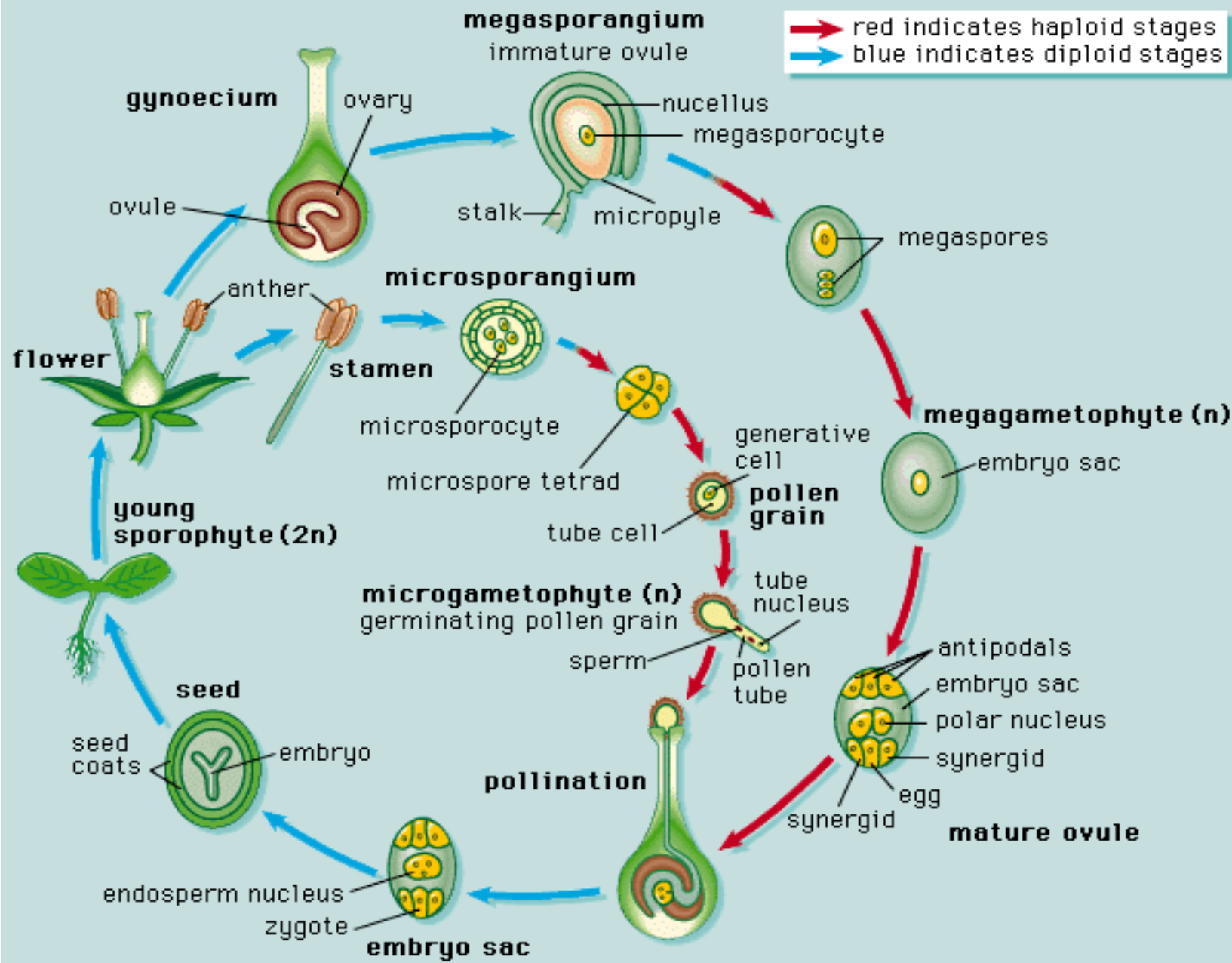
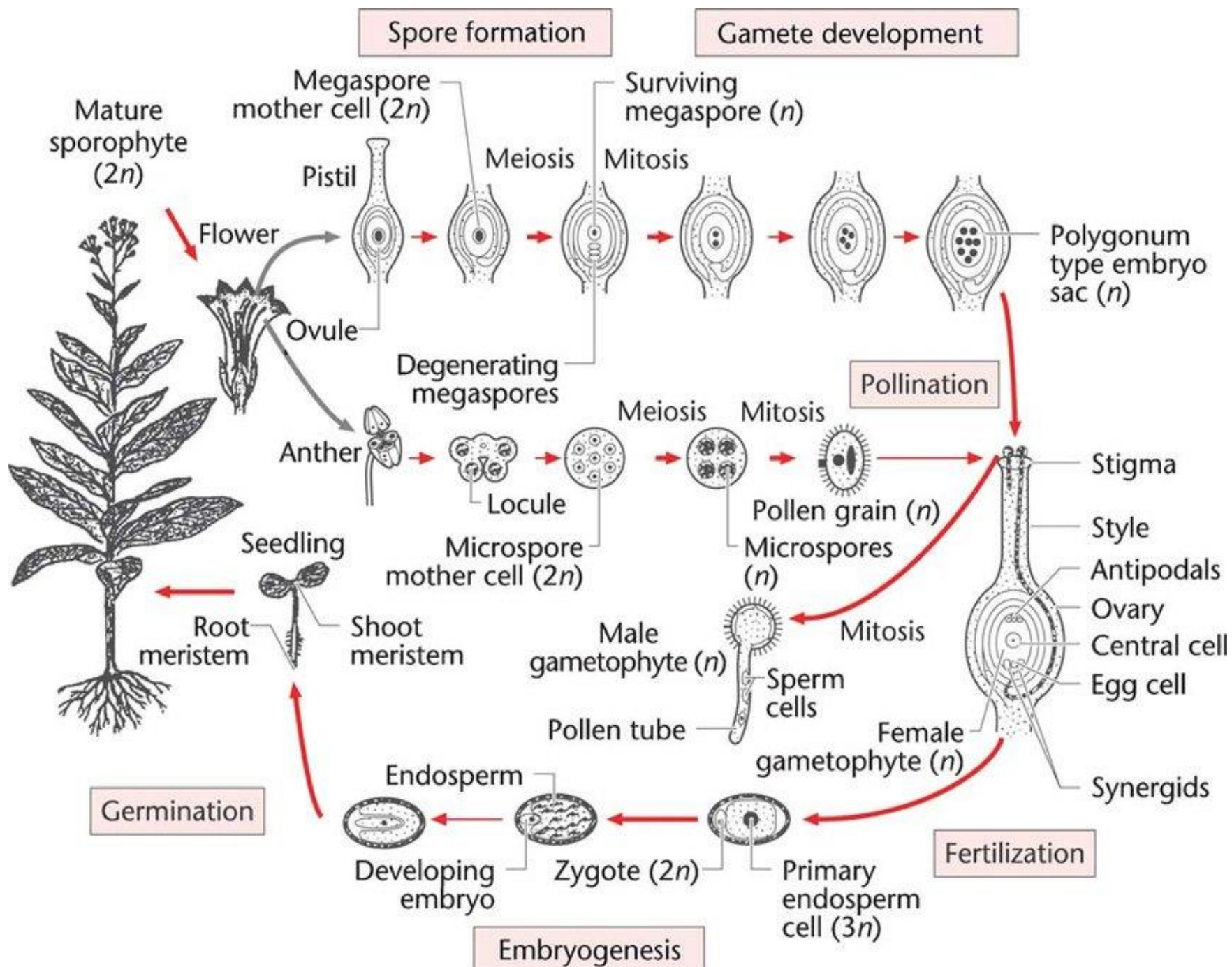


Microsporogenesis

DSE-2
UNIT-3

DR. ARINDAM MANDAL
Assistant Professor
Bejoy Narayan Mahavidyalaya
Itachuna, Hooghly
West Bengal



