الجامعة المستنصرية

كلية العلوم

قسم علوم الحياة

المرحلة الثالثة

فرع الفطريات وعلوم النبات

تشريح نبات عملي

كافة المختبرات

يطلب من

مكتبة حسنين

للطباعة والأستنساخ

07709265858

السعر. 750 عادي

2000 ملون

سعر الأستنساخ العادي6 بربع

الاستنساخ الملون 10 بألف

Lab no.1 The microscope

The microscope parts...

1-eye lens ...10x

2-objective lens .. includes

A-screen lens ..4 x

B-low power lens ...10 x

C-high power lens ..40 x

D-oil immersion lens ..100 x

تركيب المجهر الضوئى

Eyepiece (ocular lens) (1)
revolving nose piece (2)
Objective lenses (3)
Focus knobs (to move the stage)
Coarse adjustment (4)
Fine adjustment (5)
Stage (to hold the specimen) (6)
Light source (to [illegible] or a mirror) (7)
Diaphragm and condenser (8)
Mechanical stage (9)

Microscope magnifying power =eye piece power x objective piece power

3-revolving nose piece

5-Arm, Base, Light, condenser

Kinds of sections : Almost every part of plant is made of very small structures called (cells).one way to exam the cells of plant is to cut very thin slices ,called sections ( )and study them under the microscope.

Section of one cell thickness can be cut and mounted on a glass Slide .light will pass through them and the details of the cells can be seen, there are many kinds of sections.

1-transverse sections (C.S.)

2- longitudinal sections (L.S.)

3-stripping

4-skouash

5-skratching ...

ex.. made a stripping section for *Allium cepa* fleshy leaves and exam it under the microscope to see the shape and content of cells.

Lab.no.2 The plant cell

Typical plant cells different from animal cells in several ways,

1- They all have a cell wall surrounding the cell membrane, which is a non-living layer of cellulose ,which allows liquids and dissolved substances to pass freely through it .

2-Most plant cells have a large, fluid –filled space called central vacuole pushes the cytoplasm aside so that it forms just a thin lining inside the cell walls.

3-In the cytoplasm of plant cells are many tiny structures called **plastids** which are not present in animal cells .If they contain the green substance **chlorophyll**, they are called **chloroplasts**. The colorless plastids usually contain starch.

The plant cell content divided into,

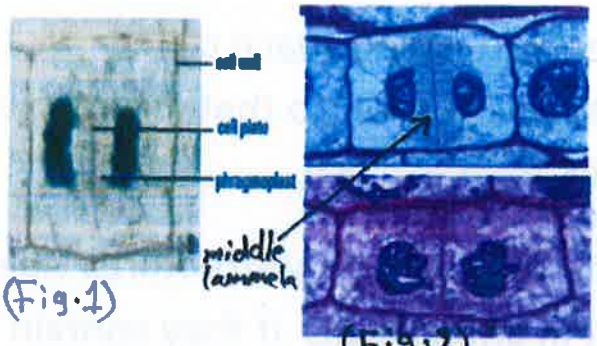
A-Living component. B-non- living component

-Non –living component includes,

1-The cell wall .. is a typical component of plant cell, walls serve as mechanical support of plant organs, especially the thick ,rigid walls .cell walls have an effect on such important activities of plant tissues as absorption, translocation ,and secretion .the principal compound in plant cell walls is **cellulose** ,a polysaccharide associated with other polysaccharides, the hemicelluloses, pectic substances, lignin, organic and inorganic substances as well as water. After the plant cell stop growing other substances added to the primary cell wall such as lignin and Subrian to form another wall above the primary wall called the **secondary cell wall** which found in cells with a secondary growth.

: 2

The cell wall
Allium root tip (L.S)

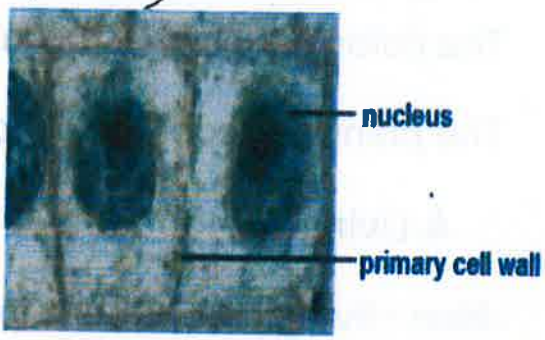


(Fig.1)

(Fig.2)

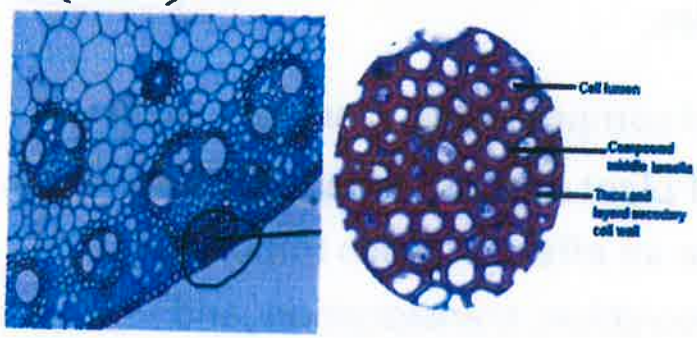
THE CELL WALL
Interphase

(Fig.3)



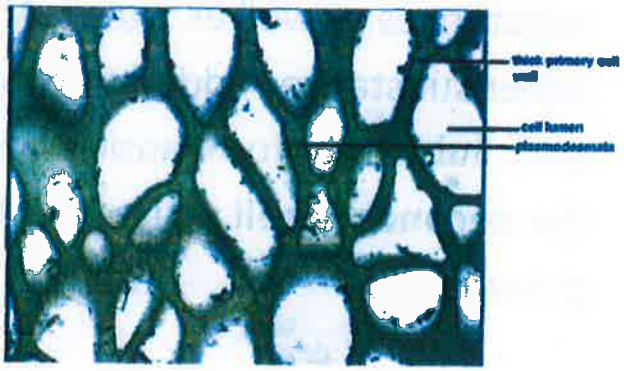
SECONDARY CELL WALL
Dracaena old stem (T.S)

(Fig.4)



(Fig.5)

THICK PRIMARY CELL WALL
Phoenix endosperm(T.S)



Stages of forming the primary cell wall..

1-**cell plate,** which is seen in the late Anaphase or early Telophase during cell division ,It begins in the center of dividing cell, composed of pectic substances then when it is completed is called middle lammela.(Fig.1)

2- **Middle Lamella** (Fig.2)

3-**Primary cell wall.**(Fig.3)/ Secondary cell wall (Fig.4)

Pits.....they are characteristic features. found in plant walls ,The pits of two contiguous cells usually oppose one another the two opposing pits together are called pit-pair.

Each pit of a pair has a pit cavity ,and the two cavities are separated from each other by a thin wall part ,the **pit membrane,** In a pit-pair ,the pit membrane consist of two primary walls and the middle lamella.

Primary walls also may have depression ,The **primary pit –field** (Fig.6). ,it is a thin place in the wall penetrated by **plasmodesmata** to provide cytoplasmic continuity between adjacent cells. when a secondary wall develops, the plasmodesmata remain in the pit cavities in the secondary wall .(Fig.5)

Practical work..

1-exam *Allium cepa* root tip L.S.to study primary wall forming.

2-exam *Zea mays* stem to study primary wall.

3-ezam *Allium cepa* scaly leaves to study primary pit field, or *Capasicum annum* epidermis C.S.

4-exam *Phoenix dactylifera* seed to study plasmodesmata.

يطلب من /
مكتبة حسنين
طباعة - استنساخ
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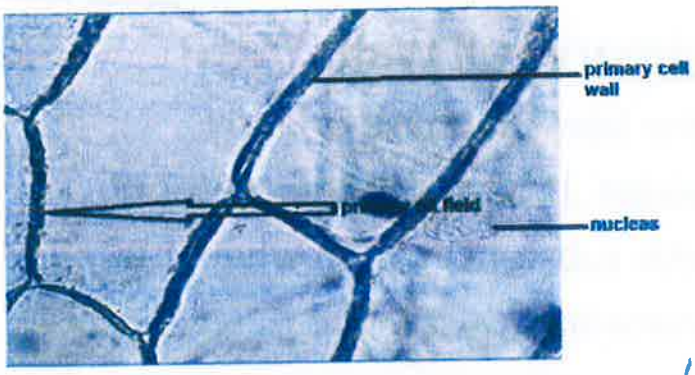
PRIMARY PIT FIELDS

Dianthus stripped of epidermis of leaf

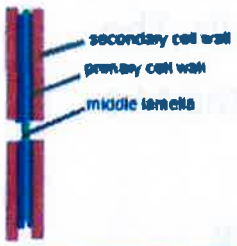


(Fig.6)

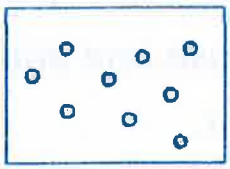
Primary pit- fields

- هى انخفاضات فى الجدار الابتدائى وتوجد باعداد كبيرة ويتخللها عدد كبير من الروابط السايتوبلازمية مما يجعل الجدار الابتدائى ذو شكل سبحى فى المقطع الطولى او العرضى

