OCTOBER UNIVERISTY
FOR MODERN SCIENCES AND ARTS
جامعة أكتوبر للعلوم الحديثة والآداب

Pharmacognosy

PHG 112

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Lecture 9

Interactive teaching methods & activities

https://www.youtube.com/watch?v=_6u9wZ83mkE

https://www.youtube.com/watch?v=9TUs--aV6l8

Quizzez

By the end of the lecture, students should be able to demonstrate knowledge of:

- **- Morphological & Microscopical characters of roots & rhizomes**
- **Morphological & Microscopical characters of Licorice & ginger**
- **Active constituents, uses, contraindication & tests of Licorice & ginger**
- **Active constituents, uses& tests of curcuma & rawolfia**

SUBTERRANEAN ORGANS (UNDERGROUND ORGANS)

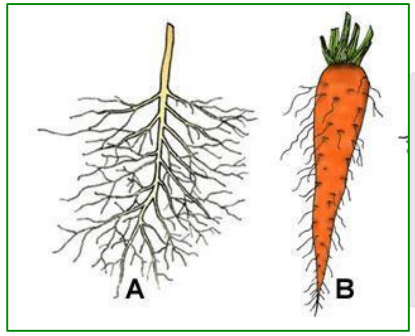
-These organs are collected from perennial plants to allow storage of the 2ry metabolites in these organs.

- Subterranean drugs are from
  * root origin
  *rhizome origin
  *root and rhizomes.

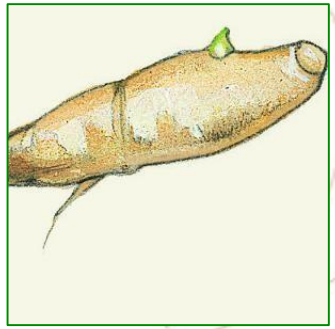
THE SUBTERRANEAN ORGANS

1- Stem origin

Rhizome
Corms Bulbs
Tubers



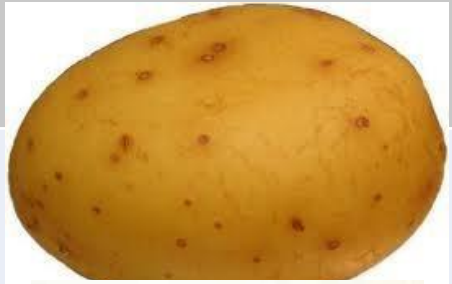
2- Root origin

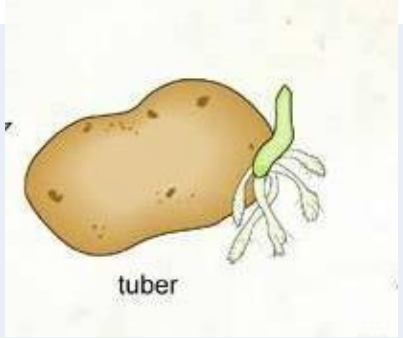


Roots Tubers
roots

1- Stem origin

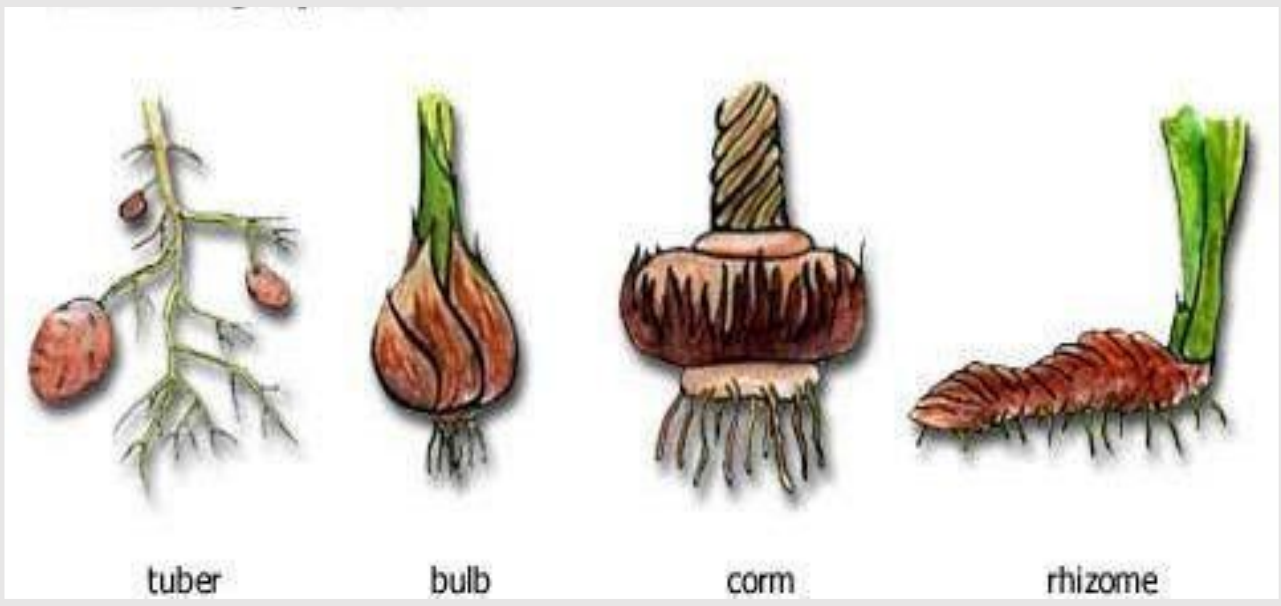
Rhizome	Bulb	Corm	Tuber
Underground horizontal stem with stored foods	Short stem with fleshy leaves	Short, vertical, swollen underground plant stem that serves as a storage organ	Tubers are various types of modified plant structures that are enlarged to store nutrients





Subterranean stem differs from the aerial stem in the following

1 It bears scale leaves (not foliage)
2 Bears adventitious roots arise from the nodes.



What is the difference between root and rhizome?

