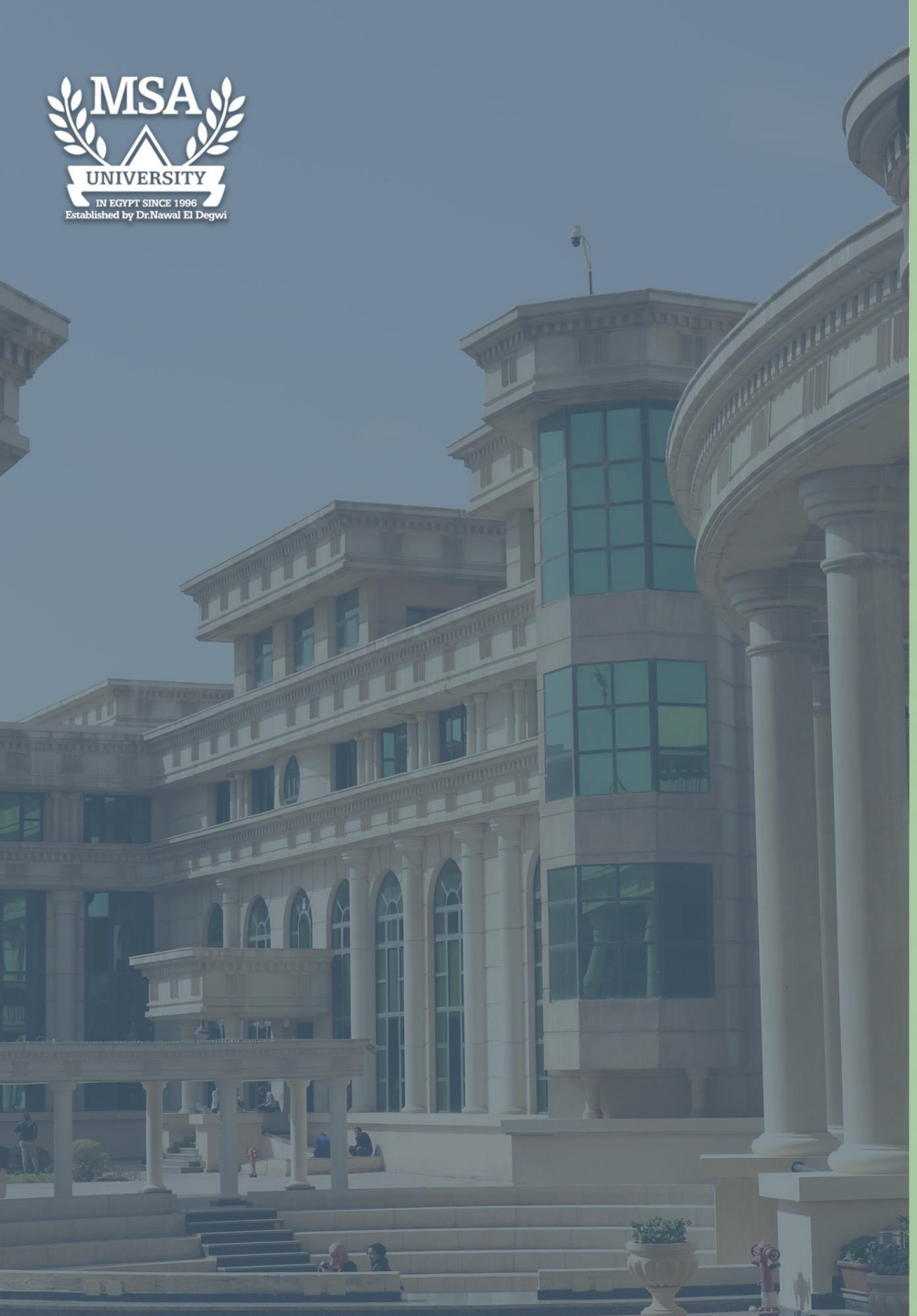

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Pharmacognosy
PHG112





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Author	Date	Title	Publisher	ISBN
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Discussion of Midterm Exam



Lecture 8

Introduction to Herbs and Examples

Interactive teaching methods and activities





Learning Outcomes

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

1. Knowledge / Remembering

- **Define** herbs (Herba) as drugs composed of the aerial parts of plants.
- **List** the different types of herbs (flowering tops, aerial parts, whole plant).
- **Identify** the classification of herbs based on life cycle (annual, biennial, perennial).
- **Recall** the botanical sources and families of Lobelia, Ergot, and Cannabis.

2. Comprehension / Understanding

- **Explain** the structure and functions of the stem including transport and support roles.
- **Describe** the macroscopic and microscopic characteristics of Lobelia and Cannabis powders.
- **Discuss** the pharmacological actions and uses of Lobelia, Ergot, and Cannabis.
- **Summarize** the concept of ergotism and its toxicological significance.

Learning Outcomes

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

3. Application

- **Apply** microscopic features (trichomes, vessels, crystals) to identify powdered herbal drugs.
- **Use** chemical tests (Van Urk test, Beam's test, Fast blue test) to detect active constituents in herbal drugs.
- **Relate** active constituents (alkaloids, cannabinoids, ergometrine) to their therapeutic uses.

4. Analysis

- **Differentiate** between the pharmacological actions of Lobelia, Ergot, and Cannabis.
- **Analyze** the relationship between chemical constituents and their CNS or systemic effects.
- **Compare** short-term and long-term effects of Cannabis use.

Learning Outcomes

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

5. Synthesis / Creating

- **Construct** a comparative table summarizing source, constituents, and uses of the studied herbs.
- **Propose** a simple identification scheme combining microscopic and chemical tests for herbal drugs.

