Study of anatomical and diagnostic signs of Collection No. 1 for prevention and frostbite treatment

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SUMMARY

The article presents the results of studying the anatomical diagnostic signs of frigoprotective "Collection No. 1".

Key words: anatomical and diagnostic signs of raw materials, anatomical diagnostic signs of collection, birch leaves, St. John's wort, oregano herb, knotweed herb, calendula flowers, licorice roots, rose hips.

I. Introduction

One of the most important problems, both in peacetime and in wartime, is damage to the body by low temperatures. Cold injury in the general structure of injuries ranges from 1–2% in regions with a temperate climate to 6–10% in northern regions [3]. The severity of complications and a high percentage of disability give the problem of cold injury medical, social and economic significance, especially in the Siberian, Far Eastern and Northern regions, where this type of injury is a marginal pathology [3].

Therefore, the development of modern medicines (MPs) that increase resistance to cooling is an urgent task.

Employees of our Institute together with the Northern State Medical University of Roszdrav (Arkhangelsk), based on the experience of traditional medicine, have developed prescriptions for two frigoprotective charges (RF Patent No. 2326684 "Means from plant materials for the prevention and treatment of frostbites" medicinal plants "Fitomorozko", which has a frigoprotective effect "[6]), consisting of official types of medicinal plants (MPR). One of the most important indicators of the quality of any collection in assessing its authenticity is the anatomical structure and microscopic diagnostic signs.

The purpose of this work was a microscopic study of "Collection No. 1" [7], consisting of birch leaves [2]; herbs St. John's wort [10], oregano [9] and bird's wort [8]; calendula flowers [11]; licorice roots [4]; rose hips [5].

Anatomical and diagnostic signs of all components of the collection are well studied and are reflected in the corresponding normative documentation (ND) [2, 4, 5, 8-11]. However, in the development of indicators of the authenticity of any new collection, an individual approach to the stages of sample preparation and identification of diagnostically significant microscopic signs is required, which must be confirmed by original illustrations. This publication is dedicated to the study of anatomical diagnostic signs.

II. Instruments, equipment and research methods For microscopic analysis of the collection, a part of the analytical sample was placed on a clean smooth surface and the components of the collection were manually isolated with a spatula or dissecting needle. When analyzing, they were guided by the appearance of the raw material, examining it with the naked eye or using a magnifying glass (10x). For each component of the collection, 25–30 particles homogeneous in appearance were selected and micropreparations were prepared from them. Microscopic examination of individual components of the collection was carried out in accordance with GF XI ed., No. 1 "Technique of microscopic and microchemical research of medicinal plant raw materials" [1]. The authenticity of highly crushed particles was determined by the method of research of powders [1].

Micropreparations from the collection were prepared according to the following procedure. An analytical collection sample was placed on a 0.25 mm sieve to determine the authenticity. Sifting particles were used to prepare micropreparations [1]. One or two drops of the containing liquid (1: 1 solution of glycerol or chloral hydrate) and a small amount of powder were applied to a glass slide. The powder was taken with the tip of a dissecting needle moistened with the containing liquid, mixed thoroughly, covered with a cover glass and heated until air bubbles were removed. Then the glass was lightly pressed by the handle of the dissecting needle, and the liquid protruding along the edges was removed with a strip of filter paper.

The study of anatomical diagnostic signs was carried out using an Olympus CX 41 microscope (Japan) with 19x eyepieces and 4x, 10x, 20x, 40x and 100x objectives. An Olympus Digital Camera C - 3000 Zoom (Japan) was used for photography.

III. Research results

3.1. Anatomical diagnostic signs of collection components 3.1.1 Birch leaves

When examining the leaf from the surface, it can be seen that the cells of the upper epidermis are polygonal with straight walls, the lower ones are slightly sinuous; stomata are large, located on the underside of the leaf, surrounded by 4–8, often 6 cells of the epidermis (anomocytic type). On both sides of the leaf along the veins and at the ends of the teeth of the leaf blade, numerous glands are located. The inner cells of the gland are round or longitudinally elongated, the peripheral cells are transparent, radially elongated.

Along the veins and along the edge of the leaf, there are simple unicellular hairs with thick walls, an expanded base and a pointed apex. Druses of calcium oxalate are visible near the veins.

