

MACRO AND MICROMORPHOLOGY OF
JASMINIUM MESNYI H. CULTIVATED IN EGYPT

PART I: The Root and Stem.

A.M. El-Moghazy , A.A. Ali, S.A. Ross & A.A. Mohamed
Department of Pharmacognosy, Faculty of Pharmacy, Assiut
University, Assiut, Egypt.

The macro and micromorphology of roots and stems of Jasminium mesnyi H. cultivated in Egypt are given with a view of determining the diagnostic features by which both organs can be identified in the entire and powdered forms

Jasminium mesnyi H. (= Jasminium Primulinum) is a climbing shrub belonging to family Oleaceae¹. Many plants belonging to family Oleaceae are used medicinally as laxative, diuretic, sedative, narcotic, bitter tonic, curing agent for wounds and antidote for cobra-venom²⁻³. Our previous study⁶ indicated that the leaves and stems of J. mesnyi H. contain ceryl alcohol, α - amyryl, B-sitosterol, ursolic acid, mannitol, quercetin, rutin and bitter glycosides.

In the present work, the macro as well as micromorphological features of the root and stem of the plant are illustrated.

The material was obtained from plants cultivated in the Experimental Station of the Faculty of Agriculture, Assiut Univ., Assiut, Egypt. The plant was identified by Prof. Dr. Ibrahim Hassan, Prof. of Floriculture, Faculty of Agriculture, Assiut Univ.

Habitat:

Jasminium mesnyi H. (Fig 1) is an evergreen, woody shrub or small tree attaining 1 to 2 meters in height and carrying numerous lenticellate branches. It bears compound imparipinnate, opposite decussate leaves. The leaflets are ovate to ovate lanceolate in shape and shortly petiolulated. The plant gives its flowers in March and April. The flowers are arranged in

small axillary cymose inflorescences. The plant is propagated or reproduced vegetatively by cuttings, or portions served from it, and which are capable of developing roots.

A- THE ROOT

Macromorphology:

It is a long, cylindrical, fusiform tap-root and measures about 20 to 30 cm. long or even more and 1 to 3 cm. in diameter at the middle portion. It bears numerous, spreading, long, tapering lateral roots. Externally, the root is pale-yellowish brown in colour with rough surface. It is odourless and with bitter taste.

Micromorphology:

A transverse section through the root (Fig 2, A) is nearly circular to ovate in outline showing a narrow cork surrounding a narrow phelloderm and a moderately wide, parenchymatous primary cortex. The pericycle is parenchymatous in young root but in old stage it shows scattered lignified groups of sclereids and fibres. The phloem surrounds a distinct cambial layer and a proportionally wide region of eccentric secondary xylem. Numerous uniseriate medullary rays containing starch granules, traversing the xylem and phloem.

The Cork: (Fig. 2B, 3)

Originates superficially in the outer region of the cortex. It is formed of a narrow zone of several rows of brownish, tabular, somewhat tangentially elongated cells.

In surface view, the cells are polygonal, subrectangular with slightly lignified thin walls and measuring from 14 to 33 microns in width, 15 to 23 microns in height and 33 to 70 microns in length.

The Cortex: (Fig 3)

The outer few layers of the cortex (phelloderm) are formed of thin-walled, tangentially elongated parenchymatous cells. The remaining layers constitute the primary cortex which is formed of ordinary, tangentially elongated, polygonal to subrectangular parenchymatous cells. The cells contain

numerous small starch granules which are mostly simple and measure from 2 to 10 microns in diameter. In old stages, some of the cortex cells are changed into lignified, thick-walled sclereids which occur either isolated or in small groups.

The sclereids are subrectangular, isodiametric, triangular or irregular in shape and possess narrow lumen and almost thick, pitted wall. They measure from 39 to 112 microns in length and 25 to 40 microns in diameter.

The endodermis is hardly recognised.

The Pericycle: (Fig 2B & 3)

The pericycle is parenchymatous in young roots, but in old ones it becomes interrupted by groups of sclerenchyma.

The sclerenchyma consists of groups of 3 to 10 sclereids in which isolated or very small groups of fibres are sometimes embedded. The sclereids are similar to those present in the cortex.

