

***Buellia lacteoides* new to Eurasia from Transbaikal Territory (South Siberia, Russia)**

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Abstract: YAKOVCHENKO, L., GALANINA, I. & DAVYDOV, E. A. 2017. *Buellia lacteoides* new to Eurasia from Transbaikal Territory (South Siberia, Russia). – Herzogia 30: 515–519.

Buellia lacteoides (Physciaceae, lichenized Ascomycetes), hitherto only known from western North America, is reported from the Transbaikal Territory (South Siberia, Russia). A morphological description based on the Russian material is provided.

Zusammenfassung: YAKOVCHENKO, L., GALANINA, I. & DAVYDOV, E. A. 2017. *Buellia lacteoides* neu für Eurasien aus Transbaikalien (Südsibirien, Russland) – Herzogia 30: 515–519.

Buellia lacteoides (Physciaceae, lichenisierte Ascomyceten), die bisher nur aus dem westlichen Nordamerika bekannt war, wird aus Transbaikalien (Südsibirien, Russland) dokumentiert. Auf der Basis des russischen Materials wird eine morphologische Beschreibung geliefert.

Key words: Physciaceae, new records, distribution, lichen, lichenized fungi.

Introduction

Buellia lacteoides de Lesd. was reported exclusively from western North America (Sonoran Region) where it is distributed in montane to subalpine habitats. The species is morphologically similar to the representatives of the *Buellia aethalea* group, especially to *B. spuria* (Schaer.) Anzi but not closely related. Members of the *B. aethalea* group have *Buellia*-type ascospores (evenly thin-walled, without septal thickening), whereas ascospores of *B. lacteoides* belong to the *Physconia*-type (with a distinctly thickened septum). Apart from this, *B. lacteoides* differs from *B. spuria* by the presence of a hyaline subhymenium between the hymenium and the pigmented hypothecium whereas subhymenium and hypothecium of *B. spuria* are uniformly pigmented. The species can also be distinguished by the position of the apothecia. In both species these are immersed when young, but only in *B. lacteoides* they remain immersed and the initially roundish disk soon becomes irregular to angular. In contrast, apothecia of *B. spuria* eventually become adnate to sessile whereas its disk normally remains circular in outline with age. The reaction of the medulla of *B. lacteoides* with IKI is much stronger and can even be observed directly on the thallus surface, whereas this reaction in *B. spuria* is not so strong and persistent (BUNGARTZ & NASH 2004, NASH et al. 2007).

Buellia lacteoides has been included to the checklist of the lichen flora of Russia (URBANAVICHUS 2010) based on a citation of the species by the first author in her PhD dis-

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sertation (YAKOVCHENKO 2009), which was not published. Thus, this record was added to the checklist without adequate documentation in the scientific literature. Here we amend this inaccuracy and discuss in detail the occurrence of *B. lacteoides* as a new record for Eurasia, reported here from the Transbaikal Territory (South Siberia, Russia).

Materials and methods

The specimens examined are deposited at the herbarium of the Institute of Biology and Soil Science, Far Eastern Branch, Russian Academy of Sciences (VLA) and at the herbarium of the Altai State University (ALTB). Morphological observations were made using a dissecting microscope. Cross-sections of apothecia and thalli were made by hand with razor blade and observed after mounting in water. Measurements are presented as follows: (smallest value recorded) (x-SD) – x – (x+SD) (largest value recorded), where x is the (arithmetic) sample mean, and SD the sample standard deviation. The total number of samples measured (N) are given in parentheses. The two extremes are given to the nearest 0.5 µm, and the sample mean to the nearest 0.1 µm. Lichen substances were examined using high performance thin layer chromatography (HPTLC) with solvent B (hexane : diethyl ether : formic acid, 140 : 72 : 18) and solvent C (toluene : acetic acid, 170 : 30) (CULBERSON & KRISTINSSON 1970).

Results

Buellia lacteoides de Lesd., Ann. Crypt. Exot. 5: 129. 1932.

(Fig. 1B–E)

Type: U.S.A. New Mexico, San Miguel Co. Hermit's Peak, 35°44'39"N, 105°24'52"W; on siliceous rock [original label data: Hermit's Peak, roche siliceuse], 3,110 m elevation, 2 July 1930, Frère Arsène Brouard s.n. (W, lectotype, selected by BUNGARTZ & NASH [2004]; S [digital photograph!]; UPS, isolectotypes).

