

# **Microsporogenesis**

# FLOWER

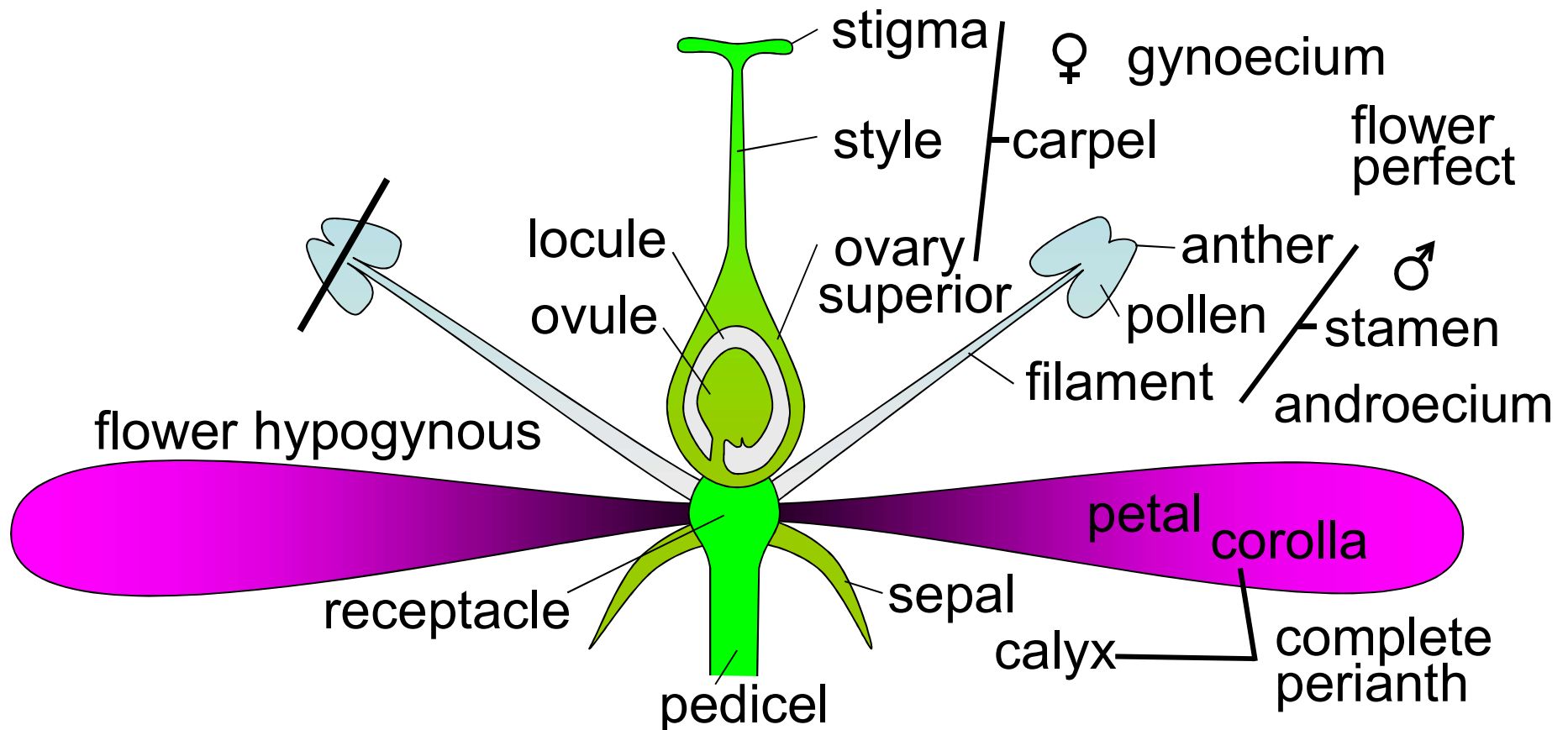
- Develops from floral primordia
- Primordia develop first into floral bud and then into a flower.
- Reproductive part of plant
- Androecium is male reproductive whorl, consists of stamens.
  - Consists of two parts- **filament** and **anther**
  - Filament is attached to thalamus or petal.
- Gynoecium is female reproductive part of flower, consists of carpel(S).

# Flower Organization-building a flower from the bottom up!

A flower is a modified short shoot (stem with leaves)

The stem is the receptacle with very short internodes

The leaves appear in four whorls



# Development of anther

- During the development of the anther, it is seen at first as a homogeneous mass of meristematic cells, oblong in cross-section and surrounded by an epidermis.
- It then becomes four-lobed and four longitudinal rows of archesporial cells are differentiated. The archesporial cells are marked off from the surrounding cells by their more deeply staining cytoplasm and conspicuous nuclei.
- Longitudinally, also, there may be one to many of them. Each archesporial cell now cuts off a primary parietal cell towards the epidermis and a primary sporogenous cell on the inner side.
- The parietal cell now divides by periclinal and anticlinal walls giving rise to several layers of cells forming the wall of the anther while the sporogenous cell usually divides a few times giving rise to a number of microspore or pollen mother cells.

