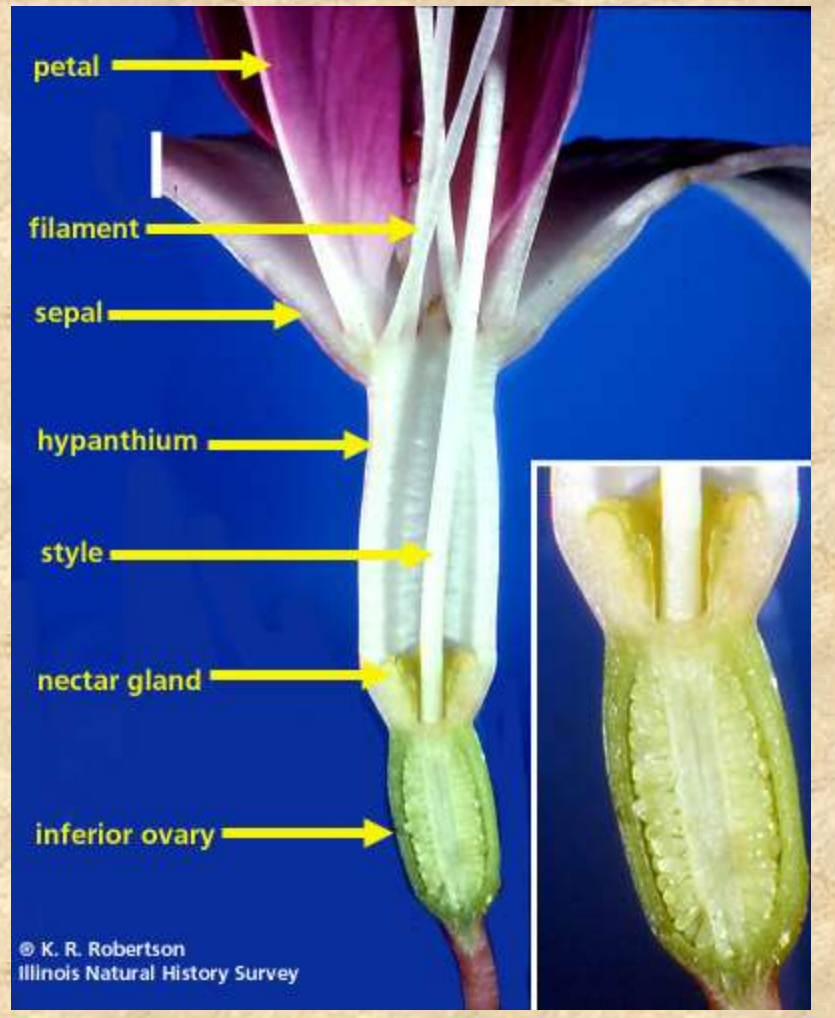
Flowers - Reproduction

What is a Flower?

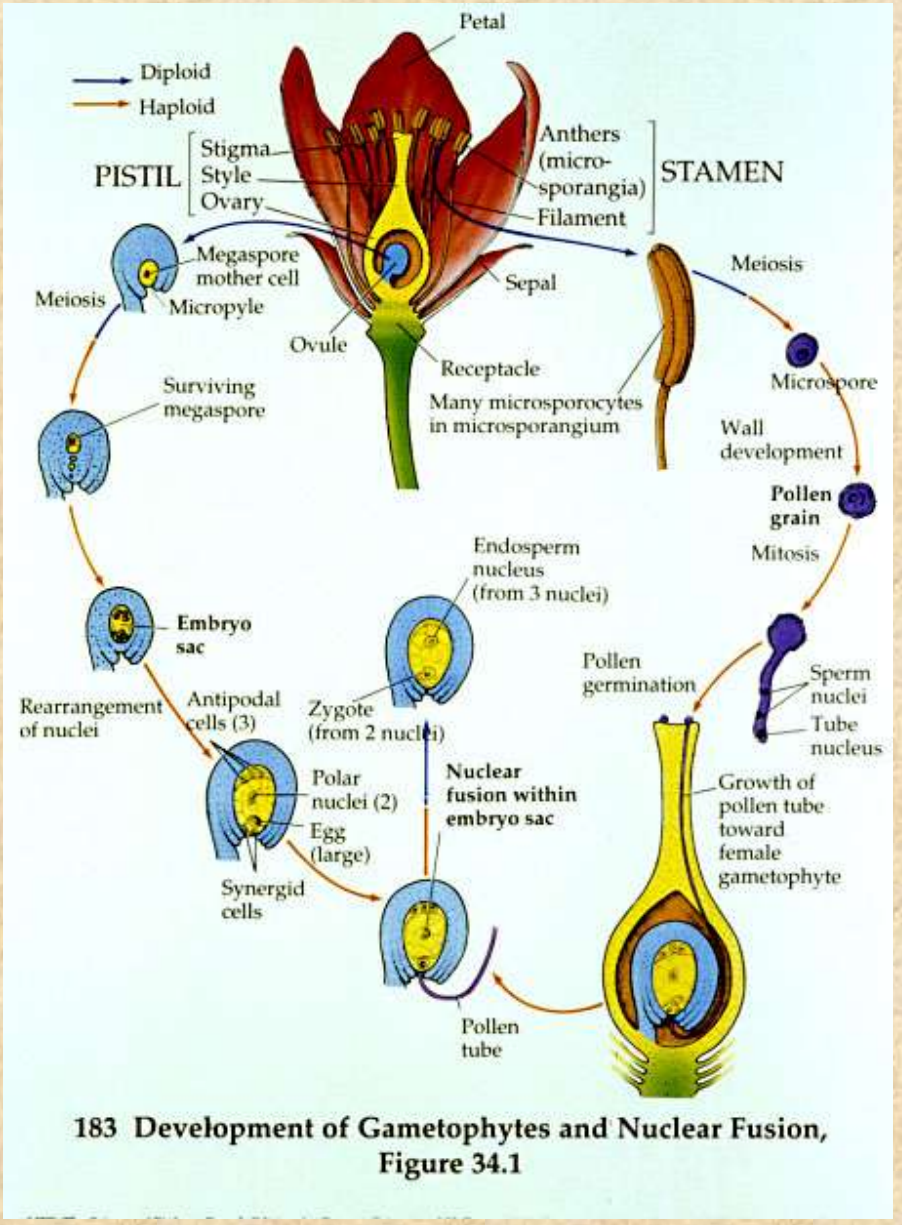


What is a Flower?

- **Flowers advertise Plant Sex**
  - Corolla is the “red-light” advertising!
  - All the naughty parts on display!
  - Even Snacks, Drinks & Comfort provided!

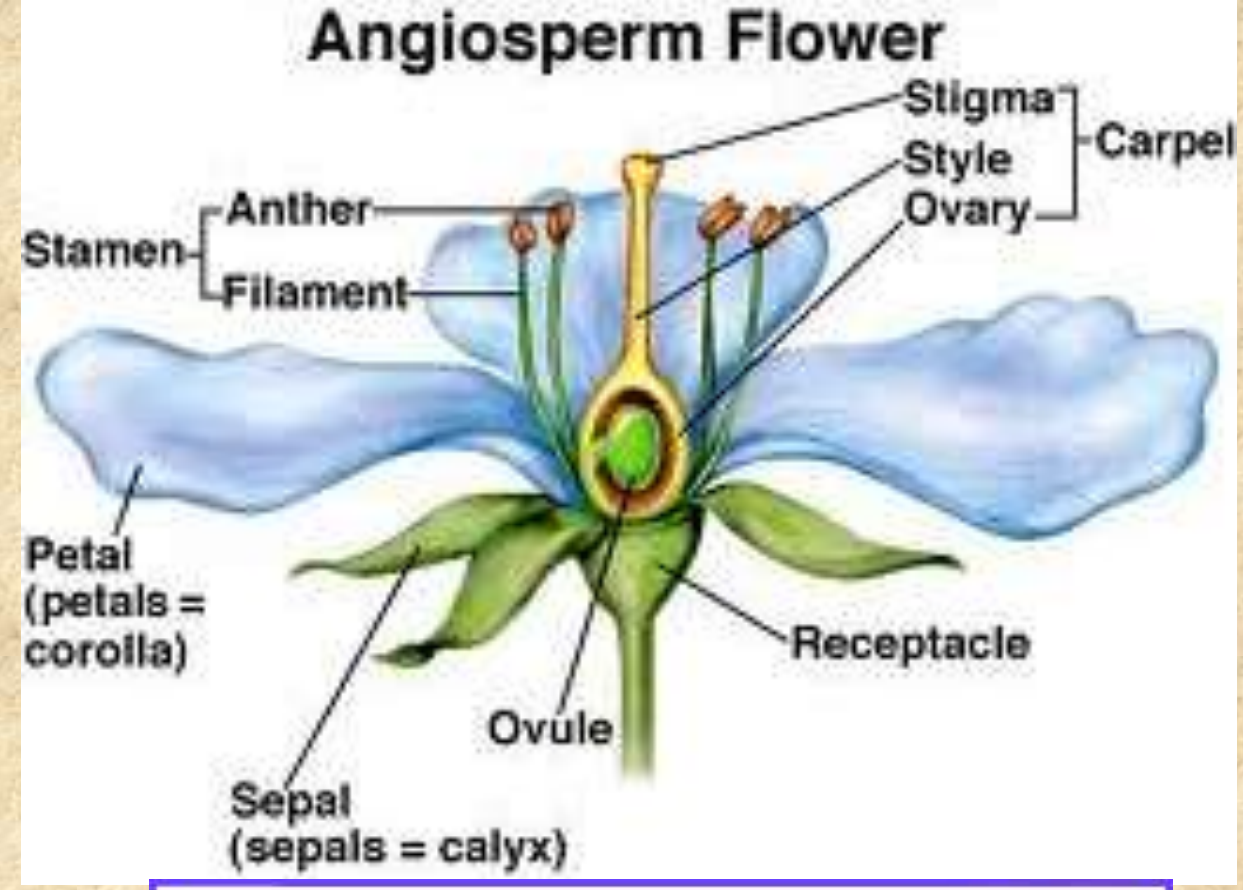
Plant Reproduction

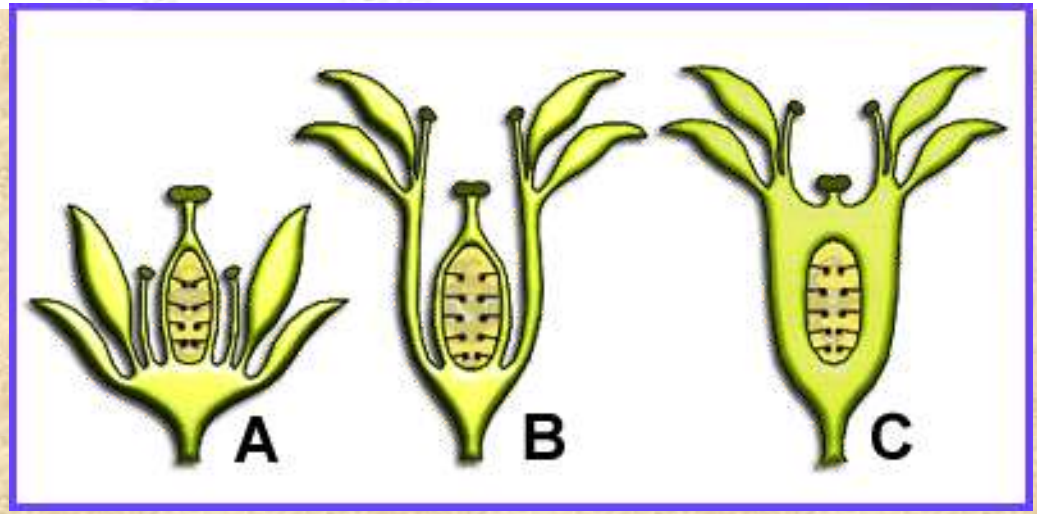
Megasporogenesis



183 Development of Gametophytes and Nuclear Fusion, Figure 34.1

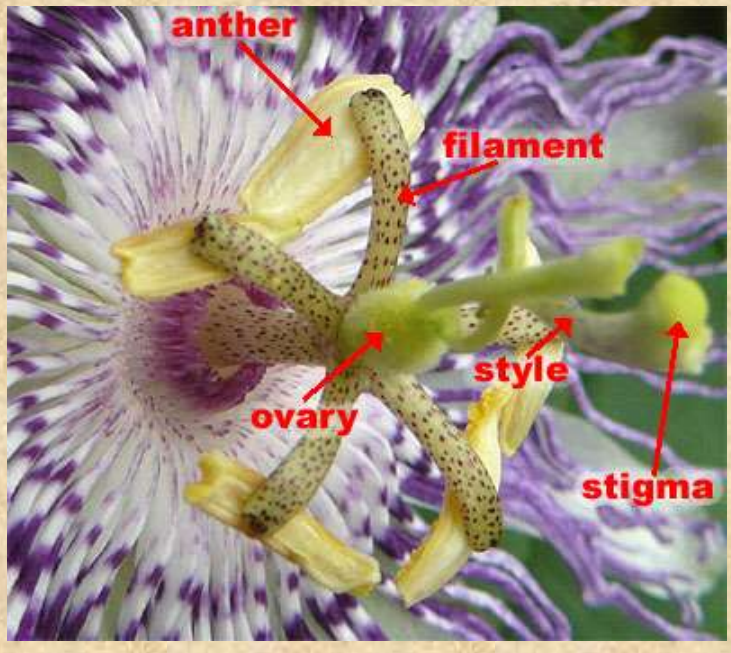
Microsporogenesis

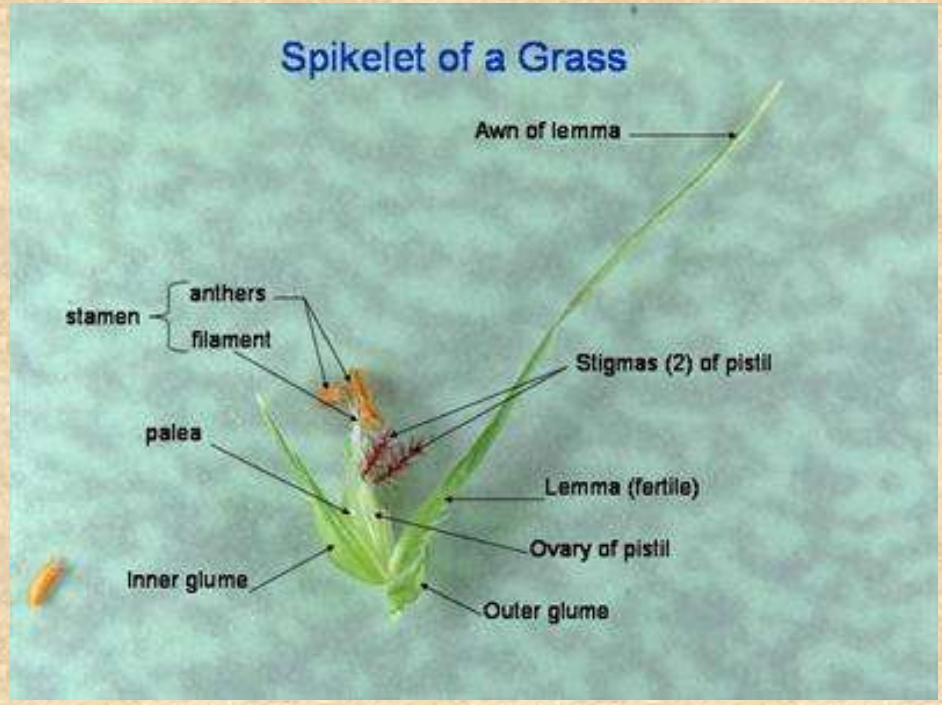

Angiosperm Flower
Stigma
Style
Ovary
Carpel
Anther
Stamen
Filament
Petal
(petals =
corolla)
Receptacle
Ovule
Sepal
(sepals = calyx)


A
B
C

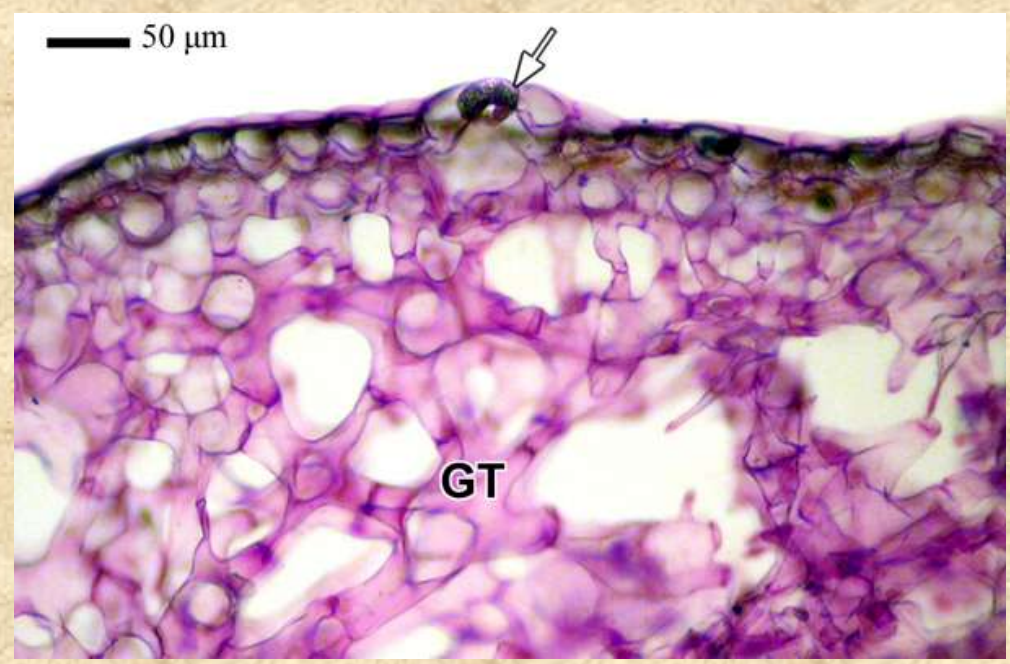
Specialization away from simple shoot
Spiral to whorled to two or more whorls
Radial (actinomorphy) to bilateral symmetry (zygomorphy)
Superior to inferior ovary
All parts to lacking parts (unisexual)


outer petaloid staminodes
petaloid filament
inner petaloid staminode
petals
floral bract
ovary
anther
sepal
Environmental Weeds of Australia


anther
filament
style
ovary
stigma

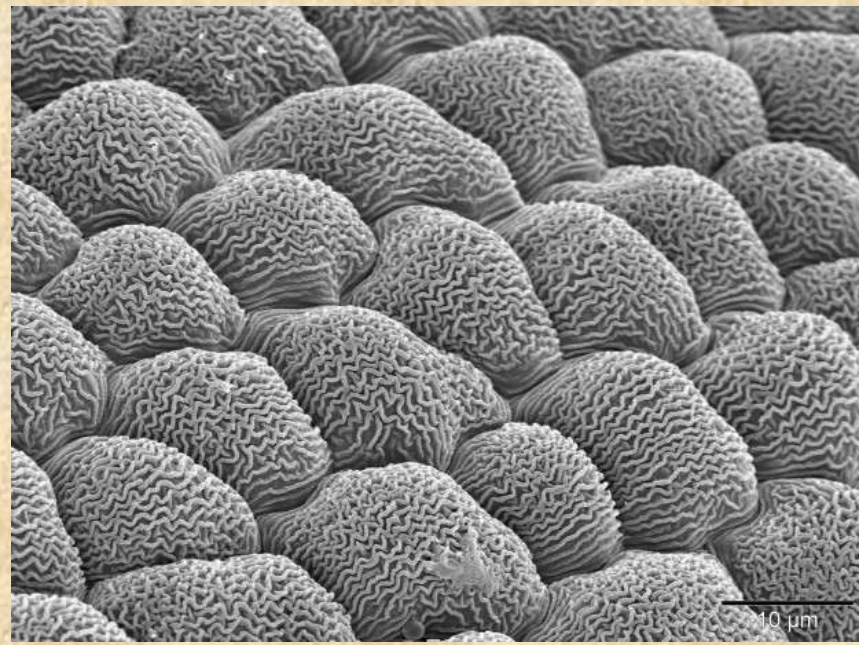

Spikelet of a Grass
Awn of lemma
stamen
anthers
filament
Stigmas (2) of pistil
palea
Lemma (fertile)
Ovary of pistil
Inner glume
Outer glume

