

MACRO- AND MICROMORPHOLOGICAL STUDY OF THE ROOT, STEM, LEAVES AND INFLORESCENCE OF *VERBENA SUPINA* L (VERBENACEAE)

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ABSTRACT

A macro- and micromorphological study of *Verbena Supina* L, have been studied, with the aim of finding out the diagnostic features of the different organs of the plant in both the entire and powdered forms.

INTRODUCTION

Verbena supina L is a procumbent herb growing in Egypt. It belongs to Verbenaceae, a family comprising about 99 genera and 3151 species distributed chiefly in tropics and subtropics^(1,4).

In folk medicine, many *Verbena* species have been used as remedies for the treatment of various diseases. In Australia, *V. bonariensis* has been suspected of causing abortion in bovine⁽⁵⁾. In South Africa, *V. officinalis* has been used as a popular medicine for fever, anaemia, dropsy, and as aphrodisiac, antineuralgic, anthelmintic, for chronic bronchitis, menstrual disorder and diuresis⁽⁵⁾. Several *Verbena* species have been reported to contain iridoids, phenylpropanoids, flavonoids, triterpenoids and anthocyanins⁽⁶⁻¹⁶⁾.

A chemical study of the aerial parts of *Verbena supina* L. has been carried out by the same author and will be published elsewhere soon. This investigation resulted in the isolation of two ursane derivatives, two oleanane derivatives in addition to a phenylpropanoid glycoside.

Nothing could be traced in the literature concerning the macro- and micromorphology of the plant.

The present study includes a macro- and micromorphological study of the root, stem, leaves and inflorescence of the plant with the aim of finding out the characteristic elements by which the different organs of the plant can be identified in both entire and powdered forms.

PLANT MATERIAL

The plant material was collected in June and July 1998 from the neighborhood of Faculty of Pharmacy, Zagazig University, Zagazig, Egypt. The plant was identified by Dr. Hesain Abdel-Baset, Associate Professor of Plant Taxonomy, Department of Botany, Faculty of Science, Zagazig University. A voucher specimen is deposited in the Department of Pharmacognosy, Faculty of Pharmacy, Zagazig University, Zagazig, Egypt.

Fresh samples as well as samples preserved in 70% alcohol containing 25% glycerol were used.

I. Macromorphology:

Verbena supina L (Fig. 1A) is a procumbent herbaceous greenish, hispidulous plant with densely hairy stem branched from the base. It has finely dissected, opposite decussate, rarely verticillate leaves, short dense spikes and reaches up to 40 cm tall.

The root (Fig. 1A) is a dark brown tap root, bearing several long tapering roots and measures 8-10 cm in length and 0.4 - 0.6 cm in diameter. The fresh root is flexible while the dry one breaks with fibrous fracture.

The stem (Fig. 1A) is herbaceous, procumbent, densely hairy, quadrangular, branched from the base and shows internodes 2.3-4.4 cm in length and 0.2 - 0.4 cm in diameter. The fresh stem is flexible, but when dry breaks with a fibrous fracture.

The leaves (Fig. 1A) are simple, cauline, opposite decussate and exstipulate with scarcely cartilaginous margins, acute apices, symmetric bases and papery texture. They are triangular, petiolate pinnatifid or pinnatisect and densely hairy; they measure 1.5 to 4 cm in length and 0.6 to 1.5 cm in breadth. They have reticulate pinnate venation with prominent midrib and main veins on the lower surface only.

The inflorescence (Fig. 1A) is spike, 2.0 to 4.0 cm long with short, dense, bracteate, hermaphrodite, complete, zygomorphic, pentamerous and hypogynous bluish flowers, measuring 16.1 to 16.4 mm long and 3.0 to 4.0 mm in diameter. Bracts are lanceolate, strigulose and measure 4.5 to 5.0 mm in length and 1.0 to 1.2 mm in breadth. The calyx is tubular, campanulate, shortly dentate and measure 7.0 to 8.7 mm in length and 0.5 to 0.6 mm in breadth. The corolla is blue with cylindrical tube and 5-spathulate, incised lobes and measures 14.0 to 16.3 mm in length. The corolla tube measures 11.7 to 12.0 mm in length and the lobes measure 4.3 to 4.6 mm in length. The androecium consists of 4-didynamous epipetalous stamens alternating with the corolla lobes, with free filaments and ovate anthers; the filament measures 0.7 to 0.8 mm in length and 0.2 to 0.3 mm in diameter, while the anther measures 1.1 to 1.2 mm in length and 0.6 to 0.7 mm in breadth. The gynaecium is yellowish-white, formed of superior, 4-lobed oblong ovary and a filiform style with short bifid stigma. The ovary measures 0.80 to 0.83 mm in length and 0.7 to 0.71 mm in diameter, and the style measures 9.1 to 9.4 mm in length and 0.2 to 0.3 mm in diameter. The plant flowers from June to August.

II. Micromorphology:

The root:

The transverse section in the root of *Verbena supina* L (Fig. 2A) is circular in outline showing an outer brownish cork followed by a narrow parenchymatous phelloderm surrounding a central cylinder

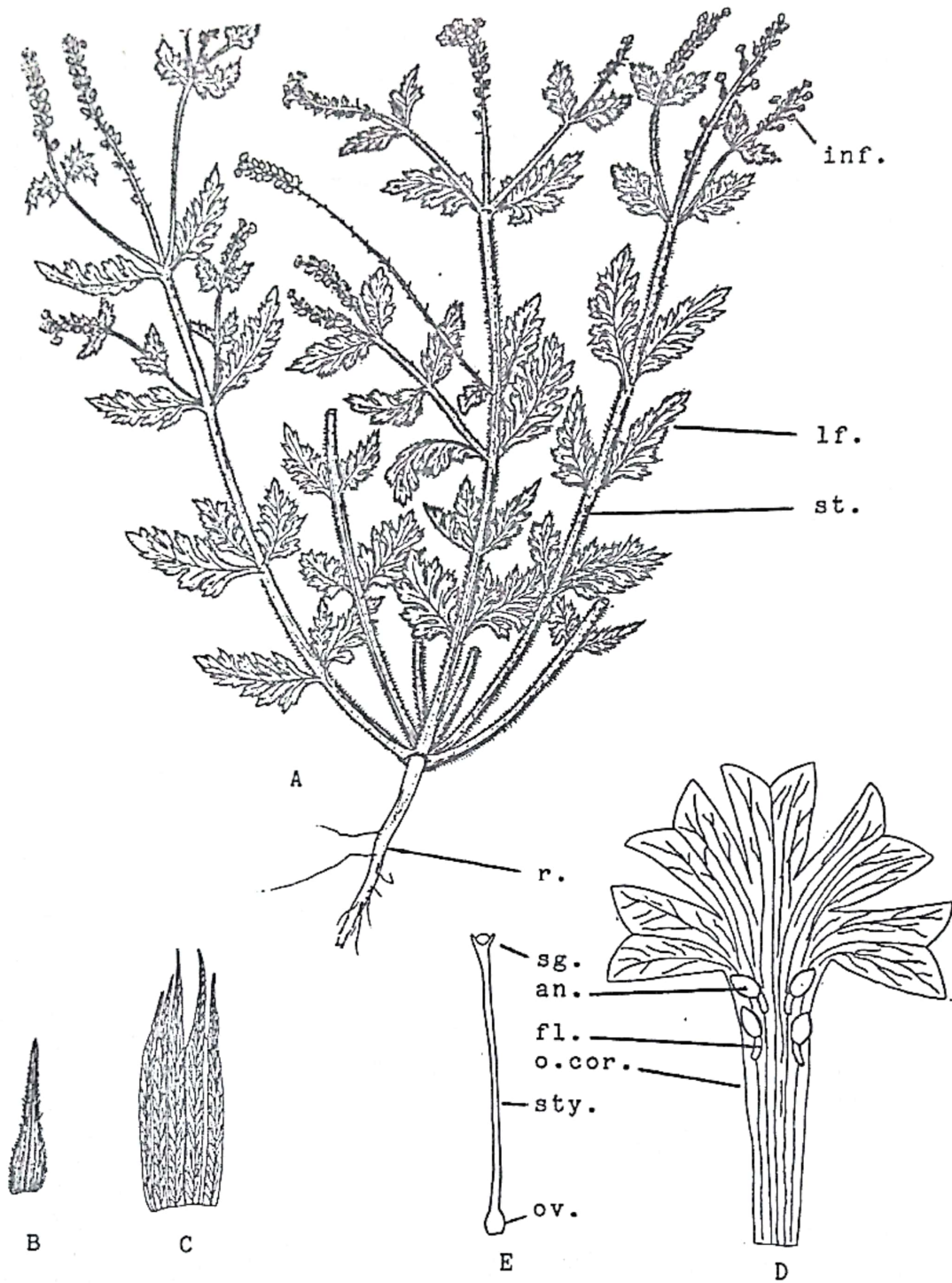


Fig.1: Macromorphology of *Verbena supina* L.

