

Experiment No - 01

Object:- To study the morphology of the Ispaghula.

Reference Kotate C.K. "Practical Pharmacognosy"
4th edition Vallabh Prakashan Page No. 4.104

Requirements:- Dried seeds of Ispaghula.

Synonyms:- Ispaghula, Isapgol, Iskgul,
Indian psyllium.

Biological source:- Dried seeds of Plantago ovata
Forsk

Family:- Plantaginaceae.

Morphological characteristics

Colour:- Pinkish-grey to brown

Odour:- None

Taste: mucilaginous.

Size: 10 to 35 x 7 to 2 mm

Shape:- Cymbiform (boat shaped)

Chemical Constituents

- Epidermal cell of isabgol contain mucilage mainly.
- Isapgol husk constitute about 25-27% of seeds.
- Husk is fully mucilage. Seeds also contains fixed oils and proteins.



Dorsal surface



Hermaphrodite

Ventral surface

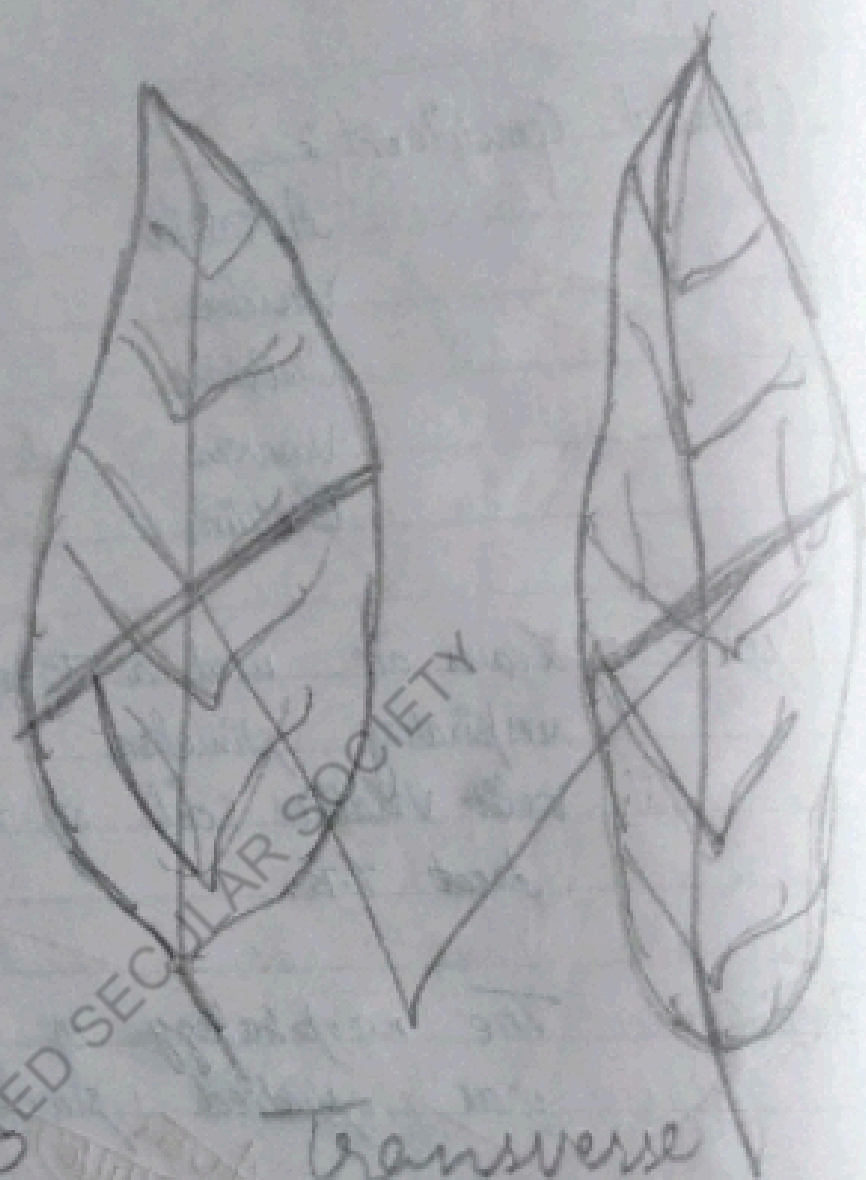
Uses!

- ① It is used as laxative
- ② It is used as demulcent.
- ③ It is used as emollient.

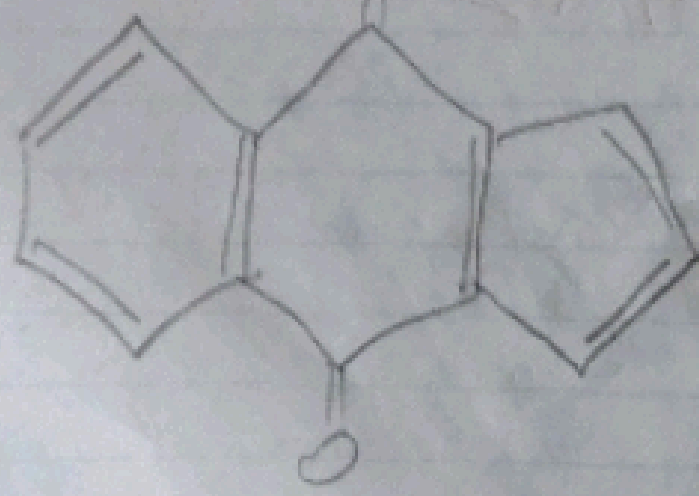
Report!

To the study of morphological characteristics of the *Ispaghula* was successfully.

UNITED SECULAR SOCIETY



Transverse
veins.



Anthraquinone

Expt. Experiment - 02

Aim: To study the morphology and microscopy of Indian Senna.

Reference: "Kokate C.K" the textbook of Pharmacognasy, Published by Nirali Prakashan 52nd edition 2016, Pg no: 9.24-29.28.

Synonyms: Cassia Senna

Biological Source: It consist of dried leaf lops of *Cassia angustifolia*.

Family: Leguminosae.

Morphology:

Colour: Yellowish green.

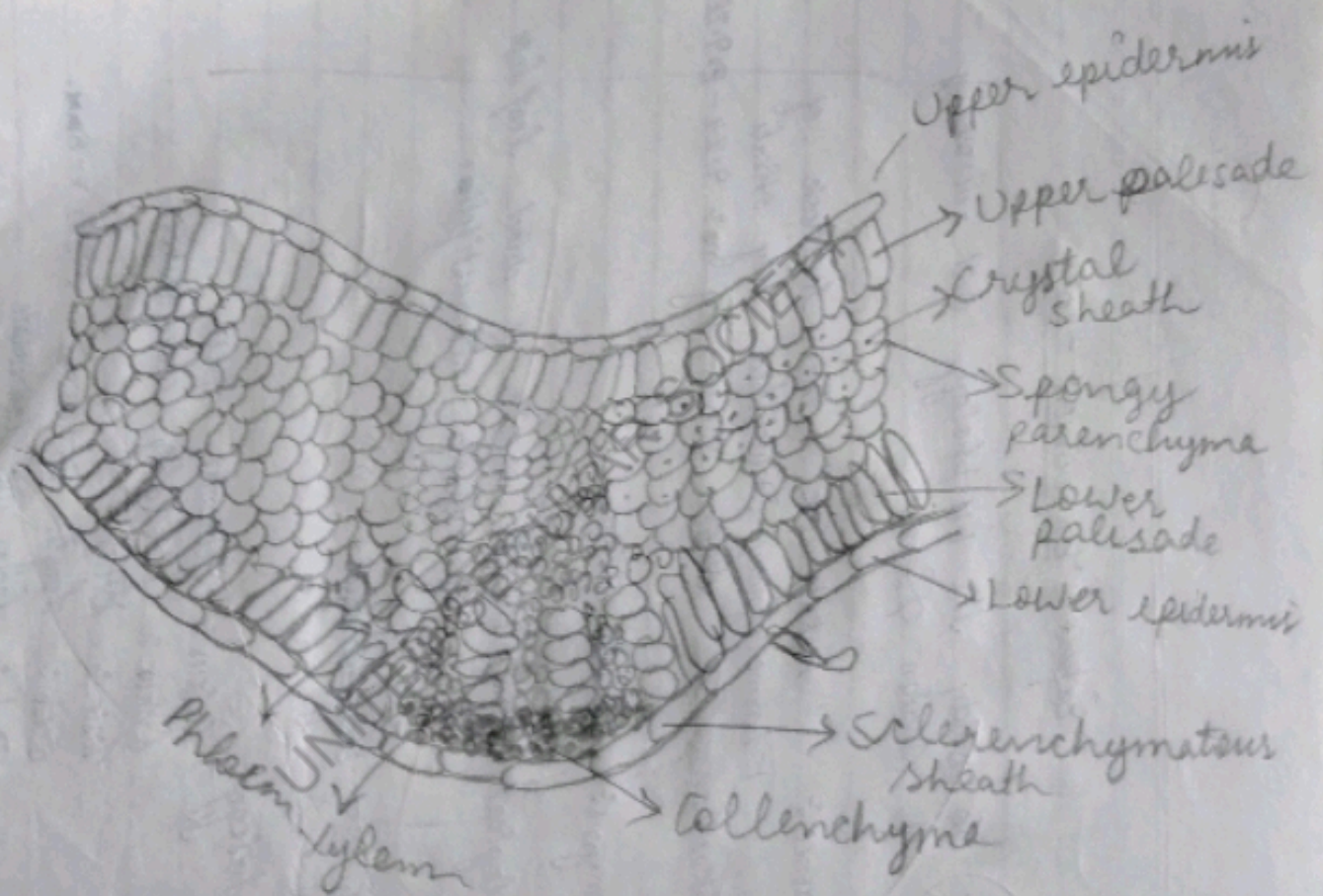
Odour: Slightly characterstics

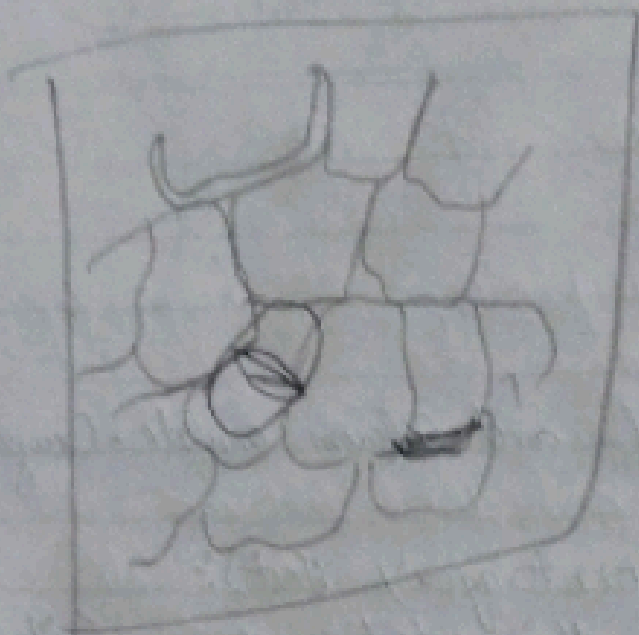
Taste: Bitter.

Size: Length 25-60 mm, width 7-8 mm.

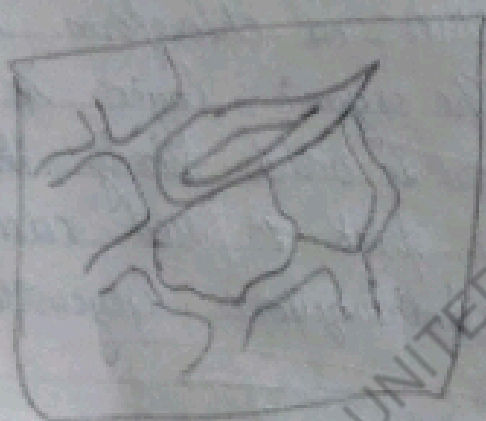
Shape: Leaves are lanceolate

Chemical Constituent: Anthraquinone Glycoside
↳ Sennosides A

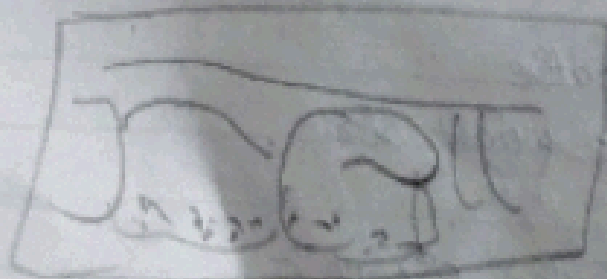




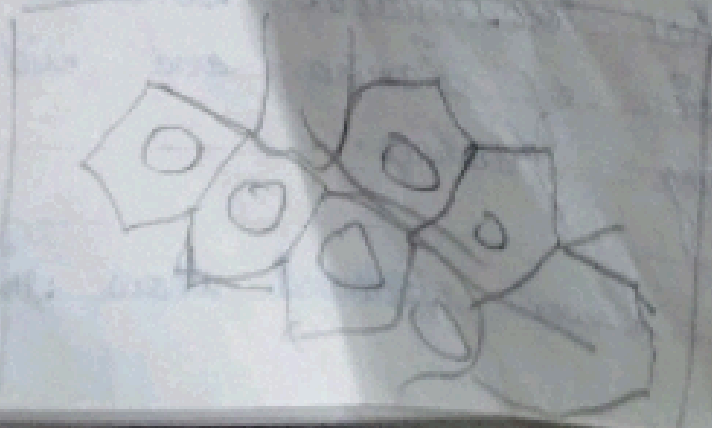
Paracytic stomata



Covering waxly
trichome



mucilage
epidermal cells



Calcium oxalate
crystals

- Sennosides B.
- Sennosides C.
- Sennosides D.

Resins, Salicylic acid and Calcium oxalate (crystals).

Chemical Test :- (Borntrager's Test) :-

In this test drug boiled with the dilute sulphuric acid, filtered and to the filtrate benzene or ether or chloroform is added and shaken well. The organic layer is separated to which ammonia is added slowly. The ammonia layer shows pink to red colour due to the presence of anthraquinone glycoside.

Uses :-

- i Used as purgative.
- ii It is used for weight loss.

Microscopic Study of Indian Senna :-

Senna leaflet has parabilateral structure.

In transverse section of lamina and midrib shows the following features.

Lamina :- Upper & lower epidermis show similar

Features - They consist of a single layer of polygonal cell. The cell are covered with thick cuticula. Epidermis consist ^{trichomes} of Upper palisade & lower palisade differentiated by the mesophyll.

Midrib :- Epidermal layer are continuous over the midrib but the cell of lower epidermis are small.

Result :- Morphology & microscopy of the given drag ~~was~~ studied successfully.

10/10

Experiment No. —

Aim! To study the morphology of "Cardamom"

Reference: K.R. Khandelwal, "Practical Pharmacognosy", Nirali Prakashan, 4th edition, pages 14.1 - 14.3.
Synonym: Chhoti, Ilaychi.

Biological Source: It consists of dried, nearly ripe fruit of *Elettaria cardamomum* var. *minuscule*.
Family: Zingiberaceae.

Morphological characteristics:

Colour: Pericarp: Green to pale buff
Odour: Aromatic, agreeable and pleasant.
Taste: Strongly aromatic
Shape: Oval elongated
Size: Capsules are 2 cm in length, 0.8 to 1.0 cm in width.

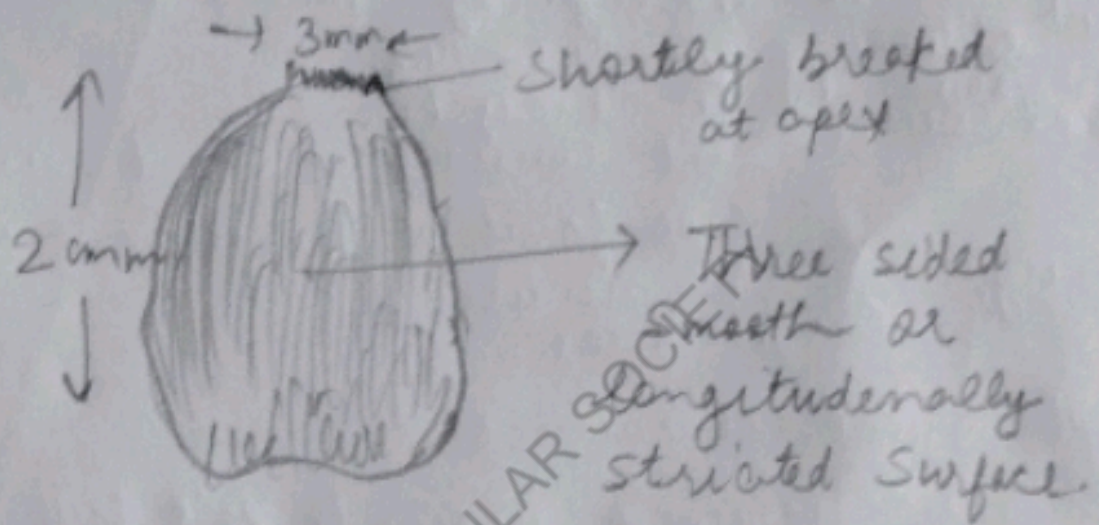
Other Surface: fruits contain three chambers, each consists of two rows of seeds.

Seeds are enclosed in membranous arillus.

Each chamber contains six to ten seeds in two rows.

Chemical constituents:

Volatile oil: Cineol, limonene, bornyl, L-terpenol, starch, fixed oil, Silica.



Cerdan

UNITED

Uses: ① It is used as carminative agent

② It is used as stimulant.

③ It is used as aromatic and flavouring agent.

Report: The morphology of Cardamom has been done.

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Experiment No: 05

Aim: To study the morphology and microscopy character of Ginger.

Reference: "Kokate C.K." text book of Pharmacognosy published by Nirali Prakashan. 4th edition. Pg. no: 14-128 - 14-131.

Synonym: Adarak, Zingiber.

Biological Source: It consist of the fresh and dried rhizome of zingiber officinal.

Family: Zingiberaceae.

