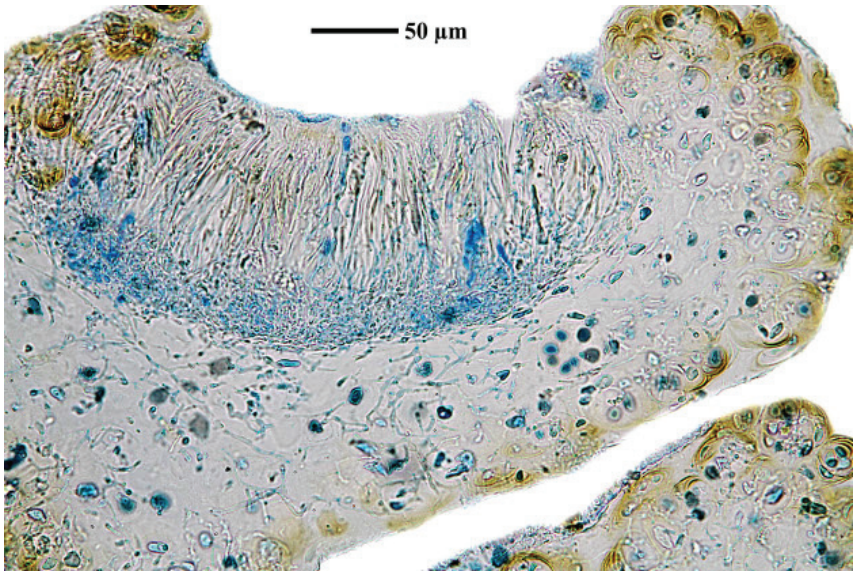
Felix Schumm & André Aptroot

# Images of Lichinaceae



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# Images of Lichinaceae

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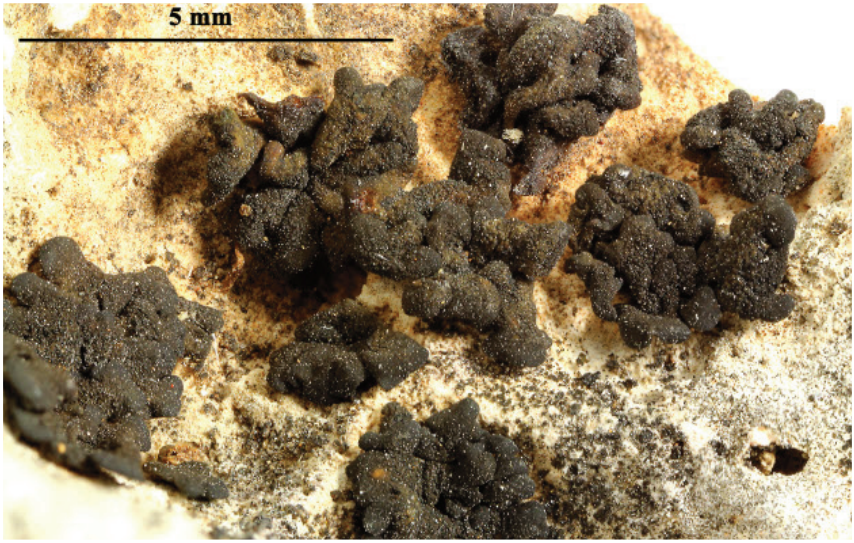
# Introduction

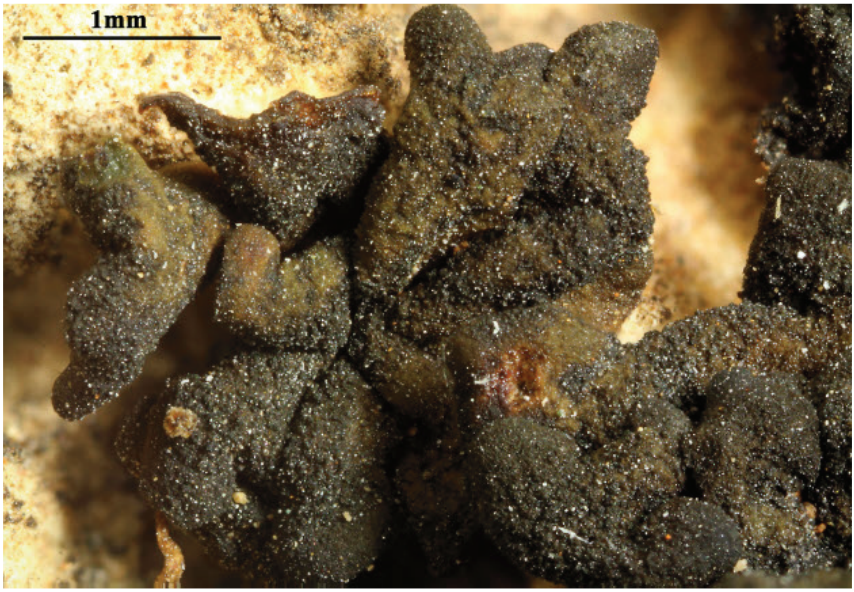
This book illustrates and describes various members of the Lichinaceae. It is a difficult group to identify, mainly because the literature is rather scattered, with few keys, but also because the diagnostic structures are mostly very small.
For a reliable identification it is useful to make thin sections, and to have access to identified reference collections. This book aims to provide those, mostly for some tropical species. Many temperate species are treated in Nimis illustrated keys, and many American subtropical species in the Sonoran Desert Flora.

***Digitothyrea polyglossa*** (Nyl.) P.P. Moreno & Egea, Lichenologist 24(3): 223 (1992)
= *Omphalaria polyglossa* Nyl., Flora, Regensburg 59: 558 (1876)
= *Thyrea polyglossa* (Nyl.) Zahlbr., Cat. Lich. Univers. 2: 808 (1924)

Characterized by narrow, 0.5-1.µm, flat lobes furrowed on the lower surface and bearing large granules (isidia in Henssen 1986a) on the upper surface; hyphae arranged in a loose strand in the central part of the thallus and perpendicularly towards the margins. Apothecia marginal, submarginal or laminal, stipitate and excipulum propium restricted to the basal part of the apothecia.

[ABL25802], USA, Puerto Rico, Distr. Ponce, Reserva forestal de Guanica, road 333, km 7.9 , dry scrub forest, on limestone. 17°57' N, 66°54' W, 10 m. Leg. A. & M. Aptroot (no. 25802), 21-31.05.1989, det. A. Aptroot, 1989, conf. M. Schultz, 2007.

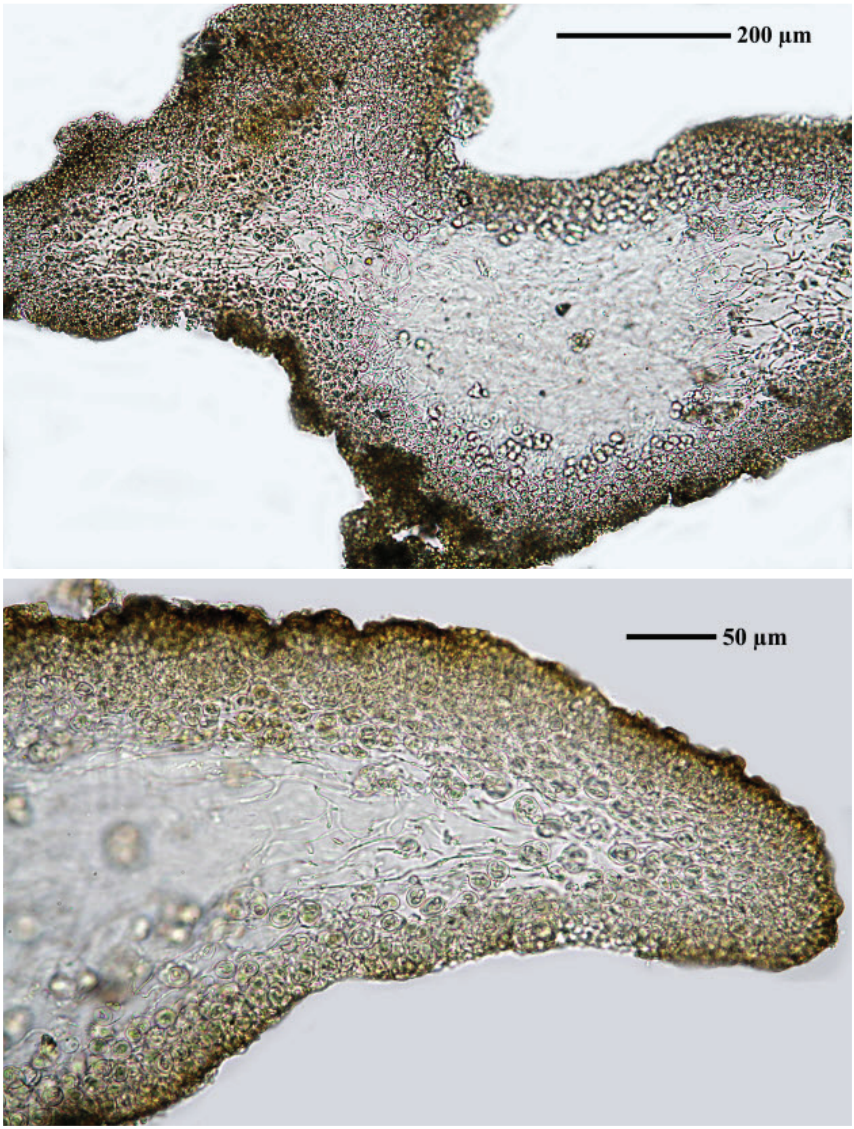




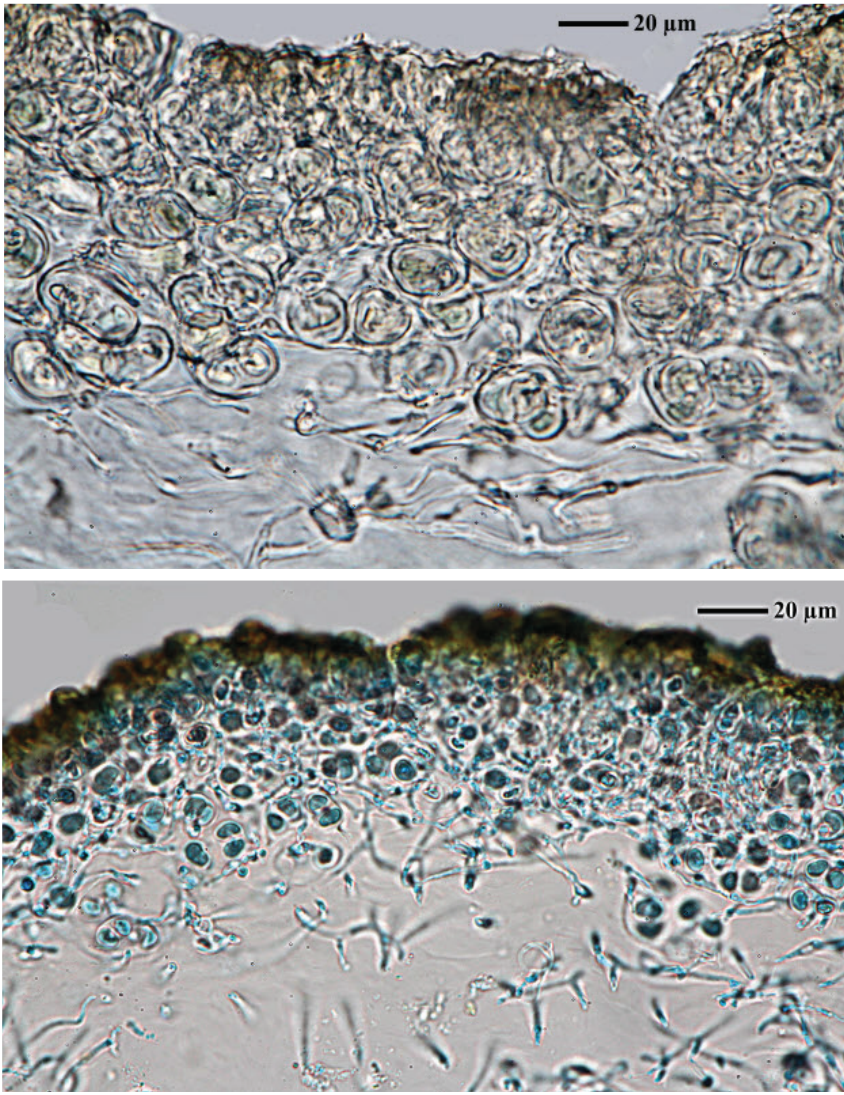




***Digitothyrea polyglossa***




***Digitothyrea polyglossa***




***Digitothyrea polyglossa***

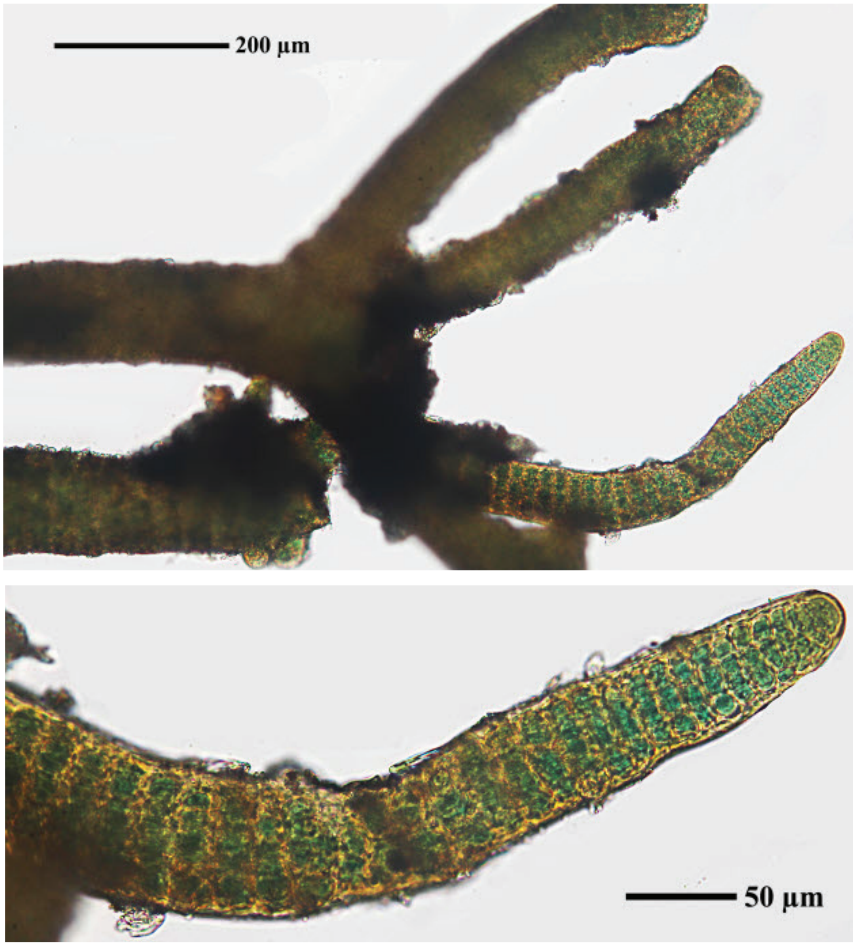
***Ephebe brasiliensis*** (Vain.) Henssen, Symb. bot. upsal. 18(no. 1): 56 (1963) - TOPOTYPE

[ABL41616], Brazil, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça. Near rapids Cachoeira da Vanjerana near Tanque Grande, on sandstone. 1300 m, 20°06' S, 43°29' W. Leg. A. Aptroot (no.41616), 20.09.1997, det. A. Aptroot, 1998, conf. M. Schultz, 2005.

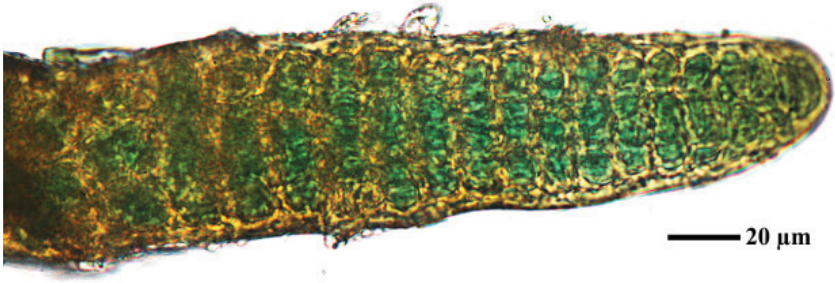





***Ephebe brasiliensis***




***Ephebe brasiliensis***







***Ephebe brasiliensis***

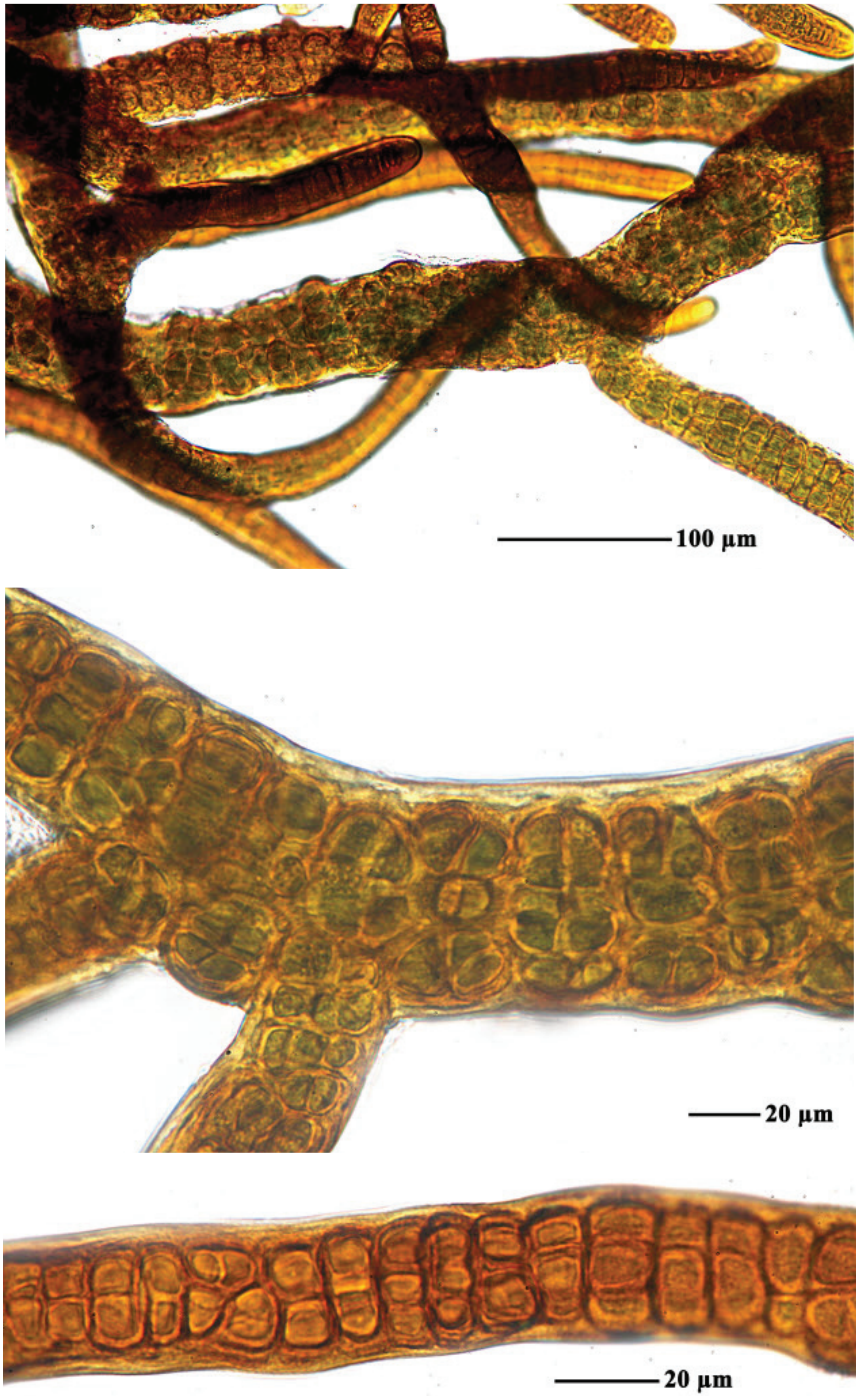
***Ephebe lanata*** (L.) Vain., Meddn Soc. Fauna Flora fenn. 14: 20 (1888)
= *Alectoria lanata* (Neck.) Nyl., in Norrlin, Not. Sällsk. Fauna et Fl. Fenn. Förh., Ny Ser. 13: 322 (1873) [1871-1874]

[11291], Portugal, Madeira, an der Straße von Paúl da Serra nach Ribeira da Janela; Ericaceenzone, windoffen, nebelreich. 32°46.289' N, 17°07.100' W, 1350 m. Leg F. Schumm (nr 11291), 26.12.2003, det. F. Schumm, 2004

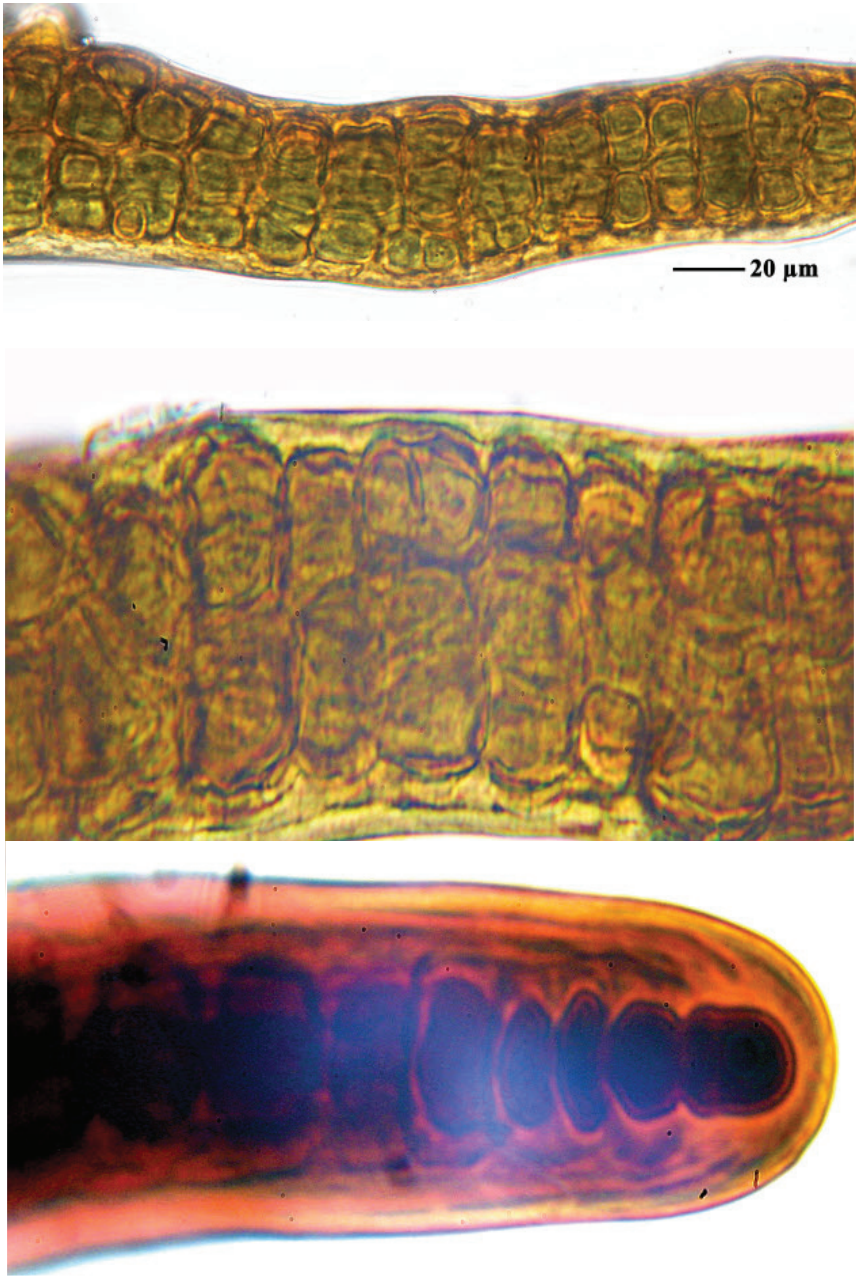




***Ephebe lanata***




***Ephebe lanata***




***Ephebe lanata***

***Ephebe ocellata*** Henssen, Symb. bot. upsal. 18(no. 1): 51 (1963)

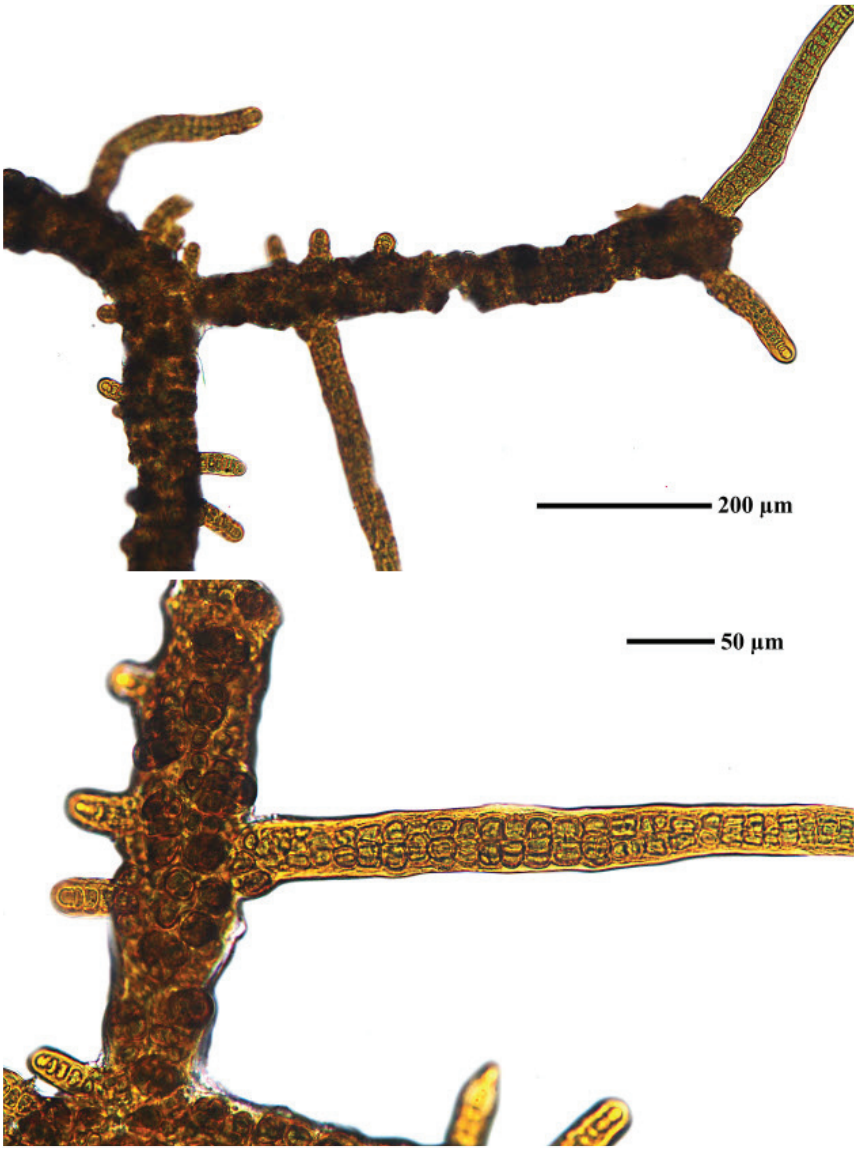
Main filaments 100 µm wide, younger branches 50 µm

[ABL23090], Australia, Tasmania, Tahune picnic area along Huon river 15 km W of Geeveston, 50 km WSW of Hobart temperate rainforest, on neutral wet rock, 60 m, 146°44’ E, 43°06’ S. Leg. A. Aptroot (no. 23090), 03.1988, det. A. Aptroot, 1988, conf. M.Schultz, 2005.






***Ephebe ocellata***




***Ephebe ocellata***




***Ephebe ocellata***

***Ephebe solida*** Bornet, Annls Sci. Nat., Bot., sér. 3 18: 169 (1852)

[Vojtko9463/Y], SE Madagascar, Andringitra, Mts. nature Reserve near Antanifotsi. On the plateau along the E path to Pic Boby. Secundary grassland with ericaceous bush patches. 22°08' S, 46°53' E, 1900-2000 m. On rock in streamlet, under watertable. Leg. A. Vojtko (no 9463/Y), 24.09.1994, det. A. Aptroot, rev. M. Schultz