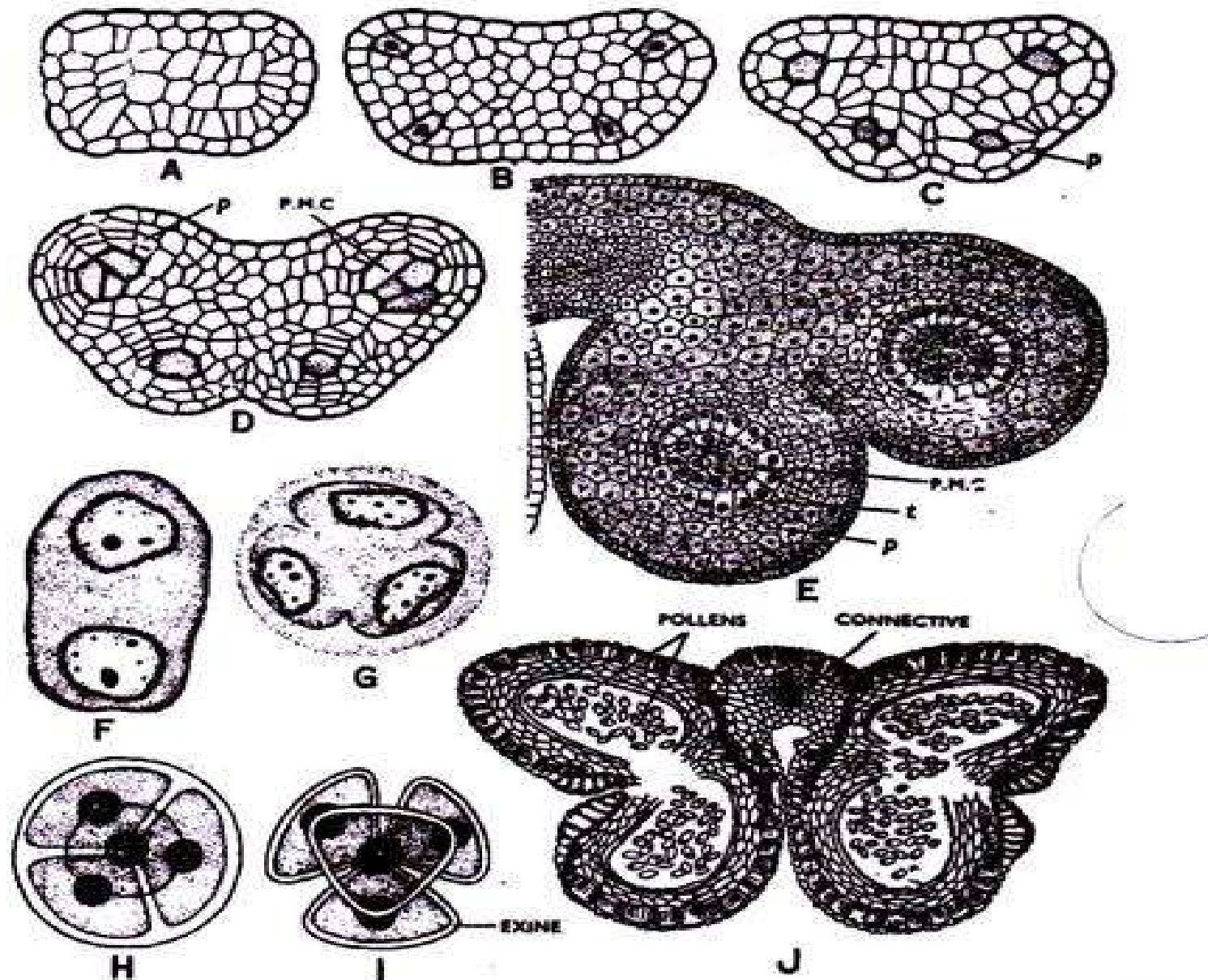
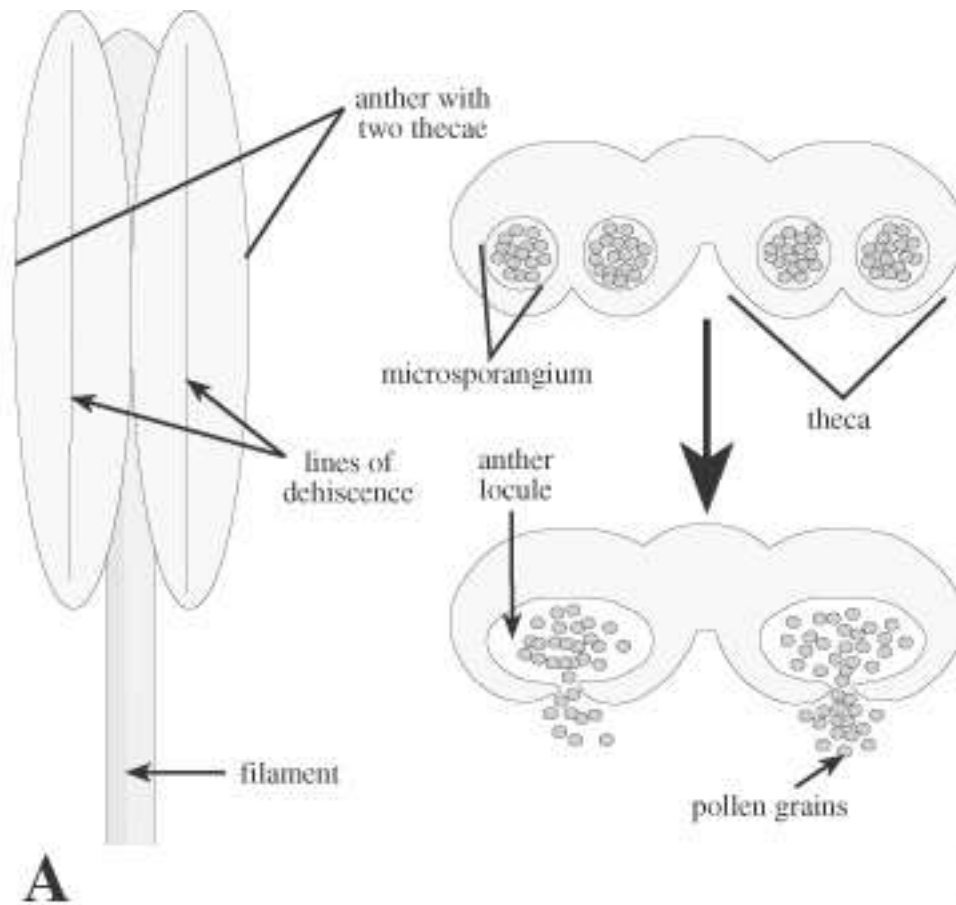
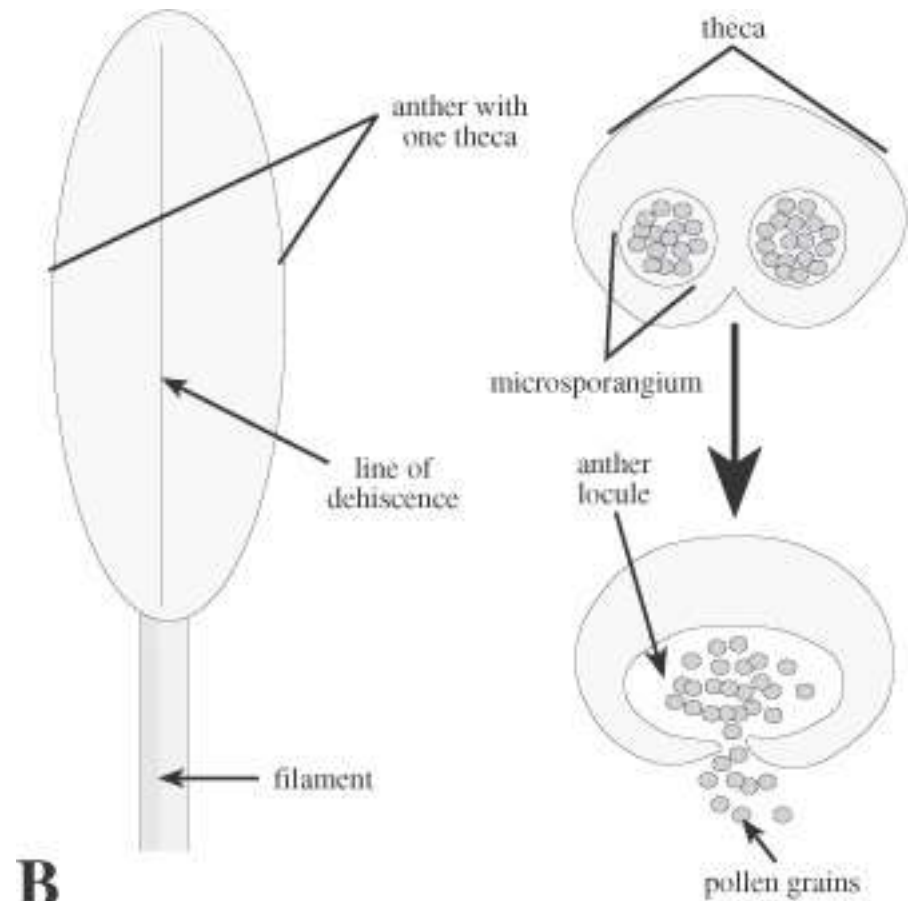


FIG. 404. Stages of anther development and microsporogenesis. A. T.s. of young anther. B. Differentiation of four rows of archesporial cells (shaded) in the four microsporangia. C. Primary sporogenous cells (shaded) and parietal cells (*p*). D. Microspore or pollen mother cells (P.M.C.). E. Microsporangia (pollen chambers) showing pollen mother cells (P.M.C.) and tapetum (*t*). F. Dyad stage of meiosis in P.M.C. G. Tetrad stage (the fourth nucleus is behind). H. & I. Tetrahedral arrangement and development of pollens. J. T.s. of mature anther.