A- Sketch of the flowering plant. B- The bract.
C- The calyx. D- Opened flower. E- The gynaecium.

All x 4.4, except A x 0.5

an, androecium; fl, filament; inf, inflorescence; lf, leaf; o.cor., opened corolla;
ov., ovary; r., root; st., stem; sg., stigma; sty., style.

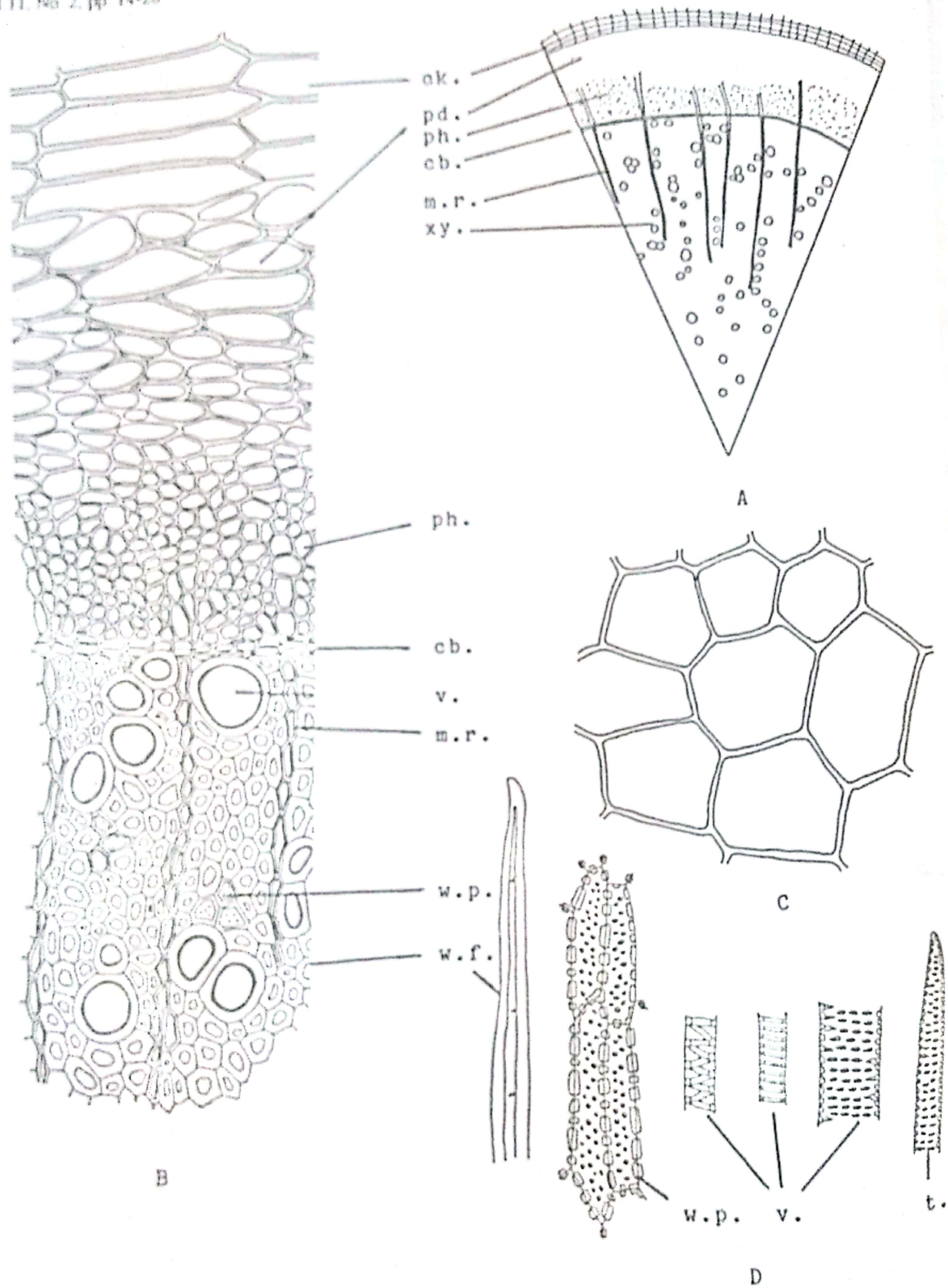


Fig 2: The root of *Verbena supina* L.

- A- Diagrammatic transverse section .
- B- Detailed transverse section .
- C- Cork cells.
- D- The powder.

All x 353, except A x 74

ck., cork; m.r., medullary ray; pd., phelloderm; ph., phloem; t., tracheids; v., vessel;
 w.f., wood fiber; w.p., wood parenchyma; xy., xylem.

of vascular tissue. The vascular tissue comprises a narrow phloem and a wide xylem with a central diarch primary xylem.

The cork (Fig. 2B and C) consists of about 4 to 5 layers of polygonal moderately thick-walled suberized, tangentially elongated cells arranged in radial rows.

The phelloderm (Fig. 2B) is narrow, formed of 7 to 10 rows of thin-walled, more or less tangentially elongated parenchymatous cells.

The vascular tissue (Fig. 2B) is formed of an outer cellulosic phloem and a wide lignified central xylem. The cambium (Fig. 2B) is formed of 2 to 3 layers of thin-walled cellulosic tangentially elongated cells. The xylem (Fig. 2B) is wholly lignified and formed mainly of fibers. The wood fibers (Fig. 2B and D) are spindle-shaped with thick lignified walls with few slit-like pits, moderately narrow lumens and acute apices. Tracheids (Fig. 2D) are few showing thick-lignified walls with numerous oval pits. Vessels (Fig. 2B and D) are diffused either isolated or in groups, showing lignified, spiral, annular and pitted walls. Wood parenchyma (Fig. 2B and D) are diffused and formed of moderately thick-walled, pitted and lignified polygonal axially elongated cells. The medullary rays (Fig. 2B) are 1 to 2 cell-wide being cellulosic in the phloem and lignified in the xylem.

Powdered root:

The powdered root (Fig. 2C and D) is brownish-yellow in colour with bitter taste and characteristic odour. It is characterized microscopically by the following features.

1. Fragments of brownish polygonal cells of the cork with moderately thick suberized walls.
2. Fragments of lignified spiral, annular and pitted vessels and few tracheids.
3. Numerous lignified wood fibers with thick-lignified walls, narrow lumen and acute apices.
4. Fragments of lignified polygonal, moderately thick-walled and pitted wood parenchyma.
5. Calcium oxalate crystals and starch are absent.

The stem:

A transverse section in the old stem (Fig. 3A & B) is more or less quadrangular in outline. It shows an epidermis followed by a narrow parenchymatous cortex with a patches of collenchyma in the four angles. The cortex is lined by a differentiated endodermis. The pericycle enclosing a continuous ring of vascular bundle surrounding a wide parenchymatous pith.

The epidermal cells (Fig. 3C) are polygonal, axially elongated with straight anticlinal walls and covered with thick, smooth cuticle.