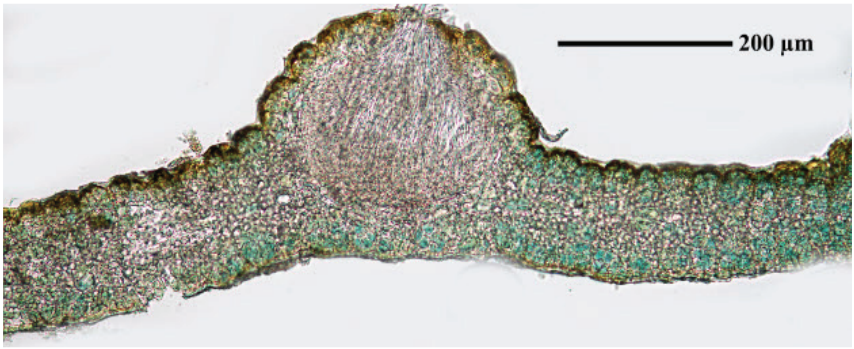


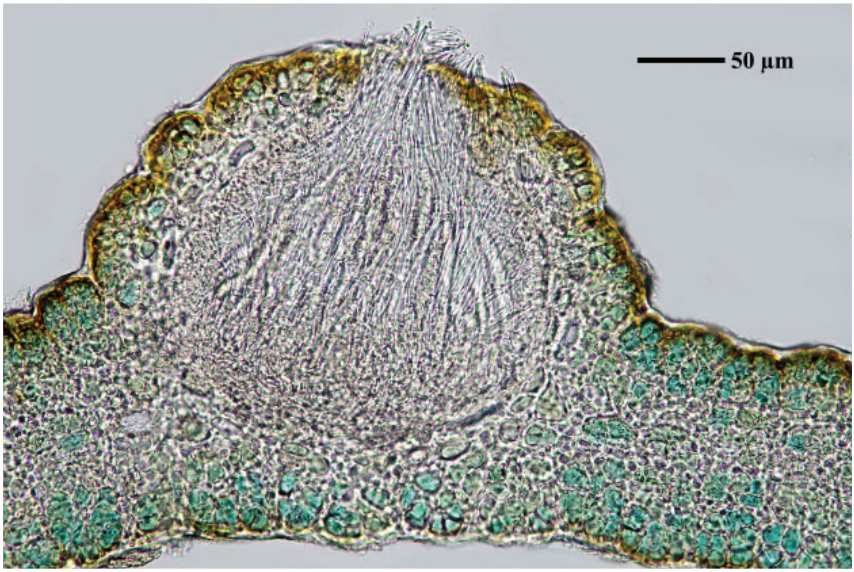




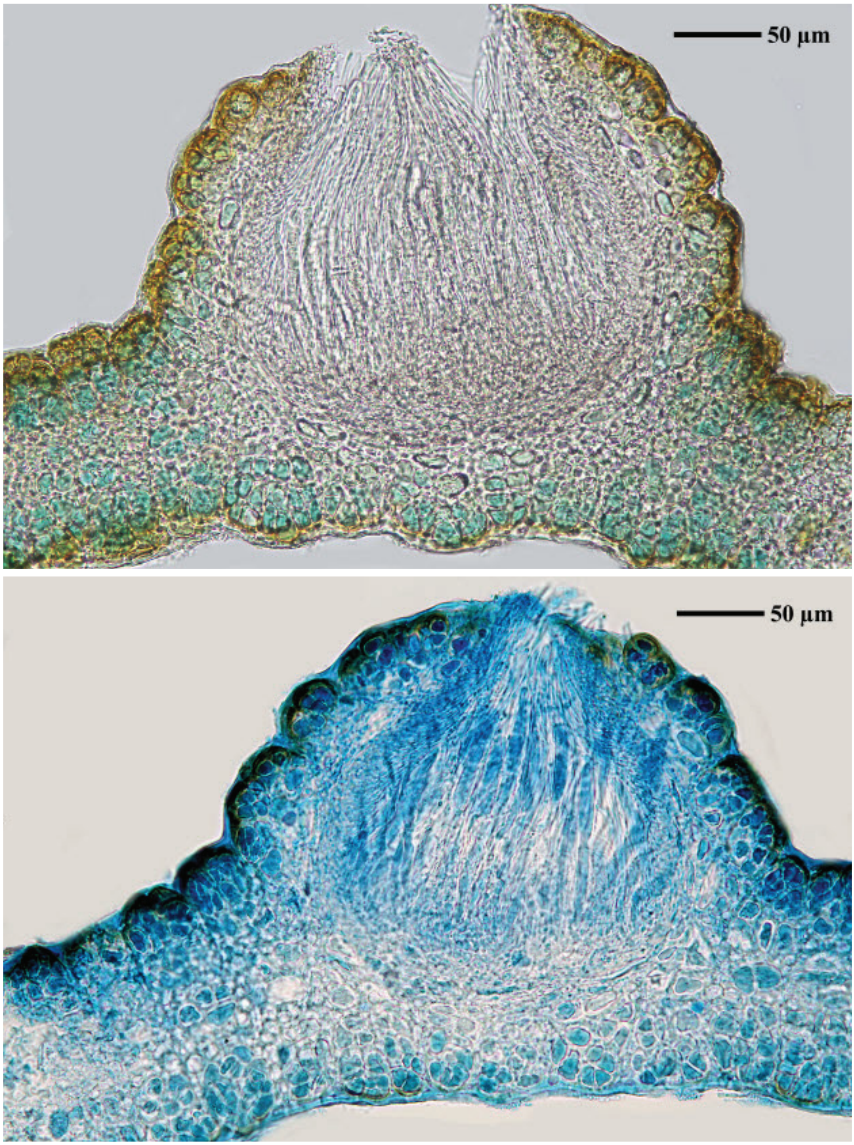


***Ephebe solida***

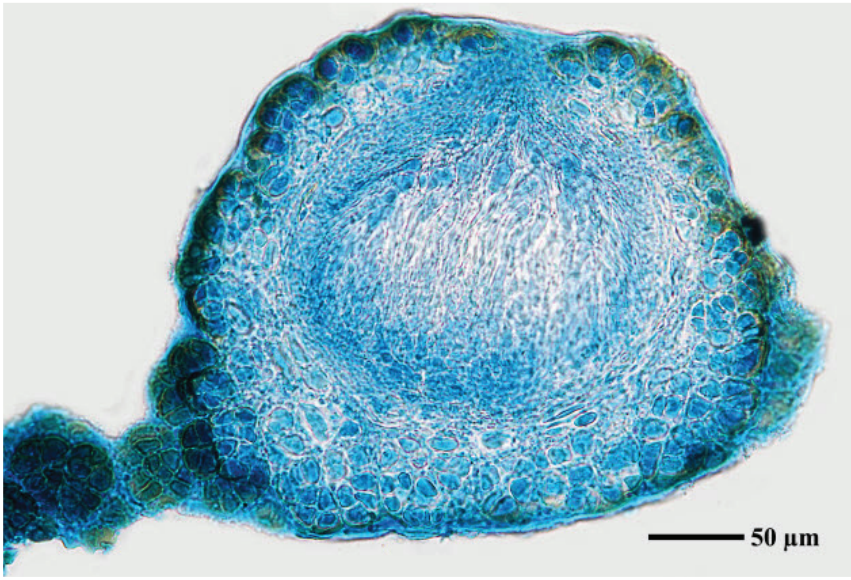


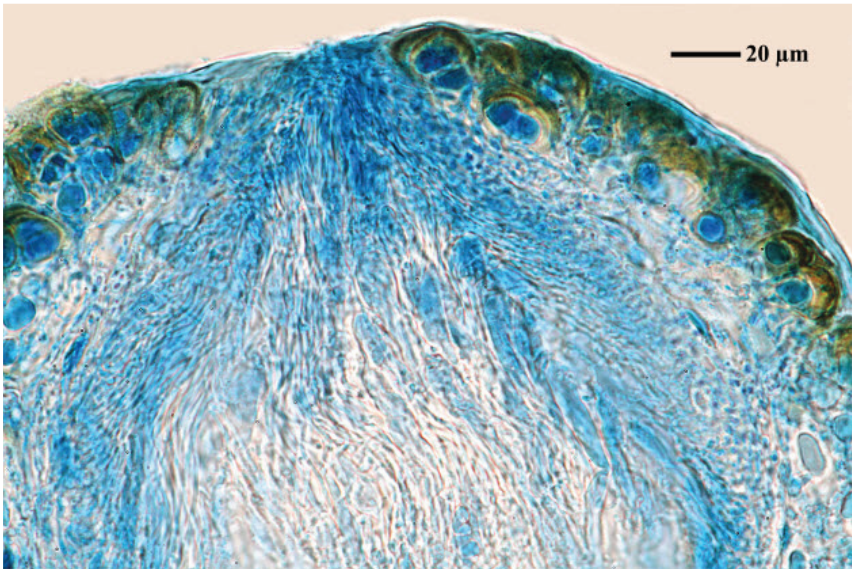




***Ephebe solida***

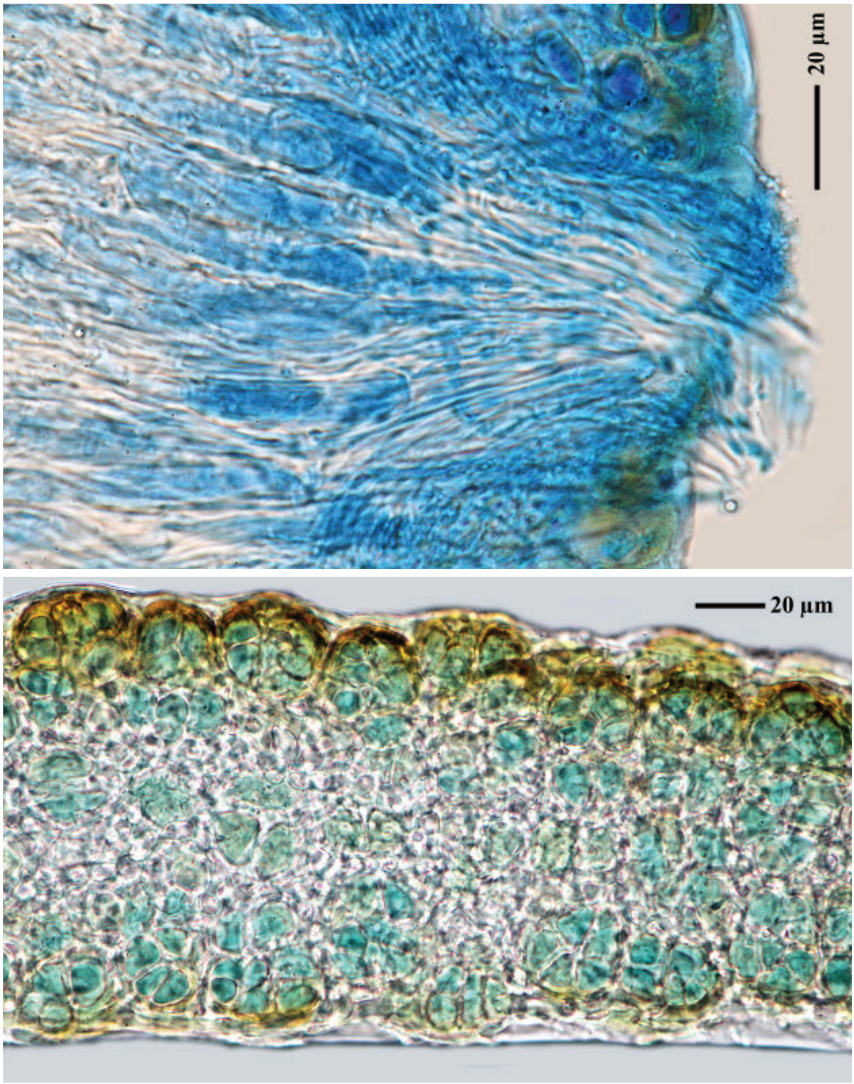



***Ephebe solida***




***Ephebe solida***

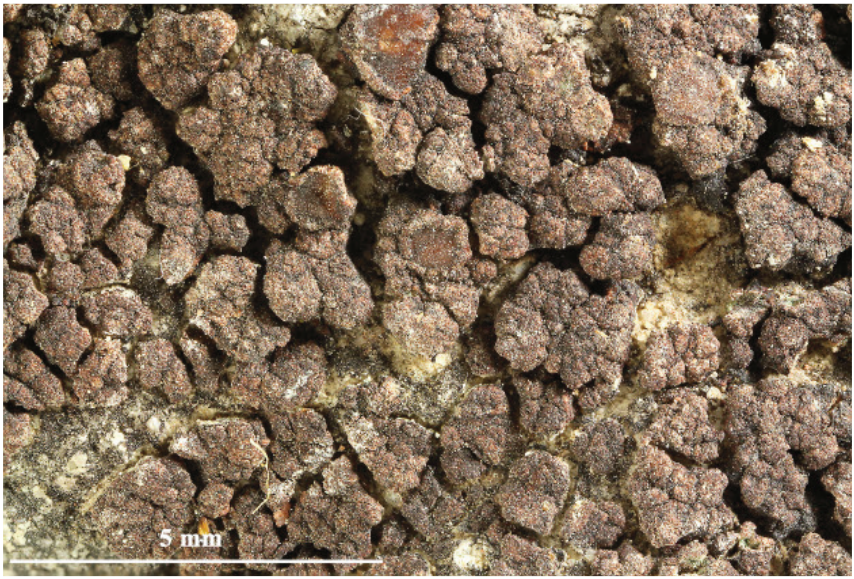


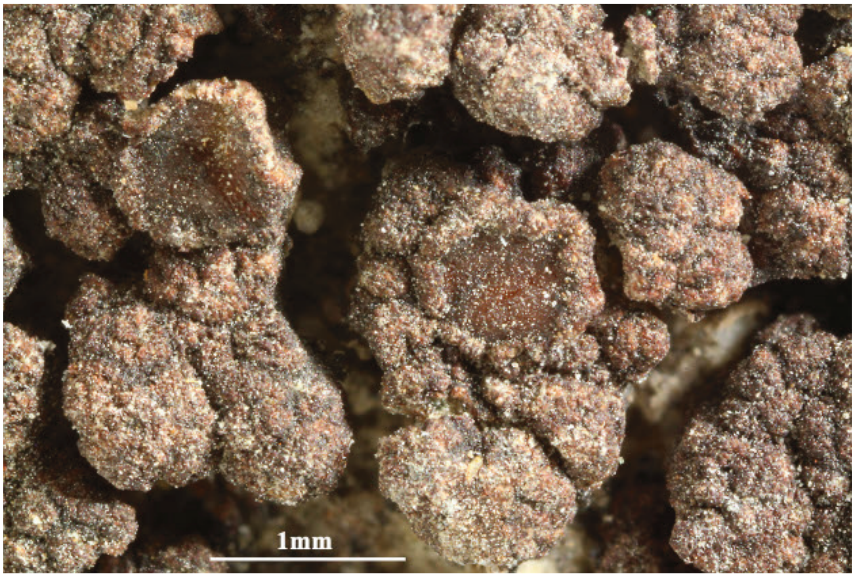

***Ephebe solida***

***Euopsis pulvinata*** (Schaer.) Vain., Meddn Soc. Fauna Flora fenn. 6: 85 (1881)
= *Blennothallia haemalea* (Sommerf.) Trevis., Caratt. Tre Nuov. Gen. Collem.: 3 (1853)
= *Collema haemaleum* Sommerf., Kgl. norske vidensk. Selsk. Skr. 2(2. H.): 63 (1827)
= *Euopsis haemalea* (Sommerf.) Nyl., Flora, Regensburg 58: 363 (1875)
= *Lecidea pulvinata* Schaer., Naturw. Anzeiger Allgem. Schweizer. Gesellsch. Naturwiss. 2: 11 (1818)
= *Pannaria granatina var. haemalea* (Sommerf.) Th. Fr., Nova Acta R. Soc. Scient. upsal., Ser. 3 3: 177 (1861) [1860]
= *Pannaria haemalea* (Sommerf.) A. Massal., Symmict. Lich.: 20 (1855)
= *Parmelia badia* * *pulvinata* (Schaer.) Torss., Enum. Lich. Byssac. Scandin.: 20 (1843)
= *Parmelia haemalea* (Sommerf.) Fr., Summa veg. Scand., Sectio Prior (Stockholm): 106 (1845)
= *Pyrenopsidium pulvinata* (Schaer.) Th. Fr.
= *Pyrenopsis haemalea* (Sommerf.) Norrl., Not. Sällsk. Fauna et Fl. Fenn. Förh. 13: 315 (1874) [1871-74]
= *Pyrenopsis pulvinata* (Schaer.) Hellb., K. svenska Vetensk-Akad. Handl., ny följd 20(no. 8): 129 (1884) [1882-1883]

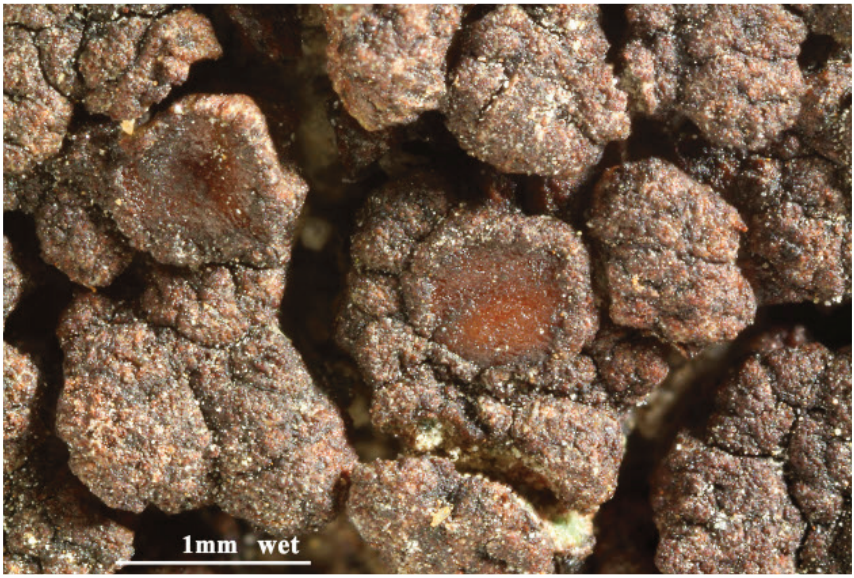
Note: Belongs now to the Harpidiaceae.

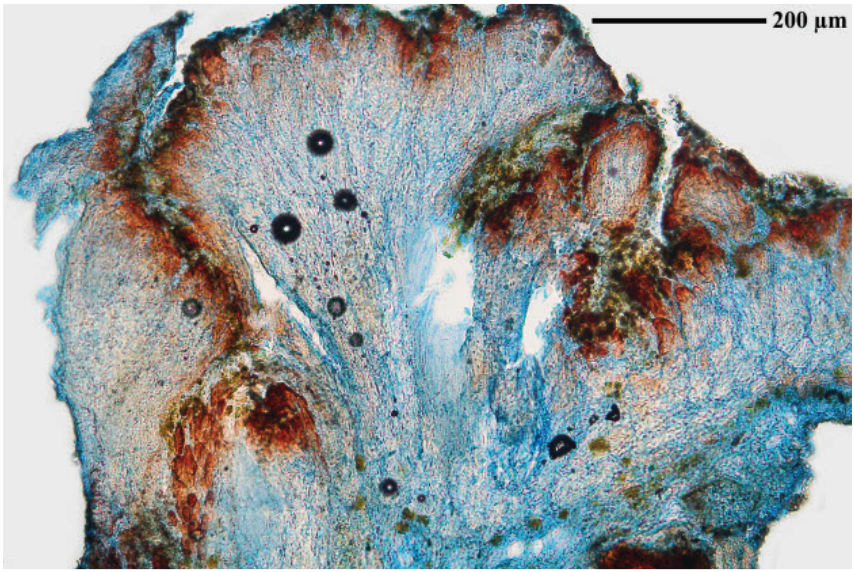
[ABL56274], China, Yunnan Prov., Jianchuan Co., San Jiang Bin Liu area, near mountain hotel, trailhead to Mt. Laojuenshan. Abies delavayi- Rhododendron forest, on siliceous rock. 26°37’56’’ N, 99°43’30’’ E, 3900-4000 m. Leg. A. Aptroot (no 56274), 18.10.2002, det. A. Aptroot, 2003.



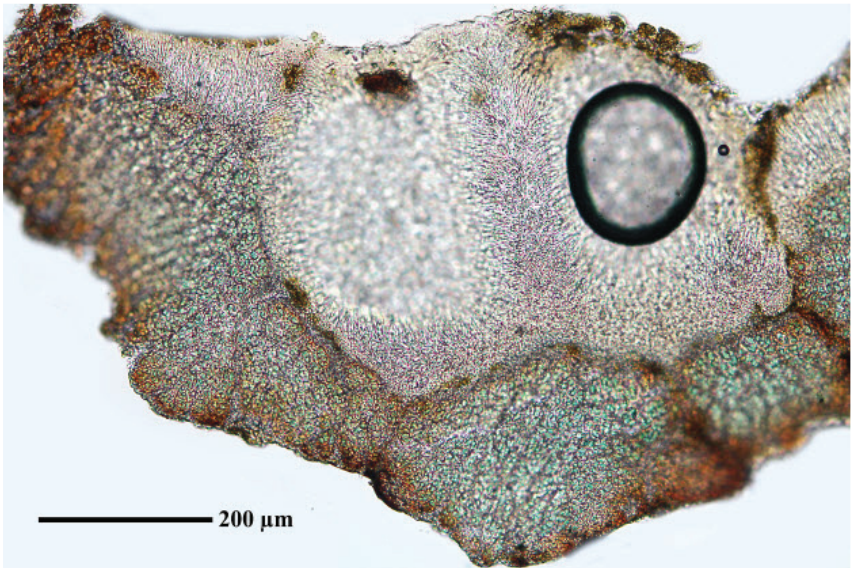



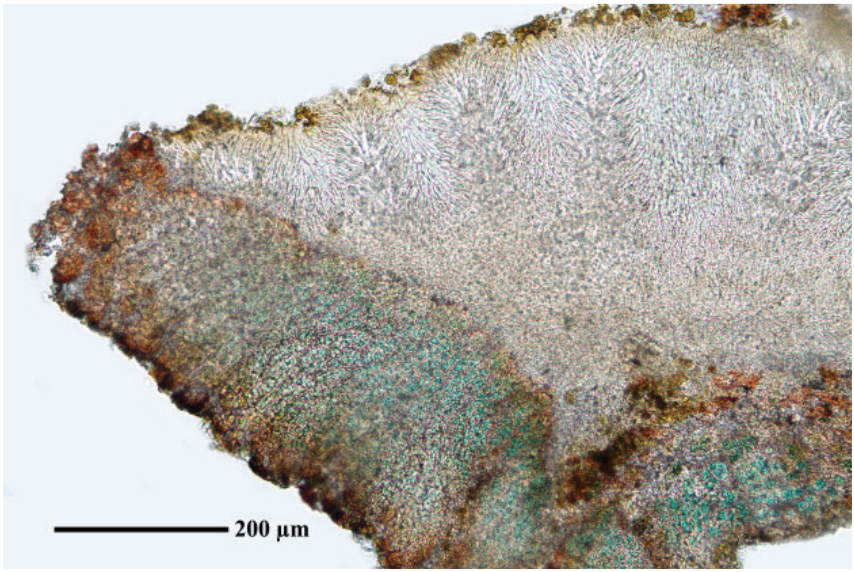

***Euopsis pulvinata***



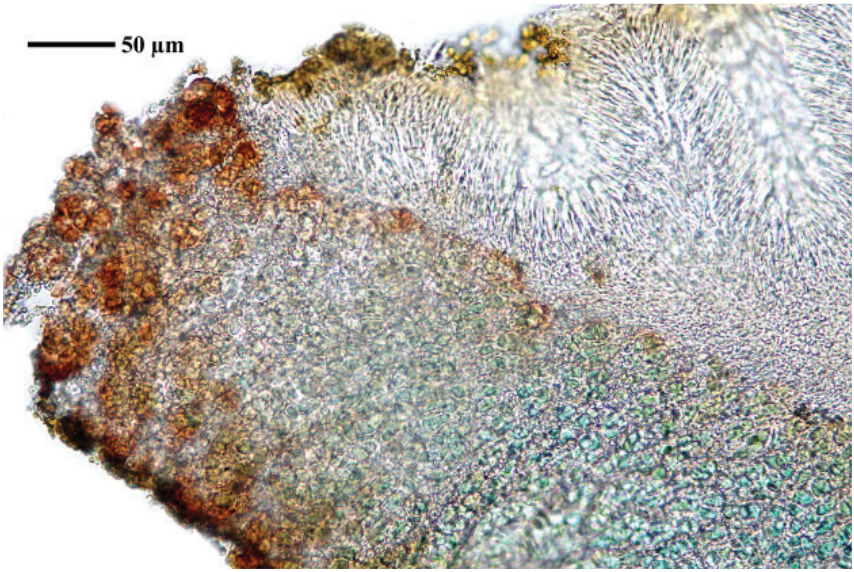



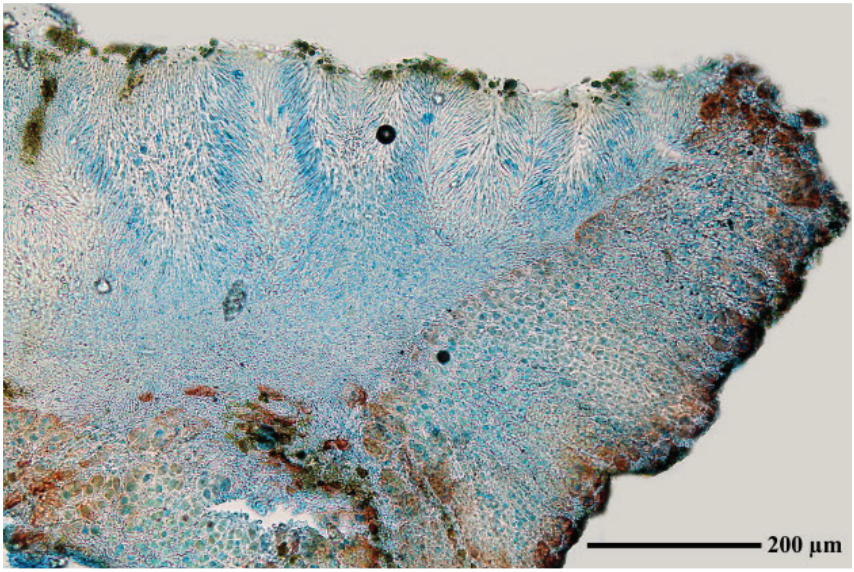

***Euopsis pulvinata***



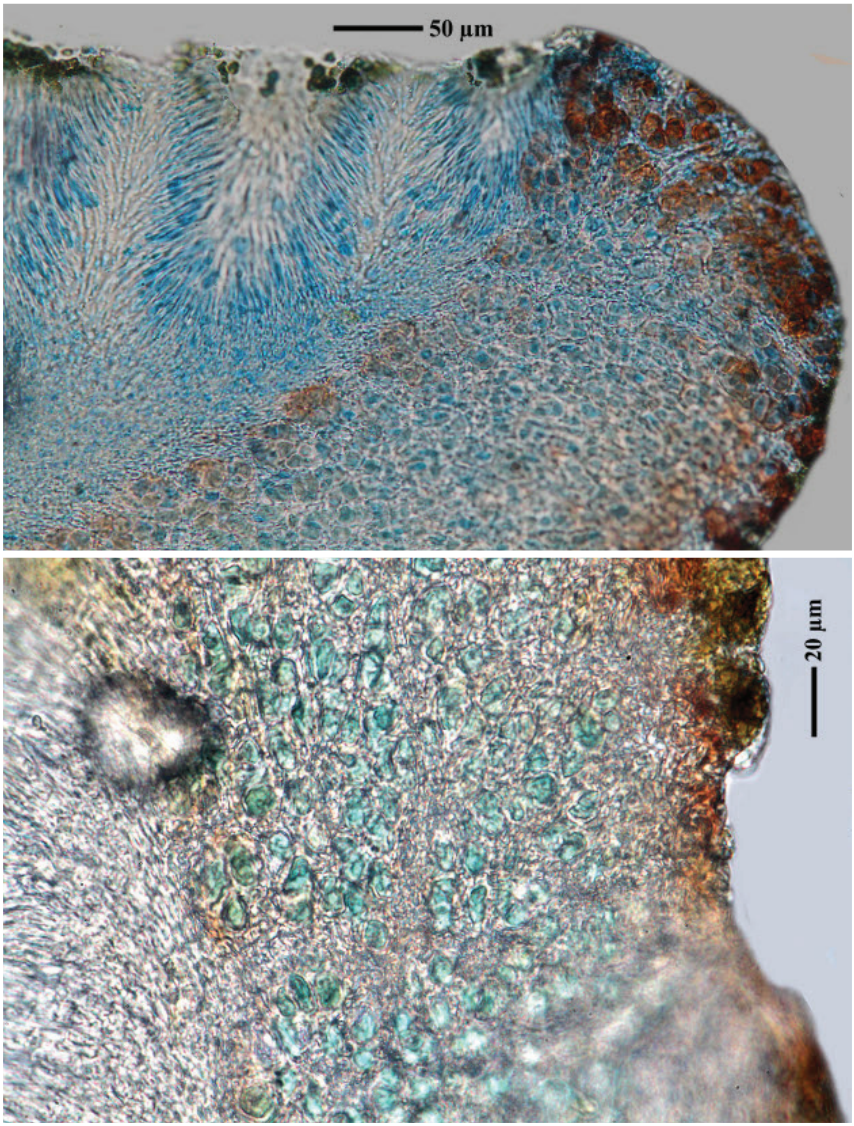




***Euopsis pulvinata***

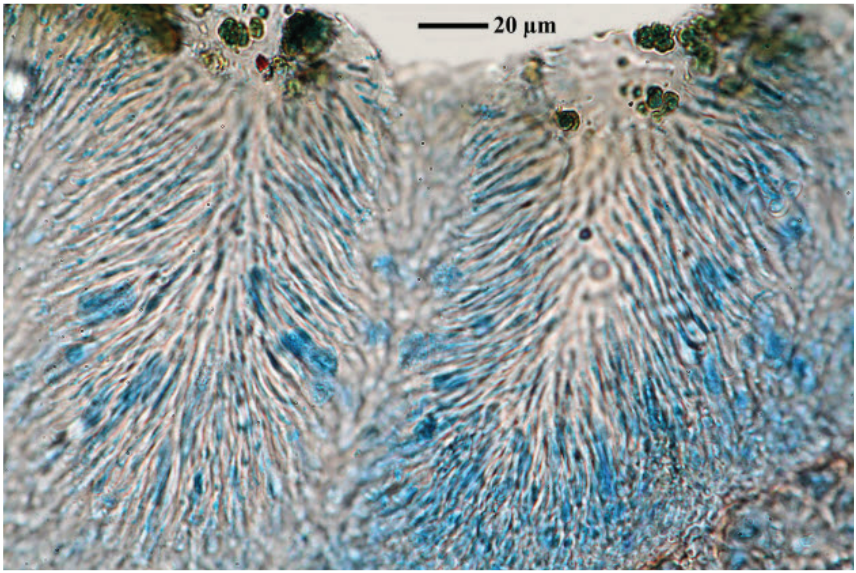



***Euopsis pulvinata***




***Euopsis pulvinata***




***Euopsis pulvinata***

***Heppia lutosa*** (Ach.) Nyl., Syn. meth. lich. (Parisiis) 2: 45 (1869)

[GZU 27-94b], Afghanistan, Prov. Paktia, 4 km N Rabat, ca. 10 km S Chamkanni, an der Straße nach Zambar. 69°47’30” E, 33°47’30” N, ca. 1800 m. Lichtung in Cedrus deodara Wald, Erdbuckeln (Löss) mit Grashorsten. Leg. M. Steiner (Ste 80), 4.7.1970, det C.M. Wetmore.

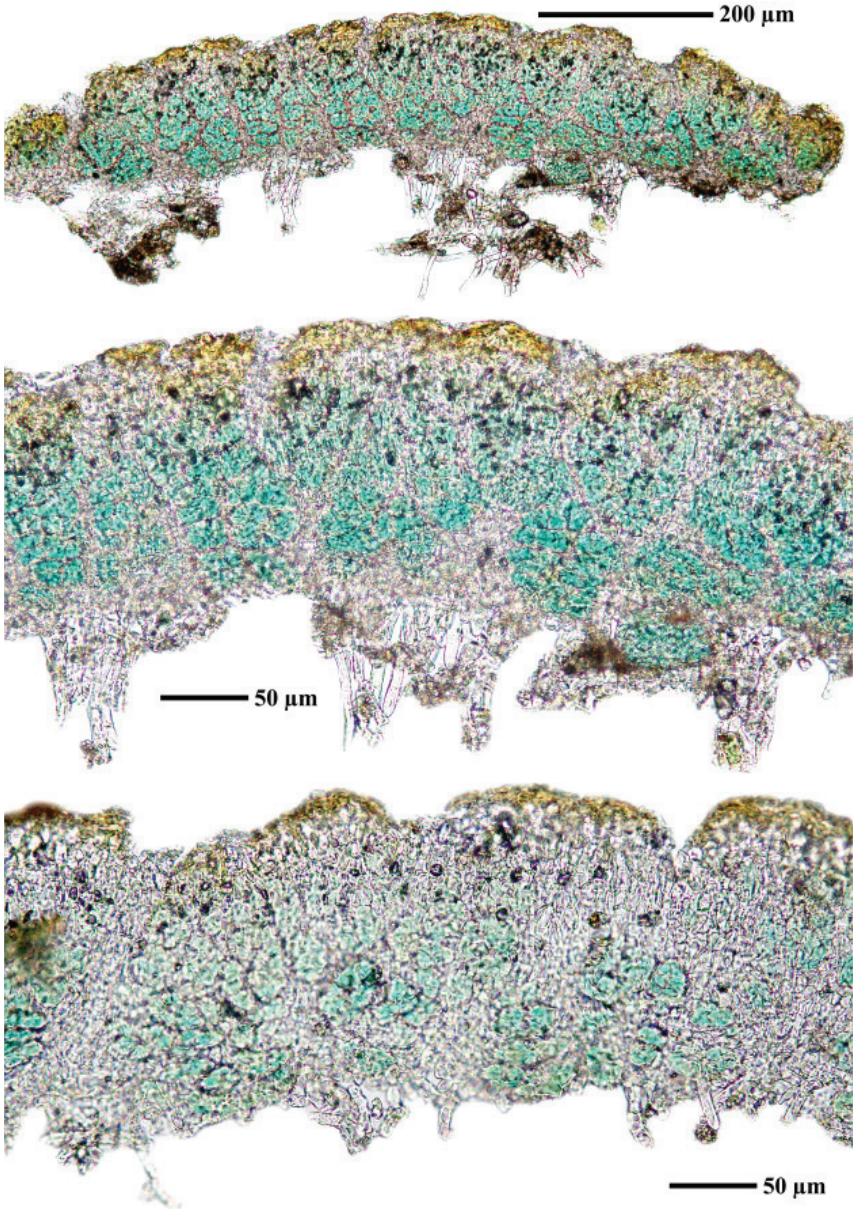




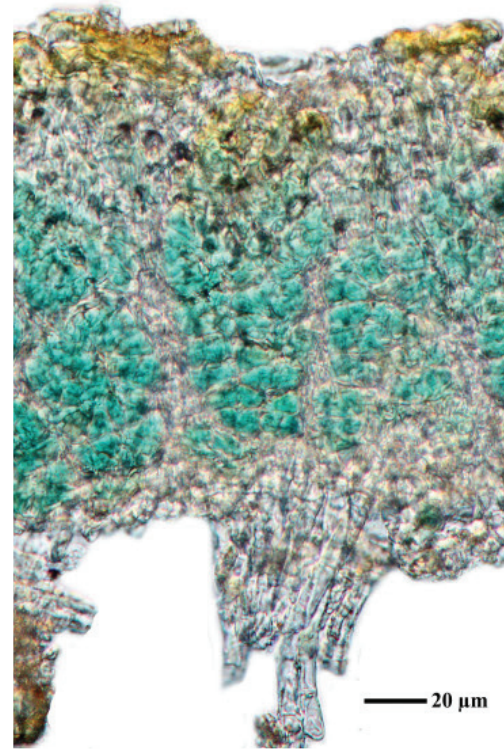

***Heppia lutosa***

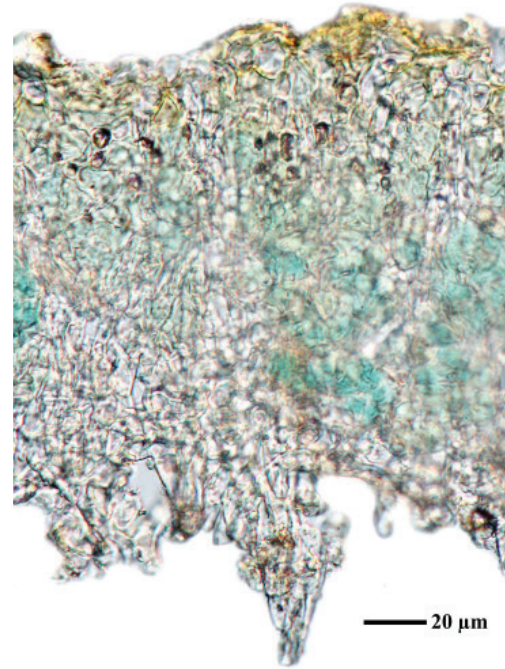



***Heppia lutosa***

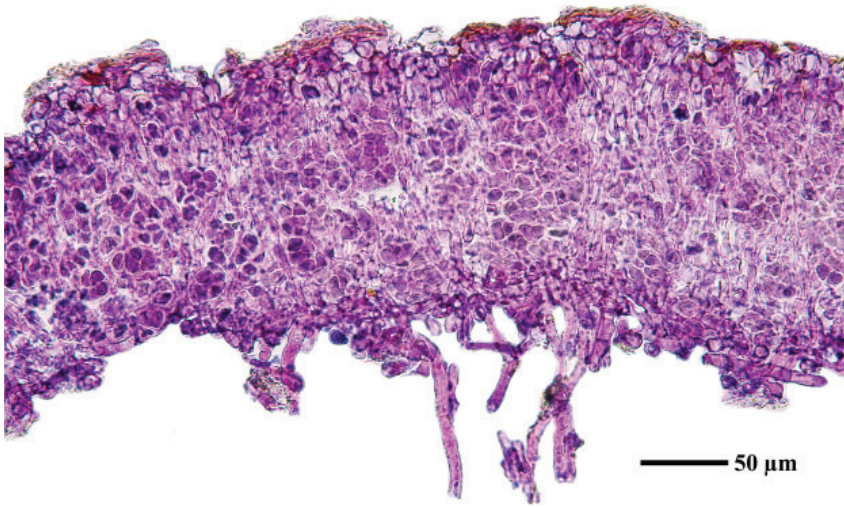


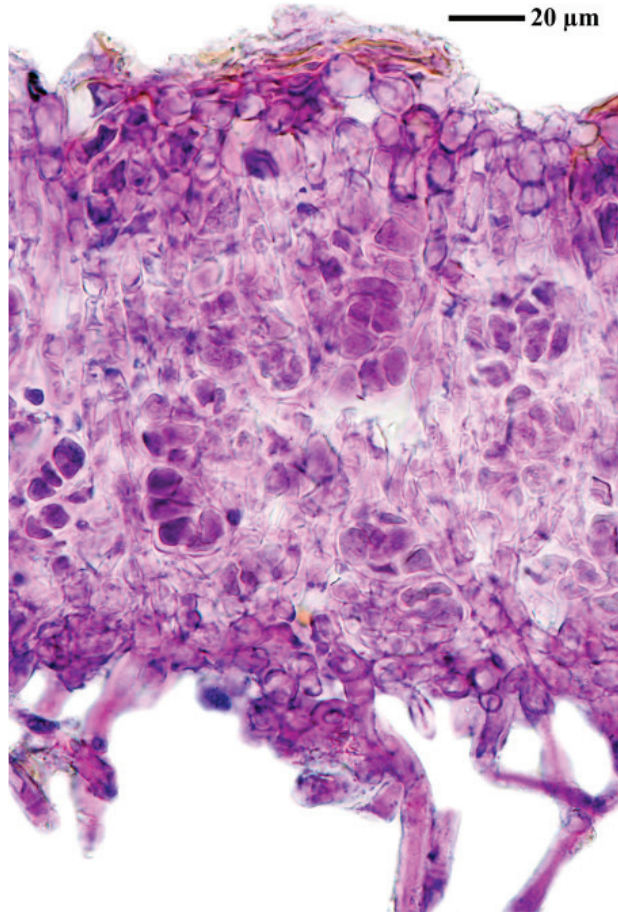

***Heppia lutosa***




***Heppia lutosa***




***Heppia lutosa***

***Lecidopyrenopsis corticola*** Vain., Hedwigia 46: 172 (1907)

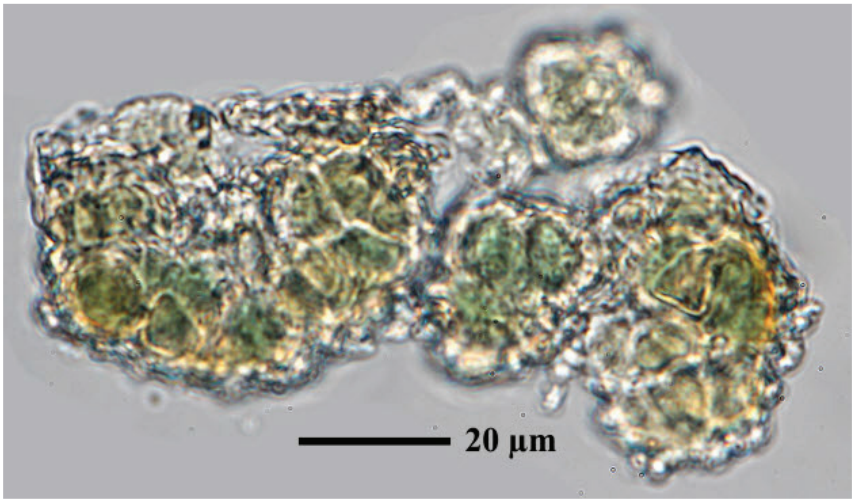
Photobiont single-celled cyanobacteria

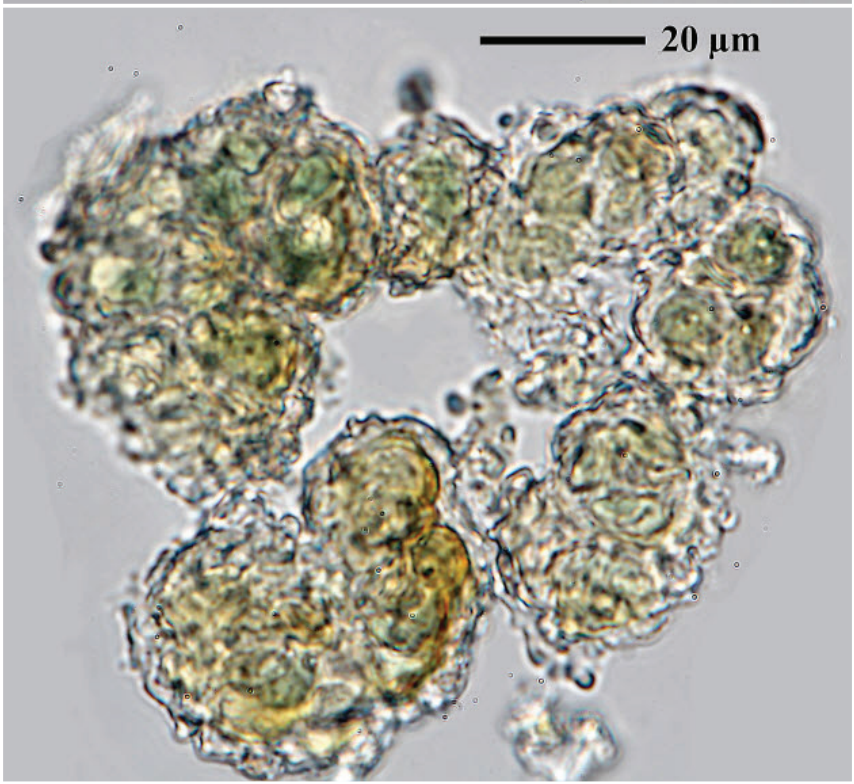
[ABL52150], Taiwan, Nantou County, 45 km WNW of Hualien, Meifeng, around field centre, on Cryptomeria. 24°05’ N, 121°10’ E, 2002100 m. Leg. A. Aptroot (no52150), 09.10.2001, det. M. Schultz, 01.2005.