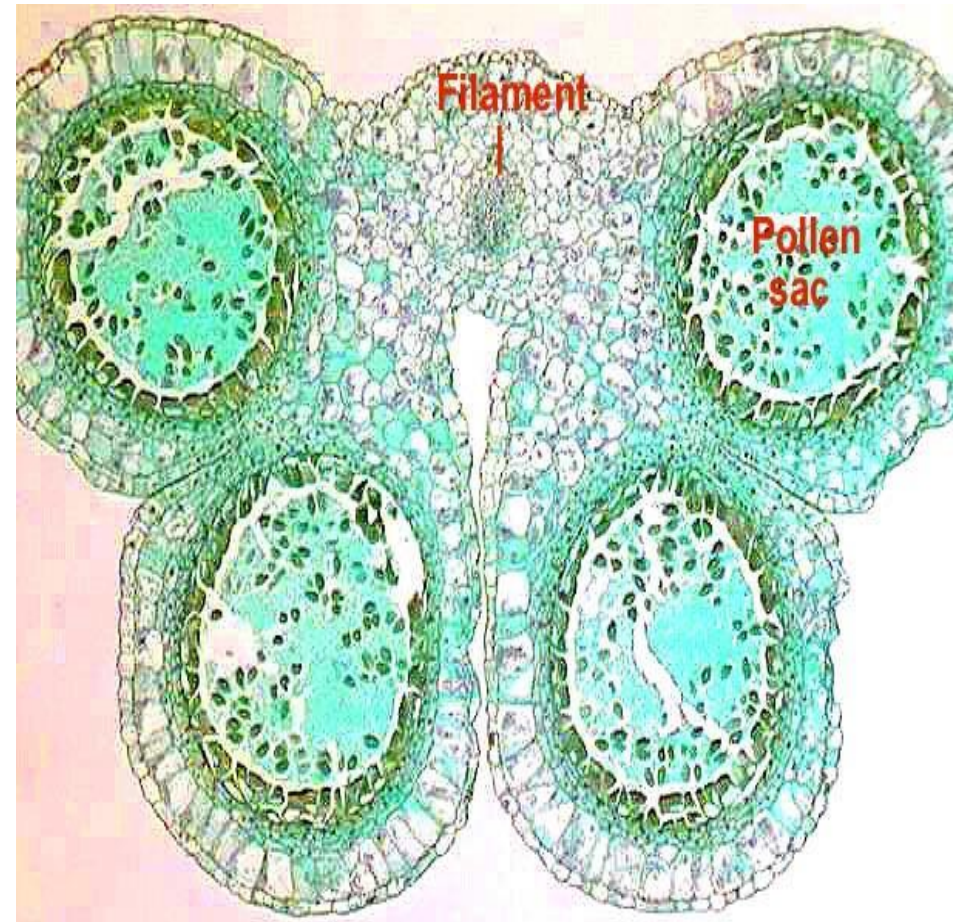


Microsporogenesis

- Occurs in anther regions called pollen sacs (microsporangia).
- Microspore mother cells produce microspores (immature pollen grains) via meiosis.

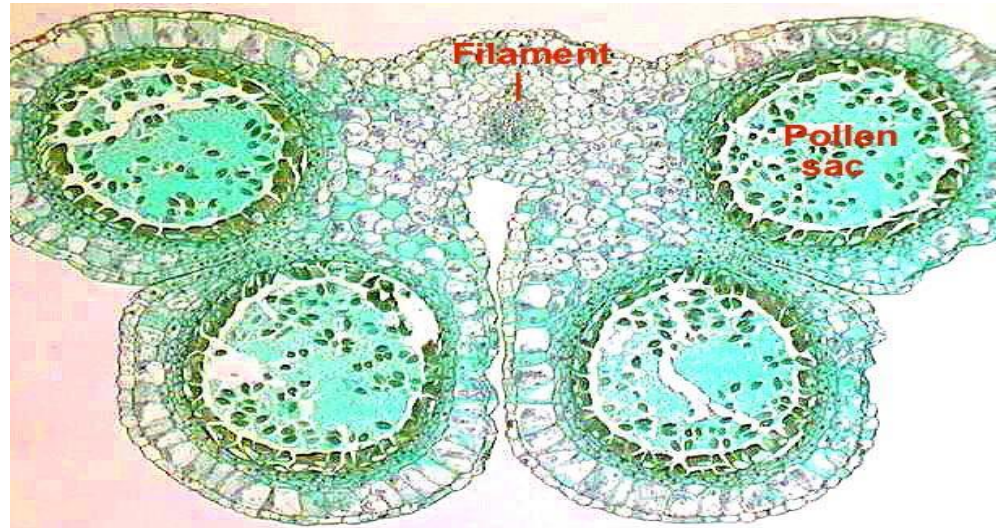
Structure Of Anther (Microsporangium)

- Bilobed and dithecous.
- A longitudinal groove separate the theca.
- 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.

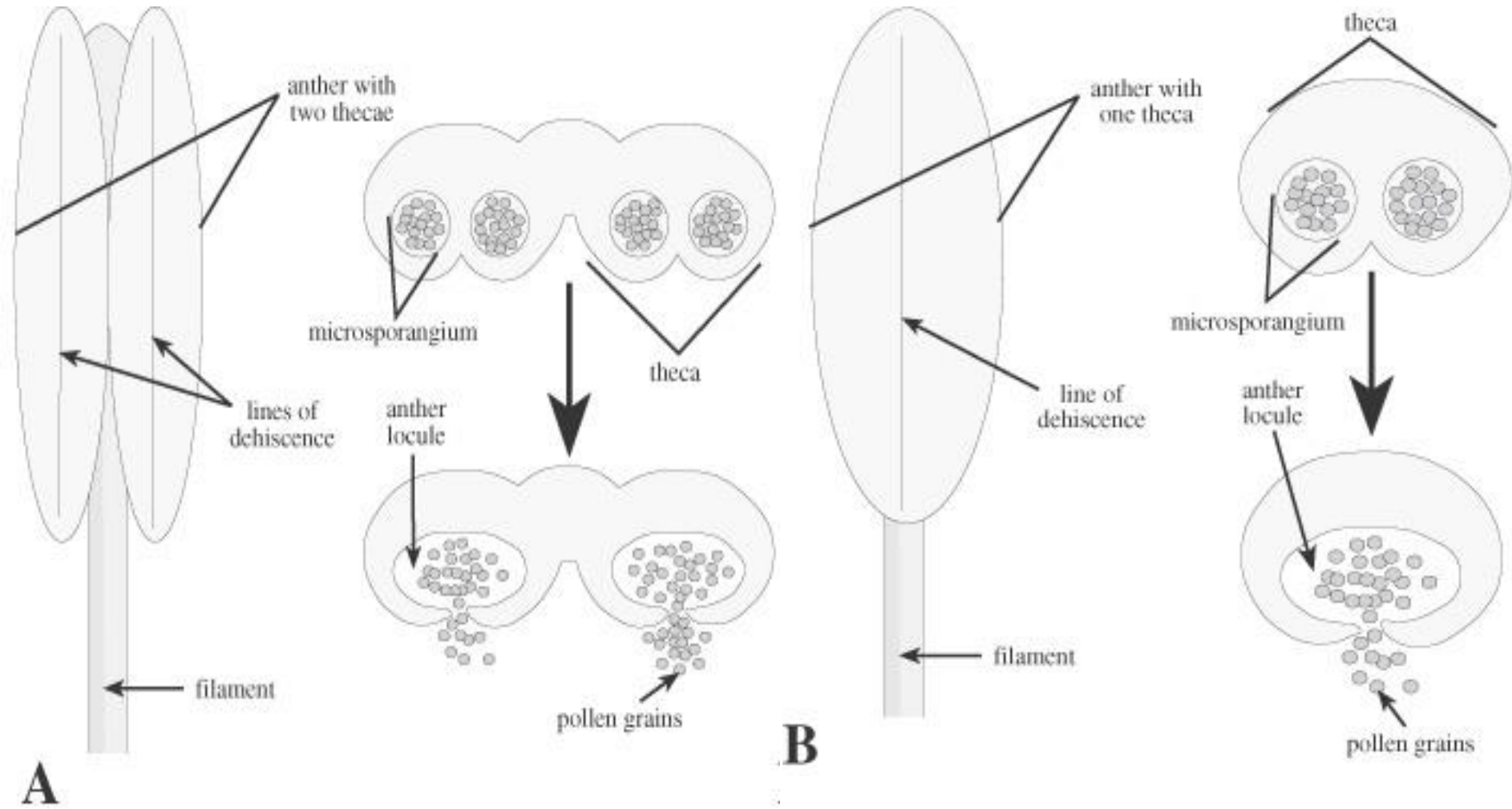


Structure Of Anther (Microsporangium)

- A microsporangium is circular and surrounded by 4 layers.
- These are epidermis, endothecium, middle layers tapetum.
- Outermost layers protect the pollen and help in dehiscence of anther to release pollen.
- Tapetum nourishes the developing pollen grains.