The Vascular System: (Fig 2 & 3)

The phloem is formed of soft cellulosic elements showing sieve tubes, companion cells and phloem parenchyma.

The cambial zone is composed of few rows of thin-walled, tangentially elongated cells.

The xylem is composed of compact, radiating, lignified and pitted elements. It is difficult to trace the primary xylem arches in old root. The vessels occur solitary or in radial rows of 2 to 8. They are wide, lignified, showing mostly bordered, sometimes simple pits with slit-like openings and measuring from 10 to 30 microns in diameter.

The vessels are usually accompanied by few tracheids, tracheidal vessels and fibrous tracheids. The wood fibres are usually straight, with acute to acuminate apices, showing wide lumen, thin, lignified walls and bearing few simple pits. They measure from 10 to 20 microns in diameter and 313 to 465 microns in length.

The wood parenchyma are usually in vertical rows, consisting of rectangular to subrectangular, axially elongated

cells, with pitted, lignified walls and measure from 17 to 20 microns in width and 33 to 67 microns in length.

The medullary rays are numerous usually uniseriate, occasionally biseriate. They are formed of moderately thick-walled, lignified, pitted cells in the xylem and thin-walled cellulosic cells in the phloem. The cells contain starch granules which are identical as those present in the cortex.

The powder:

Powdered root is brown to yellowish-brown in colour having no odour and slightly bitter taste. It shows:

- 1- Fragments of brown, slightly lignified, thin-walled cork cells.
- 2- Fragments of thin-walled, parenchymatous cells from the cortex, containing mostly simple starch granules.
- 3- Fragments of soft cellulosic and parenchymatous phloem cells.
- 4- Lignified sclereids with narrow lumen and pitted walls.
- 5- Lignified fragments of xylem elements consisting of wide vessels with bordered pits; tracheids and tracheidal vessels with simple or bordered pits; wood fibres and pitted wood parenchyma.
- 6- Starch granules which are mostly simple.
- 7- Absence of calcium oxalate crystals.

B- THE STEM

Macromorphology:

The stem is erect, woody, solid, quadrangular, reaching up to 3 cm in diameter near the ground level and up to 2 meters in length. The young parts of the stem are smooth, green in colour, while the older parts are rough, brown in colour and with distinct lenticels. The stem breaks with a fibrous fracture. The stem bark is hardly separated from the wood. The stem is odourless and with bitter taste.

Micromorphology:(Fig 4 A)

A transverse section through the stem is somewhat rectangular in outline showing about 4 raised ridges. In old stem, the cork arises superficially in the subepidermal layer and the epidermis becomes ruptured, rough and carries many raised lenticels. The cortex is narrow followed by a pericycle which is more or less complete ring of lignified fibres accompanied by few sclereids and interrupted by parenchyma. The pericycle surrounds a wide continuous ring of vascular tissue enclosing a wide, mainly solid, parenchymatous pith.

The Epidermis: (Fig 4B & C)

The epidermis is formed of polygonal, isodiametric to subrectangular cells, usually axially elongated on the ridges with straight anticlinal walls and covered with thin smooth cuticle. They measure from 7 to 15 microns in width, 9 to 20 microns in height and 15 to 50 microns in length. Stomata are frequent anomocytic, being ovoid in outline and measure from 17-22 microns in diameter and 33 to 42 microns in length. Trichomes are absent.

The cork appears in the older stems and is formed of radially arranged, tangentially elongated lignified cells and showing lenticels at the outer parts.

The Cortex. (Fig 5 A)

The cortex is narrow and shows in the ridges masses of collenchyma ranging from 6 to 10 rows,. The remaining of the cortex consists of several rows of cellulosic, moderately thick-walled, ordinary parenchyma.

The endodermis is only distinct in old stem and consists of rectangular cells containing simple starch granules.

The Pericycle. (Fig 5 A & B)

The pericycle consists of more or less continuous ring of lignified fibres interrupted by parenchyma. The pericyclic fibres occur in large groups in which solitary sclereids are scattered. The fibres have straight, regular or slightly irregular outline, mostly with thick, pitted walls and narrow

lumen. They have acute to acuminate, occasionally rounded ends and measure from 9 to 17 microns in diameter and 374 to 465 microns in length.