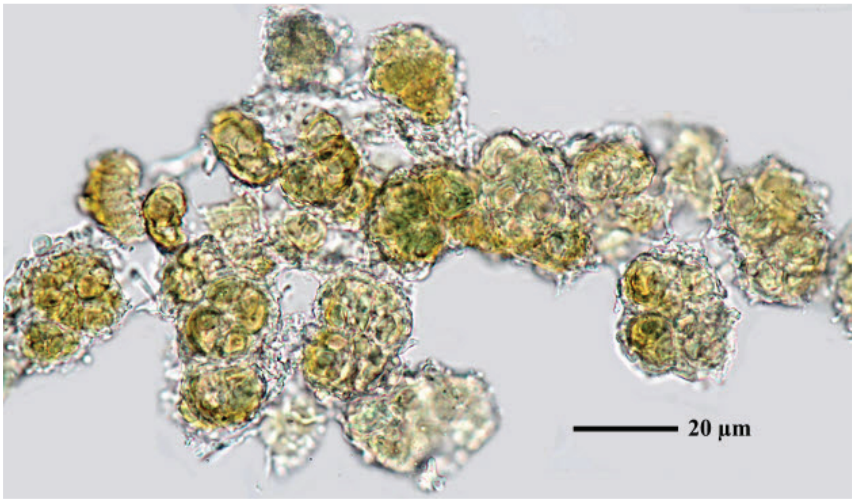


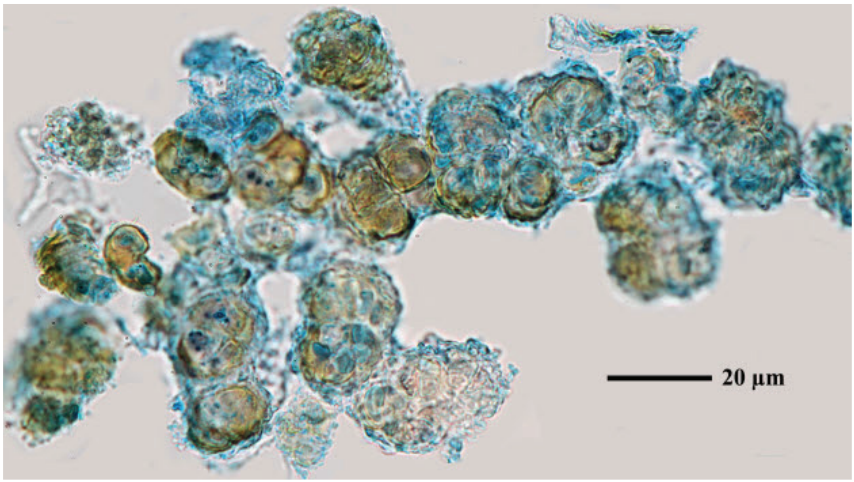

***Lecidopyrenopsis corticola***

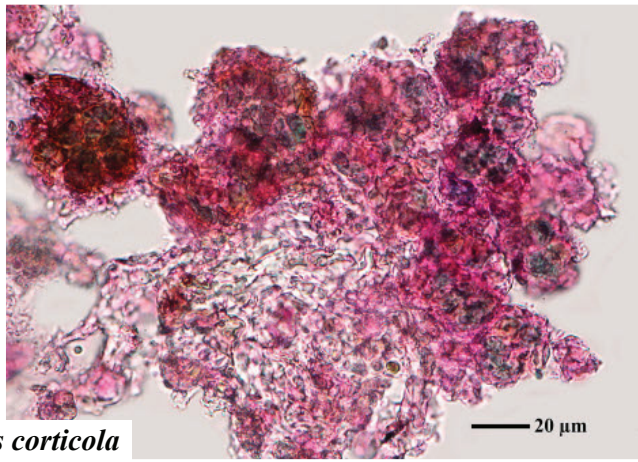



***Lecidopyrenopsis corticola***




***Lecidopyrenopsis corticola***

***Lemmopsis arnoldiana*** (Hepp) Zahlbr. [as 'arnoldianum'], in Engler & Prantl, Nat. Pflanzenfam., Teil. I (Leipzig) 1(1*): 171 (1906)

= *Collemopsis arnoldiana* (Hepp) Nyl., Flora, Regensburg 57(20): 305 (1874)

= *Leptogium arnoldianum* Hepp ex Nyl., Mém. Soc. Imp. Sci. Nat. Cherbourg 5: 333 (1858)

= *Physma arnoldianum* Hepp, in Arnold, Flora, Regensburg 41: 94 (1858)

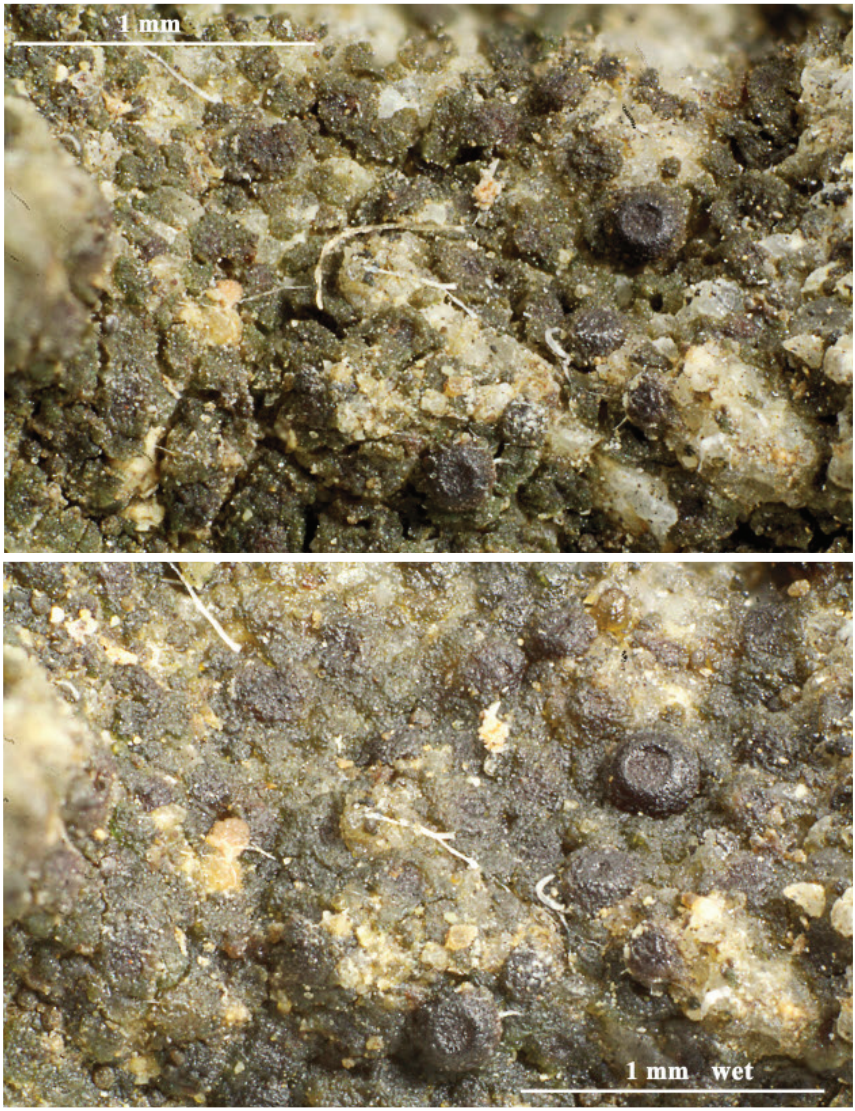
= *Psorotichia arnoldiana* (Hepp) Körb., Parerga lichenol. (Breslau) 5: 434 (1865)

= *Pyrenocarpon arnoldianum* (Hepp) Trevis., Rc. Ist. Lomb., Milano, ser. 2 13: 77 (1880)

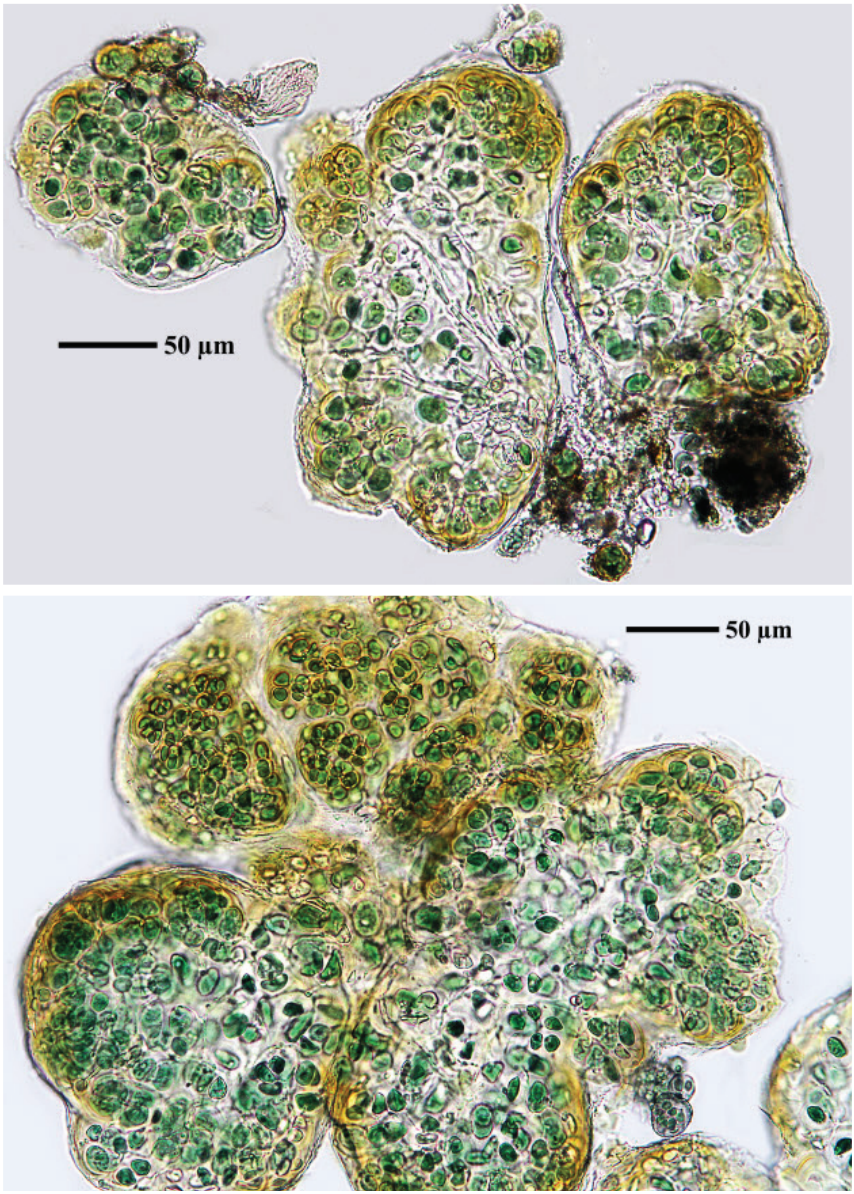
Thallus crustose-areolate. Apothecia zeorine with permanent excipilum. Ascospores 8/ascus, simple, ellipsoid, c. 14–17 x 7–7.5 µm.

[ABL53071a], Taiwan, Pingtung Couty, 45 km SE of Kaohsiumg, near Fangshan, rock conglomeratic outcrops. 22°09’45 N, 120°41’54’’ E, 20 m. Leg. A. Aptroot (no 53071a), 12.10.2001, det. M. Schultz, 07.2007.

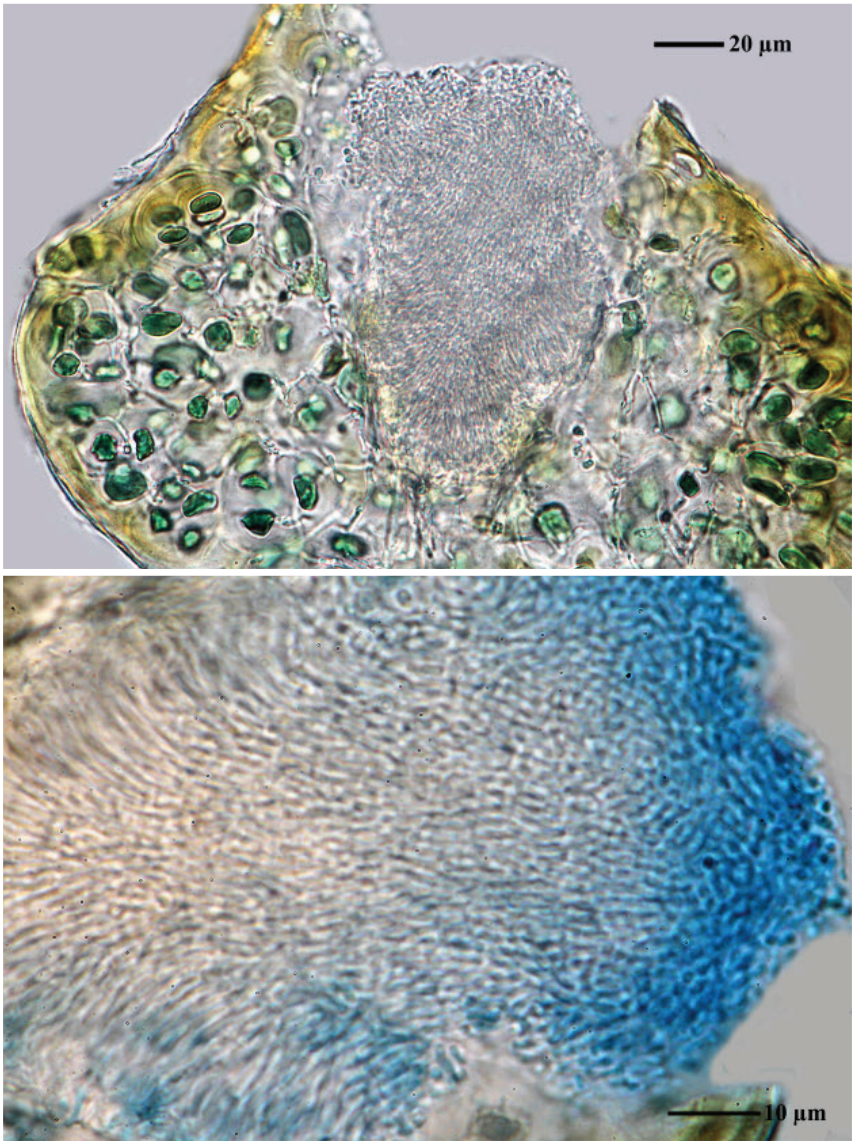





***Lemmopsis arnoldiana***




***Lemmopsis arnoldiana***



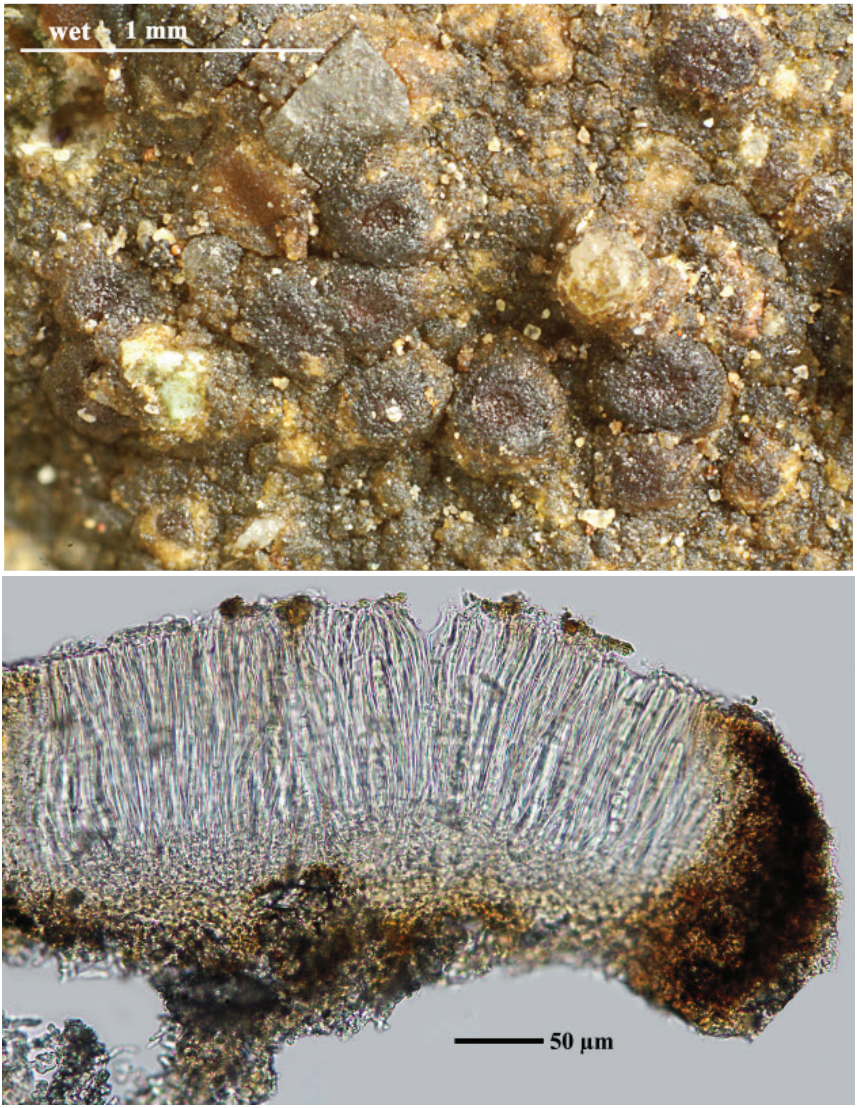

***Lemmopsis arnoldiana***

***Lemmopsis arnoldiana*** (Hepp) Zahlbr. [as 'arnoldianum'], in Engler & Prantl, Nat. Pflanzenfam., Teil. I (Leipzig) 1(1*): 171 (1906)
= *Collemopsis arnoldiana* (Hepp) Nyl., Flora, Regensburg 57(20): 305 (1874)
= *Leptogium arnoldianum* Hepp ex Nyl., Mém. Soc. Imp. Sci. Nat. Cherbourg 5: 333 (1858)
= *Physma arnoldianum* Hepp, in Arnold, Flora, Regensburg 41: 94 (1858)
= *Psorotichia arnoldiana* (Hepp) Körb., Parerga lichenol. (Breslau) 5: 434 (1865)
= *Pyrenocarpon arnoldianum* (Hepp) Trevis., Rc. Ist. Lomb., Milano, ser. 2 13: 77 (1880)

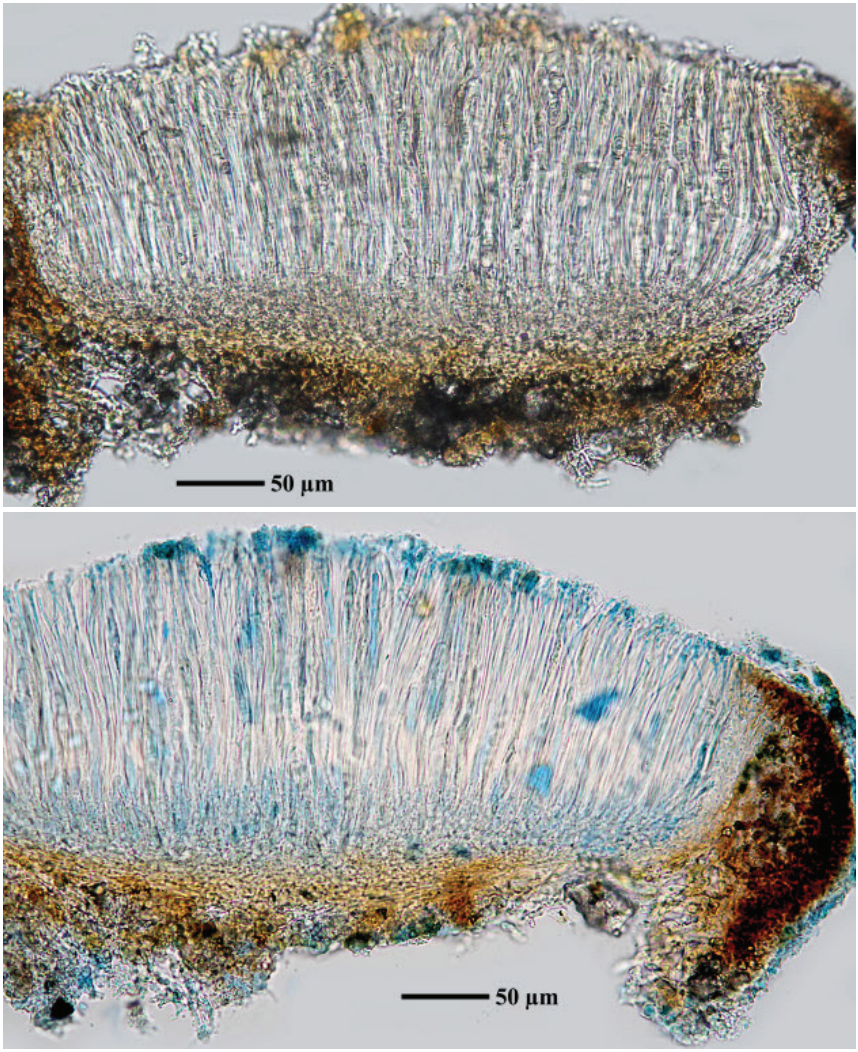
Thallus crustose-areolate. Apothecia zeorine with permanent excipilum. Ascospores 8/ascus, simple, ellipsoid, c. 14–17 x 7–7.5 µm.

[Yazici1104], Turkey, Bucak, Kizilli köyüne giderken, yol üzeri ve orman içi. 37°21’54” N, 30°52’56.52” E, 394 m. Leg. K. Yazici (no 1104), det. A. Aptroot, 2014.

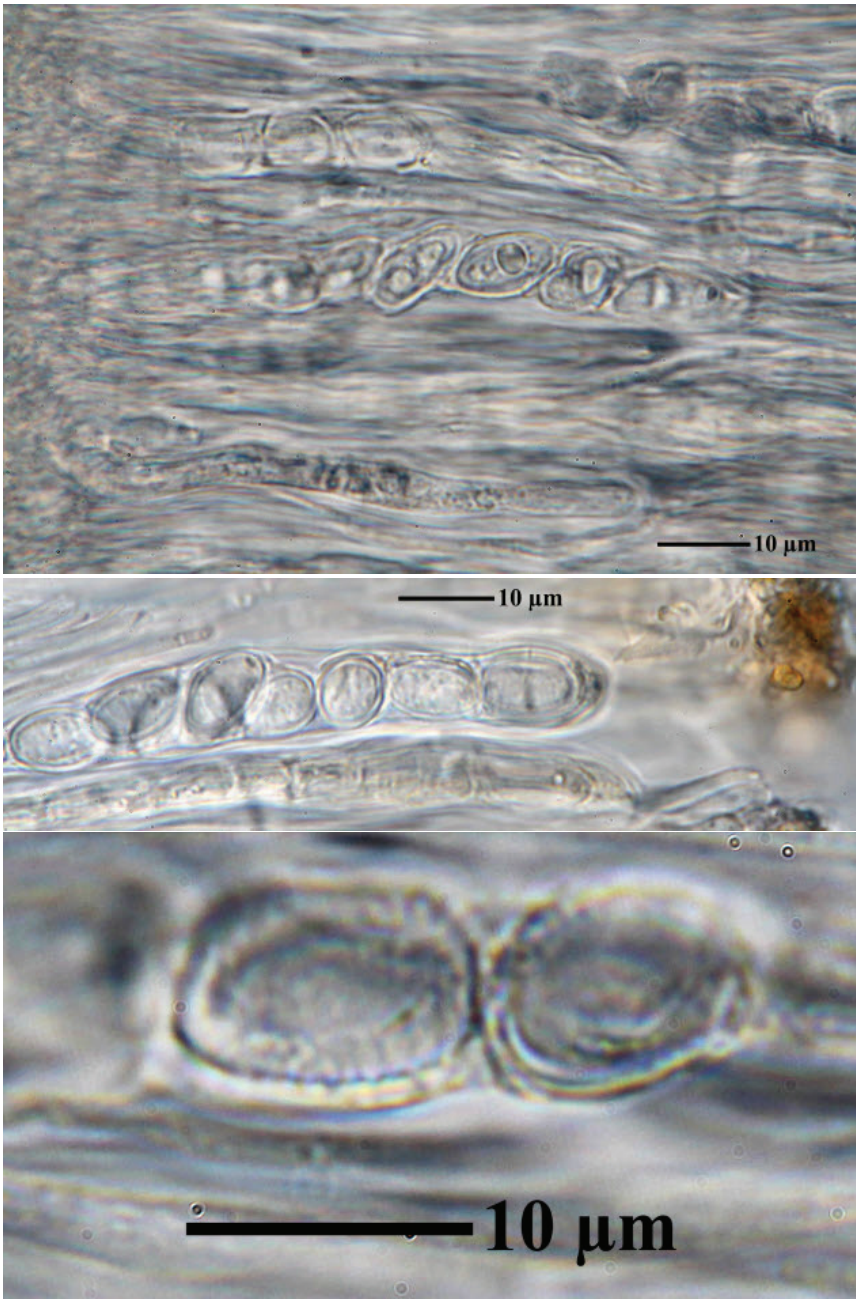




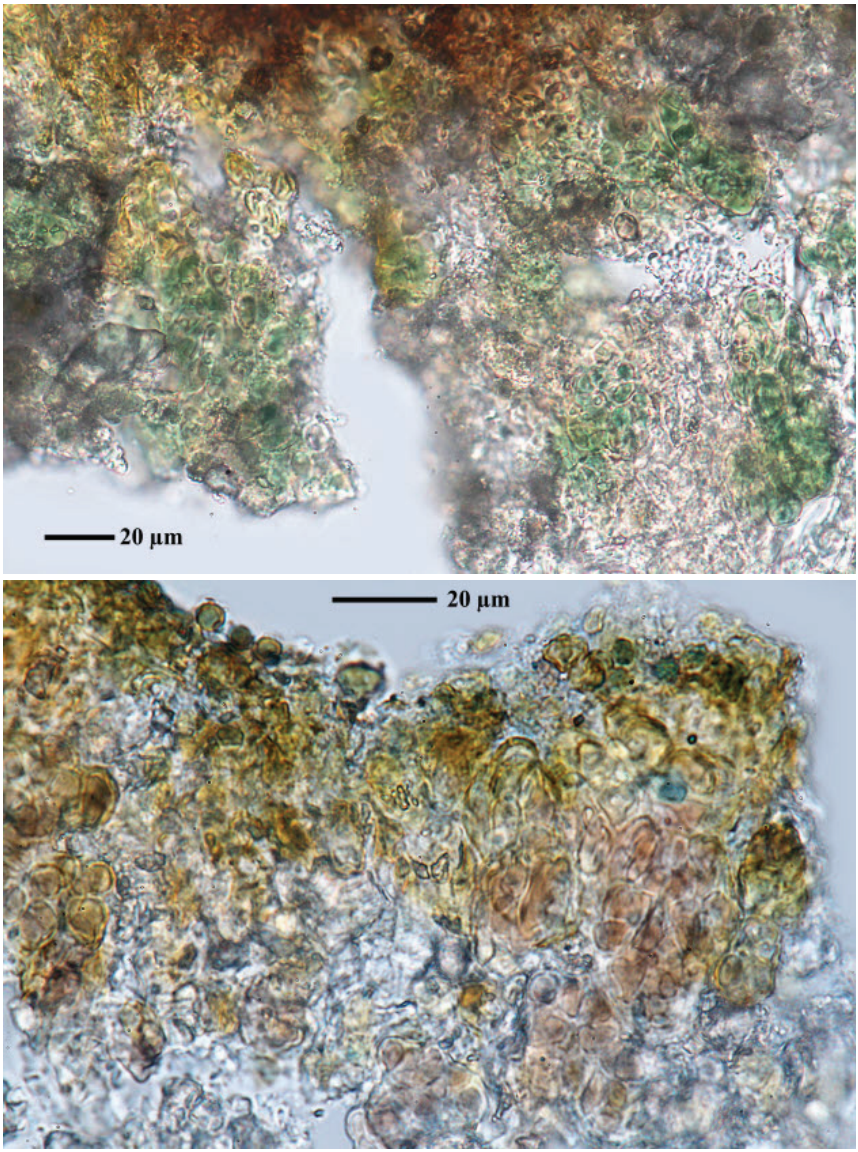

***Lemmopsis arnoldiana***




***Lemmopsis arnoldiana***




***Lemmopsis arnoldiana***




***Lemmopsis arnoldiana***

***Lemmopsis pelodes*** (Körb. ex Stein) T.L. Ellis, Lichenologist 13(2): 132 (1981)
= *Psorotichia pelodes* Körb. ex Stein 1873

Ascospores simple, c. 15–20 x 7.5–8 µm

[ABL43608], Hong Kong, Island, Victoria Peak, in mountain forest, on soil. 500 m. Leg. A. Aptroot (no 43608), 06.1998, det. M. Schultz 08.2007.

