

MACRO AND MICROMORPHOLOGY OF JASMINIUM  
MESNYI H. CULTIVATED IN EGYPT

PART II: The Leaf And Flower

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*The macro and micromorphology of the leaf and flower of jasminium mesnyi H. cultivated in Egypt are dealt with and illustrated for the purpose of their identification either in the entire or in the powdered form.*

The authors have previously<sup>1</sup> studied the macro and micromorphology of the root and stem of J. mesnyi H. cultivated in Egypt. The present work is a study of the macro- and micromorphology of the leaf and flower of this plant.

Material:

Samples of the flowers and leaves of J. mesnyi H. were collected from plants cultivated in the Experimental Station of the Faculty of Agriculture, Assiut Univ., Assiut, Egypt.

A - THE LEAF

Macromorphology: (Fig 1, A & C)

The leaves are compound imparipinnate, opposite decussate, petiolate and exstipulate. Each leaf is usually composed of 3 leaflets. The leaflets are ovate to ovate lanceolate in shape, having acute, macronate apex and entire margin. They are nearly sessile, generally shortly petiolulate and have asymmetric base except the end one is symmetric. Venation is reticulate-pinnate.

The petiolule (0.2 to 0.5 cm) is generally short, nearly cylindrical and shows a shallow groove on the upper side.

The rachis (1.5 to 3 cm) is long, cylindrical to subcylindrical, carrying about 3 prominent ridges and showing

a shallow groove on its upper side. The dried leaflets are brittle, with faint odour and bitter taste.

Micromorphology:

1- The lamina of the leaflet:

A transverse section through the midrib region of the lamina (Fig. 2, A) appears planoconvex to concavoconvex in outline. It shows a dorsiventral structure. Abutting to the lower epidermis are 2 to 3 rows of collenchyma. Several collateral vascular bundles traverse the mesophyll.

The epidermis:

The interneural cells of both the upper and lower epidermis (Fig. 2, B & C) are polygonal, isodiametric, somewhat elongated with almost straight anticlinal walls, covered with thin striated cuticle and measure about 5 to 17 microns in height, 9 to 25 microns in width and 14 to 40 microns in length. The neural epidermal cells (Fig. 2, D & E) of both surfaces are polygonal, axially elongated, with straight anticlinal walls and covered with smooth cuticle.

Stomata are only observed on the lower epidermis. They are of the anomocytic type and measure from 10 to 20 microns in diameter and 13 to 25 microns in length. Trichomes are absent, except in very young plants, few glandular trichomes of unicellular stalk and multicellular head can be observed.

The mesophyll: (Fig. 3, A & B)

The palisade abuts to the upper epidermis only and consists of 3 rows of cylindrical cells which become reduced to 1 or 2 rows of short cells in the midrib region. The spongy tissue is formed of thin-walled, rounded or slightly irregular parenchyma.

The cortical tissue: (Fig. 3, A)

The cortical tissue consists of cellulosic parenchymatous cells. Below the lower epidermis is a subepidermal mass of few rows of rounded collenchymatous cells.

The vascular system:(Fig. 3, A , C)

The vascular system is represented by several collateral vascular bundles. Each vascular bundle has a pericycle consisting of 2 arcs. The upper arc is parenchymatous and the lower one is collenchymatous. The pericycle is interrupted by small groups of non-lignified, wide lumen pericyclic fibres, measuring about 9 to 15 microns in diameter and 125 to 218 microns in length.

The phloem is formed of soft cellulosic elements. The xylem consists of spiral, scalariform and sometimes pitted lignified vessels, measuring from 12 to 24 microns in diameter. Medullary rays are uniseriate and non-lignified.

2- The Rachis:(Fig. 4, A, B & C)

A transverse section in the rachis is nearly concavoconvex to planoconvex. It carries a shallow groove enclosed between the 2 ridges on the upper surface. It has an outer epidermis covered with thin, smooth cuticle and followed by a wide parenchymatous cortical tissue, with collenchymatous masses in the ridges. The vascular system is formed of an arch of 3 widely separated, collateral vascular bundles with collenchymatous pericycle. Each bundle is identical with that of the midrib of the lamina.

3- The Petiolule:(Fig 4, D)

A transverse section in the petiolule of the leaflet is exactly similar to that of the rachis in all the fundamental arrangement of the tissues.

The Powder:

The powdered leaf is pale-green in colour, with faint odour and bitter taste. It shows:

- 1- Fragments of the epidermises of the leaf-parts consisting of polygonal, isodiametric or elongated cells with straight or slightly wavy anticlinal walls and show anomocytic stomata. Some fragments show striated cuticle.
- 2- Fragments of mesophyll, showing palisade and spongy parenchyma cells.

- 3- Fragments of moderately thick-walled, cortical parenchyma cells.
- 4- Fragments of subepidermal collenchyma.
- 5- Few non-lignified, wide lumen pericycle fibres.
- 6- Fragments of vascular tissue consisting of lignified, spiral and scalariform, occasionally reticulate and pitted vessels.
- 7- Absence of calcium oxalate crystals, starch granules and sclereids.
- 8- Few hairs.

### B- THE FLOWER

#### Macromorphology: (Fig 1)

The flowers are pedicellate, yellow in colour, having a faint odour and tasteless. They measure from 1 to 3 cm in length and 0.3 to 1 cm. in diameter. They are actinomorphic, hermaphrodite, tetracyclic, heteromerous, hypogenous and having the following floral formula:



The pedicel (Fig. 1 , A ) is green, cylindrical, longitudinally ridged, erect, measuring about 3 to 6 cm. long and about 1 to 2 mm . in diameter.

The calyx(Fig. 1,B) is persistent and consists of one whorl of 5 or 6 sepals. The sepal is nearly oblong with acute apex and entire margin. It measures about 1 cm. in length and about 2 mm. in width in the middle part.