6. Evaluation

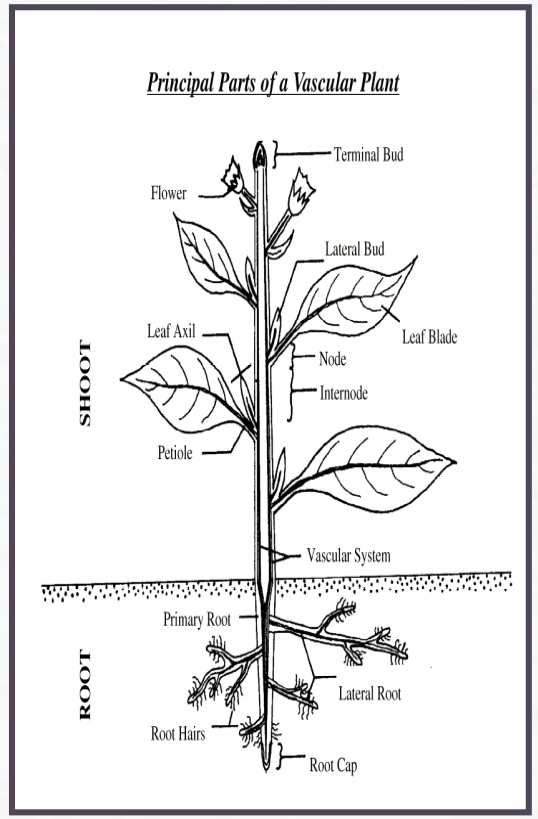
- **Evaluate** the therapeutic importance versus toxicity of ergot alkaloids and cannabis constituents.
- **Assess** the risks of misuse or abuse of herbal drugs with CNS activity.
- **Judge** the reliability of pharmacognostic identification methods in ensuring drug quality and safety.

Introduction

What is an herb?

Herb is a drug composed usually of the tender parts of the plant axis.

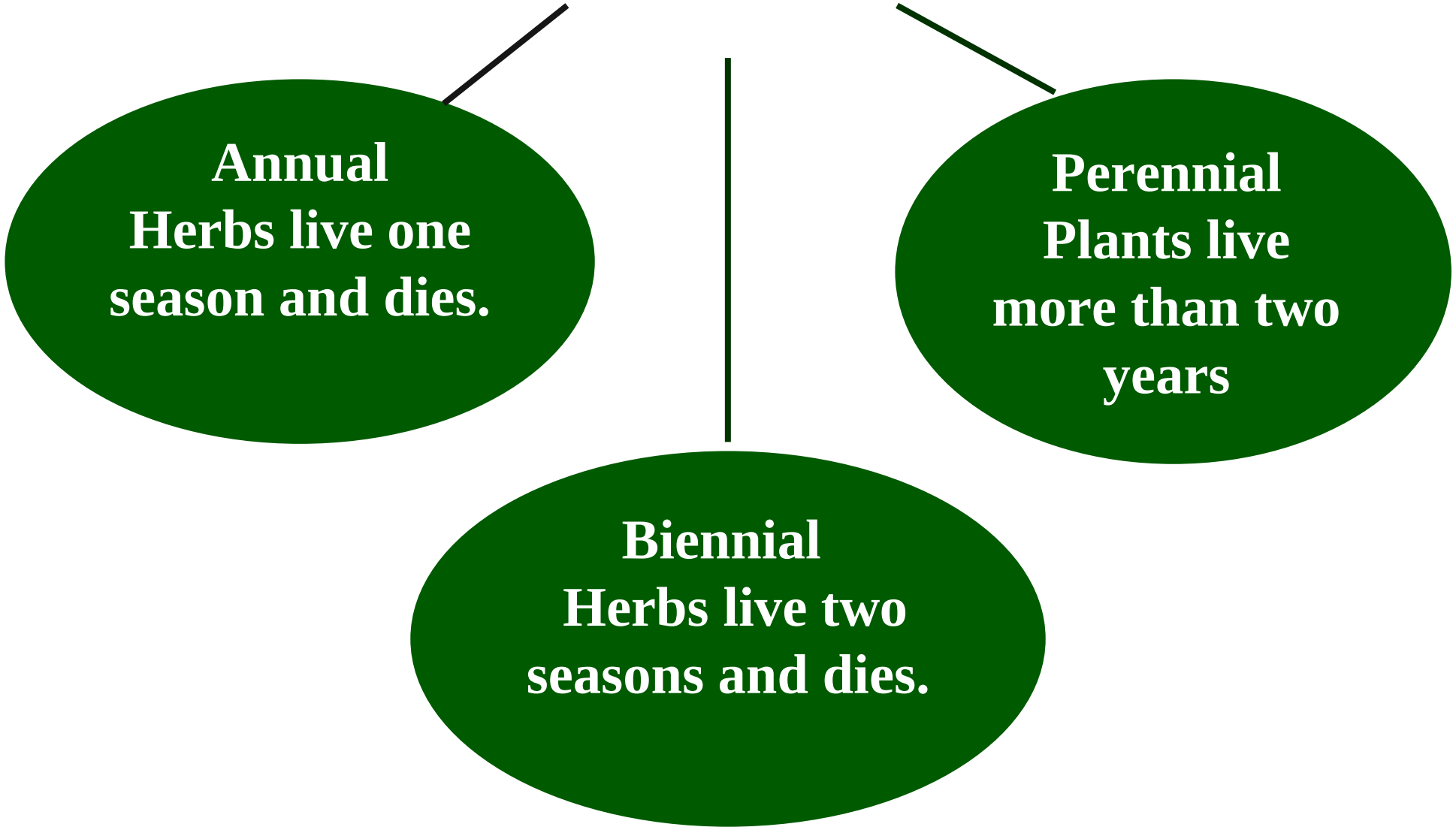
(the stem + leaves +flowers + fruits).