Anther Type



Development of Pollen Sac

- 1. Very young anther is a multicellular, four-cornered structure, surrounded by a layer of epidermis.**
- 2. In each corner develops one or more archesporial initials.**
- 3. These initials divide by a periclinal wall into outer primary parietal cell and inner primary sporogenous cell.**
- 4. Primary parietal cell divides periclinally as well as anticlinally and form 3 to 5 concentric layers of cells.**

Development of Pollen Sac

5. Innermost wall layer is called tapetum which is nutritive in function.
6. From the sporogenous tissue develop the pollen grains.
7. Some cells form the procambial strand in the centre of die anther.

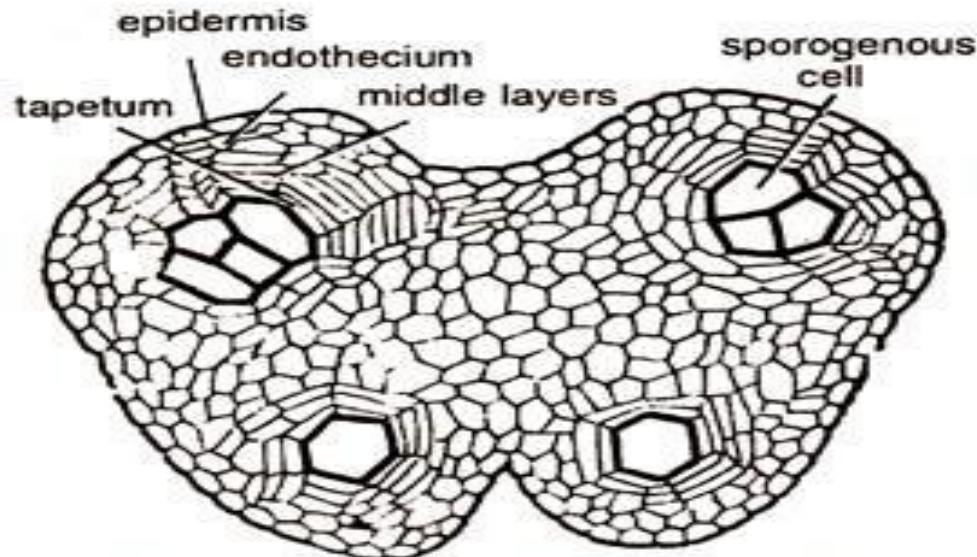


Fig. 55. T. S. young (developing) anther.

Development of Pollen Sac

8. Anther is surrounded by a layer of epidermis throughout.
9. Each pollen sac is surrounded by epidermis, an endothecial layer, one to three middle layers or wall layers and innermost layer of tapetum.
10. In each pollen sac or chamber are present many pollen tetrads which on separation form microspores.
11. A joint in the form of connective is present in the centre.

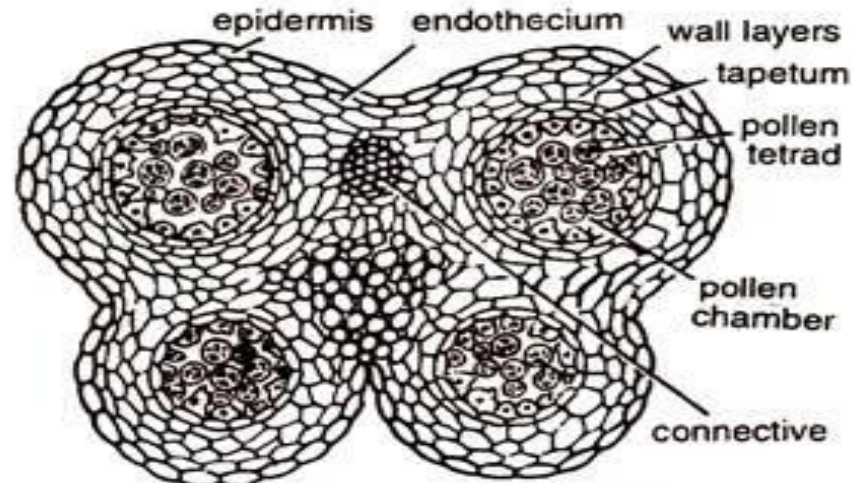


Fig. 56 - T. S. anther with mature pollen sacs.

Mature Anther

1. Four-cornered, four-chambered, multicellular body surrounded by a layer of epidermis.
2. Partition wall between the two pollen sacs is dissolved.
3. Many pollen grains or microspores are present in the pollen sacs in the form of fine, powdery or granular mass.
4. Endothecium, middle layers and tapetal layers are present below the epidermis.
5. Along the line of dehiscence of each lobe, thin walled cells of endothecium form the stomium.
6. A connective is very clear.

