

*we have different shapes of leaves but all of them share a primary function which is (absorption Sunlight & Photosynthesis).

Experiment (4) Microscopical Identification of Different Leaves and Herbs

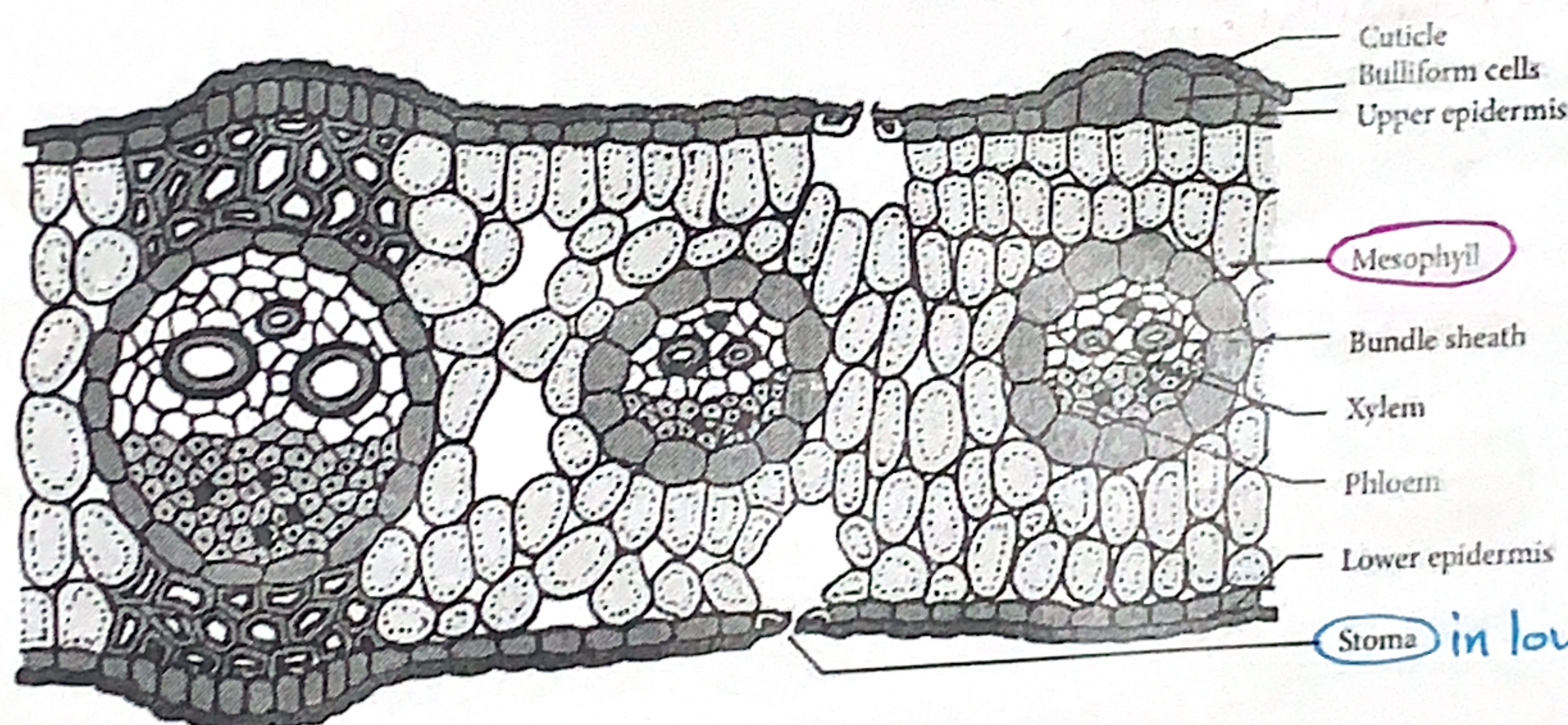
❖ **Epidermis:** → higher
→ Lower

ترتيب بسمك خلية واحدة

This is the outermost layer of the plant structure and is usually one cell thick. Important diagnostic features include the shape of the anticlinal (vertical) and the periclinal (horizontal) walls (e.g., straight, or wavy), the presence of thickening (such as beading), and the occurrence of striations of the surface cuticle (waxy protecting film covering the epidermis of leaves). Once the plant exposed to the sun

Distributed among the relatively nonspecialized epidermal cells are a number of highly specialized and characteristic structures mainly stomata and trichome.

