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NEW SPECIES OF *CALOPLACA* FROM CRIMEAN PENINSULA (UKRAINE)

Lichens, new species, Caloplaca, Ukraine, Europe

Abstract

Two new for science lichen species from the family Teloschistaceae (namely *Caloplaca karadagensis* Khodosovtsev & S. Kondr. and *Caloplaca geleverjae* Khodosovtsev & S. Kondr.) are described.

Introduction

The Eastern part of Crimean peninsula has wonderful landscapes with long historical past. The Karadag Nature Reserve is a remnant of a Grand Jurassic volcanic massif. The southern part of this massive has submediterranean climate with rare for Ukraine *Roccelion* communities. The Meganom Cape lies not far from Karadag with original semiarid landscape and conglomerate massifs on sea shore. The lichen flora of these territories is rich on the interesting species. During preliminary investigation of lichens of this region a number of hitherto unknown representatives of the genus *Caloplaca* was collected. One of them has similar with *C. lithophila* group but has densely pruinose apothecia and thin septa, second species has affinities with *Caloplaca atroflava* group but develops gray-greenish blastidia. Detail comparative study shown, that they to be still undescribed representatives of the genus *Caloplaca*. Here both species are described as new for science.

Material and methods

The results presented here based mainly on herbarium material kept in *KW, KHER, LD, C, BM, GZU, TNS, H, B, S*. For anatomical observations, fragments of lichens were sectiones with Kryomat, Leitz freezing microtome and sections put in lactophenol-cotton blue or wather. Anatomical structure and hymenial characters were studied with a Zeiss Axioscope light microscope, and photomicrographs made with a Digital DP 11 camera.

***Caloplaca karadagensis* Khodosovtsev & S. Kondr. sp. nova**

Type: Ukraine, Crimea AR, Feodosia region, Karadag nature reserve, Karagach, N slope of the Karagach ridge, a. 80–120 m alt., on shaded volcanic rocks, 09.10.2001 A. Khodosovtsev, (*KW* – holotypus, *C, KHER, KW, LD* – isotypes).

Saxicola. Thallus crustaceus, areolatus, flavus, K+ purpureum. Areolae convexes, flavo-pruinosae, dispersae, 0.15–0.25 mm in diametro. Apothecia lecanorina, pruina flavo brunnae obtecte, 0.3–0.5(0.8) mm in diametro. Stratum corticale paraplectenchymatosum e tumifaciis hyphis (–5.0)7.5–8.5(–9.0) mkm in diametro. Paraphysae 1.2–1.6 mkm crassitudinis, apicibulus (4.5–)5.5–6.0(–7.0) mkm in diametro. Ascosporae octonae, (7.5–)10.0–11.5 (–13.0) x (4.0–) 4.5–5.5(–6.0) mkm septum, 1.0–2.2(–2.7) crassitudinis.

Thallus crustose, areolate, yellow-pruinose, often to invisible under numerous apothecia, forming spots up to 5 cm diam. Areoles small, rather convex, yellow-pruinose, 0.15–0.25 (–0.4) mm diam., aggregated, rare forming small squamules 0.6–0.8 mm across. Protothallus not visible or pale yellowish. Apothecia lecanorine, 0.3–0.5(–0.8) mm diam, numerous, developed from convex rounded areoles, constricted at the base at mature. Disc flat to sligthly convex, covered by granular orange-brownish pruine. Thalline exiple even to crenulate at mature, covered by yellowish pruine.

Cortex of areoles and amphythecium paraplectenchymatous, consisting of 3–4 cells layers, up to (25–)30–40 mkm thick, cells very swollen with thin walls, lumina (5–)7.5–8.5(–9) mkm diam. Parathecium thin, visible in upper part, 20–25 mkm thick, consisting of radiate hyphes with swollen apical cells up to 7 mkm diam. Hypothecium hyaline. Paraphyses thin, 1.2–1.6 mkm thick with swollen apical cells, up to (4.5–)5.5–6.0(–7.0) mkm. Asci 8-spored, ascospores (7.5–)10.0–11.5(–13.0) x (4.0–)4.5–5.5(–6.0) mkm with thin septa, 1.0–2.2(–2.7) mkm. Pycnidia not seen.

Ecology. The new species grows on overhanging shaded volcanic rocks, associated with *Lecanora* aff. *albescens*, *Dirina massiliensis* f. *sorediata* and *Roccella phycopsis*. Probably, this species is parasitic, numerous specimens of this species found in close contacts with areoles and apothecia *Lecanora* aff. *albescens*. The some small thallus with yellowish prothallus were found directly on rocks.

Distribution: So far this species is known from the Crimea only.

Ethymology. The new species is named sfter name of locality where it was collected.

