Bull. Pharm. Sci., Assiut University
Vol. 5, PP. 53-64

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

PART II. The Flower

D.W. Bishay, C.S. Gomaa and M.H. Assaf
Departmant of Pharmacognosy, Faculty of Pharmacy, Assiut University , Assiut, Egypt.

The macro-and micromorphology of the flower of Pulicaria undulata (L.) Kostel grown in Egypt are presented with view of identification out the characters which help in its identification in both the entire and in the powdered forms.

In a previous communication, the macro-and micromorphology of the stem and leaf of Pulicaria Undulata(L.) Kostel grown in Egypt were reported[1]. In this work, the macro-and micromorphology of the flower are presented.

EXPERIMENTAL

Material:

Flowering plants of Pulicaria Undulata (L.) Kostel were collected in March 1978, 1979 from plants growing widly at the Red Sea coastal region and Edfu-Marsa Alam road.

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

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

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

Flower heads.

The flower heads occur as subhemisherical capitula attached to short peduncle. The capitula are solitary, terminal,

radiate, yellowish-brown in colour having an intense aromatic odour and a slight bitter taste.

The peduncle.

It is cylindrical, erect of slightly curved, pubescent and greyish-green in colour. It measures from 0.5 to 2.5 cm in length and 0.5 mm in diameter.

The receptacle.

It is areolate, conical and solid, measuring 5 mm in height and 8 mm in diameter and surrounded with twoto three rwos of imbricated bracts.

The bracts. (Fig. 2, C, D)

They are involucral scales, linear in shape, densely imbricated, of sub-four seriate and yellowish-green in colour The outer ones are short spathulate, leathery, distinctly keeled with entire margins. The outer surface is hairy , while the inner is smooth and measure 5 to 7 mm in length 1 to 2 mm in width. The inner bracts, resemble the outer ones except in that, they are linear and acute in outline , thinner in texture, lighter in colour and measure 7 to 9 mm in length and 0.5 to 1 mm in width.

The florets. (Fig. 2, A)

The outer florets are long, yellow in colour, often ligulate(ray), each measures 5-8 mm in length. The ray florets are unisexual, female and very often fallen off and usually absent. The inner florets (nearly all) are numerous tubular and arranged in whorls on the receptacle.

The calyx. (Fig. 2, A)

It is represented by pappus which is chaffy, 5-7 mm in height , pluriseriate dentate and notched at the tip.

The corolla. (Fig. 2,A)

It is epigenous, pale yellowish-brown in colour consisting of five membranous petals which are united together forming tubular corolla.

The androecium:

It is formed of five epipetalous stamens, mostly included in the corolla tube, with free filaments and syngenesious anthers.

The gynaecium.

It is syncarpous, consisting of two united carpels with inferior unilocular ovary, 1 to 1.5 mm in length and 0.5 in diameter ribbed, covered with shiny oil glands and dark brown in colour. The style is filiform, brown in colour and with bifid papillosed brownish stigma(Fig. 2, B)

B- Micromorphology.

1- The bract. (Fig. 3 A, B)

The outer and inner epidermises of the bract, each consists of one row of cells.

The cells of the outer (lower) epidermis are polygonal to subrectangular in shape with straight anticlinal walls and covered with longitudinally striated cuticle. They measure 57-85-142 μ in length, and 17-28-40 μ in width. The cells of the inner(upper) epidermis are axially elongated, rectangular in shape with straight anticlinal walls and covered with smooth cuticle. They measure 74-114-154 μ in length and 17-22-28 μ in width.

The trichomes (Fig. 3,A, K)

Glandular trichomes are present on the inner surface (upper) of the bract of Compositae type measuring 70 to 80 μ in diameter. Non glandular, whip shaped trichomes having 1 to 3 short basal cells and very long terminal cell with acute

tapering apex, measuring 514-628μ in length. Occasional T-shaped trichomes, are also found. The stomata are present on the outer (lower) epidermis of the bract of anomocytic type, measure 40-45μ in length 30-35 μ in width.

The Keel. (Fig. 3, J)

It shows a hypodermis of lignified fibrous, elongated, pitted, thick-walled cells, measuring 97-150-171μ in length and 17-22-28 μ in width.

