

## FIVE NEW *CALOPLACA* SPECIES (TELOSCHISTACEAE, ASCOMYCOTA) FROM ASIA

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Five new species of the genus *Caloplaca*: *C. austrocoreana* S. Y. Kondr., L. Lókös et J.-S. Hur (from rocks of coastal zone of South Korea), *C. kudratovii* S. Y. Kondr., B. Zarei-Darki et J.-S. Hur (from lichen thalli and silicate rocks of Iran), *C. tarani* S. Y. Kondr., S. I. Tchabanenko, I. Galanina et L. Yakovczenko (from bark of deciduous trees of Sakhalin, Khabarovsky and Primorsky regions of Russia), *C. yeosuensis* S. Y. Kondr. et J.-S. Hur (from rocks of coastal zone of South Korea), and *C. zoroasteriorum* S. Y. Kondr. et M. Haji Moniri (from bark of deciduous trees of Iran and Uzbekistan) are described, compared with related taxa, and illustrated.

Key words: *Caloplaca*, Iran, Korea, Russia, new for science species, Teloschistaceae

### INTRODUCTION

In spite of a number of new species of the genus *Caloplaca* were recently described (Kondratyuk *et al.* 1996, 2004a, 2007, 2009a, b, 2010, 2011a, b, 2012b; Lumbsch *et al.* 2011; etc.) there is a number of taxa, which are still out of the published keys (Kondratyuk *et al.* 2004b, 2012a).

The aim of this paper is to present valid description of the next five species recently found in various regions of Asia.

## MATERIALS AND METHODS

Materials of representatives of the Teloschistaceae were revised in the following herbaria: KW-L, KoLRI, LD, MSK-L, SAKH, VBG.

## TAXON DESCRIPTIONS

*Caloplaca austrocoreana* S. Y. Kondr., L. Lókös et J.-S. Hur, spec. nova  
(Fig. 1)

Similar to *Caloplaca albovariegata*, but differs in having regular cortical layer of thallus, in having lower hymenium, in having narrower ascospores and wider septum, in having distinctly bluish epihymenium and bluish lateral true exciple; and in the lack of reaction with K in thalline cortex and lateral outermost part of true exciple.

**Type:** South Korea: Jeollanam-do, Yeosu-si, Nam-myeon, Yusong-ri, Geumoh-do, on rock. Lat.: 34° 31' 55.03" N; Long.: 127° 45' 55.05" E; Alt.: 11 m a.s.l. Coll.: U. Jayalal, J. S. Park and J. A. Ryu (120513), 27.04.2012. Holotype: KoLRI 015504; Isotypes: KoLRI 015502, the same locality, growing together with *Buellia*, *Dimelaena*, *Verrucaria*, *Lecanora* (120511); KoLRI 015506 (sub *Phaeophyscia exornatula*), the same locality (120515-1); KoLRI 015515, the same locality (120523).

Thallus 3–4 cm across, very smooth in peripheral zone to areolated in the centre; grey to grayish white with brighter white soralia, sometimes coalescing in places; cracked or areolate, areoles small (0.2–)0.5–0.7 mm across, irregular, with not very deep cracks; with plumbeous grey upper surface and white medulla naked in the cracks. Soralia 0.3–0.5(–1) mm across, rounded, stipitate, usually at the edges of areoles, often aggregated in irregular groups 1–1.5(–2) mm across; soredious mass bluish or becoming whitish when without soredia. Soredia powdery, bluish, to 20 µm diam. Hypothallus bluish black, to 5–7 mm wide in the peripheral zone sometimes also seen between areoles in places, at the edges in contact with other crustose lichens black line often present. Thallus in section to 150 µm thick, cortical layer to 30–35 µm thick, paraplectenchymatous, cell lumina rounded to 5 µm diam., algal layer to 70–80 µm thick.

Apothecia 0.4–0.7 mm diam. (in section to 0.2 mm thick), black, distinctly contrasting to thallus, rounded, single and distant, or aggregated in groups and crenulated, immersed at first then sessile; biatorine, disc plane, black or brownish black, matt, own margin slightly rising level of disc, black or bluish

black, somewhat shiny, often indistinct, 50–75  $\mu\text{m}$  thick; in section biatorine; true exciple (40–)80–100(–130)  $\mu\text{m}$  thick in uppermost lateral portion, paraplectenchymatous with cell lumina to 5–8  $\mu\text{m}$  diam., with outer layer somewhat bluish, greenish-bluish to greenish-bluish-blackish, K–, and to (15–)40  $\mu\text{m}$  thick in lower lateral and basal portion, paraplectenchymatous with well-developed matrix, cell lumina 2–3  $\mu\text{m}$  diam.; thalline exciple sometimes developed only on underside, cortical layer to 30–35  $\mu\text{m}$  thick; hymenium 60–70  $\mu\text{m}$  high; epihymenium 30–40  $\mu\text{m}$  thick, bluish, paraphyses tips to 4–5  $\mu\text{m}$  diam., becoming distinctly brownish; subhymenium 70–100  $\mu\text{m}$  thick (“paraplectenchymatous” sensu Wetmore), with oil droplets 2–3(–4)  $\mu\text{m}$  diam.; ascospores bipolar hyaline, elongated ellipsoid to somewhat fusiform with rounded ends, (10–)12–14(–16)  $\times$  (4–)5–6  $\mu\text{m}$  in water and (11–)12–16  $\times$  5–7  $\mu\text{m}$  in K, ascospore septum (3–)4–6(–7)  $\mu\text{m}$  wide in water and (5–)6–8(–9)  $\mu\text{m}$  wide in K.

**Chemistry:** Thallus K+ yellow, then greenish yellow, C–, KC+ yellow or –; Pd+ slowly becoming pale yellow; bluish portion of lateral true exciple and hymenium K–; epihymenium K+ purple and becoming lighter to/or hyaline or dull crimson; probably contains atranorin and other compounds.

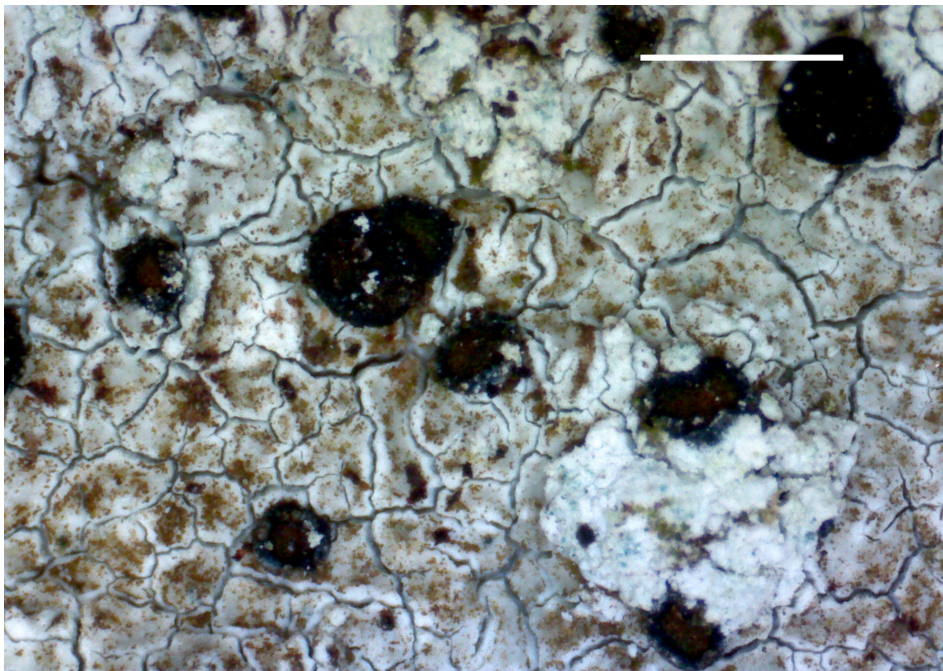


Fig. 1. Holotype of *Caloplaca austrocoreana* (KoLRI 015504) (scale bar = 1 mm)

**Ecology:** In coastal zone on rock surface growing together with *Pyxine endochrysin*, *Physcia adscendens*, and species of the genera *Aspicilia*, *Myelochroa*, *Buellia*, *Dimelaena*, *Verrucaria*, and *Lecanora*.