Taxonomic notes. The new species (*C. karadagensis*) is characterized by small convex yellowish pruinose areoles, swollen cells of paraplectenchymatous cortex and amphythecium and small ascospores with narrow septum. Anatomy of different species groups of *Caloplaca* is far to clear. The paraplectenchymatic cells within *Caloplaca* have lumina about 3–5 mkm wide [2]. *C. karadagensis* characterized by much larger swollen cells in cortex, up to 7–9 mkm across. Morphologically, pruinose thallus of the new species similar to *Caloplaca ruderum* [6], however last species has much larger ascospores, thick thalline exiple with grey-yellowish pruina and massive thallus. The small ascospores with narrow septa are characteristic for alpine species *Caloplaca caccuminum* [4], but last species does not have pruinose apothecia, it has also much smaller invisible areoles and probably different anatomy of cortex. The *C. lithophila* [1] developed small yellowish areolated thallus as well, differs by much wider septum up to 3–5 mkm thick and epruinous apothecia (table 1.)

***Caloplaca geleverjae* Khodosovtsev & S. Kondr. sp. nova**

Type: Ukraine, AR Crimea, Feodosia region, cape Meganom, on conglomerates in supralitoral zone, 02.05.2002 A. Khodosovtsev (*KW* – holotype, *KHER*, *LD* – isotypes).

Saxicola. Thallus crustaceus, areolatus, griseo-viridis vel brunneo-viridis, K+ violaceum. Blastidia numerosa globosa, (30–)60–80(–120) mkm in diametro. Apothecia biatorina, dispersa, sessilis, 0.6–0.8(–1.2) mm in diametro. Disci plani, flavo-aurantiaci, K+

Table 1. **Characters states in *Caloplaca karadagensis* Khodosovtsev & S. Kondr. sp. nova and allied species**

	C. karadagensis	*C. cacuminum*	*C. lithophila*	*C. ruderum*
Areoles (mm across)	0.15–0.25(–0.4)	more or less 0.2–0.4	up to 0.2	0.5–1.5
Apothecial pruine	yellowish to brownish-yellow predominantly on disk	absent	absent	yellowish to gray-yellowish predominantly on margin
Lumina of the cortex cells (mkm across)	(5–)7.5–8.5(–9)	?	2–4	?
Apical cells of paraphyses (mkm diam.)	(4.5–)5.5–6.0(–7.0)	up to 0.3	3–6	up to 5
Ascospores (mkm)	(7.5–)10.0–11.5 (–13.0) x (4.0–)4.5–5.5(–6.0)	10–13 x 3.5–4.5	(9.4–)10.0–13.5 (–13.9) x (3.1–)3.6–6.0(–6.5)	10–15 x 6–5
Septa (mkm)	1.0–2.2(–2.7)	1.0–1.5	(3.1–)3.6–6.0(–6.5)	2.5–5.0
Ecology	overhanging volcanic rocks with *Dirina massiliensis*	on calcareous rock in alpine situations	on siliceous and rare calciferous rocks	on soft calcareous substrates, rare on basic maritime rocks
References	Present paper	Poelt, 1977	Arup, 1994	Purvis & al., 1992

purpureum. Margo proprius flavus, 80–90 mkm crassitudinis. Margo thallinus nullus. Ascosporae octonae, (9.8–)11.0–13.0(–14.5) × (5.0–)5.8–6.2(–6.8) mkm, septum (3.8–)4.5–5.5 (–6.0) mkm. Spermogoniarum apex flavus, K+ purpureum, spermacia bacilliformes, (2.3–)2.5–2.8(–3.0) × 1.5–1.8 mkm.

Thallus crustaceus, areolatus, griseo-virescens vel brunneo-virescens, saxicola K+ violaceus. Blastidia numerosa globosa, (30–)60–80(–120) mkm in diametro. Apothecia biatorina, dispersa, sessilia, 0.6–0.8(–1.2) mm in diametro. Disci plani, flavo-aurantiacus, K+ purpureus. Margo proprius flavus, 80–90 mkm crassae. Margo thallinus nullus. Ascosporae octonae, (9.8–)11–13(–14.5) × (5.0–)5.8–6.2(–6.8) mkm, septum (3.8–)4.5–5.5(–6.0) mkm. Spermogonia apex flavus, K+ purpureus, spermacia bacilliformis, (2.3–)2.5–2.8(–3.0) × ×1.5–1.8 mkm.

Thallus crustose, grey-greenish to brownish-olivaceous, blastidiate, about 2–3 cm wide. Areoles and squamules flattened to slightly convex, greenish-grey, 0.3–0.6(–1.0) mm wide, blastidiate. Soralia not developed. Blastidia marginal, developed at the raised edges of areoles, rare on the surfaces, globular to small coralloid, scattered, concolorous with thallus, (30–)60–80(–120) mkm diam, sometimes disintegrating on free soredia-like elements, up to 30 mkm diam. Surfaces of blastidia covered by hyaline layer, external isodiametrical hyphal cells up to 2–4 mkm wide and internal hyphal cells up to (5–)10–15 mkm long, K+ violet.