Stomata (Fig. 3C) are few, of the anomocytic type and surrounded by 4-5 subsidiary cells.

Numerous non-glandular trichomes (Fig. 3D) are present. Each is unicellular, covered with thick warty cuticle and has a wide lumen and subacute apex.

The cortex (Fig. 3A & B) is comparatively narrow,

formed of 3 to 7 layers of oval or rounded cellulosic parenchymatous cells. The sub-epidermal collenchyma is restricted to the four angles of the stem and formed 3 to 10 layers of thick-walled collenchymatous cells followed by 2-6 layers of parenchyma.

The endodermis (Fig. 3B) is composed of a well differentiated parenchyma and having no casparian strips.

The pericycle (Fig. 3B & D) is formed of an interrupted ring of pericyclic fibers separated by cellulosic parenchymatous cells, surrounding the vascular tissue. The pericyclic fibers (Fig. 3B & D) are polygonal, having thick-lignified walls, wide lumens and blunt apices.

The vascular tissue (Fig. 3A & B) is formed of an outer cellulosic phloem and a wide lignified xylem; cambium is formed of 2-3 tangentially elongated cellulosic cells. The xylem is formed of wood fibers (Fig. 3B & D) having thick-lignified, pitted walls, narrow lumens and acute spines. Vessels (Fig. 3B & D) are lignified, diffused either isolated or in radial rows being spiral, annular and pitted. Wood parenchyma (Fig. 3B) are polygonal, usually elongated cells with moderately thick-walled, pitted and lignified walls.

The pith (Fig. 3A & B) is formed of cellulosic parenchyma with narrow intercellular spaces.

Starch and calcium oxalate are absent.

Powdered stem:

The powdered stem (Fig. 3C & D) is green in colour having characteristic odour and bitter taste and is characterized microscopically by:

1. Fragments of polygonal axially elongated epidermal cells with straight anticlinal walls and covered with thick, smooth cuticle.
2. Fragments of unicellular, non-lignified, non-glandular trichomes covered with thick warty cuticle.
3. Fragments of lignified spiral, annular and pitted vessels.
4. Fragments of lignified pericyclic fibers with blunt apices, thick-lignified, pitted walls and wide lumens.
5. Fragments of lignified wood fibers with thick, lignified, pitted walls, narrow lumens and acute apices.
6. Fragments of wood parenchyma with lignified, thick and pitted walls.

The leaf:

A transverse section of the leaf (Fig. 4A) shows a dorsiventral, heterogeneous mesophyll with an upper palisade interrupted by collenchyma in the midrib region. The midrib is prominent on the lower surface and traversed longitudinally by a crescent-shaped vascular bundle; the pericycle is parenchymatous.

The upper and lower epidermal cells of the leaf (Fig. 5A & B) are polygonal, nearly isodiametric having slightly wavy anticlinal walls and covered with thick, smooth cuticle.

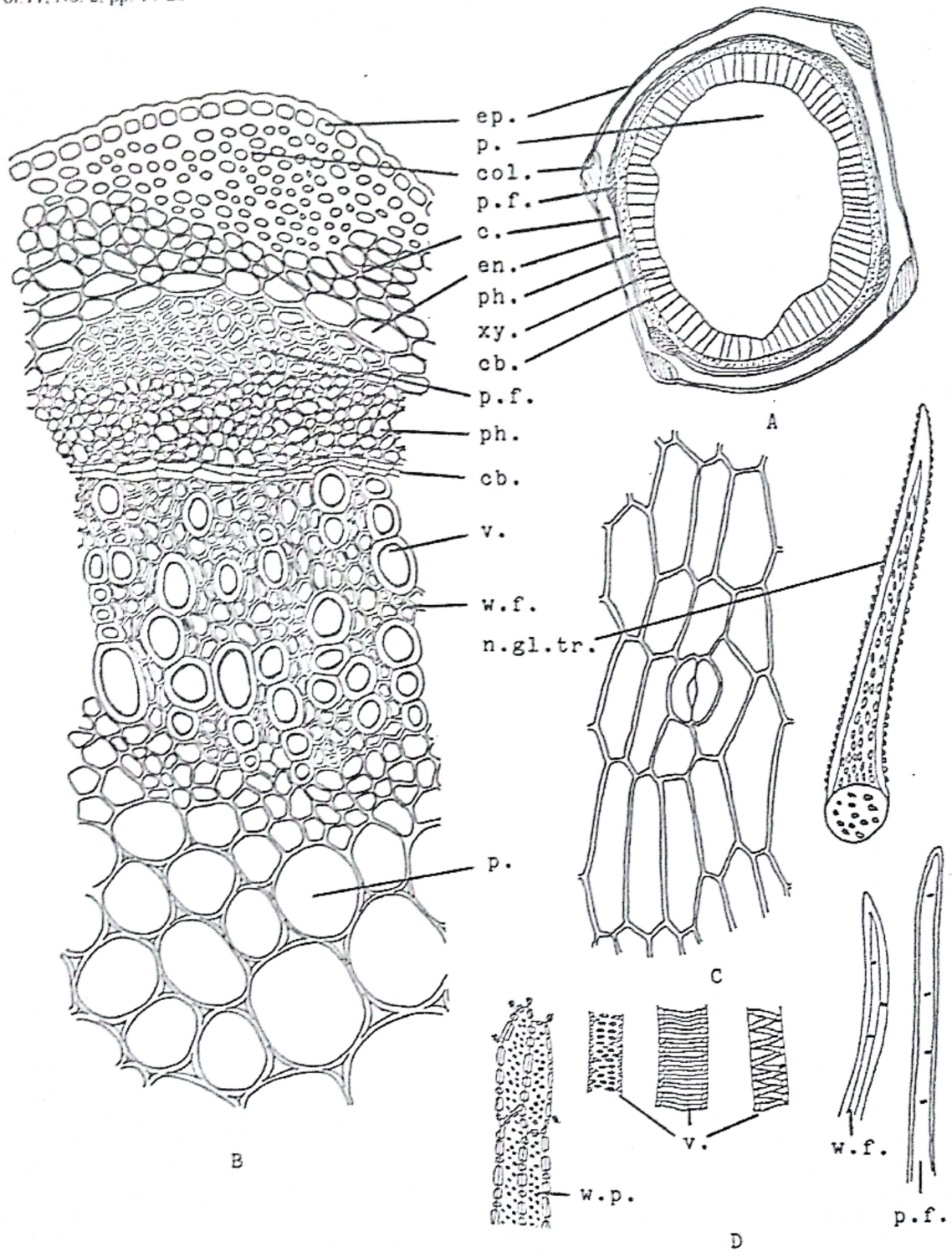


Fig.3: The stem of *Verbena supina* L.

A- Diagrammatic transverse section . B- Detailed transverse section .

C- Epidermal cells.

D- The powder.

All x 315, except A x 33

c., cortex; col., collenchyma; en., endodermis; ep., epidermis; n.gl.tr., non-glandular trichome; p., pith; p.f., pericyclic fiber; ph., phloem; v., vessel; w.f., wood fiber; w.p., wood parenchyma; xy., xylem.

