



## A new species and a new record of the lichen genus *Coenogonium* (*Ostropales: Coenogoniaceae*) from South Korea, with a world-wide key to crustose *Coenogonium* having prothalli

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### Abstract

*Coenogonium lueckingii*, a new corticolous species characterized by a greenish-gray thallus with a white prothallus and 1-septate fusiform ascospores, is described from South Korea. A description of the species is provided together with notes on its chemistry, distribution, ecology and taxonomy. Possible related lichen taxa are discussed briefly, and a worldwide key to the crustose *Coenogonium* species having a prothallus is also provided. Besides this, *Coenogonium pineti* is also reported for the first time for the lichen flora of South Korea.

**Key words** – Biodiversity – Chuja Island – Jeju Island – taxonomy

### Introduction

The lichen genus *Coenogonium* described by Ehrenberg (1820) is represented by more than 80 species worldwide (Ferraro & Michlig 2013), among which *C. luteum* (Dicks.) Kalb & Lücking (2000) is so far known from South Korea (Moon 1999 as *Dimerella lutea*, Kondratyuk *et al.* 2013). *Coenogonium*, which is the only genus in the family *Coenogoniaceae* (Sitzenberger 1862), is characterized by a crustose or filamentous thallus with a trentepohlioid photobiont, biatorine (rarely zeorine), yellow to orange or brown apothecia with paraplectenchymatous excipulum, sometimes with pilose margins, partially amyloid hymenium, thin-walled unitunicate asci, and generally small, simple to 1-septate ascospores (Rivas-Plata *et al.* 2006; Lücking 2008).

During a stay in South Korea between 2009–2011, one of the authors (YJ) identified a small specimen of an interesting corticolous species as *Biatora* sp., which was later rectified as *Coenogonium* sp. by Sergey Kondratyuk. On a recent field trip to Jeju and Chuja Islands in 2014, additional collections of the same specimen were made by the authors, and all of them were apparently an undescribed *Coenogonium* species. These specimens are described here as new to science. Besides this, the excursion revealed the occurrence of *Coenogonium pineti* (Schrad. ex

Ach.) Lücking & Lumbsch (Lücking et al. 2004) in South Korea, and that species is hereby reported for the first time as additional record to South Korean lichen flora.

This work is a further contribution to the knowledge of the lichenized fungi of South Korea, which is the result of our current study focusing on the taxonomy and diversity of lichens and allied fungi in that country. The results demonstrate that the biodiversity of crustose lichens is still incompletely known in the region, indicating that further study is warranted.

### Materials & Methods

The specimens were examined at the Korean Lichen Research Institute, Sunchon National University (KoLRI), using a Motic SMZ-168 stereomicroscope at magnifications of 7.5–50X and an Olympus BX-50 compound microscope at magnifications of 10–1000X. The anatomical features were investigated by preparing sections of thalli and ascomata and then mounting them in water and 10% KOH. Only free ascospores lying outside the asci were measured. Images of anatomical and morphological characters were taken using an HD-Measure LTHS-300 (Leetech Co.) microscope connected to a computer. Thin layer chromatography was performed as per Orange et al. (2001).

### Results and Discussion

*Coenogonium lueckingii* Y. Joshi, Gagarina, Halda & Hur, **sp. nov.**

(Fig. 1 a-c)

MYCOBANK NO.: MB 815038

Facesoffungi number: FoF 01319

Type: South Korea, Jeju-do province, Seogwipo-si, Donneako valley, Wonang fall, 33°18'04.3" N, 126°34'53.7" E, 330 m, on bark of tree, 19 June 2014, Y. Joshi and party, 140561 (Holotype KoLRI, Isotype BP).

The new species is characterized by a greenish-gray thallus with a white prothallus, apothecia 0.4–0.9 mm diam., with pale yellowish orange to deep orange disc and cream-colored margin, 1-septate spores, 7.5–10 µm long and 2–2.5 µm wide.

*Thallus* corticolous or plasticolous (KoLRI 022458), crustose, continuous, thin, smooth, greenish-gray to pale gray, 30–50 mm diam. (Fig. 1a). *Prothallus* whitish to silvery gray, shiny, conspicuous (Fig. 1b). Photobiont *Trentepohlia*, cells rectangular to angular-rounded or globose, in irregular plates or short threads, 5–10 µm diam.

*Apothecia* single or crowded, sessile with strongly constricted base, biatorine, rounded, rarely slightly irregular in outline, 0.4–0.9 mm diam., 185–250 µm high; disc cartilaginous, appearing waxy, pale yellowish orange to deep orange, usually slightly translucent, flat to slightly convex. Margin thick, usually distinct, not prominent, rarely evanescent, smooth, cream colored, paler than the disc. *Excipulum* well developed, paraplectenchymatous with radiating cell rows, colorless, I+ sordid orange-brown 75–125 µm; algal cells in basal excipulum. *Hypothecium* 25–40 µm high, colorless, I–. *Hymenium* 50–75 µm high, colorless, I+ blue then quickly sordid green then reddish brown, KI+ blue. *Paraphyses* unbranched, usually with thickened apices 2–4.5 µm. *Asci* cylindrical, completely thin walled without tholus, I–, KI–. *Ascospores* irregularly biserial, eight per ascus, ellipsoid to fusiform, transversely 1-septate, colorless, 7.5–10 × 2–2.5 µm, 3–4 times as long as broad (Fig. 1c).

*Pycnidia* not seen.

Chemistry – Thallus and ascomata K–, C–, KC–, P–, UV–. TLC: no substances detected.

Etymology – The new species is dedicated to Robert Lücking, renowned lichenologist formerly at The Field Museum Chicago, now at the Botanical Garden and Botanical Museum Berlin, for his enormous contributions to the field of lichenology.

Distribution and Ecology – To date, the new species has only been reported from two localities in South Korea, Chuja Island and Mt. Jogye, where it is found growing on the bark of trees in humid habitats. The type locality has a very poor lichen diversity, and the new species was found with fragments of *Bacidia* sp. and *Lecanora* sp.

Notes – The new species is characterized by greenish-gray thallus with a white prothallus, apothecia 0.4–0.9 mm diam., apothecia with pale yellowish orange to deep orange disc and cream colored margin, 1-septate spores, 7.5–10 µm long and 2–2.5 µm wide. Other known *Coenogonium* species with prothalli that are either corticolous or foliicolous include: *C. albomarginatum* Michlig & L.I. Ferraro (2013), *C. atroluteum* (Vain.) Lücking, Aptroot & Sipman (2006), *C. kawanae* (H. Harada & Vězda) H. Harada & Lumbsch (2004), *C. magdalenae* Rivas Plata, Lücking & Lizano (2006), *C. persistens* (Malme) Lücking, Aptroot & Sipman (2006), *C. roumeguerianum* (Müll. Arg.) Kalb (2001), *C. siquirrense* f. *siquirrense* (Lücking) Lücking (2008), *C. siquirrense* f. *denticulatum* Rivas Plata & Lücking (2006), *C. strigosum* Rivas Plata, Lücking & Chavas (2006), *C. subsquamosum* (Aptroot & Seaward) Lücking, Aptroot & Sipman (2006), *C. subzonatum* (Lücking) Lücking & Kalb (2001), *C. verrucosum* Michlig & L.I. Ferraro (2013) and *C. zonatum* (Müll. Arg.) Kalb & Lücking (2000). These taxa are all clearly distinguished from the new species.

*Coenogonium subzonatum* and *C. zonatum* are strictly foliicolous, contain wart shaped pycnidia, and have smaller apothecia (0.2–0.5 mm) and uniseriate, relatively broader ascospores. The yellowish gray-green *C. albomarginatum* never has an I+ exciple and the ascospores are uniseriate. Large apothecia (0.7–1.3 mm) with high hymenia (70–90 µm), uniseriate ascospores and neotropical distribution separate *C. magdalenae* from the new taxon. Both *C. siquirrense* f. *siquirrense* and *C. siquirrense* f. *denticulatum* differ from the new taxon in having deeply orange apothecia with orange margin. *Coenogonium strigosum* differs from the new taxon in having a ± setose thallus, larger apothecia (0.8–1.5 mm) with a denticulate margin, uniseriate ascospores, and a neotropical distribution. *Coenogonium persistens* is another neotropical species that differs from the new taxon in having larger apothecia (0.8–1.5 mm). *Coenogonium roumeguerianum* differs in having broader spores (4–6 µm). The presence of yellow prothalli in *C. verrucosum* and *C. atroluteum* separates them from the new taxon. *Coenogonium kawanae* differs in having a denticulate margin, uniseriately arranged larger ascospores (10–14 µm), while *C. subsquamosum* differs in lacking algal cells in the basal excipulum and having larger apothecia (0.8–1.2 mm).

When the prothallus is lacking or unclear (poor material, for example), the new taxon looks like *C. luteum* and is often confused with it. However, *C. luteum* differs from it in having much bigger apothecia (0.8–2 mm), a narrow excipulum (50–100 µm) and uniseriately arranged wider spores (2.5–3.5 µm).

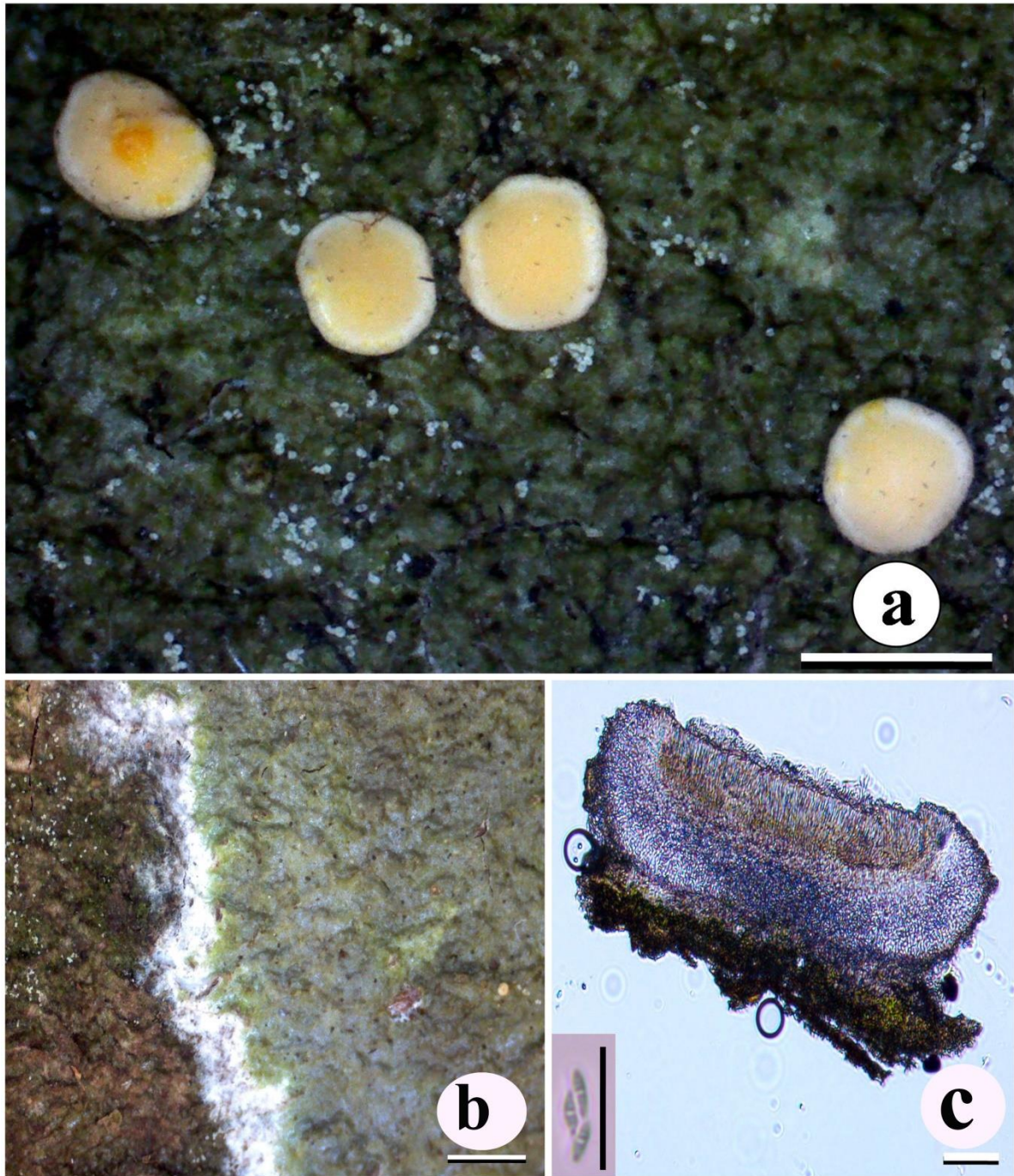
The new species has a very thick hypothecium (25–40 µm) which separates it from two similar species – *Coenogonium nepalense* and *C. geralense* – both having hypothecium less than 25 µm. The hypothecium of *C. nepalense* is 10–13 µm and that of *C. geralense* is 10–15 µm. Besides this, *C. nepalense* and *C. geralense* have not cartilaginous disc of apothecia.

Materials examined – SOUTH KOREA. Jeju-do province: Jeju-si, Hangyeong-myeon, Yongsu-ri, Seashore road, 33°20'31.6"N, 126°10'12.08"E, alt. 82 m, on bark and on plastic, 18 June 2014, J. Halda, 140398 (KoLRI 022458); Jeollanam-do: Suncheon-si, Seungju-eup, Mt. Jogye, Seonam-sa, N34°59'33.7" E127°20'22.7", alt. 210 m, on bark, 2005, L. Lőkös, 050679 (KoLRI 003583).

### ***Coenogonium pineti* (Schrad. ex Ach.) Lücking & Lumbsch**

Thallus corticolous, crustose, superficial, continuous, thin, smooth to fine-grained, grayish-green. Prothallus absent. Photobiont *Trentepohlia*, cells globose, 6–13 µm diam. Apothecia single or crowded, sessile; 0.1–0.5 mm diam.; disc whitish to pinkish yellow, concave to flat, with concolorous or paler exciple. Excipulum well developed, paraplectenchymatous, 30–110 µm. Hypothecium 10–36 µm high, colorless. Hymenium 70–90 µm high, I+ blue then quickly sordid green then reddish brown, KI+ blue. Paraphyses simple, unbranched, with thickened apices to 4 µm. Asci numerous, cylindrical, without tholus, I–, KI–. Ascospores uniseriate, eight per ascus, fusiform to ellipsoid, transversely 1-septate, colorless, 9–13 × 2–3(–4) µm.

Distribution and Ecology – The species is so far known from Jeju Island where it is found growing on the bark of unknown tree in humid habitat in association with *Graphis* sp.



**Fig. 1** – Habit of *Coenogonium lueckingii* (holotype) a) Thallus (Scale = 2 mm); b) Prothallus (Scale = 3 mm); c) Transverse section of apothecia along with spores (Scale = 100 & 20  $\mu$ m, respectively).

Remarks – *Coenogonium pineti* is similar to *C. dilucidum* (Kremp.) Kalb. & Lücking (2000), *C. kawanae* and *C. luteum*. *Coenogonium dilucidum* differs in having pale wax-colored apothecia and larger ascospores (14–18  $\mu$ m long), *C. kawanae* has pale yellow-brownish apothecia and white prothallus, while *C. luteum* has larger (0.8–2 mm), more bright orange color apothecia and thickened paraphyses up to 4.5  $\mu$ m.

Material examined – SOUTH KOREA. Jeju-do province: Seogwipo-si, Donneako valley, Wonang fall, 33°18'04.3"N, 126°34'53.7"E, alt. 330 m, on bark, 19 June 2014, L. Gagarina, 140611 (KoLRI 022470).

## Key to worldwide crustose *Coenogonium* species having prothalli

1. Prothallus yellow.....2
- Prothallus white.....3
  
2. Thallus verrucose; apothecia orange.....*C. verrucosum*
- Thallus smooth; apothecia pale yellow brown.....*C. atroluteum*
  
3. Thallus yellow.....*C. subsquamosum*
- Thallus green-gray.....4
  
4. Ascospores 12–20 µm long.....5
- Ascospores 6–12 µm long.....6
  
5. Thallus greenish gray; apothecia 0.3–0.5 mm diam., margin denticulate.....*C. kawanae*
- Thallus yellow; apothecia 0.8–1.2 mm, margin not denticulate.....*C. squamosum*
  
6. Ascospores 4–6 µm broad.....*C. roumeguerianum*
- Ascospores 1.5–4 µm broad.....7
  
7. Ascospores 3–4 µm broad.....8
- Ascospores 1.5–2.5 µm broad.....11
  
8. Apothecia medium sized, 0.3–0.8 mm diameter.....9
- Apothecia large, 0.8–2 mm diameter.....10
  
9. Apothecial margin denticulate; neotropical distribution.....*C. subzonatum*
- Apothecial margin not denticulate; pantropical distribution.....*C. zonatum*
  
10. Disc orange yellow to orange, thallus sometimes with setae, margin not denticulate.....*C. strigosum*
- Disc pale yellow to yellow, thallus without setae, margin denticulate.....*C. magdalenae*
  
11. Exciple with very large peripheral cells.....12
- All cells of the exciple of similar size.....13
  
12. Apothecial margin denticulate.....*C. siquirrense* f. *denticulatum*
- Apothecial margin never denticulate.....*C. strigosum*
  
13. Thallus glabrous, apothecia medium sized (0.8–1.5 mm diam.)..... *C. persistens*
- Thallus not glabrous, apothecia small sized (0.4–0.8 mm diam.).....14
  
14. Corticolous or plasticolous.....*C. lueckingii*
- Strictly foliicolous.....15
  
15. Ascospores 8–12 µm long, disc cartilaginous, conidia 13–16 × 1–1.5 µm. Palaeotropical distribution.....*C. pocsii*
- Ascospores 6–9 µm long, disc not cartilaginous, conidia 3–3.5 × 1.2–1.5 µm. Neotropical distribution .....*C. siquirrense* f. *siquirrense*
  
16. Ascospores 8–12 µm long; thallus without setae.....*C. persistens*
- Ascospores 6–9 µm long; thallus sometimes with setae.....*C. strigosum*

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## NEW AND NOTEWORTHY LICHEN-FORMING AND LICHENICOLOUS FUNGI 5\*

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Data on 54 new for China, India, Korea and Russia species of lichen-forming and lichenicolous fungi, including 22 new for science taxa of lichen-forming and lichenicolous fungi, i.e.: *Acarospora ulleungdoensis*, *Amandinea trassii*, *Aspicilia geumodoensis*, *Biatora ivanpisutii*, *Caloplaca patwolseleyae*, *Catillaria ulleungdoensis*, *Coenogonium agonimieoides*, *Gyalidea austrocoreana*, *G. ropalosporoides*, *Opegrapha briancoppinsii*, *O. ulleungdoensis*, *Phyllopsora loekoesii*, *Psoroglaena coreana*, *Psorotichia gyelnikii*, *Rinodina oxneriana*, *Scoliciosporum jasonhurii*, *Staurothele oxneri*, *Stigmatidium coarctatae*, *Thelocarpon ulleungdoense*, *Thelopsis loekoesii*, *Toninia poeltiana*, *Unguiculariopsis helmutii*, and and 7 new species to China (*Caloplaca ussuriensis*, *Megaspora rimisorediata*, *Rinodina xanthophaea*, *Rusavskia dasanensis*, *Xanthoria splendens*, *Zeroviella coreana*, *Z. esfahanensis*), and 1 new species to India (*Zeroviella esfahanensis*), and 24 new species to Korea (*Agonimia blumii*, *Arthonia rinodinicola*, *Buelliella minimula*, *Dactylospora australis*, *Endococcus propinguus*, *Haleciana santessonii*, *Laeviomycetes aff. fallaciosus*, *Lecanora albescens*, *L. layana*, *Lecidella scabra*, *Micarea farinosa*, *Minutoexcipula aff. mariana*, *Opegrapha anomaea*, *O. aff. xerica*, *Phoma aff. lecanorina*, *Polycoccum rubelliana*, *Porina nucula*, *Pyrenidium actinellum*, *Rhexophiale rhexoblephara*, *Rimularia badioatra*, *Rinodina confragosa*, *R. milvina*, *R. occulta*, *Tremella phaeophysciae*), as well as 1 new species to Russia (*Verseghya klarae*) are provided. Furthermore new for science species of lichenicolous fungus *Polycoccum clauderouxii* from

\* Previous contributions were published in 2013, 2015 and 2016 (Kondratyuk *et al.* 2013a, 2015a, b, 2016a).

China is described. Four new combinations, i.e.: *Biatora pseudosambuci* (Basionym: *Lecanora pseudosambuci* S. Y. Kondr., L. Lőkös et J.-S. Hur), *Buellia pseudosubnexa* (Basionym: *Hafellia pseudosubnexa* S. Y. Kondr., L. Lőkös et J.-S. Hur), *Buellia extremoorientalis* (Basionym: *Hafellia extremorientalis* S. Y. Kondr., L. Lőkös et J.-S. Hur), and *Sagedia nunatakkorum* (Basionym: *Lecanora nunatakkorum* Poelt) are proposed. Data on conidiomata and conidia for lichenicolous fungus *Opegrapha anomea* Nyl are for the first time provided.

Key words: *Acarospora*, *Aspicilia*, *Biatora*, *Buellia*, *Catillaria*, *Coenogonium*, *Gyalidea*, Korea, *Opegrapha*, new for science, *Phyllopsora*, *Polycoccum*, *Psoroglaena*, *Psorotichia*, rare, *Rinodina*, *Scoliosporium*, *Staurothele*, *Stigmidium*, *Thelocarpon*, *Thelopsis*, *Toninia*, *Unguiculariopsis*

## INTRODUCTION

Additional 46 new species of lichen-forming and lichenicolous fungi and some more occurrence records to the Korean lichen flora, as well as further contributions to the lichen flora of other Asian areas (India, China, etc.) are provided as a continuation of our former papers (Kondratyuk *et al.* 2013a, 2015a, b, 2016a).

## MATERIALS AND METHODS

This contribution is based on a total of 2,500 specimens, which were sampled during the current collections in 2015 and 2016, and these are deposited in the Korean Lichen Research Institute, Sunchon National University, South Korea (hereafter: KoLRI), as well as some duplicates in the Hungarian Natural History Museum (hereafter: BP) and the Lichen Herbarium of M. H. Kholodny Institute of the Botany of the National Academy of Sciences of Ukraine (hereafter: KW-L).

The specimens were examined using standard microscopical techniques and hand-sectioned under a dissecting microscope (Nikon SMZ 645; Nikon, Tokyo, Japan). Anatomical descriptions were based on observations of these preparations under a microscope (Nikon Eclipse E200; Nikon, Tokyo, Japan, and Zeiss Scope. A1; Carl Zeiss, Oberkochen, Germany) with digital camera AxioCam ERc 5s. Section of apothecia were tested with water and with K and IKI (10% aqueous potassium iodide) for identification.

For identification chemical substances of critical taxa standard TLC and HPTLC methods with solvent C were carried out (Arup *et al.* 1993, Orange *et al.* 2001).



## RESULTS AND DISCUSSION

## New for science taxa

*Acarospora ulleungdoensis* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 1)

Mycobank no.: MB 817966

*Similar to Acarospora suzai, but differs in having smaller and indistinct thallus, in having smaller and thinner thalline areoles, in having smaller apothecia with violet-brown disc, in having badly developed true exciple, in having very thin subhymenium, in having larger asci containing 100–200 ascospores, as well as in having somewhat wider ascospores.*

Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Seomyeon, Taeha-ri, valley of Tae-hacheon, Seodal-gil, on siliceous rocks, growing together with *Trapelia coarctata* damaged by lichenicolous fungus, *Trapelia placodioides*. Lat.: 37° 30' 12.77" N; Long.: 130° 49' 49.03" E; Alt.: 265 m a.s.l. Coll.: Woo, J.-J. (160708), 10.07.2016 (holotype: KoLRI 040946); the same locality, Coll.: Kondratyuk, S. Y. and Lőkös, L., 10.07.2016; (161849), (isotype: KoLRI 040081); the same locality, growing together with *Acarospora*

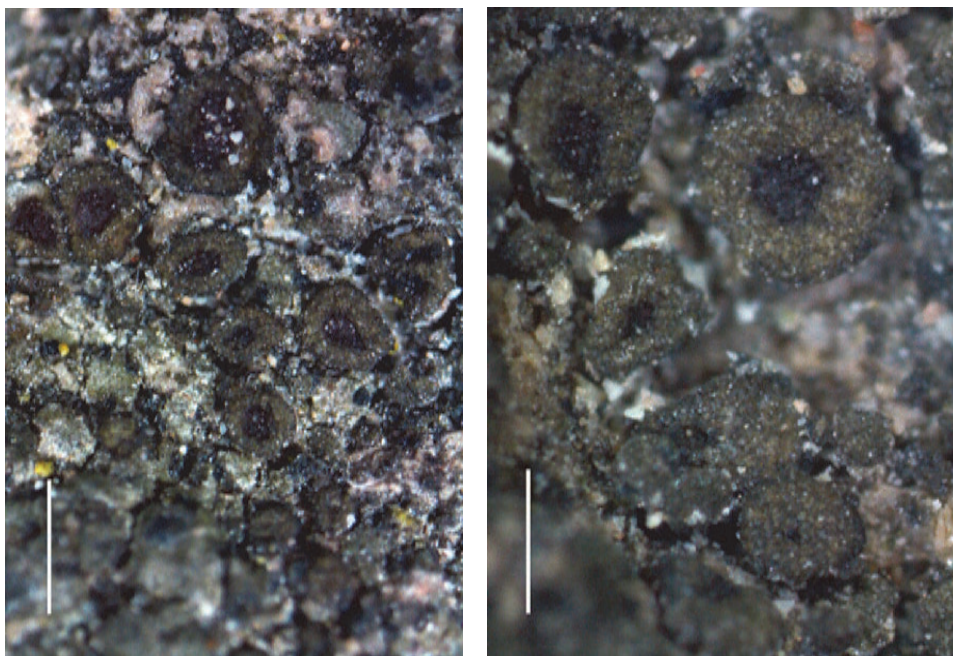


Fig. 1. *Acarospora ulleungdoensis*, general habit (holotype). Scale 0.5 mm (right) 1 mm (left) and (photo: S. Kondratyuk)

aff. *moenium*, *Caloplaca* aff. *oxfordensis*, (161955), (isotype: KoLRI 040192 sub *Acarospora* aff. *moenium*); the same locality, growing together with *Acarospora* aff. *moenium*, *Caloplaca* aff. *oxfordensis* 161959 (isotype: KoLRI 040196 sub *Acarospora* aff. *moenium*); the same locality, growing together with *Caloplaca* aff. *oxfordensis*, *Buellia* and *Caloplaca chejuensis*, 161962 (isotype: KoLRI 040199 sub *Caloplaca* aff. *oxfordensis*); the same locality, growing together with *Caloplaca* aff. *oxfordensis*, *Pyrenopsis chejudoensis*, *Buellia* and *Caloplaca chejuensis*, 161975 (isotype: KoLRI 040212 sub *Caloplaca* aff. *oxfordensis*).

Thallus very indistinct, consisting of solitary, very distant and dispersed among another lichens single areoles; areoles 0.2–0.3(–0.6) mm in diam./across, rather scattered and distant each other, dark green or dark greenish brown, very thin, in section to 55  $\mu$ m thick.

Apothecia 0.4–0.5(–0.6) mm in diam., and to 0.15 mm thick, solitary, 1 per areole, immersed into thalline areole or with thick thalline margin to 0.1–0.13 mm wide, dark green or greenish brown, disc dark violetish brown; in section true exciple to 30–40  $\mu$ m thick in the uppermost lateral portion and very thin, to 10  $\mu$ m thick in lower lateral and basal portions, paraplectenchymatous, sometimes indistinct; hymenium to 100–110  $\mu$ m high, with bright yellow or yellowish brown epihymenium to 20–30  $\mu$ m thick; paraphyses distinctly swollen towards the tips, to 4–5  $\mu$ m wide at the tips; asci 70–75  $\times$  18–25(–30)  $\mu$ m with 100–200 ascospores; ascospores elongated to widely ellipsoid or almost spherical, 3–5(–6)  $\times$  2–2.5(–3)  $\mu$ m.

Ecology: On siliceous rocks in coastal zone.

Distribution: So far known only from scattered localities in South Korea, Eastern Asia.

Etymology: It is named after Ulleung-do Island (South Korea, Eastern Asia), where type material of this taxon was collected.

Taxonomic notes: *Acarospora ulleungdoensis* is similar to *A. suzai* H. Magn., growing on siliceous rocks in Europe (Czech Republic, Hungary and Italy), in having solitary apothecia, which immersed 1 per thalline areole, but differs in having smaller and indistinct thallus (vs. to 5 cm in diam.), in having smaller thalline areoles (to 0.2–0.3(–0.6) mm vs. 0.4–1.5 mm across), in having much thinner thallus (to 55  $\mu$ m thick vs. to 400  $\mu$ m thick, including cortical layer to 15–40  $\mu$ m thick, algal layer to 60–175  $\mu$ m thick, medullary layer to 400  $\mu$ m thick and lower cortical layer well developed to 8–12  $\mu$ m thick), in having smaller apothecia (0.4–0.5(–0.6) mm vs. 0.3–0.8 mm in diam.), in having thick thalline margin (vs. without or with thin thalline margin), in having violet-brown (vs. reddish brown) disc, in having weakly developed true exciple (to 10  $\mu$ m vs. to 30–40  $\mu$ m thick below subhymenium, paraplectenchymatous with thick walled cells), in having slightly wider tips of paraphyses (4–5  $\mu$ m vs. to 4.3  $\mu$ m), in having larger asci (70–75  $\times$  18–25(–30)  $\mu$ m vs. 50–60  $\times$  14–17  $\mu$ m), which contain much higher number of ascospores (100–200 vs. ca 100),

while ascospores are almost the same size ( $3\text{--}5\text{--}(6) \times 2\text{--}2.5\text{--}(3) \mu\text{m}$  vs.  $3\text{--}5.5 \times 2\text{--}2.5 \mu\text{m}$ ), as well as in the lack of lower cortical layer and black underside of thalline areoles (Golubkova 1978).

*Acarospora ulleungdoensis* is similar to *A. durietzii* H. Magn., known from siliceous rocks of Europe and Greenland, but differs in having areolate (vs. squamulose) and green (vs. dark pure brown) thallus, in having smaller thalline areoles (0.2–0.3 mm in diam./across, vs. squamules 0.2–1.2 mm in diam.), in having thinner thallus (total thickness to 55  $\mu\text{m}$  thick, vs. total thickness 0.4–0.5 mm thick, including upper cortex 25–45  $\mu\text{m}$  thick, algal layer 50–100  $\mu\text{m}$  thick, medullary layer to 300  $\mu\text{m}$  thick), as well as in having larger and narrower ascospores ( $3\text{--}5\text{--}(6) \times 2\text{--}2.5\text{--}(3) \mu\text{m}$  vs.  $3\text{--}4.3 \times 1.8\text{--}2.5 \mu\text{m}$ ), while apothecia and asci are almost the same.

Other specimen examined: Republic of Korea. Jeollanam-do, Yeosu-si, Nam-myeon, Geumo-do, Simjang-ri, on rock, growing together with *Caloplaca* aff. *holocarpa* and *Endocarpon* sp. Lat.:  $34^\circ 30' 52.5''$  N; Long.:  $127^\circ 43' 36.6''$  E; Alt.: ca 71 m a.s.l. Coll.: Kondratyuk, S. Y. (160405), 10.06.2016 (KoLRI 038550 sub *Caloplaca* aff. *holocarpa*).

*Amandinea trassii* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 2)

Mycobank no.: MB 817967

*Similar to Buellia griseovirens, but differs in having well-developed thallus, in having larger thalline areolae, in having smaller soredia, in having larger photobiont cells, in having smaller apothecia, in having 1-septate and smaller ascospores, as well as in the lack of C+ and K+ reactions.*

Type: Republic of Korea. Gyeongsangbuk-do, Uljin-gun, Jukbyeon-myeon, Jukbyeon-ri, Jukbyeon 10-gil, roadside trees along the street, on bark of *Pinus*. Lat.:  $37^\circ 03' 27.19''$  N; Long.:  $129^\circ 25' 03.82''$  E; Alt.: 10 m a.s.l. Coll.: Kondratyuk, S. Y. (SK 102) and Lőkös, L. (151358), 11.07.2015 (holotype: KoLRI 034591).

Thallus to several cm across in irregular spots, seen as greenish-greyish spots, indistinct, at large magnification ( $\times 100$  and more) cracked, somewhat not continuous, areoles (0.2–)0.4–0.8(–1) mm across with more or less even (not convex) upper surface, pale greyish or whitish-greyish to darker greenish grey, usually abundantly sorediate. Soralia usually very indistinct, from more or less rounded (0.15–)0.2–0.3 mm in diam. at first to fissure-like or confluent later; soredious mass concave at first but later to more or less convex in places, whitish to dark brownish, grey or dark bluish-brownish grey; soredia very small, ca (12.5–)17–20(–30)  $\mu\text{m}$  in diam., mainly regularly rounded, but sometimes somewhat of irregular shape, usually whitish but becoming dark brown-

ish, grey or dark bluish-brownish grey along the edges of soralia, with hyphal layer to 3–4  $\mu\text{m}$  thick, which becoming brownish in outer portion in places.

Thallus in section to (50–)60–70  $\mu\text{m}$  thick, cortical layer 10–15(–20)  $\mu\text{m}$  thick, paraplectenchymatous at least in lower portion while upper portion often with epinecral layer; algal zone to 35–45  $\mu\text{m}$  thick, algal cells 11–17(–22)  $\mu\text{m}$  diam., medullary layer as separate layer usually not developed.

