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LICHEN GENUS *CALOPLACA* ON THE KAMCHATKA PENINSULA (RUSSIAN FAR EAST)

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Abstract

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Twenty-two species of the *Caloplaca* Th. Fr. genus are reported from the Kamchatka Peninsula (Russian Far East). Among them 18 species are indicated as new for Kamchatka; only four species have been recorded during earlier investigations. *Caloplaca crenulatella* and *C. fulvolutea* are reported for the first time for Russia and *C. sorocarpa* – for Russian Asia. *Caloplaca ammiospila*, *C. aurantia*, *C. flavorubescens*, *C. granulosa*, and *C. jungermanniae* are excluded from Kamchatka lichen lists. Some data on habitat ecology and distribution of species are presented. *Caloplaca vicaria* is synonymized here with *C. kamczatica*, and *C. brattiae* – with *C. etesiae*. Combination *C. gordejevi* (Tomin) Oxner ex Khodosovtsev is validated here. Lectotypes of *C. etesiae*, *C. gordejevi*, and *C. kamczatica* are selected.

Keywords: *Caloplaca*, taxonomy, lectotypification, biogeography, Kamchatka, Russia.

INTRODUCTION

The first *Caloplaca* Th. Fr. species reported for Kamchatka was *C. kamczatica*, described by SAVICZ (1914) (as *Placodium kamczaticum*), basing on the specimens collected in Southwestern Kamchatka near the Nalycheva River. Two species were later reported by DU RIETZ (1929) – *C. etesiae* (as *Callopisma etesiae*) and *C. flavorubescens* (as *Callopisma aurantiaca*, erroneous record). Reports of Savicz and Du Rietz were cited later by TRASS (1963) (all three species) and MIKULIN (1986, 1990, 1993 (only *C. kamczatica*); 1986, 1990 (*C. flavorubescens*)). MIKULIN (1987, 1988, 1990) also added *C. cerina* to this short list and six more species (*C. aurantia*, *C. ferruginea*, *C. granulosa*, *C. jungermanniae*,

C. obscurella, *C. sinapisperma*, records of which are dubious or erroneous (Mikulin, 1990, without any details of finding localities). *Caloplaca cerina* was also reported by Dobryš (2002) for Southern Kamchatka.

Recently Nešataeva et al. (2003, 2004) published some additional records for Kamchatian *Caloplaca* – *C. ammiospila* (erroneously), *C. cerina*, *C. ferruginea* (erroneously), and *C. tiroliensis*. Here we accept only four species correctly reported for Kamchatka since 1914 with published locality data and based on herbarium specimens.

MATERIALS AND METHODS

The material is based on the collections made by D. Himelbrant and E. Kuznetsova during Kamchatian expeditions in 2002–2003 (LECB). The herbarium specimens from H, H-NYL, KHER, LE, and UPS, mainly collected by Savicz in 1908–1909 and Mikulin in 1979–1985, were investigated. Spores, hymenial characters, and anatomical structure of thallus were studied by light microscopy (hand sections mounted in water). Nomenclature follows mainly Santesson et al. (2004), except *Caloplaca cerina* var. *chloroleuca*, *C. etesiae*, *C. fulvolutea*, *C. gordejevi*, *C. haematites*, *C. hungarica*, *C. kamczatica*, *C. litophila*, and *C. pyracea*.

RESULTS

Twenty-two species of *Caloplaca* from the Kamchatka Peninsula (Russian Far East) are listed here. Among them four species have been known from previous records, and 18 species are indicated as new for Kamchatka. *Caloplaca crenulatella* and *C. fulvolutea* are reported for the first time for Russia and *C. sorocarpa* – for Russian Asia. The list of excluded and dubious taxa contains 8 species. Corticolous species growing on bark of deciduous and coniferous trees and shrubs make the largest part (11). The group of saxicolous lichens includes 7 species inhabiting siliceous rocks. Two species – *C. fulvolutea* and *C. tetraspora* – were recorded from mosses in alpine tundra, whereas *C. epithallina* is a parasite on thalli of various saxicolous lichens.

THE LIST OF TAXA

Caloplaca borealis (Vain.) Poelt, Bestimmungsschlussel Europ. Flechten: 172 (1969).

Specimens examined: **Central Kamchatka**, Ust'-Kamchatsky District, Yelovka River basin, in the watershed of Yelovka and Levaya Rivers, 56°56'19" N, 160°58'52"E, c. 150 m, low herb old-growth rich spruce (*Picea ajanensis*) forest with *Betula ermanii*, *Populus suaveolens*, *Sorbus sambucifolia*, *Pinus pumila*, on bark of *Betula ermanii*, 30 Aug. 2003, Himelbrant et Kuznetsova, K-93 (LECB); as above, 56°56'25"N, 160°58'36"E, c. 170 m, moss rich spruce forest with low herb, *Betula ermanii*, *Sorbus sambucifolia*, *Pinus pumila*, on bark of *Picea ajanensis*, 31 Aug. 2003, Himelbrant et Kuznetsova, K-94 (LECB); **Southeastern Kamchatka**, Elizovsky district, Khodutka Bay, right side of Right Khodutka valley, in vicinity of the Pacific Ocean shore, 51°46'03"N, 157°58'35"E, c. 10 m, *Betula ermanii* forest (the oldest birch trees 250 to 300 years old) with *Calamagrostis langsdorfii*,