The root:

*It is derived from the radical and grows towards the soil and water

*It has no leaves

*No nodes and internodes

*No buds

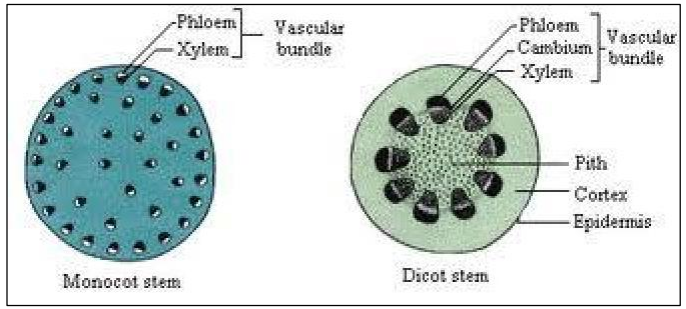
*No chlorophyll

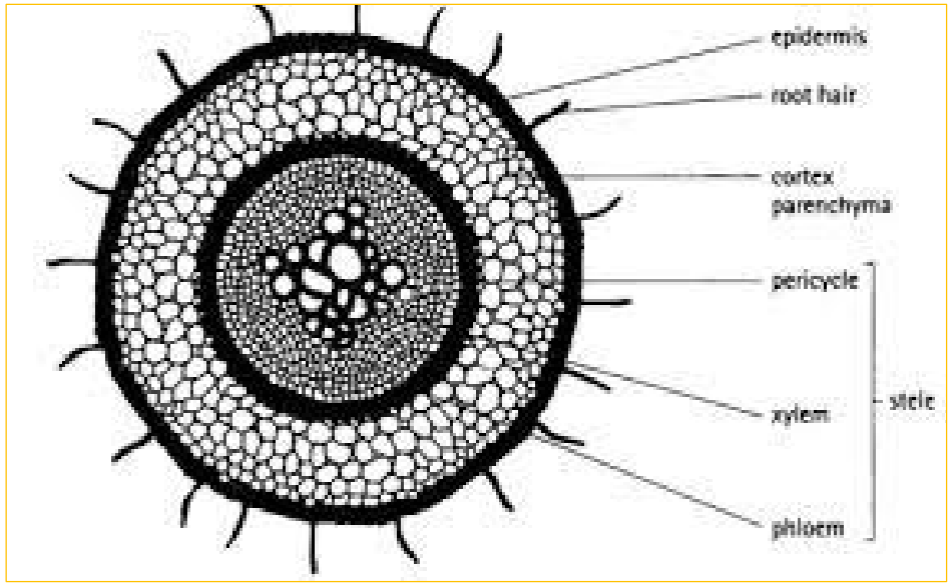
*Apical growing point called root-cap.

The rhizome:

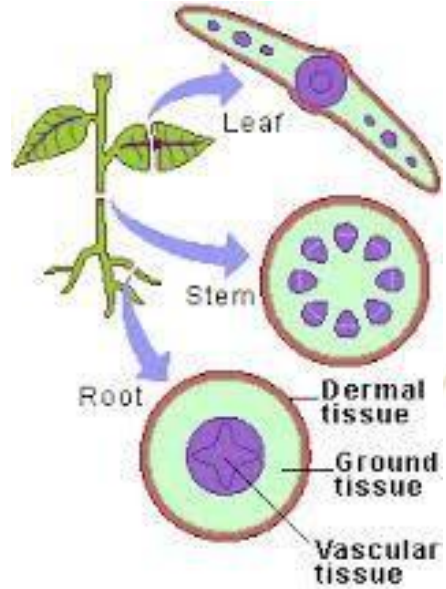
-It has nodes and internodes

-The growing point covered with scaly leaves and not root cap.





T.S of young root



LIQUORICE

Is the dried peeled or unpeeled root and rhizome (stolon) of *Glycyrrhiza glabra* var. *typica* (Spanish liquorice) or *Glycyrrhiza glabra var. glandulifera* (Russian liquorice) Family Leguminosae

Spanish liquorice

-It is mainly peeled stolon (rhizome) and few root.

-The stolon bears scale leaves, buds and root scars and microscopically has central pith.

-It has a sweet taste free from any bitterness.