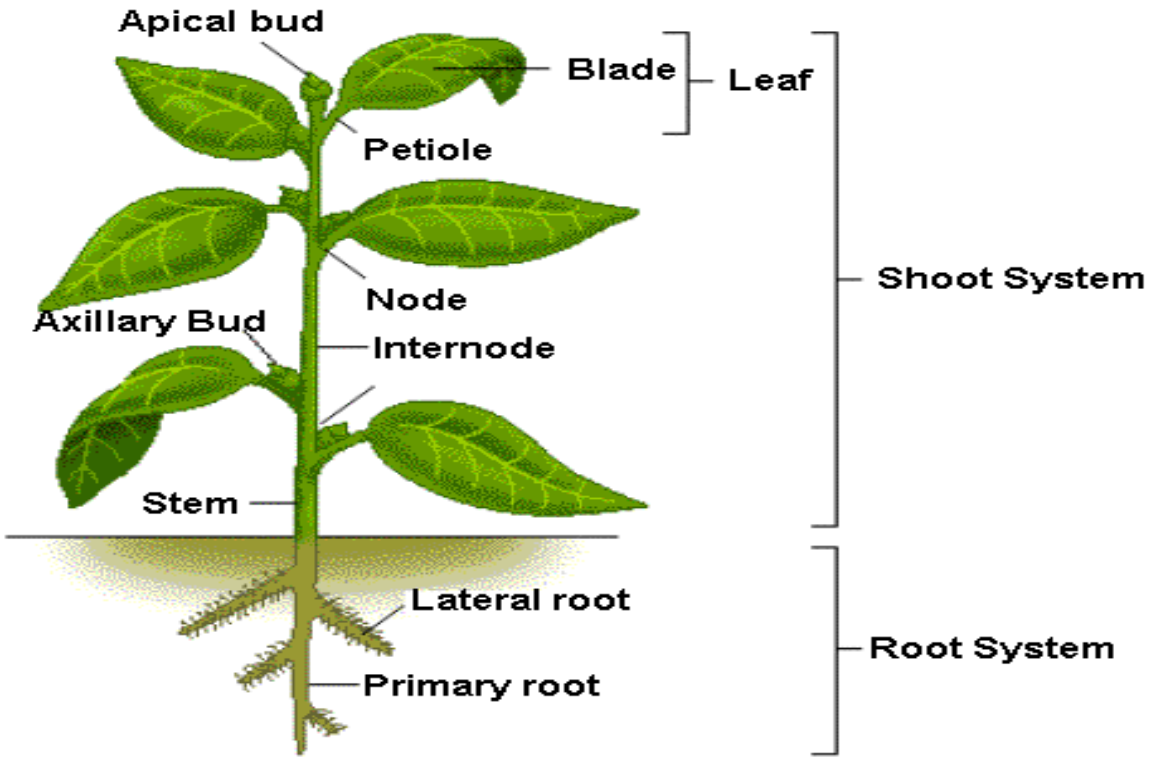
Herbs include

- 1- Flowering tops (young stem, leaf, flower, fruit)
- 2- Aerial parts (old stem, young stem, leaf, flower and fruit)
- 3- Whole plant (aerial parts plus root)

Herbs are classified according to life duration into



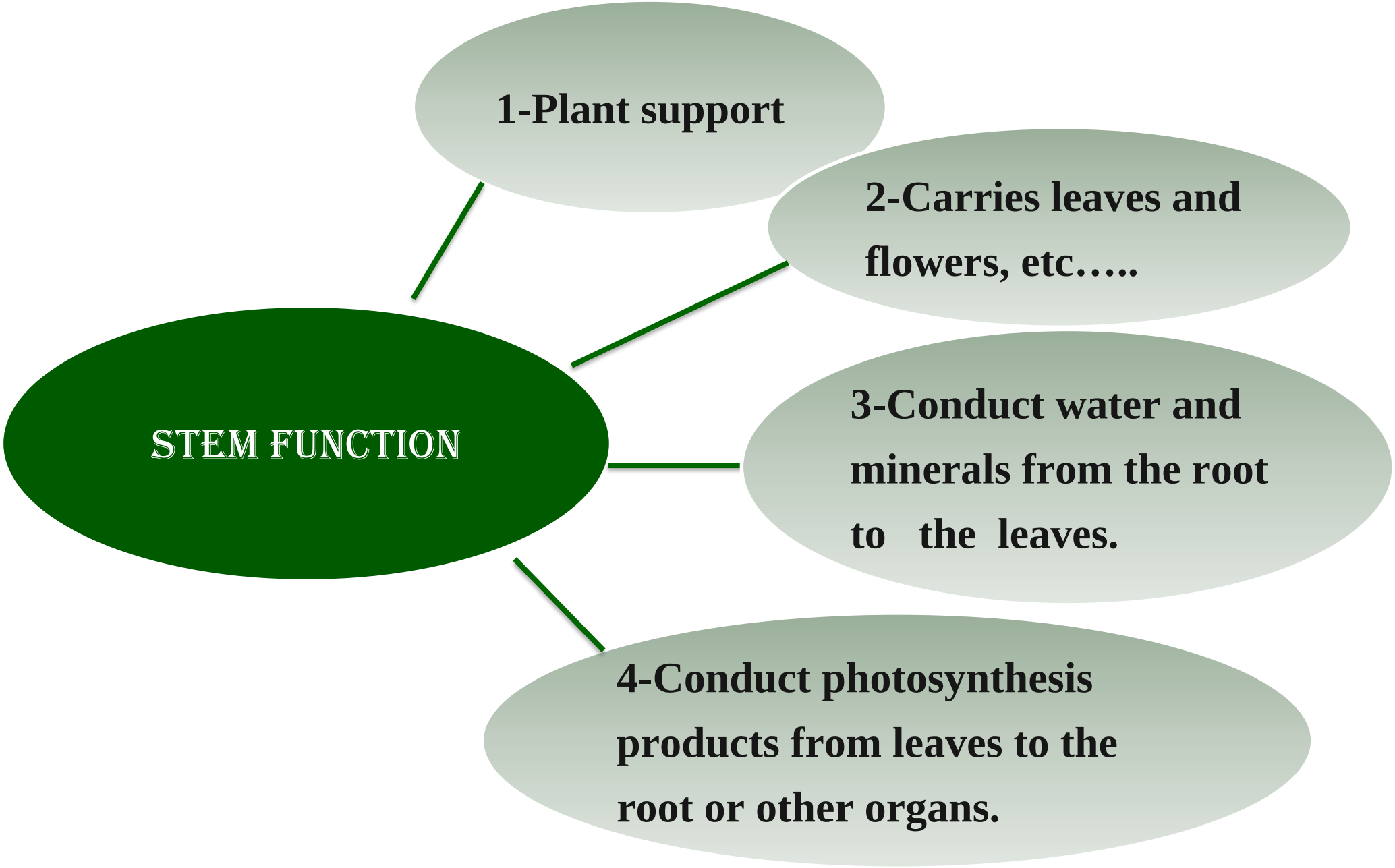
The Stem



Definition

Stem: - It is a part of the plant which carries the leaves and other plant organs.

