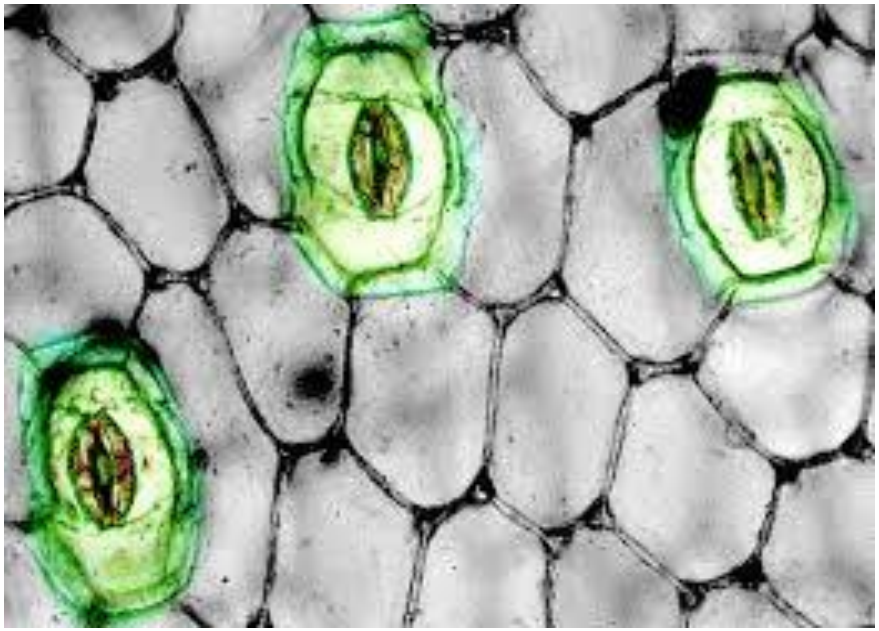
S.YBSc.Credit pattern Term II BO 241

Botany paper I.Plant Anatomy & Embryology

Chapter 2- Epidermal Tissue System



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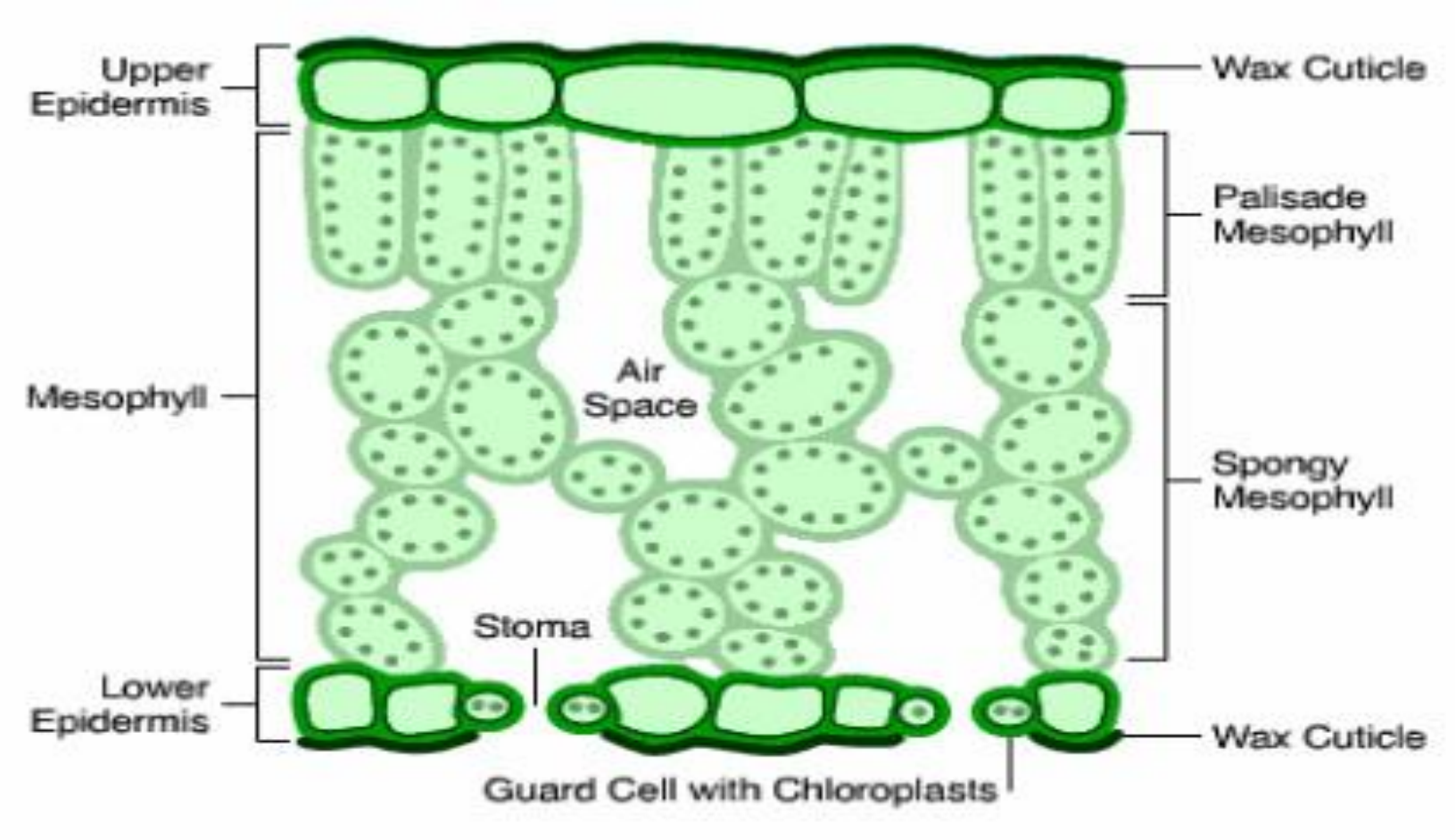
Epidermal Tissue System