The corolla(Fig. 1, B) is composed of one whorl of 6, rarely 5 petals, which are yellow in colour and alternate with sepals. The petals are united at their bases forming a short tube. The petal is oval to oblong in shape, with entire margin and blunt to rounded apex. It measures about 2 cm. in length, and about 1 cm in width.

The androecium consists of one whorl of 2 epipetalous stamens inserted at the base of the corolla. Each stamen is composed of a small, short, pale-yellow, simple filament and bearing the yellowish oblong anthers. The anther is formed of 2-lobes which open longitudinally when mature. The gynoecium (Fig. 1, E, F) is superior, bicarpellary, with 2 ovules in each locule attached to axile placenta. The style is cylindrical, long, green in colour and with a conical unilobed stigma.

Micromorphology:

1- The Calyx. The sepal (Fig 5 A) is formed of inner and outer epidermises enclosing inbetween a homogeneous parenchymatous mesophyll, which is traversed by several vascular strands, the central one being the main and represents the midrib.

The epidermis: The inner and outer epidermal cells (Fig 5, C & D) are polygonal, mainly isodiametric, but sometimes, elongated, with straight to slightly wavy anticlinal walls, covered with thin, striated cuticle and measure from 5 to 11 microns in height, 6 to 18 microns in width and 10 to 33 microns in length. Stomata are of anomocytic type.

Few of the lower(outer) epidermal cells, especially those at the margin (Fig. 5, E) are papillose, some of the papillae are changed into non-glandular, unicellular, conical trichomes, with rounded apex and wide lumen. The trichomes measure from 9 to 67 microns in length.

The Mesophyll is homogeneous (Fig 5, B), formed of 6 to 10 layers of parenchymatous cells, which contain starch granules. The starch granules are mostly simple and measure about 2 to 7 microns in diameter.

The vascular strands show narrow spiral, pitted, lignified vessels with patches of soft cellulosic phloem.

2- The Corolla. The petal is formed of inner and outer epidermises enclosing between them few layers of undifferentiated parenchymatous mesophyll through which run several vascular strands.

The lower epidermal cells(Fig 6, A, B, C & G): The cells of the apical and marginal regions are polygonal, elongated, with wavy anticlinal walls and measure from 10 to 40 microns in width and 17-77 microns in length. In the middle region the cells resemble those of the apical region, but being larger, measuring from 7 to 37 microns in width and 19 to 97 microns in length. In the basal region the cells are polygonal, axially elongated with more or less straight anticlinal walls, measuring from 9 to 17 microns in width and 17 to 100 microns in length.

All the cells of the lower epidermis are covered with smooth cuticle. Stomata are of anomocytic type and present in the basal and middle regions. Trichomes are absent. The Upper epidermal cells (Fig 6, D, E, F & H) show that the cells of the apical, middle and marginal regions are polygonal, isodiametric, with projections from anticlinal walls and measure from 17 to 35 microns in width and 25 to 74 microns in length. The basal cells are polygonal, isodiametric, with straight anticlinal walls, bear papilles and measure from 14 to 37 microns in width and 17 to 74 microns in length.

All the cells are covered with smooth, thin, cuticle. Trichomes and stomata are absent.

3- The Stamen: A transverse section in the anther(Fig. 7 A & B) shows two lobes attached by the connective, with a central vascular strand. Each anther lobe is formed of two pollen sacs containing numerous pollen grains. The wall of the anther is formed of an epidermis, a fibrous layer of 2 to 3 rows in the connective region, decreasing to one row near the line of dehiscence, and the remains of the tapetal layer. The pollen grains(Fig. 7 C) are rounded in outline, with pitted surface and having 3 germ pores. They measure from 17 to 42 microns in diameter.

4- The Gynaecium A transverse section in the ovary (Fig. 7, G) shows that it is bilocular with more or less circular outline. The ovary wall consists of an outer and inner epidermises, enclosing a wide parenchymatous ground

tissue. The ground tissue is traversed by several collateral open vascular bundles. The central axis shows 2 concentric vascular bundles.

The outer epidermis (Fig 7,H) of the ovary, is formed of polygonal, usually isodiametric cells, with straight anticlinal walls, covered with smooth cuticle and measure from 4-12 microns in width and 7 to 17 microns in length.

Trichomes and stomata are absent. The epidermal cells of the style (Fig. 7, I) are polygonal, subrectangular, almost axially elongated with straight thin anticlinal walls, striated cuticle and measure from 5 to 15 microns in width and 42 to 93 microns in length. The epidermis of the stigma (Fig. 7, J) are polygonal, isodiametric, with more or less straight anticlinal walls and covered with thin smooth cuticle. The cells show more or less conical elongated papillae.

#### 5- The Pedicel:

A transverse section in the pedicel (Fig 8,A) appears more or less quadrangular and irregular in outline, due to the presence of 4 longitudinal ridges. It shows an epidermis followed by a collenchymatous hypodermis and followed by a comparatively narrow parenchymatous cortex, with collenchymatous masses in the ridges. The endodermis is indistinct. The central cylinder is formed of a complete ring of phloem and xylem enclosing the central wide parenchymatous hollow pith.