SIMPLE PITS IN SIDE VIEW (Fig.7)

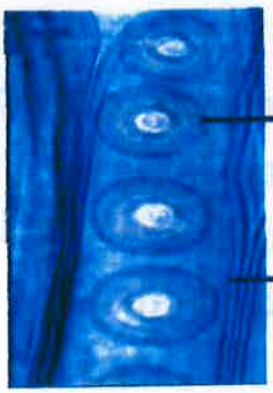


simple pits in surface view



Pinus R.L.S. Xylem stem

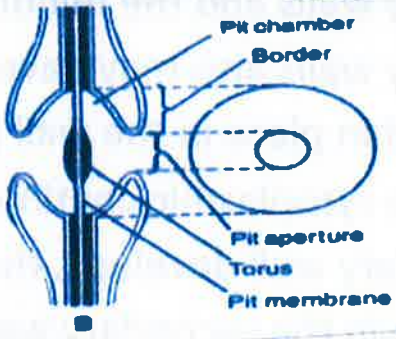
Bordered pit in surface view



(Fig.8)

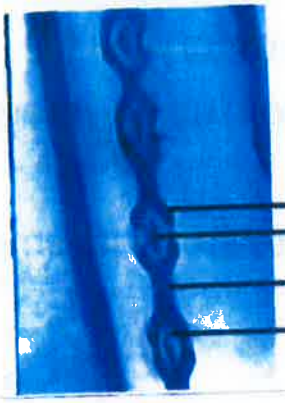
Bordered pits

- وفيها يتقوس الجدار الثانوى على فراغ الخلية مكونا مايسمى Border بالضفة



Pinus R.L.S. Xylem stem

Bordered pit in side view



(Fig.8)

Lab.no.3 cell wall

-Types of pits....pits vary in size and detailed structure..

1-**Simple pit..**the secondary wall may end abruptly at the pit cavity ,which thus retains approximately the same diameter through the depth of the secondary wall .**(Fig.7)**

Bordered pit..the secondary wall may overarch the pit cavity forming border.**(Fig.8)**

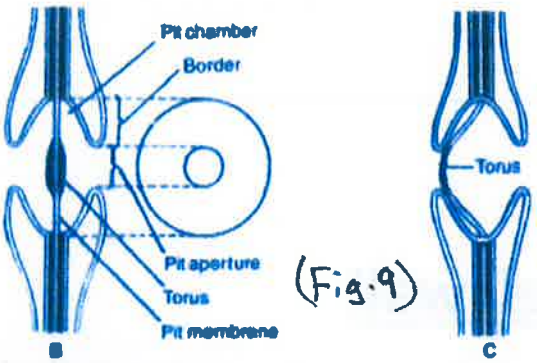
Half-borderd pit..the pit cavity enclosed by the border opens into the cell lumen through a discontinuity in the border ... pit aperture .combinations of bordered and simple pits, called half-bordered pit –pair.(found in xylem).

Aspirated pit..found in gymnosperm tracheids ,a thickening in the middle of the border membrane forms the **torus** and in stress conditions it moves toward one or the other side of the border closing the aperture by the torus and in this conditions the pit is not functioning (Fig.9)

Branched or ramiform pit..if secondary walls continues to thicken, the cavities become canals. thus the so called branched pit develops(Fig.10).

-practical work...

Pinus T.L.S. in xylem stem
Asperated pit



(Fig.9)

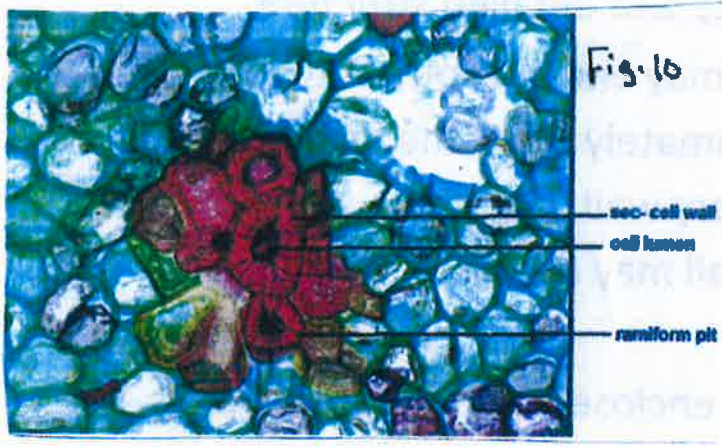
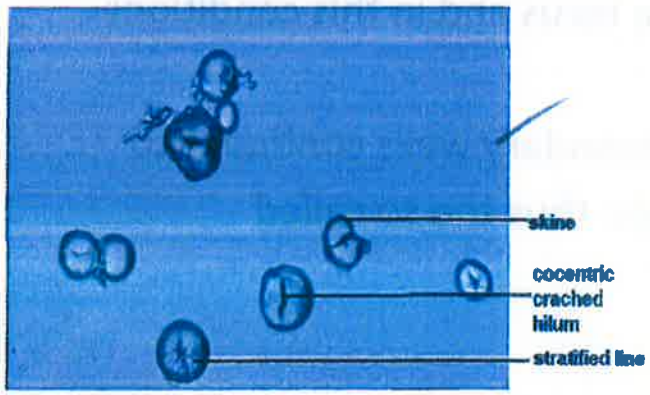


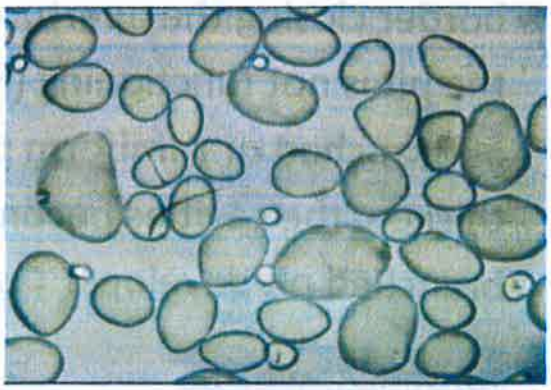
Fig.10

Bean cotyledons
concentric cracked hilum



(Fig.11)

Simple,compound and semicompound starch grain



1-exam *Pyrus communis* to studystone cell in fruit (secondary cell wall) .

2-exam *Vitis* stem L.S.to study simple pit.

3-exam *Larix* L.S.or C.S.to study bordered pit.

Lab.no.4 Non –living component

2-Starch grains.. it is the most abundant carbohydrate in the plant world .during photosynthesis, starch is formed in chloIroplasts later ,it is broken down and resynthesized as storage starch in amyloplasts which may contain one or more starch grains.

Starch grain varied in shape and show layering centered around apoint ,the (hilum) which may be in the center (concentric hilum) or to one side (excentric hilum).

Types of starch grain.. (Fig.11)

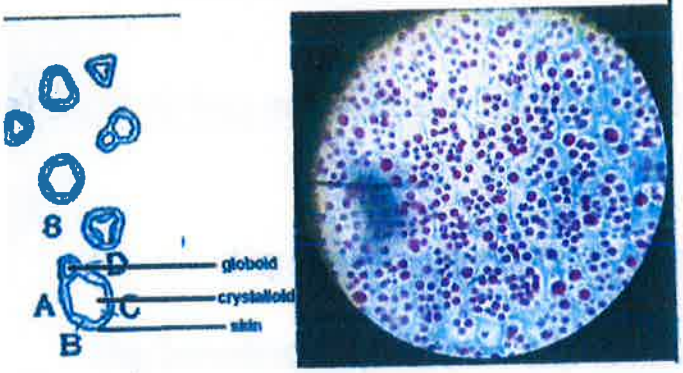
1- Simple starch grain.

2- Semi-compound grain.

3- Compound grain.

4- Cracked hilum starch grain.

Aleuron grains
Ricinus endosperm Lab. 4



(Fig. 12)

3-Aleurone grain..proteins are stored as solid protein bodies or aleurone grains , in fruits and seeds of many species , aleurone grian consist of two parts , acrystalliod protein called (crystalloid body) and the second is amorphous non proteinaceous called (globoid body).the two kinds embedded in matrix and enclosed in aunit membrane(Fig. 12)

4-Inuline crystals..it is apolysaccaride substance found in many of the compositae family plant .

Practical work..

1-exam *Solanium tuberosium* stem Scratching section to study starch grain.

2-*Phasolus vulgaris* seed to study the cracked hilum starch grain.

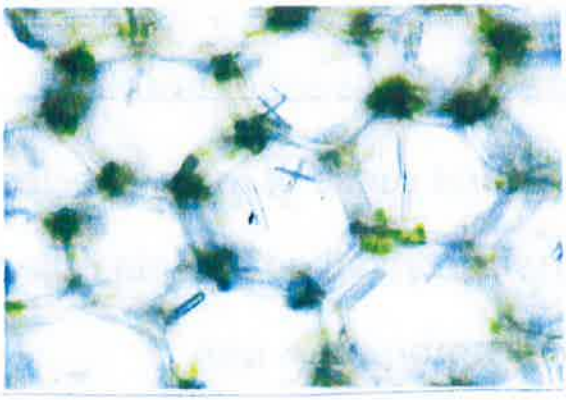
3-*Ricinus communis* seed endosperm c.s. to study aleurone grain.

