HISTOLOGICAL CHARACTERISTICS OF THE SKIN OF *SALAMANDRELLA KEYSERLINGII* (CAUDATA, HYNOBIIDAE) MALES IN THE AQUATIC AND TERRESTRIAL PHASES OF THEIR SEASONAL CYCLE

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Histological features of the skin of *Salamandrella keyserlingii* males are analyzed as depends on the seasonal cycle phase. Skin areas from the middle of the tail's right side (caudal skin, CS), the center of the throat sac (throat skin, TS), and the middle of the back (dorsal skin, DS) were examined. For them, the presence of the stratum corneum of the epidermis and the fullness degree of the mucous glands were estimated, and the relative areas of the main structural elements (epidermis, strata compactum and spongiosum, connective tissue in the whole, granular and mucous glands) were measured. It was established that, regardless of the skin area, the aquatic morphotype males had no cornified epidermis with secretion of their mucous glands. By quantitative histological parameters, seasonal variability was more pronounced for TS and CS and was not detected for DS. In the males of the aquatic morphotype, in comparison with those of the terrestrial one, TS and CS were characterized by a larger area of the connective tissue and stratum compactum. For the epidermis, differently directed changes were noted, depending on the site: the CS of the aquatic morphotype males had a more powerful epidermis layer as compared to the individuals of the terrestrial morphotype, and in the TS, on the contrary, the epidermis area was larger in the terrestrial phase. For the TS of the terrestrial morphotype males, hypertrophy of their granular glands was found in comparison with those of the aquatic morphotype.

Key words: Amphibia, *Salamandrella keyserlingii*, integuments, seasonal variation, cutaneous adaptations.

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REFERENCES

Bannikov A. G. On a Seasonal Change of the Respiratory Function in Tritons. *Doklady of the Academy of Sciences of the USSR*, 1948, vol. 59, no. 5, pp. 1021–1024 (in Russian).

Borkin L. J. Systematics. In: *The Siberian newt*: *Zoogeography*, *Systematics*, *Morphology*. Moscow, Nauka Publ., 1994, pp. 54–80 (in Russian).

Dilmuchamedov M. E. Skin. In: *The Siberian newt*: *Zoogeography*, *Systematics*, *Morphology*. Moscow, Nauka Publ., 1994, pp. 109–115 (in Russian).

Kuranova V. N., Yartsev V. V. Sexual, seasonal, and interannual variability of morphological characteristics of Siberian newt, *Salamandrella keyserlingii* Dybowski, 1870, from the south-east of Western Siberia. *Proc. 4th Meeting of the Nikolsky Herpetological Society* "*The Problems of Herpetology*". Saint Petersburg, Russkaia kollektsiia Publ., 2011, pp. 136–141 (in Russian).

Yartsev V. V. Reproduktivnaia biologiia khvostatykh zemnovodnykh roda *Salamandrella* (Amphibia : Caudata, Hynobiidae) [Reproductive Biology of Salamanders of Genus *Salamandrella* (Amphibia: Caudata, Hynobiidae)]. Thesis Diss. Cand. Sci. (Biol.). Tomsk, 2014. 24 p. (in Russian).

Aoto T. A remarkable swelling of male skin of a salamander (*Hynobius retardatus* Dunn) in the breeding season. *J. of the Faculty of Science Hokkaido University*, *Zoology*, 1950, vol. 10, no. 1, pp. 45–53.

Brizzi R., Delfino G., Jantra S., Alvarez B. B., Sever D. M. The amphibian cutaneous glands: some aspects of their structure and adaptive role. In: P. Lymberakis, E. Valakos, P. Pafilis, M. Mylonas, eds. *Herpetologia Candiana*. Irakleio, Natural History Museum of Crete, 2001, pp. 43–49.

Exbrayat J. M. Classical methods of visualization. In: J. M. Exbrayat, ed. *Histochemical and Cytochemical Methods of Visualization*. Boca Raton, London, New York, CRC Press Taylor and Francis Group, 2013, pp. 3–58.

Fox H. Epidermis. In: Eds. J. Bereiter-Hahn, A. G. Matoltsy, K. S. Richards. *Biology of the Integument*. *2*. *Vertebrates*. Berlin, Heidelberg, New York, Springer-Verlag, 1986, pp. 78–110.

Hasumi M., Iwasawa H. Seasonal changes in body shape and mass in the salamander, *Hynobius nigrescens*. *J. of Herpetology*, 1990, vol. 24, no. 2, pp. 113–118. DOI: 10.2307/1564217

Hasumi M., Iwasawa H. Wandering behavior and cutaneous changes in winter-dormant male salamanders (*Hynobius nigrescens*). *Herpetologica*, 1992, vol. 48, no. 3, pp. 279–287.

Toledo R. C., Jared C. Cutaneous adaptations to water balance in amphibians. *Comparative Biochemistry and Physiology. Part A: Physiology*, 1993, vol. 105, iss. 4, pp. 593–608.

Ueda T., Nakabayashi Sh. External morphology in two morphotypes of the Siberian Salamander, *Salamandrella keyserlingii* from Kushiro marshland, Hokkaido. *Current Herpetology in East Asia*. Kyoto, Herpetological Society of Japan, 1989, pp. 135–141.

Wells K. D. *The Ecology and Behavior of Amphibians*. Chicago, London, University of Chicago Press, 2007. 1148 p.

Xiong J., Dai Ch., Li M., Dengi W., Li J. Morphological Characteristics of the Dorsal skin of two Hynobiids and their Adaptive Role in Aquatic and Terrestrial Habitats. *Asian Herpetological Research*, 2013, vol. 4, iss. 1, pp. 62–67. DOI: 10.3724/SP.J.1245.2013.00062

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