Petals – simple anatomy

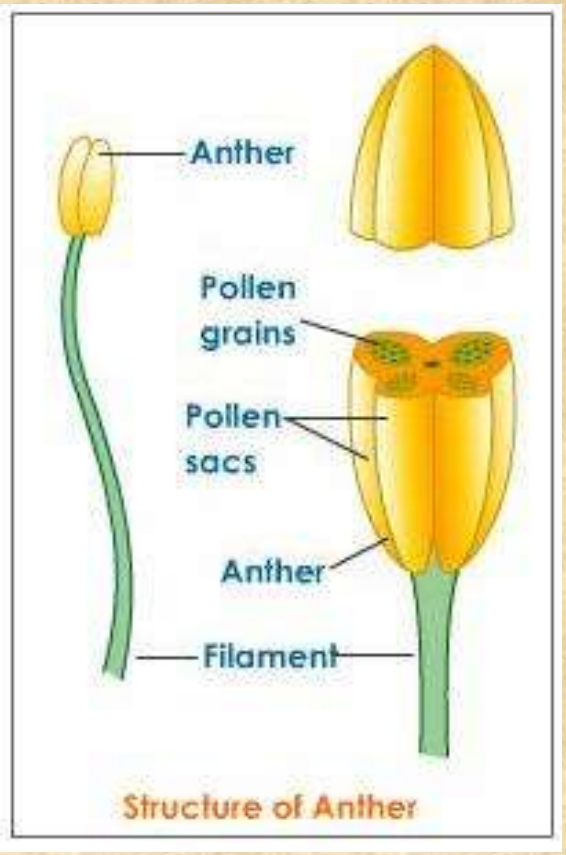


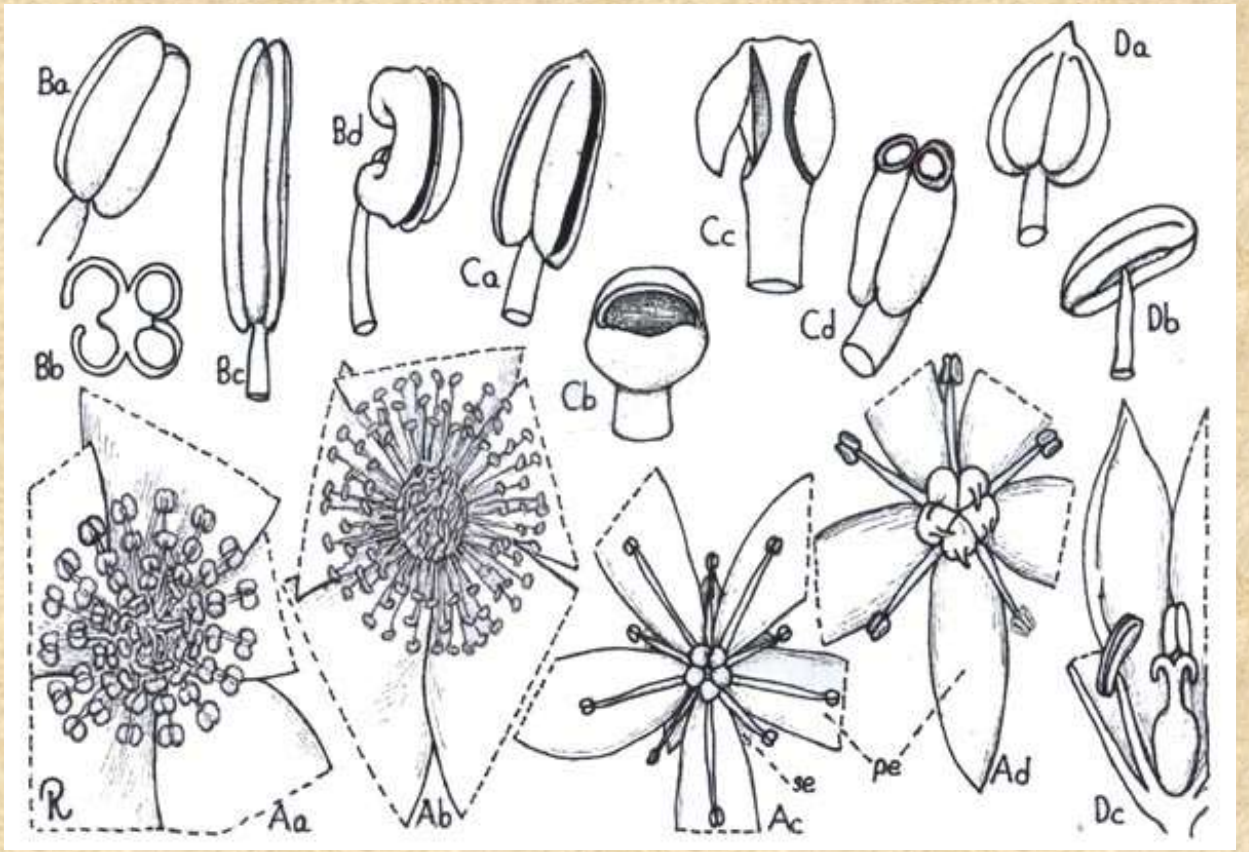
Petal xs, Lilium, TBO
Stomatal complex
Ground tissue

Petal nanoridges

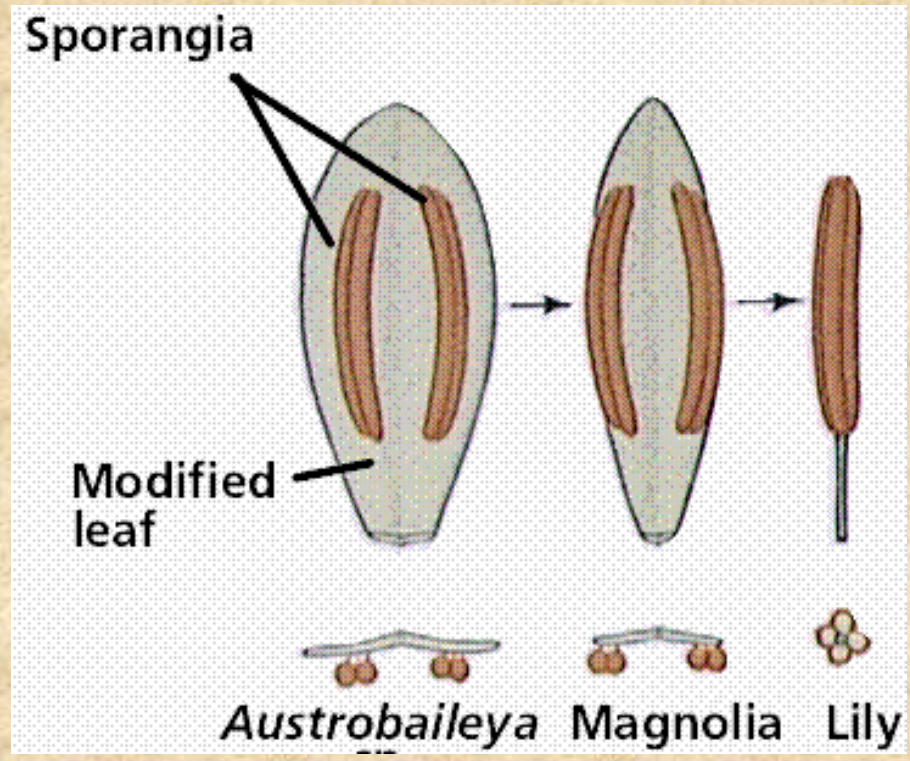


Androecium and stamen types





Hypothesized evolutionary pathway for the development of the anther

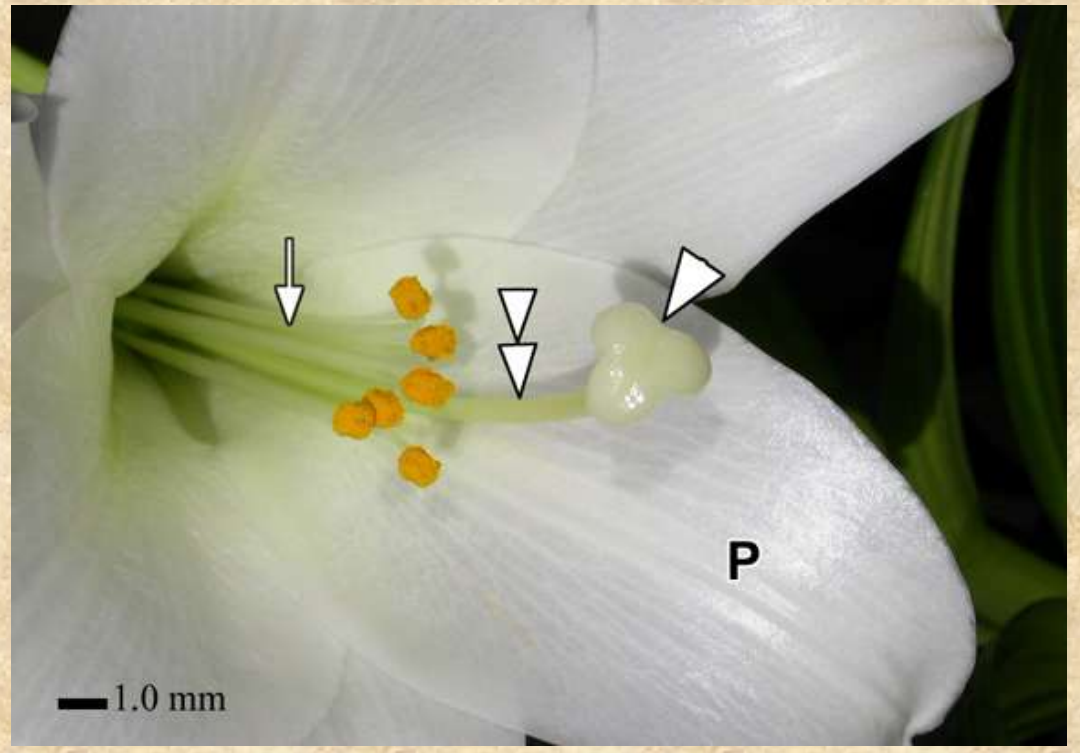


Drimys granadensis

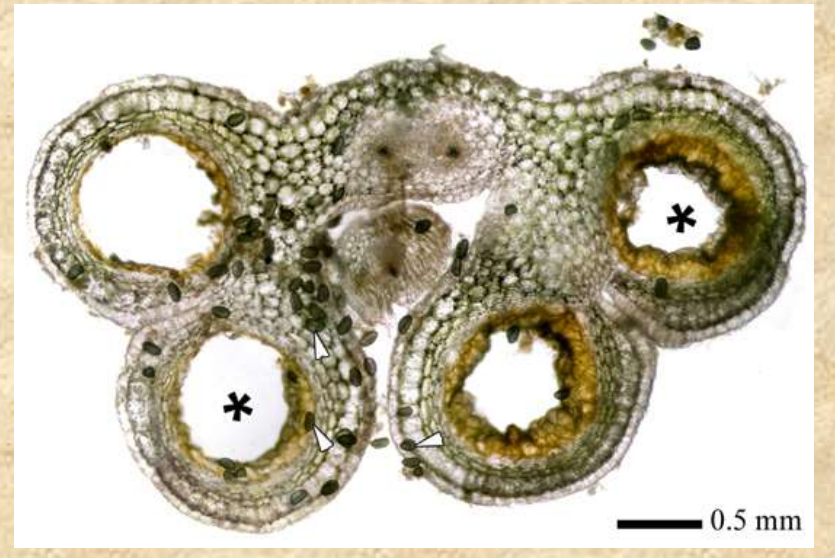
Magnolia

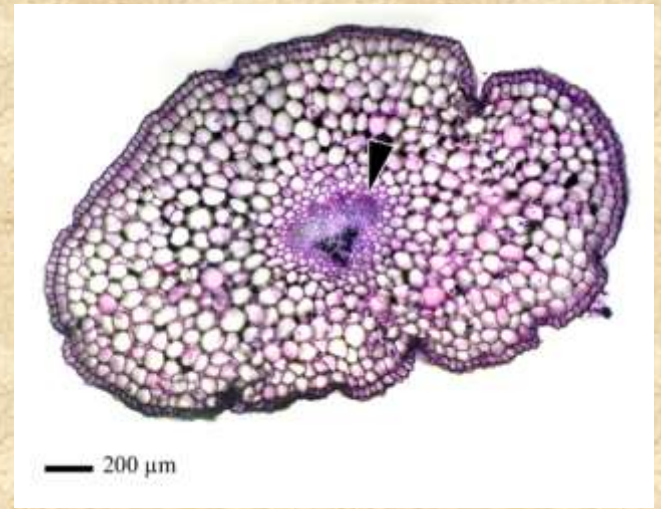
Liriodendron

Lilium – flower parts – stigma, style, filaments, anthers, tepals

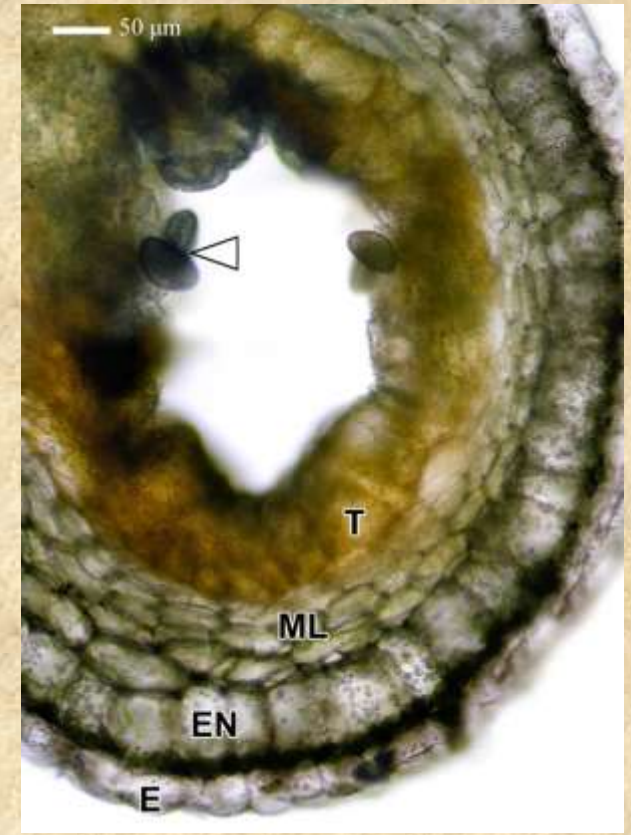


Lilium - anther xs – unstained





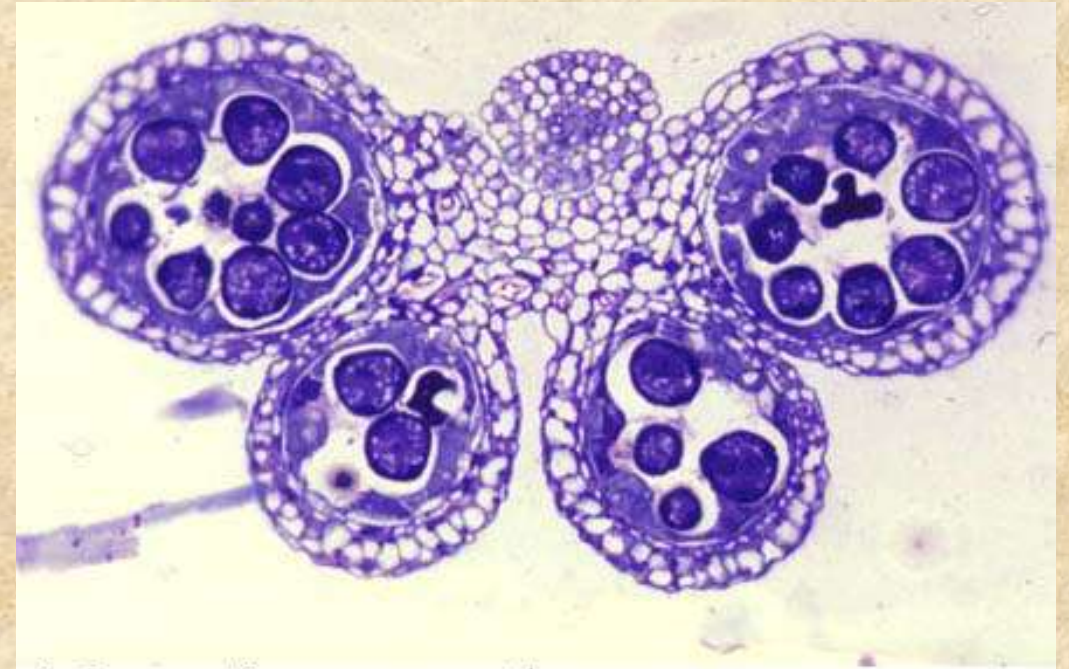
Filament xs
Parenchyma cells
Single vascular bundle



Epidermis
Endothecium
Middle layer
Tapetum

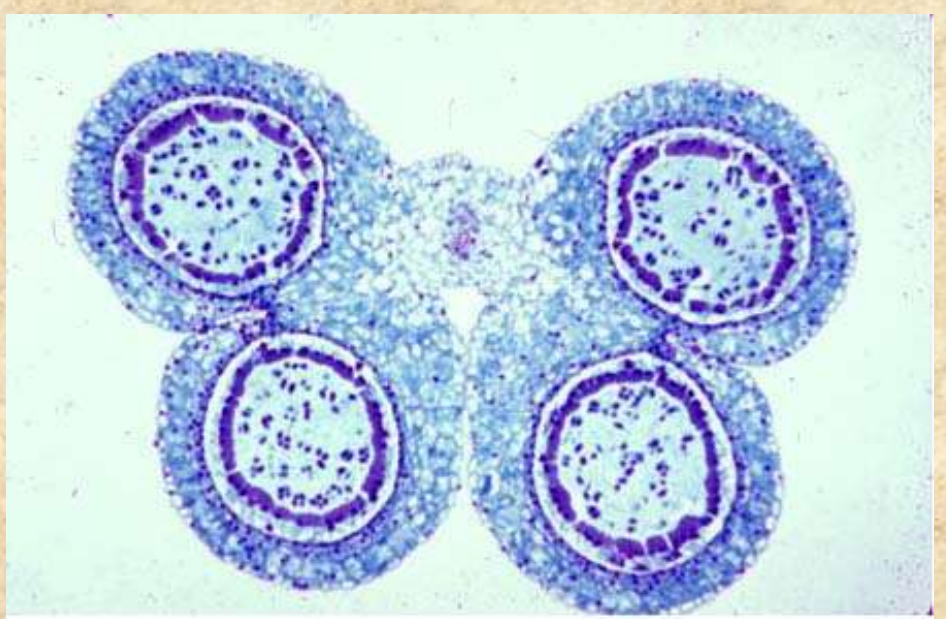
Anther Structure

Hypericum perforatum anthers

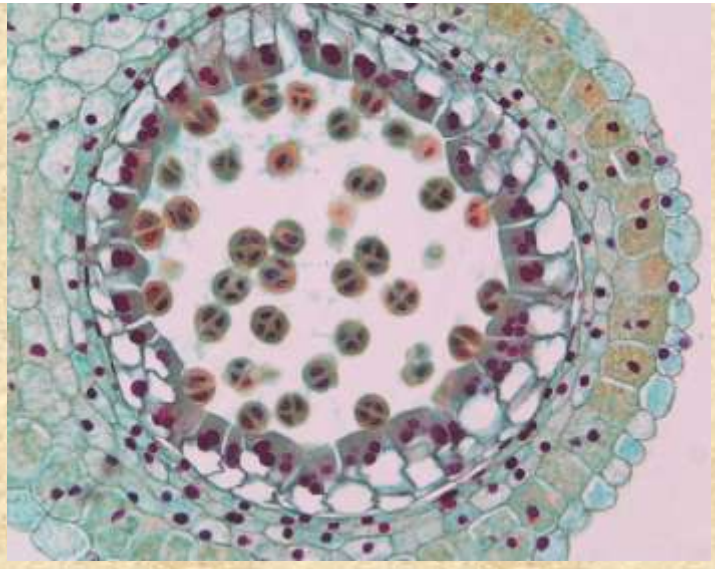


Soybean anther cross section.