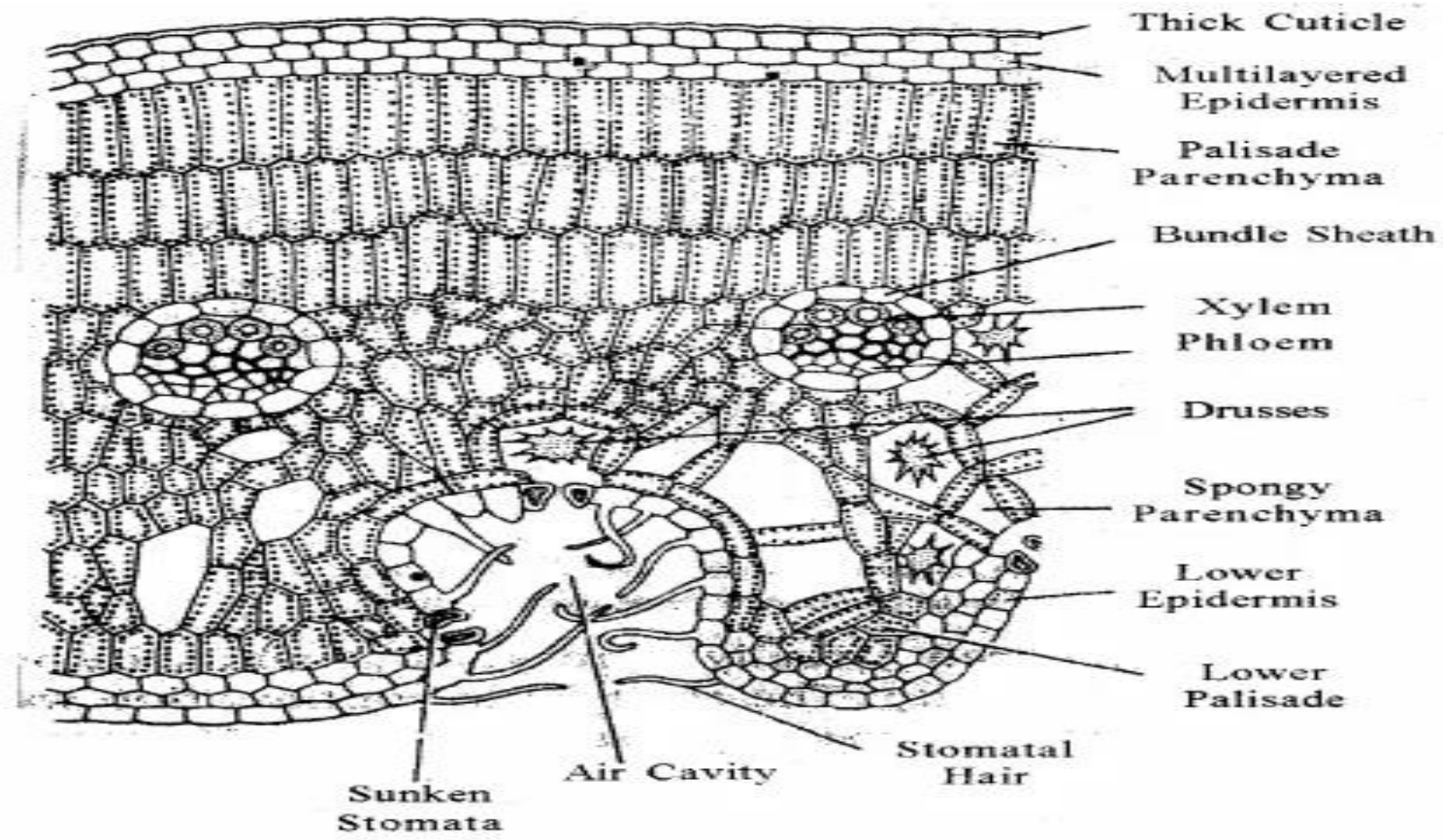
- **Epidermis**, in botany, outermost, protoderm-derived layer of cells covering the stem, root, leaf, flower, fruit, and seed parts of a **plant**.
- The **epidermis** and its waxy cuticle provide a protective barrier against mechanical injury, water loss, and infection.