#### The Powder:

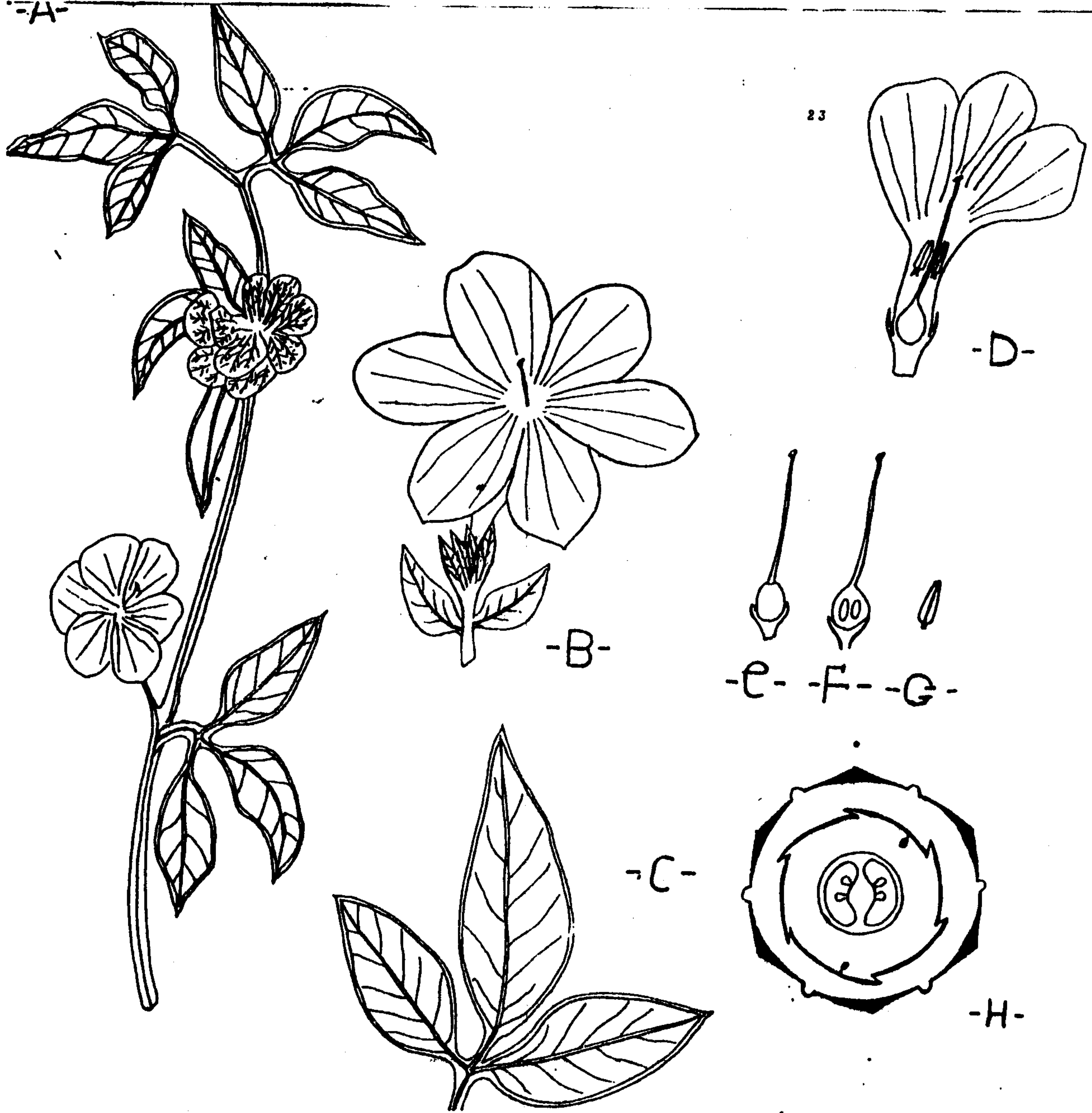
The powdered flower is yellowish-green in colour, odourless and tasteless. It shows:

- 1- Fragments of the epidermis of the sepals, consisting of polygonal isodiametric cells with straight to slightly wavy anticlinal walls, covered with striated cuticle, some showing anomocytic stomata, as well as, few unicellular non-glandular hairs.
- 2- Fragments of the epidermis of the petals, consisting of polygonal, isodiametric, to somewhat elongated cells with wavy or straight showing projections from

anticlinal walls, with or without papillae, covered with smooth cuticle and showing anomocytic stomata.

- 3- Fragments, of the filament with polygonal somewhat elongated epidermal cells, showing straight anticlinal walls and covered with striated cuticle.
- 4- Fragments of the epidermal cells of the anther, consisting of polygonal cells, with straight anticlinal walls and covered with striated cuticle showing papillae.
- 5- Fragments of the fibrous layer of the anther, consisting of polygonal, isodiametric cells showing lignified bar-like thickenings.
- 6- Numerous spherical pollen grains, having 3 germ pores and a minutely pitted exine.
- 7- Fragments of the stigma showing small, polygonal, isodiametric, papillosed cells.
- 8- Fragments of vascular tissues, showing lignified, mostly spiral, occasionally pitted and reticulate vessels, as well as, lignified tracheids with simple pits.
- 9- Absence of sclereids and calcium oxalate crystals.





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Fig. 1- Sketch of *Jasminium mesnyi* H. cultivated