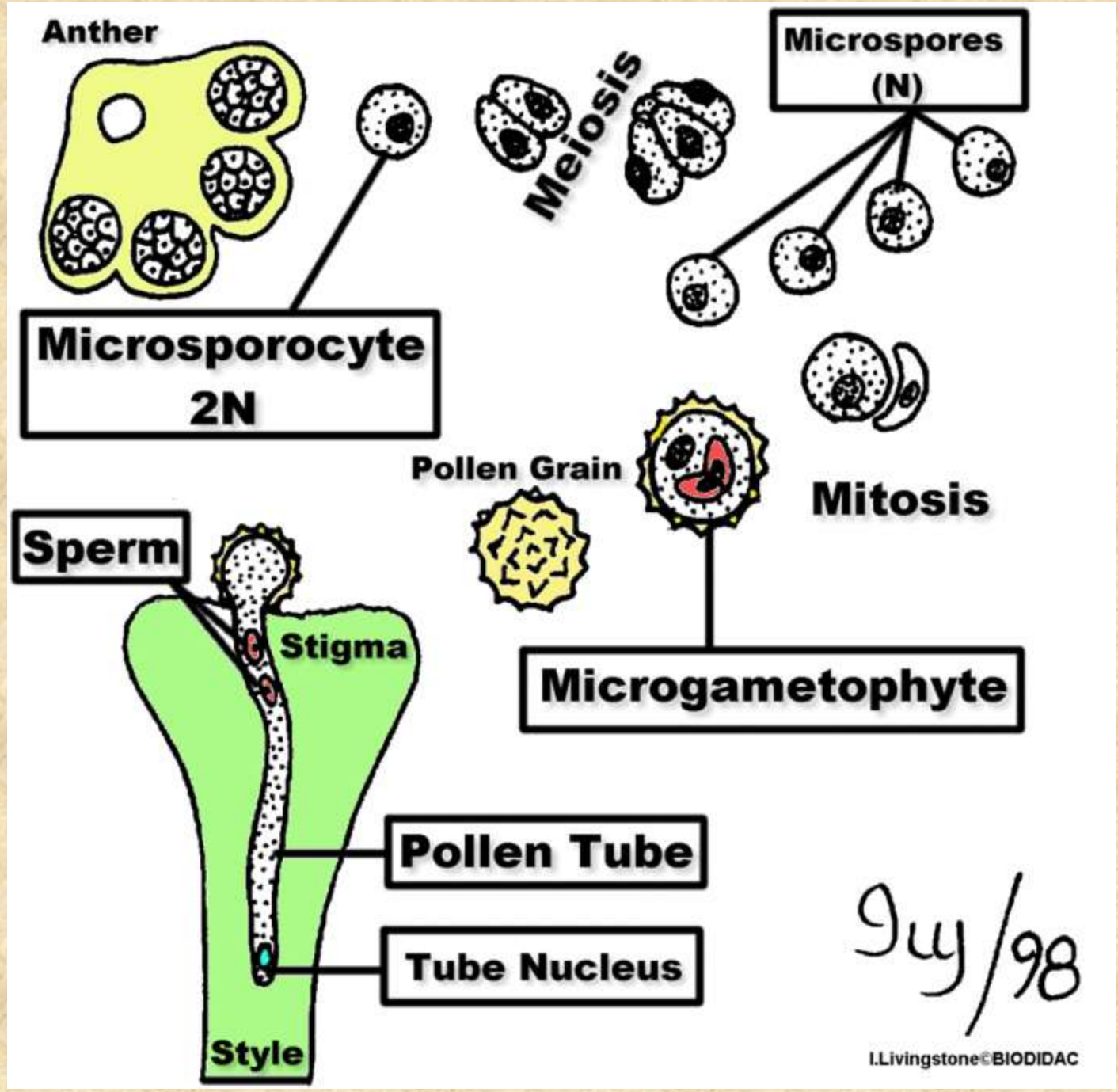
Lilium - anther



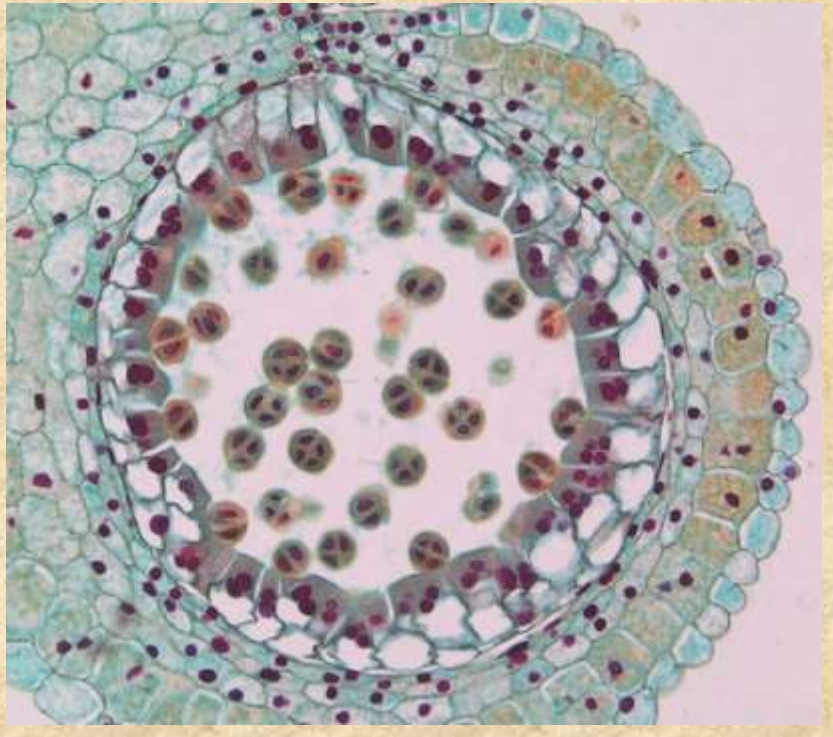
Lily anther cross section.

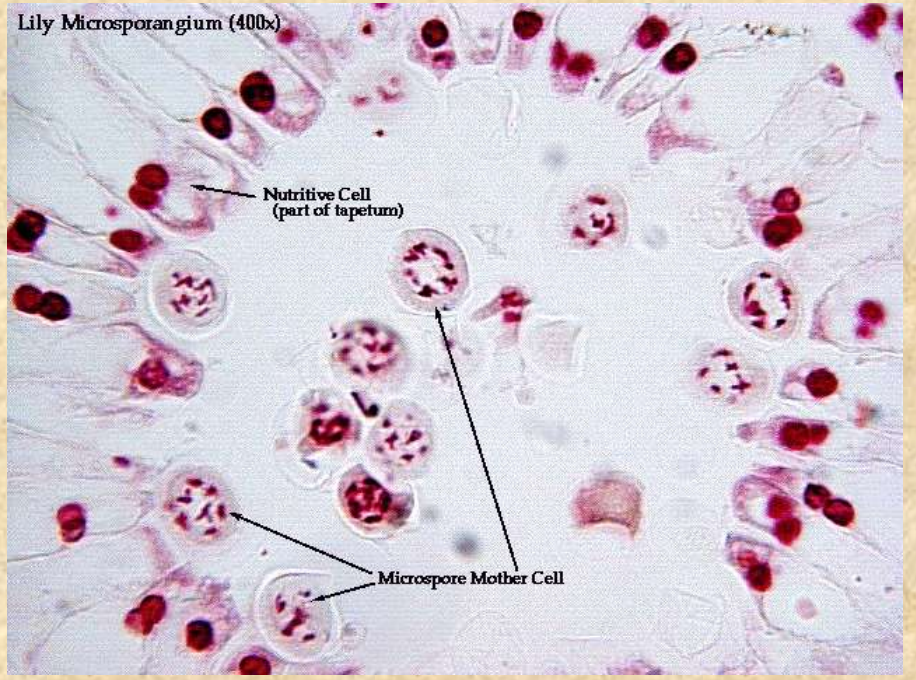


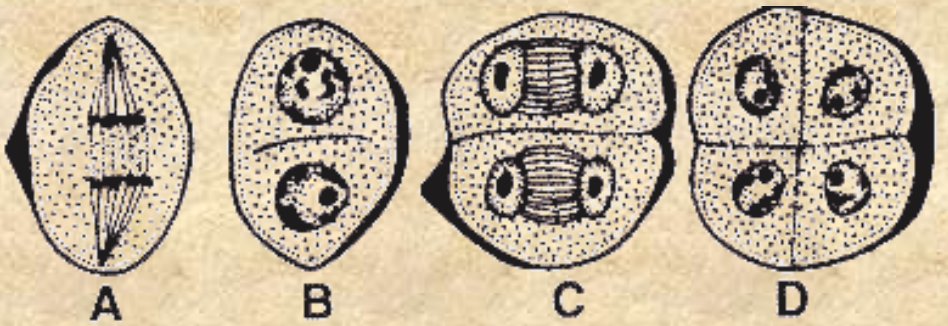
Lily microsporangia with pollen

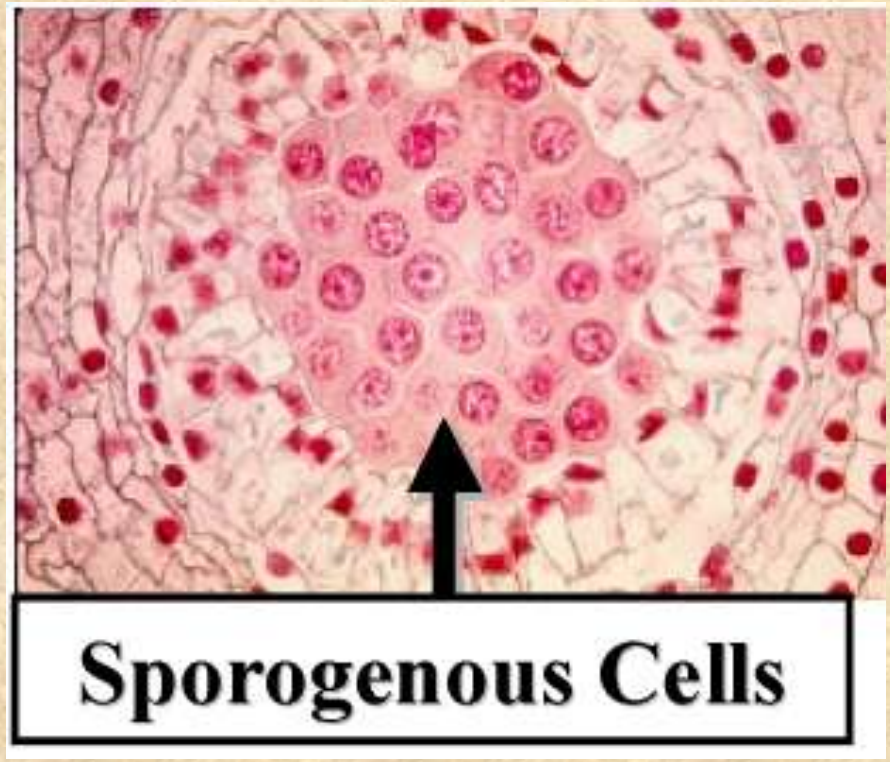

Anther
Microsporocyte
2N
Meiosis
Microspores
(N)
Mitosis
Pollen Grain
Microgametophyte
Sperm
Stigma
Pollen Tube
Tube Nucleus
Style
9y/98
I.Livingstone©BIODIDAC