Russian liquorice

-Mainly unpeeled roots

-It has sweet taste but with bitterness

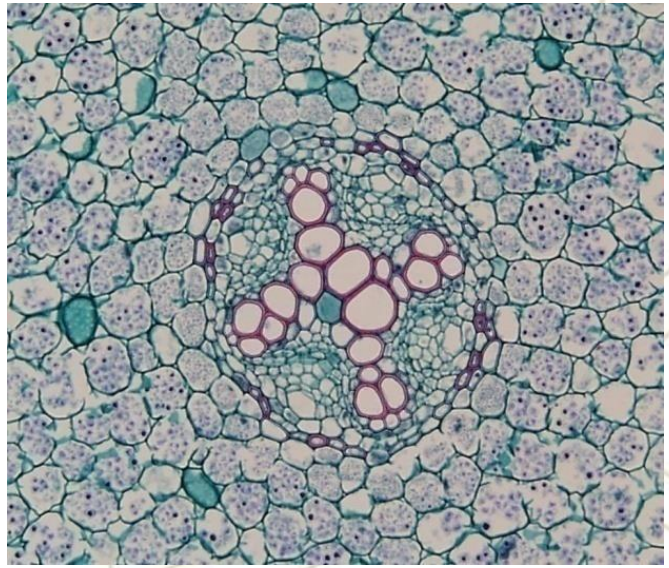
Microscopical Characters:

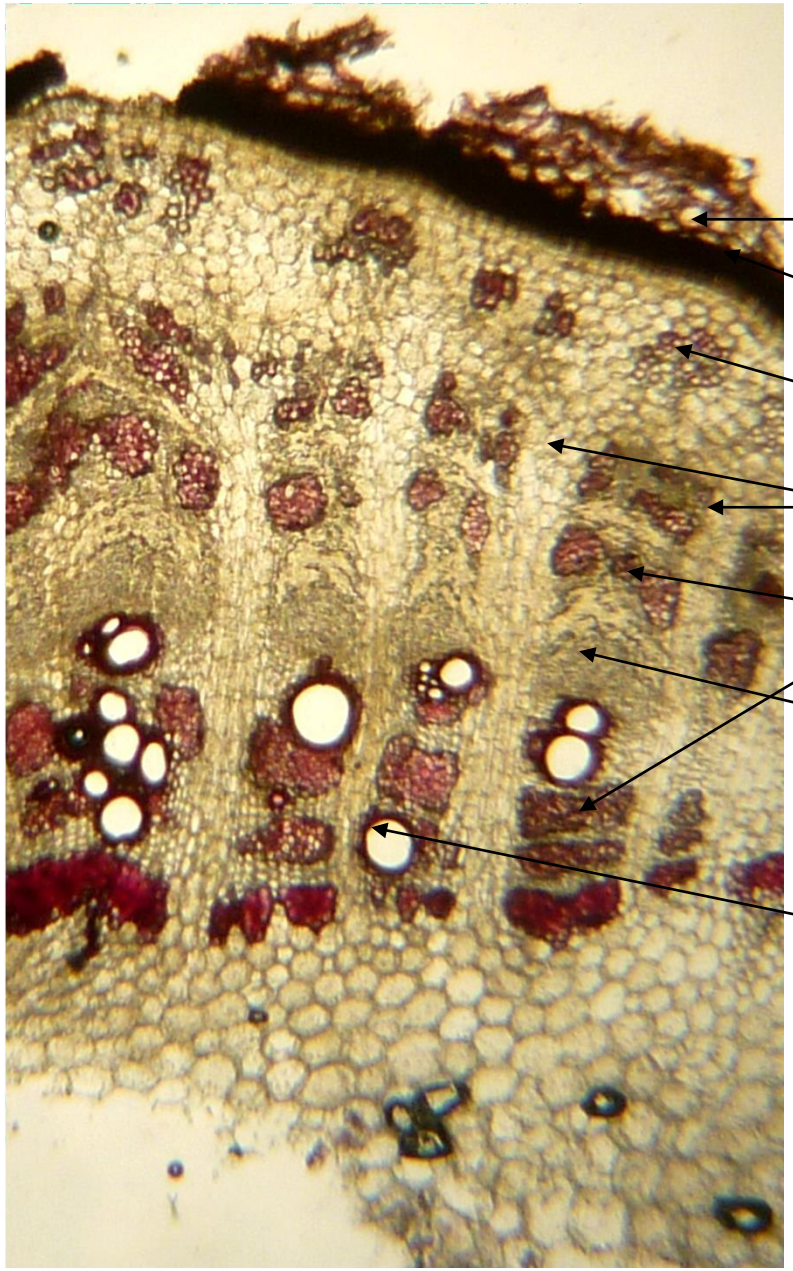
Rhizome and roots of liquorice have typical structures except