**Etymology:** It is named after South Korea, where the type collection was found.

**Distribution:** It is hitherto known from Eastern Asia (South Korea).

**Taxonomic notes:** *Caloplaca austrocoreana* is similar to *Caloplaca albovariegata* (B. de Lesd.) Wetmore, western North American species growing on calcareous and non-calcareous rocks having blue-grey thallus colour, stipitate areoles, thick irregular thallus cortex with epinecral layer, and the clumps of algae causing variegated areole surface. However, *Caloplaca austrocoreana* differs from the latter in having regular cortical layer of thallus, in having lower hymenium (60–70  $\mu\text{m}$  vs. 72–116  $\mu\text{m}$  high), in having shorter and narrower ascospores (13–14  $\times$  5–6  $\mu\text{m}$  vs. 14–18  $\times$  7–10  $\mu\text{m}$ ) and wider ascospore septum (4–6  $\mu\text{m}$  vs. 1.5–4  $\mu\text{m}$ ), in having distinctly bluish epihymenium and bluish lateral true exciple and in absence of reaction with K in thalline cortex and lateral outermost part of true exciple, as well as in the lack of epinecral layer and clumps of algae (Wetmore 1994).

A number of other members of the genus *Caloplaca* subgen. *Pyrenodesmia*, i.e. *C. conversa* (Krempf.) Jatta, *C. variabilis* (Pers.) Müll. Arg., *C. atroalba*, *C. peliophylla*, differs from *C. austrocoreana* in having much wider ascospores and in the lack of soredia.

*Caloplaca oblongula* (H. Magn.) Wetmore differs from *C. austrocoreana* in having light purplish brown epihymenium, in having non-septate or one septate larger (both longer and wider) ascospores (15.5–21  $\times$  5.5–8.5  $\mu\text{m}$  vs. 13–14  $\times$  5–6  $\mu\text{m}$ ), and narrower ascospore septum (0–1.5  $\mu\text{m}$  vs. 4–6  $\mu\text{m}$  wide), as well as in having apothecial margin K+ purple (Wetmore 1994).

**Additional specimens examined:** South Korea: Jeju Island, Seogwipo-si, Namwon-eur, Wimi-ri, on rock growing together with *Caloplaca squamosa* and *Lecanora* sp. Lat.: 33° 16' 06.39" N; Long.: 126° 39' 29.56" E; Alt.: 10 m a.s.l. Coll.: X. Y. Wang et al. (091424), 29.05.2009 (KoLRI 1067); Salyang Island, Gyeongsangnam-do, Tongyeong-si, Sang-do, on rock. Lat.: 34° 50' 33.20" N; Long.: 128° 12' 08.35" E; Alt.: ca. 28 m a.s.l. Coll.: X. Y. Wang et al. (110028), 20.04.2011 (KoLRI 012873); Gyeongnam Prov., Namhae Country, sea side, on rock. Lat.: 34° 43' 30.90" N; Long.: 127° 53' 40.70" E; Alt.: 16 m a.s.l. Coll.: X. Y. Wang and J. A. Ryu (110228), 28.04.2011 (KoLRI 13442); the same locality (110227), 28.04.2011 (KoLRI 13441); Jeollanam-do Yeosu-si, Nam-myeon, Yusong-ri, Geumoh-do, Mando beach, on rock, growing together with *Pyxine endochrysin*, *Physcia ascendens*, *Aspicilia*, *Myelochroa*, *Buellia*. Lat.: 34° 38' 55.00" N; Long.: 127° 48' 12.05" E; Alt.: 18 m a.s.l. Coll.: U. Jayalal, J. S. Park and J. A. Ryu (120577), 27.04.2012 (KoLRI 015569); the same locality (120580), 27.04.2012 (KoLRI 015572).

*Caloplaca kudratovii* S. Y. Kondr., B. Zarei-Darki et J.-S. Hur, spec. nova  
(Figs 2–3)

Similar to *C. scrobiculata*, but differs in having smaller thalli, in having smaller apothecia, in having paraplectenchymatous cortical layer of thallus and thalline exciple, in having smaller ascospores, and in having much wider ascospore septum, as well as in having initially parasiting habit, and in the lack of peripheral lobes.

**Type:** Iran, Esfahan and Markazi Province, about 200 km to S of Tehran, about 85 km to N of Esfahan City, between Meymeh and Delijan settlements, Mooteh Wildlife refuge, 13 km to the West of Zarkan settlement and Kharsng settlement, on rock, plant community with *Echinophora platyloba* DC., *Artemisia sieberi* Besser, *Acanthophyllum spinosum* (Desf.) C. A. Mey. Lat.: 33° 26' 01" N; Long.: 50° 56' 07" E; Alt.: 2,449 m a.s.l. Coll.: B. Zarei-Darki (2900), S. J. Khajeddin, Naghipur, Jabbari, 28.05.2010. Holotype: TEH.

Thallus initially among areoles or above thalli of *Caloplaca saxicola* or *C. biatorina*, then usually of scattered and distant areoles or rarely to more or less aggregated; areoles 0.5–1(–1.5) mm wide/across, irregularly rounded, not very thick, yellow-orange; upper surface of areoles distinctly wrinkled (but never fissurate or cracked and without exfoliations of whitish necrotic portions of cortical layers).

Apothecia to 0.7 mm diam., (in section to 0.3 mm thick), seem to be biatorine, while in section zeorine, initially 1–4 per areole, but usually only with one adult apothecium per areole; thalline exciple 12–24 µm thick in the uppermost position and to 100–120 µm wide on underside, cortical layer of thalline exciple paraplectenchymatous, with large cell lumina; true exciple rather thin, 12–24 µm wide in lateral portion and distinctly widened to 100–150 µm thick in basal portion, paraplectenchymatous; hymenium 72–80 µm high; paraphyses distinctly swollen towards the tips to 7 µm diam.; subhymenium to 100 µm thick; ascospores bipolar, hyaline, widely ellipsoid (especially in K), 12–13 × 4.5–5.5 µm in water and 11.5–14 × 6–7.5(–9.5) µm in K; ascospore septum (1–)3.5–4.5 µm wide in water and 4.5–5.5 µm wide in K.

**Chemistry:** Thallus and apothecia K+ purple.

**Ecology:** At initial stage usually as parasite on thalli of *Caloplaca saxicola* or *C. biatorina*, as well as on various rocks at high altitudes.

**Etymology:** It is named after a known Tajik lichenologist and our friend Imom Nazar Kudratov (07.03.1946–) (Dushanbe, Tajikistan), who emphasised species characters of *Caloplaca scrobiculata*, known so far from Central Asian

countries, with similar morphology of the upper cortex of areoles, and in recognition of his contribution to our knowledge on Central Asian lichens.

**Taxonomic notes:** *Caloplaca kudratovii* is similar to *C. scrobiculata* H. Magn. after having waved/wrinkled (seem to be eroded) surface of areoles, but differs in having smaller thalline areoles (0.5–1 mm vs. 1.5–2.5 mm diam./across), in having smaller apothecia (to 0.7 mm diam. vs. 0.8–1.5 mm diam.), in having paraplectenchymatous cortical layer of thallus and thalline exciple (vs. scleroplectenchymatous in *C. scrobiculata*), in having higher hymenium (72–80  $\mu\text{m}$  vs. 47–55  $\mu\text{m}$  high), in having smaller (shorter and narrower) ascospores (12–13  $\times$  4.5–5.5  $\mu\text{m}$  vs. 14–19  $\times$  5.7–7.6  $\mu\text{m}$ ), in having much wider ascospore septum (3.5–4.5  $\mu\text{m}$  vs. to 1.5  $\mu\text{m}$  wide), and in having initially parasite habit and in the lack of peripheral lobes, as well as in the lack of peripheral lobes.