The Vascular System. (Fig 5 A & B)

The vascular system shows a wide continuous ring formed mainly of secondary elements. The phloem is formed of soft cellulosic elements. A cambial zone is distinct. The xylem is formed of lignified vessels, fibres, tracheids and parenchyma. The vessels show simple or sometimes bordered pits and measure from 12 to 30 microns in diameter.

The tracheids are pitted and measure from 13 to 30 microns in diameter and 60 to 316 microns in length. The wood fibres have straight, lignified walls, wide lumen, acute to acuminate apices and measure from 14 to 22 microns in diameter and 239 to 415 microns in length. The wood parenchyma cells are thick-walled, lignified, pitted and measure from 12 to 20 microns in width and 27 to 49 microns in length.

The medullary rays are usually uniseriate, occasionally biseriate.

The Pith. (Fig 5 A)

The pith is wide, parenchymatous, consisting of large, polygonal, isodiametric to rounded cells. Some of the cells show rounded pits.

The Powder:

Powdered stem is yellowish-green in colour having a faint odour and a bitter taste. It shows:

- 1- Fragments of polygonal, axially elongated epidermal cells, having straight anticlinal walls, covered with smooth cuticle, showing anomocytic stomata.
- 2- Fragments of brown, lignified, thin-walled cork cells.
- 3- Fragments of the cortical tissue consisting of cellulosic parenchyma.
- 4- Lignified pericyclic fibres with straight, thick, pitted walls, narrow lumen and acute to acuminate apices.

- 5- Lignified xylem fragments showing pitted vessels with wide perforations, pitted tracheids, numerous wood fibres having thin walls, wide lumen and acute to acuminate apices.
- 6- Fragments of lignified, pitted wood parenchyma and medullary ray cells.
- 7- Lignified sclereids with narrow lumen and thick walls.
- 8- Scattered starch granules which are mainly simple.
- 9- Absence of calcium oxalate crystals.



Fig. 1- Photograph Of *Jasminium Mesnyi* H.