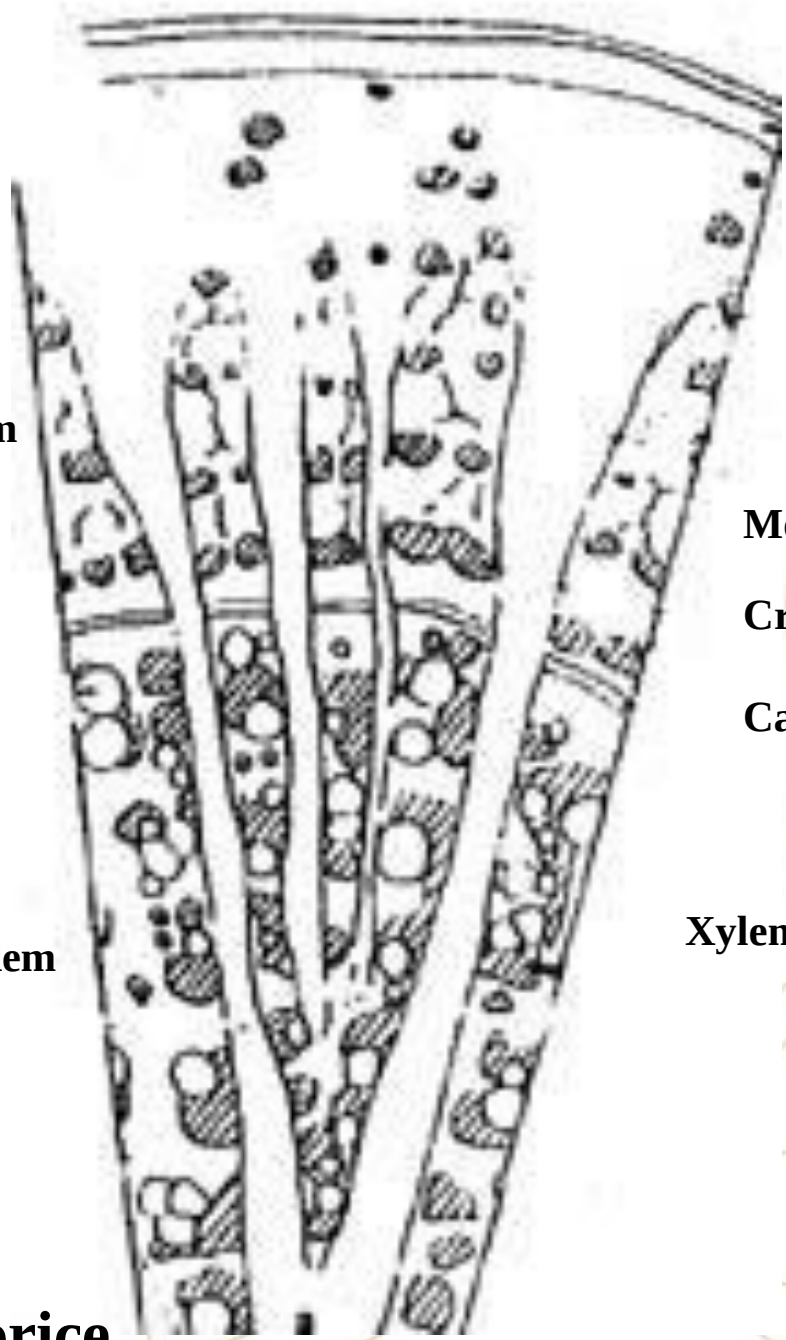
-Absences of the pith in the root (c.f. rhizome)

- Presence of tetra arch 1ry

xylem in the root.







Transverse section (T. S.) of Liquorice

T. S of liquorice

1- Cork

2- Cortex (contain starch & prisms of Ca ox)

3- Pericycle: parenchyma with groups of lignified pericyclic fibers.

4-Phloem: with groups of lignified phloem fibers

with crystal sheath (prisms of Ca ox)

5- Cambium; from intrafascicular type.

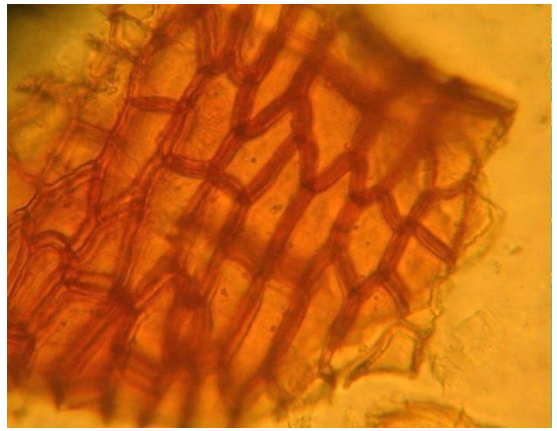
6- Xylem composed of wood fibers with crystal sheath , wood parenchyma and xylem vessels with bordered pits.

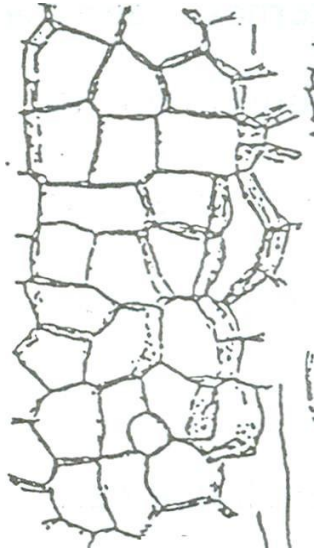
7- Meduallary rays.

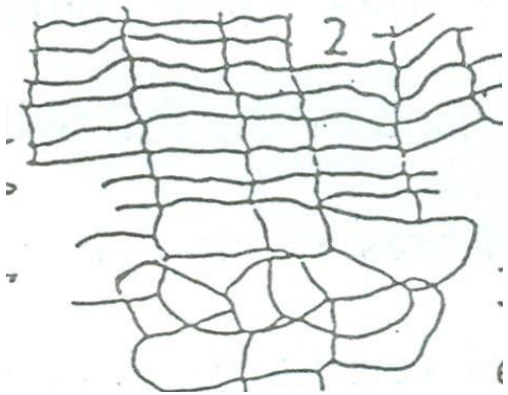
8-Central pith found in the rhizome while central 1ry xylem in the root.