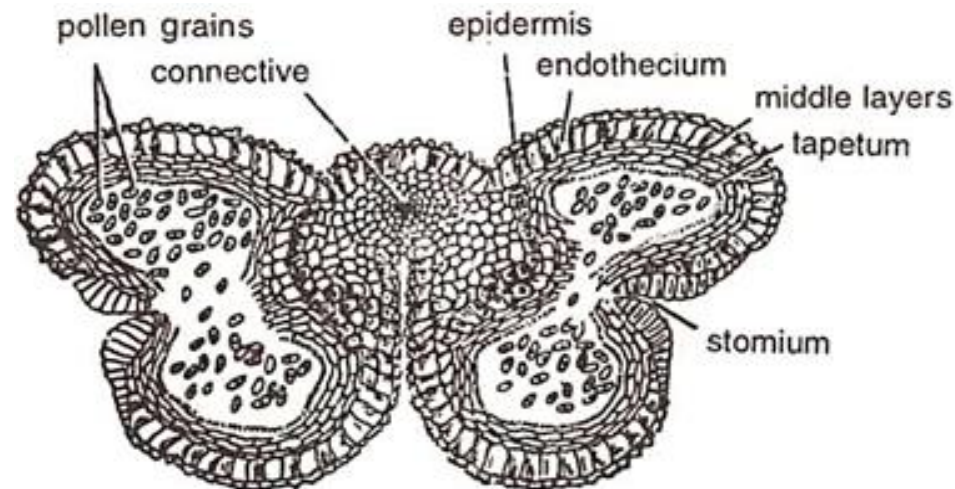
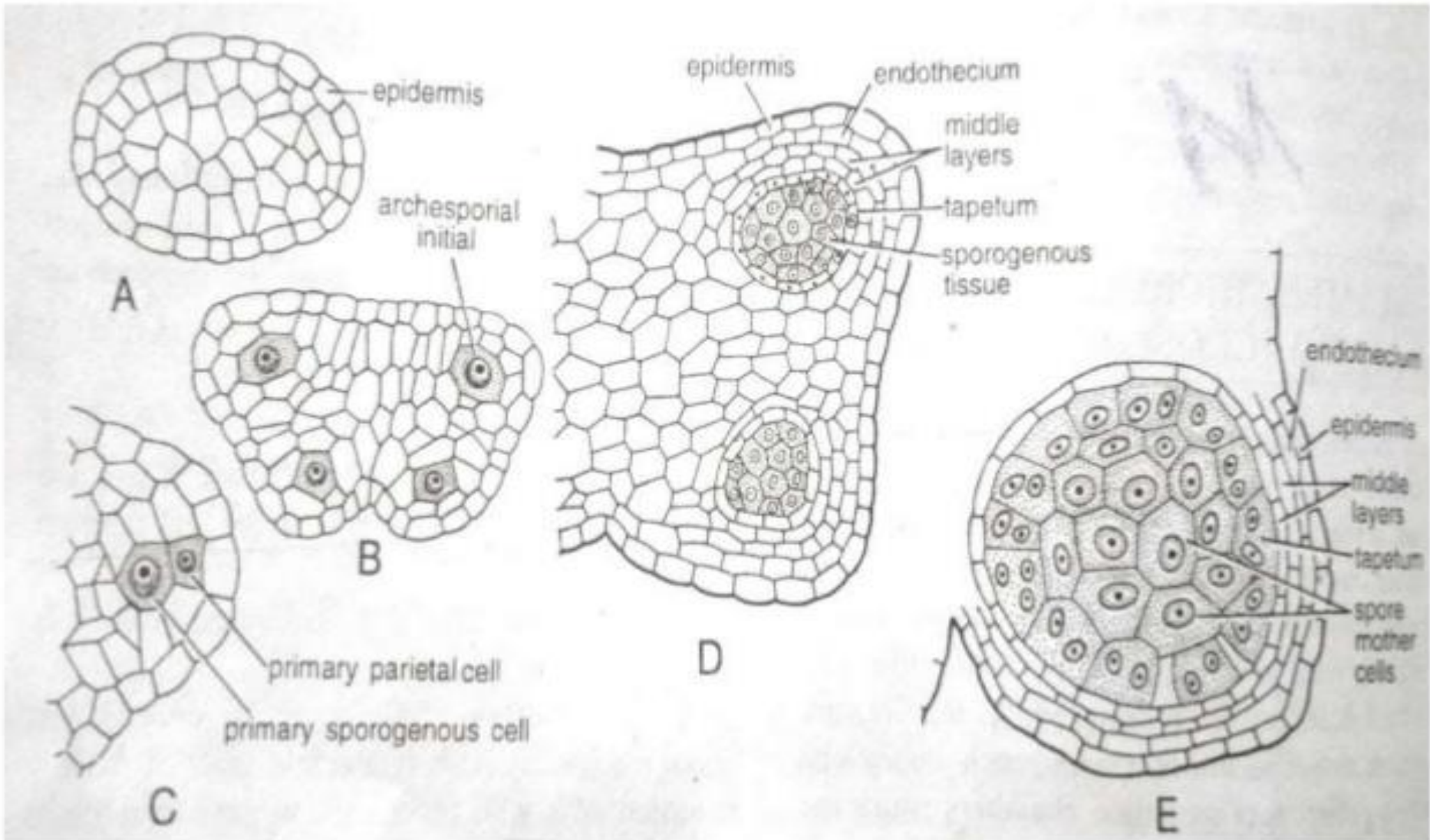


Fig. 57. T. S. mature anther

Development of Microsporangia

DEVELOPMENT OF ANTHER:-



Development of Microsporangia

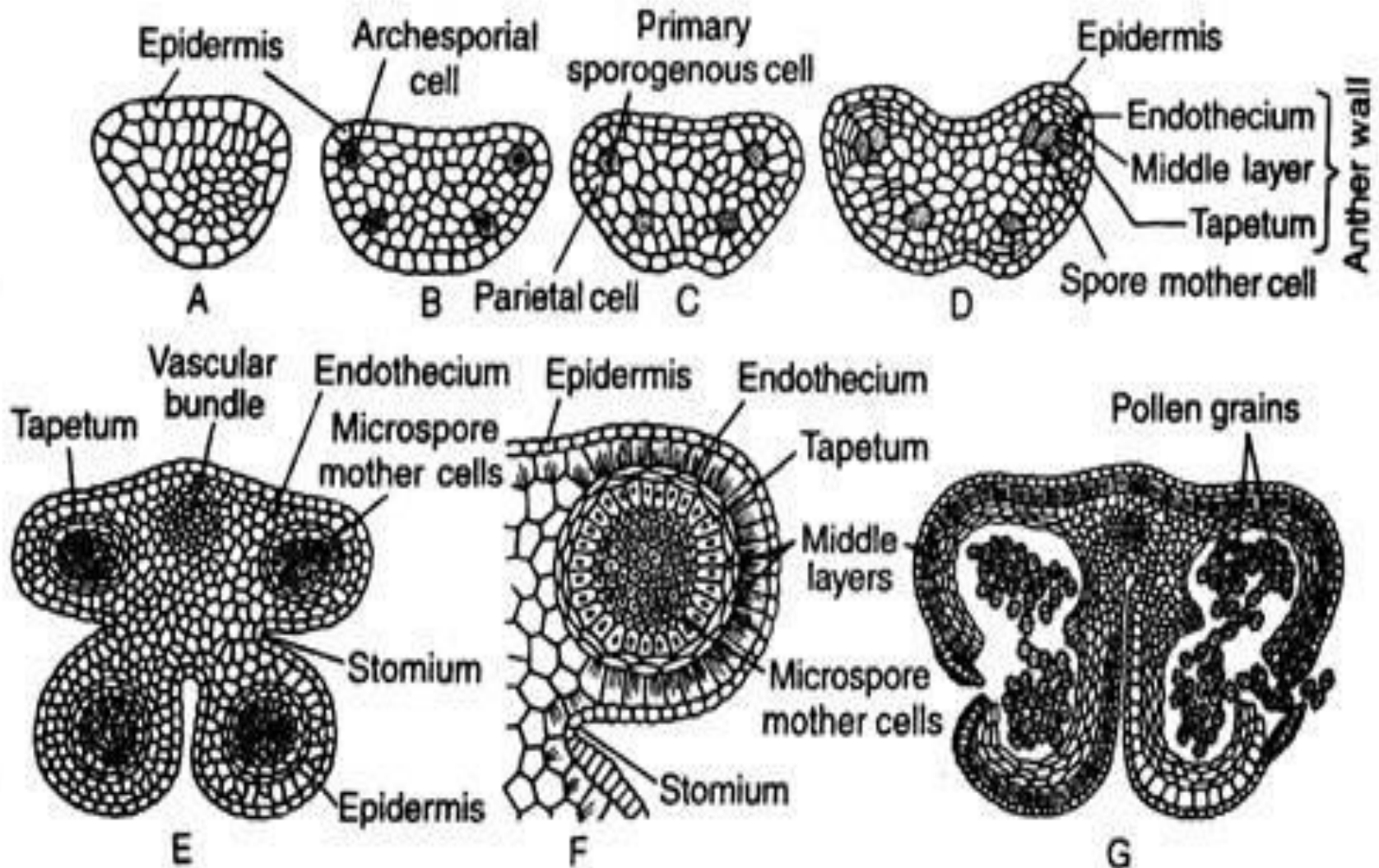
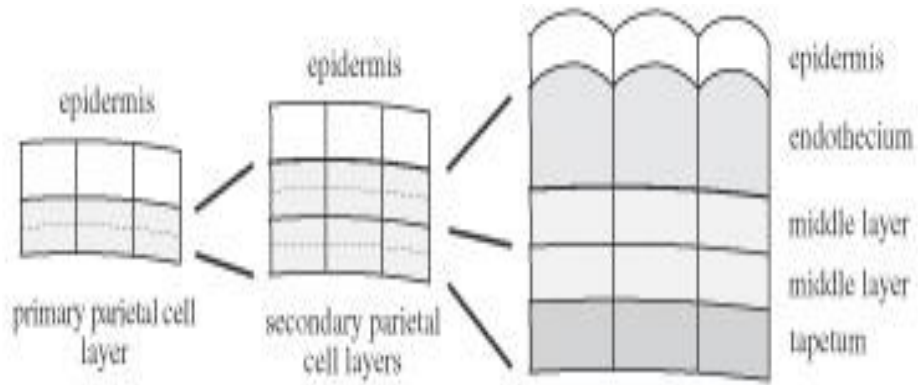
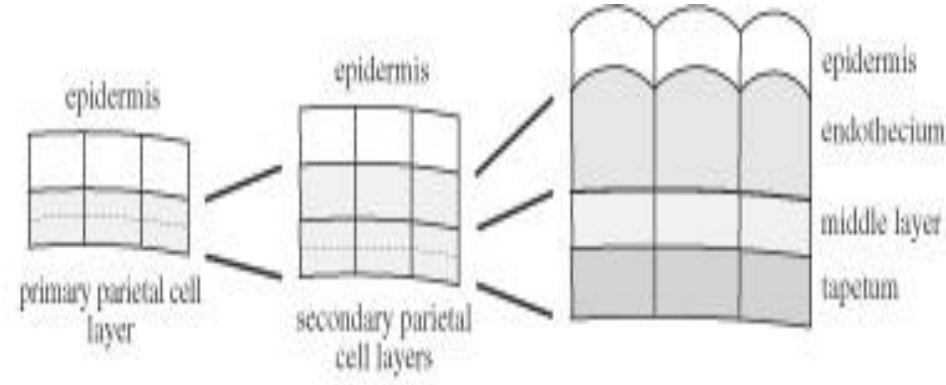