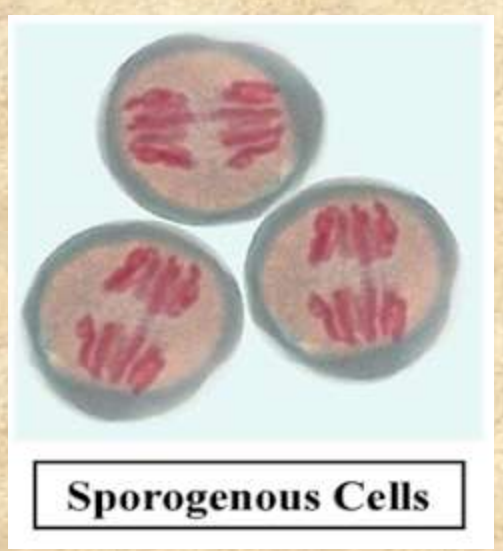
Pollen Mother Cells



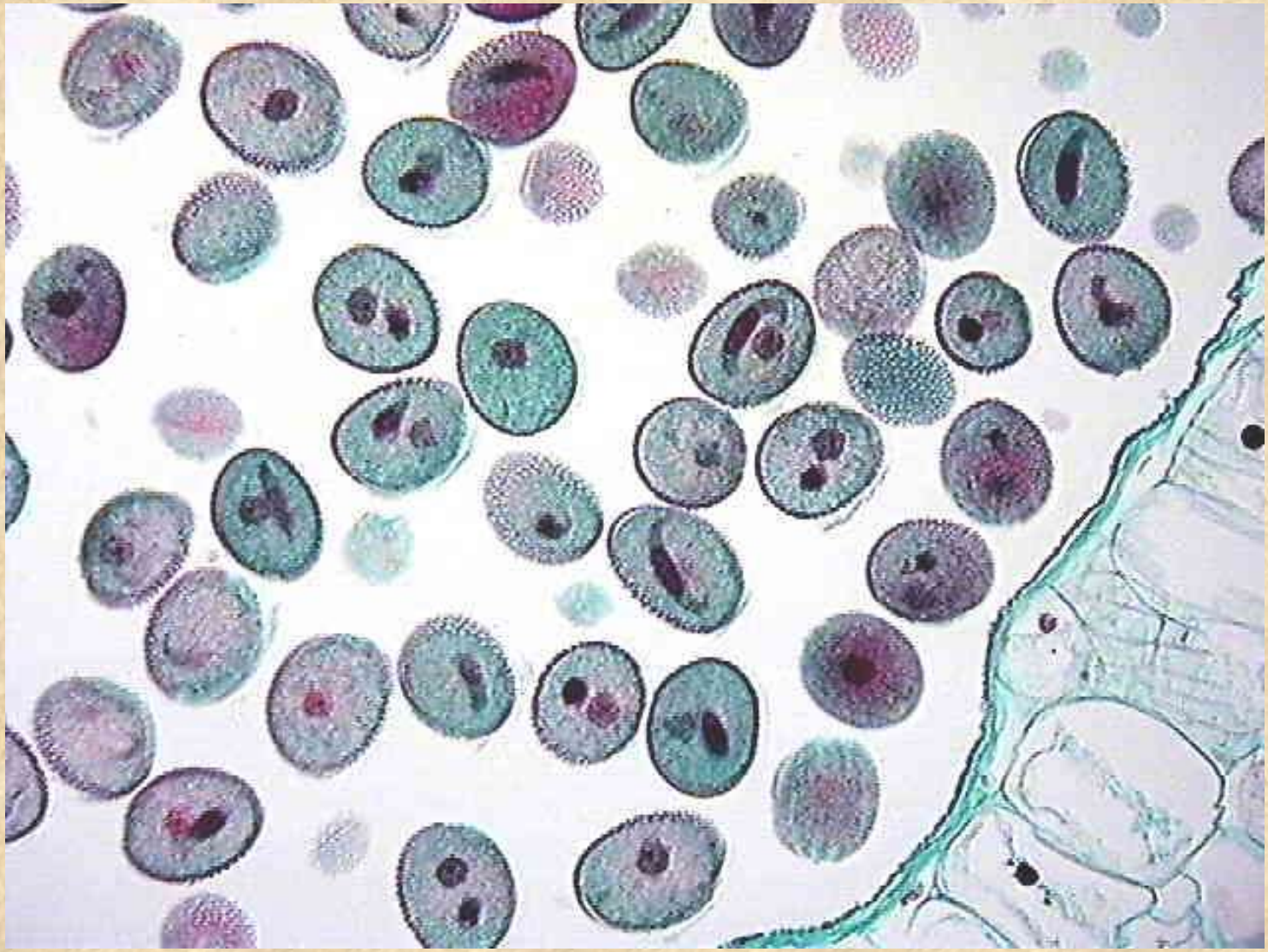




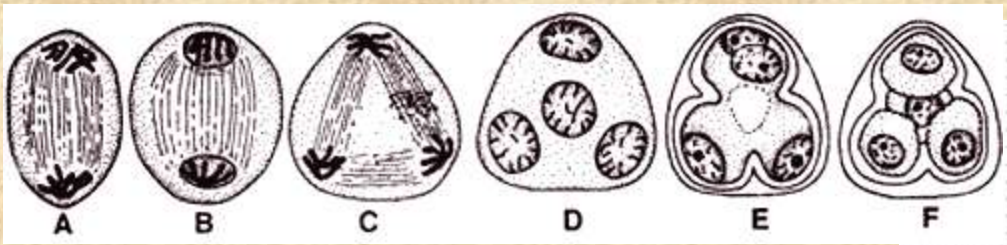

Sporogenous Cells


Sporogenous Cells

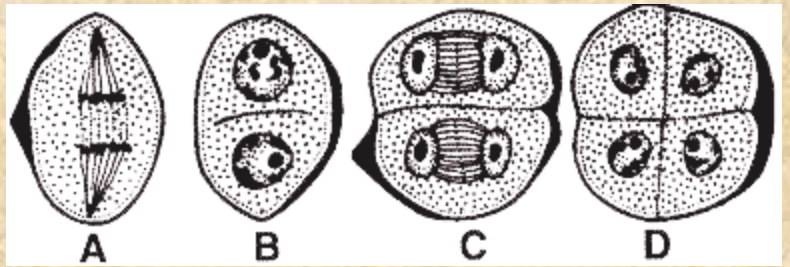
Lilium - Binucleate Mature Pollen



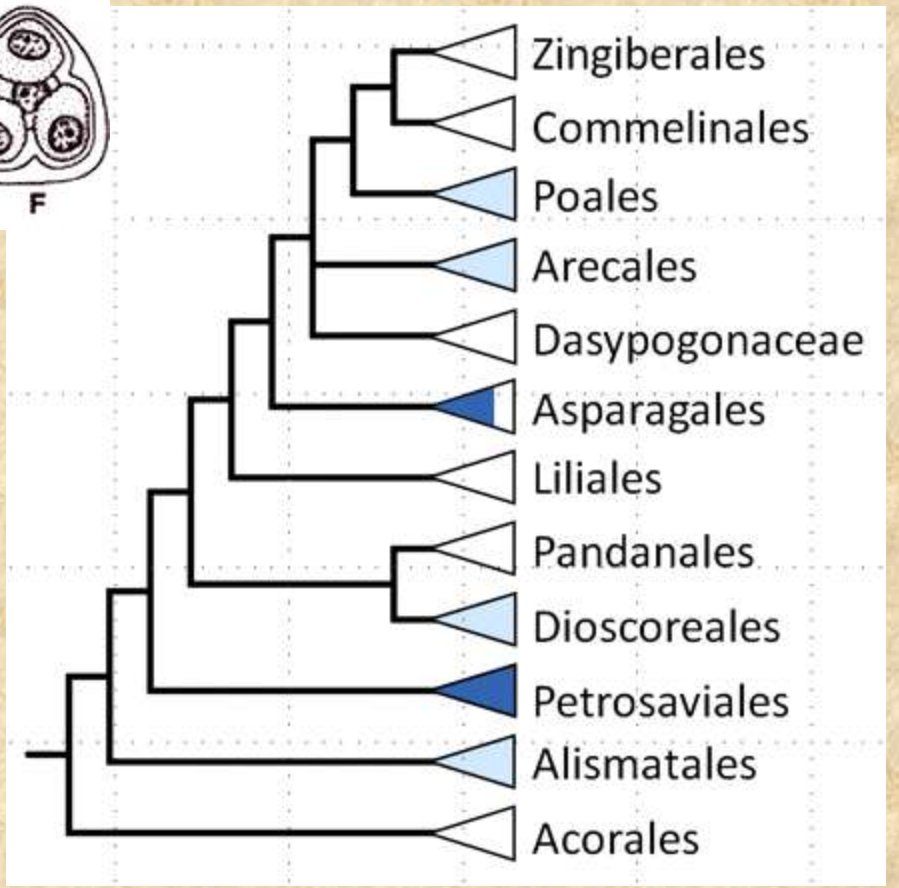
Microsporogenesis



blue: simultaneous

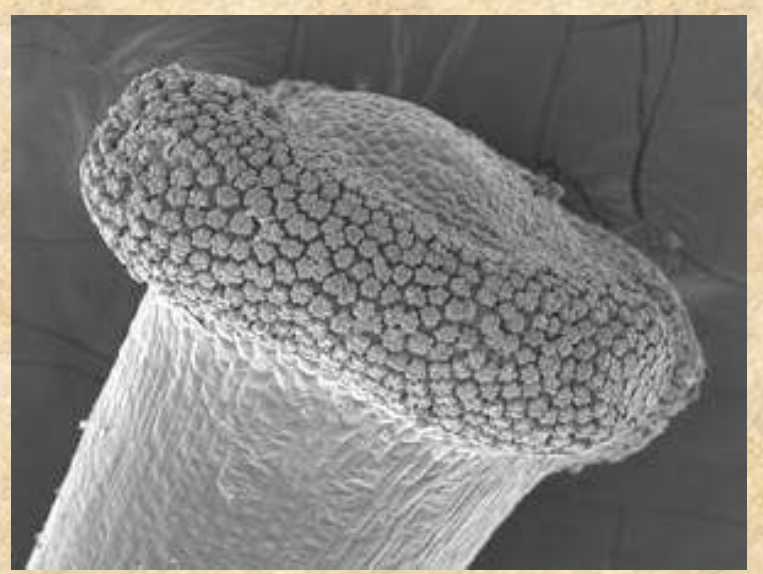


White: successive



Phylogenetic tree of the monocots showing the variation recorded in cytokinesis type during microsporogenesis across orders. White: successive cytokinesis; dark blue: simultaneous cytokinesis; light blue: both. Nadot et al.2008. AJB 95

Pollination - Fascinating Diversity!

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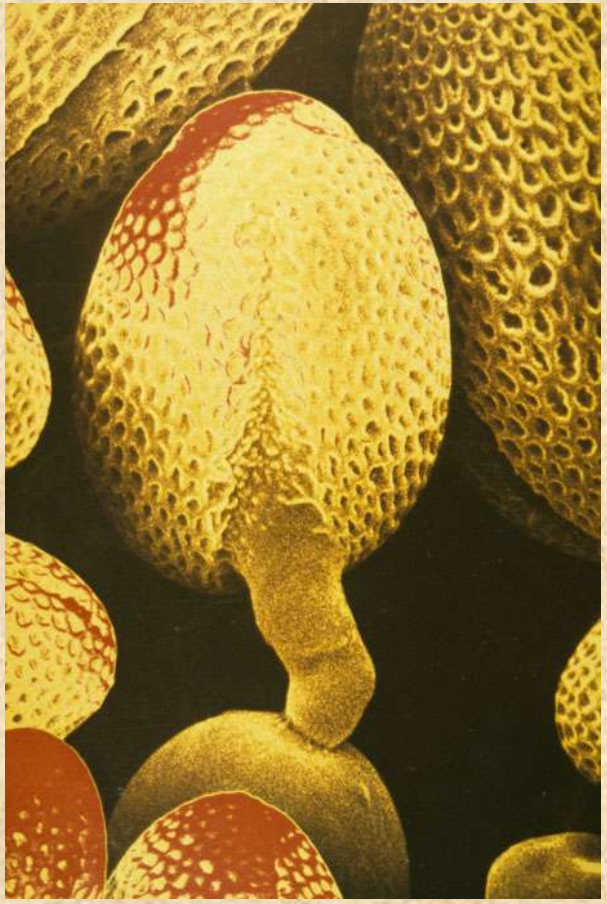
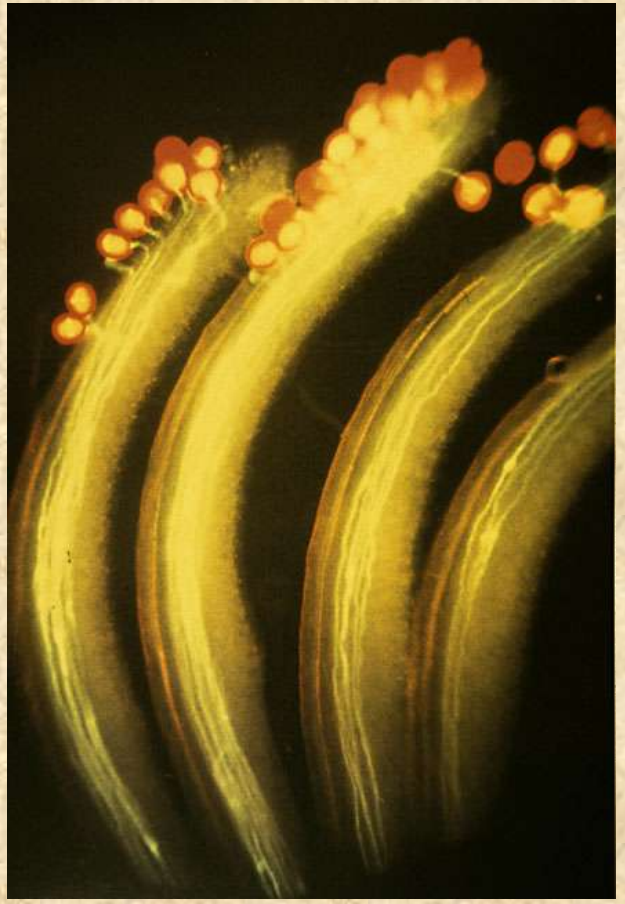
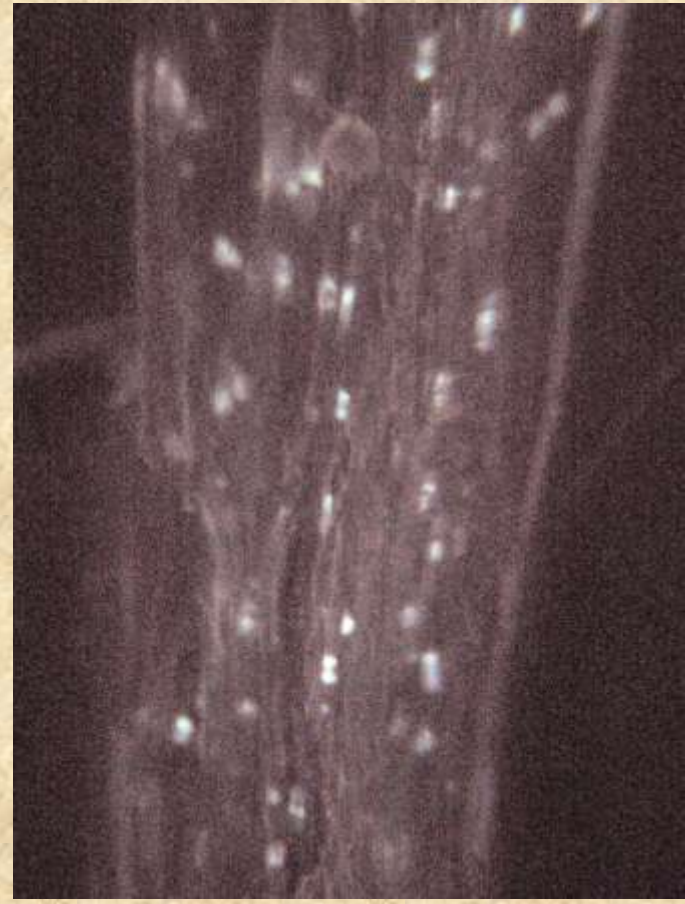
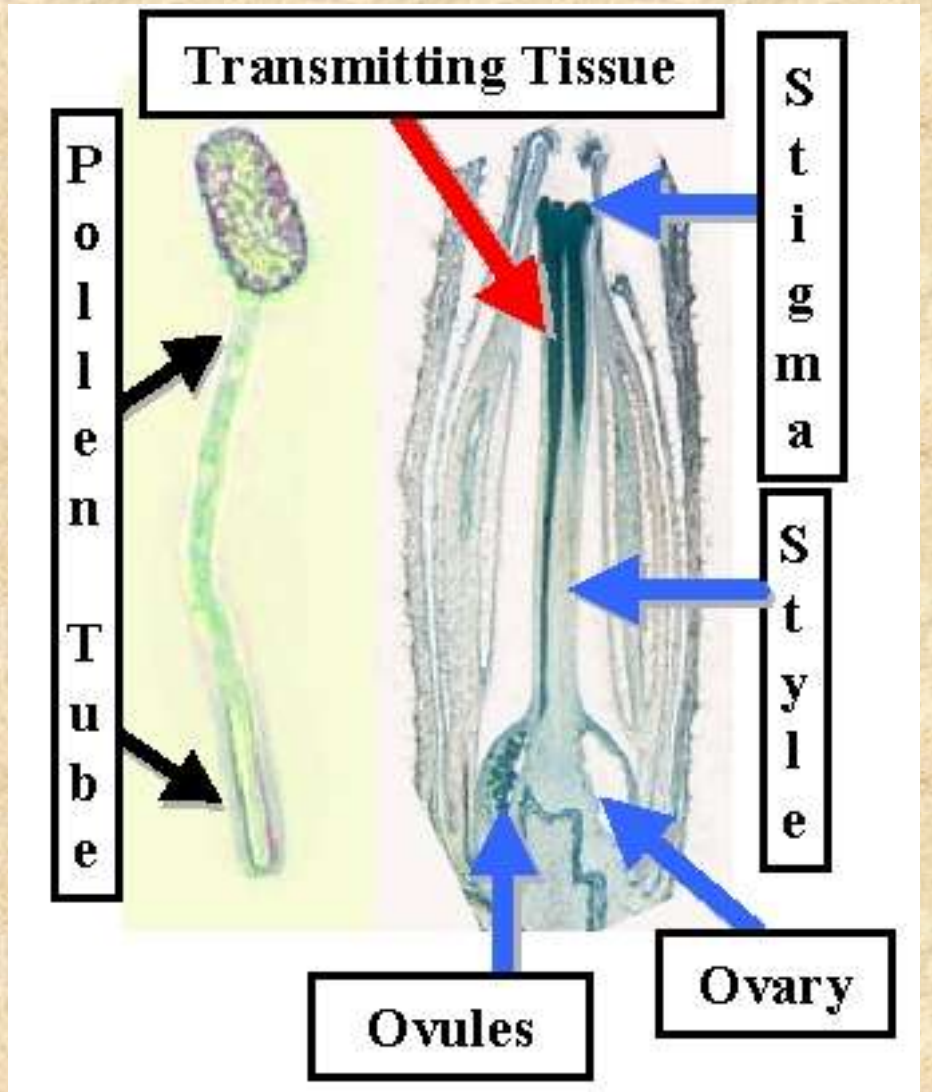
HV spot WD det HFW mag pressure 2 mm
10.00 kV 2.5 15.3 mm LFD 4.83 mm 62 x 24 Pa Amarylis pistil