Lab.no.5 Non-living component..

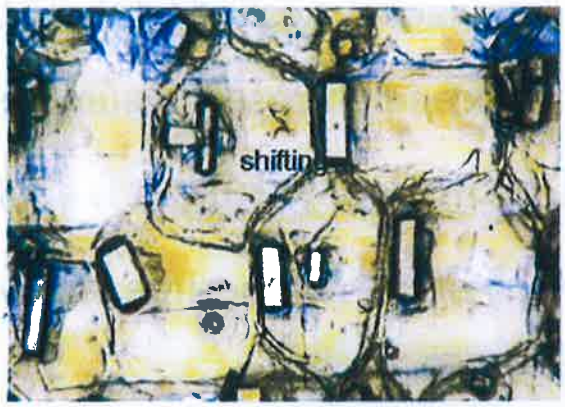
5-Crystals...it usually develops in vacuoles and often classified as excretory products.

(Fig. 13)

Raphides crystals, Zebrania Leaf (t.s)



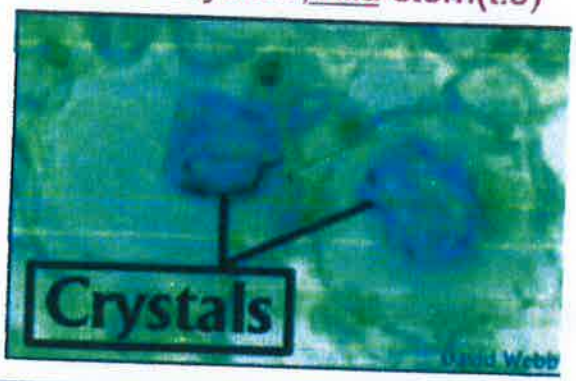
Prismatic crystals Fig. 14



PROTOPLAST Fig. 15

Non living contents

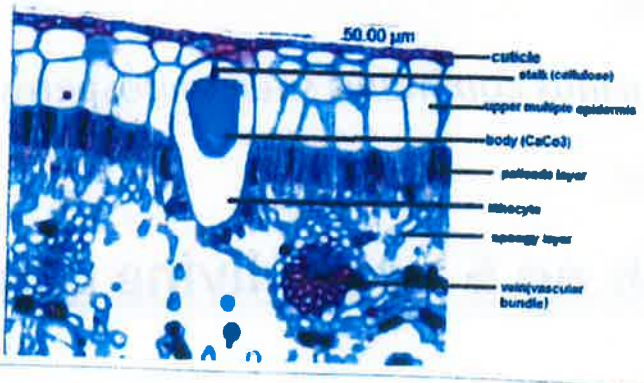
Druces Crystals, Tilia stem(t.s)



(Fig. 16)

Ficus elastica leaf (v.s)

Cystolith crystal



Types of crystals as it is chemical structure

1- **Calcium oxalate crystals...**there are different shapes of it...

A-Raphids (bundles of needles).(Fig.13)

Exam..*Zebrania* leave c.s.

B-Prismatic crystals.(Fig.14)

Exam..*Allium cepa* scaly leaves .

C-Druses crystals.(Fig.15)

Exam..*Neriym oleander* leaves c.s.

2-Calcium carbonate crystals...they are not common in higher plants .and it is sometimes associated with the cell wall in the form of cystoliths which contain of two parts (stalk is formed of cellulose and crystal body is formed of calcium carbonate).(Fig.16)

Exam..*Ficus elastic* leave c.s.

Lab.no.6 The plant cell living component

-Plastids... They are characteristic organelles of eukaryotic plant cells .they are appear in many forms and sizes, and categorized chiefly on the basis of presence or absence and

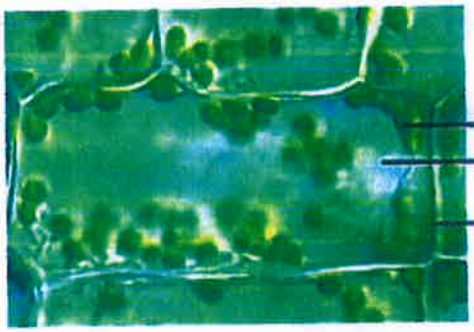

CHLOROPLAST
CYTOPLASM
CELL WALL

Fig. 17

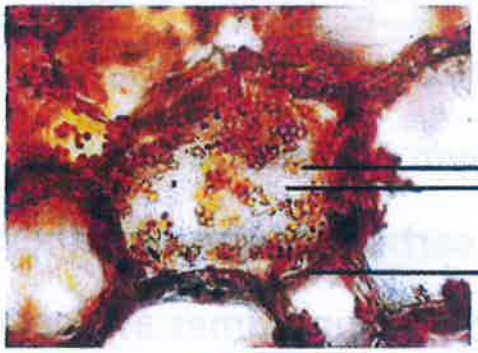

CHROMOPLAST
CYTOPLASM
CELL WALL

Fig. 18

type of pigmentation. and one type of plastid may change into another .

Types of plastids....

1-Chloroplasts.. contain chlorophyll and are concerned with photosynthesis. They occur in green plant parts(Fig. 17).

Exam.. *Capasicum annum* fruit c.s.

2-Chromoplasts...commonly contain yellow and orange carotenoid pigments. They are found in petals and other colored flowers parts, roots, and fruits(Fig. 18).

Exam.. *Solanium lycopersicum fruit* section.

3-Leucoplasts..the non pigmented plastids .sometimes they are identified with young. Relatively undifferentiated plastids that is, the proplastids, which occur in meristematic cells. leucoplasts located in tissues removed from light and storage certain plant products (starch, proteins, fats).

Exam..*Solanium tuberosium* stem scratching or exam *Cana indica* rhizome c.s.

Permanant tissues

- النسيج المستديم :هو مجموعة من الخلايا المتكشفة او المتخصصة .
- والجسم النباتى يشمل على ثلاثة اجهزة نسيجية رئيسية الجهاز النسيجى الوقائى dermal tissue system ويتكون من نسيج البشرة او البريديرم ،
- والجهاز النسيجى الاساسى ground tissue system ويتكون من النسيج البرنكيمى والكولنكيمى ،
- والجهاز النسيجى الوعائى vascular tissue system ويتكون من الخشب واللحاء

Lab.no.7 Plant tissue

Tissues..a certain groupings of cells which are distinct from others structurally or functionally or both .

Types of tissues.. 1- meristematic tissues 2-permenent tissues.

Permanent tissues.. The vascular plant body has three tissue systems, the dermal, vascular ,and the fundamental (or ground) system.

1-The dermal tissue system.. it comprises the epidermis , that is , the primary outer protective covering of the plant body . epidermal cells form a continuous layer on the surface of the plant body in the primary state .the epidermal cells vary in shape (**ordinary** , **guard cells** of the stomata, and various **trichomes** including root hairs). The epidermis may contain secretory and sclerenchymatic cells. The principal distinctive features of the epidermal cells in the aerial parts of the plant

Lab: 7

Fig. 19

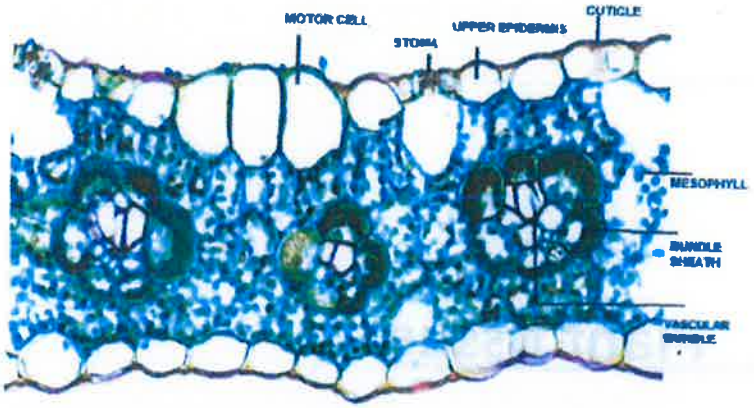
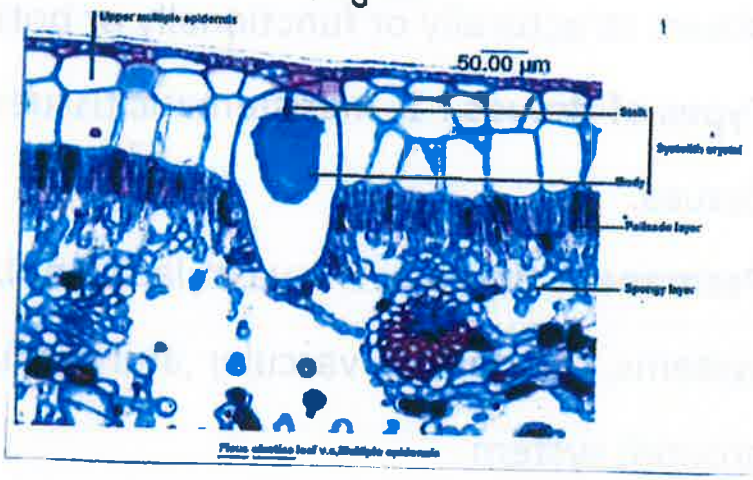


Fig. 20



are the **cuticle** on the outer wall and the cutinization of the outer and of some or all of the other walls . the epidermis gives mechanical protection and is concerned with restriction of transpiration and with aeration . In stems and roots having secondary growth , the epidermis is commonly replaced by the periderm .