Morphology:

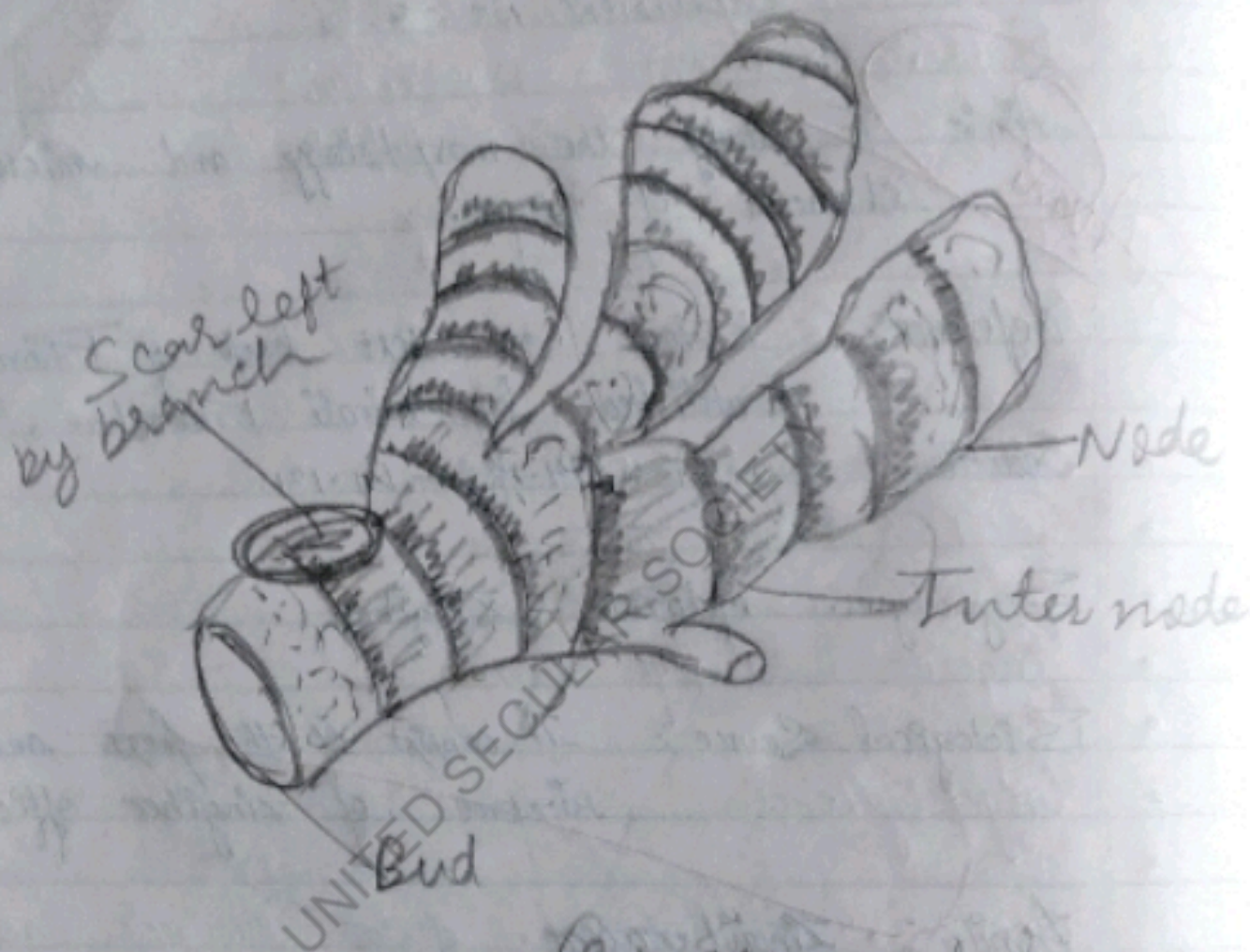
colour: Buff

Taste: Pungent

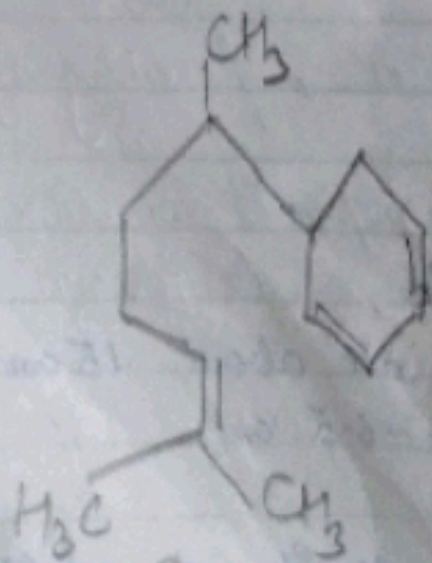
Odour: Aromatic

Size: Rhizome are about 15 cm long and 1.5 - 6.5 cm.

Chemical Constituent: It consist of volatile oil.



Ginger rhizome



Aingerberin

Starch, fat, fibre, inorganic material,
Residual Moisture.

- Ginger also consist Monoterpin, hydrocarbon,
sesque terpene hydrocarbon, Phenyl propanoids.

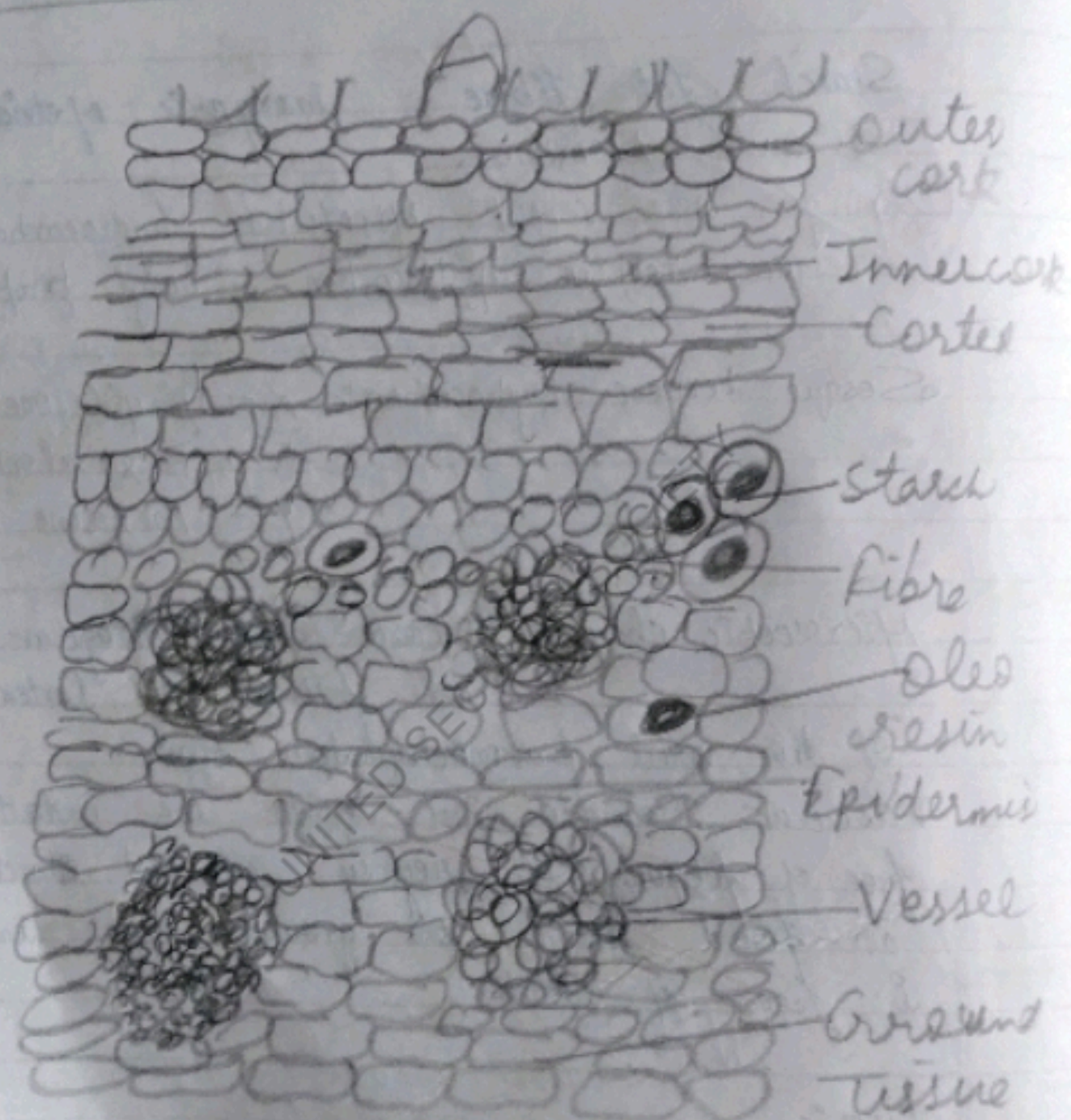
Sesque terpene hydrocarbon: α - Zingiberene
 β - Bisabolene
 γ - Farnesene

Microscopic character :- Cork consist irregular arranged
 cell followed by Cortex, made
 of thin wall parenchymatous tissue.

Vascular bundles just inside the endodermis are
 free of fibrous oil region cell and starch grains
 are found though out ground tissue endodermis
 is free of starch.

Uses :-

- It is used as aromatic.
- Used as carminative,
- Ginger oil also used as a mouth wash.
- Used as a stimulant.
- Ginger powder is effective in Motion
 sickness.



T.S of Ginger Rhizome

Result :- The morphology and microscopy of
given crude drug was performed
Successfully.

~~Ans~~
~~13/11/19~~

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Experiment No-06

Object To study the morphological characteristics of "Nutmeg"

Reference "Kokate" ct The text book of Pharmacognosy Published by Nirali Prakashan 4th edition 2018 Page No - 4.109.

Synonyms myristica, Nix-muscha.

Biological source Dried kernels of seeds

Family myristica fragrans Houtt.
myristicaceae.

Morphological characteristics

Colour The kernels are greenish brown

Odour Strongly aromatic

Taste Pungent and aromatic

Shape Ellipsoidal.

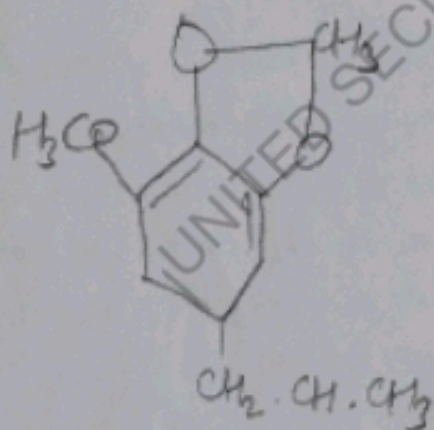
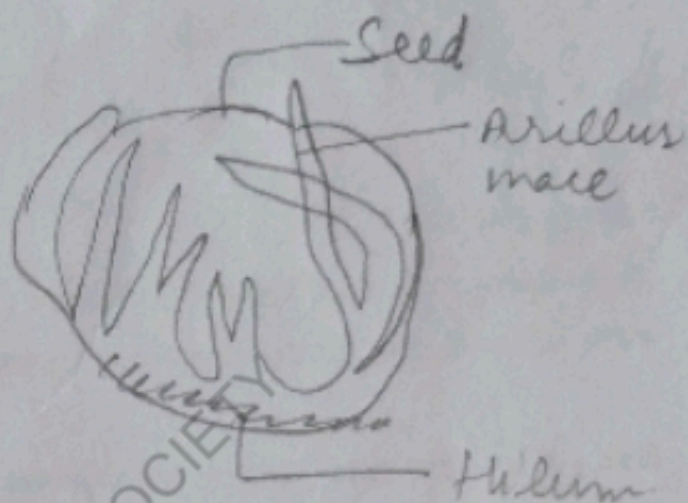
Size 20 to 30x20 mm.

Extra features Kernels are irregularly wrinkled and covered with arillus.

Chemical constituents

1 Nutmeg kernels contains 7.13% of Volatile oil, fat about 25-30% and starch.

2 Volatile oil is the chief active constituents of the drug containing myristicin in the chief constituents and responsible for flavour.



myristicin

uses!

① It is used as carminative and flavouring agent.

Report!

To study the morphological characteristics of ~~that~~ given crude drug ~~was~~ study was successfully.

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Experiment No - 07

Object: To study the morphological characteristics of "Black Pepper"

Reference: "Kokateck" the textbook of pharmacognosy published by nirali prakashan 4th edition 2018 Page No - 4.80.

Requirements:

Drug: ~~Black~~ "Dried fruits of Black pepper"

* Biological Source: Dried unripe fruits of "*Piper nigrum*"

Synonyms: Pepper, *Piper nigrum*, maricha

Family: Piperaceae

Morphological characteristics:

Colour: Blackish brown to greyish brown

Odour: Aromatic

Taste: Pungent and spicy

Size: Berries are 3-5mm in diameter.

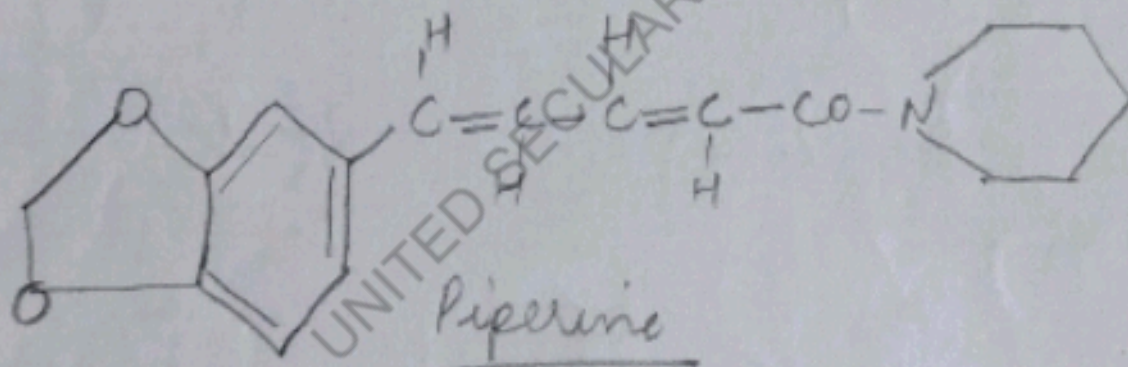
Shape: Oval.

Extra features: Globular and reticulately wrinkled, with stigma at apex.

The pericarp is thin with single kernal. Kernal is white and hollow at the centre.

Chemical constituents: Pepper contains 1 to 25% of Volatile oils, pungent resin 6.0% and alkaloid

piperine 5-10%.



Piperine

- Uses
- ① It is used as the carminative.
 - ② It is used as the aromatic.
 - ③ It is used as the stimulant and stomachic.

Report To study the morphological characteristics of given crude drug was successfully.

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Experiment No - 08

Object: To study the morphological characteristics of "CINNAMON"

Reference: "Kokate CK" Text book of Pharmacognosy published by Nirali Prakashan 4th edition Pg No - 4.55

Synonyms: Ceylon Cinnamon, Kalmi Dalchini

Biological source: Dried inner bark of shoots of coppiced trees of *Cinnamomum zeylanicum* family Lauraceae.

Morphological characteristics:

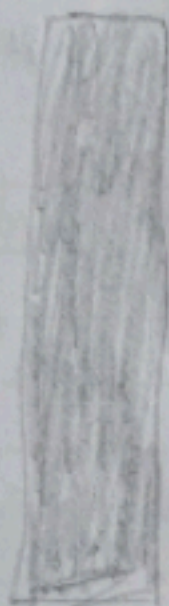
Colour: Dull yellowish brown externally, ~~bark~~ yellowish internally.

Odour: aromatic fragrant

Taste: Sweet followed by warm sensation.

Shape: Compound quills, ~~thickest~~ approximately 25mm

Size: 1 metre in length and 0.1 cm in diameter. Thickness of the bark is approximately 0.5mm

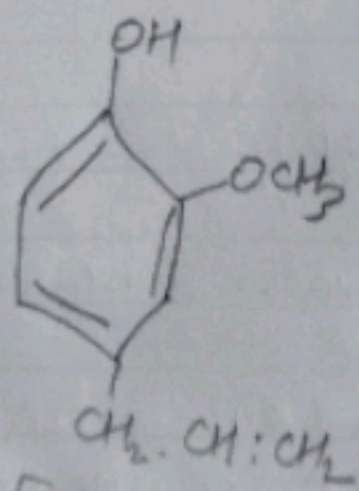


Outer Squill



Middle Squill

Inner squill.



Eugenol.

Extra Features!

Fracture splintery.

→ The outer surface of the bark is marked by wavy longitudinal striations with small holes or scars left by the branches.

→ The inner surface also shows longitudinal striations. Bark is free of cork.

* Chemical constituents

→ Cinnamon bark contains 0.5 to 0.1% volatile oil, 1.2% tannins, volatile oil contains cinnamaldehyde, eugenol, benzaldehyde, cuminaldehyde.

→ It also contains mucilage, calcium oxalate, starch and sweet substance as mannitol.

Uses → It is used as Stomachic.

① It is used as carminative and stimulant.

② It is used as mild astringent and antiseptic.

Report To study the morphological characteristics of Cinnamon was done.

Experiment No - 09

Object To the study morphological characteristics of "Clove"

Reference "Kotale" C.K. the text book of Pharmacognosy published by nirali prakashan 4th edition 2018 page No - 4.72

Synonyms Clove buds, Caryophyllum

Biological source Dried flower buds of *Eugenia caryophyllus*.