Apothecia 0.15–0.25 mm in diam., in section to 0.1 mm thick, often numerous in places, usually 1 per areole, slightly immersed into the thallus at first, later becoming slightly uplifted, sessile, disk from plane to semiconvex; in section lecideine, true exciple to 15–25  $\mu\text{m}$  wide, dark brown to blackish brown in lateral portion; hymenium 35–45  $\mu\text{m}$  high, epihymenium to 5–7  $\mu\text{m}$  thick, somewhat blackish, paraphysis tips distinctly swollen to 3–5  $\mu\text{m}$  wide, dark brown or blackish brown; subhymenium 40–50(–70)  $\mu\text{m}$  thick, brownish; asci 8-spored, 32–35  $\times$  11–13  $\mu\text{m}$ ; ascospores 1-septate, ellipsoid to slightly curved, greenish-blackish at first then dark brown, (8–)10–13(–15)  $\times$  5–6(–7)  $\mu\text{m}$ .

Chemistry: Thallus and soralia K–, C–, Pd–.

Ecology: On bark of pine trees (*Pinus densiflora* and *P. thunbergii*).

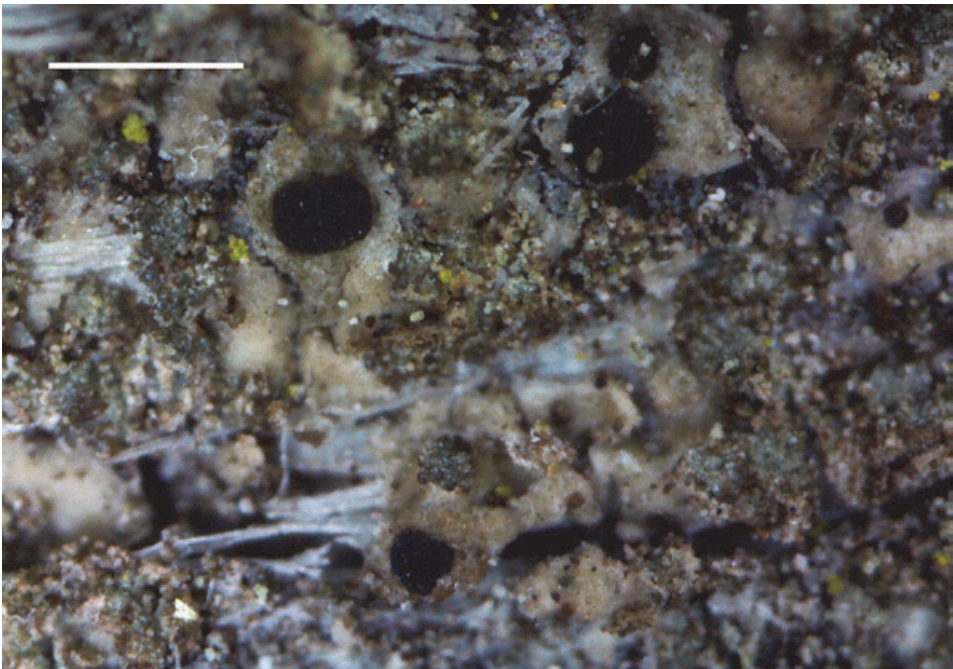


Fig. 2. *Amandinea trassii* (holotype), general habit. Scale 0.5 mm (photo: S. Kondratyuk)

Distribution: It is known so far from scattered localities in South Korea, Eastern Asia.

Etymology: It is named after the well-known Estonian lichenologist Hans Trass (1928–) in recognition of his contribution to recent knowledge on the Physciaceae and Buelliaceae of the Asian continent.

Taxonomic notes: After having greyish white or dark grey with a bluish tinge, mostly circular in outline, rarely fissure-shaped often surrounded laterally by a lacerate cortical sheet, up to 0.3 mm diam. soralia *Amandinea trassii* is similar to *Buellia griseovirens* (Sm.) Almb., but differs in having well-developed thallus (vs. endosubstratal or episubstratal sensu Tønsberg 1992), in having larger thalline areoles (0.4–0.8(–1) mm vs. to 0.4 mm in diam.), in having smaller soredia ((12.5–)17–20(–30)  $\mu\text{m}$  vs. 20–40  $\mu\text{m}$  in diam.), in having larger photobiont cells (11–17(–22)  $\mu\text{m}$  vs. 8–12  $\mu\text{m}$  in diam.), in having very small apothecia (0.15–0.25 mm vs. to 2 mm in diam. after Tønsberg (1992), or 0.4–1 mm diam. after Orange *et al.* (1992)), in having 1-septate and smaller ((8–)10–13(–15)  $\times$  5–6(–7)  $\mu\text{m}$  vs. submuriform, (13–)15–28  $\times$  7–13  $\mu\text{m}$ ), as well as in the lack of C+ yellowish reaction, Pd+ yellow or yellow-orange, and K+ fuscous brown reactions, and in the lack of atranorin, norstictic and connorstictic acids and 'griseovirens unknown' substance (data on *Buellia griseovirens* are provided after Tønsberg (1992)). Furthermore after phylogenetical analysis of the members of the family Buelliaceae based on nrITS sequences material of *Amandinea trassii* is member of the *Amandinea* branch, while *Buellia griseovirens* is positioned in the *Buellia* clade (Kondratyuk *et al.*, in prep.).

*Amandinea trassii* is similar to *Buellia arborea* Coppins et Tønsberg usually growing on decorticated trunks of *Pinus sylvestris* in Atlantic and Central Europe, which is similar to *Buellia griseovirens* when sterile, but having C– thallus and Pd– soralia, but differs in having 1-septate and smaller (vs. 1–3-septate, (17.5–)19–25(–28)  $\times$  (7.5–)8.5–10(–12)  $\mu\text{m}$ ), as well as in the lack of K+ fuscous brown reactions, and in the lack of norstictic and other substances of the stictic acid complex (data on *Buellia arborea* are provided after Tønsberg 1992).

Other specimens examined: Republic of Korea. Gangwon-do, Sacheon-myeon, Gaudunji-gil, small pine plantation along the seashore road (Haeon-ro) at Sacheon Beach, on bark of *Pinus densiflora* and *P. thunbergii*. Lat.: 37° 49' 43.21" N; Long.: 128° 52' 41.50" E; Alt.: 5 m a.s.l. Coll.: Kondratyuk, S. Y. (150827), 09.07.2015 (KoLRI 034060). – Jeju-do, Jeju-si, Chuja-do, Chuja-myeon, Sinyang-1-ri, seashore of Mojini-mongdol, on bark of *Pinus*. Lat.: 33° 56' 44.9" N; Long.: 126° 20' 03.01" E; Alt.: 57 m a.s.l. Coll.: Kondratyuk, S. Y. (SK-07). (140901-6), 21.06.2014 (KoLRI 023421); the same locality, (140922-4), (KoLRI 023453); the same locality, growing together with *Lecanora*, (140934-4), (KoLRI 023473).

*Aspicilia geumodoensis* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 3)

Mycobank no.: MB 817968

*Similar to Aspicilia tofacea, but differs in having larger thalline areoles, in having larger apothecia, in having lower hymenium, and in having larger ascospores, as well as in containing gyrophoric acid and in the lack of K+ yellow then reddish reaction of the medulla.*

Type: Republic of Korea. Jeollanam-do, Yeosu-si, Nam-myeon, Geumo-do, Simjang-ri, on rock, growing together with *Lepraria* and *Endocarpon* spp. Lat.: 34° 31' 19.7" N; Long.: 127° 43' 52.1" E; Alt.: ca 51 m a.s.l. Coll.: Kondratyuk, S. Y. (160406), 10.06.2016 (holotype: KoLRI 038551); the same locality, growing together with *Pyxine*, *Lepraria* and *Caloplaca* sp., (160418), (isotype: KoLRI 038563); the same locality, growing together with *Lecania*, *Lepraria* and *Endocarpon* sp., (160416), (isotype: KoLRI 038561); the same locality, growing together with *Caloplaca* sp., (160414), (isotype: KoLRI 038559).

Thallus crustose, distinctly areolate, whitish grey; areoles 0.7–1.3(–1.7) mm across, irregular. Thallus to 130–200(–270)  $\mu\text{m}$  thick in section, somewhat thicker around apothecium; cortical layer to 20–30  $\mu\text{m}$  thick, with somewhat

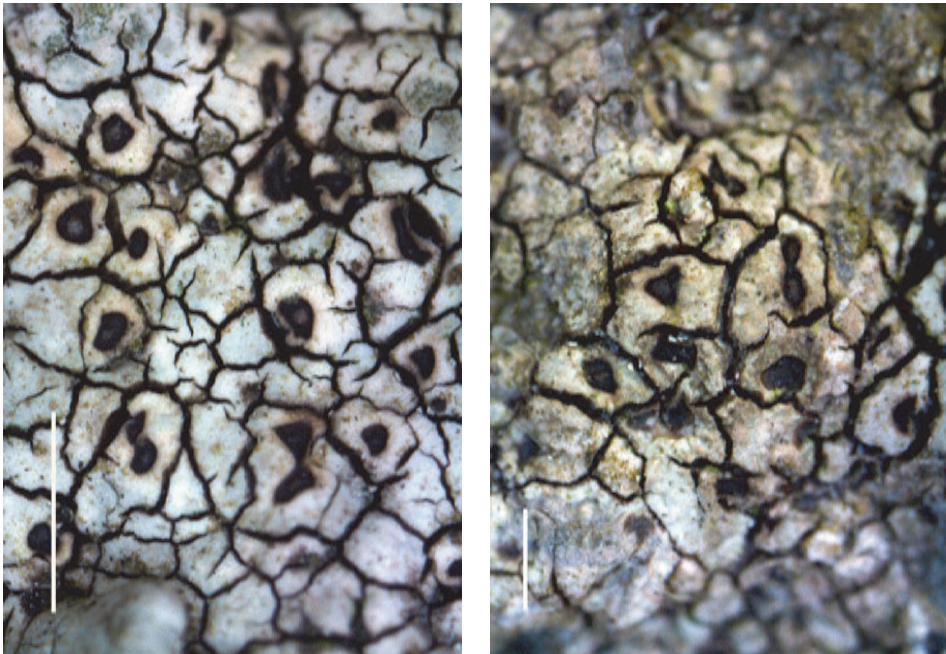


Fig. 3. *Aspicilia geumodoensis*, general habit (holotype). Scale 1 mm (left) and 0.5 mm (right) (photo: S. Kondratyuk)

brownish upper portion to 10–15  $\mu\text{m}$  thick, paraplectenchymatous, cell lumina 5–8  $\mu\text{m}$  in diam./across; algal zone to 50  $\mu\text{m}$  thick, algal cells to 13–20  $\mu\text{m}$  in diam.

Apothecia 0.4–0.7(–0.8) mm in diam./across, in section to 0.25–0.4(–0.8) mm in diam., and to 150–180(–300)  $\mu\text{m}$  thick, (nucleus to 130–170  $\mu\text{m}$  in diam. and to 150–170  $\mu\text{m}$  thick), immersed into thalline areoles and with slightly distinct, slightly rising above level of apothecium thalline margin, concolorous with thallus, whitish grey; disc blackish, sometimes thalline margin well distinct, to 0.1 mm thick; true exciple to (10–)15–30  $\mu\text{m}$  thick in lateral portion and to 40  $\mu\text{m}$  thick in basal portion, mesodermatous paraplectenchymatous, with distinct matrix and cell lumina 2–5  $\mu\text{m}$  across, hyaline or yellowish to somewhat greyish owing to numerous air inclusions, sometimes in basal or lower lateral portions becoming dark brown to blackish brown in places; hymenium to 110–120(–140)  $\mu\text{m}$  high, with oil droplets to 5  $\mu\text{m}$  in diam., sometimes divided into several portions by vertical brownish portions; epihymenium to (15–)20–30(–35)  $\mu\text{m}$  thick, yellowish brown to brown orange or dark brown or greenish brown; paraphyses to 3(–4)  $\mu\text{m}$  wide, not swollen and not moniliform at the tips (or to 6–8  $\mu\text{m}$  wide and more or less moniliform), in K– becoming brownish; subhymenium to 40  $\mu\text{m}$  thick; ascospores simple, hyaline, ellipsoid to widely ellipsoid, (17–)20–25(–30)  $\times$  (8–)9–13  $\mu\text{m}$ , cell wall to 1  $\mu\text{m}$  thick.

Chemistry: Thallus K+ yellow, Pd–, C+ red, gyrophoric acid present.

Ecology: On siliceous rocks in coastal zone.

Distribution: So far known only from the type locality in South Korea, Eastern Asia.

Etymology: It is named after Geumo-do Island, where type material of this taxon was collected.

Taxonomic notes: Among Eastern Asian species of *Aspicilia* described by Hue (1910) in the beginning of the 20th century four species of this genus, i.e. *A. tofacea* Hue and *A. umbrinella* Hue, as well as *A. asteria* Hue and *A. nitellina* Hue are the most similar to *A. geumodoensis*.

*Aspicilia geumodoensis* is similar to the Eastern Asian species *A. tofacea* Hue, but differs in having larger thalline areoles (0.7–1.3 mm vs. 0.3–0.6 mm across), in having larger apothecia (0.4–0.7 mm vs. 0.2–0.3 mm in diam.), in having lower hymenium (110–120  $\mu\text{m}$  vs. 120–130  $\mu\text{m}$  high), and in having larger ascospores ((17–)20–25(–30)  $\times$  (8–)9–13  $\mu\text{m}$  vs. 13–24  $\times$  10–12  $\mu\text{m}$ ), as well as in containing gyrophoric acid (thallus C+ red) and in the lack of K+ yellow then reddish reaction of the medulla.

*Aspicilia geumodoensis* is similar to another Eastern Asian species *A. umbrinella* Hue, which is also characterised by whitish in parts or umbrinus, K– or K+ reddish (?) thallus, but differs in having larger thalline areoles (0.7–1.3 mm vs. 0.3–0.6(–1) mm across), in having larger apothecia (0.4–0.7 mm vs.

0.2–0.5 mm in diam.), in having mainly larger ascospores ((17–)20–25(–30) × (8–)9–13 μm vs. 16–24 × 9–14 μm), and in containing gyrophoric acid.

*Aspicilia geumodoensis* is similar to another Eastern Asian species *A. asteria* Hue, but differs in having much thinner and white, K+ yellow (to 0.3 mm thick vs. more than 0.5 mm thick, grey, K–) thallus, in the lack of radially orientated thalline areoles in peripheral zone, in having lower hymenium (110–120 μm vs 130–180 μm high), in having mainly larger ascospores ((17–)20–25(–30) × (8–)9–13 μm vs. 16–20 × 10–14 μm), and in containing gyrophoric acid.

*Aspicilia geumodoensis* is similar to another Eastern Asian species *A. nitelina* Hue, but differs in having white, K+ yellow (brown, K–) thallus, in having larger apothecia (0.4–0.7 mm vs. 0.2–0.4 mm in diam.), in having lower hymenium (110–120 μm vs. 140–180 μm high), and in having narrower ascospores ((17–)20–25(–30) × (8–)9–13 μm vs. 14–24 × 10–18 μm), as well as in containing gyrophoric acid.

Unfortunately diagnoses of the Eastern Asian Hue taxa are missing of some modern characters of and they are in urgent need of revision with the usage modern methods including molecular data set.

*Aspicilia geumodoensis* is similar to *Ionaspis obtecta* (Vain.) R. Sant., growing on metal enriched rock, montane, very rare species in Europe, but differs in having plane areoles (vs. areole surface convex), and in having white areoles (vs. deep rust-red), in having immersed apothecia (vs. sessile, constricted at the basis), in the lack of proper margin (vs. proper margin thick, becoming black, often radially striate), in having lower hymenium (110–120 μm vs. to 170 μm high, pale yellow, K+ yellow, N–), in the lack of brown granules in epihymenium (vs. interspersed with brown granules, not dissolving in K), in having larger ascospores ((17–)20–25(–30) × (8–)9–13 μm vs. 18–26 × 10–13 μm), and in having C+ (gyrophoric acid present) thallus.

Other specimens examined: Republic of Korea. Jeollanam-do, Yeosu-si, Nam-myeon, Geumo-do, Simjang-ri, on rock, growing together with *Lepraria* sp. Lat.: 34° 31' 19.7" N; Long.: 127° 43' 52.1" E; Alt: ca 51 m a.s.l. Coll.: Kondratyuk, S. Y. (160417), 10.06.2016 (KoLRI 038562 sub *Lepraria*); the same locality, growing together with *Lepraria* sp., (160410), (KoLRI 038555 sub *Lepraria*).

***Biatora ivanpisutii* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova***  
(Fig. 4)

Mycobank no.: MB 817969

*Similar to Biatora longispora, but differs in much larger and much thicker apothecia, in having well-developed true exciple distinctly underlying all structures of apothecium, in having much darker apothecium disc, and in having 0–1–2–3-septate and much longer ascospores.*



Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, at a rockwall, on bark, growing together with *Biatora ocelliformis*, *Phaeophyscia rubropulchra* and *Porina* sp. Lat.: 37° 31' 19.51" N; Long.: 130° 54' 16.03" E; Alt.: 415 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161743), 09.07.2016 (holotype: KoLRI 039961).

Thallus greyish to greenish grey, somewhat indistinct in places, from very thin to thicker at the apothecia.

Apothecia to 0.8–0.9 mm in diam. and to 0.3 mm thick in section, scattered or aggregated in groups, regularly rounded to somewhat irregularly pressed, from slightly semiconvex and marginate at first to more or less convex and almost emarginated, own margin from hyaline or whitish to dirty greyish, disc dark brown to blackish brown; in section true exciple well developed, to 30–40(–80)  $\mu\text{m}$  thick in uppermost lateral, to 60–80(–90)  $\mu\text{m}$  thick in lower lateral and basal portion, distinctly palisade with well-developed matrix and hyphae lumina of 2–3  $\mu\text{m}$  in diam., mainly hyaline in inner layer, but with dull brownish inclusions in places, usually well underlying all structures of apothecium; hymenium to (50–)60–80  $\mu\text{m}$  high, becoming brownish in places; epihymenium to 10–20  $\mu\text{m}$  thick, bluish or dark/blackish bluish or dark

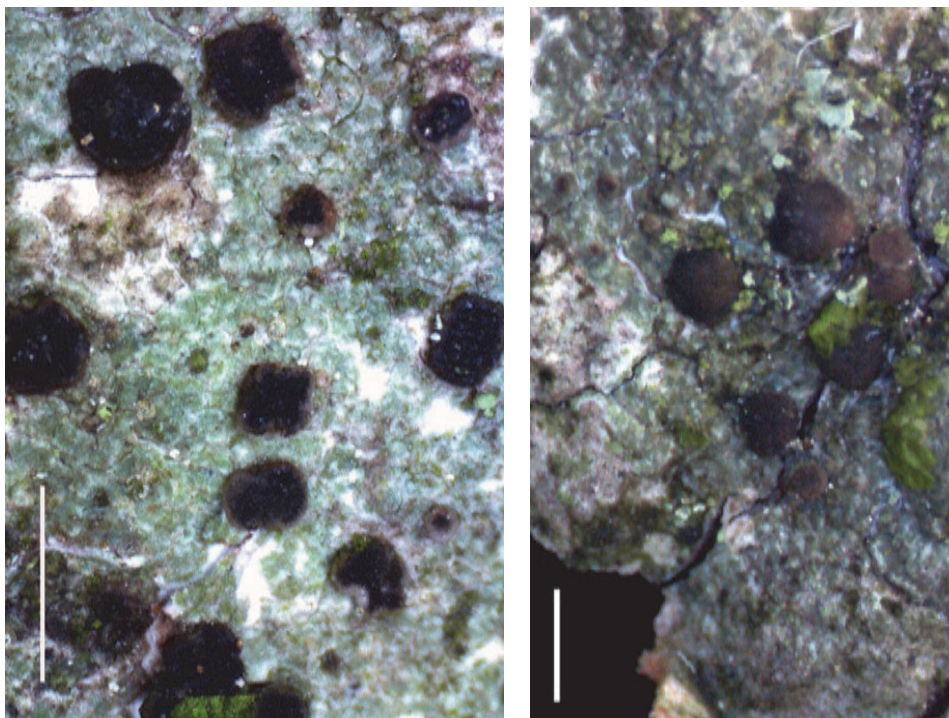


Fig. 4. *Biatora ivanpisutii*, general habit (holotype). Scale 1 mm (photo: S. Kondratyuk)

brown in places, N+ violet-red, K– or slightly lighter; paraphyses more or less widened gradually to the tips, to 3–4  $\mu\text{m}$  wide, often becoming dull brownish to dark brownish or dirty blackish-bluish towards the tips; subhymenium to 50  $\mu\text{m}$  thick, more or less light brownish in lower portion and yellowish or straw to greyish in the upper portion, or dark brown throughout, N– or more yellowish brown, K–; ascospores 0–1–2(–3)-septate, hyaline, fusiform or somewhat cylindrical or slightly widened at one end, sometimes slightly curved, usually one end thinner of the second, (17–)19–25(–29)  $\times$  2.5–4(–4.5)  $\mu\text{m}$  in water (and slightly narrower, (18–)20–29  $\times$  (2.8–)3–3.5(–4.5)  $\mu\text{m}$  in K).

Chemistry. Thallus and apothecia K–, N–, Pd–.

Ecology: On bark of tree.

Distribution: So far known only from the type locality in South Korea, Eastern Asia.

Etymology: It is named after the well-known Slovak lichenologist and our friend Ivan Pišút (1935–) (Bratislava, Slovak Republic) in recognition of his contribution to lichenology and especially to our knowledge on diversity of lichen-forming fungi in mountain systems of Eurasia, as well as after external similarity of this taxon to the Eastern Asian taxon *Ivanpisutia oxneri*.

Taxonomic notes: *Biatora ivanpisutii* is similar to *B. longispora* (Degel.) Lendemer et Printzen, but differs in much larger and much thicker apothecia, in having well-developed true exciple distinctly underlying all structures of apothecium, in having much darker apothecium disc, and in having 0–1–2–3-septate and much longer ascospores (see also Kondratyuk *et al.* 2013a).

A number of specimens were selected with preliminary name as *Biatora ivanpisutii* from recent collections in the KoLRI. However, most of these specimens are in somewhat intermediate position between *Biatora longispora* and type collection of *B. ivanpisutii*. A further, detailed study of this species group including molecular data is planned.

*Caloplaca patwolseleyae* S. Y. Kondr., U. Jayalal et J.-S. Hur, *spec. nova*  
(Fig. 5)

Mycobank no.: MB 817970

*Similar to Caloplaca filsonii, but differs in having wider ascospores, and in having much wider ascospore septum, and in different chemistry and distribution.*

Type: Republic of Korea. Jeollanam-do, Yeosu-si, Nam-myeon, Geumo-do, Uhak-ri port, on bark. Lat.: 34° 30' 30.07" N; Long.: 127° 46' 13.00" E; Alt.: 14 m a.s.l. Coll.: Jayalal, U., Park, J. S., Ryu, J. A. (120610), 27.04.2012 (holotype: KoLRI 015603).

Thallus to 3–4 cm across, crustose, whitish grey to pale grey, with uneven, slightly warted upper surface. In section thallus to 200(–225)  $\mu\text{m}$  thick (in

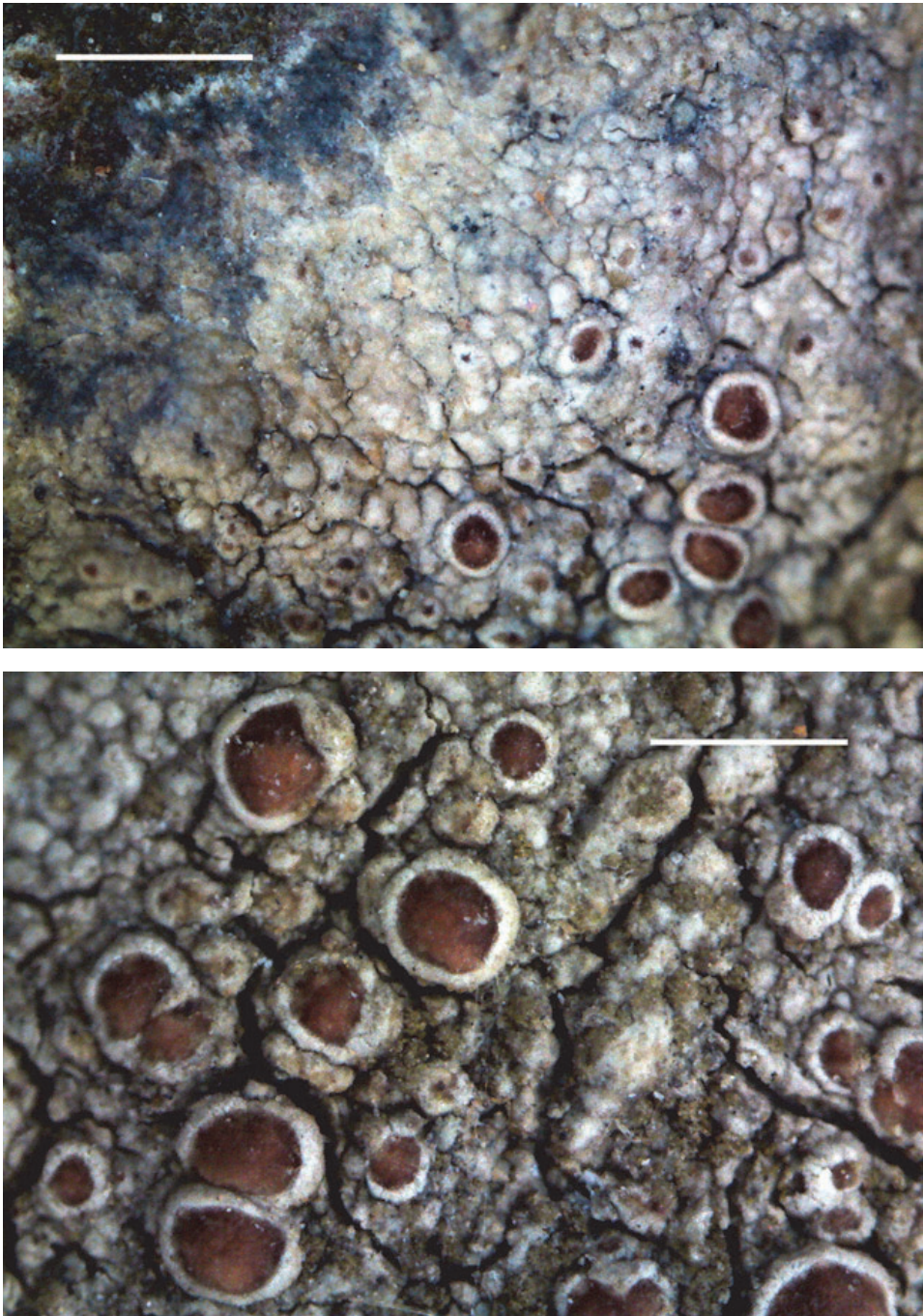


Fig. 5. *Caloplaca patwolseleyae* (holotype), general habit (scale 1 mm) (photo: S. Kondratyuk)

the centre near apothecium), cortical layer to 20  $\mu\text{m}$  thick with very thick cell walls. Algal zone to 80  $\mu\text{m}$  thick, algal cells to 10–13  $\mu\text{m}$  in diam. Hypothallus black to bluish black, seen in peripheral zone as black line to 0.2–0.5 mm wide sometimes with whitish to 0.1 mm wide edge.

Apothecia 0.3–1 mm in diam., and to 0.5 mm thick in section, lecanorine, at first scattered, distant and regularly rounded, later sometimes more or less aggregated, pressed and irregular, and semiconvex to convex with uplifted central portion; thalline margin whitish or white greyish, to 0.08–0.1(–0.12) mm wide; disc dull brown to dark brown, at first plane but soon becoming semiconvex with distinctly uplifted central portion.

In section thalline margin to 150  $\mu\text{m}$  thick, with very thin cortical layer to 15–20  $\mu\text{m}$  thick; algal zone to 75–120(–130)  $\mu\text{m}$  thick in the basis of apothecium; true exciple weakly developed, to 10–15  $\mu\text{m}$  thick in lateral and basal portion, paraplectenchymatous; hymenium to 70–80(–100)  $\mu\text{m}$  high, with slightly yellowish to dull straw yellow epihymenium; paraphysis tips very slightly swollen, to 2–3  $\mu\text{m}$  wide, distinctly becoming yellowish and brownish; subhymenium to 200–250  $\mu\text{m}$  thick, hyaline, with coarse small oil droplets to 1  $\mu\text{m}$  in diam.; asci 8-spored; ascospores very narrow, bifusiform, slightly widened at the septum, (12–)13–15(–16)  $\times$  4–6  $\mu\text{m}$ , septum to (3.5–)4–6  $\mu\text{m}$  wide. Conidia short bacilliform, 2–2.5  $\times$  1  $\mu\text{m}$ .

Chemistry: Thallus K<sup>+</sup> more or less yellowish or brownish yellow.

Ecology: On bark of tree.

Distribution: It is known only from the type locality in South Korea, Eastern Asia.

Etymology: It is named after the well-known British lichenologist Patricia (Pat) A. Wolseley (1939–) (London (BM), UK) for recognition of her contribution in study of lichens of tropical and South Hemisphere regions and her kind support of young lichenologists especially from tropical regions of the Asian continent.

Taxonomic notes: *Caloplaca patwolseleyae* is characterised by pale grey thallus with lecanorine apothecia with brownish disc (*Lecanora subfusca* aggr. type apothecia), as well as in having narrow bipolar ascospores with rather wide ascospore septum.

*Caloplaca patwolseleyae* is similar to *C. filsonii* Hafellner, S. Y. Kondr. et Kärnefelt, known from bark of *Avicennia marina* from several localities in Queensland, Australia, but differs in having continuous grey (vs. verrucose whitish grey) thallus, in having only lecanorine (vs. lecanorine then zeorine) apothecia, in having slightly wider ascospores ((12–)13–15(–16)  $\times$  4–6  $\mu\text{m}$  vs. (11–)12–15(–16)  $\times$  3–5.5  $\mu\text{m}$ ), and in having much wider ascospore septum ((3.5–)4–6  $\mu\text{m}$  thick vs. 1–2(–5)  $\mu\text{m}$  wide), and in different chemistry (vs. thallus K<sup>+</sup> red, caloploicin (major), vicanicin (minor), atranorin (minor) and sev-

eral unknown antraquinones), and distribution (Eastern Asia vs. Australia) (Kondratyuk *et al.* 2007).

As other *Caloplaca* species without antraquinones, like *Caloplaca patworseleyae* as well as other similar taxa, i.e.: *C. brebissonii* (Fée) R. Sant. ex Hafellner et Poelt, *C. homologa* (Nyl.) Hellb., *C. ochrolechioides* S. Y. Kondr. et Kärnefelt, *C. tomnashii* S. Y. Kondr., Elix et Kärnefelt, *C. subdecadens* (Nyl.) Hafellner et Poelt, *C. jatolensis* Y. Joshi et Upreti, and *C. chujaensis* S. Y. Kondr., L. Lőkös et J.-S. Hur (see also *Fauriea* paper in this issue (Kondratyuk *et al.* 2016b), and which resemble *Lecanora* species are commonly (and understandably) mistaken for a species of *Lecanora*, until the ascospores are checked (see Galloway 2007, Joshi *et al.* 2008, Kondratyuk *et al.* 2007, 2011, 2015a, 2016a).

It should be mentioned that these species mentioned above (i.e.: *C. brebissonii*, *C. chujaensis*, *C. homologa*, *C. filsonii*, *C. jatolensis*, *C. patworseleyae*, and *C. subdecadens*) should be added to the key of *Caloplaca* species with brown discs and with a lecanorine margin so that resemble species of the *Lecanora subfusca* aggr. recently proposed by Aptroot and Cáceres (2016). Unfortunately all taxa published much earlier were not included in the key of Aptroot and Cáceres.

*Catillaria ulleungdoensis* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Figs 6–7)

Mycobank no.: MB 817971

*Similar to Catillaria chalybeia, but differs in having less developed and not areolate thallus, in having usually smaller apothecia, in having N–hymenium and exciple, in having narrower hymenium, as well as in having shorter ascospores.*

Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Bukmyeon, Na-ri, along the coast road (Ulleungunhwan-ro, Nr. 926), close to Cheonbu Harbour, on siliceous rocks. Lat.: 37° 32' 09.12" N; Long.: 130° 51' 45.28" E; Alt.: 15 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161830), 10.07.2016 (holotype: KoLRI 040055), the same locality, (161828), (isotype: KoLRI 040053).

Thallus to 2 cm across or more, weakly developed or indistinct, mainly from very thin in peripheral zone and to somewhat thicker and cracked (but not areolate), with small irregular portions to 0.1–0.3 mm across (seen only at the highest magnification, above  $\times 100$ ); dark greyish or dull brownish grey. Hypothallus indistinct or with somewhat shiny line to 0.5 mm wide in peripheral zone.

Apothecia to 0.15–0.3(–0.55) mm in diam., and to 0.12–0.13(–0.18) mm thick in section, lecideine, mostly flat; in section true exciple to (15–)50–70 (–150)  $\mu\text{m}$  thick in the uppermost lateral portion, to 20–30  $\mu\text{m}$  thick in low-

er lateral portion, and to 40–80  $\mu\text{m}$  thick in basal portion (better seen in K), black or black-brown throughout; hymenium to 35–40  $\mu\text{m}$  high; epihymenium dark brownish or blackish, in K– or K+ intensifying black brownish; paraphysis tips with distinct black cups, very variable in shape, 3–6(–7)  $\mu\text{m}$  wide or sometimes to 7–10  $\mu\text{m}$  wide if paraphysis tips curved; subhymenium (30–)40–70  $\mu\text{m}$  thick, more or less dark greyish or blackish or dark brown to blackish brown (better seen in K, in K distinctly brown); asci of *Catillaria*-type; ascospores hyaline, 1-septate, narrowly ellipsoid, in K better seen constriction at the septum, (6–)7–9(–10)  $\times$  (2–)2.2–2.5(–3.8)  $\mu\text{m}$ . Pycnidia not seen.

Chemistry: Epihymenium and outermost layer of true exciple N–, green N+ pigment absent, epihymenium and exciple K– or + intensifying black-brown. Chemistry not examined.

Ecology: On siliceous rocks.

Distribution: Probably rather common species in coastal zone of Eastern Asia, while so far known only from scattered localities in South Korea, Eastern Asia.

It should be emphasised that previous records of both *Catillaria atomarioides* and *C. chalybeia* should be revised and compared with the new taxon described here.

