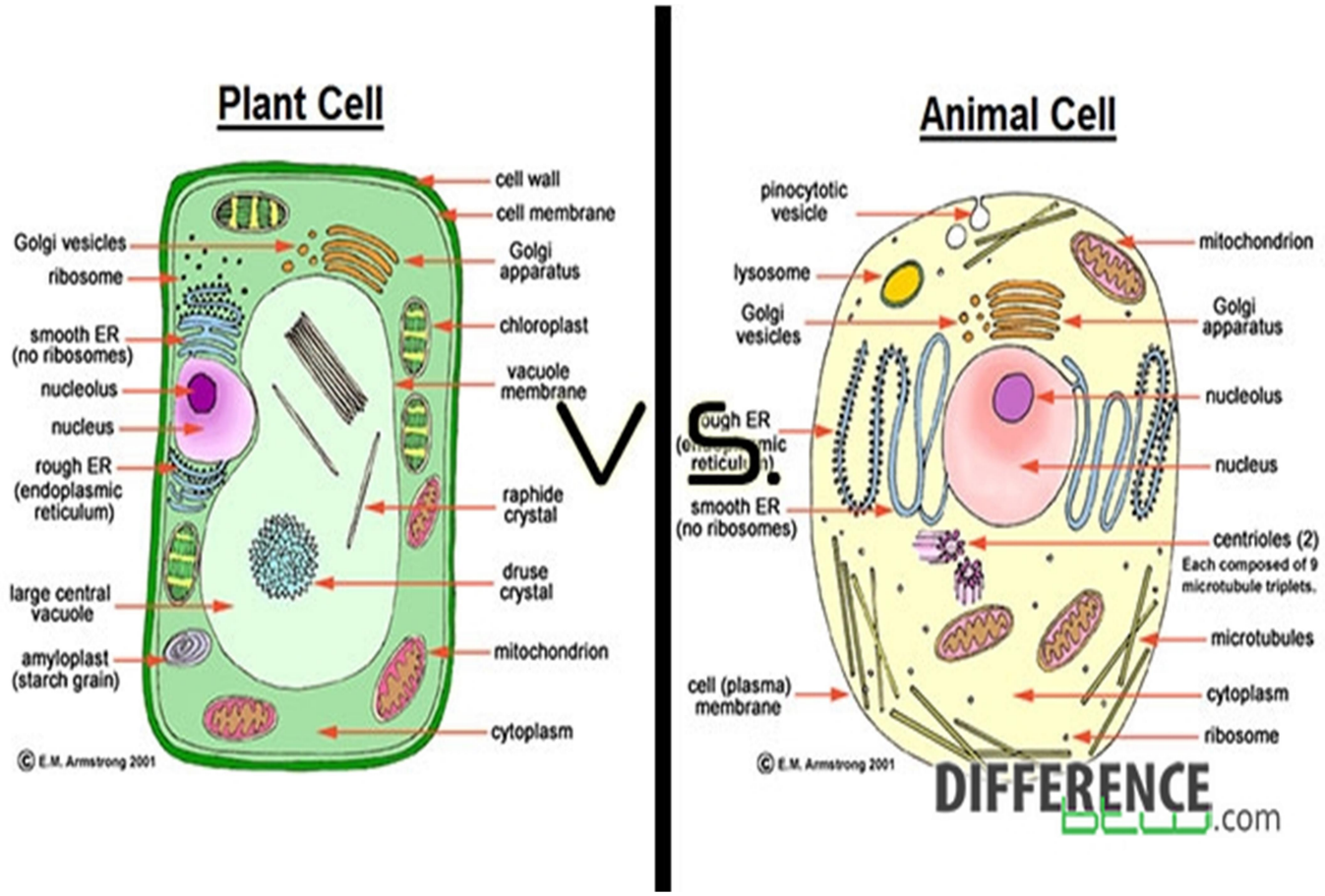
Subject : Botany stage : one class : C

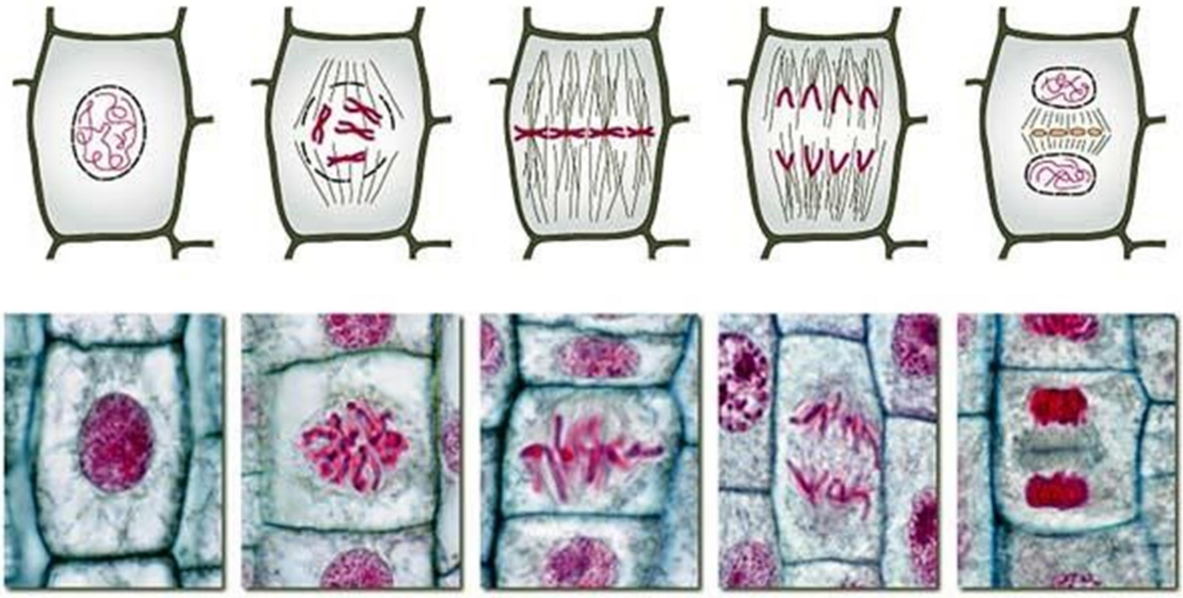
college of science / biology department

Lec. 3

**comparison between plant and animal cell:

Animal cell	Plant cell
1/ no cell wall, and no cellulose	**1/** cell wall and cellulose is present
2/ cytoplasm is denser and more granular and take most of the space in cell	**2/** cytoplasm is pushed to the side against cell wall and form a thin layer
3/ vacuoles absent, and if present they are small, and temporary and work in excretion or secretion	**3/** vacuoles are large and permanent, and may be one or more in the cell
4/ plastids are absent	**4/** plastids are generally present
5/ centrosome is present with one or two centrioles	**5/** centrosome is absent. Instead there are two polar caps work in cell division
6/ golgi bodies present near the nucleus	**6/** golgi apparatus is present and called dictyosome
7/ Store food in the form of **glycogen**	**7/** store food in form of **starch**





(Plant cell division)

Tissues

****Tissues:** are a group of cells that perform similar function.

** Any plant organ may be composed of several different tissues, and each tissue may classified according to its structure, origin, or function.

**types of tissues in plant cells:

1/ meristematic tissues

2/ tissues produced by meristems: A// simple T. B// complex T.

**meristematic tissues: plants have permanent region of growth called meristems, where cells actively divide, and new cells are produced, they are small, six-sided, boxlike structure, large nucleus near the center, tiny or no vacuoles.

***Types of meristems:**

1/ apical meristem

2/ lateral meristem

3/ vascular cambium

4/ cork cambium

5/ intercalary meristem

*apical meristem: are meristems found at, or near the tips of roots and shoots, they increase in length as the apical meristems produce new cells, this type of growth is called as **primary growth.**

**what are the regions that develop from apical meristem in shoots?

Answer= 1-three primary meristems 2- embryo leaves 3- buds

**the three primary meristems are:

1/ protoderm 2/ ground meristem 3/ procambium

** The tissues produced from the primary meristems are called **primary tissues.**

*****lateral meristem: it produces tissues that increase the girth of roots and stems, such growth is called **secondary growth.** Example for lateral meristem is **vascular cambium** and **cork cambium**.