→ Cuticle is form which repel the water & shell pesticides from the leaves



❖ **Trichomes:**

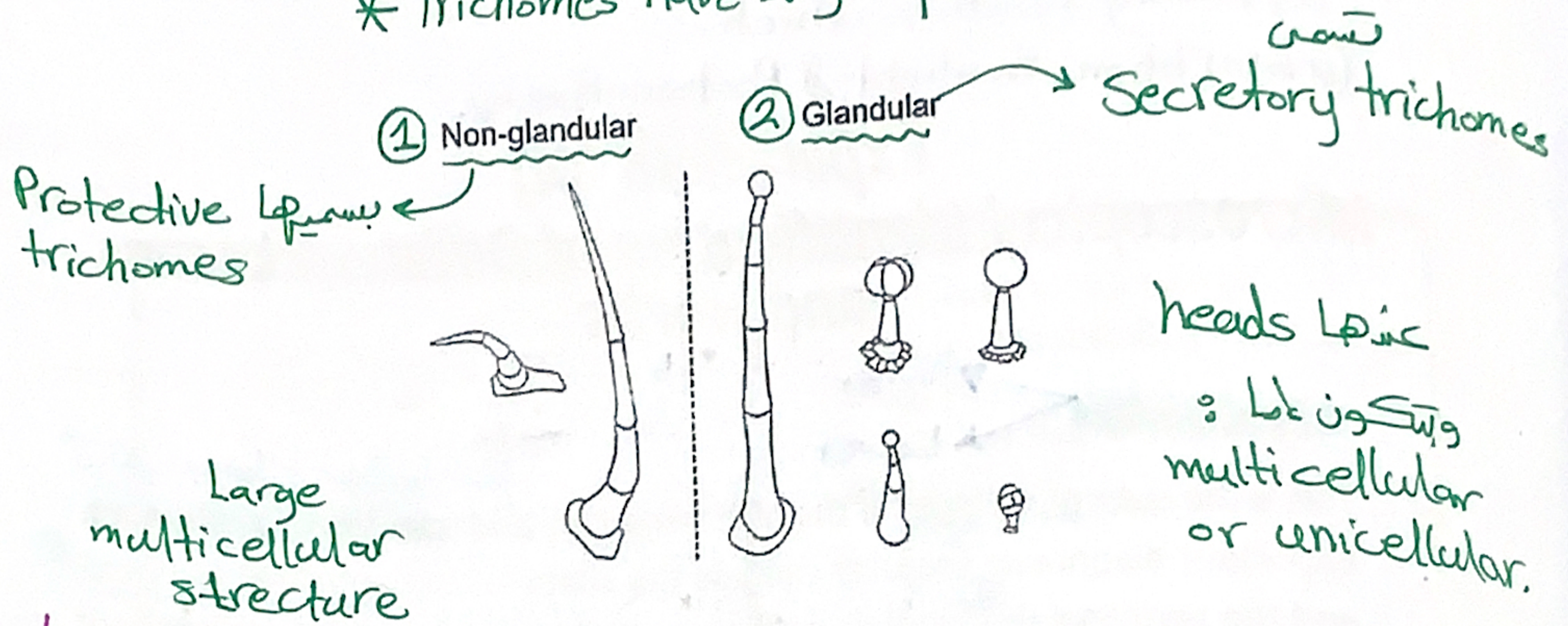
Most leaves and many herbaceous stems, flowers, fruits, and seeds possess hairs or trichomes of one kind or another. Many shows hair of more than one type.