2- Tubular floret.

a) The calyx.(Fig. 3, C)

It is represented by pappus which consists of a multicellular axis and unicellular conical thick walled branches, measuring 26-114-137 μ in length and 14-17-28 μ in width.

b) The corolla. (Fig. 3, H)

The outer epidermal cells are axially elongated with slightly wavy antichinal walls covered with longitudinally striated cuticle. The cells measure 114-160-217 μ in length, 22-34-40 μ in width. The apical cells of the corolla are papillosed.

The stomata and trichomes are present on the outer surface resembling those of the bract.

c) The gynaecium.

The outer and inner epidermises of the ovary, each consists of one row of cells, covered with thin smooth cuticle. The outer epidermal cells are more or less isodiametric, rectangular cells with straight antichinal walls measure 40-51-91 μ in length and 17-22-34 μ in width, trichomes of the glandular and non-glandular types are present on the outer epidermis similar to those of the bract.

No stomata are present on the ovary walls

The style(Fig. 3, D)

It consists of axially elongated, rectangular cells with straight anticlinal walls and covered with smooth cuticle. The cells measure 57-68-80 μ in length 17-21-28 μ in width.

The stigma. (Fig. 3, E)

It is papillosed showing clubshaped papillae protruding from the epidermal cells, measure 40-62-80 μ in length, 17-20-22 μ in width.

d) The androecium:

The filament. It is formed of axially elongated cells, having slight wavy anticlinal walls and covered with smooth cuticle.

The anther.

The epidermis consists of polygonal, isodiametric, thin walled cells and covered with smooth cuticle.

The fibrous layer. (Fig. 2,G)

It is formed of one row of cells with lignified curved bar-lik thickening. In surface view, they are polygonal with distinctly beaded walls, measuring 51-68-80 μ in length 27-30-34 μ in width.

Pollen grains. (Fig. 2,F)

They are spherical, spiny, having three pores and three germinal furrows. They measure 40-45-57μ in diameter.

The Peduncle . (Fig. 4, A)

A transverse section in the peduncle is more or less rounded to subrectangular in outline. It shows an epidermis covered with thick cuticle and abundant trichomes of glandular and non glandular type followed by a comparatively

narrow cortex. The vascular system is formed of 10-12 separate vascular bundles each is capped with a group of pericyclic fibres and the phloem is separated from the xylem with indistinguishable cambium. A central parenchymatous pith is present.

The epidermis. (Fig. 4, B)

It consists of one row of cells, covered with thick longitudinally striated cuticle. The epidermal cells are axially elongated measure 45-91-148 μ in length and 29-34-40 μ in width. Stomata of anomocytic type are present similar to those of the bract.

The cortex.

It consists of thin-walled ovoid parenchymatous cells, with narrow intercellular spaces.

The pericycle.

It consists of 2-3 rows of parenchymatous cells interrupted by groups of pericyclic fibres. The pericyclic fibres are lignified with wide lumen and slit shaped pits, having tapering apices and measuring 440-560-645 μ in length 17-20-27 μ in width.

The vascular system.

The phloem.

It consists of small sieve elements and parenchyma cells with thin shiny walls.

The xylem.

Both spiral and pitted vessels with ovoid slits are present, accompained by wood fibres which are lignified with narrow lumen.

The pith.

It consists of thin-walled rounded or oval parenchyma cells with narrow intercellular spaces.

The powder.

The powder is yellowish or yellowish-brown with some greenish particles, having intense aromatic odour and slight bitter taste. It is characterised microscopically by:

1- Numerous shining glandular trichomes of the compositous type both in top and side view and some non-glandular trichomes, T-shaped and whip shaped.

2- Fragments of epidermal cells of corolla, some fragments show papillosed cells.

3- Fragments of stigma showing club-shaped papillosed cells.

4- Fragments of the anther showing the fibrous layer with beaded, lignified anticlinal walls.

5- Fragments of epidermal cells of bract with anomocytic stomata.

6- Numerous spherical spiny pollen grains.

7- Fragments of vessels with spiral or pitted thickening.

8- Fragments showing pitted and lignified fibrous cells of the hypodermis of the bract.

9- Fragments of lignified fibres with tapering apices.