Upper surface of areoles of *Caloplaca kudratovii* is finely wrinkled, but never fissured and without exfoliations of whitish necrotic portions of cortical layer (what is very characteristic for *C. scrobiculata*). Furthermore, areoles of *C. kudratovii* usually are distant and dispersed, they are not so densely aggregated as in *C. scrobiculata*.

After molecular data *C. kudratovii* found to be similar to *C. flavescens* group after ITS1/ITS2 gene of nuclear DNA, while after mitochondrial 12S SSU gene this taxon shows the highest similarity with *Seiophora* branch of the phylogenetic tree of the Teloschistaceae (Kondratyuk, Joeng, Hur et al., in prep.).

**Additional specimens examined:** Iran: Esfahan and Markazi Province, about 200 km to S of Tehran, about 85 km to N of Esfahan City, between Meymeh and Delijan set-



Fig. 2. Holotype of *Caloplaca kudratovii* (TEH, B. Zarei-Darki 2900) (scale bar = 1 mm)



tlements, Mooteh Wildlife Refuge, 4 km to the West of Varzaneh settlement. South of the Godar sorkh Mountain, on rock and on thalli of *Caloplaca saxicola*, plant community with *Acanthophyllum spinosum* (Desf.) C. A. Mey., *Artemisia sieberi* Besser, *Echinophora platyloba* DC. Lat.: 33° 33' 18" N; Long.: 50° 32' 38" E; Alt.: 1,892 m a.s.l. Coll.: B. Zarei-Darki (462), Khajeddin, Naghipur, 21.07.2010 (TEH); 6 km to the East of Golcheshme settlement and to the North of Ganehnoo Mountain, on rock, plant community with *Fumaria asepala* Boiss., *Acinus graveolens* (M. B.) Link, *Lithospermum officinale* L., *Pyrus communis* L. Lat.: 33° 42' 44" N; Long.: 50° 40' 39" E; Alt.: 2,182 m a.s.l. Coll.: B. Zarei-Darki (1652), Khajeddin, Naghipur, 21.07.2010 (KW-L); 6 km to the NE of Abbaric check-point and to the W of Palangi Mountain, on rock growing together with *Rusavskia elegans*, plant community with *Artemisia sieberi* Besser, *Acanthophyllum spinosum* (Desf.) C. A. Mey., *Echinophora platyloba* DC. Lat.: 33° 40' 37" N; Long.: 50° 41' 31" E; Alt.: 2,140 m a.s.l. Coll.: B. Zarei-Darki (2593), Khajeddin, Naghipur, 21.07.2010 (KW-L); 21 km to the West of Varzaneh settlement, on rock, plant community with *Artemisia sieberi* Besser, *Acanthophyllum spinosum* (Desf.) C. A. Mey., *Echinophora platyloba* DC. Lat.: 33° 38' 02" N; Long.: 50° 33' 16" E; Alt.: 2,089 m a.s.l. Coll.: B. Zarei-Darki (2777), Khajeddin, Naghipur, Jabbari, 21.07.2010 (TEH); the same locality. Coll.: B. Zarei-Darki (2779), Khajeddin, Naghipur, Jabbari, 21.07.2010 (KW-L); 1.5 km to the West of Laibeid village, on rock, plant community with *Astragalus glaucacanthus* Fisch., *Arrhenatherum kotschyi* Boiss., *Carduus pycnocephalus* L., *Andrachne telephioides* L., *Centaurea iberica* Trev. ex Spreng., *Phalaris minor* Retz. Lat.: 33° 25' 34" N; Long.: 50° 39' 56" E; Alt.: 2,510 m a.s.l. Coll.: B. Zarei-Darki (3024), Khajeddin, Naghipur, 21.01.2011 (KW-L); Esfahan

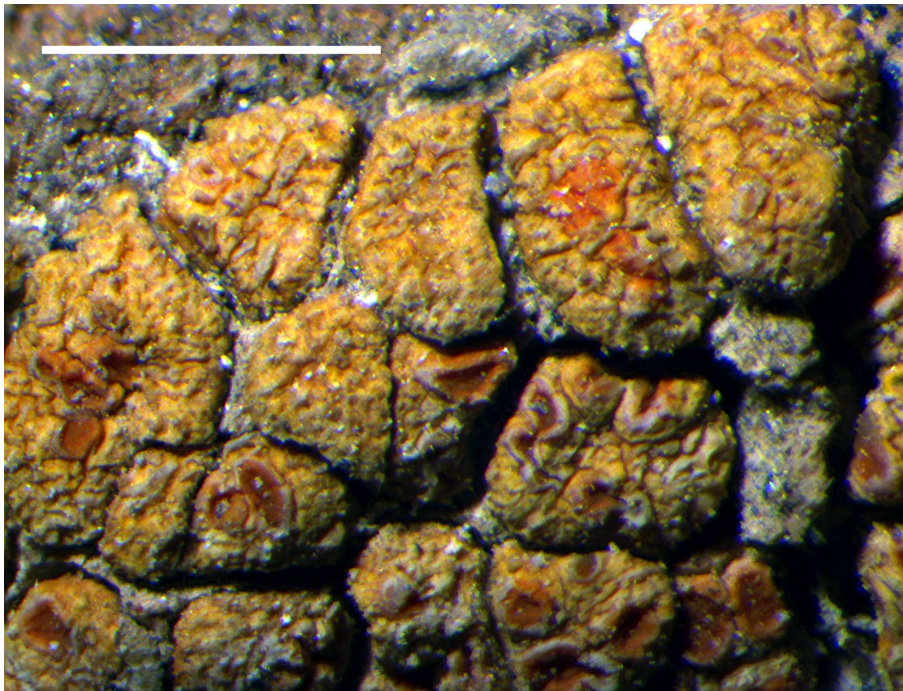


Fig. 3. Holotype of *Caloplaca kudratovii* (TEH, B. Zarei-Darki 2900), enlarged thallus areoles (scale bar = 1 mm)

and Markazi Province, about 250 km to S of Tehran, about 80 km to the North of Esfahan City, to the E of suburbs of Natanz settlement, along the Teheran–Yezd highway 7, Karkas Hunting-Prohibited Region, Abderaz farm, 6 km to the Northeast of Kalherud settlement, on rock growing together with *Lecania ochronigra*, plant community with *Bromus tectorum* L., *Valeriana cymbicarpa* C. A. Mey., *Amygdalus communis* L., *Malva sylvestris* L. var. *sylvestris*. Lat.: 33° 22' 20" N; Long.: 51° 35' 54" E; Alt.: 3,380 m alt. Coll.: B. Zarei-Darki (1653), Khajeddin, Safavi, Jabbari, Naghipur, 29.08.2010 (KW-L); the same locality. Coll.: B. Zarei-Darki (1657), Khajeddin, Safavi, Jabbari, Naghipur, 29.08.2010 (KW-L); the same locality. Coll.: B. Zarei-Darki (1660), Khajeddin, Safavi, Jabbari, Naghipur, 29.08.2010 (KW-L); to the South of Abderaz farm and nearly 5 km to NE of Kalherud settlement, on rock, plant community with *Astragalus glaucacanthus* Fisch., *Arrhenatherum kotschyi* Boiss., *Carduus pycnocephalus* L., *Andrachne telephioides* L., *Centaurea iberica* Trev. ex Spreng., *Phalaris minor* Retz. Lat.: 33° 32' 56" N; Long.: 51° 49' 01" E; Alt.: 1,846 m alt. Coll.: B. Zarei-Darki (1943), Khajeddin, Safavi, Jabbari, Naghipur, 30.04.2010 (KW-L); the same locality. Coll.: B. Zarei-Darki (1956), Khajeddin, Safavi, Jabbari, Naghipur, 30.04.2010 (KW-L); 3 km to the S of Abgahe Nia-beh; 16 km to the N of Kalherud settlement, on rock, plant community with *Delphinium lanigerum* Boiss. et Hohen., *Melica persica* Kunth, *Pistacia atlantica* Desf. Lat.: 33° 33' 36" N; Long.: 51° 38' 52" E; Alt.: 2,390 m a.s.l. Coll.: B. Zarei-Darki (1979, 1985, 1988, 1994, 1996, 1997, 1998), Khajeddin, Safavi, Jabbari, Naghipur, 15.08.2010 (TEH, KW-L); 1 km to NW of Abyaneh settlement, close to waterfall, on rock. Lat.: 33° 35' 13" N; Long.: 51° 34' 35" E; Alt.: 2,269 m a.s.l. Coll.: S. Y. Kondratyuk (21137), P. M. Zarenko and B. Zarei-Darki, 02.09.2011 (KW-L); 7 km to the NW of Targh settlement, towards Natanz settlement, on rock. Lat.: 33° 22' 11" N; Long.: 51° 43' 12" E; Alt.: 2,276 m a.s.l. Coll.: S. Y. Kondratyuk (21138), P. M. Zarenko and B. Zarei-Darki, 02.09.2011 (KW-L).

