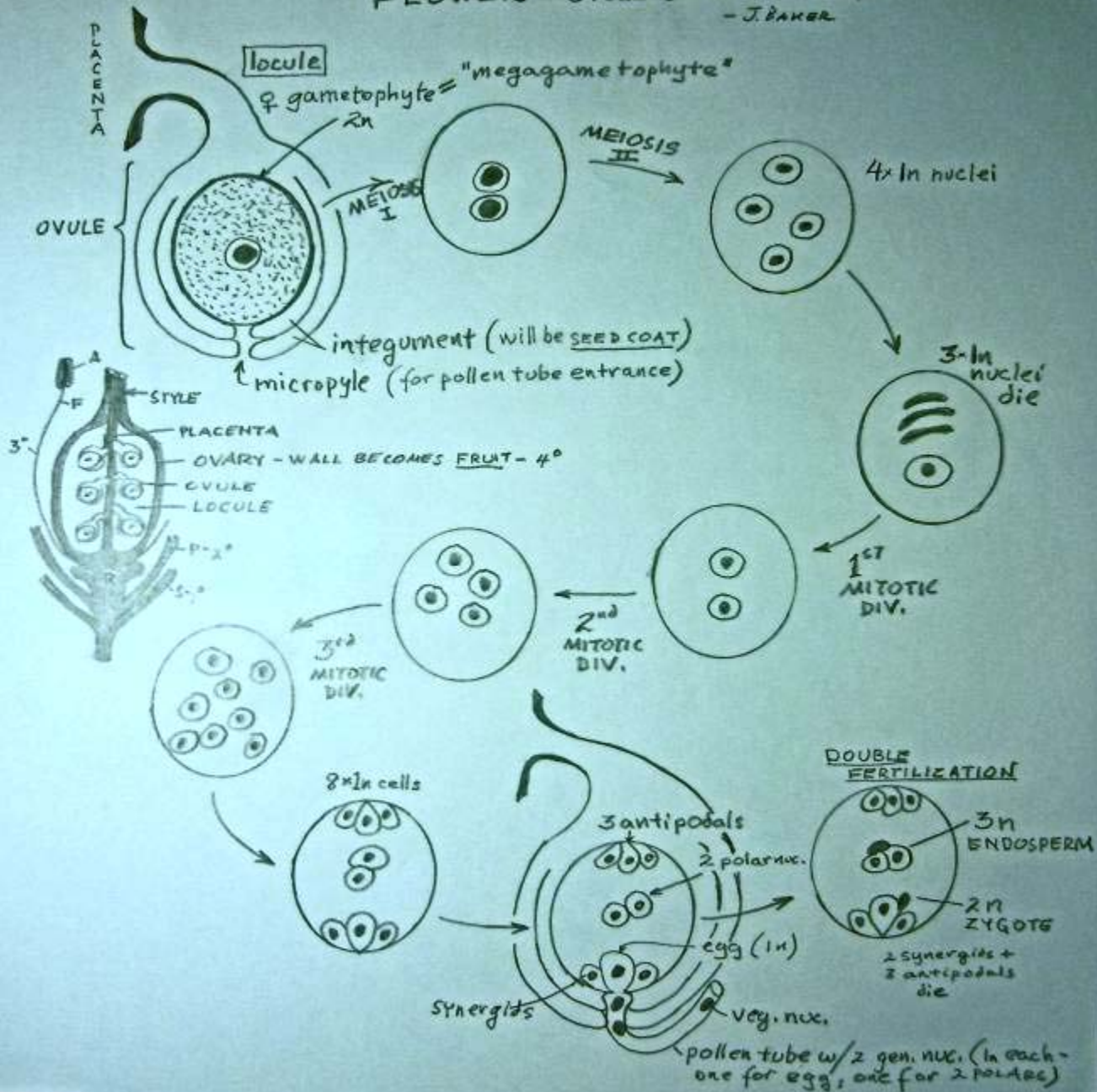
SEM

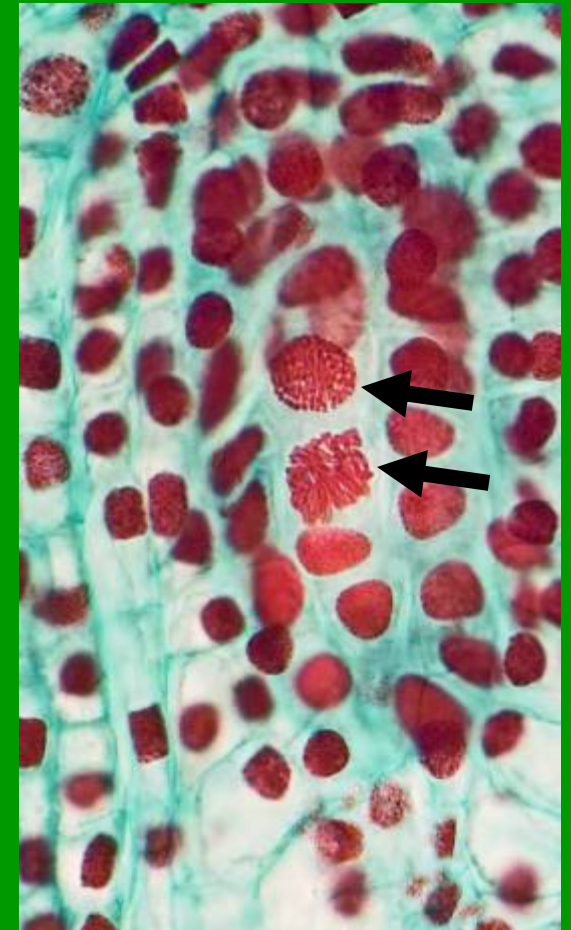
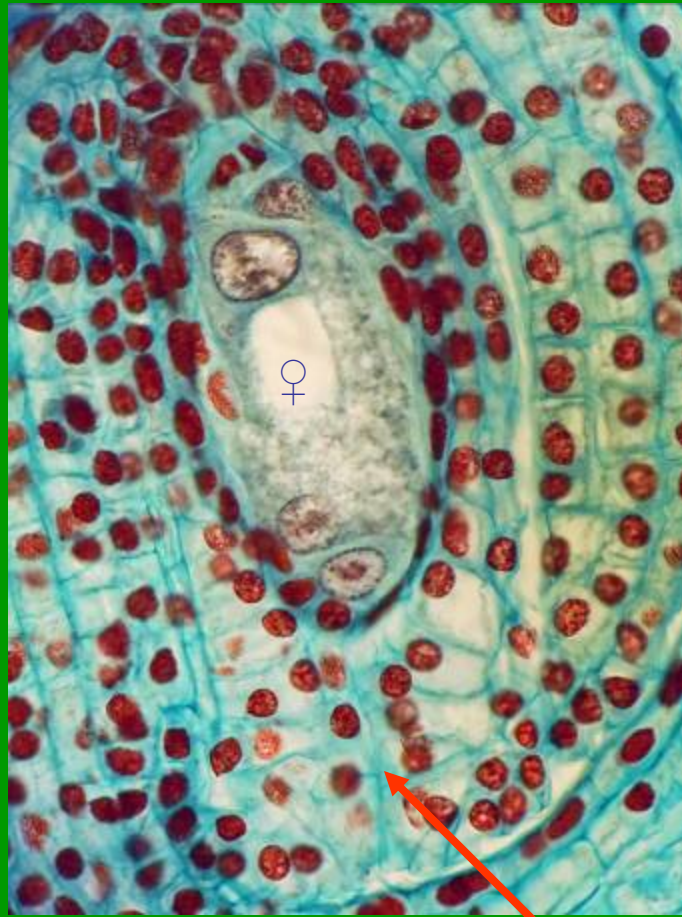
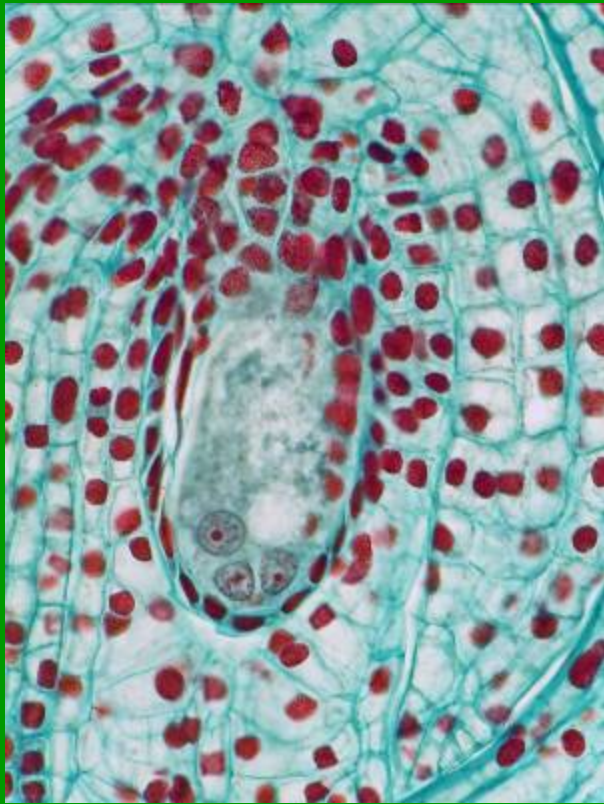
Pollen grains have a reticulate pattern on their exine and 4 sulci or furrows ('tetracolpate' or 'stephanocolporate') on their side