Types of epidermis..

1- **Simple ...** which is one layer only (Fig. 19).

Exam..*Zea mays* c.s. stem

2- **Double..**two layer of epidermal cells

Exam..*Nerium oleander* leave c.s.

3- **Multiple..**more than two layers (Fig. 20)

Exam..*Ficus elastica* leave c.s.

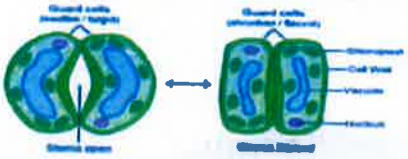
Kinds of cells in epidermal tissues..

1- Ordinary cells , the commune cells in the epidermis , vary in shape from longitudinal to curved shape.

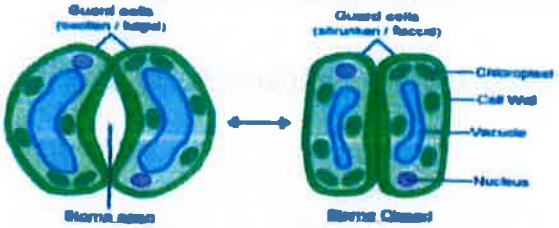
2- Guard cells , it is a specialized cells commonly in kidney shape from surface view , enriched in chloroplasts , comes in pairs and

الثغور Stomata

- الثغر Stomata: هو فتحة توجد فى نسيج البشرة ، تحاط بخليتين حارستين guard cells كل خلية تحتوى على نواة ، وغنية بالبلاستيدات الخضر . وجدار الخلية الحارسه يكون غليظا فى الناحية المواجهة لفتحة الثغر،ورقيقا من الناحية البعيدة عنها .

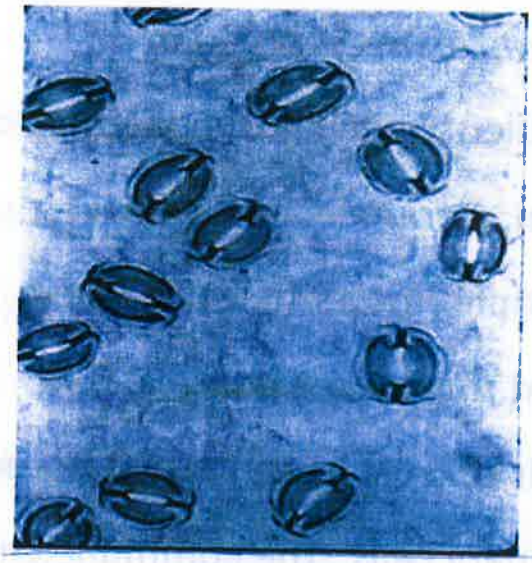


- يوجد نوعان من الثغور حسب نوع الخلايا الحارسة ففى احد النوعين تكون الخلايا الحارسة كلوية الشكل Kidney shape



- بينما تكون الخلايا الحارسة فى النوع الثانى صولجانية الشكل Dumb bell shap ذات جزء وسطى ضيق سميك الجدار ونهايتين منتفختين رقيقتى الجدار

Monocot - dicot type Fig. 21



Hordium stripped- off epidermis leaf
Note: the Graminae type stoma

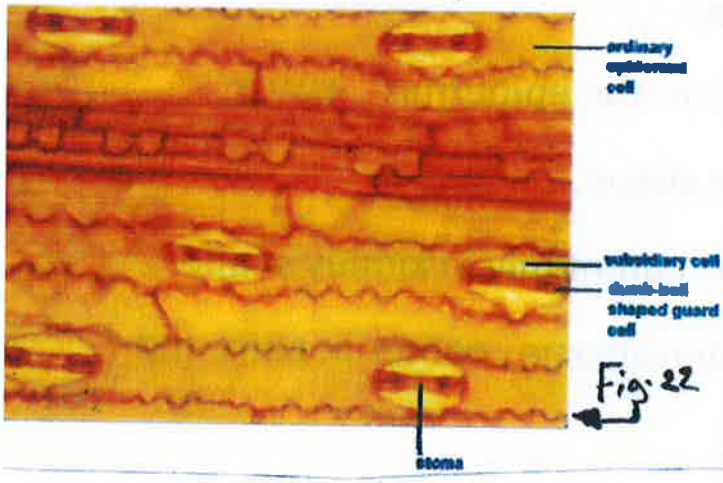
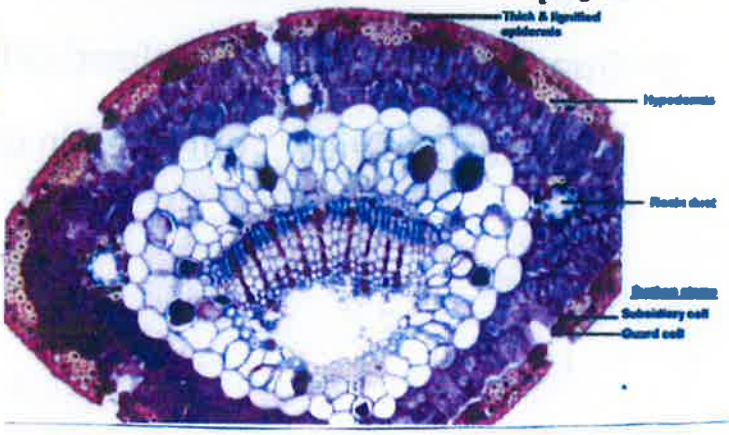


Fig. 22

Pinus leaf V.S Fig. 23



each guard cell pair surrounded an aperture called **stoma** which found only in the aerial parts of plant body.

Types of stomata...

1- **Monocot-dicot type..**guard cell in kidney shape , found in all kinds of plants except the gramineae and cyperaceae familesFig.21

2- **Gramineae- cyperaceae type..**guard cell in dumb-bell shape. Fig.22

3- **Gymnosperm type..**also called the sunken stomata ,guard cell in spindle shape.Fig.23

Exam..*Pinus pine* c.s. of leave.

Patterns of stomata... the presence of subsidiary cells.

1- **Anomocytic type..**no subsidiary cell found.Fig.24

Exam..*Vicia faba* leave, epidermis stripping.

2- **Anisocytic type..**three subsidiary cell or more differs in size.Fig.25

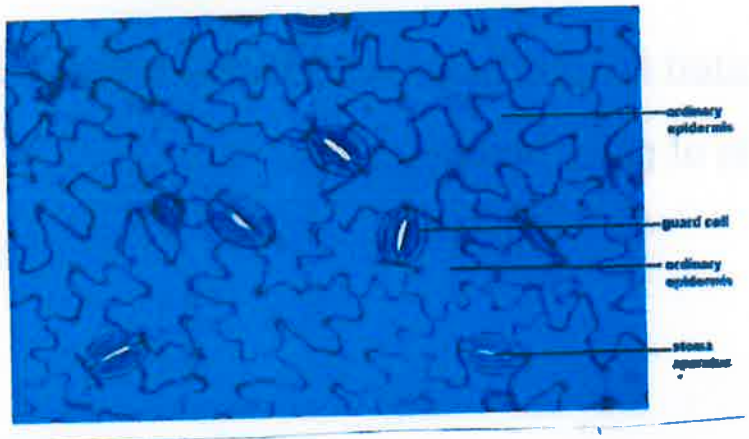
Exam..*Raphanus* leave , epidermis stripping.

3- **paracytic type..**two subsidiary cells parallels the guard cell.Fig.26

Exam.. Grass epidermis stripping (it is a gramineae – cyperaceae type of stomata).