The Russian specimens have a thin, ± continuous, creamy white, ivory to whitish grey (in young thalli patches) crustose areolate thallus of irregular to angular areoles (0.15–)0.25–0.40–0.55(–0.8) mm wide (N=54), dispersed on well-developed black hypothallus, clearly visible in-between the areoles and along the thallus periphery (Fig. 1B), surface lacking pruina and vegetative propagules. Apothecia lecideine, (0.2–)0.3–0.4–0.5(–0.7) mm diam. (N= 47), developing close to the edges or at the edges of the areoles, black, roundish initially then angular, immersed or level with the thallus surface, with plane disks and thin, smooth, often indistinct proper margin. Medulla white, strongly amyloid with IKI, K+ yellow to red, C–, KC–, P+ yellow. Proper exciple (38–)40–43–46(–50) µm wide (N= 10) in uppermost part, *aethalea*-type, outer exciple of parallel hyphae, carbonized, with *cinereorufa*-green pigment, HNO₃+ violet, inner exciple of colorless, prosoplectenchymatous hyphae, often indistinct; epihymenium brown to green with *cinereorufa*-green pigment, pigmentation continuous with the outer exciple; hypothecium with colorless subhymenial layer in uppermost part, pale ochre to ochre-brown below, up to 200(–225) µm tall; hymenium colorless, (42.5–)45.5–57.5–69.5(–75.0) µm tall (N= 10) (Fig. 1C); paraphyses simple to branched, ca. 1.5–2.0 µm wide in midhymenium, tips clavate, with a pigmented cap, up to 5.0 µm wide; asci 8-spored, clavate, *Bacidia*-type, (42.5–)47.5–53.0–58.5(–62.5) × (17.5–)17.5–19.0–20.5(–22.5) µm (N=10) (Fig. 1D); ascospores initially colorless to olive soon brown, with septum distinctly thickened during spore ontogeny (*Physconia*-type), oblong to ellipsoid, not constricted, straight, not attenuated at the ends, (10.5–)12.0–13.5–15.5(–19.0) × (6.5–)6.5–7.5–8.5(–9.0) µm (N=25) (Fig. 1E). Wall ornamentation rugulate. Pycnidia and conidia not seen.

Secondary metabolites: thalli react K+ yellow to red, C–, KC–, P+ yellow, IKI+ blue (reactions distinct even if reagents applied to the thallus surface); atranorin, norstictic with connorstictic acid.

Specimens examined: Russia, Transbaikal Territory, Sokhondinskiy State Biosphere Reserve: Balbashniy Mount., 49°48'57.7"N, 110°51'54.8"E, altitude 1865 m above s. l., gravelly barrens with spots of *Pinus pumila*, on rock, 03

VII 2007, Yakovchenko L. S. 1108 (ALTB); Southeast spur of Sopkoyan Mount., 49°36'48.5''N, 110°44'52.1''E, altitude 1995 m, thickets of *Pinus pumila* on a rocky mountain terrace, 06 VII 2007, Yakovchenko L. S. 1109 (VLA); Tsagan-Ula Mount., 49°39'35.1''N, 111°02'53.6''E, altitude 1996 m, gravelly barrens with *Pinus pumila* and sparse *Larix gmelinii*, on rock, 24 VII 2005, Yakovchenko L. S. 1157 (VLA) (Fig. 1A); Tsagan-Ula Mount., first mountain terrace, 49°38'01.8''N, 111°02'23.7''E, altitude 1885 m, gravelly barrens with *Pinus pumila* and sparse *Larix gmelinii*, on rock, 15 VII 2001, Galanina I. A. No.1303; Sokhondo Mount., 49°40'25.2''N, 111°02'24.7''E, altitude 2150 m, gravelly barrens with spots of dryas-herb-lichens tundra, on rock, 18 VII 2005, Yakovchenko L. S. 1258 (VLA).

