LICHENS — ЛИШАЙНИКИ

A new finding of an enigmatic lichenicolous 'lichen' from the Arctic

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Abstract. A lichen-like association occurring on thalli of other lichens and outwardly resembling species of genus *Sphaerellothecium* is briefly described, illustrated and discussed based on its new collection in the Arctic.

Keywords: lichenization, extreme environments, Russia, Siberia.

Новая находка загадочного лихенофильного «лишайника» из Арктики

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Резюме. Представлены данные о новой находке в Арктике лишайникоподобной ассоциации, развивающейся на талломах других лишайников и внешне напоминающей виды *Sphaerellothecium*.

Ключевые слова: лихенизация, экстремальные местообитания, Россия, Сибирь.

Screening arctic lichens in search of lichenicolous fungi, I found now and then a strange lichen-like association growing on thalli of other lichens. Its former finds from Norway and Russia on *Lecidoma demissum* (Rutstr.) Gotth. Schneider et Hertel and species of *Stereocaulon* Hoffm. were reported by Zhurbenko and Triebel (2008) and were interpreted as goniocysts or an "undetermined fungal taxon with primitive lichenization". Externally it looks like a species of the lichenicolous genus *Sphaerellothecium* Zopf, and at first I interpreted it as empty overmature ascomata of a *Sphaerellothecium* species occasionally colonized by unicellular green algae. However, with some experience I saw that this association is quite recognizable under a dissecting microscope (× 40–60) and does not contain any traces of asci or ascospores. It is described below based on its new collection from the Siberian Arctic.

Material and methods

Specimen examined. Russia, Yamal-Nenets Autonomous Area, Yamal Peninsula, Belyi Island, 3.2 km SW of M. G. Popova Polar Sea Hydrological Monitoring Station, 73°18'33"N, 70°07'44"E, on sandy soil in polygonal lichen-moss tundra, on *Si-*

phula ceratites (Wahlenb.) Fr. (thallus) (LE 264319a) and adjacent *Cladonia* sp. (cup and basal squamules) (LE 264319b), 23 VII 2009, *Walker*.

The specimen was examined with Zeiss microscopes Stemi 2000–CS and Axio Imager A1 equipped with Nomarski differential interference contrast optics. Microscopical examination was done in water. The measurements of 'lichen bodies' and algal cells are given as: (min){X–SD}–{X+SD}(max), where min and max are the extreme values, X the arithmetic mean, and SD the corresponding standard deviation. The studied material is housed in the Mycological Herbarium of the V. L. Komarov Botanical Institute in St. Petersburg (LE).

Description

Vegetative hyphae superficial, conspicuous, black, branched, 3.5–8 μm diam., medium brown in water mounts, septate, constricted at the septa, verruculose, supporting 'bodies' of unclear nature (Fig. 1). 'Bodies' almost black, glossy, subglobose, (20)30–55(75) μm diam. (n = 30), often with a slight depression above, but distinct pore not seen, sometimes collapsed when old, superficial, dispersed to aggregated, associated with a net of vegetative hyphae; wall medium brown in water mounts, paraplectenchymatous in surface view, of cells ca. 5–10 × 3.5–7.5 μm, verruculose. The interior of the 'bodies' filled with subglobose, ovoid or ellipsoid green algal cells (5)5.5–9(11) × (2.5)4–7.5(9) μm (n = 24, in water), alternating with colourless to occasionally pale brown, branched, septate hyphae, constricted at the septa, 2–6 μm diam., forming a sort of network. No diaspores were observed.

Discussion

The 'bodies' associated with a dark superficial hyphal net are reminiscent of *Sphaerellothecium* species, however, the observed internal hyphae are unusual for this genus. Habitually it is quite distinct from the species of *Sphaerellothecium* growing in the same habitats by its tiny glossy 'bodies'.

Perhaps the same organism has formerly been reported from Scandinavia (probably from the alpine habitats) growing on thalli of *Lecidoma demissum* and *Stereocaulon cumulatum* (Sommerf.) Timdal (Ihlen, Wedin, 2007).

I hypothesize that this is a peculiar lichen-like organism, probably recapitulating one of the original scenarios of lichenization in the extreme environments. There are many further questions to be answered, such as: "What is the origin of its photobiont?", "How does it propagate?", "Is it phylogenetically related to species of *Sphaerellothecium*?", "Can it be considered as obligately lichenicolous?", and "Is it restricted to arctic-alpine environments?".

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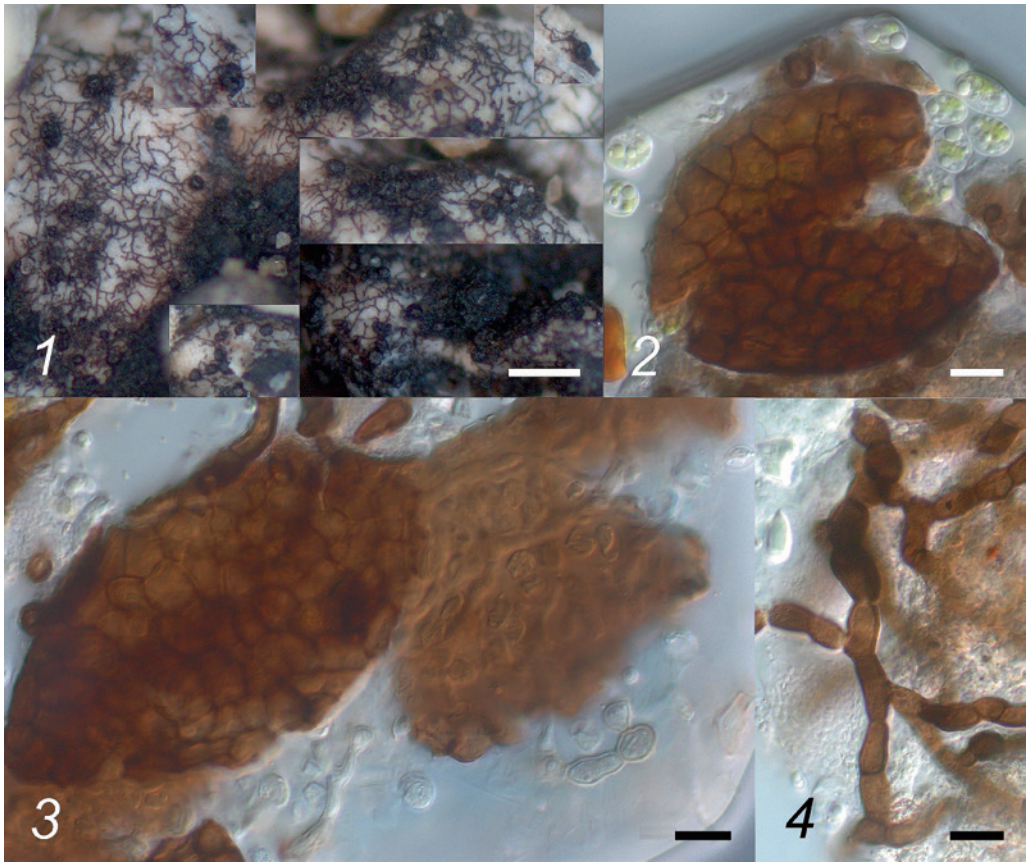

Fig. 1. A 'lichen' growing on *Siphula ceratites* thallus (LE 264319a).
1 — habitus; *2* — squashed 'body' filled with green algal cells (in water); *3* — squashed 'body' with inner branched septate hyphae (in water); *4* — vegetative hyphae (in water).
Scale bars: *1* — 200 μm; *2–4* — 10 μm.

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