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ФЛОРИСТИЧЕСКИЕ НАХОДКИ

LEPTOCHIDIUM ALBOCILIATUM (LICHENIZED ASCOMYCOTA), THE FIRST RECORD OF THE SPECIES AND THE GENUS FOR THE CAUCASUS

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None species of the genus *Leptochidium* was previously known within the Caucasus. In the mountain pine forest of Dagestan on siliceous rock outcrops we found a first species of this genus – *Leptochidium albociliatum*. In the lichen flora of Russia, *L. albociliatum* was known only from northern and arctic regions of the European part with the latest record dates back more than 100 years ago. Description of the genus *Leptochidium* and the species *L. albociliatum* with information of its habitat, distribution and comparison with *L. crenatulum* are given.

Keywords: Dagestan, highland, floristic studies, new findings, pine forest

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In August 2024, during the fieldwork in the mountain pine forest of Highland Dagestan, we found a lichenized fungus with blue-green photobiont visually resembled a small *Leptogium* (Ach.) Gray s.l. or *Collema F. H.* Wigg.s.l. species. However, very distinctive under a magnifying glass white marginal hairs of the specimen doubt our suggestion. Further study of the specimen revealed a new species *Leptochidium albociliatum* (Desm.) M. Choisy belonging to the genus *Leptochidium* M. Choisy previously unknown within the Caucasus.

French lichenologist M. Choisy described the genus *Leptochidium* in 1952 as monotypic with *Leptochidium albociliatum* as a type species (Choisy, 1952). The genus *Leptochidium* was previously long-assigned to the family Placynthiaceae Å. E. Dahl (Eriksson, 2006). In 2007, as a result of molecular phylogenetic studies, this genus, along with the genera *Massalongia* Körb. and *Polychidium* (Ach.) Gray, was separated into a distinct family, the Massalongiaceae Wedin, P.M. Jørg. et E. Wiklund, within the order Peltigerales Walt. Watson (Wedin et al., 2007).

Norwegian lichenologist P.M. Jørgensen in 2006 transferred in this genus a species originally named *Leptogium rivulare* var. *crenatulum* Nyl. with a new combination *Leptochidium crenatulum* (Nyl.) P.M. Jørg. (Jørgensen, 2006). The genus currently comprises two species worldwide – *L. albociliatum* and *L. crenatulum*, predominantly with mountain or arctic-alpine distribution. Both species are known in Russia from northern and arctic regions of European part and Far East (Urbanavichus, 2010).

First report of *Leptochidium albociliatum* for Russia dates back to the specimen collected in 1859 from the Ladoga Karelia by W. Nylander (Nylander, 1861). In 1863 this species was found in the Ponoi Lapland of Murmansk Region, with the specimen being deposited in the Herbarium of Helsinki (Urbanavichus et al., 2008). Deposited in the Herbarium of Oslo, there are two specimens of *L. albociliatum* (O-L-124063, O-L-124070), collected by B. Lynge in 1921 from Novaya Zemlya (The Lichen Herbarium, 2024). These specimens are latest known records of the species from Russia. Thus, our finding of *Leptochidium albociliatum*

in Dagestan is the first one in Russia after more than 100 years of interruption.

The specimen identification was based on standard morphological and anatomical procedures with light microscopy (LOMO MSP-2 and Mikmed-6). The geographical coordinates are given in system WGS 84. The specimens are deposited in the herbarium of the Mountain Botanical Garden DFRC RAS (DAG), Altai State University (ALTB) and personal herbarium of G. Urbanavichus.

Leptochidium M. Choisy, Bulletin Mensuel de la Société Linnéenne de Lyon 21: 165 (1952).

Thallus squamulose to foliose, dark brownish blackish to olive-green, gelatinous, mainly without proper cortex, in one species with short glassy hairs along the margin. Apothecia laminal (not seen in our material), reddish brown, convex at maturity, often with hairy margin. Spores colourless, narrowly ellipsoid, one-septate. Pycnidia rare (not seen in our material) semiimmersed, punctiform; conidia bacilliform, simple. Photobiont cyanobacterial (nostocoid), in short chains, individual cells 4–6 μm wide. No secondary substances.

Leptochidium albociliatum (Desm.) M. Choisy, Bulletin Mensuel de la Société Linnéenne de Lyon 21: 165 (1952) (fig. 1).