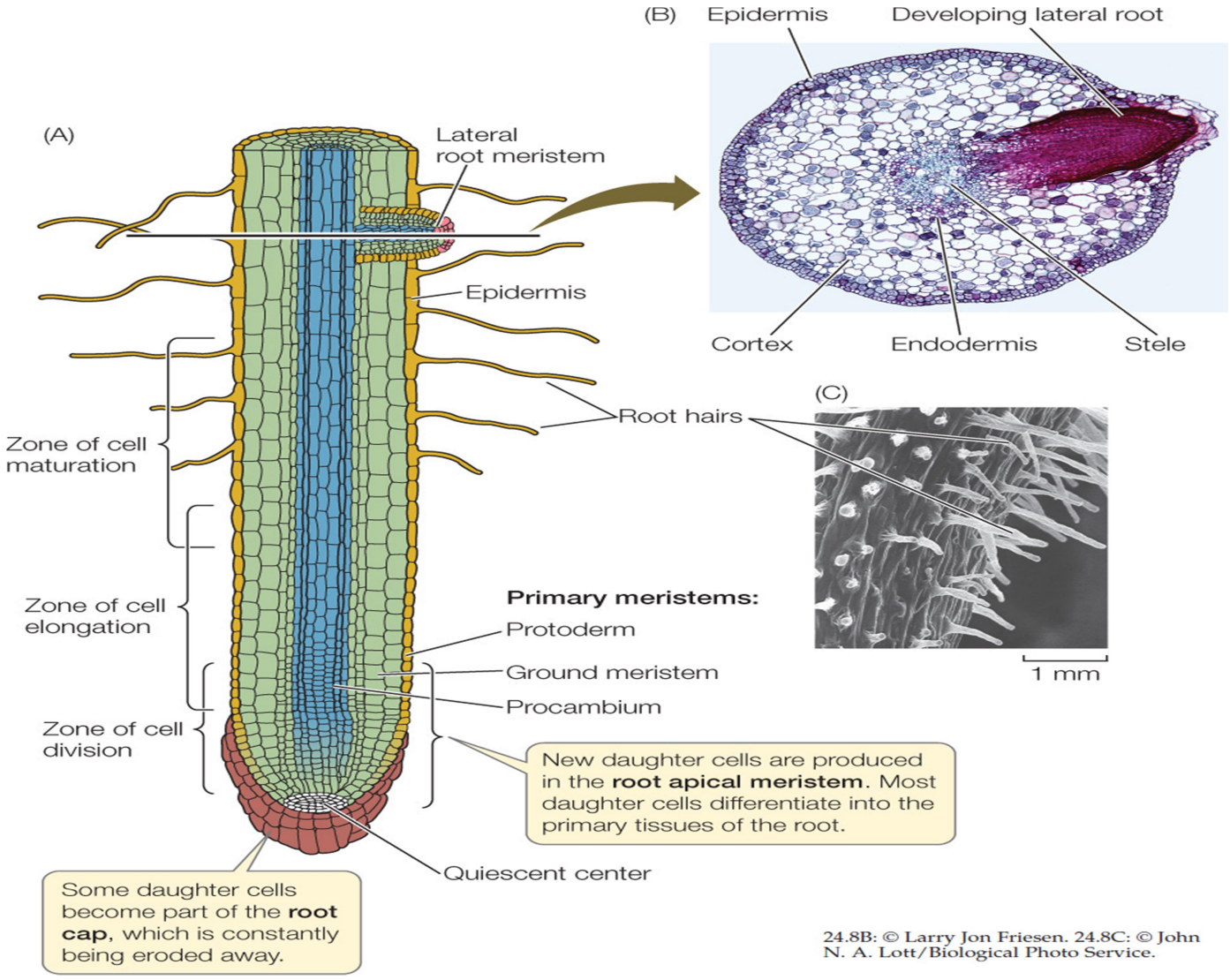
*vascular cambium: often called cambium, produces secondary tissues that function in support and conduction, it extend through the length of roots and stems in perennial and many annual plants as thin cylinder of brick-shaped cells. It responsible of increase in girth of plant.

the individual remaining cells of the cambium are referred to as **initials, while their sister cells are called **derivatives**.

*cork cambium: is in form of a thin cylinder that runs the length of roots and stems of woody plants, it lies outside the vascular cambium, and inside the outer bark, which it produces.

****the tissues that formed by vascular and cork cambium are called **secondary tissues**, since they are produced after the primary tissues have matured.

*intercalary meristems: is a meristematic tissue formed near node areas on stems of grass and related plants, it develop at intervals along stems and give length to stems.



