Bull. Pharm. Sci., Assiut University
Vol. 5, PP. 41-52

MACRO-AND MICROMORPHOLOGY OF PULICARIA UNDULATA (L.)KOSTEL GROWING IN EGYPT

PART I. The Stem and Leaf

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The macro- and micromorphology of the stem and leaf of Pulicaria undulata (L.) kostel are presented with the aim of finding the characters of these organs by which it could be easily identified either in the entire or powdered form.

Pulicaria undulata (L.) kostel[1], family Compositae, is much branched, woolly procumbent, branches are from a few up to 50 cm long. It is a common plant in sandy and calcanous places, and very common in the Eastern mediterranean coast in the Egyptian desert, in Sudan and in Sinai[2]. Local name : ghobeyra(Del.), Kut-kal (Schweinfurth) and generally rabbul. The plant was reported to have folkloric medicinal uses such as in treatment of haemorrhoids and vaginal tumours and used as tonic and for cold[3]. It was found that it possesses bactericidal and bacteriostatic effects on microcultures[4]. In previous communications, the authors have reported the phytochemical study and the antibacterial screening of the different constituents of the plant under investigation[5,6].

A literature survey showed that nothing could be traced concerning the macro-and micromorphological characters of this plant, so it was deemed of value and interest to carry out an investigation of this plant to indicate the diagnostic characters of its organs by which they could be identified both in the entire and in the powdered form.

EXPERIMENTAL

Material:

The stems and leaves of Pulicaria undulata (L.)kostel were collected from the flowering plants growing wildly at the Red Sea coastal region and Edfu-Marsa Alam road, in March 1978, 1979.

Authentication of the plant was done by Prof. Dr. N. El-Hadidy, Botany Dept., Faculty of Science, Cairo University.

A voucher specimen is kept in the Pharmacognosy Dept., Faculty of Pharmacy, Assiut University.

I- The Stem.

A. Macromorphology: (Fig. 1, A).

It is erect, hoary, cylindrical to slightly sub-cylindrical in outline, herbaceous ranging from 15 to 50 cm in height, reaching up to 3 to 5 mm in diameter. It is much branched, branches are monopodial with short internodes. The surface is hairy, pubescent and longitudinally striated. The stem has a slight pleasant aromatic odour and a slight bitter taste.

B. Micromorphology: (Fig. 2, A,B)

A transverse section in the stem appears circular in outline with 3-5 slightly raised ridges. It shows an epidermis followed by a narrow chlorenchymatous cortex. The pericycle is represented by groups of pericyclic fibres interrupted by groups of parenchyma. The vascular system in young stem (Fig. 2,A) consists of 20-22 separate collateral open vascular bundles of xylem and phloem. In old stem (Fig. 2, B) it consists of a continuous ring of phloem and a continuous ring of xylem surrounding a wide central pith which occupies about half of the diameter.

The epidermis. (Fig. 2, C)

It consists of one row of cells. The epidermal cells appears in top view to be polygonal, axially elongated with straight anticlinal walls and covered with finely striated cuticle. The cells measure 88-200-266 μ in length, 44-59-66 μ in width and 18-21-31 μ in height. Stomata of anomocytic type are present measuring 40-45 μ in length and 30-35 μ in width.

Trichomes: (Fig. 3, B)

They are glandular and non-glandular. The glandular trichomes are of Compositae type, with bicellular, biseriate stalks, measure 60-85-106 μ in length, 70-86 μ in width and multicellular biseriate heads, consisting of 10-12 cells arranged in two parallel rows measure 130-160 μ in height and 90-130-148 μ in width. The non-glandular type are multicellular uniseriate which densely covering the surface of the stem and measure 555-1518 μ in length and 29-51 μ in width.

The cortex. (Fig. 3, A)

It is comparatively narrow and is formed of 3-5 rows of oval or rounded chlorenchymatous cells with narrow intercellular spaces. The endodermis consists of tangentially elongated parenchyma cells.

