

- To disseminate information about the environmental status of the ecological situation in threshold part of the Dnipro to the citizens.

**Research design:** literary analysis, floristic methods (study of species and systematic composition of flora, field botanical descriptions and definition of herbarium specimens, historical-comparative method).

**Scientific novelty:** comparative analysis of the plant species, whose distribution areas were on the threshold part of the Dnipro, before and after flooding the river was conducted, the causes of disappearance of some species were identified.

**Practical value:** due to the scientific researches all changes, which have happened to the plants near the threshold part of the Dnipro, were analyzed; the actions, which must be accomplished in order to save the plant formation in this area, were recommended to urgent fulfillment.

#### References:

- [1] Akinfiiev, I. Katerinoslav Vegetation in the End of the First Century of its Existence. (1889). Katerinoslav: Katerinoslav State Duma. Vol.I-II. [Russian language]
- [2] Belgard, A. Forest Vegetation in the Southeast of the USSR. (1950). Kiev: Kiev State University [Russian language]
- [3] Maniuk, V. Regional Landscape Park «Prydniprovskiy». (2010). Dnipro [Ukrainian language]
- [4] Tarasov, V. Flora of the Dnepropetrovsk and Zaporozhye Regions. Vascular Plants with their Biology-ecological Characteristic.(2012). Dnepropetrovsk: «Lira». [Ukrainian language]
- [5] Yavornytskyi, D. History of Zaporozhean Cossacks. (1990). Lviv: «Svit». Vol. 1. [Russian language]

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## STUDY OF MICROSCOPIC STRUCTURE FEATURES CUTICULAR LAYER OF EUROPEAN HEDGEHOG NEEDLES (*ERINACEUS EUROPAEUS*)

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Dorsal part of the hedgehog's body is covered with needles 15-30 mm long. The hedgehog needles have a keratin origin and a hair-like structure [7]. They are devoid of elasticity and thus form a kind of "brush" on the back and sides of the hedgehog, which gives "shelter" to ixodic mites and other blood-sucking insects. Microscopic

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indices of the hair of different animals are important stages of species identification [2, 4]. Despite current scientific methods for determining the species of animals, raster electron microscopy of the hair remains relevant [1, 6].

One of the most modern and accurate laboratory methods is scanning electron microscopy, which allows differentiation of biological objects at the microscopic level [5]. Therefore, the aim of our work was to investigate the microscopic structure features cuticular layer of European hedgehog needles (*Erinaceus europaeus*).

**Methods.** The subject of the study were samples of European hedgehog needles obtained from 5 adults from the back. The research was carried out in the laboratory of electronic microscopy of the SNAU using a raster electron microscope REM-106I (SEIMI, Ukraine). Preparation of samples was carried out in accordance with generally accepted requirements [1, 3].

**Results.** It is established that the needles of the European hedgehog (*Erinaceus europaeus*) are cylindrical in shape. Samples of needles from the back of the hedgehog have different thicknesses along the entire length of the needle: 429.9-502.5 $\mu\text{m}$  thick at the root, middle section – 1.24-1.29 mm and narrowing to the peripheral end – 0.08-0.12 mm (fig. 1).

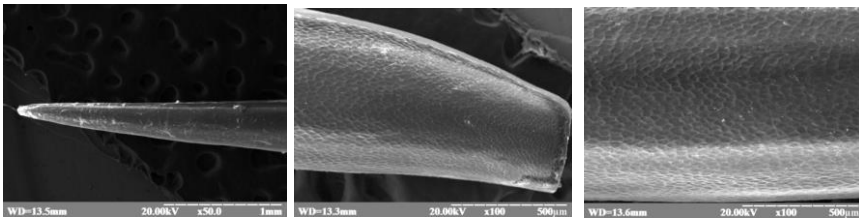


Fig. 1. Cuticle pattern of hedgehog needle.