*Caloplaca tarani* S. Y. Kondr., S. I. Tchabanenko,  
I. Galanina et L. Yakovczenko, spec. nova  
(Fig. 4)

Similar to *Caloplaca oxneri*, but differs in having soresidious thalline protuberances often forming confluent soresidious mass in the centre, as well as in having mainly pruinose apothecia and shorter ascospores.

**Type:** Russia: Sakhalin Island, Smirnykhovsky district, at the basis of Mt Pogranichnaya, mixed deciduous and coniferous forest, on bark of *Ulmus laciniata*. Coll.: A. A. Taran, 30.05.1997. Holotype: SAKH; isotype: KW-L.

Thallus to 0.8–1.5 cm across or aggregated in larger spots; of scattered and more or less distant to more or less closely attached areoles being plane in peripheral zone to subconvex or convex and usually having isidia-like or protuberance-like uplifted formations on whitish hypothallus in the centre; sometimes somewhat indistinctly granular or with soresidia; grey, greenish grey to grey-brownish, when completely covered by apothecia or indistinct, at the edges in places of contact with other crustose lichen thalli forms black



line; thalline areoles very small, *ca* 0.1 mm across, usually scattered and plane, greenish well contrasting whitish hypothallus in peripheral zone; thalline areoles subconvex, convex and ascending, greenish grey to dark greenish grey or convex protuberances to 0.2–0.3 mm diam., upper portion of which with much brighter lemon-yellow soresidious mass, usually in the centre of thallus; soresidious mass dull greenish yellow, but usually seem to be much brighter (lightly yellowish) in parts owing to white medulla naked in places, not lax, seem to be isidiate. Soredia irregular granular, 30–50  $\mu$ m diam./across, yellow or greenish yellow, seem to be soaked or agglutinate, soon becoming isidiate. Hypothallus white, between areoles well seen.

Apothecia 0.4–1.2 mm diam., (in section to 0.27 mm thick), sometimes very numerous, lecanorine at first, with grey-brownish thalline margin and dull orange discs and true exciple, then seem to be biatorine or zeorine; disc dull brownish yellow, dull brown or brownish orange, at high magnification (40–100 $\times$ ) scarce yellow pruina; thalline margin dull yellow-brown-orange; true exciple dull brown-orange (usually darker of disc), and thalline exciple usually crenulate, yellow-green; disc plane at first then more or less undulating; in section thalline exciple to 70–100  $\mu$ m thick, well developed usually below of true exciple level, cortical layer to 20–30(–35)  $\mu$ m thick, paraplectenchymatous, cell lumina 5–6  $\mu$ m across, better developed on underside

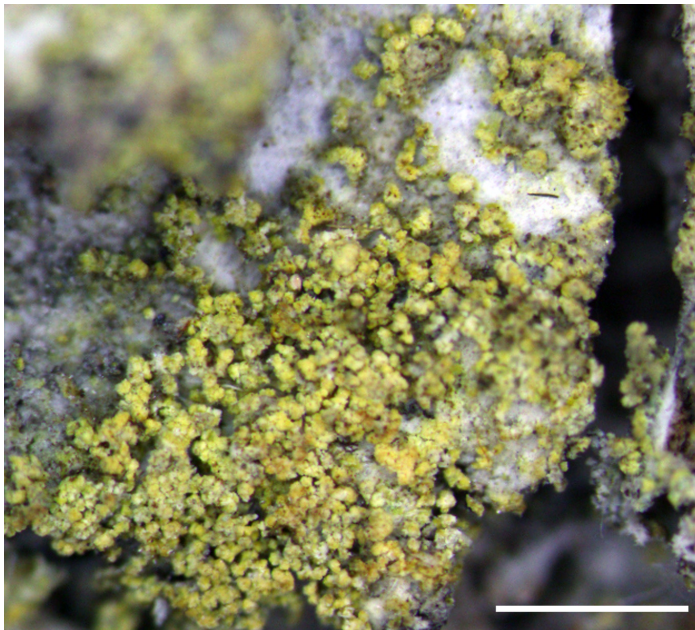


Fig. 4. Holotype of *Caloplaca tarani* (SAKH) (scale bar = 1 mm)

than in lateral portion; true exciple to 70–90  $\mu\text{m}$  in the upper lateral and to 50  $\mu\text{m}$  thick in basal portion, prosoplectenchymatous, hypha lumina to 2–4  $\mu\text{m}$  diam.; algal zone continuous, 60–70  $\mu\text{m}$  thick; hymenium 70–85(–90)  $\mu\text{m}$  high with oil droplets, especially in lower portion; subhymenium 50–60  $\mu\text{m}$  thick, somewhat greyish owing to numerous irregularly rounded oil droplets to 4–7(–8)  $\mu\text{m}$  diam./across (apothecium of the *Caloplaca flavorubescens* type); asci 8-spored, sometimes with single ascospores together with bipolar ones in the same ascus; ascospores widely ellipsoid, 12–16  $\times$  6–9  $\mu\text{m}$  in water, and (11–)15–18(–22)  $\times$  (5.5–)8–11(–12)  $\mu\text{m}$  in K, ascospore septum 5–7  $\mu\text{m}$  wide in water and (5–)6–10  $\mu\text{m}$  wide in K.

**Chemistry:** Cortical layer of thallus and thalline exciple, outer layers of true exciple and epihymenium K+ brightly cherry purple; the whole hymenium becoming purple in K.

**Ecology:** On bark of deciduous trees (*Populus maximowiczii*, *Salix sakhaliensis*, *Ulmus laciniata*), growing together with species of the genera *Chaenotheca*, *Lecanora*, *Collema* and some crustose sorediose lichens.

**Distribution:** So far known from several localities in deciduous-coniferous forests of the Sakhalin Island, Khabarovskiy and Primorsky regions of Russia.

**Etymology:** It is named after the known Russian botanist, specialist on vascular plants and geobotany, Dr Alexander A. Taran (Yuzhno-Sakhalinsk, Russia), who kindly provided us with the type collection and in recognition of his contribution to our knowledge on plant cover of Russian Far East region.

**Taxonomic notes:** *Caloplaca tarani* is a member of the *Caloplaca flavorubescens* complex including a number of species in the Russian Far East and Eastern Asia totally (*Caloplaca gordejevii* (Tomlin) Oxner et Khodos., *C. ussuriensis* Oxner, S. Y. Kondr. et Elix, *C. oxneri* S. Y. Kondr. et Søchting, *C. kiewkaensis* L. S. Yakovczenko, I. A. Galanina et S. Y. Kondr., *C. subflavorubescens* Y. Joshi et J.-S. Hur, etc.) (Kondratyuk et al. 2004a, 2011b, 2012b, Joshi et al. 2010).