Single layered Epidermis with waxy cuticle



Multilayered epidermis In xerophytic eg.cactus,aloe,nerium

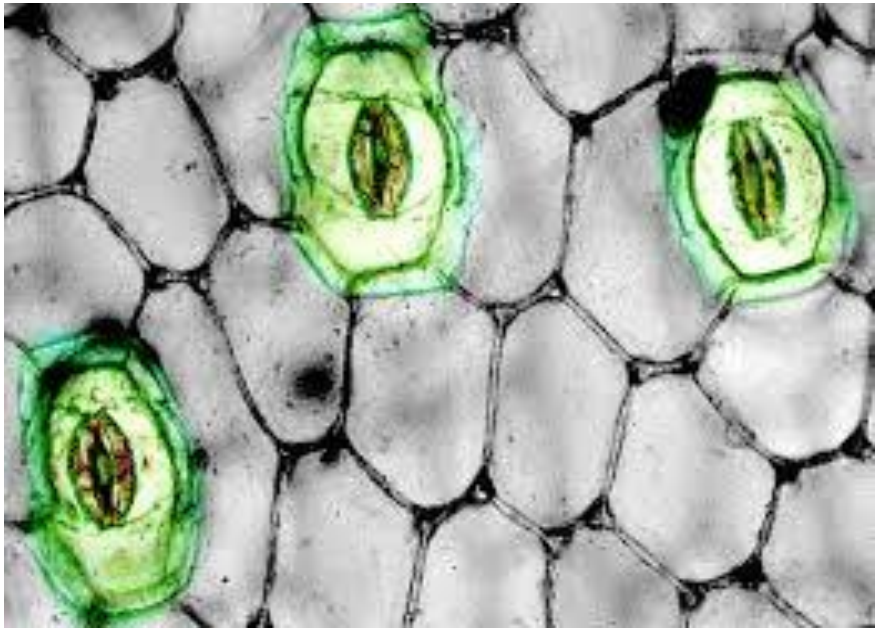
- To reduce rate of transpiration.Stomata are sunken type