The pericycle: (Fig. 3, A)

It consists of a more or less complete ring of fibres which are interrupted by groups of thin walled parenchyma cells. The fibres are lignified with pointed apices and narrow lumen, measuring 550-723-1276 μ in length and 42-53-63 μ in width.

The phloem: (Fig. 3, A)

It consists of small sieve elements and parenchyma cells with thin shiny walls. The phloem is separated from the xylem by two rows of thin walled tangentially elongated and radially arranged cambiform cells.

The xylem: (Fig. 3,A)

It is formed of spiral and pitted vessels with ovoid slits are present (Fig. 3, B), measure 50-63 μ in diameter The rows of the xylem vessels are traversed by a few medullary rays which are of 2 to 6 cells wide. The individual medullary ray cells mesure 26-32-45 μ in length. 12-15-20 μ in width. The vessels are accompanied by some tracheids, wood fibres and wood parenchyma. The wood parenchyma consist of elongated cells with moderately thick pitted lignified walls. The wood fibres are lignified and with narrow lumen.

The pith(Fig 3, A)

It occupies about half the diameter of the stem. It consists of polygonal or rounded thick-walled cells with narrow intercellular spaces together with parenchymatous central region of large thin-walled cells.

The Powder:

The powder is yellowish-green in colour, having a faint pleasant aromatic odour and a slight bitter taste. It is characterised microscopically by:

1- Fragments of epidermal cells covered with finely striated cuticle. Some epidermal cells show anomocytic stomata, non-glandular and glandular trichomes.
2- Abundant non-glandular cottony trichomes with 1-3 short basal cells and longer terminal one.
3- Fragments of fibres from pericycle and xylem with pointed apices, narrow lumen, lignified, showing slit-like simple pits.
4- Fragments of lignified vessels with pitted and spiral thickening.
5- Fragments of pitted tracheids with boardered pits.
6- Fragments of lignified wood parenchyma.

II. The Leaf.

A. Macromorphology (Fig. 1,B)

The leaf is simple, alternate, sessile, exstipulate. The leaf measures 2-5 cm in length and 2-5 mm in width, with subacute apex and amplexicaul base. The lamina is simple, oblanceolate to obtuse, dentate, often undulated. Both upper and lower surfaces are greenish and hairy with pinnate reticulate vennation, pleasant aromatic scent and a slight bitter taste.

B. Micromorphology. (Fig. 4, A)

A transverse section of the leaf shows the midrib bulging on the lower surface. The lamina is isobilateral having a single layer of palisade beneath each epidermis. The palisade is not continuous at the region of the midrib where it is interrupted by a small mass of chlorenchyma. In between the upper and lower palisade is the spongy tissue. The midrib shows the vascular bundles, usually consists of a large central crescent shaped one, occasionally with one or two lateral small vascular bundles.

The pericycle is usually parenchymatous with isolated groups of fibres towards the upper and lower sides. Both upper and lower epidermises are covered with non-glandular and glandular trichomes.

The epidermis (Fig. 4, b, C)

The upper and lower epidermises are covered with thick smooth cuticle. Each epidermis consists of one row of cells.

The upper epidermal cells are subrectangular, slightly elongated cells, having somewhat wavy walls, measure 120-135-177 µ in length, 58-72-98 µ in width and 22-27-35 µ in height.

The lower epidermal cells show more wavy anticlinal walls. Numerous stomata of anomocytic type are present being surrounded by 3 or 4 epidermal cells, measure 35-40 µ in length and 32-40 µ in width. Glandular and non-glandular

trichomes are present on both the upper and lower surfaces similar in shape and size to those of the stem.

The mesophyll. (Fig. 4 A, D)

It is regular and predominating at the ends, differentiated into palisade and spongy tissue. The palisade composed of upper and lower layers which consists of short subrectangular cells with straight walls, measure 51-80-114 µ in length and 51-62 µ in width. The spongy tissue consists of oval parenchymatous cells with wide and numerous intercellular spaces containing yellowish-green plastids.