- It has nodes and internodes.


STEM FUNCTION
1-Plant support
2-Carries leaves and flowers, etc…..
3-Conduct water and minerals from the root to the leaves.
4-Conduct photosynthesis products from leaves to the root or other organs.

Structure of The Stem

Epidermis: with cuticle, stomata and hairs

Cortex: Parenchyma, Collenchyma

Endodermis: inner most layer of cortex.

Pericycle: parenchyma, collenchyma, fibers, sclereids.

Pith: parenchyma; pitted lignified

Cambium: Responsible for 2ry thickening giving 2ry phloem outside and 2ry xylem inside.

Phloem

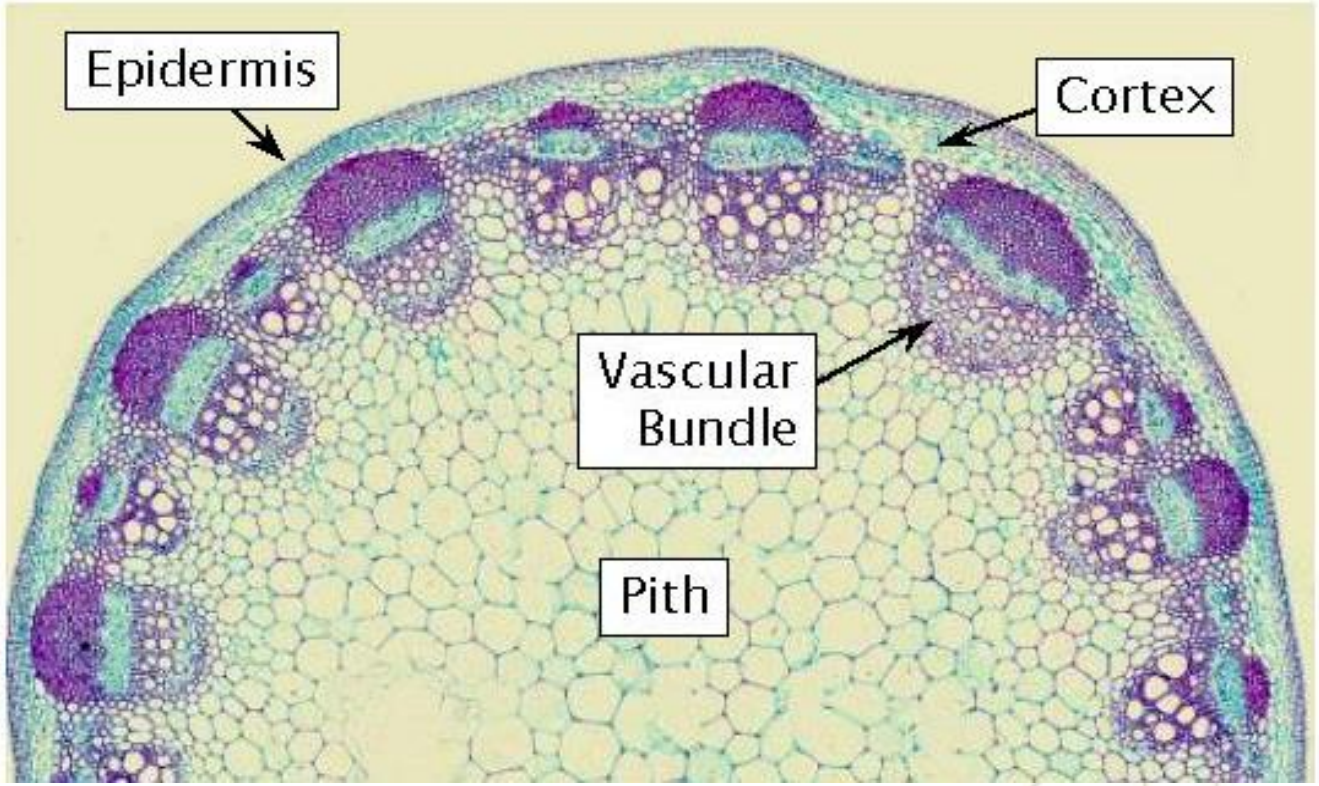
Xylem: Vessels (Spiral, annular, pitted.

Fibers and wood parenchyma)

N.B.

Stele: All tissues inside the endoderm .

T. S. in Young (herbaceous) stem of Dicotyledons:



[Vascular bundle is Open V.B.]

Lobelia herb (Indian tobacco) Asthma weed, Duchan Hindi



Origin: Is the dried aerial parts of *Lobelia inflata* F. Campanulaceae.

It is used by North American Indians as domestic medicine as a cigarette for asthma.



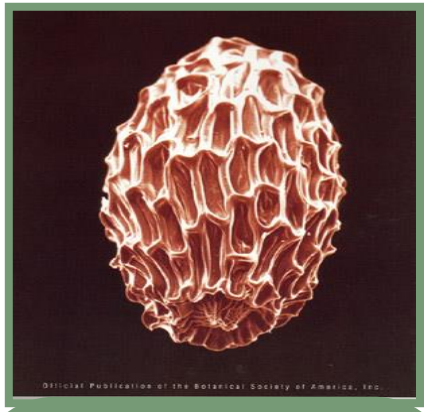
Macroscopical characters :



Flowers: Pale blue flowers



Fruits: Capsule containing about 500 small seeds.



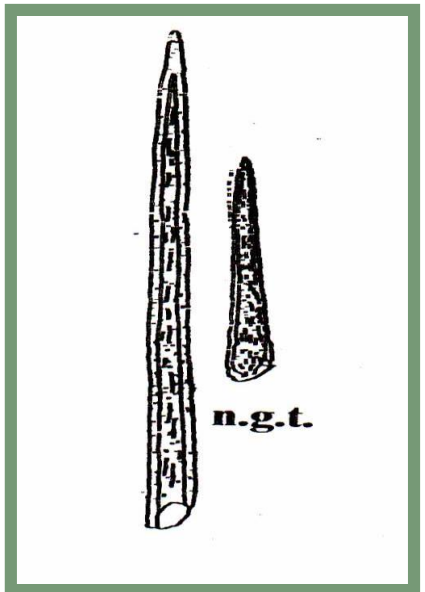
Seeds: 0.5 mm long and 0.3 mm wide, reddish-brown with reticulate surface.