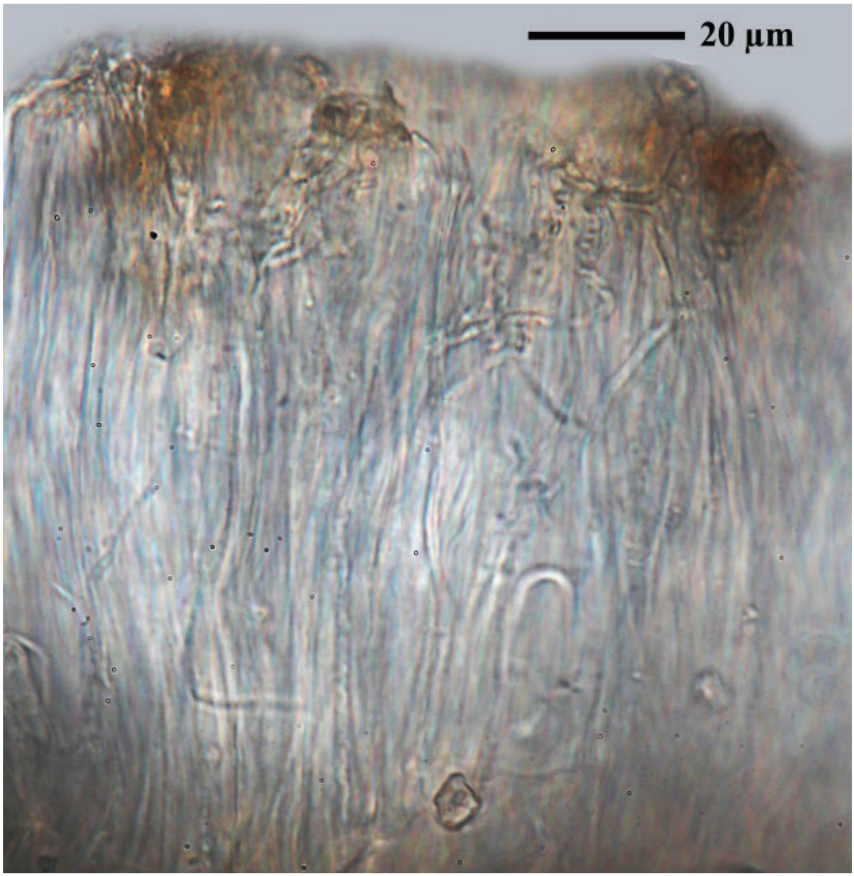




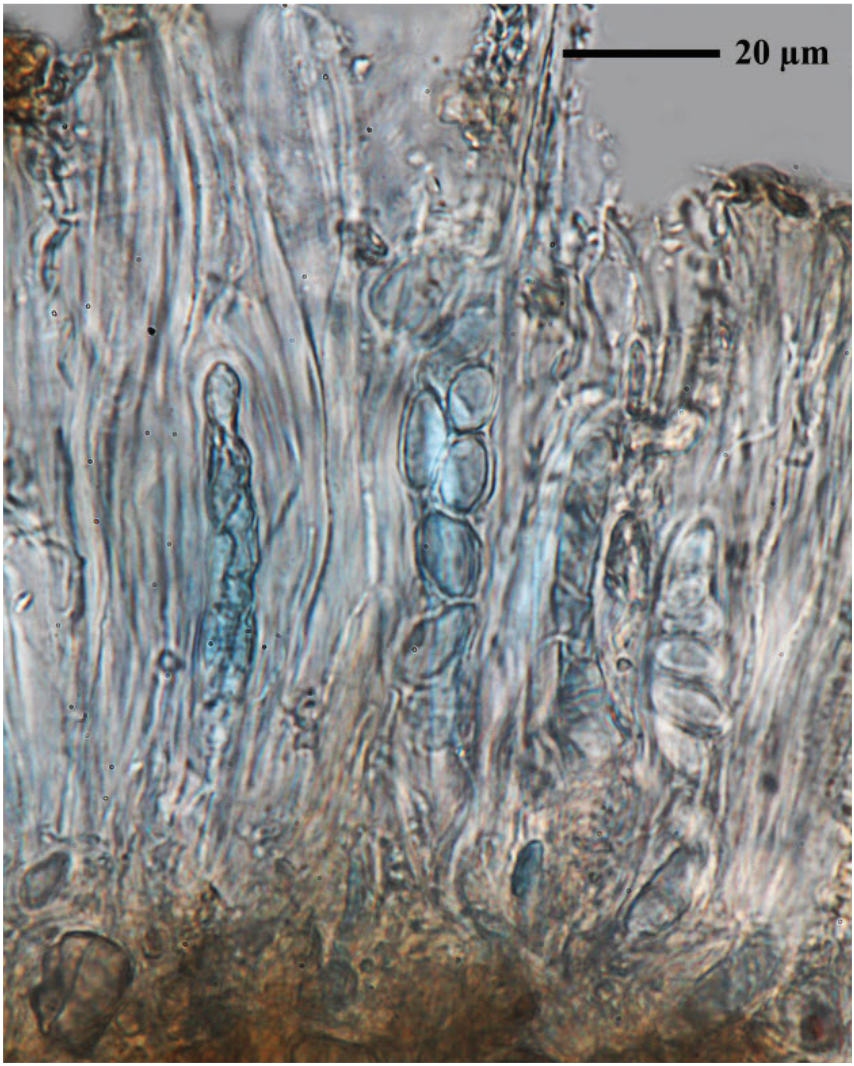




***Lemmopsis pelodes***




***Lemmopsis pelodes***



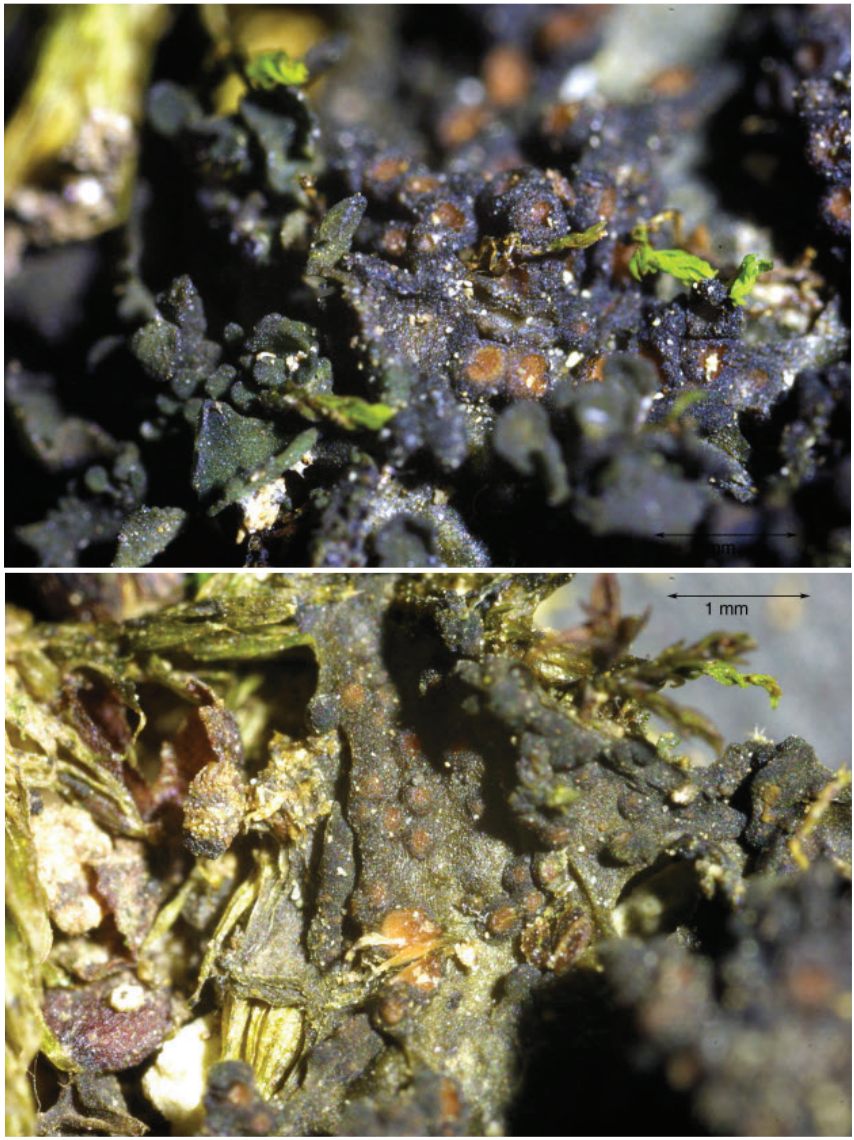

***Lemmopsis pelodes***

***Lempholemma chalazanum*** (Ach.) B. de Lesd., Recherch. Lich. Dunkerque: 261 (1910)
= *Collema chalazanum* Ach., Lich. Univ.: 630 (1810)
= *Gabura chalazana* (Ach.) Kuntze, Revis. gen. pl. (Leipzig) 2: 873 (1891)
= *Lichen furvus* * *chalazanum* (Ach.) Lam., Encycl. Méth. Bot., Suppl. (Paris) 3(2): 414 (1813)
= *Parmelia chalazana* (Ach.) Wallr., Fl. crypt. Germ. (Norimbergae) 1: 550 (1831)
= *Physma chalazanum* (Ach.) Arnold, Flora, Regensburg 50: 119 (1867)

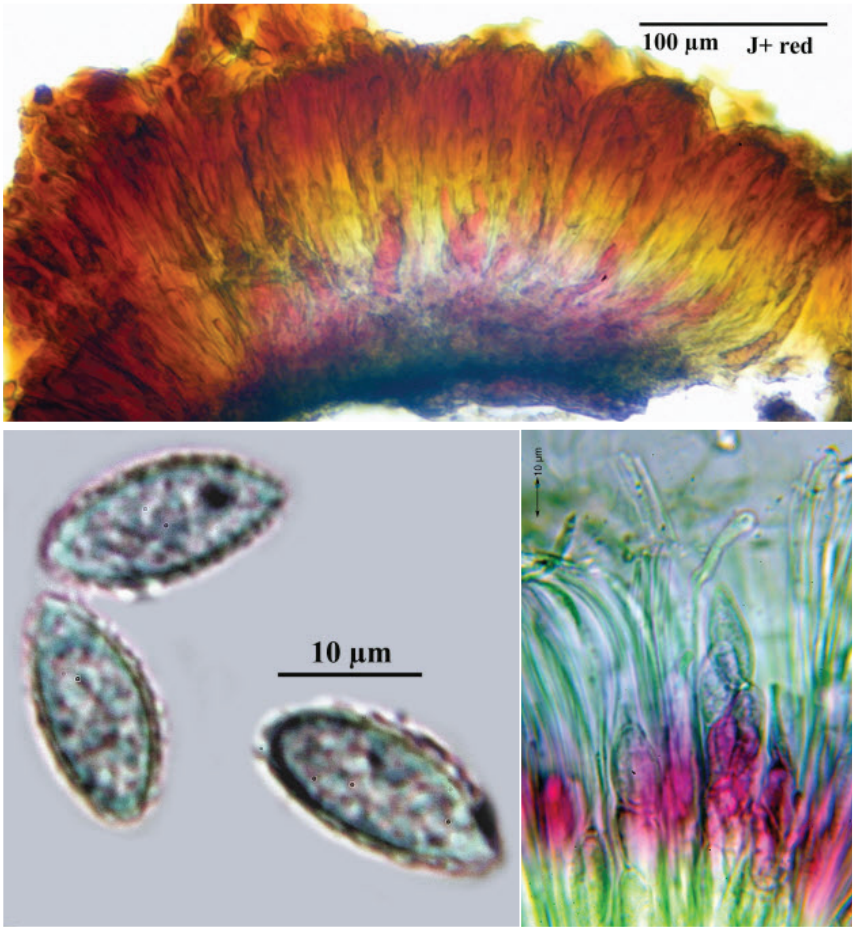
Sporen hyalin, warzig, 8/Ascus, 1-zellig, 17-18,2 x 8,6 µm. Hym. J+ rot

[12250], Germany, Baden-Württemberg, Alb-Donau Kreis, nördlich von Urspring bei der Bahnunterführung an der Straße nach Amstetten, auf Moosen über Kalksteinen, 48°33.296'N, 9°53.442' E, 570 m. Leg. Schumm 29.10.2005.





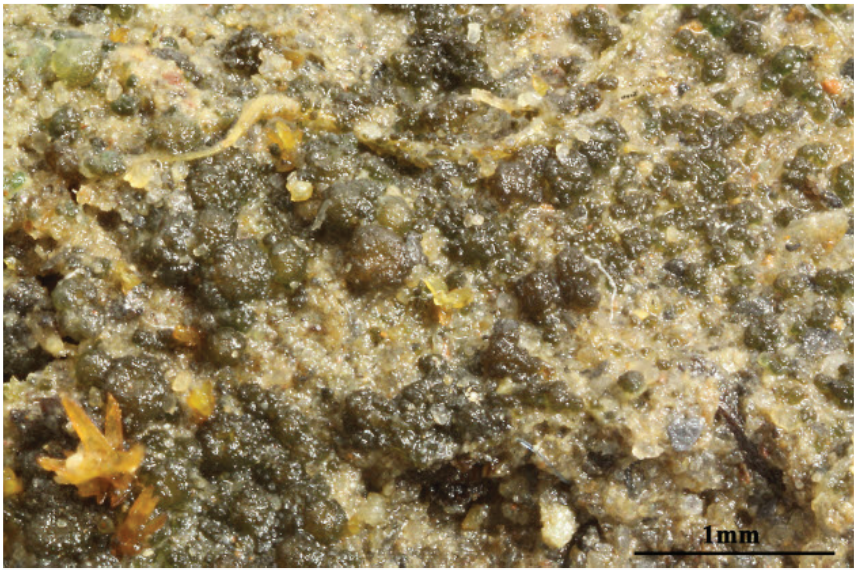

***Lempholemma chalazanum***

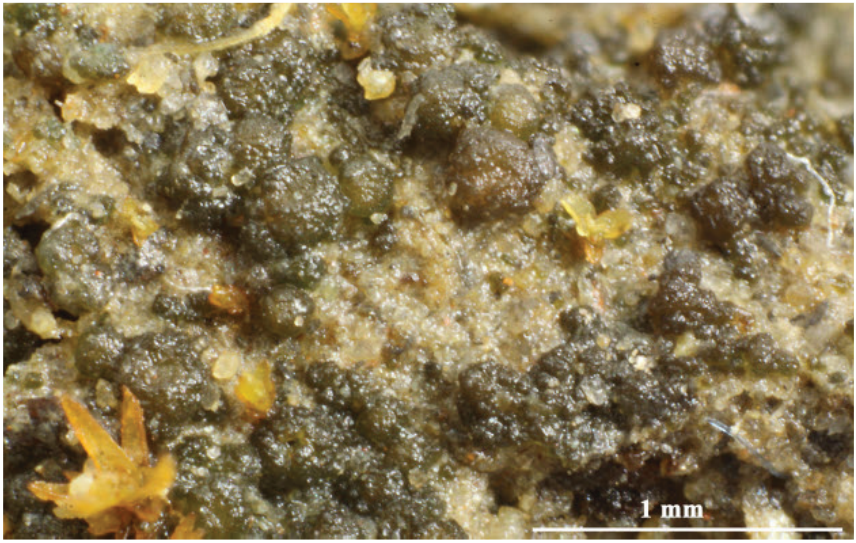


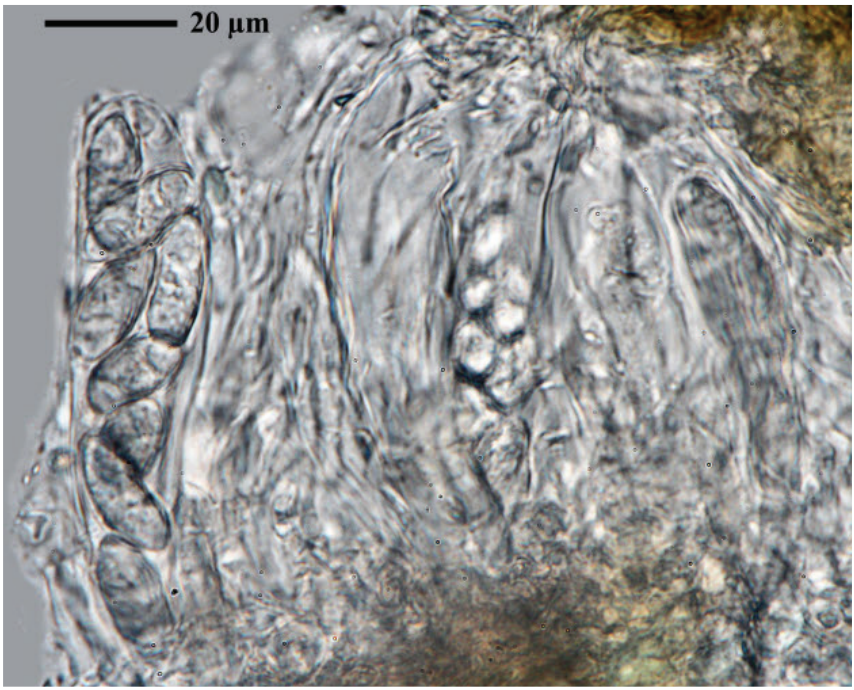

***Lempholemma chalazanum***

***Lempholemma chalazanum*** (Ach.) B. de Lesd., Recherch. Lich. Dunkerque: 261 (1910)
= *Collema chalazanum* Ach., Lich. Univ.: 630 (1810)
= *Gabura chalazana* (Ach.) Kuntze, Revis. gen. pl. (Leipzig) 2: 873 (1891)
= *Lichen furvus* * *chalazanum* (Ach.) Lam., Encycl. Méth. Bot., Suppl. (Paris) 3(2): 414 (1813)
= *Parmelia chalazana* (Ach.) Wallr., Fl. crypt. Germ. (Norimbergae) 1: 550 (1831)
= *Physma chalazanum* (Ach.) Arnold, Flora, Regensburg 50: 119 (1867)

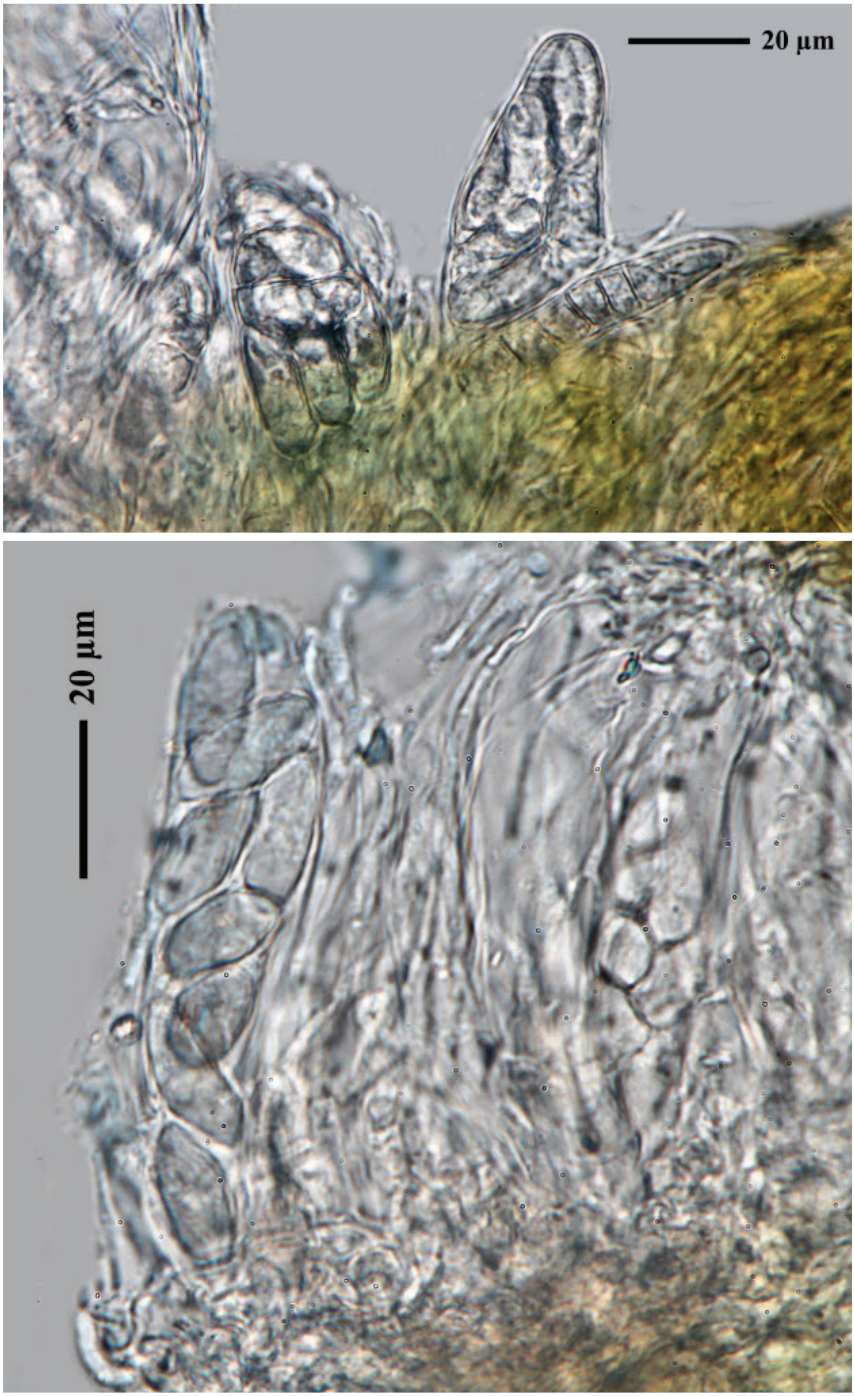
[ABL52733], Taiwann, Hualian County. Taroko National Park, Hohuan Shan near Field Station. 24°09’21’’ N, 121°17’16’’ E, 3200 m, On soil.



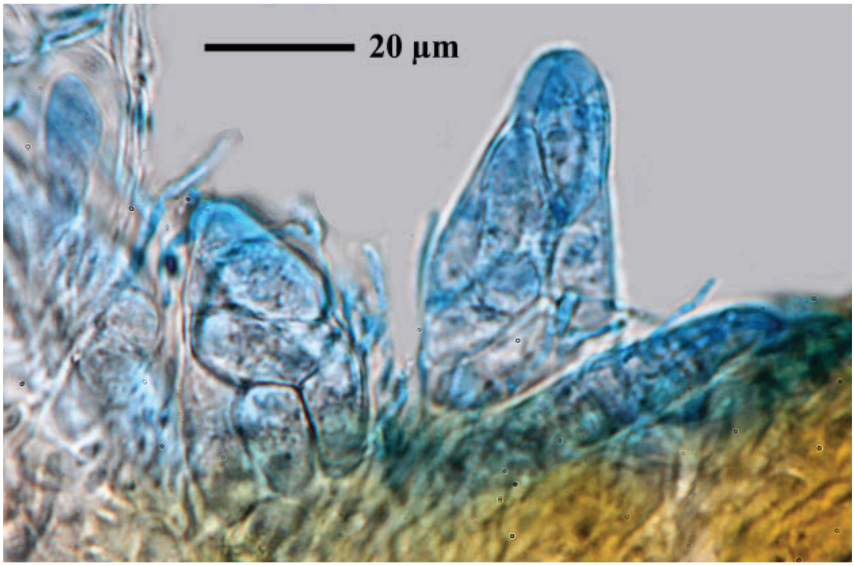


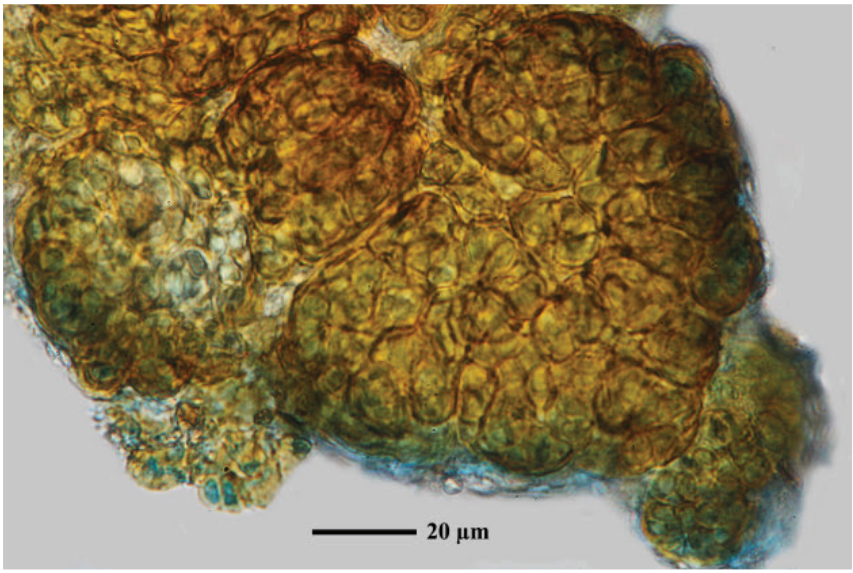




***Lempholemma chalazanum***

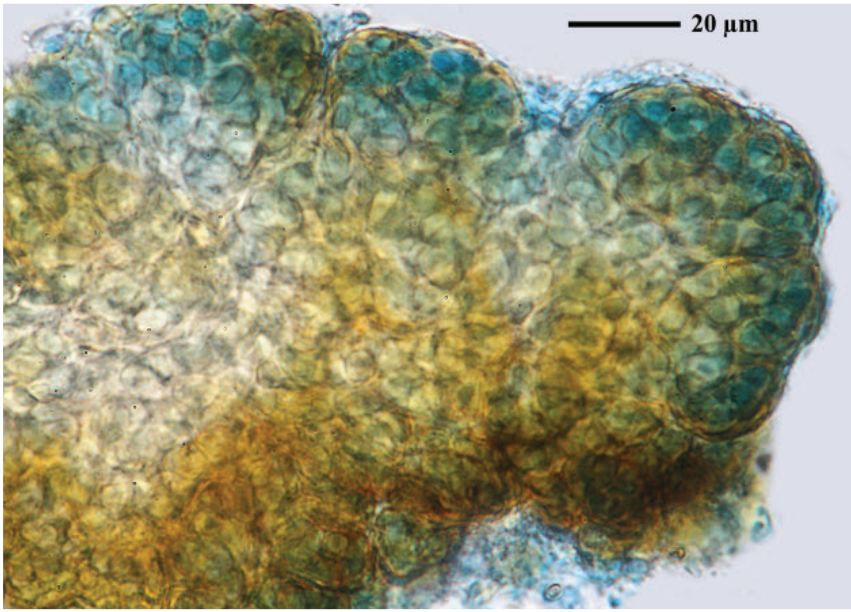



***Lempholemma chalazanum***




***Lempholemma chalazanum***




***Lempholemma chalazanum***

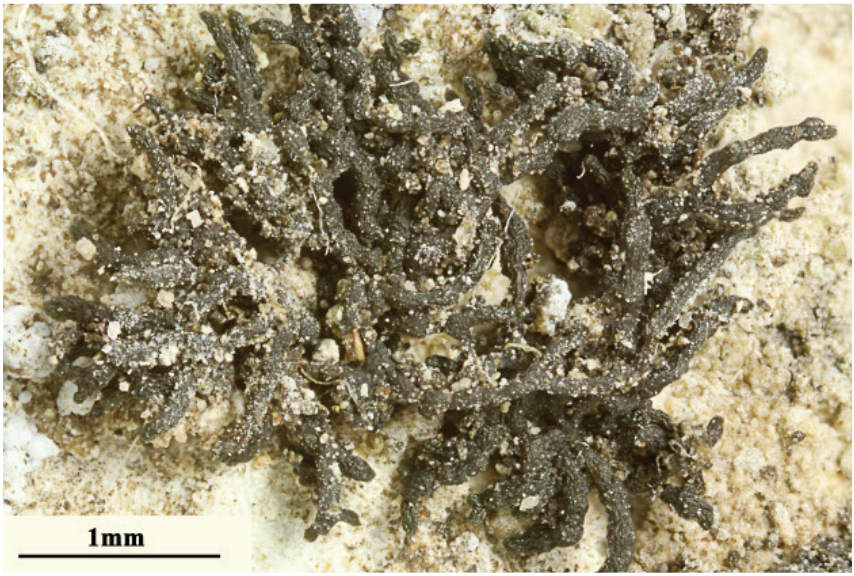
***Lempholemma intricatum*** (Arnold) Zahlbr., Cat. Lich. Univers. 3: 22 (1924) [1925]
= *Lempholemma fennicum* (Räsänen) Degel., (1946)]
= *Synalissa intricata* (Arnold) Nyl., Flora, Regensburg 66: 534 (1883)]

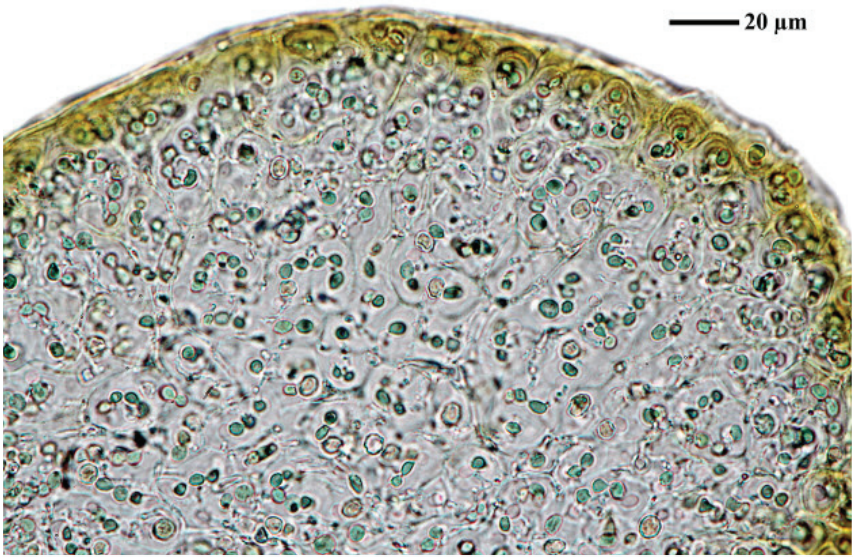
[TSB_31377], Italy, Friuli, Carnic Alps, Passo del Pura, Southern slopes of Mt. Nauleni, c. 2100 m, on limestone. Leg. M. Tretiach, 27.07.1999.