Family Myrtaceae

Morphological characteristics

Colour Crimson to dark brown

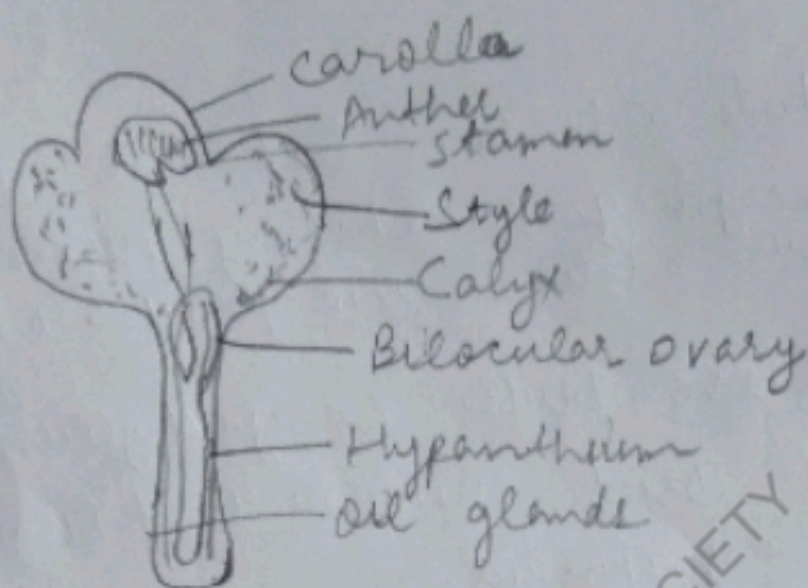
Odour Slightly aromatic

Taste Pungent followed by numbness

Shape 10 to 15 mm in length, 4 mm in width and 2 mm thick

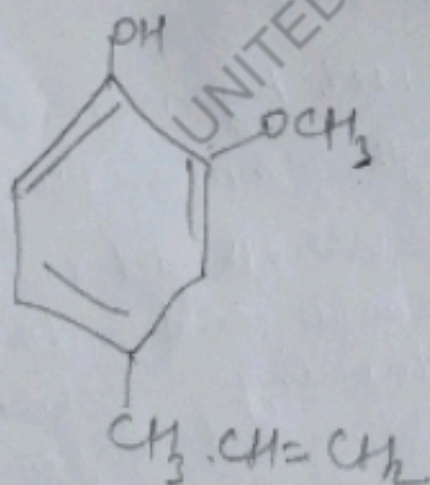
Size Hypanthium is surrounded with 4 thick divergent sepals and dome shaped corolla containing membranous petals, several stamens and single stiff prominent style.

Extra features Cloves are heavier than water.



Clove

Structure



Eugenol

Chemical Constituents:

1 Clove contains about 18 to 20% of Volatile oil, which contains eugenol (70 to 90%), eugenol acetate caryophyllenes.

Uses:

- ① It is used as Dental analgesic,
- ② It is used as stimulant and antiseptic.
- ③ It is used as ~~stimulant~~ aromatic and

④ .

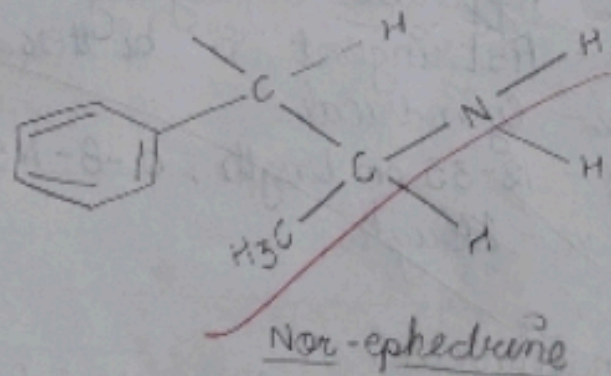
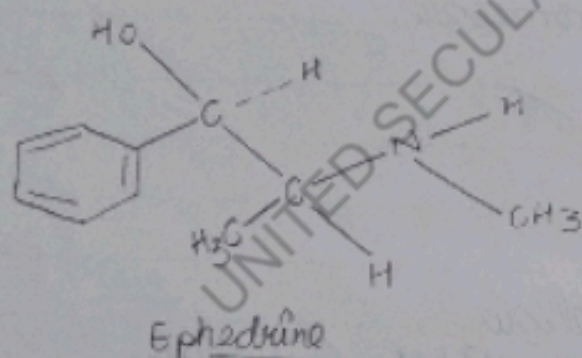
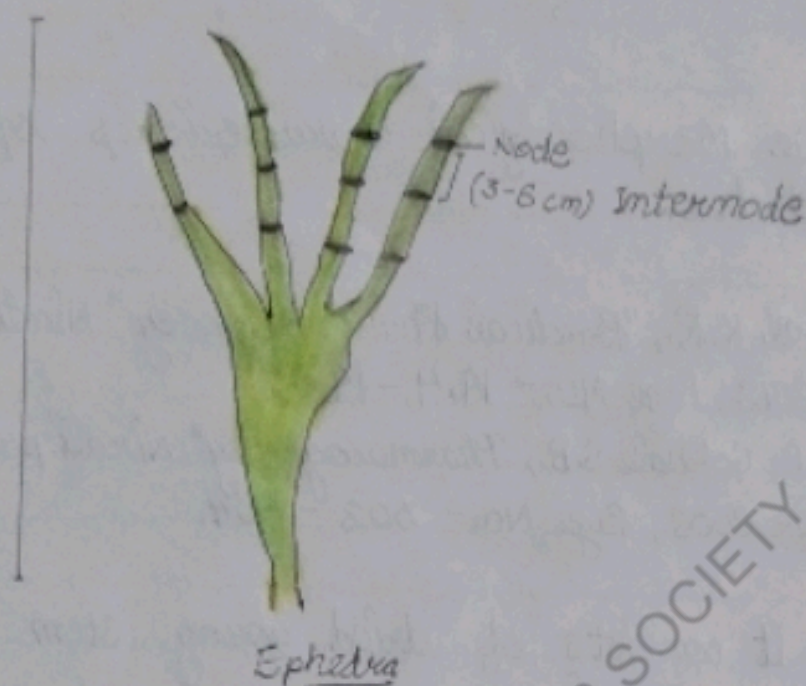
Report:

To the study the morphological characteristics of clove buds was successfully.

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Experiment No. - 10

- ~~Object~~ To study the Morphological characteristics of *Ephedra*.
- Reference: Khandkwal K.R., "Practical Pharmacognosy", Nirali prakashan, 22nd edition, April 2012, Page No. - 19.4 - 19.6.
→ Kekate C.K., Purohit A.P., Gokhale S.B., "Pharmacognosy", Nirali prakashan, 36th edition, September 2006, Page No. - 502 - 504.
- Biological Source: It consists of dried young stem of *Ephedra Gerardiana*.
Family - Genetaceae / Ephedraceae.
- Synonym: Ma-Huang
- Morphology:
 - Colour - Greenish - Yellow
 - Odour - Agreeable & slightly aromatic.
 - Taste - Astringent & bitter
 - Shape - Cylindrical
 - Size - 12-33 cm length, 0.8-1.5 mm thickness
 - Surface - Rough
- Chemical Constituents:
 - Ephedra contains the amino alkaloids or alkaloidal amine like - Ephedrine (30-90%)
 - Nor-ephedrine
 - n-methyl ephedrine



- pseudo-ephedrine, etc.

- Uses: It is used as
 - Sympathomimetics
 - bronchodilator in asthma
 - treatment of allergic conditions like hay fever.

- Allied Drugs: *E. sinica*
E. alata.

- Report:

The morphological characteristics of Ephedra was successfully studied.

Abhi

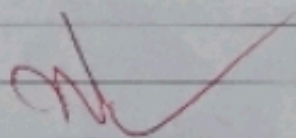
Experiment No. - 11

Object

To study the Morphological Characteristics of Rauwolfia Root.

- Reference : Khandelwal K.R., "Practical Pharmacognosy", Nirali prakashan, 22nd edition, April 2012, Page No. - 18.1 - 18.5.
→ Kokate C.K., Purohit A.P., Gokhale S.B., "Pharmacognosy", Nirali prakashan, 36th edition, September 2006, Page No. - 466-468.
- Synonym : Sarpagandha
- Biological Source : It consists of dried roots & rhizomes of Rauwolfia serpentina.
Family - Apocynaceae.
- It contains not less than 0.15% of reserpine group of alkaloids.
- Morphological Characteristics :
 - Colour - Wood - Pale Yellow
 - Root Bark - Greyish yellow to brownish.
 - Odour - Odourless
 - Taste - Bitter
 - Size - About 10-18 cm long & 1-3 cm in diameter.
 - Shape - Sub-cylindrical, slightly tapering, tortuous.
 - Fracture - Short, irregular.
- Chemical Constituents : It contains about 30 indole alkaloids.
- The important alkaloid of Rauwolfia is Reserpine.

- The other alkaloids present in the drug are -
 - Rauwolfipine
 - Rescinamine
 - Reserpine
 - Serpentine
 - Serpentinine
- It also contains oleo-resin, phytosterol, fatty acids, alcohol & sugars.
- Uses: It is used as
 - Antihypertensive &
 - tranquillizing agent.
- Report:
The morphological characteristics of Rauwolfia Root was successfully studied.

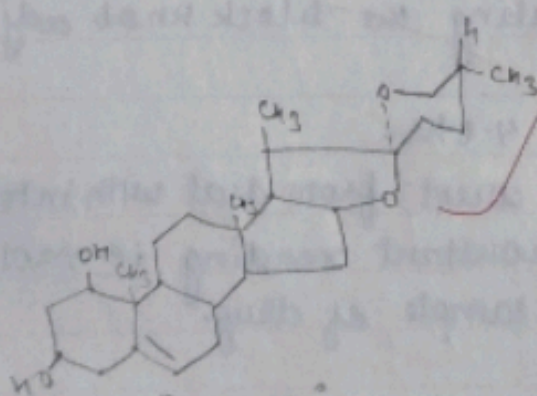




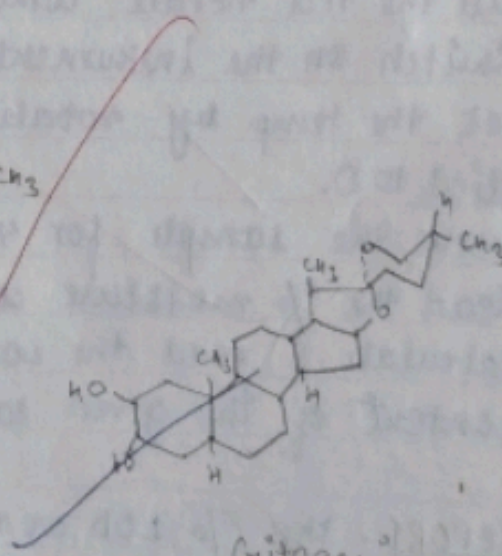
CHOTA



GOKHRO



Ruscogenin



Gitogenin

EXPERIMENT: 12

Aim: To study the morphological characteristics of Gokhru (Chota Gokhru)

REFERENCE: - Lady J.S., "Pharmacognosy", B.S. Shah Prakashan, 14th Edn, P.258.

Biological Source: - It consist of fruits of Tribulus terrestris (Zygophyllaceae)

MORPHOLOGY:

Size :- 1-2 cm in diameter, 1-1.5 inch thickness.

Shape :- globus with muciculate cocci.

Color :- yellowish brown

Odour :- characteristic

Taste :- Mucilaginous.

CHEMICAL CONSTITUENTS: - contain protodioscin, diosgenin, sarsogenin, gitogenin, flavone glycoside, kampfieri, Bohannasides, alkaloid, fixed oil, potassium nitrate.

Uses:-

It is used as diuretic, cooling, demulcent, aphrodisiac action.

It is used in the treatment of kidney stones, gonorrhoea etc.

It is used as important ingredient in ayurvedic prep.ⁿ such as

Dasmularishtha, chywanprash.

REPORT: - Chota Gokhru is morphologically studied & done.



PUNARNAVA TWIG

OBJECT:- To study the morphology of Punarnava.

REFERENCE:-

BIOLOGICAL SOURCE:- drug consists of dried, mature whole plant of *Boerhavia diffusa*, *Boerhavia repens*, *B. procumbens* (Nyctaginaceae).

MORPHOLOGY

STEM:- prostrate, divaricately branched, slender, prostrate or ascending, swollen at nodes, nearly glabrous, green.

Size:- 0.6-0.9m long.

LEAVES:- upper surface green & glabrous, simple, thick, opposite in unequal pairs at each node.

Size:- 2.5-3.8 cm, smaller - 1.3-2 cm.

Color:- green upper & silvery white beneath.

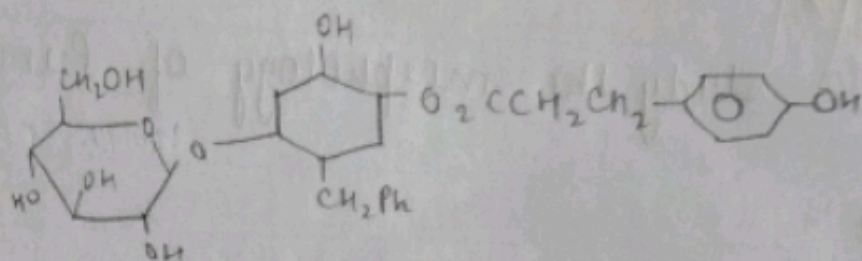
Appearance:- broadly ovate, sub-orbicular, rounded at apex, usually rounded, subcordate beneath.

Flowers:- small, long axillary peduncled umbellate clusters.

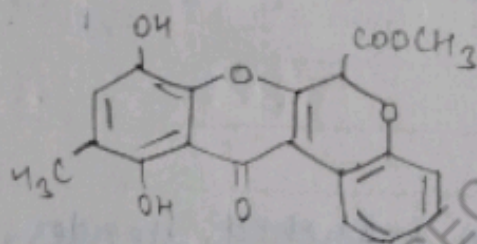
Color:- pink.

Odour:- no distinct odour.

Taste:- slightly bitter.



Panaxanavoside



Boeraxione

CHEMICAL CONSTITUENTS

It contains alkaloids like punarnavoside, punarnavoids, β -sitosterol, uracolic acid. Fatty acid like stearic acid, arachidic acid. Flavonoids like Boeravinone, c-methyl flavones.

Uses:-

- 1) It is used in the treatment of diuretic, expectorant.
- 2) It is also used in the treatment of jaundice.
- 3) It is also used in anti-inflammatory & antibacterial.
- 4) It is also used as antifungal.
- 5) It is used as cardiac tonic.

REPORT:-

The morphology of punarnava is studied.

mlh



fig:- Cinchona Bark

Wood

EXPERIMENT NO-14Object:-

To study the morphological characteristics of Cinchona Bark.

Reference:-

Khande Lal R.R. Practical Pharmacognosy Techniques and Experiment Nirali Prakashan 22nd edition
Page no - 16-8

Biological Source:-

It consists of dried bark part of Cinchona
Succirubra / officinalis.

Family - Rubiaceae.

Morphological Characteristics:-

Shape - cylindrical with cell marked longitudinal
wrinkles

Size - 20-30mm diameter, 2-6mm thick

Colour - Reddish Brown

Taste - Bitter

Odour - Characteristic

Chemical Constituents:-

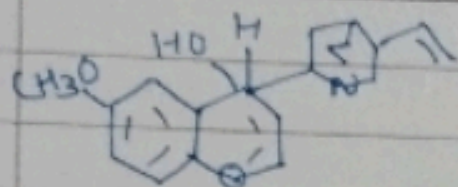
- Quinine.

- Quinidine.

- Cinchonine.

- Cinchonidine.

• Chemical Structure:-



Quinine

$R = OCH_3$ (Quinine)

$R = H$ (Cinchonidine)

• Uses:-

- ① Anti-malarial.
- ② Analgesic.
- ③ Cardiac Depressant.
- ④ Atrial fibrillation.

Report:-

The Morphological Characteristics of the cinchona bark was successfully studied.

Extra features:

- Strips are translucent, lustrous & slender, while the plates are grayish white in colour.

Solubility: Insoluble in water and also soluble in hot water.

Chemical constituents:

- Agar contains polysaccharides as agarose and agaropectin.
- It contains about 3.3% cellulose and 6 nitrogen containing substance.

Uses: ① It is used as emulsifying agent.

② It is used as bulk, laxative, in the preparation of culture media.

Report: The morphological characteristics of "Agar" studied was successfully.

Experiment No - 15

Object:

To the study of morphological characteristics of "Agar"

Reference:

"Kokate" C.K. the text book of Pharmacognosy published by Nirali Prakashan 4th edition 2018
Page no 5.24

Synonym:

Agar - agar, Japanese - Isinglass, Vegetable gelatin

Biological source:

Dried gelatinous substance derived from red algal.
"Gelidium amansii"

Family:

Rhodophyceae.

Morphological characteristics:

Colour: Yellowish grey to white or colourless
Odour: odourless

Taste:

musculagenous

Shape:

Various forms like strips, sheets, flakes
coarse powder

Size:

4mm in width 40 to 60 cm in length.

Extra features:

- strips are translucent, lustrous and slender, while the flakes are grayish to white in colour.

Solubility Insoluble in water and alcohol soluble in hot water.

Chemical constituents:

- Agar contains of polysaccharides as agarose and agaropectin.
- It contains about 3.5% cellulose and 6 nitrogen containing substance.

uses ① It is used as emulsifying agent.

② It is used as bulk laxative, in the preparation of culture media.

Report The morphological characteristics of "Agar" studied was successfully.

Experiment - 16

Object: To study the microscopical characteristics E.T.S.I of "Ajowain"

Reference: "Kokate C.K. text book of Pharmacognosy Published by Nirali Prakashan 4th edition Page - 4.6 to 4.7."