(Longitudinal axis diagram of a plant, showing location of meristems)

**Tissues produced by meristems:

A/ Simple tissues: **1/ Parenchyma** **2/ Collenchyma** **3/ Sclerenchyma** **4/ Fibers**

****parenchyma:** it's the most abundant tissue and are found in almost all major parts of higher plants.

**parenchyma tissue cells are spherical in shape when first produced, then after maturation they have various shapes and sizes.

**characteristics of parenchyma cells:

1/ have various shapes and sizes

2/ have thin primary walls

3/have large vacuoles

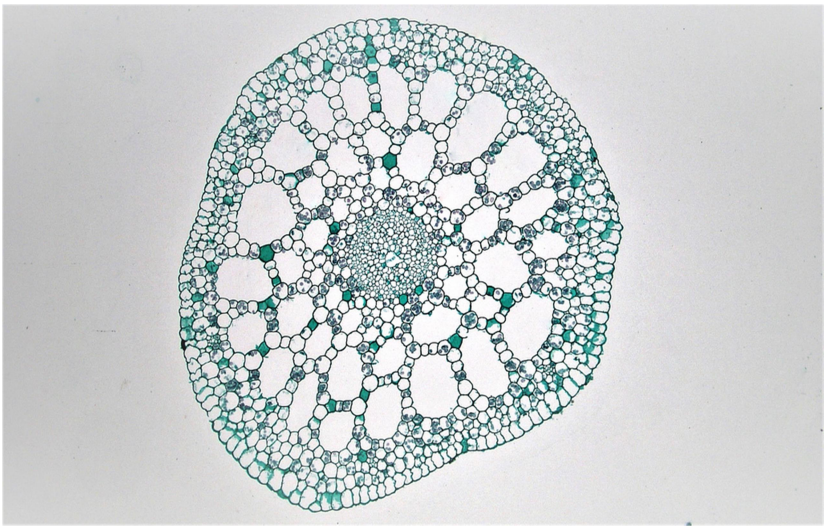
4/ have intercellular spaces

5/remain life for long time

6/ keep their meristematic ability to divide (this is important in repair of tissues).

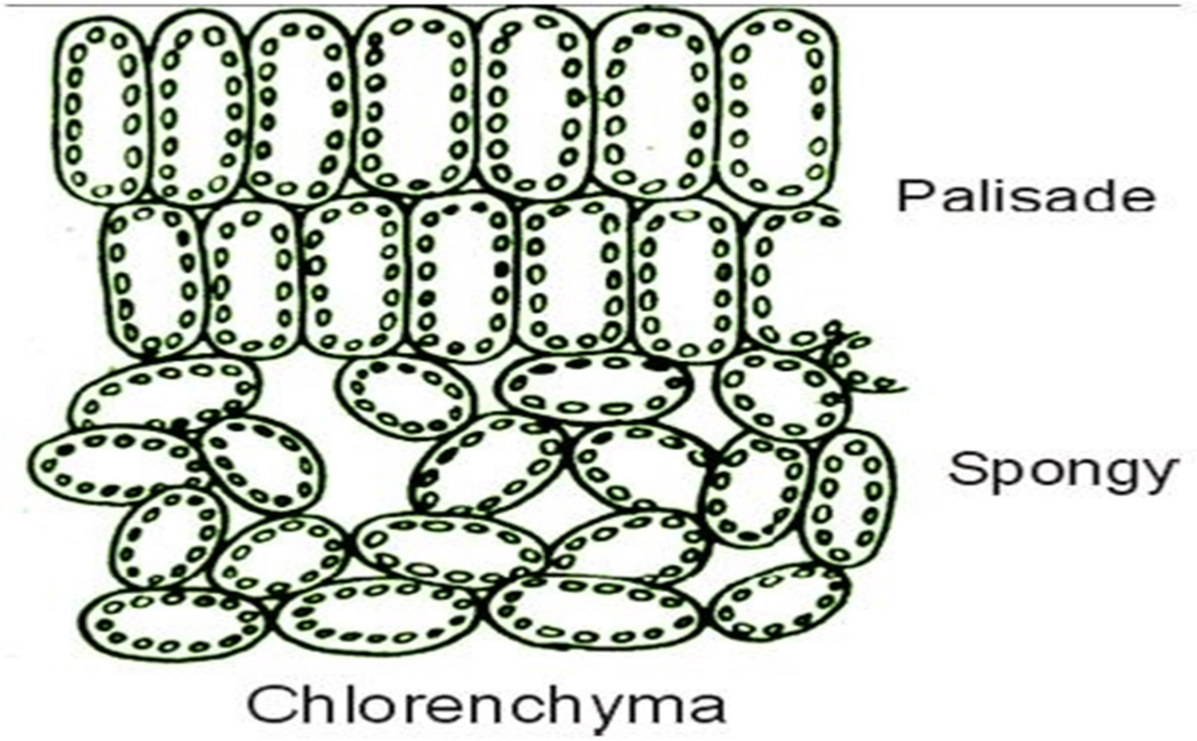
***types of parenchyma tissues: 1/ aerenchyma 2/ chlorenchyma 3/ transfer parenchyma