The trichomes (hair) may be grouped into:

- Non-glandular (protective) hairs: These may be unicellular which vary from small papillose outgrowth to large structures, or multicellular.
- Glandular (secretory) hairs: A glandular hair usually has a stalk and a head. The stalk may be either unicellular or multicellular, and likewise, the head may be either unicellular or multicellular.

head و stalk
unicellular
multicellular

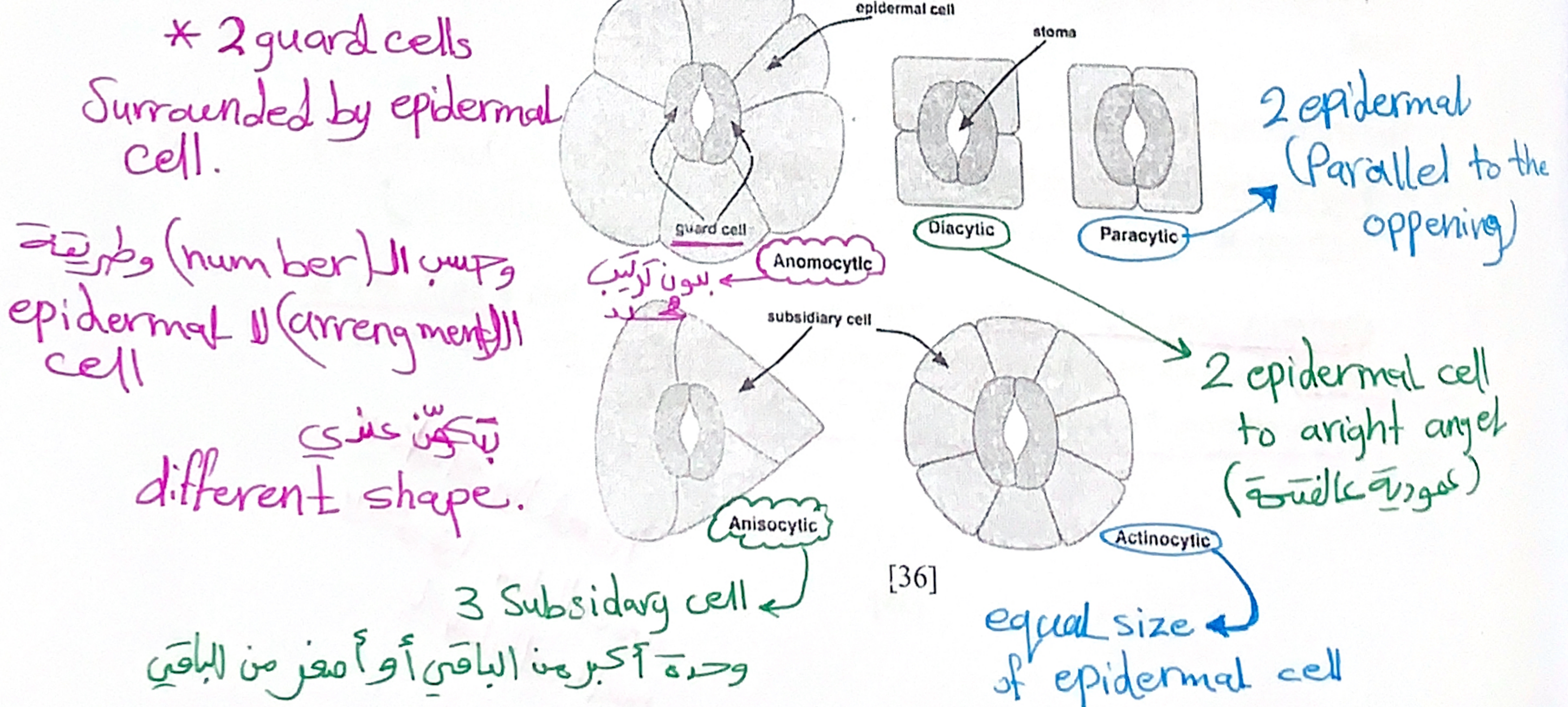
* Trichomes have 2 groups:



Stomata: regulate the passage of gases & vapor into and out by transpiration process. Stomata (Singular: stoma) most frequently occur on the young leaves and stems but can also be found on other organs like flowers. Stomata allow gas exchange between the surrounding air and the photosynthetic cells inside the leaves. A stoma consists of a pore surrounded by two guard cells. microscopical openings Open & Close according to the temperature, humidity, sunlight,

The arrangement of epidermal cells around the stoma falls into one of four main types:

- Anomocytic stomata: the stomata are surrounded by cells resembling the other epidermal cells with no particular arrangement.
- Anisocytic stomata: the stoma is surrounded by three or four subsidiary cells one of which is smaller or larger than the others.
- Diacytic stomata: the stoma has two subsidiary cells with their long axis at right angles to the pore of the stoma.
- Paracytic stomata: the stoma has two subsidiary cells with their long axis parallel to pore of the stoma.



We are going to examine three selected plants:

❖ Leaves:



Sage leaf

أوراق الخس



Senna leaf

❖ Herbs:



Absinthium herb

عشبة الشب

أوراق الخمرصة

1. Sage Leaf: Scientific name family
Dried leaf of *Salvia officinalis* (Labiatae).

➤ Physical characters:

- Color: grayish green أخضر مائل للرمادي
- Odor: aromatic / spicy.
- Taste: slightly bitter & aromatic / spicy. طويها مر

➤ Constituents:

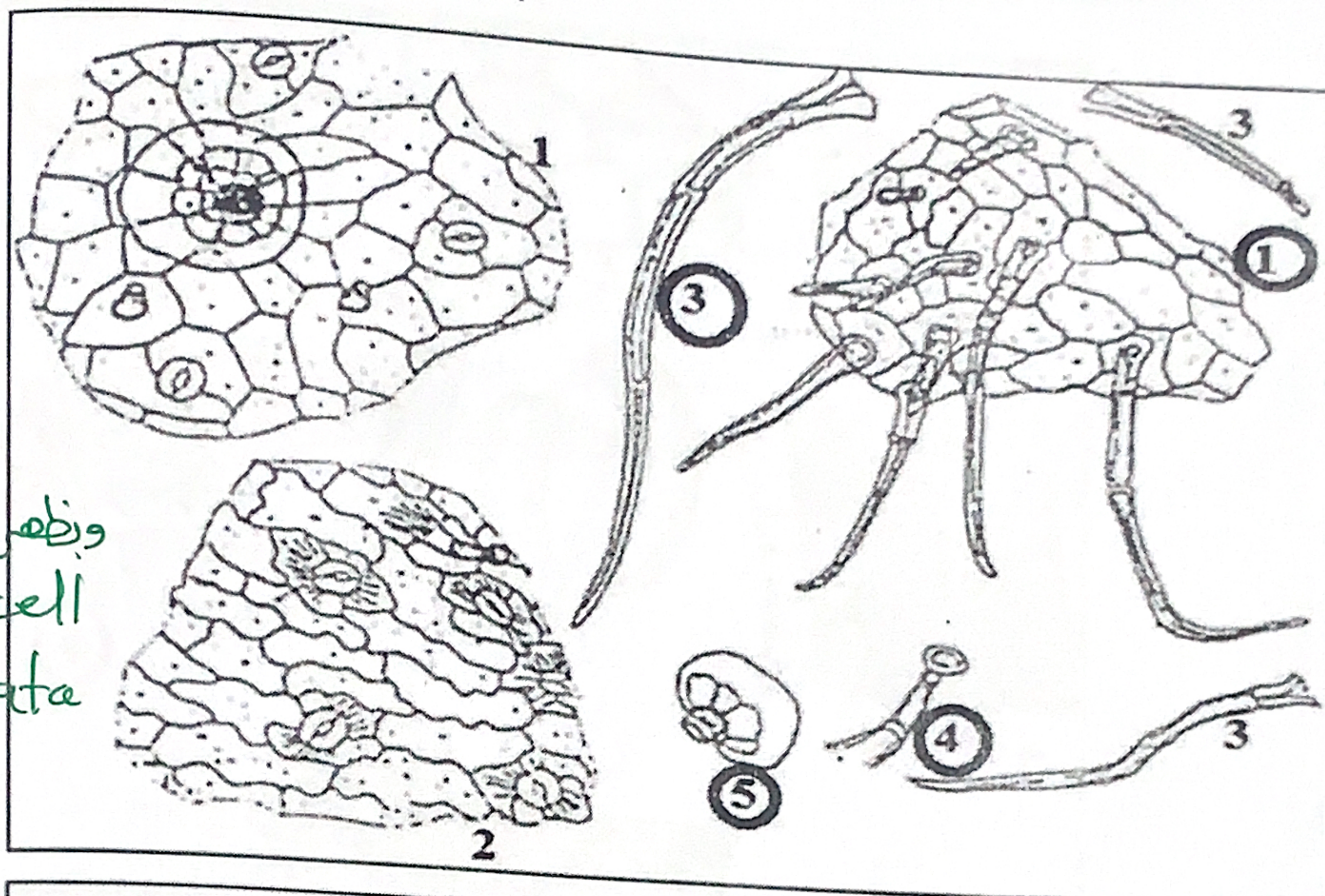
- Volatile oils (cineole) → terpene ether
- Flavonoids
- Terpenes
- Tannins
- Acids