Apothecia biatorine, 0.6–0.8(–1.2) mm diam., sessile to constricted at the base. Disk yellow-orange flat to slightly convex, surrounded by fine thick yellow proper margin. Thallus margin reduced. Parathecium in upper part 80–90 mkm thick, consists of radiate hyphae 1.5–1.8 mkm thick, in lower part 20–25 mkm thick. Hymenium 60–75 mkm high, hyaline. Amphythecium reduced, but under hypothecium developed thick algae layer. Asci 8-spored, ascospores (9.8–)11–13(–14.5) × (5.0–)5.8–6.2(–6.8), septa (3.8–)4.5–5.5(–6.0) mkm wide. Spermogonia disperse, with yellow apical tips, 60–80 mkm, K+ purple. Spermacia bacillifom (2.3–)2.5–2.8(–3.0) × 1.5–1.8 mkm.

Table 2. **Diagnostic characters of *Caloplaca geleverjae* Khodosovtsev & S.Kondr. sp. nova and allied species**

	C. geleverjae	*C. atroflava*	*C. virescens*	*C. chlorina*	*C. xerica*	*C. fuscoblasti-diata*	*C. aquensis*
Thallus color	greenish-gray to brownish-green	dark-gray to blackish	greenish-gray to bluish-gray	dark-gray to greenish-gray	greenish-gray to dark-grey	pale-gray to olive-gray	endolythic or whithish
Vegetative diaspores	blastidia	not developed	soredia	isidia and blastidia	isidia-like lobules	blastidia	not developed
Size of diaspores (mkm)	(30–)60–80(–120)	-	30–60	60–150	70–200	50–150	-
Apothecia type	biatorine	biatorine	lecanorine to zeorine	lecanorine to zeorine	zeorine	zeorine to biatorine	biatorine
Apothecia (mm diam.)	0.6–0.8(–1.2)	0.3–0.6	0.5–1.2	0.5–0.8(–1.5)	0.5–0.8(–1.5)	up to 0.8	0.3–1.0
Disk color	yellow-orange	yellow-orange	yellow-orange	yellow-orange	orange to brown-orange	dark brownish	orange
Epihymenium	K+ purple	K+ purple	K + purple	K+ purple	K + purple	K -	K + purple
Ascospores (mkm)	(9.8–)11–13(–14.5) x (5.0–)5.8–6.2 (–6.8)	(9–)11–13(–17) x 5.5–7.0(–9)		10–15 x 5–7	10–16 x 6–8	10–14 x 5.5–7.0	13–19(–23) x 6.0–7.5(–9)
Septa (mkm)	(3.8–)4.5–5.5(–6.0)	4–6	1–3	3–5(–6)	3–6	4–6	2–4
Pycnidial tips	yellowish	blackish	?	?	blackish	olive blackish	?
Ecology	supralitoral zone on conglomerates	on siliceous rocks in shaded situations	on bark of deciduous trees	on bark of deciduous trees rare on siliceous rock (?)	on exposed siliceous rocks	on bark of evergreen old trees	on calciferous rocks in supralitorale zone
References	present paper	Wetmore, 1996	Purvis & al., 1992	Wetmore, 1996	Poelt & Hinterreger, 1993	van den Boom, Etayo, 1995	Navarro-Rosines & Roux, 1992

Ecology. The species grows on the vertical surfaces of the shaded conglomerate rocks in upper supralitoral zone. The pitting from fallen conglomerate cernes were typical locations for *Caloplaca geleverjae*. The associated species were *Caloplaca micothallina*, *C. citrina*, *Lecania atrynoides*, etc. The species was presented by numerous individual thalli, but found from classic locations in Crimea only.

Etymology. The new species is named after maiden name of the senior co-author's wife.

Notes. The vegetative propagules of this species closely connected with *Caloplaca fuscoblastidiata* [7] named as blastidia. The general habit of the apothecia in nature is similar to *Caloplaca aquensis* [3]. However, both species have completely different apothecial characters (table 2). The isidiate-blastidiate *Caloplaca chlorina* [6, 8], and complitely sorediate *C. virescens* [6] species differ by lecanorine apothecia with gray, well developed thalline margin. The fine proper and reduced thalline margins developed in *Caloplaca xerica* [5], but last species has lobulate-isidiate vegetative propagules, dark orange color of the apothecial disk, blackish picnidia tips and different ecology. The apothecial anatomy and pigments of the new species, probably, closely connected with *Caloplaca atroflava* [8], but last species does never form vegetative diaspores and furthermore it has blackish pycnidial tips (table 2).

Acknowlegements

We are grateful to Dr. L.I. Minina (Kherson State University) for checking Latine diagnoses.

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Описано два нових для науки таксони з родини *Teloschistaceae* (зокрема: *Caloplaca karadagensis* Khodosovtsev & S. Kondr. та *C. geleverjae* Khodosovtsev & S. Kondr.).

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