on bark of *Betula ermanii*, 25 July 2002, Neshataeva, K-84, K-85 (LECB); Uzdach River, near Nachiki, Aug. 1908, Savicz 5747, Kamchatian expedition of Rjabushinsky (LE); Petropavlovsk-Kamchatsky, Mishennaya mountain, June 1908, Savicz 304, Kamchatian expedition of Rjabushinsky (LE); **Southwestern Kamchatka**, Ust'-Bol'sheretsky district, Bannaja River basin, right side of Bannaja River, near Kosogorchik mountain, 52°54'56''N, 157°31'15''E, c. 260 m, old-growth *B. ermanii* forest (the oldest birch trees 200 to 250 years old) with *Filipendula camtschatica*, on bark of *Betula ermanii*, 5 Aug. 2002, Himelbrant et Kuznetsova, K-86 (LECB); as above, 52°54'40''N, 157°28'28''E, c. 270 m, tall-herb *Betula ermanii* forest, on bark of *Betula ermanii*, 8 Aug. 2002, Himelbrant et Kuznetsova, K-150 (LECB); as above, 52°54'46''N, 157°30'05''E, *Salix udensis* forest, on bark of *Alnus fruticosa*, 13 Aug. 2002, Himelbrant et Kuznetsova, K-151 (LECB); Bystraja-Bol'shaja River basin, right side of Bystraja-Bol'shaja River, 53°06'50''N, 156°52'06''E, c. 150 m, *Betula ermanii* forest (the oldest birch trees 150 to 200 years old) with *Pinus pumila*, 17 Aug. 2002, on bark of *Betula ermanii*, *Sorbus sambucifiolia* and *Salix udensis*, Himelbrant et Kuznetsova, K-79, K-81, K-82 (LECB); as above, 53°05'42''N, 156°53'06''E, c. 140 m, *Betula ermanii* forest (the oldest birch trees 150 to 270 years old) with tall herbs and *Angelica ursina*, 18 Aug. 2002, Himelbrant et Kuznetsova, K-87 (LECB).

Caloplaca borealis is one of the most widespread and common kamchatian corticolous lichens with circumboreal distribution. It grows on bark of *Alnus fruticosa*, *Betula ermanii*, *Salix udensis*, *Sorbus sambucifiolia* and *Picea ajanensis* in *Betula ermanii* or *Picea ajanensis* stands as well as mixed forests. *Caloplaca borealis* is characterized by presence of olivaceous pigment in the proper margin of apothecia that is very similar to young *C. cerina*. *C. tiroliensis* grows on the cortex of the Kamchatian deciduous trees as well, but varies from *C. borealis* due to more swollen margin (up to 80–110 μm) and urceolate to flat apothecial disk predominated by olivaceous pigment. *C. borealis* has thinner proper margin (up to 60–80 μm) predominated by olivaceous pigment and flat to slightly convex apothecial disk.

Caloplaca caesiorufella (Nyl.) Zahlbr., Cat. Lich. Univ., **7**: 83 (1931).

Specimens examined: **Southeastern Kamchatka**, Elizovsky district, Khodutka Bay, right side of Right Khodutka valley, in vicinity of the Pacific Ocean shore, 51°46'03''N, 157°58'35''E, c. 10 m, *Betula ermanii* forest (the oldest birch trees 250 to 350 years old) with *Calamagrostis langsdorfii*, 25 July 2002, Nešataeva et Černyadjeva, K-173 (LECB); **Southwestern Kamchatka**, Ust'-Bol'sheretsky district, Bannaja River basin, right side of Bannaja River near Kosogorchik mountain, 52°54'40''N, 157°28'28''E, c. 270 m, tall-herb old-growth *Betula ermanii* forest, on bark of *Betula ermanii*, 8 Aug. 2002, Himelbrant et Kuznetsova, K-168 (LECB).

Caloplaca caesiorufella grows in Southern Kamchatka on bark of *Betula ermanii* in *B. ermanii* forests. It seems to be a rare lichen. Known from North Europe, Asia, and North America. It is closely related to *C. phaeocarpella* (Nyl.) Zahlbr. differing in amphithecial tissue reacting pale bluish in I (SØCHTING, 1989).

Caloplaca cerina (Ehrh. ex Hedw.) Th. Fr., N. Acta Reg. Soc. Sc. Upsal., ser. 3, **3**: 218 (1861).

Specimens examined: **Southeastern Kamchatka**, Elizovsky district, Rakovaya Bay, cape next to Solenoe Lake, May 1909, Savicz 4999 (as *Placodium gilvum* (Hoffm.) Vain. v. *stillicidiorum* Ach.), Kamchatian expedition of Rjabushinsky (LE); as above, between Schapino and Kronoki, Pology pass, 1908, Savicz 6245 (as *Placodium gilvum* (Hoffm.)

Vain. v. *stillicidiorum* Ach.), Kamchatian expedition of Rjabushinsky (LE); as above, Schapinski hot springs, May 1909, Savicz 6174 (as *Placodium gilvum* (Hoffm.) Vain. v. *stillicidiorum* Ach.), Kamchatian expedition of Rjabushinsky (LE); **Southwestern Kamchatka**, Ust'-Bol'sheretsky district, Bystraja-Bol'shaja River basin, right side of Bystraja-Bol'shaja River, 53°06'50''N, 156°52'06''E, c. 150 m, *Betula ermanii* forest (the oldest birch trees 150 to 200 years old) with *Pinus pumila*, on bark of *Betula ermanii*, Himelbrant et Kuznetsova, K-58 (LECB).

It grows in Southern Kamchatka on bark of deciduous trees. Seems to be widespread on the peninsula and in Northern Hemisphere though not abundant.