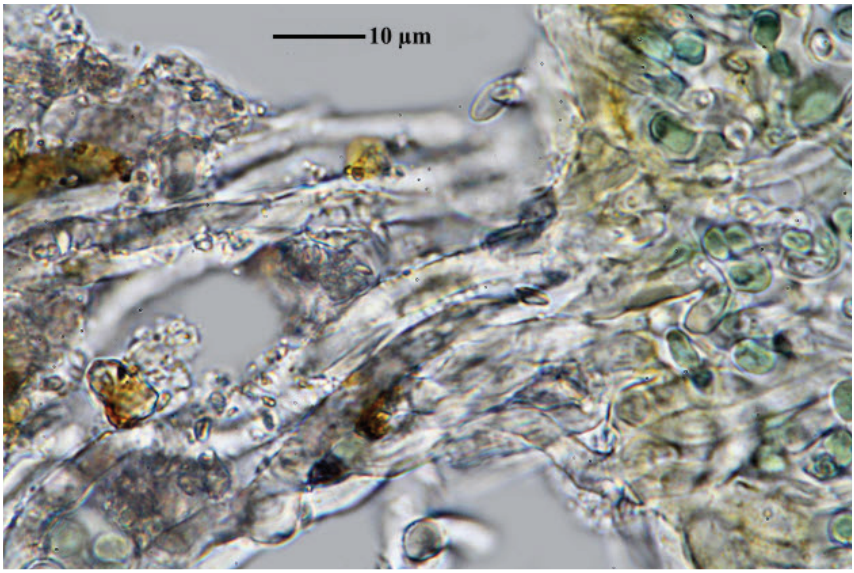

***Lempholemma intricatum***



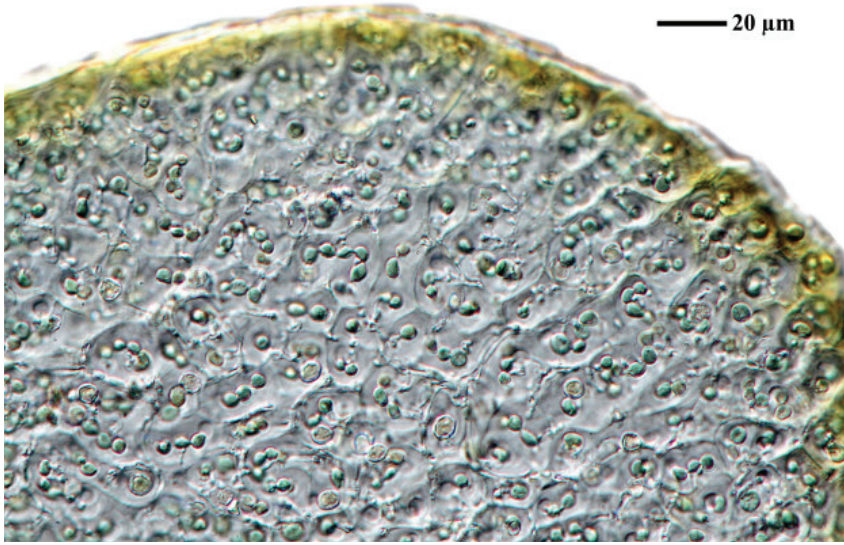



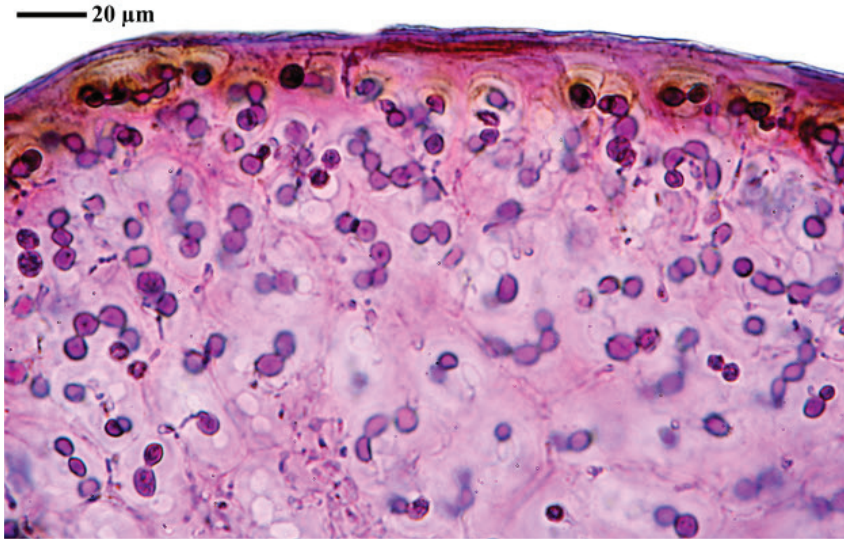

***Lempholemma intricatum***



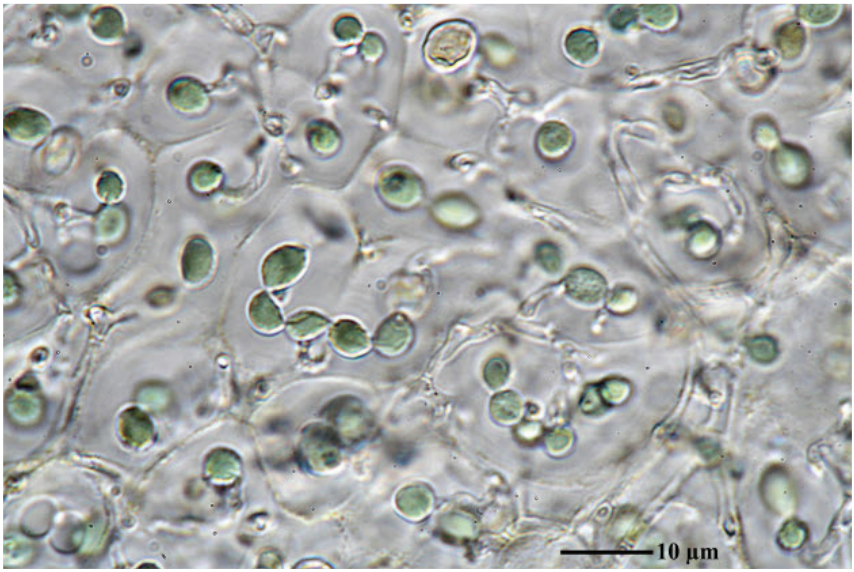



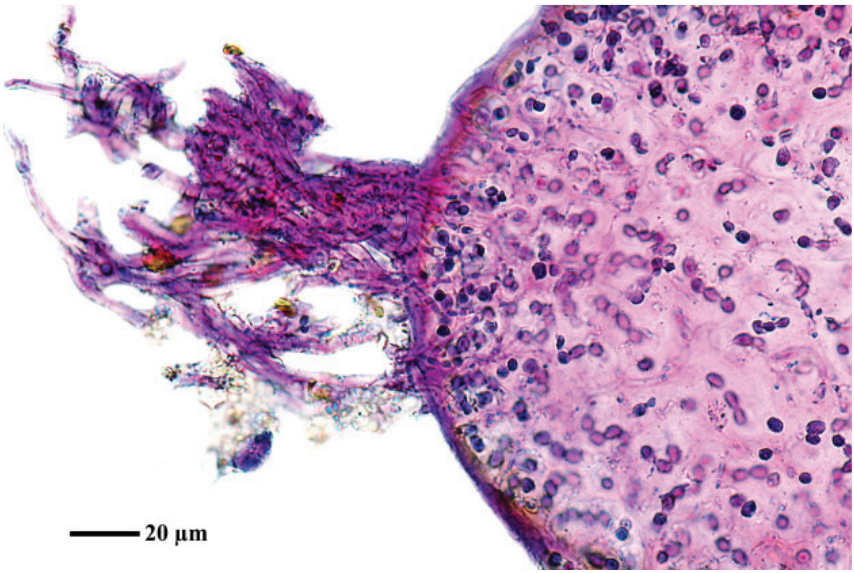

***Lempholemma intricatum***




***Lempholemma intricatum***



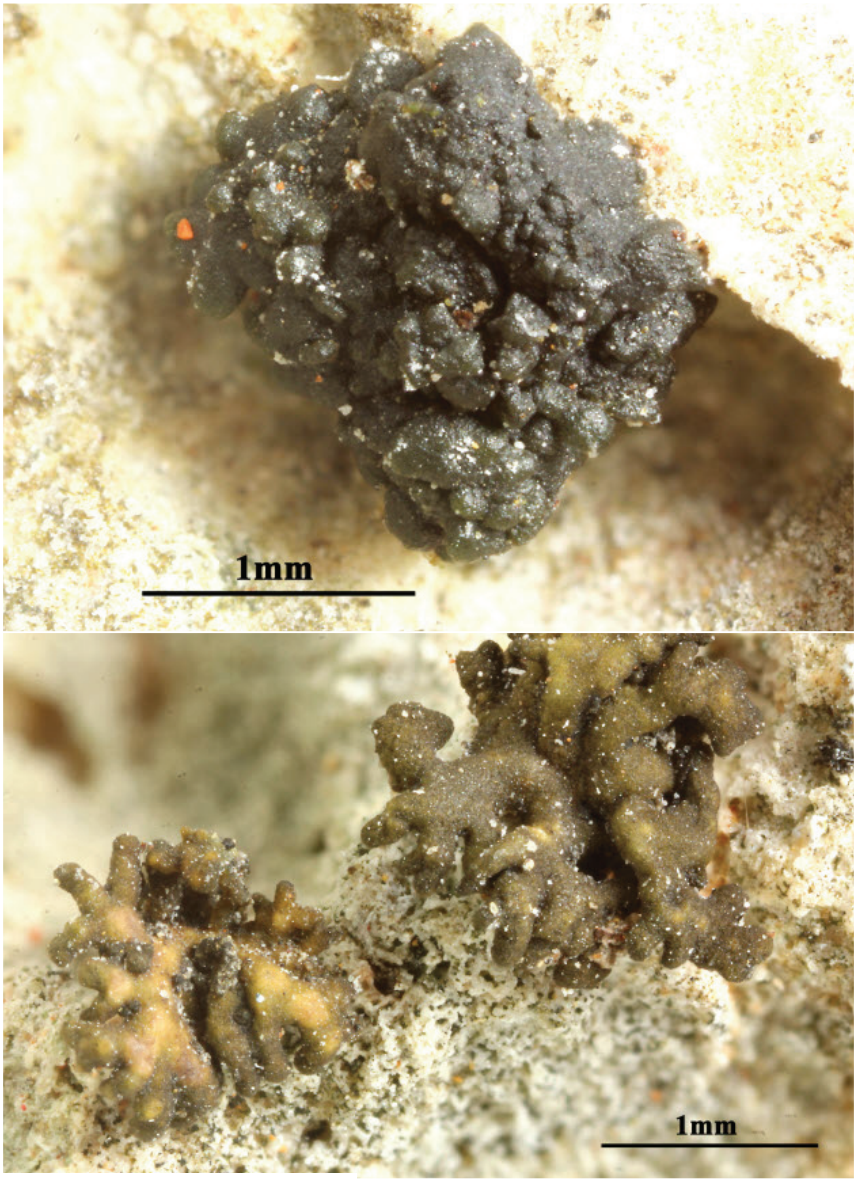

***Lempholemma intricatum***

***Lempholemma polycarpum*** M. Schultz, Lichenologist 37(3): 231 (2005)

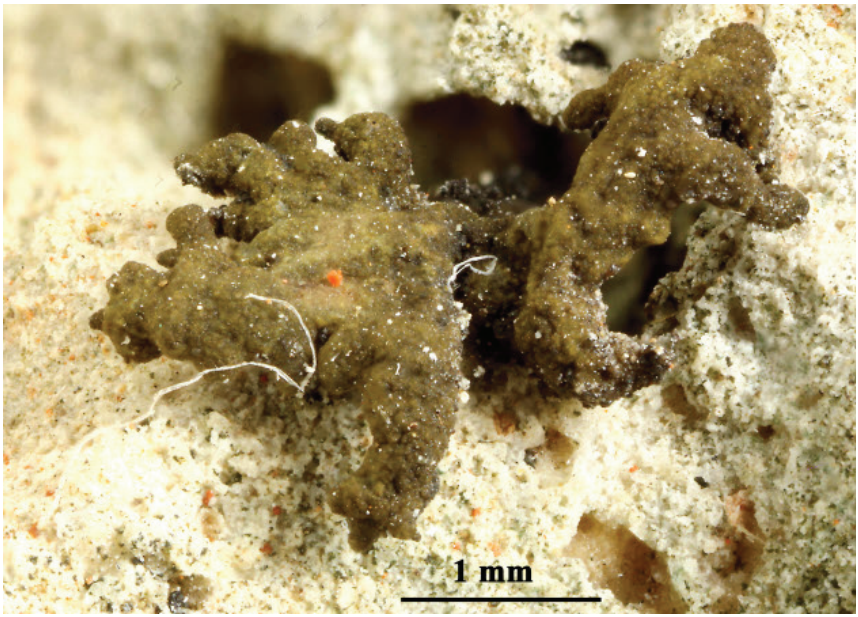
Thallus blackish, dull, rarely slightly pruinose, concolorous below, gelatinous when wet. Thalli consisting of individual, ± regular, umbilicate-lobate rosettes 3–6 mm in size. Lobes radiating, free, tongue-shaped, convex, 1–2 times furcately branched with diverging tips, short, 1.5–2.5 mm long, 0.5–0.6 mm wide, 0.25–0.45 mm thick. Lobe surface smooth becoming verrucose when numerous small apothecia are produced. Thallus ecorticate, anatomy homoiomerous but a few strands of hyphae may be present in the centre and at the base of the lobes. Mycobiont forming a loose network of elongated hyphae which becomes denser towards the lobe margins, cells 10–17.5 x 1.5–2(–5) µm. Photobiont Nostoc with twisted and bent, bead-like chains of 5–20 globose to ellipsoid cells. Photobiont cells 3–5 µm wide without sheath, 10–12.5 µm wide including the sheath, gelatinous sheath hyaline in the thallus centre, yellowish brown towards the upper surface. Apothecia usually abundant, 1–10 per lobe, very small, 200–250 µm wide, immersed to semi-immersed with low thalline margin, apothecial disc punctiform, depressed, finally open, 100–150 µm wide, reddish black when dry, dark red when moist and usually surrounded by pale brownish proper margin. Apothecia leaving small pits when old hymenia fall off. Uppermost part of the hymenium reddish brown, K–. Hymenium hyaline, 100 µm high, IKI+ blue. Subhymenium hyaline, 20–25 µm high, IKI+ blue. Paraphyses straight, sparingly branched and anastomosing, distinctly septate, apical cell slightly thickened, 3.5(–5) µm wide. Excipulum proprium thin, 7.5–12.5 µm wide, apically slightly widened and somewhat brownish, otherwise hyaline, composed of thin, interwoven hyphae. Asci cylindrical to narrowly clavate, up to 75 x 7.5–10 µm, ascus wall thin throughout, IKI–. Ascospores eight, simple, hyaline, broadly ellipsoid, 12.4(±1.3)–6.5(±0.9) µm ; spore wall slightly thickened with age, up to 1.5 µm wide. Pycnidia immersed to semi-immersed, ± globose to broad pyriform, 75–100 x 100 µm, wall simple, ostiolum dark coloured. Conidia simple, hyaline, bacilliform to slightly rod-shaped, 3.5–4 x 1–1.5 µm, produced terminally on simple conidiophores. Ontogeny. Ascogones arise beneath pycnidia (pycnoascocarps). Juvenile asci are formed in the pycnidial cavity when some of the conidiophores are still producing conidia, whereas other conidiophores become stretched, thus functioning as ‘primary’ paraphyses. In young apothecia remnants of conidiophores

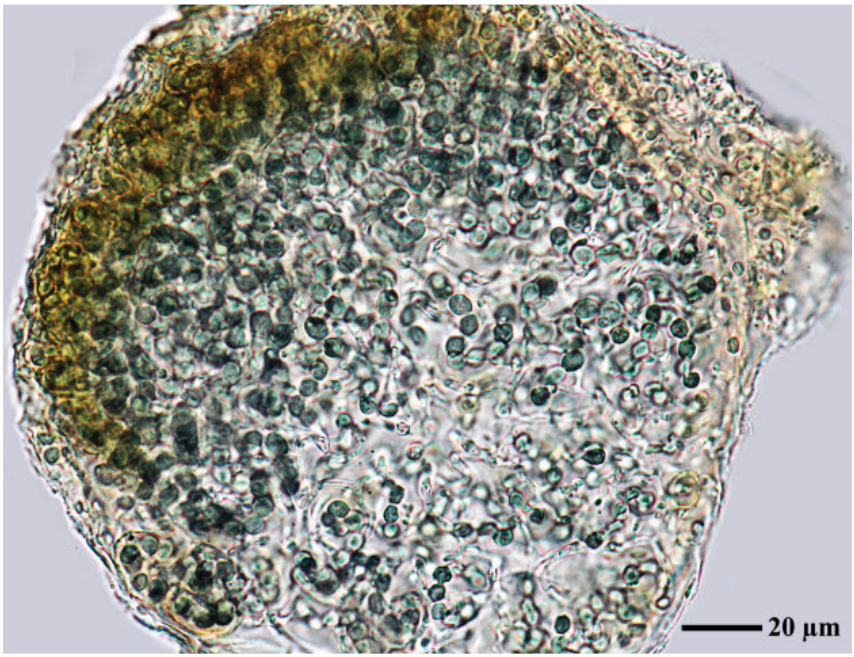
are often visible between the hymenium and the surrounding proper exciple.

[ABL25794], USA, Puerto Rico, Distr. Ponce, Reserva forestal de Guanica, road 333, km 7.9, dra scrub forest, on limestone. 17°57' M, 66°54' W, 10 m. Leg. A. & M. Aptroot (no 25794), 21-31.05.1989, det. M. Schultz, 03.2007.

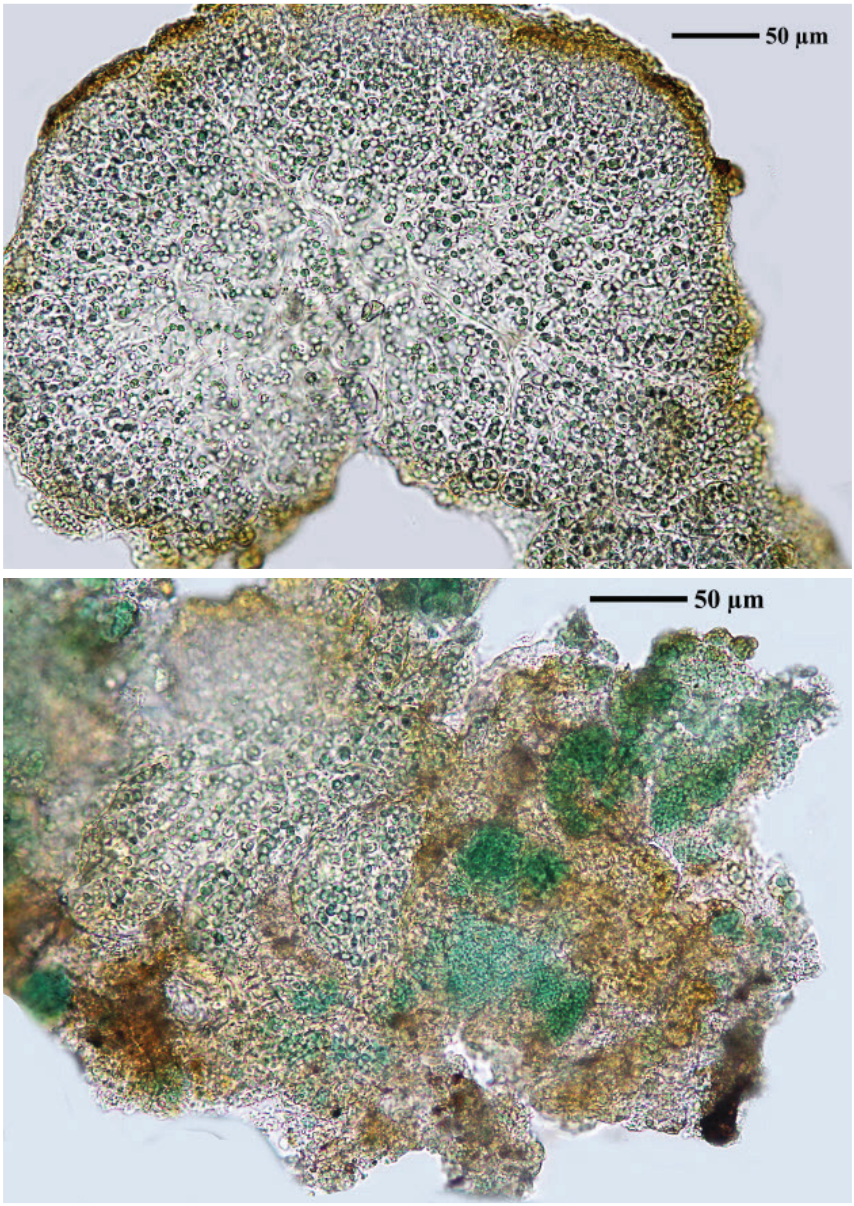



***Lempholemma polycarpum***

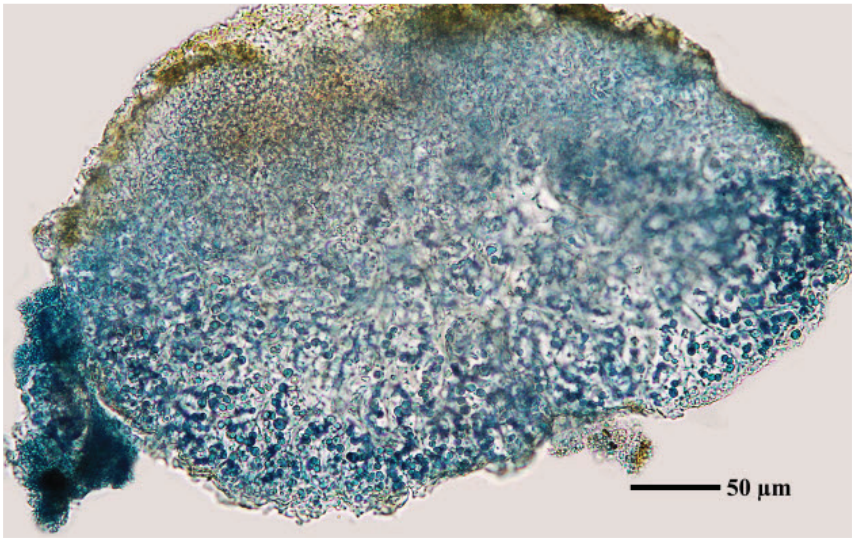


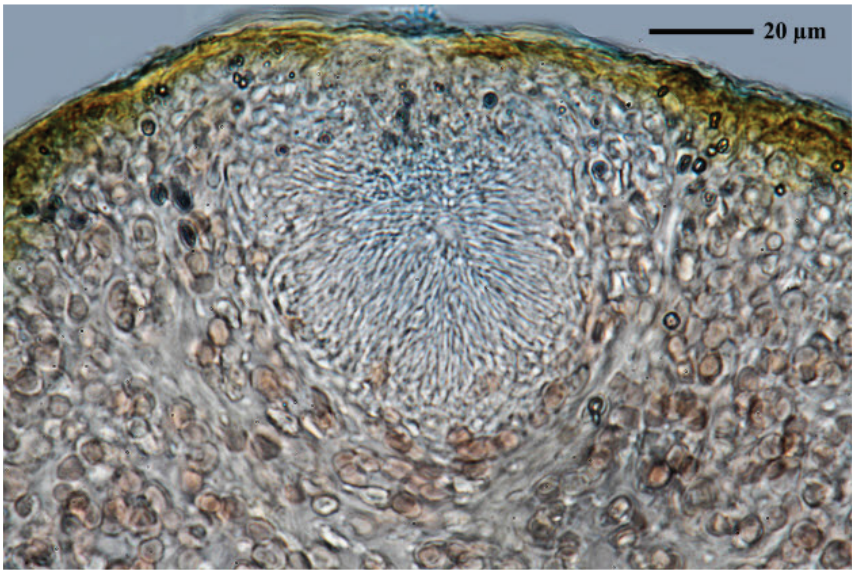




***Lempholemma polycarpum***

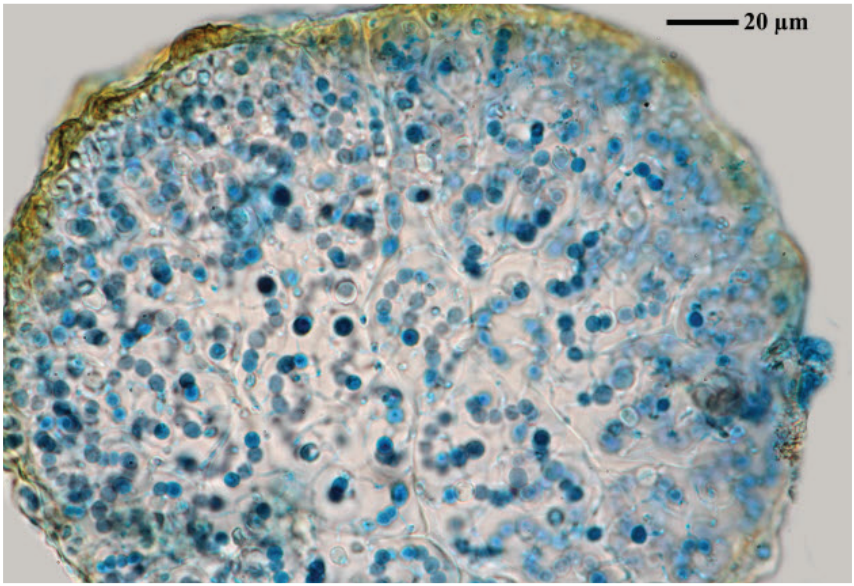


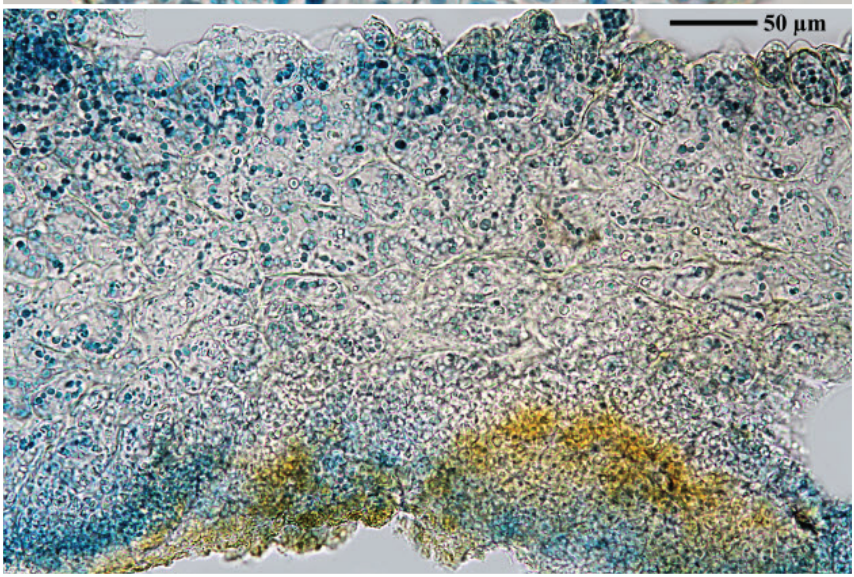

***Lempholemma polycarpum***



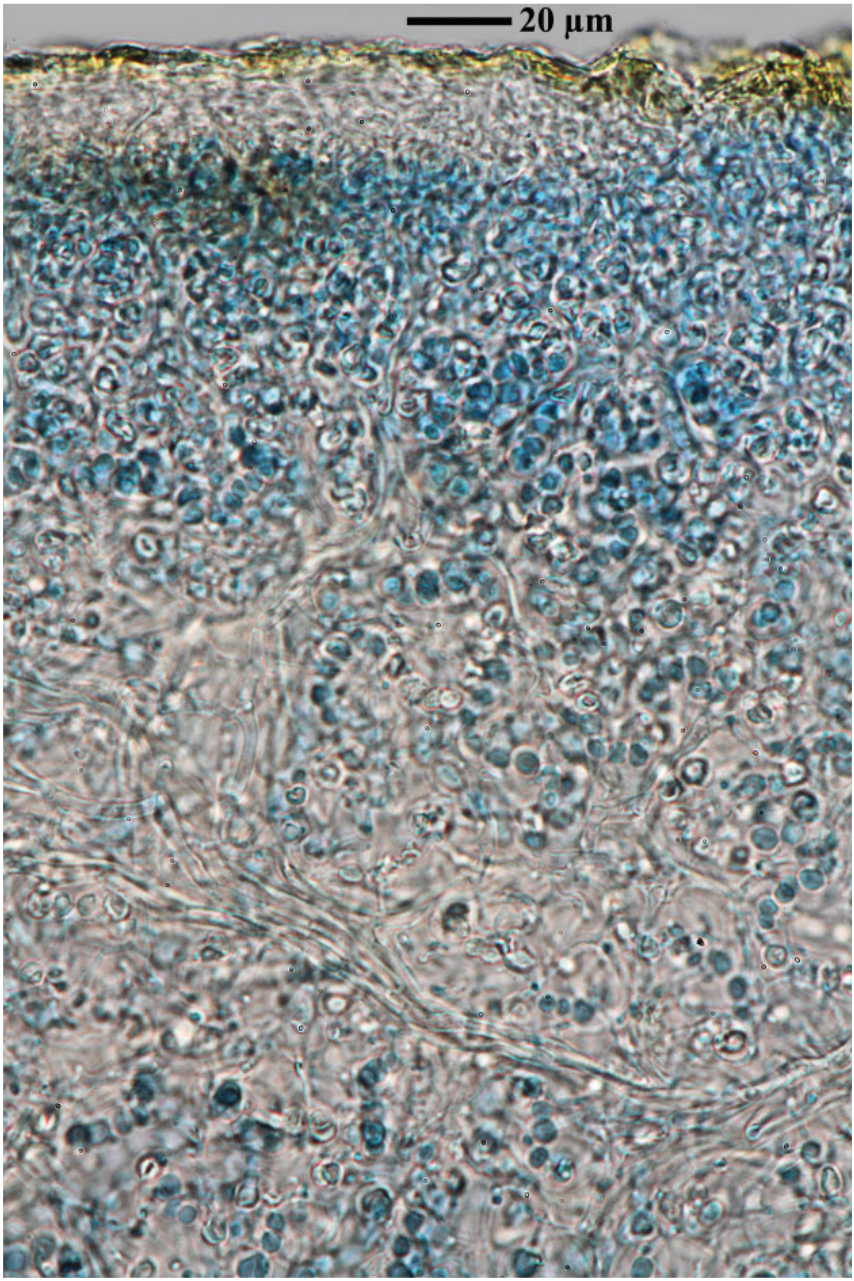




***Lempholemma polycarpum***




***Lempholemma polycarpum***



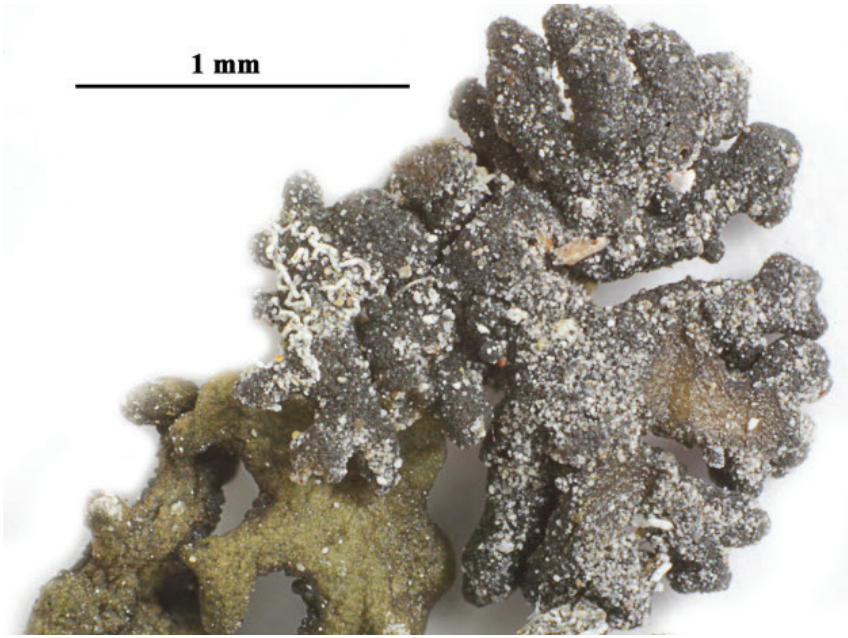

***Lempholemma polycarpum***

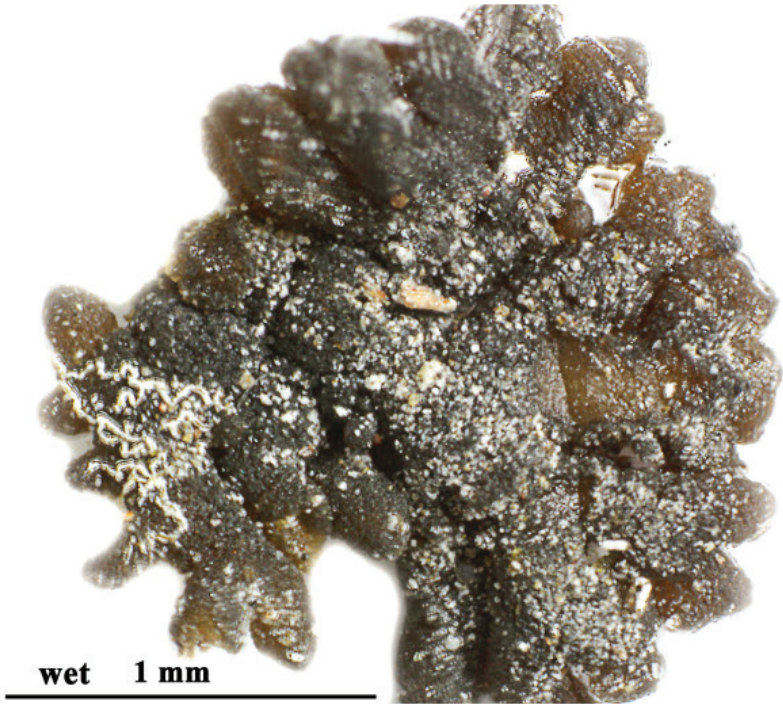
***Lempholemma polycarpum*** M. Schultz, Lichenologist 37(3): 231 (2005)

Nostoc chains

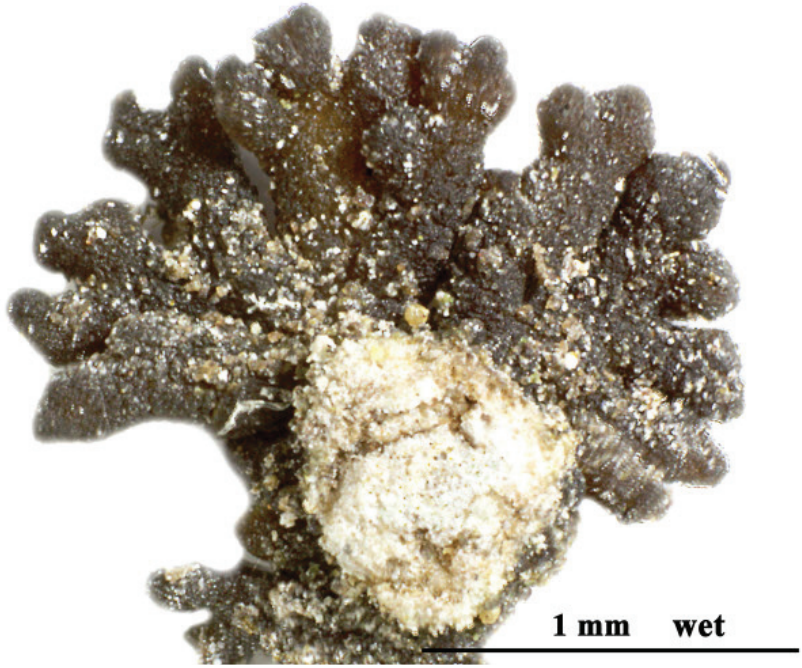
**[**ABL60808]**,** Costa Rica, Prov. Guanacaste, Barra Honda National-park, 10 km ENE of Nicoya. 85°21' W, 10°10' N, 450-500 m. On limestone in open semideciduous forest along trail to Terciopelo cave. Leg. A. Aptroot (no 60808), 22.03.2004, det. A. Aptroot, 2023.