Powder:

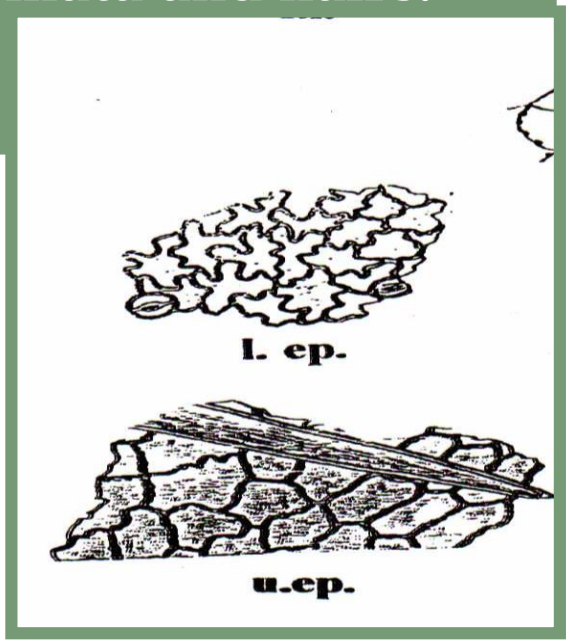


1- Non glandular hairs (conical, unicellular with lignified inner walls).



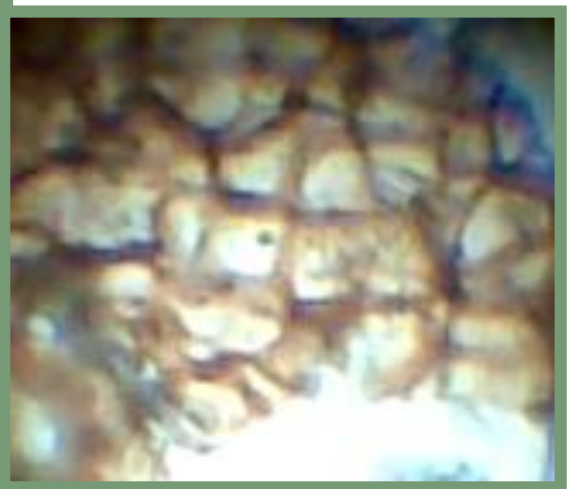


2- Fragments of leaves showing beaded papillosed epidermal cells, anomocytic stomata and hairs.

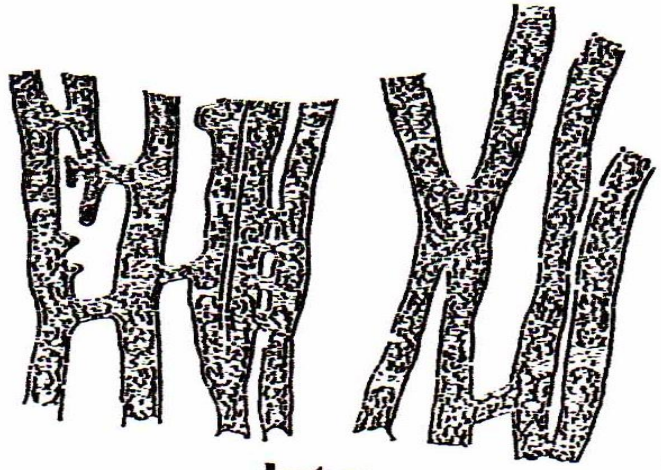


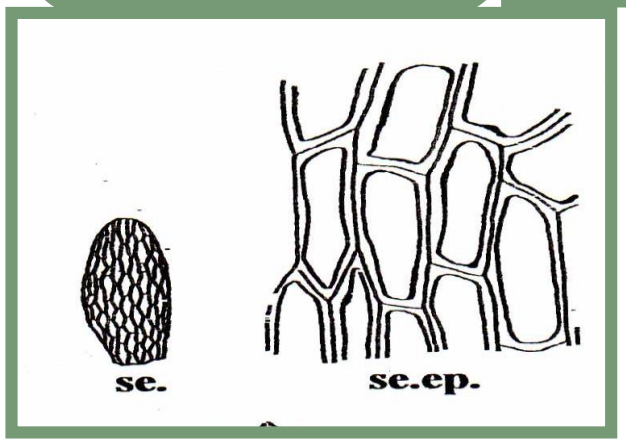
Powder:

3- Fragments of seed coat showing the characteristic thick-walled, lignified cells.

