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THE ANATOMICAL STUDY OF SHEPHERD'S PURSE HERB

V.S.Kyslychenko, V.Yu.Kuznietsova, Yu.S.Kolisnyk, N.A.Sushchuk

National University of Pharmacy
Odessa National Medical University

Key words: shepherd's purse; State Pharmacopoeia of Ukraine; anatomical study

*The results of the anatomical study of shepherd's purse (*Capsella bursa-pastoris* L.) herb are presented in the article. The main diagnostic features have been identified. The preparations were studied by a "LOMO Mikmed 1" light microscope at a magnification of 60-400 times. The research results were recorded with a SCIENCELAB 10.0MPix Colour CMOS digital camera. The results of the study can be used when developing a monograph "Shepherd's purse herb" for the State Pharmacopoeia of Ukraine.*

The medicinal raw material is one of the most important sources for developing drugs. Consistent quality and the proven pharmacological activity are the main requirements for using herbal drugs of both cultivated and wild medicinal raw material. The monographs of the State Pharmacopoeia of Ukraine are documents that regulate the quality of herbal drugs in Ukraine. They are presented both harmonized with the European Pharmacopoeia monographs and the national parts of monographs [2]. In certain cases the European Pharmacopoeia (Ph. Eur.) and the Pharmacopoeia of the Soviet Union of the XII-th edition have a different approach to standardization of the raw material, its quality indicators, methods of control, regulation, etc. However, focusing only on the requirements of the European Pharmacopoeia consumers and producers can lose a great number of the raw material, which is popular in Ukraine. Shepherd's purse herb belongs to these kinds of the raw material used in medicine from ancient times [7, 10-13].

According to the concept of creation and introduction of monographs to the State Pharmacopoeia the herb of shepherd's purse belongs to the list of herbal drugs described in Pharmacopoeia of the Soviet Union of the XII-th edition, and it is absent in the European Pharmacopoeia [2, 3, 6]. Therefore, development of the monograph for shepherd's purse herb to include it to the State Pharmacopoeia of Ukraine is a topical issue. However, it is necessary to consider the world experience in the study of this type of the raw material, first of all, the requirements of the World Health Organization and various Pharmacopoeias (German, French, etc.) [2-4, 6].

One of the sections of the pharmacopoeial monograph is identification, which provides morphological and anatomical features of the medicinal raw material. The raw material of shepherd's purse is called herb in the appropriate monographs in different Pharmacopoeias of the USSR, but identification includes only the microscopic characteristics of the leaf surface. Only Pharmacopoeia of the Soviet Union of the IX-th edition included description of the leaf surface and the stem epidermis [2]. The British Herbal Pharmacopoeia determines the micro-

scopic characteristics of the stem, leaves, flowers, fruits, seeds [9].

Shepherd's purse – *Capsella bursa-pastoris* L. (Medic.) is an annual herbaceous plant of the *Brassicaceae* family. The stem is erect, simple or branched, 10-50 cm tall. Leaves are alternating; radical leaves – in the socket, petiolate, pinnate, divided into triangular serrated shares; stem leaves – sessile, entire, sagittiform at the base, and amplexicaul. Flowers are bisexual, regular, small, 4-petal, white in terminal racemes. The fruit is silicle. It blossoms from April to September [3, 8, 9].

The aim of this work was to study the anatomical structure of shepherd's purse herb and to determine the of main diagnostic features of the raw material under research for development of the appropriate section "Identification" of the "Shepherd's purse herb" monograph of the State Pharmacopoeia of Ukraine.

Materials and Methods

A fresh shepherd's purse herb fixed with ethanol-glycerol-water (1:1:1) was used for the anatomical studies. Shepherd's purse herb was collected in the Kharkiv region in 2013-2014. The preparations were prepared according to conventional methods. Time microslides were prepared manually. The mixture of chloral hydrate-water-glycerol (120:100:5) was used as an antireflective liquid [1, 5]. The preparations were studied by a "LOMO Mikmed 1" light microscope at a magnification of 60-400 times. The research results were recorded with a SCIENCELAB 10.0MPix Colour CMOS digital camera.