Fig. 3.1 : Stages of anther development and microsporogenesis : A–D. Developmental stages, E. T.S. of developing anther, F. Enlarged microsporangia with wall, and G. T.S. of mature anther showing liberation of pollen grains

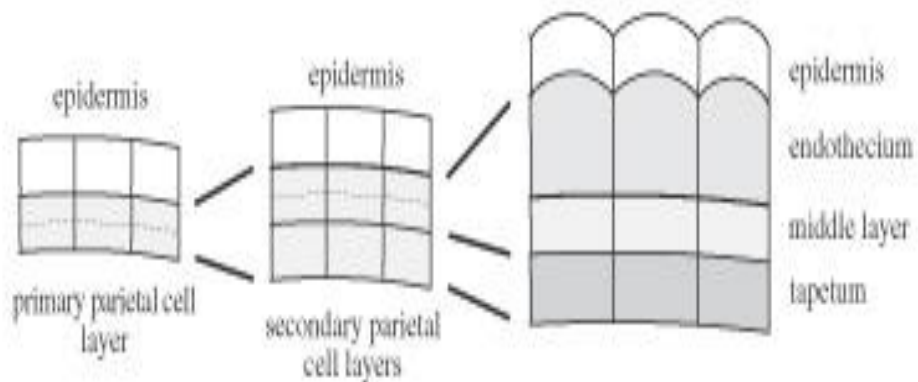
Anther Wall Development



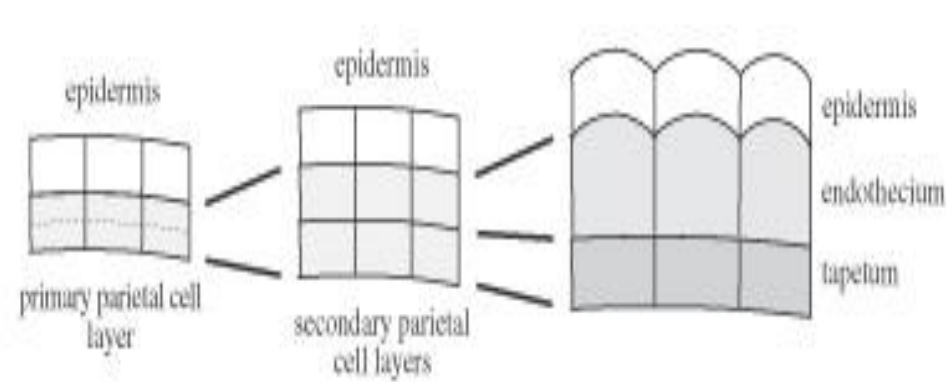
Basic



Monocotyledonous



Dicotyledonous



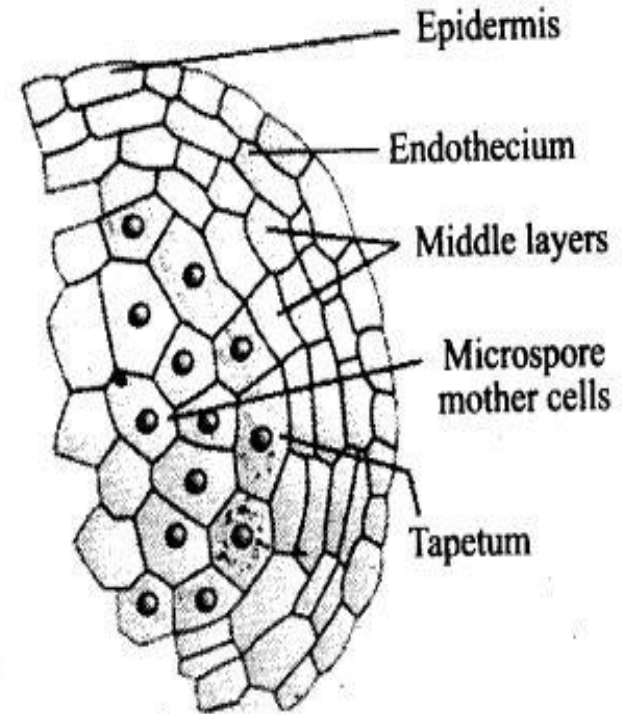
Reduced

Anther Wall

The anther wall consists of four layers. These are epidermis, endothecium, middle layers and tapetum.

Epidermis: This is the outermost layer. It is only one cell in thickness.

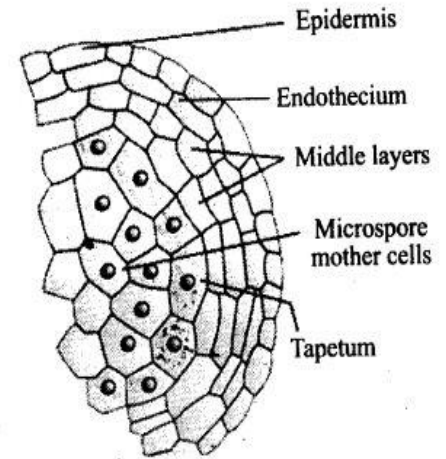
Middle layers: The middle layers consist of three to four layers of thinned wall cells. These layers are situated below the endothecium. These layers generally degenerate to provide nourishment to the growing microspore mother cells.



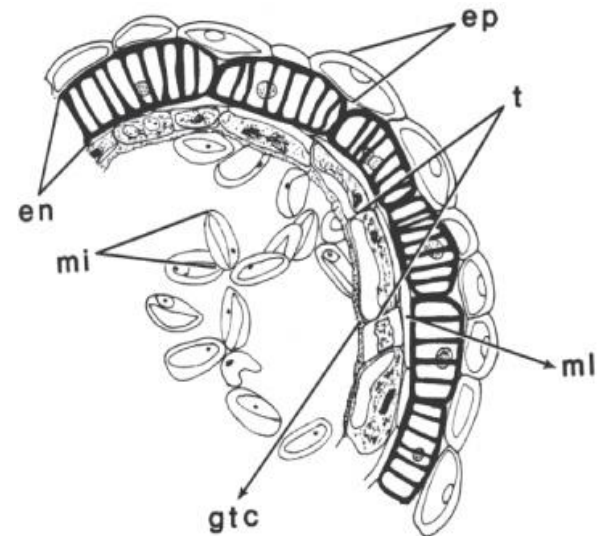
Enlarged view of one microsporangium showing wall layers

Endothecium

This layer is situated just below the epidermis. It is a single layer of radially elongated cell with fibrous thickening. Because of the presence of fibrous thickenings, the endothecium is also called fibrous layer. In between these cells, a few cells without thickening are also present. These thinned wall cells collectively form the stomium or line of dehiscence.