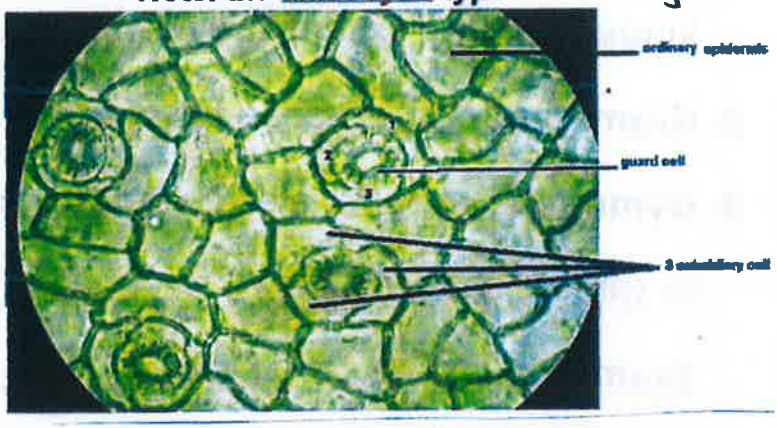
Fig. 24

Vicia faba leaf stripped –off epidermis
Note: the anomocytic type



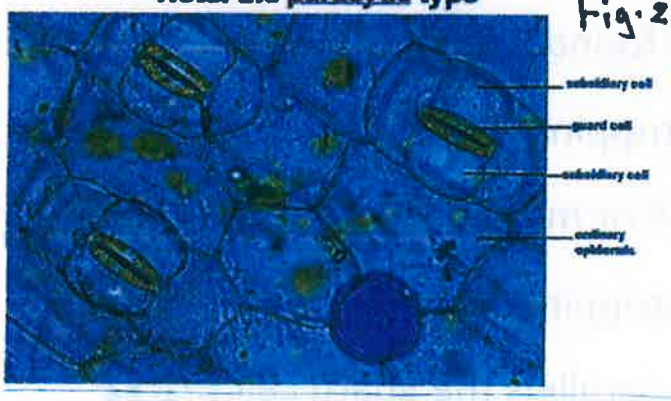
Raphanus leaf stripped- off epidermis
Note: the anisocytic type

Fig. 25



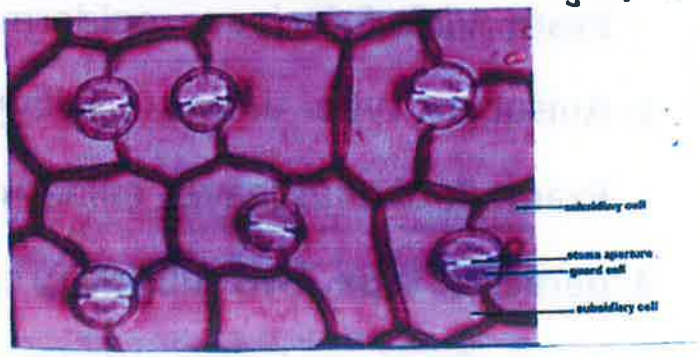
Tradescantia stripped of epidermis leaf
Note: the paracytic type

Fig. 26



Dianthus leaf stripped –off epidermis
Note: the diacytic type

Fig. 27



4- **Diacytic type..**Two subsidiary cells deistic the guard cell. Fig. 27

Exam.. *Dianthus* leave .

5- **Actinocytic type..**many subsidiary cells surrounding guard cell in star shape.

Exam..*Zea mays* leave .

Lab.no.8... epidermis Trichomes

It is an epidermis appendages which takes different shapes and functions and found in all parts of plant body.

Kinds of trichomes..

1-Hairs..

A, unicellular hair such as **..**

1-root hair **Exam..***Zea mays root c.s.*

2-stining hair **Exam** *Urtica* stems c.s.

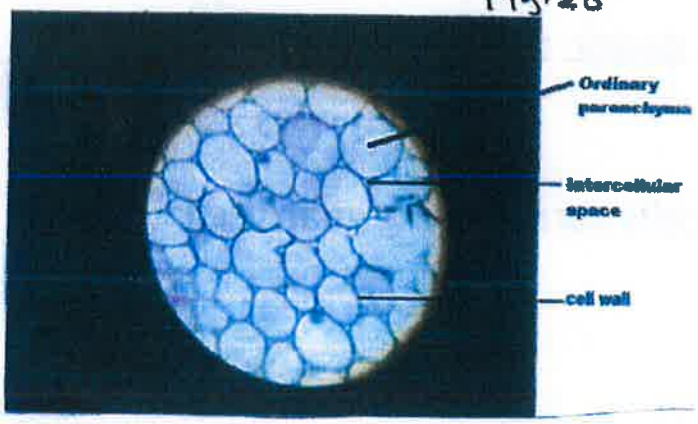
B,Multicellular hair ..

1- Multicellular-uniseriate **Exam..***cucurbita c.s. or Malva* leave c.s.

2- Multicellular-multiseriate **Exam..** *Portulaca oleraceae* leave petiole c.s.

Ordinary parenchyma

Fig. 28



2-Scales.. exam.. *Olea europeae* leave scratching.

3-Papillae..exam..*Rosa* spp. Leave petiole or stem c.s.

Lab.no.9 2- Fundemental tissue system

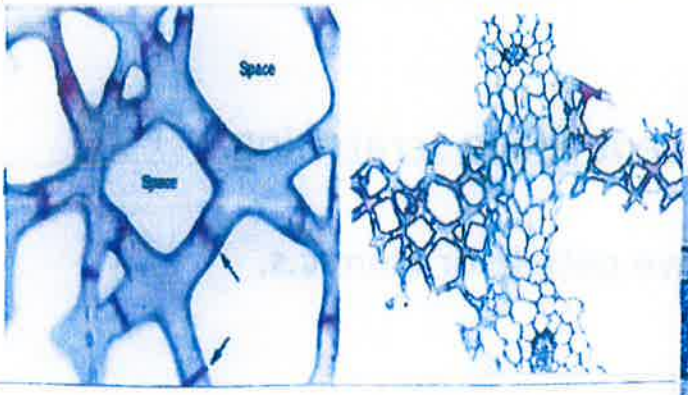
1-Parenchyma tissue...it is a simple tissue morphologically yet it is complex one philologically .it plays many roles such as storage of food ,water ,air ,and photosynthesis if include chloroplasts in it . structurally parenchyma cell commonly háve a thin primary walls with many inter cellular spaces between them, also parenchyma cells keeps the meristematic ability in it .and it is found in all parts of plant body.

Types of parenchyma...according to their shapes

1-ordinary parenchyma.. exam..*Zea mays c.s. of stem.* (Fig. 28)

Fig. 29

Stellate parenchyma



Columnar & lobed parenchyma

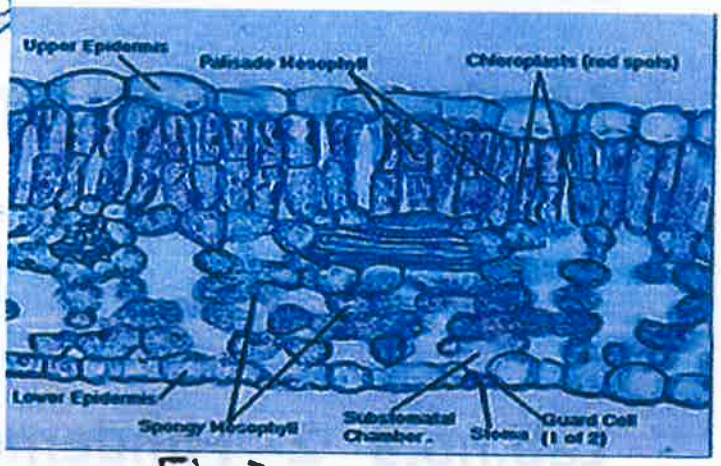
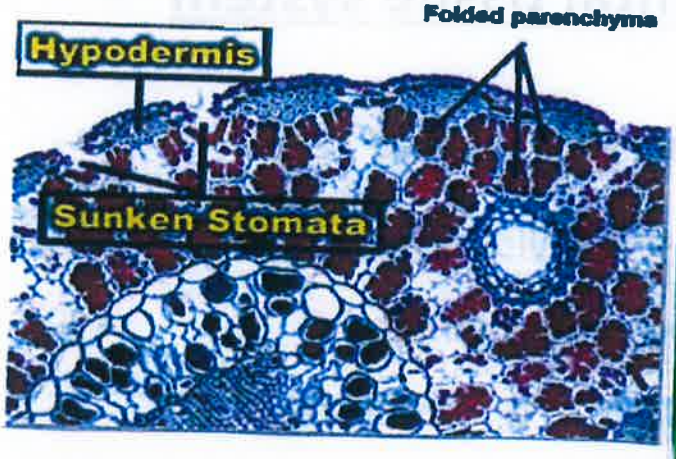


Fig. 30

Folded parenchyma

Fig. 31



البرنكيمة التمثيلية (الكلورنكيما)