The Midrib: (Fig. 5)

It consists of an upper and lower masses of chlorenchyma and parenchymatous cells.

The vascular tissue consists of radiating xylem which composed of spiral and pitted vessels, measure 18-23-25 µ in diameter, wood parenchyma are subrectangular, axially elongated cells with pitted lignified walls. The phloem consists of small thin-walled and shiny cellulosic elements. The pericycle consists of 2-3 rows of thin-walled parenchymatous cells and isolated pericyclic fibres. The fibres are found towards the upper and lower surfaces with slightly rounded or tapering apices, wide lumen, slightly lignified walls and slit-like pits are present, measure 300-444-537 µ in length and 25-37 µ in width.

The powder

The powder is greyish-green in colour, having a leasant aromatic warm odour and a slight bitter taste. It is characterised microscopically by.

1- Fragments of the upper and lower epidermises showing anomocytic stomata, glandular and non-glandular trichomes.
2- Fragments of mesophyll tissue with subrectangular palisade cells and spongy parenchyma.
3- Fragments showing entire and broken non-glandular trichomes.
4- Fragments of pericyclic fibres.
5 -Fragments of broken spiral and pitted xylem vessels which are lignified.

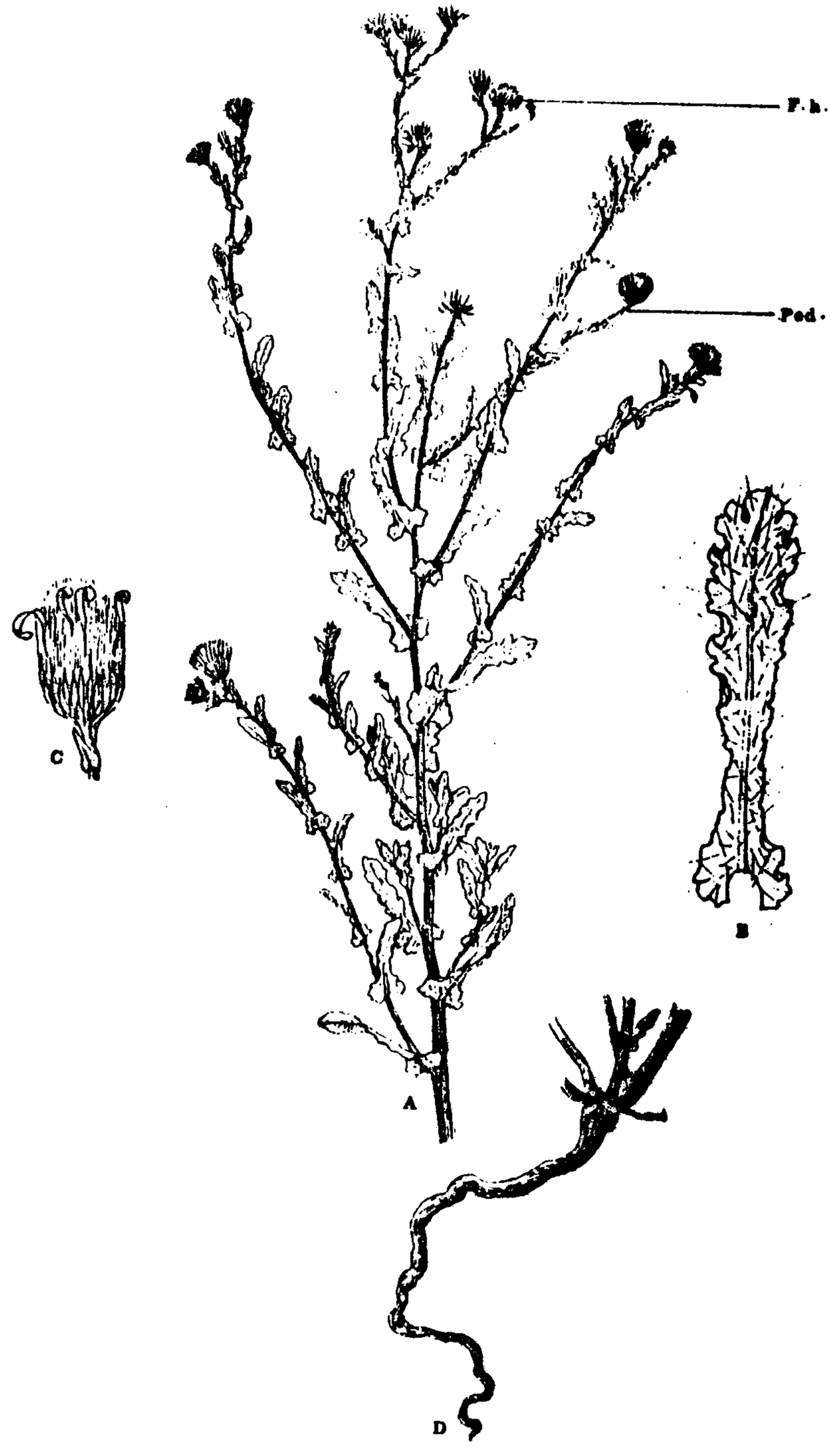

Fig. 1: Macromorphology of Pulicaria Undulata (L.) Kostel

A-	Flowering branch	X 0.65
B-	The leaf	X 1.30
C-	The flower head	X 1.30
D-	The root	X 0.65

f.h., flower head; Ped., Peduncle.