Caloplaca cerina var. ***chloroleuca*** (Sm.) Th. Fr., Lichenogr. Scand., **1**: 174 (1871).

Specimens examined: **Central Kamchatka**, Ust'-Kamchatsky district, northern slope of volcano Ploskaja-Dal'naja, Glacier Bilchenok., 56°11'44''N, 160°21'54''E, c. 910 m, 24 July 2003, Bakalin, K-152 (LECB); Bystrinsky district, Kreruk River basin, group of hot springs "Krerukskye", 56°21'22''N, 159°25'55''E, c. 690 m, on dead *Peltigera* thallus, 27 July 2003, Kuznetsova, K-158 (LECB).

On mosses and plant debris in open alpine and subalpine communities. Probably not rare, but overlooked. General distribution is the same as of the type variety.

Caloplaca chrysophthalma Degel., K. Sv.-Akad. Skr. Natursk., **46**: 56 (1944).

Specimens examined: **Central Kamchatka**, Bystrinsky district, Bystraja River basin, right side of Bystraja River, 55°49'57''N, 159°26'20''E, c. 125 m, *Populus suaveolens* forest with *Sorbaria sorbifolia*, on bark of *Populus suaveolens*, 19 Aug. 2003, Bakalin, K-154, K-155 (LECB); near vill. Tolbachik, Tolbachik River, July 1909, Savicz 5440, Kamchatian expedition of Rjabushinsky (LE); near vill. Kirganik and vill. Mashura, 1909, Savicz 5473, Kamchatian expedition of Rjabushinsky (LE).

On bark of *Populus suaveolens* and *Alnus* spp. in deciduous forests. Probably widespread, but overlooked. It is known from Europe, Asia, and North America. The species is characterized by whitish, slightly pruinose filmy thallus with punctiform yellow soralia.

Caloplaca citrina (Hoffm.) Th. Fr., N. Acta Reg. Soc. Sc. Upsal., **3(3)**: 218 (1861).

Specimens examined: **Central Kamchatka**, Bystrinsky district, Bystraja River basin, vicinity of Esso, rocks along the road to the pass Gorgochan, 55°53'11''N, 158°40'10''E, c. 670 m, on rocks, 19 Aug. 2003, Himelbrant et Kuznetsova, K-99, K-102 (LECB); **Southwestern Kamchatka,** Ust'-Bol'sheretsky District, Bystraja-Bol'shaja River basin, right side of Bystraja-Bol'shaja River, 53°04'20''N, 156°55'24''E, c. 100 m, on concrete base of bridge, 16 Aug. 2002, Himelbrant et Kuznetsova, K-156 (LECB).

On various rocks in moderately shaded conditions. Widespread cosmopolitan lichen but probably overlooked in Kamchatka.

Caloplaca crenulatella (Nyl.) H. Olivier, Mem. Soc. Sc. Nat. Cherbourg, **37**: 110 (1909).

Specimen examined: **Central Kamchatka**, Bystrinsky district, Anavgay River basin, group of hot springs "Oksinskye", 56°17'06''N, 159°11'07''E, c. 660 m, on travertine stones, 19 July 2003, Kuznetsova, K-109 (LECB).

Collected from rocks near hot springs. Known from one locality in Central Kamchatka. This species reported from Europe and New Zealand. *C. crenulatella* resembles *C. lactea* and is characterized by small yellow-orange areoles or squamules, medium-sized ascospores

(up to 20–22 μm) with narrow septa (2–3 μm), often colonizing newly opened and anthropogenic substrates. New to Russia and Asia.

Caloplaca epithallina Lynge, Lichens NE Greenl.: 144 (1940).

Specimen examined: **Central Kamchatka**, Bystrinsky district, Bystraja River basin, vicinity of Esso, vertical rock surfaces along the road to the pass Gorgochan, southern exposition, 55°53'11''N, 158°40'10''E, c. 660 m, on *Rhizoplaca* sp., 21 Aug. 2003, Himelbrant et Kuznetsova, K-108 (LECB).

On thalii of various foliose and crustose saxicolous lichens (e. g. *Rhizoplaca*). Known from Central Kamchatka. It has wide holarctic distribution.

Caloplaca etesiae (Nyl.) Du Rietz, Arkiv. för Bot, 20 A, **13**: 23 (1929).

Lecanora etesiae Nyl., Flora, 68: 439 (1885). – **Type**: Fretum Behringii. Ins. Behringii. (Exped. Vega) no. 30458 (H-NYL lectotype, selected here).

Caloplaca brattiae W. A. Weber, Graphis Scripta **2**: 168 (1989). – **Type**: U.S.A. California, Santa Barbara County, Channel Islands, Santa Cruz Island, west end of the island, on top of the rocky headland just above the spray zone, ca. 50–100 m. An almost pure stand dominating the level or gently sloping area; occurring with *Caloplaca rosei* Hasse and sometimes overgrown with *Xanthoria candelaria* (L.) Th. Fr., 8 Jan. 1986, W. A. Weber et C. Bratt, Lich. Ex. Colo. No. 660 (H isotype).

Specimens examined: **Southeastern Kamchatka**, Elizovsky district, Pacific Ocean shore, S to Halaktyrka River estuary, 52°56'33''N, 158°47'27''E, c. 30 m, on littoral rocks, 30 July 2002, Himelbrant et Kuznetsova, K-104 (LECB); as above**,** cape in Rakovaya Bay, close to colony of lepers, May 1909, Savicz 5025 (as *Placodium murorum* (Hoffm.) DC.), Kamchatian expedition of Rjabushinsky (LE); as above**,** Toporkoff island, 8 Aug. 1920, Hulten 781, Svenska Kamchatka expeditionen 1920–1922 (Du Rietz, 1929) (as *Callopisma etesiae* (Nyl.) DR.), L-132624 (264688), (UPS).