3.1.2. Oregano herb

When examining the leaf from the surface, cells of the upper epidermis with slightly sinuous, sometimes bead-like thickened walls are visible (Fig. 6). The cells of the lower epidermis are more sinuous. The stomata are numerous, surrounded by two

cells of the epidermis, located perpendicular to the stomatal fissure (diacytic type).

Hair of two types: simple and capitate, located throughout the leaf blade, especially on the underside. Simple hairs numerous, coarsely warty, 1-5-celled; capitate hairs on a unicellular stalk with an oval unicellular head. Essential oil glands are 8-celled, located mainly on the underside of the leaf; at the place of attachment of the gland, cells of the epidermis often form a rosette.

3.1.3. St. John's wort

When examining the leaf from the surface, the cells of the upper epidermis are slightly sinuous, the lower ones are strongly sinuous. Their walls have beaded thickenings. The stomata are found only on the underside of the leaf. They are surrounded by 3-4 cells of the epidermis (anomocytic type of stomatal complex). There are two types of containers: with pigmented and colorless contents. Reservoirs with pigmented contents are located mainly along the edge of the leaf blade, and are also found on its surface and apex. At the top of the leaf, along the edge of the leaf blade and along the entire surface of the leaf, there are mainly large containers. Medium and small pigmented receptacles are located along the edge of the leaf blade.

All pigmented containers are round or oval in shape. In the middle and lower leaves, pigmented receptacles are sometimes found elongated along the length of the leaf. Containers with colorless contents are scattered over the entire surface of the leaf. They have a round or oval shape, they are found elongated along the length of the leaf.

3.1.4. Knotweed herb

The microscopic picture of knotweed grass is characterized by: epidermal cells of the upper and lower sides of the leaf with straight thickened walls and often with brown contents, the cell walls of the upper epidermis are often clearly thickened. The cuticle along the edge of the leaf and above the large veins is longitudinally folded. The stomata are often surrounded by 3 cells of the epidermis, of which one is much smaller than the others (anisocytic type). On the edge of the leaf blade, epidermal cells are arranged in 3 rows, have thick membranes and are slightly elongated into the papilla. There are many calcium oxalate drusen in the leaf mesophyll. The presence of mechanical fibers, located more often above the veins, both on the upper and lower sides, as well as along the edge of the leaf blade, is characteristic. The fibers have a sinuous contour and thick shells.

3.1.5. Calendula flowers

When examining ligulate flowers, elongated epidermal cells with orange rounded chromatoplasts are visible from the surface; on the denticles the epidermis with papillae, sometimes with stomata. The ovary of reed flowers is pubescent: on the convex side with glandular, along the edges of the concave side - with simple single-row and double-row hairs. The head of the glandular hairs consists of 2, 4, or 8 cells.

Epidermal cells of tubular flowers are thin-walled, elongated on the outside, and sinuous on the inside. The folds of the cuticle, usually masked by chromoplasts, are visible only in certain areas. The lower part of the corolla tube and ovary are densely pubescent with one-, two-row glandular, less often with tworow simple hairs. The tops of the free parts of the flower end with cells strongly drawn in the form of papillae. The pollen is round, spiny.

The leaflets of the envelope are densely pubescent outside and along the margin with simple and glandular hairs. A significant number of hairs with one very long terminal cell, often 6–7 times longer than the 1–2-row part of a hair, are found. This long terminal cell is very thin walled and often breaks off.

Along the edge, the epidermis consists of elongated cells of polygonal, rectangular and rhomboid-fusiform shapes with straight walls, in the middle part with sinuous walls and stomata.

3.1.6. Licorice roots

Small and large particles (usually in longitudinal section) are observed in crushed microslides: cork fragments; scraps of obliterated tissue; groups of fibers with crystal-bearing prismatic crystal lining; a group of vessels consisting of wide barrel-shaped segments with bordered pores and reticular; fragments of the parenchyma with starch grains (preparations in glycerin solution or water); individual starch grains (preparations in glycerin solution or water) and prismatic crystals. When the reagent of Lugol's solution was added, the starch grains turned blue.

