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Atrophysma cyanomelanos (Pannariaceae) – a new lichen genus and species for Eurasia from the Polar Urals (Russia)

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Keywords: Alaska, Arctic, biogeography, cyanolichens, new record.

Summary. *Atrophysma cyanomelanos* is reported for the first time for the Eurasia from the European part of the northern end of the Polar Urals (Russia). Morphological features of the Russian specimen were identical to those from Alaska. The main morphological differences of this species from related taxa are given in this manuscript. Substrate chemistry, light conditions and moisture regime were similar for the specimens found in the Polar Urals and Alaska.

Atrophysma cyanomelanos (Pannariaceae) – новый для Евразии вид и род лишайников с Полярного Урала (Россия)

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Ключевые слова: Аляска, Арктика, биогеография, новая находка, цианобионтные лишайники.

Аннотация. Приводится описание *Atrophysma cyanomelanos* – нового для Евразии вида и рода лишайников, найденного на европейской стороне северной оконечности Полярного Урала (Приуральский район, Ямало-Ненецкий автономный округ, Россия). Морфологические особенности найденного образца совпадают с таковыми типового образца из Северной Америки. Даются основные морфологические отличия вида от близких таксонов. Установлено, что местообитания вида на Полярном Урале и на Аляске близки по характеру субстрата, режиму освещения и условиям увлажнения.

Introduction

Atrophysma cyanomelanos T. Sprib. was originally collected by T. Spribille in Alaska in 2007 and later described as a new species (Spribille et al., 2020). It belongs to the monotypic genus *Atrophysma* T. Sprib. (Pannariaceae). The worldwide distribution of this species was restricted to Alaska. Ten records were aggregated into two areas separated by 1200 km in the range from 60°N to 68°N. The species occurs on slightly calcareous rocks in the alpine belt of mountains at altitudes between 800 and 1200 meters above sea level (Spribille et al., 2020).

Materials and methods

The specimen was collected during an expedition to the Polar Urals in 2019. The species was identified accidentally (during the library enquiry for information on the other lichen species), since at the moment this species was not included in any identification keys on cyanobiont lichens. The sample

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was carefully examined using classical anatomical and morphological methods and standard reagents (Smith et al., 2009). The specimen is kept in herbarium (KPABG) of Polar-alpine botanical garden-institute of the Kola science center of the Russian Academy of Sciences (PABGI KSC RAS).

Results

Atrophysma cyanomelanos T. Sprib., 2020, Lichenologist 52: 85.

Description. Thallus up to 7 cm diam. (Fig. 1) contains *Nostoc* Vaucher ex Bornet et Flahault, with a blue-black hypothallus, micro-fruticulose, consisting of minute coralloid fingers 70–150 µm diam., covers the substrate with a dense carpet. Apothecia black, single or grouped, (0.25–)0.5–0.6(–1.3) mm diam., with proper margin, flat or convex, rarely concave, with or without white pruina (Fig. 2). Hymenium up to 90 µm, with a pigmented (almost black) upper layer (HNO_3+ mauve, KOH+ weakly greenish tinged, I+ wine). Asci 8-spored, widely flask-shaped, lightly I+ blue externally, I– internally, lacking an amyloid apical tube or tholus. Exciple purple inside and blue-black outside. Hypothecium up to 200 µm, almost colorless in upper part and brown below (Fig. 3). Spores are simple, in one row, 11–14 × 8 µm in our specimen and (10–) 11.0–16.0(–19) × (5.5–)7.1–8.1(–9.5) µm in specimens from Alaska.

Thallus chemistry. No secondary metabolites detected by spot tests (K, C, KC, P).

Ecology. On periodically wet, slightly calcareous rock in alpine habitats.

Distribution. Earlier was known only from Alaska. Our new record is slightly (8 km) northern (N68.12582°) than the northernmost record of the species in Alaska (N68.04952°).

Specimen examined: "Russia, Yamalo-Nenets Autonomous Okrug, Polar Urals Mountains, Sidyayambtose river valley, northern slope of the mountain, N68.12582°, E65.89578°, 600 m a. s. l., alpine belt, on periodically wet, good lightening rock surface, on weakly carbonaceous rock. 10 VIII 2019. Leg.: A. Melekhin" (KPABG (lichens) –21264).