Citrus aurantifolia

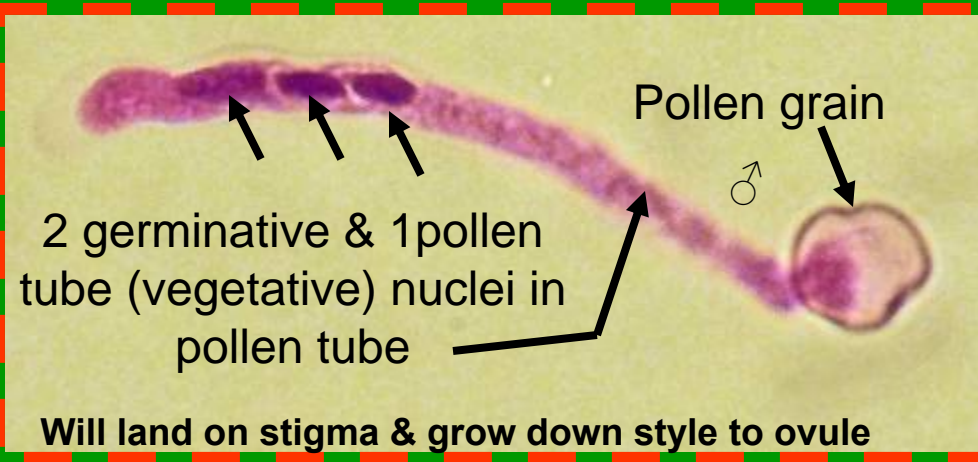
FLOWER - OVULE DEVELOPMENT

- J. BAKER



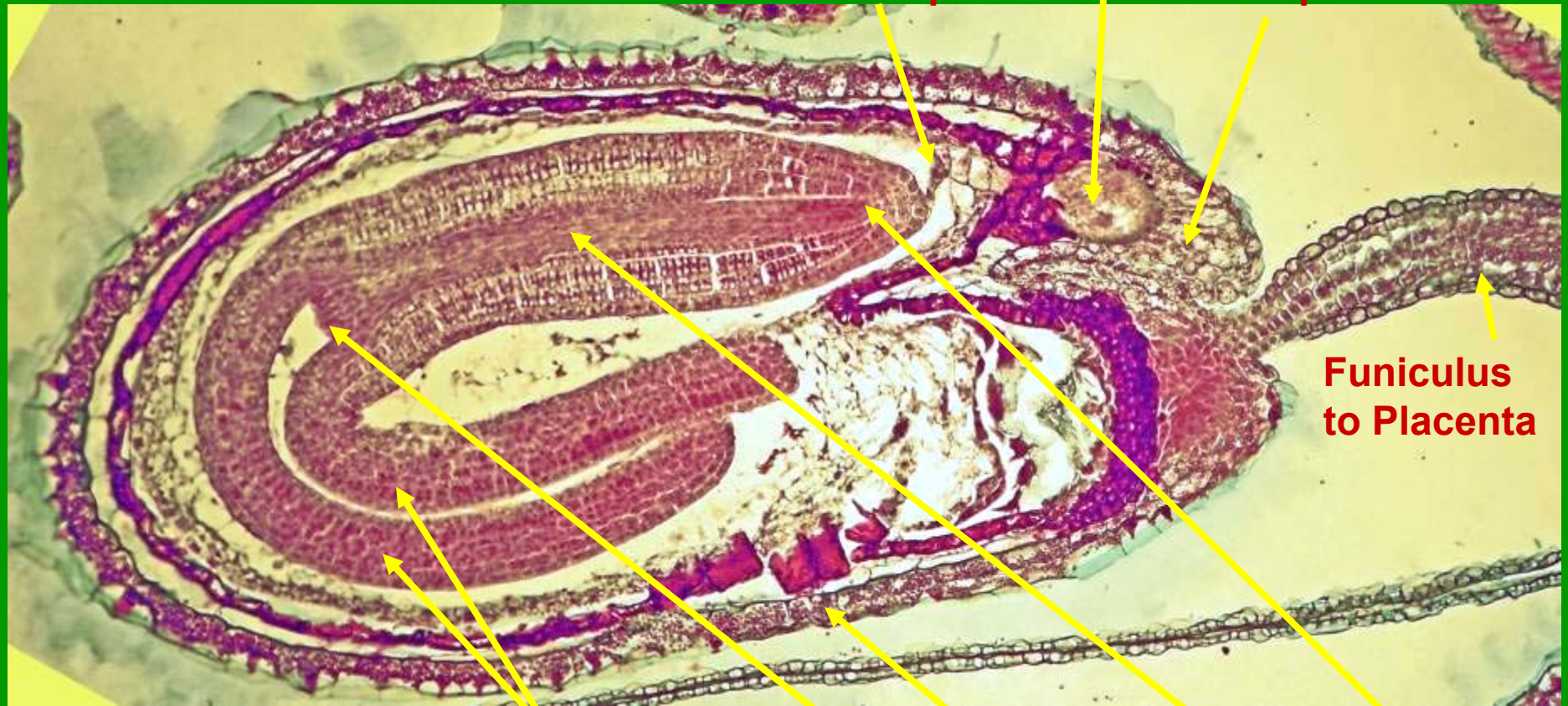


micropyle



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

Plant Embryo: Later Stage



Cotyledons(2), Shoot apex, Seed Coat, Hypocotyl, Radicle = Epicotyl



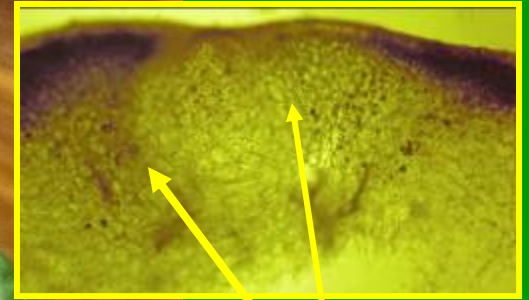
Very early embryo on its suspensor cells



The blossoms were in bloom and the sweet scent was powerful 3/22/2012

Seed (c.s.)
with embryo
inside

Placenta
(axial or
axile)