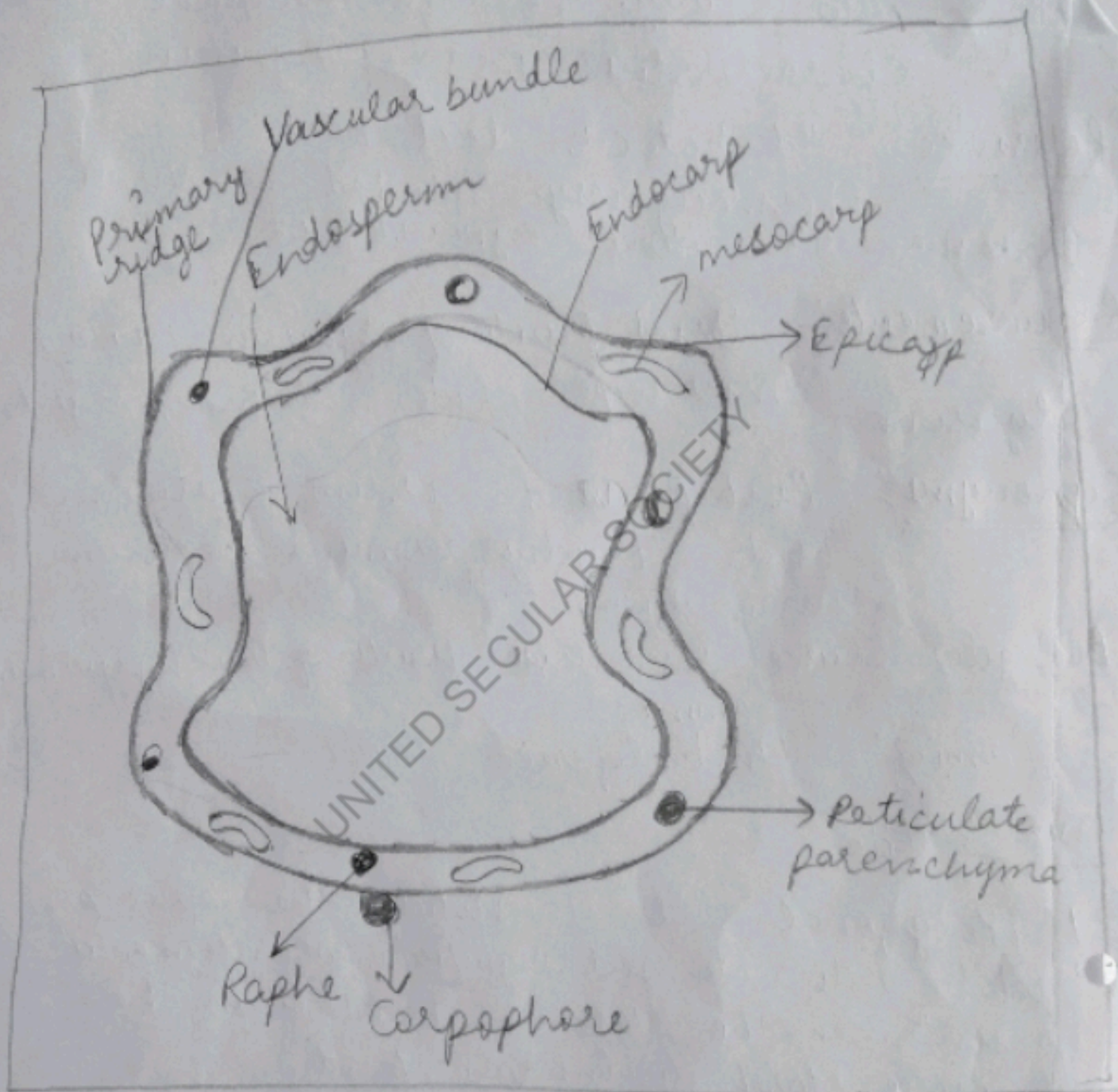
Requirements: Dried fruits of Ajowain (Powder), glycosine, microscope, slide, staining agent,

Synonyms: Bishop's weed *Cassia Copticum* Link., *Trichyspermum copticum* Hieron Ajowain.

Biological Source: Dried ripe fruits of *Trichyspermum ammi* family: Umbelliferae.

microscopy

- Polygonal cells constitute the epicarp, while reticulate and lignified parenchyma is present near the vascular bundles in the mesocarp, starch grains are absent.
- Elongated cells with parquetry arrangement is represented by endocarp. Six number of vittae are present, four on the mesocarpic region and two on the commissural surface of mericarp. polyhedral, thick walled endosperm cells contain volatile oil globules and also aleurone grains.



T.S of Rajwain Fruit (mericarp)

Trichome and calcium oxalate crystals absent.

Powder characteristics

- ① Parquetty arrangement of endocarp.
- ② Volatile oil globules.
- ③ Thick walled endospermic cells.

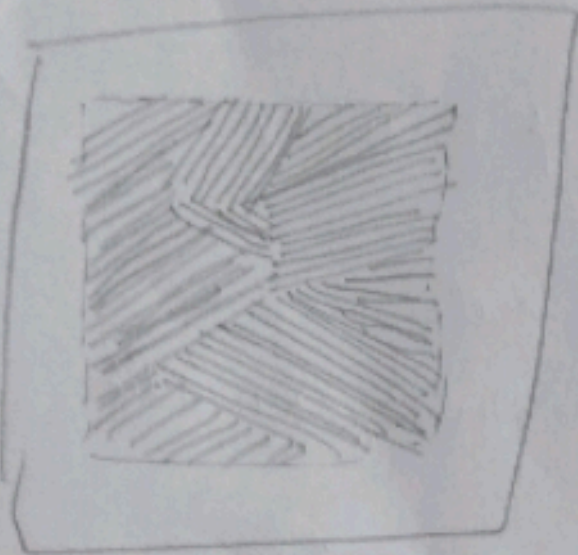
Uses ① It is used as Antispasmodic and Stimulant.

② It is used as carminative.

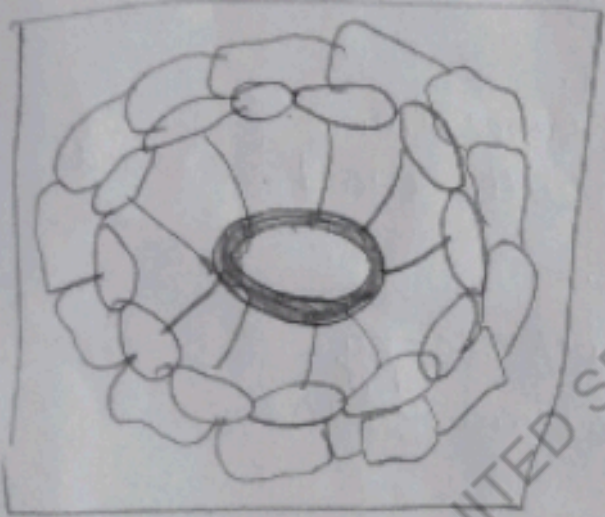
③ It is used as bronchitis and sore throat.

④ Oil is used in the preparation of deodorants, gargles, mouth washes and also as flavouring agent.

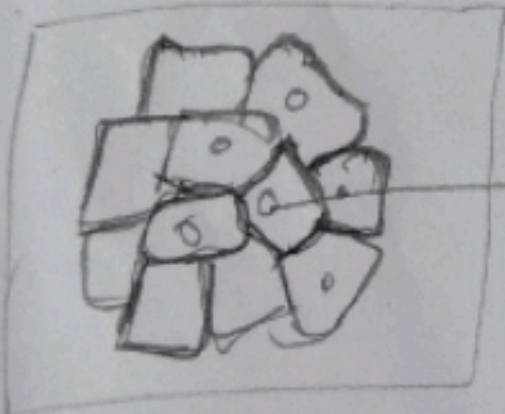
Report To study the microscopy Characteristics of Azarain was Successfully.



microscopic
parquetry layer



UNITED SECULAR SOCIETY
Vitta



Fixed oil

Powder characteristics of Ajawain
fruit.

EXPERIMENT No-17

- Object:-

To study the morphological characteristics of Datura leaf.

- Reference:-

Khandekar A.R. Practical Pharmacognosy Techniques and Experiment Nirali Prakashan 22nd edition 2012 Pg no 1203

- Botanical Source:-

It consists of fresh and dried leaves part of Datura metel

- Family:-

Solanaceae

- Morphology:-

Shape - oval, oblong, simple

Size - 5-25 cm long, 7-15 cm wide

Colour - Dull green

Odour - Characteristics

Taste - Bitter

Surface - Hairy, soft

Margin - A symmetrical, Angular Base

- Chemical constituents:-

- Isoprene alkaloids - Nitrogen must present

- Atropine

- It contains 0.5-1.1% total alkaloids especially scopolamine (hyoscyamine) is the main alkaloid with a



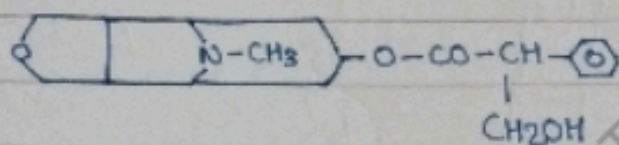
Fig. Datura leaf

Topic _____

Date _____

Small amount of Atropine, hyoscamine, Scopolamine and esters of tropic acid.

• Chemical Structure:-



Scopolamine (Hyoscine)

• Uses:-

- It is use as CNS depressant.
- It is use as parasympathomimetic (stimulate cholinergic ^{receptor})
- Mydriatic (Pupil dilate)
- Antispasmodic and cerebral sedative.

• Report:-

Morphological Characteristics of Datura leaf was successfully studied.

Experiment No-18

Object:- To study the powder microscopy of Cinnamon.

Reference: Kokate C.K "Practical Pharmacognosy", 4th edition Vallabh prakashan Pg 4, 85

Biological source: Dried inner bark of shoots of capped trees of "*Cinnamomum zeylanicum*"
family: Lauraceae.

microscopy characteristics:-

- ① Transverse section of stem bark shows a buds of sclerenchyma cells and secondary phloem.
- ② The outermost part consists of 3-4 layers of sclereids which are lignified, pitted + the U-shaped
- ③ Small pithy fibres are present on the outer side of layers of stone cells
- ④ Secondary phloem contains phloem parenchyma, phloem fibres and medullary rays. starch grain and prismatic calcium oxalate crystals are present in phloem
- ⑤ Axially elongated oil cells are present throughout the phloem parenchyma.
- ⑥ medullary rays are uni- or bi-seriate and contain acicular calcium oxalate crystals.

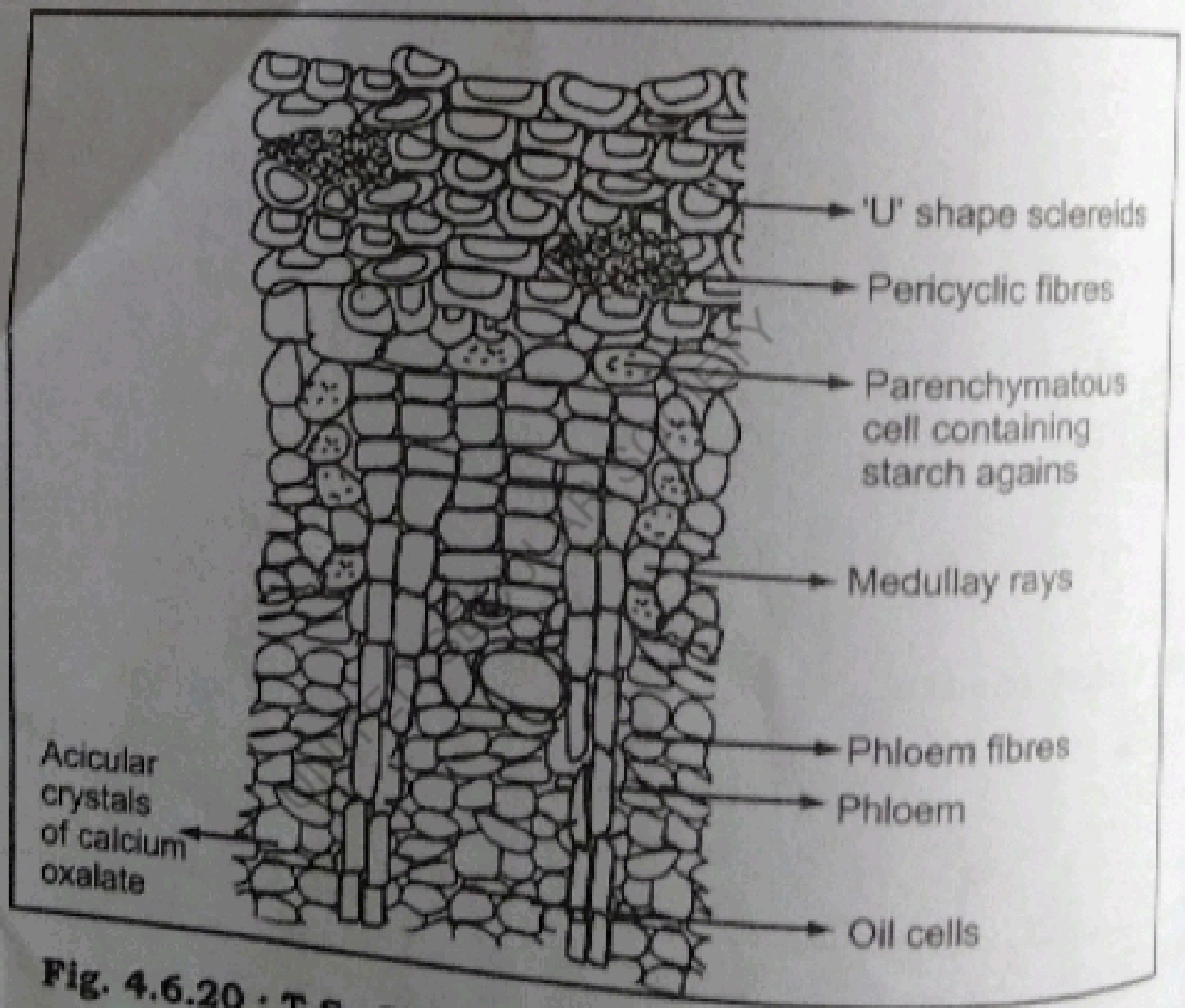


Fig. 4.6.20 : T.S. *Cinnamomum zeylanicum* stem bark

der Characteristics :
Fibres

Powder characteristics

- 1) Fibres: Pointed, thin and isolated, less than 30 μ (bark)
- 2) Stone ~~cells~~ Cells: Tetradiametric, outer cells wall less thickened, inner walls lignified, pitted, V-shaped.
- 3) Oil cells: Isolated, big, oval.
- 4) Calcium oxalate crystals: Aricular, in phloem parenchyma and medullary ray cells, 5-8 μ .
- 5) Starch grains: Numerous, simple and compound, 10 μ in cortex.

uses:

- ① It is used as stomachic.
- ② It is used as stimulant.
- ③ It is used as mild astringent and antiseptic.

Report:

The microscopy characteristics of Cinnamon powder was done.

Experiment No. - 19

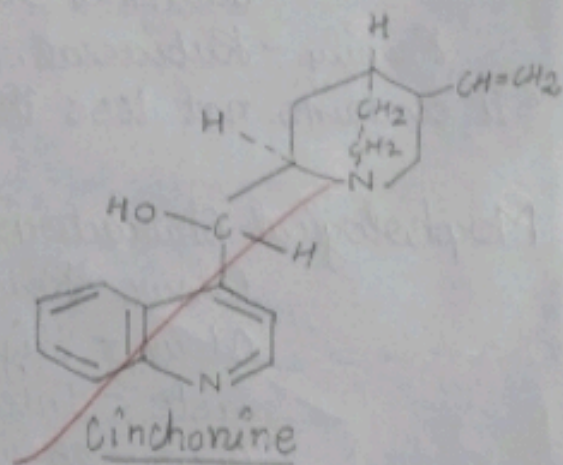
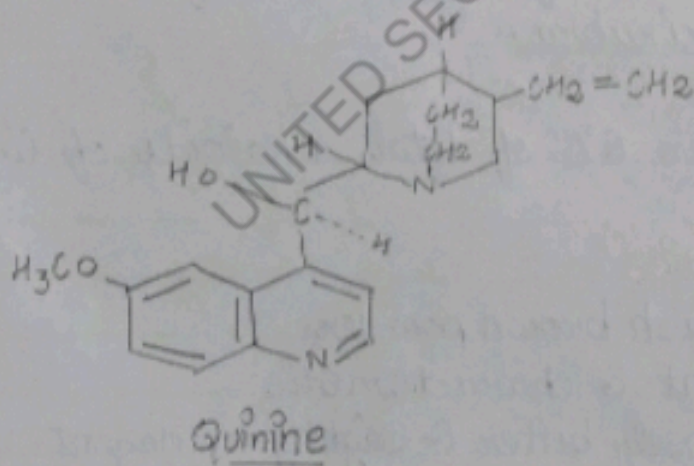
- ~~Object~~ ^{11/09/18} To study the Morphological Characteristics of Cinchona Bark.
- Reference : Khandelwal K.R., "Practical Pharmacognosy", Nirali prakashan, 22nd edition, April 2012, Page No. - 18.12 - 18.15.
→ Kokate C.K., Pawar R.P., Gokhale S.B., "Pharmacognosy", Nirali prakashan, 36th Edition, September 2006, Page No. - 496 - 498.
- Synonym : Kurena.
- Biological Source : It consists of dried bark of the *Cinchona succirubra*.
Family - Rubiaceae.
- It contains not less than 6% of total alkaloids of Cinchona.
- Morphological Characteristics :
 - Colour - Reddish brown powder
 - Odour - Slight & characteristic
 - Taste - Intensely bitter & slightly astringent.
 - Size - 20-40 mm in diameter, 2-5 mm thick
 - Shape - Cylindrical
 - Surface - longitudinal wrinkles, but less transverse cracks.
- Chemical Constituents : Cinchona bark contains about 25 alkaloids, which belong to quinoline group. The important alkaloids are -

20-40 mm



longitudinal wrinkles

Cinchona Bark



- Quinine
 - Quinidine
 - Cinchonine
 - Cinchonidine
- Cinchona succirubra contains 5-7% of total alkaloids, of which 30% is quinine.
- Uses: Cinchona bark is antimalarial in nature.
 - It is also used as bitter stomachics and Antipyretics.
 - Report: The morphological characteristics of Cinchona Bark was successfully studied.

Experiment No - 20

Object: To study the microscopical characteristics of Coriander.

Reference: "Khondelwal K.R.", "Practical Phytology Pharmacognosy", Nirali prakashan 22nd edition April 2012, page no 14.16 to 14.18

Requirements: microscopy, slide, cover slip, staining solution.