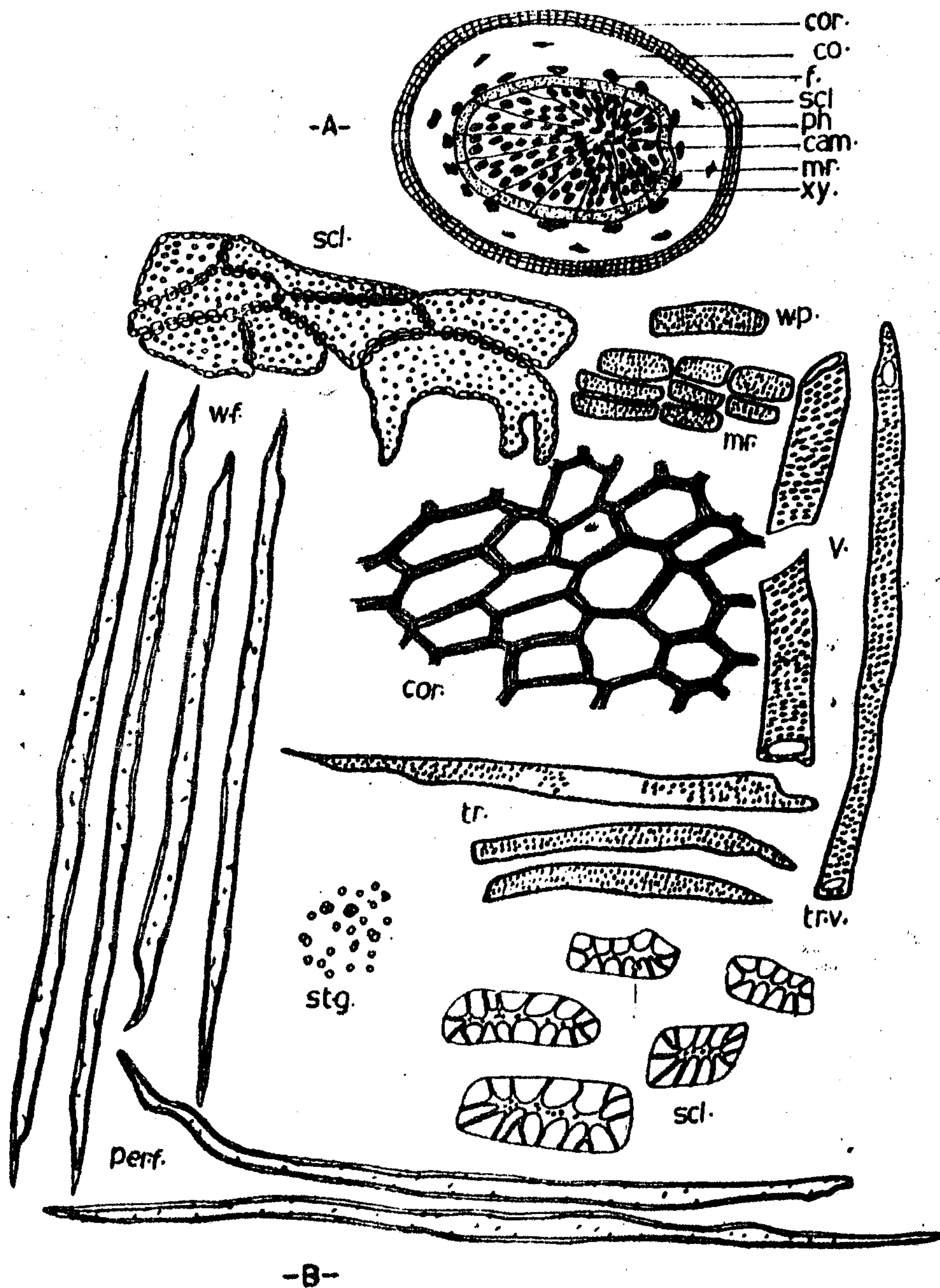


Fig. 2- A. Diagramatic T.S. of the root X 24
 B. Isolated elements of the root X 135
 cor., cork; co., cortex; F., fibres; Scl., Sclereids;
 ph., phloem; Cam., cambium; m.r., medullary ray Xy.,
 xylem; W.P., wood parenchyma; W.f., wood fibre; V.,
 vessel; -er.f., pericyclic fibre; tr., tracheid; St.g.,
 starch granules.