On exposed seashore rocks. Known from Southeastern Kamchatka. Distribution of *Caloplaca etesiae* ranges from Russian Far East (Kamchatka, Chukotka) and Northwest and West U.S.A. (Alaska, Oregon, California). The morphology and anatomy of the type specimens of *C. brattiae* and *C. etesiae* are identical and differ only in localities (both in the North Pacific region). *C. scopularis* is related lobate species resembling *C. etesiae* by anticlinally arranged hyphae of the cortex, but having shorter lobes (up to 1.0–1.5 mm, 1.5–2.5 mm in *C. etesiae*) and wider ascospores (up to 5.0–6.5 μm, 3.5–5.0 μm in *C. etesiae*). *C. verruculifera*, another similar species, develops long marginal lobes, but is characterized by abundant wart-like isidia. For more details and differences of some related taxa see discussion in Du Rietz (1929).

Caloplaca aff. ***flavovirescens*** (Wulfen) Dalla Torre et Sarnth., Die Flechten von Tirol: 180 (1902).

Specimens examined: **Central Kamchatka**, Bystrinsky district, Bystraja River basin, vicinity of Esso, vertical rock surfaces along the road to the pass Gorgochan, eastern exposition, 55°53'07''N, 158°40'16''E, c. 580 m, on rocks, 19 Aug. 2003, Himelbrant, Kuznetsova, K-103 (LECB); as above, 55°53'11''N, 158°40'10''E, c. 670 m, fissure in the rock, on rocks, 19 Aug. 2003, Himelbrant, Kuznetsova, K-100 (LECB).

On vertical surfaces of siliceous rocks. Known from Central Kamchatka. It has a widespread distribution in Northern Hemisphere. The kamchatian specimens of *C. flavovirescens* differ from type description in less prominent areoles.

Caloplaca fulvolutea (Nyl.) Jatta, Sylloge Lich. Ital.: 245 (1900).

Specimen examined: **Southern Kamchatka**, Schapinskye hot springs, Aug. 1909, Savicz 6384 (as *Placodium jungermanniae* (Vahl) Tuck. v. *subolivacea* Th. Fr.), Kamchatian expedition of Rjabushinsky (LE).

On mosses (*Grimmia*) near hot springs in mountains of Central Kamchatka, probably overlooked. It has an arctic-alpine distribution in Europe and Asia. In old collections *C. fulvolutea* was misidentified or confused with *C. jungermanniae*. *C. fulvolutea* grows on *Grimmia* as a parasite, has smaller apothecia (up to 0.3–0.6 mm, 1–2 mm in *C. jungermanniae*) and ascospores (up to 15–17 × 7–10 μm, 16–21 × 7–8 μm in *C. jungermanniae*), as well as urceolate to flat ochraceous-orange disc. For detailed description see Hanssen et al. (1987). New to Russia.

Caloplaca gordejevi (Tomin) Oxner ex Khodosovtsev, comb. nova

Placodium gordejevi Tomin, Bull. of Southern Ussuri Branch of the State Russian Geographical Society, 12: 217 (1926). – **Type**: Ussurijsky Kray, E slope of main top Reinike, on bark of trees, 1915, Gordeev, L 448 (LE – lectotype, selected here).

Caloplaca gordejevi (Tomin) Oxner, Keys for identification of genera and species of family *Caloplacaceae* Zahlbr. for the lichen flora of the USSR: 44 (1990), *comb. illeg*.

Specimens examined: **Southeastern Kamchatka**, Elizovsky district, middle current of Kronotskaja River, *Betula ermanii* forest with *Populus suaveolens*, on bark of *Populus suaveolens*, 14 Aug. 1982, Mikulin 239-82 no. 2-118-d (as *Caloplaca aurantiaca* Th. Fr.) (LE); **Southwestern Kamchatka**, Ust'-Bol'sheretsky district, Bolsheretsk, 52°26'N 156°16'E, on *Salix gmelinii*, 10 July 1921, Hulten 2089, Svenska Kamchatka expeditionen 1920–1922, L-132623 (264687) (UPS) (in Du Rietz, 1929 as *Callopisma aurantiaca* (Lightf.) Mass.); as above, Bannaja River basin, right side of Bannaja River near the local mountain, 52°54'56"N, 157°31'15"E, c. 260 m, old-growth *Betula ermanii* forest (the oldest birch trees 200 to 250 years old) with *Filipendula camtschatica*, on bark of *Betula ermanii*, 5 Aug. 2002, Himelbrant et Kuznetsova, K-88 (LECB); as above, 52°54'32"N, 157°30'32"E, c. 260 m, *Salix udensis* brushwood on beach, on bark of *S. udensis*, 6 Aug. 2002, Himelbrant et Kuznetsova, K-169 (LECB); as above, 52°54'46"N, 157°30'37"E, c. 250 m, *Betula ermanii* forest, on bark of *B. ermanii*, 13 Aug. 2002, Himelbrant et Kuznetsova, K-171 (LECB); as above, 52°54'26"N, 157°30'06"E, c. 240 m, water-meadow, on bark of *Populus suaveolens*, 6 Aug. 2002, Himelbrant et Kuznetsova, K-170 (LECB); as above, Bystraja-Bol'shaja River basin, right side of Bystraja-Bol'shaja River, 53°06'50"N, 156°52'06"E, c. 146 m, *Betula ermanii* forest (the oldest birch trees 150 to 200 years old) with *Pinus pumila*, on bark of *Betula ermanii*, 17 Aug. 2002, Himelbrant et Kuznetsova, K-78 (LECB); as above, right side of Nachilova River near the bridge, 53°07'00"N, 156°53'43"E, c. 60 m, *Salix udensis-Chosenia arbutifolia* forest, on bark of *Salix udensis*, 17 Aug. 2002, Himelbrant et Kuznetsova (LECB); **Southern Kamchatka,** Elizovsky district, between Korjaki and Nachiki, "Narrow place" next to Korjatskaja River, Sept. 1908, Savicz 6038, Kamchatian expedition of Rjabushinsky (as *Placodium aurantiacum* (Light.) Hepp. v. *salicinum* Ach.) (LE).