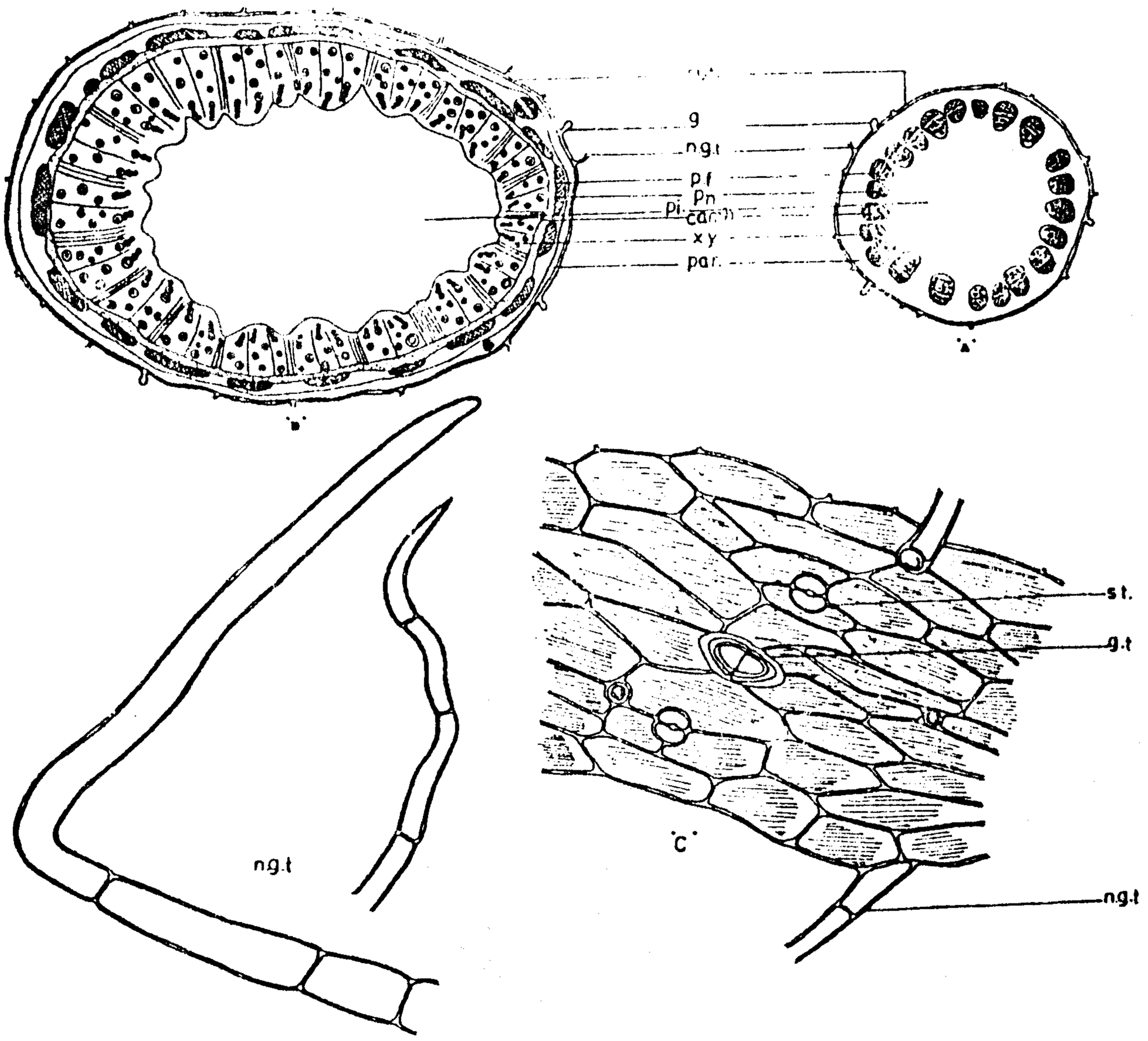

Fig. 2: Pulicaria Undulata (L.) Kostel

The stem:

A- T.S. diagram in young stem X 24
B- T.S. diagram in old stem X 24
C- Surface preparation of stem X 135

cam., cambium; cut., cuticle; g t., glandular trichome; n.g.t., non-glandular trichome; par., parechyma; p.f., pericyclic fibre; ph., phloem; pi., pith; st., stoma; xy., xylem