*Caloplaca tarani* is similar to *Caloplaca oxneri*, but differs in having discrete soralia on thalline protuberances or confluent soredious mass, in having pruinose apothecia and in having somewhat shorter and especially narrower ascospores (12–16  $\times$  6–9  $\mu\text{m}$  vs. 13.5–18  $\times$  6–7  $\mu\text{m}$ ). Sometimes in places where soredious mass disappeared and only scarce fragment of isidia-like ascending remnants of protuberances present, it seems to be very similar to *C. oxneri*. However, the presence of the soredious mass in the same thallus helps to identify the material of *C. tarani*. Furthermore, *C. tarani* differs from *C. oxneri* in having apothecium discs with more or less well-developed yellow pruina.

*Caloplaca tarani* is similar to *Caloplaca ussuriensis*, but differs in having grey-brownish thallus often with numerous warts and/or protuberances bear-

ing soralia in their upper portions, in having lecanorine apothecia, as well as in the lack of fissure-like soralia (Kondratyuk *et al.* 2011b).

After keys for Asian species (Kondratyuk *et al.* 2004a) it can be keyed to *Caloplaca lucifuga* Thor and *C. chrysophthalma* Degel. However, *Caloplaca tarani* differs from *C. lucifuga* in having well-developed, sometimes rather thick thallus (vs. thallus indistinct, absent or endophleoid, often only hypothallus developed), in having confluent soresidious mass on upper surface (vs. soralia deeply immersed into substrate, crater like 0.2–0.4 mm diam.), in having bright yellowish soresidious mass (vs. dull yellowish, greenish grey to dirty yellow-orange-brownish soresidious mass), in having larger grain-like, yellow soresidia (30–50  $\mu\text{m}$  vs. 15–20  $\mu\text{m}$  irregularly rounded, whitish green to lightly grey or orange-yellow) (Kondratyuk *et al.* 2004a).

From *C. chrysophthalma*, European and North American lichen, *C. tarani* differs in having much better developed thallus from crustose with warts to pustulate (vs. rather thin, evenly smooth), in having numerous lecanorine then biatorine/zeorine apothecia, in having confluent soresidious mass forming on warts and/or pustulate portions of thallus (vs. soralia rounded 0.1–0.3 mm diam. to fissure-like irregular or confluent), in having larger irregular granular, dull yellow to whitish yellow soresidia (30–50  $\mu\text{m}$  vs. soresidia small, farinose, 20–25  $\mu\text{m}$  diam., brightly golden-yellow). Differences of Eastern Asian species *Caloplaca ussuriensis* from European *C. chrysophthalma* see also in our previous paper (Kondratyuk *et al.* 2011b).

After rather bright yellow-greenish or lemon-yellow-green thallus *C. tarani* is rather similar to bright yellowish grey-green thalli of Eastern Asian taxon *Caloplaca subflavorubescens*, but it differs in having better developed thalline protuberances, in having soresidia, and in the lack of gyrophoric acid in thallus (Joshi *et al.* 2010).

After ascospore measurements *C. tarani* is very close to *C. flavorubescens* (it has somewhat shorter ascospores, i.e. 12–16  $\times$  6–9  $\mu\text{m}$  vs. 15–18  $\times$  7–10  $\mu\text{m}$ ), but it differs in having slightly narrower ascospores septum (5–7  $\mu\text{m}$  vs. 6–9  $\mu\text{m}$  wide), and in having different morphology of thallus.

**Additional specimen examined:** Russia: Sakhalin, Smirnykhovsky district, Chamginsky pass, at the mean flow of Khrebtovy stream, riverbed forest, on bark of *Populus maximowiczii*. Coll.: S. I. Tchabanenko, 14.08.2006 (SAKH, KW-L); Yuzhno-Sakhalinsk city, in the vicinity of Yuri Gagarin city park, Rogatka River, mixed riverbed forest, on bark of *Ulmus laciniata*. Lat.: 46° 57' N; Long.: 142° 44' E. Coll.: A. K. Ezhkin, 20.10.2011 (SAKH); Sakhalin, Nogliksky district, Nogliki settlement, Dagi River, on bark of *Populus maximowiczii* and *Salix sakhalinensis*. Lat.: 51° 49' N; Long.: 143° 07' E. Coll.: A. K. Ezhkin, 10.09.2012 (SAKH); Khabarovsk region, Ulchsky district, S of Sofijsk village, basin of Amur River, NE foothills of the Sikhote-Alinj Mts, N macroslope of Mt Tiul-Shaman, valley of Kamenka River, upper flow, on *Populus* sp. (70–80 cm diam.), in riverbed Piceeta forest with *Populus* and *Alnus*. Lat.: 51° 31' 27" N; Long.: 139° 54' 32" E; Alt.: 150 m a.s.l. Coll.: L. S. Yakov-

chenko, 09.09.2012 (VBGI, KW-L); Primorsky region, Shkotovsky district, to SW of Anisimovka village, northern slope of Mt Litovka, Smolny stream, coniferous-deciduous forests, on bark of *Populus*. Lat.: 43° 06' 38.4" N; Long.: 132° 45' 39.9" E; Alt.: 486 m a.s.l. Coll.: L. S. Yakovchenko, 18.09.2012 (VBGI).

*Caloplaca yeosuensis* S. Y. Kondr. et J.-S. Hur, spec. nova  
(Figs 5–7)

Similar to *Caloplaca flavovirescens*, but differs in having bright greenish or lemon yellow thallus, in having variegated colour of thallus from whitish to yellow or greenish yellow, in having very convex or compressed areoles, which sometimes seem to be isidia-like, in having lecanorine or zeorine apothecia, with well-developed, often crenulated and undulated thalline margin, as well as in having *Caloplaca flavorubescens* type of apothecia.

**Type:** South Korea, Jeollanam-do, Yeosu-si, Nam-myeon, Geumoh-do, Dumo-ri, Jickpo coast, on rock, growing together with *Caloplaca diffluens*. Lat.: 34° 30' 45.00" N; Long.: 127° 44' 14.08" E; Alt.: 6 m a.s.l. Coll.: U. Jayalal et al. (120360), 26.04.2012. Holotype: KoLRI 015350; Isotypes: KoLRI 015346, the same locality, growing together with *Caloplaca diffluens* (120357); KoLRI 015349, the same locality (120359); KoLRI 015325, the same locality (120336); KoLRI 015321, the same locality, growing together with *Caloplaca* sp., *Phaeophyscia* sp. and *Lecanora* sp. (120332); KoLRI 015369, the same locality, growing together with *Lecanora* sp. (120380); KoLRI 015367, growing together with *Caloplaca galbina* (120378); KoLRI 015359, the same locality (120370).

Thallus 3–5 cm across, distinctly areolate, mainly lemon-yellow, while variegated colour with higher magnification (more of 10×) from whitish to yellow or greenish yellow as within the same thallus as within the same thalline areole; often aspect of thallus formed by numerous dull brown apothecia; at the edge in places of contact with other crustose lichens forming black line; thalline areoles of very variegated shape and size, from very small, seen as plane spots at the apothecia to ascending and very convex, 0.3–1.5 mm across; from distant, divided by wide cracks (surface of rock well seen between areoles) to very densely aggregated and forming dense plane aggregation, as well as to convex and pustule-like, showing tendency to be ascending, very waved; upper surface dull yellow brownish to green-yellow or whitish in places.