It is a common and widespread lichen growing on bark of deciduous trees. *Caloplaca gordejevi* seems to be a geographic vicariant of *C. flavorubescens* in the Far East. It resembles *C. flavorubescens* but differs in having short-bacilliform spermatia (2.0–2.5 × 0.5–0.8 μm), dark-orange to ferruginous-red disk with concolorous proper margin as well as biatorine to zeorine (rarely) apothecia. According to Giralt et al. (1991), *C. flavorubescens* has longer spermatia (4.0–5.0 × 0.7 μm) as well as orange to dark-orange disk and more or less zeorine apothecia.

Caloplaca haematites (Saint-Amans) Zwackh, Flora, **45**: 478 (1862).

Specimen examined: **Southeastern Kamchatka**, Elizovsky district, Zavojko (Elizovo), bank of Avacha River, Sept. 1908, Savicz 6056 (as *Placodium gilvum* (Hoffm.) Vain.), Kamchatian expedition of Rjabushinsky (LE).

On bark of deciduous trees. It is a holarctic lichen known from Southeastern Kamchatka. *Caloplaca haematites* seems to be part of *C. cerina* complex, which is in need of revision.

Caloplaca hungarica H. Magn., Göteb. K. Vetensk. Vitterh. Samh. Handl., ser. B, 3, **1**: 28 (1944).

Specimens examined: **Southeastern Kamchatka**, Elizovsky district, Khodutka Bay, right side of Right Khodutka valley, vicinity of the Pacific Ocean, 51°46'03''N, 157°58'35''E, c. 10 m, *Betula ermanii* forest (the oldest birch trees 250 to 300 years old) with *Calamagrostis langsdorfii*, on bark of *Betula ermanii*, 25 July 2002, Nešataeva, K-85 (LECB); as above, Zavojko (Elizovo), on bark of shrubs, 1908, Savicz 6150 (as *Placodium ferrugineum* (Huds.) Hepp v. *ammiospila* (Nyl.)), Kamchatian expedition of Rjabushinsky (LE); **Southwestern Kamchatka**, Ust'-Bol'sheretsky District, Bannaja River basin, right side of Bannaja River near Kosogorchik mountain, 52°54'40''N, 157°28'28''E, c. 270 m, tall-herb *Betula ermanii* forest, on bark of *B. ermanii*, 8 Aug. 2002, Himelbrant et Kuznetsova, K-167 (LECB); **Southern Kamchatka**, Mil'kovsky district, Mashura, on wood of old bridge, 1909, Savicz 5480 (as *Placodium ferrugineum* (Huds.) Hepp v. *genuinum* Th. Fr.), Kamchatian expedition of Rjabushinsky (LE); Elizovsky district, Malki-Ganaly, on bark of *Populus*, 1909, Savicz 5113 (as *Placodium ferrugineum* (Huds.) Hepp v. *corticolum* Anzi), Kamchatian expedition of Rjabushinsky (LE); as above, Nachiki, Uzdach River (on bark), 1908, Savicz 5738 (as *Placodium ferrugineum* (Huds.) Hepp), Kamchatian expedition of Rjabushinsky (LE).

On bark of *Betula ermanii*, *Populus*, and on wood. Widespread in Southern Kamchatka, though not abundant. It is distributed in boreal zone of Europe and Asia. *Caloplaca hungarica* is often misidentified for *C. ferruginea* in Boreal zone of Holarctic. Main differences of *C. hungarica* are smaller orange-ferruginous biatorine apothecia up to 0.3–0.6 mm (0.5–1.5 mm in *C. ferruginea*), thinner proper margin up to 60–80 μm (80–150 μm in *C. ferruginea*), and smaller ascospores 12–15 × 7–8 μm (15–18 × 8–9 μm in *C. ferruginea*) with septa 2.5–5.0 μm (5.0–7.5 μm in *C. ferruginea)*.

Caloplaca kamczatica (Savicz) Zahlbr., Cat. Lich. Univ., **7**: 149 (1931).

Placodium kamczaticum Savicz, Bull. Jard. Bot. Imp. Pierre le Grand, 14: 124 (1914). – **Type**: Kamchatka, coast of the Nalychevaya River, near mouth, on *Alnus*, Oct. 1909, Savicz L 45 (LE lectotype, selected here).

Caloplaca vicaria H. Magn., Bot. Notiser: 70 (1944). – **Type**: (not seen).