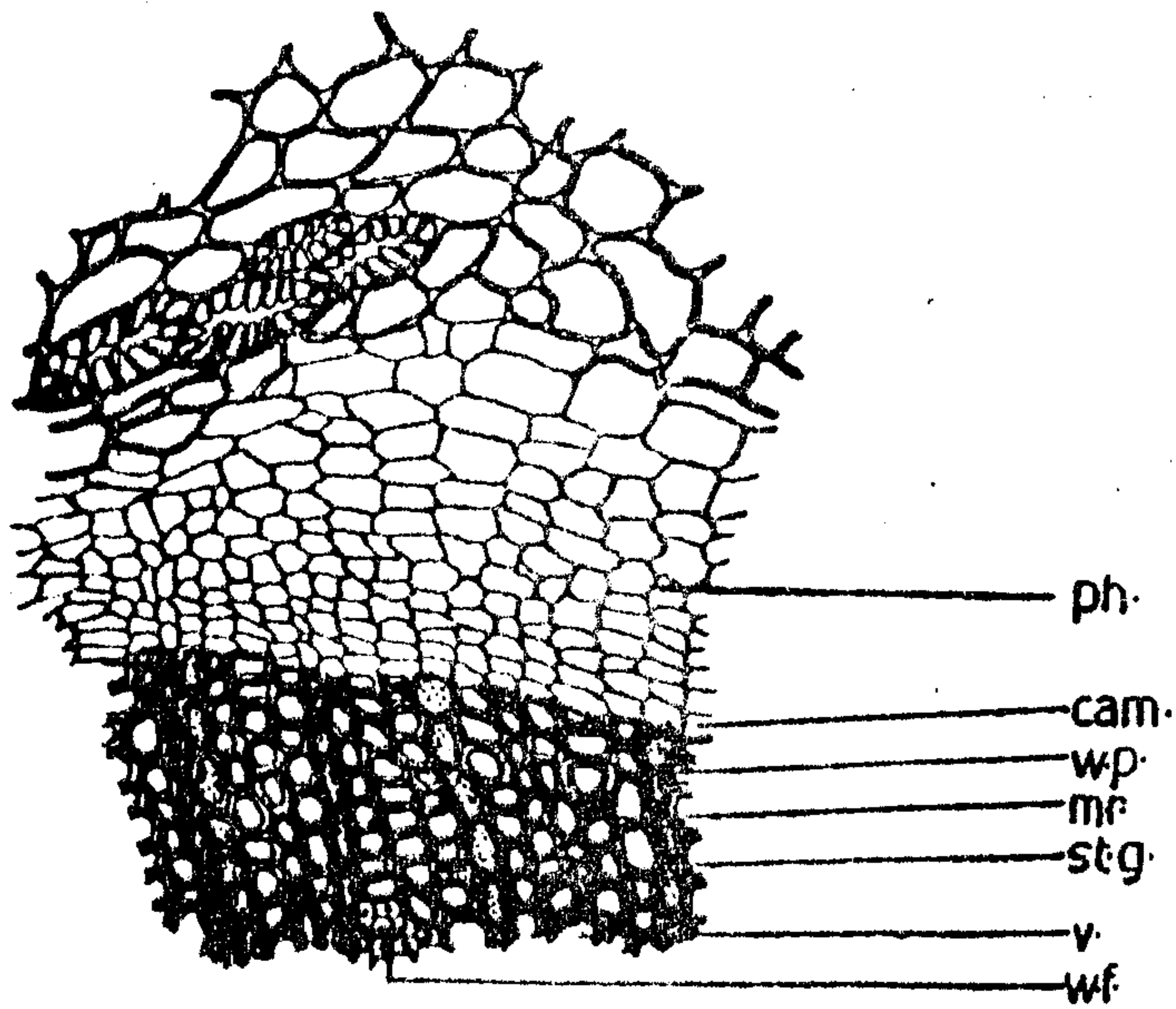
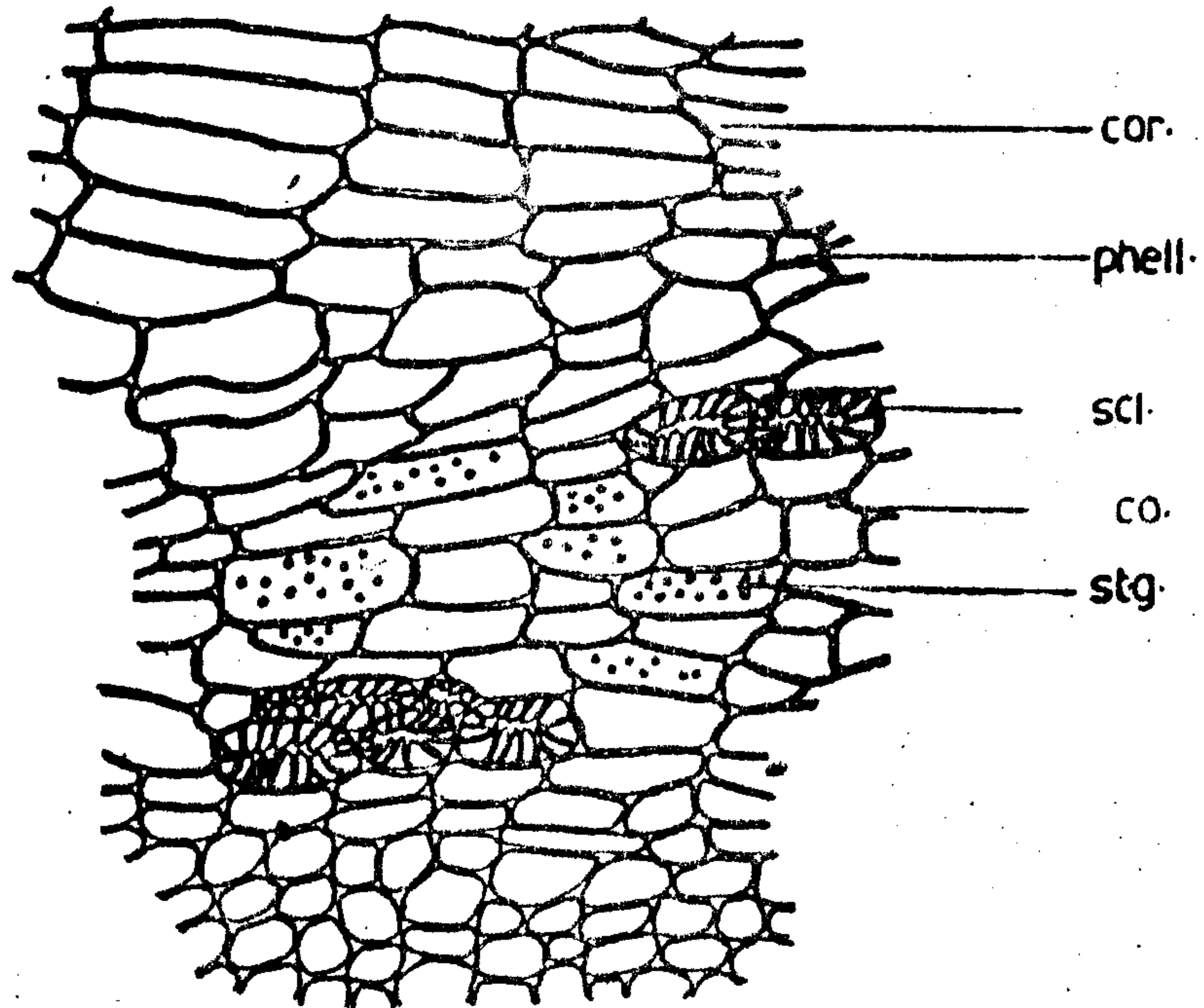