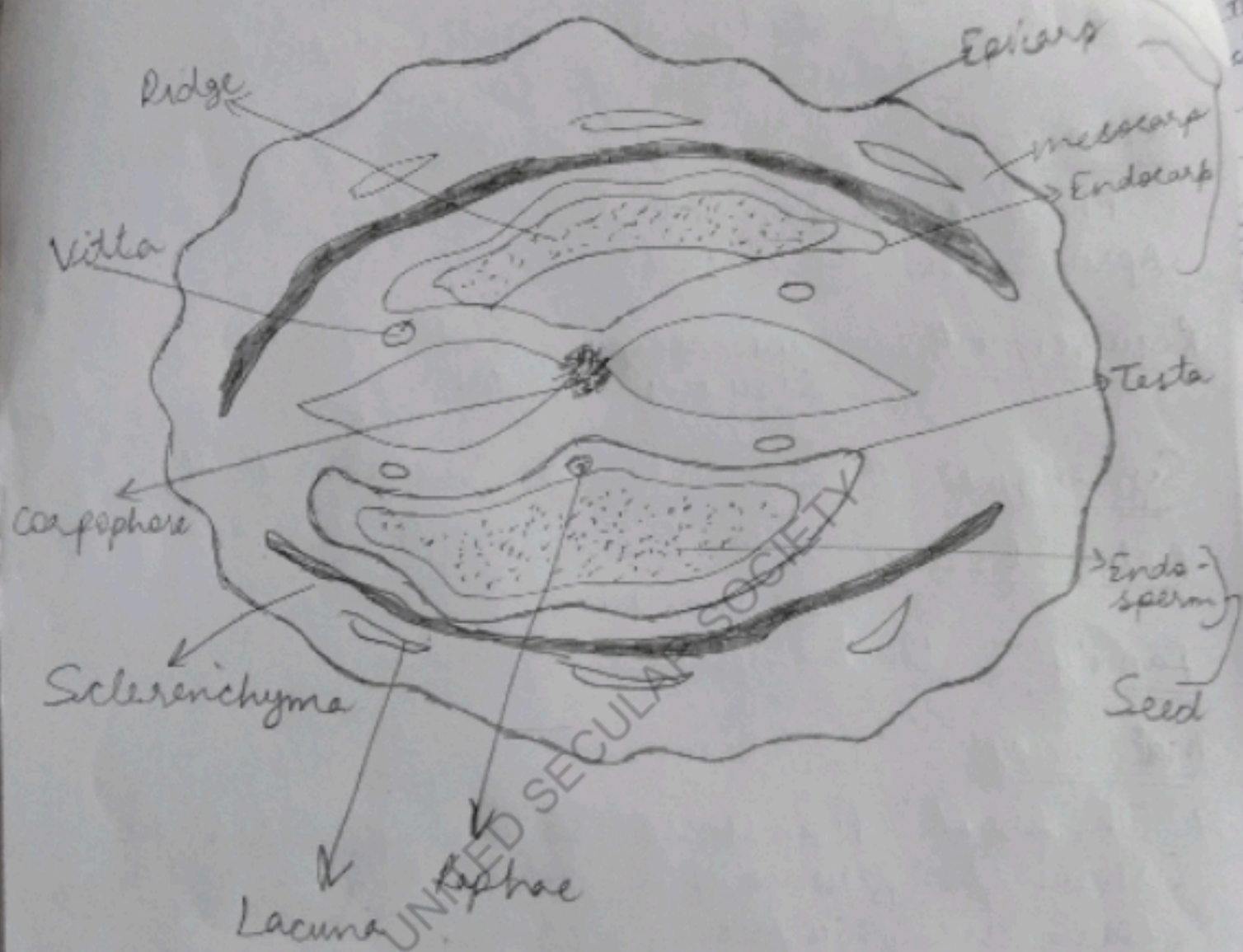
Synonym: Dhania (Hindi) Coriander fruit.

Biological source: Dried ripe fruits of "*Coriandrum sativum* Linn

Family: Umbelliferae.

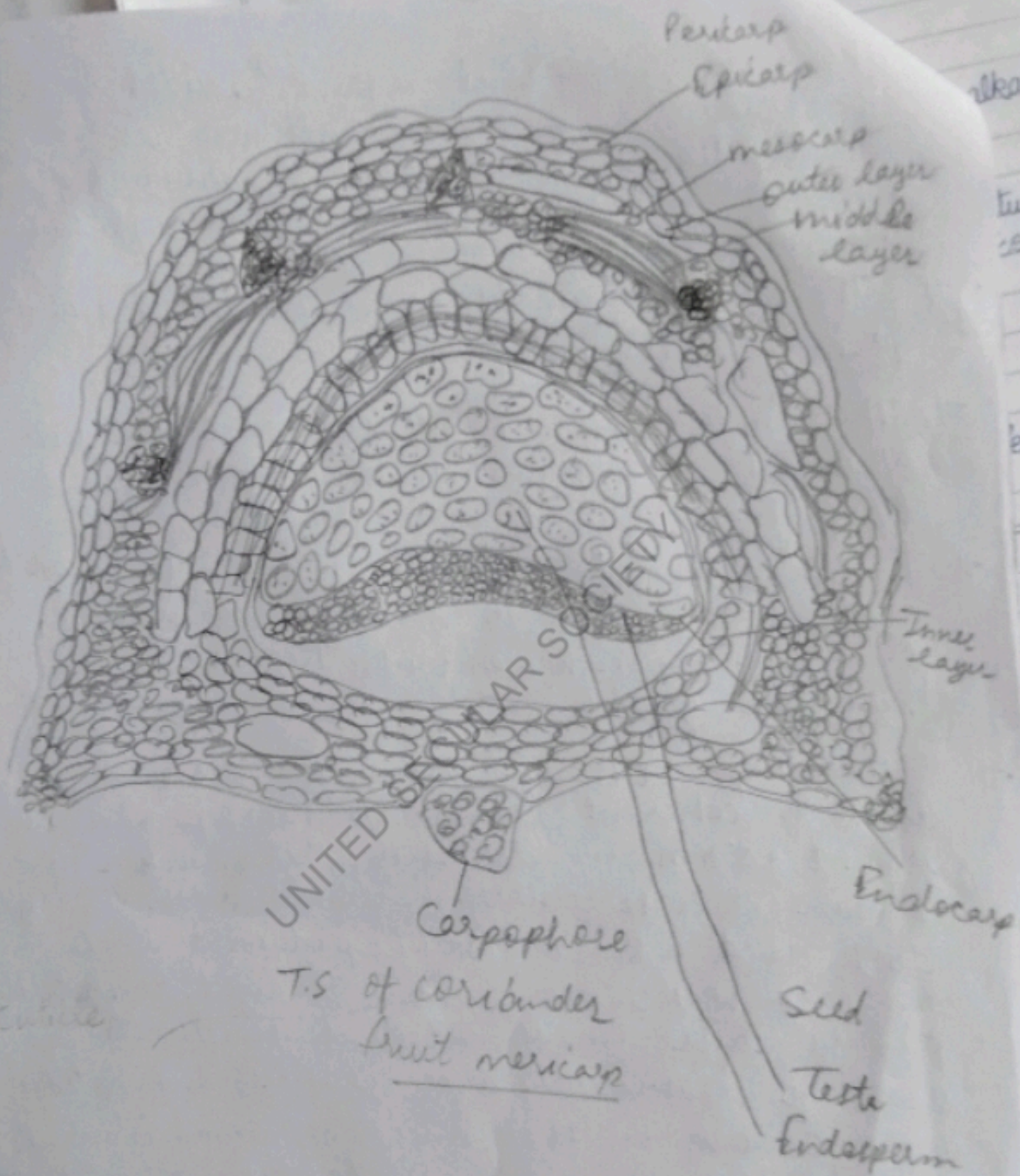
Microscopy:

- The ~~fruit~~ Transverse section of coriander shows the presence of a dorsal surface and a commissural surface.
- The dorsal surface consists of two vittae and a carophore. The dorsal surface has five primary ridges and four secondary ridges.
- The epicarp consists of a single row of small thick walled cells with calcium oxalate crystals.
- The mesocarp has an outer loosely arranged tangentially elongated parenchyma cells and the middle layer consisting of Sclerenchyma.



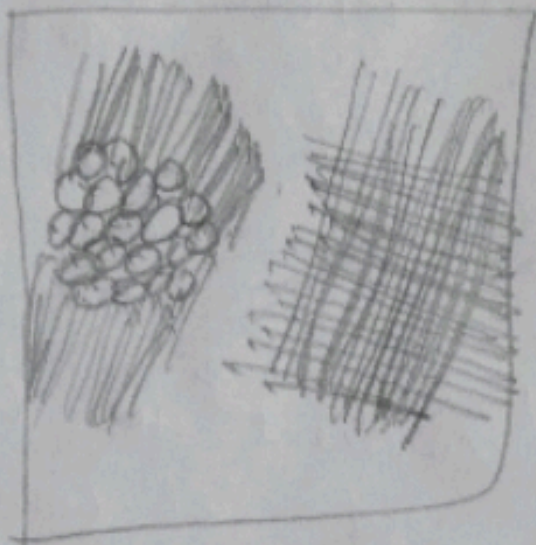
T.S of Cremocarp

- The middle layer is again divided into, the outer region of sclerenchyma is represented by longitudinally running fibres, whereas the inner region has tangentially running fibres.
- The vascular bundles are present below the primary ridges.
- The inner layer has polygonal irregularly arranged parenchyma cells. The endocarp has the parquetry arrangement.
- In the testa it has single layered, yellowish cells, and endosperm is thick, polygonal colourless parenchyma with fixed oil and aleurone grains.
- "mericarps usually coherent cremocarp usually coherent cremocarp nearly globular from 3 to 5 mm. in diameter, externally light brown or red colored, summit with 5 calyx teeth and a short stylopodium, each mericarp with 5 prominent, straight, longitudinal primary ribs and 4 indistinct undulate secondary ribs, mericarps easily separated, deeply concave on the inner or commissural surface and shearing in transverse section 2 vittae (oil tubes) on the inner surface of each
- Under the microscope, sections of Coriander show an epidermis of small cells with thick walls, a layer of several rows of thin-walled more or less collapsed parenchyma

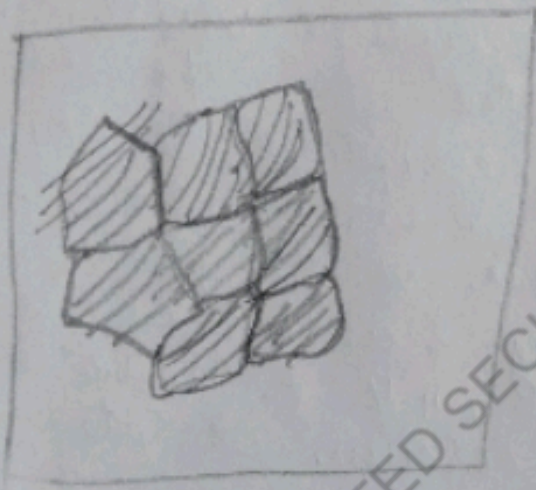


Separated from a broad zone of strongly lignified.

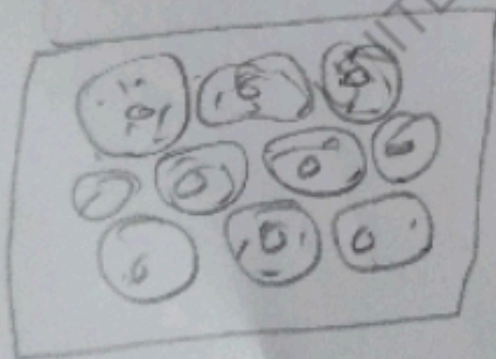
- Sclerenchymatous fibres which extend as a continuous ring in the mesocarp, 2 or 3 layers of large, tangentially elongated, thin walled parenchyma cells, frequently with numerous large lysigenous intercellular spaces.
- Inner epidermis of large tabular cells, the inner yellowish walls being considerably thickened and closely coherent to the brownish cells of the seed-coat, commissural surface with 2 large, elliptical utricles, the cells of the pericarp separated from the seed-coat and forming a large elliptical cavity.
- Endosperm distinctly reniform in outline and consisting of tubular or polygonal thick walled cells containing numerous large aleurone grains each with a rosette aggregate or prism of calcium oxalate.



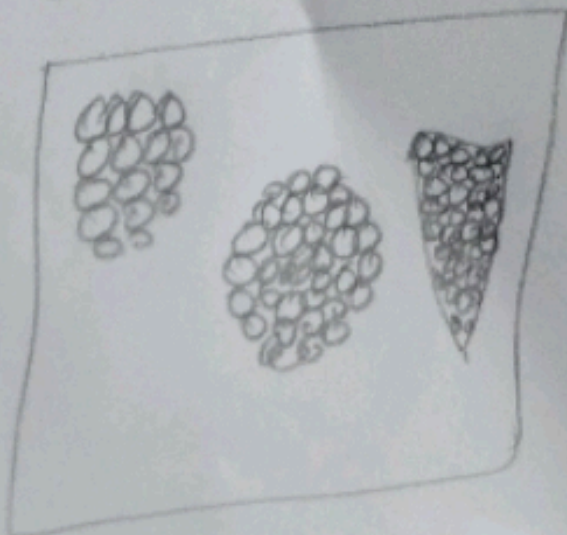
Sclerenchymatous layer



Endocarp



Endosperm



Vittae.

Powder microscopy

- Coriander powder is light brown to brown in colour with aromatic odour and characteristic aromatic taste
- It is characterized microscopically by:
 - (i) Numerous irregular fragments of endosperm cell containing globules of fixed oils and aleurone grains. Calcium oxalate crystals are numerous, from 0.003 to 0.01 mm. in diameter, mostly in rosette aggregates
 - (ii) Fragments of endocarp cells associated with hexagonal sclerenchyma of the innermost layer of mesocarp.
 - (iii) Sclerenchymatous fibres irregularly curved, having thick, yellowish lignified walls and having numerous simple pores and numerous globules of fixed oil
 - (iv) Fragments of characteristic irregularly curved yellowish pitted lignified fusiform fibres of the mesocarp.
 - (v) Fragments of parenchymatous cells of the mesocarp without reticulate thickening.
 - (vi) Very few fragments showing pieces of yellowish brown vittae.
 - (vii) Hairs and starch granules are completely absent

- A group of sclereids from the mesocarp with adjacent unlignified parenchyma.
- ④ Branching vittae (Shows an outline) only and understanding endocarp in surface view.
 - Covering trichomes
 - Part of a group of fibre-vascular tissue
 - Epicarp in surface view showing stomata and striated cuticle
 - Part of two vittae showing transverse septa and part of the underlying endocarp in surface view.
 - Endosperm containing microspheroidal crystals of calcium oxalate.

Uses: ① Coriander is used as Aromatic and

- ② Coriander is used as antispasmodic and diaphoretic
- ③ Coriander is used as flavouring agent.
- ④ It is used as refrigerant, tonic, appetizer, diuretic, aphrodisiac and stomachic
- ⑤ Coriander can be applied externally for rheumatism and painful joints.
- ⑥ The infusion or decoction of dried fruit of cardamom is useful for the treatment of sore-throat, indigestion, vomiting, flatulence and other intestinal disorders.

Result: To study the microscopical characteristics of Coriander was study successfully

Experiment No- 21

Object: To study the powder microscopy of Withania.

Reference: Khandelwal K.R, "Practical Pharmacognosy", Nirali prakashan 22nd edition, April 2012, Page No-18, 26+18-29.

Synonym: Ashvagandha.

Biological source: It consists of dried root parts of Withania somnifera.

Family: Solanaceae.

1. Powder ~~microscopical~~ characteristics:

1. Cork
- Irregularly outlined.

2. Vessels
- Lignified, bordered pits, spiral and annular.

3. Fibres
- Lignified thick walled.

Topic .

Date

4. Calcium oxalate

Microsphenoid

5. Starch

→ Simple, few compound, Reniform & oval.

→ Abundant in parenchymatous cells

Uses

It is used as

- Anti-tumour
- Hypotensive
- Respiratory stimulant
- Antispasmodic
- Antidiabetic
- Hepatoprotective etc

Report

The powder microscopy of Withania powder was successfully done & studied.

Experiment :- 22

Object :- To study microscopical characteristics of Licorice Powder & ts. of licorice stolen or root.

Reference :- Dr. K.R. Khondelwal "Practical Pharmacognosy" Nirali Prakashan, Pune, Edition: XIX-2009 Pg-123

Synonym :- Glycyrrhizae radice, glycyrrhiza, Mulethi, Jathimadh

Biological Source :- It consists of dried, peeled or unpeeled roots & stolons of glycyrrhiza glabra Linn., Family :- Leguminosae

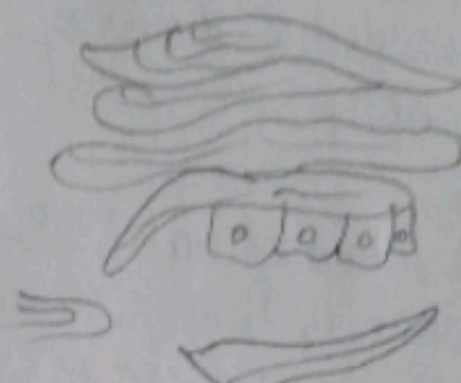
Macroscopy :-

colour :- Peeled - Pale yellow, unpeeled - yellowish brown to dark brown

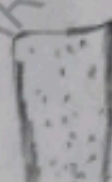
odour :- Faint & characteristics

Taste :- Sweet, free from bitterness

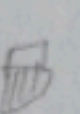
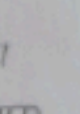
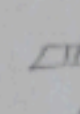
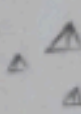
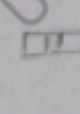
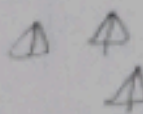
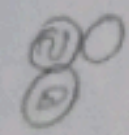
Shape :- Angular in shape



Fibres



xylem vessels



calcium oxalate crystals



Starch grain

Microscopical characteristics :-

Fibres : Lignified, thickened, yellow walls, in bundle of about 10-50 with crystal sheath of parenchymatous cells each containing single Prism of Calcium Oxalate.

Xylem vessels : Large with numerous bordered pits, Surface is lignified.

Calcium Oxalate Crystals :- Individually Prism shaped, 10-15 to 25-30 long. Present in parenchymatous cells and many are scattered in the powder.

Starch Grain : Most are simple, oval or rounded, about 2-4 to 10-20 μ long, Showing no striations.

Cork :- Abundant fragments of orange-brown cork composed of thin walled polygonal cells.

Chemical Constituents :-

Saponin glycosides : Glycyrrhizin (3-9%), Glycyrrhizic acid (algycon)

Flavonoid glycosides : Isoliquiritin & liquiritin

Coumarin derivatives : Herniain, Umbelliferone

Identification Test

Sl. No.	Reagents	Observation	Characteristics
(i)	Phloroglucinol + Conc. HCl (1:1)	Pink	Lignified xylem fibres, Phloem fibres
(ii)	Iodine sol ⁿ	Blue	Starch
(iii)	Acetic acid	Insoluble	Calcium oxalate crystals
(iv)	HCl	Soluble	"
(v)	H ₂ SO ₄ (60% w/w)	Soluble needles of Ca ⁺⁺ sulfate on standing	Ca ⁺⁺ oxalate crystals.

uses :-
(i) used as an expectorant & demulcent
(ii) as an antitumor, Sweetening agent
(iii) Also used for masking undesired flavour

Report :- The microscopical characteristics of
Liquorice powder had been studied
successfully.