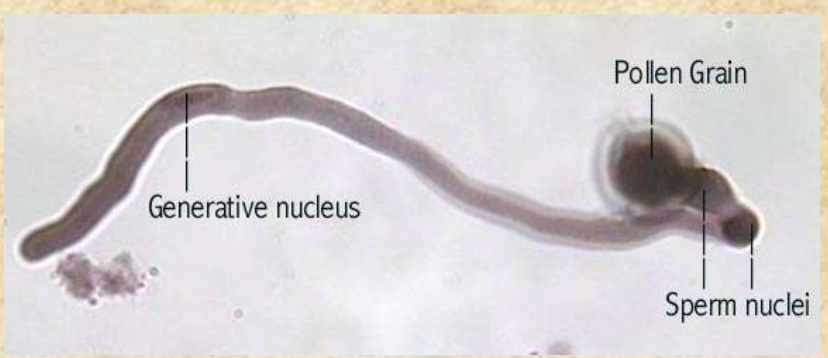
Pollen tube growth

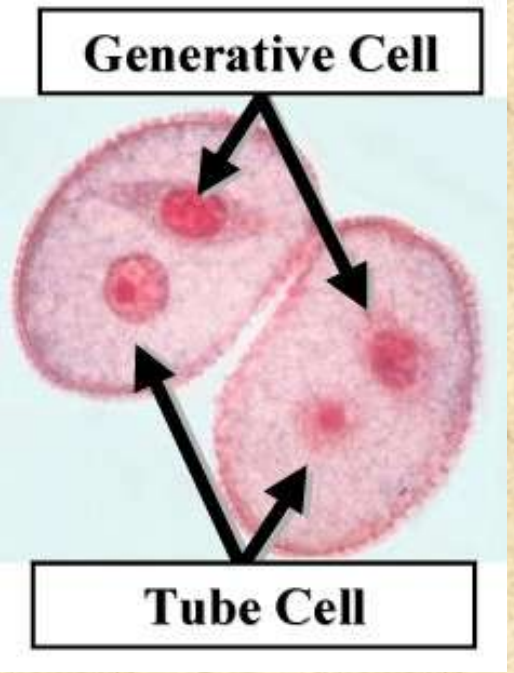




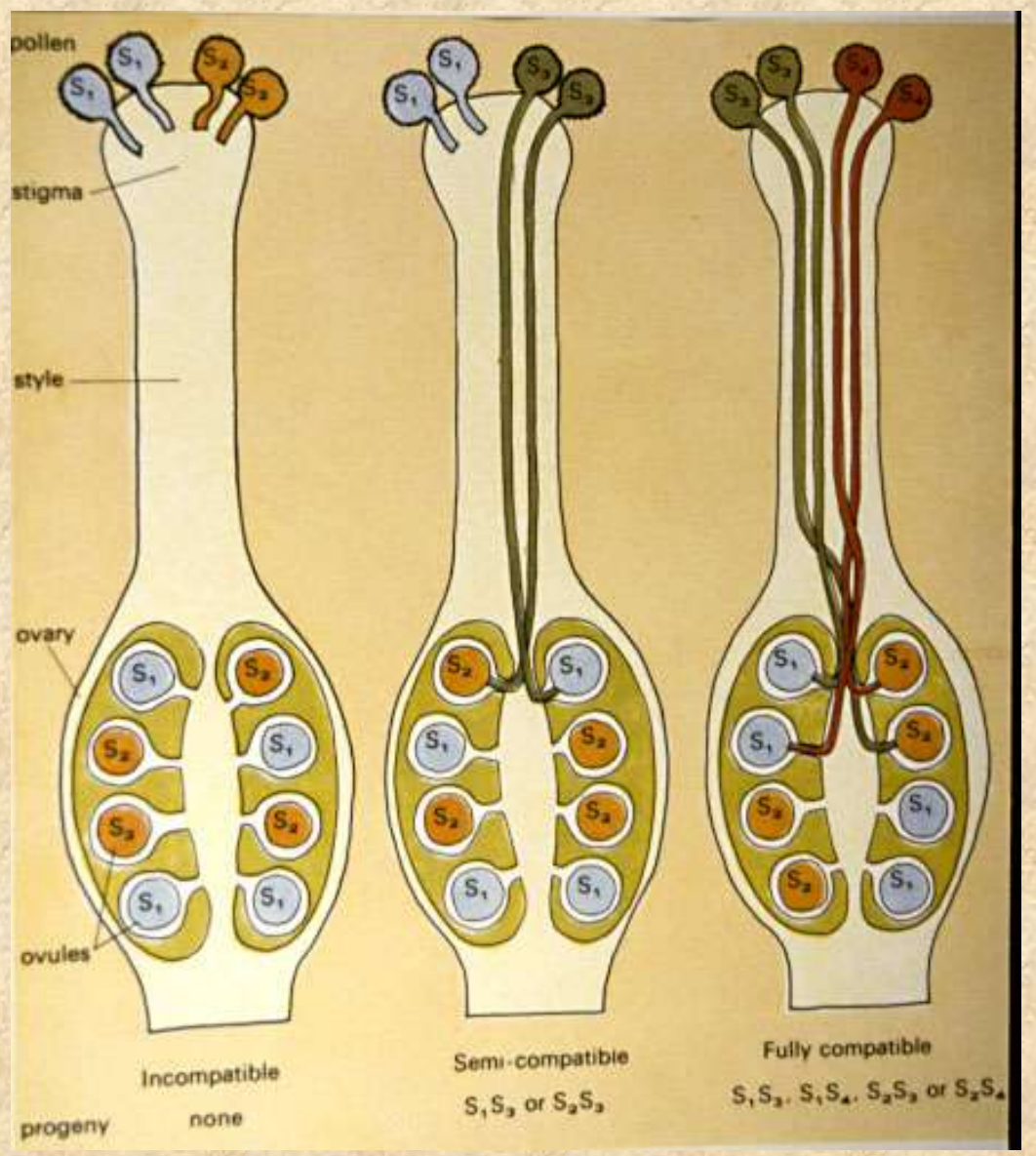



Transmitting Tissue
Pollen Tube
Stigma
Style
Ovules
Ovary

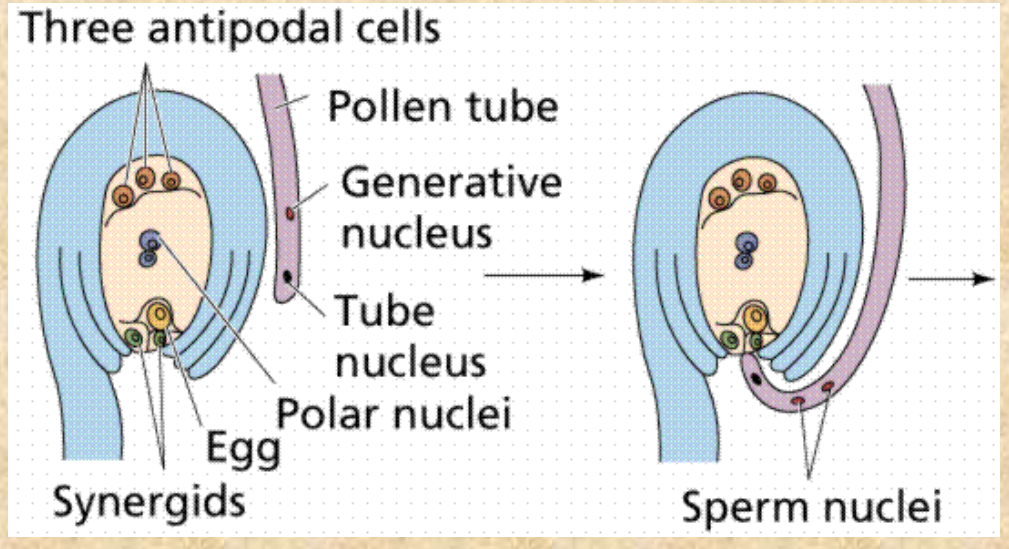

Pollen Grain
Generative nucleus
Sperm nuclei

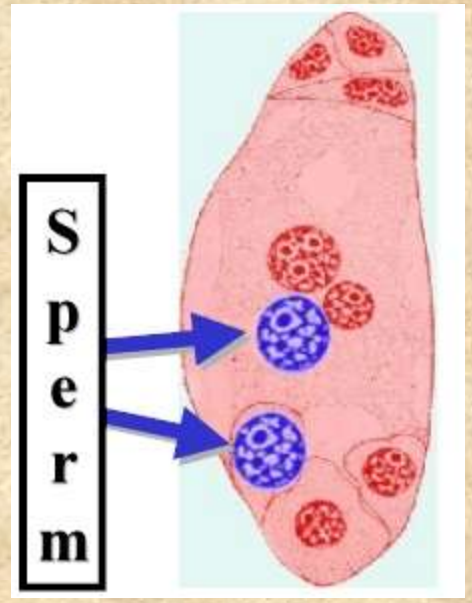

Generative Cell
Tube Cell

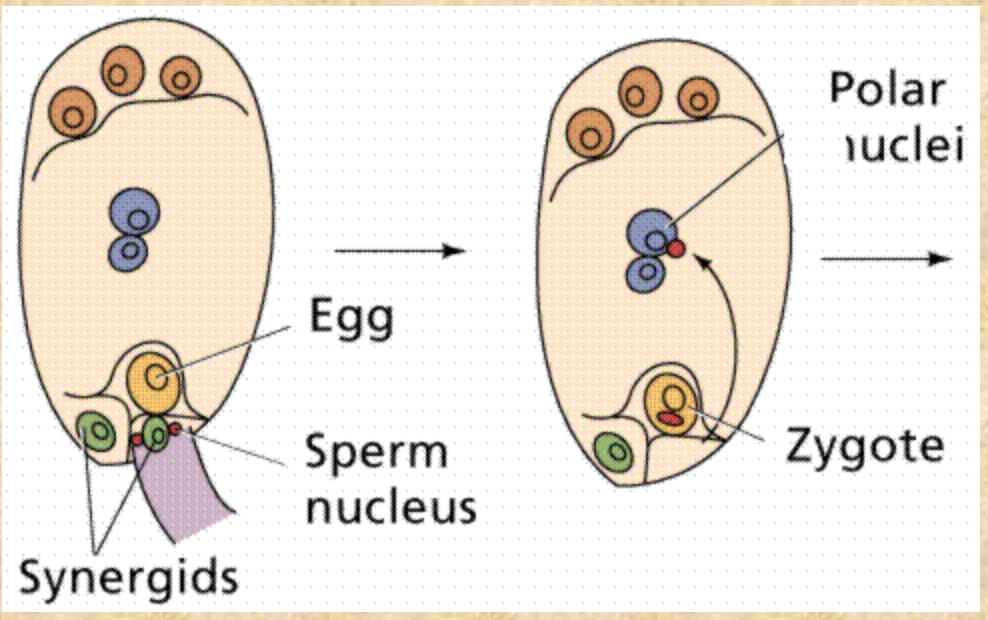
Pollen-Stigma Interactions - Compatibility

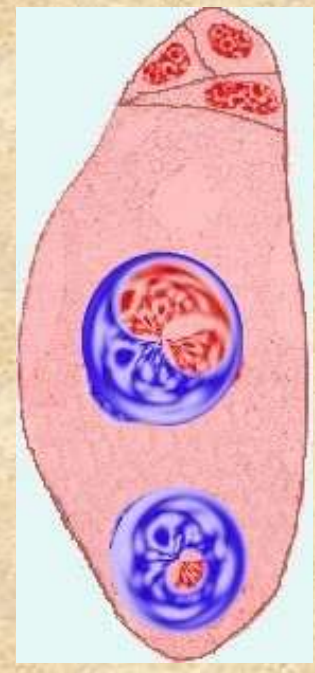


Double Fertilization

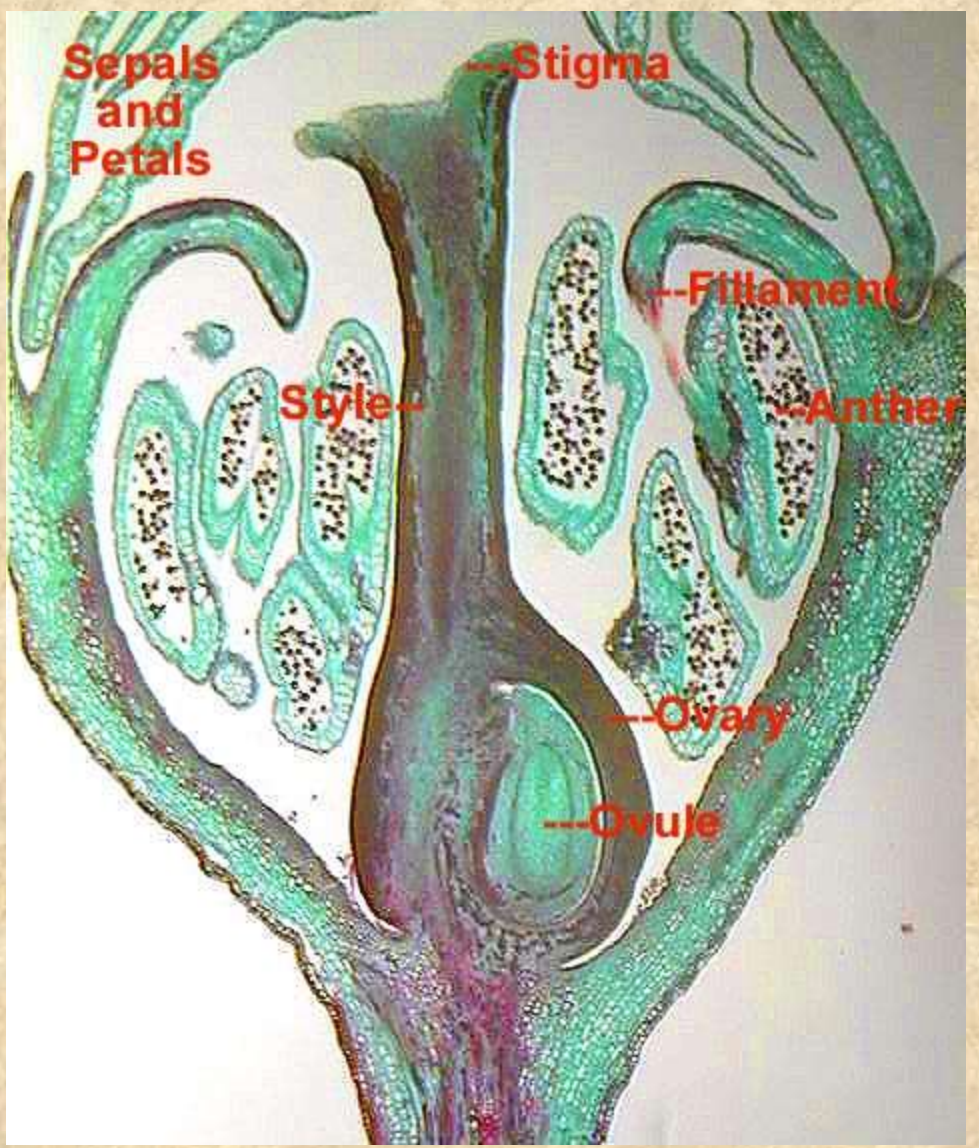








Gynoecium


Sepals and Petals
Stigma
Filament
Style
Anther
Ovary
Ovule

Gynoecium Terms

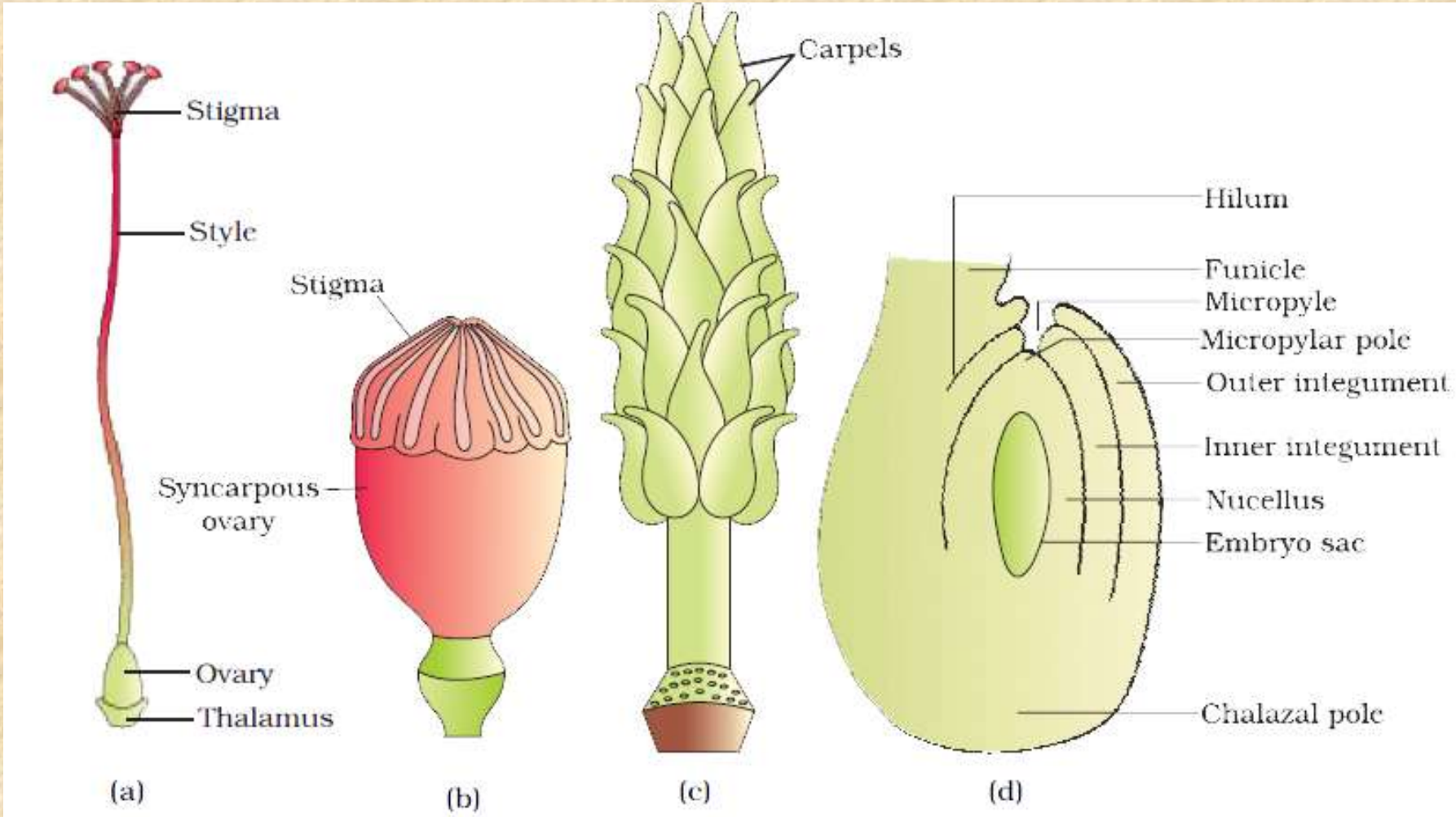
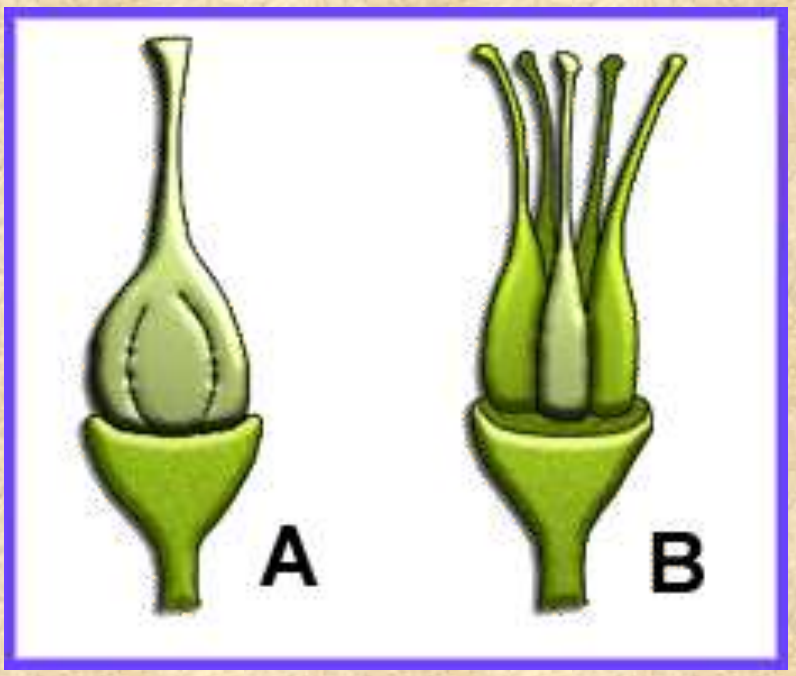
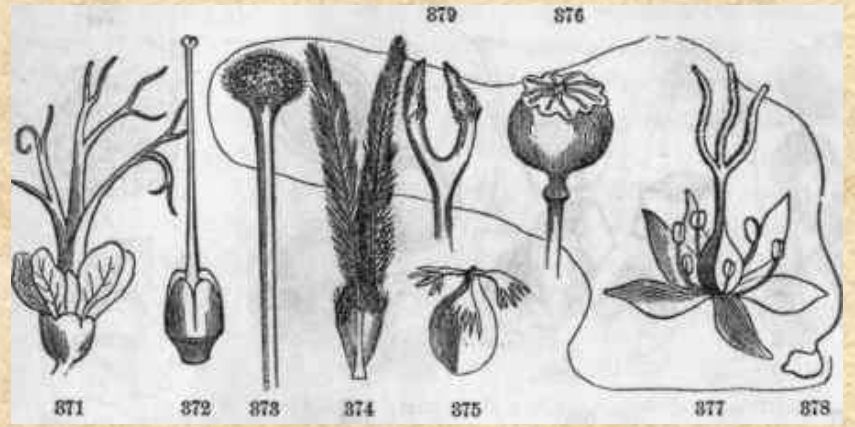


Figure 2.7 (a) A dissected flower of *Hibiscus* showing pistil (other floral parts have been removed); (b) Multicarpellary, syncarpous pistil of *Papaver*; (c) A multicarpellary, apocarpous gynoecium of *Michelia*; (d) A diagrammatic view of a typical anatropous ovule