Results and Discussion

Leaf. The lamina is dorsoventral type. The epidermis is uniseriate. The cells of the upper epidermis are slightly sinuous; the cell membranes are evenly thickened. The stomatal apparatus is of the anisocytic type; stomata are small. The cells of the lower epidermis have a sinuous wall, and they are evenly thickened. The stomata on the lower epidermis are larger than the upper epidermis stomata (Fig. 1). Hairs are numerous. Stellate hairs are unicellular (3-6 pointed, sometimes they are 7-pointed) with a warty surface. The rays of hairs are pressed to the lamina surface. Double-pointed hairs

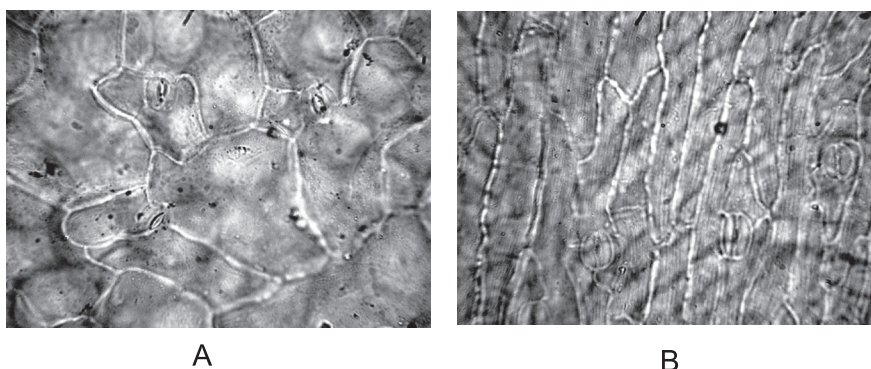


Fig. 1. The lamina surface of shepherd's purse: A – upper epidermis cells; B – lower epidermis cells.

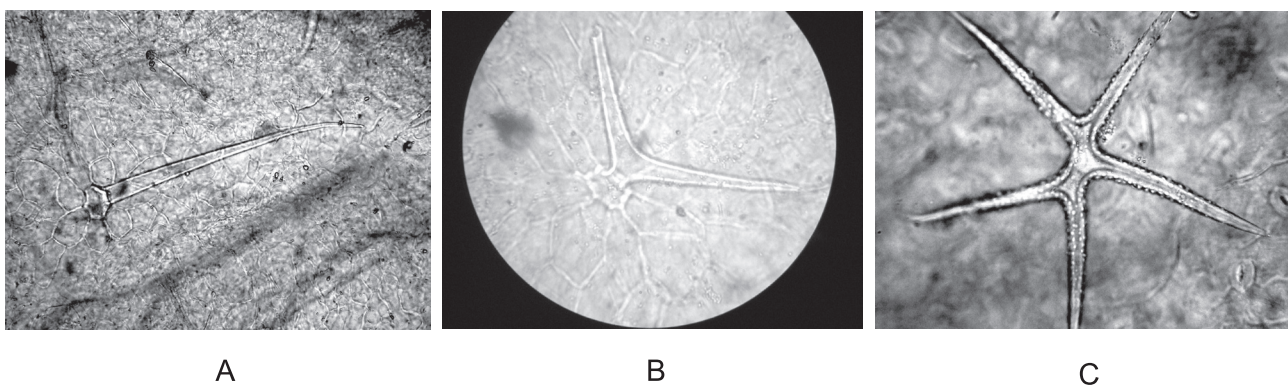


Fig. 2. Hairs on the lower epidermis of the shepherd's purse leaf: A – Simple hair; B – 2-pointed hair; C – Stellate hair with a warty surface.

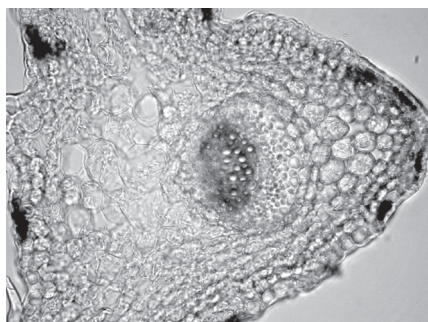


Fig. 3. The cross section of the shepherd's purse lamina.

have rays, which rise above the surface of the lamina. There are also simple, single-celled, conical hairs with a wide base, an acute apex and with sufficiently large internal cavities (Fig. 2).

The midrib is a single-beam on a cross section. A fibrovascular bundle is collateral. The parenchyma consists of large parenchymal cells and intercellular spaces. The sclerenchyma layer is observed from the phloem layer. The palisade parenchyma consists of 1-2 rows; a spongy parenchyma includes 4-6 rows with friable intercellular spaces (Fig. 3).