Etymology: It is named after the type locality, i.e. Ulleung-do Island in South Korea, Eastern Asia.

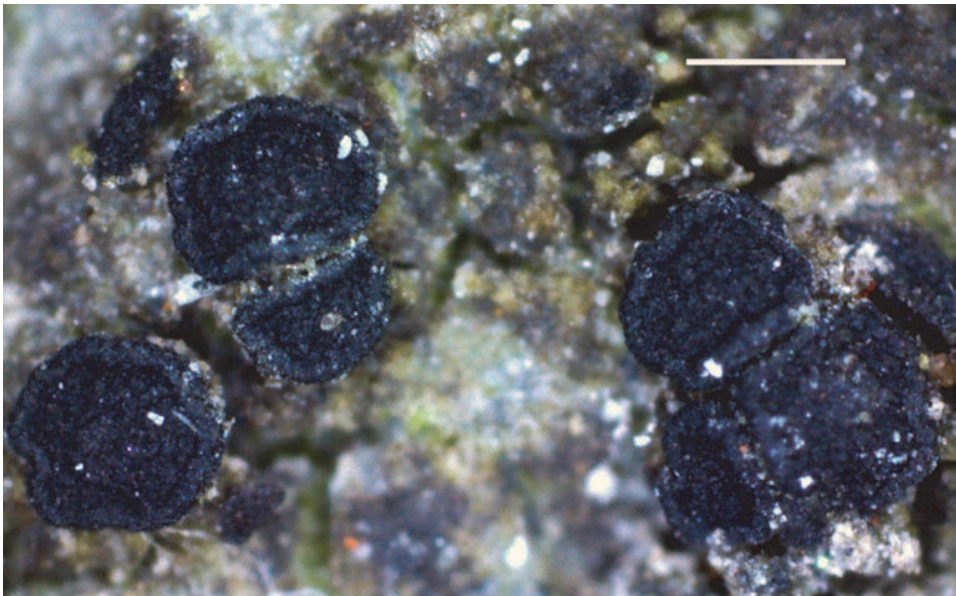


Fig. 6. *Catillaria ulleungdoensis*, general habit (holotype). Scale 0.5 mm (photo: S. Kondratyuk)

Taxonomic notes: After having more or less large apothecia (from 0.2 to 0.5 mm in diam./across), after having dark brown true exciple throughout, and after having dark brown hypothecium *Catillaria ulleungdoensis* is similar to *C. chalybeia* (Borrer) A. Massal., growing on a wide range of slightly base-rich or nutrient-enriched siliceous rocks (incl. sea-shore), rare on highly calcareous substrata, occasionally on dust-impregnated timberwork and tree trunk, throughout in Europe, Macaronesia, North and South America, Asia, Africa and Australia, but differs in having less developed and not areolate thallus (vs. distinctly areolate to verruculose-areolate, areoles 0.1–0.4 mm in diam.), in having usually smaller apothecia (0.15–0.3(–0.55) mm vs. 0.2–0.5(–1) mm in diam.), in having N– (vs. N+ purple red) hymenium and exciple, in having narrower hymenium (to 35–40  $\mu\text{m}$  vs. 40–60  $\mu\text{m}$  high), as well as in the lack of green pigment in epihymenium, hymenium and own margin N+ purple-red, as well as in having shorter ascospores ((6–)7–9(–10)  $\times$  (2–)2.2–2.5(–3.8)  $\mu\text{m}$  vs. (7.5–)9–12(–15)  $\times$  2.5–4  $\mu\text{m}$ ).

*Catillaria ulleungdoensis* is similar to *C. atomarioides* (Müll. Arg.) H. Kilius, growing on hard siliceous rocks in Europe, Macaronesia, South Africa, but differs from the latter species in having larger apothecia (0.15–0.3(–0.55) mm vs. 0.1–0.2 mm in diam.), in having brown-black (vs. green-black) exciple, in having dark brown hypothallus (vs. colourless), while ascospores are almost the same ((6–)7–9(–10)  $\times$  (2–)2.2–2.5(–3.8)  $\mu\text{m}$  vs. 7–10  $\times$  2.3–3.5  $\mu\text{m}$ ). It should be emphasised that all previous records of *Catillaria atomarioides* from South Korea (Aptroot and Moon 2014, Kondratyuk *et al.* 2015a, 2016a) may belong to this taxon.

*Catillaria ulleungdoensis* is similar to *C. subviridis* (Nyl.) Zahlbr., growing on nutrient-enriched (e.g. by birds) rocks, in submesic supralittoral zone with *Verrucaria maura* in Europe and North America, but differs in having black

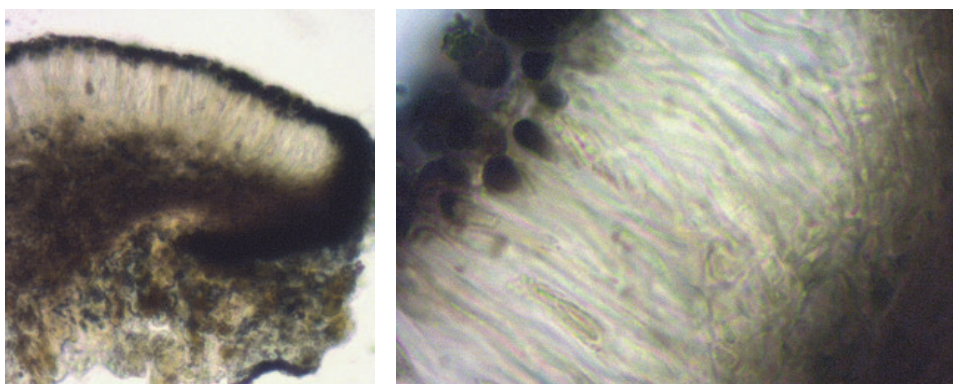


Fig. 7. *Catillaria ulleungdoensis* (holotype), section of apothecia (left) and paraphyse tips (right) (photo: S. Kondratyuk)

true exciple throughout (vs. true exciple dark brown only at outer edge and more or less colourless in inner portion), and in having smaller and especially narrower ascospores ((6–)7–9(–10) × (2–)2.2–2.5(–3.8) μm vs. 10–16 × 4.5–6 μm).

Other specimens examined: Republic of Korea. Gyeongsangbuk-do, Ulleung-gun, Ulleung-eup, Dodong-ri, Dodong Port, on rock, growing together with *Caloplaca* sp. 7. Lat.: 37° 28' 59.9" N; Long.: 130° 54' 40.7" E; Alt. 20 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (162014), 11.07.2016 (KoLRI 040252 sub *Catillaria*). – Jeollabuk-do, Gunsan-si, Okdo-myeon, Sinsi-do. Lat.: 35° 49' 08.8" N; Long.: 126° 27' 55.8" E; Alt.: 19 m a.s.l. Coll.: [unmentioned] (110820), 22.08.2011 (KoLRI 013829 sub *Pertusaria subobductans*). – Jeju-do, Jeju-si, Chuja-do, Chuja-myeon, Yecho-ri, Road of Mt Sindea observatory, on rock, growing together with *Caloplaca* cf. *flavorubescens*, and *Fuscidea coreana*. Lat.: 33° 57' 09.9" N; Long.: 126° 20' 13.08" E; Alt.: 56 m a.s.l. Coll.: Joshi, Y., So, J. [site 9] (141038), 21.06.2014 (KoLRI 023592 sub *Caloplaca* cf. *flavorubescens*). – Jeju-do, Seogwipo-si, Seongsan-eup, Goseong-ri, Seopjicoji, on rock, growing together with various species of *Rinodina* and *Psorotichia*. Lat.: 33° 19' 21.0" N; Long.: 126° 50' 49.03" E. Alt.: 69 m alt. Coll.: Halda, J. P. [site 2] (140432), 19.06.2014 (KoLRI 022829 sub *Rinodina*).

*Coenogonium agonimioides* J. P. Halda, S.-O. Oh et J.-S. Hur, *spec. nova*  
(Fig. 8)

Mycobank no.: MB 817972

*Coenogonium agonimioides* differs in having greenish grey coralloid thallus and simple fusiform ascospores (12 × 2 μm). The closest relative *Coenogonium isidiatum* differs with cylindrical to coralloid isidia formed by thallus outgrowths and also with wider ascospores.

Type: Republic of Korea. Jeju-do province, Seogwipo-si, shaded basaltic rock on the bank of the river. Lat.: 33° 18' 01.36" N; Long.: 126° 34' 37" E; Alt.: 303 m a.s.l. Coll.: Halda, J. P., Oh, S.-O., Liu, D. and Park, C.-H. (152600) 18 August 2015 (holotype: KoLRI 036822); the same locality, (152619) (isotype: KoLRI 036841).

Thallus saxicolous, pale grey green, fragile, composed from minutely coralloid to deeply dissected, branched squamules, resembling richly branched, coralloid isidia, easily detached from stone surface, 30–50 μm in diam. and to 350 μm tall, corticate, with a shiny surface when dry; and with white hyphal hairs of 30–50 × 4–6 μm on the lower side of squamules. Photobiont *Trentepohlia*, cells 5–12 μm in diam.

Apothecia sessile with strongly constricted base, biatorine, rounded, rarely slightly irregular in outline, loosely attached to the thallus, 0.3–1.2 mm in diam., 180–250 μm high, abundant, at first barrel-shaped, but soon becoming flat, with waxy-orange disc and whitish margin. Exciple well developed, 75–125 μm, paraplectenchymatous with radiating cell rows of cellular lumina 4–7(–9) μm wide and to 12 μm long. Hymenium 25–40 μm high, colourless.



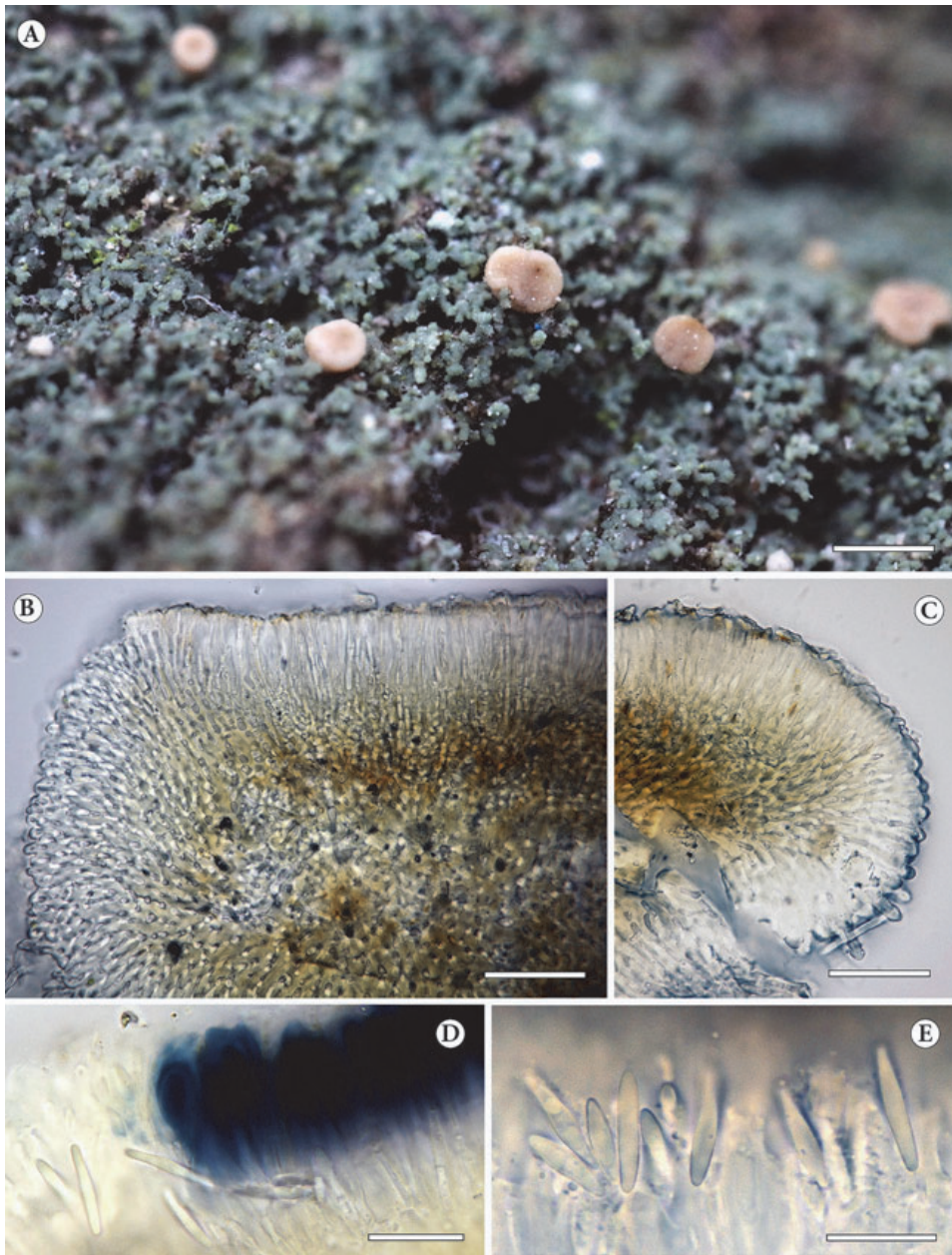


Fig. 8. *Coenogonium agonimioides* (KoLRI 036822, holotype), A. thallus with ascomata; B, cross-section of apothecium; C, details of exciple; D. mature ascospores with asci (mounted in Lugol); E. details of ascospores (mounted in water); Scales: A – 1 mm, B, C – 50  $\mu$ m, D, E. – 10  $\mu$ m (photo: J. P. Halda)

Epithecium colourless, K-. Hypothecium colourless to pale brown in the centre; paraphyses 1.5 µm wide, septate, unbranched to rarely branched, sometimes swollen on apices, apices 2–3 µm wide. Asci 8-spored, *Catillaria*-type, 20–25 × 6–8 µm. Ascospores (9–)11–14(–15) × (1.5–) 2 (–2.5) µm (× = 12.2 × 1.7 µm; SD 1.3; 0.3 µm; n = 50; l/w ratio = 7.2), simple, acicular to fusiform. Pycnidia not observed.

Chemistry: Thallus and ascomata K-, C-, KC-, P-, UV-. TLC: no substances detected.

Ecology: The species was found growing on acidic rocks (basalt) in shaded habitat along stream protected by forest together with *Agonimia pacifica*, *Coenogonium lueckingii*, *Flakea papillata*, *Porina curnowii*, *P. eminentior*, *P. leptalea*, *P. mastoidea*, *Strigula nipponica*, *Verrucaria aethiobola* and *Willeya iwatsukii*.

Distribution: So far known from the type locality in Seogwipo, Jeju Island, South Korea.

Etymology: Species epithet “agonimioides” refers to the coralloid arrangement of the thallus branches like in *Agonimia* species.

Taxonomic notes: *Coenogonium agonimioides*, a new saxicolous species characterised by a greenish grey, coralloid thallus and simple, fusiform ascospores, was found during a field trip in Jeju Island (South Korea) in August 2015.

The lichen genus *Coenogonium* is represented by more than 80 species worldwide (Rivas Plata *et al.* 2006, Ferraro and Michlig 2013). *Coenogonium*, which is the only genus in the family Coenogoniaceae (Stizenberger 1862), is characterised by a crustose or filamentous thallus with a trentepohlioid photobiont, biatorine (rarely zeorine), yellow to orange or brown apothecia with paraplectenchymatous excipulum, sometimes with pilose margins, partially amyloid hymenium, thin-walled, unitunicate asci, and generally small, simple to 1-septate ascospores (Rivas-Plata *et al.* 2006, Lücking 2008).

The delicate, richly branched, coralloid “isidia” like thallus and habitat ecology distinguish *Coenogonium agonimioides* from other relatives. When sterile, *C. agonimioides* most easily confused with sterile, isidiose morphs of *A. cavernicola* (Kondratyuk *et al.* 2015a) or *A. koreana* (Kashiwadani *et al.* 2002). Corticolous *C. isidiatum* (Thor and Vězda 1984, Rivas Plata *et al.* 2006) differs with cylindrical to coralloid isidia formed by thallus outgrowths and also with ascospores (1-septate, 9–14 × 3–4 µm). *C. isidiigerum* (Lücking 1999, Rivas Plata *et al.* 2006) forms thin, epiphyllous thallus often dissolved in discoid isidia on whitish stalk. Epiphytic *C. isidiosum* (Breuss 2002, Rivas Plata *et al.* 2006) is easily distinguish by small apothecia (0.5 mm in diam.), taller hymenium (50–60 µm vs. 25–40 µm in *C. agonimioides*) and isidia with swollen apices. Saxicolous *C. lueckingii* described from Jeju Island (Joshi *et al.* 2015) lacks isidia and forms continuous crustose thallus with white prothallus. Corticolous *C. kawa-*

*nae* (Harada and Vězda 1997, Rivas Plata *et al.* 2006) from Japan forms thin to filmy thallus without isidia, smaller gyalectoid apothecia (0.25–0.5 mm) and 1-septate ascospores ( $10\text{--}14 \times 4\text{--}5 \mu\text{m}$ ). *C. luteum* also known from Korea differs with thin, evanescent thallus without isidia, but with whitish conidia.

***Gyalidea austrocoreana*** S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 9)

Mycobank no.: MB 817973

*Similar to Gyalidea testacea, but differs in having dark apothecia with black true exciple, in having dark blue hymenium and dark brown subhymenium, in having much thicker and more uplifted above substrate level apothecia, in having (1–2)-septate and longer ascospores.*

Type: Republic of Korea. Jeollanam-do Prov., Goheung-gun Co., Bongnae-myeon, Queinaro-do (Wenaro) Island, Mt Bongra, on siliceous rocks, growing together with *Porpidia albocaerulescens*, *Melanophloea coreana*, *Scoliciosporum jasonhurii*, *Stereocaulon*, *Acarospora*, and *Ionaspis*. Lat.:  $34^\circ 27' 2.76''$  N; Long.:  $127^\circ 30' 08.16''$  E; Alt.: 231 m a.s.l. Coll.: Wang, X. Y. and Ryu, J. A. (110960), 24.10.2011 (holotype: KoLRI 013936 sub *Porpidia albocaerulescens*).

Thallus crustose, well developed from very thin in peripheral zone to rather thick in the centre, distinctly verruculose, areolated to continuous with wrinkled or verruculose surface; areoles 0.2–0.3 mm in diam., early becoming semiconvex to very convex, somewhat distant at initial stages, but soon becoming densely aggregated and forming thick almost continuous thallus, whitish or whitish greyish, with bluish-whitish or greenish-whitish or greenish greyish spots. Hypothallus bluish or bluish black, often as line to 0.25–0.5 mm wide around thallus usually well distinctly observed.

Apothecia 0.5–0.85(–1) mm in diam., and to 0.3 mm thick in section, distant and solitary or often aggregated in small clusters or groups; lecideine, black with bluish tinge or bluish black with somewhat whitish underside; in section true exciple to  $30 \mu\text{m}$  thick in the uppermost lateral portion and to  $50\text{--}70 \mu\text{m}$  thick in lower lateral portion, and to  $80\text{--}120$ (–200 or more if stipe present)  $\mu\text{m}$  in the basal portion, black throughout with somewhat yellowish outermost layer to  $10 \mu\text{m}$  thick (in basal portion to  $30 \mu\text{m}$  thick); hymenium to  $60\text{--}70 \mu\text{m}$  thick, dark bluish, epihymenium not differentiated; subhymenium to  $20 \mu\text{m}$  thick, dark bluish or bluish black; asci of *Gyalidea*-type, 8-spored, often with 1-septate and 3-septate in the same ascus; ascospores (1–2)–3-septate, with distinct halo,  $15\text{--}20 \times (3.5\text{--})3.8\text{--}4.5$ (–5)  $\mu\text{m}$ .

Ecology: On siliceous rocks.

Distribution: So far known only from the type locality in South Korea, Eastern Asia.

Etymology: It is named after country, South Korea, where type material was collected.

Taxonomic notes: From all species of the genus *Gyalidea* it differs in having dark bluish hymenium layer and narrow ascospores with halo.

*Gyalidea austrocoreana* is similar to *G. testacea* Vězda et Poelt known from Nepal, after having ascomata 0.6–0.8 mm in diam., and 1–3-septate, halonate ascospores, but differs in having dark apothecia (vs. light brown), in having apothecia with black (vs. colourless) true exciple, in having dark blue (vs. colourless) hymenium, in having dark brown subhymenium (vs. colourless), in having much thicker and more uplifted (above substrate level) apothecia, in having (1–2)-septate (vs. 1- or 3-septate) and longer ascospores (15–20 × (3.5–)3.8–4.5(–5) μm vs. 12–16 × 4–5 μm).

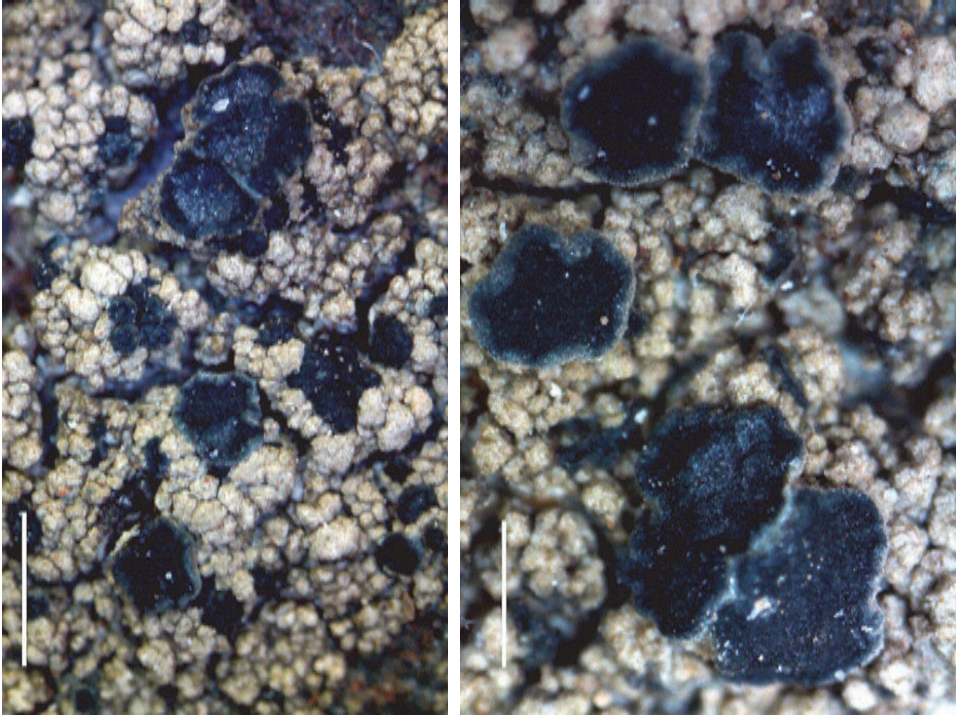


Fig. 9. *Gyalidea austrocoreana*, general habit (holotype). Scale 1 mm (left, 0.5 mm (right) (photo: S. Kondratyuk)

*Gyalidea ropalosporoides* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 10)

Mycobank no.: MB 817974

*Similar to Gyalidea hyalinescens, but differs in having much thicker and often becoming convex apothecia, in having dark or blackish own margin, in having blackish brown or dark brown disc, in having lower hymenium, in having dark, black or black-bluish exciple with thin hyaline/colourless outer layer, in having narrower and longer ascospores usually with one end distinctly attenuated.*

Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, Jeodong-ri, on rock wall along path to Bongrae waterfall. Lat.: 37° 29' 52.10" N; Long.: 130° 53' 19.72" E; Alt.: 285 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161546), 09.07.2016 (holotype: KoLRI 039764).

Thallus crustose, very thin, often cracked together with substrate surface (Fig. 10), to badly developed or indistinct.

Apothecia rather large, 0.9–1.2 mm in diam., and very thick, to 0.2–0.45 (–0.5) mm thick in section, when convex at overmature; at first with well-developed and well distinct uplifting level of disc own margin, dark brownish black to black, concolorous with disc; in section exciple to (30–)50–75 µm thick in the uppermost lateral portion, to 70–100 µm thick in the lower lateral portion and to 75–150 µm thick in basal portion, bluish black or black in inner portions while outer layer to (10–)15–20 µm thick (especially in lateral portion) hyaline or transparent to lightly brownish or violetish black, palisade with well-developed matrix and separate hyphae to 5–6 µm wide, and hyphae lumina of 2(–3) µm seen; epinecral layer to 3–7 µm thick in lateral portion and on underside sometimes observed, hyaline hyphae to 15–25 µm long and 2–2.5 µm wide sometimes at outer layer of true exciple observed; sometimes stipe or basis of apothecium to 100(–150) µm thick, blackish, concolorous with true exciple often observed; hymenium to (50–)60–70(–80) µm high, hyaline but sometimes with bluish portions vertically orientated; epihymenium indistinct, the same hyaline or bluish as hymenium; paraphyses slightly swollen towards the tips to 3–4(–5) µm wide; asci 75–85 × 10–12 µm, 8-spored; subhymenium 20–25(–40) µm thick, somewhat brownish to reddish or violetish brown; ascospores (0–)1–3(–4)-septate, hyaline, elongated ellipsoid to fusiform, slightly widened in the middle with more or less attenuated but rounded ends, sometimes one of the middle cell is the widest and one end thinner (tail-like), slightly constricted at septum, (16–)22–29(–30) × 4–5.5(–6.5) µm. Pycnidia not seen.

Chemistry: Chemistry not examined.

Ecology: On shaded, siliceous rocks.

Distribution: So far known only from scattered localities in South Korea, Eastern Asia.

Etymology: It is named after similarity with *Ropalospora chirisanensis* S. Y. Kondr., L. Lőkös et J.-S. Hur recently described from South Korea, Eastern Asia.

Taxonomic notes: *Gyalidea ropalosporoides* is similar to *G. hyalinescens* (Nyl.) Vězda in having well-developed own margin at first and concave or flat disc, as well as in having large apothecia, but differs in having much thicker and often becoming convex apothecia (0.2–0.45(–0.5) mm vs. 0.2–0.3 mm thick, only concave later flat), in having dark or blackish own margin (vs. waxy yellowish to yellow-brown), in having blackish brown or dark brown disc (vs. light yellow-brown to light brown), in having lower hymenium (vs. 90–120  $\mu\text{m}$  high), in having somewhat thinner true exciple in the uppermost lateral portion (50–75  $\mu\text{m}$  in the uppermost and to 100  $\mu\text{m}$  thick in lower lateral portion vs. 60–120  $\mu\text{m}$  thick in lateral portion); in having dark, black or black-bluish exciple with thin hyaline (transparent) outer layer (vs. colourless or slightly yellowish, where outermost layer yellow to olive yellow), in having wider range of ascospore sizes seem to be narrower and longer and usually with one end distinctly attenuated (22–29  $\times$  4–5.5  $\mu\text{m}$  vs. 16–24  $\times$  5–6  $\mu\text{m}$ ), as well as in the lack of pruina in young apothecia.

*Gyalidea ropalosporoides* is similar to *Ropalospora chirisanensis* S. Y. Kondr., L. Lőkös et J.-S. Hur recently described from South Korea, Eastern Asia (Kond-

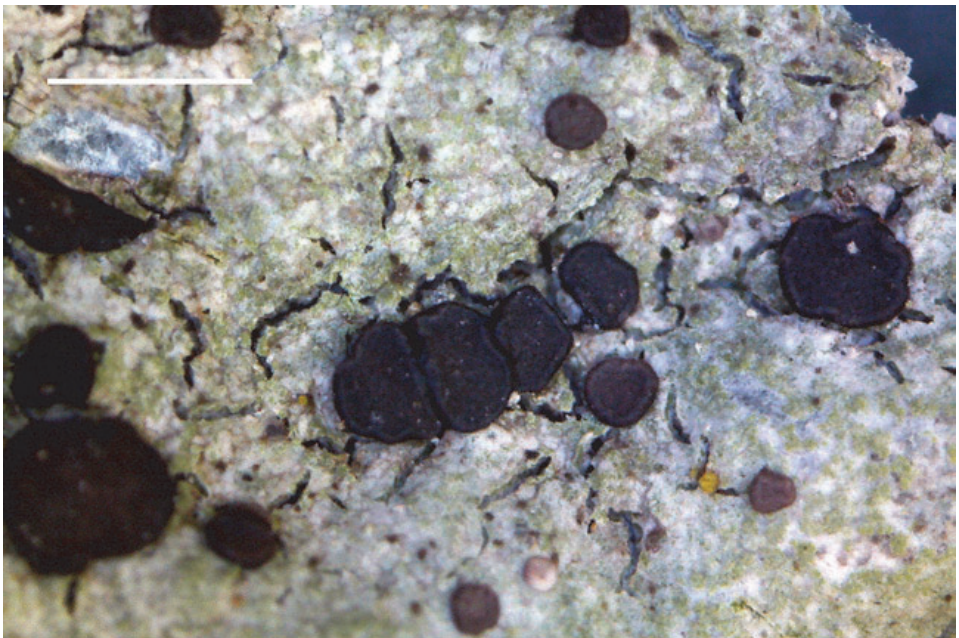


Fig. 10. *Gyalidea ropalosporoides*, general habit (holotype). Scale 1 mm (photo: S. Kondratyuk)

ratyuk *et al.* 2016a) after having black, lecideine apothecia from plane with very thick own margin to convex and emarginated, after having black, brownish or bluish black true exciple in inner portions and hyaline or colourless in outermost layer, and after having hyaline hymenium and not differentiated (the same hyaline) epihymenium, but differs in having apothecia closely attached to the substrate (vs. uplifted above the thallus surface), in having darker blackish apothecia (vs. dull greyish brown or brown to dull dark brown), in having distinctly plane or concave apothecium disc at young stages, in having hyaline hyphae projected at outer layer of true exciple, in having palisade true exciple with hyphae lumina of 2(–3)  $\mu\text{m}$  (vs. scleroplectenchymatous true exciple, hyphae lumina of 1–1.5  $\mu\text{m}$ ), in having darker subhymenium (vs. hyaline), in having *Gyalidea*-type of asci, in having narrowly ellipsoid to fusiform ascospores (vs. widened at the equatorial portion with distinctly attenuated ends to somewhat rhomboid) and in having somewhat longer ascospores (22–29  $\times$  4–5.5  $\mu\text{m}$  vs. 18–25  $\times$  4–6  $\mu\text{m}$ ).

Other specimen examined: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, near shelter house, on siliceous rocks, growing together with *Dimerella* aff. *lutea* and other crustose lichens. Lat.: 37° 31' 09.53" N; Long.: 130° 54' 13.17" E; Alt.: 280 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161718), 09.07.2016 (KoLRI 039936 sub *Dimerella*).

***Opegrapha briancoppinsii*** S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 11)

Mycobank no.: MB 817975

*Similar to Phaeographa glaucomaria, but differs in having smaller apothecia, in having somewhat rounded aggregations of ascomata, in having narrower ascospores, as well as in having different host.*

Type: Republic of Korea. Jeju-do Prov., Cheju-do Island, Jeju-si, Mt Halla, Gwanum-sa trail, on rocks. Lat.: 33° 25' 18.04" N; Long.: 126° 32' 58.09" E; Alt.: 577 m a.s.l. Coll.: Oh, S.-O., Jayalal, U., Park, A.-S. and Hur, J.-S. (120935), 01.06.2012 (holotype: KoLRI 015965 sub *Porpidia albocaerulescens*).

Ascomata lichenicolous, black, epruinose, when young, roundish, subspherical, totally immersed in the host thallus and breaking through the host cortex; upper sterile stromatic layer soon breaking along irregular slits giving the ascoma a verruculose appearance, with remnants often remaining on margin and/or upper surface of the ascoma; mature ascomata regularly appearing aggregated in groups reaching to 0.4–0.8(–1) mm diam./across and being immersed into the host thallus, often causing bleaching spots of host thallus to

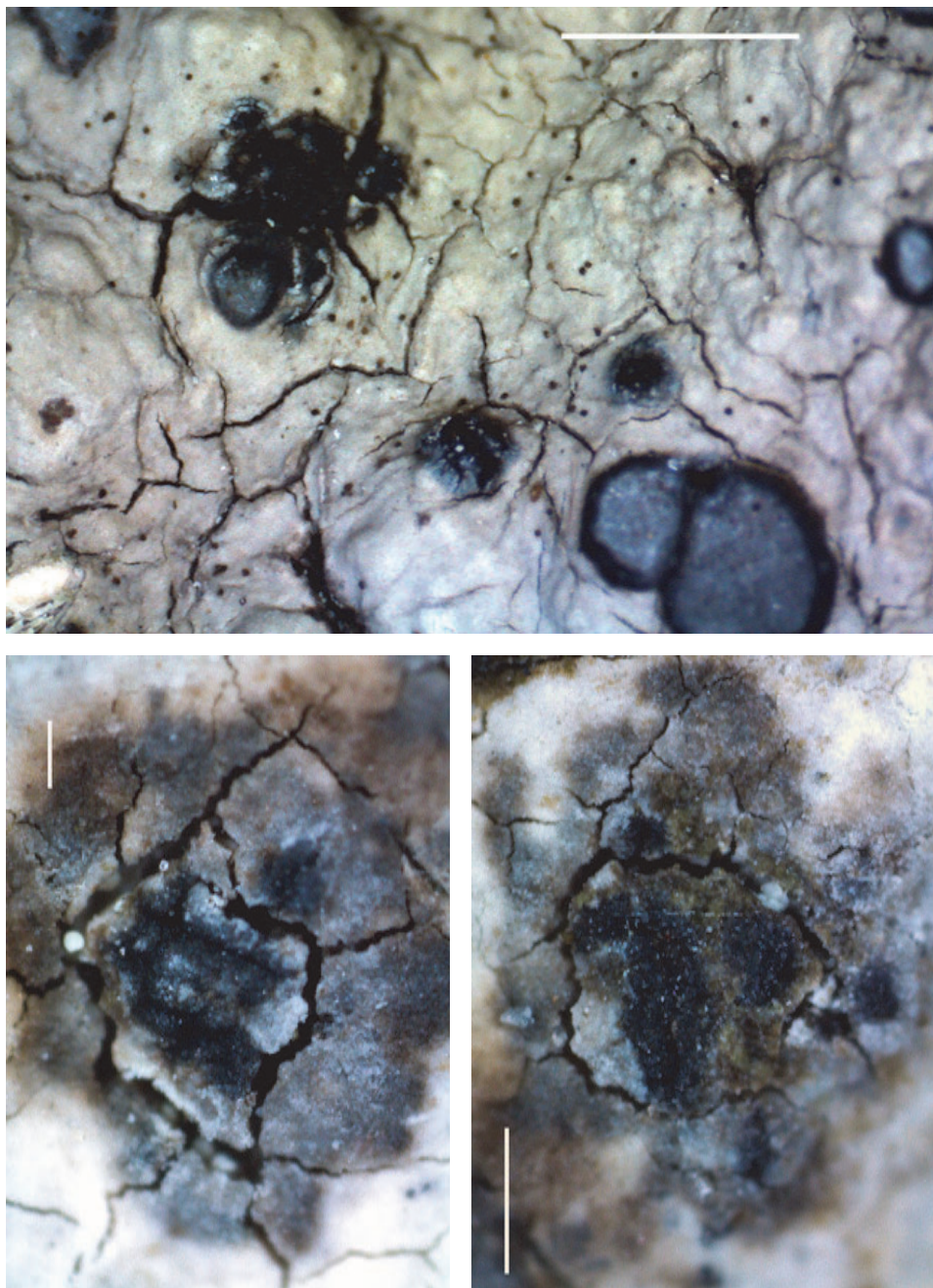


Fig. 11. *Opegrapha briancoppinsii* (holotype), general habit (KOLRI 004777) (top), enlarged ascomata (bottom). Scale 2 mm (top), 0.5 (bottom) (photo: S. Kondratyuk)



1–1.5 mm total size, but usually as somewhat greyish zone around ascomata; apothecia mainly slit (not open), exciple laterally and basally very variable in thickness, dark brown, K–; hymenium hyaline, 90–100  $\mu\text{m}$  high; subhymenium hyaline, paraphyses branched and anastomosed, 2–2.5  $\mu\text{m}$  wide, apically indistinctly swollen; asci subclavate, ca  $70 \times 18 \mu\text{m}$ , 8-spored, often with 1-septate and 3-septate ascospores in the same ascus; ascospores elongate ellipsoid or with one end slightly narrower, (1–2–)3-septate, slightly constricted at the medium septum, hyaline, becoming brown (to blackish-greenish or intensifying greenish in K) and distinctly verrucose at maturity, with distinct verrucae to 2–3  $\mu\text{m}$  across (better seen in K),  $(19\text{--})21\text{--}29 \times (4\text{--})4.5\text{--}6\text{--}(7.5) \mu\text{m}$ ; brown pigment located on the ascospore wall; ascospores often remain agglutinated together after releasing from asci. Conidiomata and conidia unknown.