Oil glands in
lime outer
pericarp(exo-
carp): very
similar to
those on leaf

Segment or
'Locule' in
endocarp =
what we eat

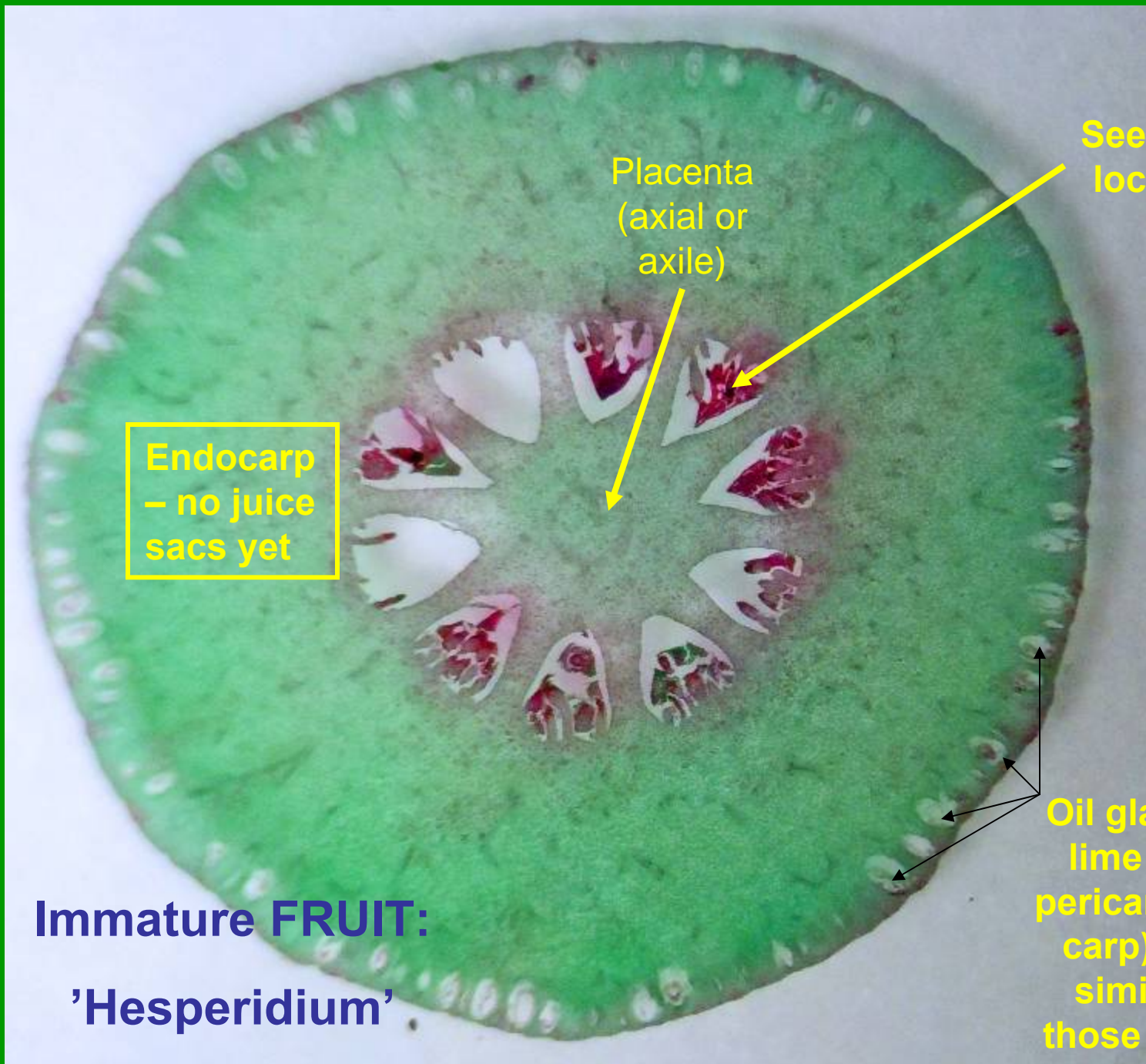
FRUIT:

'Hesperidium'

Pericarp: outer is exocarp (flavedo)
w/ glands and white is mesocarp
(albedo)

Juice 'sacs'=
Endocarp

Citrus aurantifolia



Seeds in locules

Placenta (axial or axile)

Endocarp – no juice sacs yet

Oil glands in lime outer pericarp (exocarp): very similar to those on leaf

Immature FRUIT:
'Hesperidium'