Fig. 3- Detailed T.S. of the root X 135
 cor., cork; phell., phelloderm; Scl., Sclereide; Co.,
 cortex; St.g., starch granules; Ph., phloem; Cam.,
 cambium; W.P., wood parenchyma; m.r., medullary ray;
 V., vessel; W.f., wood fibre.

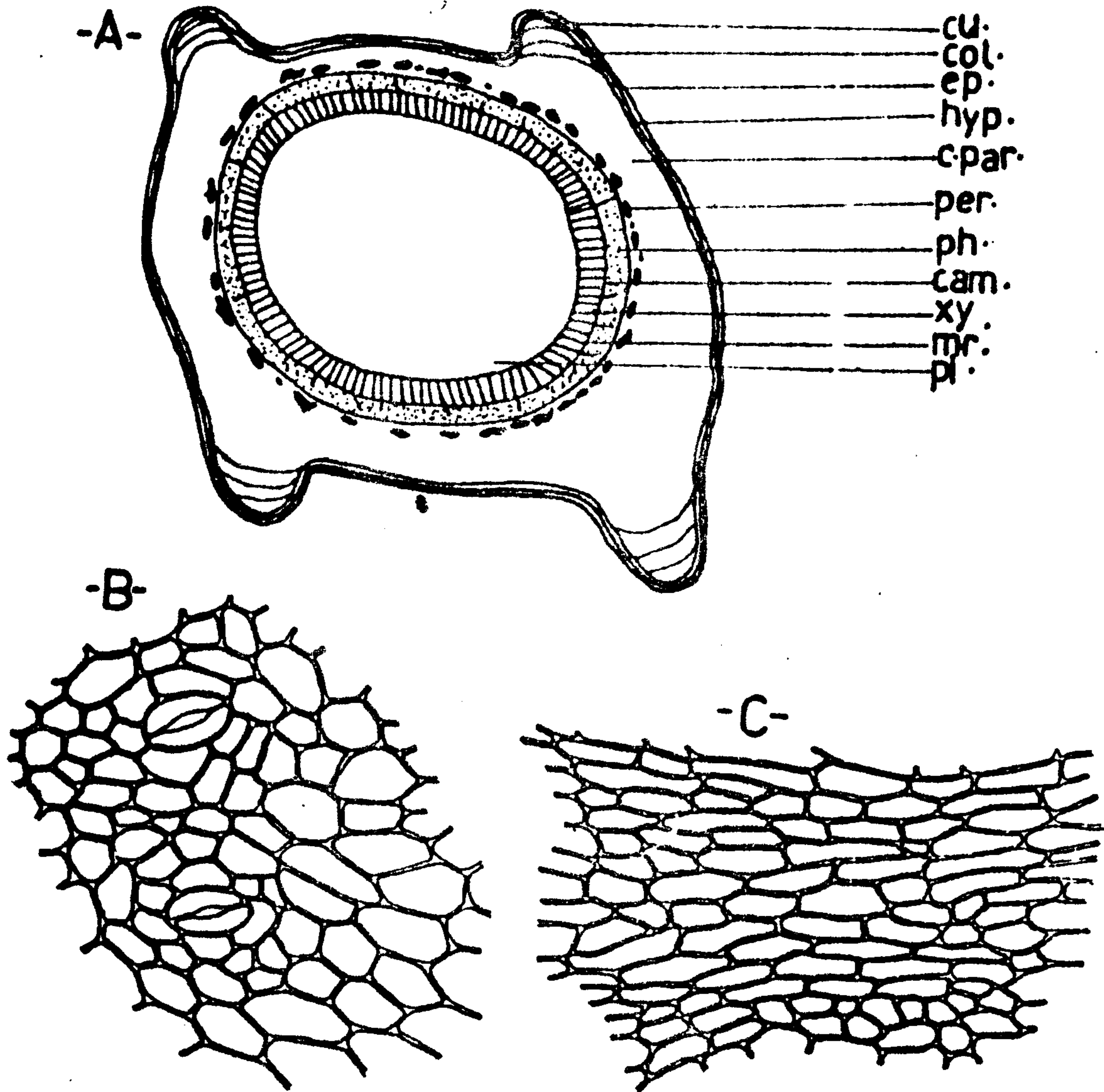
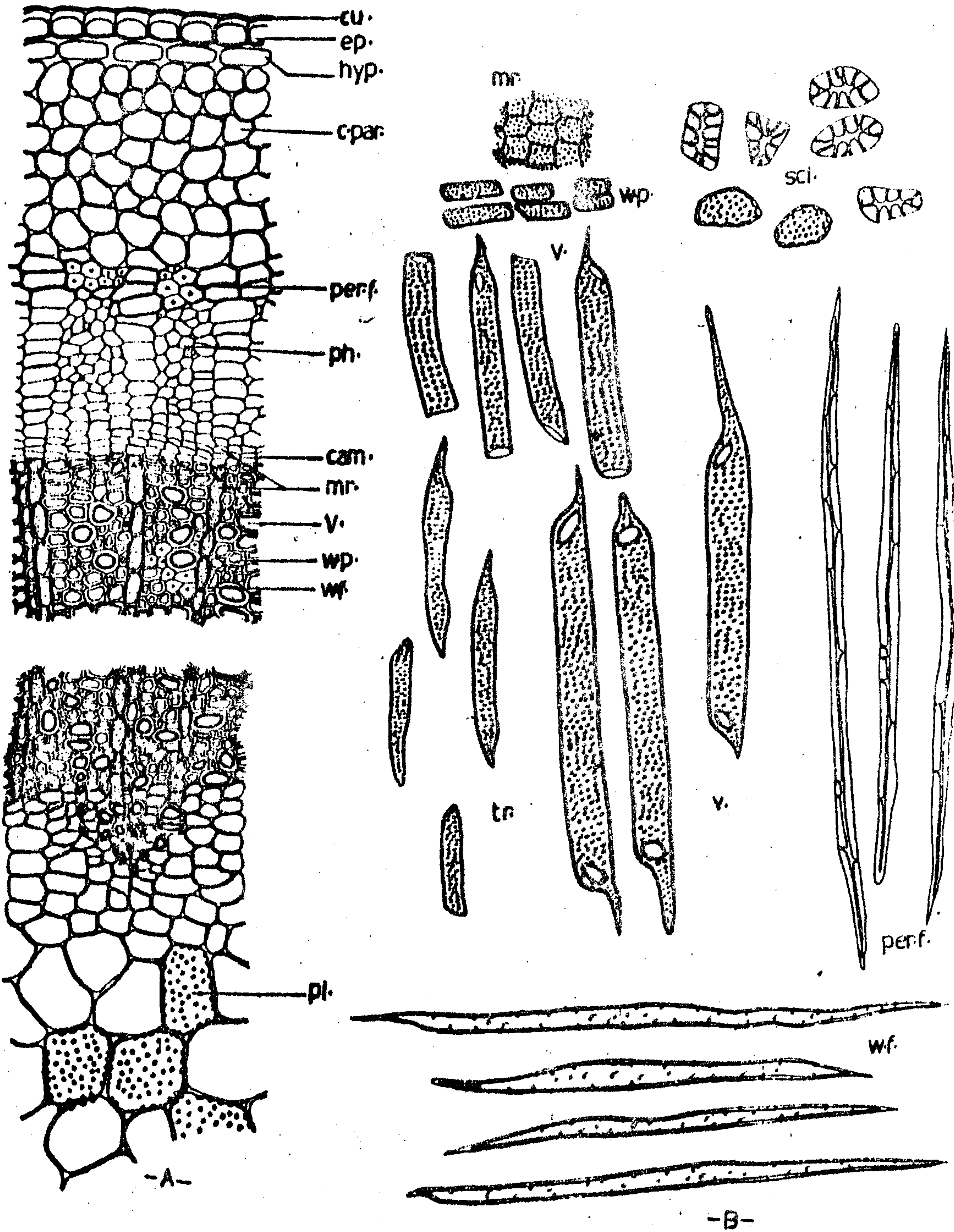