3.1.7. Rose hips

In the crushed micropreparations, a set of large (less often small) particles is observed: fragments of the epidermis of hypanthium (often with remnants of the parenchyma) of a fenestrated structure with polygonal cells with straight, in places beaded-thickened walls and rare stomata, with translucent druses and crystals in the parenchyma; fragments of the parenchyma of hypanthium, consisting of loose cells containing orange-red inclusions, drusen and crystals; fragments of the inner epidermis of hypanthium and the epidermis of the fetus, consisting of polygonal cells with long unicellular filamentous pointed straight yellowish thick-walled hairs with oblique pores and an insignificant cavity and / or places of their attachment; fragments of the fetus, consisting of groups of stony cells with highly thickened porous membranes and / or sclerenchymal fibers; individual stony cells; fragments with poorly distinguishable conducting beams with spiral vessels; individual simple unicellular filamentous pointed straight yellowish thick-walled hairs with oblique pores with an insignificant cavity and more thin-walled, slightly sinuous, colorless hairs with a wide cavity.

3.2. Anatomical diagnostic signs of "Collection No. 1"

Thus, as a result of the study of the field of view of the microscope, we found:

- scraps of leaf epidermis with large multicellular glands; the inner walls of the gland are small, more or less rounded, filled with brown contents; peripheral glandular cells are radially elongated, transparent; scraps of leaf epidermis with simple thick-walled unicellular hairs widened at the base; there are individual hairs and their fragments - leavesbirch (Fig. 1);

- scraps of epidermal cells with sinuous bead-thickened walls; pieces of a leaf with numerous containers of two types: colorless (translucent) and pigmented (with reddish-violet pigment) - St. John's wort herb (Fig. 2);

- scraps of the epidermis with slightly sinuous walls and stomatal a complex of diacytic type; round essential oil glands with 8 radially located excretory cells on a short stalk, at the base of which epidermal cells form a rosette; hairs are simple and capitate, located throughout the leaf blade; simple hairs large, numerous, 1-5-celled with thickened walls - oregano herb (Fig. 3);

- scraps of fabric with large druses of calcium oxalate, oval three-furrow pore pollen, covered with small dots (tubules) - grasshighlander bird (fig. 4);



Rice. 1. Fragment of a leaf blade of birch leaves. Underside epidermis (20x): 1 anomocytic stomatal complex; 2 - druses of calcium oxalate; 3 - elongated cells epidermis along the vein; 4 - essential oil gland.



Rice. 2. A fragment of a leaf blade of St. John's wort (10x): 1 - container with colorless content.



Rice. 3. Fragment of a leaf blade of oregano herb (40x): essential oil piece of iron.



Rice. 4. A fragment of a leaf blade of the herb of Knotweed (20x): 1 - papillary outgrowths along the edge of the leaf; 2 - anisocyte stomatal complex; 3 -

epidermal cells with brown content; 4 - druses of calcium oxalate.

- scraps of flowers with elongated erect-walled cells of the epidermis, containing orange-yellow chromoplasts and covered with a pronounced folded cuticle with simple and glandular one-two-row hairs, often found on the corolla tube with well-visible druses of calcium oxalate in the mesophyll of the flower; scraps of envelope leaves densely pubescent with long one-two-row simple glandular and branched hairs -calendula flowers (Fig. 5);

- scraps of thin-walled parenchyma with a large amount of starch grains; groups of sclerenchymal fibers of bark and wood with remnants of a crystalline sheath; scraps of wide vessels with bordered pores; separate elements of cork tissue - licorice roots (Fig. 6);

- scraps of the epidermis from polygonal cells with straight lines, in places beaded thickened walls; scraps of parenchymal tissue with cells filled with orangered clumps of carotenoids and calcium oxalate drusen; stony cells; large simple unicellular hairs with thick walls - rose hips (Fig. 7).



Rice. 5. Fragment of the epidermis of calendula flowers. Simple two-row hair (20x).





Rice. 6. A fragment of licorice root. Crystalline coated fibers (10x).

Rice. 7. Fragment of the epidermis of rose hips (20x).

III. Conclusion

As a result of the study, anatomical and diagnostic signs of frigoprotective "Collection No. 1" were revealed. The results obtained will be used to develop the characteristics of the collection authenticity and will be included in the draft FSP for this drug.

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