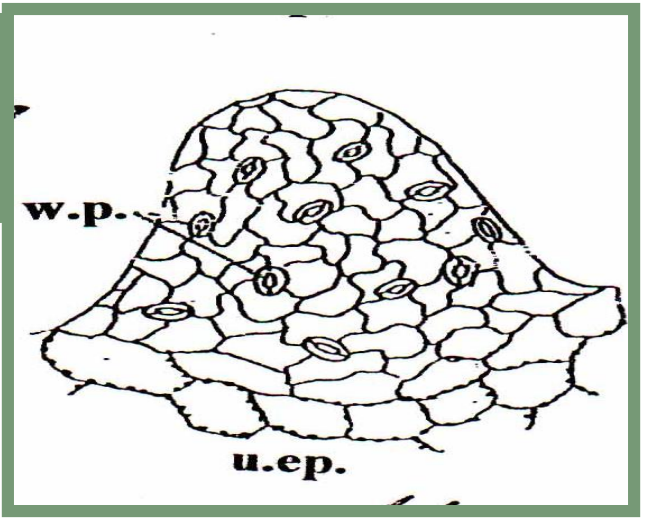


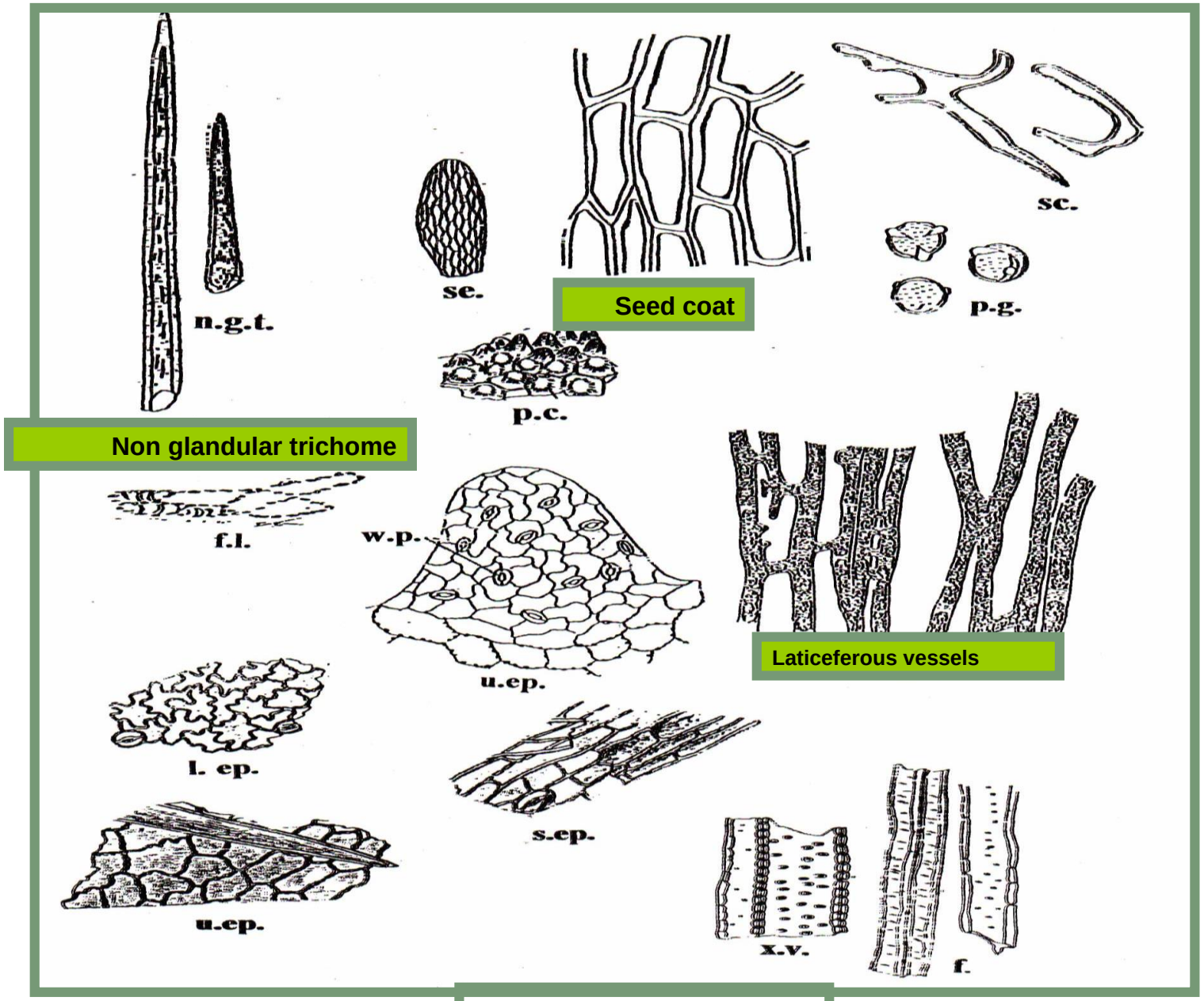
4-Laticiferous vessels





5- Fragments of upper epidermis of leaves showing water pores.





Lobelia powder

ACTIVE CONSTITUENTS

1-Alkaloids (0.25-0.4%) Lobeline, lobelidine, lobelanine & isolobelanine.
2-Neutral principle inflatin
3-Lobelic acid

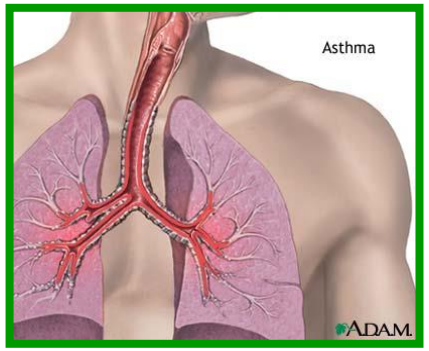
USES:

1-Expectorant

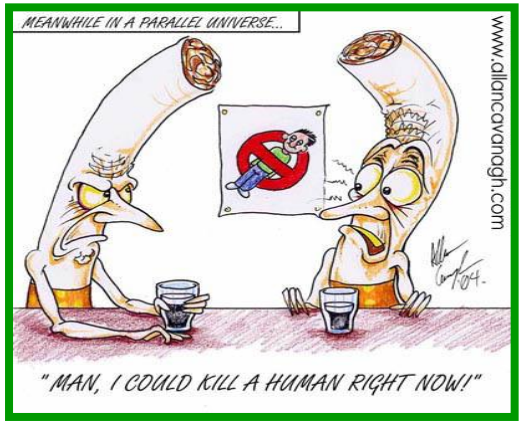


2-An injection of lobeline HCl is used for resuscitation in newborn babies.

3-In treatment of bronchitis& bronchial asthma as it dilates the bronchioles.



4-Breaking of smoking habit



Ergot

Ergot of Rye

Ergot is the sclerotium of *Claviceps purpurea* Family Hypocreaceae, developed in the ovary of rye plant, *Secale cereale* family Graminae.

What is ergotism?



PLATE XXXVII.—*Claviceps purpurea* (Rye ergot). (From Jackson: *Experimental Pharmacology and Materia Medica.*)

ACTIVE CONSTITUENTS

A- Alkaloids (Ergometrine and ergotamine)

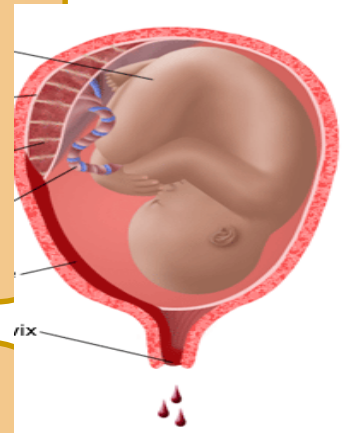
B - LSD (lysergic acid diethylamide) a hallucinogenic illegal drug

C- Ergosterol used in synthesis of Vit. D

USES

1- Ergometrine alkaloid:

- Oxytocic: It stimulates the uterus → initiate delivery (labor)
- It reduces postpartum hemorrhage



2- Ergotamine alkaloid:

- Vasoconstrictor, used for the treatment of migraine.
- Used in combination with caffeine to treat headaches.