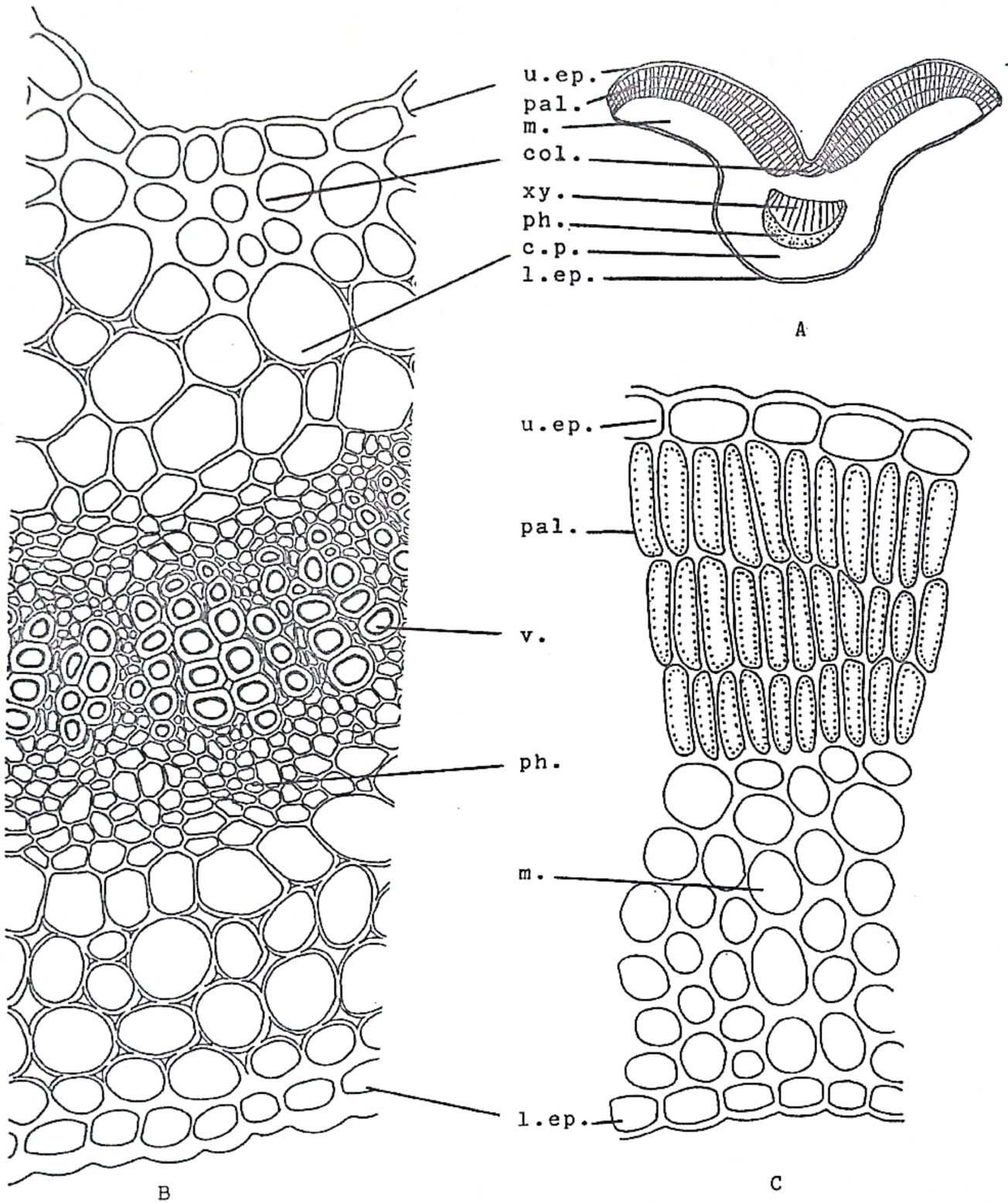


Fig.4: The leaf of *Verbena supina* L.

A- Diagrammatic transverse section .

B- Detailed transverse section of the midrib .

C- Detailed transverse section of the lamina .

All x 354, except A x 38

c.p., cortical parenchyma; col., collenchyma; l.ep., lower epidermis; m., mesophyll; pal., palisade; ph., phloem; u.ep., upper epidermis; v., vessel; xy., xylem.

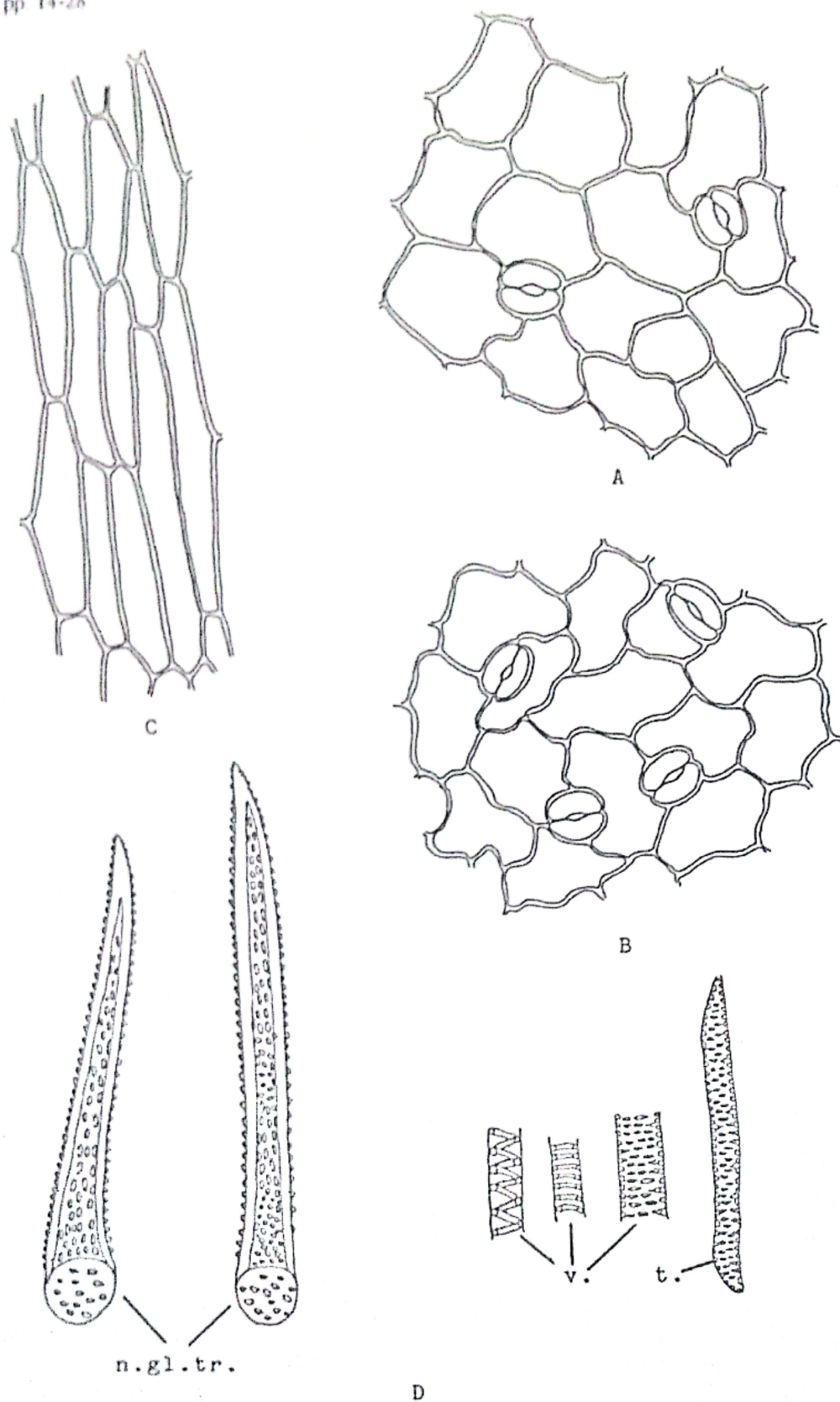


Fig.5: The leaf of *Verbena supina* L.

A- Upper epidermis.

B- Lower epidermis.

C- Neural epidermis.

D- The powder.

All x 321

n.gl.tr., non-glandular trichome; st., stomata; t., tracheid; v., vessel.

The upper and lower neural epidermal cells (Fig. 5C) are polygonal, axially elongated with straight anticlinal walls and covered with thick, smooth cuticle.

Stomata of anomocytic type (Fig. 5A & B) are present on both epidermises of the leaf being more numerous on the lower epidermis.

Non-glandular trichomes (Fig. 5D) are present on both surfaces. They are unicellular, covered with thick-warty cuticle and having wide lumen and subacute apices.