# Anther Type

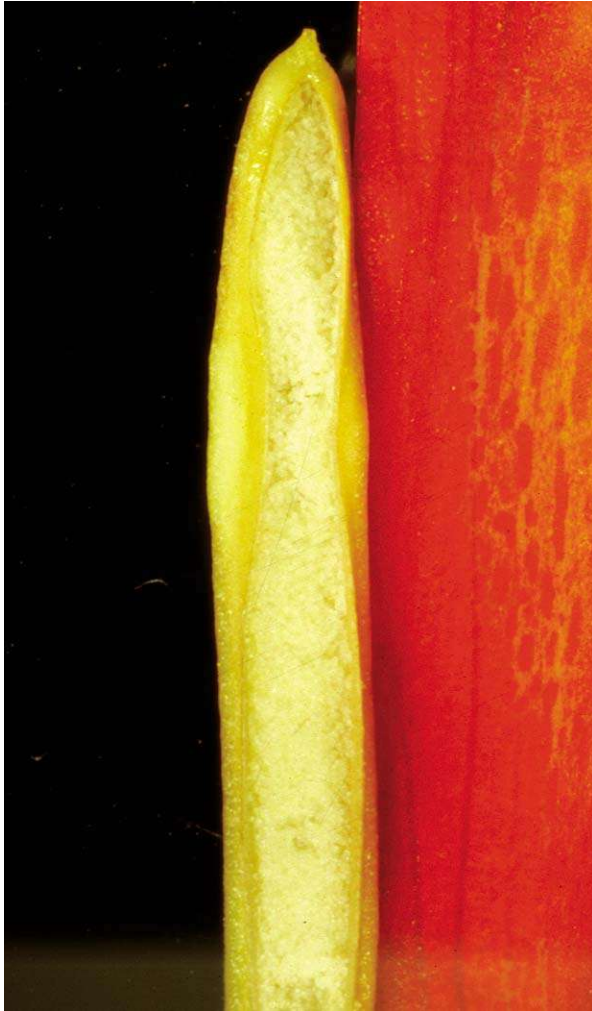


**bithecal**

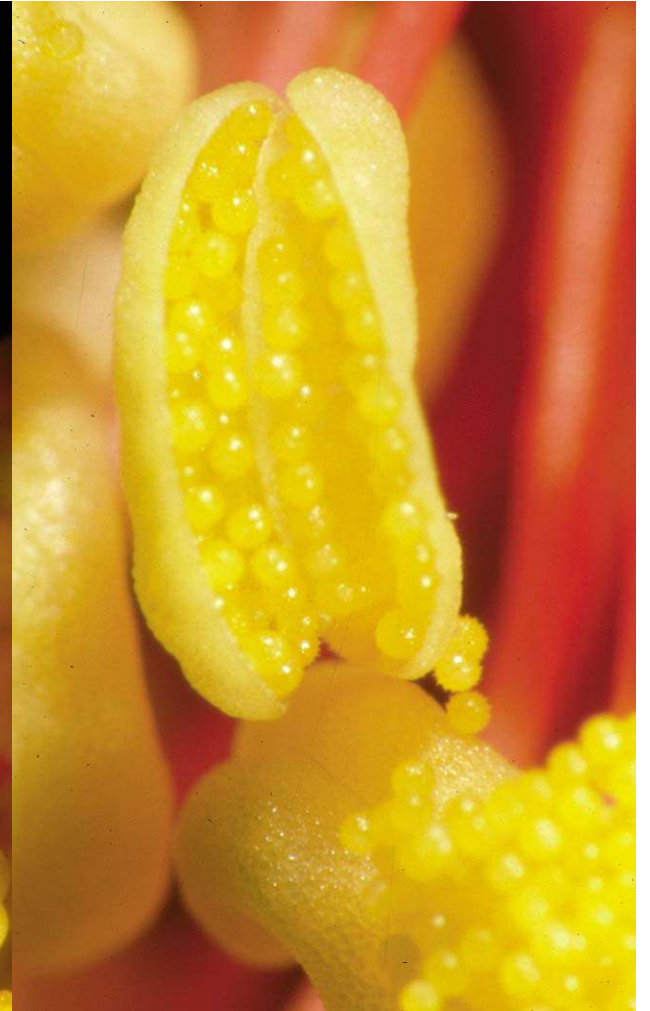


**monotheical**

monothecal



*Canna*



*Hibiscus*

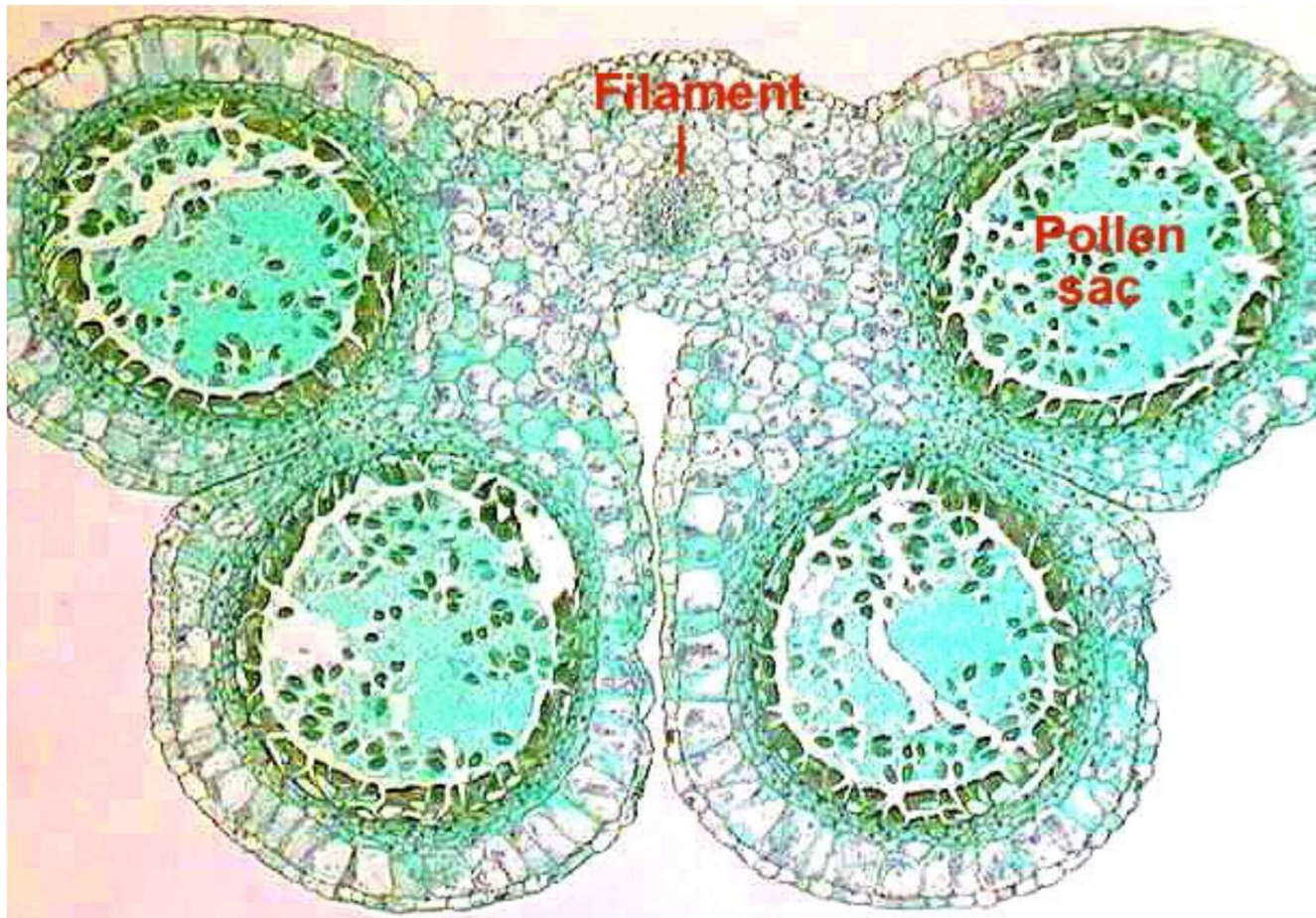


# Structure Of Anther

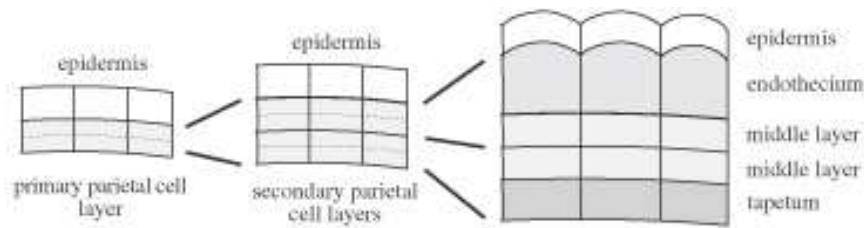
- In a cross- section anther is a tetragonal structure, consisting of 4 microsporangia, two in each lobes.
- Later two microsporangia of each lobe fuse as a pollen sac.
- A microsporangium is circular and surrounded by 4 layers.
- These are epidermis, endothecium, middle layers and tapetum.