Additional specimens examined (*C. vicaria*): British Columbia, Canada, Queen Charlotte Ids, Graham island, 5 miles S of Tlell, 53°29'N, 131°56'W, spruce forest and adjoining field close to shore, on fallen *Alnus*, 14 June 1967, Brodo et Shchepanek 9731. Det.: Brodo, Apr. 1988. CANL 96410 REPS: 4, Nat. Herb. of Canada (H); British Columbia, Canada, Queen Charlotte Ids, Graham island, 4 miles N of Skidegate Mission, along the beach just N of the mouth of Miller Creek, 53°20'N, 131°57'W, young *Picea* forest and sand-gravel beach, on dead *Picea sitchensis* at edge of beach, 9 July 1971, Brodo et Wong 17975. CANL 96460 REPS: 6, Nat. Herb. of Canada (H).

Specimens examined: **Southwestern Kamchatka**, Ust'-Bol'sheretsky district, Bannaja River basin, right side of Bannaja River, 52°54'32''N, 157°30'32''E, c. 260 m, *Salix udensis* brushwood on beach, on bark of *S. udensis*, 6 Aug. 2002, Himelbrant et Kuznetsova, K-128, K-129 (LECB, dupl. in herb. Ulrik Søchting); as above, Bystraja-Bol'shaja River basin, right side of Bystraja-Bol'shaja River, 53°06'50''N, 156°52'06''E, c. 150 m, *Betula ermanii* forest (the oldest birch trees 150 to 200 years old) with *Pinus pumila*, on bark of *Betula ermanii*, 17 Aug. 2002, Himelbrant et Kuznetsova, K-80 (LECB, dupl. in herb. Ulrik Søchting); as above, on bark of *Sorbus sambucifiolia*, 17 Aug. 2002, Himelbrant et Kuznetsova, K-127 (LECB, dupl. in herb. Ulrik Sochting); as above, 53°04'51''N, 156°54'38''E, c. 60 m, *Betula ermanii* forest (the oldest birch trees 150 to 200 years old), bark of *Salix udensis*, 18 Aug. 2002, Himelbrant et Kuznetsova, K-130 (LECB, dupl. in herb. Ulrik Søchting).

On bark of deciduous trees (*Alnus*, *Salix*, *Sorbus*). Probably not rare in Southern Kamchatka, locally abundant. General distribution: North Pacific region (Russian Far East: Kamchatka; Canada: British Columbia).

We have not seen the type material of *Caloplaca vicaria*, only type material studied by Arup (1995: 107). He noted: "When A. H. Magnusson (1944) described *C. vicaria* he was not aware of the total variation of the species. Therefore, the type material represents an extreme form with almost no black or gray tinge to the proper margin". The diagnosis of this species in Magnusson (1944:71) does not include description of the blackish proper margin: "Apothecia 0.5–0.8(1) mm large, 0.2–0.3 mm thick, a few old ones with dark ferruginous brown disc. Apothecia without gonidia and cortex". We agree with concept of this species by Arup (1995) and determination of *C. vicaria* by Brodo (H). The latter data corresponds to our concept of *C. kamczatica* described from Kamchatka by Savicz (1914). This species is characterized by gray thallus limited by dark hypothallus, biatorine apothecia 0.3–0.7 mm diam. with yellowish-orange disk surrounded by blackish proper margin with greenish-black to dark-gray pigment in outer part of the parathecium as well as ascospores 11–15 × 7–9 μm and septa 3.5–5.5 μm. The Russian material has spermogonia and bacilliform spermatia 2.5–4.0 × 0.7–1.0 μm and slightly smaller ascospores when compared to North American specimens of *C. vicaria*. *Caloplaca kamczatica* is very closely related to *C. litoricola* Brodo (Brodo, 1984) that is, probably, ecological vicariant of *C. kamczatica* on littoral rocks. *Caloplaca vicaria* and *C. litoricola* are discussed and compared also in Arup (1995).

Caloplaca lithophila H. Magn., Ark. Bot., 33 A, **1**: 132 (1946).

Specimen examined: **Central Kamchatka**, Bystrinsky district, Anavgaj River basin, group of hot wells "Oksinskye", 56°17'11''N, 159°10'58''E, c. 680 m, dry and hot open place next to the brook, on travertine stones, 18 July 2003, Kuznetsova, K-105 (LECB).

On siliceous rocks near hot springs. It is a little known lichen in North Hemisphere, found from one locality in Central Kamchatka. *C. lithophila* sometimes is included into *C. holocarpa* complex. Under this name here we unite saxicolous forms with small and dispersed yellowish to orange areoles.

Caloplaca obliterans (Nyl.) Blomb. et Forssell, Points Förteckn. Scand. Växt., **4**: 69 (1880).

Specimens examined: **Central Kamchatka**, Bystrinsky district, Bystraja River basin, vicinity of Esso, vertical rocks along the road to the pass Gorgochan, eastern exposition, 55°53'11''N, 158°40'10''E, c. 670 m, fissure in the rocks, on rock, 19 Aug. 2003, Himelbrant et Kuznetsova, K-99 (LECB); **Southwestern Kamchatka**, Ust'-Bol'sheretsky district,

Bystraja-Bol'shaja River basin, right side of Bystraja-Bol'shaja River, 53°04'20''N, 156°55'24''E, c. 100 m, open place, on concrete base of bridge, 16 Aug. 2002, Himelbrant et Kuznetsova, K-153 (LECB).

On vertical surfaces of siliceous rocks and concrete constructions. Probably a widespread holarctic lichen, but overlooked in Kamchatka. *C. obliterans* grows with *C. citrina*, occupying small areas and is distinguished by squamules and lobes as well as punctiform soralia.