A. The flowering branch

B. Flower

C. Leaf

D. Longitudinal cut of flower

E. Ovary

F. Longitudinal cut of ovary

G. Anther.

H. Floral diagram

X 1

X 4

X 1

X 4

X 4

X 4

X 4

X 4

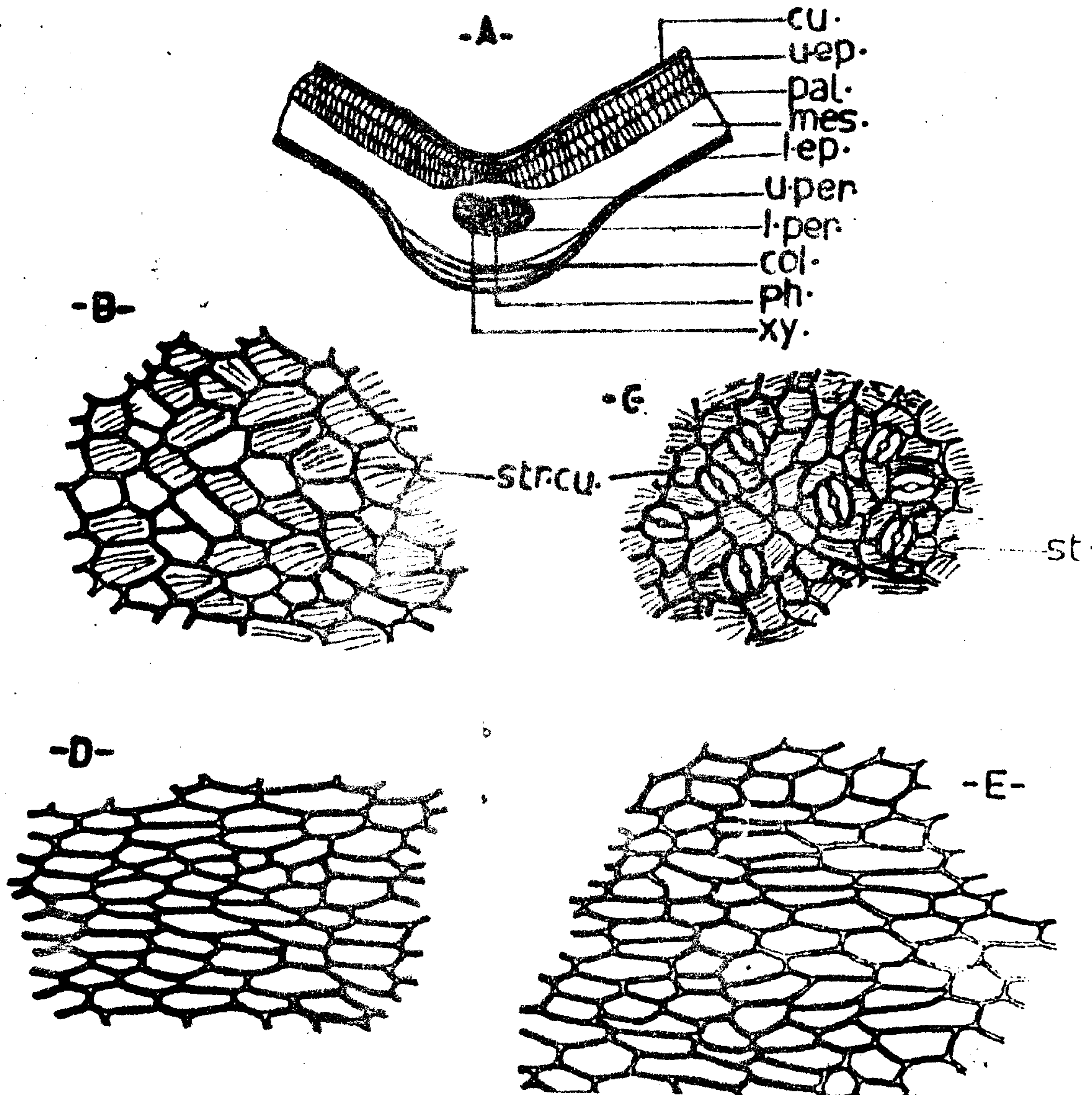


Fig. 2- A. Diagrammatic T.S. of the leaf

- |                             |       |
|-----------------------------|-------|
| B. Upper epidermis          | X 24  |
| C. Lower epidermis          | X 135 |
| D. Upper epidermis (neural) | X 135 |
| E. Lower epidermis (neural) | X 135 |
- L.ep., lower epidermis; u.ep., upper epidermis; L. per., lower pericycle; U.per., upper pericycle; Str.cu., striated cuticle; St., stomata; mes., mesophyll; pal., palisade; col., collenchyma; Ph., phloem; Xy., xylem; m.r., medullary ray.