Gynoecium


Receptacle
Style
Ovary
Stigma


A
B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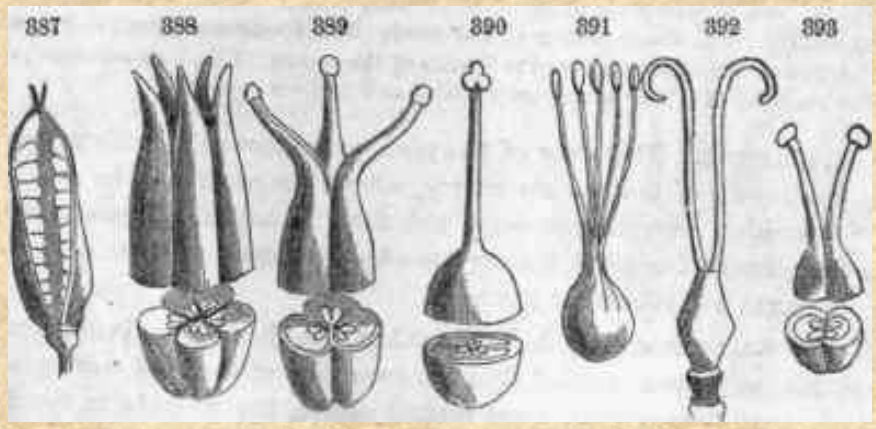
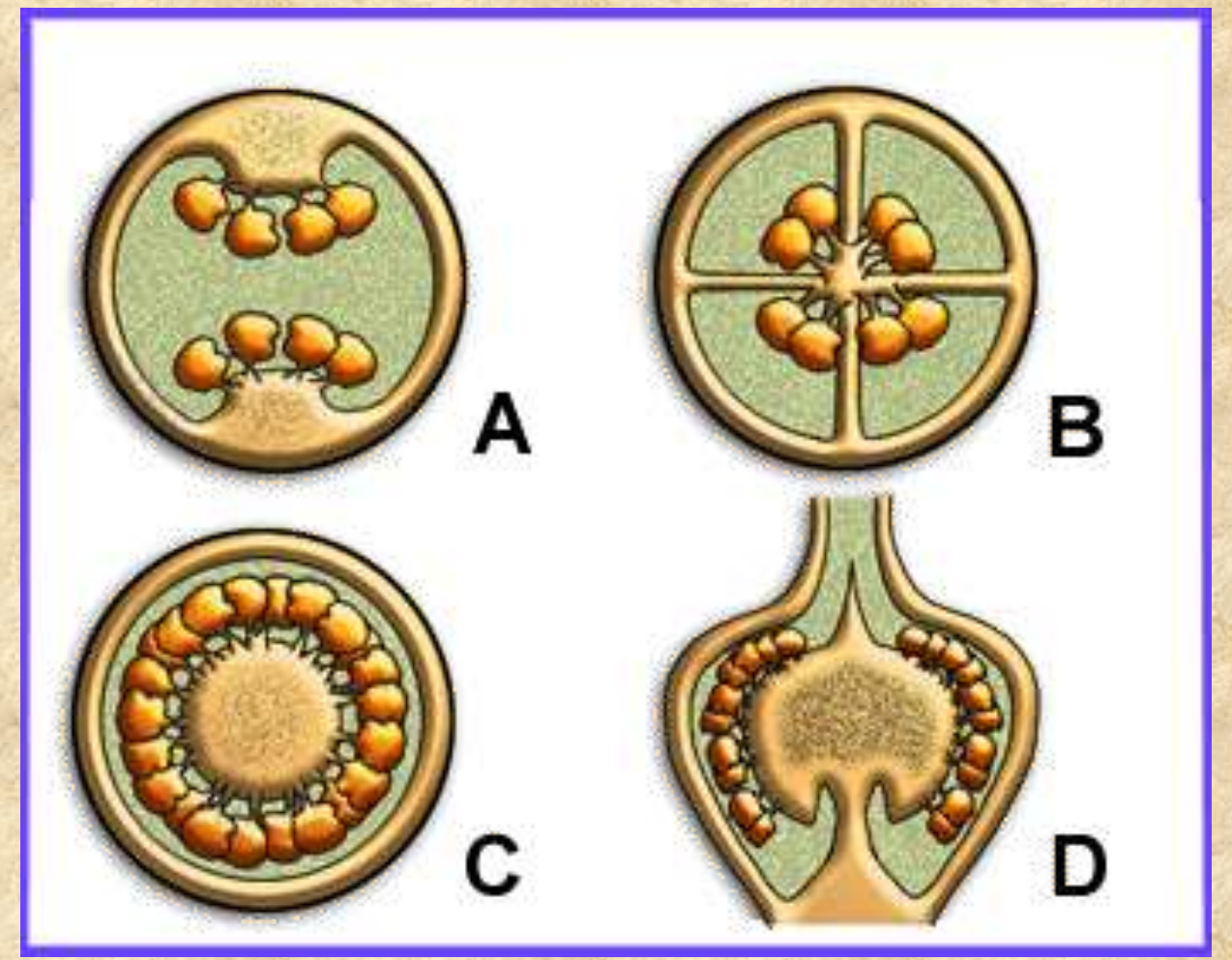
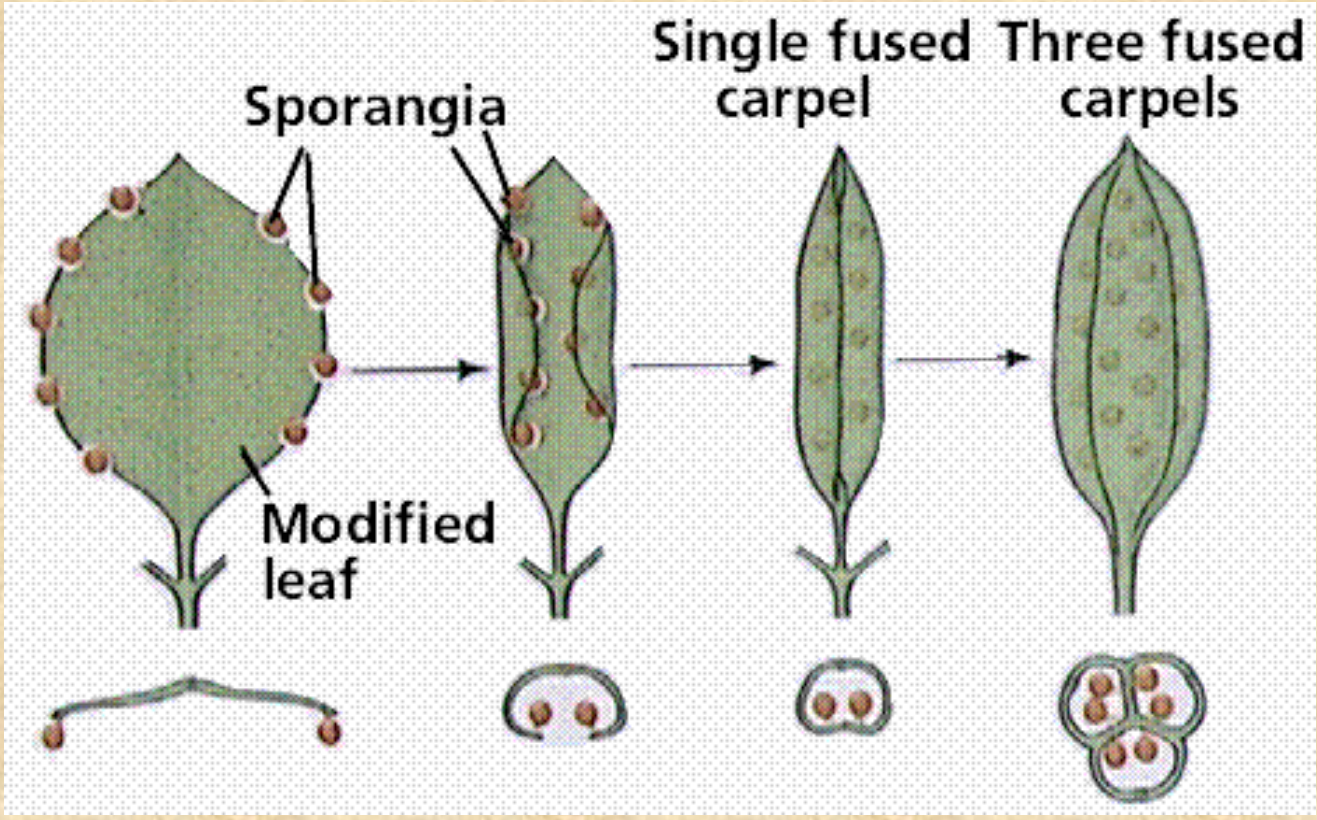

887
888
889
890
891
892
893


878 bis
879 bis
880
881
882
883
884
885

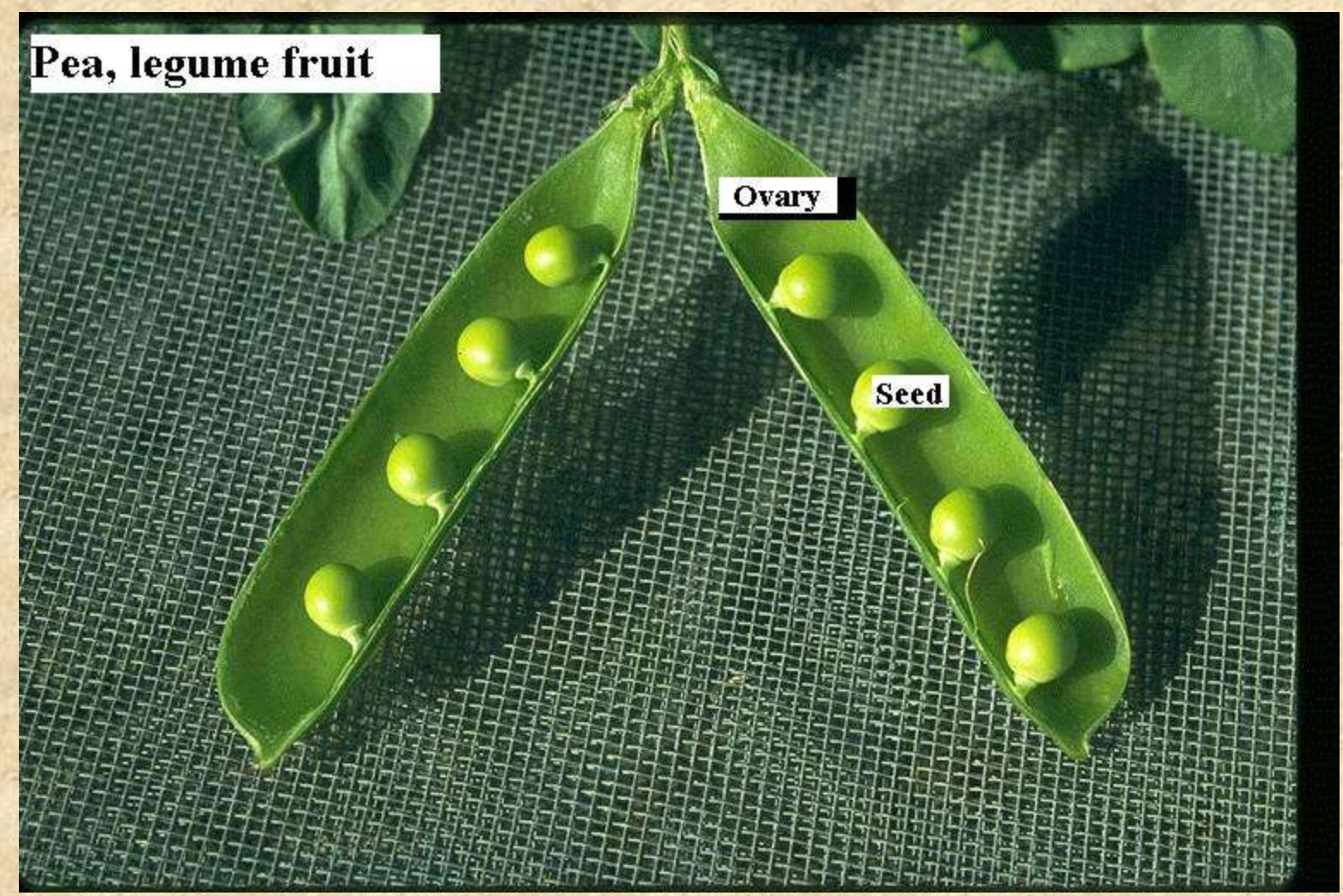
Placentation



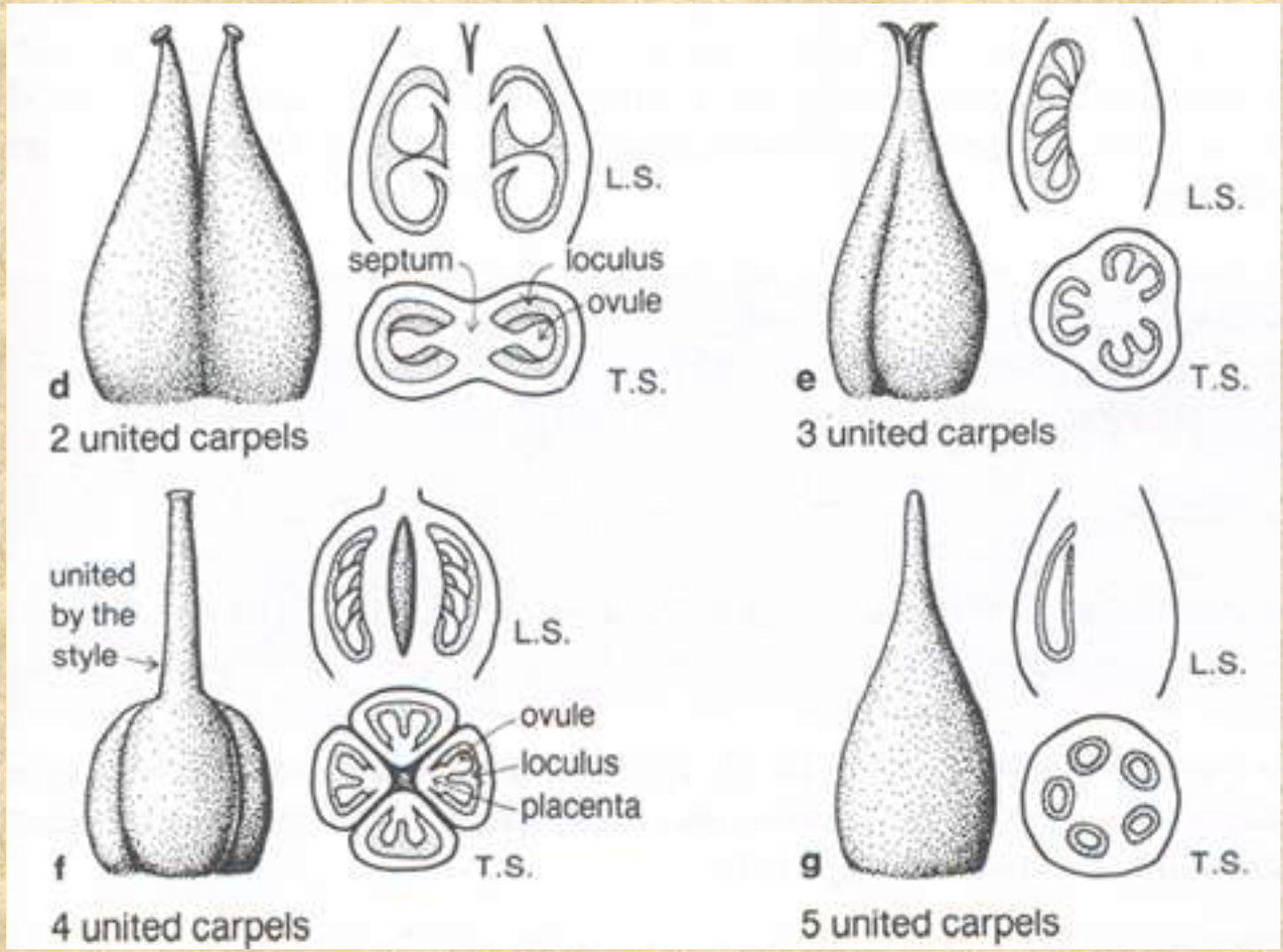
Carpel Evolution?



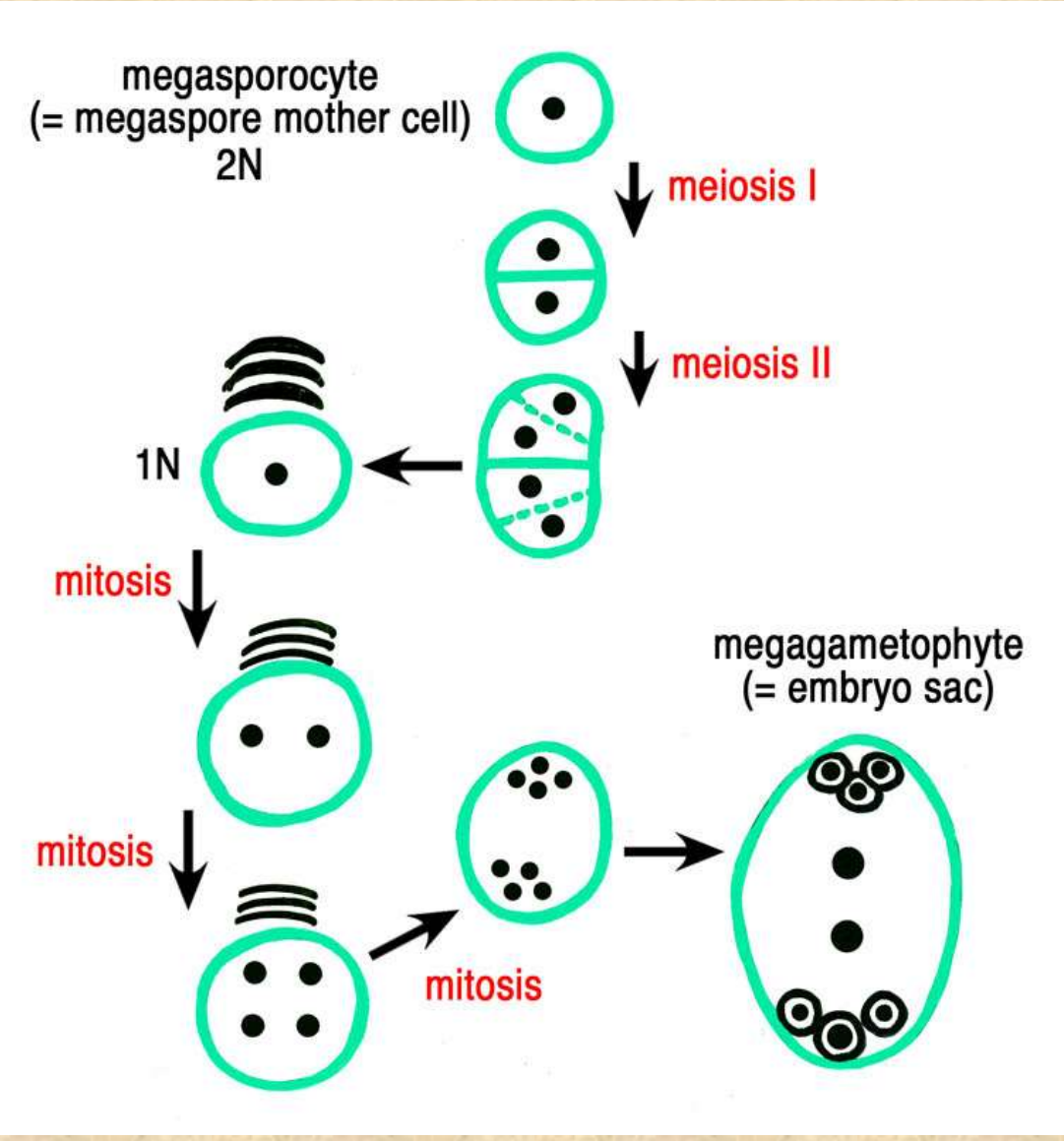
Carpels



Carpels


d
L.S.
septum
loculus
ovule
T.S.
2 united carpels
e
L.S.
T.S.
3 united carpels
united by the style
f
L.S.
ovule
loculus
placenta
T.S.
4 united carpels
g
L.S.
T.S.
5 united carpels