Powdered Liquorice

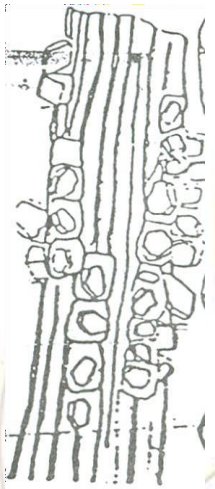
1- Cork cells



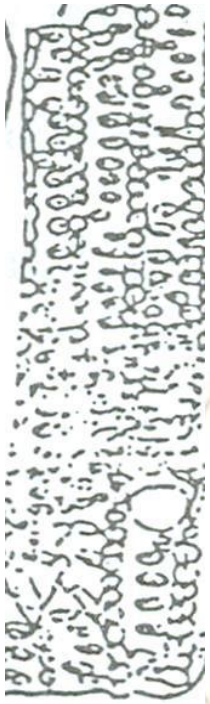




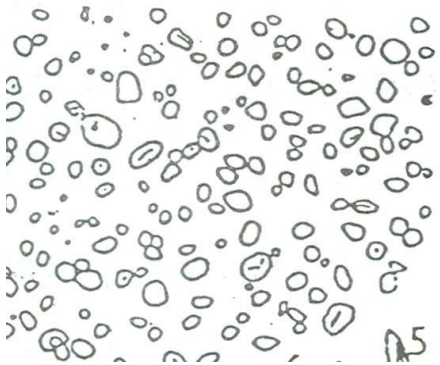
2- Crystal sheath



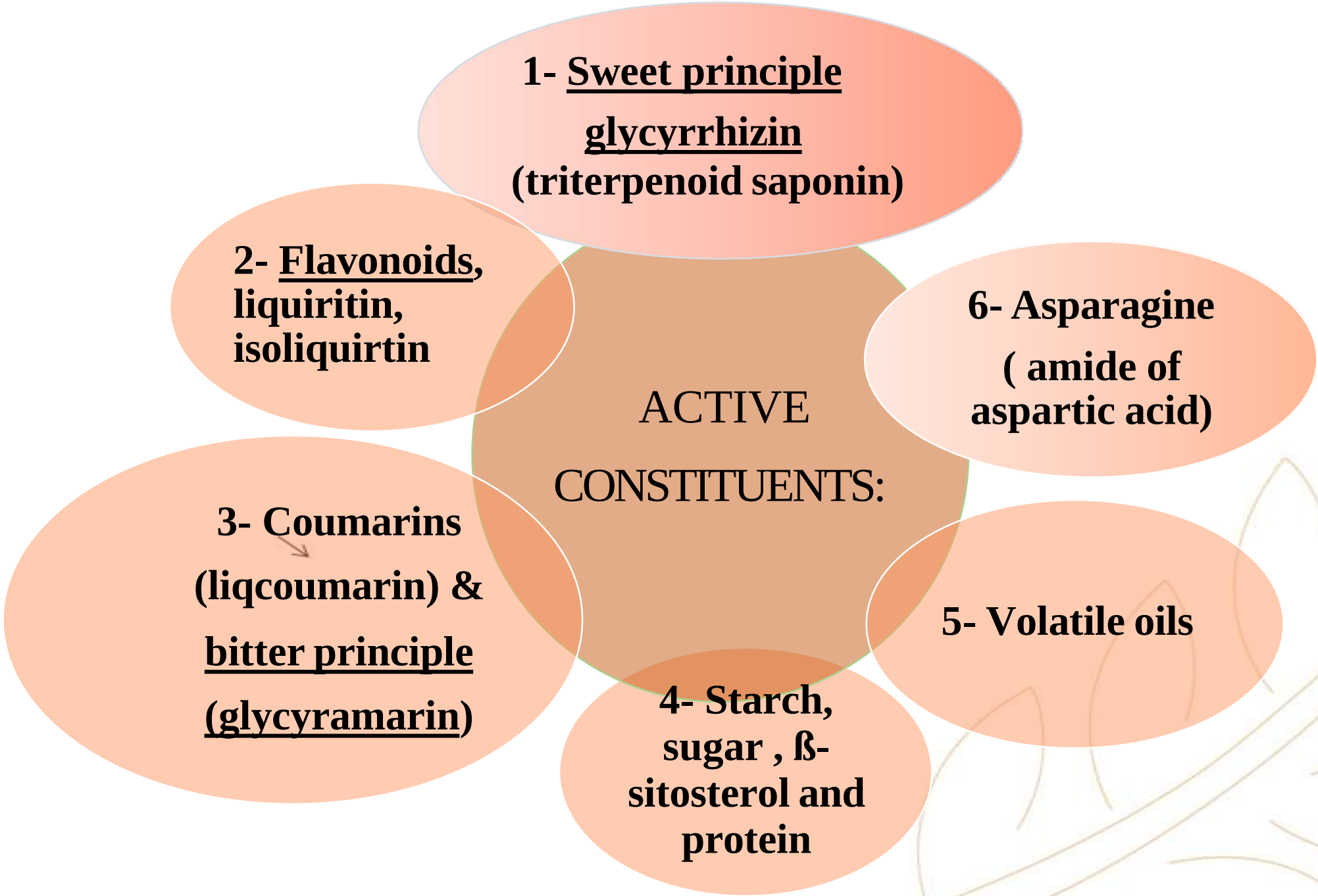
3- Xylem vessels lignified, showing bordered pits