Description: Thallus foliose, to 3 cm diam. Lobes erect, 1–3 mm wide, blackish-olive-green, not pruinose, 80–100 μm thick, with rounded ends and undulate to crenulate, often ascending margins bearing abundant, thin, transparent hairs (about 0.1 mm long). Rhizines sparse, white, fasciculate, 0.35–0.7 mm long. Isidia sometimes present in center of mature lobes, black, globose, to 0.1 mm diam. Upper and lower cortex only partly developed, paraplectenchymatous, formed by 1–3 layers of cells. Medulla present between two photobiont layers. Apothecia not seen in Dagestan material, their description is provided according to literature (Arcadia, 2023): 0.7–1.6 mm diam., slightly concave to slightly convex, not pruinose with hairy proper margin. Disc brown. Thalline margin present, persistent but very thin, smooth; in section: 100 μm wide, with distinct cellular cortex. Exciple sometimes visible externally as a thin ring, darker brown than disc; in section: 50–70 μm wide, colourless except at surface which is orange-brown, of prominent large cells, 5–14 × 5–10 μm, long axis oriented in outward direction. Epithecium orange-brown, K–. Hymenium 90–100 μm tall, colourless, KI+ blue. Hypothecium 50 μm tall, colourless, lower part distinctly cellular, long axis of cells horizontal, cellular layer continuous with exciple. Paraphyses simple, with conspicuous septa, expanding gradually from 1.5 μm at base to 3 μm at apex, not capitate, sometimes slightly

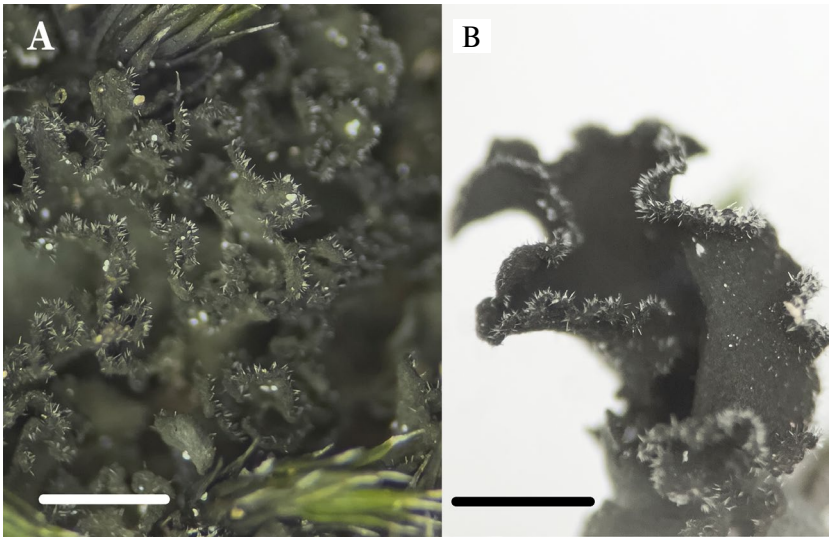

Fig. 1. *Leptochidium albociliatum*: A – habitus, B – single lobe with transparent hairs.
Scale bars – 0.5 mm.

Рис. 1. *Leptochidium albociliatum*: A – внешний вид, B – отдельная лопасть с прозрачными волосками.
Шкалы – 0.5 мм.

moniliform. Asci 60 × 20 μm, variable in shape, cylindrical, narrowly clavate, or bulging at the middle, KI+ blue in a narrow arc at the tip (without obvious structure). Ascospores colourless, 1-septate, constricted at septum, ±narrowly ellipsoid though ends sometimes slightly pointed 25–30 × 8–10 μm, 8 per ascus. Photobiont blue-green (nostocoid), cells globose, 5–8 μm diam., sometimes in chains, forming two distinct but ±identical layers separated by a layer with no or few photobiont cells. Both photobiont layers continuous and regular.

Habitat: the specimen is found in the pine forest of the **Pinetum kochianae myrtillosum** association (Abdurakhmanova et al., 2018) on the spurs of Kyabyaktepe Ridge in the upper reaches of the Khynekhchay River (natural landmark Khynekhdere). This territory refers to the Highland Dagestan and is located in the zone of temperate climate. Main climatic features of the studied locality: annual precipitation – 600 mm, air humidity – 65%, snow cover thickness – 30–40 cm, average temperature – 8°C, average temperature of cold season – 0.1°C, average temperature of warm season – 13.6°C (Fizicheskaya..., 1996).