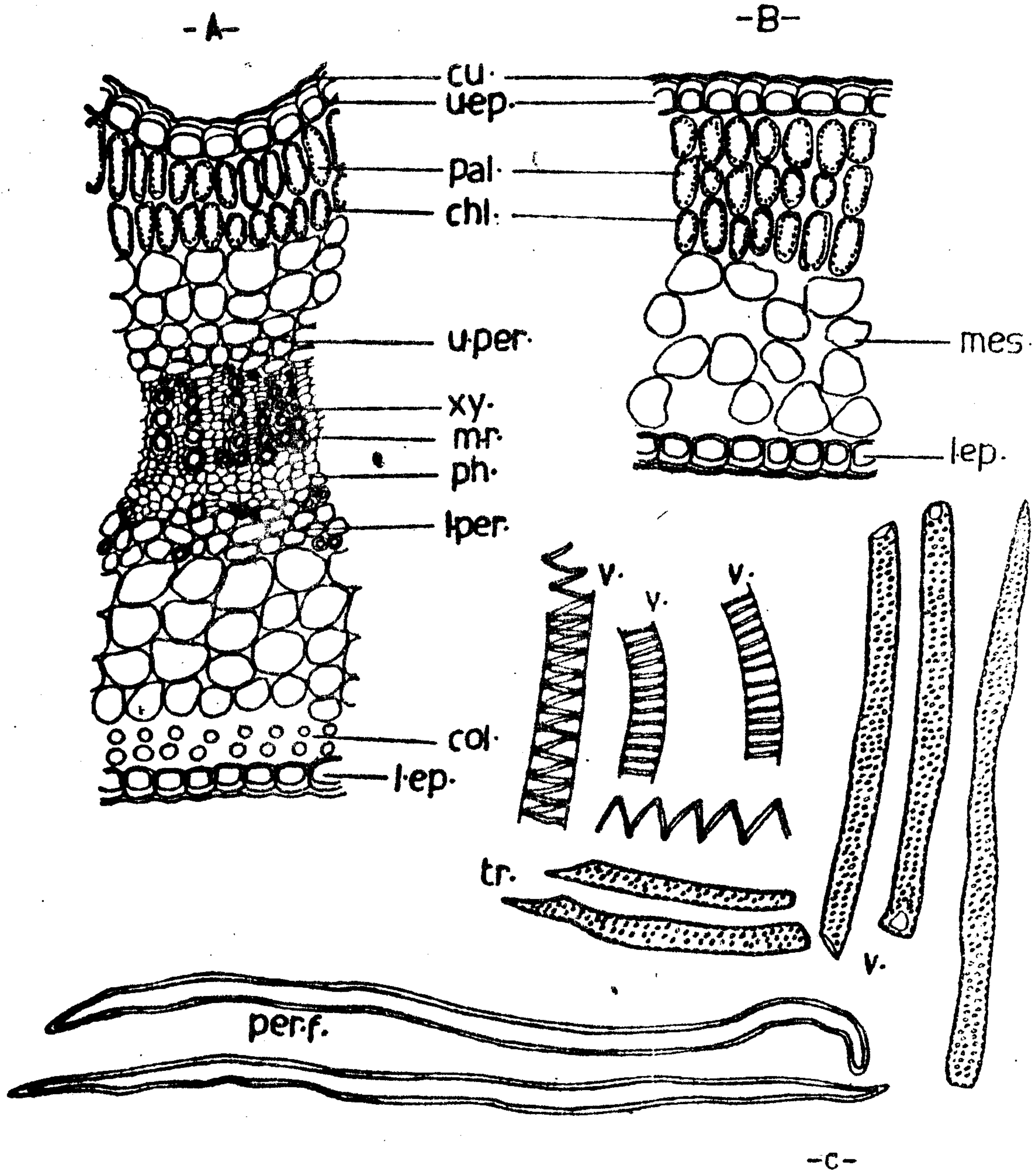


Fig. 3- A., & B., Detailed T.S. in the leaf X 135  
 C. Isolated elements of the leaf X 135  
 Cu., cuticle; chl., chloroplast; L.ep., lower epidermis;  
 L.per., lower pericycle; U.ep., upper epidermis; U. per.,  
 upper pericycle; mes., mesophyll; pal., palisade;  
 par., parenchyma; ph., phloem; per.f., pericyclic  
 fibres; m.r., medullary ray; xy., xylem; V., vessel;  
 tr., tracheid.

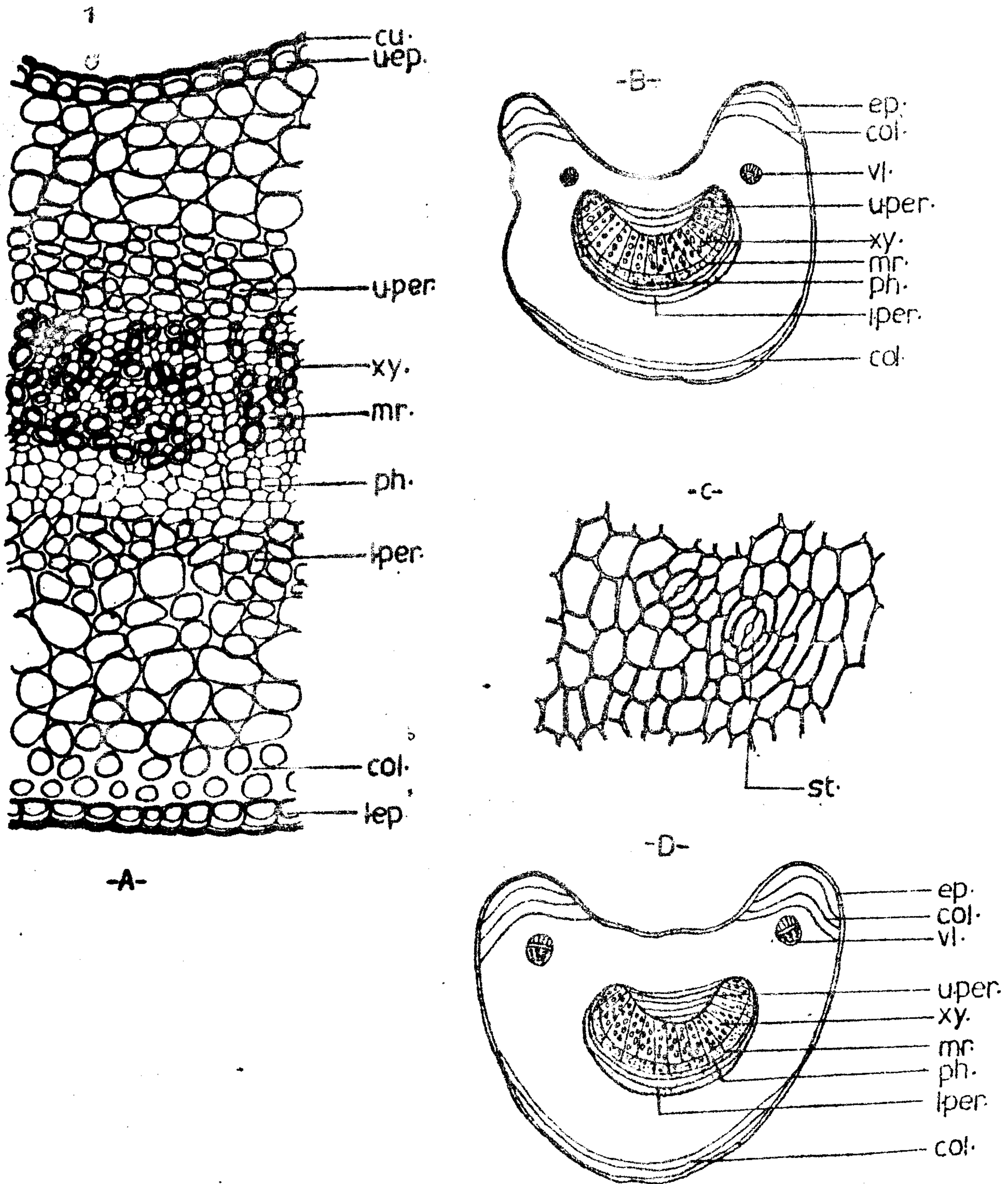


Fig. 4- A. Detailed T.S. in the rachis X 135  
 B. Diagrammatic T.S. in the rachis X 24  
 C. Surface preparation of the rachis X 135  
 D. Diagrammatic T.S. in the petiolule X 24  
 L.ep., lower epidermis; u.ep., upper epidermis; L.per., lower pericycle; Cu., cuticle; St., stomata; col., collenchyma; Ph., phloem; Xy., xylem; m.r., medullary ray; vl., veinlet.