Apothecia (0.3–)0.5–1.5 mm diam., in section to 0.4 mm thick, large enough and distinctly sessile, very highly uplifted above thallus level, from regularly rounded, distant and scattered at first, then to aggregated to 2–3(–6) per areole

and irregular with waved margin, lecanorine or zeorine; thalline margin to 0.1–0.15 mm wide, very distinct and usually characteristically crenulate, with the same variegated colour as thallus, yellow or greenish yellow to whitish in places; disc dull brownish orange or dull brown to yellowish dark brown; true exciple (if apothecium zeorine) very thin, seen at large magnification (20–40×), dull orange or light brown, lighter or concolorous with disc; apothecium in section zeorine; thalline exciple 70–80(–150)  $\mu\text{m}$  wide with cortical layer to 20–30  $\mu\text{m}$  thick on underside, paraplectenchymatous, cell lumina 4–6(–8)  $\mu\text{m}$  diam.; true exciple 20–50  $\mu\text{m}$  thick in lateral and basal portions, pseudopropsectenchymatous with matrix (sensu Kondratyuk and Kärnefelt 1997), cell lumina to 3–4(–5)  $\mu\text{m}$  diam./across; hymenium 70–90(–100)  $\mu\text{m}$  high, in lower portion with oil droplets; paraphyses tips almost not swollen, 2–3  $\mu\text{m}$  diam.; subhymenium 50–70  $\mu\text{m}$  thick, greyish owing to numerous oil droplets to 5–7(–10)  $\mu\text{m}$  diam. or irregular oil agglomerations (apothecium of *Caloplaca flavorubescens* type); asci 8-spored; ascospores widely ellipsoid with rounded ends, 13–17  $\times$  (7–)8–9(–10)  $\mu\text{m}$  in water and (10–)11–15(–18)  $\times$  7–10(–11)  $\mu\text{m}$  in K; ascospore septum 4–7(–8)  $\mu\text{m}$  wide in water and in K.

**Chemistry:** Cortical layer of thalline exciple, outermost layer of true exciple, epihymenium K+ bright cherry or crimson purple, while lower portion of hymenium and subhymenium is the same greyish as in water.

**Ecology:** On rocks in littoral zone, associated with *Caloplaca diffluens*, *C. galbina*, *C. loekoesii*, *C. pelodella*, *C. squamosa*, species of the genera *Lecanora*, *Phaeophyscia*, *Verrucaria*, etc.

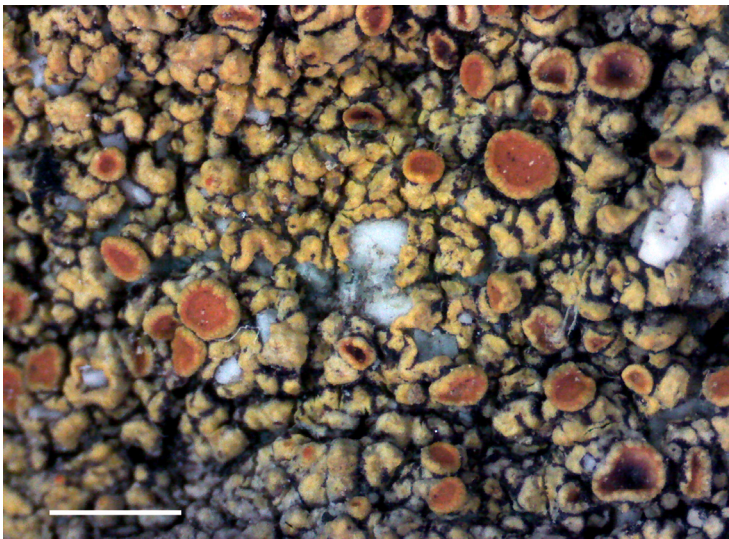


Fig. 5. Holotype of *Caloplaca yeosuensis* (KoLRI 015350) (scale bar = 1 mm)



**Etymology:** It is named after Yeosu city in South Jeolla Province, South Korea, the territory where the type collection and many other specimens examined of this species were collected.

**Taxonomic notes:** *Caloplaca yeosuensis* growing often together with *Caloplaca loekoessii*, from which it differs in having more smooth lemon-greenish thallus and in having brighter and darker orange apothecia (vs. thallus dull greenish yellow and somewhat seem to be much thicker; apothecia the same colour as thallus in *C. loekoessii*); in having black hypothallus, often seen to 1 mm wide in peripheral zone (vs. hypothallus absent in *C. loekoessii*), in having ascending, somewhat isidia-like areoles (similar to *Caloplaca herbidella* or *C. oxneri*).

From the mainly epiphytic European species *Caloplaca herbidella* (Hue) H. Magn. *C. yeosuensis* differs in having much longer and wider ascospores ( $13\text{--}17 \times 8\text{--}9 \mu\text{m}$  vs.  $10\text{--}14 \times 6\text{--}8 \mu\text{m}$ ), in having apothecia of *Caloplaca flavorubescens* type, as well as in epilithic habit and distribution.

From the epiphytic Eastern Asian isidiate lichen *Caloplaca oxneri* S. Y. Kondr. et Søchting *C. yeosuensis* differs in having much wider ascospores ( $13\text{--}17 \times 8\text{--}9 \mu\text{m}$  vs.  $13.5\text{--}18 \times 6\text{--}7 \mu\text{m}$ ), in epilithic habit, as well as in the lack of true isidia-like protuberances dissolving into schizidia-like grains.

*Caloplaca yeosuensis* can be similar to *Caloplaca multicolor* (Hue) S. Y. Kondr. et J.-S. Hur in having yellow-bright yellow thallus, but in *C. multicolor* thalline areoles are evenly coloured from greenish yellow to deeply yellow, areoles in *C. multicolor* are flat, they are larger (1–3 mm across vs. 0.3–1.5 mm

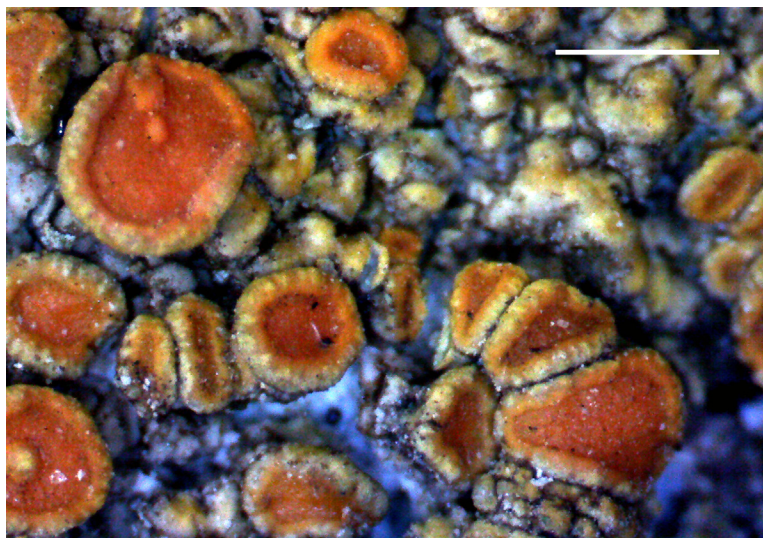


Fig. 6. Holotype of *Caloplaca yeosuensis* (KoLRI 015350), enlarged apothecia (scale bar = 1 mm)

across in *C. yeosuensis*), they are not so convex and they do not have pustula-like ascending portions (Kondratyuk *et al.* 2012b).

From *Caloplaca micromera* Hue, described from rocky outcrops of Japan, *C. yeosuensis* differs in having much larger thalline areoles (0.3–1.5 mm vs. 0.3–0.6 mm across), in having larger apothecia (0.5–1.5 mm vs. 0.4–1 mm diam.), in having longer and wider ascospores ( $13\text{--}17 \times 8\text{--}9 \mu\text{m}$  vs.  $10\text{--}14 \times 6\text{--}7 \mu\text{m}$ ), as well as in the lack of reddish thallus.

From *Caloplaca rubeola* Hue, described also from rocky outcrops of Japan, *C. yeosuensis* differs in having much smaller thalline areoles (0.3–1.5 mm vs. 3–4 mm across), in having much larger apothecia (0.5–1.5 mm vs. 0.3–0.5 mm diam.), in having longer and wider ascospores ( $13\text{--}17 \times 8\text{--}9 \mu\text{m}$  vs.  $12\text{--}14 \times 5\text{--}6 \mu\text{m}$ ), in having much wider ascospore septum ( $4\text{--}7 \mu\text{m}$  vs.  $2\text{--}4 \mu\text{m}$  wide), as well as in the lack of apothecia being in aggregations (often 2–3 together) and in the lack of reddish orange thallus.