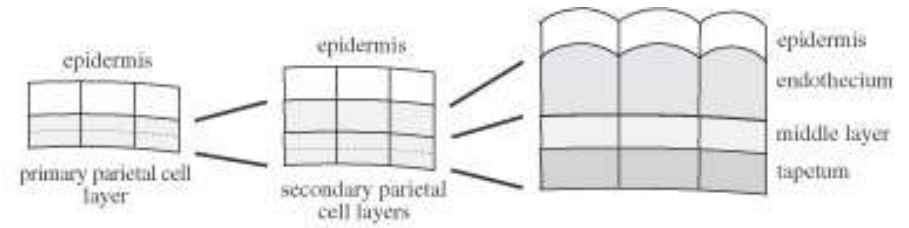
# T.S. OF Anther



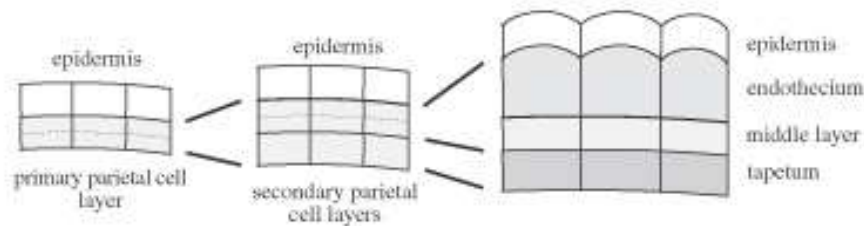
# Anther Wall Development



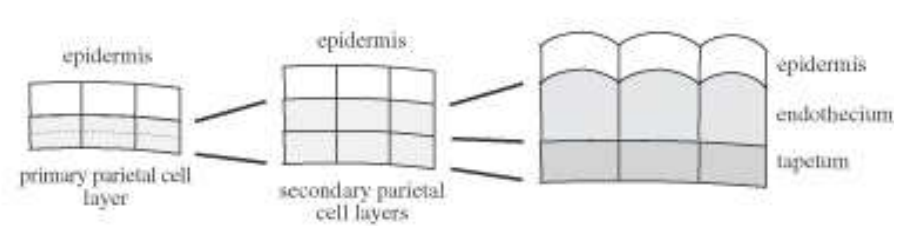
**Basic**



**Monocotyledonous**

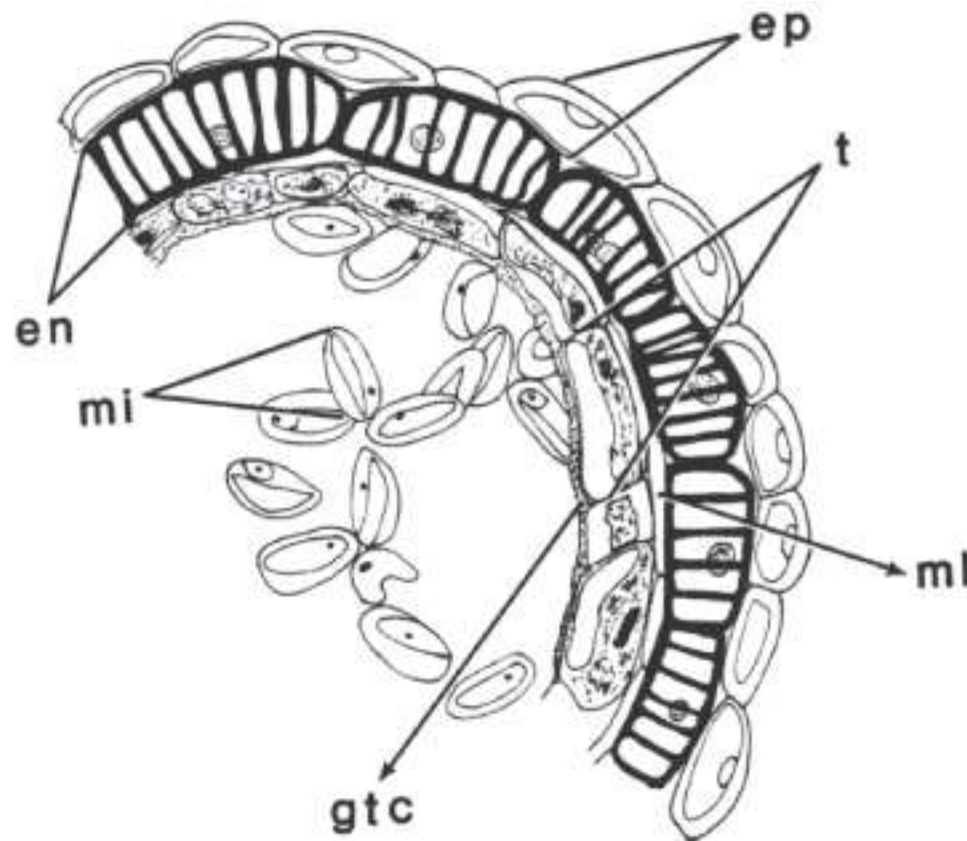


**Dicotyledonous**



**Reduced**

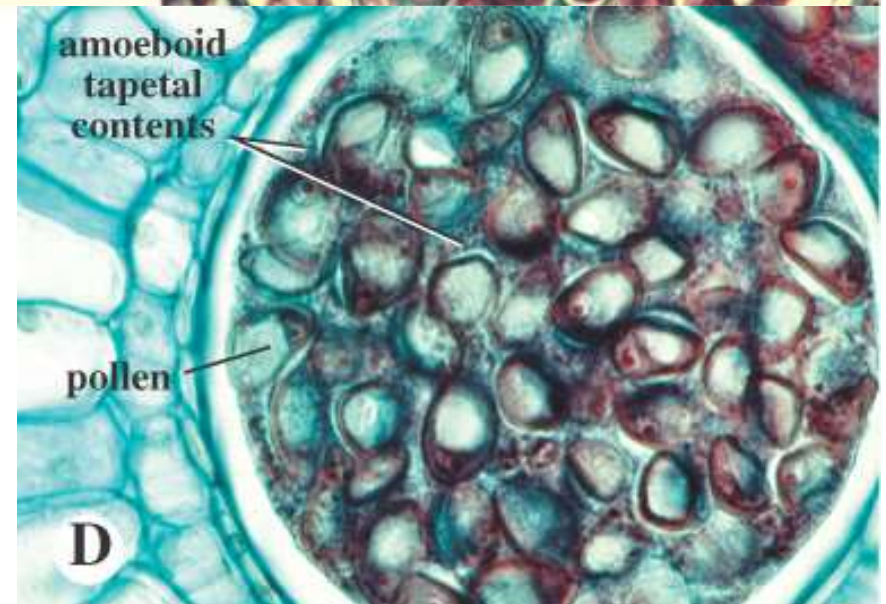
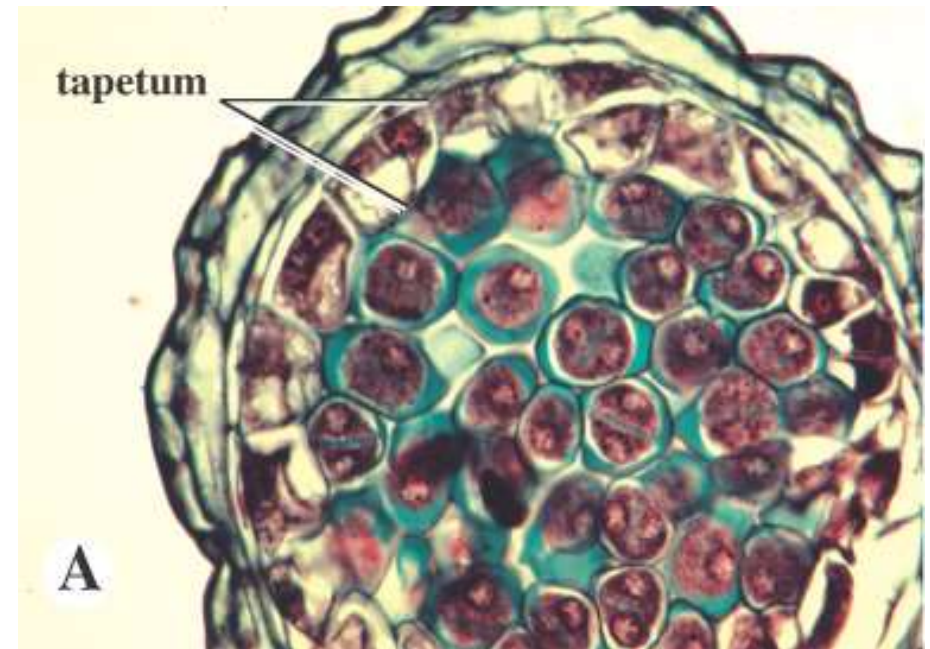
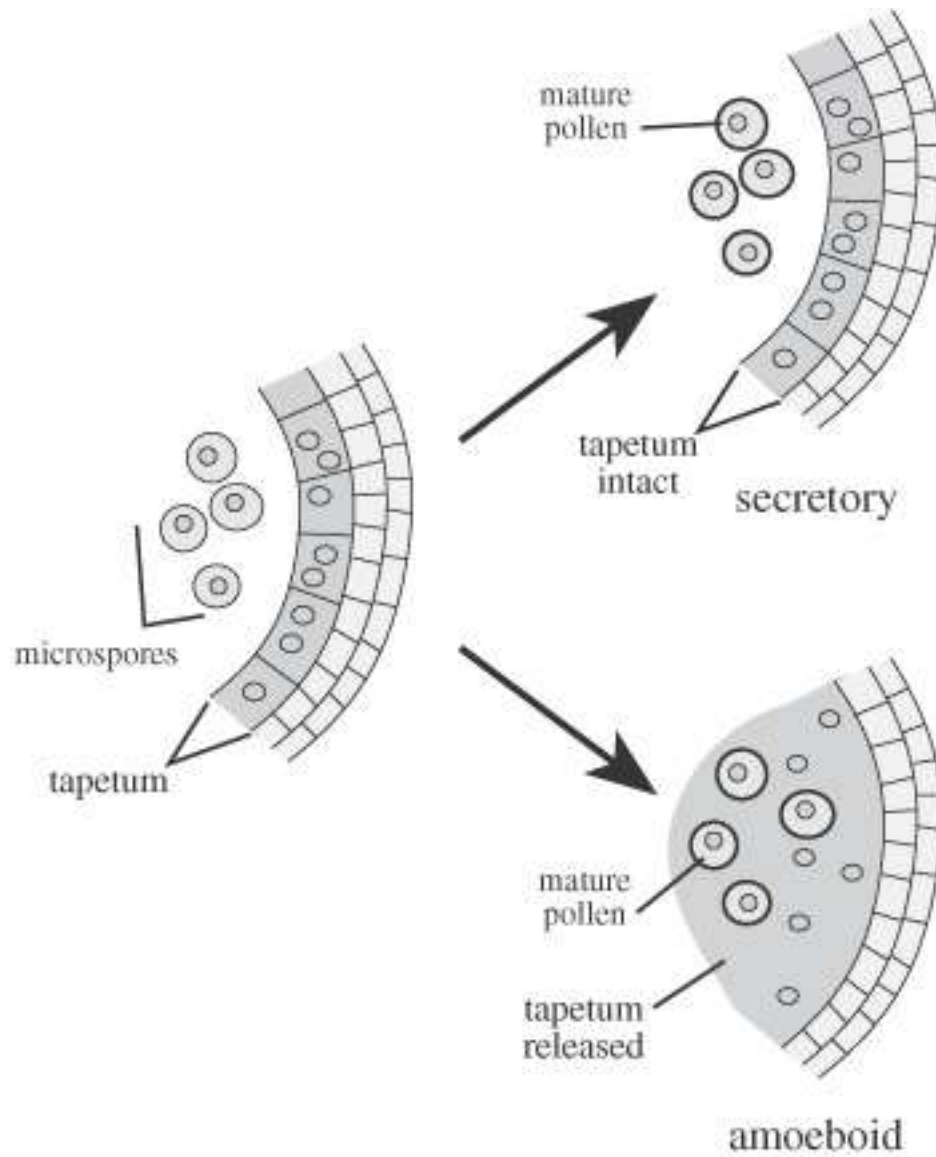
# Endothecium type