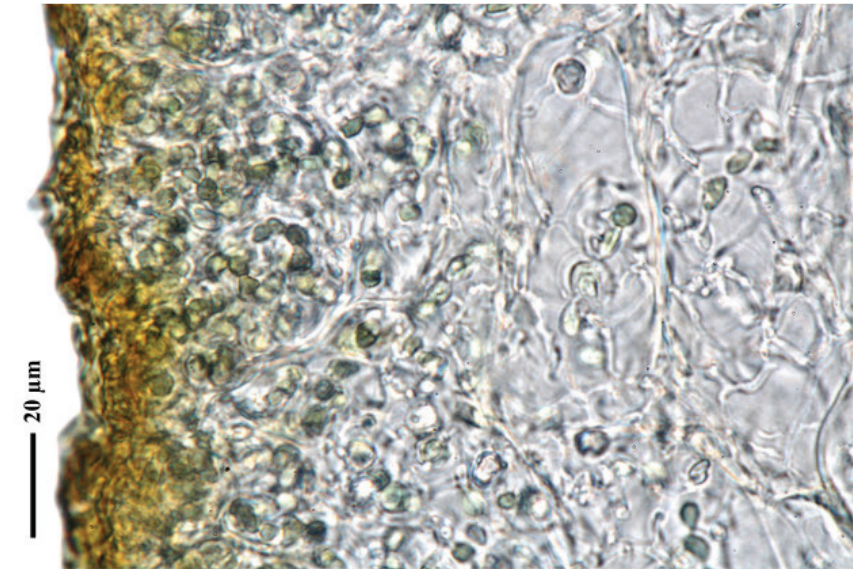


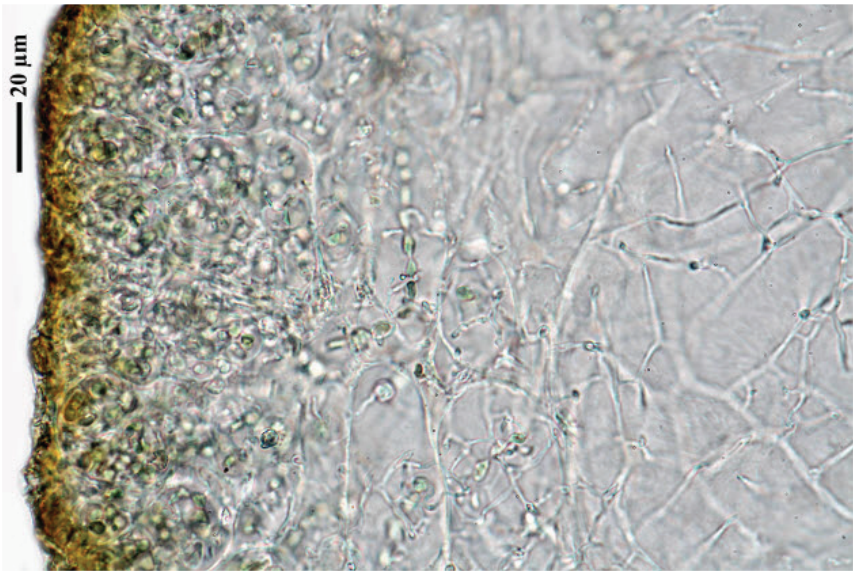




***Lempholemma polycarpum***

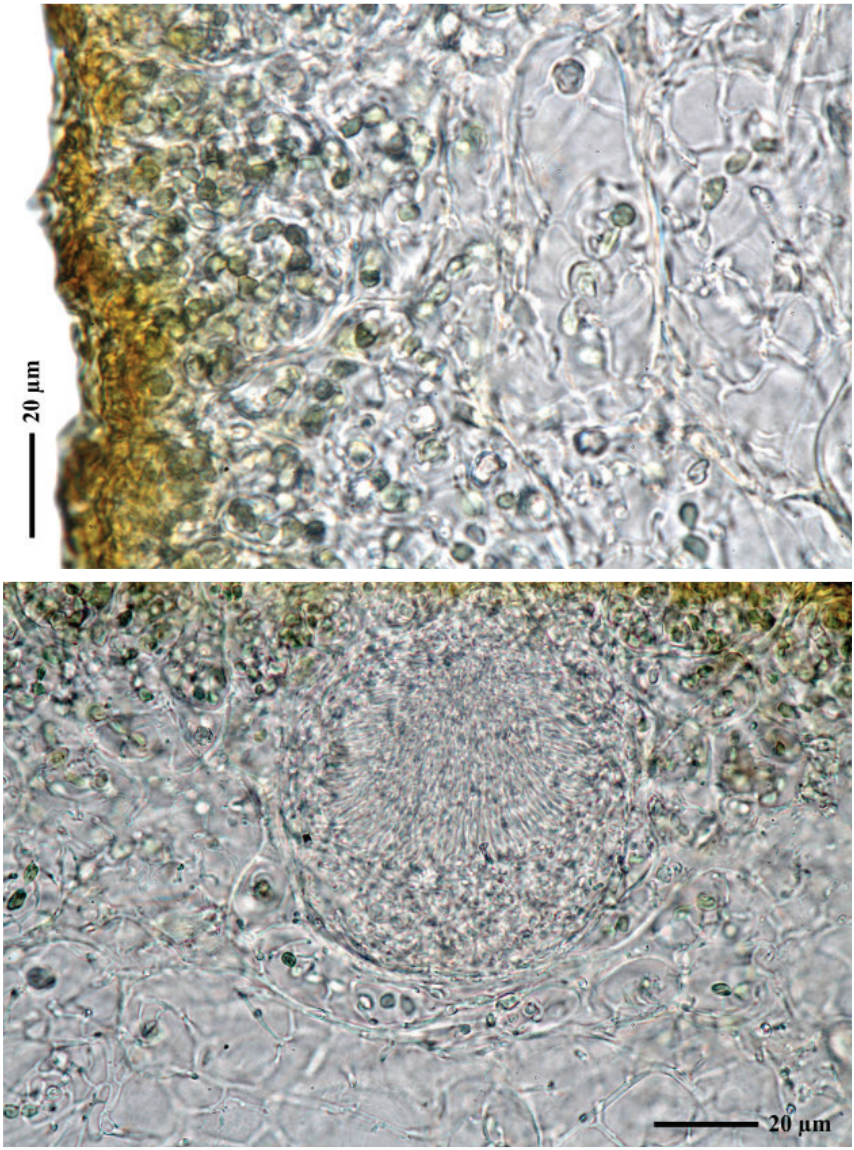



***Lempholemma polycarpum***

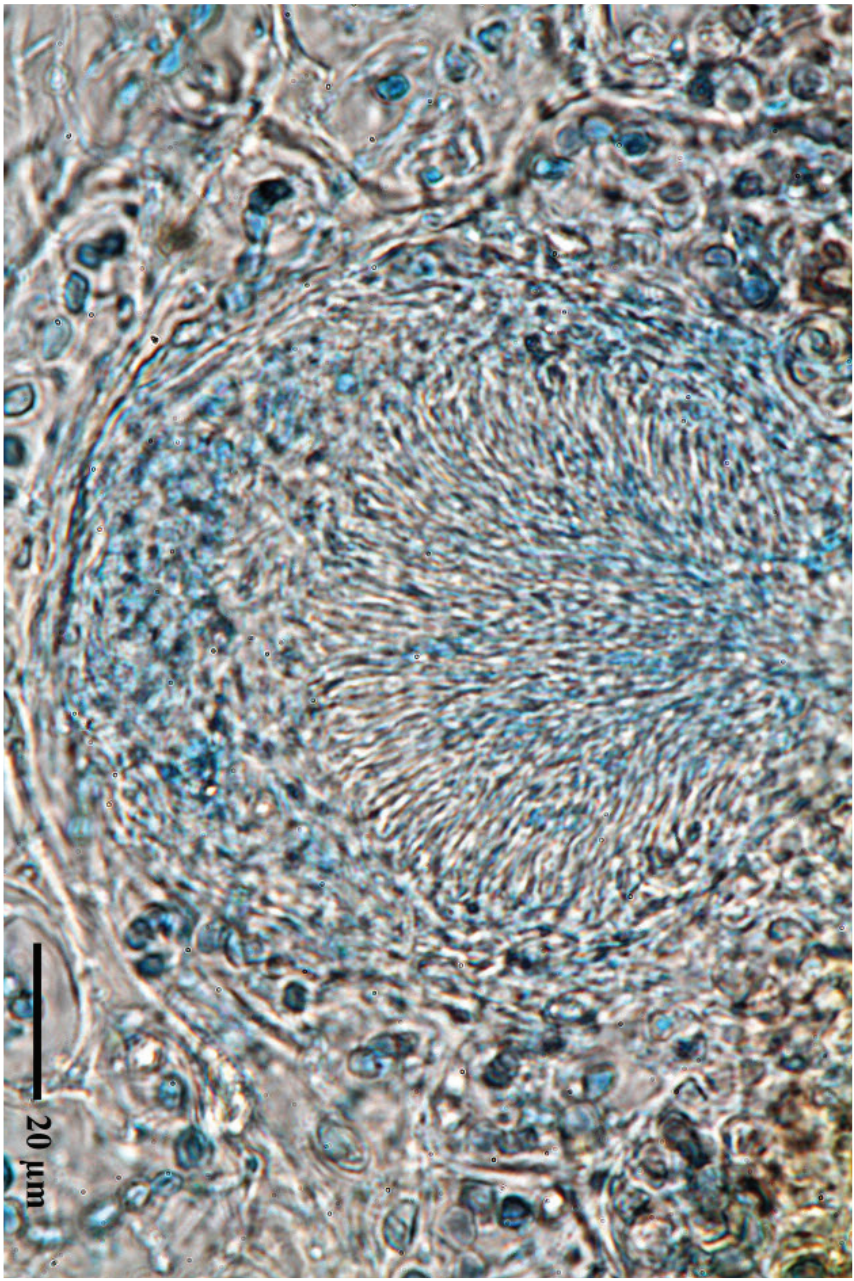



***Lempholemma polycarpum***




***Lempholemma polycarpum***



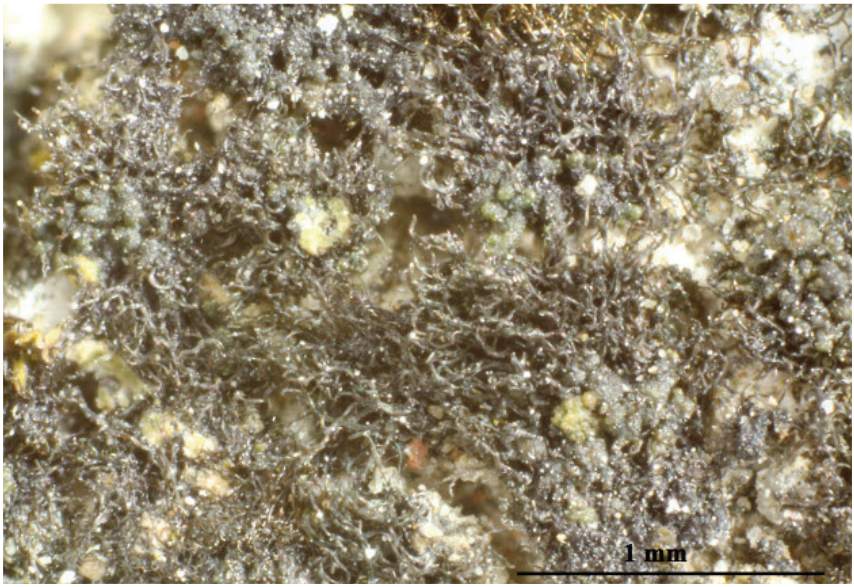

***Lempholemma polycarpum***

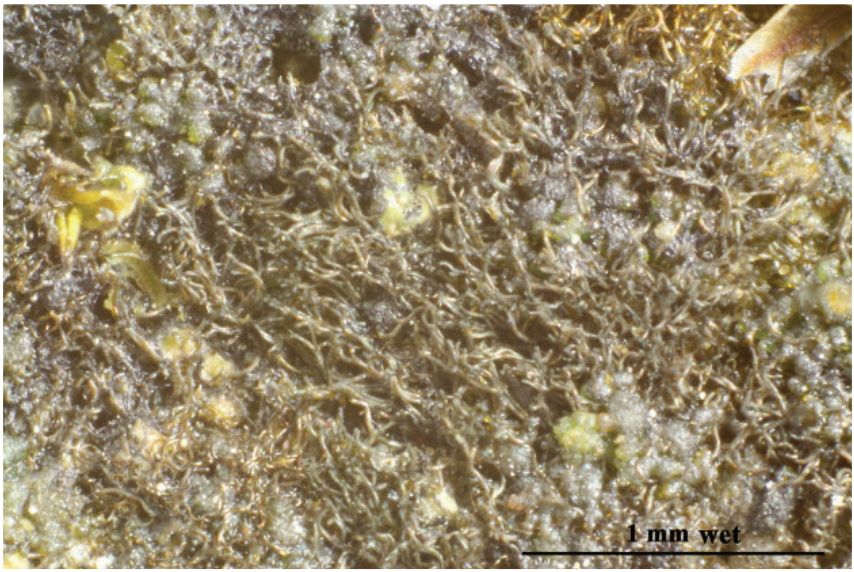
***Leprocollema americanum*** Vain., Acta Soc. Fauna Flora fenn. 7(no. 1): 232 (1890)

Hymenium divided by bands of sterile hyphae. Excipulumproprium thick an distinct, pale. Ascospores simple, hyalin, 20–25 x 10–13 µm.

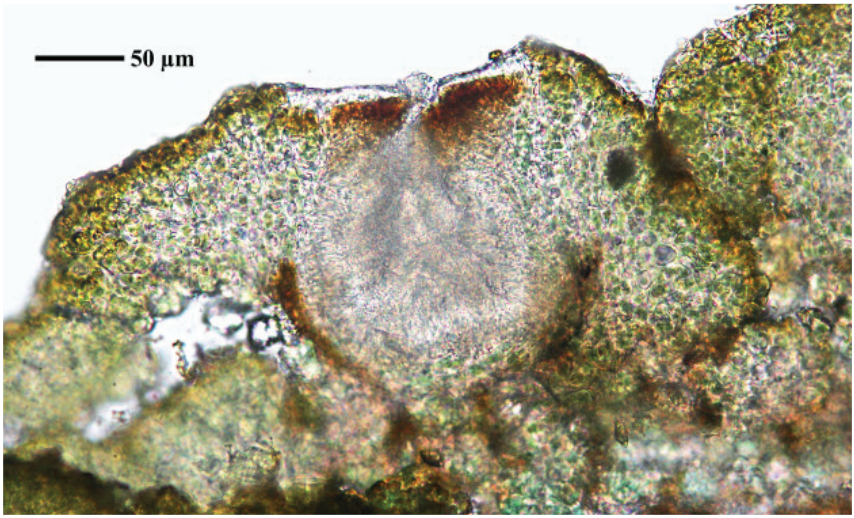
[ABL53008], Taiwan, Tainan County, Tainan, Anping, Fort Zeelandia, on mortar.23°00’11’’ N, 120°11’38’’ E, 5 m. Leg. A. Aptroot (no 55008), 15.10.2001, det. M. Schultz, 08.2005.

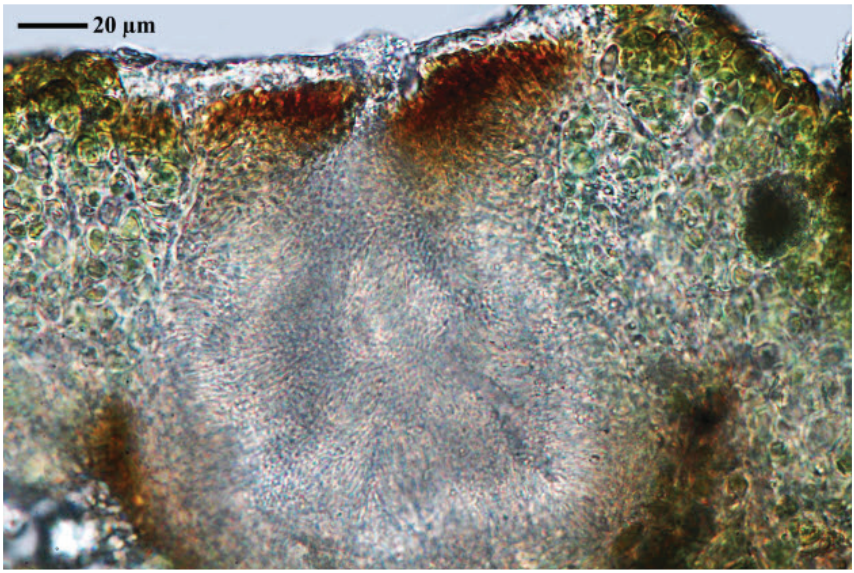





***Leprocollema americanum***

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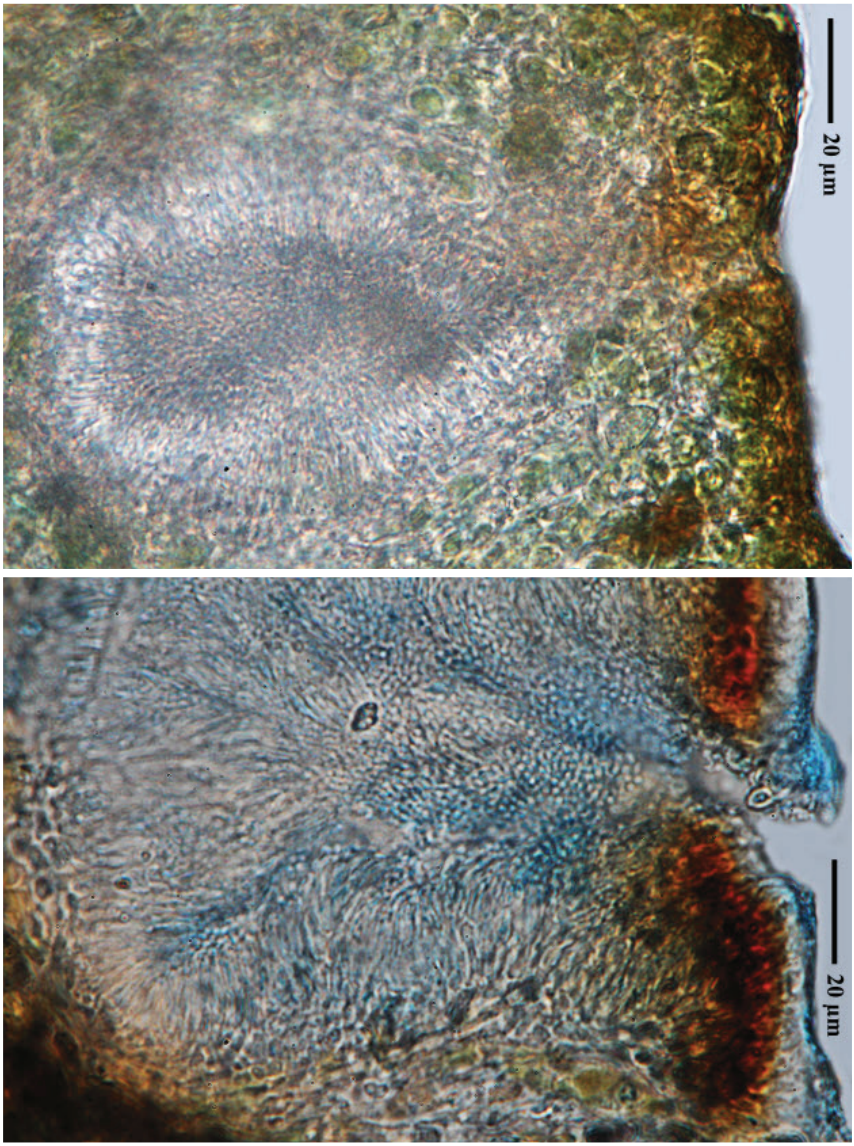


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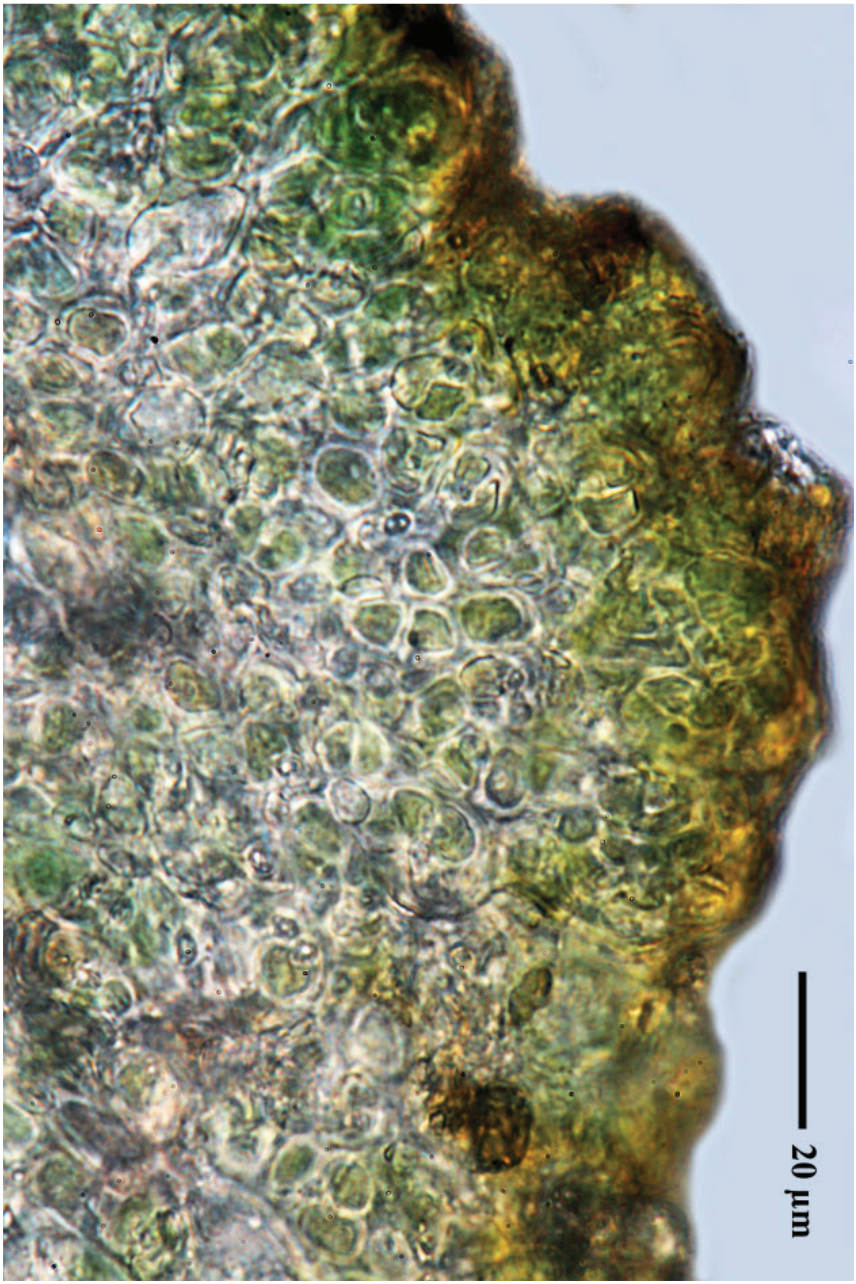


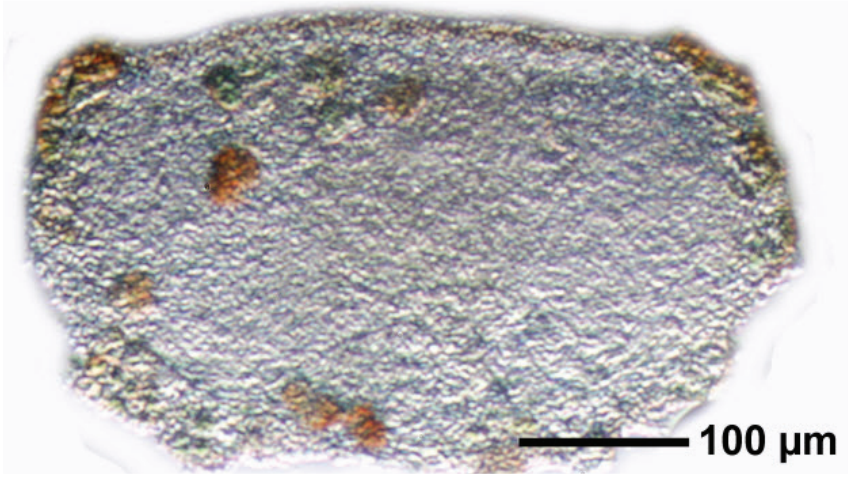

***Leprocollema americanum***

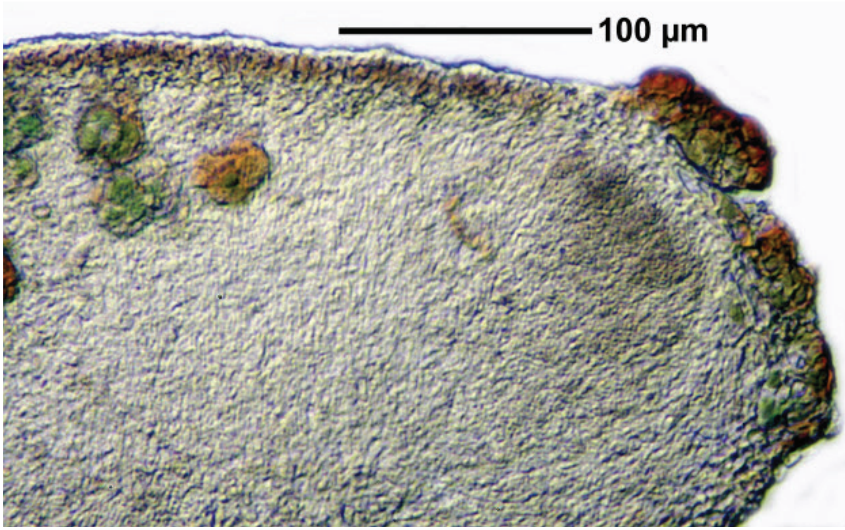
***Leprocollema novocaledonianum*** A.L. Sm. [as 'nova-caledonianum'], J. Linn. Soc., Bot. 46(1): 78 (1922)

Ascospores simple, hyaline, 17–8 µm

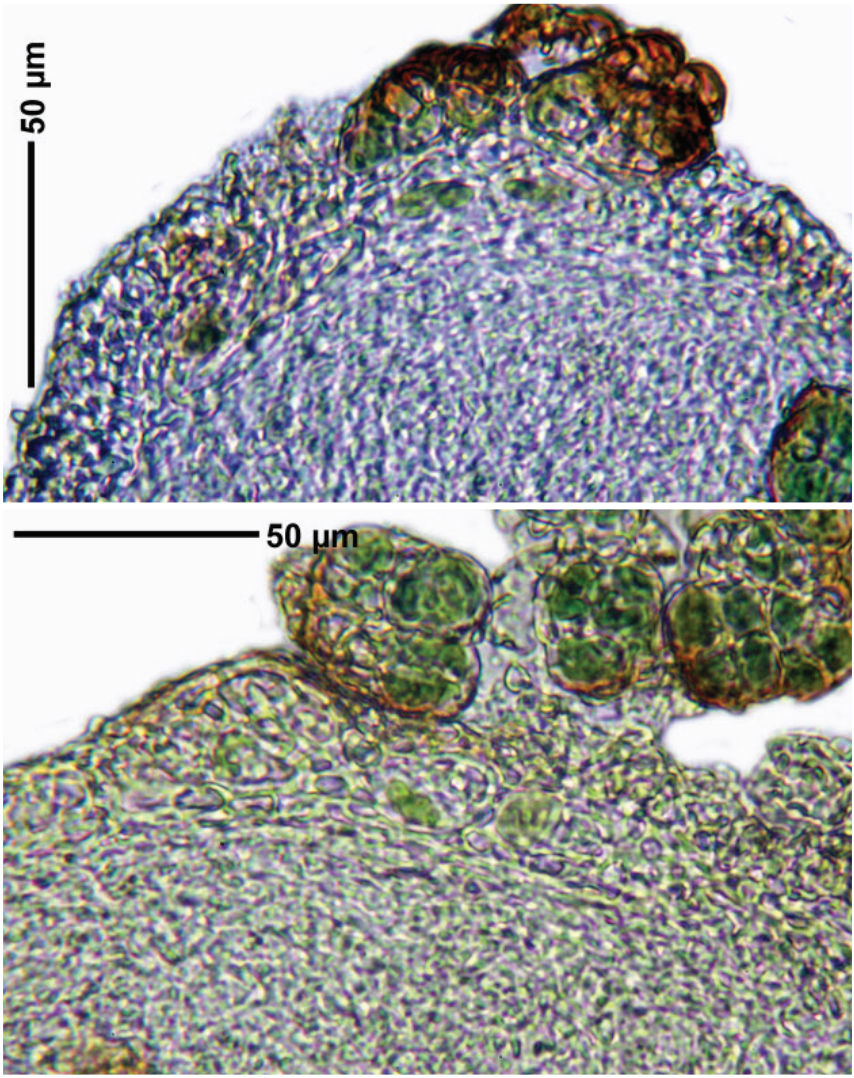
[14361], Seychelles, Praslin, Anse La Blague, beim Hotel La Vanilla, 4°19.793' S, 55°47.019' E, 17 m; an Cocos nucifera. Leg. F. Schumm, 27.09.2008, det. A. Aptroot 2008.



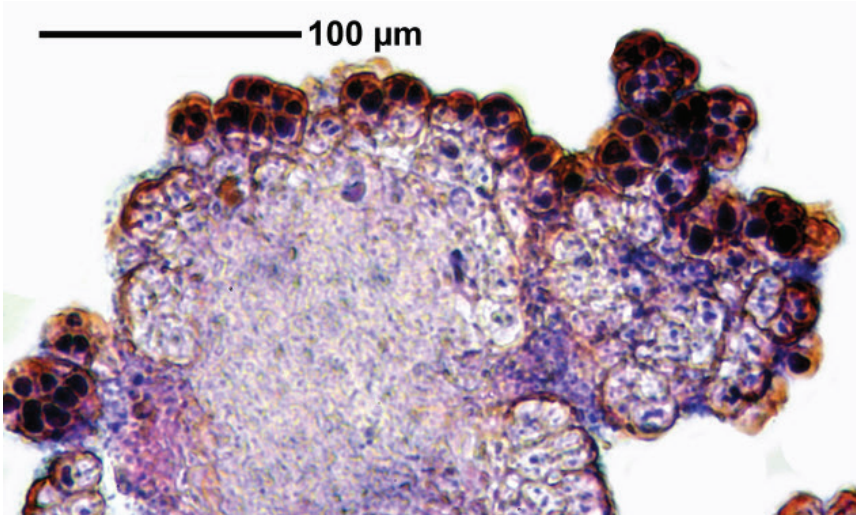


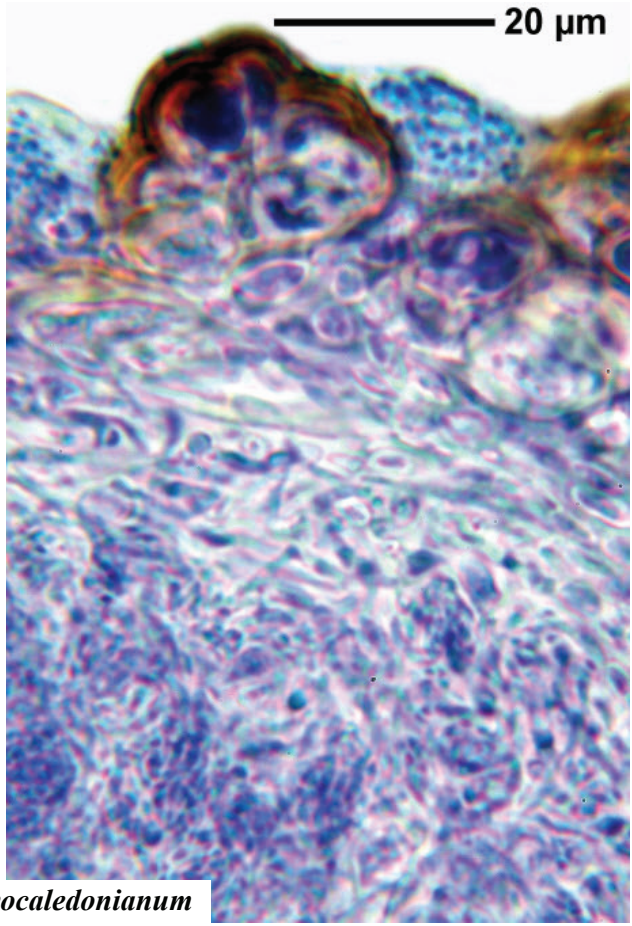




***Leprocollema novocaledonianum***

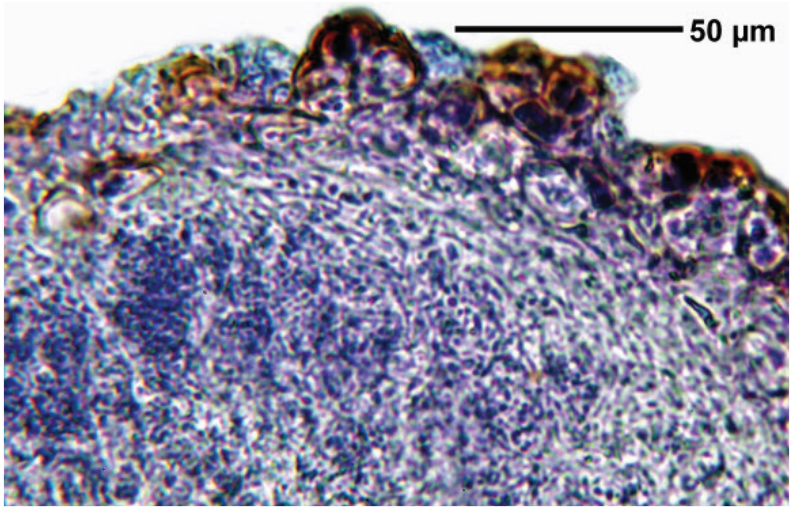


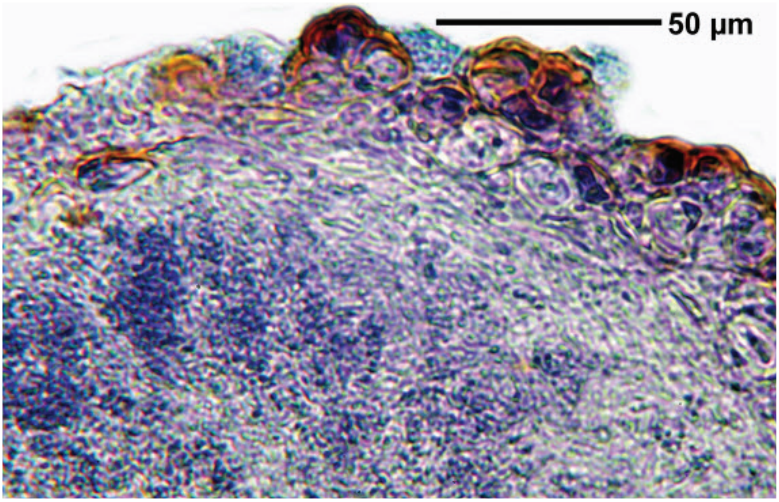

*Leprocollema novocaledonianum*




***Leprocollema novocaledonianum***



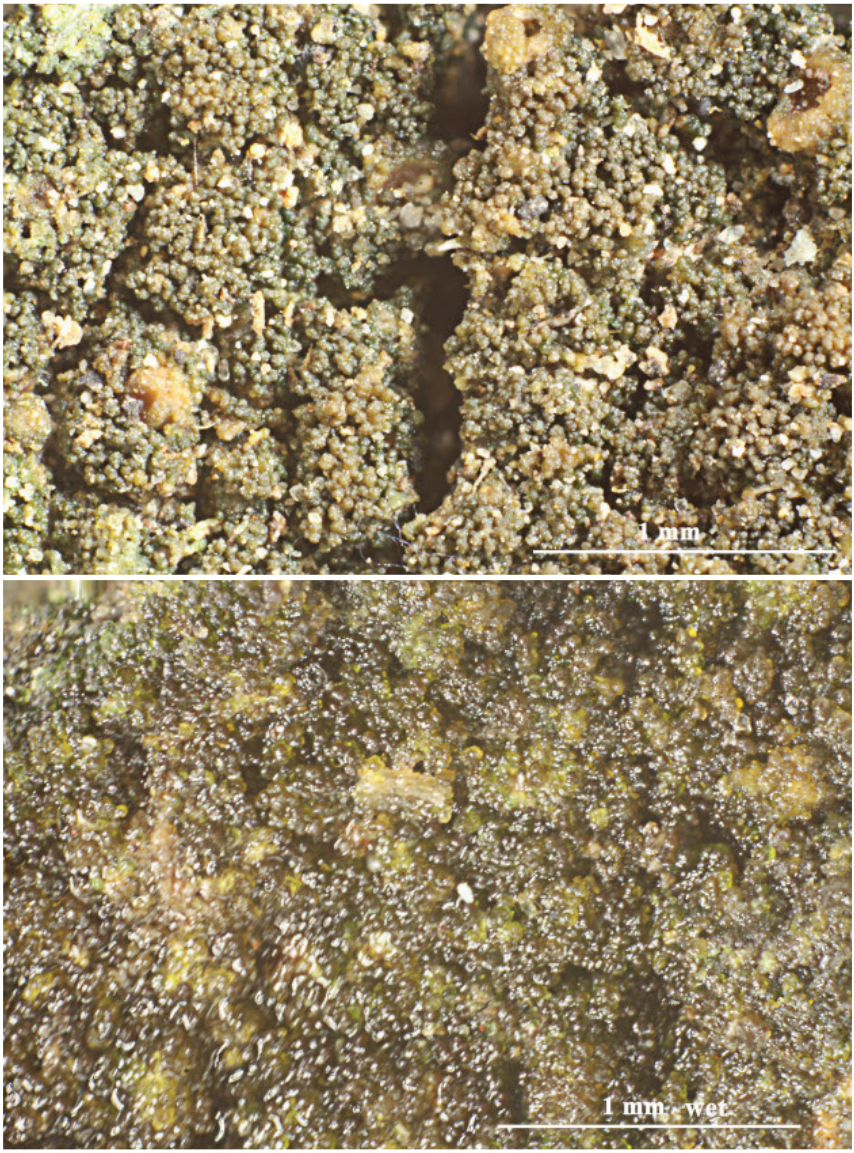

***Leprocollema novocaledonianum***

***Leprocollema novocaledonianum*** A.L. Sm. [as 'nova-caledonianum'], J. Linn. Soc., Bot. 46(1): 78 (1922)

Ascospores simple, hyaline, 17–8 µm

[ABL48008], Brazil, Sergipe. Poço Redondo, Cajueiros, Trilha Eco-parque, on tree bark in Caatinga. 09°39’43’’ S, 43°40’18’’ W, 30 m. Leg. A. Aptroot (no 48008) & M. Cáceres, 15.11.2018, det. A. Aptroot, 2018.