Host: *Porpidia albocaerulescens* (thallus).

Distribution: So far known from scattered localities in South Korea, Eastern Asia.

Etymology: It is named after the well-known British lichenologist Brian J. Coppins (1949–) (Edinburgh (E), UK) for recognition of his contribution to recent knowledge on microlichens especially and who has much contributed to study of the genus *Opegrapha* s. lat., too.

Taxonomic notes: *Opegrapha briancoppinsii* is similar to *Phaeographa glaucomaria* (Nyl.) Hafellner (= *Opegrapha glaucomaria* (Nyl.) Hafellner), but differs in having smaller apothecia (0.4–0.8(–1) mm vs. up to 1 mm in diam.), in having somewhat rounded aggregations of ascomata (vs. sometimes arranged in arcs on the host thallus), in having narrower ascospores ( $(19\text{--})21\text{--}29 \times (4\text{--})4.5\text{--}6\text{--}(7.5) \mu\text{m}$  vs.  $21\text{--}29 \times 7\text{--}9 \mu\text{m}$ ), as well as in having different host (vs. *Lecanora rupicola*, rarely known from *Protoparmelia badia*).

*Leciographa stigma* (Arnold) Rehm known from *Porpidia macrocarpa* from Bavarian Alps has very small ascomata (to 0.1–0.3 mm in diam.), very small asci ( $30\text{--}36 \times 10\text{--}12 \mu\text{m}$ ), and very small 1–3-septate ascospores ( $6\text{--}10 \times 3\text{--}4 \mu\text{m}$  vs.  $(19\text{--})21\text{--}29 \times (4\text{--})4.5\text{--}6\text{--}(7.5) \mu\text{m}$  in *Opegrapha briancoppinsii*).

*Opegrapha briancoppinsii* is similar to *O. physciaria* (Nyl.) D. Hawksw. et Coppins, but differs in having smaller apothecia to 0.4–0.8(–1) mm in diam./across (vs. dense clusters to 0.5–4 mm in diam.) and being immersed into the thallus (vs. uplifted above level of host thallus), and in causing bleaching spots to 1–1.5 mm total size, but usually as somewhat greyish zone around ascomata observed, in having K– exciple (vs. K+ brown-red exciple), in having mainly slit (not open) disc, as well as in having higher hymenium (vs. to 45  $\mu\text{m}$  high), and in having much longer ascospores ( $(19\text{--})21\text{--}29 \times (4\text{--})4.5\text{--}6\text{--}(7.5) \mu\text{m}$  vs.  $(12\text{--})14\text{--}17 \times (4\text{--})5\text{--}6.5 \mu\text{m}$ ).

*Opegrapha rinodinae* Vězda growing on *Phaeorrhiza nimbose* and known from Europe (Slovakia and Norway) has almost the same ascospores ( $(19\text{--})$

21–29 × (4–)4.5–6(–7.5) μm vs. 22–26 × 4–6 μm), but differs in having 3–5-septate ascospores and 4–8-spored asci.

*Opegrapha parasitica* (A. Massal.) H. Olivier, which has immersed ascogonia in *Aspicilia calcarea* thallus, known from Europe and Australia, differs also in having much shorter 3-septate ascospores (16–22 × 6–8 μm) hyaline at first, becoming brown with age.

After 3-septate ascospores and 8-spored asci material of *Opegrapha brianccoppinsii* may be keyed to *Leciographa parvula* (Arnold) Sacc., growing on *Pertusarias* and known from Newfoundland (Canada), to *Leciographa furfuracea* (Anzi) Rehm known from various not calcium containing saxicolous rocks of Lombardy Alps (Italy, Europe), and to *Opegrapha pulvinata* Rehm in Lojka, growing on *Dermatocarpon miniatum* of Europe, North and Central America. However, in contrast to *Opegrapha brianccoppinsii*, *Leciographa parvula* has K+ reddish brown epihymenium and smaller ascospores (15–18 × 4 μm vs. (19–)21–29 × (4–)4.5–6(–7.5) μm). Furthermore *Leciographa furfuracea* differs from *Opegrapha brianccoppinsii* in having very small and much wider ascospores (11–13 × 6–7 μm vs. (19–)21–29 × (4–)4.5–6(–7.5) μm), and *Opegrapha pulvinata* has shorter and wider ascospores (18–25 × 6–9 μm vs. (19–)21–29 × (4–)4.5–6(–7.5) μm).

Among lichenicolous fungi having pruinose apothecium disc, but being similar to *Opegrapha brianccoppinsii*, *Leciographa weissii* Koerb. and *L. associata* (Norm.) Rehm (= *Geltingia associata* (Th. Fr.) Alstrup et D. Hawksw.) should be mentioned, too.

Other specimens examined: Republic of Korea. Gangwon-do, Pyeongchang-gun, Daegwalnyeong-myeon, Byeongnae-ri, Odae-san Mts, on rocks. Lat.: 37° 45' 53.5" N; Long.: 128° 36' 34.7" E; Alt.: 1,088 m a.s.l. Coll.: Hur, J.-S. (080498), 15.07.2008 (KoLRI 008733 sub *Porpidia albocaerulescens*). – Jeju-do, Seogwipo-si, Donneako Valley, Wonang Waterfall, on rocks. Lat.: 33° 18' 04.3" N; Long.: 126° 34' 53.7" E; Alt.: 330 m a.s.l. Coll.: Joshi, Y. (140533), 19.06.2014 (KoLRI 022928 sub *Porpidia albocaerulescens*). – Jeollanam-do, Gwangyang-si, Baegun-san Mts. Lat.: 35° 06' 55.3" N; Long.: 127° 36' 37.0" E; Alt.: 1,000 m a.s.l. Coll.: [s.n.] (060406), 27.06.2006 (KoLRI 004777 sub *Porpidia albocaerulescens*).

*Opegrapha ulleungdoensis* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 12)

Mycobank no.: MB 817976

*Similar to Opegrapha calcarea, but differs in having mainly greyish-brownish thallus, in having mainly seem to be widely gaped disc, in having lower hymenium, in having longer ascospores, and in the lack of lipid-rich cells.*

Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Buk-myeon, Cheonbu-ri, steep rocky roadside along Buk-myeon coast road (Ulleungsunhwan-

ro, Nr. 926), on siliceous rocks. Lat.: 37° 32' 29.14" N; Long.: 130° 54' 46.98" E; Alt.: 10 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L. (161299), 07.07.2016 (holotype: KoLRI 039505); the same locality, (161302), (isotype: KoLRI 039508); the same locality growing together with *Lepraria*, (161284), (isotype: KoLRI 039490 sub *Opegrapha*); the same locality growing together with *Lecanora*, (161287), (isotype: KoLRI 039493 sub *Opegrapha*); the same locality growing together with *Lecanora* and *Agonimia*, (161288), (isotype: KoLRI 039494 sub *Opegrapha*); the same locality growing together with *Agonimia*, (161293), (isotype: KoLRI 039499 sub *Opegrapha*); the same locality growing together with *Lecanora*, (161298), (isotype: KoLRI 039504 sub *Opegrapha*); the same locality growing together with *Lecanora*, (161300), (isotype: KoLRI 039506 sub *Opegrapha*).

Thallus greenish grey or greyish-brownish, continuous, sometimes somewhat indistinct.

Apothecia rather small, 0.5–0.8 × 0.15–0.25(–0.3) mm wide and to 0.12 mm thick in section; exciple entire, to 10–12 µm wide in the uppermost lateral portion, and to 20–25 µm thick in lower lateral portion, 25–30 µm thick in basal portion, black to black-olivaceous, in K becoming blackish olive; hymenium to 70–80 µm high; epihymenium to 15–20 µm thick, brownish; subhymenium to 20–30 µm thick, brownish-greenish, sometimes with oil droplets to 4 µm in diam.; asci 8-spored, (40–)45–60 × 12–18 µm, with rather thick walls to 3 µm thick; ascospores 3-septate, hyaline while at overmature with blackish grains in epispodium, one cell in the middle slightly wider, without constriction at the septum, (16–)19–23 × (3–)4.5–5.5 µm. Conidiomata and conidia not observed.

Ecology: On siliceous rocks in supralittoral zone of coastal areas.

Distribution: Known so far from several localities of Ulleung-do Island (South Korea, Eastern Asia), where sometimes rather abundant.

Etymology: It is named after Ulleung-do Island where type material was collected.

Taxonomic notes: *Opegrapha ulleungdoensis* is similar to *O. calcarea* Sm., growing on damp, shaded limestone, mortar, bone or base-enriched rock, known from Europe, Macaronesia, N America, Asia and Africa, in having somewhat greenish exciple, epihymenium and subhymenium in K, but differs in having mainly greenish or greyish-brownish thallus (vs. white, grey, pale green-pink or rusty ochraceous), in having mainly seem to be widely gaped disc (owing to rather small length, vs. disc a slit, sometimes partially exposed with age), in having shorter apothecia (0.5–0.8 × 0.15–0.25(–0.3) mm vs. 0.6–1.2(–2) × (0.1–)0.15–0.3 mm), in having lower hymenium (70–80 µm vs. 80–100 µm high), in having longer ascospores ((19–)20–23 × (4–)4.5–5.5 µm vs. 16–20(–24) × 4–5(–6.5) µm), in lack of lipid-rich cells (vs. often with abundant lipid-rich cells which stain in Sudan Black, 5–10 µm wide).

*Opegrapha ulleungdoensis* is similar to *O. dolomitica* (Arnold) Clauzade et Cl. Roux, growing on moist limestone or calcareous schists (especially under

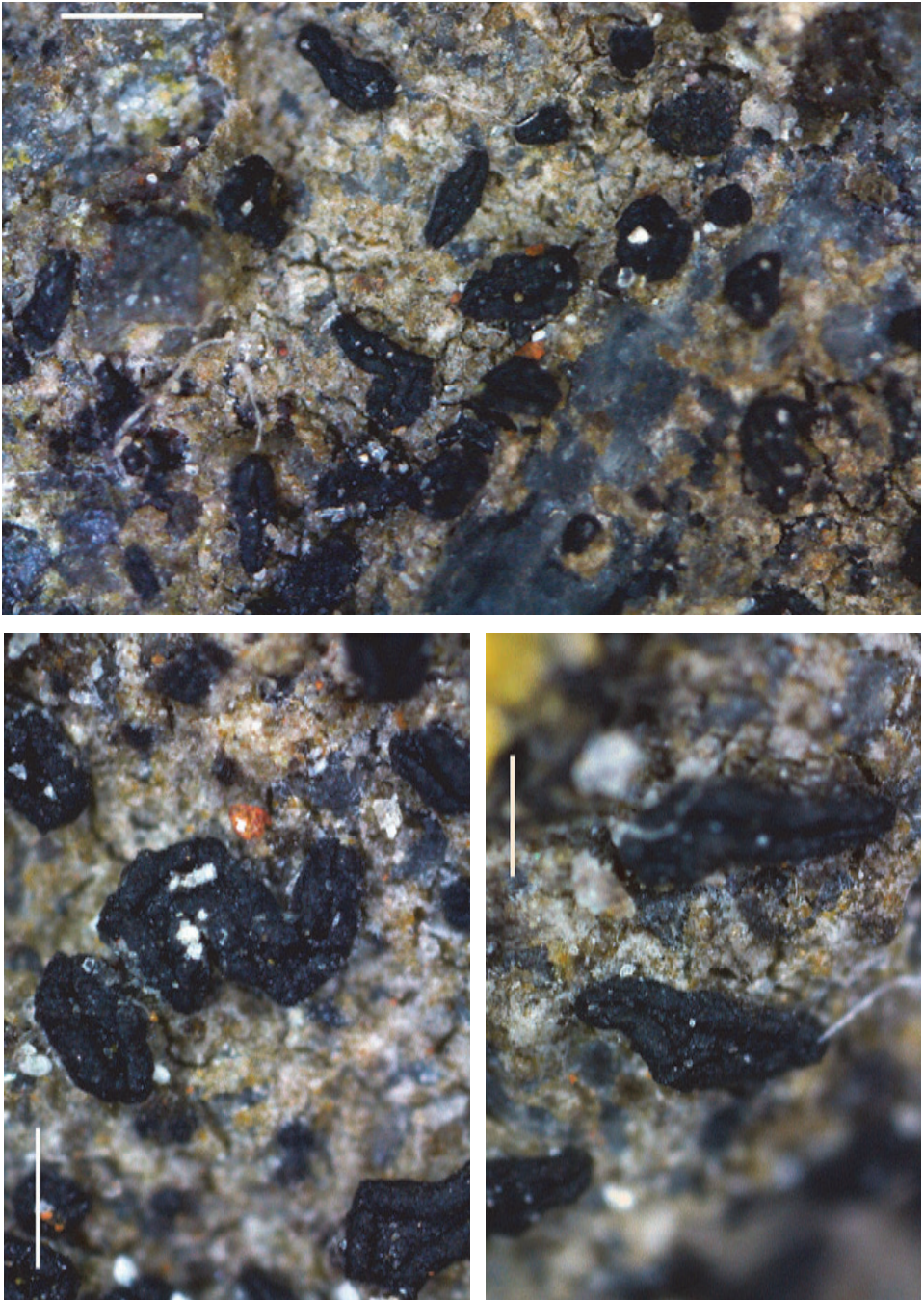


Fig. 12. *Opegrapha ulleungdoensis* (holotype). Scale 0.5 mm (photo: S. Kondratyuk)

overhangs), sides of clints in limestone pavement, mortar or associated base-enriched siliceous rock in Europe, but differs in having grey-brown thallus (vs. creamy white, grey, greenish to brown-red), in having shorter apothecia ( $0.5\text{--}0.8 \times 0.15\text{--}0.25\text{--}(0.3)$  mm vs.  $0.5\text{--}1.8\text{--}(3) \times 0.16\text{--}0.25\text{--}(0.35)$  mm), in having blackish olive (vs. brown) pigmentation of the apothecial tissues, in having greenish exciple, epihymenium and subhymenium in K, in having lower hymenium ( $70\text{--}80$   $\mu\text{m}$  vs.  $90\text{--}120$   $\mu\text{m}$ ), in having somewhat shorter and narrower ascospores ( $(19\text{--})20\text{--}23 \times (4\text{--})4.5\text{--}5.5$   $\mu\text{m}$  vs.  $(20\text{--})22\text{--}26\text{--}(31) \times 5\text{--}8$   $\mu\text{m}$ ), and in the lack of a thin perispore.

The 'KoLRI 034547' specimen (coll. num. 151314) differs in having much narrower ascospores ( $(15\text{--})19\text{--}22 \times (2.5\text{--})3\text{--}4$   $\mu\text{m}$ ) and may represent a separate taxon. It is included here with some hesitation.

Other specimens examined: Republic of Korea. Gangwon-do, Samcheok-si, Geundeok-myeon, Gongchonhaebyeon-gil, seashore siliceous rocks, growing together with *Caloplaca* sp. Lat.:  $37^\circ 19' 43.68''$  N; Long.:  $129^\circ 16' 12.36''$  E; Alt.: 5 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L. (151314), 11.07.2015 (KoLRI 034547 sub *Opegrapha*). – Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Buk-myeon, Cheonbu-ri, steep rocky roadside along Buk-myeon coast road (Ulleung-sunhwan-ro, Nr. 926), on siliceous rocks, growing together with *Lecanora*. Lat.:  $37^\circ 32' 29.14''$  N; Long.:  $130^\circ 54' 46.98''$  E; Alt.: 10 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L. (161285), 07.07.2016 (KoLRI 039491 sub *Lecanora*). – Jeollanam-do, Yeosu-si, Nam-myeon, Geumo-do, Uhak-ri port, on rock. Lat.:  $34^\circ 30' 30.07''$  N; Long.:  $127^\circ 46' 13.00''$  E; Alt.: 14 m a.s.l. Coll.: Jayalal, U., Park, J. S. and Ryu, J. A. (120587), 27.04.2012 (KoLRI 015579 sub *Opegrapha*).

*Phyllopsora loekoesii* S. Y. Kondr., E. Farkas, S.-O. Oh et J.-S. Hur,  
spec. nova  
(Fig. 13)

Mycobank no.: MB 817977

*Similar to Phyllopsora corallina, but differs in having longer ascospores; in having Pd– thallus, in having long and abundantly branched isidia, in having narrower cortex, and in the lack of crystals in cortex, in having dull brown apothecia, in the lack of pale to red prothallus, in the lack of atranorin, argopsin, norargopsin, vicanicin, norvicanicin, phyllopsorin, chlorophyllopsorin, parvifoliin, zeorin, in the lack of red pigmented apothecium margin, as well as hypothecium and hymenium.*

Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, at a rock wall, on siliceous rocks. Lat.:  $37^\circ 31' 19.51''$  N; Long.:  $130^\circ 54' 16.03''$  E; Alt.: 415 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L. (161759), 09.07.2016 (holotype: KoLRI 039977); the same locality, growing together with *Lepraria* sp., (161765), (isotype: KoLRI 039983); the same locality, growing together with sterile cyanolichen, (161769), (isotype: KoLRI 039989).

Thallus crustose, squamulose and crustose at first, but soon becoming bulky and multi-stored of numerous isidious formations, green to dark green with scattered brownish apothecia. Thalline squamules 0.3–0.5 mm in diam./across, at first rather distinct, slightly convex, with numerous isidia, but soon completely covered by isidia and indistinct. Isidia more or less cylindrical or with undulating surface, to 0.1–0.15(–0.23) mm wide and to 0.5–0.8(1) mm long, richly ramified, secondary lobules of the same (to 0.1 mm wide) thickness, total width of the whole isidia with secondary lobules to 0.6–0.8 mm wide; in section radially built with very narrow cortical layer to 5–7  $\mu\text{m}$  thick. Upper surface green to dark green or whitish to slightly brownish-whitish in damaged portions; at large magnification with pimples and separate vertically orientated hyphae to 2.5–5(–7.5)  $\mu\text{m}$  long. Total width of one single squamule with isidia very indistinct as far they form continuous mass/bulky thallus.

Apothecia 0.4–1 mm in diam., and to 0.3 mm thick in section; very variegated in shape and colour, from light to dark brown within the same apothecium, biatorine, from convex at first stage to somewhat plane and with undulating surface; with indistinct somewhat greyish edge/own margin, sometimes whitish to 0.1 mm wide, distinct at  $\times 100$  magnification; and more or less convex light brown to dark brown disc; in section true exciple to 100  $\mu\text{m}$  thick in lateral and basal portions, outer layer hyaline, while inner layers bright yellowish or bright yellow-brownish, with well-developed matrix but separate hyphae to 7–8  $\mu\text{m}$  wide seen with hyphae lumina of 2–3  $\mu\text{m}$ ; hymenium to 50  $\mu\text{m}$  thick, yellowish or somewhat hyaline-yellow in comparison with other tissue; subhymenium to 80  $\mu\text{m}$  thick, somewhat indistinct in lower portion, in lower portion dull orange or dull orange-brownish (the darkest portion of apothecium section); ascospores narrowly ellipsoid to cylindrical or fusiform, where only slightly widened in the middle portion, simple, hyaline, (11–)13–16  $\times$  2–2.8(–3.5)  $\mu\text{m}$ .

Chemistry: Apothecium and thallus K–, Pd–. No chemical substances detected by TLC.

Ecology: On siliceous rocks in mountainous area.

Distribution: So far known only from the type locality in South Korea, Eastern Asia.

Etymology: It is named after the well-known Hungarian lichenologist and our friend László Lőkös (1959–) in recognition of his contributions to recent knowledge on Korean lichen flora and who participated in collecting the type material of this taxon.

Taxonomic notes: *Phyllopsora loekoesii* is similar to three isidiate species of this genus, i.e.: *P. corallina* (Eschw.) Müll. Arg., *P. intermediella* (Nyl.) Zahlbr., and *P. furfuracea* (Pers.) Zahlbr., but differs from all of them in having longer ascospores ((11–)13–16  $\times$  2–2.8(–3.5)  $\mu\text{m}$  vs. 6.5–13.0  $\times$  2.0–3.5  $\mu\text{m}$  in *P. corallina*, 7–9  $\times$  2.5–3.5  $\mu\text{m}$  in *P. intermediella*, and 6–9–12  $\times$  2–2.3–2.5  $\mu\text{m}$  in *P. furfuracea*)

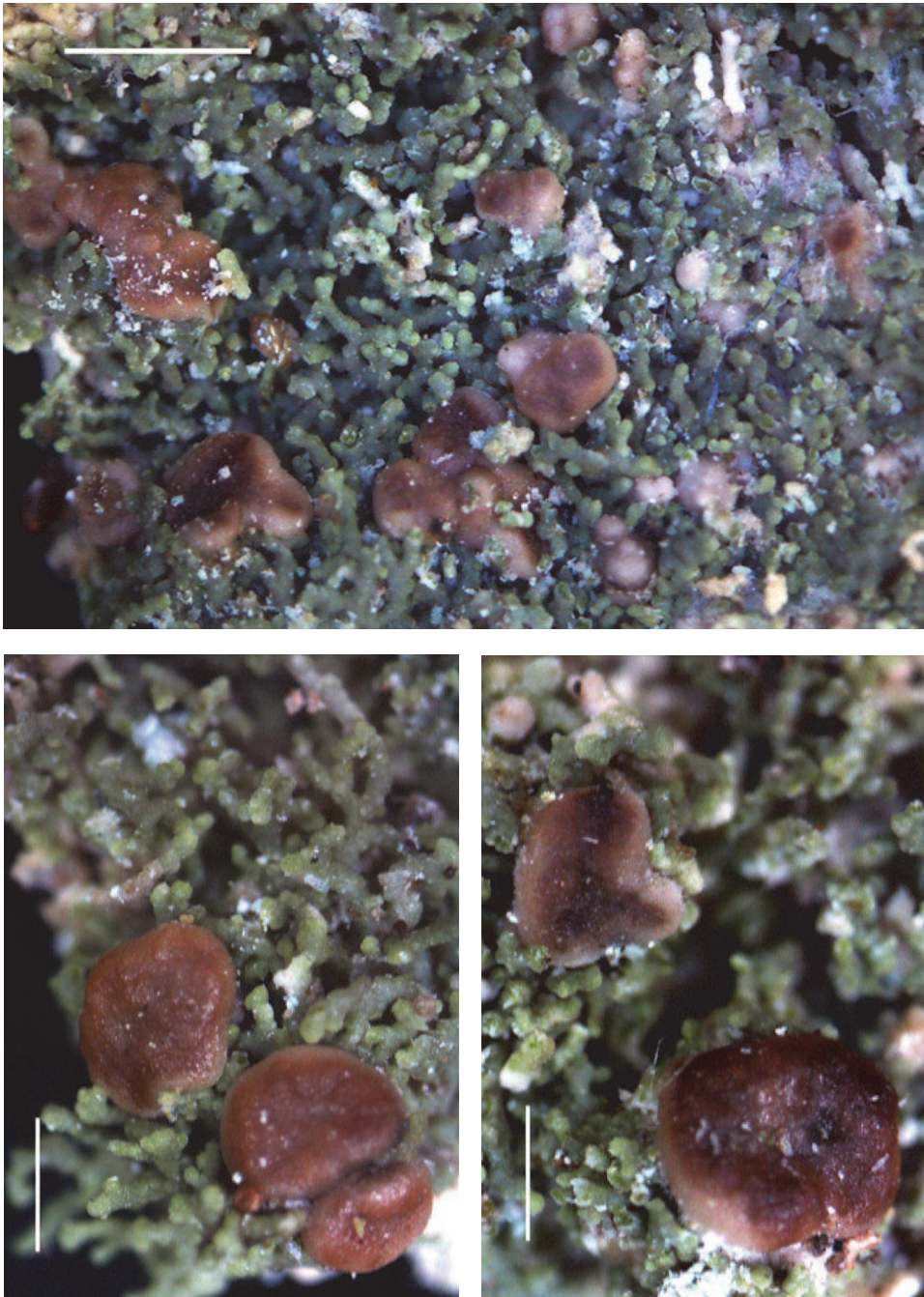


Fig. 13. *Phyllopsora loekoessii*, enlarged apothecia (holotype). Scale 1 mm (top), 0.5 (bottom) (photo: S. Kondratyuk)

(Brako 1991). Furthermore, *P. loekoesii* differs from *P. corallina* in having longer ascospores; in having Pd- thallus (vs. Pd- or Pd+ orange), in having long and abundantly branched isidia (vs. globose to cylindrical isidia), in having narrower cortex (to 10  $\mu\text{m}$  vs. 25–45  $\mu\text{m}$  thick), and in the lack of crystals in cortex, in having dull brown apothecia (vs. orange-brown or reddish), in the lack of pale to red prothallus, in the lack of atranorin, argopsin, norargopsin, vicanicin, norvicanicin, phyllopsorin, chlorophyllopsorin, parvifoliin, zeorin, in the lack of red pigmented (K- or K+ purplish brown pigment) apothecium margin, as well as hypothecium and hymenium. *Phyllopsora loekoesii* differs from *P. intermediella* also in having regularly cylindrical almost the same thickness of isidia throughout, mainly horizontally orientated and forming multi-stored type of thallus (vs. isidia variable, irregular, globose, cylindrical with a bulbous base or slightly flattened, to 1 mm long, erect), in having thinner cortical layer (to 10  $\mu\text{m}$  vs. to 20  $\mu\text{m}$  thick), in the lack of reddish prothallus, in the lack of red fibrils in apothecium margin, in having dull yellow brownish exciple (vs. reddish brown, K- exciple), in having only dull yellow brownish hypothecium (vs. yellow brown to partly red pigmented, K-), in having lower hymenium (vs. to 50  $\mu\text{m}$  high). From *Phyllopsora furfuracea* *P. loekoesii* differs in also in having larger and flat thalline squamules (vs. rounded to irregular *ca* 0.1 mm in diam., mostly slightly convex, closely adjoined and sometimes appearing as continuous crust), in having longer and abundantly branched isidia, in the lack of reddish prothallus, in having dull brown (vs. red-brown) apothecia, in the lack of abundant pale fibrils on apothecium margin, in having brown (not black) apothecia, in having yellow-brown exciple and hypothecium (vs. to partly red pigmented, containing an orange crystalline material dissolving and diffusing pale yellow to red or purplish in K), in having lower hymenium (*ca* to 60  $\mu\text{m}$ ).

After having long ascospores *Phyllopsora loekoesii* is similar to *P. longiuscula* (Nyl.) Zahlbr., known from central and South America (Cuba, Puerto Rico, Venezuela), and *P. kiiensis* (Vainio) Gotth. Schneider, known from Japan (Asia), Kenya and Tanzania (Africa) (Upreti *et al.* 2003). However *Phyllopsora loekoesii* differs from *P. longiuscula* in having much narrower and longer, usually richly branched isidia (vs. isidia much wider, flattened, incised, and shorter, and not branched), in having thinner cortical layer (to 10  $\mu\text{m}$  vs. to 20  $\mu\text{m}$  thick), in the lack of reddish prothallus, in the lack of abundant red fibrils on apothecium margin, and in having narrower ascospores ((11–)13–16  $\times$  2–2.8(–3.5)  $\mu\text{m}$  vs. 12.5–19  $\times$  3–4  $\mu\text{m}$ ) (Brako 1991). Furthermore *Phyllopsora loekoesii* differs from *P. kiiensis* in having smaller and indistinct thalline squamules/areoles (0.2–0.4 mm vs. 0.5–1 mm in diam.), in having green or whitish green upper surface of thallus (vs. yellowish brown, reddish towards margins), in having another type of cortical layer (vs. cortex type 2 in *P. kiiensis*),



in the lack of red or reddish brown prothallus, in having smaller apothecia (0.4–1 mm vs. 0.5–1.5 mm in diam.), in having yellow or dull yellow-orange exciple and hypothecium (vs. excipulum red tinged, and hypothecium colourless, as diagnostic characters), in having narrower ascospores ((11–)13–16 × 2–2.8(–3.5)  $\mu\text{m}$  vs. 10–17(–20) × 2.5–4  $\mu\text{m}$ ) and in the lack of furfuracein.

***Polycoccum clauderouxii*** S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 14)

Mycobank no.: MB 817978

*Similar to Polycoccum clauzadei, but differs in having larger galls on host thalli, in having 8-spored asci, and in having longer and narrower ascospores, as well as in having different host.*

Type: China. Qinghai Province, between Jingtai and Zhongwei (close to Yellow River), along 201 Provincial Road, on soil. Lat.: 37.42216° N; Long.: 104.58057° E; Alt.: 1,686 m a.s.l. Coll.: Park, C. H. and Hur, J.-S. (CH-160017), 06.2016 (holotype: KoLRI sub *Zeroviella laxa*); the same locality, (CH-160003), (isotype: KoLRI sub *Zeroviella laxa*).

Lichenicolous fungus forming convex, basally distinctly constricted galls to 0.5–1.5 mm diam. in thalline lobes of *Zeroviella laxa*.

Ascomata perithecioid, totally immersed in the galls of the host lichen, more or less globose to pyriform, ostiolate, 120–180(–190) × 170–190(–210)  $\mu\text{m}$ , black, sometimes epinecral layer (the same with epinecral layer of host cortical layer of thalline galls) observed above perithecia to 5–7  $\mu\text{m}$  thick; excipulum wall brown to dark brown, ca 15–20  $\mu\text{m}$  thick at the basis and to 30–40  $\mu\text{m}$  wide at ostiole. Paraphyses present, richly branched and anastomosed, septate, to 2  $\mu\text{m}$  thick; asci 8-spored, elongate, clavate, 65–70 × 12–13  $\mu\text{m}$ ; ascospores from greenish brown to dark brown or blackish brown at overmaturity, with granules to 0.5  $\mu\text{m}$  across; (16–)18–20(–21) × 6–7  $\mu\text{m}$ . Pycnidia not seen.

Host: *Zeroviella laxa* growing on soil in mountain deserts.

Distribution: So far known only from the type locality in Qinghai Province of China, Eastern Asia.

Etymology: It is named after the well-known French lichenologist and specialist on lichenicolous fungi Claude Roux (1945–), who has described also *Polycoccum clauzadei* to which new taxon shows the highest similarity.

Taxonomic notes: *Polycoccum clauderouxii* is positioned in somewhat intermediate position between *P. clauzadei* Nav.-Ros. et C. Roux and *P. pulvinatum* (Eitner) R. Sant. (= *P. galligenum* Vězda). However, after ascospores and in having different hosts *P. clauderouxii* is quite different from the both taxa mentioned.

*Polycoccum clauderouxii* is similar to *P. clauzadei*, but differs in having larger galls on host thalli (0.5–1.5 mm vs. (0.2–)0.4–0.8 mm diam./across), in having 8-spored (vs. 4–6-spored) asci, and in having longer and narrower ascospores ((16–)18–20(–21) × 6–7 μm vs. 15–18.5(–19.5) × (6.5–)7–9(–9.5) μm), as well as in having different host (*Zeroviella laxa* vs. *Rusavskia elegans*).

Furthermore *Polycoccum clauderouxii* differs from *P. pulvinatum*, in having different hosts (*Zeroviella laxa* vs. *Physcia* spp.), in having smaller galls on host thallus (0.5–1.5 mm vs. (0.5–)1–3 mm diam./across), in having smaller ascomata (120–180 μm vs. 150–300 μm diam./across), in having 8-spored (vs. (4–)8-spored) asci, and in having narrower ascospores ((16–)18–20(–21) × 6–7 μm vs. 14–21 × 6–9 μm) (Navarro-Rosinés and Roux 1998).