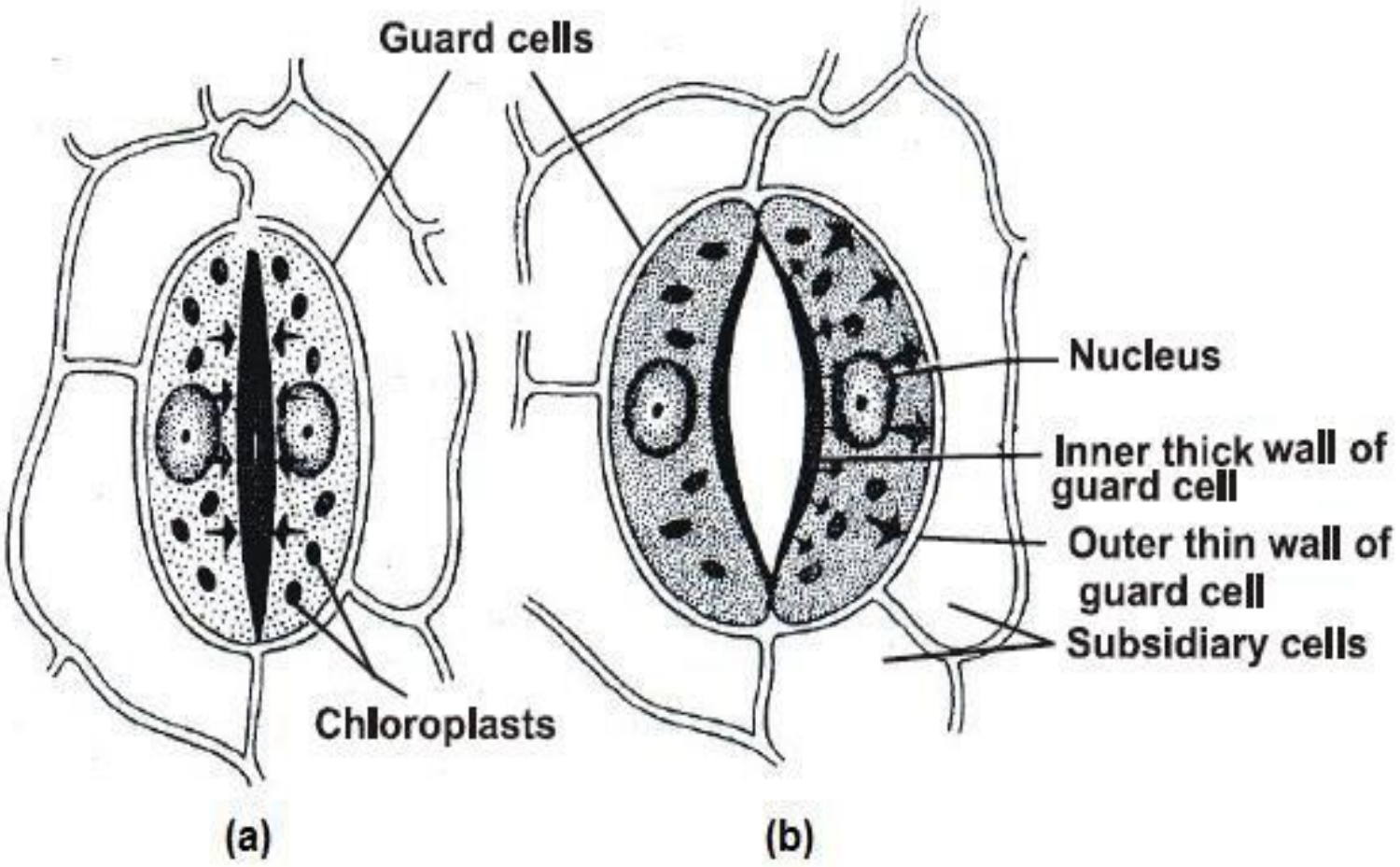
Dicot Stomata

- Through Stomata water loss takes place in the form of water vapour.Phenomenon is called Transpiration.Stomata are present in between epidermal cells.
- Or modified epiderml

cells



- Dicot stomata has two kidney shaped guard cell in centre.outer to to it 4-5 subsidary cells are present.Guard cell is active with nucleus,chloroplast & cell organels.
- Due to endosmosis guard cell become turgid & open in day period.
- Due to exosmosis process ,stomata become flaccid & close in night period.



Stomata: (a) Closed; (b) Open

Monocot stomata

- Present in monocot plants like grasses,wheat,jowar,bajra etc.
- It has Dumbelled shaped guard cell.
- Stomatas are arranged in rows.