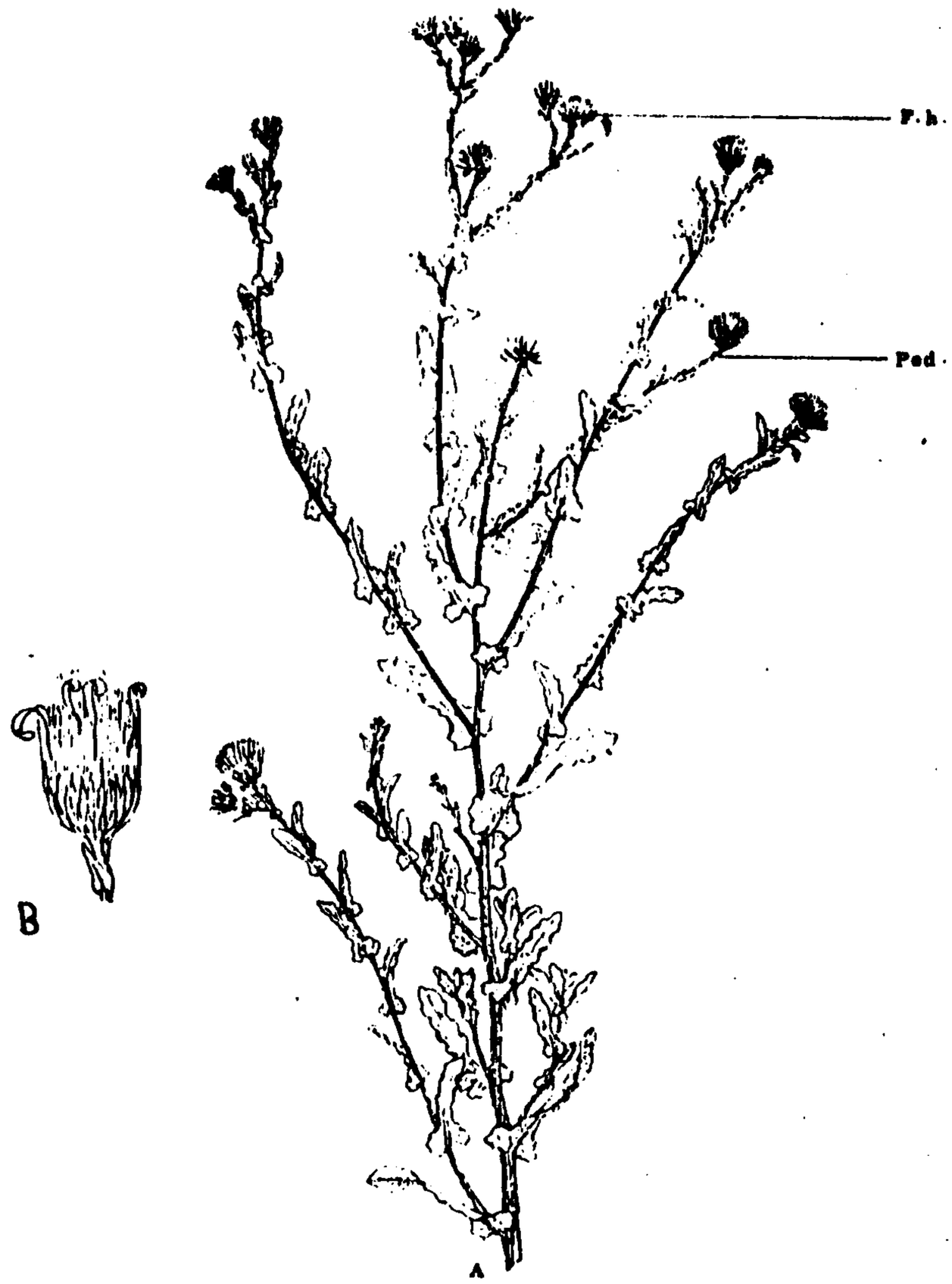

Fig. 1: Pulicaria Undulata (L.) Kostel

A- Flowering branch X 0.65
B- The flower head X 1.30

f.h., flower head; ped., peduncle;