Enlarged view of one microsporangium showing wall layers



Tapetum

Tapetum is the innermost layer of the wall and is multinucleate.

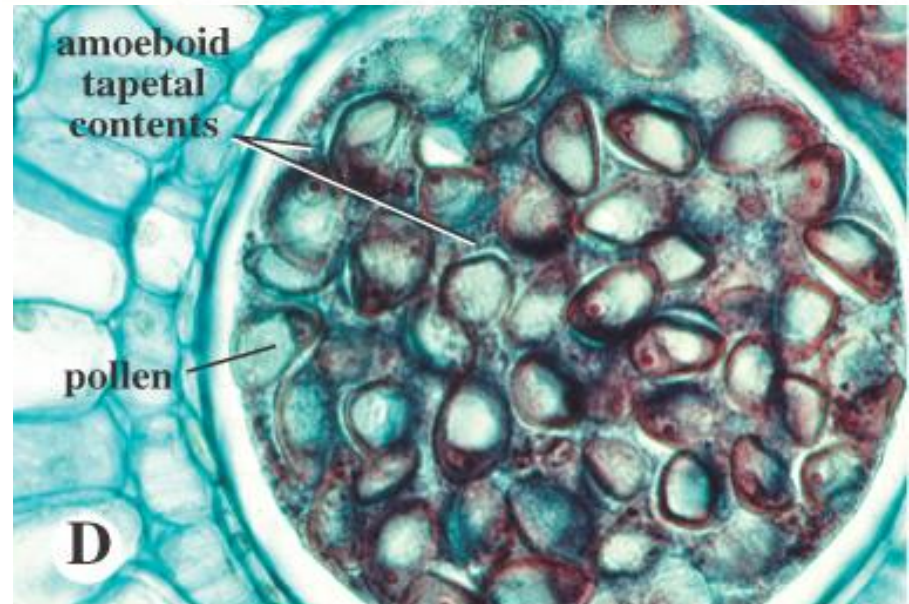
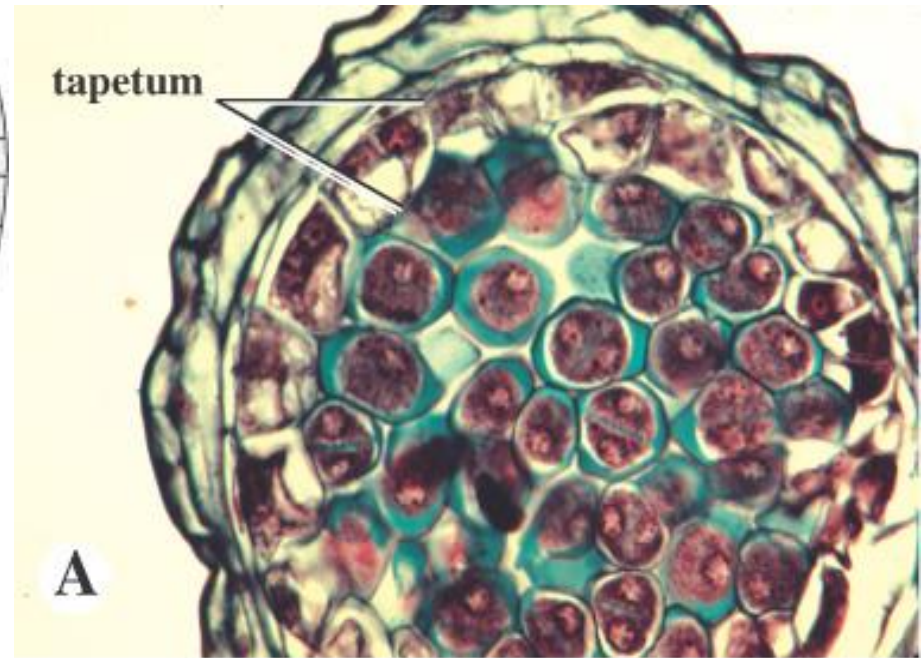
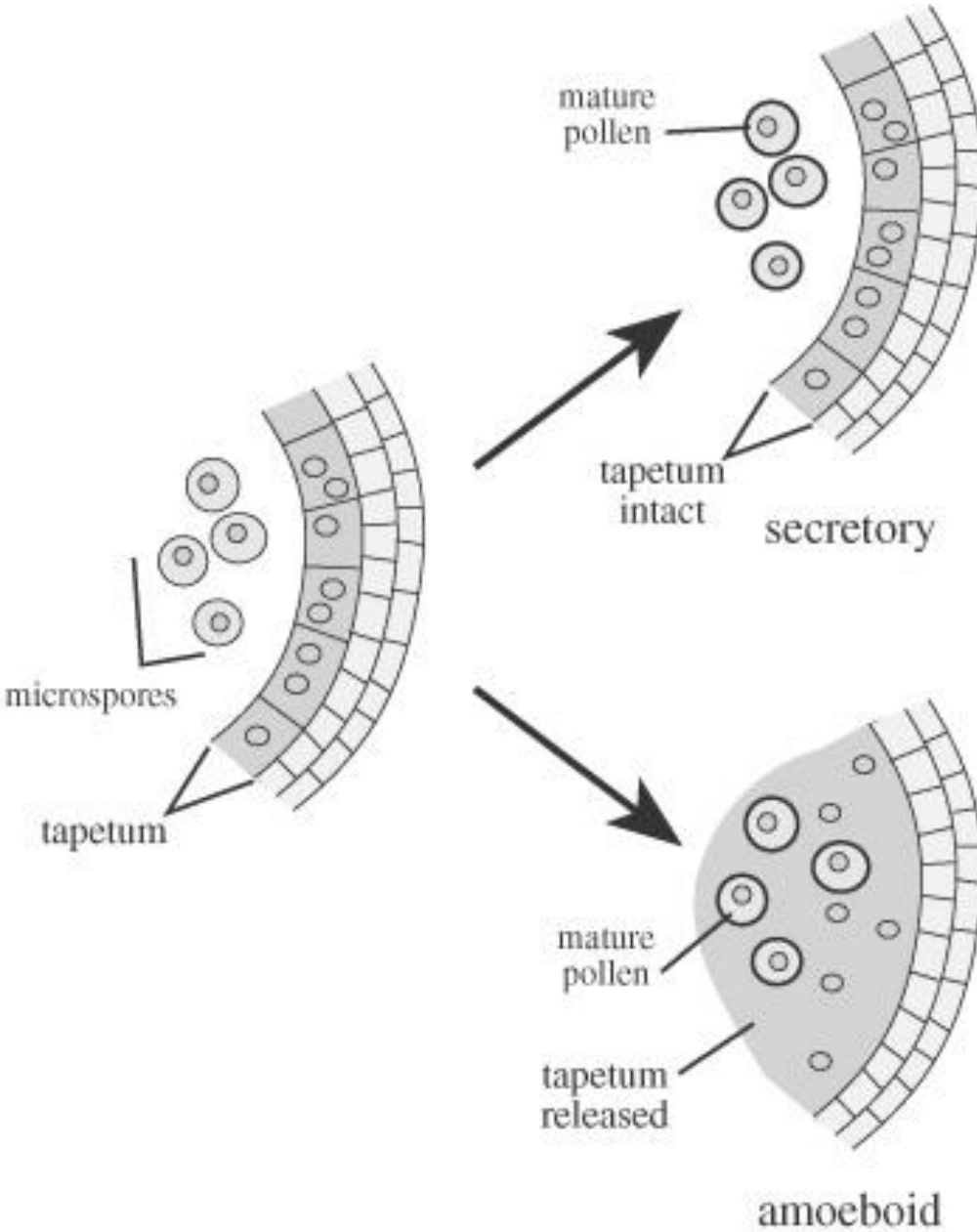
The tapetal cells provide nutrition to the developing microspores.