It is interesting that *Rusavskia elegans*, the host of a gall-forming lichenicolous fungus *Polycoccum clauzadei*, and *Zeroviella laxa*, the host of a similar (to latter) gall-forming lichenicolous fungus *Polycoccum clauderouxii* are members of the same *Rusavskia* clade of the subfamily Xanthorioideae of the Teloschistaceae. The genus *Zeroviella* was recently segregated from the genus *Rusavskia* on the basis of three gene phylogeny (Kondratyuk *et al.* 2015c). Finding of different lichenicolous fungi on member of these two genera, i.e. *Rusavskia* and *Zeroviella*, is additional confirmation that these lichen groups are quite different. Furthermore, *Zeroviella laxa* was recently erected to the species level also (Kondratyuk *et al.* 2015c).

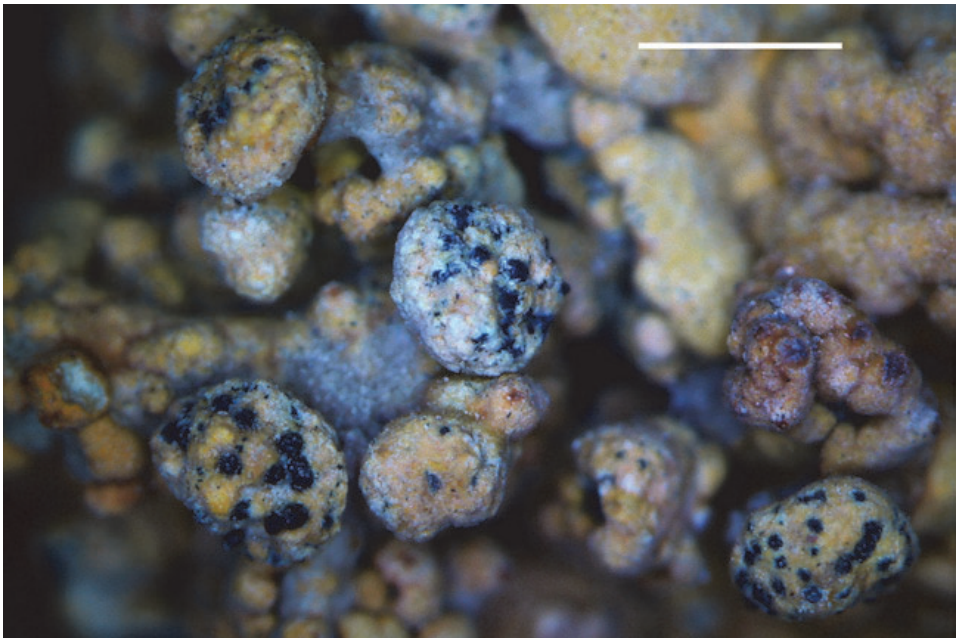


Fig. 14. *Polycoccum clauderouxii* (holotype), general habit. Scale 1 mm (photo: S. Kondratyuk)

*Psoroglaena coreana* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 15)

Mycobank no.: MB 817979

*Similar to Psoroglaena japonica, but differs in having more or less continuous thallus, in having hyaline and smaller perithecia, in having larger algal cells, in having hyaline and thinner exciple, in having wider periphyses, in having lower hymenium, in having 1–3-septate, and longer and wider ascospores.*

Type: Republic of Korea, Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Seomyeon, Taeha-ri, valley of Tae-hacheon, Seodal-gil, near Bogho waterfall, on beton kerb, growing together with *Bacidina egenula*, and *Verrucaria* sp. Lat.: 37° 30' 14.09" N; Long.: 130° 50' 07.83" E; Alt.: 370 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161845), 10.07.2016 (holotype: KoLRI 040045 sub *Bacidina egenula*).

Thallus crustose, continuous, green or greenish grey, perithecia as whitish or yellow-whitish tips, to 0.1–(0.2) mm in diam. seen. Thallus in section to 50 µm thick, continuous crust, no goniocysts observed. Algae 7–14 µm in diam.

Perithecia to (110–)120–180(–220) µm in diam. and to 150–190 µm high in section, immersed in substratal rocks only at base, subglobose to globose, ellipsoidal or pyriform, algal layer at the lower half of exciple to 25–35 µm thick, continuous (not goniocystal type). Exciple to (12–)17–25(–35) µm thick in lower portion, while to 25–50(–60) µm thick at the ostiole, pseudoparenchymatous, cell lumina of 5 µm; hyaline throughout or at the ostiole somewhat pinkish or yellowish; periphyses (8–)15–25(–40) µm long and (1.5–)2–3 µm wide; hymenium to 70–80 µm high; asci 8-spored, (50–)60–75 × 11–13 µm; ascospores 1–3-septate, central septum is somewhat curved (not straight or even) often with oil droplets, slightly wider when bent, (16–)18–22 × (5–)5.5–6.5(–7.5) µm. Conidiomata and conidia unknown.

Ecology: On siliceous and calcium containing rocks.

Distribution: So far known from scattered localities in South Korea, Eastern Asia.

Etymology: It is named after the country, i.e. South Korea, where type collection was made.

Taxonomic notes: *Psoroglaena coreana* is characterised by continuous green thallus, whitish perithecia to 0.2 mm diam., 1–3-septate, rather long and narrow ascospores and the saxicolous habitat.

*Psoroglaena coreana* is similar to *P. japonica* H. Harada, growing on friable rocks in shade in damp, semi-aquatic habitats and around lucidophyllous forests dominated by evergreen *Quercus* in hilly area in the temperate zone on the Pacific side of Honshu, Central Japan, but differs in having more or less continuous thallus (not farinose thallus consisting almost exclusively of goni-

ocysts), in having hyaline (vs. pale orange brown or medium to dark brown) perithecia, in having thalline clusters to 25–50  $\mu\text{m}$  (vs. goniocysts to 10–20  $\mu\text{m}$  diam./across), in having larger algal cells (7–14  $\mu\text{m}$  vs. 3–10  $\mu\text{m}$  diam.),

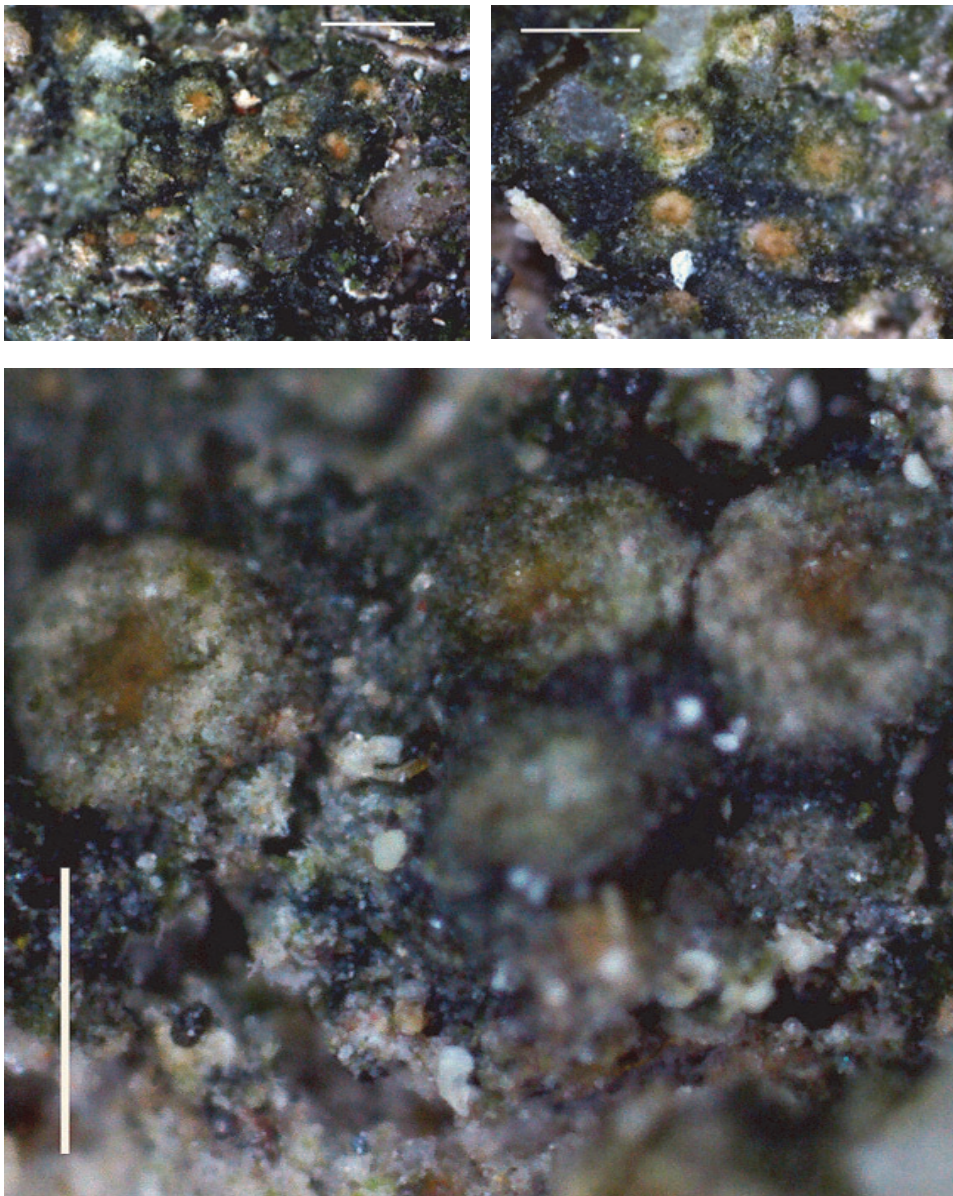


Fig. 15. *Psoroglaena coreana* (holotype), general habit (top), enlarged ascomata (bottom). Scales 0.5 mm (photo: S. Kondratyuk)

in having smaller perithecia in section (to 120–180(–220)  $\mu\text{m}$  vs. 250–350  $\mu\text{m}$  diam. and 150–190  $\mu\text{m}$  vs. 260–330  $\mu\text{m}$  high), in having hyaline (vs. orange brownish or brown in the outer layer) and in having thinner exciple (to 25  $\mu\text{m}$  vs. 35–65  $\mu\text{m}$  thick at the sides, and 25–50  $\mu\text{m}$  vs. 50–90  $\mu\text{m}$  thick in the upper part), in having wider periphyses (2–3  $\mu\text{m}$  vs. 1–1.5  $\mu\text{m}$ ) in having lower hymenium (70–80  $\mu\text{m}$  vs. 140–280  $\mu\text{m}$  high), in having 1–3-septate (vs. 3-septate), and longer and wider ascospores ((16–)18–22  $\times$  (5–)5.5–6.5(–7.5)  $\mu\text{m}$  vs. 13–17  $\times$  5–6  $\mu\text{m}$ ) (Harada 2003).

*Psoroglaena coreana* is similar to *P. stigonemoides* (A. Orange) Henssen, but differs in having 1–3-septate (vs. 3–5-septate) ascospores, in the lack of granulose thallus (i.e. thallus “often disintegrating into soredia-like granules” (Orange 1991), and in having mainly hyaline (vs. pale orange-brown) perithecia and in different substrate (vs. grows on the bark of trees) (Orange 1989).

*Psoroglaena abscondita* (Coppins et Vězda) Hafellner et Türk, *P. hepaticola* (Döbbeler et Vězda) H. Harada and *P. perminuta* (Vězda) H. Harada also have 3-septate ascospores, but they have smaller perithecia (up to 0.2 mm in diam.) and are either foliicolous (the latter two species (Döbbeler and Vězda 1982, Vězda 1973)) or corticolous (*P. abscondita*, Orange 1991).

Thallus of *P. coreana* usually to 50  $\mu\text{m}$  thick continuous crust, which only in very wet conditions (sometimes in place of contact with bryophytes) may form thalline portions to 0.1–0.15 mm across, which seem to be dissolved into smaller granules to 20–50  $\mu\text{m}$  diam./across. However, these thalline granules are very irregular and they do not have special “cortical layer”, so they cannot be considered as “goniocysts” sensu Vězda.

Other specimens examined: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, Jeodong-ri, on rock wall along path to Bongrae waterfall. Lat.: 37° 29' 52.10" N; Long.: 130° 53' 19.72" E; Alt.: 285 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161538), 09.07.2016 (KoLRI 039756); the same locality, (161517), (KoLRI 039735); the same locality, (161631), (KoLRI 039849); the same locality, (161638), (KoLRI 039856). – Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, on siliceous rocks, growing together with *Lecania rinodinoides*, and *Rinodina* damaged by *Arthonia rinodinicola*. Lat.: 37° 30' 59.62" N; Long.: 130° 54' 17.54" E; Alt.: 285 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161646), 09.07.2016 (KoLRI 039864).

***Psorotichia gyelnikii* S. Y. Kondr., L. Lőkös et J.-S. Hur, spec. nova**  
(Fig. 16)

Mycobank no.: MB 817980

*Similar to Psorotichia murorum, but differs in having only areolate thallus, in having thinner thalline areolae, in having dark brown upper surface, in having cryptolecanorine apothecia, as well as in having shorter ascospores.*

Type: Republic of Korea. Jeju-do, Seogwipo-si, Seongsan-eup, Goseong-ri, Seopjicoji, on rocks, growing together with *Caloplaca pelodella*, *Buellia* sp., *Caloplaca* cf. *subsoluta* and *Placopyrenium* sp. Lat.: 33° 19' 21.0" N; Long.: 126° 50' 49.03" E; Alt. ca 69 m a.s.l. Coll.: Lőkös, L. (140390-1), 19.06.2014 (holotype: KoLRI 022768 sub *Psorotichia*); the same locality, Coll.: Halda, J. (140444), 19.06.2014 (isotype: KoLRI 022841 sub *Psorotichia*).

Thallus to several cm across, crustose, forming almost continuous crust, which areolate in fact (seen at the highest magnification, at  $\times 100$  and more), very thin and closely attached to the substrate, dark brown or pure brown when dry. Thalline areoles 0.2–0.4(–0.6) mm diam./across, and to (60)100–150(–250)  $\mu\text{m}$  thick in section, irregular or more or less rounded, more or less distant, rarely somewhat aggregated especially if areoles fertile; thalline areole surface not granular, more or less smooth, or rarely with more or less irregular granules to 20–30  $\mu\text{m}$  across. Hypothallus not observed.

Apothecia to 130–190  $\mu\text{m}$  wide in section; immersed or sunken into thalline areoles, seen as concave or urn-like cavity/disc to 0.05–0.1(–0.15) mm in diam., concolorous with thallus, dark brown or blackish brown; often aggregated to 1–3(–5) apothecia per thalline areole; algal packets in thalline margin brownish-reddish; exciple to 5(–10)  $\mu\text{m}$  thick, consisting of very small, 2–3  $\mu\text{m}$  diam./across, and rounded cells, or indistinct or not seen in places; hymenium to (50–)80–130(–180)  $\mu\text{m}$  high, IKI+ blue; epihymenium dull brownish or brownish green or greyish; paraphyses 2–3  $\mu\text{m}$  wide, branched; asci 8-spored, 45–55(–60)  $\times$  15–16  $\mu\text{m}$ , often with various size of ascospores in the same ascus; ascospores widely ellipsoid or more or less spherical, (9–)10–13(–15)  $\times$  (6–)7–8(–9)  $\mu\text{m}$ , or 7–9  $\mu\text{m}$  in diam., if spherical. Conidiomata very inconspicuous, immersed into thalline areoles, often in the same areole with apothecia; in wet condition conidiomata somewhat better distinct than apothecia, because becoming convex in contrast to apothecia, which becoming completely indistinct (the same thickness as thalline areoles in wet conditions); conidia bacilliform or elongated ellipsoid, 2.5–4  $\times$  0.9–1.1  $\mu\text{m}$ .

Ecology: On siliceous rocks in coastal zone.

Distribution: So far known only from several localities of coastal zone of South Korea, Eastern Asia.

Etymology: It is named after the well-known Hungarian botanist, mycologist, lichenologist Vilmos Kőfaragó-Gyelnik (1906–1945) for his contribution to lichenology in general and to recent knowledge on cyanolichens especially.

Taxonomic notes: *Psorotichia gyelnikii* is similar to *P. murorum* A. Massal. in having large thalline areoles, in having many small apothecia per areole, in having I+ blue hymenium, and in having very thin true exciple, but differs in having only areolate (not granulose) thallus, in having thinner thalline areoles (to 0.1(–0.25) mm vs. 0.3–0.5 mm thick), in having dark brown (not black) upper surface, in having cryptolecanorine apothecia (margin not

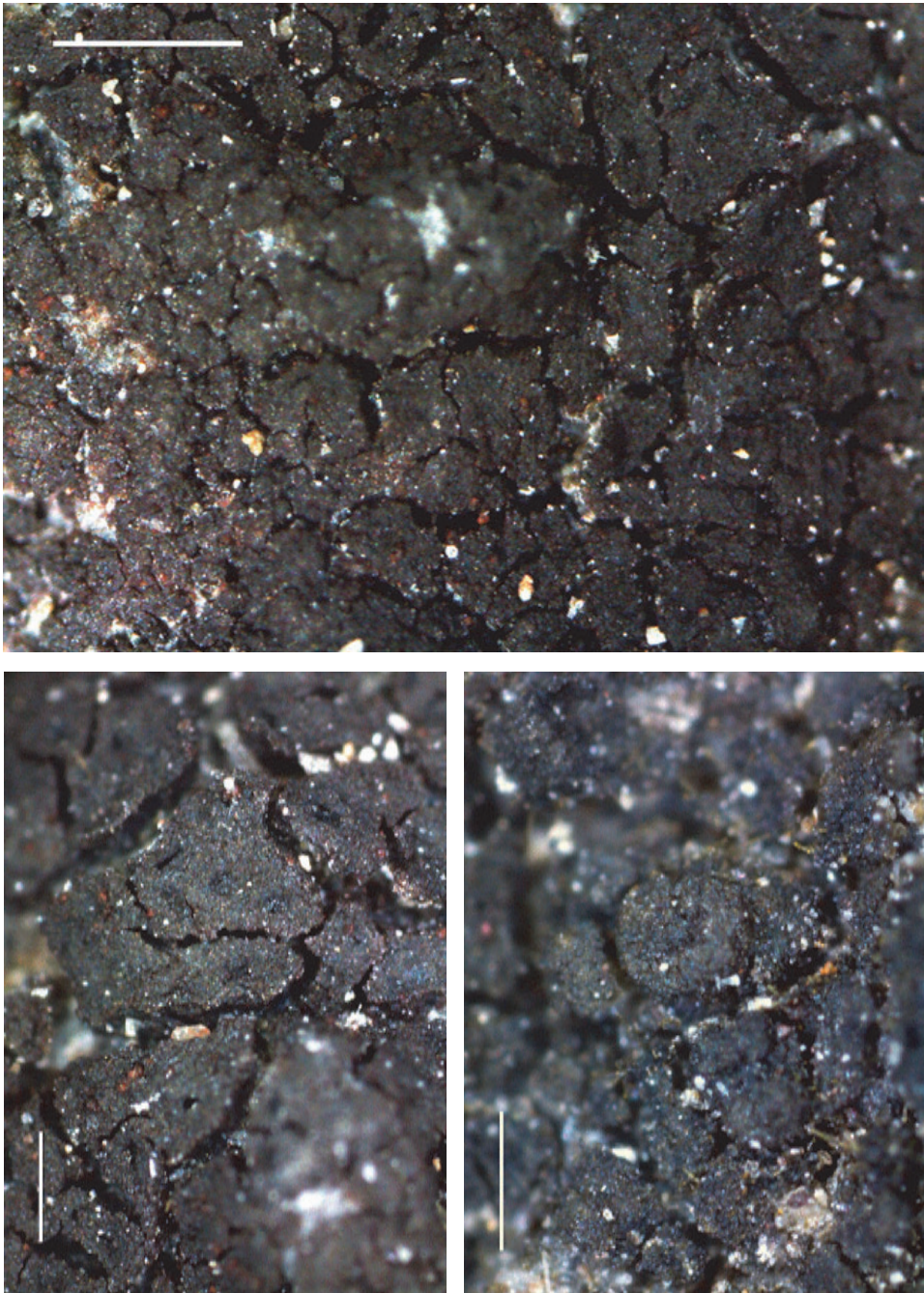


Fig. 16. *Psorotichia gyelnikii* (holotype), general habit (top), enlarged apothecia (bottom).  
Scale 1 mm (top), 0.5 mm (bottom) (photo: S. Kondratyuk)

prominent, vs. with persisting, smooth thalline margin), as well as in having shorter ascospores  $((9-10-13(-15) \times (6-7-8(-9) \mu\text{m}$  vs.  $(10-12.5-17.5(-20) \times 7.5-10 \mu\text{m})$ .

Unfortunately conidia of *Psorotichia murorum* are hitherto not observed. In *P. gyelnikii* conidia bacilliform or elongated ellipsoid,  $2.5-4 \times 0.9-1.1 \mu\text{m}$ .

In having I+ blue hymenium *Psorotichia gyelnikii* is similar to *P. numidella* (Nyl.) Forssell, described originally from North Africa (Sakhara) and known from SW Europe and North America (Sonoran) at the moment, but differs in having smaller thalline areoles ( $0.2-0.4 \text{ mm}$  vs.  $0.3-0.8(-1) \text{ mm}$  across), in having areolate (not being granulose) thallus, in having dark brown (not blackish) upper surface of thallus, in having smaller apothecia (to  $0.1-0.15 \text{ mm}$  vs.  $0.15-0.3 \text{ mm diam.}$ ), in the lack of rizohyphae and in the lack of bluish green epihymenium, as well as apothecia not becoming black and not contrasting with thallus when wet (vs. especially *P. numidella* var. *flageyana* J. Steiner).

The 'KoLRI 022731' specimen (coll. num. 140365) having widely ellipsoid to widely bacilliform conidia,  $(1.5-2-3.2 \times (0.8-1.2-1.5(-1.7) \mu\text{m}$ , probably belongs to another taxon. It is included here with some hesitation.

Other specimens examined: Republic of Korea. Jeju-do, Jeju-si, Hangyeong-myeon, Sinchang-ri, seashore road. Lat.:  $33^\circ 20' 31.6''\text{N}$ ; Long.:  $126^\circ 10' 12.08'' \text{E}$ ; Alt.: 82 m a.s.l. Coll.: Halda, J. P. (140128), 18.06.2014 (KoLRI 022494); the same locality, Joshi, Y. and So, J. (140183), (KoLRI 022554 sub *Psorotichia*). – Jeju-do, Seogwipo-si, Seongsan-eup, Goseong-ri, Seopjicoji. Lat.:  $33^\circ 19' 21.0'' \text{N}$ ; Long.:  $126^\circ 50' 49.03'' \text{E}$ ; Alt.: 69 m a.s.l. Coll.: Gagarina, L. (140365), 19.06.2014 (KoLRI 022731); the same locality, growing together with *Protopermeliopsis chejuensis*, (140350), (KoLRI 022718 sub *Protopermeliopsis chejuensis*); the same locality, growing together with *Rusavskia mandshurica*, Coll.: Lökös, L. (140387\_1), 19.06.2014 (KoLRI 022759 sub *Rusavskia mandshurica*); the same locality, Halda, J. P. (140430), 19.06.2014 (KoLRI 022827); the same locality, growing together with *Catillaria* and *Rinodina*, (140432), (KoLRI 022829 sub *Rinodina*); the same locality, (140436), (KoLRI 022833); the same locality, (140441), (KoLRI 022838); the same locality, growing together with *Caloplaca diffluens* and *Orientophila fauriei*, (140442), (KoLRI 022839 sub *Orientophila fauriei*); the same locality, Coll.: Joshi, Y. and So, J. (140489), 19.06.2014 (KoLRI 022891).

***Rinodina oxneriana* S. Y. Kondr., L. Lökös et J.-S. Hur, spec. nova**  
(Fig. 17)

Mycobank no.: MB 817981

*Similar to Rinodina roboris* var. *roboris*, but differs in having mainly squamulose to phyllidiate thallus (not granular!) and with whitish or whitish-greyish (not pinkish) at margins, in having usually narrower and whitish thalline margin, in having higher hymenium, in having larger (longer) ascospores, as well as in the lack of  $K^+$  yellow reactions of thallus (in the lack of atranorin).



Type: Republic of Korea. Gyeongsangnam-do, Sancheong-gun, Sicheon-myeon, Nae-dae-ri, Jirisan National Park, Georim Trail, on *Quercus* bark, growing together with *Rinodina xanthophaea*. Lat.: 35° 17' 23.93" N; Long.: 127° 42' 09.85" E; Alt.: 885 m a.s.l. Coll.: Kondratyuk, S. Y., Lee, B. G. and Lőkös, L. (161106), 30.06.2016 (holotype: KoLRI 039301); the same locality, growing together with *Caloplaca oxneri*, (161087), (isotype: KoLRI 039282); the same locality, growing together with *Pertusaria* sp., (161091), (isotype: KoLRI 039286); the same locality, (161097), (isotype: KoLRI 039292); the same locality, (161098), (isotype: KoLRI 039293); the same locality, growing together with *Rinodina xanthophaea*, *Phaeophyscia* sp., (161100), (isotype: KoLRI 039295); the same locality, (161104), (isotype: KoLRI 039299); the same locality, growing together with *Phaeophyscia* sp., and *Bacidia* sp., (161113), (isotype: KoLRI 039308).

Thallus to 5–10 cm across, crustose, distinctly squamulose or phyllidiate, where separate squamules/phyllidia plane and distinctly dorsiventral, very often ascending, attached to the substrate by one end and seem to be isidiate, from horizontally orientated, scattered and distant in peripheral portion of thallus (and especially in case of overgrowing thalli of bryophytes) to densely aggregated of ascending squamules and forming indistinct squamulose/phyllidiose portions, whitish grey or light grey to greyish green; squamule 0.2–0.4(–0.5) mm diam./across, somewhat rounded or irregular, sometimes forming phyllidia *ca* 0.1–0.15 mm wide and to 0.1–0.2(–0.3) mm long along the squamule edge. Hypothallus whitish, rarely observed.

Apothecia 0.4–1 mm in diam., mainly distinctly zeorine, rarely lecanorine; thalline margin usually with numerous squamules/phyllidia, true exciple well distinct, to 60–80 µm thick, whitish or light brownish/greyish or transparent hyaline, well contrasting dark brown or black brown disc; disc plane, rarely convex; in section zeorine, where thalline exciple to 70 µm wide, algal cells 5–12 µm in diam, often aggregated in clusters to 15–25 µm diam./across; and true exciple to (70–)80–120(–130) µm wide in the uppermost lateral portion with outermost layer to 20(–30) µm thick brownish portion and inner hyaline, and to (30–)50–70 µm thick in lower lateral portion, scleroplectenchymatous with well developed matrix and hyphae lumina to 2–2.5 µm diam. seen, hyaline, and mainly absent or not developed in the basal portion; hymenium 120–130 µm high, epihymenium to 20–25 µm thick, paraphyses more or less adglutinated, paraphyses to 4 µm wide towards the tips; subhymenium to 40–50 µm thick, more yellowish or lightly yellow-brownish; asci 8-spored, 110 × 30 µm; ascospores with somewhat attenuated ends, especially at one end, (20–)23–30(–32) × (10–)11–16 µm.

Chemistry: not studied.

Ecology: On bark of *Quercus* trees where often associated with *Rinodina xanthophaea*, *Caloplaca oxneri* and various species of the genera *Phaeophyscia*, *Bacidia*, *Biatora*, etc.

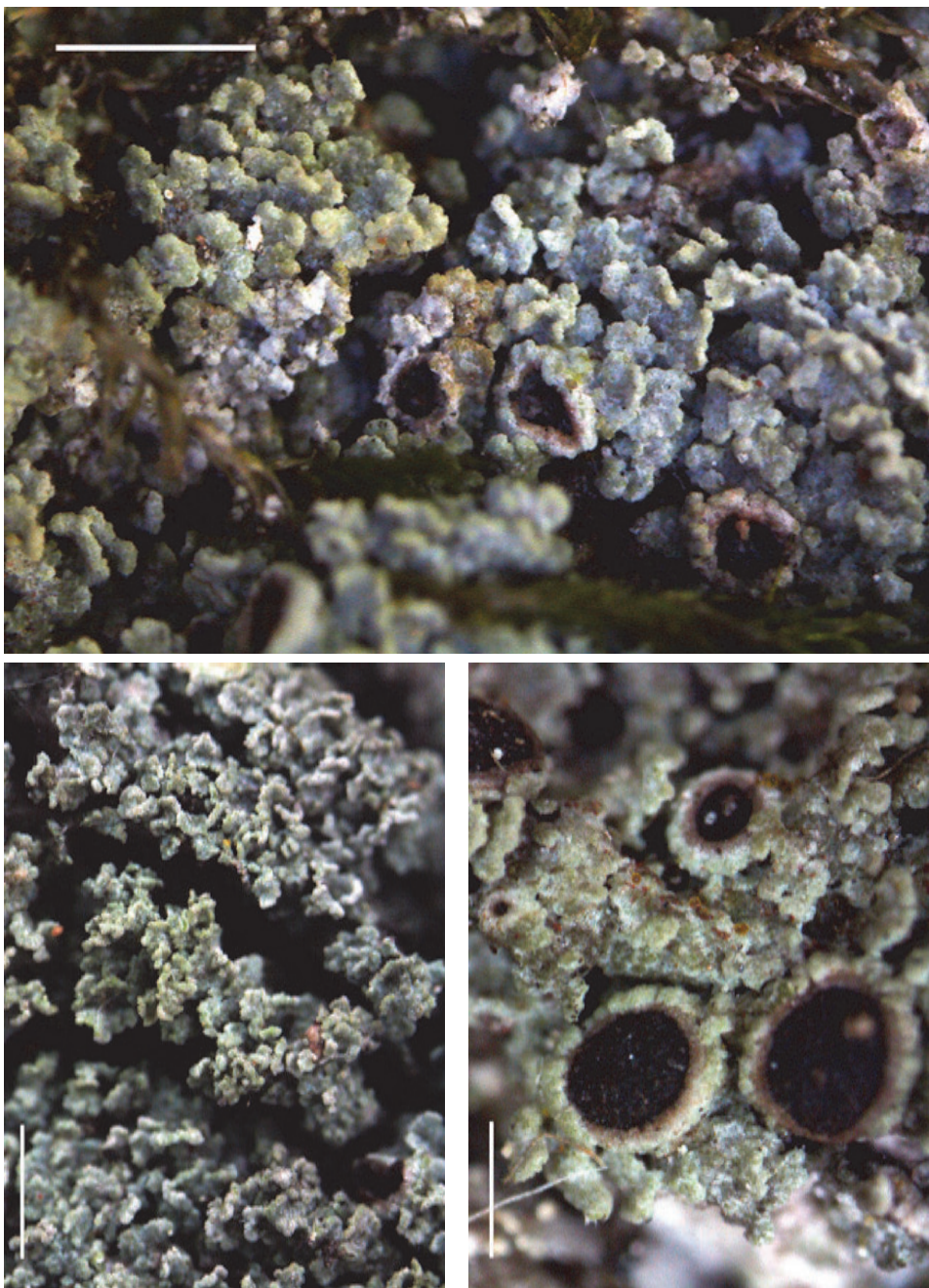


Fig. 17. *Rinodina oxneriana* (holotype), general habit (top, bottom left), enlarged apothecia (bottom right). Scale 1 mm (top, bottom left), 0.5 mm (bottom right) (photo: S. Kondratyuk)

Distribution: So far known from scattered localities in South Korea, Eastern Asia, where sometimes rather abundant.

Etymology: It is named after the well-known Ukrainian lichenologist Alfred Oxner (Kiev, Ukraine) (1898–1973) in recognition of his contribution to study of Eastern Asian lichens, as well as after similarity with *Caloplaca oxneri* having the same type of squamulose/phyllidiate type of thallus, which can be accepted as isidiate thallus, too.

Taxonomic notes: Among all species of the genus *Rinodina* with *Pachysporaria*-type of ascospores *Rinodina oxneriana* is characterised by squamulose or phyllidiate thallus, distinctly zeorine apothecia with whitish or light greyish/brownish/transparent true exciple and very large ascospores.

*Rinodina oxneriana* is similar to *Rinodina roboris* (Nyl.) Arnold var. *roboris*, growing on well-lit bark, especially rough barked trees, such as *Quercus* and *Fraxinus*, but also on *Fagus*, locally common in W Europe, Macaronesia, N America and Asia, and characterised by the usually pale grey (K+ yellow) thallus, the large flat apothecia with relatively thick, more or less crenulate thalline exciple and by *Pachysporaria*-type of ascospores, in having continuous or often irregularly cracked, flat, and often slightly squamulose and differently coloured margins and in having *Pachysporaria*-type of ascospores, but differs in having mainly squamulose to phyllidiate thallus (not granular!) and with whitish or whitish-greyish (not pinkish) at margins, in having usually narrower and whitish thalline margin (vs. thalline exciple 0.1–0.5 mm wide, concolorous with thallus), in having higher hymenium (120–130  $\mu\text{m}$  vs. 95–115  $\mu\text{m}$  tall), in having larger (longer) ascospores ((20–)23–30(–32)  $\times$  (10–)11–16  $\mu\text{m}$  vs. 14–22  $\times$  8–12  $\mu\text{m}$ ), as well as in the lack of K+ yellow reactions of thallus (in the lack of atranorin) (Giavarini *et al.* 2009).

*Rinodina oxneriana* is similar to *R. poeltiana* Giralt et Obermayer, growing on horizontal branches of *Quercus agrifolia* in moist habitats in Europe and North America, in having *Pachysporaria*-type of ascospores and in having vegetative propagules, but differs in having quickly becoming lobulated or phyllidiate thallus (vs. thin, continuous, quickly becoming rimose-areolate), in having larger thalline areoles/squamules (vs. areoles up to 0.5 mm wide, plane), in having phyllidia (not blastidia), and finally forming entirely phyllidiate thallus and in the lack of blastidia (vs. blastidia arising from areole margins and, then areole surface, finally forming entirely blastidiate thallus, darker than thallus, spherical, 40–70  $\mu\text{m}$  in diam., or elongate to 80–90(–120)  $\times$  90–120(–230)  $\mu\text{m}$ ); in having larger apothecia (0.4–1 mm vs. 0.4–0.5 mm diam.), in having higher hymenium (120–130  $\mu\text{m}$  vs. 70–100  $\mu\text{m}$  tall), and in having larger ascospores ((20–)23–30(–32)  $\times$  (10–)11–16  $\mu\text{m}$  vs. (13–)15.5–17.5(–20)  $\times$  (7–)9–10.5(–13))  $\mu\text{m}$  (Sheard 2004).