Longitudinal section of seed

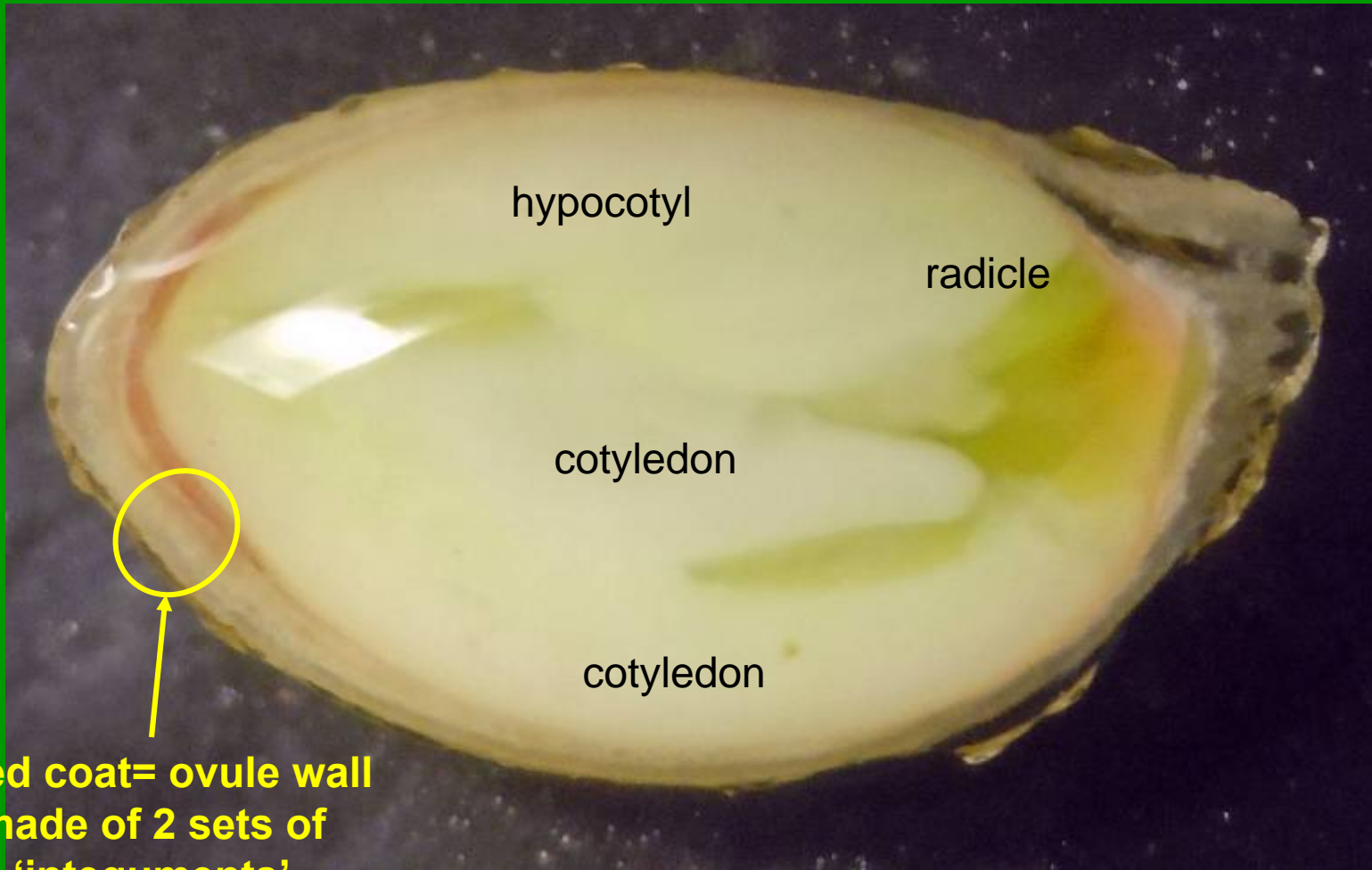
Citrus aurantifolia

Plumular apex

To axis
of
placenta