Monocot stomata

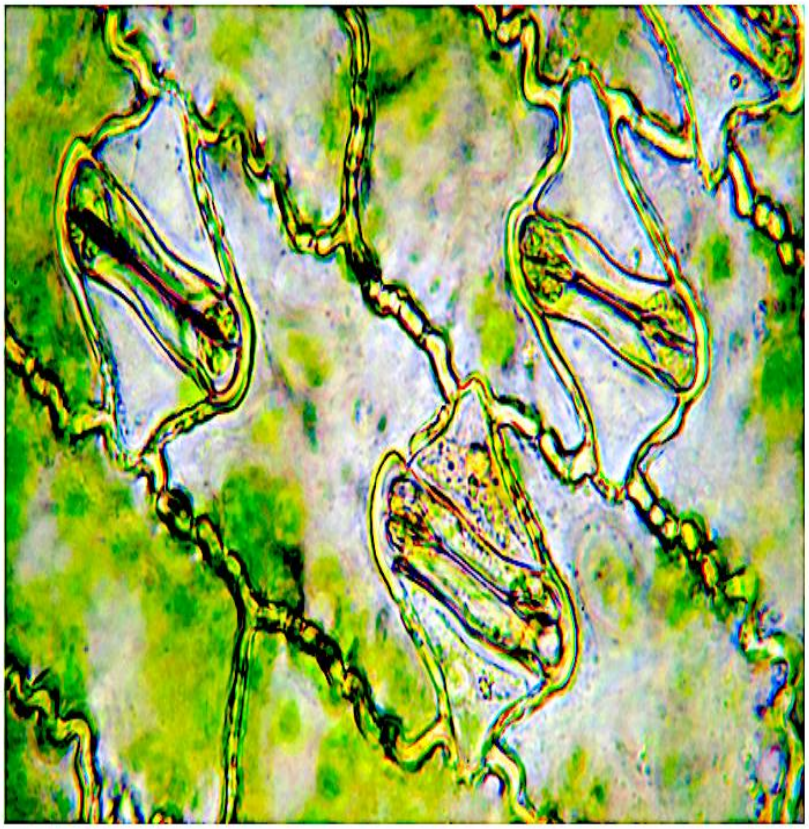