*Rinodina oxneriana* is similar to another blastidiate species with *Pachysporaria*-type of ascospores *R. perreagens* Sheard, North American endemic species growing on bark or wood of *Quercus* and *Platanus* spp. at elevations of 1,280–1,950 m and characterised by the presence of pannarin in the thallus (and sometimes the epihymenium) and is distinguished from the southern and western European *Rinodina dalmatica* Zahlbr., by its lighter coloured thallus sometimes larger blastidia, apothecia with more persistent thalline margins, and its larger ascospores. But *Rinodina oxneriana* differs from *R. perreagens* in having phyllidiate thallus (vs. discontinuous at first, becoming rimose and sometimes areolate, areoles up to *ca* 0.6 mm wide); in the lack of soredia (vs. soredia 15–45 µm in diam., often covering large areas of thallus, sometimes with blastidia up to 0.1 mm long; in having plane apothecia (vs. becoming convex), in having whitish and wider (?) thalline margin (vs. 0.05–0.1 mm wide, sometimes incomplete), in the lack of zeorine type of apothecia (excipular ring usually prominent and raised), in having higher hymenium (120–130 µm vs. 80–120 µm high), in the lack of reddish brown epihymenium with superficial pannarin crystals (Pd+ forming red crystals), in having 8-spored asci (vs. sometimes only 6 fully developed ascospores), in having wider range of ascospore variation ((20–)23–30(–32) × (10–)11–16 µm vs. (21.5–)26–27.5(–32) × (10.5–)13–14(–16.5) µm), and in the lack of K+ faint yellow and Pd+ immediately orange-red reaction and in the lack of pannarin, zeorin and other substances (Sheard 2004).

*Rinorina oxneriana* is similar to *R. isidioides* (Borrer) H. Olivier, rare species of oceanic Europe, N America and E Africa, growing on bark or more rarely amongst mosses overgrowing bark of mature *Quercus*, in ancient woodlands, but differs in having distinctly squamulose/phyllidiate (not isidiate) thallus, where separate lobules/phyllidia plane and distinctly dorsiventral, very often ascending, attached to the substrate by one end and seem to be isidiate (vs. isidia more or less cylindrical, minute, coralloid, branched and thin, only sometimes appressed or like folded squamules), in having whitish thalline margin, which contrasting both dark brown or black apothecium disc and grey or whitish grey to greenish grey thallus (vs. thalline exciple 0.1–0.15 mm thick, concolorous with thallus), in having brownish epithecium (not red-brown); in having somewhat narrower ascospores ((20–)23–30(–32) × (10–)11–16 µm vs. 21–31.5 × 11.5–17 µm), and in the lack of K+ yellow reaction of thallus and in the lack of atranorin, as well as in different ecology (i.e. very often growing amongst mosses overgrowing bark of deciduous trees) (Giavarini *et al.* 2009).

After having squamulose/phyllidiate thallus *Rinodina oxneriana* is somewhat similar with *Caloplaca oxneri* with which it sometimes growing side by side. However, *C. oxneri* has usually distinctly yellowish or yellowish-greyish

thallus (only in shaded conditions it can be greyish green), as well as *Teloschistes*-type of ascus and bipolar ascospores. However, identification of sterile thalli from shaded conditions can be connected with some problems. However, thalline squamules of *Rinodina oxneriana* are much aggregated and usually ascending in the centre of thallus, while thalline squamules/areoles of *Caloplaca oxneri* are usually more scattered and distant and horizontally orientated (in case if apothecia absent).

Other specimens examined: Republic of Korea. Gyeongsangnam-do, Sancheong-gun, Sicheon-myeon, Naedae-ri, Jirisan National Park, Georim Trail, on *Quercus* bark. Lat.: 35° 17' 23.93" N; Long.: 127° 42' 09.85" E; Alt.: 885 m a.s.l. Coll.: Kondratyuk, S. Y., Lee, B. G. and Lőkös, L. (161115, 161116, 161120, 161129, 161131, 161135), 30.06.2016 (KoLRI 039310, KoLRI 039311, KoLRI 039315, KoLRI 039324 (dupl. BP), KoLRI 039326, KoLRI 039330). – Gyeongsangnam-do, Sancheong-gun, Sicheon-myeon, Naedae-ri, Jirisan National Park, Georim Trail, on *Quercus* bark, growing together with *Rinodina xanthophaea* and *Lecanora* sp. Lat.: 35° 17' 38.70" N; Long.: 127° 41' 55.55" E; Alt.: 990 m a.s.l. Coll.: Kondratyuk, S. Y., Lee, B. G. and Lőkös, L. (161189), 30.06.2016 (KoLRI 039384); the same locality, growing together with *Rinodina xanthophaea*, *Bacidia*, *Biatora* and *Lecanora* spp. (161190), (KoLRI 039385).

***Scoliciosporum jasonhurii*** S. Y. Kondr., S.-O. Oh et L. Lőkös, *spec. nova*  
(Fig. 18)

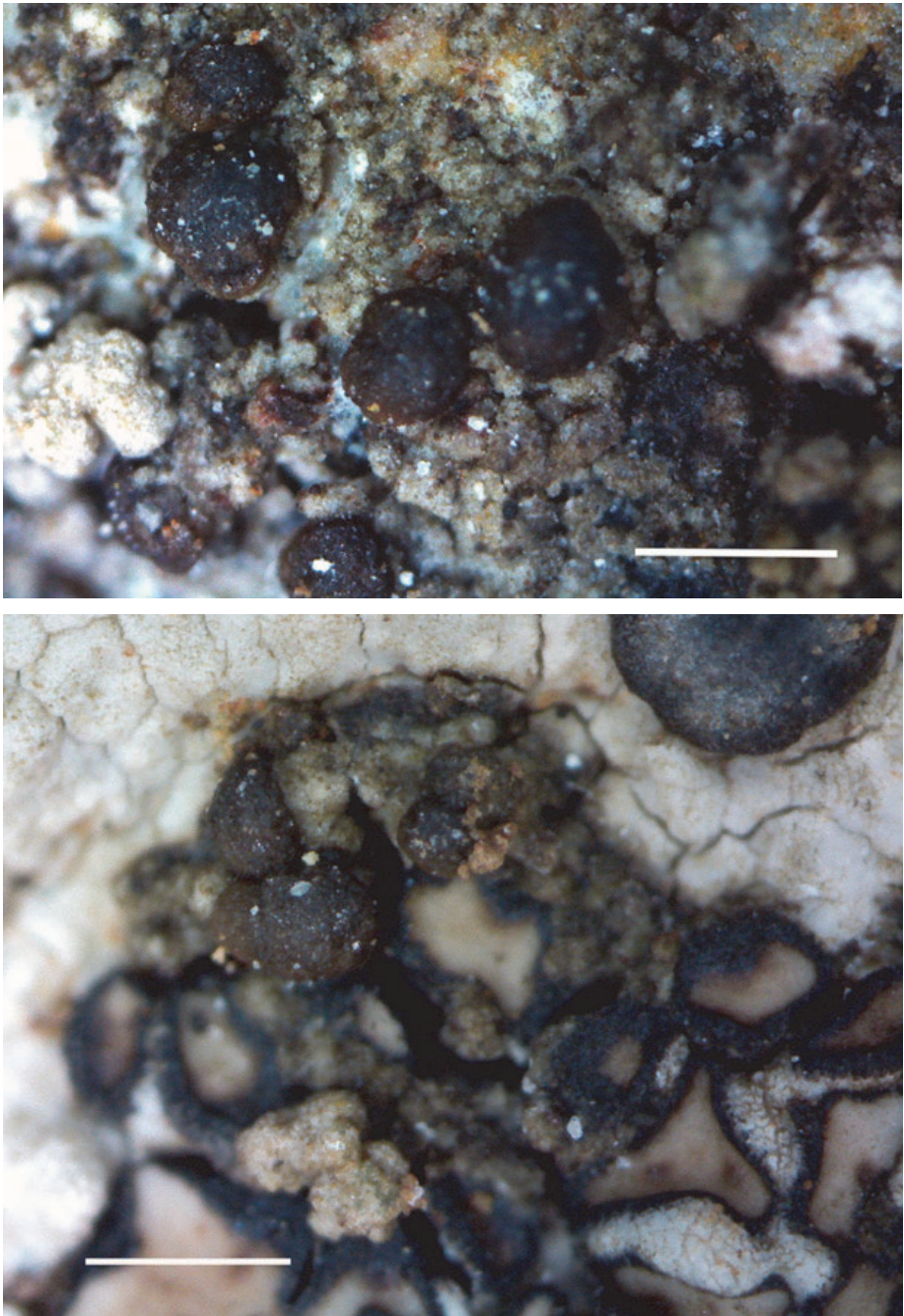
Mycobank no.: MB 817982

*Similar to Scoliciosporum umbrinum in having very thin needle-shaped, spirally twisted ascospores, but differs in having light greenish or greenish-greyish thallus, in having smaller and light brown to dark brown, in having 1-septate and shorter ascospores.*

Type: Republic of Korea. Jeollanam-do Prov., Goheung-gun Co., Bongnae-myeon, Queinaro-do (Wenaro) Island, Mt Bongra, on siliceous rocks, growing together with *Melanophloea coreana*, *Gyalidea austrocoreana*, *Stereocaulon*, *Acarospora*, and *Ionaspis*, as well as *Porpidia albocaerulescens*. Lat.: 34° 27' 2.76" N; Long.: 127° 30' 08.16" E; Alt.: 231 m a.s.l. Coll.: Wang, X. Y. and Ryu, J. A. (110960), 24.10.2011 (holotype: KoLRI 013936 sub *Porpidia albocaerulescens*).

Thallus to 1–3 mm across rarely larger, crustose, light greenish, pale or greenish grey, very thin and often indistinct as very small portions between other crustose lichen thalli, or sometimes on thalli of *Porpidia albocaerulescens* in parts. Hypothallus not seen.

Apothecia very small (0.1–)0.2–0.3(–0.4) mm in diam.; scattered and distant or sometimes aggregated in groups (up to 3–5 apothecia) to 0.5 mm across, semiconvex to convex and emarginated, dull brown to dark brown.



*Fig. 18. Scoliciosporum jasonhurii* (holotype), general habit (top), enlarged apothecia (bottom). Scale 0.5 mm (photo: S. Kondratyuk)

In section to 0.45 mm wide and 0.3 mm thick, convex, biatorine, true exciple well developed while bent downwards, to 30–40(–120)  $\mu\text{m}$  wide in the uppermost lateral portion, to 40–50(–80)  $\mu\text{m}$  thick in lower lateral portion, slightly brownish in section in outer layer and hyaline in inner portion, and to 40–50(–80)  $\mu\text{m}$  thick in basal portion (in its lateral portion) and to 30  $\mu\text{m}$  thick in the centre of basal portion, scleroplectenchymatous, with distinct matrix and hyphae lumina 1–1.5  $\mu\text{m}$  diam.; hymenium to 40–50  $\mu\text{m}$  high; epihymenium darkish dull olive or bluish dark brown, paraphysis tips to 5  $\mu\text{m}$  wide in water, and to 2  $\mu\text{m}$  wide in K, and with gelatine sheath to 5  $\mu\text{m}$  thick (seen in K); subhymenium to 60–70  $\mu\text{m}$  thick, asci of *Bacidia* or *Catillaria*-type, 8-spored; ascospores needle-shaped, often spirally twisted in ascus, 12–15  $\times$  2  $\mu\text{m}$ .

Chemistry: Apothecium and thallus K–, Pd–.

Ecology: On siliceous rocks often as small islands among other crustose lichens, sometimes it is problematic to make conclusion if it is not lichenicolous fungus.

Distribution: So far known only from the type locality in South Korea, Eastern Asia.

Etymology: It is named after the well-known Korean lichenologist, and our friend Dr Jae-Seoun Hur (KoLRI, Suncheon, Republic of Korea) for recognition of his contribution to recent knowledge on Korean lichen flora.

Taxonomic notes: From all known species of the genus *Scoliciosporum* differs in having very narrow ascospores. *Scoliciosporum jasonhurii* is similar to *S. umbrinum* in having very thin (to 2  $\mu\text{m}$  vs. 2–3  $\mu\text{m}$  wide) needle-shaped, spirally twisted ascospores, but differs in having light greenish or greenish-greyish thallus (vs. dark green-brown, occasionally rusty), in having smaller (0.2–0.3 mm vs. 0.3–0.8 mm in diam.) and light brown to dark brown (not red-brown to dark brown-black), in having 1-septate (vs. from 3- to 7-septate) and shorter (12–15  $\mu\text{m}$  vs. (15–)20–30(–40)  $\mu\text{m}$  long) ascospores.

*Staurothele oxneri* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 19)

Mycobank no.: MB 817983

*Similar to Staurothele levinae, but differs in having larger thallus, in having much thinner and usually closely aggregated, and not attenuated towards the tips areoles, in having grey thallus, and in having much smaller hymenial algae.*

Type: Republic of Korea. Jeollanam-do, Yeosu-si, Nam-myeon, Simjang-ri, Geumodo, roadside from Yeon Elementary school, on rocks, in coastal zone. Lat.: 34° 28' 58.9" N; Long.: 127° 48' 15.4" E; Alt.: ca 18 m a.s.l. Coll.: Kondratyuk, S. Y. (160351), 10.06.2016 (holotype: KoLRI 038496); the same locality, (160340), (isotype: KoLRI 038485).

Thallus areolate, forming large spots to 15 cm across or more, with very distinct flattened marginal areoles, light grey or whitish grey especially in the peripheral portions and dark grey or somewhat brownish grey in the centre; areoles in peripheral zone to 1–2(–2.5) mm long and to 0.2–0.4(–0.5) mm wide in narrowest portions, becoming distinctly widened towards the tips, to (0.3–)0.7–0.8 mm wide, and to (0.2–)0.3–0.5 mm wide in the centre.

Thallus in section to 130–170(–220)  $\mu\text{m}$  thick, leptodermatous paraplectenchymatous throughout, cells arranged more or less in vertical rows. Upper cortex up to 25–30(–35)  $\mu\text{m}$  thick, weakly differentiated from medulla, leptodermatous paraplectenchymatous, mainly hyaline only sometimes slightly brownish in the uppermost portion in places, cell lumina of 5–7(–10)  $\mu\text{m}$ ; usually without epinecral layer, seen only a few times to 5–10  $\mu\text{m}$  thick. Medulla to 90–100  $\mu\text{m}$  thick, algal cells more or less evenly distributed in medulla (to 60  $\mu\text{m}$  thick), more or less in vertical rows. The basal layer largely variable in thickness, (25–)40–100  $\mu\text{m}$  thick, the same leptodermatous paraplectenchymatous, dark brown or almost black, sometimes upper portion to 20–25  $\mu\text{m}$  thick black or blackish grey while lower portion to 50–70  $\mu\text{m}$  thick much lighter, i.e. greyish or light brownish; tightly attached to the substrate, cell lumina of (3–)5–6(–9)  $\mu\text{m}$ .

Perithecia pyriform to almost spherical, to 0.2–0.35(–0.4) mm in diam., (and 250–350  $\mu\text{m}$  high in section), 1/3 or 1/2 immersed into thalline areoles, only upper portion with ostiole as black uplifted portion to 0.2 mm diam. above level of thallus well distinct; with thalline layer almost till ostiole, involucrellum mainly merging with the basal layer of thallus; exciple dark brown to black brown in outer layer and hyaline in inner portions, to 30–40  $\mu\text{m}$  thick in lower lateral and basal portions, and thicker at the uppermost portion (to 90–100  $\mu\text{m}$  thick, where dark portion to 30–70  $\mu\text{m}$  thick and hyaline to 40(–50)  $\mu\text{m}$  thick, cell lumina of 4–9  $\mu\text{m}$ ); periphyses at ostiole to 30–40(–50)  $\mu\text{m}$  long and to 2–3  $\mu\text{m}$  wide; hymenial algae spherical, (2–)2.5–4(–5)  $\mu\text{m}$  in diam., or elongated ellipsoid, oblong to bacilliform, (3–)3.5–7(–9)  $\times$  (2–)3–5  $\mu\text{m}$ , sometimes pairs, tetrads and packets with 8 and 16 algal cells observed. Asci (1–?)2-spored, clavate. Ascospores hyaline at first, then becoming yellowish to yellow-orange, widely ellipsoid, with rounded ends, often with slight constriction at the equatorial portion and seem to be divided into two equal portions, (35–)40–67(–85)  $\times$  (13–)15–24(–27)  $\mu\text{m}$ , sometimes with thick wall of 3  $\mu\text{m}$ . Conidiomata to 60  $\mu\text{m}$  diam. and to 80  $\mu\text{m}$  high in section, immersed into thallus, hyaline, closely situated to perithecia; and conidia narrowly bacilliform, 4.5–5  $\times$  1  $\mu\text{m}$ .

Ecology: On rocks in place with periodically running water.

Distribution: So far it is known from the type locality, South Korea, Eastern Asia.

Etymology: It is named after the well-known Ukrainian lichenologist Alfred Oxner (1898–1973) (Kiev, Ukraine), in recognition of his contribution to



knowledge on Asian lichens and especially for his contribution to the study of the genus *Staurothele* in Eurasia.

Taxonomic notes: Species is characterised in having thallus with radiate flattened areolae at margins, in having 2-spored asci and rather large ascospores.

After having radiate areolae at margin it can be compared with *Staurothele levinae* Oxner, Asian taxon known from Central and Middle Asia regions from siliceous rocks, and *S. effigurata* J. W. Thomson (1990), known from acidic rocks from desert to lower montane regions of North American continent, as well as with one more American taxon *S. drummondii* (Tuck.) Tuck.

However, *Staurothele oxneri* differs from *S. levinae* in having larger thallus, in having much thinner and usually closely aggregated (not being distant each other), and not attenuated towards the tips areoles, in having grey (not dark brown or black-brown) thallus, and in having much smaller hymenial algae (vs. 2.7–5.2  $\mu\text{m}$  diam./across), while ascospores of these two species are considerably overlapping (40–67  $\times$  15–24  $\mu\text{m}$  vs. 28–52  $\times$  15.6–26  $\mu\text{m}$ ).

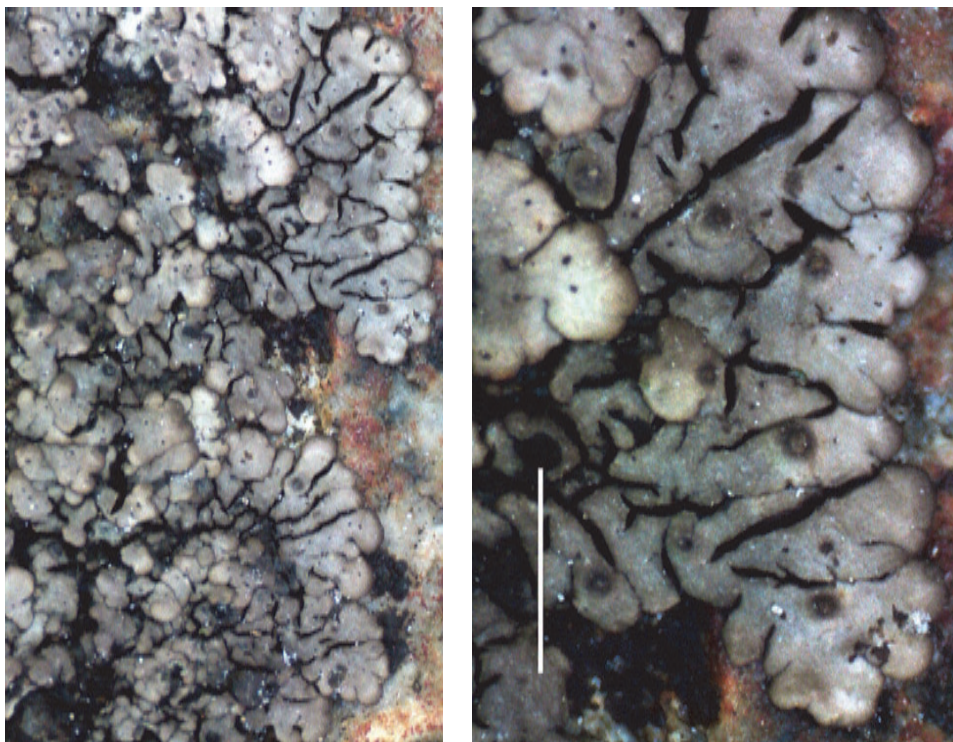


Fig. 19. *Staurothele oxneri* (holotype), general habit (left), enlarged radiate areoles (right). Scale 2 mm (left), 1 mm (right) (photo: S. Kondratyuk)

*Staurothele oxneri* differs from *S. effigurata* in having narrower thalline areoles (vs. 0.3–1 mm broad), in having smaller radiating flattened marginal areoles (vs. to 2 mm long and 1 mm broad), in having larger perithecia (vs. up to 0.3 mm in diam.), in having well-visible perithecia arising thalline level (vs. perithecia within the central areoles, only the mouth visible as an inconspicuous small projections of the areole), in having larger hymenial algae (vs. predominantly 3–4  $\mu\text{m}$  in diam.), in having mainly eumuriform ascospores (vs. mainly submuriform with to 7-septate transversely and 3-septate longitudinally), and in having much wider ascospores (40–67  $\times$  15–24  $\mu\text{m}$  vs. 40–45  $\times$  15–20  $\mu\text{m}$ ).

Additionally *Staurothele drummondii* differs from *S. oxneri* in having narrow, highly convex marginal areoles, as well as in having shining or dull brown to blackish brown upper surface, in having blackish cobwebby prothallus, in having larger perithecia (0.4–0.6 mm in diam.), and in having somewhat submuriform ascospores with up to 9-septate transversely and 3-septate longitudinally, and in having smaller and somewhat narrower ascospores (24–50  $\times$  11–21  $\mu\text{m}$  vs. 40–67  $\times$  15–24  $\mu\text{m}$ ).

*Staurothele oxneri* is similar to *S. elenkinii* Oxner and *S. lazarenkoi* Oxner in having 2-spored asci and in general habitat (i.e. growing on siliceous rocks). However, *Staurothele oxneri* differs from *S. elenkinii*, known from Europe, Caucasus and North America, in having much thicker thallus, in having much better distinct perithecia and in having much larger ascospores (40–67  $\times$  15–24  $\mu\text{m}$  vs. 24–44  $\times$  11–16.1  $\mu\text{m}$ ). Furthermore, *Staurothele oxneri* differs from *S. lazarenkoi*, known hitherto from Middle Asia (Kyrgyzstan), in having much thicker and well-developed areolate, grey or light greyish brown thallus (vs. very thin and slightly areolate, brownish or olive-brown thallus), in having much larger thalline areoles (vs. 0.2–0.5 mm across), in having larger perithecia (vs. 0.2–0.3 mm in diam.), in having blackish brown exciple (vs. brown), as well as in having hyaline and much wider ascospores (40–67  $\times$  15–24  $\mu\text{m}$  vs. 38–46  $\times$  11.4–19  $\mu\text{m}$ , and becoming dark brownish at overmature).

Three more species known hitherto for South Korea, i.e.: *Willeya japonica* (B. de Lesd.) Gueidan, *W. iwatsukii* (H. Harada) Gueidan, and *Staurothele rugulosa* (A. Massal.) Arnold, belong to species group, which have 8-spored asci and mainly much smaller, especially narrower, ascospores, as well as in having continuous, distinctly crustose (film-like) thallus in peripheral portions and only in the centre cracked or areolate.

*Staurothele oxneri* is similar to *S. fissa* (Taylor) Zwackh after having the perithecia covered at least partly by layer of thallus, and they form distinct mounds above the level of the rest of the thallus, but differs in having grey thallus (vs. pale brown to brown), in the lack of whitish prothallus, in having larger hymenial algae not being only in pairs and tetrads but also in larger packets (= aggregations), in having larger and especially wider ascospores (40–67  $\times$  15–24  $\mu\text{m}$  vs. (31–)37–48(–55)  $\times$  (15–)16–20(–25.5)  $\mu\text{m}$ ).

*Stigmidium coarctatae* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 20)

Mycobank no.: MB 817984

*Similar to Stigmidium tabacinae, but differs in having much better developed, well distinct dark vegetative hyphae as well as very characteristic setae-like formations, in having superficial ascomata, in having thinner ascomata wall; in having wider and longer periphyses, in having wider ascospores.*

Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Seomyeon, Taeha-ri, valley of Tae-hacheon, Seodal-gil. Lat.: 37° 30' 12.77" N; Long.: 130° 49' 49.03" E; Alt.: 265 m a.s.l. on siliceous rocks, on thalli of *Trapelia coarctata*, growing together with *Trapelia placodioides*. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161847\_4), 10.07.2016 (holotype: KoLRI 040077); the same locality, on thalli of *Trapelia coarctata*, growing together with *Trapelia placodioides*, and *Thelocarpon ulleungdoense*, (161849), (isotype: KoLRI 040081); the same locality, on thalli of *Trapelia coarctata*, growing together with *Trapelia placodioides*, (161847\_2, 161862), (isotypes: KoLRI 040075, KoLRI 040099); the same locality, on thalli of *Trapelia coarctata*, growing together with *Trapelia placodioides*, (161868), (isotype: KoLRI 040105).

Vegetative hyphae rather common and well distinct, usually of two different types: simple vegetative hyphae, dark grey to dark brown or greyish brown, to 1.5–2 µm diam. and usually very long 20–50 µm long, scarcely septate, without constrictions at the septa, sometimes bulbous at the basis to 3 µm diam.; and setae-like branched formations, much darker and thicker in comparison with simple hyphae, to (5–)12–25(–30) µm long and (3–)3.5–6 µm diam. and dark brown at the bases, gradually becoming lighter and thinner towards the tips, with 2–3 or more characteristic divaricate branching.

Ascomata perithecioid, dark brownish black, spherical, (35–)50–80(–90) µm in diam. and to 60–70 µm high in section, black, usually abundant and aggregated in semiconvex aggregations above host thalline areoles, with distinct superficial vegetative hyphae and setae-like formations; ascomatal wall dark brown or blackish brown, to 7–8(–12) µm thick, pseudoparenchymatous, consisting of 2(–3) layers of black cells, cells to 5–7 × 3 µm, innermost one being subhyaline; periphyses well developed, 1.5–2(–2.2) µm wide and to 15(–25) µm long. Short pseudoparaphyses resemble those of type 'a' sensu Roux and Triebel (1994). Asci subcylindrical, narrowly elliptical, (4–)8-spored, (35–)40–45 × 11–12 µm. Ascospores hyaline, narrowly ellipsoid almost bacilliform and with equal cells, with rather acute upper and rounded lower one, not constricted at septum, usually each cells with 2 oil droplets (pseudotetrablastic), non-halonate, smooth-walled, irregularly 2-seriate in a ascus, 11–14(–17) × (3.2–)4–5(–5.5) µm.

Host: Thalline areoles of *Trapelia coarctata*, which sometimes completely covered by lichenicolous fungus in type locality, while thalline areoles of growing here *T. placodioides* side by side with *T. coarctata* were untouched by this lichenicolous fungus.

Distribution: So far known only from the type locality in South Korea, Eastern Asia.

Etymology: It is named after lichen host *Trapelia coarctata*.

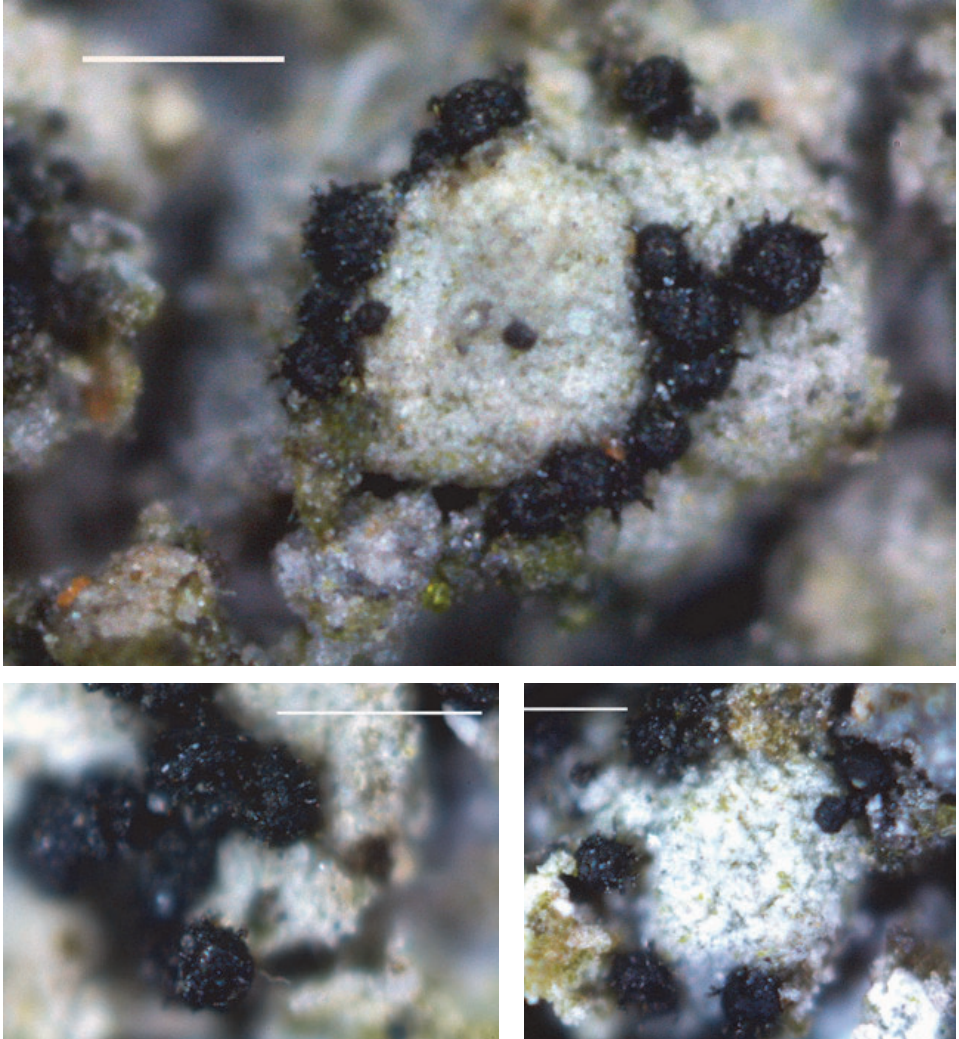


Fig. 20. *Stigmidium coarctatae* (holotype), enlarged ascomata with setae-like vegetative hyphae. Scale 0.5 mm (top), 200  $\mu$ m (bottom) (photo: S. Kondratyuk)

Taxonomic notes: *Stigmidium coarctatae* is similar to *S. tabacinae* (Arnold) Triebel, known from Europe and North America, growing on thallus of *Toniinia physaroides* and *T. tristis*, but differs in having much better developed, well distinct dark (vs. colourless, some pale brown) vegetative hyphae, as well as very characteristic setae-like formations, in having superficial (vs. semi-immersed to immersed) ascomata, in having thinner ascomata wall (7–8  $\mu\text{m}$  vs. mostly 10–12  $\mu\text{m}$  thick); in having wider and longer periphyses (to 2(–2.2)  $\mu\text{m}$  wide and 15(–25)  $\mu\text{m}$  long vs. 1.5  $\mu\text{m}$  in diam. and ca 6  $\mu\text{m}$  long), in having wider ascospores (11–14(–17)  $\times$  (3.2–)4–5(–5.5)  $\mu\text{m}$  vs. 10–14  $\times$  3–4  $\mu\text{m}$ ).

*Stigmidium coarctatae* closely resembles some other host thallus-inhabiting species of the genus, viz. *S. fuscatae* (Arnold) R. Sant., *S. psorae* (Anzi) Hafellner, *S. epixanthum* Hafellner, *S. gyrophorarum* (Arnold) D. Hawksw. etc. (Roux and Triebel 1994, Roux *et al.* 1995, Triebel and Cáceres 2004). However, all these species grow on different host taxa (most *Stigmidium* Trevis. species are supposed to be confined to a particular host genus) and have significantly larger ascomata, shorter asci and ascospores (mainly longer of 15  $\mu\text{m}$ , maximum up to 23.5  $\mu\text{m}$  long). Furthermore, *Stigmidium fuscatae*, growing on *Acarospora* sect. *Phaeothallina*, differs in having smaller ascospores. *Stigmidium psorae* is characterized by 1–3-septate and much longer ascospores. *Stigmidium epixanthum* growing on *Acarospora* sect. *Acarospora* has much wider ascospores, and *S. gyrophorarum* differs in having much longer and wider ascospores, too.

Additional specimen examined: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Seomyeon, Taeha-ri, valley of Tae-hacheon, Seodal-gil, on siliceous rocks, on thalli of *Trapelia coarctata* growing together with *Thelocarpon ulleungdoense*. Lat.: 37° 30' 12.77" N; Long.: 130° 49' 49.03" E; Alt.: 265 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L., 10.07.2016 (161847\_1), (KoLRI 040074 sub *Trapelia coarctata*).

***Thelocarpon ulleungdoense*** S. Y. Kondr., L. Lőkös, J.-J. Woo et J.-S. Hur,  
spec. nova  
(Fig. 21)

Mycobank no.: MB 817985

*Similar to Thelocarpon albidum, but differs in having single, scattered ascomata, in having much thinner true exciple, in having much higher number of ascospores in ascus, and in having much smaller ascospores and in its distribution.*

Type: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Seomyeon, Taeha-ri, valley of Tae-hacheon, Seodal-gil, on siliceous rocks, growing together with *Trapelia coarctata* damaged by lichenicolous fungus, *Trapelia placodioides*. Lat.: 37° 30' 12.77" N; Long.: 130° 49' 49.03" E; Alt.: 265 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L., 10.07.2016 (holotype from J.-J. Woo [specimen 68 – photo]; the same locality, (161849), (isotype: KoLRI 040081).