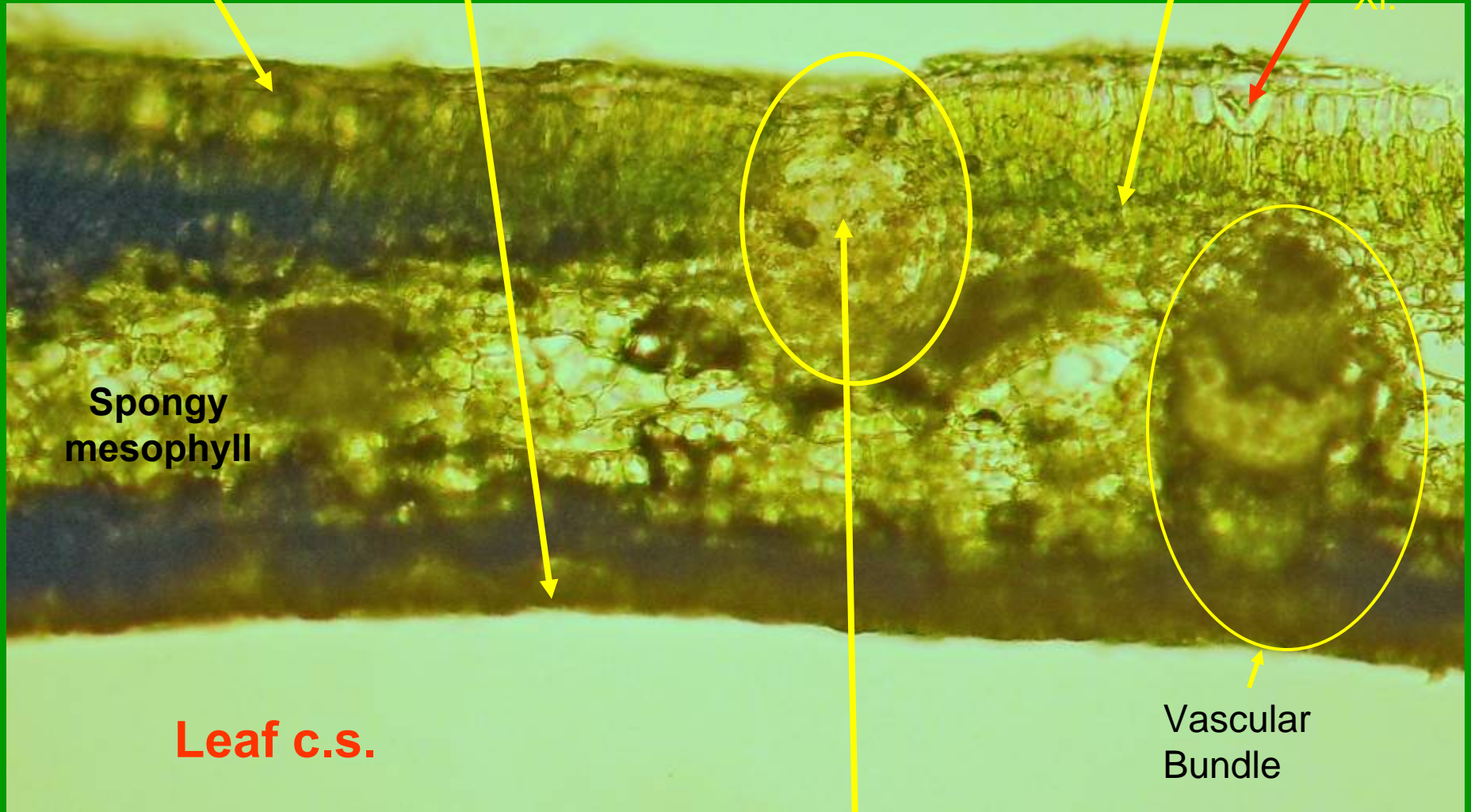
Very early embryo on its suspensor cells



Seed coat= ovule wall
made of 2 sets of
'integuments'

Citrus aurantifolia