Caloplaca pyracea (Ach.) Th. Fr., Lich. Scand., **1**: 178 (1871).

Specimens examined: **Central Kamchatka**, Ust'-Kamchatsky district, Kluchi town, central street, on bark of *Populus suaveolens*, 22 Aug. 2003, Himelbrant et Kuznetsova, K-106 (LECB); **Southeastern Kamchatka**, Elizovsky District, Termalny habitation, central street, on bark of *Populus suaveolens*, 2 Aug. 2002, Himelbrant et Kuznetsova, K-107 (LECB); Avacha River, near Zavoyko (Elizovo), 1908, Savicz 6056, Kamchatian expedition of Rjabushinsky (LE).

On bark of deciduous trees in towns and villages of Kamchatka. Probably a common and widespread holarctic lichen. Here we use combination *C. pyracea* according to Søchting (1989), but commonly this species is included into *C. holocarpa* (Hoffm. ex Ach.) A. E. Wade complex.

Caloplaca saxicola (Hoffm.) Nordin, Calopl. Sect. Gasparr. i Nordeur.: 87 (1972).

Specimen examined: **Central Kamchatka**, Bystrinsky district, Bystraja River basin, vicinity of Esso, vertical rocks along the road to the pass Gorgochan, eastern exposition, 55°53'11''N, 158°40'10''E, c. 670 m, fissure in the rocks, on rock, 19 Aug. 2003, Himelbrant et Kuznetsova, K-101, K-102 (LECB).

On vertical siliceous rocks. It has cosmopolitan distribution, but known from only one locality in Central Kamchatka. The specimen of *C. saxicola* from Kamchatka relates to forms characterized by small thalline lobes and loose hyphae below the hypothecium (Wetmore & Karnefelt, 1998).

Caloplaca sorocarpa (Vain.) Zahlbr., Cat. Lich. Univ., **8**: 589 (1932).

Specimens examined: **Central Kamchatka**, Bystrinsky district, Bystraja River basin, right bank of Bystraja River, 55°49'57''N, 159°26'20''E, c. 120 m, *Populus suaveolens* forest with *Sorbaria sorbifolia*, on bark of *Populus suaveolens*, 19 Aug. 2003, Bakalin, K-155 (LECB); as above, Anavgaj River basin, right bank of Anavgaj River, on bark of *Populus suaveolens*, 30 July 2003, Kuznetsova, K-157 (LECB); **Southwestern Kamchatka**, Ust'-Bol'sheretsky district, Bystraja-Bol'shaja River basin, right side of Nachilova River near the bridge, 53°07'00''N, 156°53'43''E, c. 60 m, *Salix udensis*-*Chosenia arbutifolia* forest, on bark of *Salix udensis*, 17 Aug. 2002, Himelbrant et Kuznetsova (LECB).

On bark of *Populus suaveolens*. Probably common in Central Kamchatka. It is known from Europe, Asia, and North America. The barrel-shaped greenish-gray soralia, brownish-tinged external soredia are diagnostic for *Caloplaca sorocarpa*. New to Russian Asia.

Caloplaca tetraspora (Nyl.) H. Olivier, Mém. Soc. Sc. Nat. Cherbourg, **37**: 140 (1909).

Specimen examined: **Southeastern Kamchatka**, basin of Kronotskoye Lake, pass from Schapina River, alpine zone, July 1909, Savicz 6350 (as C. *jungermanniae* (Vahl) Th. Fr. v. *glabratum* Savicz nov. var.), Kamchatian expedition of Rjabushinsky (LE).

On mosses in high altitudes. Known from one locality in Kamchatka. It is an arctic-alpine lichen with bipolar distribution. The species has four large ascospores per ascus and rust-coloured epipsamma on the convex apothecial disk.

Caloplaca tiroliensis Zahlbr., Annal. Mycol., **1**: 360 (1903).

Specimens examined: **Central Kamchatka**, Ust'-Kamchatsky district, Yelovka River basin, right side of River Yelovka opposite the estuary of Urylychen River, 56°55'25''N, 160°59'57''E, c. 100 m, moss-rich *Picea ajanensis* forest with *Betula ermanii*, *Larix cajanderi*, *Sorbus sambucifolia*, *Pinus pumila*, on bark of *Sorbus sambucifolia*, 29 Aug. 2003, Himelbrant et Kuznetsova, K-92 (LECB); as above, 56°55'48''N, 161°00'56''E, c. 110 m, moss rich *Picea ajanensis* forest with *Betula ermanii*, *Sorbus sambucifolia*, *Sorbus sibirica*, *Pinus pumila*, on bark of *Betula ermanii*, Himelbrant et Kuznetsova, 1 Sept. 2003, K-95 (LECB); **Southwestern Kamchatka**, Ust'-Bol'sheretsky District, Bystraja-Bol'shaja River basin, right side of Bystraja-Bol'shaja River, 53°05'42''N, 156°53'06''E, c. 140 m, *Betula ermanii* forest (the oldest birch trees 150 to 270 years old) with tall herbs and *Angelica ursina*, on bark of *Salix udensis*, Himelbrant et Kuznetsova, 18 Aug. 2002, K-83 (LECB); as above, 53°05'37''N, 156°53'29''E, c. 100 m, tall-herb stone-birch forest (the oldest birch trees 250 to 300 years old), on bark of *Betula ermanii*, Himelbrant et Kuznetsova, 16 Aug. 2002, K-91 (LECB).