Fig. 4- A. Diagramatic T.S. of the stem X 24
 B. Surface preparation between ridges X 135
 C. Surface preparation on ridges X 135
 Cu. cuticle; Col., collenchyma; ep., epidermis; hype., hypodermis; C.par., parenchymatous cortex; per., pericycle; Ph., phloem; Cam., cambium; Xy., xylem; m.r.; medullary ray; Pi., pith.



Fir. 5- A. Detailed T.S. of the stem X 135
 B. Isolated elements of the stem X 135
 Cu., cuticle; ep., epidermis; hyp., hypodermis; C. par., parenchymatous cortex; Per.f., pericyclic fibre; Ph., Phloem; Cam., cambium; V., vessel; W.P., wood parenchyma; W.f., wood fibre; Pi, pith; Scl., sclereides; tr., tracheid.

REFERENCES

- 1) V., Täckholm; *Students Flora of Egypt; Anglo-Egyptian Bookshop, Cairo, P. 405 (1974).*
- 2) L.H., Bailey; *The Standard Cyclopedia of Horticulture; The Mc Millan company, New-York; Vol 1, pp 1861, 2324, 1716, 1274 (1942).*
- 3) R.N, Chopra; *Indigenous Drugs of India; Dhur & Sons; Private Ltd., Calcutta; 2 nd Ed., p. 64 (1958).*
- 4) R. Mischler; *A. Mannual Flora of Egypt; Friedlaender and Sohn, Karls Traise; Berlin, Vol II, p. 730(1912).*
- 5) A.B., Rendle; *The Classification of Flowering Plants; Univ. Press, Cambridge, Vol II, pp 455, 458 (1959).*
- 6) A.M., El-Moghazy, A.A. Ali, S.A. Ross, & A.A. Mohamed; *Fitoterapia; No. 4, pp 197-199 (1980).*

الصفات العيانية والمجهريّة لنبات الياسمين الاصفر

المنزوع في مصر

الجزء الاول : الجذر والساق

احمد محمد المغازى - احمد عبد الرحمن على - سمير انيس روس - احمد عابدين محمد

قسم العقاقير - كلية الصيدلة - جامعة اسيوط

يشتمل هذا البحث على دراسة الصفات العيانية والمجهريّة
لجذر وساق نبات الياسمين الاصفر الذى يزرع
في جمهورية مصر العربيّة بهدف التعرف على جذر
وساق هذا النبات صحيحة كانت او على هيئة مسحوق