4- Starch granules



5- Prisms of Ca oxalate


1- Sweet principle glycyrrhizin (triterpenoid saponin)
2- Flavonoids, liquiritin, isoliquirtin
ACTIVE CONSTITUENTS:
6- Asparagine (amide of aspartic acid)
3- Coumarins (liqcoumarin) & bitter principle (glycyramarin)
5- Volatile oils
4- Starch, sugar , ß-sitosterol and protein

USES AND ACTIONS:

1- Demulcent and mild **expectorant**

2- **Sweetening agent**

5- Mouth wash **for mouth ulcer.**

3- **Anti-inflammatory for gastric and duodenal ulcer and rheumatoid arthritis** (due to presence of cortisone like compounds)

4- Mild laxative.

Liquorice as cosmeceutical

Cosmeceutical benefits, including anti-aging, sun protection and acne management.

It also promote hair growth but also leave your hair feeling soft and silky.

- **Strengthens hair roots preventing hair breakage and promoting overall hair health.**
- **Promotes hair growth: stimulates the scalp and encourages hair growth.**

The glycyrrhizic acid helps in the proliferation of hair follicles, leading to thicker and fuller hair over time.

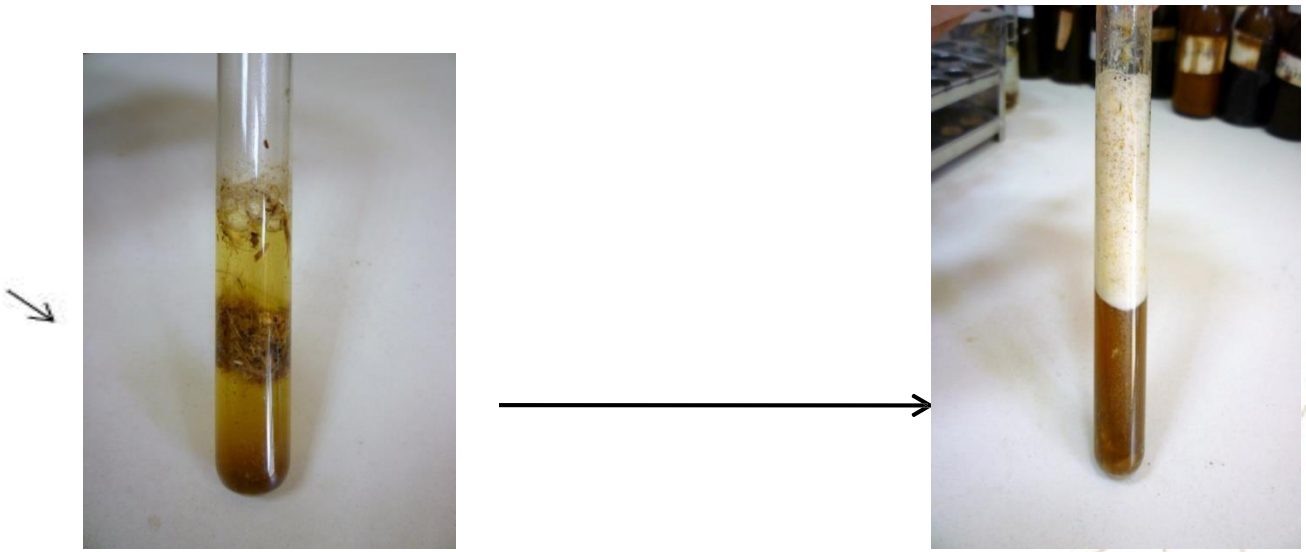
- **Prevents Hair Loss.**
- **Reduces Dandruff and Scalp Issues: has anti-inflammatory and anti-microbial properties, making it effective in reducing dandruff and soothing various scalp issues.**

It helps maintain a healthy scalp environment for hair growth.

CHEMICAL TEST:

1-Froth test:

Powder + Water in a test tube and shake well, Persistent froth stable for more than 1 min. (saponin)



2- Powder +66% H_2SO_4→orange red colour

Deglycyrrhizinated licorice, or **DGL**

- Is an herbal supplement typically used in the treatment of gastric and duodenal ulcers.
- It is made from licorice from which the glycyrrhizin has been removed.

Glycyrrhizin is known to cause negative side effects, such as hypertension and edema; removing the glycyrrhizin is meant to avoid these symptoms

GINGER

Is the fresh or dried rhizomes of

Zingiber officinale

F. Zingiberaceae.

<u>To avoid insect attack ginger undergo:</u>

<u>Decorticated, peeled (unbleached)</u>

<u>Limed ginger (with calcium carbonate)</u>

Ginger is an example for monocot rhizome

The drug has aromatic odour and pungent aromatic taste.

The pungency is destroyed by boiling with KOH solution (c.f. capsicum).

Microscopical characters:

-Cork (in case of unpeeled)

-Cortex with scattered closed vascular bundles.