The wall cells just below the epidermis form the endothecium which later loses the cell contents, usually becomes fibrous, and forms the dry coat of the mature anther in which the epidermis becomes rather inconspicuous



# Tapetum type



- **Nuclear behaviour of tapetal cells**

- Multinucleate condition
- Endomitosis
- Formation of restitution nucleus

## **Function of tapetum**

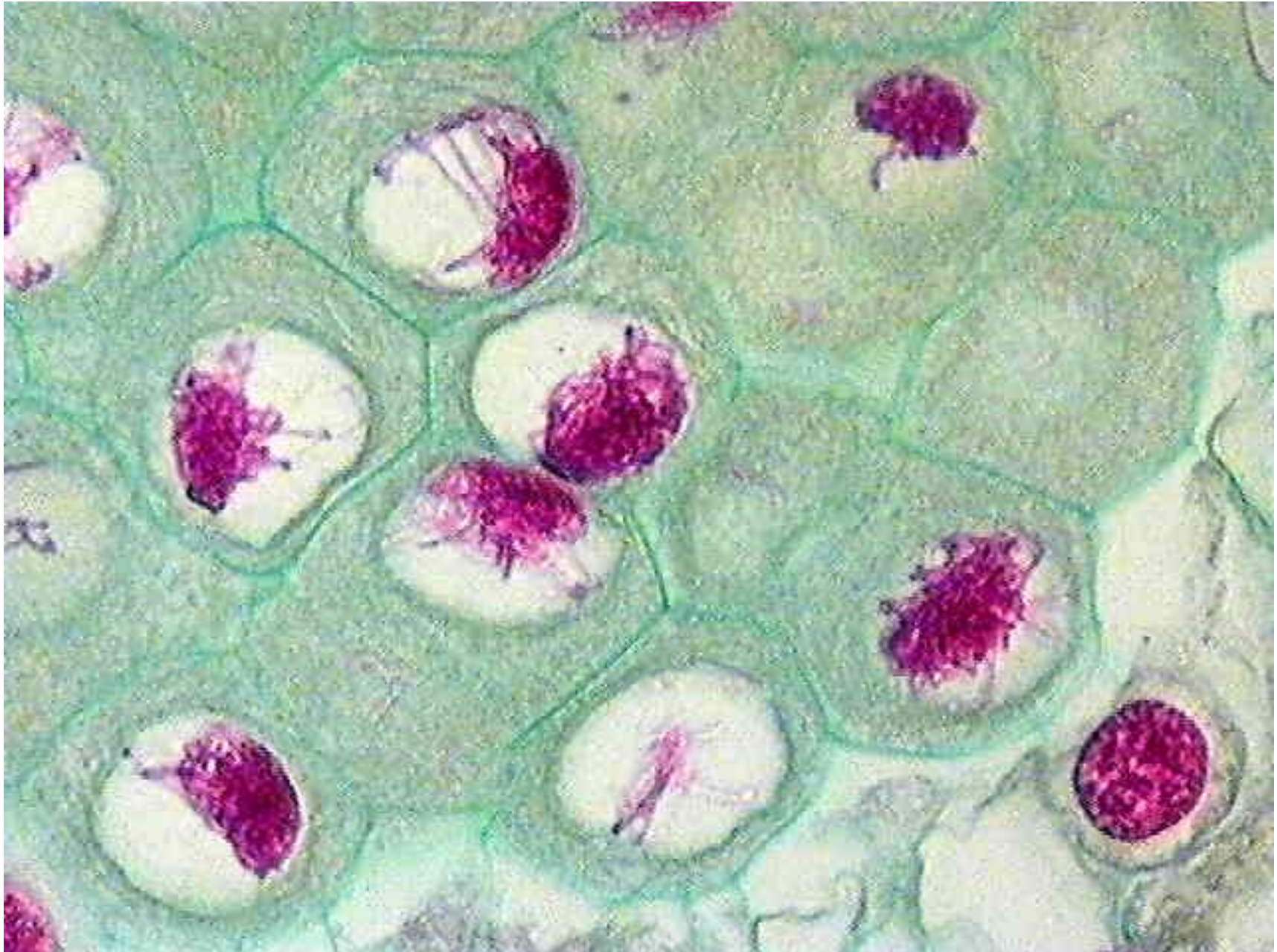
- Transportation of nutrients to the inside of anther locule
- Formation of pollen wall by contributing sporopollenin
- Formation of pollen kit
- Synthesis of callase enzyme for release of microspores
- Stores protein and starch at early stages
- Proteins from tapetal origin is helpful for recognition and rejection reaction.

# Microsporogenesis

- The process of formation of microspores from a pollen mother cell through meiosis is called microsporogenesis.
- The cells of sporogenous tissue undergo meiosis to form **microspore tetrad** arranged in a cluster of 4 cells..
- As each cell of sporogenous tissue has potential to form tetrad, so each cell is a microspore mother cell (PMC).
- On maturation and dehydration of anther, the spores dissociate and develop into pollen grains.
- Pollen grains release with the dehiscence of anther.