➤ Uses:

- Antispasmodic activity ^{للمخض}
- Gingivitis, (Antimicrobial and Antiviral) + Anti-inflammatory ← as mouth wash or gargles
- Enhance memory (cineole)
- Hypoglycemic activity لمرضى السكر (بشأن مستوى السكر)

+ asthma & COPD

❖ Examination under microscope:



1. Fragment from upper leaf epidermis in top to view
2. Fragment from the lower leaf epidermis in top view
3. Fragments of long smooth multicellular (2-4 cellular), non glandular hairs (KE)
4. Fragments of a glandular hair with multicellular stalk and unicellular head
5. glandular hair side view

II. Senna Leaf:

Dried leaves of *Cassia acutifolia*, *Cassia angustifolia* (Fabaceae).

➤ Physical characters:

- **Color:** grayish-green to yellowish-green
- **Taste:** mucilaginous slightly bitter *مر وصفي*
- **Odor:** distinctive, not penetrating.

➤ Constituents:

- Anthraquinones: dianthrone glycosides, primarily sennosides A and B.
- Flavonoids.
- Saponins.

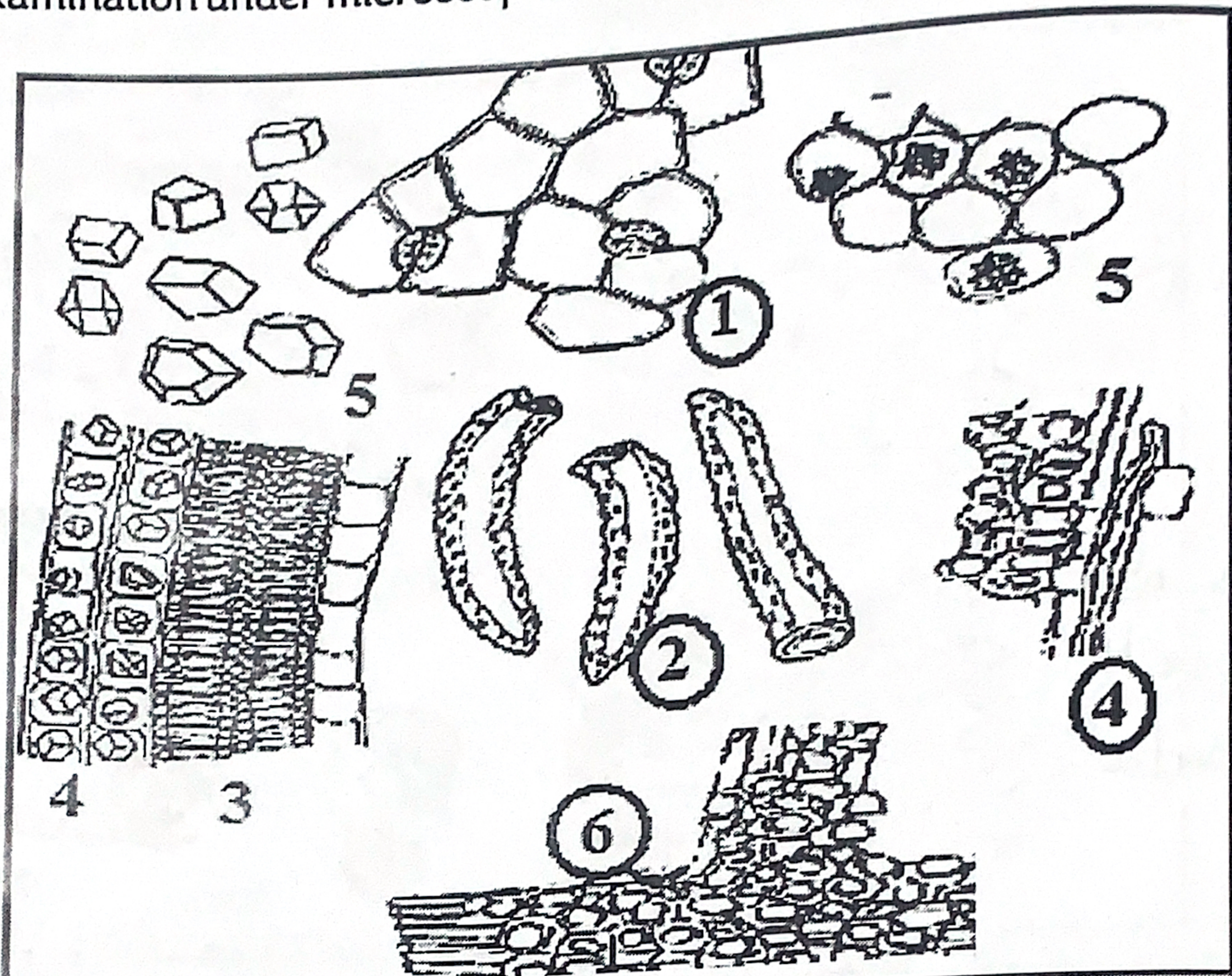
➤ Uses:

- Laxative. *علاج Constipation*

❖ Identification test for Anthraquinones:

- Plant powder + KOH: yellow to red color

❖ Examination under microscope:



1. Epidermis in surface view showing parenchymatic stomata
2. Covering trichome
3. Part of a pitted vessel
4. Part of a group of fibers with calcium oxalate prism sheath
5. Cluster of calcium oxalate
6. Group of fibers with calcium oxalate prism sheaths at the junction of two small vein (KE)

Key element

III. Absinthium Herb (Wormwood):

Dried leaves and flowering tops of *Artemisia absinthium* (Asteraceae, compositae)

Scientific name

Family

➤ Physical characters:

- Color: dark green or blue
- Taste: bitter acrid taste *مر و لاذع*
- Odor: strong bitterish aromatic odor *مرار واضح*

➤ Constituents:

- Volatile oil: Thujone
- Bitter glycoside: Absinthin

➤ Uses:

- Tonic *نبات البرد*
- Antispasmodic *المخض*
- Febrifuge (treat fever) → *للحرارة*

➤ Warning:

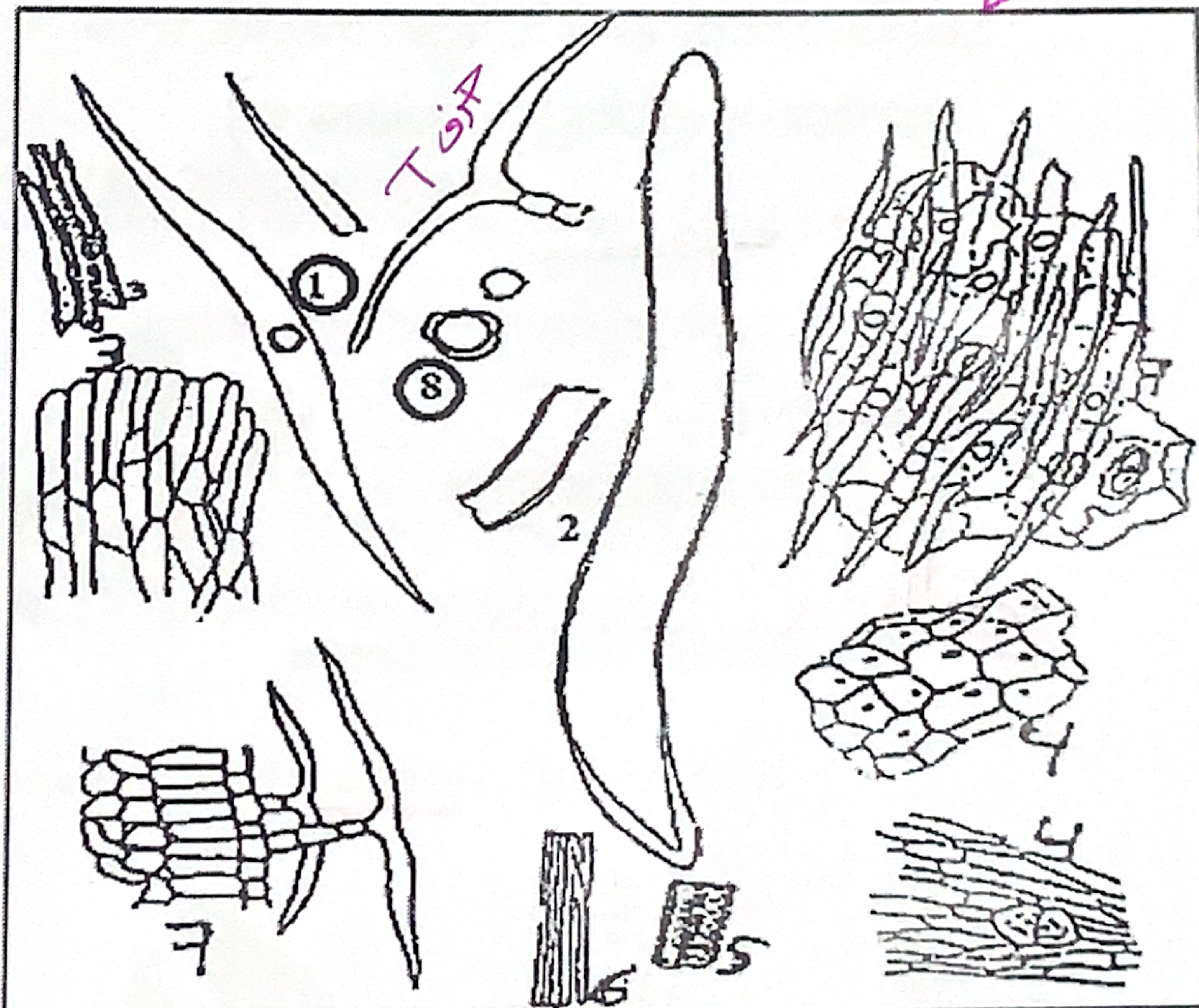
- Classified as unsafe herb by FDA because of the neurotoxic potential (causes seizures) of thujone and its derivatives. *غير آمن*

*تجنب استهلاكه
high doses:*

(muscle spasm) داء

❖ Identification test for lignin

❖ Examination under microscope:



① T-hair fragment in side view (KE)

2. Hair of receptacle

3. Fragments of sepals

4. Fragments of petals with calcium oxalate crystals in surface view

5. Fragment of vascular bundle from the stem

6. Fragment from a bast group from the stem

7. Fragments of the leaves

8. Pollen grains

2. Plan identification using different chemical tests:

✓ Identification test for Anthraquinones:

- Senna powder (in a test tube) + 5% KOH
- Positive result → Yellow to red color.

(Absinthium) ←

✓ Identification test for lignin:

- Wormwood ←
- (Wormwood powder) (on slide) + (Phloroglucinol + conc. HCL) then cover with cover slip and observe.

Positive result → pink color on the walls of fibers and vessels.