Stem. The epidermis of the stem is presented by prosenchymal, wall-sided cells, the stomata are small (with the prosenchymal stomatal apparatus). The stem

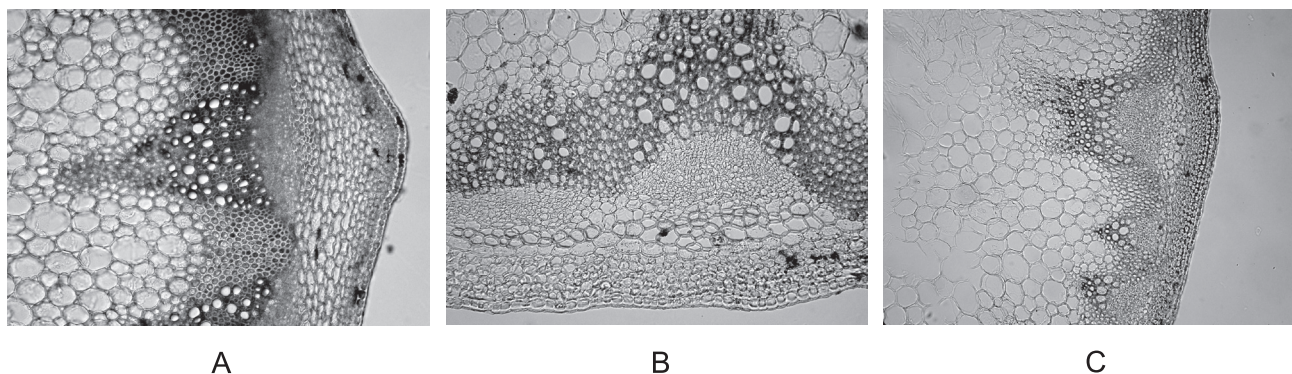


Fig. 4. The fragment of the cross-section of the shepherd's purse stem: A – bottom part; B – middle part; C – top part.

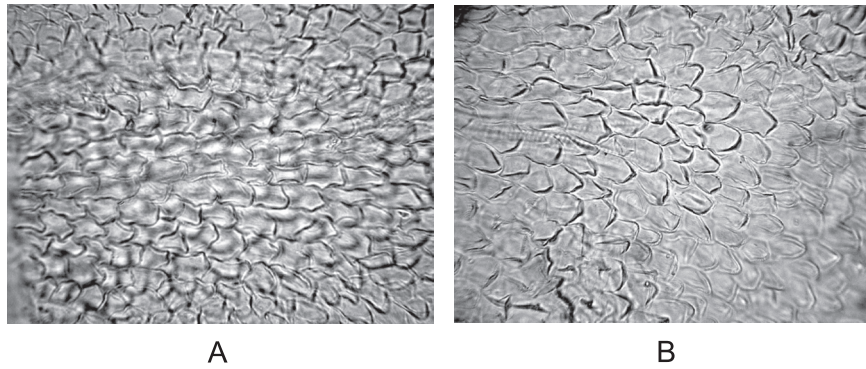


Fig. 5. The surface of the shepherd's purse petals: A – upper epidermis of petals; B – lower epidermis of petals.

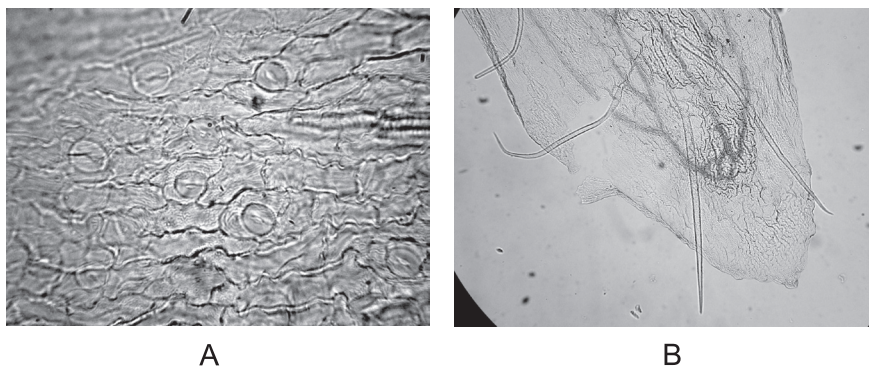


Fig. 6. The surface of the shepherd's purse sepals: A – upper epidermis of sepals; B – lower epidermis of sepals.

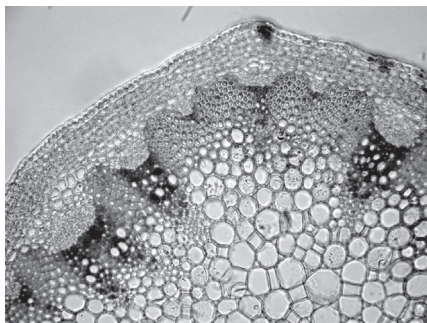


Fig. 7. The fragment of the cross-section of the axis of the shepherd's purse inflorescence.

has a rounded triangular shape, slightly ribbed on a cross section of the bottom part. The epidermis is monolayer. The cork parenchyma is situated under the epidermis. Fibrovascular bundles alternate with the areas of mechanical fibres. The groups of sclerenchyma fibres are situated above the beams. Large bundles protrude into the core. The core is quite large and presented by thin-walled parenchymal cells, sometimes it is broken (Fig. 4).