Fig. 1. *Atrophysma cyanomelanos* (KPABG(lichens) –21264) field photo.

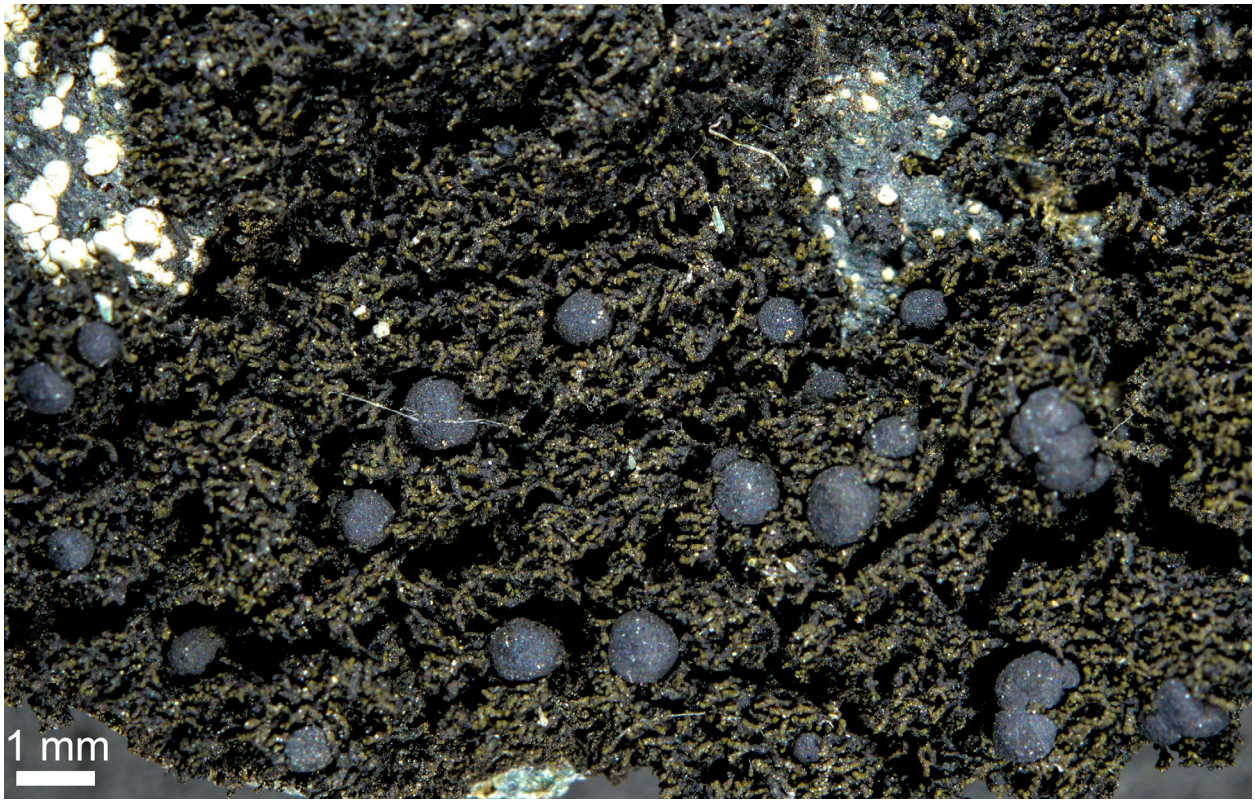

Fig. 2. *Atrophysma cyanomelanos* (KPABG(lichens) –21264) after 5 year of storage in herbarium.