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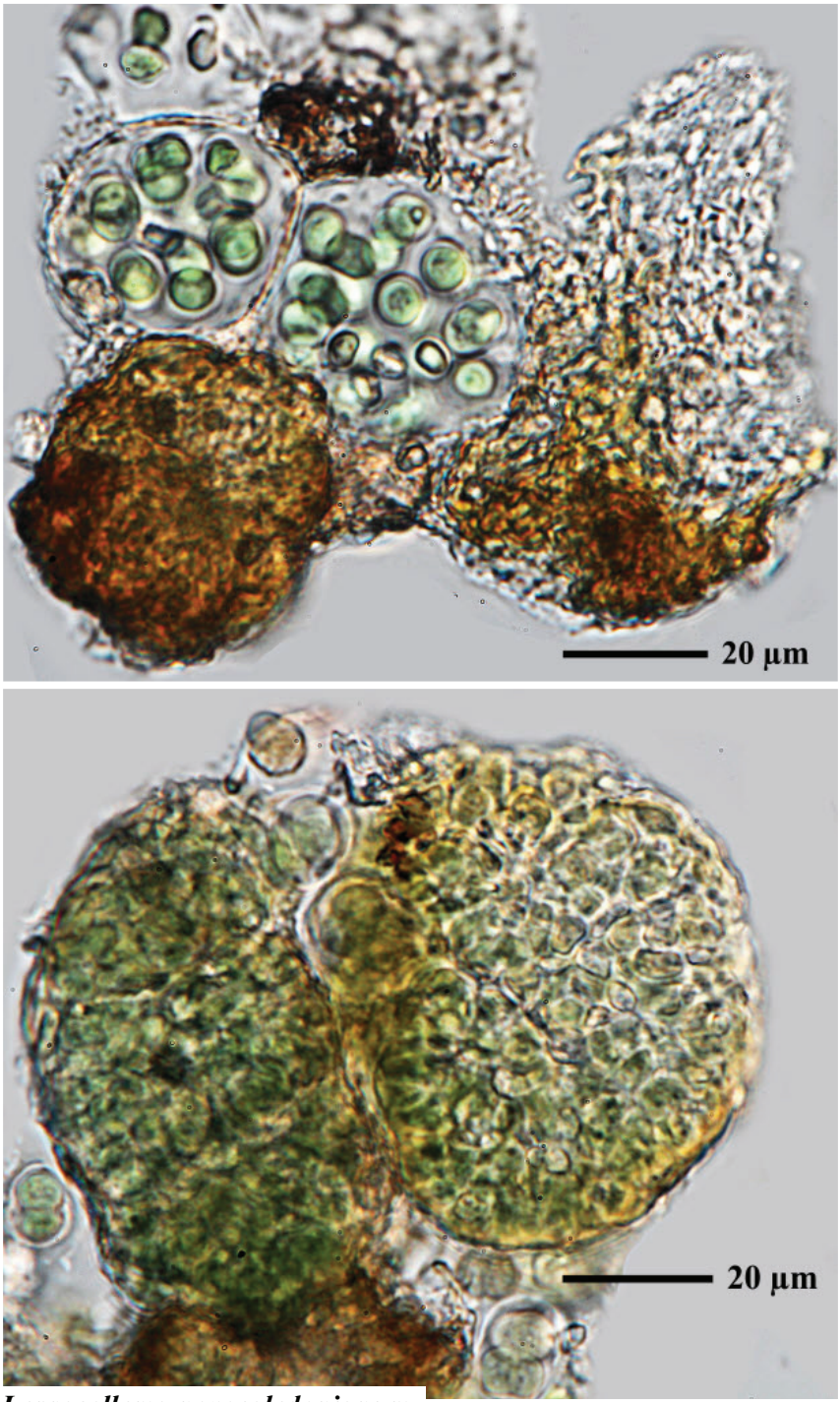


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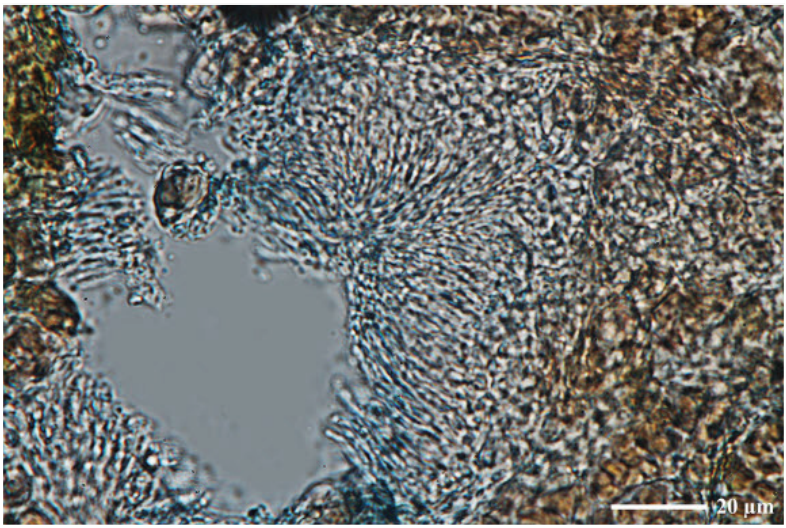
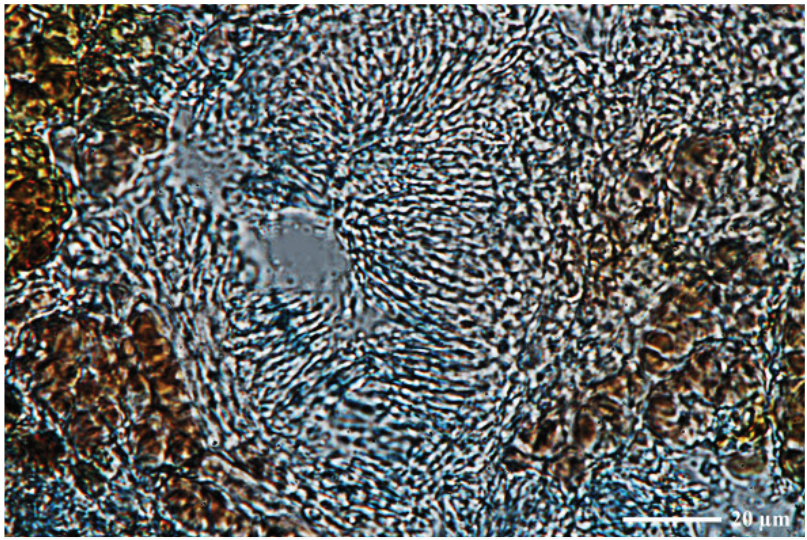


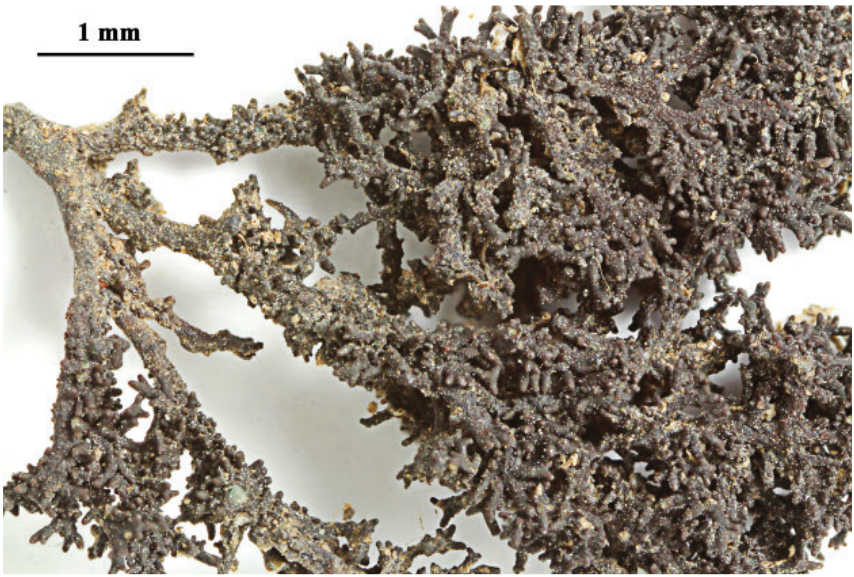

***Leprocollema novocaledonianum***

***Lichinella iodopulchra*** (Couderc ex Croz.) P.P. Moreno & Egea, Cryptog. Bryol.-Lichénol. 13(3): 245 (1992)
= *Omphalaria iodopulchra* Couderc ex Croz. 1910

Thallus small-foliose to squamulose-umbilicate, gelatinous when wet, black, usually smooth, sometimes becoming uneven, the squamules 10–15(–20) mm wide, forming rosettes or cushions, at first flat and lobulate, soon becoming divided into erect, adpressed or ascending, 2–4 mm wide and 0.4–0.8 mm thick lobes with a narrow base, rounded tips, and down-turned margins; lower surface attached by a central holdfast. Thallus 0.6–0.8 mm thick, the outer part formed by short-celled, 1.5–2.5 µm thick, mainly anticlinally oriented hyphae enclosing the photobiont cells, the medullary part of loosely arranged, 1–1.5 µm thick hyphae with cylindrical cells, lacking photobionts. Apothecia thallinocarps, sunken in thallus and difficult to recognize unless when wet, marginal to submarginal, filling the entire lobe tip, 2–4(–6) mm across, round to irregularly shaped, with a slightly flat to convex, dotted or fissured disc, and a 50–100 µm thick thalline margin. Proper exciple indistinct; epithecium brownish, 20–30 µm high; hymenium 80–100 µm high, finally incompletely separated into partial hymenia by intrusions of wedge-shaped, sterile thalline tissue, covered by a continuous layer of sterile tissue separated only by the pore-like discs of the partial hymenia, I+ blue turning wine-red; paraphyses short-celled, 2–3 µm thick, not or only slightly capitate; subhymenium compact, 30–40 µm high. Asci 16–32-spored, with a thin, one-layered, non-amyloid wall, an amyloid external apical cap, and passive spore discharge via apical rupturing. Ascospores 1-celled, hyaline, broadly ellipsoid, 5–9 x 3–5 µm. Pycnidia globose to broadly pyriform, immersed, unilocular, up to 0.2 mm wide. Conidia ellipsoid, 2–3 x 1–1.5 µm. Photobiont cyanobacterial, chroococcoid, with a few cells measuring 5–9 x 3–5 µm, penetrated by haustoria and surrounded by a brownish gelatinous sheath. Spot test: all negative. Chemistry: without lichen substances. Note: on steeply inclined to vertical seepage tracks of more or less calcareous or basic siliceous rocks.

[ABL79369], Brazil, Rio Grande do Sul, Cangaçu, Baixada do Rodeiro, Rio Pantanosa, on exposed siliceous rock. 31°14’20’’ S, 52°43’57’’ W, 260 m. Leg. A. Aptroot (no 79369), 16.07.2019, det. A. Aptroot, 2019.



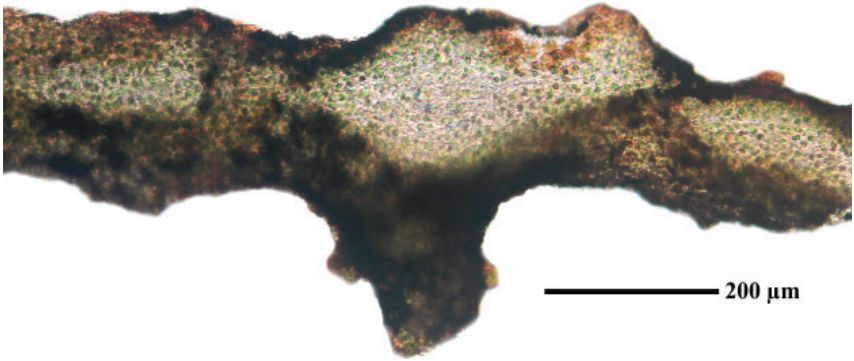

***Lichinella iodopulchra***

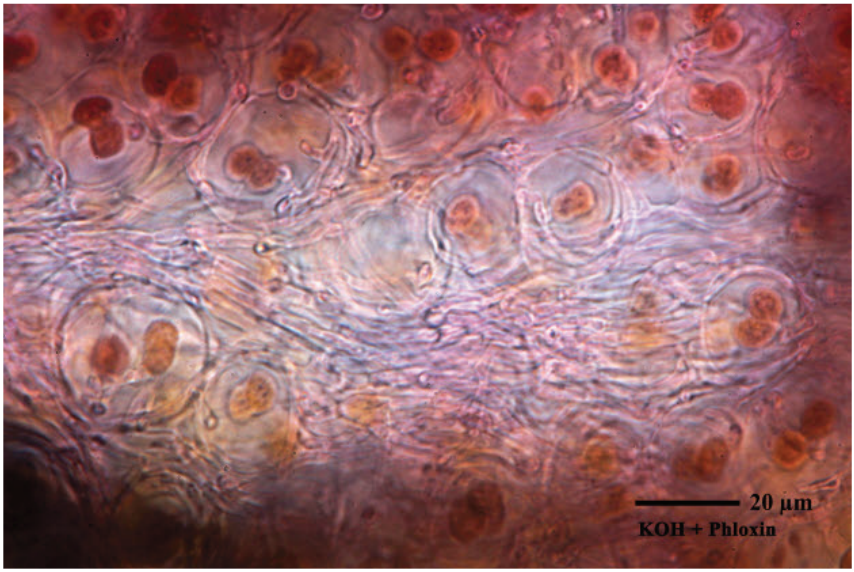



***Lichinella iodopulchra***

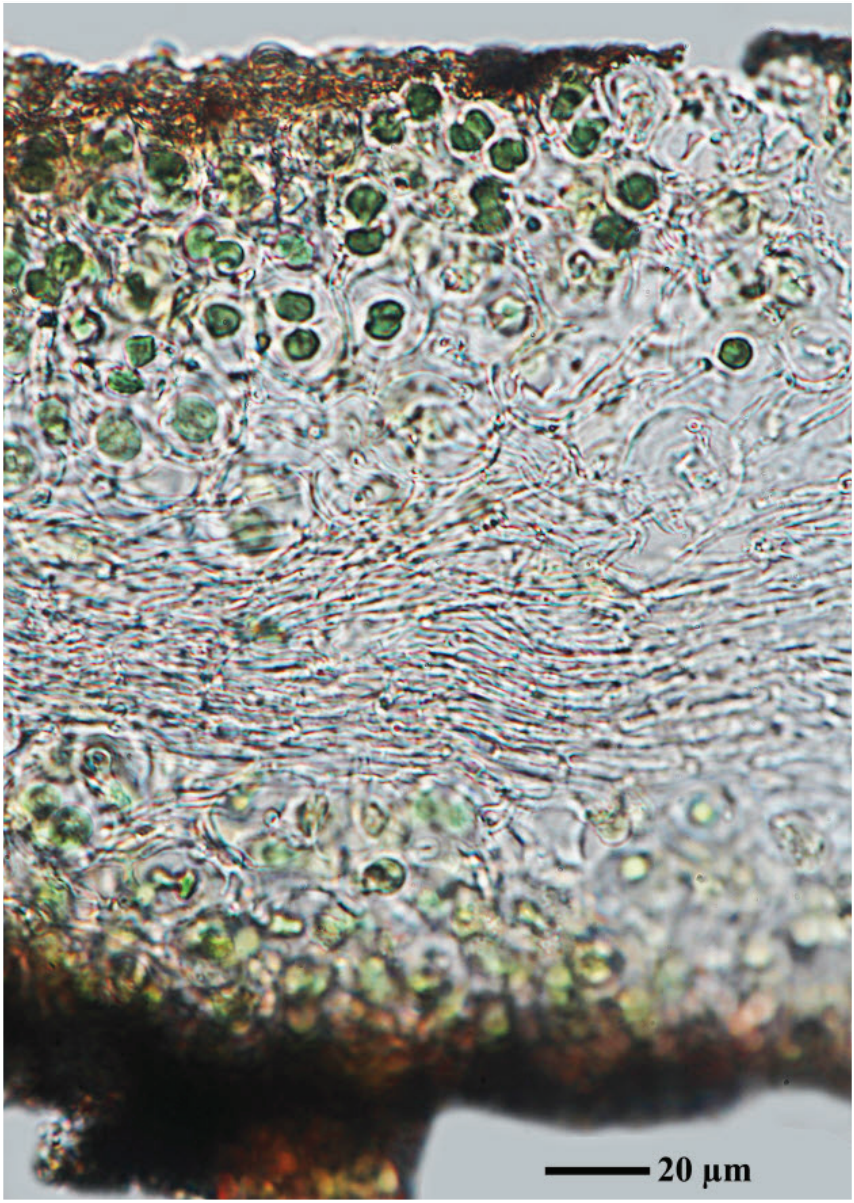



***Lichinella iodopulchra***




***Lichinella iodopulchra***

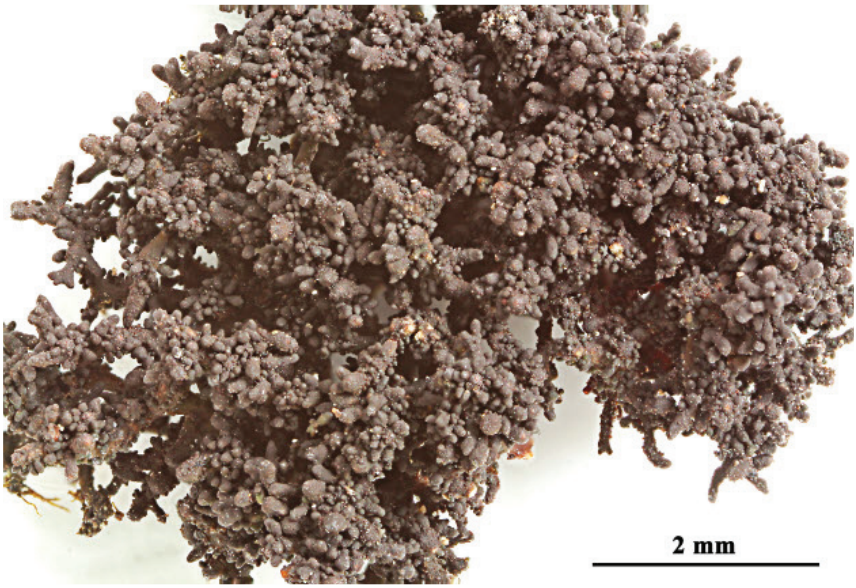


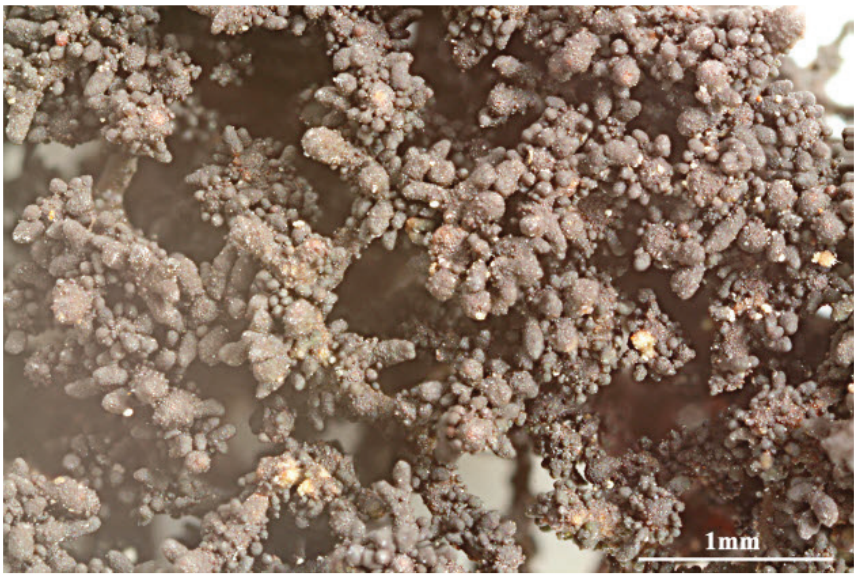

***Lichinella iodopulchra***

***Lichinella japonica*** H. Harada & Henssen, Lichenologist 19(3): 289 (1987)

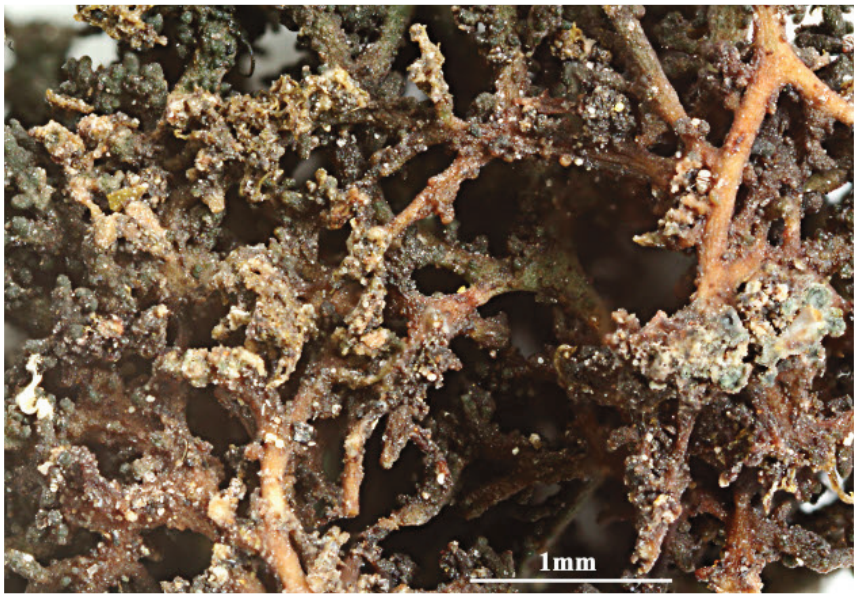
*Thallus* subfruticose, blackish, *c.* 3 mm high, forming mats to 20 cm diam, decaying at base. Lobes erect, terete or rarely in part flattened, more or less nodulose or opuntioid in water preparations, 40–120 (–200) µm thick, irregularly branched, branches to 0.5 mm long, lobes fastened to substratum by tuft of colourless rhizoidal hyphae. Thallus hyphae forming a network of short or elongated cells, in basal part of aged lobes hyphae aggregated in a loose central cord. *Apothecia* thallinocarps, terminal, to 0.5 mm diam, frequently irregular in outline, disc flat or concave, concolorous with thallus or brownish, slightly rough to uneven, covered by groups of algal cells, which form a mosaic. Thalline margin 70–125 µm thick composed of discrete hyphae with short or elongated cells. Hymenium 70–100 µm high, hymenial gelatine blue in iodine turning vinose. Subhymenium 25–45 (µm high at the margin, elongated into 90 µm long stipe in the central part. *Asci* prototunicate with uniformly thin wall, cylindrical obclavate, (50–) 85–90 x 5.5–9.5 (–15) µm, including 36–48 or more spores. *Ascospores* simple, colourless, ellipsoid or subglobose, 5.5–7.0 x 3.5–4.5 µm. Paraphyses sparsely branched and anastomosing, 1–2 µm thick, *Pycnidia* terminal, to 190 µm broad, with single cavity, conidia rod-shaped, 2–4 x *c.* 1 µm, produced terminally by conidiogenous cells. In habit, *L. japonica* mostly resembles *L. stipatula,* but is distinguished by the thinner, uneven lobes with rounded tips; in *L. stipatula* the lobes are about twice as thick, straight and stiff, ending in pointed tips. In addition, the two species differ in the thallus anatomy: while in *L. japonica* the hyphae form a network of regular meshes in *L. stipatula* they are arranged in a distinct fountain-shape.

[ABL71297], Korea, Prov. Gyeongsangbuk-do, Cheong-gum Distr.,Budong-myeoun, Sangui-ri. Mt. Juwang, en route from Daegeon temple to Mt. Janggun-bong, on siliceous rock. 36°23’26’’ N, 129°08’27’’ E, 270–680 m. Leg. A. Aptroot (no 71297), 13.10.2013, det. A. Aptroot, 2013.




***Lichinella japonica***

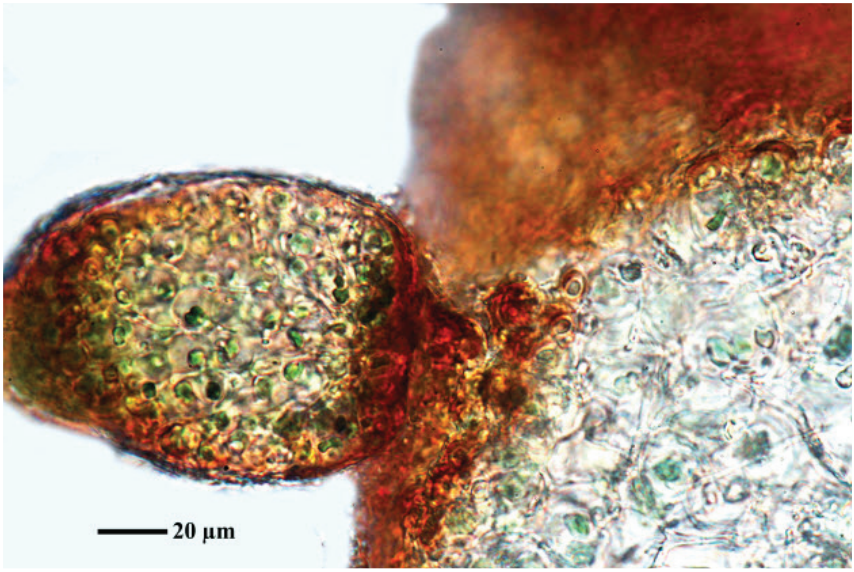




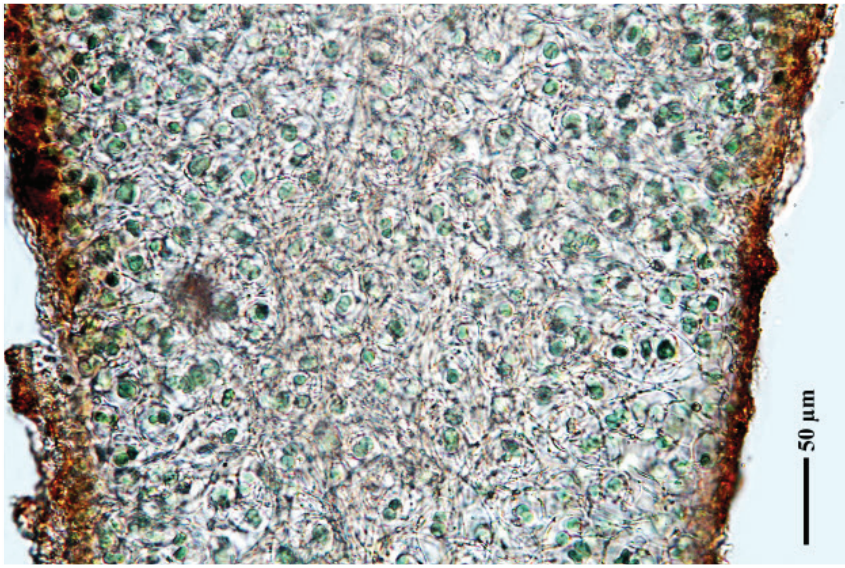


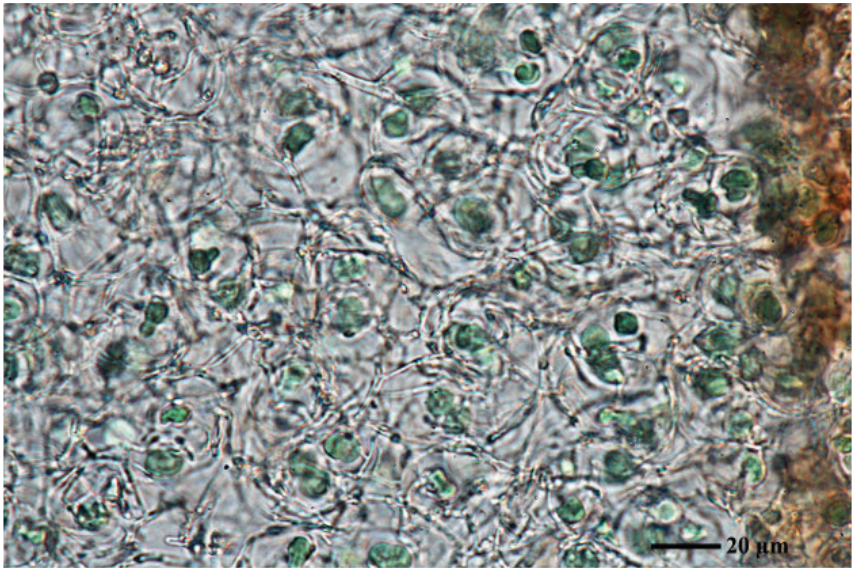
***Lichinella japonica***



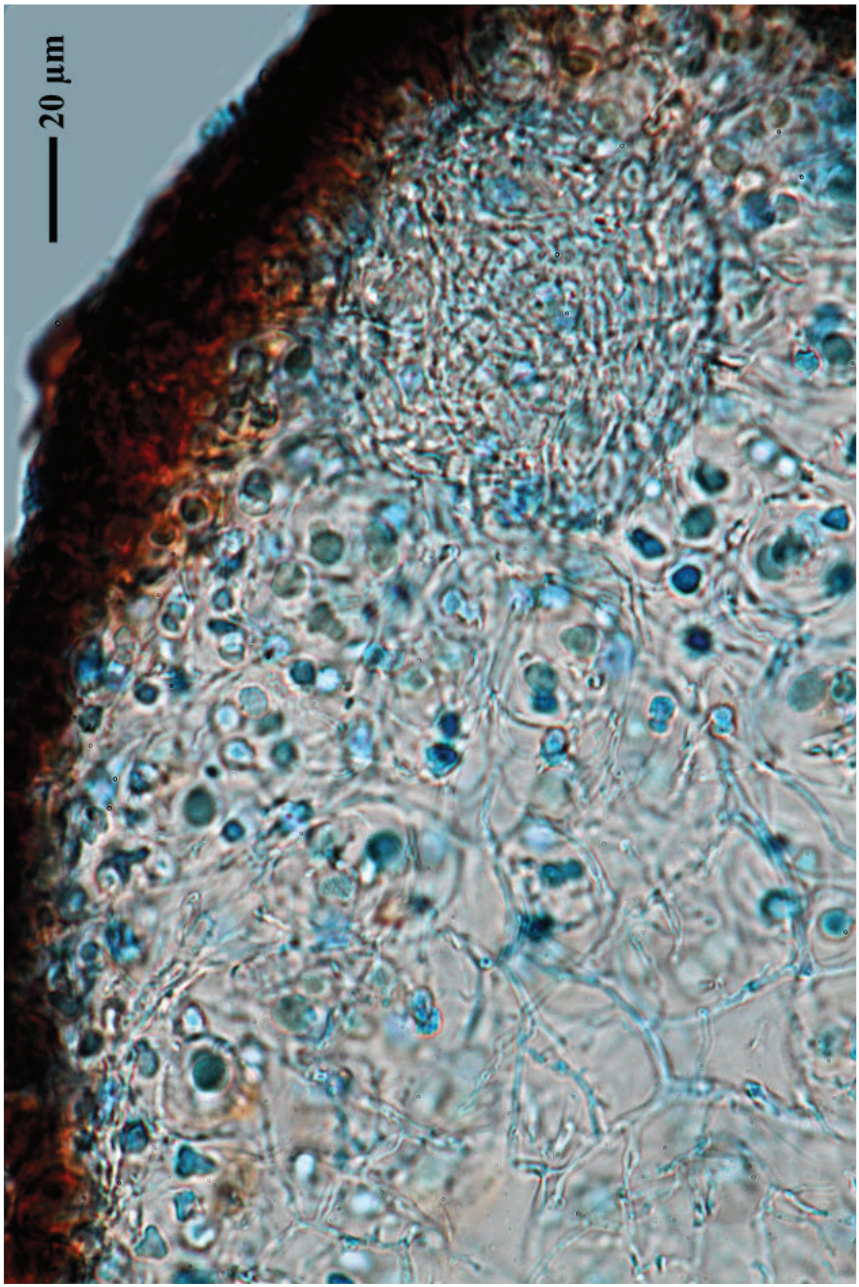




***Lichinella japonica***




***Lichinella japonica***



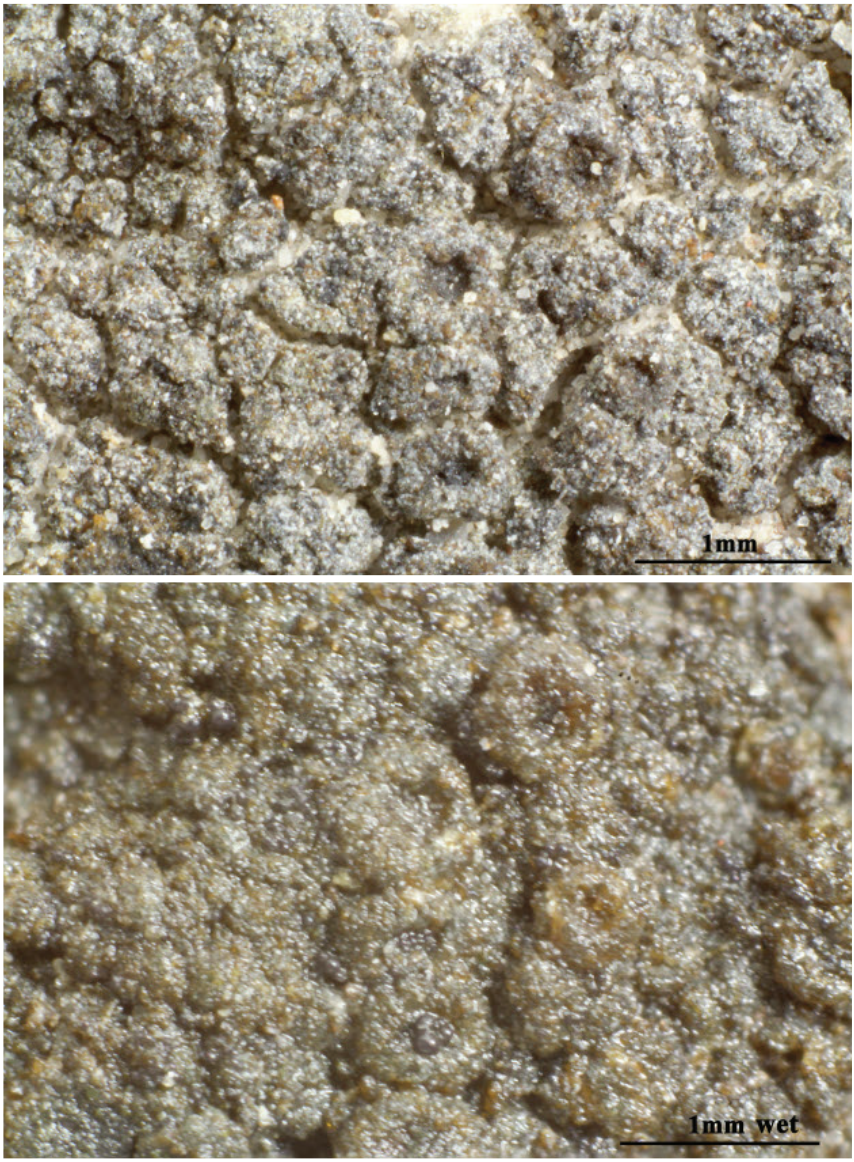

***Lichinella japonica***

***Metamelanea caesiella*** (Th. Fr.) Henssen, in Henssen & Jørgensen, Lichenologist 22(2): 141 (1990)
= *Pyrenopsis caesiella* Th. Fr. 1866

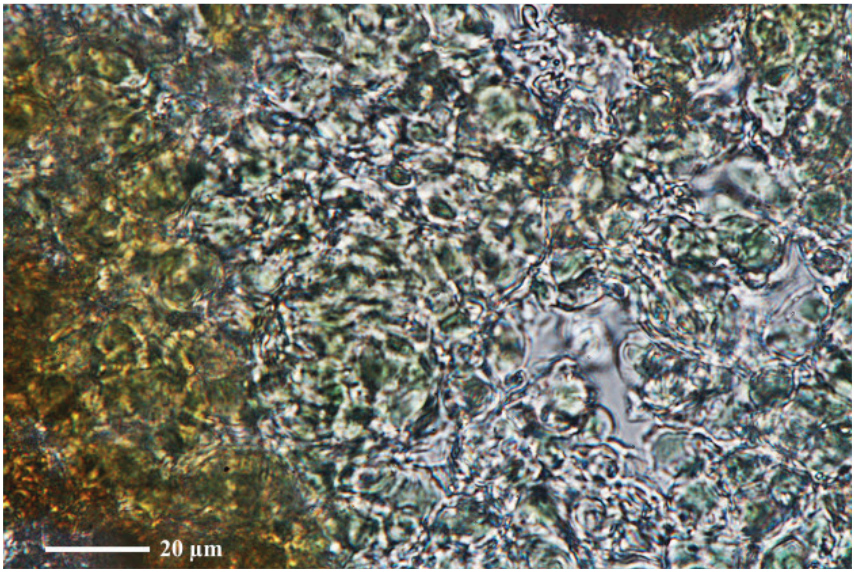
Ascospores, simple, hyalin, 15 x 8 µm.
Although this species is known only from a specimen with pycnidia, there is no difficulty in placing it in the recently described genus *Metamelanea* (Henssen 1989). It has the same typical anatomy as the two other species, *M. melambola* (Tuck.) Henssen and *M. umbonata* Henssen, with colonies of the small-celled, poorly lichenized cyanobiont in packets appearing in + vertical rows, and the position of the pycnidia within the thallus corresponding to that of the apothecia in the two other species. In the other two species pycnidia are unknown. Otherwise, *M. caesiella* combines characters from *M. melambola* and *M. umbonata,* clearly differing from both in its subpulverulent, grey-blue upper surface.