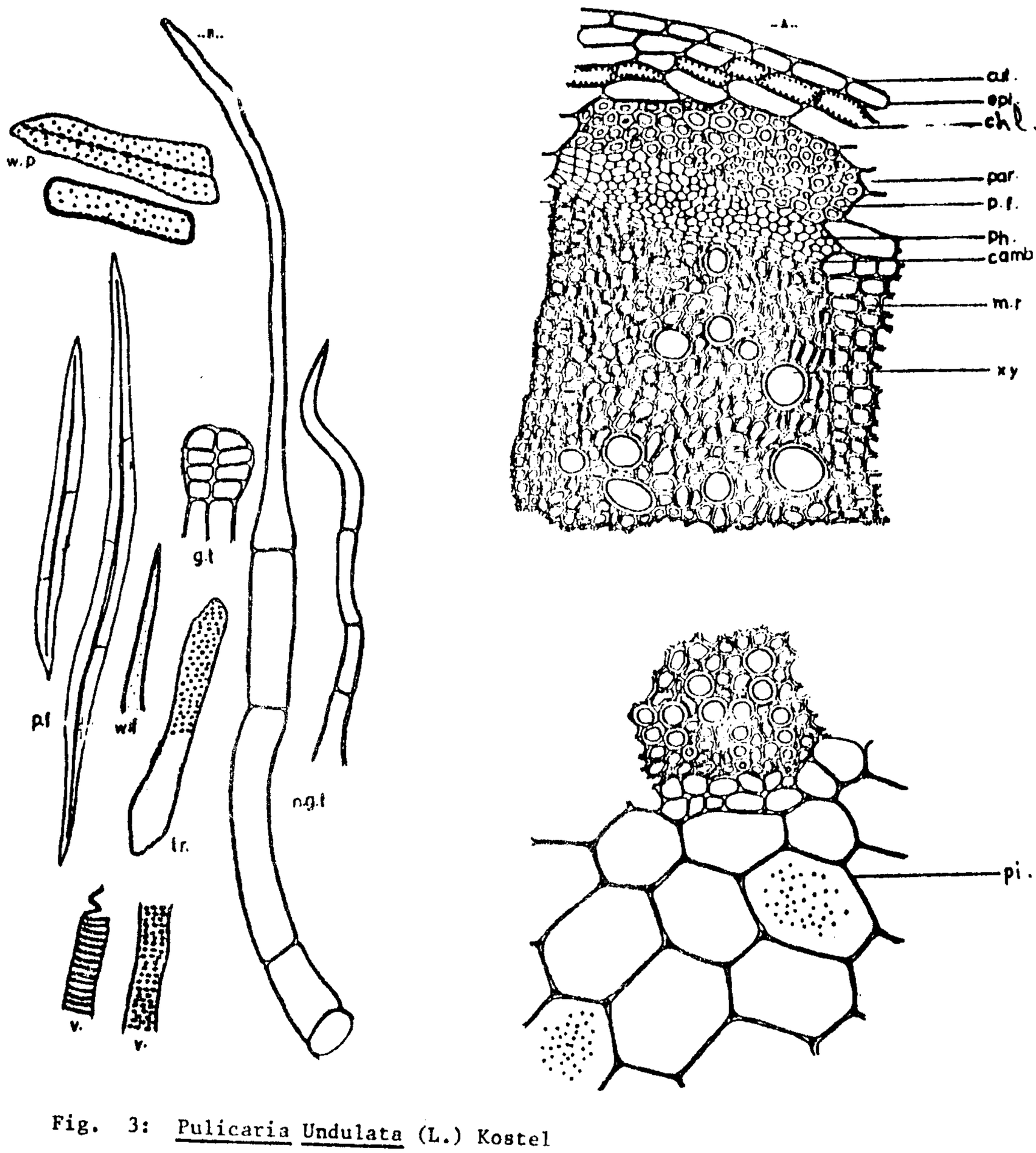

Fig. 3: Pulicaria Undulata (L.) Kostel

The stem:

A- Detailed sector X 94
B- Isolated elements X 94

camb., cambium; cut., cuticle; chl., chlorenchyma; epi., epidermis; g.t., glandular trichome; m.r., medullary ray; n.g.t. non-glandular trichome; par., parenchyma; p.h., pericyclic fibre; ph., phloem; pi, pith; tr., tracheid; v., vessel, w.f. wood fibre; w.p., wood parenchyma; xy., xylem;

