INTRODUCTION

Definitions.

- ***Pharmacognosy:***

  It derives from two Greek words, "pharmakon" or drug, and "gnosis" or knowledge.

  Recently it has undergone significant change defined as: "*a science that study the physical, chemical, biochemical and biological properties of drugs, drug substances, or potential drugs or drug substances of natural origin as well as the search for new drugs from natural sources*".

  It is one of five major areas of pharmaceutical education. Research problems in pharmacognosy include studies in the areas of phytochemistry, microbial chemistry, biosynthesis, biotransformation, chemotaxonomy, and other biological and chemical sciences.

- ***Phytochemistry:***

  "*It is the branch of chemistry concerned with plants and plant products*".

  Phytochemistry is the *study of phytochemicals, which are chemicals derived from plants, to describe the structures of the large number of secondary metabolic compounds found in plants, the functions of these compounds in human and plant biology, and the biosynthesis of these compounds.*

  The compounds found in plants are of many kinds, but most are in four major biochemical classes, the alkaloids, glycosides, polyphenols, and terpenes.

  Phytochemistry can be considered sub-fields of botany or chemistry. Activities can be led in botanical gardens or in the wild with the aid of ethnobotany. The applications of the discipline can be for pharmacognosy,or the discovery of new drugs, or as an aid for plant physiology studies.

A. Tissues and Tissue Systems:

When cells are grouped together for an identical function, a tissue is formed. In the plantbody, the following three tissue systems can he distinguished:

1-Ground Tissue System: (Basic Cell Types)

It consists of simple cells, which may be thickened. It represents ground tissue made up of parenchyma collenchyma and sclerenchyma; it includes cortex, hypodermis pith, mesophyll, and portion of midrib of leaves.

A. Parenchyma:

Parenchyma is the simplest and most common type of cell.

B. Collenchyma:

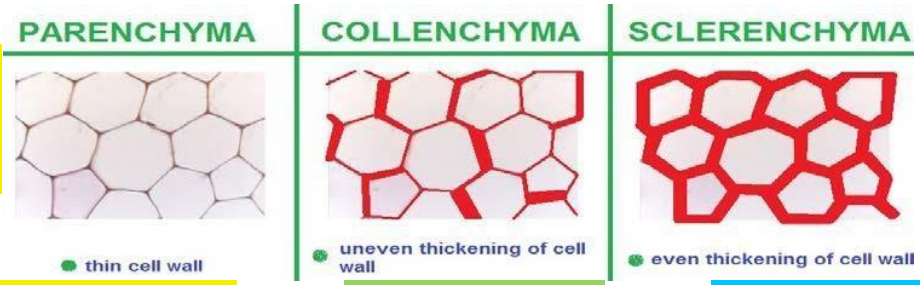
Collenchyma is the typical supporting tissue of young herbaceous stems and leaf midribs. It is similar to parenchyma except that the primary cell wall is thickened to give greater mechanical strength.

C. Sclerenchyma:

Sclerenchyma is a hard supporting tissue with heavy secondary thickening. I'm Sclerenchymatouscells are usually divided into two categories according to their aspect ratio. Sclereids (stone cells)are typically roughly isodiametric, although elongated and branched form also occurs. They may be found singly, in groups, or as a complete layer.

Fibers are typified by high length-to-width ratio. They are usually thick walled and have a narrow lumen and pointed ends. Fibers are usually classified according to the area in which they occur aspericyclic, xylem and phloem fibers. A crystal sheath is sometimes formed around sclerenchyma, and this feature together with the size, frequency, and distribution of the cells, is often of diagnosticsignificance.

The simplest most common type of cell



No intracellular space

Typical supporting tissue in plant.