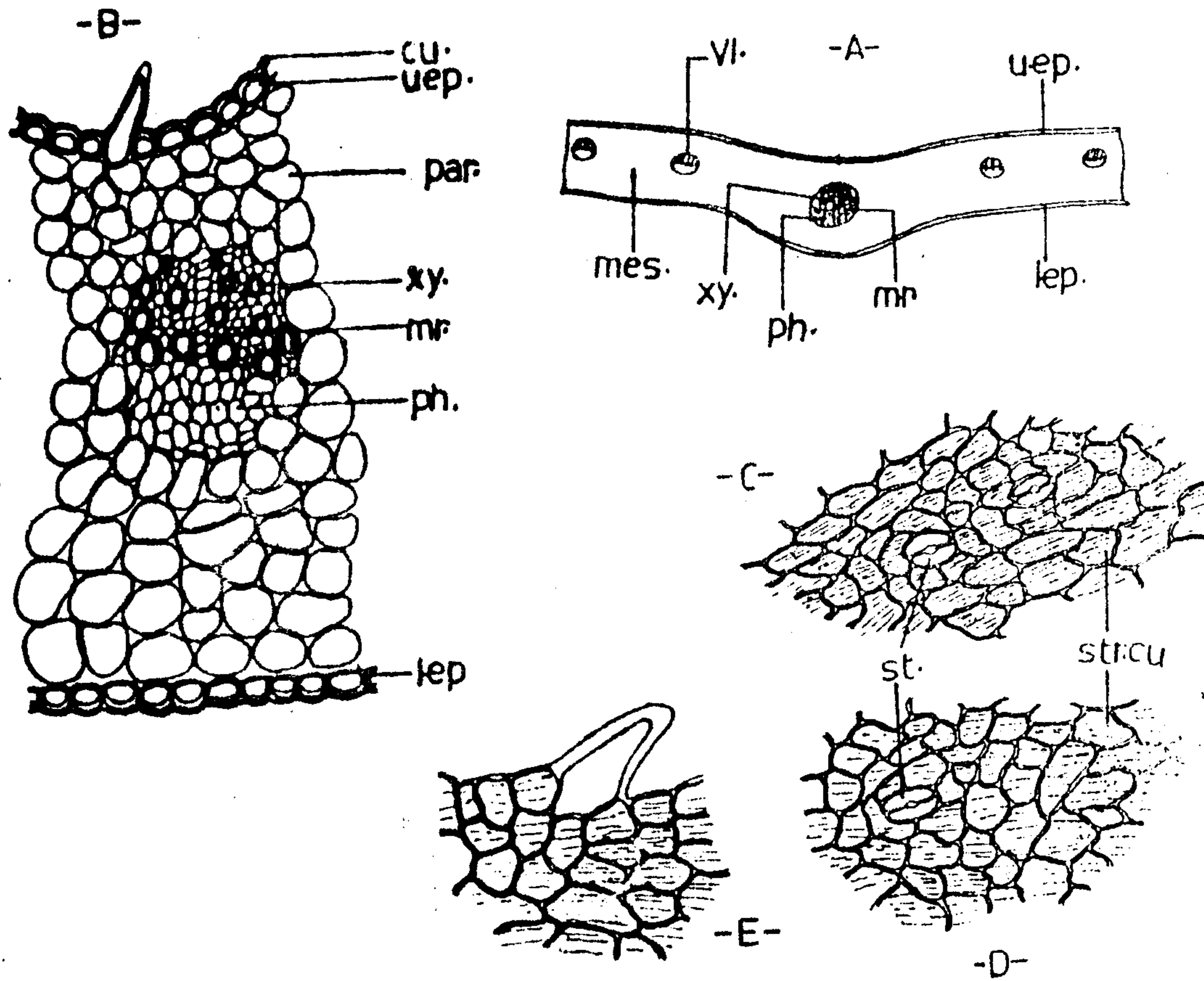


Fig. 5- A. Diagrammatic T.S. in the sepal X 24  
 B. Detailed T.S. in the sepal X 135  
 C. surface preparation of upper epidermis  
 of sepal X 135  
 E. Surface preparation of upper epidermis  
 of sepal, upper region X 135  
 Cu., cuticle; U.ep., upper epidermis; par.,  
 parenchyma; Xy., xylem; m.r., medullary ray; Ph.,  
 phloem; L.ep., lower epidermis; St., stomata;  
 Str. cu., striated cuticle; mes., mesophyll;  
 Vl., veinlet.