Tapetum secretes both enzymes and hormones.

Tapetum is of two types-

- 1. Secretory or glandular tapetum.**
- 2. Amoeboid or plasmodial tapetum.**

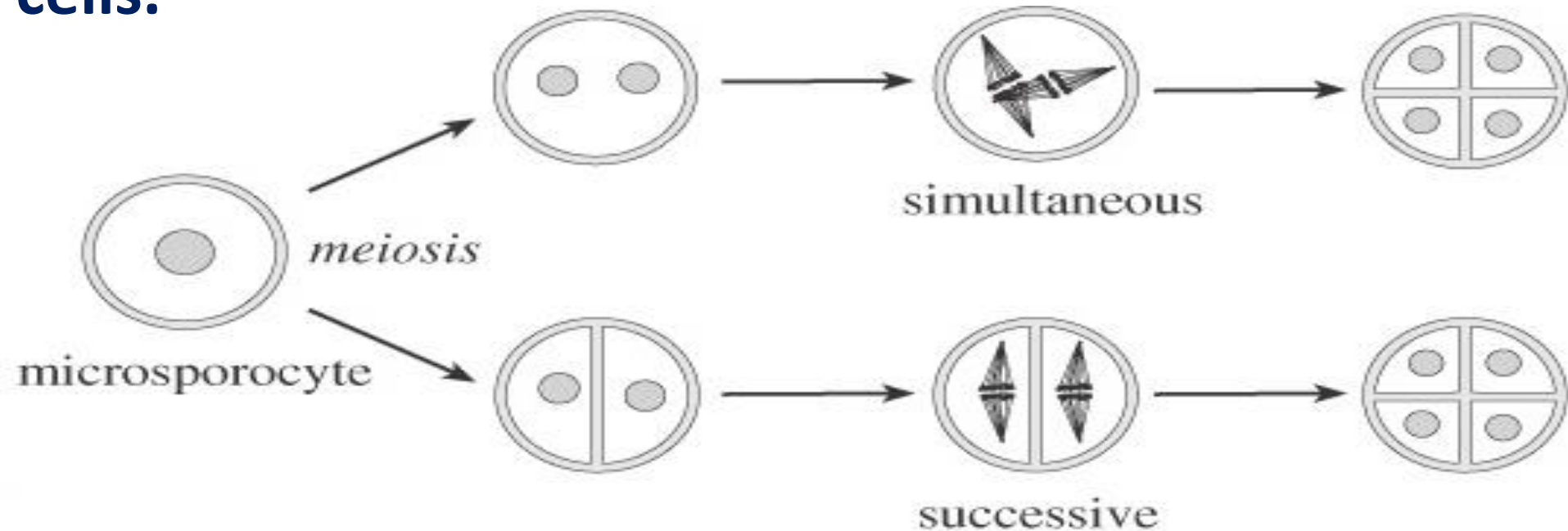
Tapetum type



Microsporogenesis

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.

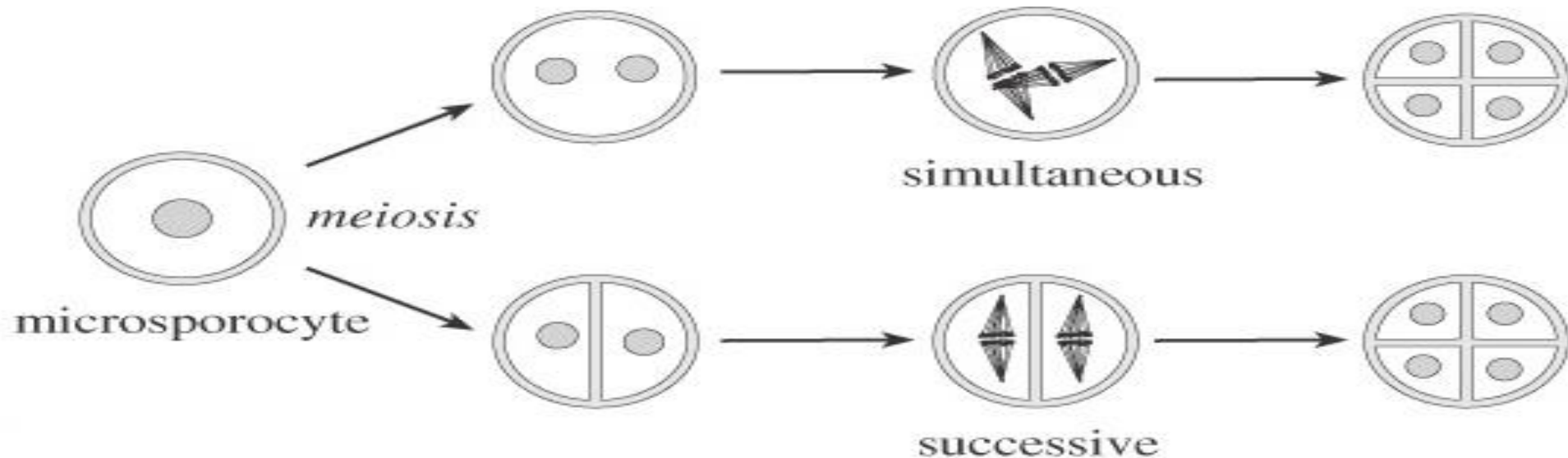


Microsporogenesis

It is of following types:

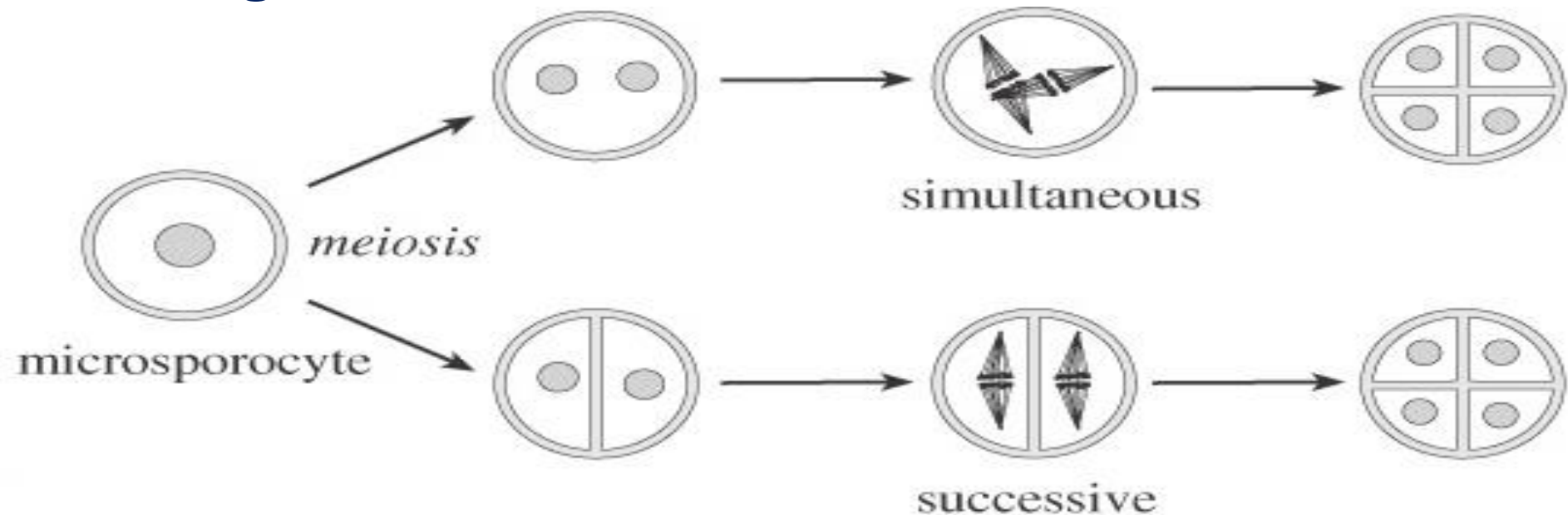
Simultaneous type: In simultaneous type, the cytokinesis occurs only at the end of meiosis II. This results in the production of four cells by cell wall formation between the four nuclei. The resultant tetrad shows tetrahedral arrangement and is common in dicotyledons.