Chlorenchyma

Fig. 32

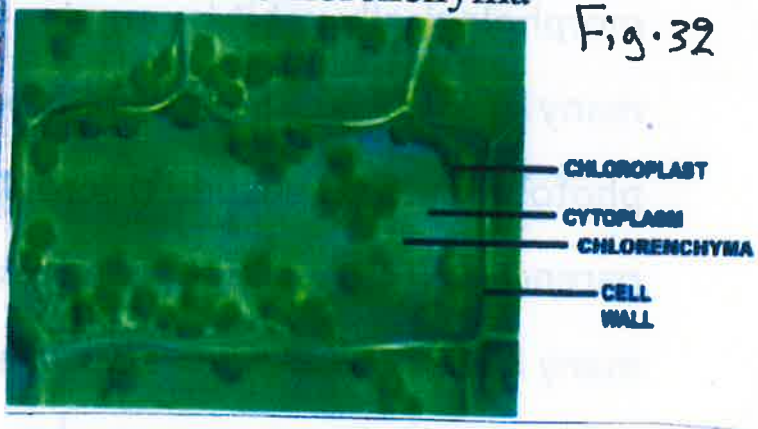


Fig. 33

storage البرنكيما الخازنة parenchyma

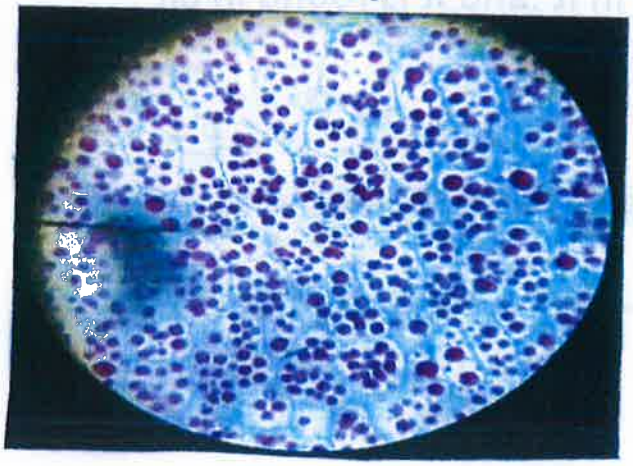
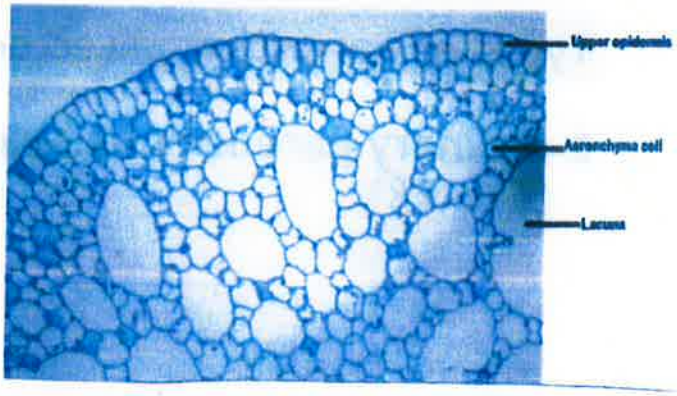


Fig. 34

(Aerenchyma) البرنكيما الهوائية



2-stellate parenchyma.. exam..*Cana indica* c.s. of leave petiole. (Fig. 29).

3-columanar parenchyma..exam..*Nerium oleander* c.s. leave(Fig. 30)

4-Lobed parenchyma.. exam.. *Nerium oleander* c.s. leave. (Fig. 30)

5-folded parenchyma.. exam..*Pinus pine* c.s. of leave (Fig. 31)

Types of parenchyma tissue by their function..

1- **Chlorenchyma..**it has chloroplasts in it.(Fig. 32)

Exam.. *Nerium oleander* c.s. of leave

2-Food storage parenchyma...exam..*Ricinus communis* c.s. of seed endosperm(Fig. 33)

3-Water storage parenchyma...exam..*Ficus elastica* c.s. of leave

4-Air stogage parenchyma.. exam.. *Elodea c.s. stem*(Fig. 34)

Lab.no.10 Fundemental tissue system

2- Collenchyma tissue..

Fig. 35
Angular collenchyma tissue

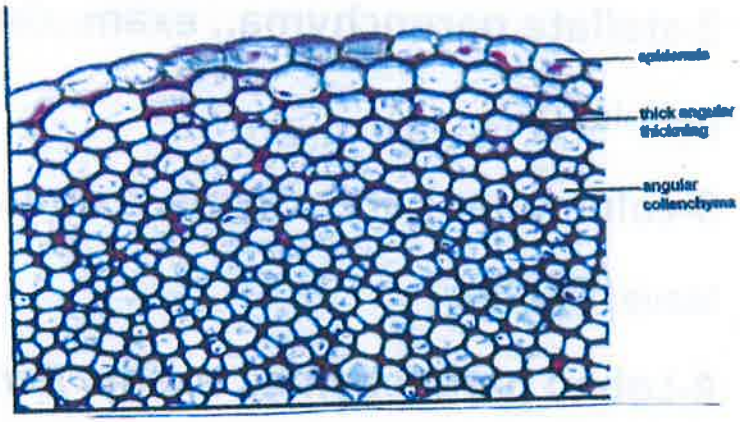


Fig. 36
Lamellar collenchyma

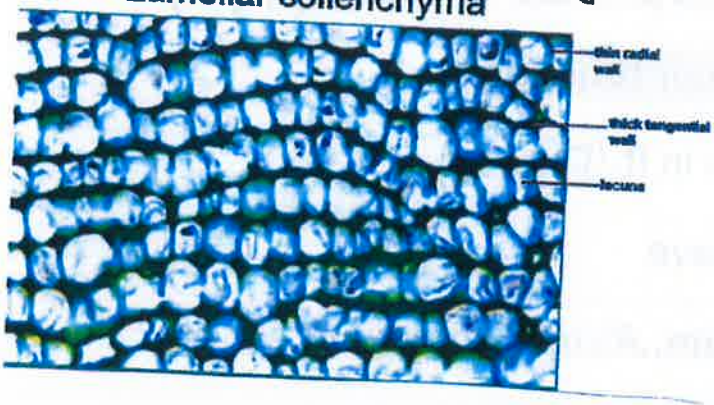
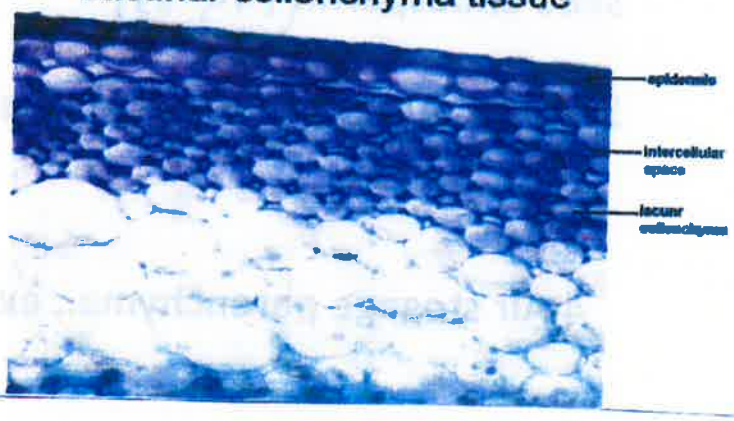


Fig. 37
Lacunar collenchyma tissue



It is a living tissue, with irregular thickness of primary walls, found in aerial parts of plant body only (leaves and stems).it play supporting role in plant body

Types of collenchymas..

1-Angular collenchymas..exam..*Medicago* c.s. of stem.(Fig.35)

2-Lamellar collenchymas..exam..*Sambucus* c.s. of stem.(Fig.36)

3-Tubular and lacunar collenchymas..exam...(Fig.37)

Nerium oleander c.s. of leave.

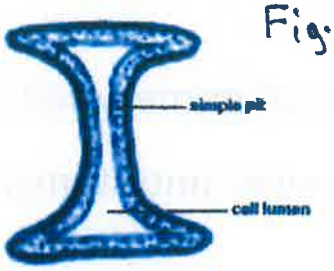
3-Sclernchyma tissue. .. their cells die after maturation ,and have a thick secondary walls ,play role in supporting other tissues ,and it found in all parts of plant body .it include two kinds of cells..

A-Scleride

B-fibers

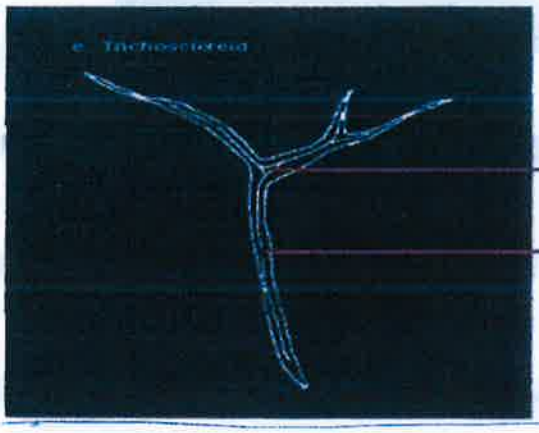
- **Osteosclereids** السكلريدات العظمية
- خلايا تشبه عظم الساق حيث تنتفخ فى نهاياتها واحيانا تتفرع وتوجد فى الاوراق واغلفة البذور

Fig·38



phoenix fruit stripped off epidermis osteosclereids

- **Tricho Sclereids** السكلريدات الخيطية
- خلايا طويلة رفيعة تشبه الالياف وذات تفرع ثنائى وتوجد فى اوراق الزيتون

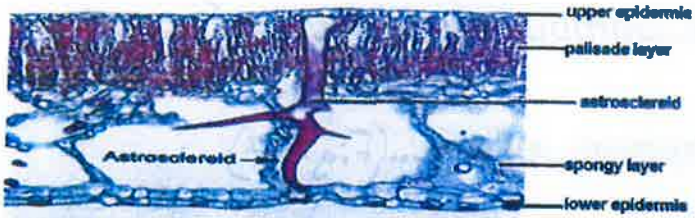


Fig·39

Astrosclereids السكلريدات النجمية

خلايا متفرعة بدرجات متفاوتة تشبه النجمة وتوجد فى نباتات ذوات الفلقتين

Fig·40



Fig·41

Zea mays stem (T.S), hypodermal and bundle sheath fibers

Scleride cell found as single cell or in bundles inside other tissues such as stems ,leaves mesophyll ,fleshy fruits, sclerids have many shapes ..