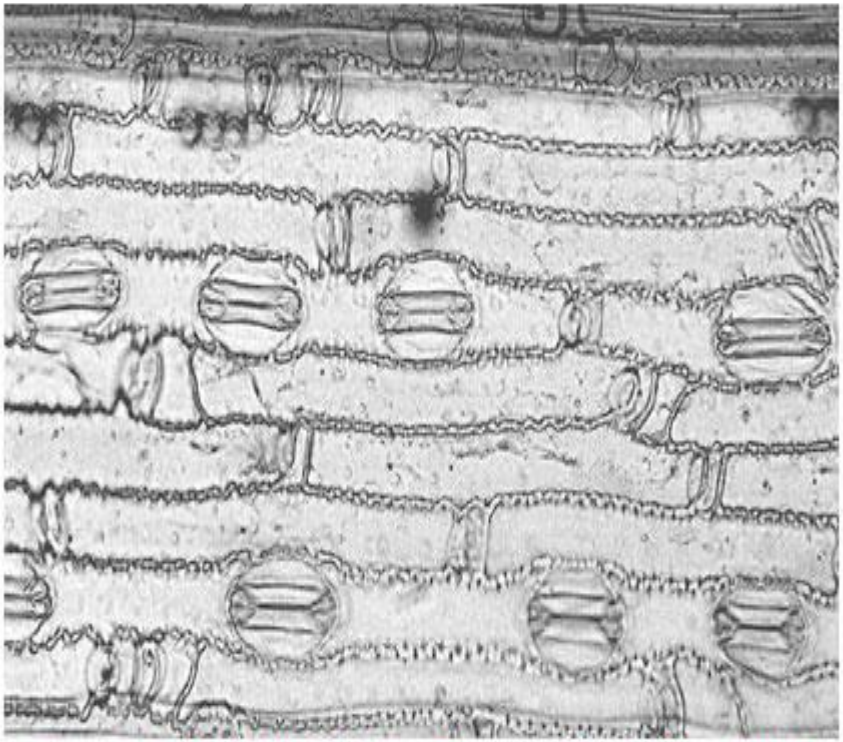
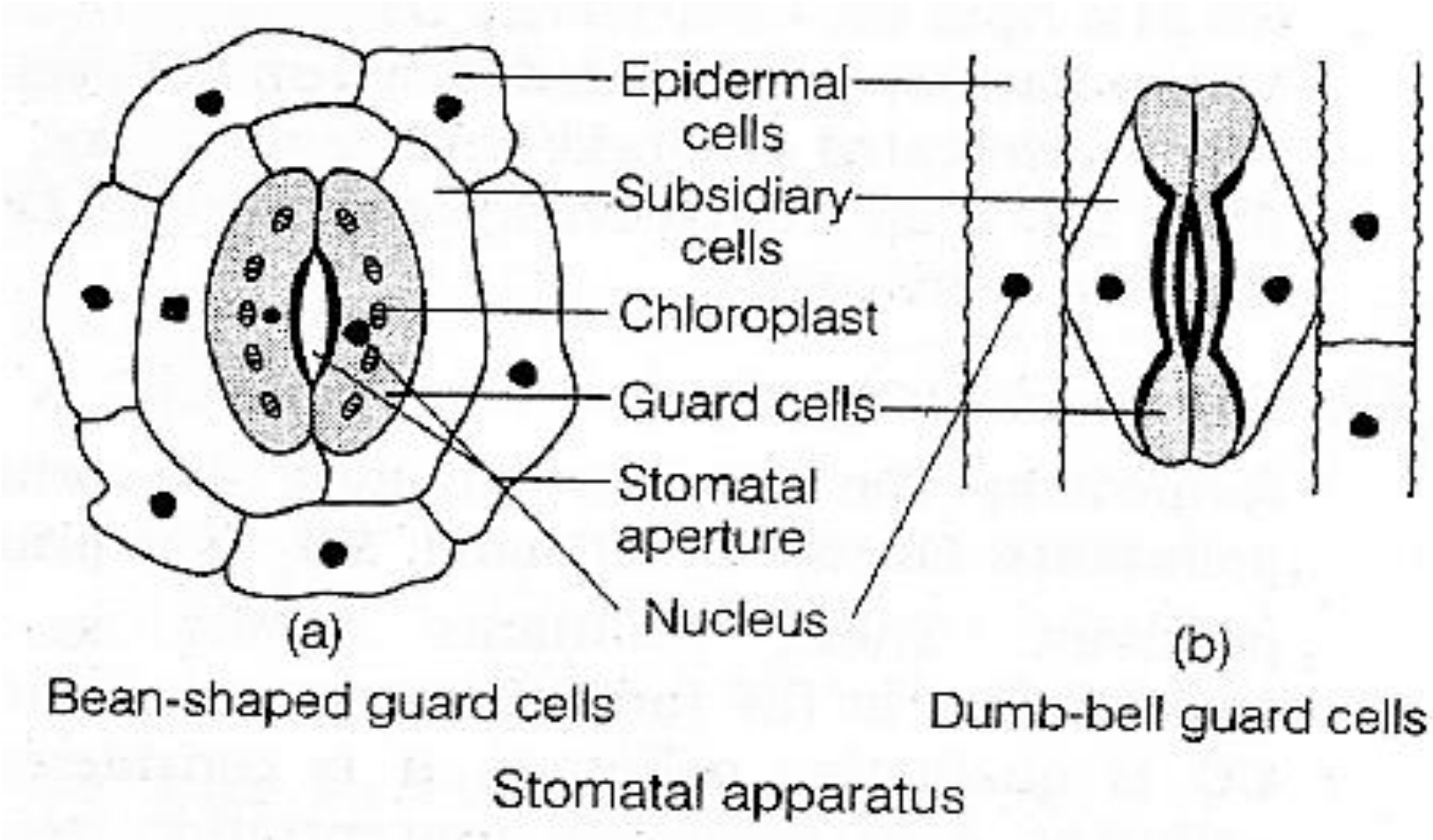