The cuticle of the hedgehog needles is devoid of scales. It has a mosaic pattern or “honeycombs” appearance, which appears at the base of the needle and completely disappears to the peripheral edge of the needles (fig. 2). The average cell area is 1094.1  $\mu\text{m}^2$  with a circumference of 131.5  $\mu\text{m}$ . The total number of “honeycombs” per 10000  $\mu\text{m}^2$  is 7-8. In cross-sectional needle microscopy revealed a porous structure of the cuticular layer with rectangular hollow cells 78.6-97.2 x 127.4-137.4  $\mu\text{m}$  in size (fig. 3). The cuticle width on the cross section is 234.7  $\mu\text{m}$ .

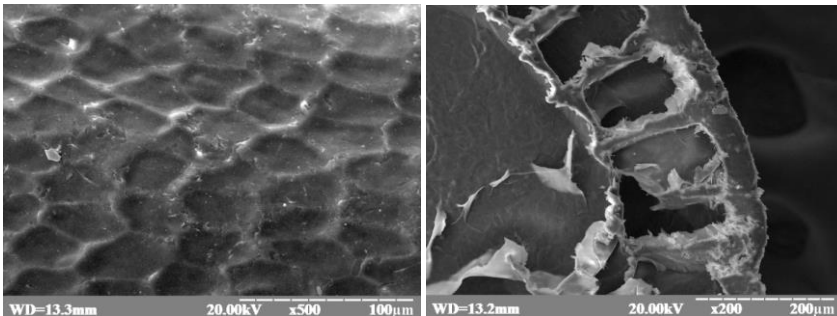


Fig. 2. “Honeycombs” of hedgehog needle. Fig. 3. Cross section of hedgehog needle.

*Conclusions.* The morphometric features of the European hedgehog (*Erinaceus europaeus*) needles structure have been studied. As a result of the researches, it was found that the needles are empty inside, in cross section have a cuts structure of the cuticular layer. Surface cuticle pattern – mosaic.

#### References:

- [1] *Best Practice Manual for the Microscopic Examination and Comparison of Human and Animal Hair* ENFSI-BPM-THG-03. Retrieved from <https://ghep-isfg.org/pt-pt/publicaciones-enfsi/publicaciones-enfsi/>
- [2] Krause, K. & Foitzik, K. (2006) Biology of the Hair Follicle: The Basics *Seminars in Cutaneous Medicine and Surgery*, 25 (1), pp. 2-10. doi: 10.1016/j.sder.2006.01.002.
- [3] Kunytskyi, Yu.A. (1998) *Elektronna mikroskopija [Electronic microscopy]*. Lybid, Kyiv, 389 p. [in Ukrainian]
- [4] Oro, A.E. & Higgins, K. (2003) Hair cycle regulation of Hedgehog signal reception. *Developmental Biology*, 255 (2), pp. 238-248. doi: 10.1016/S0012-1606(02)00042-8
- [5] Pikhitirova, A.V. & Ivchenko, V.D. (2018) Sudova veterynarna ekspertyza volosu tvaryn za dopomohoiu rastrovoi elektronnoi mikroskopii [Court veterinary examination of hairs animals by scanning electron microscopy]. *World Sci.*, 6 (34), 43-46. doi: 10.31435/rsglobal\_ws/12062018/5864 (in Ukrainian).
- [6] Paus, R. & Cotsarelis, G. (1999) The biology of hair follicles. *New England Journal of Medicine*, 341 (7), pp. 491-497. doi: 10.1056/NEJM199908123410706
- [7] Wolinsky, H. (2010) History in a single hair. *EMBO Reports*, 11 (6), pp. 427-430. doi: 10.1038/embor.2010.70

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## **БІОКОНВЕРСІЯ ВІДХОДІВ ВІД БАНАНІВ ЗА ДОПОМОГОЮ КУЛЬТИВУВАННЯ *PLEUROTUS OSTREATUS***

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У сучасному світі стрімко зростає розвиток грибівництва. Один з варіантів утилізації бананових шкірок є використання його як субстрат для вирощування грибів. Гриби родів *Pleurotus* вирощують у всьому світі. Завдяки присутності особливих поліцикридів. *Pleurotus ostreatus* належить до числа базидієвих

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