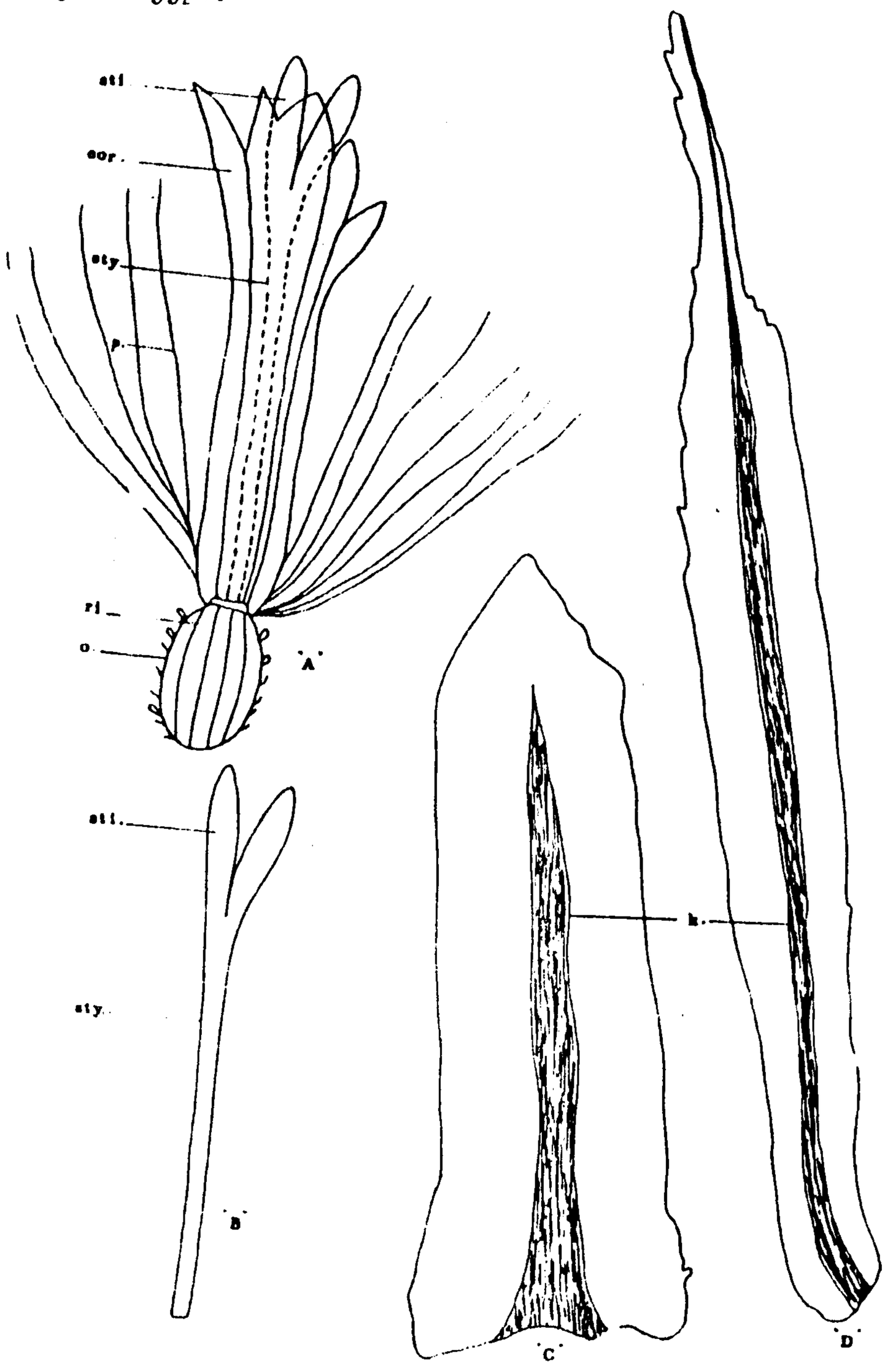

Fig. 2: Pulicaria Undulata (L.) Kostel

The 'lower head'

A- The tubular floret X 34
B- Style and stigma X 34
C- The outer bract X 34
D- The inner bract X 34

cor., corolla; k., keel; o. ovary; p., psppus; ri.,ride, sti; stigma sty., style.