The mesophyll (Fig. 4A & C) is dorsiventral, formed of three rows of palisade cells abutting the upper epidermis, followed by a relatively wide spongy tissue. The palisade cells are columnar with thin straight radial walls. The spongy tissue is formed of 6-7 rows of oval or rounded loosely packed parenchyma.

The cortex of the leaf (Fig. 4A & B) is parenchymatous with subepidermal collenchyma abutting the upper epidermis. The collenchyma consists of 1 to 3 rows of thick-walled cellulose cells. The parenchyma is formed of 4 to 5 rows of thin-walled cellulose cells with narrow intercellular spaces.

The pericycle (Fig. 4A & B) is formed of undifferentiated parenchymatous cells.

The vascular bundle (Fig. 4A, B & 5D) consists of cellulose phloem with thin-walled elements and xylem formed of lignified spiral, annular and pitted vessels, and few tracheids.

Powdered leaf:

The powdered leaf (Fig.5) is pale green in colour, with a faint characteristic odour and a slightly bitter taste. It is characterized microscopically by the following features:

1. Numerous fragments of upper and lower epidermises with slightly wavy anticlinal walls, covered with thick, smooth cuticle and showing anomocytic stomata.
2. Numerous fragments showing unicellular non-glandular trichomes covered with thick warty cuticle.
3. Fragments of lignified spiral, annular and pitted vessels; few tracheids are also observed.

The microscopical numerical values of the leaf are summarized in Table 1

Table 1: Microscopical numerical values of the leaf of *verbena supina* L.

The numerical value	Recorded value
Stomatal index of the upper epidermis	14.4 - 15.5 - 16.2
Stomatal index of the lower epidermis	24.1 - 25.2 - 26.3
Palisade ratio	5 - 6 - 8
Vein-islet number	11 - 13 - 15
Veinlet termination number	15 - 19 - 21

The flower:

The bract:

The inner (upper) surface (Fig. 6A) are polygonal, nearly isodiametric at the upper and basal regions and axially elongated at the middle part, having straight anticlinal walls at the upper and middle regions and wavy at the basal part. They are covered with smooth cuticle. The outer (lower) epidermis (Fig. 6B) is formed of polygonal, nearly isodiametric cells, having straight anticlinal walls and covered with smooth cuticle. The upper and lower neural epidermal cells (Fig. 6C) are polygonal nearly axially elongated with straight anticlinal walls and covered with smooth cuticle.

Stomata are of anomocytic type (Fig. 6A₁ & B₂), observed only at the upper part of the inner epidermis and at the middle part of the outer epidermis.

Non-glandular trichomes (Fig. 6) are present on both surfaces especially at the marginal region. They are unicellular, covered with thick-warty cuticle, having wide lumen and subacute apices.

The calyx:

The epidermises of calyx (Fig. 7A & B) consists of polygonal, nearly isodiametric cells with straight anticlinal walls and covered with smooth cuticle.

Stomata of anomocytic type (Fig. 7B₁ & B₂) are observed on the outer epidermis at the apical and middle regions.

Unicellular non-glandular trichomes (Fig. 7) are present on both surfaces, being more numerous on the outer epidermis. They have warty cuticle, wide lumen and subacute apices.

The corolla:

The inner (upper) epidermis of corolla (Fig. 8A) is formed of polygonal cells with slightly wavy anticlinal wall at the apical part and straight anticlinal walls at the throat, middle and basal regions. They are isodiametric at the apical part and throat of corolla, and axially elongated at the middle and basal regions. The outer (lower) epidermal cells (Fig. 8B) are polygonal having wavy anticlinal walls at the apex and middle, being straight at the base. The inner and outer neural epidermal cells (Fig. 8C) are polygonal, axially elongated, with straight anticlinal walls and covered with smooth cuticle.

Warty, non-glandular, unicellular trichomes with wide lumen and sub-acute apices (Fig. 8) are observed, being numerous on the inner surface at the throat region.

Stomata are absent.

The androecium:

A transverse section in the anther (Fig. 9A & B) shows two lobes attached by the connective, which has a vascular strand in the center; each lobe consists of two pollen sac, which open forming one cavity in each lobe, containing numerous pollen grains. The anther-wall (Fig. 9A & B) is formed of an outer epidermis followed by one row of lignified fibrous layer cells and the remains of tapetum. The epidermal

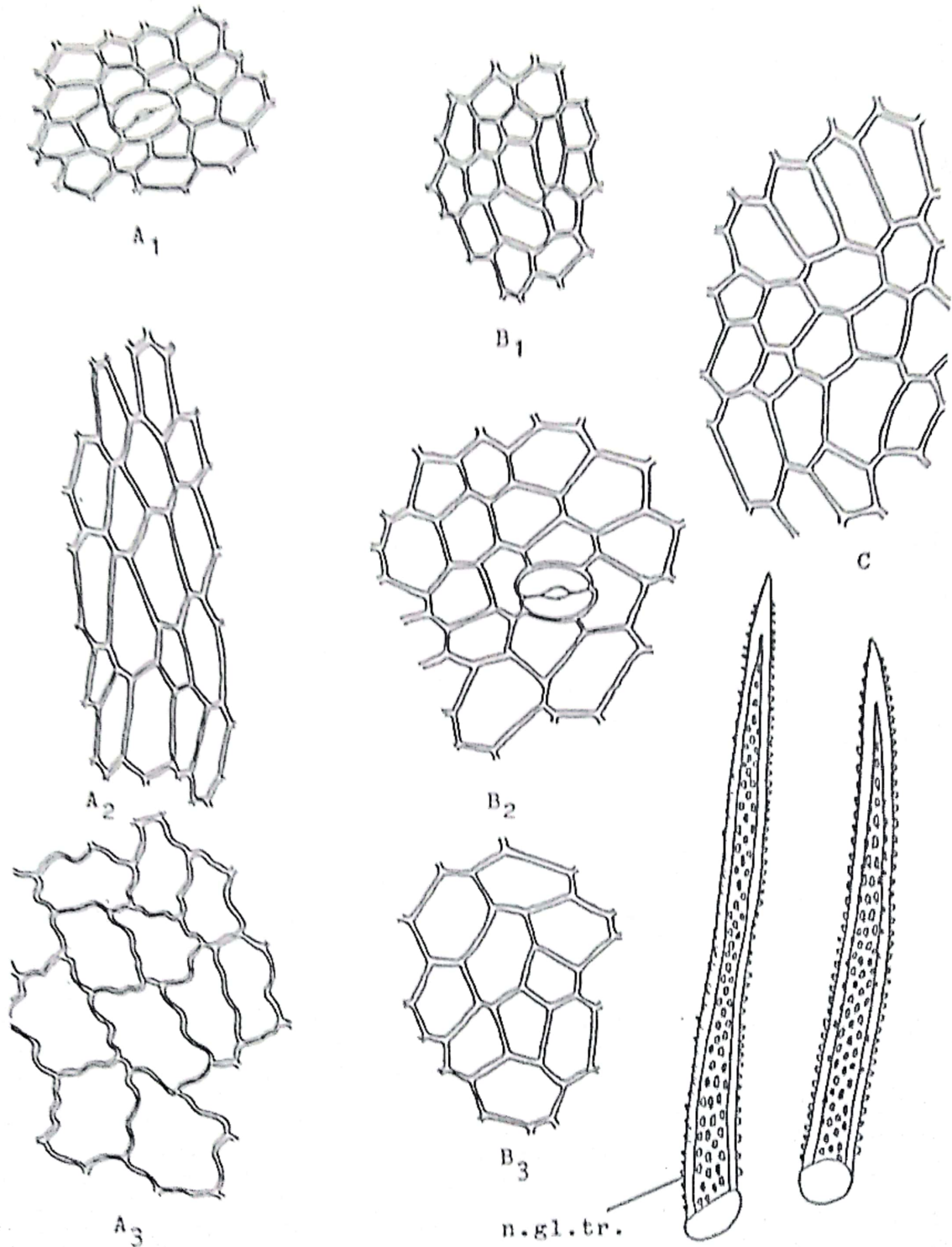


Fig.6: The bract of *Verbena supina* L.