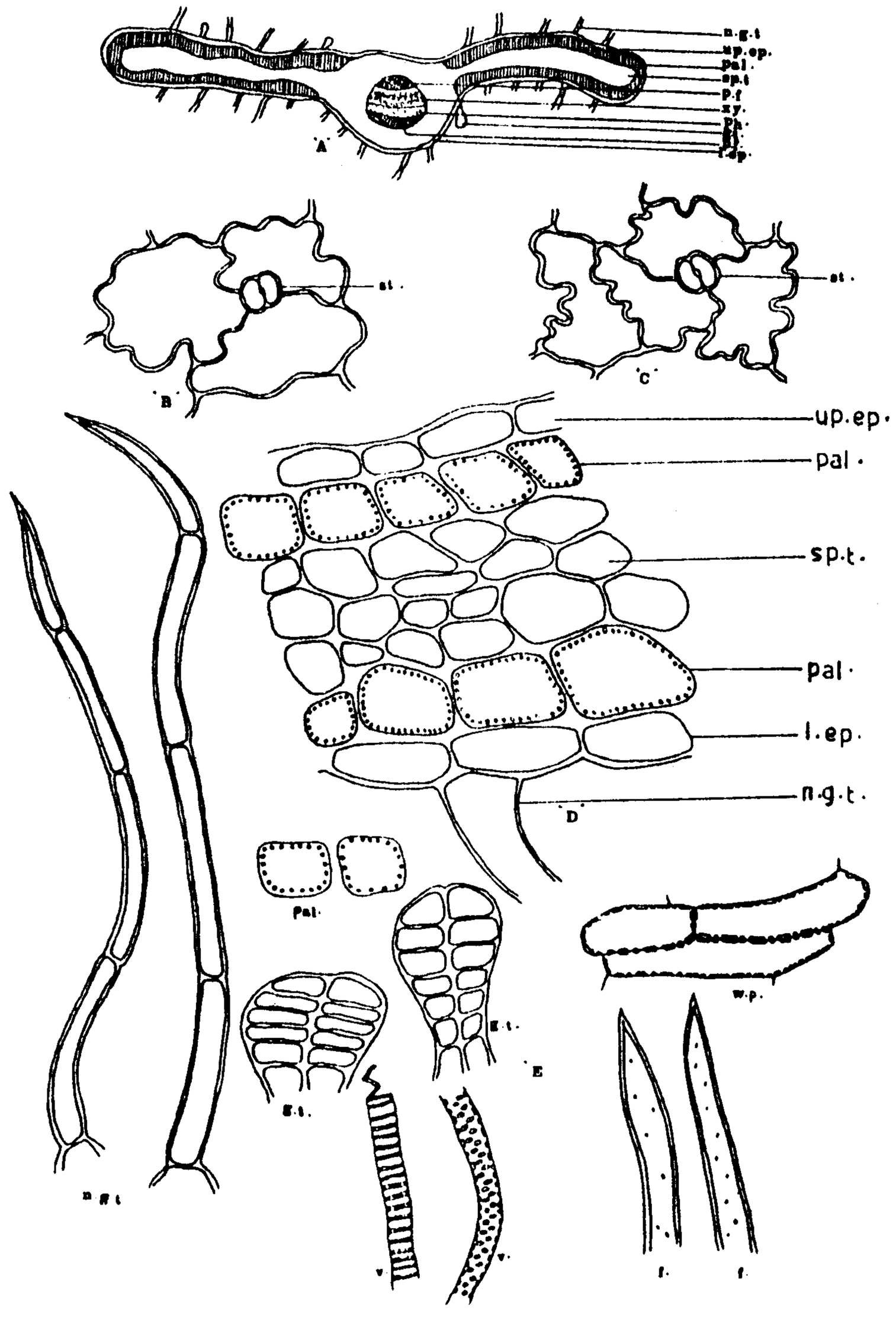

Fig. 4: Pulicaria Undulata(L.) Kostel

The leaf

A-	T.S. diagram	X 31
B-	Upper epidermis	X 175
C-	Lower epidermis	X 175
D-	Detailed T.S. in the lamina	X 175
E-	Isolated elements	X 175

f. fibre; g.t., glandular trichome; l. ep., lower epidermis; n.g.t., non-glandular trichome; pal., palisade; p.f., pericyclic fibre; ph., phloem; sp.t., spongy tissue; st., stoma; up. ep., upper epidermis; v., vessel; w.p., wood parenchyma; xy., xylem.