Thallus greenish, somewhat indistinct; in section thalline portion outside perithecium to 200  $\mu\text{m}$  thick, ecorticate, completely filled out by algal cells.

Perithecia 0.19–0.25 mm in diam., semi-immersed, only to 0.5 of their height with corticated thalline sheath, lower portion immersed in algal zone; cortical layer to 10–15(–20)  $\mu\text{m}$  thick, present in the thalline verrucae to 2/3 of perithecium height, outer layer dull brownish or brownish yellow owing to richly present yellow-brown pruina; algal sheath 20–50(–70)  $\mu\text{m}$  wide; algal cells 8–12  $\mu\text{m}$  in diam./across.; nucleus to (160–)170–220(–250)  $\mu\text{m}$  diam., hyaline wall of exciple to 10–15  $\mu\text{m}$  thick in lower portion and to 30–35  $\mu\text{m}$  thick near the ostiole; paraphyses the same height as asci (= “hymenium” (?)) to 110  $\mu\text{m}$  thick, to (0.7–)0.9–1.2  $\mu\text{m}$  diam./thick, paraphyse cells often with numerous oil droplets inside. Asci to (80–)110–140  $\times$  (12–)17–22  $\mu\text{m}$ , with 150–250 ascospores; ascospores hyaline, simple or 1-septate, 1(–2)-guttulate, widely ellipsoid to elongate ellipsoid, sometimes somewhat clavate, 3–4(–4.5)  $\times$  (1.5–)2–2.5(–3)  $\mu\text{m}$  or spherical to 2–3.5  $\mu\text{m}$  in diam.

Ecology: On siliceous rocks, where growing together with species of the genera *Trapelia*.

Distribution: So far known only from the type locality Ulleung-do Island in South Korea, Eastern Asia.

Etymology: It is named after Ulleung-do Island, South Korea, Eastern Asia, where type collection was done.

Taxonomic notes: *Thelocarpon ulleungdoense* is similar to *T. albidum* Nyl. described from limestone of North Africa (Algeria) in having algal sheath and paraphyses, but differs in having single, scattered ascomata (vs. verrucae aggregate, forming a whitish thallus without pruina), in having much thinner algal sheath (20–50  $\mu\text{m}$  vs. 60–100  $\mu\text{m}$  thick), and in having smaller algal cells (8–12  $\mu\text{m}$  vs. 11–20  $\mu\text{m}$  diam.), and in having narrower cortical layer (10–15  $\mu\text{m}$  vs. 30–50  $\mu\text{m}$  thick), in having much thinner true exciple (10–15  $\mu\text{m}$  vs. 50–60  $\mu\text{m}$  thick), in having smaller asci (140  $\mu\text{m}$  vs. to 225  $\mu\text{m}$  long), in having much higher number of ascospores in ascus (150–250 vs. 40–80 per ascus), and in having much smaller ascospores (3–4(–4.5)  $\times$  (1.5–)2–2.5(–3)  $\mu\text{m}$  vs. 11–17  $\times$  5.5–9  $\mu\text{m}$ ) and in its distribution, as well as in the lack of perithecium neck (vs. to 100  $\mu\text{m}$  long).

*Thelocarpon ulleungdoense* is similar to *T. intermediellum* Nyl. known from the Northern Hemisphere in having globose scattered perithecia with yellow pruina. However, *T. ulleungdoense* differs from *T. intermediellum* in having well-developed algal sheath (vs. algal sheath absent or rudimentary, in having well-developed paraphyses (vs. paraphyses absent), and in having much wider ascospores (3–4(–4.5)  $\times$  (1.5–)2–2.5(–3)  $\mu\text{m}$  vs. 3–4(–5)  $\times$  1–1.5  $\mu\text{m}$ ).

*Thelocarpon ulleungdoense* differs from other two Korean species *T. vicinellum* and *T. epibolum* Nyl. in having algal sheath. Furthermore *Thelocarpon ulleungdoense* differs from *T. vicinellum* in having smaller ascospores (3–4(–4.5)

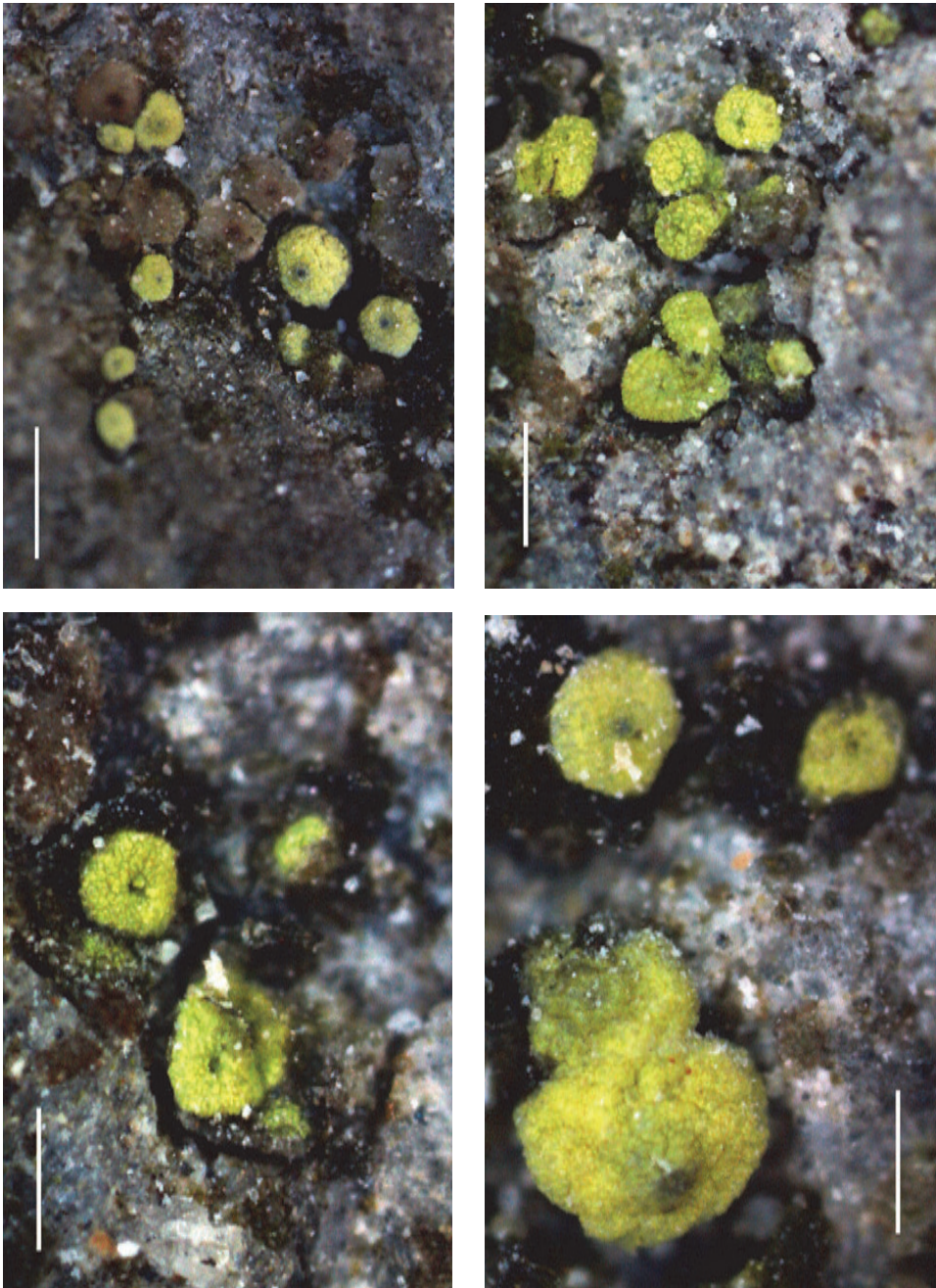


Fig. 21. *Thelocarpon ulleungdoense* (holotype), general habit (top), enlarged apothecia (bottom). Scales 0.5 mm (photo: S. Kondratyuk)

× (1.5–)2–2.5(–3) μm vs. 4.5–6 × 2 μm), and different reaction of hymenial jelly and asci (vs. asci I+ dark blue, and hymenium jelly I–). Furthermore, *Thelocarpon ulleungdoense* differs from *T. epibolum* in having smaller ascospores (3–4(–4.5) × (1.5–)2–2.5(–3) μm vs. 4–7 × 1.7–2 μm), and different reaction of hymenial jelly and asci (vs. asci I–, and hymenium jelly I+ yellow-red, rarely blue).

*Thelocarpon ulleungdoense* differs from *T. laureri*, known from Europe, Canary Islands and North America, where it grows on various substrates (stones, wood, soil, brick, leather etc.), but differs from the latter taxon in having periphyses, in having simple (vs. branched and anastomosing) paraphyses, and in having wider ascospores (3–4(–4.5) × (1.5–)2–2.5(–3) μm vs. 1.5–4(–6) × 1.5–2 μm), as well as in distribution.

Additional specimen examined: Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Seomyeon, Taeha-ri, valley of Tae-hacheon, Seodal-gil, on siliceous rocks, growing together with *Trapelia coarctata* damaged by *Stigmidium coarctatae*. Lat.: 37° 30' 12.77" N; Long.: 130° 49' 49.03" E; Alt.: 265 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L., 10.07.2016 (161847\_1), (KoLRI 040074 sub *Trapelia coarctata*).

*Thelopsis loekoesii* S. Y. Kondr., J. Halda et J.-S. Hur, *spec. nova*  
(Fig. 22)

Mycobank no.: MB 817986

*Similar to Thelopsis rubella, but differs in having only grey to greyish green thallus, in having smaller perithecia, in having the darkest portions of perithecium around ostiole, in having less number of ascospores in ascus, in having wider periphyses, and in having longer and narrower ascospores.*

Type: Republic of Korea. Gyeongsangnam-do, Sancheong-gun, Sicheon-myeon, Naedae-ri, Jirisan National Park, Georim Trail, on *Quercus* bark. Lat.: 35° 17' 23.93" N; Long.: 127° 42' 09.85" E; Alt.: 885 m a.s.l. Coll.: Kondratyuk, S. Y., Lee, B. G. and Lökös, L. (161137), 30.06.2016 (holotype: KoLRI 039332); the same locality, growing together with *Bacidia* (161133), (isotype: KoLRI 039328 sub *Thelopsis*).

Thallus to 10–15 cm across, crustose, very thin or endophleoid, whitish-grey to grey or greyish-greenish, with very indistinct immersed perithecia. Hypothallus not observed.

Perithecia 0.3–0.4 mm in diam., and to 0.4 mm high, scattered and discrete, usually immersed into substrate/thallus and only 1/4 of ascomata seen above thalline level, sometimes thalline warts with ascomata to 0.4–0.6 mm diam./across can be observed, or only ostiole portion seen if perithecia totally immersed into the thallus; ostiole violetish brown or light brown with somewhat darker concentric circles in the centre (like the pupil of the eye, Fig. 22), often with open ostiole to 40 μm diam. Exciple rather thick to 70–90 μm thick



at the ostiole and to 40–50  $\mu\text{m}$  thick in lower lateral and basal portions, hyaline throughout, only central portion to 100  $\mu\text{m}$  wide around the ostiole with light brownish colouration in the outermost layer or yellowish in thin outer part of the lower portion; periphyses to 30–40(–50)  $\mu\text{m}$  long and to 2–2.5  $\mu\text{m}$  wide, paraphyses to 1.5  $\mu\text{m}$  wide towards the tips while slightly wider, *ca* 2.5  $\mu\text{m}$  in lower part; subhymenium to 20–25  $\mu\text{m}$  thick; hymenium and subhymenium somewhat yellowish; asci multispored, with 80 ascospores, narrowly elongated to somewhat cylindrical, 140–150  $\times$  22–27  $\mu\text{m}$ ; ascospores 3-septate, hyaline, narrowly ellipsoid, with distinct constriction at the septa, (12–)16–21  $\times$  4–5  $\mu\text{m}$ . Pycnidia not seen.



Fig. 22. *Thelopsis loekoessii* (holotype), general habit (top), enlarged ascomata. Scale 1 mm (top), 0.5 mm (bottom) (photo: S. Kondratyuk)

Chemistry: Chemistry not examined.

Ecology: On bark of deciduous tree (*Quercus*).

Distribution: So far known only from the type locality in South Korea, Eastern Asia.

Eymology: It is named after the well-known Hungarian lichenologist and our friend László Lőkös (1959–) (Budapest, Hungary), who has collected and identified this material for the first time.

Taxonomic notes: *Thelopsis loekoesii* is similar to *Thelopsis rubella* Nyl., known from bark of mature deciduous trees of the genera *Quercus*, *Fagus*, *Fraxinus*, and *Populus* mostly in the Lobarion in ancient woodlands or parklands, where it is an important indicator species in Europe, after having brownish or brownish-reddish perithecia and after having mainly 3-septate ascospores, as well as after measurements of paraphyses and ascomatal wall, but differs in having only grey to greyish green thallus (not pale brownish), in having smaller perithecia (up to 0.4 mm vs. 0.4–0.6 mm in diam.), in having the darkest portions around ostiole (vs. perithecia dark brown or reddish brown often paler around the ostiole), in having smaller asci (140–150 × 22–27 µm vs. 150–200 × 18–25 µm), in having less number of ascospores in ascus (*ca* 80 vs. 100–150 per ascus), in having wider paraphyses (to 2–2.5 µm vs. to 1.5 µm thick) and in having longer and narrower ascospores ((12–)16–21 × 4–5 µm vs. 12–18 × 5–6 µm), after Vězda (1973) and ((10–)12–16(–18) × 4–8 µm) after Rose *et al.* (2009)).

*Thelopsis loekoesii* is similar to *T. chirisanensis* L. Lőkös, S. Y. Kondr. et J.-S. Hur, recently described from South Korea, Eastern Asia, but differs in having smaller perithecia (up to 0.4 mm vs. 0.6–0.7 mm in diam.), while ascomatal wall is much thicker (70–90 µm thick at the ostiole and to 40–50 µm thick in lower lateral and basal portions vs. to 30 µm thick at the ostiole and to 10–15 µm thick in lower portion), in having longer paraphyses (30–40(–50) µm vs. 20–30 µm long), in having lower subhymenium (20–25 µm thick vs. 50–60 µm thick), in having larger number of ascospores in ascus (*ca* 80 vs. 40–60 ascospores per ascus) and in having only 3-septate (vs. submuriform) and much narrower ascospores ((12–)16–21 × 4–5 µm vs. (10–)13–17 × (6–)6.5–7(–8) µm).

*Thelopsis loekoesii* may be similar to *Strigula thelopsidoides* Coppins, Cl. Roux et Sérus. in Roux et Sérusiaux, which may resemble a diminutive *Thelopsis rubella*. However, *Strigula thelopsidoides* differs from both *Thelopsis loekoesii* and *T. rubella* in having 8-spored asci and in having smaller ascospores. Furthermore, *Strigula thelopsidoides* differs from *Thelopsis loekoesii* in having whitish or inconspicuous immersed thallus, in having orange to pale brown exciple, in having not constricted at septa, as well as much shorter and narrower ascospores ((9.5–)10.5–13(–14.5) × 2.5–3.5(–4.5) µm vs. (12–)16–21 × 4–5 µm).

Additional specimen examined: Republic of Korea. Gangwon-do, Jeongseong-gun, Gangneung-si, tourist pass toward peak Seokbyeongsan, on bark, growing together with *Micarea* aff. *stipitata* and *Bacidia* sp. Lat.: 37° 34' 38.58" N; Long.: 128° 51' 23.94" E; Alt.: 760 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (150883), 10.07.2015 (KoLRI 034116 sub *Micarea*).

*Toninia poeltiana* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 23)

Mycobank no.: MB 817987

*Similar to Toninia plumbina, but differs in having smaller apothecia, in having hyaline true exciple in inner part, in having hyaline subhymenium, in having thinner hymenium, in having dark bluish grey or bluish black or violet-black epihymenium, and in having 1–3-septate, as well as shorter ascospores, as well as in having K+ violetish epihymenium.*

Type: Republic of Korea. Gangwon-do, Jeongseon-gun, Jeongseon-eup, Aesan-ri, Jeongseon church, on calcareous rocks, on thalli of *Verrucaria fuscella* (Turner) Winch, growing together with *Collema* sp. Lat.: 37° 22' 17.3" N; Long.: 128° 40' 25.2" E; Alt.: 319 m a.s.l. Coll.: Park, J. S., Woo, J.-J. and Lee, B. G. (152867), 06.09.2015 (holotype: KoLRI 037176).

Species non-lichenized, lichenicolous.

Apothecia (0.1–)0.15–0.3(–0.4) mm in diam., and to 0.1 mm thick while often stipe to 0.1–0.12 mm high observed in section; black or dark brown-black, from initial stage immarginate and semiconvex, rarely plane, soon becoming convex, epruinose; true exciple to 50 µm thick in the uppermost lateral and to 30 µm thick in lower lateral portions with brown or dark brown to blackish brown outermost layer (N+ violet), lacking crystals, and somewhat greyish in inner portions, to 15 µm thick in basal portion, hyaline; hymenium 40–50 µm high; epihymenium to 10–15 µm thick, bluish to violet-blackish, lacking crystals, K+ violetish, N+ violet; paraphyses densely conglutinated, swollen towards the tips to 4 µm wide, with somewhat darker surroundings around tips, but no cups observed; subhymenium 40–50 µm thick, hyaline, lacking crystals; stipe to 100–130 µm high with brownish to dark brown outermost layers and hyaline in inner portion; ascospores 1(2–)3-septate, hyaline, 13–19(–21) × (2.5–)3–4 µm. Pycnidia not seen.

Chemistry: Epihymenium and outermost layer of true exciple N+ violet, epihymenium K+ violet. Chemistry not examined.

Ecology: On thallus of *Verrucaria fuscella* (Turner) Winch, mainly along edge of host thalline areoles or rarely on the upper surface of areoles, without visible damaging influence.

Distribution: So far known only from type locality in South Korea, Eastern Asia.

**Etymology:** It is named after the well-known German lichenologist Josef Poelt for whom parasitic lichens were especially favourite group among lichens.

**Taxonomic notes:** *Toninia poeltiana* is similar to *T. plumbina* (Anzi) Hafellner et Timdal, growing on thallus of *Degelia plumbea* (Lightf.) P. M. Jørg. et P. James in Europe, Cyprus and Macaronesia, ranging from the Mediterranean to the low-alpine regions, but differs in having smaller apothecia (to 0.4 mm vs. to 0.6 mm in diam.), in having hyaline true exciple in inner part (vs. dark brown), in having hyaline subhymenium (vs. dark brown), in having thinner hymenium (40–50  $\mu\text{m}$  vs. 50–60  $\mu\text{m}$  high), in having dark bluish grey or bluish black or violet-black (not dark olivaceous green to bright green) epihymenium, and in having 1–3-septate (vs. (1–)3(–5)-septate), as well as shorter ascospores (13–19(–21)  $\times$  (2.5–)3–4  $\mu\text{m}$  vs. 18.5–29  $\times$  3–4.5  $\mu\text{m}$ ), as well as in having K+ violetish epihymenium.

*Toninia poeltiana* is similar to *T. subfuscae* (Arnold) Timdal, growing in the thallus of various crustose lichens (*Lecanora campestris* (Schaerer) Hue, *Protoparmeliopsis muralis* (Schreber) M. Choisy, *Lecidella scabra* (Taylor) Hertel et Leuckert), in Europe ranging from about sea level to 650 m, but differs in having smaller (to 0.4 mm vs. to 0.6 mm in diam.) and very convex (vs. plane to

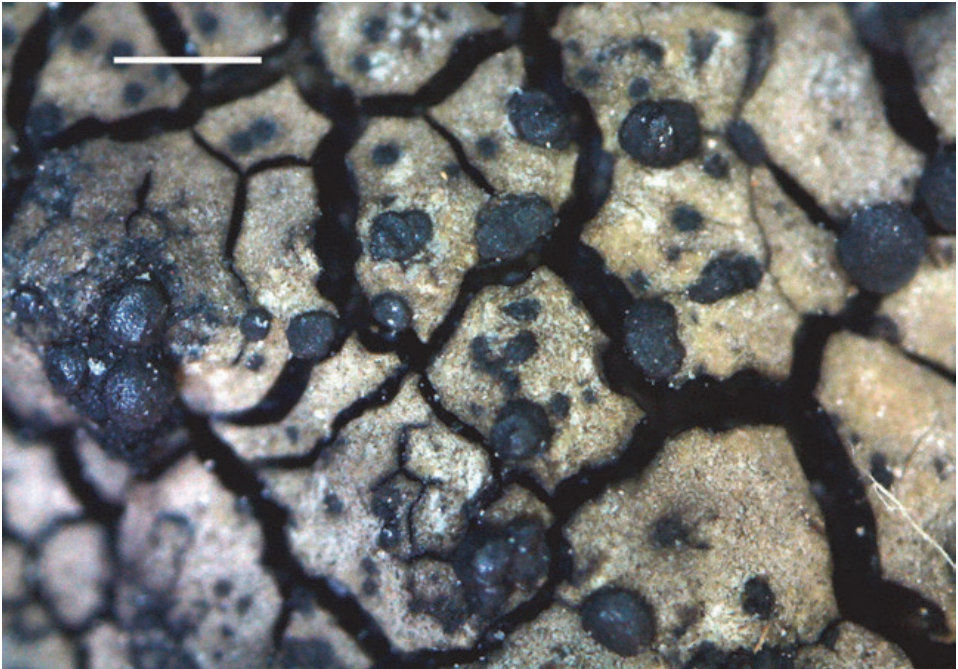


Fig. 23. *Toninia poeltiana* (holotype) growing on thallus of *Verrucaria fuscella*, general habit. Scale 0.5 mm (photo: S. Kondratyuk)

weakly convex) and usually immarginate (vs. with a narrow and more or less persistent margin) apothecia, in having mainly hyaline true exciple (vs. dark reddish brown, usually with a green tinge, K-, N+ violet), in having hyaline subhymenium (vs. reddish brown), in having lower hymenium (40–50  $\mu\text{m}$  vs. up to 50–60  $\mu\text{m}$  high), in having dark bluish grey or blackish epihymenium (vs. olivaceous green to dark green, K-, N+ violet), in having narrower ascospores (13–19(–21)  $\times$  (2.5–)3–4  $\mu\text{m}$  vs. 9.5–16  $\times$  4–5.5  $\mu\text{m}$ ), as well as in having K+ violetish epihymenium.

*Unguiculariopsis helmutii* S. Y. Kondr., L. Lőkös et J.-S. Hur, *spec. nova*  
(Fig. 24)

Mycobank no.: MB 817988

*Similar to Unguiculariopsis acrocordiae, but differs in having distinctly superficial ascomata, in having smaller ascomata with concave disc and prominent margin, in having brown, K– exciple, in having shorter excipular hairs, as well as in having longer and narrower ascospores.*

Type: Republic of Korea. Jeollanam-do, Yeosu-si, Nam-myeon, Simjang-ri, Geumodo, on bark. Lat.: 34° 30' 52.5" N; Long.: 127° 43' 36.6" E; Alt.: ca 71 m a.s.l. Coll.: Kondratyuk, S. Y. (160379), 10.06.2016. (holotype: KoLRI 038524 sub *Unguiculariopsis*); the same locality, growing on *Rinodina*, growing together with *Buellia*, (160365), (isotype: KoLRI 038510 sub *Unguiculariopsis*); the same locality, on thalli of *Rinodina*, growing together with *Buellia* aff. *griseovirens*, (160381, 160385), (isotypes: KoLRI 038526, KoLRI 038530 sub *Unguiculariopsis*).

Ascomata superficial on thallus or rarely on host apothecia, brownish with whitish/greyish shade of hairs, from initial stage urn-like and very thin at the basis, then becoming more expanded, (90–)130–140(–150)  $\mu\text{m}$  in diam. and 80–100  $\mu\text{m}$  thick; when mature, disc concave to more or less, margin prominent, covered by white hairs (at more than  $\times 100$ ). Exciple pale to brown, to 15–25  $\mu\text{m}$  thick in lateral portion, and to 20–25  $\mu\text{m}$  thick in basal portion, N–, paraplectenchymatous, cells subglobose, 4–7(–8)  $\mu\text{m}$  diam./across with conglutinate walls; excipular hairs hyaline, better seen in the uppermost portion of lateral exciple, more or less straight, without an apical hook, 5–7 long and 1.5–1.8(–2)  $\mu\text{m}$  wide at the basis and becoming thinner towards the tips. Subhymenium, hymenium and epihymenium hyaline or pale. Hymenium 30–40  $\mu\text{m}$  high. Subhymenium to 30  $\mu\text{m}$  thick. Paraphyses hyaline, filiform, septate, not rarely branched in the upper part, apically not or slightly thickened. Asci clavate to subcylindrical, wall thickened near the apex, without or with an indistinct ocular chamber, I– and KI–, 8-spored, 22–45  $\times$  4–8  $\mu\text{m}$ . Ascospores hyaline, simple, ellipsoid to rather widely ellipsoid, smooth-walled, without a distinct perispore, 6–7  $\times$  1.5–2.2(–2.5)  $\mu\text{m}$ . Conidiomata not seen.

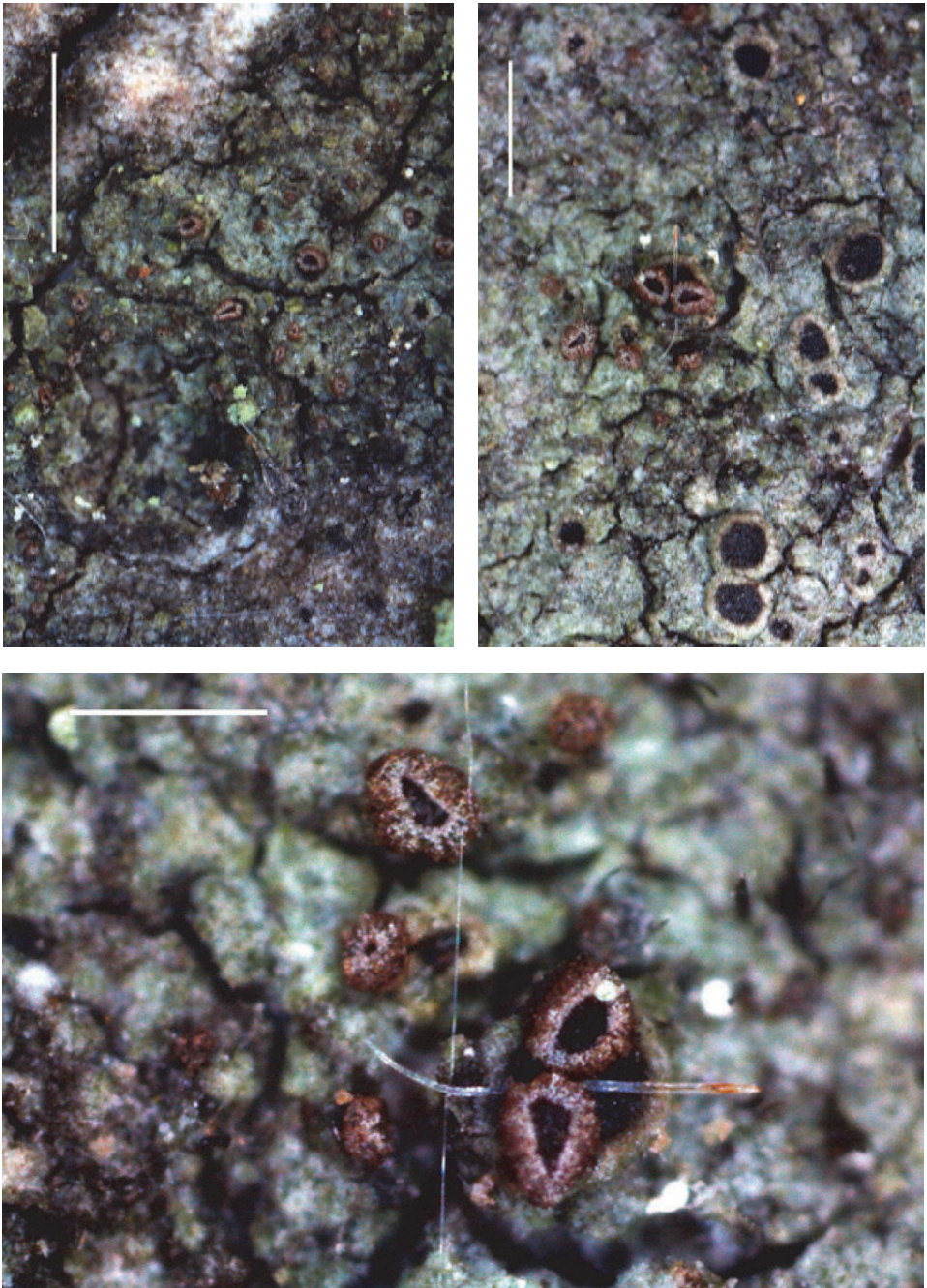


Fig. 24. *Unguiculariopsis helmutii* (holotype), general habit (top), enlarged ascomata (bottom). Scale 1 mm (top, left), 0.5 mm (top, right and bottom) (photo: S. Kondratyuk)

Host: Commensalistic on *Rinodina* aff. *sophodes* (thallus and apothecia).

Distribution: It is so far known only from the type locality, in Geumo-do Island, South Korea, Eastern Asia.

Etymology: It is named after the well-known Austrian lichenologist Helmut Mayrhofer (1953–) (Graz, Austria), in recognition of his contribution to recent knowledge on members of the genus *Rinodina* in the world scale.

Taxonomic notes: Similar to *Unguiculariopsis acrocordiae* in having margin covered by whitish hairs, more or less straight, without an apical hook, and in having small ascospores, but differs in having distinctly superficial ascomata (vs. slightly immersed to superficial), in having smaller ascomata with concave disc and prominent margin (vs. when mature, disc  $\pm$  plane to slightly convex, margin prominent or not), in having brown exciple (vs. reddish to orange brown, pigment K<sup>+</sup> reddish, N<sup>-</sup>), in having shorter excipular hairs (vs. 25–50  $\times$  2.5–5.5  $\mu\text{m}$ ), as well as in having longer and narrower ascospores (vs. 5.5–7.5  $\times$  2.5–3  $\mu\text{m}$ ).

*Unguiculariopsis helmutii* similarly to *U. acrocordiae* (after Diederich and Etayo 2000), clearly does not belong to *Skyttea* s. str. It strongly resembles other species of *Unguiculariopsis*, but is distinguished by straight, apically not hooked excipular hairs and asci with a thickened apex. However, at least four other lichenicolous species of *Unguiculariopsis* with straight (not hooked) excipular hairs are known: *U. lesdainii* (Vouaux) Etayo et Diederich (Diederich and Etayo 2000), *U. lobariellum* S. Y. Kondr. et D. J. Galloway (see Kondratyuk and Galloway 1995), *U. refractiva* (see Coppins 1988), and *U. manriquei* Etayo (see Etayo and Diederich 1996). The hairs in *U. helmutii* similarly to *U. acrocordiae* are quite variable, and some have a slightly swollen base, which is characteristic for most species of *Unguiculariopsis*.

### New combinations

***Biatora pseudosambuci*** (S. Y. Kondr., L. Lőkös et J.-S. Hur) S. Y. Kondr., L. Lőkös et J.-S. Hur, *comb. nov.*, MB 817989 (Basionym: *Lecanora pseudosambuci* S. Y. Kondr., L. Lőkös et J.-S. Hur, *Acta Botanica Hungarica* 58(1–2): 81 (2016)).

***Buellia pseudosubnexa*** (S. Y. Kondr., L. Lőkös et J.-S. Hur) S. Y. Kondr., L. Lőkös et J.-S. Hur, *comb. nov.*, MB 817990 (Basionym: *Hafellia pseudosubnexa* S. Y. Kondr., L. Lőkös et J.-S. Hur, *Acta Botanica Hungarica* 57(3–4): 359 (2015)).

***Buellia extremoorientalis*** (S. Y. Kondr., L. Lőkös et J.-S. Hur) S. Y. Kondr., L. Lőkös et J.-S. Hur, *comb. nov.*, MB 817991 (Basionym: *Hafellia extremorientalis* S. Y. Kondr., L. Lőkös et J.-S. Hur, *Acta Botanica Hungarica* 57(3–4): 359 (2015)) are proposed.

***Sagedia nunatakkorum*** (Poelt) S. Y. Kondr., *comb. nov.*, MB 817992 (Basionym: *Lecanora nunatakkorum* Poelt, in *Mitt. Bot. Staatssamml. München, Heft* 8: 325 (1953)).

## Rare or noteworthy species\*

*Agonimia blumii* S. Y. Kondr. – Republic of Korea. Gyeongsangnam-do, Hadong-gun, Hwagae-myeon, Jiri Mts, Yeonhacheon-Byeoksoryeong, on siliceous rock, growing together with *Porpidia* and *Halecania santessonii*. Lat.: 35° 18' 21.30" N; Long.: 127° 35' 12.84" E; Alt.: ca 1,473 m a.s.l. Coll.: Joshi, Y., Wang, X. Y. and Hur, J. Y. (091211), 14.10.2009 (KoLRI 011210 sub *Pertusaria subfallens*). – Gyeongsangnam-do, Namhae-gun, Namhae Island, Mt. Nogud-wissan, on siliceous rock. Lat.: 34° 45' 38.6" N; Long.: 128° 02' 54.0" E; Alt.: 262 m a.s.l. Coll.: Hur, J.-S. (070955), 11.11.2007 (KoLRI 007745 sub *Pertusaria flavicans*). – Jeollanam-do, Gurye-gun, Masan-myeon, Jiri Mts, Nogodan-Yeonhacheon, on siliceous rock, growing together with *Halecania subalpivaga*. Lat.: 35° 17' 50.34" N; Long.: 127° 33' 11.88" E; Alt.: ca 1,364 m a.s.l. Coll.: Joshi, Y., Wang, X. Y. and Hur, J. Y. (091092), 13.10.2009 (KoLRI 011144 sub *Pertusaria subobductans*). – It was described from the Russian Far East recently (Kondratyuk 2015). New to Korea!