A- Inner epidermis (A₁, at the apex; A₂, at the middle; A₃, at the base).
B- Inner epidermis (B₁, at the apex; B₂, at the middle; B₃, at the base).
C- Neural epidermis.

All x 355

n.gl.tr., non-glandular trichome; st., stomata.

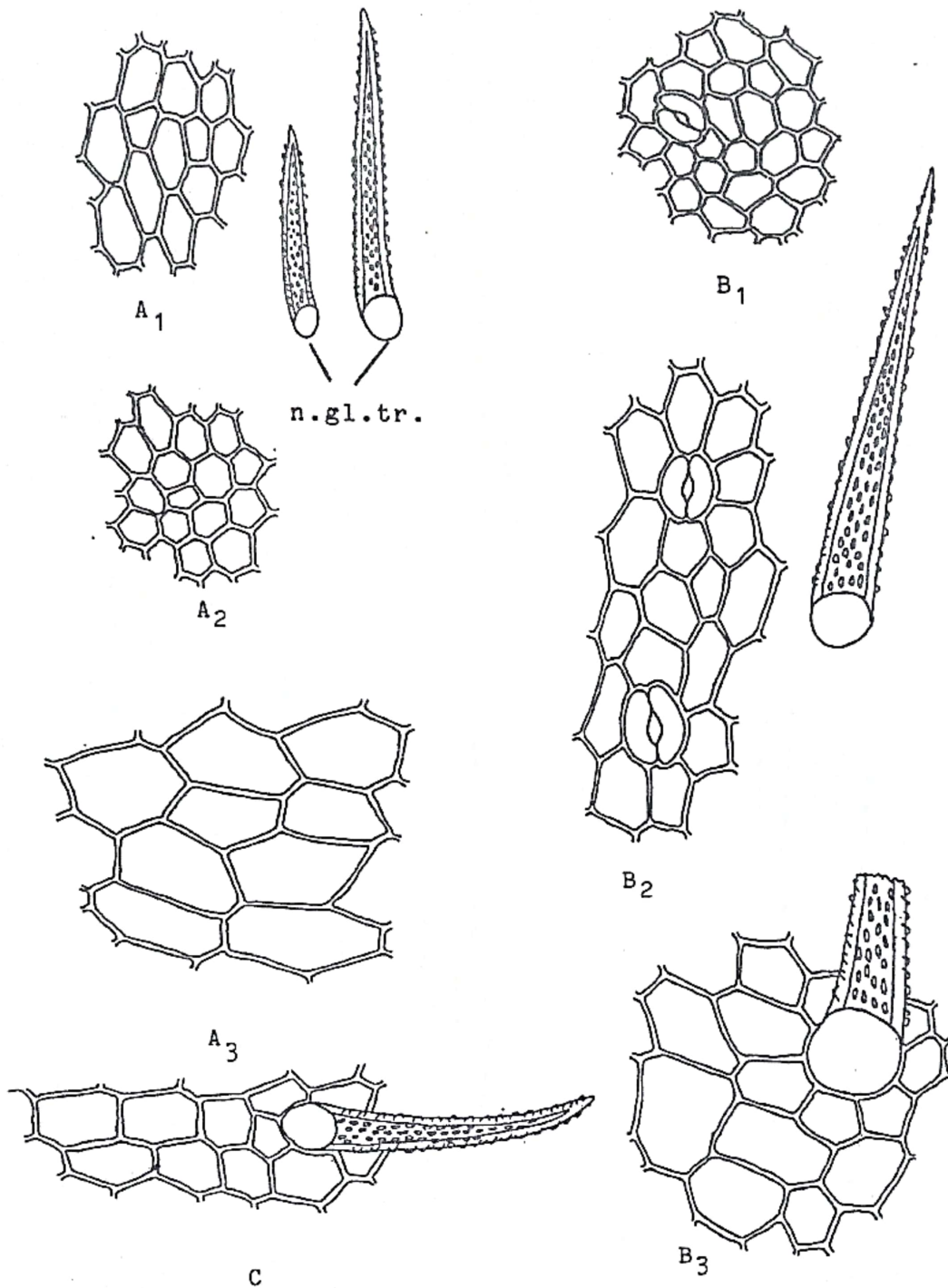


Fig.7: The calyx of *Verbena supina* L.

A- Inner epidermis (A₁, at the apex; A₂, at the middle; A₃, at the base).

B- Inner epidermis (B₁, at the apex; B₂, at the middle; B₃, at the base).

C- Neural epidermis.

All x 341

n.gl.tr., non-glandular trichome; st., stomata.

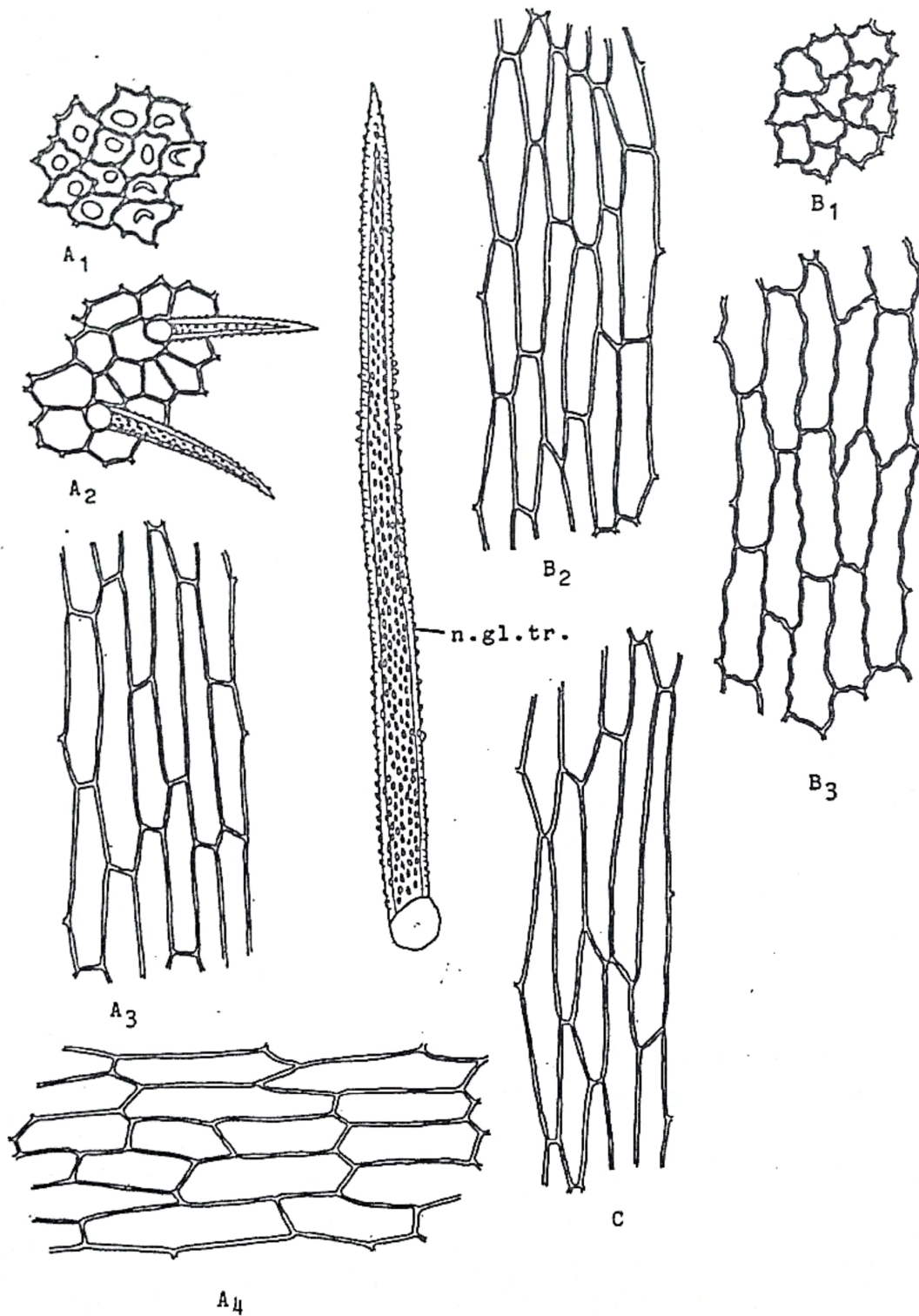


Fig.8: The corolla of *Verbena supina* L.