Figure 1: Maize Stomata



Stomatal Distribution in Monocot Leaf (Parallel)

Dicot & monocot stomata



Types of stomata

- There are 4 basic types of stomata among the dicotyledons, these types are distinguished on the basis of the subsidiary cells surrounding the stomata & their arrangements,
- The four types are as the following

A) Anomocytic type, Ranunculaceae
B) Anisocytic type, Curciferae
C) Paracytic type, Rubiceae
D) Diacytic type, Caryophyllaceae

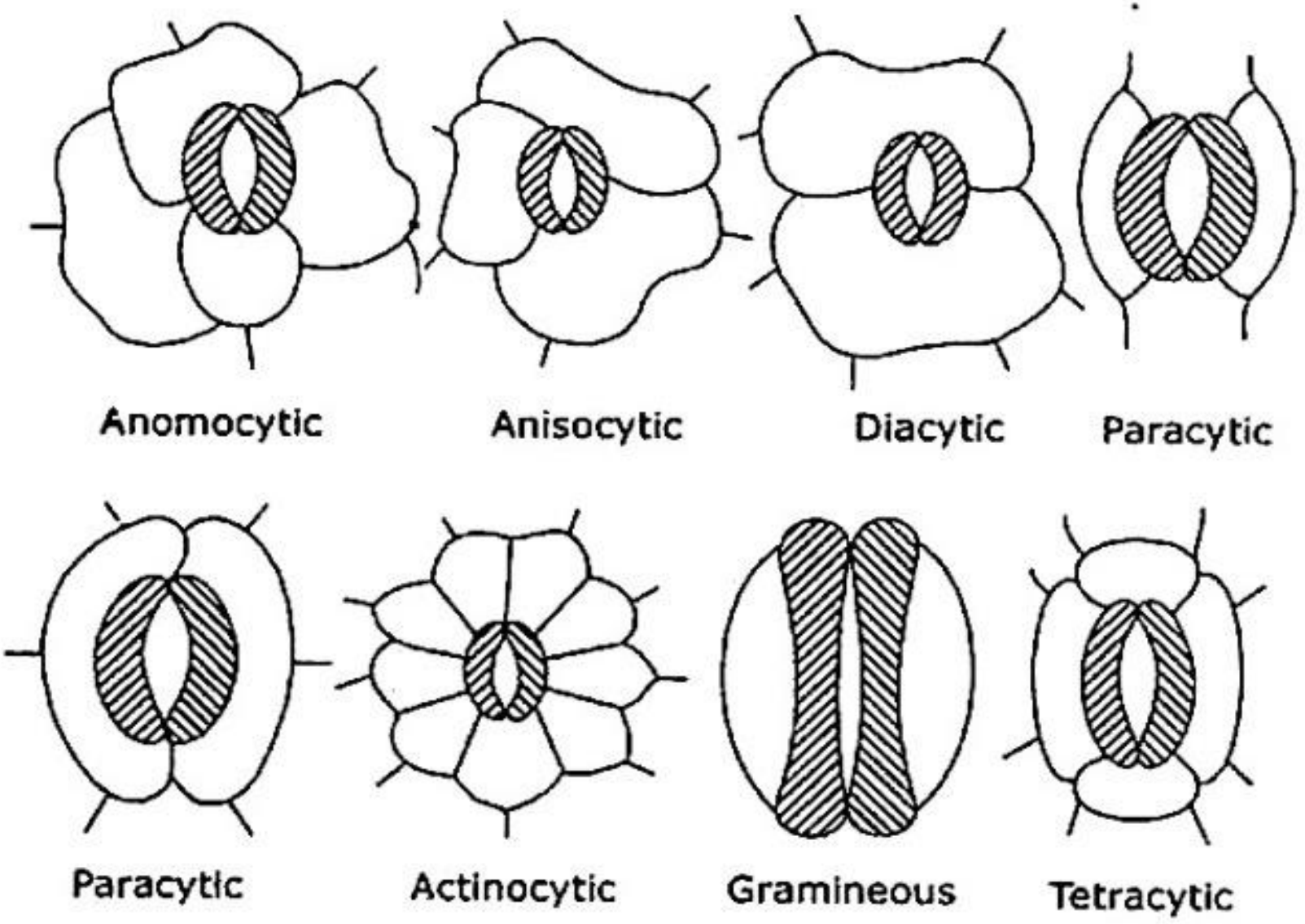

Anomocytic
Anisocytic
Diacytic
Paracytic
Paracytic
Actinocytic
Gramineous
Tetracytic

Figure 12.9

Types of stomata

- Anomocytic /Irregular/Rananculus-guard cell surrounded by irregular subsidary cells.eg.rananculus,capparis
- Anisocytic/ unequal/cruciform- guard cell surrounded by 3 subsidary cells.out of three one cell is smaller or larger eg.brassica , potato,tomato
- Paracytic / parellel /rubiaceous – two subsidary cells , which are parellel to guard cell.ixora , hamelia

- Diacytic / cross walled/caryophyllous- subsidary cells arearranged at right angle to guard cell. Eg.dianthus
- Graminaceous – dumbel shaped stomata. Examlpe of all monocot plant belongs to family Graminae , Cyperaceae.
- Coniferous – it is sunken stomata. Eg. Gymnosperm plant pinus.

Types of Stomata

- According to the basis of development of guard cells and subsidiary cells are classified in 3 different types
- 1) Mesogenous stomata: both guard cells & subsidiary ces are derived from a single meristem cell. Eg. Rubiaceae, Cruciferae
- 2) Perigenous stomata: the guard cells & subsidiary cells have independent origin Eg. Cucurbitaceae
- 3) Mesoperigenous stomata: the subsidairy cells are of dual origin i.e some are derived from stomatal mother cell and some from neighboring cells Eg. Caryophllaceae

Trichomes

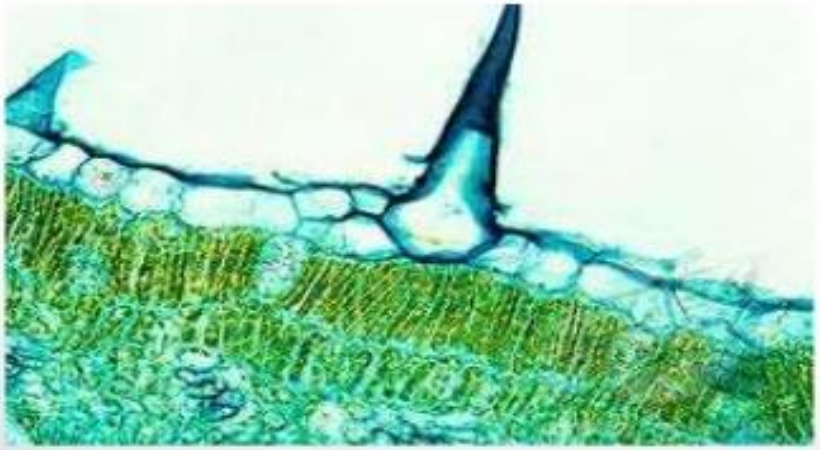
- Trichomes can be superficially regarded as “Plant’s hair” and fall into two categories which are Glandular trichome and Non-glandular trichome.