*!Arthonia rinodinicola* Candan et Halıcı – Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, on siliceous rocks, growing on *Rinodina*. Lat.: 37° 30' 59.62" N; Long.: 130° 54' 17.54" E; Alt.: 285 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161646), 09.07.2016 (KoLRI 039864). – New to Korea! The second record after the type collection in Turkey (on *Rinodina gennarii* on calcareous rocks) (Candan and Halıcı 2009).

*!Buelliella minimula* (Tuck.) Fink – Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, Dodong-ri, Seonginbong trail, on bark, on *Pertusaria*. Lat.: 37° 29' 40.6" N; Long.: 130° 52' 26.2" E; Alt.: 855 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (160421), 08.07.2016 (KoLRI 039634). – Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, Dodong-ri, Seonginbong trail, at Seonginbong peak, on bark, on *Pertusaria*. Lat.: 37° 29' 52.2" N; Long.: 130° 52' 03.4" E; Alt.: 967 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161437\_1), 08.07.2016. (KoLRI 039653). – Jeollanam-do, Wandogun, Bogil-myeon, Bogil Island, Buhwang-ri, Mt Gyeokjasan, on bark (*Camellia*), growing on thallus of *Pertusaria* sp. Lat.: 34° 08' 15.56" N; Long.: 126° 32' 09.41" E; Alt.: ca 64 m a.s.l. Coll.: Joshi, Y., Jeon, H. S. and Jeong, M. H. (100015), 05.02.2010 (KoLRI 011515 sub *Buelliella*). – New to Korea and new to Asia!

*Caloplaca ussuriensis* Oxner, S. Y. Kondr. et Elix – China. Daxinganling, Heihe county, Mt Dahei, on bark, growing together with *Rinodina xanthophaea* and *Rinodina* sp. Lat.: 50° 11' 58.20" N; Long.: 126° 29' 06.00" E; Alt.: ca 805 m a.s.l. Coll.: Hur, J.-S. and Wang, X. Y. (CH-090242), 16.08.2009 (KoLRI 010856). – New for China!

\* Lichenicolous fungi are marked by an exclamation mark (!).



***Dactylospora australis*** Triebel et Hertel – Republic of Korea. Gangwon-do, Samcheok-si, Miro-myeon, Mt Duta, on siliceous rock, on thallus of *Porpidia albocaerulescens*. Lat.: 37° 26' 05.7" N; Long.: 128° 58' 47.4" E; Alt.: 1,152 m a.s.l. Coll.: Hur, J.-S. (080152), 11.05.2008 (KoLRI 008398 sub *Porpidia albocaerulescens*), – Gangwon-do, Yangyang-gun, Seo-myeon, Gajeonggokbong, on siliceous rock. Lat.: 37° 52' 52.80" N; Long.: 128° 26' 50.94" E; Alt.: ca 1,101 m a.s.l. Coll.: Joshi, Y., Wang, X. Y. and Ryu, J. A. (090626), 22.05.2009 (KoLRI 010295 sub *Porpidia albocaerulescens*). – Gangwon-do, Yangyang-gun, Seo-myeon, Hwangi-ri, Mt Jobong, on siliceous rock. Lat.: 37° 56' 06.42" N; Long.: 128° 33' 44.82" E; Alt.: 980 m a.s.l. Coll.: Joshi, Y., Wang, X. Y., Ryu, J. A. and Hur, J. Y. (090238), 14.05.2009 (KoLRI 009993 sub *Porpidia albocaerulescens*). – Gyeongsangnam-do, Sancheong-gun, Sancheong-eup, Jiri Mts, Mt Ungseok, on siliceous rock. Lat.: 35° 22' 59.2" N; Long.: 127° 51' 27.1" E; Alt.: 837 m a.s.l. Coll.: Hur, J.-S. (070895), 16.10.2007 (KoLRI 012836 sub *Porpidia albocaerulescens*). – Jeollanam-do, Gurye-gun, Masan-myeon, Jiri Mts, Hwaem valley, on siliceous rock. Lat.: 35° 15' 18.78" N; Long.: 127° 30' 04.68" E; Alt.: ca 266 m a.s.l. Coll.: Joshi, Y., Wang, X. Y. and Hur, J. Y. (090992), 12.10.2009 (KoLRI 006872 sub *Porpidia albocaerulescens*). – Jeollanam-do, Gurye-gun, Toji-myeon, Jiri Mts, Piagol, Jangteomok, on siliceous rock. Lat.: 35° 19' 06.2" N; Long.: 127° 40' 50.1" E; Alt.: 1,559 m a.s.l. Coll.: Hur, J.-S. (060940), 29.09.2006 (KoLRI 005324 sub *Porpidia albocaerulescens*). – New to Korea!

***Endococcus propinguis*** (Körb.) D. Hawksw. – Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, Dodong-ri, Seong-inbong trail, on siliceous rocks, growing on *Porpidia albocaerulescens*. Lat.: 37° 29' 30.00" N; Long.: 130° 53' 10.88" E; Alt.: 565 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L. (161497), 08.07.2016 (KoLRI 039715). – New to Korea.

***Halecania santessonii*** Andreev – Republic of Korea. Chungcheongbuk-do, Danyang-gun, Gagok-myeon, Sobaeksan Mts, on siliceous rock. Lat.: 36° 57' 45.6" N; Long.: 128° 30' 29.3" E; Alt.: ca 1,149 m a.s.l. Coll.: Hur, J.-S. (070487), 11.06.2007 (KoLRI 007339 sub *Porpidia albocaerulescens*). – Gangwon-do, Yangyang-gun, Seo-myeon, Jeombongsan Mts, Galjeonggokbong, on siliceous rock, Lat.: 37° 52' 57.12" N; Long.: 128° 30' 09.66" E; Alt.: ca 1,104 m a.s.l. Coll.: Joshi, Y., Wang, X. Y. and Ryu, J. A. (090593), 22.05.2009 (KoLRI 010271 sub *Porpidia albocaerulescens*). – Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, at a rockwall, on siliceous rocks, on *Pertusaria*. Lat.: 37° 31' 19.51" N; Long.: 130° 54' 16.03" E; Alt.: 415 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L. (161762), 09.07.2016 (KoLRI 039980). – Gyeongsangnam-do, Hadong-gun, Hwagae-myeon, Jiri Mts, Byeoksoryeong-Seseok, on siliceous rock. Lat.: 35° 19' 40.74" N; Long.: 127° 39' 31.32" E; Alt.: ca 1,346 m a.s.l. Coll.: Joshi, Y., Wang, X. Y. and Hur, J. Y. (091375), 15.10.2009 (KoLRI 011297 sub *Porpidia albocaerulescens*).

– Gyeongsangnam-do, Hadong-gun, Hwagae-myeon, Jiri Mts, Yeonhaceon-Byeoksoryeong, on siliceous rock, growing together with *Agonomia* aff. *blumii* and *Porpidia*. Lat.: 35° 18' 21.30" N; Long.: 127° 35' 12.84" E; Alt.: ca 1,473 m a.s.l. Coll.: Joshi, Y., Wang, X. Y. and Hur, J. Y. (091211), 15.10.2009 (KoLRI 011210 sub *Pertusaria subfallens*). – Jeju-do Prov., Cheju-do Island, Jeju-si, Mt Hallasan, Hallasan National Park, Gwaneumsa trail, on siliceous rock. Lat.: 33° 23' 37.04" N; Long.: 126° 32' 16.01" E; Alt.: 1,072 m a.s.l. Coll.: Oh, S.-O., Jayalal, U., Park, J. S. and Hur, J.-S. (121058-1), 01.06.2012 (KoLRI-016091 sub *Porpidia*). – This species was so far known from several localities in the Russian Far East (Primorsky Region) (Andreev 2010). New to Korea!

! *Laeviomyces* aff. *fallaciosus* Hafellner et Kalb – Republic of Korea. Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, Jeodong-ri, Seonginbong trail at the KBS aerial, on beton, on the thallus of *Sarcogyne regularis*. Lat.: 37° 29' 11.77" N; Long.: 130° 53' 33.37" E; Alt.: 280 m a.s.l. Coll.: Kondratyuk, S. Y. and Lókös, L. (161507), 08.07.2016 (KoLRI 039725). – New to Korea!

*Lecanora albescens* (Hoffm.) Branth et Rostr. – Republic of Korea. Gangwon-do, Jeongseon-gun, Jeongseon-eup, Aesan-ri, Jeongseon church, on calcareous rock, growing together with *Rusavskia coreana*, *Thyrea* sp., *Acarospora*. Lat.: 37° 22' 17.3" N; Long.: 128° 40' 25.2" E; Alt.: 319 m a.s.l. Coll.: Lee, B. G. (152796), 06.09.2015 (KoLRI 037783). – New to Korea!

*Lecanora layana* Lendemer – Republic of Korea. Gangwon-do, Jeongseon-gun, Bukpyeong-myeon, Mt Baekseokbong, on bark. Lat.: 37° 28' 44.34" N; Long.: 128° 39' 45.60" E; Alt.: 494 m a.s.l. Coll.: Joshi, Y., Wang, X. Y., Ryu, J. A. and Hur, J. Y. (090440, 090455), 16.05.2009 (KoLRI-010146, KoLRI 010158). – Jeju-do, Cheju-do Island, Jeju-si, Mt Hallasan, Hallasan National Park, Seongpanak trail, along the tourist path, on bark of deciduous trees. Lat.: 33° 22' 38.8" N; Long.: 126° 34' 16.4" E; Alt.: 1,181 m a.s.l. Coll.: Kondratyuk, S., Hur, J.-S., Oh, S.-O. and Kusama, Y. (121666), 07.08.2012 (KoLRI 016981 sub *Lecanora*). – Jeollabuk-do, Jinan-gun, Sungsu-myeon, on bark. Lat.: 35° 41' 33.54" N; Long.: 129° 21' 12.75" E; Alt.: 725 m a.s.l. Coll.: Lee, B. G. ['Jinan 18'], Woo, J.-J., 22.05.2016 (KoLRI). – Jeollanam-do, Suncheon-si, Songgwang-myeon, Sinpyeong-ri, Songgwangsa 12, on bark. Lat.: 35° 00' 07.3" N; Long.: 127° 16' 29.3" E; Alt.: 220 m a.s.l. Coll.: Park, J. S., Woo, J.-J. and Lee, B. G. (160107), 08.05.2016 (KoLRI 038067). – Jeollanam-do, Wando-gun, Bogil-myeon, Bogildo Island, Jungtong-ri, Bogil elementary school, 379-1, on bark. Lat.: 34° 09' 44.3" N; Long.: 126° 33' 20.4" E; Alt.: 7 m a.s.l. Coll.: Park, J. S., Woo, J.-J. and Lee, B. G. (160068), 06.05.2016 (KoLRI 038028). – It was recently described from North America (Lendemer 2015). Molecular data confirming status of Korean material will be published elsewhere. New to Korea, new to Asia!

*Lecidella scabra* (Taylor) Hertel et Leuckert – Republic of Korea. Gyeong-sangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, near shelter house, on siliceous rocks. Lat.: 37° 31' 09.53" N; Long.: 130° 54' 13.17" E; Alt.: 280 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161721), 09.07.2016 (KoLRI 039939). – New to Korea!

*Megaspora rimisorediata* Valadbeigi et A. Nordin – China. Xinjiang province, Urumqi city, Mt Tian, on trunk, growing together with *Seirophora orientalis*, *Caloplaca neobaltistanica* and *Caloplaca* sp. 18. Lat.: 43° 53' 20.9" N; Long.: 88° 07' 05.7" E; Alt.: ca 1,962 m a.s.l. Coll.: Oh, S.-O. and Hur, J.-S. (CH-130095), 15.07.2013 (KoLRI 019172 sub *Caloplaca neobaltistanica*); the same locality, growing together with *Megaspora verrucosa*, *Caloplaca neobaltistanica*, *Caloplaca* aff. *chlorina*, *Lecidella* cf. *euphorea*, *Anaptychia*, *Rinodina*, and *Caloplaca* sp., (CH-130099), (KoLRI 019176 sub *Caloplaca* aff. *chlorina*). – Xinjiang province, Uygur, Wutonggou (Wutong valley), on branches, growing together with *Caloplaca cerinella* aggr. Lat.: 44° 23' 24.9" N; 87° 52' 06.0" E; Alt.: ca 438 m a.s.l. Coll.: Oh, S.-O. and Hur, J.-S. (CH-130172), 17.07.2013 (KoLRI 019249 sub *Caloplaca cerinella* aggr.); the same locality, growing together with *Caloplaca cerinella*, *Caloplaca* sp. 27, and *C. zoroasteriorum*, (CH-130167), (KoLRI 019244 sub *Caloplaca cerinella*); the same locality, on soil, growing together with *Caloplaca tominii* and cyanolichen, (CH 130155), (KoLRI 019232); the same locality, on soil, growing together with *Caloplaca tominii*, *Peltula* and *Endocarpon*, (CH-130152), (KoLRI 019229 sub *Peltula*). – New to China.

*Micarea farinosa* Coppins – Republic of Korea. Gangwon-do, Gangneung-si, Jeongseong-gun, tourist pass toward peak Seokbyeongsan, on bark. Lat.: 37° 34' 38.58" N; Long.: 128° 51' 23.94" E; Alt.: ca 760 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (150882), 10.07.2015 (KoLRI 034115). – New to Korea, new to Asia!

*!Minutoexcipula* aff. *mariana* V. Atienza – Republic of Korea. Gyeong-sangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, Dodong-ri, Seonginbong trail, at Seonginbong peak, on bark, on thallus of sterile *Pertusaria* sp. Lat.: 37° 29' 52.18" N; Long.: 130° 52' 03.11" E; Alt.: 948 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161485), 08.07.2016 (KoLRI 039703). – New to Korea!

*Opegrapha anomaea* Nyl. – Republic of Korea. Gangwon-do, Sokcho-si, Mt Seorak, on bark (*Acer*), growing together with *Lecanora* sp. and *Biatora longispora*. Lat.: 38° 07' 09.9" N; Long.: 128° 27' 37.1" E; Alt.: 1,500 m a.s.l. Coll.: Hur, J.-S. (041584), 12.10.2004 (KoLRI 002378 sub *Pertusaria laeviganda*). – Jeollanam-do Prov., Jindo-gun, Hacho-do Island, on siliceous rocks, on thalli of *Pertusaria* sp. Lat.: 34° 19' 05.0" N; Long.: 126° 02' 22.9" E; Alt.: 3 m a.s.l. Coll.: Wang, X. Y. and Ryu, J. A. (110883), 23.10.2011 (KoLRI 013877 sub *Opegrapha*). – New to Korea! It is the second record of this species from Asia (see Zhur-

benko and Kobzeva 2014). *Pertusaria laeviganda* is for the first time recorded as host of this lichenicolous fungus. Data on conidiomata and conidia for this species were hitherto missing (Ertz *et al.* 2004). They are provided here for *O. anomea* for the first time. Conidiomata was richly present in Korean specimen 110883 (KoLRI 013877). Conidiomata was observed in the same stromatic formation with ascomata as immersed to 150–170 µm diam. and to 130–150 µm high among ascomata, which were slightly smaller ( to 100 µm diam. and to 150 µm high). Conidia narrowly bacilliform, 3.5–4 × 0.5–0.7 µm.

***Opegrapha* aff. *xerica*** Torrente et Egea – Republic of Korea. Jeju-do Prov., Cheju-do Island, Seogwipo-si, Donnaeko-ro, Donnaeko, on bark. Lat.: 33° 18' 04.3" N; Long.: 126° 34' 53.07" E; Alt.: 330 m a.s.l. Coll.: Kondratyuk, S. Y. (140616-2), 19.06.2014 (KoLRI 023012). – New to Korea! This taxon is in urgent need of the further revision with inclusion of additional specimens. Within future revision this taxon should be compared with *Opegrapha intertexta* C. Knight described from New Zealand as well.

***Phoma* aff. *lecanorina*** Diederich – Republic of Korea. Jeju-do Prov., Cheju-do Island, Jeju-si, Hallim-eup, Gwideok-ri, coast near the Chorok village, on rock, on thalli *Prototermeliopsis muralis*. Lat.: 33° 26' 33.3" N; Long.: 126° 17' 00.1" E; Alt.: ca 18 m a.s.l. Coll.: Kondratyuk, S. Y., Lőkös, L., Oh, S.-O., Jayalal, U., Joshi, S., Park, J. S. and Hur, J.-S. (121367), 05.07.2012 (KoLRI 016424 sub *Prototermeliopsis muralis*). – New to Korea! It is the second record for species described from Luxembourg (Europe) from *Lecanora expallens* (Diederich 1986). However, it should be mentioned that our specimen differs in having slightly longer and much wider conidia and in having different host. Furthermore our specimen was insufficient to be selected as type specimen of a new taxon.

***Polycoccum rubellianae*** Calatayud et V. Atienza – Republic of Korea. Jeollanam-do, Goheung-gun, Geumsanmyeon, Geogeum-do Island, Sinpyeong-ri coast, on siliceous rock, on *Buellia* cf. *stellulata*, growing together with *Jasonhuria bogilana*, *Aspicilia* sp., *Xanthoparmelia coreana* damaged by *Lichenostigma cosmopolites*. Lat.: 34° 28' 30.4" N; Long.: 127° 14' 03.6" E; Alt.: 1 m a.s.l. Coll.: Jayalal, U., Park, J. S. and Ryu, J. A. (120073), 17.04.2012 (KoLRI 140666 sub *Buellia stellulata*). – New to Korea, new to Asia!

***Porina nucula*** Ach. – Republic of Korea. Jeollanam-do, Wando-gun, Bogil-myeon, Bogil-do Island, Mt Gyeokjasan, on siliceous rock. Lat.: 34° 08' 42.34" N; Long.: 126° 33' 14.39" E; Alt.: ca 141 m a.s.l. Coll.: Joshi, Y., Jeon, H. S. and Jeong, M. H. (100037), 05.02.2010 (KoLRI 011537 sub *Porina*). – New to Korea! This species differs from all *Porina* species in having very wide ascospores and presence of halo.

***Pyrenidium actinellum*** Nyl. – Republic of Korea. Gyeongsangbuk-do, Sangju-si, Naeseo-myeon, deciduous forest, on siliceous rock, on edge/own

margins of apothecia of *Porpidia albocaerulescens*. Lat.: 36° 26' 45.1" N; Long.: 126° 01' 34.4" E; Alt.: 320 m a.s.l. Coll.: Lee, B. G., Woo, J.-J. and Park, J. S., 23.05.2016. – Gyeongsangbuk-do, Ulleung-do Island, Ulleung-gun, Ulleung-eup, between Naesujeon and Soekpo waterfall, at a rockwall, on siliceous rocks, on thallus of *Porpidia albocaerulescens*, growing together with *Lepraria* sp. Lat.: 37° 31' 19.51" N; Long.: 130° 54' 16.03" E; Alt.: 415 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (161737), 09.07.2016 (KoLRI 039955 sub *Porpidia*); the same locality, on thallus of *Porpidia albocaerulescens*, growing together with *Lepraria* spp. (161738), (KoLRI 039956 sub *Porpidia*). – New to Korea!

***Rhexophiale rhexoblephara*** (Nyl.) Hellb. – Republic of Korea. Gangwon-do, Gangneung-si, Jeongseong-gun, tourist pass toward peak Seokbyeongsan, on bark. Lat.: 37° 34' 41.82" N; Long.: 128° 51' 37.65" E; Alt.: ca 810 m a.s.l. Coll.: Kondratyuk, S. Y. and Lőkös, L. (151010, 151011, 151013), 10.07.2015 (KoLRI 034243, KoLRI 034244, KoLRI 034246 sub *Biatora longispora*); the same locality, growing together with *Biatora longispora*, *Verseghya klarae*, and *Scoliciosporum*, (151015), (KoLRI 034248 sub *Biatora longispora*); the same locality, Lat.: 37° 34' 36.55" N; Long.: 128° 51' 47.16" E; Alt.: ca 840 m a.s.l. (151066), (KoLRI 034299 sub *Biatora longispora*); the same locality, growing together with *Rinodina xanthophaea*, and *Biatora longispora*, (151101), (KoLRI 034334 sub *Rinodina xanthophaea*); the same locality, Lat.: 37° 34' 46.37" N; Long.: 128° 52' 05.02" E; Alt.: ca 850 m a.s.l. (151151), (KoLRI 034384 sub *Lecanora*); the same locality, growing together with *Bacidia* and *Lecanora* spp., (151168), (KoLRI 034401 sub *Lecanora*). – Gangwon-do, Gangneung-si, Mt Seokbyeongsan, on bark, growing together with *Pertusaria amara* and *Biatora longispora*. Lat.: 37° 34' 38.5" N; Long.: 128° 51' 24.2" E; Alt.: 763 m a.s.l. Coll.: Park, J. S. (151752), 10.07.2015 (KoLRI 034744 sub *Pertusaria amara*). – Gangwon-do, Gangneung-si, Wangsan-myeon, Korea forest seed and variety centre of Gangneung office, on bark. Lat.: 37° 35' 23.40" N; Long.: 128° 48' 41.72" E; Alt.: 876 m a.s.l. Coll.: Jayalal, R. U. G., Park, J. S. and Woo, J.-J. (141359), 16.07.2014 (KoLRI 023813 sub *Lecanora imshaugii*). – New to Korea!

***Rimularia badioatra*** (Krempelh.) Hertel et Rambold – Republic of Korea. Jeju-do, Cheju-do Island, Seogwipo-si, Yeongcheon-dong, on siliceous rock. Lat.: 33° 18' 01.7" N; Long.: 126° 34' 34.7" E; Alt.: 278 m a.s.l. Coll.: Oh, S.-O. and Liu, D. (152453), 18.08.2015 (KoLRI 036675). – New to Korea!

***Rinodina confragosa*** (Ach.) Körb. – Republic of Korea. Jeollanam-do, Wando-gun, Saengil-myeon, Saengil-do Island, Geumgok-ri coast, on rock. Lat.: 34° 20' 02.02" N; Long.: 126° 57' 51.02" E; Alt.: 7 m a.s.l. Coll.: Jayalal, U., Park, J. S. and Ryu, J. A. (120188), 18.04.2012 (KoLRI 014782 sub *Aspicilia caesiocinerea*). – New to Korea!

***Rinodina milvina*** (Wahlenb.) Th. Fr. – Republic of Korea. Jeju-do Prov., Jeju-si, Chuja-do Island, Chuja-myeon, Yecho-ri, Port of Yecho-ri, on siliceous

rock, growing together with *Buellia chujadoensis*. Lat.: 33° 57' 22.4" N; Long.: 126° 20' 03.54" E; Alt.: ca 40 m a.s.l. Coll.: Halda, J. P. (141099), 21.06.2014 (KoLRI 023657 sub *Buellia spuria*). – New to Korea!

***Rinodina occulta*** (Körb.) Sheard – Republic of Korea. Jeollanam-do, Wando-gun, Bogil-myeon, Bogil-do Island, Mt Gyeokjasan, between Keungil-jae and Suribong, on siliceous rock, growing together with *Pertusaria corallina* and *Candelariella corallina*. Lat.: 34° 08' 34.06" N; Long.: 126° 32' 12.51" E; Alt.: ca 346 m a.s.l. Coll.: Joshi, Y., Jeon, H. S., Jeong, M. H. (100140), 05.02.2010, (KoLRI 011637 sub *Pertusaria corallina*). – New to Korea!

***Rinodina xanthophaea*** (Nyl.) Zahlbr. – China. Daxinganling, Heihe county, Mt Dahei, on bark, growing together with *Rinodina* sp. Lat.: 50° 11' 58.20" N; Long.: 126° 29' 06.00" E; Alt.: ca 805 m a.s.l. Coll.: Hur, J.-S. and Wang, X. Y. (CH-090242), 16.08.2009 (KoLRI 010856 sub *Caloplaca ussuriensis*); the same locality, Lat.: 50° 11' 33.24" N; Long.: 126° 28' 20.22" E; Alt.: ca 831 m a.s.l. (CH-090274), (KoLRI 010888). – New to China!

***Rusavskia dasanensis*** S. Y. Kondr., I. Galanina et J.-S. Hur – China. Xinjiang province, Urumqi city, Mt Tian, on rock. Lat.: 43° 53' 34.5" N; Long.: 88° 06' 23.9" E; Alt.: ca 2,094 m a.s.l. Coll.: Oh, S.-O. and Hur, J.-S. (CH-130055), 14.07.2013 (KoLRI 019131). – New to China! This species was recently described from several Eurasian countries (Kondratyuk *et al.* 2013b).

***Tremella phaeophysciae*** Diederich et M. S. Christ – Republic of Korea. Gangwon-do, Gangneung-si, Mt Seokbyeongsan, on bark, growing together with *Pertusaria*, *Lecidella* and *Rinodina* spp. Lat.: 37° 34' 38.5" N; Long.: 128° 51' 50.8" E; Alt.: 855 m a.s.l. Coll.: Park, J. S. (151794), 10.07.2015 (KoLRI 034793 sub *Pertusaria* sp.); the same locality, growing together with *Pertusaria*, *Lecidella* and *Myelochroa* spp., (151796), (KoLRI 034795 sub *Pertusaria* sp.). – Gangwon-do, Gangneung-si, Mt Seokbyeongsan, on bark, growing together with *Pertusaria*, and *Phaeophyscia* spp. Lat.: 37° 34' 41.3" N; Long.: 128° 51' 55.9" E; Alt.: 872 m a.s.l. Coll.: Park, J. S. (151802), 10.07.2015 (KoLRI 034802 sub *Pertusaria* sp.). – Gyeongsangnam-do, Sancheong-gun, Sancheong-eup, along the tourist path to Ungseokbong, on bark (*Robinia*), growing together with *Biatora longispora* and *Phaeophyscia*. Lat.: 35° 22' 41.74" N; Long.: 127° 52' 21.93" E; Alt.: 324 m a.s.l. Coll.: Kondratyuk, S. Y. and Lökös, L. (150239), 22.06.2015 (KoLRI 033834 sub *Biatora longispora*). – Jeollabuk-do, Muju-gun, Mupung-myeon, Mt Daedeok, on bark (*Quercus*), on thallus of *Phaeophyscia adiaestola*, growing together with *Caloplaca subflavorubescens*. Lat.: 35° 55' 34.7" N; Long.: 127° 52' 58.4" E; Alt.: 1,265 m a.s.l. Coll.: Woo, J.-J., Jang, S. H. and Oh, S.-O. (150198), 19.06.2015 (KoLRI 035746 sub *Phaeophyscia*). – Jeollabuk-do, Muju-gun, Seolcheon-myeon, Mt Sambong, on bark (*Quercus*), on thallus of *Phaeophyscia adiaestola*. Lat.: 35° 52' 20.3" N; Long.: 127° 49' 36.6" E; Alt.: 939 m a.s.l. Coll.: Woo, J.-J., Jang, S. H. and Oh, S.-O. (150002), 18.06.2015 (KoLRI 035548)

sub *Phaeophyscia adiastrata*). – Jeollabuk-do, Namwon-si, Ayeong-myeon, Gusan-ri, Mt Bonghwa, on bark (*Quercus*), growing together with *Pertusaria*, *Biatora longispora* and *Rinodina* sp., Lat.: 35° 32' 17.1" N; Long.: 127° 34' 18.8" E; Alt.: 723 m a.s.l. Coll.: Woo, J.-J. and Oh, S.-O. (152203), 17.07.2015 (KoLRI 036126 sub *Pertusaria* sp.). – New to Korea!

*Versegghya klarae* S. Y. Kondr., L. Lőkös et J.-S. Hur – Russia. Primorsky region, Khasan district, "Zemlia Leoparda" (= Leopard Land) Federal Nature Park, "Kedrovaya padj" reserve, along the pass to the Second Golden Stream, deciduous forest, on bark growing together with *Bacidia* sp., and *Pyrenula* sp. Lat.: 43° 06' 52.5" N; Long.: 131° 31' 00.1" E; Alt.: ca 144 m a.s.l. Coll.: Kondratyuk, S., Oh, S.-O. and Hur, J.-S. (RU 130449), 06.08.2013 (KoLRI 019976 sub *Versegghya klarae*). – It was recently described from Korea (Kondratyuk et al. 2016a). New to Russia!

*Xanthoria splendens* (Darb.) Poelt – China. Xinjiang province, Urumqi city, Mt Tian, on rock. Lat.: 43° 53' 38.7" N; Long.: 88° 06' 31.5" E; Alt.: ca 2,066 m a.s.l. Coll.: Oh, S.-O. and Hur, J.-S. (CH-130029), 14.07.2013 (KoLRI 019105). – New to China!

*Zeroviella coreana* (S. Y. Kondr. et J.-S. Hur) S. Y. Kondr. et J.-S. Hur – China. Daxinganling, Heihe County, Mt Xifeng, on rock, growing together with *Lecanora polytropa*. Lat.: 50° 34' 57.60" N; Long.: 127° 09' 33.18" E; Alt.: ca 220 m a.s.l. Coll.: Hur, J.-S. and Wang, X. Y. (CH-090298), 17.08.2009 (KoLRI 010912 sub *Zeroviella*). – It was recently described from South Korea (Kondratyuk et al. 2015a). New to China!

*Zeroviella esfahanensis* S. Y. Kondr., B. Zarei-Darki et J.-S. Hur – China. Daxinganling, Heihe county, Mt Xifeng, on rock, growing together with *Lecanora polytropa*. Lat.: 50° 34' 57.60" N; Long.: 127° 09' 33.18" E; Alt.: ca 220 m a.s.l. Coll.: Hur, J.-S. and Wang, X. Y. (CH-090301), 17.08.2009 (KoLRI 010915 sub *Lecanora polytropa*). – Inner Mongolia, Duolun county, Shisanlitan, on rock, growing together with *Protoparmeliopsis* cf. *muralis* and *Rhizoplaca*. Lat.: 42° 01' 0.66" N; Long.: 116° 17' 44.28" E; Alt.: ca 1,434 m a.s.l. Coll.: Hur, J.-S. and Wang, X. Y. (CH-090333), 08.08.2009 (KoLRI 010947 sub *Zeroviella*). – Inner Mongolia, Xilin county, Mountain, on rock, growing together with *Sedelnikovaea baikalensis*, *Lecanora frustulosa* aggr., and *Aspicilia* damaged by *Lichenostigma*. Lat.: 43° 36' 16.32" N; Long.: 116° 43' 14.52" E; Alt.: ca 1,260 m a.s.l. Coll.: Hur, J.-S. and Wang, X. Y. (CH-090347), 10.08.2009 (KoLRI 010961 sub *Sedelnikovaea*); the same locality, growing together with *Acarospora*, *Protoparmeliopsis*, *Rhizoplaca*, and *Buellia*, (CH-090348), (KoLRI 010962 sub *Zeroviella*). – Xinjiang province, Urumqi city, Mt Tian, on rock. Lat.: 43° 53' 32.2" N; Long.: 88° 06' 08.8" E; Alt.: ca 2,153 m a.s.l. Coll.: Oh, S.-O. and Hur, J.-S. (CH-130078), 14.07.2013 (KoLRI 019154); the same locality, (CH-130074), (KoLRI 019150); the same locality, (CH-130071), (KoLRI 019147); the same locality, Lat.: 43°

53' 34.5" N; Long.: 88° 06' 23.9" E; Alt.: ca 2,094 m a.s.l. (CH-130065), (KoLRI 019141); the same locality, growing together with *Anaptychia* sp. and *Aspicilia*, (CH-130057), (KoLRI 019133 sub *Zeroviella*); the same locality, growing together with *Lobothallia* sp. and *Aspicilia*, Lat.: 43° 53' 38.7" N; Long.: 88° 06' 31.5" E; Alt.: ca 2,066 m a.s.l. (CH-130016), (KoLRI 019092 sub *Zeroviella*); the same locality, growing together with *Protoparmeliopsis muralis* and *Aspicilia*, Lat.: 43° 53' 34.1" N; Long.: 88° 07' 46.6" E, Alt.: ca 2,017 m a.s.l. (CH-130007), (KoLRI 019083 sub *Zeroviella*); the same locality, growing together with *Protoparmeliopsis muralis*, (CH-130006), (KoLRI 019082 sub *Zeroviella*); the same locality, growing together with *Acarospora* and *Aspicilia*, Lat.: 43° 53' 20.9" N; Long.: 88° 07' 05.7" E; Alt.: ca 1,962 m a.s.l. (CH-130087-1), (KoLRI 019164 sub *Zeroviella*); the same locality, growing together with *Caloplaca biatorina*, *Acarospora*, (CH-130101), (KoLRI 019178 sub *Zeroviella*). – Xinjiang province, Urumqi city, Mt Tian, the first Bingchuan, on rock, growing together with *Rusavskia elegans*. Lat.: 43° 07' 00.3" N; Long.: 86° 59' 59.1" E; Alt.: ca 2,690 m a.s.l. Coll.: Oh, S.-O. and Hur, J.-S. (CH-130256), 18.07.2013 (KoLRI 019336 sub *Rusavskia elegans*). – Xinjiang province, Urumqi city, Wucaicheng, on rock. Lat.: 45° 04' 56.9" N; Long.: 89° 09' 54.0" E; Alt.: ca 882 m a.s.l. Coll.: Oh, S.-O. and Hur, J.-S. (CH-130140), 16.07.2013 (KoLRI 019217). – India. Uttaranchal, Chamoli district, Badrinath, Mana village, on rock. Coll.: Shukla, V. and Joshi, Y., 21.06.2005 (LWG 05-005253). – Uttarakhand, Chaniali district, Jumma, on rock, growing together with *Rusavskia elegans* and *Caloplaca biatorina*. Coll.: Rawat, S., 3.07.2007 (LWG 07-008609); Chamoli district, Malari, on rock. Coll.: Rawat, S., 24.06.2007 (LWG 07-008609, LWG 07-008620); Badrinath, Mana, on rock. Coll.: Shukla, V. and Joshi, Y., 21.06.2005 (LWG 05-005383); Chamoli district, ½ km before Malari, on way to Niti, on rocks. Alt.: ca 3,086 m a.s.l. Coll.: Upreti, D. K. and Nayaka, S., 19.08.2007 (LWG 07-011225). – This species was recently described from Eurasia and North Africa (Kondratyuk 2015c). New to China and India!

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