Upper (Adaxial) & Lower (Abaxial) Epidermis; Palisades Mesophyll



Spongy mesophyll

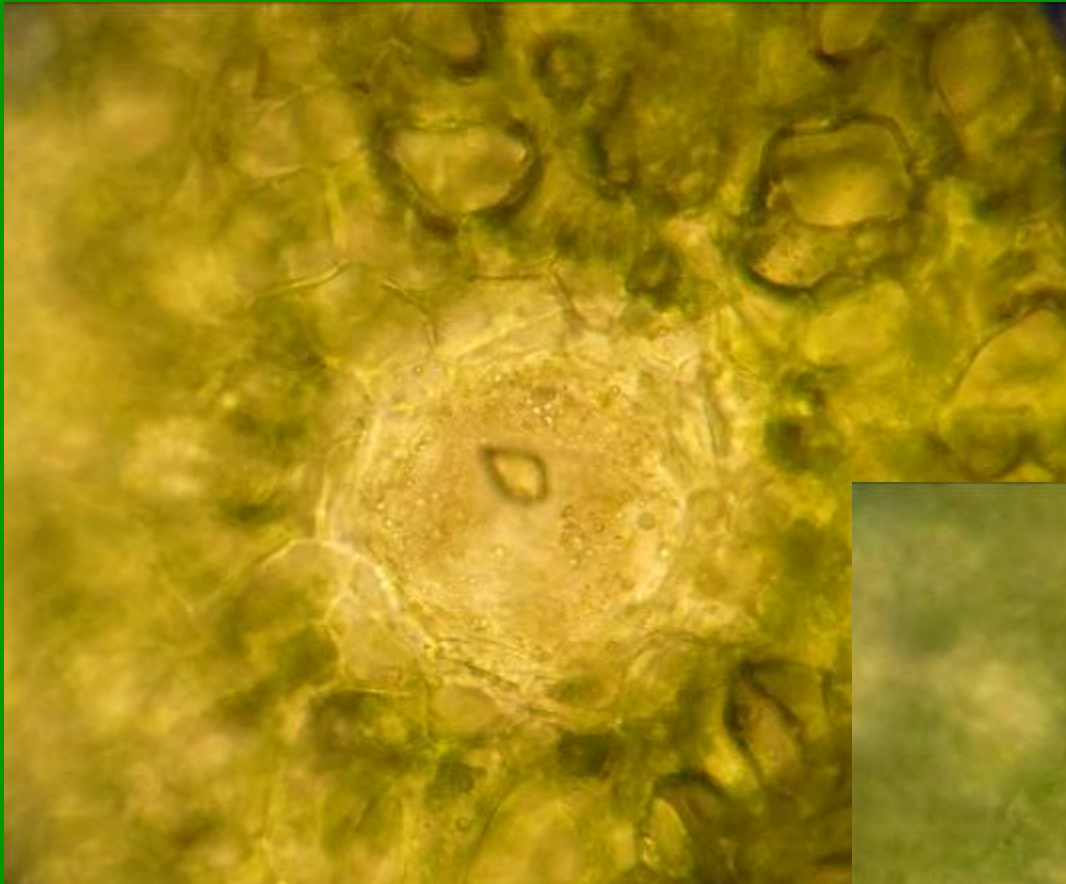
Leaf c.s.