Megasporogenesis



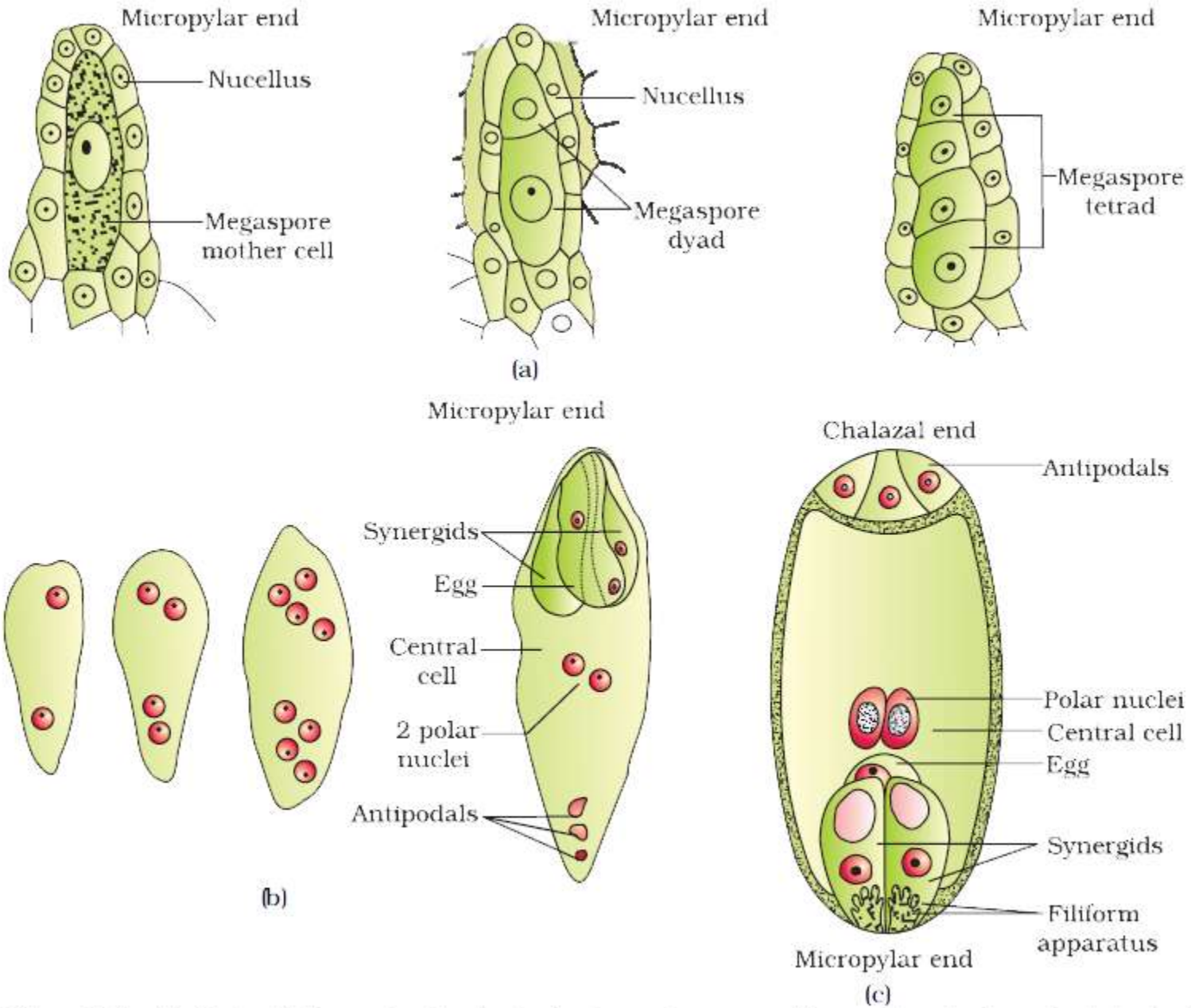
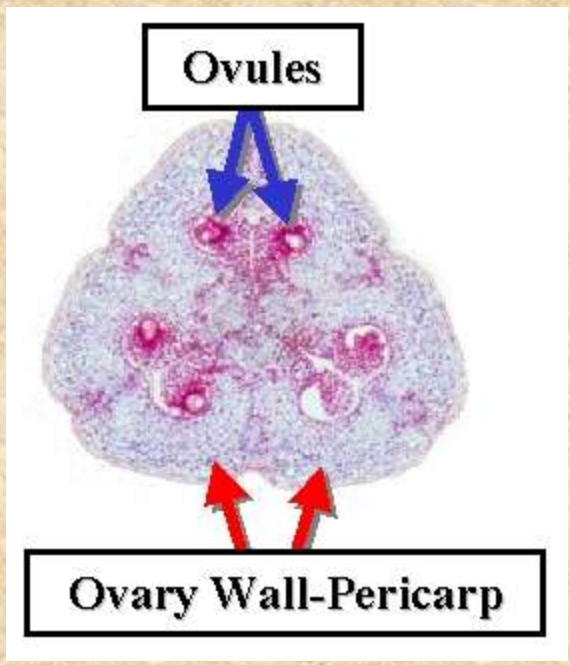
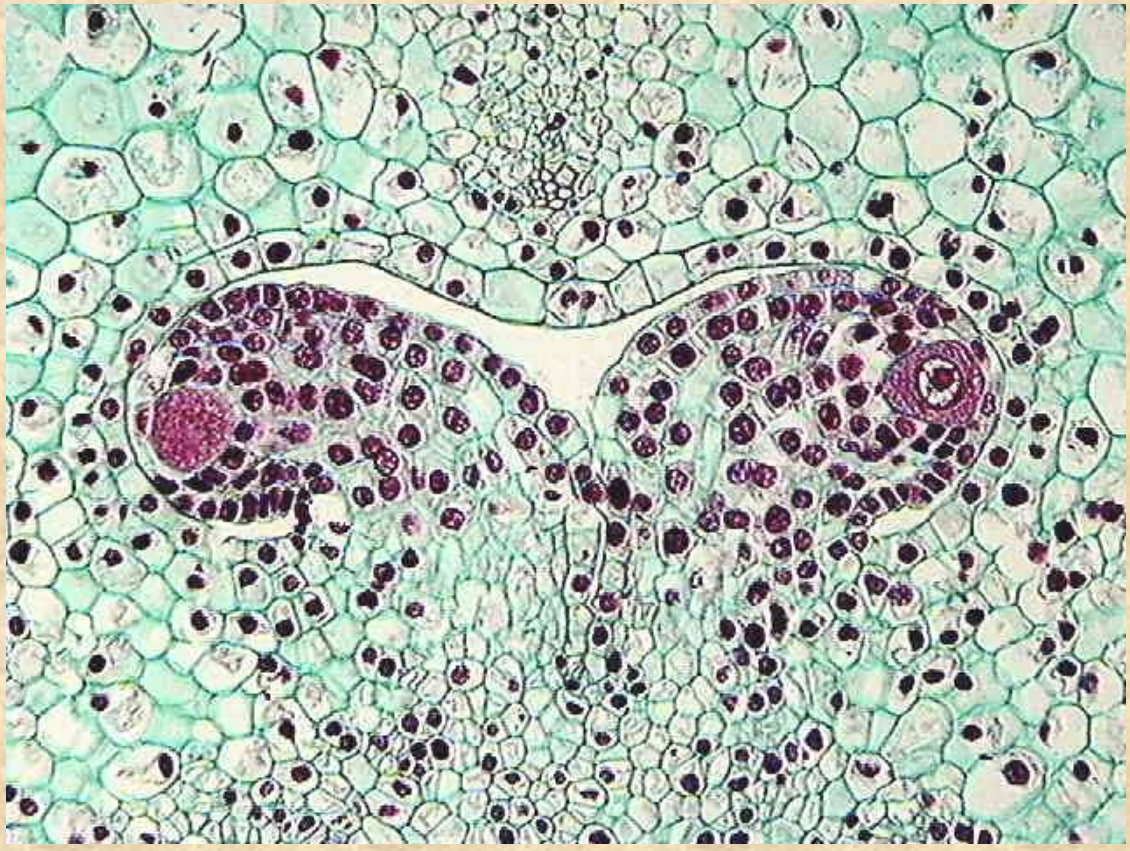


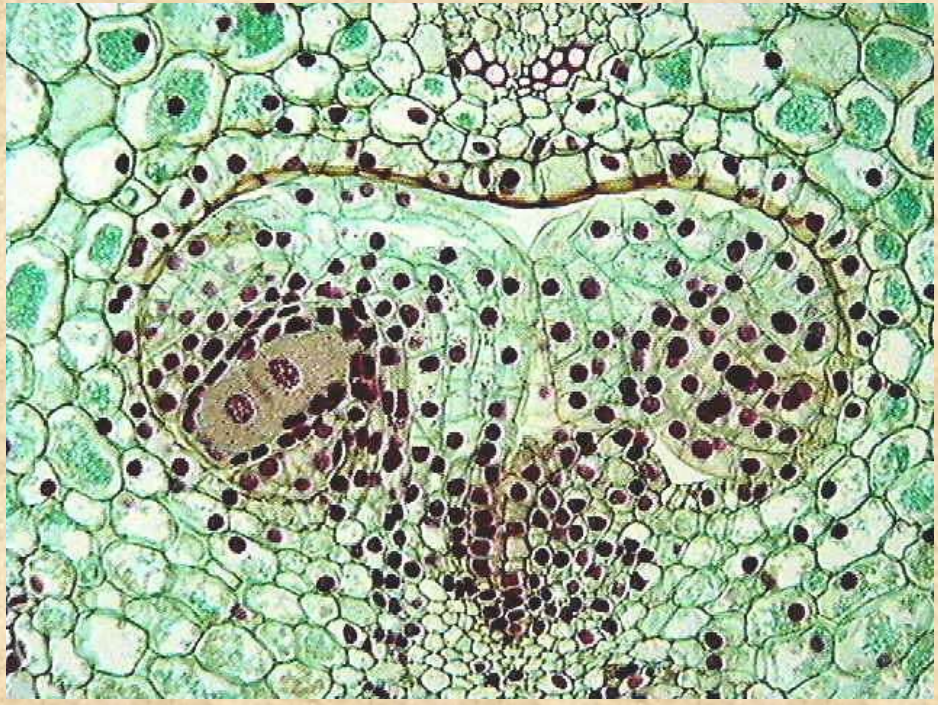
Figure 2.8 (a) Parts of the ovule showing a large megaspore mother cell, a dyad and a tetrad of megaspores; (b) 2, 4, and 8-nucleate stages of embryo sac and a mature embryo sac; (c) A diagrammatic representation of the mature embryo sac.