## Microsporogenesis: Prophase I of Meiosis

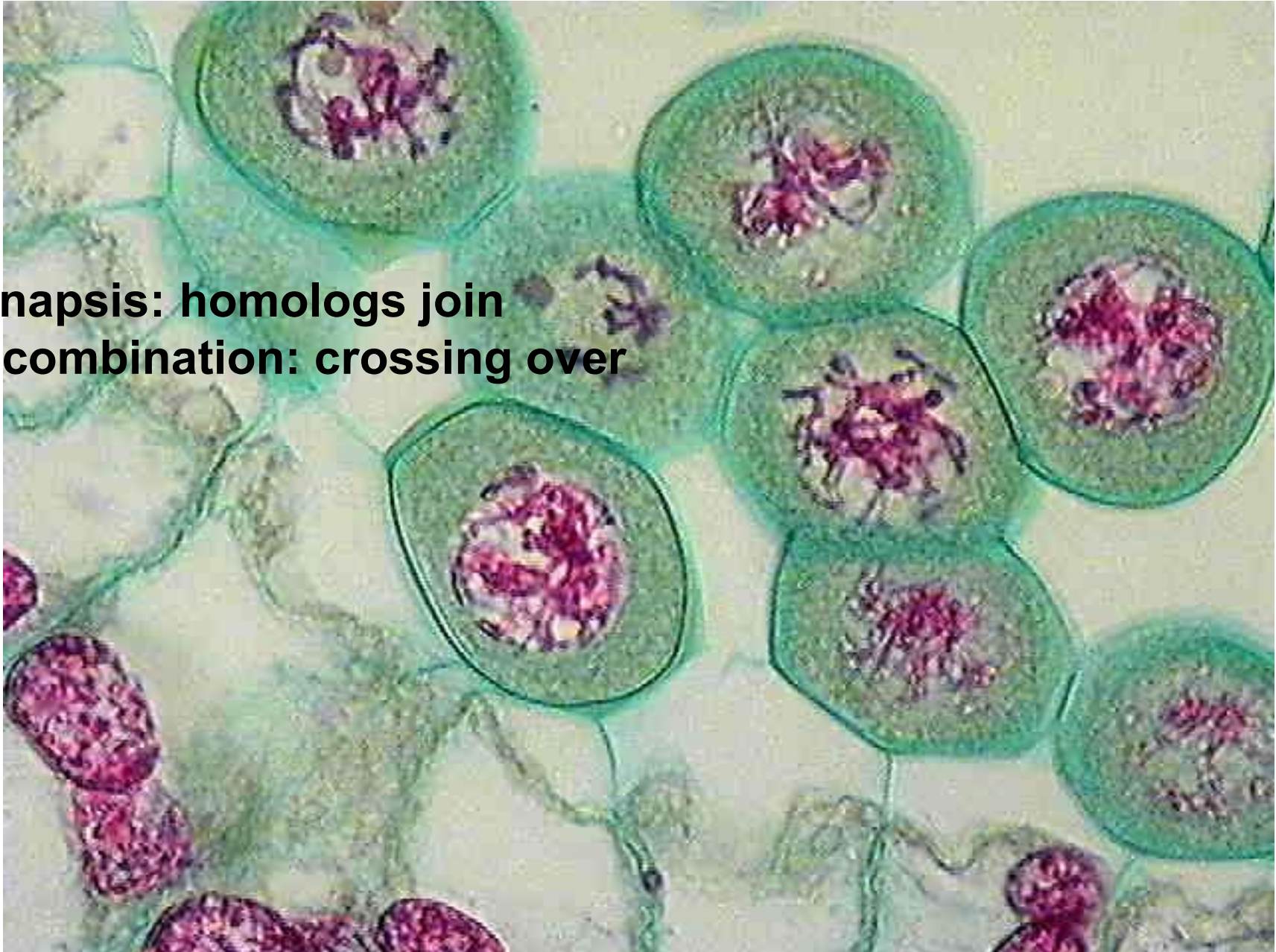


<http://images.iaspr.org/lily/lpachy-m.jpg>



## Microsporogenesis: Late Prophase I of Meiosis

**Synapsis: homologs join**  
**Recombination: crossing over**



<http://images.iaspr.org/lily/lepto.jpg>

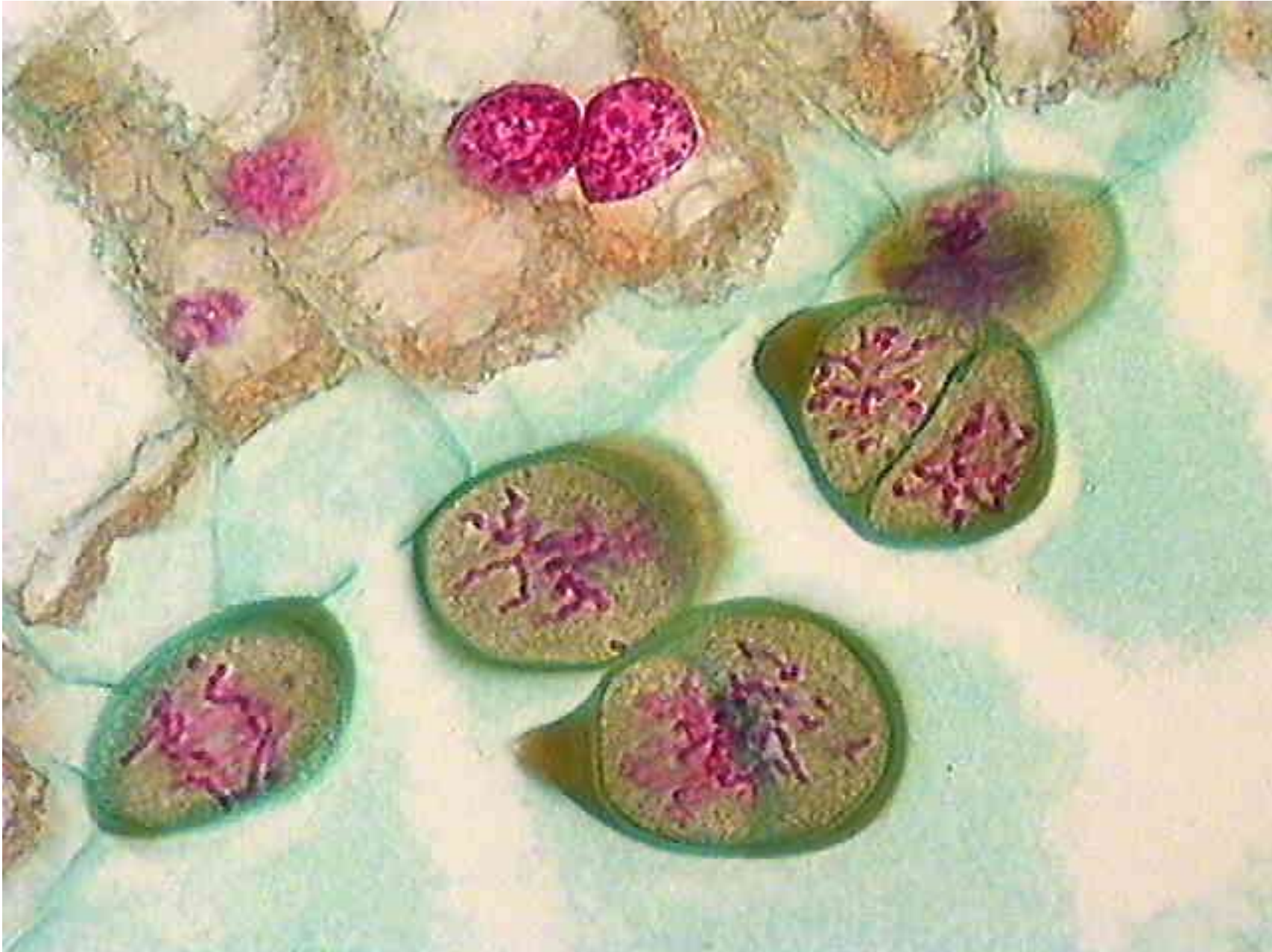