1- **Macro scleride.. exam..***Allium sativum* scaly leaves.

2- **Osteo scleride..exam..***Allium cepa* scaly leaves (the un shine face).(Fig.38)

3- **Tricho scleride ..exam..***Olea europaea* c.s. of leave.(Fig.39)

4- **Stone cell..exam..***Pyrus communis* fruit.

5- **Astero scleride..exam..***Nymphaea* c.s. of leave.(Fig.40)

Lab.no.11 Fundemental tissue system

3-Sclernchyma tissue..

Fibers..it names after it is location.

A-extra xylary fibers..which it outside the vascular bundle ...includes

1- **Hypodermal fibers..exam.***Zea mays* c.s.of stem.(Fig.41)

2- **Cortical fibers..exam..***cucurbita c.s. of stem. Or Phoenix* c.s. of root

Fig. 42

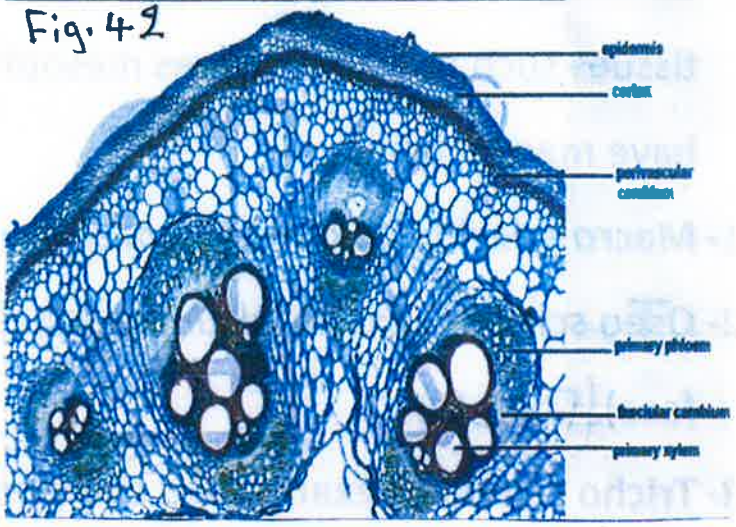
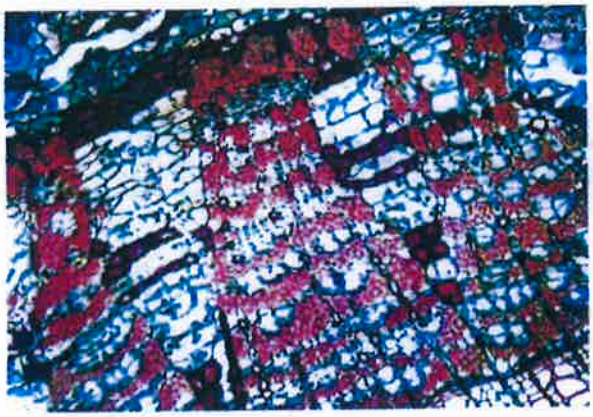


Fig. 43



Tilia old stem (T.S)Phloem fibers

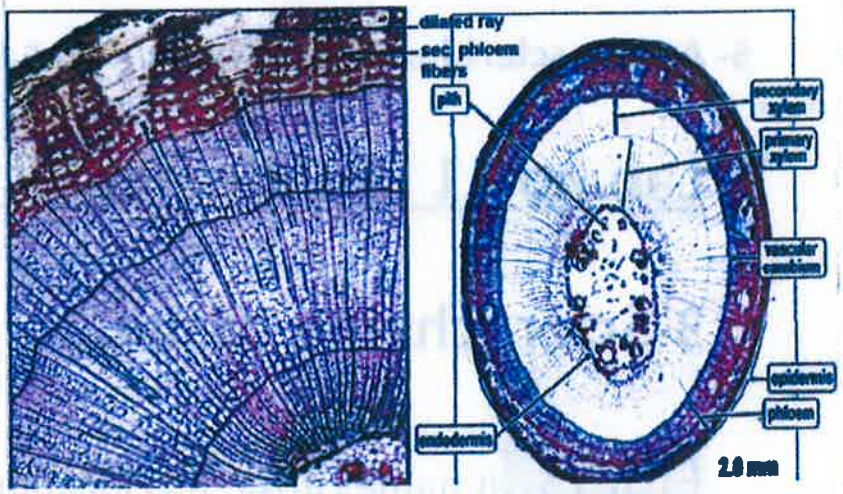
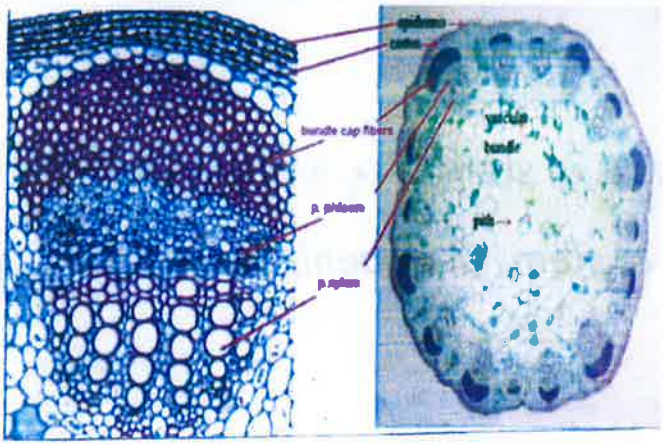


Fig. 44

Helianthus stem (T.S) Bundle cap fibers



3- **Perivascular fiber..exam...** *cucurbita c.s. of stem or Aristolochia* c.s. of stem.(Fig. 42)

4- **Phloem fiber ..exam..***Tilia* c.s. of stem.(Fig. 43)

5- **Bundle cap fiber..exam..***Helianthus* c.s.of stem.(Fig. 44)

B-intraxylary fibers..xylem fibers.

Lab. no.12 ..3-Vascular tissue system..

-Xylem... The xylem is the principal water conducting tissue in a vascular plant . it is usually spatially associated with the phloem , the principal food-conducting tissue . the two tissues together are called the vascular tissue. The combination of xylem and phloem forms a continuous vascular system throughout all parts of the plant, including all branches of stem and root . xylem tissue is concerned with storage, and support. It is consists of several kinds of cells and the principal water conducting cells are tracheids and vessel members. The vessel members are joined end to end into vessels .storage occurs in parenchyma cells ,which are arranged in vertical files and ,in

Xylem tissue

نسيج الخشب : وهو النسيج الرئيسى الموصل للماء والاملاح فى النباتات الوعائية، ويكون مع اللحاء الجهاز الوعائى vascular system

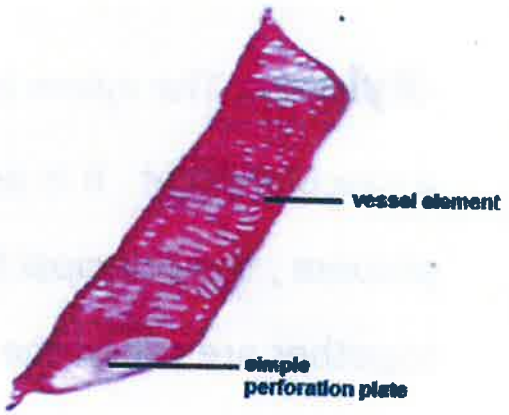
الخشب نسيج معقد يتكون من اكثر من نوع من الخلايا الحية وغير الحية ، ويجمع بين وظيفتى التوصيل والدعامة ،

الخشب فى الجسم النباتى الابتدائى يدعى الخشب الابتدائى Primary xylem وينشا من الانسجة القمية . اما الخشب فى الجسم النباتى الثانوى فيسمى الخشب الثانوى Secondary xylem وينشا من الانسجة المرستيمية الجانبية

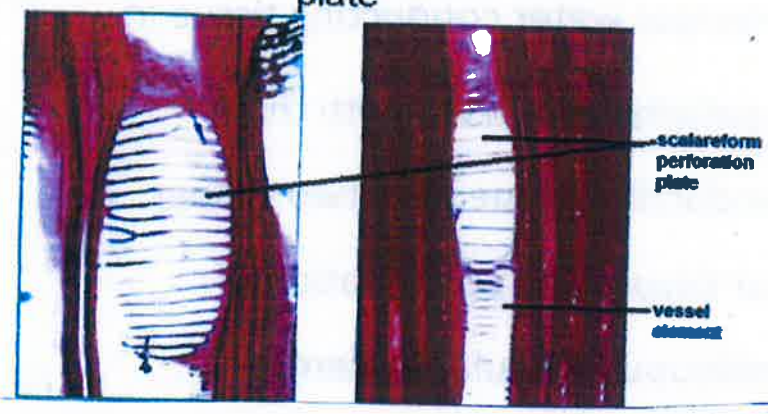
يتكون الخشب من العناصر التالية

- ١- العناصر التوصيلية Tracheary elements
  - Tracheids قصيبات
  - Vessels اوعية
- ٢- الياف الخشب Xylem fibers
- ٣- برنكيما الخشب Xylem parenchyma

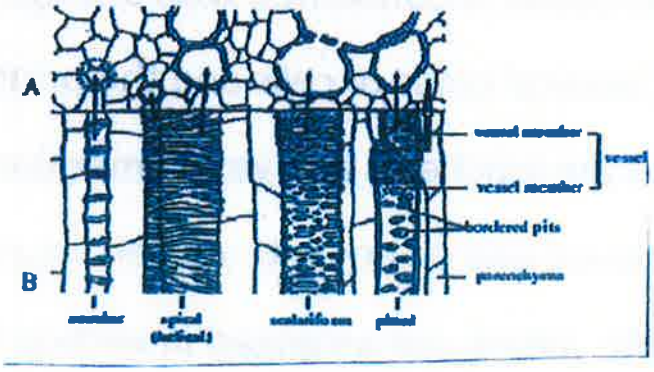
Vessels with simple perforation plate



Vessels with scalariform perforation plate



Tracheary elements of xylem in T.S and L.S



the secondary xylem, also as rays. Mechanical cells are fibers and sclereids.