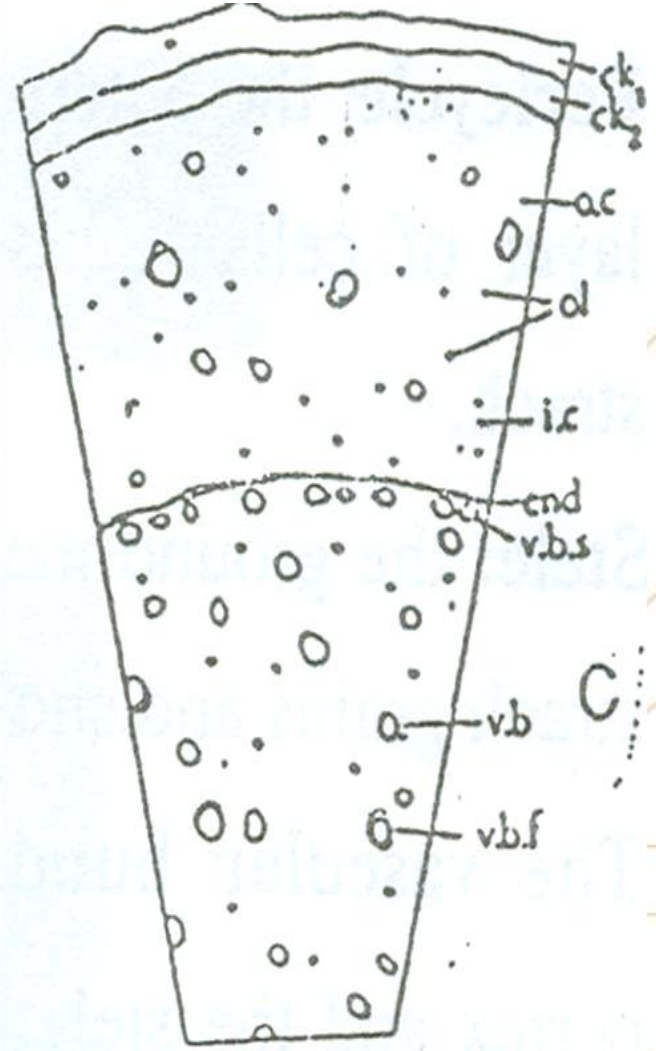
-The parenchyma of cortex contains

large scitaminaceous starch granules and

oleo-resin cells

non lignified septated fibers and

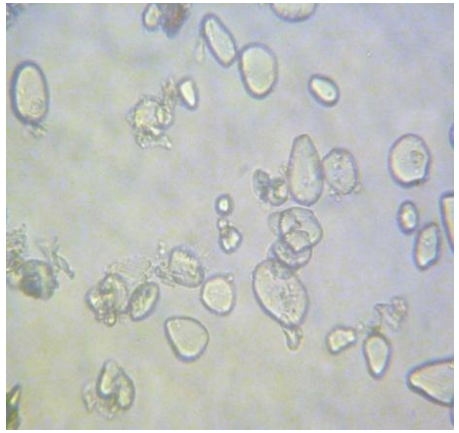
non lignified xylem vessels.



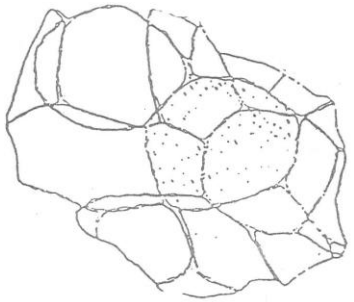
T. S. diagram of Ginger rhizome

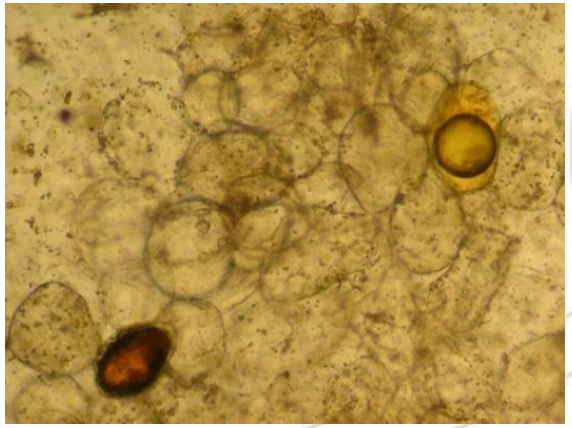
Powder

1- Large scitaminaceous starch granules



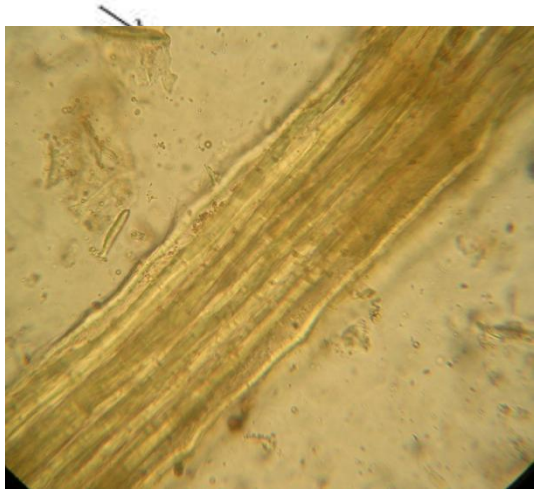
2- Parenchyma contains oleo-resin cells.