## Microsporogenesis: Telophase I of Meiosis



<http://images.iaspr.org/lily/telo-i.jpg>

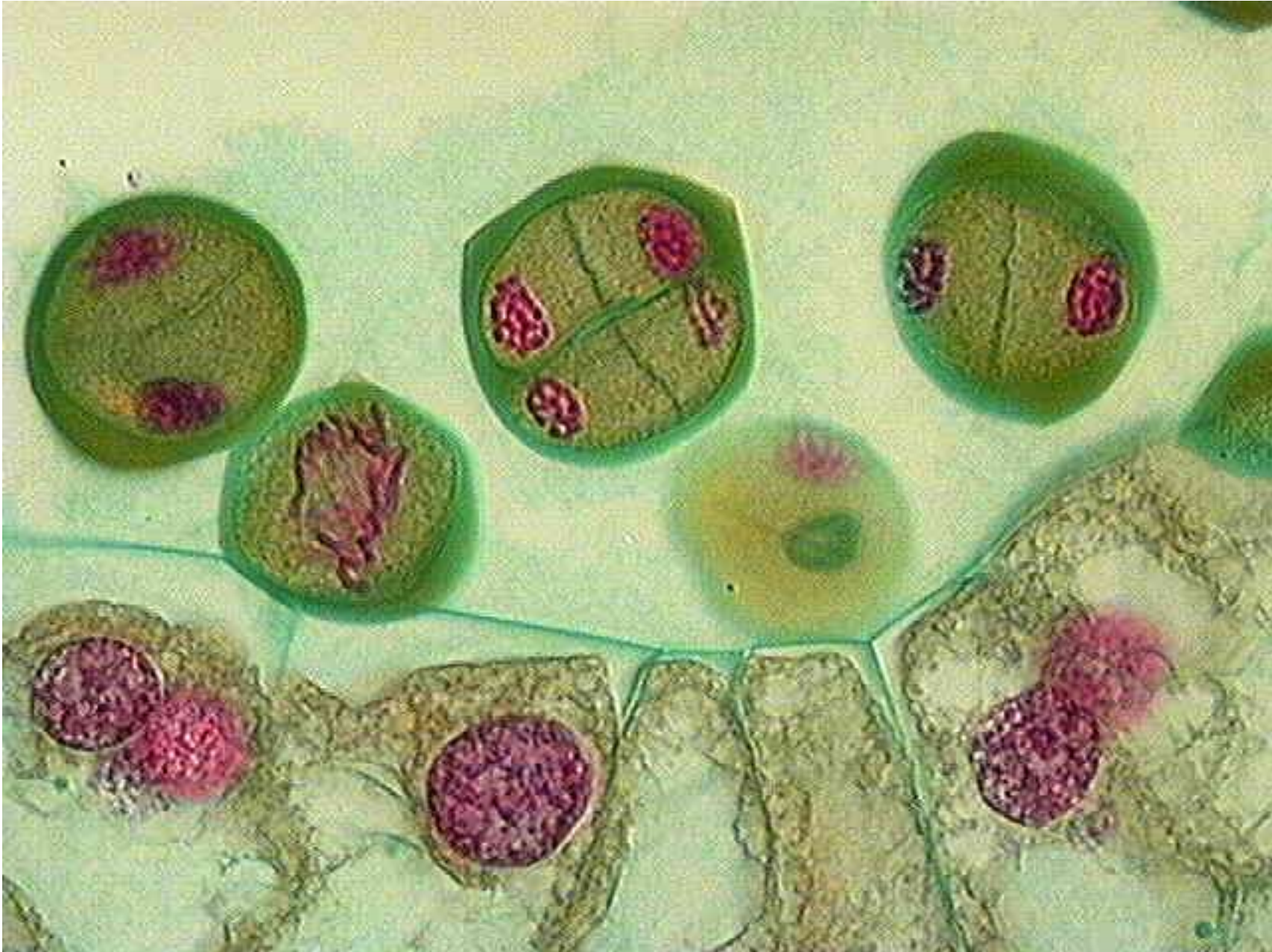
## Microsporogenesis: Metaphase II and Anaphase II of Meiosis



<http://images.iaspr.org/lily/meta-ii.jpg>

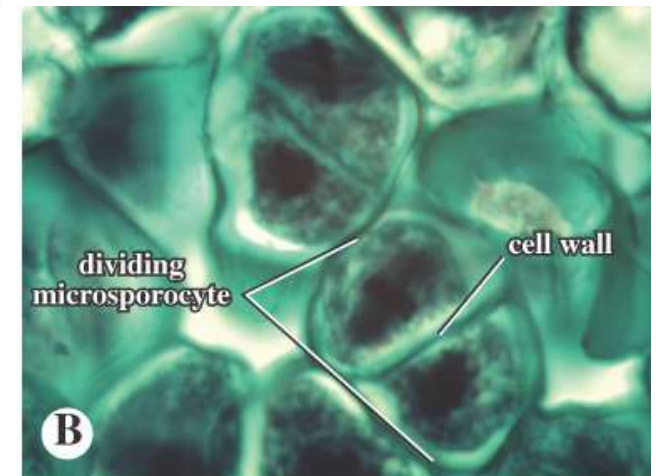
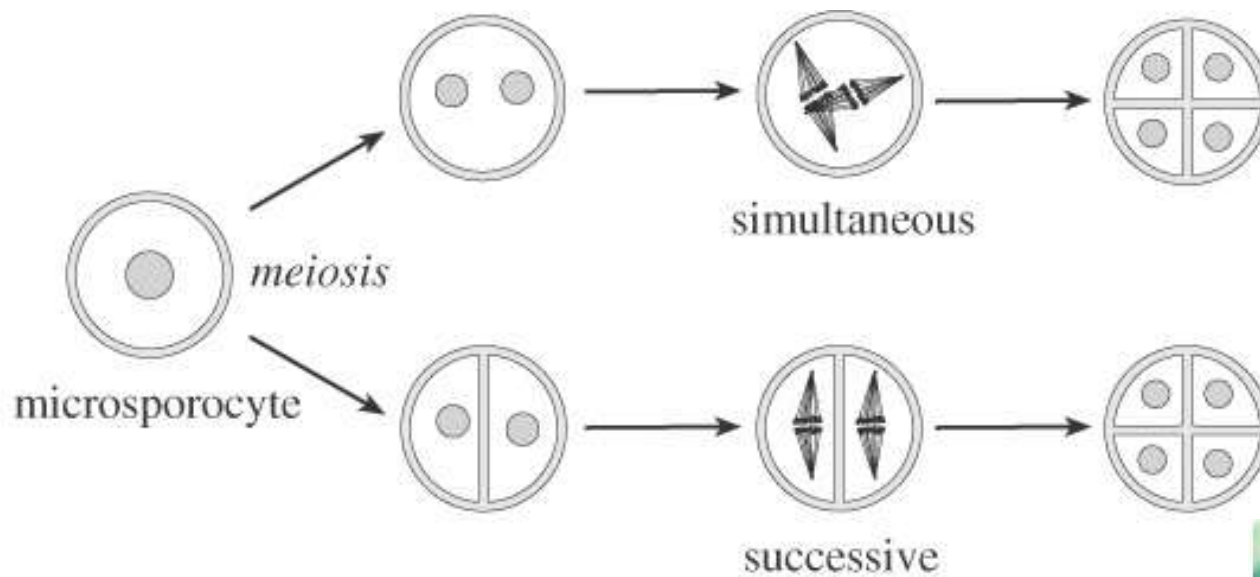
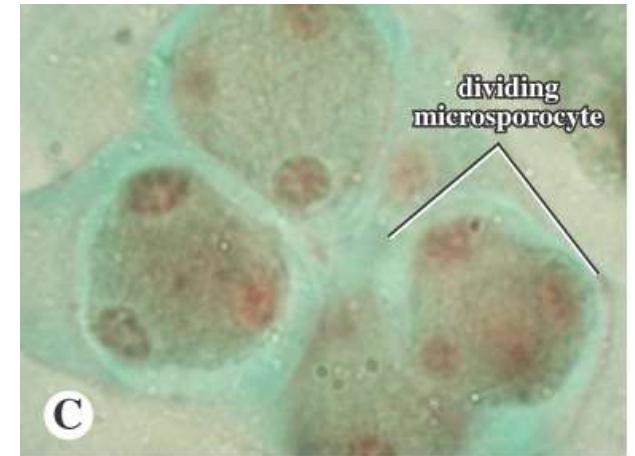