Pharmaceutical Preparations Containing Ergot Alkaloids





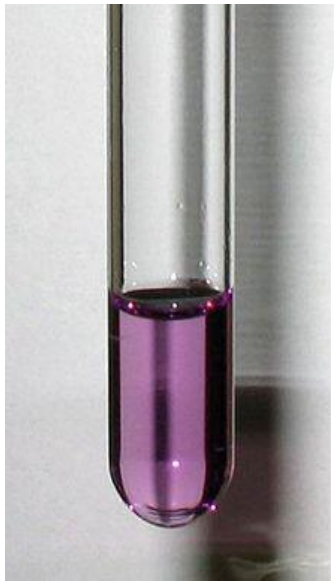






CHEMICAL TESTS

1- Test for Chitin



Digest the sclerotium with NaOH to give chitosan , acetic acid and ammonia.
Chitosan + Iodine + H_2SO_4 gives violet colour.

2-Test for coloring substance

Shake the ergot with ether & 5 drops of H_2SO_4, add $NaHCO_3$ and shake well where a reddish violet colour is given in the aqueous layer (used to detect ergot in flour).

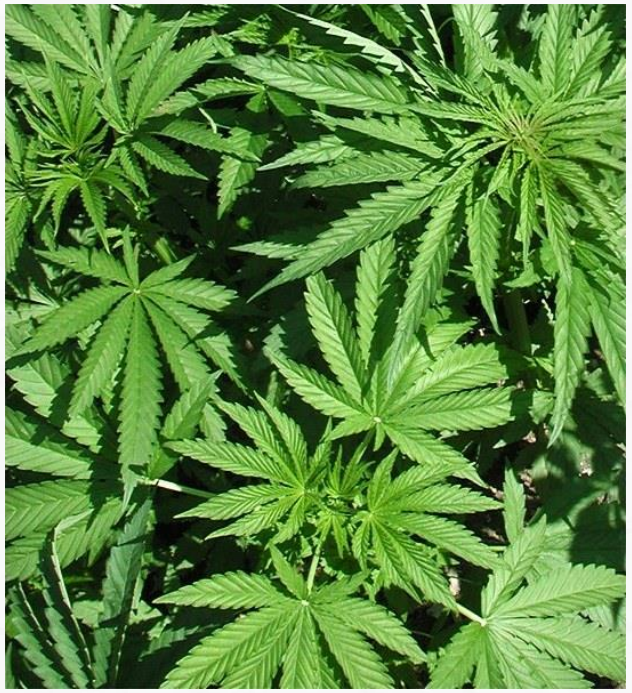
3- Test for ergotoxin (Van Urk)

Shake the ergot with Na_2CO_3 and $CHCl_3$
Separate the chloroform layer and shake it with Van Urk reagent (PDMAB and $FeCl_3$ in H_2SO_4) where a blue colour is developed in the acid layer.

Cannabis Herb (Indian Hemp, Hashish, Marijuana)

Origin: Is the dried pistillate plants (leaves and flowering tops) of *Cannabis sativa* Family Cannabinaceae.

- **The plant is cultivated in tropical countries for resin production.**
- **In temperate region it produces less or no resin but more fibers.**