- Glandular trichomes affect the plant in a number of ways. It contains or secretes a mixture of chemicals that can be used as pesticide, pharmaceutical and flavour/fragrance industries. Besides glandular trichomes on some crop species confer resistance against insect pests.

- One of the exudates from glandular trichomes is lipid.

Trichomes

Trichomes – outgrowths of epidermal cells



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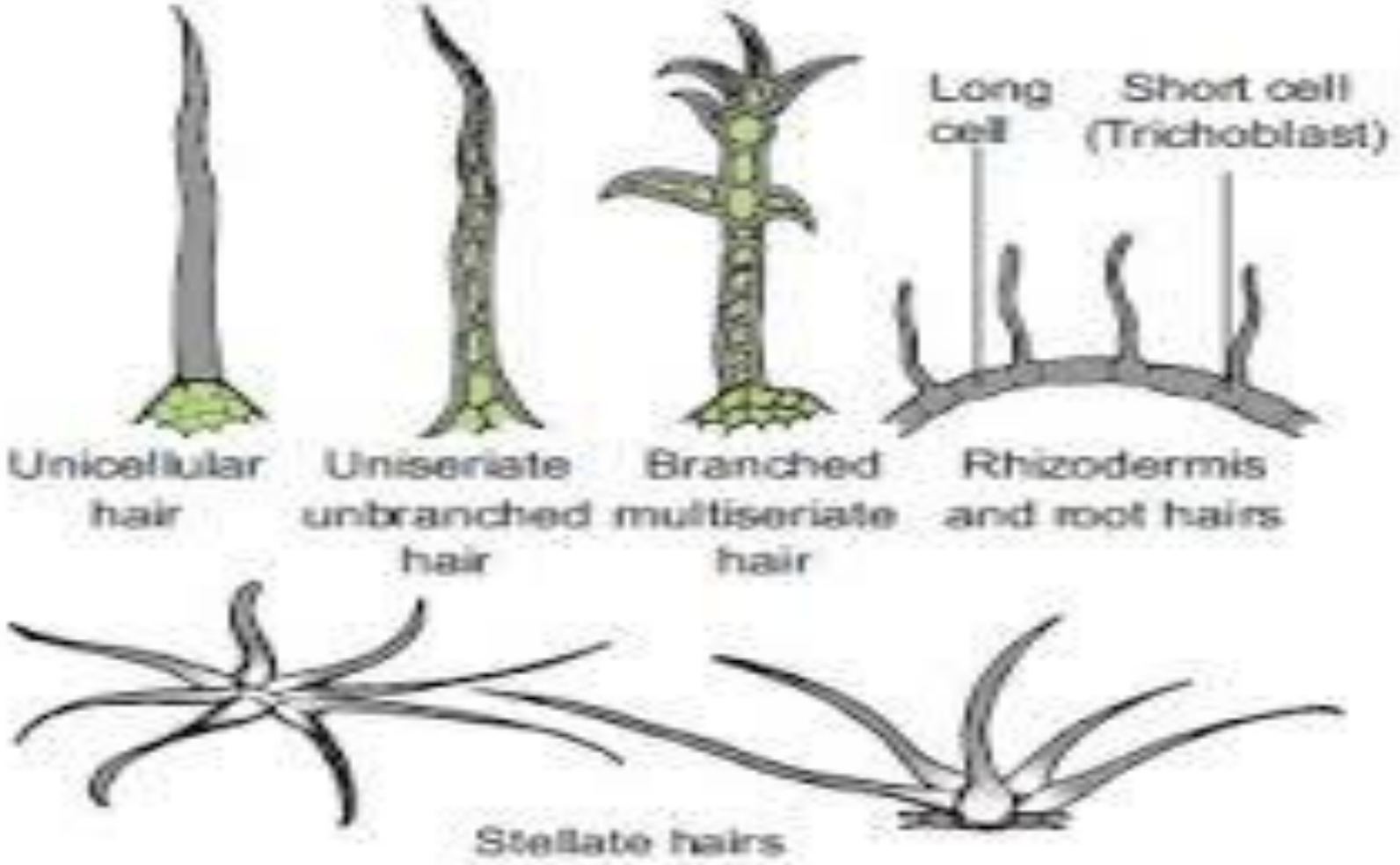

Figure 9.16: Types of Trichomes

Dermal Tissues: Epidermis

- Glands secrete substances that protect the plant
- secrete nectar
- digestive glands
- Sundews
- trigger hairs of a Venus Flytrap

Other specialized epidermal cells

Trichomes and glands

- Globular trichomes release compounds that are toxic to insects
- Secretory hairs allow plants to secrete compounds