Successive type: In this type, cytokinesis occurs twice – once at the end of meiosis I, forming two cells and then again at the end of meiosis II to form four cells. The resultant tetrad shows isobilateral arrangement and is found in monocotyledons.



Microsporogenesis

- 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.



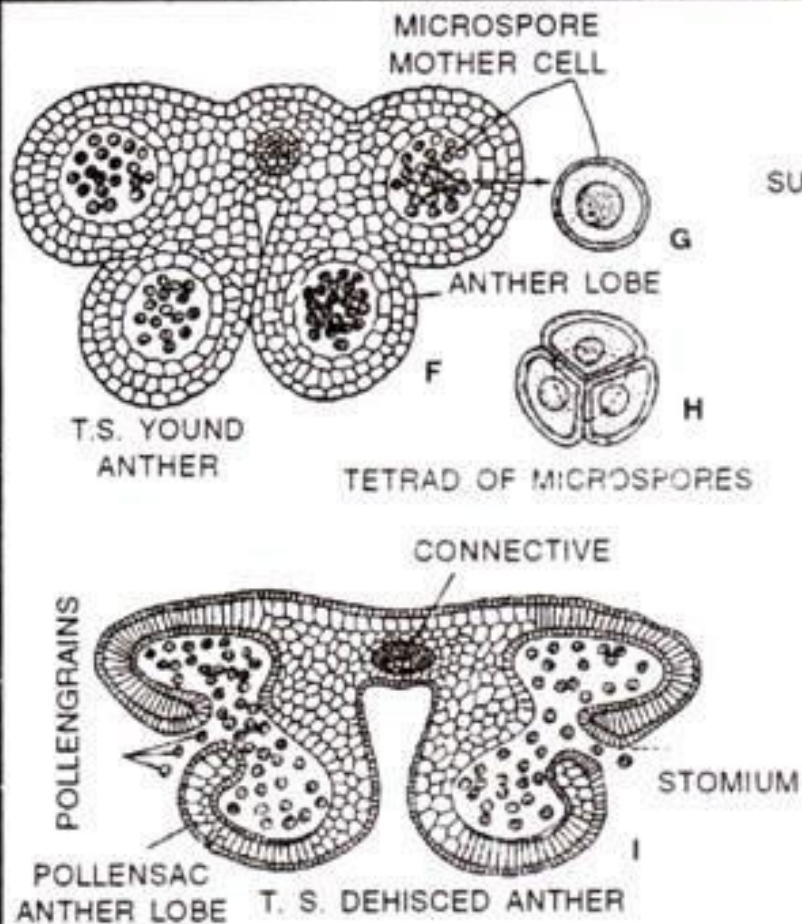


Figure 10.22. Development of pollen grains (microspores) and dehiscence of anther.

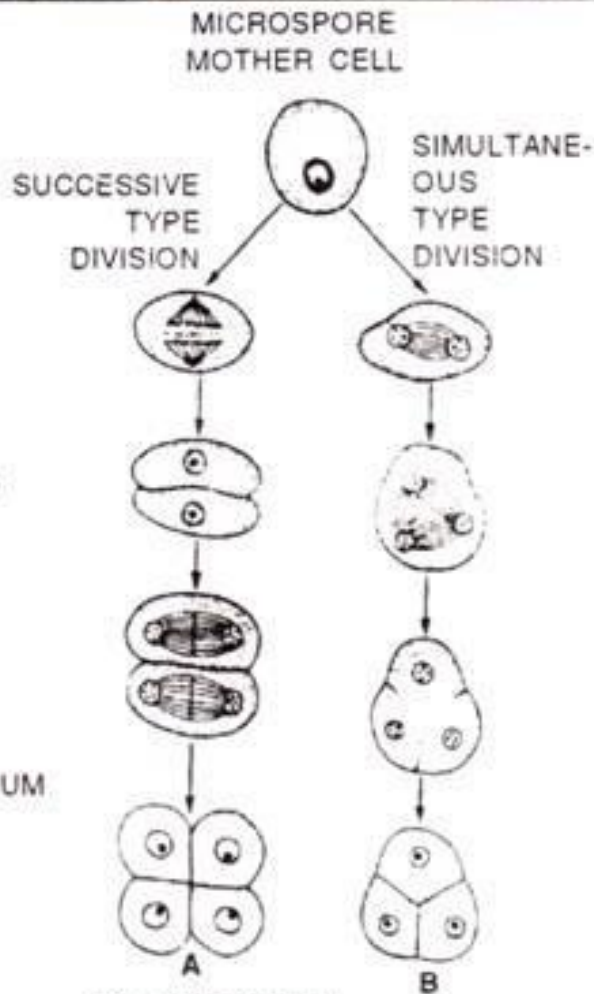


Figure 10.23(A). Microsporogenesis—**A.** Successive type in monocotyledonous plants, **B.** Simultaneous type in dicotyledonous plants.

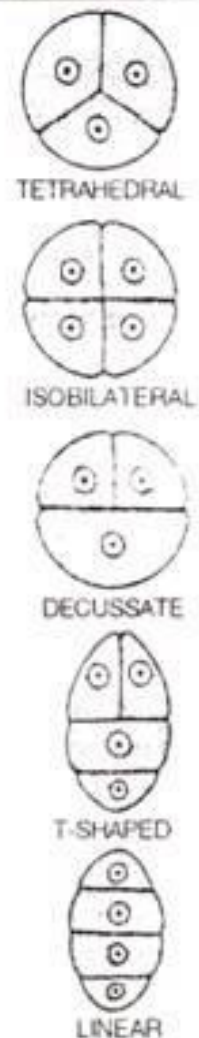


Figure 10.23(B). Different types of microspore tetrads.

Microspore

- Spherical in shape.
- Have two layered wall- outer hard exine layer and inner thin intine.
- Exine- made up of sporopollenin. Resistant to organic matter, withstand high temperature, acids, alkalis and enzymes. It has prominent apertures called germ pores, where sporopollenin is absent.
- Intine- It is thin, continuous layer, made of cellulose and pectin.
- In the cytoplasm are present water, protein, fats, carbohydrates, etc.

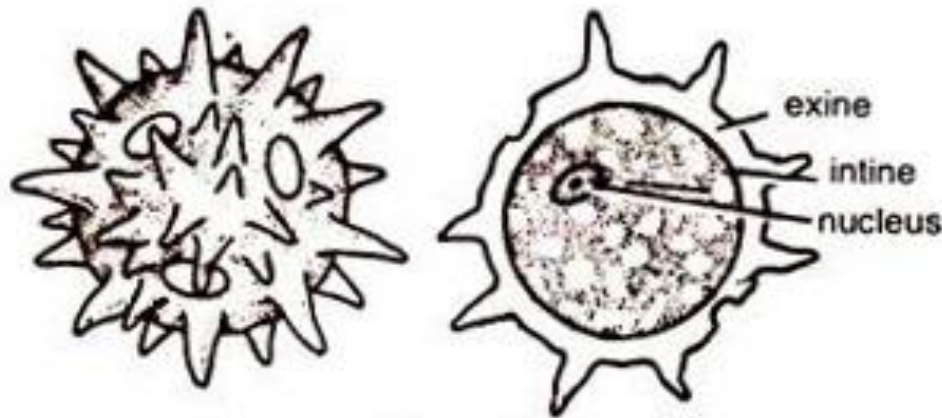


Fig. 59 . Pollen grains

Pollen Nucleus Number