**Additional specimens examined:** South Korea: Jeju-do, Jeju-si, Hangeong-myeon, Sinchang-ri, around Singaemul Park nearby coast, on rock. Lat.:  $33^\circ 20' 31.91''$  N; Long.:  $126^\circ 10' 13.00''$  E; Alt.: 2 m a.s.l. Coll.: S. Kondratyuk 212652, L. Lőkös, S. O. Oh, U. Jayalal, S. Joshi, J. S. Park and J.-S. Hur (121572), 05.07.2012 (KoLRI 016618); Jeollanam-do, Yeosu-si, Geumoh-do, Nam-myeon, Yusong-ri, Mando-beach, on rock, growing together with *Caloplaca galbina*, *C. pelodella*. Lat.:  $34^\circ 38' 55.00''$  N; Long.:  $127^\circ 48' 12.05''$  E; Alt.: 18 m a.s.l. Coll.: U. Jayalal *et al.* (120579), 27.04.2012 (KoLRI 015571); Jeollanam-do, Yeosu-si, Nam-myeon, Geumoh-do, Yusong-ri, on rock. Lat.:  $34^\circ 31' 55.03''$  N; Long.:  $127^\circ 45' 55.05''$  E; Alt.: 11 m a.s.l. Coll.: U. Jayalal *et al.* (120544), 27.04.2012 (KoLRI 015536); Jeollanam-do, Yeosu-si,

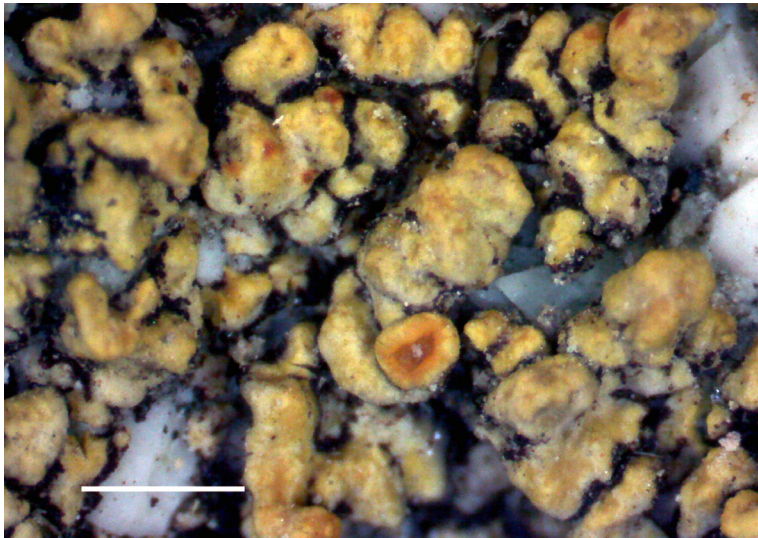


Fig. 7. Holotype of *Caloplaca yeosuensis* (KoLRI 015350), enlarged thallus areoles (scale bar = 1 mm)

Hwayang-myeon, Imok-ri, Baelga coast. Lat.: 34° 39' 00.04" N; Long.: 127° 34' 04.07" E; Alt.: 12 m a.s.l. Coll.: U. Jayalal et al. (120644), 28.04.2012 (KoLRI 015638); the same locality, growing together with *Caloplaca loekoessii* and *C. galbina* (120684) (KoLRI 015679); the same locality (120683) (KoLRI 015678); the same locality (120660) (KoLRI 015655, sub *Lecanora* sp.); Jeollanam-do, Yeosu-si, Nam-myeon, Geumoh-do, Usil coast side road, on rock. Lat.: 34° 30' 40.01" N; Long.: 127° 46' 38.07" E; Alt.: 1 m a.s.l. Coll.: U. Jayalal et al. (120456), 26.04.2012 (KoLRI 015446); Jeollanam-do, Goheung-gun, Yeongnam-myeon, Yongam village, Ucheon-ri, Yongbawi seaside. Lat.: 34° 35' 45.90" N; Long.: 127° 30' 22.50" E; Alt.: 10 m a.s.l. Coll.: Y. Joshi et al. (100318), 19.02.2010 (KoLRI 011828); Jeollanam-do, Yeosu-si, Nam-myeon, Geumoh-do, Yenam middle school, on rock growing together with *Caloplaca galbina*, *C. pelodella*. Lat.: 34° 30' 43.09" N; Long.: 127° 46' 02.01" E; Alt.: 18 m a.s.l. Coll.: U. Jayalal, J. S. Park and J. A. Ryu (120330), 26.04.2012 (KoLRI 015319, sub *Biatora* sp.).

*Caloplaca zoroasteriorum* S. Y. Kondr. et M. Haji Moniri spec. nova  
(Figs 8–10)

Similar to *Caloplaca persica*, but differs in having much better developed white thalline areoles/squamules being richly soredate, in having narrower ascospores and in having narrower ascospore septum.

**Type:** Iran, Razavi Khorasan Province, West of Torbat-e Heidarieh, Baig, Rudmaajan, close to waterfall, on bark of *Prunus* sp. Lat.: 35° 27' 19.3" N; Long.: 58° 50' 21.6" E; Alt.: 1,118 m a.s.l. Coll.: F. Hooshmand and M. Haji Moniri, 15.09.2012. Holotype: TEH; isotypes: LD, KW-L.

Thallus small, and usually indistinct, consisting of very small, scattered and very indistinct whitish thalline areoles/squamules, sometimes richly soredate and in such cases becoming greenish and with very rare and very



Fig. 8. Holotype of *Caloplaca zoroasteriorum* (TEH), enlarged apothecium (scale bar = 1 mm)



small apothecia. Blastidia/soresia regularly rounded, 25–30  $\mu\text{m}$  diam., rarely forming irregular conblastidia to 50–60  $\mu\text{m}$  across.

Apothecia 0.45–0.7 mm diam., in section to 0.27–0.3 mm thick, zeorine; thalline exciple to (25–)40–70(–120)  $\mu\text{m}$  thick in uppermost lateral portion often with lax or hollow medulla, cortical layer paraplectenchymatous, 25–30  $\mu\text{m}$  thick, cella lumina 7.5–12.5  $\mu\text{m}$  across; true exciple to 25–50  $\mu\text{m}$  thick in the uppermost lateral portion, up to 10(–30)  $\mu\text{m}$  thick in lower lateral and 10–20  $\mu\text{m}$  thick in basal portion, paraplectenchymatous; hymenium 50–60(–70)  $\mu\text{m}$  high; epihymenium to 10–20  $\mu\text{m}$  thick, brownish; subhymenium 20–50  $\mu\text{m}$  thick; uppermost cells of paraphyses to 7.5  $\mu\text{m}$  diam.; asci with 8–(12–16?) ascospores; ascospores (9–)12–13.5(–15)  $\times$  (4.5–)5–6.5(–7.5)  $\mu\text{m}$  in water, (12–)13–15(–16)  $\times$  6–7.5(–8)  $\mu\text{m}$  in K; ascospore septum (1–)2.5–3.5  $\mu\text{m}$  wide in water and 2.5–3.5(–5)  $\mu\text{m}$  wide in K.

**Chemistry:** Apothecium disc K+ purple.

**Ecology:** On bark of deciduous trees (*Prunus* sp. and *Populus* spp.), often close to waterfalls or reservoirs of irrigation system, as well as including roadside trees.

**Etymology:** Species epithet refers to country Iran, where 'zoroastrianism' as a religion and philosophy was accepted in the eastern part of old (greater) Iran before the 6th century.