## Microsporogenesis: Telophase II of Meiosis



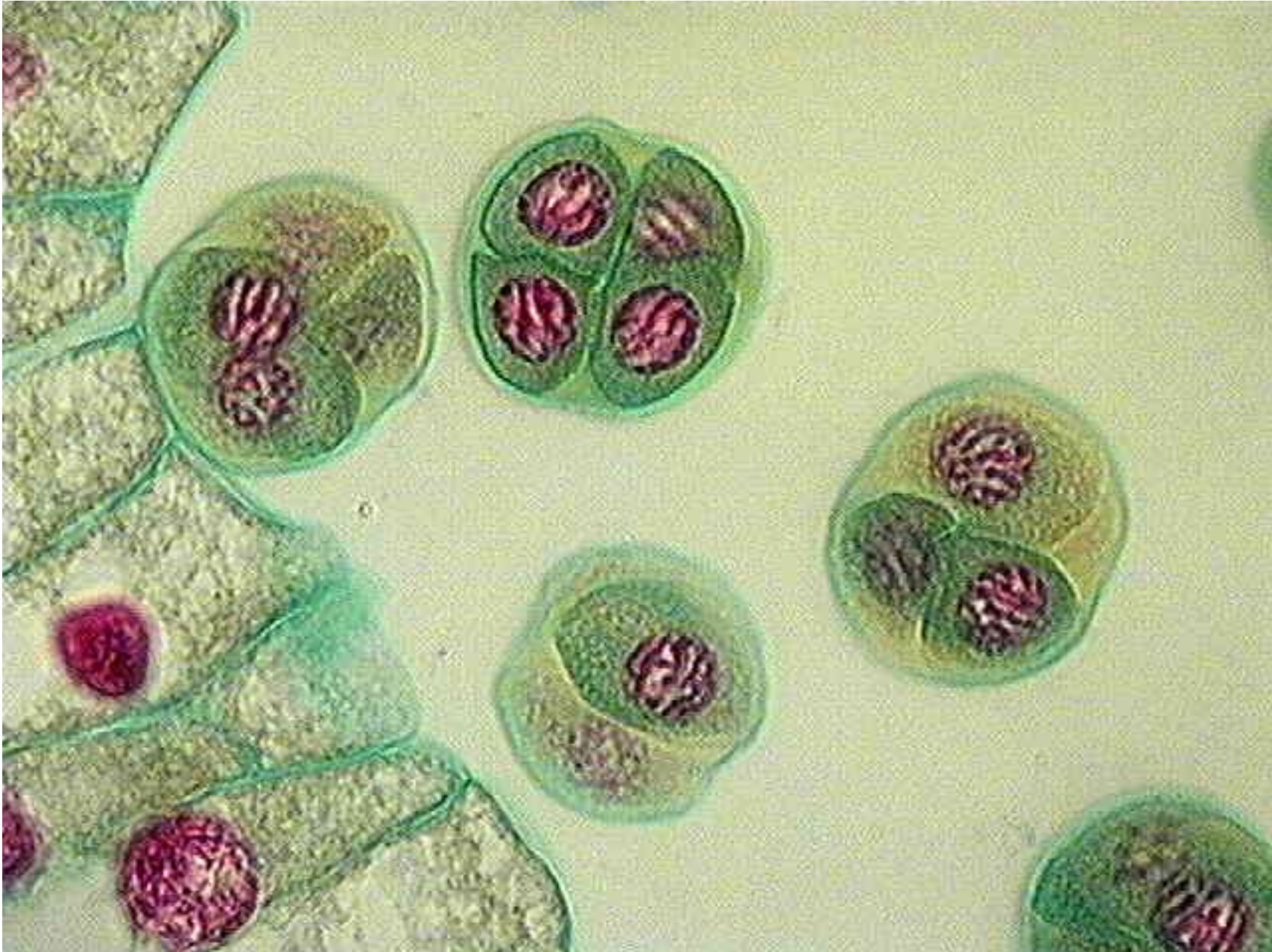
<http://images.iaspr.org/lily/telo-ii.jpg>

# Cytokinesis





## Microsporogenesis: Meiosis complete (but prophase of mitosis)



<http://images.iaspr.org/lily/tetrad.jpg>



## Microsporogenesis: Completed, Separated Microspores (note prophase)



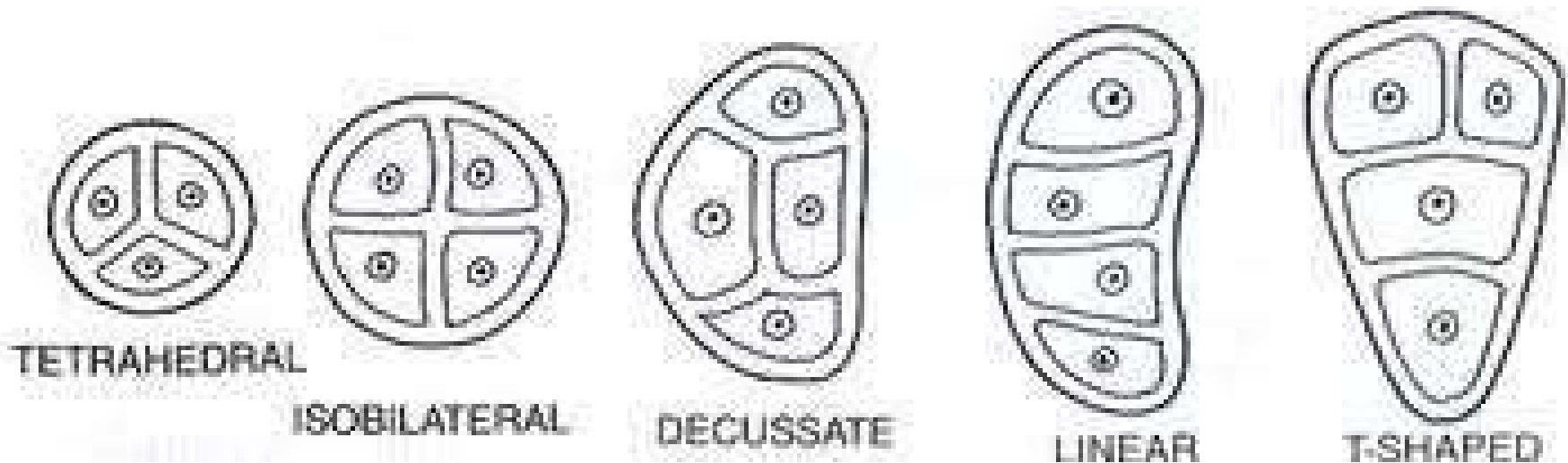
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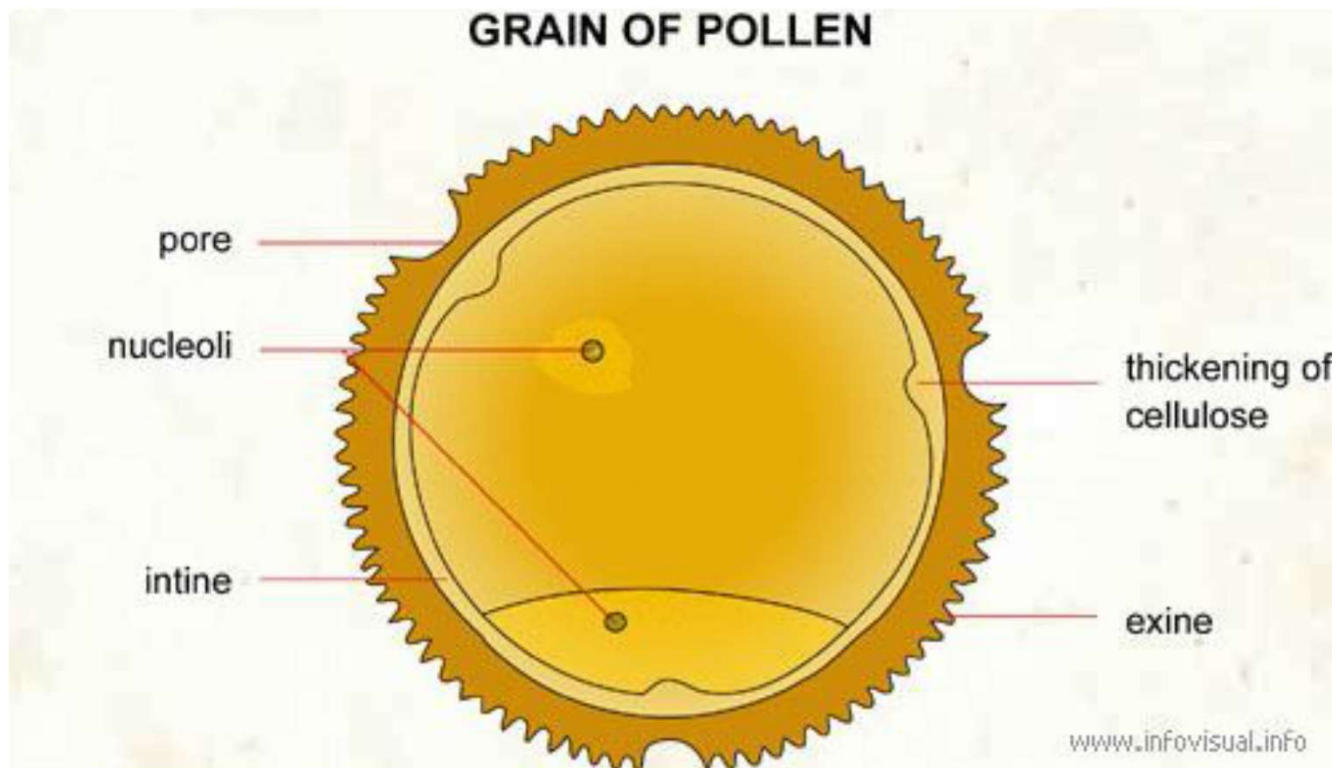
# Microspore tetrads

- Tetrahedral
- Decussate
- T-shaped

Isobilateral  
Linear



# A mature pollen grain



*Thank  
you*