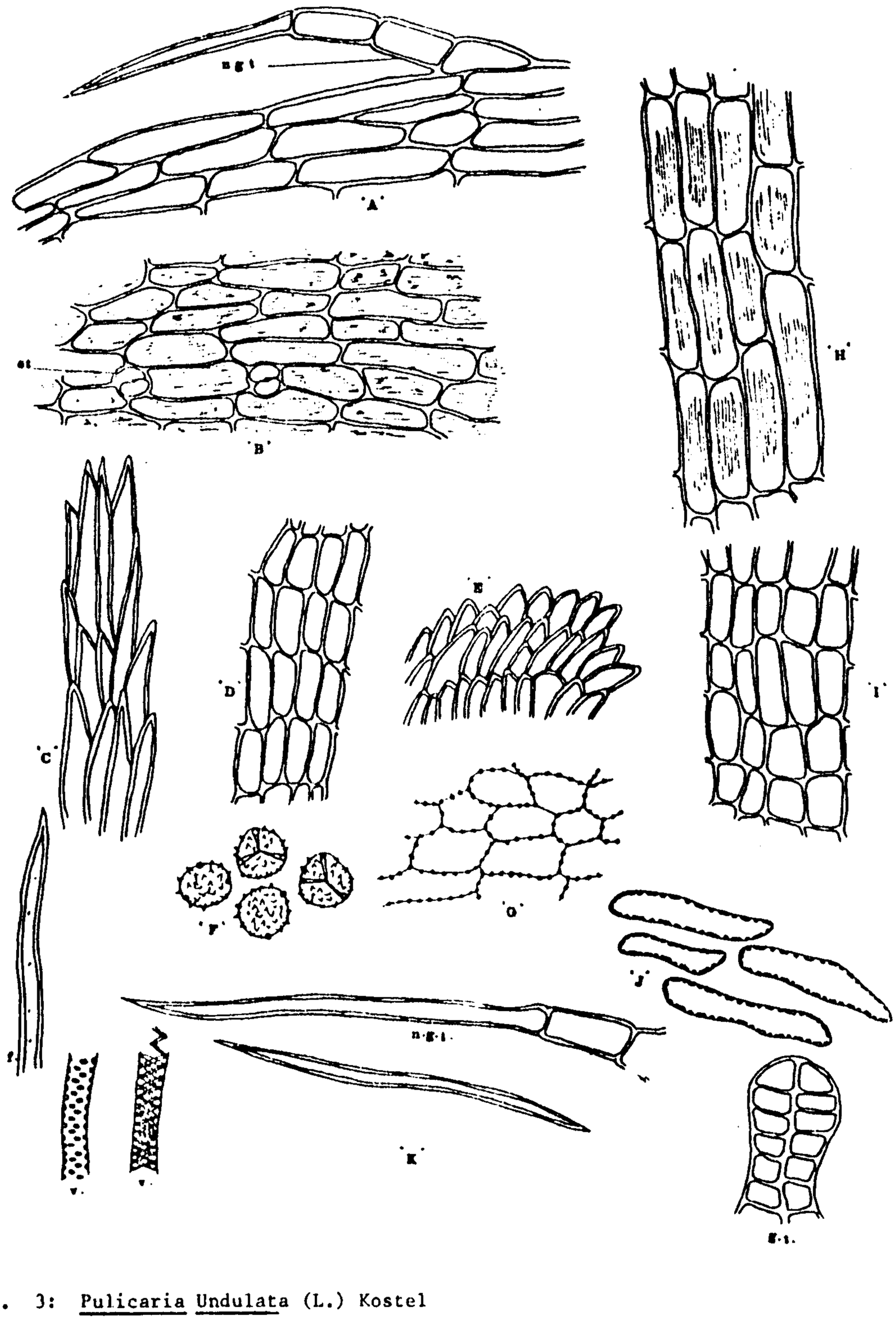

Fig. 3: Pulicaria Undulata (L.) Kostel

The flower head

A- Epidermis of inner surface of the bract X 175
B- Epidermis of outer surface of the bract X 175
C- Surface of the pappus X 175
D- Surface of the style X 175
E- Surface of the stigma X 175
F- Pollen grains X 175
G- Fibrous layer of the anther X 175
H- Epidermis of corolla X 175
I- Epidermis of ovary X 175
J- Fibrous cells of the bract X 175
K- Isolated elements of bract

f., fibre; g.t., glandular trichome; n.g.t., non-glandular trichome; v., vessel.