Vascular Bundle

Oil gland

Citrus aurantifolia

Top surface of 2 oil glands in dorsal (adaxial) view of leaf: note tiny, clear oil drops; used to produce oil for scent and cleaning



Citrus aurantifolia



Abaxial (bottom or lower or ventral) surface of leaf showing stomata

stomata

Citrus aurantifolia



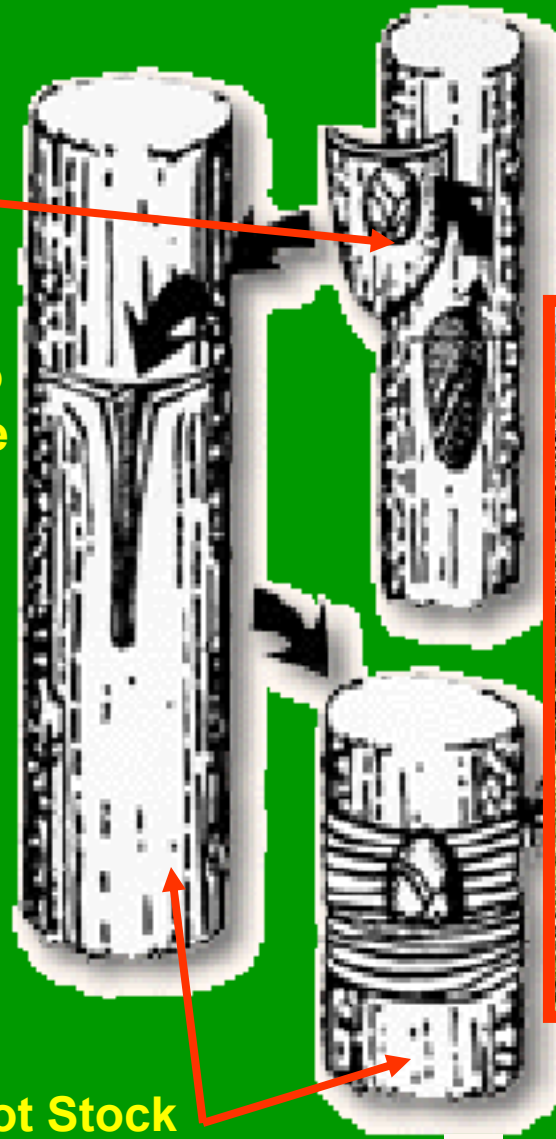
**Crystals in upper
epidermal cells of
leaf**

Citrus aurantifolia



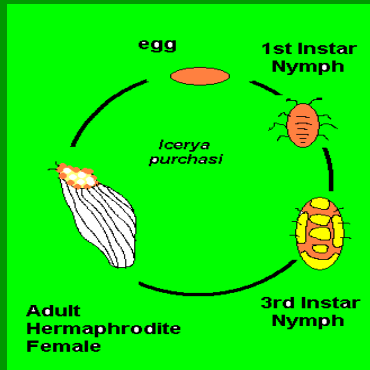
Scion
from tree
you are
looking to
reproduce
asexually

Root Stock
(any hardy
citrus plant)



Grafting

Scale (Insecta: Hemiptera)
parasite of Citrus



Hemiptera: Margarodidae
Cottony cushion scale
Icerya purchasi