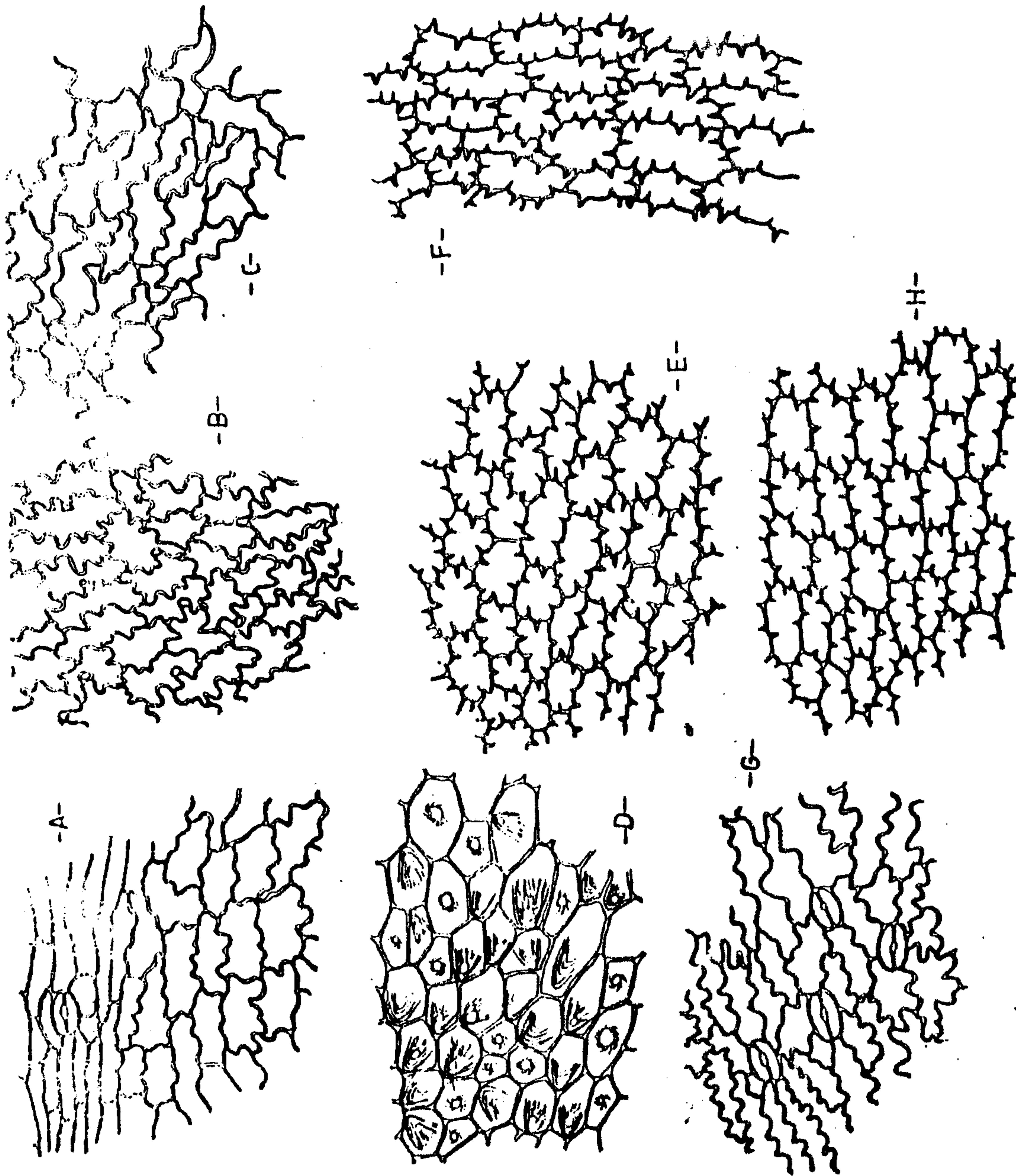


Fig. 6- Surface preparation of the petal  
 A. Basal region of lower epidermis  
 B. Apical region of lower epidermis  
 C. Marginal region of lower epidermis  
 D. Basal region of upper epidermis  
 E. Apical region of upper epidermis  
 F. Marginal region of upper epidermis  
 G. Middle region of lower epidermis  
 H. Middle region of upper epidermis