Substrate and ecology: on wet, shaded siliceous rocks among mosses under pine forest canopy. Predominantly a cool-temperate mountain species with several arctic localities. Mainly found among bryophytes over siliceous rock, rarely on soil of basic siliceous substrata or tree bases (Burgaz, Martínez, 2001; Nimis, 2022; Arcadia, 2023).

Specimen examined: Republic of Dagestan, Rutulskiy district, vicinity of the Luchek village, upper reach of the Khynekhchay River, pine forest with siliceous rock outcrops on western slope, on lower shaded part of wet siliceous rocks among mosses, 1885 m a.s.l. 41°35′44″N, 47°17′51″E. 27 VIII 2024. G.P. Urbanavichus (DAG 1524; ALTB; herb. G. Urbanavichus).

Distribution: New species and genus for the Caucasus. The nearest locality is known from Bitlis Province in Turkey from 1425 m a.s.l. (Yazıcı et al., 2020). Within Russia is known from northern and arctic regions of the European part (Karelia, Murmansk Region, Novaya Zemlya) (Fadeeva et al., 2007; Urbanavichus et al., 2008; Urbanavichus, 2010). World distribution: North America (widespread), Central America (Mexico), Macaronesia, Europe (Northern, Western and Southern, except for the British Isles), Western Asia (Turkey, Syria), North Africa (Morocco, Algeria) (Arcadia, 2023).

Note: *Leptochidium albociliatum* is superficially similar to *Leptogium* spp. The former is usually easily recognizable by the presence of short, glassy hairs on the lobe-margins. Hairs of some *Leptogium* species are different and usually are not confined to lobe-margins. In addition, *Leptochidium* lacks a regular upper cortex, and has different apothecia and spores (Jørgensen, 2007). *Leptochidium crenatulum* differs by squamulose thallus, non-isidiate lobes without marginal hairs.

Species of the genus *Leptochidium* have different ecology and distribution but same substrate preferences. *Leptochidium albociliatum* probably is a mountain lichen, rather than arctic-alpine. Its main range covers cool-temperate mountainous regions of North America, Eurasia and Africa, with only several arctic localities. In North America, the species occurs in forest belt of the western mountain regions (Brodo et al., 2001), in the Iberian Peninsula – in humid localities in the meso-, supra-, oromediterranean and montane belts (550–1700 m a.s.l.) (Burgaz, Martínez, 2001), in Italy is very rare in humid submediterranean, oromediterranean and subalpine belt (Nimis, 2022), in Greece – at altitudes 920–1300 m (Arcadia, 2023), in North Africa – up to 1400 m (Amrani et al., 2018), in the Alps – from submediterranean to alpine belt (Nimis et al., 2018), in the Caucasus – in the belt of the mountain pine forest (1885 m). Thus, the known altitudinal range of *Leptochidium albociliatum* distribution within its main range is 500–1900 m a.s.l. Conversely, *Leptochidium crenatulum* is predominantly found in northern and arctic regions, with several localities in mountains. It is most frequently observed in Scandinavia and is considered an extremely rare species in the Alps (Nimis, 2022). It is found growing on mossy, wet siliceous rocks, though is less frequently observed on sand by rivers or in wet tundra (Jørgensen, 2007). The known localities outside Scandinavia provide compelling evidence that the species has arctic-alpine distribution. These localities include Iceland, Greenland, and Baffin Island in Canada (Jørgensen, 2006).

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LEPTOCHIDIUM ALBOCILIATUM (ЛИХЕНИЗИРОВАННЫЕ АСКОМИЦЕТЫ) – ПЕРВАЯ НАХОДКА ВИДА И РОДА ДЛЯ КАВКАЗА

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Виды рода *Leptochidium* ранее не были известны на Кавказе. В Дагестане, в поясе горных сосновых лесов, на выходах силикатных скал нами найден вид *Leptochidium albociliatum*. В лихенофлоре России *L. albociliatum* известен только из северных и арктических районов европейской части, последняя находка которого датируется более чем 100-летней давностью. Приводится описание рода *Leptochidium* и вида *L. albociliatum* с информацией о местообитании, распространении и сравнение с *L. crenatulum*.

Ключевые слова: высокогорья, Дагестан, новые находки, сосновые леса, флористические исследования

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