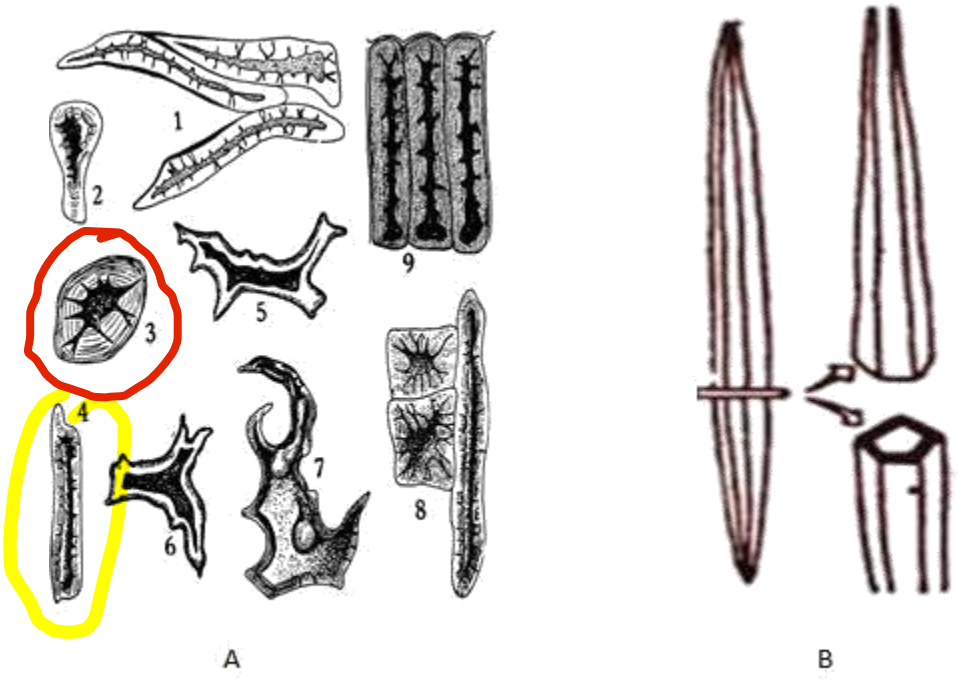
Have intracellular space between cells

Hard supporting tissue with heavy secondary thickining

Fibers cell
(Narrow lumen)
Positive end وعندها

Stone cell
Key element

Crysal sheet
Calcium crysta عبارة عن
متجمعين حولين بعض

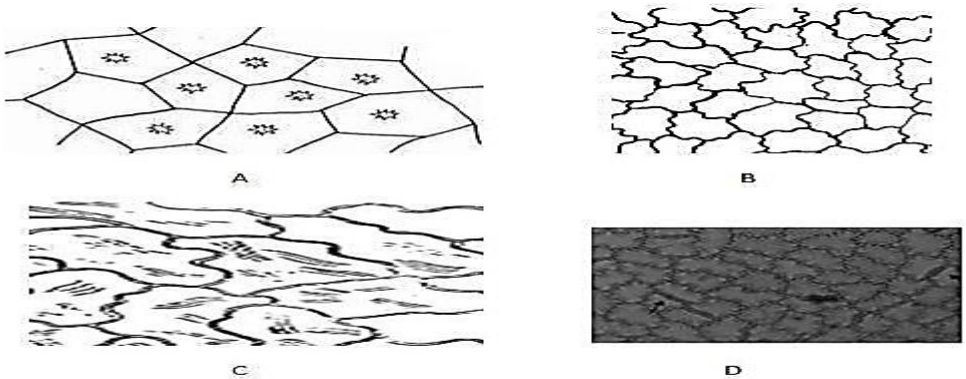


Sclerenchymatous cells: A. Stone cells (Sclereids); B. Fibers.

2- Dermal Tissue System:

A. Epidermis: الطبقة السطحية الخارجية للنبات

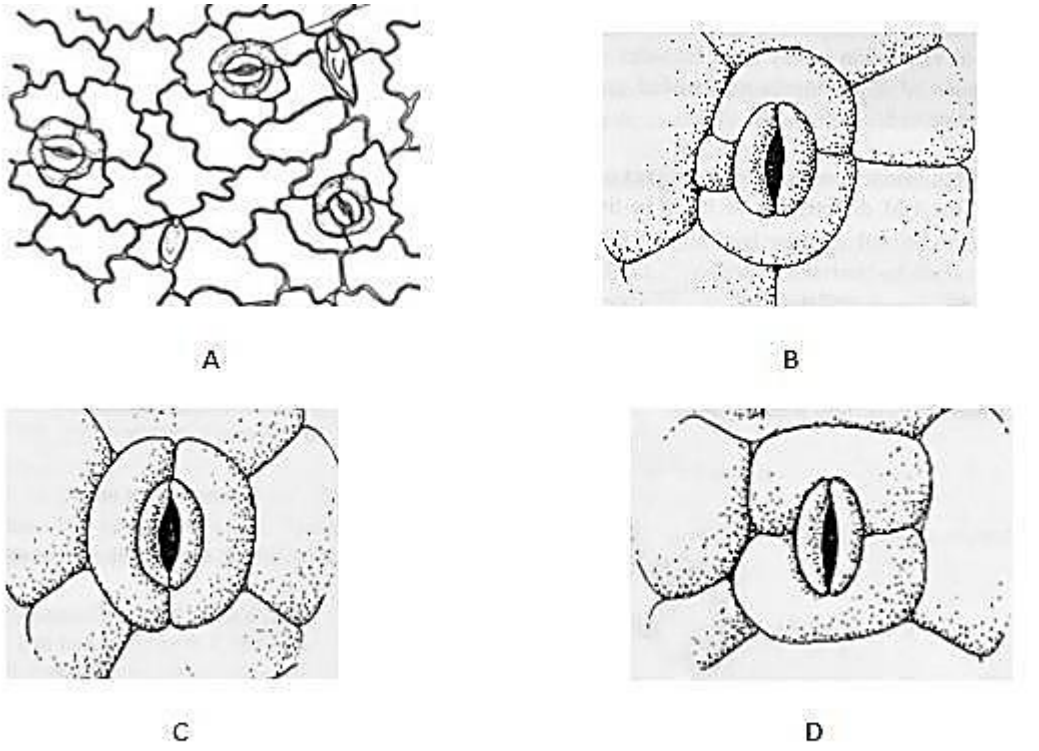
This is the outer most layer of the plant structure and it is usually one cell thick. In many cases the epidermal cells on the two surfaces of a leaf differ in form. Important diagnostic featuresinclude the shape of the anticlinal (vertical) and periclinal (horizontal) walls (e.g. straight or wavy),the presence of thickening (such as beading), and occurrence of striations on the surface cuticle.



Epidermal cells: A. Straight- walled polygonal; B. Wavy-walled; C. Beaded; D. Slightly wavy with striated cuticle.

Stomata : Gardian cell
تنظم دخول الماء وتحافظ عليه

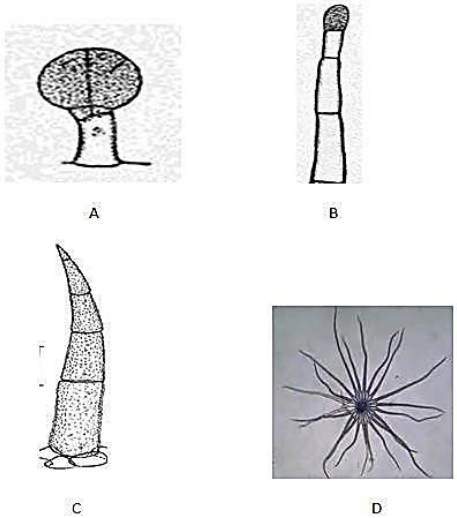
Several highly specialized and distinctive structures are dispersed among the relatively epidermalcells. The most universal of these are stomata, which control water loss from the plant. They occurmost frequently on young leaves and stems but can also be found on other organs such as flowers.A stoma consists of a pore surrounded by two guard cells.



Types of arrangement of epidermal cells around stomata: A. Anomocytic; B. Anisocytic; C. Paracytic; D. Diacytic

Secretory/lanzodar cell

Trichomes are highly variable outgrowths of epidermal cells which can occur in all parts of the plant. They include glandular (secretory) and non-glandular (protective) types and may be uni- ormulticellular.



Examples of epidermal trichomes: A. Glandular with bicellular head and unicellular stalk ; B.

B. Endodermis:

A specialized layer of cells which is found typically in roots and rhizomes and in certain stems.

It marks the inner edge of the cortex.

C. Periderm:

Periderm is a protective tissue which replaces the epidermis in stems and roots which have continual secondary growth. It is formed from the cork cambium (phellogen) which produces cork (phellem) on the outside and secondary cortex (phelloderm) on the inside.