X 135

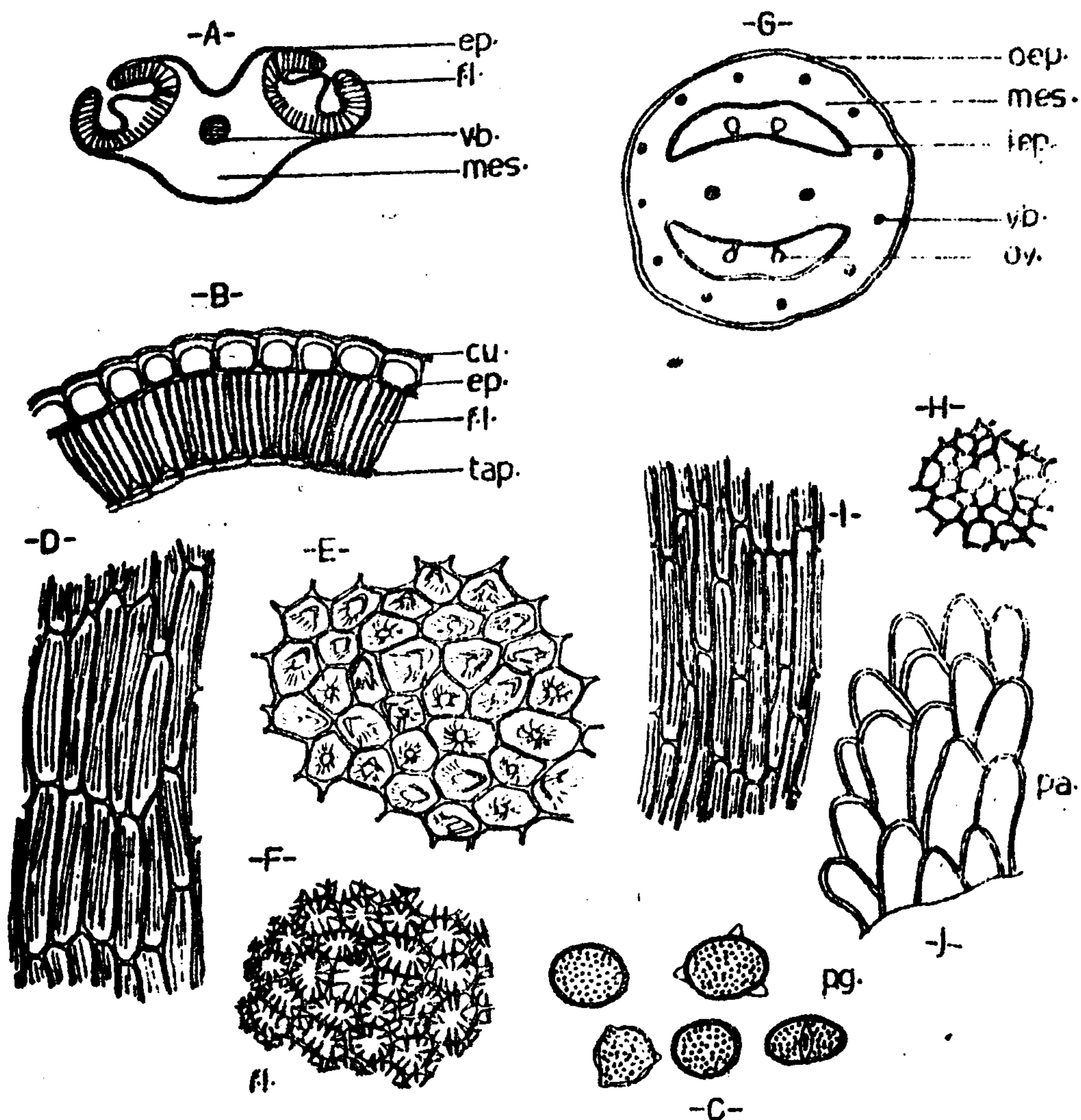


Fig. 7- The Androecium and Gynaecium

A. Diagrammatic T.S. in the anther	X 24
B. Detailed T.S. in the anther	X 135
C. Pollen grains	X 135
D. Epidermis of filament	X 135
E. Epidermis of anther	X 135
F. Fibrous layer of the anther	X 135
G. Diagrammatic T.S. in the ovary	X 24
H. Surface preparation of the ovary	X 135
I. Surface preparation of the style	X 135
J. Surface preparation of the stigma	X 135

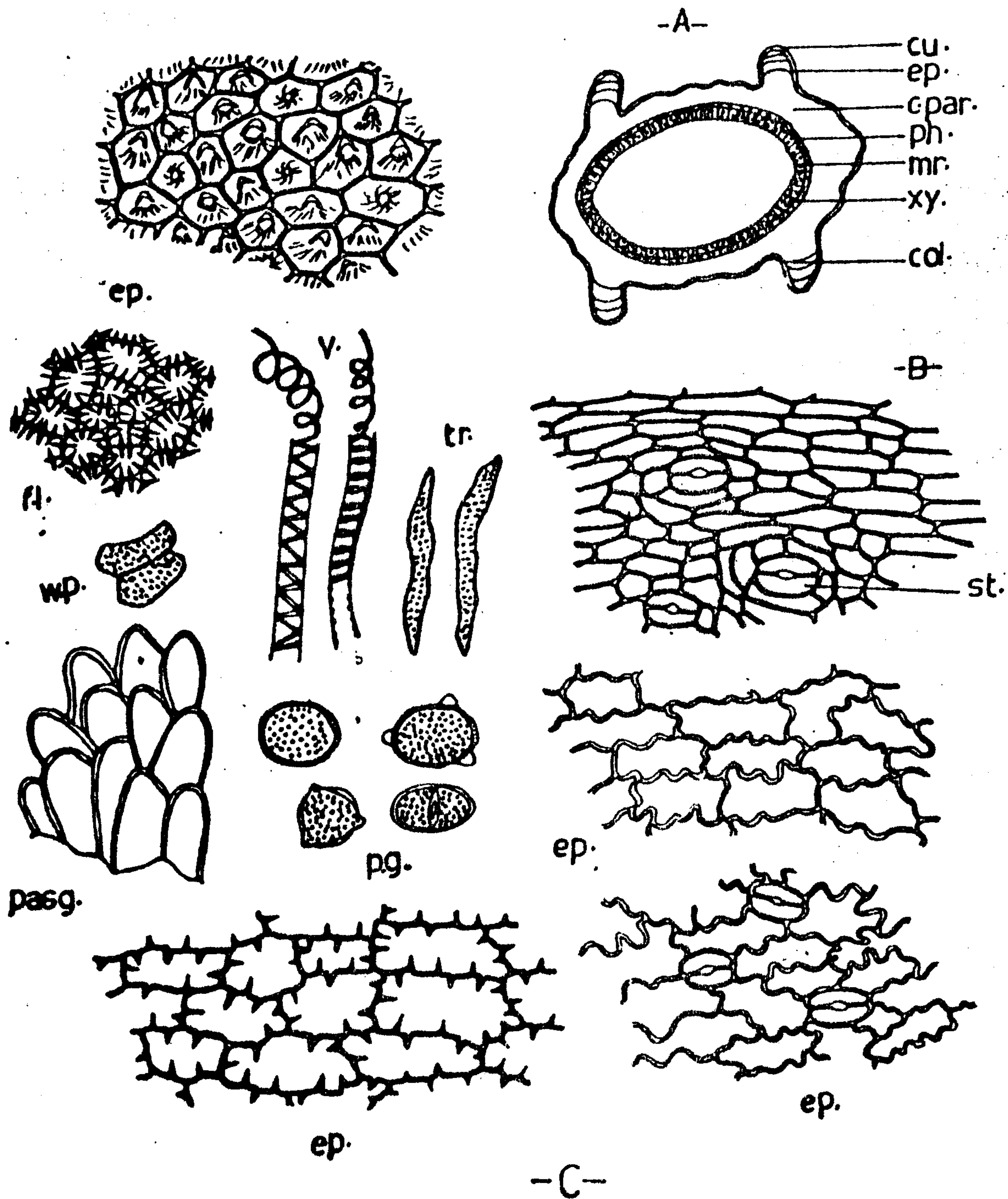


Fig. 8- A. Diagramatic T.S. in the pedicel X 24  
 B. Surface preparation in the pedicel X 135  
 C. Isolated elements of the flower X 135  
 Cu., cuticle; ep., epidermis; par., parenchyma; ph., phloem; m.r., medullary ray; Xy., xylem; col., collenchyma; St., stomata; V., vessel; tr. tracheid; W.p., wood parenchyma; P.g. pollen grains; Pa.Sg., papillosed stigma; f.l., fibrous layer.



REFERENCES

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الصفات الميانية والجهيرية لنبات الياسمين الاصفر

المنزوع في مصر

الجزء الثاني : الورقة والزهرة

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للاوراق وازهار نبات الياسمين الاصفر السذى بمنزوع في جمهورية  
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