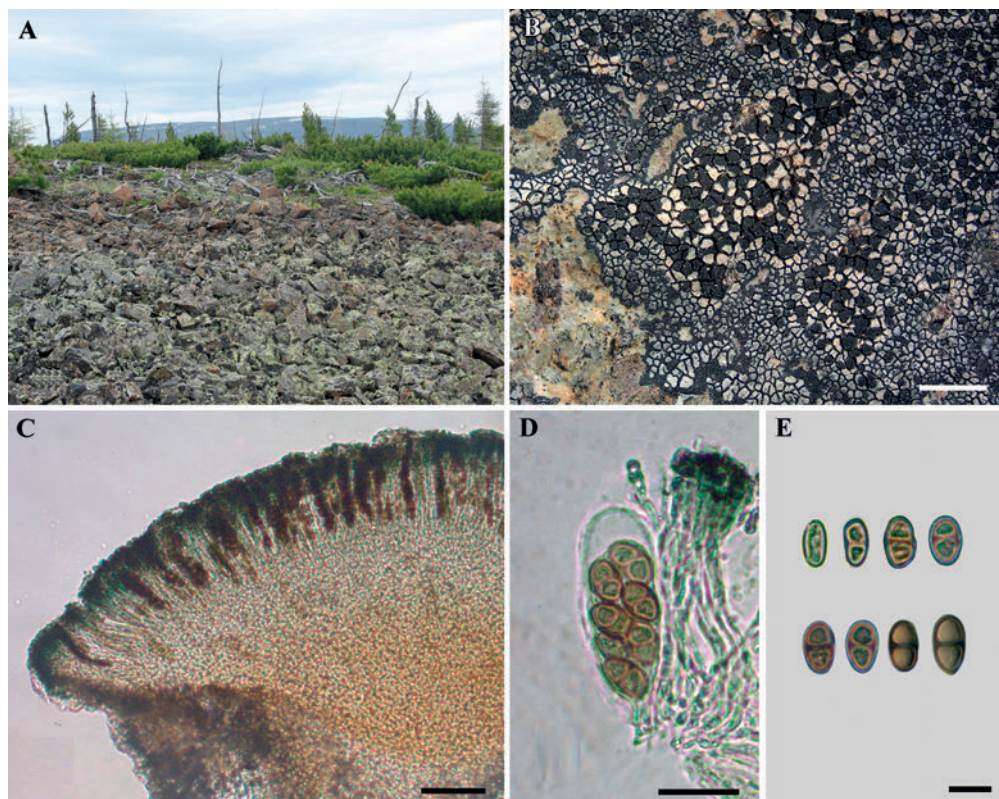


Fig. 1. *Buellia lactoidea*. **A.** Gravelly barrens with spots of *Pinus pumila* and sparse *Larix gmelinii* at the mountain terrace – a typical habitat of *Buellia lactoidea*. **B.** *Buellia lactoidea* on rock [Sokhondinskiy Reserve, Yakovchenko No. 1157]. Scale = 2 mm. **C.** Section of apothecium with hyaline subhymenium between the hymenium and the pigmented hypothecium. Scale = 500 μ m. **D.** Ascus and paraphyses. Scale = 20 μ m. **E.** *Physconia*-type ascospores. Scale = 10 μ m.

Discussion

Buellia lactoidea is characterized by its creamy white areolate thallus, delimited by a well-developed, black hypothallus also visible in between the areoles, and by angular, plane lecideine apothecia, remaining immersed or at the same level as areoles with age, developing along the edges of the areoles (Fig. 1B); a strong amyloid medulla. Additional distinguishing important characters are: the hyaline upper hypothecium, the content of atranorin and norstictic acid and the *Physconia*-type ascospores (with ornamented walls).

Two species of the *Buellia aethalea* group are known in Russia in addition to *B. lacteoides*: *B. aethalea* (Nyl.) Th.Fr. and *B. stellulata* (Taylor) Mudd (URBANAVICHUS 2010). Their distribution covers South Siberia where *B. lacteoides* is herein reported. In contrast to *B. lacteoides*, the mentioned species are characterized by ascospores of the *Buellia* type. *B. stellulata* has a IKI –, and *B. aethalea* has a IKI + blue or – reaction, the species also differ by their secondary metabolites. In contrast to *B. lacteoides*, *B. aethalea* lacks atranorin and sometimes contains stictic, cryptostictic, constictic and menegazzic acids. *Buellia stellulata* is different from *B. lacteoides* by presence of 2-*O*-methylperlatolic and confluent acids. Morphologically *Buellia lacteoides* differs from *B. aethalea* by the paler color of the thallus. The prothallus of *B. lacteoides* is strongly developed, whereas in *B. aethalea* it could be absent. Apothecia of *B. lacteoides* develop along the edges of the areoles whereas apothecia in *B. aethalea* are predominantly situated at the center of areoles. *Buellia stellulata* differs from *B. lacteoides* by small (up to 0.3 mm in diam.), emergent apothecia with circular disc, frequently with thalline veil, whereas apothecia of *B. lacteoides* are larger (up to 0.7 mm in diam.), at the same level as areoles with soon angular disc and never with thalline veil. Anatomically *Buellia stellulata* differs by a dark brown pigmented layer of hyphae directly below the hymenium. Both *B. aethalea* and *B. stellulata* are common in coastal habitat, whereas *B. lacteoides* is a continental montane species.