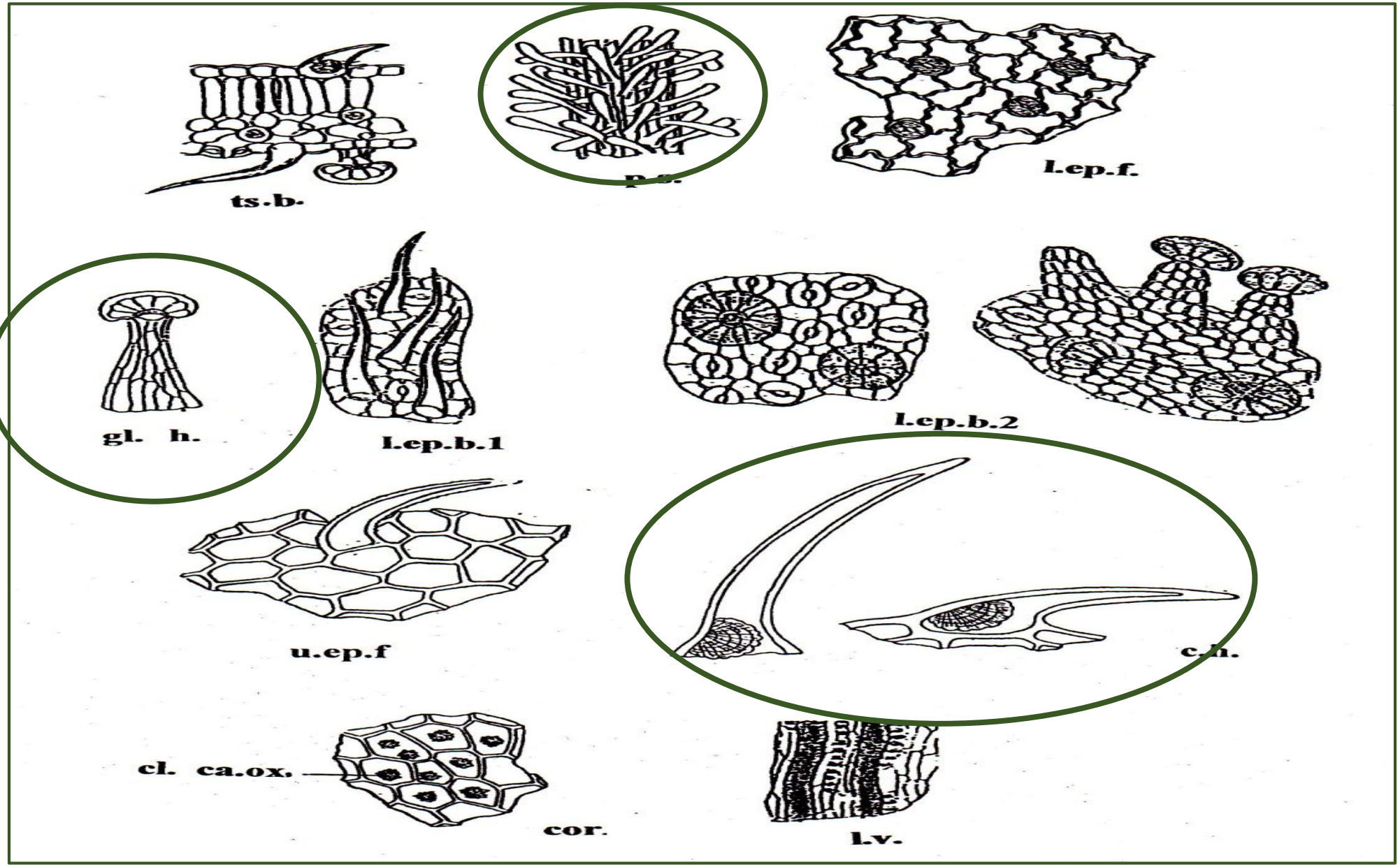
Powdered cannabis

- **Color:** Dark green
- **Odor:** Narcotic characteristic
- **Taste:** No taste.

Microscopical characters of the powder:

- 1-Glandular trichomes showing globular multicellular head of 8-16 radiating club-shaped cells and a long multicellular pluriseriate stalk.
- 2- leaf tissue with cluster crystal of Ca Ox.
- 3- Curved hairs with or without cystolith of $CaCO_3$.
- 4- Glandular trichomes with labiaceous glandular head and short unicellular stalk.
- 5- Papillosed stigma.
- 6- Laticiferous vessels and pericyclic fibers.

Powdered cannabis



ACTIVE CONSTITUENTS

1-Resin materials :

Tetrahydro cannabinol (THC) and cannabinoids e.g. Cannabinol & cannabinal

2-Nitrogen bases e.g. choline, trigonelline

3-Volatile oil, oxidase enzyme

4-Sterols

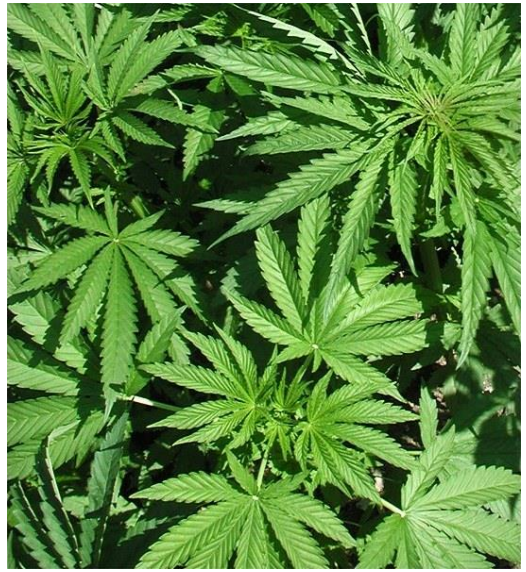
USES & ACTIONS

1- CNS stimulant, it produces mental excitement , delirium with hallucination followed by sleep interrupted by bad dreams &marked weakness & mental depression, high sensitivity to sound and less to time & space.

2- Analgesic

3- Anti anxiety& sedative in mania & hysteria

4- THC is a potent anti-emetic used in cancer patients



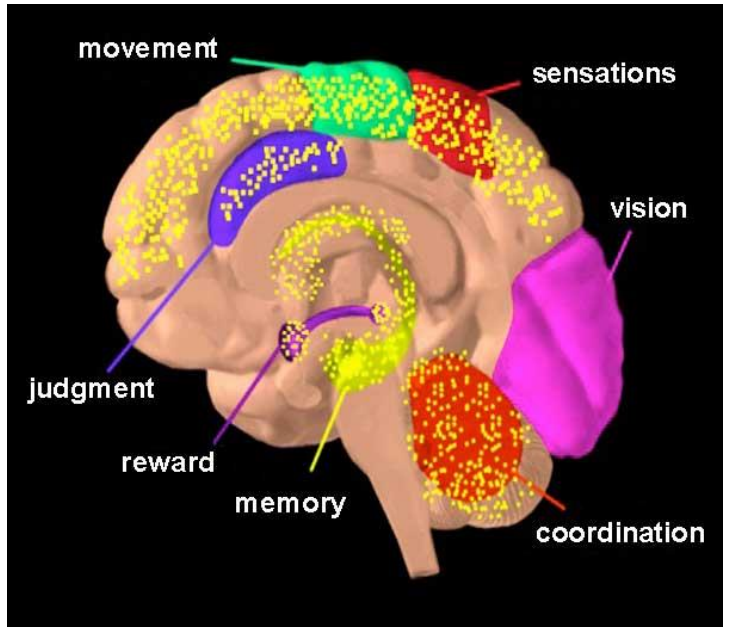
Side Effects

❑ **Short term side effects:**

Decrease in short-term memory, dry mouth, impaired motor skills, red eyes and feelings of paranoia or anxiety

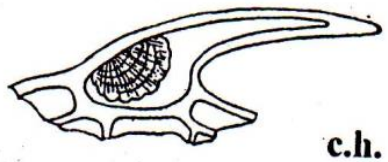
❑ **Long term side effects:**

Addiction, decreased mental ability in those who started as teenagers, and behavioral problems in children whose mothers' used cannabis during pregnancy.



CHEMICAL TESTS

1- Powder+ HCl produces eff. due to calcium carbonate in cystolith.



2- Beam's test: Cannabis shaked with light petrol and alc. KOH and amyl alcohol give violet pink colour.

3- Fast blue test: (di-O-anisidine tetrazolium chloride) Biological samples + Fast Blue reagent

Different sequences of colors with different cannabinoids



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https://notebooklm.google.com/notebook/5b8c9885-3660-4f77-a955-b3a75113c313


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