C. tiroliensis is a common bipolar lichen on small twigs, mosses, and plant debris in subarctic or subalpine communities. In Kamchatka this species grows on bark of *Betula ermanii*, *Salix udensis*, and *Sorbus sambucifolia* with *Caloplaca borealis*.

Caloplaca verruculifera (Vain.) Zahlbr., Cat. Lich. Univ., **7**: 272 (1931).

Specimen examined: **Southeastern Kamchatka**, Elizovsky district, 10 km N to estuary of Semjachik River, rocky shore of Pacific Ocean between estuaries of spring Gorjachij and Pervaja River, on rocks, 28 July 1985, Mikulin 1-03-a/1-85 No 2-095-d (as *Caloplaca granulosa* Jatta) (LE).

It is known on littoral rocks in northern regions of Europe, Asia, and North America. Not common in Southeastern Kamchatka. *C. verrucullifera* differs from *C. granulosa* (Müll. Arg.) Jatta by anticlinally arranged hyphae of thalline cortex and in ecology (rocks in the littoral zone).

EXCLUDED TAXA AND DUBIOUS REPORTS

Caloplaca ammiospila (Wahlenb.) H. Olivier, Mém. Soc. Sc. Nat. Cherbourg, 37: 136 (1909).

Specimens reported by Nešataeva et al. (2003; LECB) belong to *C. caesiorufella* (Nyl.) Zahlbr., which distinguishes by smaller apothecia and spores, as well as thin margin of apothecia.

Caloplaca aurantia (Pers.) Hellb., Sitzungsber. K. Akad. Wiss. Wien, math.-naturw. Kl., 105, **1**: 433 (1896).

This species was mentioned by Mikulin (1990) without locality details. *C. aurantia* grows on calcareous rocks, especially on limestone in the semiarid regions. Therefore, its presence on Kamchatka seems to be dubious taking into account moist and cold climate of this region and predominating volcanic rocks.

Caloplaca ferruginea (Huds.) Th. Fr., N. Acta Reg. Soc. Sc. Upsal., ser. 3, **3**: 233 (1861).

Mikulin (1987, 1988, 1990) reported this species in broad sense: specimen collected from stones in Elizovsky District, Kronotsky Penninsula, Bol'shaja Chazhma River basin, top of mountain 1100 m, 1 Aug. 1981, 564n-81 No 1-120-d (LE), does not belong to *C. ferru-ginea* s. str. Records of epiphytic *C. ferruginea* (Nešataeva et al., 2003) belong to *C. hun-garica*.

Caloplaca flavorubescens (Huds.) J. R. Laundon, Lichenologist, **8**: 147 (1976).

All specimens determined as *C. flavorubescens* (syn. *C. aurantiaca* auct.) (LE; H) have short spermatia and ferruginous-red apothecia and therefore belong to *C. gordejevi*. Reports of this species in Du Rietz (1929) and Mikulin (1986, 1990) are erroneous.

Caloplaca granulosa (Müll. Arg.) Jatta, Sylloge Lich. Ital.: 237 (1990).

The only specimen determined as *C. granulosa* (Mikulin, 1990) is kept in LE. It has been collected from seashore rocks and is characterized by anticlinally arranged hyphae of thalline cortex, long lobes and, therefore, belongs to *C. verrucullifera*.

Caloplaca jungermanniae (Vahl) Th. Fr., N. Acta Reg. Soc. Sc. Upsal., ser. 3, **3**: 221 (1861).

Specimens reported by Mikulin (1990, without locality data) under the name of *C. jungermanniae* are absent in LE. Two specimens collected by Savicz (LE unpublished) belong to *C. fulvolutea* and *C. tetraspora*.

Caloplaca obscurella (J. Lahm ex Körb.) Th. Fr., Lichenogr. Scand., **1**: 182 (1871).

This species was reported by Mikulin (1990, without localities). The specimens were not found in LE. This record probably belongs to *C. sorocarpa*.

Caloplaca sinapisperma (Lam. et DC.) Maheu et Gillet, Lich. Corse: 35 (1914).

The ecological conditions of Kamchatka Mountains are optimal for this species, but we have not seen any specimens of *C. sinapisperma* reported by Mikulin (1990, without localities) in LE.

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KERPIŲ GENTIS *CALOPLACA* KAMČIATKOS PUSIASALYJE (RUSIJOS TOLIMIEJI RYTAI)

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Santrauka

Straipsnyje aprašytos šiuo metu Kamčiatkos pusiasalyje (Rusijos Tolimieji Rytai) užregistruotos 22 *Caloplaca* genties rūšys. Iš jų 18 rūšių Kamčiatkoje aptiktos pirmą kartą. *Caloplaca crenulatella* ir *C. fulvolutea* aptiktos pirmą kartą Rusijoje, o *C. sorocarpa* – Rusijos azijinėje dalyje. *Caloplaca ammiospila*, *C. aurantia*, *C. flavorubescens*, *C. granulosa* ir *C. jungermanniae* išbrauktos iš Kamčiatkos kerpių sąrašo. Pateikti straipsnyje aprašomų kerpių ekologijos ir paplitimo duomenys.

Straipsnyje pateikiamos nomenklatūros naujovės: *Caloplaca vicaria* sinonimizuojama su *C. kamczatica*, o *C. brattiae* su *C. etesiae*; iš naujo skelbiama *Caloplaca gordejevi* (Tomin) Oxner ex Khodosovtsev nomenklatūrinė kombinacija. Nustatyti *C. etesiae*, *C. gordejevi* ir *C. kamczatica* lektotipai.

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