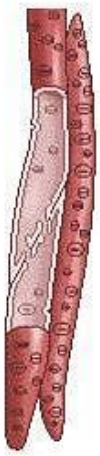
3- Vascular Tissue System:

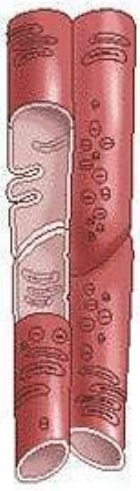
It is concerned with transmission of material in the plant and represents stellar structures likexylem and phloem; they are responsible for the conduction of water and food material in plant.

A. Xylem: مسؤول عن توصيل الماء داخل النبتة

The principal water-conducting tissue of a plant. Xylem is a compound tissue made up ofparenchyma, fibers, and tracheary elements (tracheids and vessel members).

وعائه ضيق





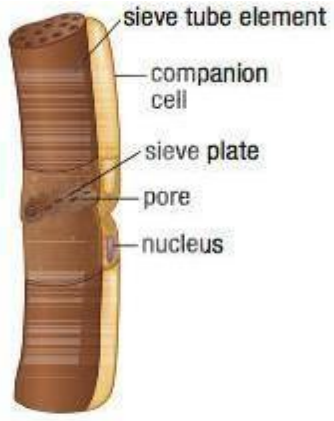
وعائه أوسع

A B

Tracheary elements: A. Tracheids showing only pitting and no perforation; B. Vessel member showing perforation.

B. Phloem:

Phloem is also a compound tissue, and it is responsible for the transport of food. It containsparenchyma, sclerenchyma, and sieve elements (sieve tubes and companion cells).



Sieve elements: Sieve tube and companion cell.

B.Preliminary Tests of Powdered Drugs:

1. Organoleptic Tests: لون ، رائحة ، طعم

❖ Note the color:

مش حفظ

- White: acacia.
- Light yellow: liquorice, squill.
- Light brown: cardamom.
- Brown: cinnamon.
- Dark brown: clove
- Green: senna.
- Orange: rhubarb

❖ Note the odor:

The following are particularly characterized:

- Ginger
- Clove

- Cinnamon
- Thyme
- Peppermint

❖ **Note the taste.**

- **Aromatic:** cardamom, cinnamon, clove.
- **Aromatic and pungent:** ginger.
- **Bitter:** quassia, gentian.
- **Sweet:** liquorice.
-

✓ **IMPORTANT NOTE:**

Students should not taste powdered drugs without the consent of the supervisor.Adulterated or spoiled drugs may be harmful, others such as capsicum are too pungent to taste, and alkaloid-containing drugs are poisonous.

2. Physical Tests:

Examples:

➢ **Water Solubility:**

Aleivera in water gives homogeneous solution But linseed give gummy mixture like gel

Mix a small quantity of powder with a few drops of water and allow to stand. Aqueous extracts and inspissated juices such as aloes dissolve almost completely, while the gummy or mucilaginous nature of drug such as acacia and linseed become apparent.

➢ **Volatility**:

ما بتطايروا Fixed oil
بتبخرو مع الحرارة Volatile oil
مثل ال thyme + pperment

Press a small quantity of powder between two filter papers. An oily stain, spreadingbut persisting when the paper is heated in an oven, occurs with powders containing fixed oils (e.g.: Linseed, black mustard seed). Volatile oils will give a stain, disappearing on heating in an oven. (e.g.: Clove flower, thyme leaf).

اختبار الرغوة

➢ **Frothing Test (detects the presence of saponins) :**

For Liquorice with vigorous shaking

Shake a little powder in a half a test-tube-full-of water, and if any marked frothingoccurs, suspect saponin-containing drugs (e.g.: liquorice root).