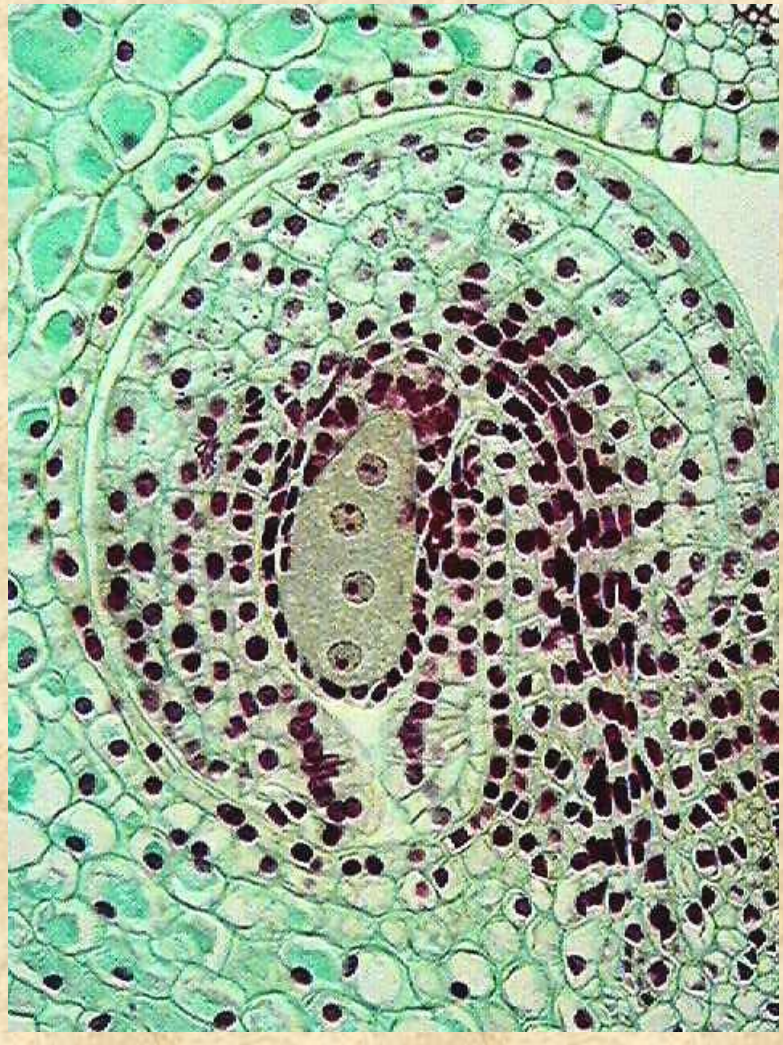
Megasporogenesis



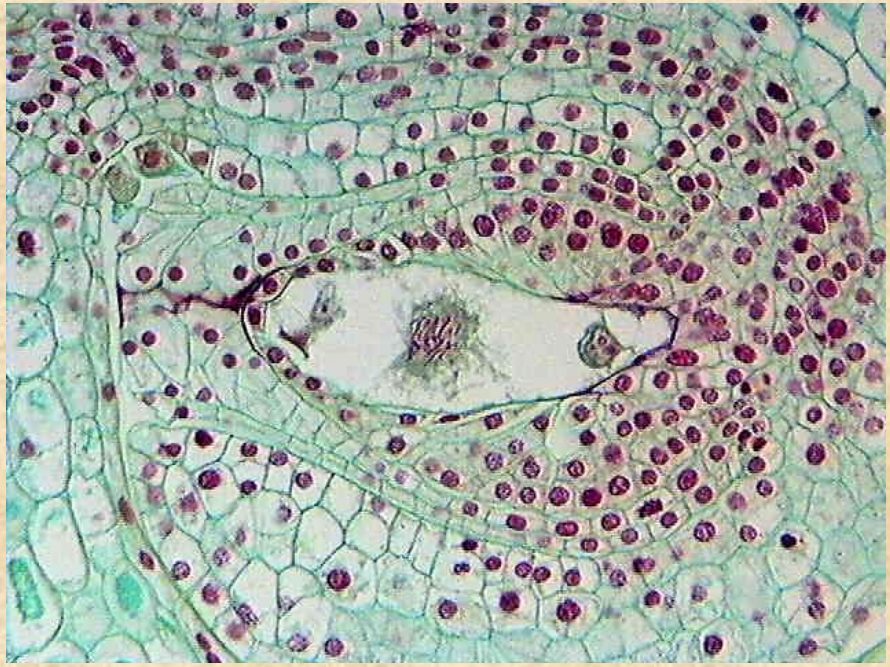


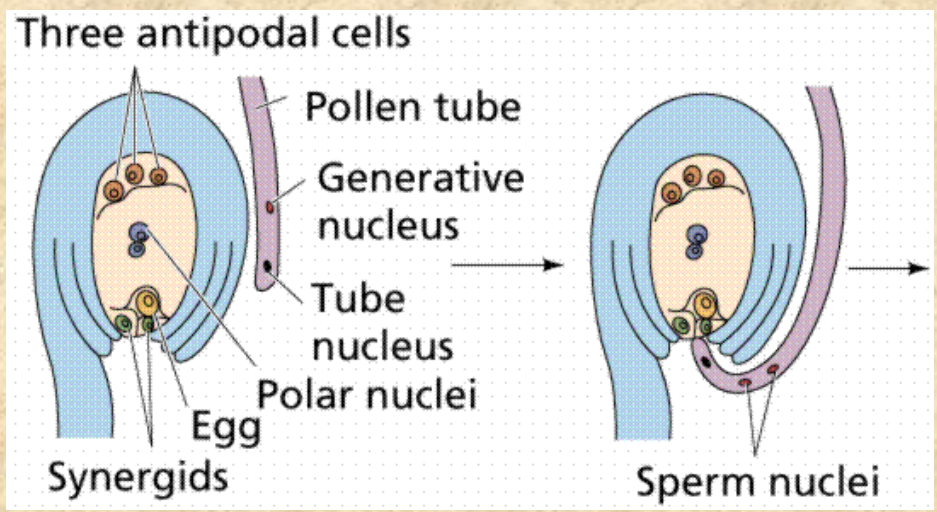
Megasporogenesis

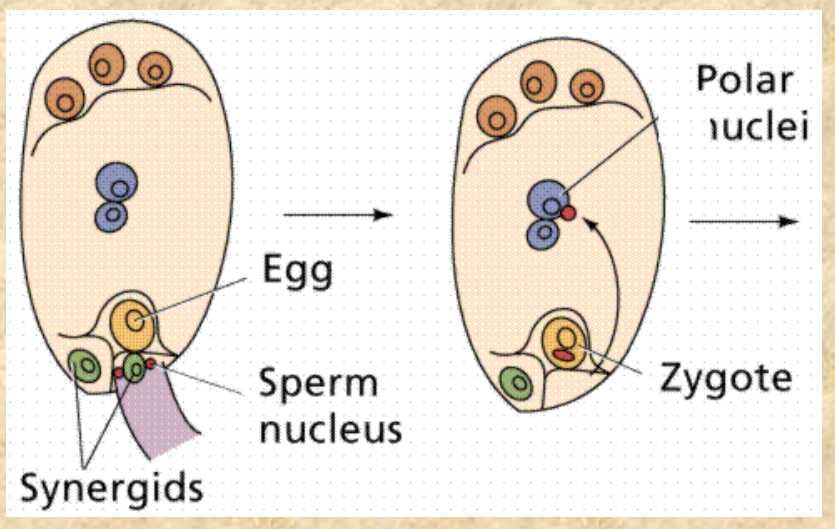




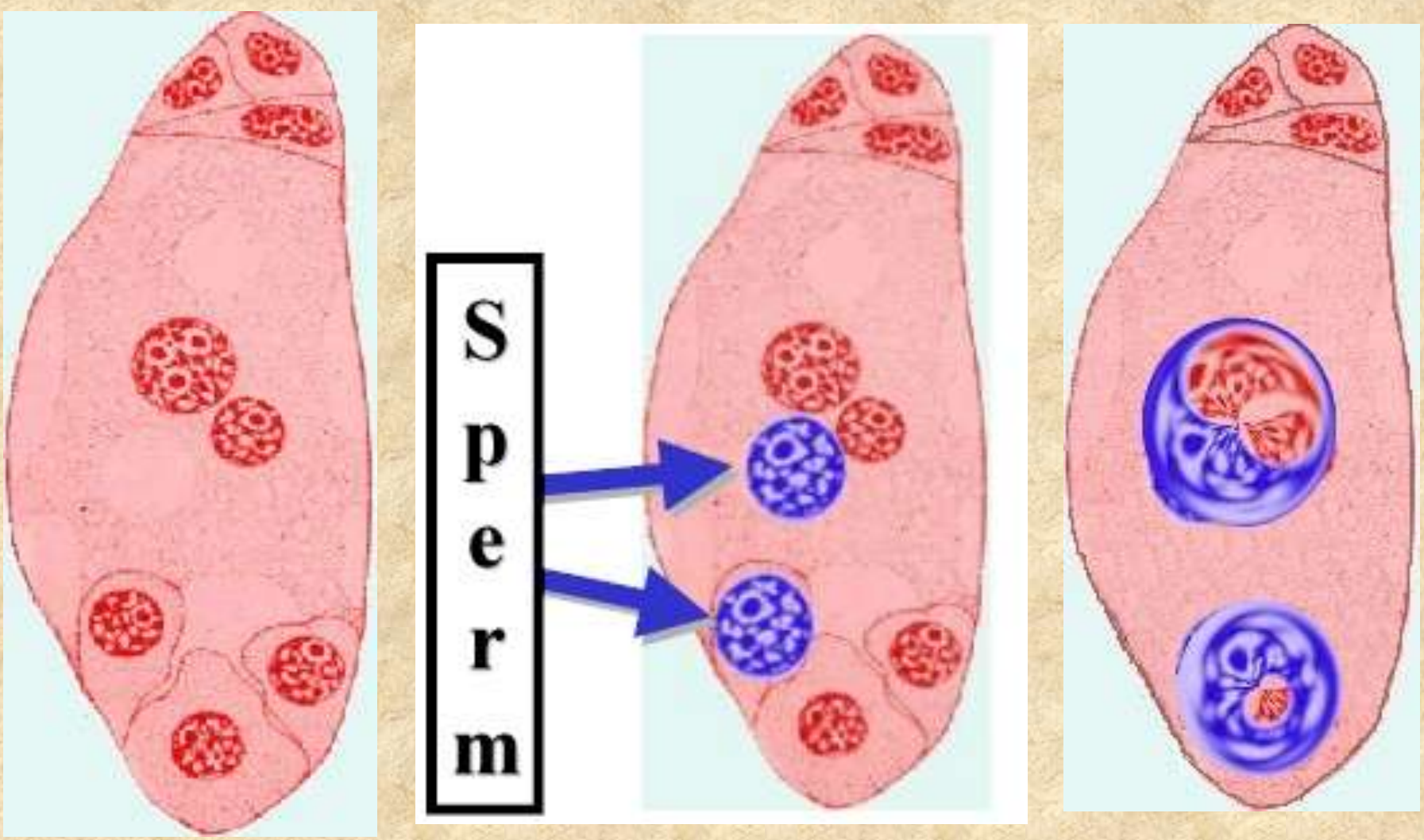
Double Fertilization







Double Fertilization



Fertilization and Embryo Development

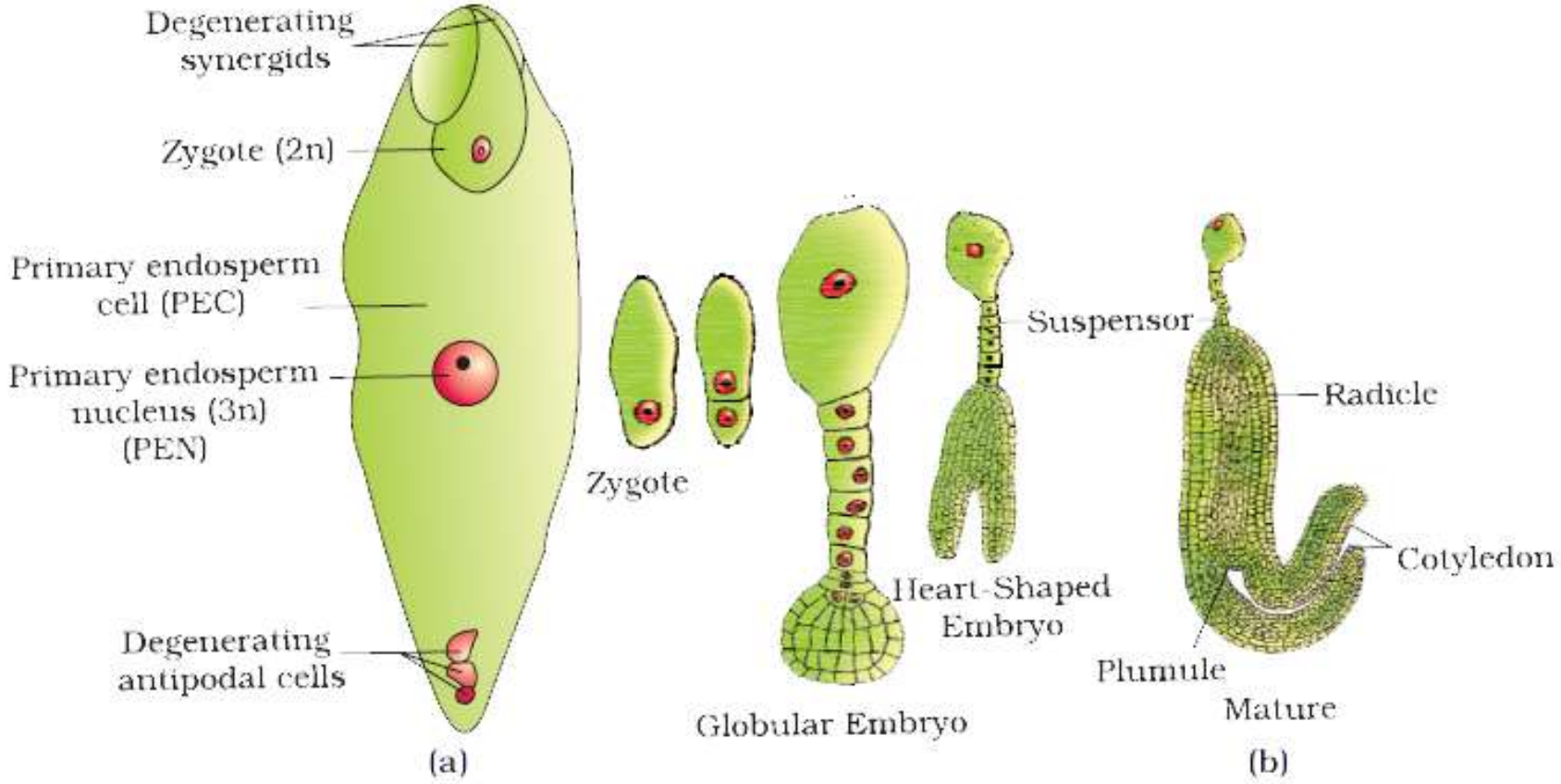
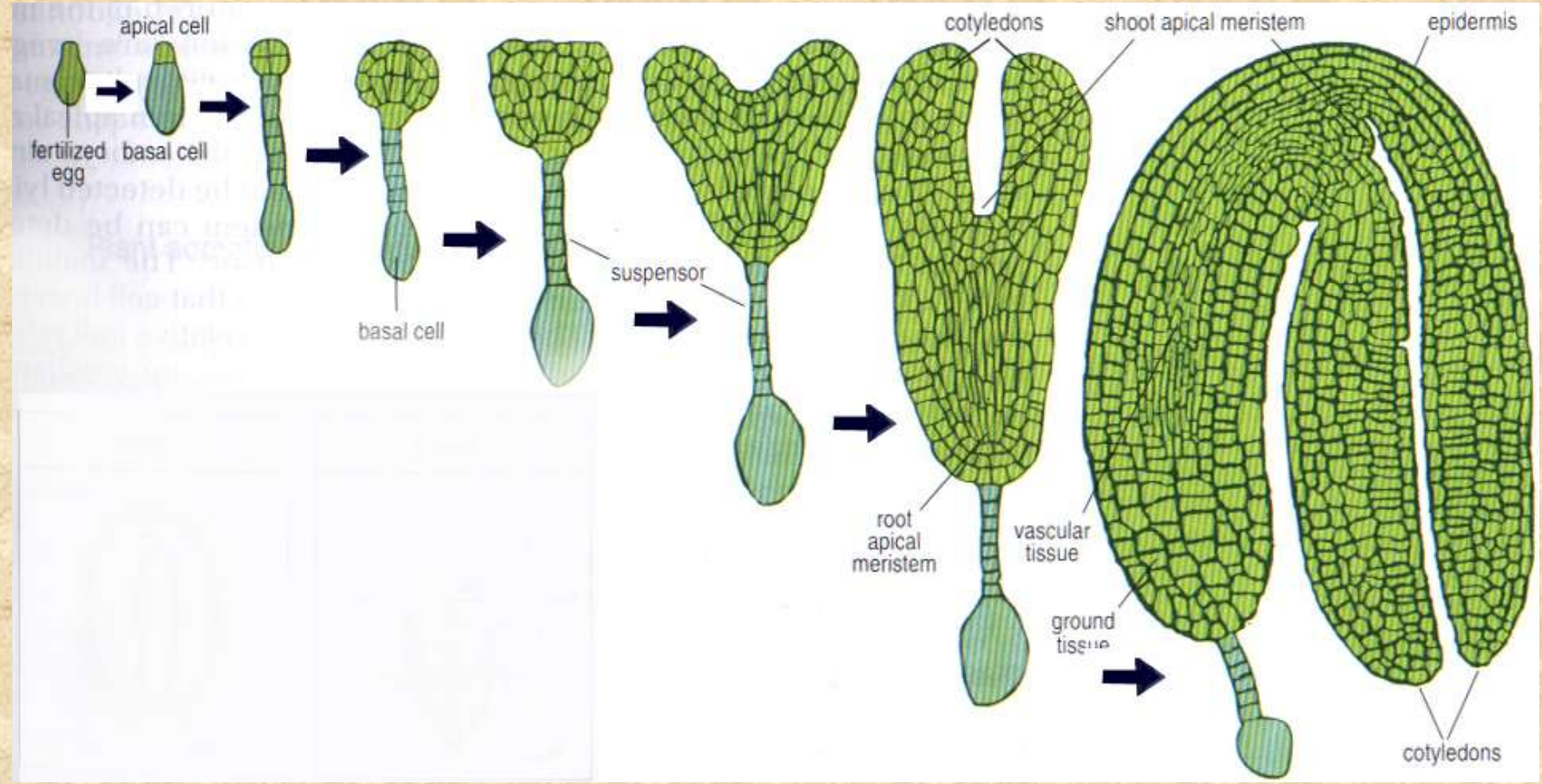


Figure 2.13 (a) Fertilised embryo sac showing zygote and Primary Endosperm Nucleus (PEN); (b) Stages in embryo development in a dicot [shown in reduced size as compared to (a)]


apical cell
fertilized egg
basal cell
basal cell
suspensor
cotyledons
shoot apical meristem
epidermis
root apical meristem
vascular tissue
ground tissue
cotyledons

Seed Structure

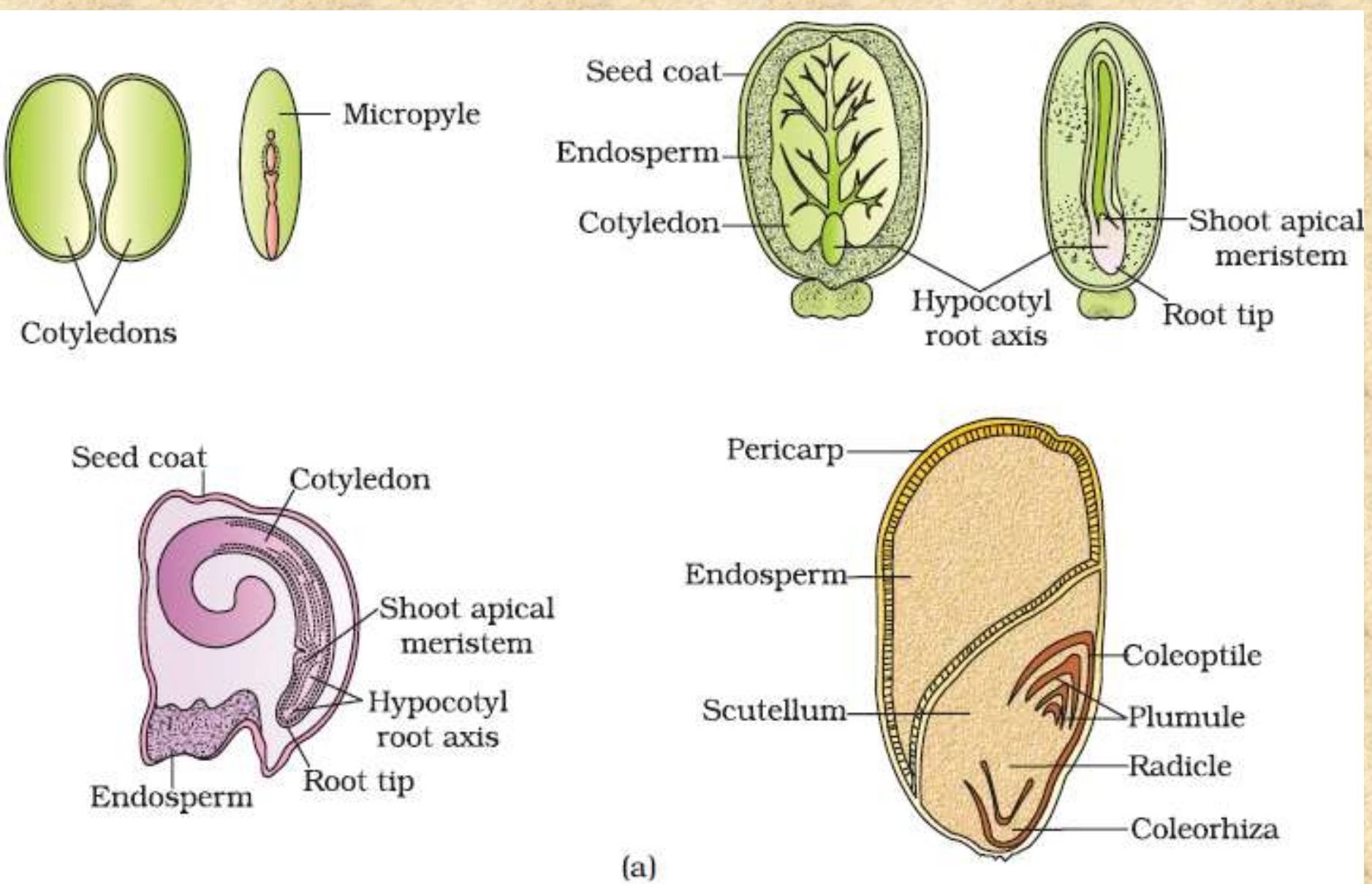
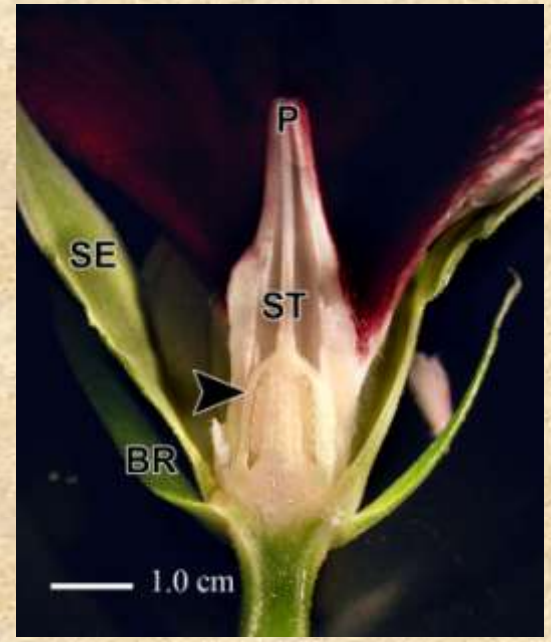
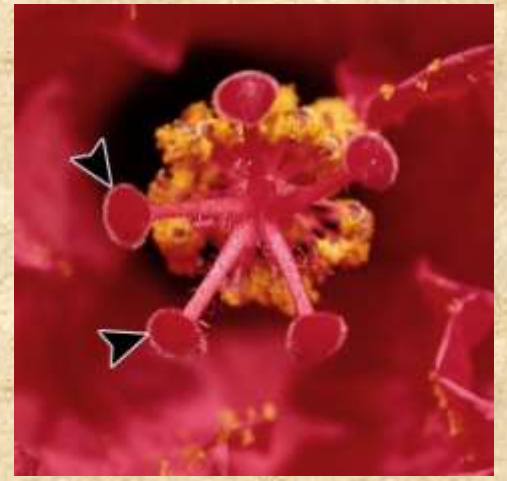
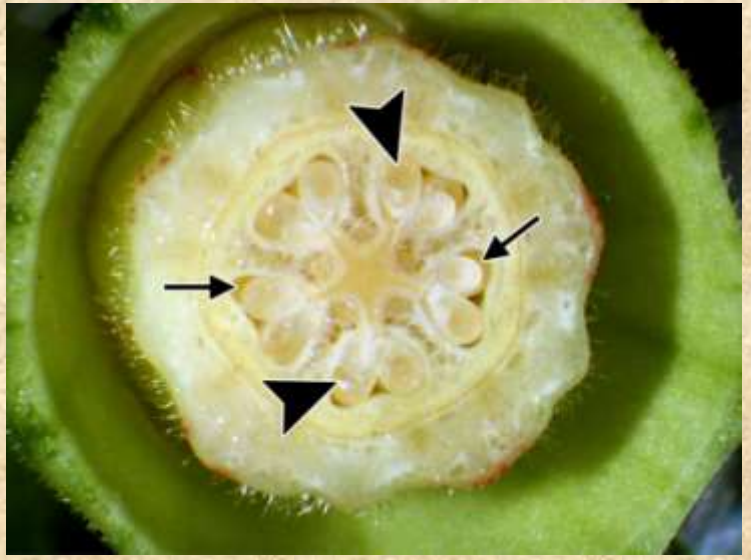


Figure 2.15 (a) Structure of some seeds.

Hibiscus rosa-sinensis







End