South Siberian specimens fully correspond with the detailed description in BUNGARTZ & NASH (2004) and NASH et al. (2007). Only the apothecia of the Russian material are slightly smaller – maximum values correspond with the average of North American material. In Russian material, the hypothecium pigmentation of young apothecia is faint and sometimes the hypothecium seems to be colorless, but the pigmentation becomes more prominent with age. BUNGARTZ & NASH (2004) noted that mature apothecia of *B. lacteoides* might easily be confused with apothecia of *B. spuria*, which are characterized by deep-pigmented hypothecium. However, in Russian material of *B. lacteoides* the differentiation in coloration is permanent – the colorless layer between hymenium and ochre-brownish pigmented hypothecium is always observed, even in mature apothecia (Fig. 1C). In literature, a C+ red and KC+ red reaction (gyrophoric acid) is reported for part of the material from North America (BUNGARTZ & NASH 2004, NASH et al. 2007). We did not observe these reactions in the Russian specimens studied.

In South Siberia, *Buellia lacteoides* occurs on hard siliceous rocks. All collections were made in the high montane elevation zone, between 1865 to 2150 m above sea level. Accompanying species of *Buellia lacteoides* are *Aspicilia cinerea* (L.) Körb., *Lasallia pennsylvanica* (Hoffm.) Llano, *Lecanora bicincta* Ramond, *Melanelia hepatizon* (Ach.) A.Thell, *Miriquidica deusta* (Stenh.) Hertel & Rambold, *Ophioparma ventosa* (L.) Norman, *Protoparmelia badia* (Hoffm.) Hafellner, *Rhizocarpon eupetraeoides* (Nyl.) Blomb. & Forssell, *R. geographicum* (L.) DC., *Rhizoplaca chrysoleuca* (Sm.) Zopf, *Ropalospora lugubris* (Sommerf.) Poelt, *Sporastatia testudinea* (Ach.) A.Massal. and others. *Buellia lacteoides* was collected in South Siberia in five localities scattered through the high mountain massifs of the Sokhondinskiy State Biosphere Reserve (Fig. 1A). These mountains were isolated from each other during two glaciations in middle and upper Pleistocene. The distance between the most remote localities exceeds 25 km. The distribution of the species in South Siberia appears to be restricted to the high montane vegetation zone; it was not found during our exhaustive lichenological survey of the South Siberian steppe in 2001–2009 years at lower altitudes. Worldwide, the species has so far only been reported from the Sonora Region of western North America, but it is not a typical desert species. Instead it there also has been reported from montane vegetation; e.g., one

record has been found on the top of San Pedro Martir, in a mountain range of Baja California, Mexico (ca. 3000 m above sea level). *Buellia lacteoides* is an example of species with Asian – western North American distribution similar to that of several other epilithic species, e.g., *Candelariella kansuensis* H. Magn. (WESTBERG & SOHRABI 2012), *C. spraguei* (Tuck.) Zahlbr. (BREDKINA 1982, WESTBERG 2007) and *Umbilicaria angulata* Tuck. (WEI & BIAZROV 1991) as well as some corticolous species like *Candelariella biatorina* M. Westb. (YAKOVCHENKO et al. 2013) and others. The distribution of *Buellia lacteoides* is thus probably much wider than previously reported. The species can be easily confused with *B. spuria* and may therefore have been overlooked. We expect to find this species also in other mountainous regions of Eurasia.

Acknowledgements

We are indebted to Toby Spribille for his help with the identification of the species. The work of L.Y. is partly supported by the Russian Foundation for Basic Research (grant no. 15-04-05971).

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Manuscript accepted: 17 August 2017.

Communicated by: Volker Otte

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