Cell wall in primary tracheary elements...

The primary tracheary cells have a variety of secondary wall thickenings .The different forms of wall appear in a specific ontogenetic series that indicates a progressive increase in the extent of the primary wall area covered by secondary wall material . in the earliest tracheary elements the secondary walls may occur as rings (**annular** thickenings) not connected with one another . the elements differentiating next have **helical (spiral)** thickenings . then follow cells with thickenings that may be characterized as helices with coils interconnected (**scalariform** thickenings). These are succeeded by cells with netlike ,or **reticulate** ,thickenings ,and finally by **pitted** elements.

Practical work

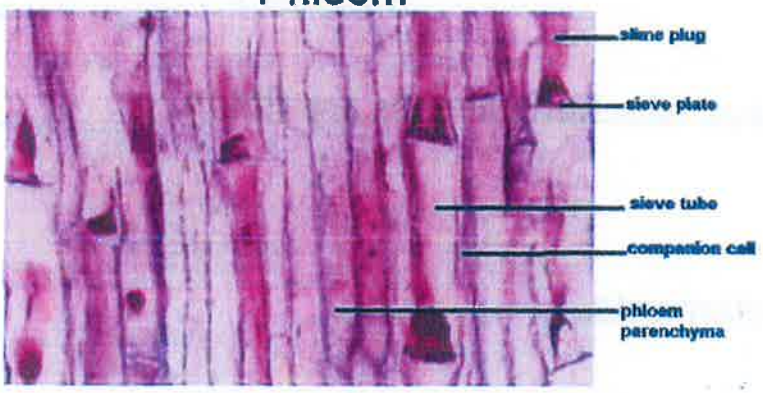
1-exam.. *Vitis* l.s. of stem.

2-exam.. *Helianthus* c.s. of stem.

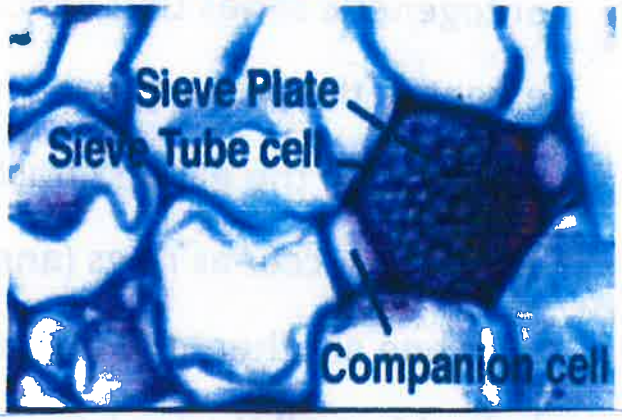
نسيج اللحاء

- اللحاء هو النسيج الموصل للمواد الغذائية ، ويوجد دائما بجانب الخشب ، ويكون مع الخشب الجهاز التوصيلى فى جسم النبات .
واللحاء يعتبر مركبا شكلا ووظيفة ، ومكوناته الاساسية هى العناصر المنخلية **sieve element** وبرنكيما والياف اللحاء بالاضافة الى خلايا مرافقة او خلايا زلالية .

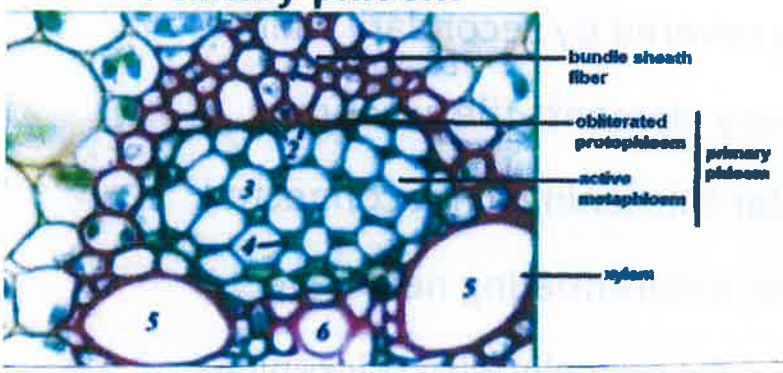
Cucurbita stem (L.S.)
Phloem



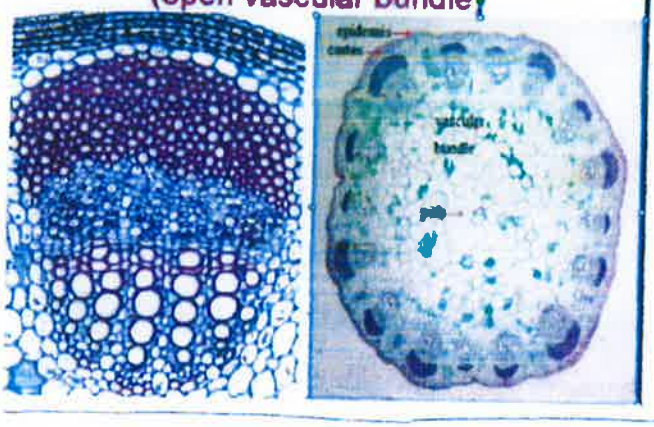
Cucurbita stem (T.S.)
Phloem



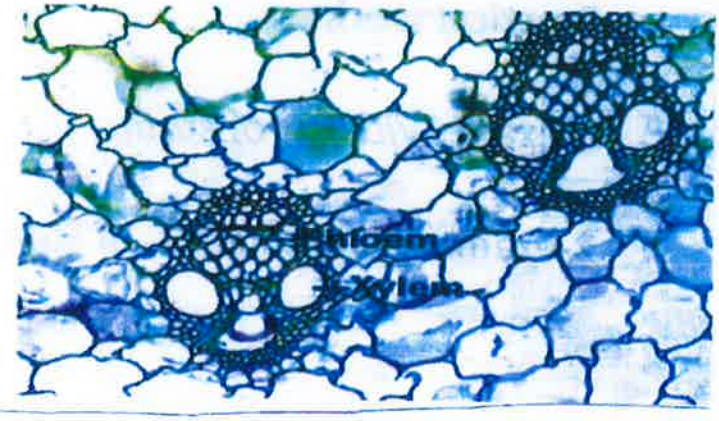
Zea mays stem (T.S.)
Primary phloem



Helianthus stem (T.S)Collateral
(open vascular bundle)



Zea mays stem (T.S)Collateral
(closed vascular bundle)



-Phloem.. it is a complex tissue composed of several kinds of cells . the phloem tissue occurs throughout the plant body , together with the xylem , and may be primary or secondary in origin . it is concerned with conduction and storage of food and with support . the principal conducting cells are sieve cells and sieve –tube members , both typically enucleate at maturity . sieve –tube members are joined end to end into sieve tubes and are associated with companion cells , which are special parenchyma cells .secondary phloem also contains parenchyma in the form of rays . supporting cells are the fibers and sclerids.

In gyminosperm plant phloem consists of sieve cells only.

Practical work..

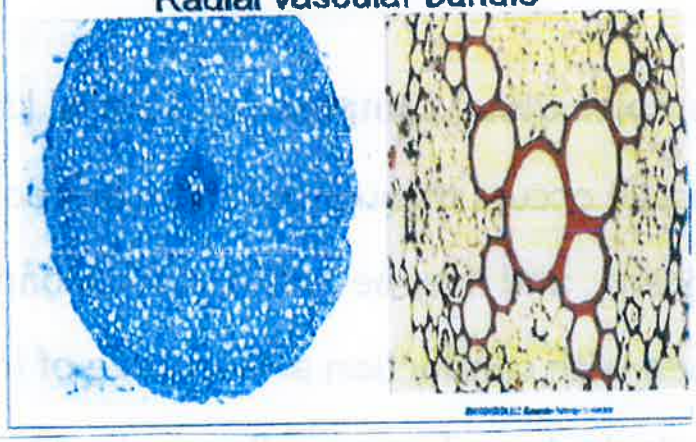
1- Exam..*Helianthus* c.s. of stem.

2- Exam.. *Tilia* c.s. of stem.

3- Exam.. *Vicia faba* l.s. of stem.

Lab.no.13 whole sections study

Ranucuculus root T.S
Radial vascular bundle



Zea mays root (T.S)
Radial vascular bundle