****aerenchyma:** it's a type of parenchyma tissue with extensive connected air spaces, which found in aquatic plants (e.g. water liliy).



(aerenchyma tissue)

****chlorenchyma:** it's a parenchyma cells containing numerous chloroplasts (as in leaves) and it function mainly in photosynthesis.



__transfer parenchyma:__** it's a parenchyma cells that develop irregular extension of the inner wall to increase the surface area of the plasma membrane (e.g. nectars of flowers play role in transferring dissolved substances between adjacent cells.

***Collenchyma:

Characteristics of collenchyma tissue:

1-live for long time.

2-un even thickness in primary cell wall.

3-its found under the epidermis.

4-their walls pliable and strong.

5-they provide support for growing and mature organs (e.g. leaves and floral parts).

**Justify the unevenness in collenchyma tissue walls?

Answer= due to extra primary wall in the corners of cells.

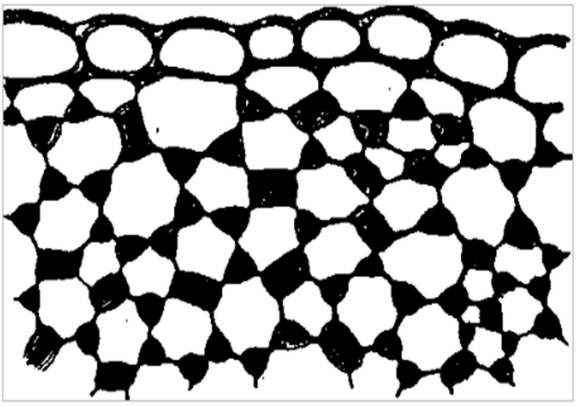


*Fig: **Typical** collenchyma*

***Sclerenchyma:

*characteristics of sclerenchyma tissue:

1-dead cells at maturity.

2-thick secondary cell walls with lignin.

3-function in support.

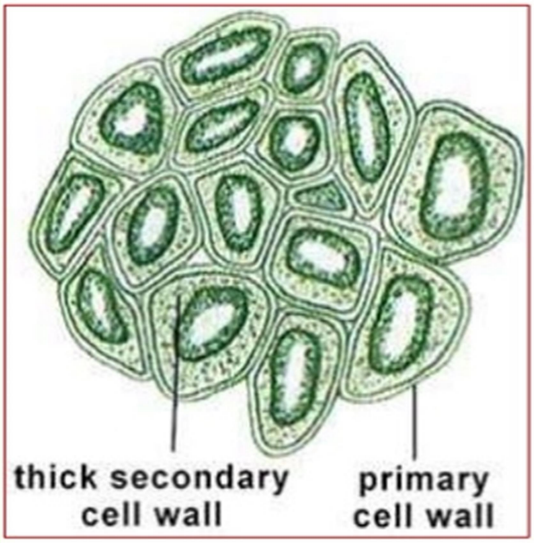
**types of sclerenchyma: 1/ Sclereids 2/ Fibers

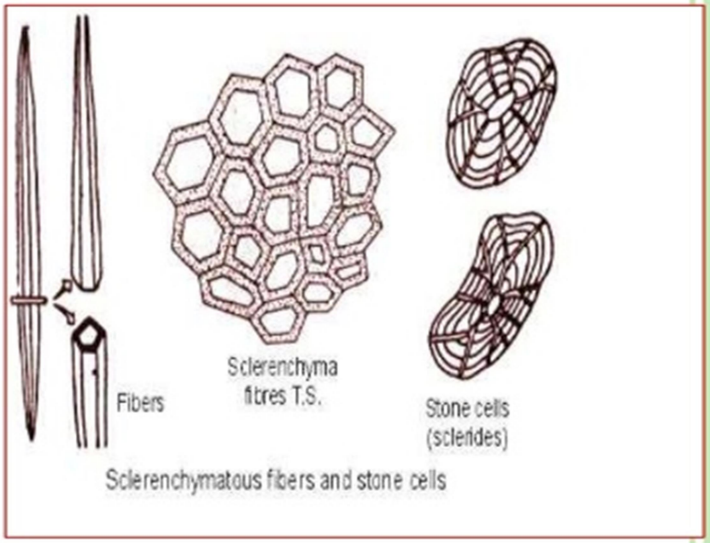
**distribution of sclerenchyma tissue:

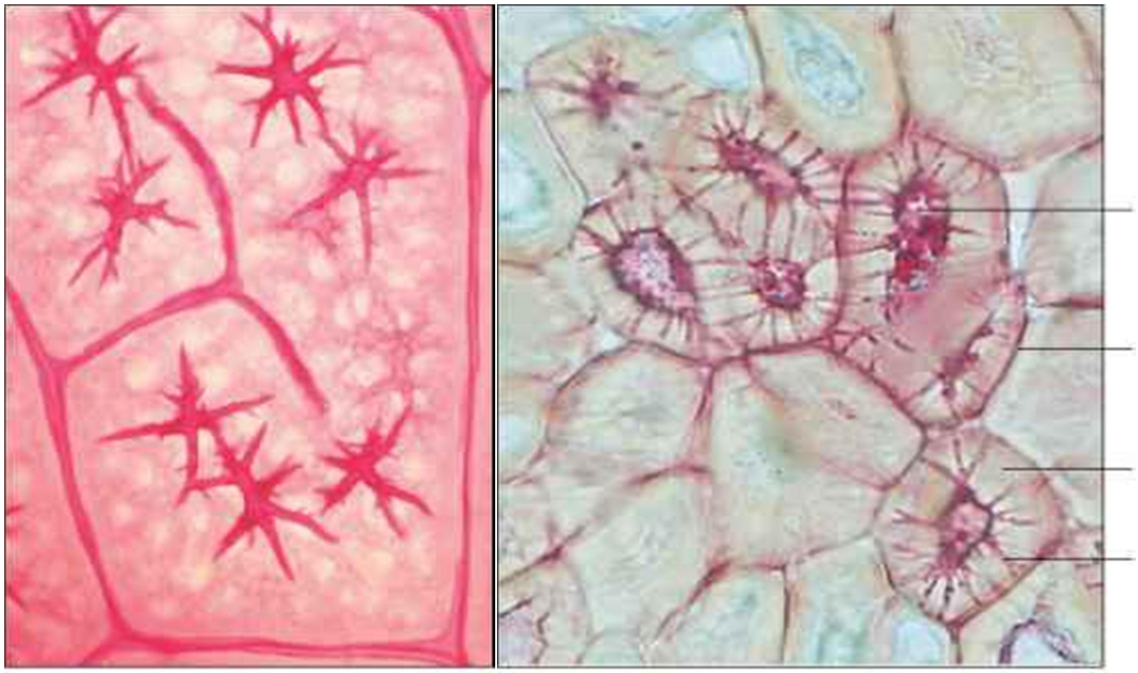
1-randomly distributed in other tissues (e.g. stone cell in pears)

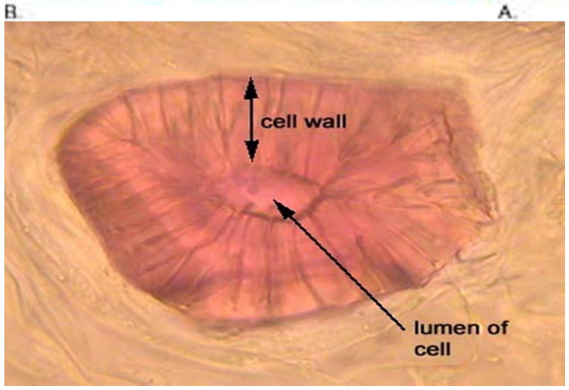
2-sometimes occur in specific zone (e.g. margins of camellia leaves.

SCLERENCHYMA









(Stone cell in pears)

Justify the gritty texture of pears?

Answer= due to the presence of groups of sclereids (stone cells)

*****Fibers:** it's a type of sclerenchyma tissue , it may be found in association with a number of different tissues in roots, stems, leaves and fruits. They are usually much longer than they are wide and have a proportionately tiny cavity, or lumen in the center of the cell.