**Distribution:** So far it is known from several localities in Iran and Uzbekistan.

**Taxonomic notes:** After Kondratyuk *et al.* (2004b) this material can be keyed to *Caloplaca persica* after asci having 12–16 ascospores. *Caloplaca zoro-*

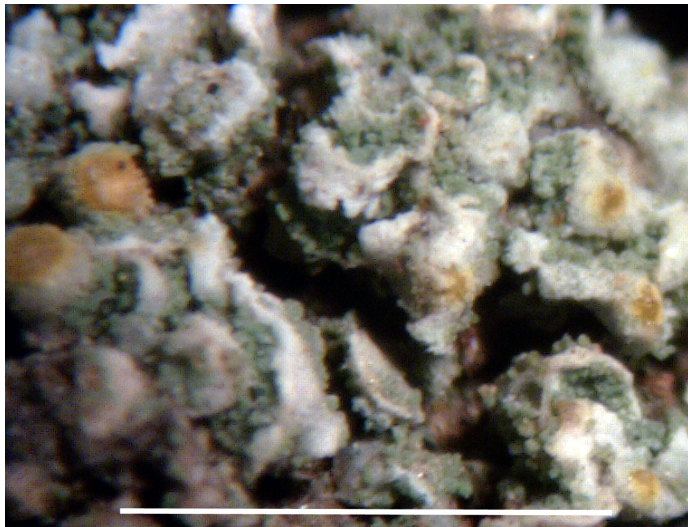


Fig. 9. Holotype of *Caloplaca zoroasteriorum* (TEH), enlarged thallus areoles (scale bar = 1 mm)

*asteriorum* is similar to *Caloplaca persica*, but differs in having much better developed white or whitish grey thalline areoles/squamules (vs. thalline lobes greyish yellow, without pruina, 0.3–0.8 mm across, badly developed, usually covered by numerous aggregated apothecia), in having soredia, in having much rarer apothecia (not covering completely thallus), and in having narrower ascospores ( $9\text{--}12.5 \times 5\text{--}6.5 \mu\text{m}$  vs.  $10\text{--}14 \times 7\text{--}8 \mu\text{m}$ ).

Material of *Caloplaca zoroasteriorum* can be also keyed to *Caloplaca scythica* Khodos. et Søchting, *C. virescens* (Sm.) Coppins and *C. polycarpoides* (J. Steiner) M. Steiner et Poelt, but all these species have only 8-spored asci. Furthermore, *Caloplaca zoroasteriorum* differs from *Caloplaca scythica* (which is considered to be synonym to *Caloplaca phlogina* (Ach.) Flagey now) in having white thallus, in having greenish soredia, as well as in having much larger asci, in having more of 8 ascospores, as well as in having mainly shorter ascospores ( $9\text{--}12.5 \times 5\text{--}6.5 \mu\text{m}$  vs.  $11\text{--}13 \times 4.5\text{--}6 \mu\text{m}$  in *C. scythica* or  $12\text{--}14 \times 3.5\text{--}5 \mu\text{m}$  in *C. phlogina*), and in having better developed thalline areoles/squamules.

*Caloplaca zoroasteriorum* differs from *C. virescens* in having much better developed white thalline areoles/squamules, in having zeorine apothecia, in having asci containing more than 8 ascospores, in having somewhat shorter and distinctly wider ascospores ( $9\text{--}12.5 \times 5\text{--}6.5 \mu\text{m}$  vs.  $11\text{--}13 \times 4\text{--}5 \mu\text{m}$ ), as well as in lack of *Caloplaca cerina* type apothecia and in the lack of thick layer of grain-like soredia.

From *C. polycarpoides*, which differs itself from *Caloplaca lobulata* in having dirty grey to yellow-grey thallus and narrow septum, *Caloplaca zoroasteriorum* differs in having much smaller apothecia (to 0.45 mm vs. 0.4–1(–1.6) mm

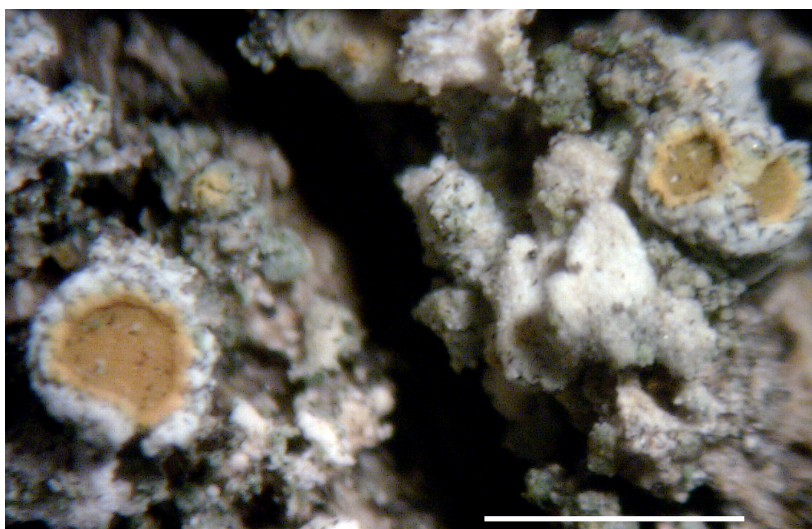


Fig. 10. Holotype of *Caloplaca zoroasteriorum* (TEH) (scale bar = 1 mm)



diam.); in having white or whitish grey thallus (vs. dirty yellow, ash-grey, rarely dirty grey, epruinose), in having greenish soredia, and in having much shorter and narrower ascospores ( $9\text{--}12.5 \times 5\text{--}6.5 \mu\text{m}$  vs.  $13\text{--}16 \times 7\text{--}8 \mu\text{m}$ ).

*Caloplaca zoroasteriorum* differs from *Caloplaca lobulata* in having whitish thallus (vs. yellow or yellowish grey thallus), in having rare and scarce apothecia (not numerous and not covering totally thallus); in having smaller apothecia (to 0.45 mm vs. 0.2–0.6 mm diam.), not being distinctly attenuated and without distinct stipe; in having greenish soredia, as well as in having narrower ascospores ( $9\text{--}12.5 \times 5\text{--}6.5 \mu\text{m}$  vs.  $10\text{--}16 \times 5\text{--}8 \mu\text{m}$ ) and in having much narrower ascospore septum ( $(1\text{--})2.5\text{--}3.5 \mu\text{m}$  vs.  $5\text{--}7 \mu\text{m}$  wide).

Thalline areoles with whitish waved upper surface and with darkish greenish soredia on sides or on lower portions of areoles may resemble epilithic European species *Acarospora moenium*, but it is very easy to distinguish *Caloplaca zoroasteriorum* after apothecia containing bipolar ascospores and antraquinones, as well as epiphytic habit.

**Additional specimens examined:** Iran: Razavi Khorasan Province, West of Torbat-e Heidarieh, Baig, Rudmaajan, close to waterfall, on bark of *Prunus* sp. Lat.:  $35^{\circ} 27' 19.3''$  N; Long.:  $58^{\circ} 50' 21.6''$  E; Alt.: 1,118 m a.s.l. Coll.: F. Hooshmand and M. Haji Moniri, 26.09.2011 (TEH, KW-L); Esfahan Province, about 350 km South of Tehran, about 80 km West of Isfahan City, close to Hojat Abad village, about 2 km higher along Zayandehrud River of the health centre belonging to dam of Zayandehrud water reservoir, close to river, on bark of roadside *Populus* sp. Lat.:  $32^{\circ} 42' 40.8''$  N; Long.:  $50^{\circ} 47' 33.6''$  E; Alt.: ca 2,050–2,100 m a.s.l. Coll.: S. Kondratyuk (21135), 07.09.2011 (KW-L, TEH). – Uzbekistan: “Ferganskaya dolina” [Ferghana Valley], [on bark], growing together with *Caloplaca polycarpoides* aggr. and *Lecania* sp. Coll.: N. Shafeev, 10.03.1949 (MSK-L, sub *Caloplaca cerodes* (Nyl.)); Ferghana Valley, on bark of mulberry in orchard, growing together with *Caloplaca polycarpoides* and *Lecania* sp. Coll.: N. Shafeev, 10.03.1949 (MSK-L, sub *Caloplaca cerodes*); along Dugave River, on bark, growing together with *Caloplaca polycarpoides*, *C. cf. biatorina*, *Caloplaca* sp., *Gallowayella cf. sogdiana*, *Candelariella* sp., and *Lecania* sp. Coll.: N. Shafeev, 21.08.1950 (MSK-L).

\*

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