A- Inner epidermis (A₁, at the apex; A₂, at the throat A₃, at the middle; A₄, at The base).

B- Inner epidermis (B₁, at the apex; B₂, at the middle; B₃, at the base).

C- Neural epidermis.

All x 280

n.gl.tr., non-glandular trichome; st., stomata.

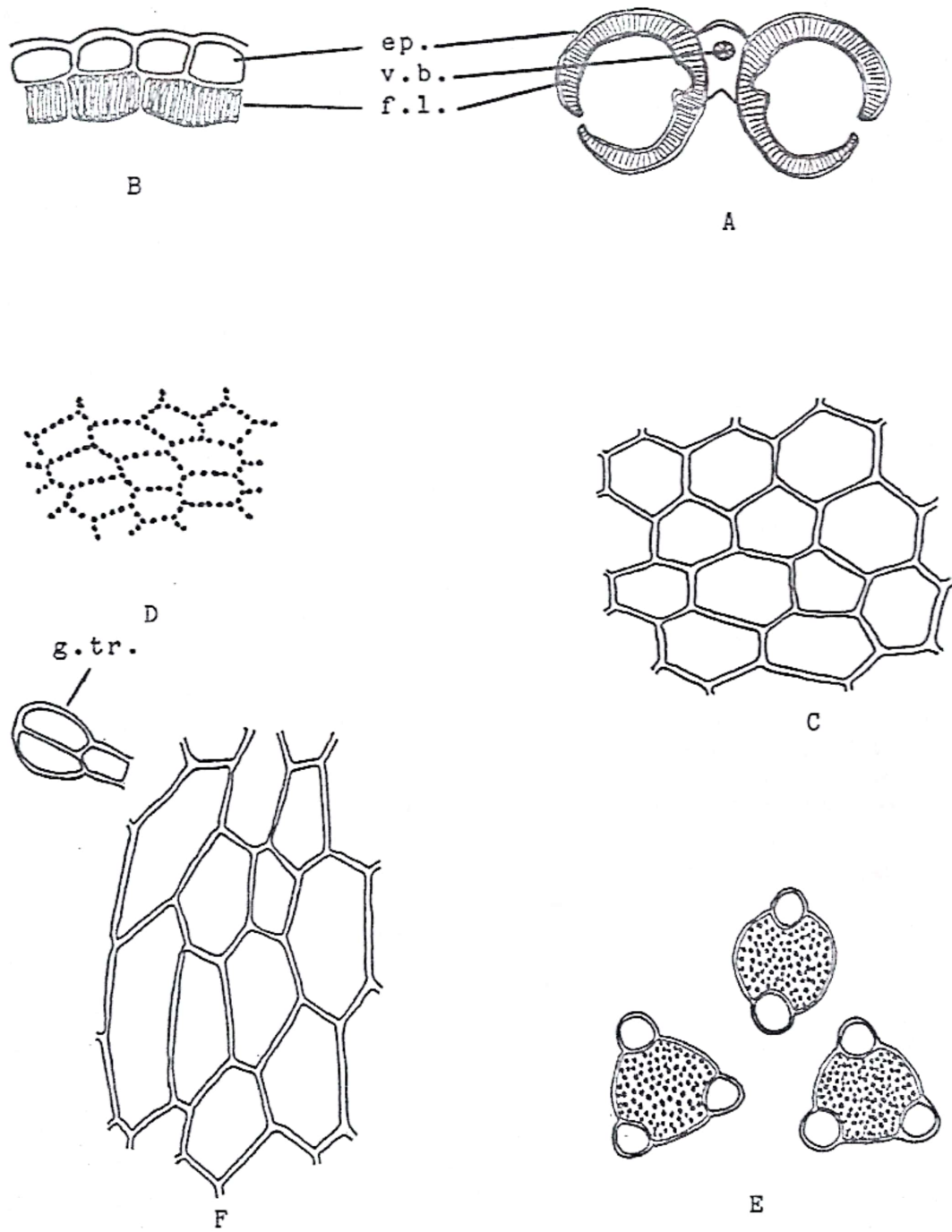


Fig.9: The androecium of *Verbena supina* L.

A- Diagrammatic transverse section of the anther.

B- Detailed transverse section in the anther-wall.

C- Epidermis of the anther .

D- The fibrous layer of the anther.

E- Pollen grain.

F- Epidermis of the filament.

All x 466, except A x 88 and B x 358

ep., epidermis; g.tr., glandular trichome; f.l., fibrous layer; v.b., vascular bundle.

cells of the anther lobe (Fig. 9C) are polygonal, nearly isodiametric with straight anticlinal walls and covered with smooth cuticle. The fibrous layer of the anther (Fig. 9D) is composed of polygonal, nearly isodiametric, lignified cells having straight and beaded anticlinal walls. The pollen grains (Fig. 9E) are nearly triangular with warty exine, three germ pores and three germinal furrows.

The epidermal cells of the filament (Fig. 9F) are polygonal, axially elongated and covered with smooth cuticle.

Glandular trichomes (Fig. 9F) are present on the epidermal cells of the filament. They have short unicellular, uniseriate stalk and 2-celled, nearly spherical head.

Stomata and non-glandular trichomes are absent.

The gynaeceum:

The ovary wall (Fig. 10A & B) is composed of an inner an outer epidermises enclosing a homogenous mesophyll traversed longitudinally by four vascular strands. The outer epidermis (Fig. 10C) consists of thin-walled, polygonal, isodiametric cells with straight anticlinal walls and covered with smooth cuticle.

The epidermis of the style (Fig. 10D) is formed of polygonal axially elongated cells and covered with smooth cuticle.

The epidermis of stigma (Fig. 10E) is formed of polygonal, papillosed cells with straight anticlinal walls and smooth cuticle.

Stomata and trichomes are absent.

Powdered flower:

The powdered flower is bluish in colour, having a faint characteristic odour and a slightly bitter taste. It is characterized microscopically by:

1. Numerous unicellular, thick-walled, non-glandular trichomes with wide lumen and covered with warty cuticle.
2. Few glandular trichomes with short unicellular stalk and 2-celled head.
3. Numerous triangular pollen grains with warty exine, three germ pores and three germinal furrows.
4. Fragments from the fibrous layer.
5. fragments of floral leaves showing epidermal cells with anomocytic stomata.
6. Fragments of the epidermal cells of the filament and anther lobes.
7. Fragments of papillosed stigma.

Cell dimensions of different tissues of the root, stem, leaves and the flower are listed in Table 2.

Table 2: Cell dimensions of the different tissues of the root, stem, leaf and flower of *verbena supina* L.