Experiment No-23

Object: To study the microscopy of Clove Bud, and powder.

Reference: Kokate C.K. "Practical Pharmacognosy" 4th edition Vallabh prakashan Pg 78.

Requirements:

Synonyms: Lavang.

Biological source: It consists of dried flower buds of "Eugenia Caryophyllus Sprange".

Family: myrtaceae.

Microscopical characteristics:

① Epidermis:

→ Single layer, straight walled cells with anomocytic Craspedoleucous stomata, very thick cuticle.

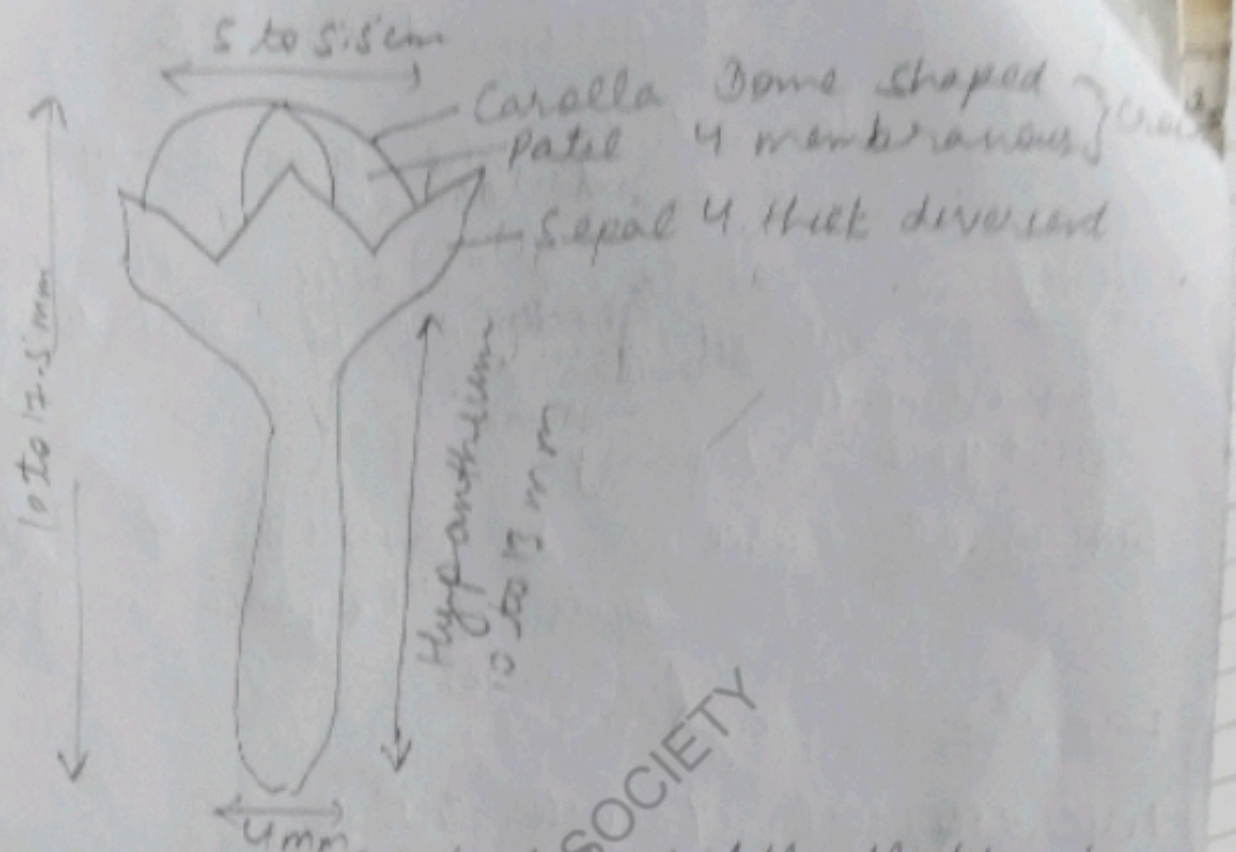
② Cortex: Three zones

(i) Upper zone:

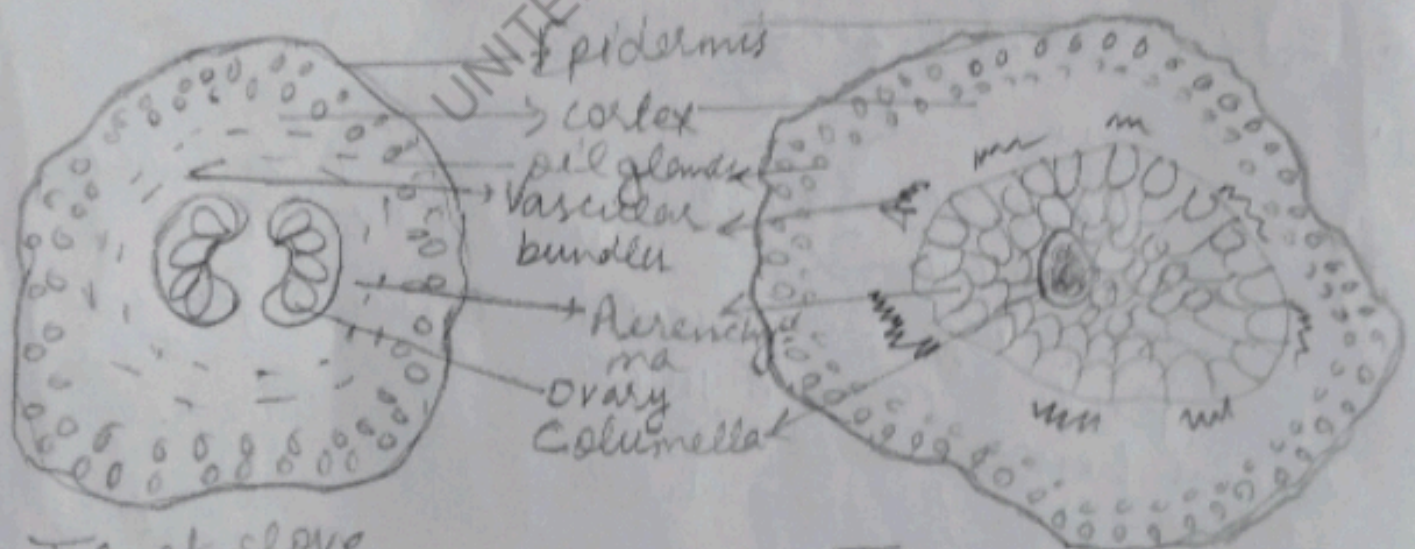
→ Upper zone contains radially arranged parenchymatous cells with two to three layers of big, ellipsoidal, Ischizolysigenous oil glands. Parenchymatous cell contain tannins hence show dark colour when stained with ferric chloride.

(ii) Middle zone

→ middle layer or region containing a ring of bicollateral vascular bundles where xylem is composed of three to five lignified spiral vessels. About 15 vascular bundles.



Shape: sub-cylindrical slightly flattened.
 Clove bud



T.S of clove
 Hypanthium
 passing through
 ovary

T.S of clove
 Hypanthium
 passing through
 columella

are present in ring. Isolated pericyclic fibres (lignified) may be present around the vascular bundle (fibro vascular bundle).

- 7 Fibres are prominent and show distinguished pink colour on staining

(III) Lower zone

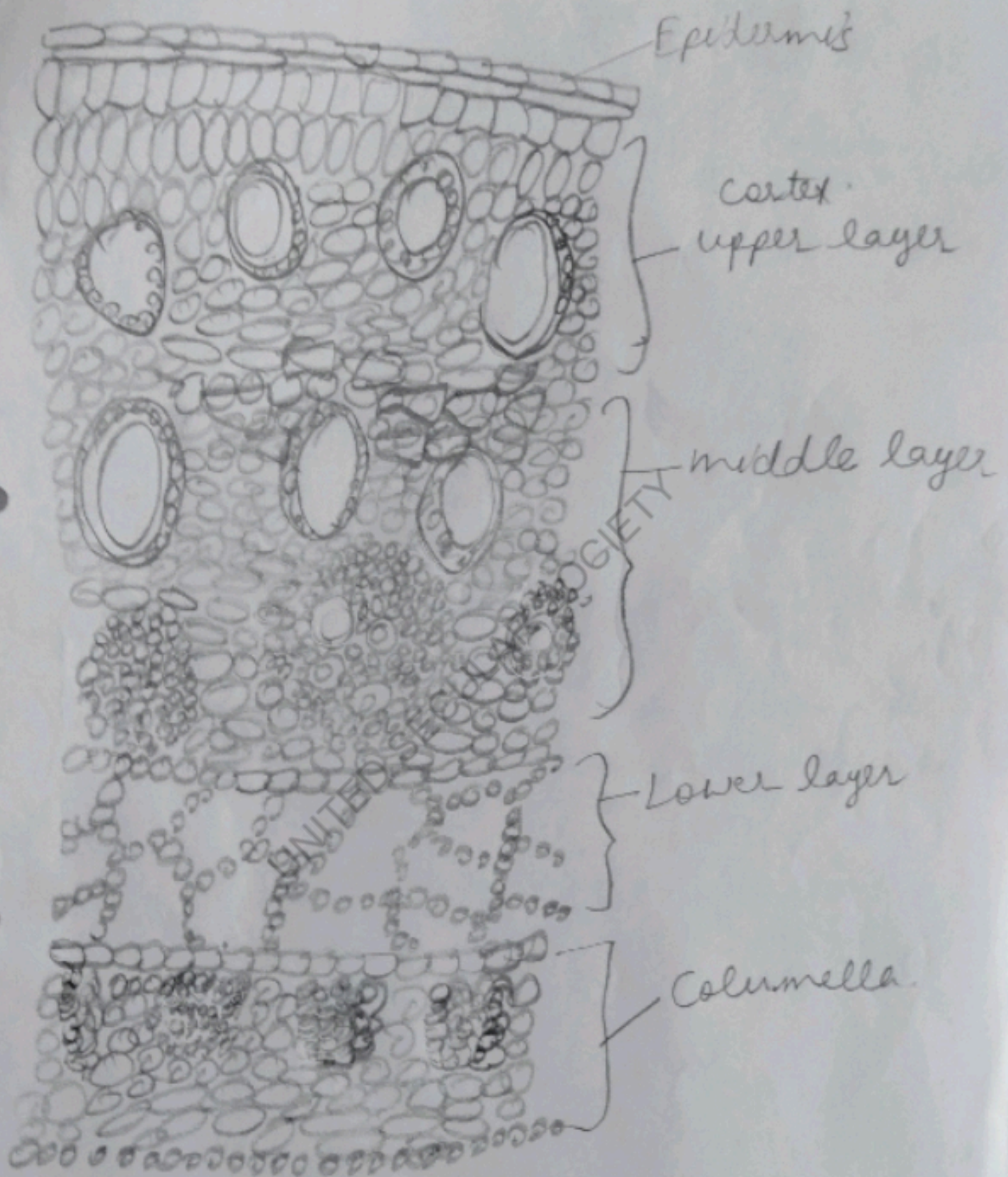
- 7 Lower zone or Inner zone of parenchyma composed of air spaces (aerenchyma), separated by lamellae, one cell thick which supports the central columella.

COLUMELLA

- 7 Parenchymatous, rich in calcium oxalate clusters, a ring of vascular bundles towards the periphery.
- 7 25-30 small vascular bundles are present at periphery.
- 7 If T.S is passing through ovary, instead of columella, two bean shaped lobes with axils will be seen in the center.
- 7 Calcium oxalate prisms, starch, trichomes and stone cells are absent

* Staining / Diagnosis / micro-chemical Tests:

S.No	Reagents	Observation	Characteristics
01	Phloroglucinol + conc ⁿ HCl (1:1)	Pink	Vascular bundles and fibres.
02	Sudan Red III	Red	Cuticle, oil glands



strong KOH
solution

Needle shaped
potassium

Eugenol and
volatile oil

04 Dil hydrochloric
acid

eugenate crystals
Crystals soluble

Calcium
oxalate crystals

05 Sulphuric
acid (60% w/w)

Soluble, needles
of calcium
sulphate, on
standing

Calcium
oxalate
crystals

Uses: ① It is used as carminative.

② It is used as aromatic and
stimulant.

③ It is used as antiseptic and
flavouring agent.

④ It is used as dental analgesic
oil, in microscopic work, for isolation
of eugenol.

Report The microscopical characteristics
of Clove (flower bud) was studied
successfully.

Experiment - 24

Object:

To study the microscopical characteristics of Turmeric (*Curcuma*)

Reference: "Kakate C.K." Textbook of "Pharmacognosy" published by "Nirali Prakashan" 4th edition
Page No - 4.149

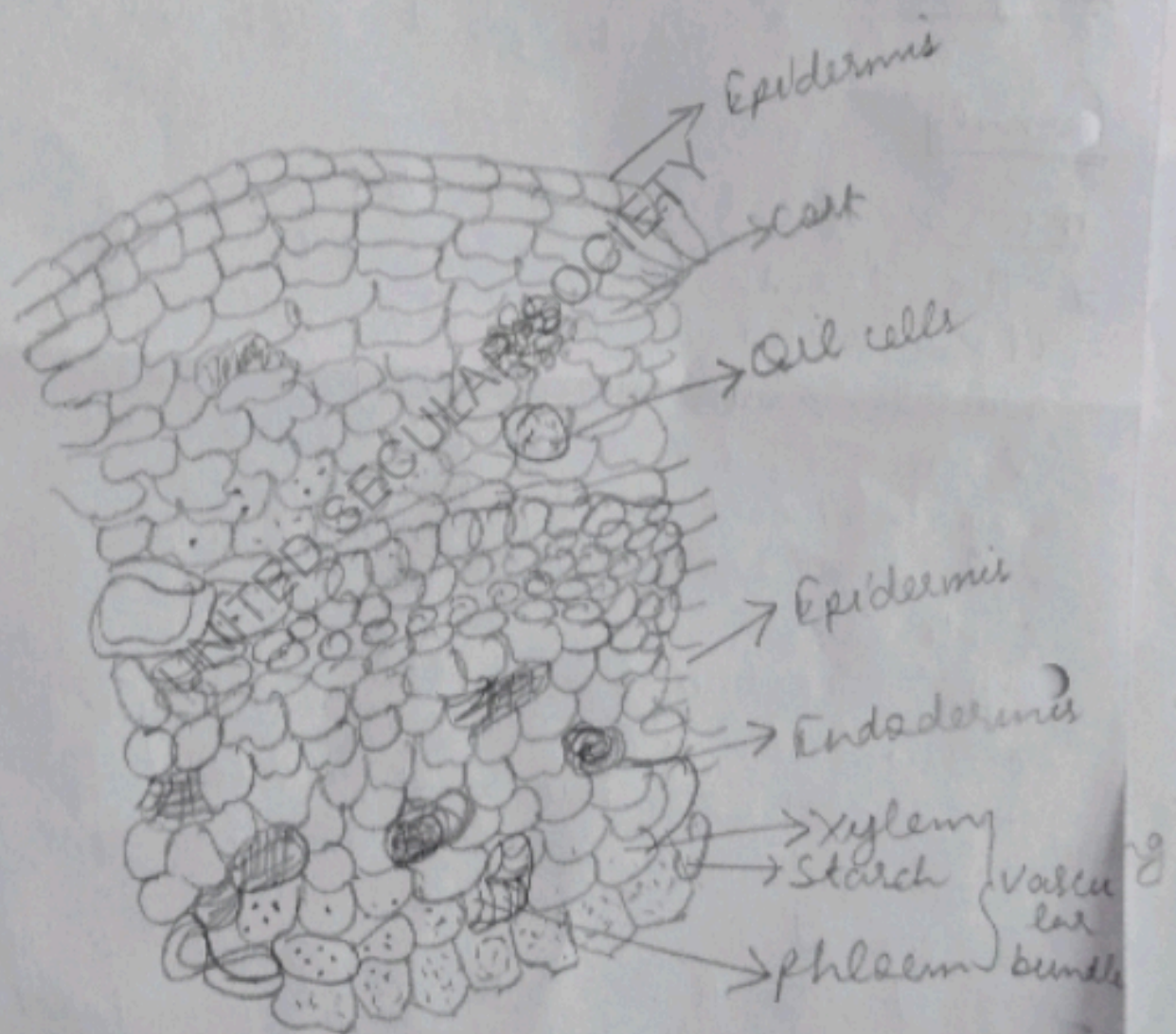
Synonyms: Haldi, Haridra, Curcuma.

Biological source: Dried as well as fresh rhizomes of the plant *Curcuma longa* Linn

Family: Zingiberaceae.

microscopical characteristics:

- The transverse section of the rhizome is characterized by the presence of mostly thin-walled rounded parenchyma cells, scattered vascular bundles, definite endodermis, few layers of cork developed under the epidermis, and scattered xylem cells with brownish contents.
- The epidermis is consisted of thick-walled cells, cubical in shape, of various dimensions.
- The cork cambium is developed from the sub-epidermal of the cork, the epidermis is retained.
- Cork is generally composed of four to six layers of thin-walled brick shaped parenchymatous cells.
- The next region of cortex is composed of few layers of thin walled, polygonal parenchymatous cells containing gelatinized, flattened starch grains, yellow coloured matter and vascular bundles (collateral type).



T.S of Turmeric rhizomes.

Cortex region also shows presence of oil cells having thickened wall containing orange yellow globules of volatile oil or amorphous resinous masses.

- Endodermis is present below cortex and is composed of single layer of thin walled cells.
- Innermost region of pith is composed of parenchymatous cells containing starch grains, numerous oil cells and vascular bundles.
- The vascular bundles in this region are scattered and form a discontinuous ring just below endodermis.
- The vascular bundles are of collateral type. Phloem shows sieve tubes and xylem shows reticulate, spiral or annular vessels.

Powder characteristics

- ① Fragments of cortex - Thin walled parenchymatous cells containing gelatinized starch grains, yellow colouring matter.
- ② Starch grains - Simple, oval, long lens shaped, flattened. Grains show transverse striations and small hilum.
- ③ Fragments of pith - Thin walled, parenchymatous cells containing starch grains.
- ④ Vessels - mainly spiral, reticulate and annular vessels are few in number.