3- Non lignified xylem vessels.

4- Non lignified septate fibers with dentate margin and transverse pectosic septa



ACTIVE CONSTITUENTS:

1- Volatile oils

Zingeberene, bisabolene and farnesene

2-Gingerol and shogaols (responsible for pungent taste)

3- Resin and starch

USES

1- **Powerful anti-emetic.**

In motion sickness.

2- **Carminative & flavouring agent**

7- **Cough mixtures**

3- **Reduce high cholesterol level in blood**

6- **Antioxidant**

5- **Anti-inflammatory and in rheumatic pain.**

4- **Improve circulation and antihypertensive**

Some important subterranean drugs

Black ginger

-Origin : the rhizomes of ***Kampferia parviflora*** Known as “Thai ginseng,” F. Zingiberaceae.

Used as food and a folk medicine for more than 1000 years in Thailand

Active constituents:

- Polymethoxyflavones:
- Essential oils: Sesquiterpenoid compounds, such as germacene D, β-elemene, α-copaene, and (E)-caryophyllene

Biological activity:

- Antiallergic
- Anti-inflammatory
- Antidepressive
- Antimicrobial, anticancer.
- Anti-peptic ulcer, cardioprotective, antiobesity .

Black ginger in skin care

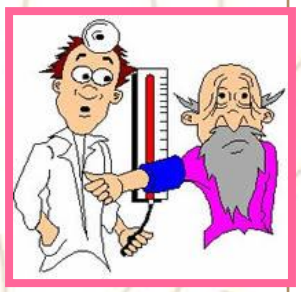
- **<u>Antiacne</u>**
- **<u>Improve skin aging</u>**: by restoring expression of essential components of the extracellular matrix, including collagen type I, fibrillin-1, and hyaluronic acid.
- Regular consumption of black ginger may help reduce the appearance of fine lines and wrinkles, promote skin elasticity, and support a healthy complexion.

Normal Ginger Vs. Black Ginger

Normal Ginger	Black Ginger/Kaempferia Parviflora
It has a pungent and zesty aroma, accompanied by a **slightly spicy and tangy flavor.**	It emits an intense & exotic fragrance with hints of earthiness. **Its flavor is described as milder & less pungent than normal ginger.**
It is renowned for its anti-inflammatory properties, aiding digestion, **relieving nausea**, and supporting immune health.	It is valued for **its antioxidant** content and its potential to boost energy levels, enhance circulation, & promote overall well-being.
The regular/normal ginger exhibits **a pale yellow to golden color, with a smooth and thin skin.**	It stands out with its deep ebony color, often **appearing darker and more intense than normal ginger. Its skin is rougher and thicker.**
It is a versatile spice used in various cuisines, adding flavor and aroma to dishes, beverages, and desserts	While less commonly used in cooking, it can be infused into teas, herbal remedies, & health supplements for its health benefits.

Some important subterranean drugs

Name	Origin	Active constituents	Uses
Curcuma or Turmeric	**Is the dried prepared rhizome of *Curcuma domestica* or *Curcuma longa* F. Zingiberaceae** ↘	**1- <u>Volatile oils; turmerone, zingiberene</u>** **<u>2-Curcumin (a yellow polyphenol)</u>** **3- Resin, starch (gelatinzed) and sugar.**	**1-<u>Antiinflammatory,</u> antioxidant and <u>antihepatotoxic</u>** **2-Colouring agent, and carminative**

Name	Origin	Active constituents	Uses
Rauwolfia 	**Is the dried root and rhizome of Rauwolfia serpentina F. Apocyanaceae.** 	**Mainly <u>alkaloids</u> (<u>Reserpine</u>, rescinnamine, <u>ajmaline,</u> ajmalinine and serpentine.)** 	**1-Reserpine used as powerful <u>antihypertensive</u>.**  **<u>2-In insomnia and psycatric disorders.</u>**

Home work

- Suggest the types of the following undergrounds:
  liqorice- ginger- onion- sweet potato- colcasia
- How can you differentiate between normal ginger& black ginger
- How can you differentiate between roots & rhizomes
- How can you differentiate between subterranean stem & aerial stem
- Mention the uses & contraindications of *liquorice*
- Mention the uses curcuma and rawolfia

Case 1

Adel is an 18- year- old male who suffers from lymphoma. He was admitted to the hospital to take chemotherapy. After taking the required dose, he experienced vomiting as a side effect to the chemotherapeutic drug**.**

I- Suggest **a drug** that can be used to treat this side effect, mention **its main active constituent, and how can you test for this active constituent.**

Case 2

A pregnant female was admitted to the hospital for labor, she had difficulty in giving birth. After delivery, the baby was suffering from difficulty in respiration. After saving both the mother and the baby, the mother showed low milk secretion.

I-Suggest **a crude drug** that can be used to facilitate the delivery, mention **its main active constituent, and how can you test for this active constituent.**

II- Suggest **a crude drug** that can be used to help the baby with his difficulty in breathing, mention **its main active constituent, and explain other uses of this drug.**

III-Suggest the name **of two crude drugs from different plant organs** to promote her milk production and **mention their main active constituents**.

Faculty of **Pharmacy**

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October Univeristy for Modern Sciences and Arts
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Thank You!

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