مكون من مكونات عرق السوس

3. Chemical Tests:

حفظ مطلوبين بالكويز
ومهم نعرف لون الراسب

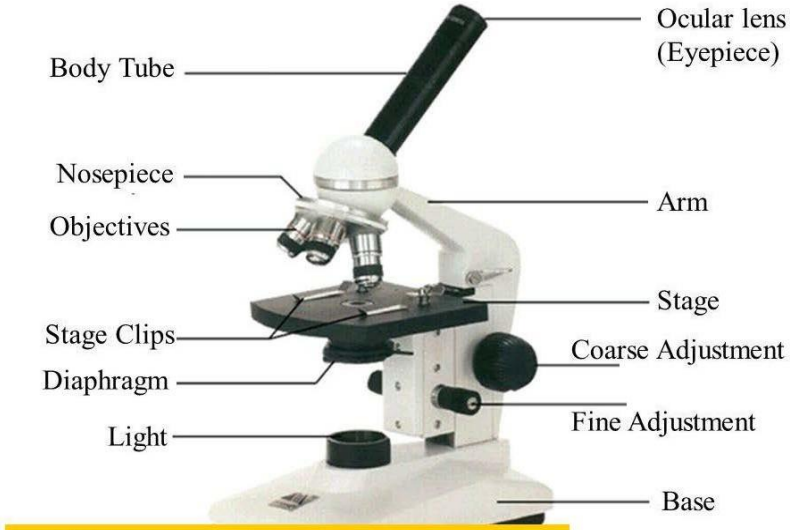
Examples:

- **Mayer's test:** (detects alkaloids)
  $HgCl_2$ + KI + H_2O + plant powder = white ppt.
- **FeCl3 test:** (detects tannins)
  $FeCl_3$ + plant powder = dark green color.
- **Borntrager's test:** (detects free oxidized anthraquinones)
  KOH + plant powder = pink to red color.

C. Structure of Microscope and Microscopical Technique:

✓ *Structure of microscope:* حفظ الأجزاء عليهم سؤال بالكويز

قوة التكبير الي رح نستخدمها هي ضرب 4 او ضرب 10



Always carry a microscope with one hand holding the **arm** and one hand under the **base**.

1. **Eyepiece**: where you look through to see the image.
2. **Body tube**: long tube that holds the eyepiece and connects it to the objectives.
3. **Nosepiece:** the rotating part of the microscope at the bottom of the body tube; it holds the objective lenses.
4. **Objective lenses**: they vary in length (the shortest has the lowest power of magnification; the longest has the highest power of magnification).
5. **Arm-part**: you carry the microscope with it.
6. **Coarse adjustment knob**: large, round knob on the side of the microscope. Used for focusing the slide.
7. **Fine adjustment knob**: small, round knob on the side of the microscope, used to fine-tune the focus after using the coarse adjustment knob
8. **Stage**: large, flat area under the objectives, where the sample or specimen is placed for examination.
9. **Light source**: usually found near the base of microscope.

✓ *Microscopical technique and reagents:*

For microscopical observation a small sample is placed on a glass slide and dispersed in a suitable mountant (any substance in which a specimen is suspended between a slide and a cover glass for microscopic examination) . This has a refractive index, which will give image contrast and may also clear the preparation by dissolving pigments or other substances.

A cover slip is gently placed on top of the preparation thus trapping the particles.

Solvent

a) Reagents (mountants):

العينات بتكون مجففة ومنكمشة ف رح يرجعها لحجمها الطبيعي

1. Chloral hydrate solution is particularly useful for the examination of dried plant materials as it acts as a clearing agent and also expands shrunken cells to restore their natural shape. This mountant removes certain characters such as: starch, but it does not affect calcium oxalate, oils or fats.
2. Glycerol: it is a non-drying mountant which has no solvent power. As it does not dissolve starch it is useful for the routine qualitative examination of starch.
3. Water: used for starch.
4. (Phloroglucinol + HCL): used for lignified tissue.

خشنة

b) Magnification:

On a typical compound optical microscope, there are three objective lenses: Scanning, Low and High. The actual power or total magnification of an optical microscope is the product of the powers of the ocular (**eyepiece**), usually about 10×, and the objective lens being used.

The total magnification = The ocular x The objective lens.

رح نجيب السلايد ونحط عليها باودر بكمية بسيطة وبنمسك ال Cover slip بزاوية 45 وبنزلها عشان ما نشوف ال air bubble

	Magnification	Ocular lens	Total Magnification
Scanning	4x	10x	40x
Low Power	10x	10x	100x
High Power	40x	10x	400x

Note : air bubbles ال بتبين تحت الميكروسكوب على شكل عجال لونهم اسود