- uses:-
- ① It is used as antiseptic
 - ② It is used as expectorant
 - ③ It is used as colouring agent.

Report:- To study the microscopical characteristics of Turmeric was study successfully.

UNITED SECULAR SOCIETY

Experiment no - 25

Object: To study the ^{microscopical} characteristics of Nux-Vomica seed.

Reference: Khandelwal K.R. Practical Pharmacognosy Techniques and Experiments Nirali prakashan 22nd edition

2012 Page No - 13.3

Synonym: Semen strychnini, Kuchla, Zerkachuro.

Biological source:

1. It consists of the dried ripe seeds of *Strychnos nuxvomica*.

Family: Loganiaceae.

Microscopical characteristics of powdered drug of Nux-Vomica

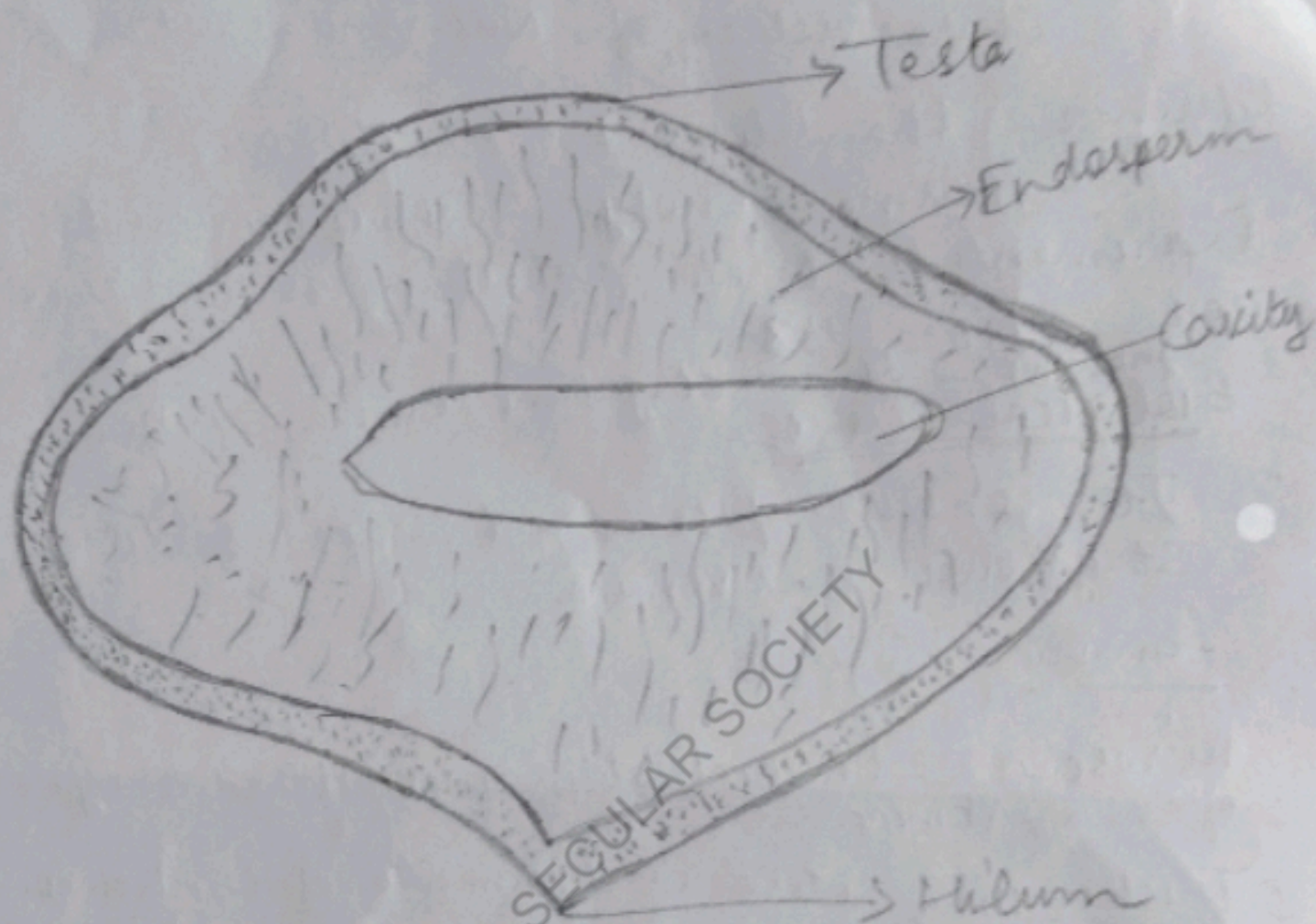
- ① Trichomes: Entire or fragments of trichomes, lignified. Base is pitted and broad.

Apex: Apex is rounded.

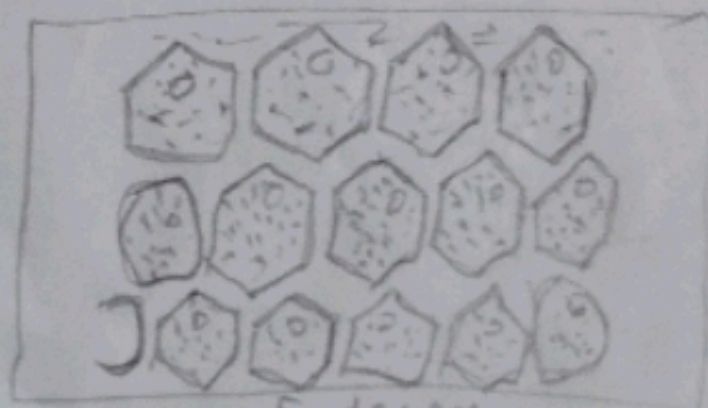
Ridges: Ridges are present on the surface.

Length: 60 - 1000 μ . Diameter about 25 μ

- ② Endosperm: Polygonal cellulosic cells, with oil globules and aleurone grains.



Trichomes



Endosperm

Testa!

① Lignified trichomes

- Thick walled, bent and twisted lignified trichomes, immersed from epidermis, parallel in one direction.
- (ii) Length 600-1000 μ , diameter about 25 μ

(iii) Epidermal cell : §

- Single layer, forms lignified trichomes.
- large thick walled with oblique linear pits
Base of trichomes.

(iv) Collapsed parenchyma :

- Two layers, flattened parenchyma, present below epidermal trichomes.

② Endosperm

- Thick walled cellulose parenchymatous cell.
- cell shows hemicellulose in the cell wall and following characteristics.

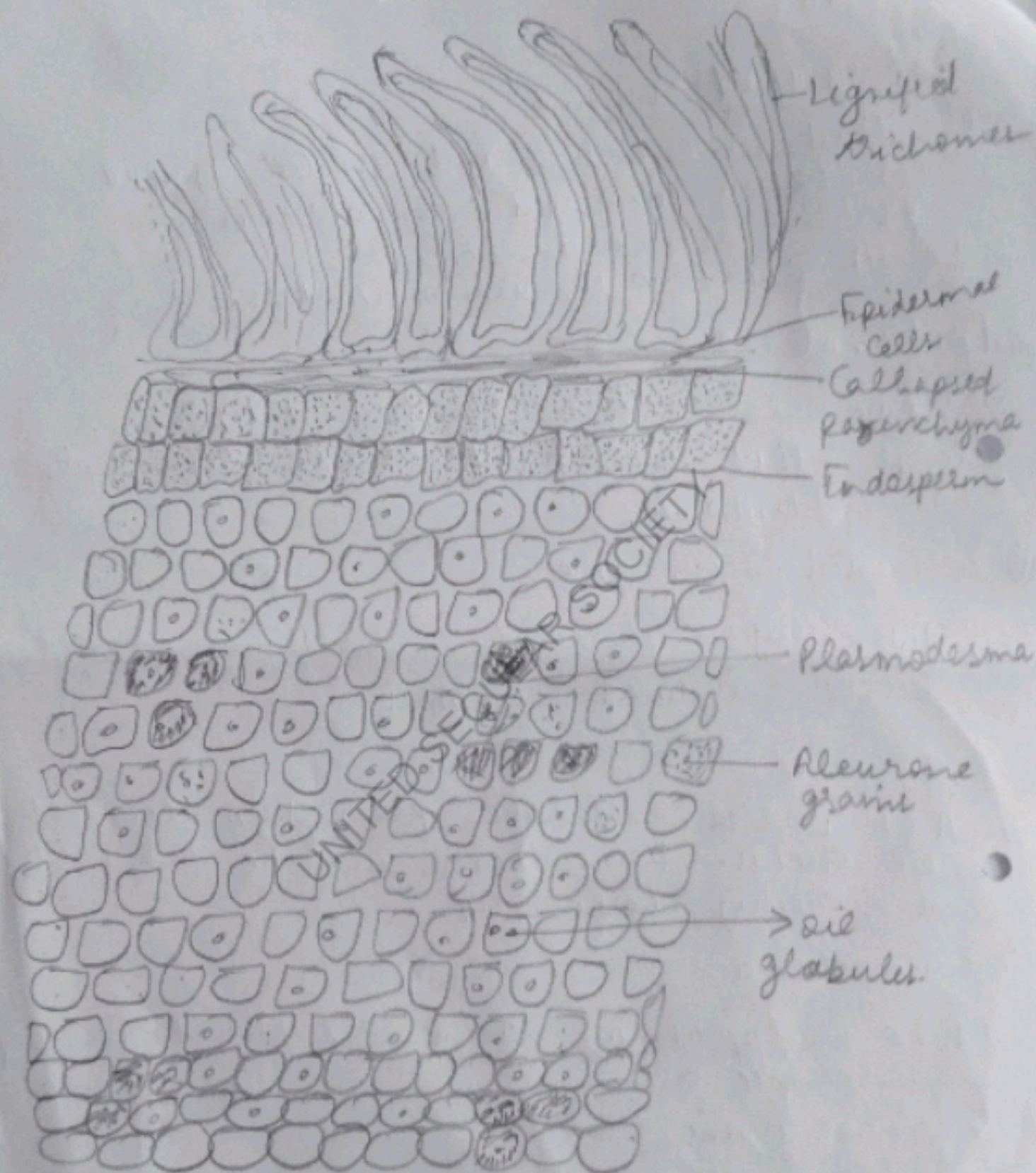
(i) Plasmodesma

- Fine protoplasmic strands b/w the walls of endospermic cells.

(ii) Aleurone grains!

- About 30 μ in diameter. Only globoids are present

- (iii) oil globules : fixed oil as small oil droplets in the cell.



T.S of Nux. Vomica Seed.

Staining / Diagnosis / micro-chemical Tests:-

S.No	Reagents	Observation	Characteristics
01	Phloroglucinol + concentrated HCl (1:1)	Pink	Lignified epidermal trichomes.
02	Dil. Iodine + conc. sulphuric acid	Blue	Hemicellulose - Endospermic wall. (plasmodesma)
03	Alcoholic picric acid	Yellow	Aleurone grains present in the cells of endosperm
04	Sudan Red III	Red	oil globules present in the cells of endosperm.

uses ① It is used as Bitter
stomachic

② It is used as spinal cord
stimulant.

③ It is used as Nerve tonic

Report:- To the study the microscopical
characteristics of ~~the given crude drug~~
was successfully.

Experiment No. - 2.6

Object:

To study the Microscopy of *Vasaka* leaf.

Reference: Khandelwal K.R., "Practical Pharmacognosy", Nirali Prakashan, 22nd edition, April 2012, Page No. - 12.30 - 12.33.

Biological Source: It consists of fresh & dried leaves of plant *Adhatoda vasica*.
Family - Acanthaceae.

Microscopy:

1. Upper Epidermis -

- Single layered, rectangular cells, wavy anticlinal walls, cuticularized covering and glandular trichomes (Sessile without stalk) and diacytic stomata are present.

2. Mesophyll: Dorsiventral.

Palisade -

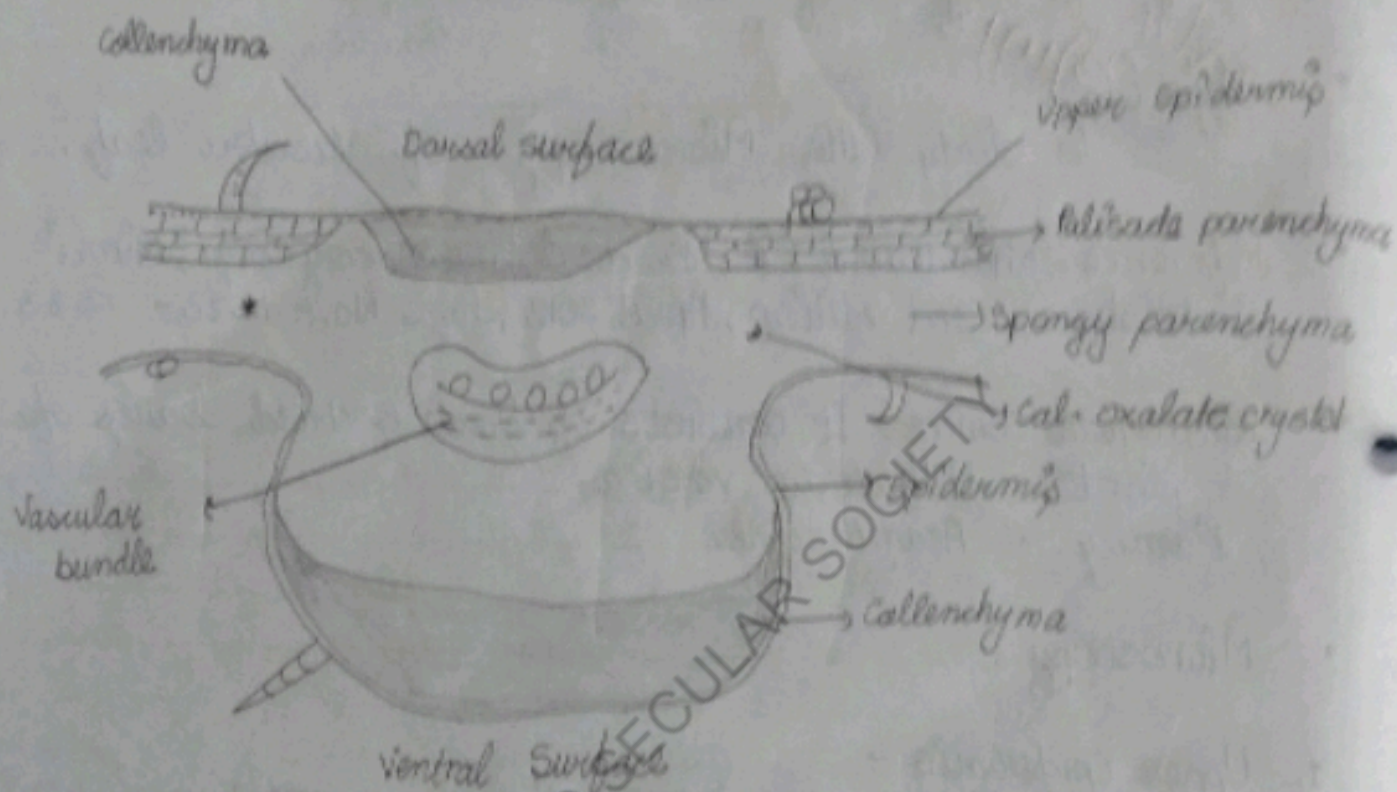
- 2 layered, compact & radially elongated cells.

Spongy parenchyma -

- 4 to 6 layered, loosely arranged with intercellular spaces, presence of calcium oxalate crystals.

3. Lower Epidermis -

- Resembles upper epidermis, but no. of trichomes & stomatal pores are more.



T.S. of *Mimosa* leaf

V. Hood

4. Covering trichome :
 - 2-4 cells blunt, thick walled, pointed.
 5. Glandular trichome :
 - Sessile, with quadricellular heads.
 6. Stomata :
 - Caryophyllaceous (Diacytic).
 7. Collenchyma :
 - 2 to 4 layers, below upper epidermis. Also present above lower epidermis.
 8. Cystoliths :
 - Few cystoliths can be seen in cortical parenchyma.
 9. Vascular bundles :
 - These are arc-shaped, collateral.
Xylem : Lignified
Phloem : Non-lignified.
 10. Collenchyma :
 - Thick walled cellulose cells.
- Report :
The microscopy of the Vasaka leaf was successfully studied.

Abhi

Experiment No. - 27

Object: To perform the physical & chemical test for "ASAFOETIDA"

Reference: Katate CK, Purohit AB, Gokhale SB text book of pharmacognosy, 51 edition nirali prakashan, Page no. 33.

Requirements:

Apparatus: mortar and pestle, test tube, conical flask, beaker, filter paper, Drug sample, Weight balance.

Chemicals: HCl, Ammonia 5% HNO_3 , H_2SO_4 water.

Biological source:

It is the oleo resin obtained from roots and rhizomes of *Ferula foetida*.

Physical Characteristics:

appearance:-	Crystalline
colour:-	yellowish brown
odour:-	Intense penetrating and alliaceous odour
Shape:-	Tear and masses.
Taste:-	Bitter acid alliaceous taste
Solubility:-	Partially soluble in alcohol.

S.No	Test	observation	Inference
01	Triturate with H_2O	Yellowish orange emulsion	Asafoetida present
02	Treat fractured surface with 50% nitric acid	Green colour	Asafoetida present.
03	Treat fractured surface with conc. Sulphuric acid	Red or reddish brown colour	Asafoetida present.
04	Combined Umbelliferone Fluorescence Test Triturate 0.5g of drug + Sand + 5ml HCl acid add 2ml water, filter, filtrate + equal volume of ammonia	Blue Umbelliferone fluorescence (Umbelliferone)	Asafoetida present

05	Alcoholic extract + phloroglucinol and conc ⁿ HCl.	Pink colour	Asafoetida present.
06	on burning	Yellow flame	Asafoetida present.

Uses: ① It is used as a carminative (relieve excessive collection of gas in the stomach).

② - It is used as expectorants.

Result: The chemical and physical test of Asafoetida was successfully.