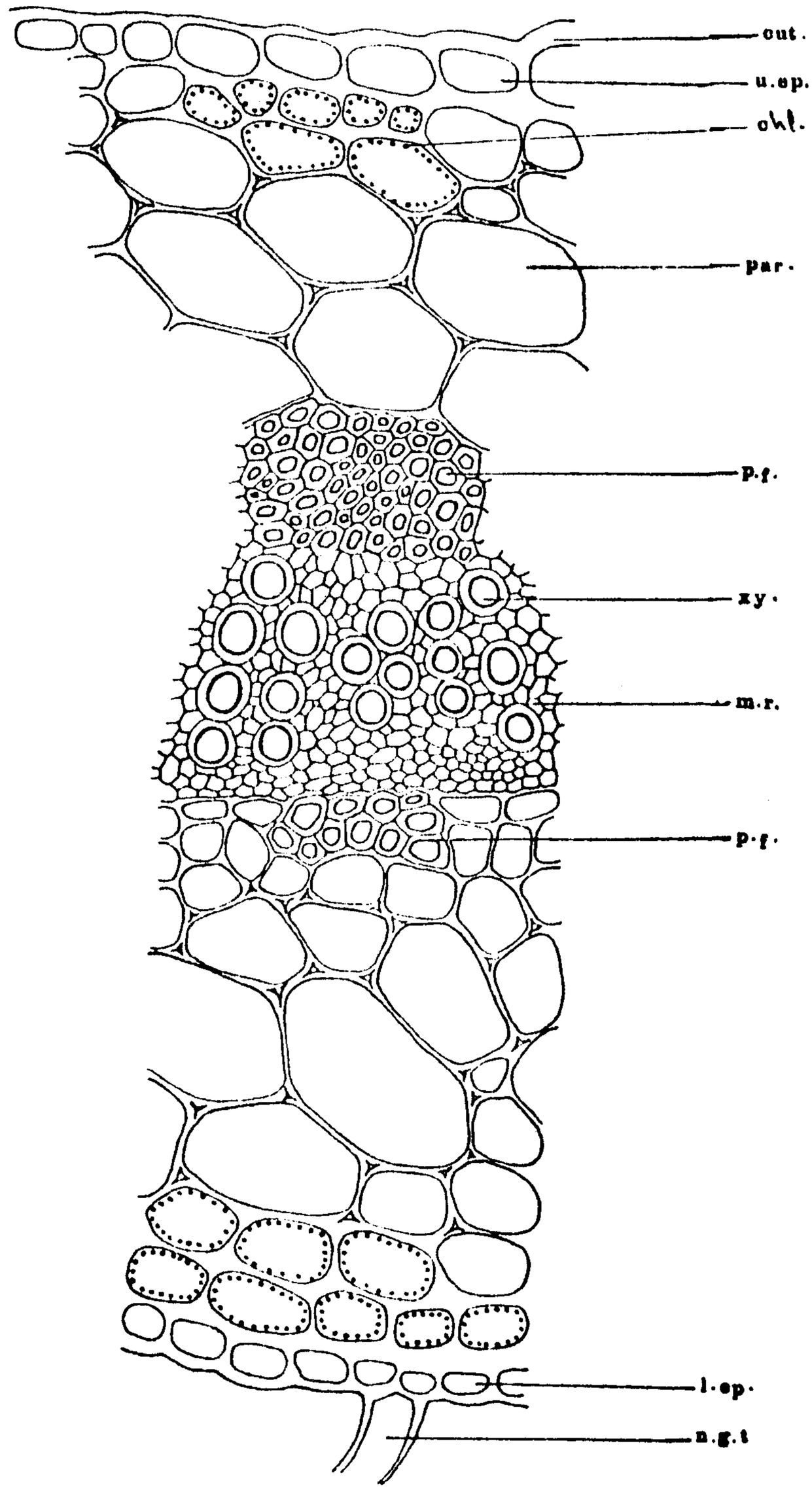

Fig. 5: Pulicaria Undulata (L.) Kostel

The leaf

A- Detailed T.S. in the midrib X 216

A. chlorenchyma; cut., cuticle; l.ep., lower epidermis; chl., chlorenchyma; cut., cuticle; l.ep., lower epidermis; m.r., medullary ray; n.g.t., non-glandular trichome; par., parenchyma; p.f., pericyclic; fibre; u.ep., upper epidermis; xy., xylem.

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دراسة الصفات العيانية والمجهرية فى نبات الشاى الجبلى (بوليكاريا انديولاتا) الذى ينمو فى مصر

جزء (١) السيقان والاوراق

داود ونيس بشاى ـ كاميليا سعيد جمعه ـ محمود حافظ عساف

قسم العقاقير ـ كلية الصيدلة ـ جامعة اسيوط

فى هذا البحث تم دراسة الصفات العيانية والمجهرية لسيقان وأوراق نبات الشاى الجبلى بهدف التعرف عليها سواء كانت صحيحة او على هيئة مسحوق .

received in 18/3/1981 & accepted in 15/4/1981