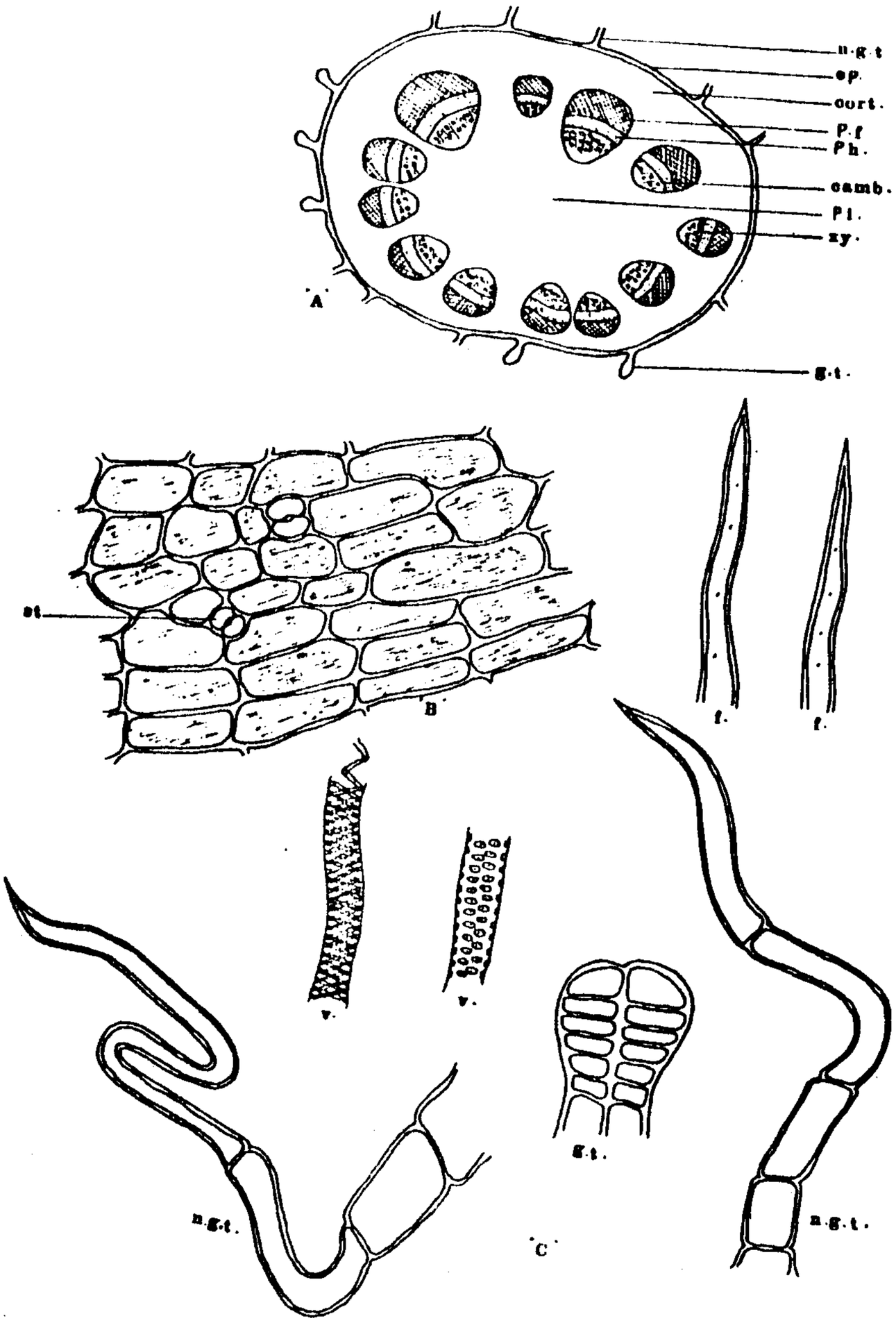

Fig. 4 : Pulicaria Undulata (L.) Kostel.

The peduncle of flower head.

A- T.S. Diagram X 175
B- Epidermis X 175
C- Isolated elements X 175

camb., cambium; cort., cortex; ep., epidermis; f., fibre; p.f., glandular trichome; n.g.t., non-glandular richome; p.f., pericyclic fibre; ph., phloem; pi., pith; st., stome; v., vessel; xy., xylem.

REFERENCES

1) D. W. Bishay, C.S. Gomaa and M.H. Assaf . The Bulletin of Pharmaceutical Sciences, Faculty of Pharmacy, Assiut University, Assiut, Egypt. (in press).

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

جزء (٢) الازهار

داود ونيس بشاى ـ كاميليا سعيد جمعه ـ محمود حافظ صاف
قسم العقاقير ـ كلية الصيدلة ـ جامعة اسيوط

تم فى هذا البحث دراسة الصفات العيانية والمجهرية لازهار نبات الشاى الجبلى بغرض معرفة الصفات التى تيسر التعرف عليها سواء كانت صحيحة او على هيئة مسحوق.

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