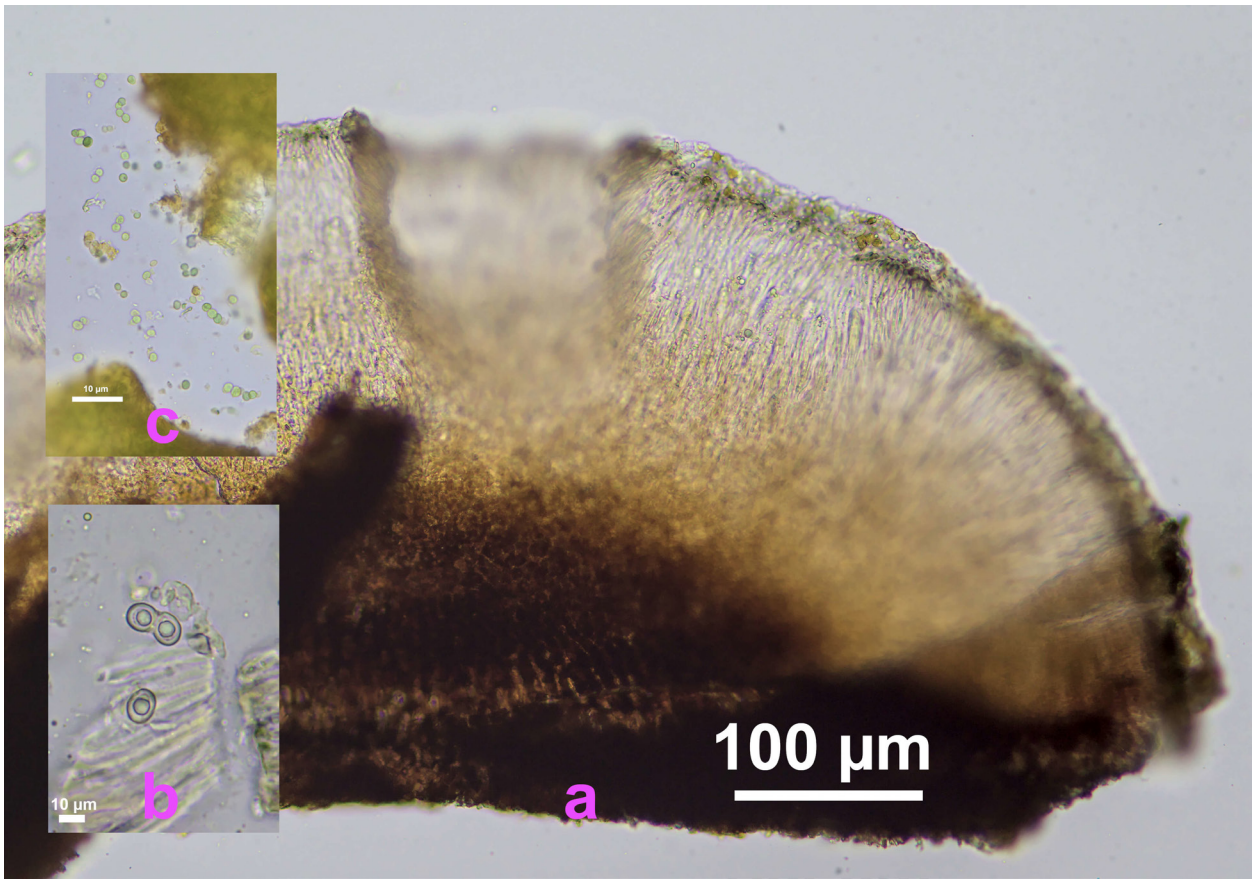

Fig. 3. *Atrophysma cyanomelanos* (KPABG(lichens) –21264): a – section of apothecium; b – ascospores; c – *Nostoc*-like cyanobacterial photobiont near broken thallus lobes.

Discussion

Atrophysma cyanomelanos is easily recognizable in nature and it is well separated from similar taxa. The genus *Atrophysma* is most similar (according to Spribille et al., 2020) to the genus *Placynthium* (Ach.) Gray (some species of this genus also have a carpet-like micro-fruticulose thallus with *Nostoc*, a pronounced hypothallus and apothecia without a thalline margin) and differs from it by the simple spores. It differs from species of the similar genus *Leciophysma* Th. Fr. by presence of a dark blue-black pigment in the apothecia and the presence of a hypothallus. The presence of a hypothallus, simple spores and dark (blue-black, sometimes with a coating, as in our case) apothecia distinguishes it from the similar species *Polychidium muscicola* (Sw.) Gray (also a micro-fruticulose lichen with *Nostoc*).

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