Organ	Tissue	Dimension (µm)
Root	Cork	L = 42 - 99, W = 41 - 64
	Vessels	D = 12 - 35
	Tracheids	L = 198 - 213, W = 12 - 17
	Wood fibers	L = 665 - 933, W = 8 - 21
	Wood parenchyma	L = 70 - 120, W = 14 - 21

Table 2: continued

Stem	Epidermal cells	L = 34 - 125, W = 9 - 21, H = 4 - 9	
	Stomata	L = 30-34, W = 22-26	
	Non-glandular trichomes	L = 220 - 270, W = 14 - 32	
	Pericycle fibers	L = 930 - 1867, W = 4 - 14	
	Vessels	D = 7 - 43	
	Wood fibers	L = 800 - 1467, W = 5 - 14	
Leaf	Upper epidermis	L = 35 - 75, W = 22 - 54, H = 19 - 24	
	Lower epidermis	L = 35 - 82, W = 26 - 52, H = 9 - 19	
	Neural epidermis	L = 70 - 156, W = 9 - 24, H = 9 - 22	
	Stomata	L = 25 - 35, W = 18 - 26	
	Non-glandular trichomes	L = 226 - 283, W = 14 - 35	
	Palisade	L = 22 - 60, W = 7 - 13	
	Vessels	D = 4 - 24	
	Tracheids	L = 141 - 170, W = 8 - 13	
Flower	bract	Inner epidermis at apex	L = 14 - 40, W = 12 - 17
		at middle	L = 21 - 55, W = 8 - 21
		at base	L = 33 - 64, W = 18-45
	Outer epidermis	at apex	L = 9 - 31, W = 8 - 17
		at middle	L = 19 - 50, W = 18 - 33
		at base	L = 21 - 47, W = 18 - 31
		Neural epidermis	L = 21 - 50, W = 9 - 30
		Stomata	L = 25 - 35, W = 19 - 24
	Non-glandular trichomes	L = 240 - 312, W = 21 - 26	
	Calyx	Inner epidermis	at apex
at middle			D = 8 - 21
at base			L = 42 - 71, W = 18 - 34
Outer epidermis		at apex	L = 11 - 24, W = 11 - 16
		at middle	L = 11 - 43, W = 11 - 28
		at base	L = 22 - 50, W = 16 - 40
		Neural epidermis	L = 16 - 50, W = 11 - 22
		Stomata	L = 21 - 37, W = 16 - 27
Non-glandular trichomes	L = 84 - 283, W = 11 - 33		
Corolla	Inner epidermis	at apex	L = 19 - 33, W = 18 - 28
		at throat	L = 19 - 35, W = 12 - 27
		at middle	L = 84 - 156, W = 14 - 21
		at base	L = 56 - 120, W = 15 - 27
	Outer epidermis	at apex	L = 12 - 28, W = 12 - 27
		at middle	L = 67 - 137, W = 9 - 21
		at base	L = 69 - 187, W = 14 - 24
Neural epidermis	L = 87 - 205, W = 12 - 23		
Non-glandular trichomes	L = 99 - 574, W = 9 - 33		
Androecium	Epidermis of the anther	L = 18 - 31, W = 14 - 25	
	Fibrous layer of the anther	L = 12 - 25, W = 7 - 11	
	Pollen grains	D = 35 - 39	
	Epidermis of the filament	L = 23 - 66, W = 10, 24	
	Glandular trichomes head	D = 20 - 24	
	Stalk	L = 11 - 15, W = 8 - 11	
Gynaecium	Epidermis of ovary wall	L = 8 - 21, W = 6 - 17	
	Epidermis of stigma	L = 10 - 21, W = 10 - 16	
	Vessel	D = 2 - 4	
	Epidermis of style	L = 27 - 34, W = 7 - 16	
at apex	L = 66 - 96, W = 9 - 20		
at middle	L = 53 - 101, W = 7 - 11		
at base			

D = diameter, H = height, L = length, W = width.

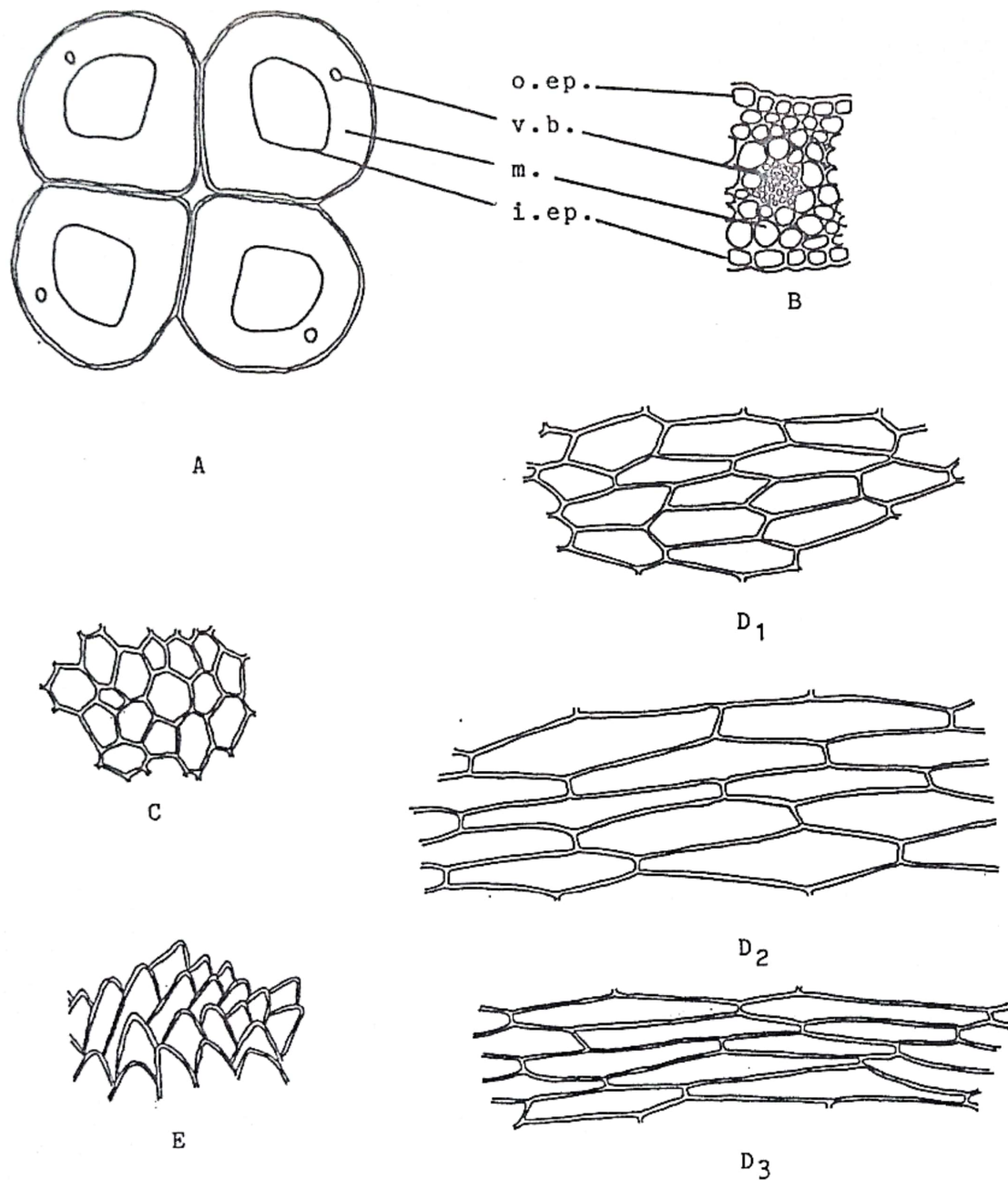


Fig.10: The gynaecium of *Verbena supina* L.

A- Diagrammatic transverse section in the ovary.

B- Detailed transverse section in the ovary-wall.

C- Outer epidermis of the ovary.

D- Epidermis of the style (D₁, at the upper part; D₂, at the middle; D₃, at the base)

E- Epidermis of the stigma.

All x 415, except A x 74 and B x 294

i.ep., inner epidermis; m., mesophyll; o.ep., outer epidermis; v.b., vascular bundle.

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دراسة الصفات العيانية والمجهريّة للجذع والسيقان والأوراق والنورة لنبات فريينا سويينا (العائلة الفريينية)

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في هذا البحث تم إجراء دراسة للصفات العيانية والمجهريّة لنبات فريينا سويينا (العائلة الفريينية)

للتعرف على هذا النبات سواء كان في حالته الصحيحة أو على هيئة مسحوق.