Flower. Petals. The inner petal epidermis is presented by parenchymal slightly sinuous cells with papillary excrescences. Epidermal cells have an elongated shape along the axis of petals at the base of the petals. Papillary excrescences are smaller or almost absent. The cells have straight wall membranes. The cells of the sepal epidermis are oblong, and the membranes are slightly

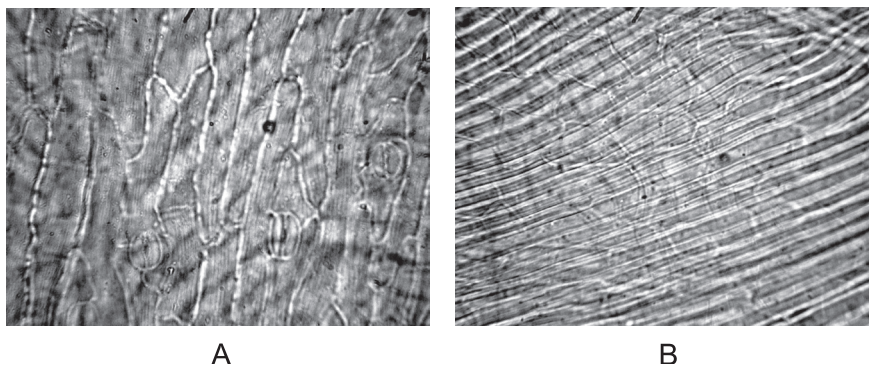


Fig. 8. The surface of shepherd's purse fruits: A – external epidermis ; B – internal epidermis.

sinuous and thickened. The cuticle is wrinkled. Hairs are long, unicellular, with a warty surface. Hairs from the abaxial side are more common. The stomata are small (Fig. 5-6).

The axis of inflorescence. The axis has a round, ribbed form on a cross section. The anatomical structure is similar to the structure of the stem, but the fibrovascular bundles are smaller in size. The sclerenchyma between beams is underdeveloped (Fig. 7).

Fruit. The external epidermis is built of parenchymal cells with a sinuous wall. The cells have an elon-

gated shape closer to the axis of the fruit. The stomatal apparatus is of the anisocytic type. The cuticle is longitudinally folded. The epidermal cells are inner narrow, elongated, thick-like fibres (Fig. 8).

CONCLUSIONS

1. The anatomical structure of shepherd's purse herb has been studied. The main diagnostic features have been determined.

2. The results of the study can be used when developing a monograph "Shepherd's purse herb" for the State Pharmacopoeia of Ukraine.

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ВИВЧЕННЯ АНАТОМІЧНОЇ БУДОВИ ТРАВИ ГРИЦИКІВ ЗВИЧАЙНИХ

В.С.Кисличенко, В.Ю.Кузнєцова, Ю.С.Колісник, Н.А.Суцук

Ключові слова: грицики звичайні; Державна фармакопея України; анатомічне дослідження
У роботі представлені результати анатомічного вивчення трави грициків, встановлені основні діагностичні ознаки сировини. Препарати вивчали під світловим мікроскопом «ЛОМО Мікмед-1» при збільшенні в 60-400 разів; результати досліджень фіксували за допомогою фотокамери «SCIENCELAB 10.0MPix Color CMOS digital camera». Отримані результати можуть бути використані для розробки монографії на «Грициків звичайних трава» для Державної фармакопеї України.

ИЗУЧЕНИЕ АНАТОМИЧЕСКОГО СТРОЕНИЯ ТРАВЫ ПАСТУШЬЕЙ СУМКИ

В.С.Кисличенко, В.Ю.Кузнєцова, Ю.С.Колесник, Н.А.Суцук

Ключевые слова: пастушья сумка обыкновенная; Государственная фармакопея Украины; анатомическое изучение

В работе представлены результаты анатомического изучения травы пастушьей сумки, установлены основные диагностические признаки исследуемого сырья. Препараты изучали под световым микроскопом «ЛОМО Микмед-1» при увеличении в 60-400 раз; результаты исследований фиксировали с помощью фотокамеры «SCIENCELAB 10.0MPix Color CMOS digital camera». Полученные результаты могут быть использованы при разработке монографии на «Пастушьей сумки трава» для Государственной фармакопеи Украины.