Experiment 1-28

Aim To perform the physical and chemical test for the given crude drug "BENZOIN"

Reference "Kokate C.K." The textbook of Pharmacognosy, Published by Nirali Prakashan 4th edition 2018 Page No - 5.36

Requirements

Chemicals KMnO_4 Solⁿ, H_2SO_4 , FeCl_3 , Sulphuric Acid

Apparatus China dish, glass rod, beater, filter paper, heating mantle, Test tube, T.T holder.

Physical characteristics

Colour! greyish brown or grey masses
odour! agreeable and balsamic
Taste! Sweetish and slightly acid.
Shape! tears, masses, lump.
Size! Varying in size.

Uses It is used as Expectorant, Carminative diuretic, antiseptic and protective.

Characteristics	Sumatra benzoin	Siam Benzoin
Physical Colour Taste Odour Extra Features Solubility	Greyish brown or grey Aromatic and Characteristics Sweetish and slightly acid. Lumps of varying size and tears which are externally yellowish milky white Alcohol.	Yellowish brown to rusty brown Vanilla like Sweetish and Slightly acid Hard and brittle masses soften and on heating becomes plastic. Alcohol
Standards: Acid insoluble ash Benzoic acid extractive Loss on drying.	Not more than 1% Not less than 6% Not less than 75% Not less more than 10%	Not more than 5% Not less than 12% Not less than 90% Not more than 10%
Chemical constituents	Free balsamic acids (benzoic and cinnamic acid); Triterpenoid acids like Summarosonic acid.	An ester Coniferyl benzoate (75%) Styrol, Vanillin and phenyl propyl cinnamate.
Chemical Test.	odour of benzaldehyde	
① Warm 0.5g benzoin powder + 10 ml kmr		
② 1ml ether extract of benzoin + 2-3 drops of H_2SO_4	Deep reddish brown	Deep purplish red colour.
③ Alcoholic extract benzoin powder + alcoholic sol ⁿ of $FeCl_3$	Green Colour	Negative.

Digest 0.5g of drug + 5 ml ether 5 min. take 1 ml of ethereal soln in a porcelain dish + conc. sulphuric acid.

Deep reddish brown colour.

Deep ~~pink~~ purple red.

Chemical Test

S.No	Test	Observation
01	0.5g benzoin powder heated with 10 ml of KMnO_4	odour of benzaldehyde.
02	Alcoholic solution of benzoin + H_2O	milky solution (acidic to litmus)
03	Heat 0.5g benzoin powder slowly in dry test tube	Evolves irritating whitish fumes which condense to form whitish crystalline sublimate at upper part of test tube.
04	Sublimates after sealing	Crystals of tinnamic acids.

Result To perform the physical and chemical test for the given crude drug was done.

Experiment No - 29

Object:- To the study of the physical character of given crude drug.
"pale. Catechu".

Reference:- Kokate C.K, Text book of pharmacognosy published by Nivali prakashan, 4th edition
pag No - 5.59

Requirements:- Equipment:- Test tube, Test tube holder, spatula, test tube stand, Spirit lamp,

Chemicals:- HCl, Vanillin, light petroleum, hydroxide solⁿ

Apparatus:- China, dish, glass rod, beaker, filter paper, heating mantle, test tube and T.T holder.

Chemical constituents

7 Pale catechu contains mainly catechins about 7.33%. Catechu tannic acid are catechu resin in addition to quercetin and gambier fluorescein

Procedure

S.No.	Experiment	Observation	Inference
01	mix with in vasti Vanillin and HCl	red and pink colour.	quercetin is present.
02	pale catechu when treated with HCl	purple colour - phloroglucinol.	presence in catechu.
03	To alcoholic extract of pale catechu add Sodium Hydroxide and few drops of light petroleum. Shake well.	green fluorescence.	gambier fluorescein.

Uses:

- ① It is used as Astringent in diarrhoea and in the form of lozenges for buccal - cavity.

Result: The physical and chemical test for given crude drug was done.

Experiment No -

Object:-

To study the physical and chemical test of given crude drug for Black catechu.

Reference

Kokate C.K. Purohit A.P. & Grothle S.B.
pharmacognosy, editions 4th Nirali
publication pag No - 5.58.

Reagents

Black catechu

Chemicals

ferrous chloride solⁿ
Vanillin, HCl.

Synonyms

Quinch, Kattha, Khadir, Catechu.

Biological Source

Dried aqueous extract of heart wood of "Acacia catechu"

Family

Leguminosae.

Morphological Character

Colour:- Light brown to black powder.

Odour:- None.

Taste:- Astringent.

Size:- 2 to 5 cm cubes or rectangular pieces.

Shape:- cubes or irregular fragments.

Standards

Pieces are friable, porous, with vegetable debris, fracture short.

Solubility

Soluble in water and alcohol.

Chemical Constituents

It contains 10% of acacatechin, other constituents are catechu red, quercetin and gum, but contain no chlorophyll and fluorescent substance present in

pale catechu.

Chemical Test:-

- ① Gives bluish black colour with ferric chloride solution.
- ② Pink or red colour with vanillin and hydrochloric acid.
- ③ Brown colour with lime water.

Uses:- It is used as the antidiarrhoeal, astringent, carminative and stimulant.

Result:- The physical characters of Black Catechu was done.

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Experiment no - 31

Aim To perform the chemical test and physical test for the given crude drug Castor oil.

Reference "Kotak CK, Parshat AP and S.B. Grothale, "Pharmacognosy" edition 4th Nirali Prakashan Page no. 5.5

• Requirements Chemicals: light petroleum, ether, Chloroform, glacial acetic acid.

Synonyms: Oleum Ricini

Biological source: Fixed oil from dried "Kernels Ricinus communis"

Family: Euphorbiaceae.

• Morphological character

Colour: Colourless

Odour: Characteristic

Taste: Slightly acid.

Standard:

Wt per ml: 0.945 to 0.965g

Solidifying point: -10 to -18°C

Refractive Index: 1.4758 to 1.4798

Solubility: Soluble in alcohol and in chloroform, ether, petroleum ether and glacial acetic acid. It is insoluble in mineral oils.

Chemical Constituents:

- It contains triglycerides of ricinoleic acid, fatty acid as isoricinoleic, linoleic, stearic and isostearic acids.
- Castor oil also contains heptaldehyde, undecanoic acid, sebacic acid.

Chemical Tests:

- ① With equal volume of alcohol, clear liquid is obtained, on cooling to 0°C for three hours liquid remains clear.
- ② It mixes with half its volume of light petroleum ether ($40-60^{\circ}$).

Uses ① It is used as Irritant purgative, lubricant and also for cosmetics purposes.

Result: The physical & chemical character of castor oil was done.

Experiment N-32

Aim: To identify the physical and chemical characters of Acacia.

Reference: Kokate CK, practical pharmacognosy, 4th edition Vallabh prakashan, Delhi.

Requirements:

Chemicals: Gum Arabic consists almost entirely of glycoside acid, named Arabic acid, Combined with potassium, magnesium and calcium, $FeCl_3$, iodine solution, HCl,

Equipments:

Physical Test:

Synonyms: Indian gum, Gum acacia, Gum, arabica,

Biological source: Dried gummy exudation of stems of Acacia arabica,

Family: Leguminosae.

Morphological characteristics:

Colour: Cream to Cream brown

Odour: Odourless

Taste: Bland and mucilaginous

Size: 1 to 5 cm

Shape: Tears of various sizes

Extra Feature: Tears are glossy, marked with fissures, brittle, break with angular fragments.

Solubility: Soluble in water (partly)
Insoluble in alcohol and ~~large~~ organic solvents.

Chemical Test:

By hydrolysis arabic acid yields 1-molecule of 1-rhamnose, 2-molecules of D-galactose and 3-molecules of 1-arabinose and an aldonic acid.

It also contains diastase and an oxidase enzyme.

Procedure:

- ① Dissolve about 0.25 gm of the coarsely powdered drug in 5ml of distilled water by shaking in the cold. Add 0.5ml of hydrogen peroxide and 0.5ml of benzidine solution. Shake and allow to stand for 10 minutes. A deep blue colour is formed due to the presence of oxidase enzyme.
- ② A 10% aqueous solution of acacia fails to produce any precipitate with dilute solution of lead acetate, it does not give any colour change with iodine solution and it never produces a bluish-black colour with FeCl₃ solution.
- ③ Hydrolysis of an aqueous solution of acacia with dilute HCl yields reducing sugars whose presence are ascertained by boiling with ~~ferrous~~ solution to give a brick-red precipitate of cuprous oxide.

Uses: It is used as Demulcent, suspending agent, emulsifying agent, binding agent.

Experiment no.

physical

Subject
Conclusion

From the physical test and
Chemical test for the given crude
drug is identified as Acacia.

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Experiment No. 33

Object:- To Identify the chemical character of given sample (Tragacanth)

Reference:- Kokate CK, practical pharmacognosy, 4th edition
Vallebbh Prakashan Delhi Page no. -

Requirements:- Hydrochloric acid (HCl) sodium hydroxide, fehling's solution, Barium chloride solution, lead acetate, Ranthecium red, Iodine Caustic potash.

Back ground:-

- ① Unorganized drugs, are drugs that show no definite cellular structure. These are derived from plants, animal or mineral sources by some process of extraction and followed by the purification if necessary.
- ② These may be differentiated by observing the solubility in alcohols than applying other physical and chemical standards.
- ③ Tragacanth is the derived gummy exudation from the stem of Extracellular gummifer, Labillardiere and other species of Astragalus.
- ④ It occur is flat or curved ribbon shaped flake odorless almost tasteless, white or pale yellowish white some what translucent heavy. fracture short.

Procedure:

- ① To unit of 0.5 g. W/V solution add 0.5 ml of HCl acid and heat for 3 minutes on a water bath, divide the liquid into two parts.
- ② To one part, add 1.5 ml of sodium hydroxide solution and Fehling's solution, warm on water bath: red precipitate is produced.
- ③ To the second part, add barium chloride solution (10%) no precipitate is obtained (distinction from agar).
- ④ To a 0.5% W/V solution of gum and add 20% W/V solution of lead acetate. A voluminous fluorescence precipitate is obtained.
- ⑤ Amount a small quantity of powder is rheumatic red and examine microscopically: practical do not acquire pink colour.
- ⑥ To 0.1 g of powder add N/50 Iodine. The mixture acquire an alive green colour.
- ⑦ Powder is warmed with 5% aqueous caustic potash. Canary yellow colour will be obtained.

Conclusion:

From the above morphological characters and chemical test the given crude drug is identified as Tragacanth.

Experiment No - 34

Object:

To identify the physical and chemical test for agar.

Reference:

Kokate C.K. Practical Pharmacognosy
4th edition Vallabh prakashan,
Page No. 884

Physical Test:

① Synonyms: Agar-Agar, Japanese - Icinglass,
Vegetable gelatin.

② Biological source: Dried gelatinous substance
derived from red algae
Gelidium amansii and other species of
red algae.

③ Family: Rhodophyceae.

④ Morphological characteristics:

Colour: Yellowish gray to white or colourless
shreds.

Colour: colourless

⑤ Taste: mucilaginous

Shape: Various forms like strips, sheets, flakes

Size: 4mm in width and 40 to 60 cm in length.

⑥ Extra Features:

Strips are translucent, lustrous
and slender, while the flakes are
grayish to white in colour.

⑦ Solubility:

Insoluble in water and alcohol,
Soluble in hot H_2O

② Chemical constituents

- Agar consists of polysaccharides as agarose and agarosectin.
- It contains about 35% cellulose and 6% nitrogen containing cellulose.

Chemical test

① Test: Boil 1gm of agar with some of water until it is affected. Cool to room temperature.

(a) Observation: A slip jet is formed

(b) Inference: Agar.

② Test: 0.2% solution of agar aqueous solution of tannic acid.

(a) Inference: Distinction from gelatin.

(b) Observation: No precipitate is formed.

③ Test: Warm little sample in alcoholic solution of potassium hydroxide.

(a) Inference: Agar present.

(b) Observation: Canary yellow colour is produced.

④ Test: mount a small quantity of powder in the solution of ruthenium red and examine microscopically.

Inference: Presence of mucilage in agar.

Observation: Particles acquire red or pink colour.

⑤ Test: Add 1 drop of N/10 solution of iodine to 10 ml of decoction of agar. Rapidly cool under tap water to room temperature.

Inference: Agar is present.

Observation:

⑥ Test: Add 0.5 ml of concⁿ. HCl to 4 ml of 0.5 % solution of agar. Heat it on H₂O bath for 30 minutes. Cool at room temperature and divide into two portions.

(a) Add 3 ml of 10% NaOH solution and Fehling's solution A and B in equal quantities and warm over water bath.

(b) Add 10% of barium chloride solution.

Inference: (a) Red ppt. of cuprous oxide is obtained.

(b) Slight white ppt of barium sulphate is obtained.

Observation: Reducing sugars are present.

(7) Test: Incinerate agar to ash, add a drop of concⁿ HCl observed under microscope.

Inference: Agar is present.

Observation: Fragment of diatom.

Conclusion: From the morphological character and chemical tests the given crude drug is identified as Agar.

Experiment: 35

Aim: To study the physical and chemical test for the given "Guar Gum"

Reference: Kakate C.K. Text book of pharmacognosy published by Nirali Prakashan, 11th edition
pag No. 5.26

Requirement: ^{Chemicals} Iodine solution, Lead acetate solution, Guar Gum,

Synonyms: Guar flour, Jaguar gum.

Biological Source:

Powder of endosperm of seed of *Cyamopsis tetragona* Linn.

Family: Leguminosae.

Morphological characters:

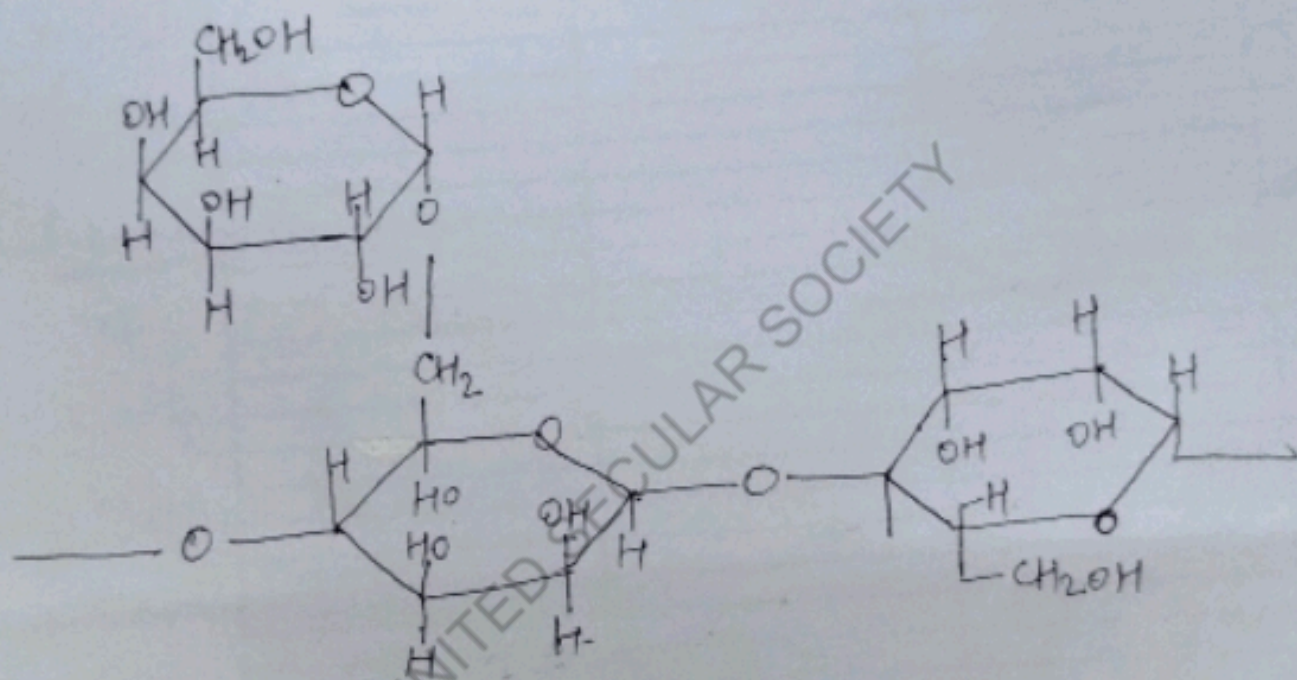
Colour: Pale yellowish

Odour: Odourless

Taste: Gummy - characteristic

Size: fine powder.

Structure



Chemical Constituents

Guar Gum contains Water soluble and Water insoluble parts.

- 7 Water soluble part is polysaccharide gum (85%) as guaran. It also contains 5-7% of proteins.

Chemical Test

- ① It does not acquire olive green colour with dilute iodine.
- ② Does not form pink colour, with Ruthenium red.
- ③ 2.0% Lead acetate solution give precipitate with guar gum solution.
- ④ Dissolve 0.5gm of guar gum in 20 ml of water by shaking. To it, add 0.5 ml hydrogen peroxide and 0.5 ml 1% solution of benzidine in alcohol. No blue colour is produced.

Uses ① Binding

- ① It is used as emulsifying, suspending agent, bulk laxative.

Result To perform the chemical test for the 'Guar Gum' was successfully.

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Experiment no-36

Aim: To identify the chemical character of Gelatin.

Reference: Kokate C.K. practical pharmacognosy 4th edition Vallabh prakashan, Delhi.

Background: Gelatin is occurs in thin sheets, strips or as granular powder. High grade gelatin is light yellow semi crystalline substance. It is odourless and tasteless in cold water it swells up and slowly dissolves on the warming to form viscous solutions.

Chemical Tests:

- ① When gelatin is heated with soda lime in dry test tube, ammonia is evolved due to the presence of Nitrogenous compound is gelatin.
- ② Gelatin solution is added millon's reagent to give a white ppt. which turns red on heating.
- ③ Gelatin gives buff white ppt with tannic acid solution.
- ④ Biuret test to 3ml of test solution of gelatin, NaOH is added whereby white to whitish buff coloured ppt is formed which does not dissolve on heating.
- ⑤ Yellow ppt is formed on adding picric acid to solution of gelatin.

⑥ It gives yellow ppt with trinitrophenol in aqueous solutions.

Conclusions: From the above morphology and chemical test the given crude drug is identified as Gelatin.

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