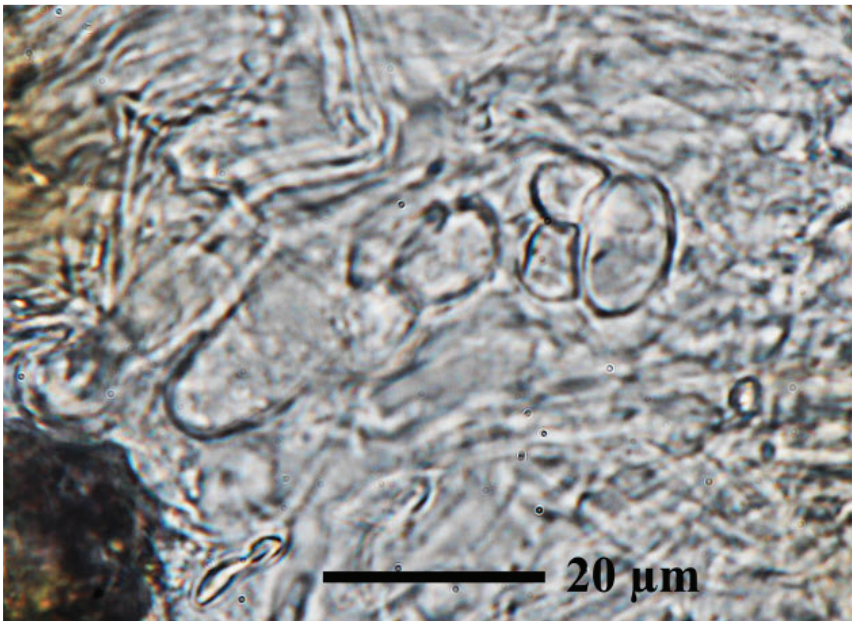
[ABL75845], Belgium, Namur, Dinant, Fonds de Leffe, on limestone. Leg. A. Aptroot (no 75845), 16.09.2017, det. A. Aptroot, 2017



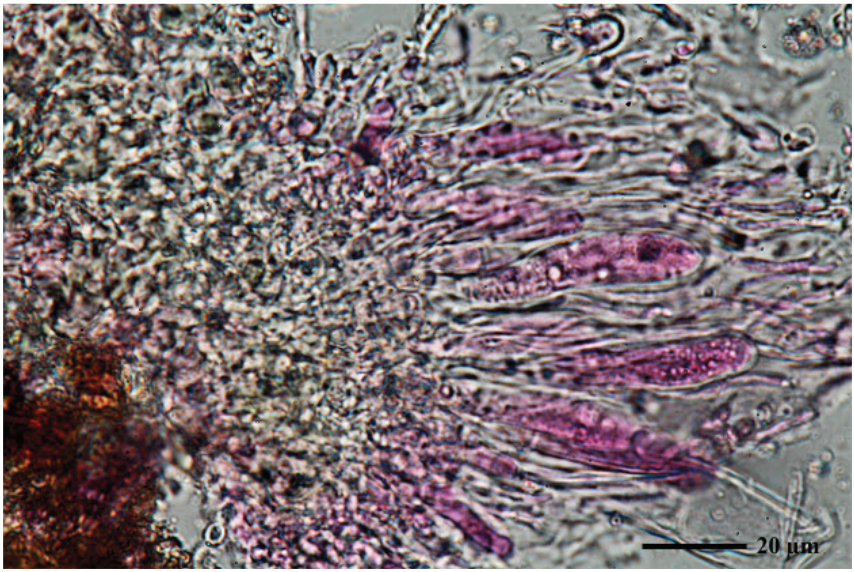



***Metamelanea caesiella***




***Metamelanea caesiella***





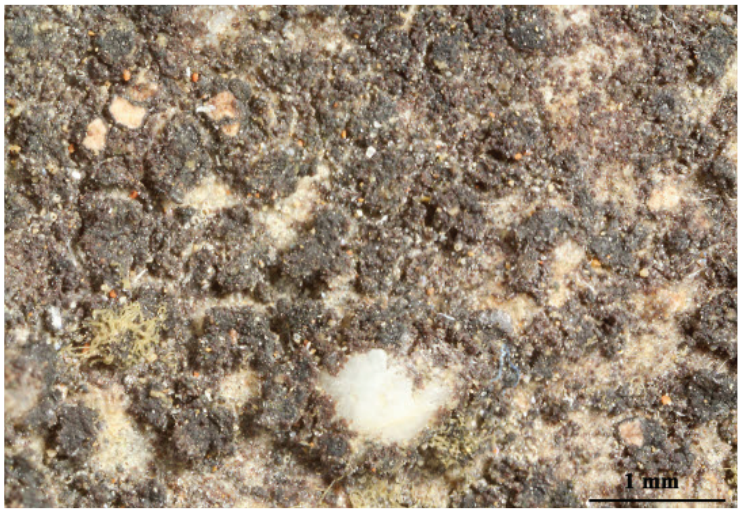


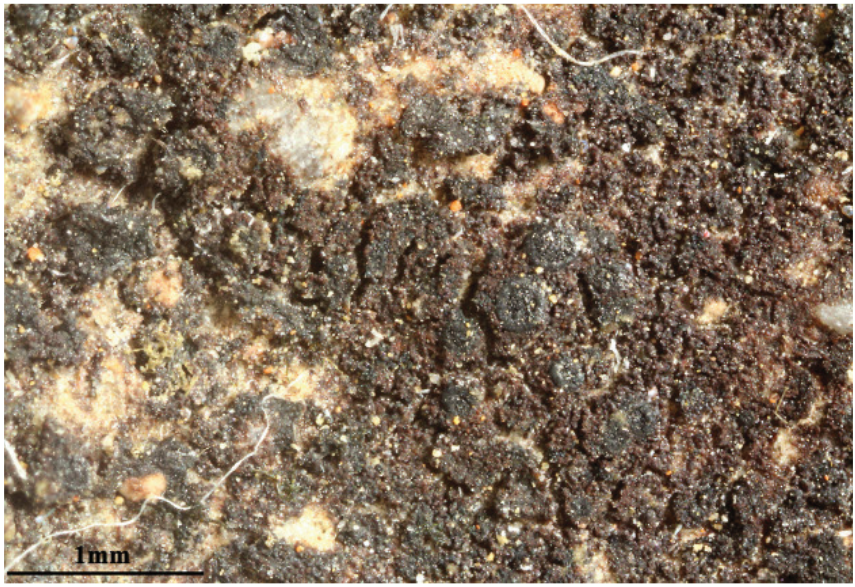
***Metamelanea caesiella***

***Metamelanea melambola*** (Tuck.) Henssen, Lichenologist 21(2): 109 (1989)
= *Synalissa melambola* Tuck. 1877

*Thallus* blackish olive, areoles *c.* 0.5–2 mm broad and 0.5–0.8 mm high, fastened by broad hyphal strands. Lobes densely aggregated, 20–40 µm thick, irregular or articulated, composed of strongly lichenized colonies of the cyanobiont, a member of the Chroococcales. Algal cells with a brown gelatinous sheath. *Apothecia* arising from a central hyphal core, inserted superimposed. *Hymenium* becoming multidivided, fertile parts of the hymenium 5–150 µm broad and 90–120 µm high, I + blue. *Subhymenium* 35–45 µm high. Exciple and epithecium brown-black. *Paraphyses* branched and anastomosing, c. 1.5 µm thick. *Asci* long-cylindrical, 75–105 x 7 µm, with eight or fewer spores. *Ascospores* 9.5–12 x 6–7 µm (immature within ascus), frequently deformed. *Pycnidia* not seen. *Remarks:* The characteristic features of *M. melambola* are the rimoseareolate, blackish olive thallus and the completely immersed apothecia, which are hard to observe without moistening the thallus. Species of *Psorotichia* with a similar habit differ in the structure of the thallus and apothecia. The thallus areoles are composed of units forming vertical lobes, the apothecia arise not between but within lobes and are not surrounded by a pigmented exciple but by a well-developed thalline margin.

[ABL43095], Hong Kong, Hong Kong Island, Lung Fu Shan, ‚ountain slope, along mountain stream on exposed granite, 200 m. Leg. A. Aptroot (no 43096), 06.1998, det. M. Schultz, 01.2005.

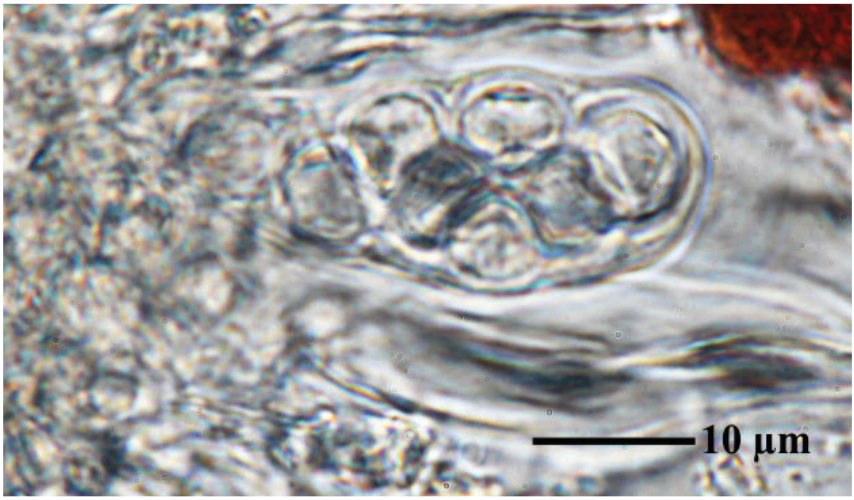


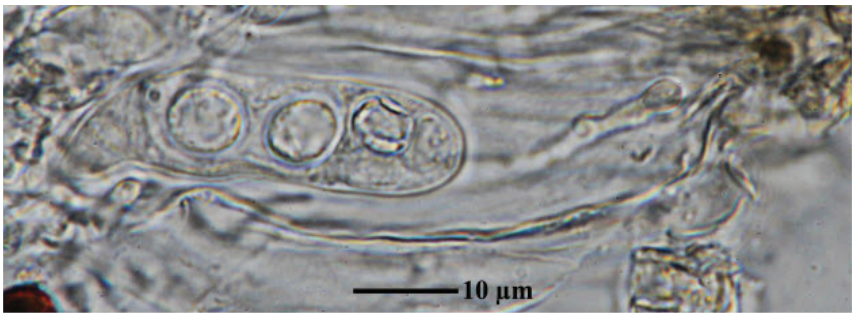


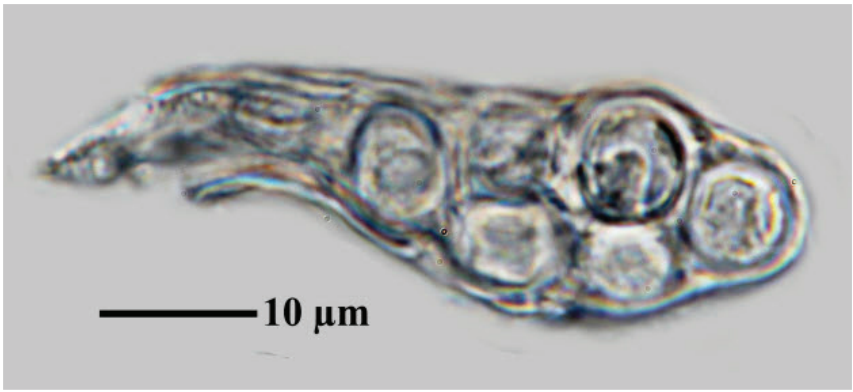




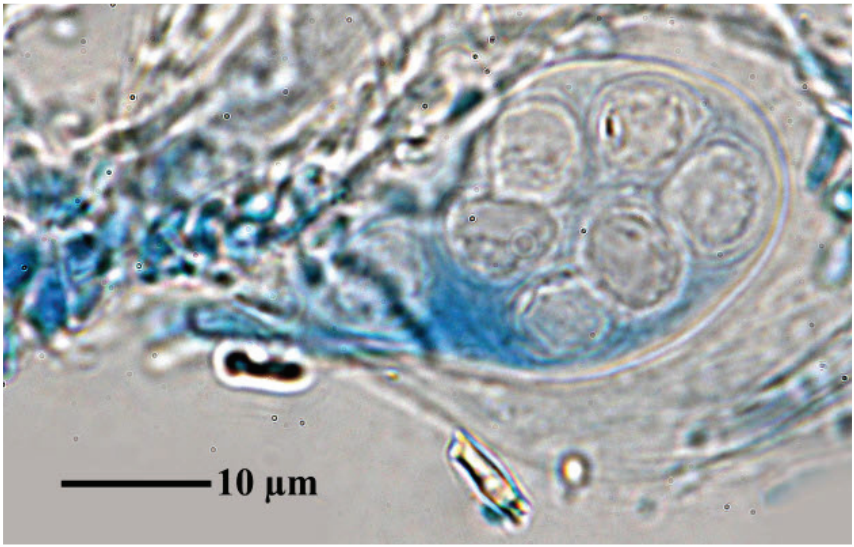
***Metamelanea melambola***

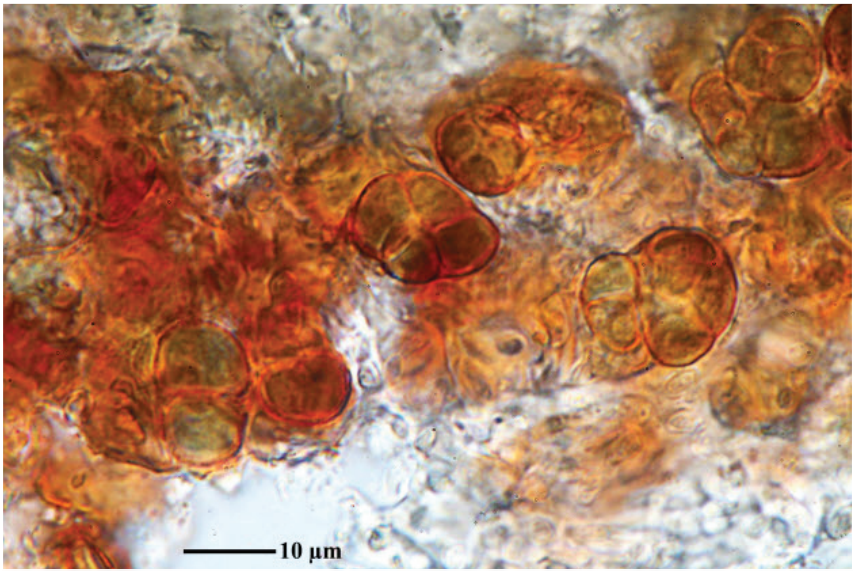


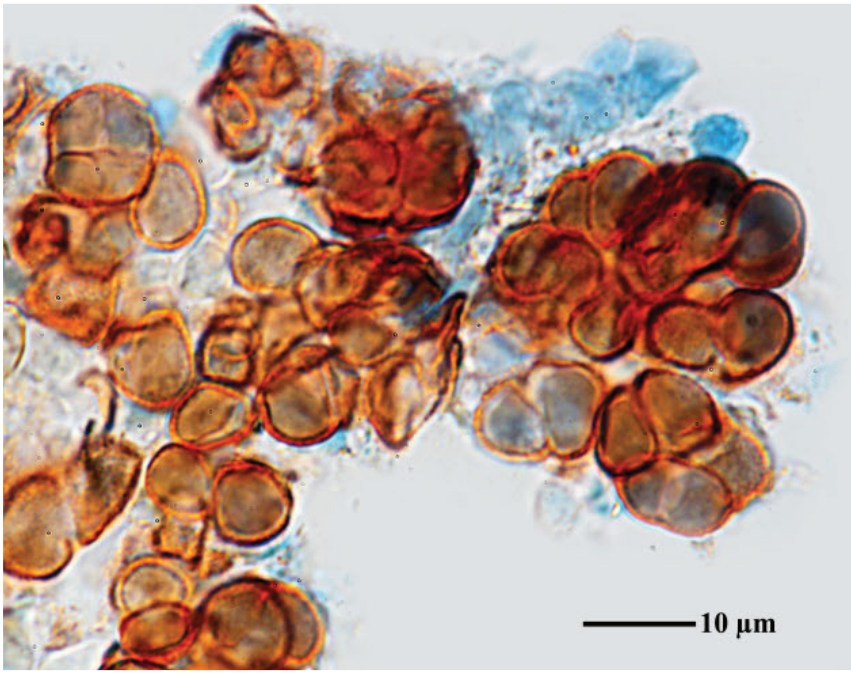




***Metamelanea melambola***




***Metamelanea melambola***





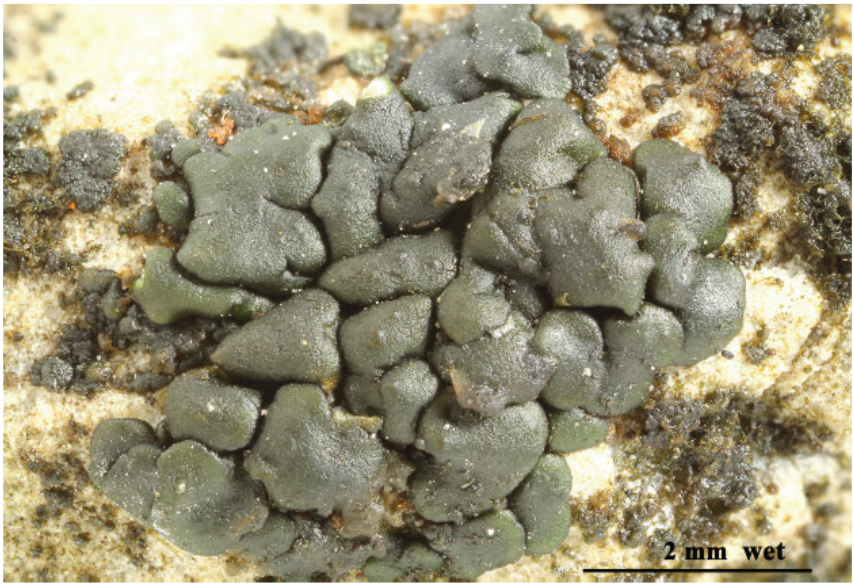


***Metamelanea melambola***

***Paulia cubana*** (Tuck.) Henssen, Lichenologist 18(3): 221 (1986)
= *Omphalaria cubana* Tuck., Gen. lich. (Amherst): 83 (1872)
= *Thyrea cubana* (Tuck.) Riddle, Mycologia 15(2): 82 (1923)

[ABL77817], Brazil, Mato Grosso do Sul, Bodoquena, Dente de Cão, summit, in Atlantic rain forest on exposed limestone. 20°47’05’’ S, 56°45’03’’ W, 450 m. Leg. A. Aptroot (no 77817),7.11.2018, det. A. Aptroot, 2019.

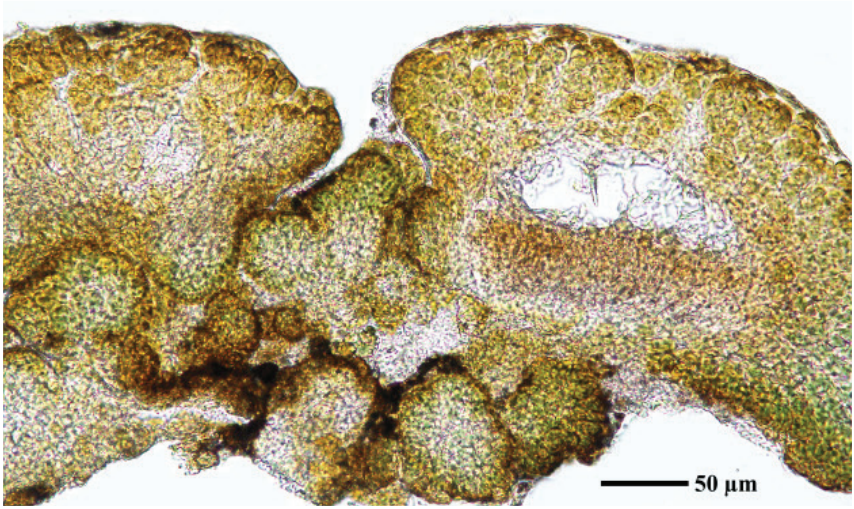


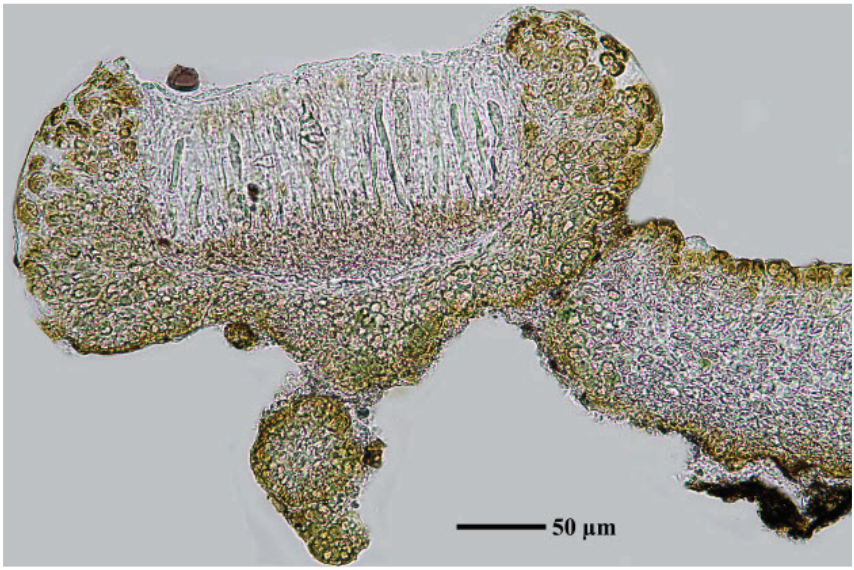




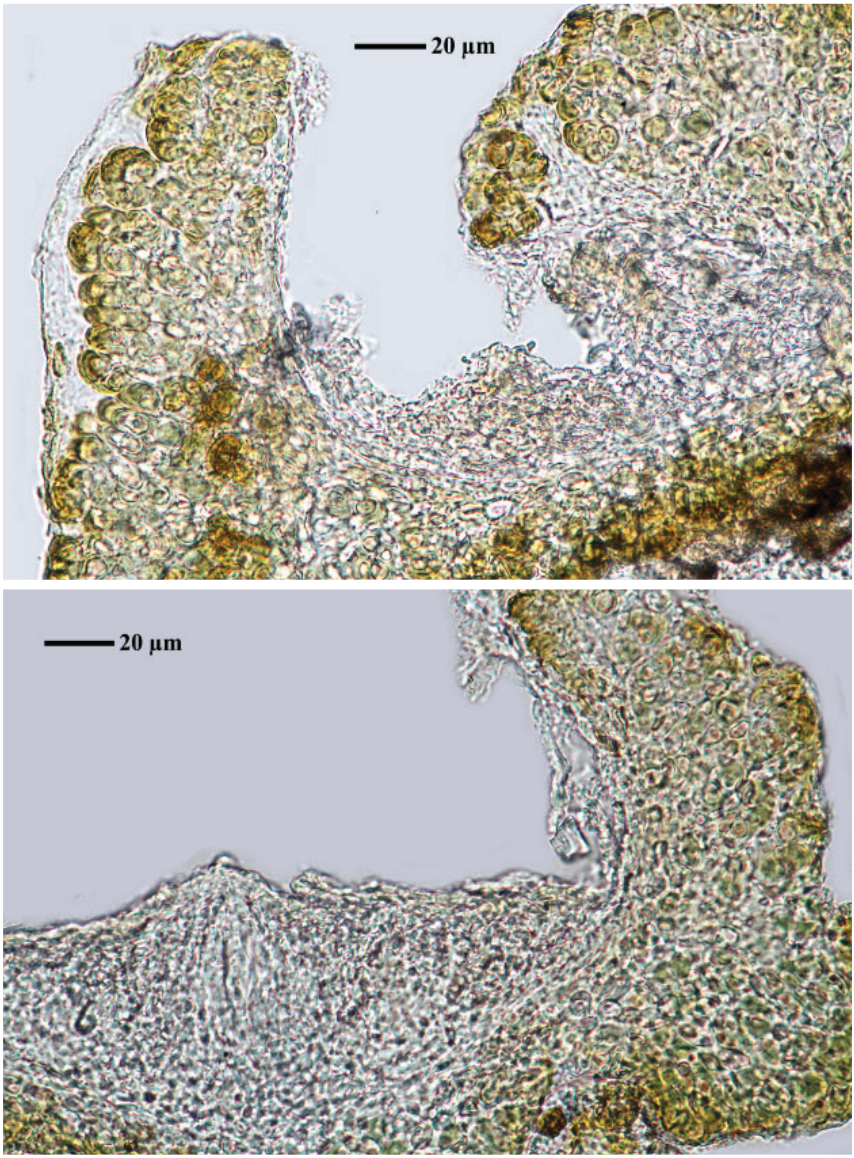


***Paulia cubana***

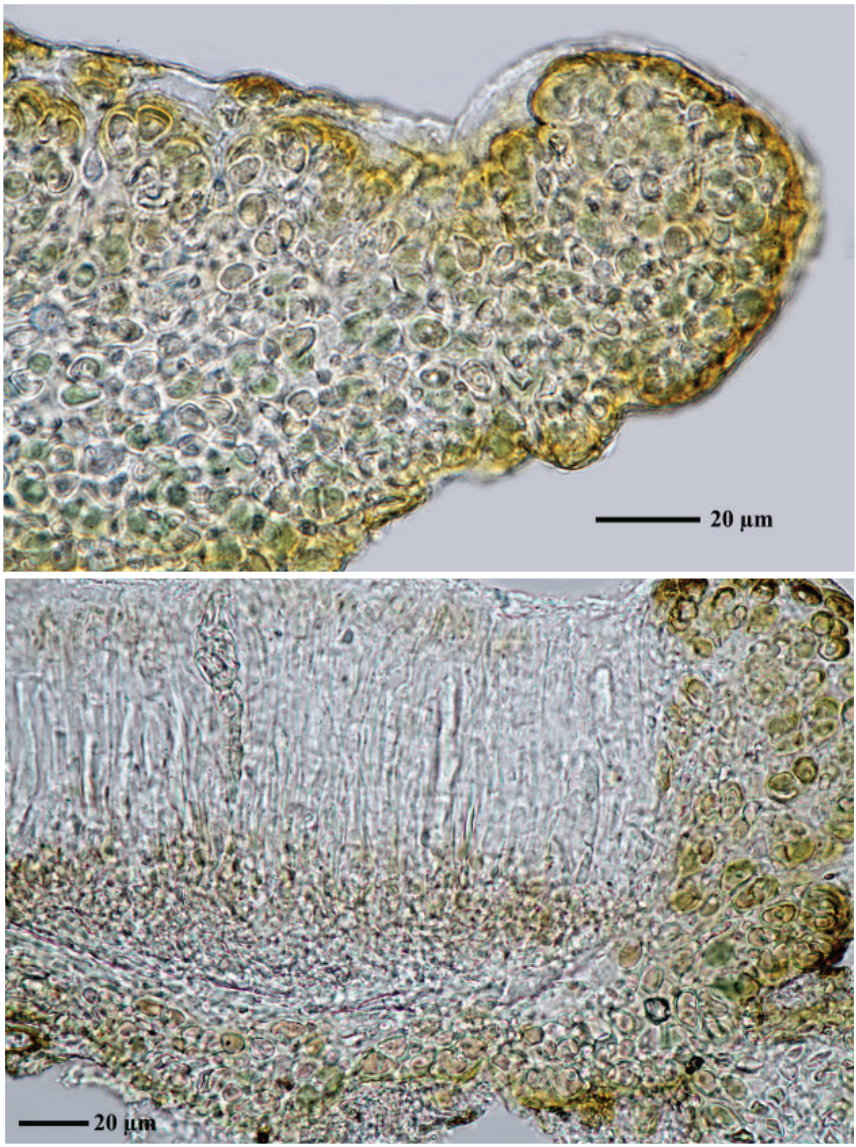


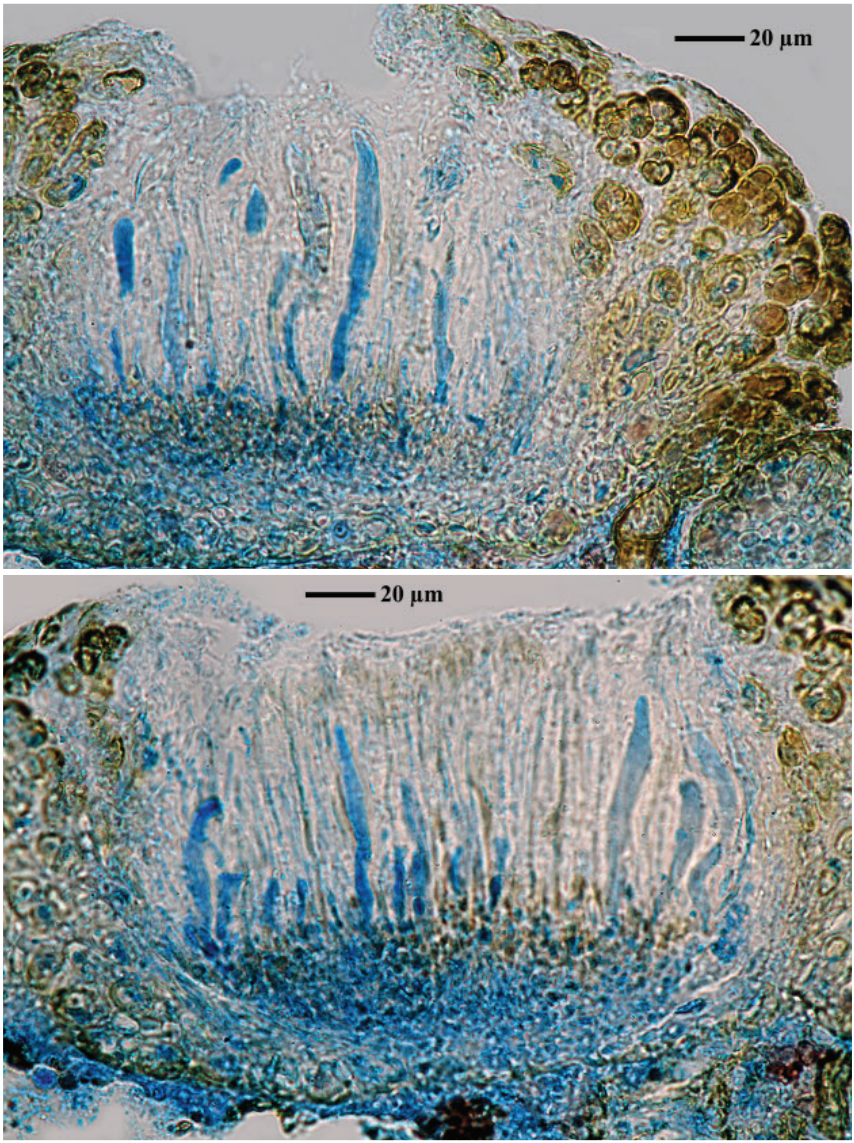

***Paulia cubana***



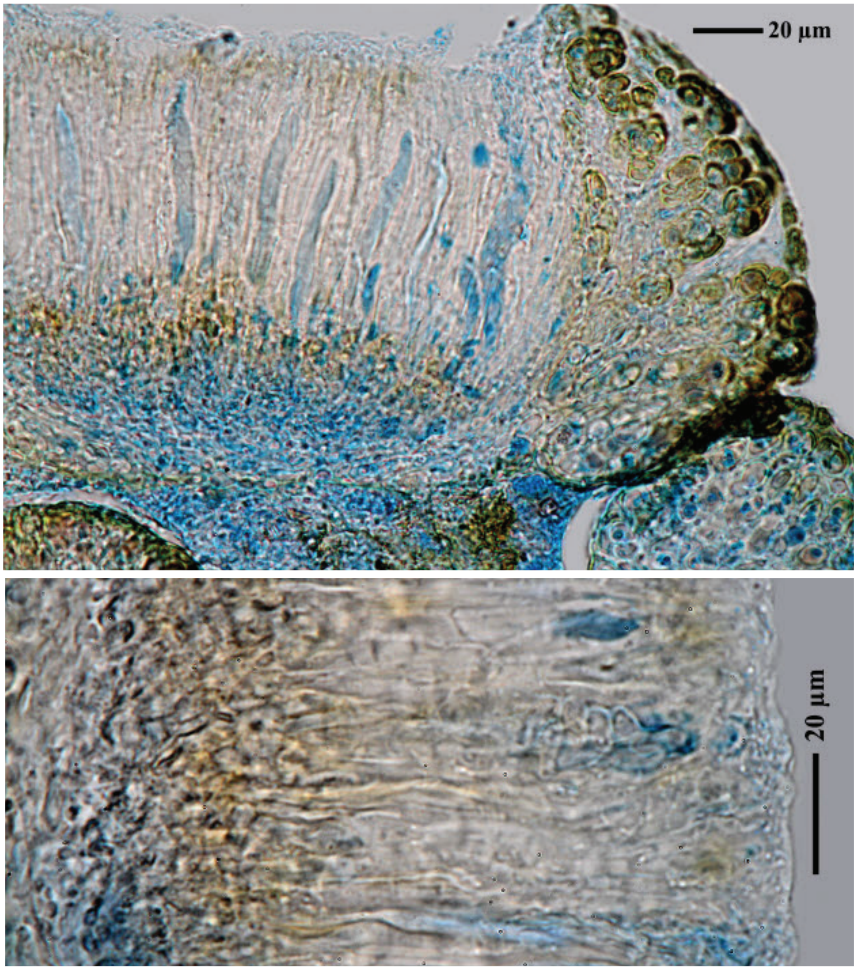

***Paulia cubana***




***Paulia cubana***




***Paulia cubana***




***Paulia cubana***

***Paulia glomerata*** Henssen & Tretiach, Nova Hedwigia 60(1-2): 298 (1995)

Thallus fruticose, black, gelatinous when wet, rarely orbicular, rosette-shaped and attached by a central holdfast, usually consisting of numerous, flattened or globose glomerules attached on conspicuous, elongated, whitish, branched, up to 3 cm long rhizoidal strands, the flattened lobes to c. 4 mm long and 2.8 mm broad, the globose ones to 2 mm across. Hyphae forming a network around the cyanobiont cells, which are penetrated by haustoria. Soredia abundant, especially at the base of the glomerules, globose, naked, 18–35 to 140 µm across. Apothecia rare, to 1.3 mm across, first immersed then adnate, with a dark brown, urceolate to flat disc, and a c. 0.3 mm thick thalline margin. Proper exciple not developed; hymenium colourless, 120–180 µm high, non-amyloid; paraphyses slightly branched and anastomosed. Asci (2–)4–8-spored subcylindrical, without apical amyloid structures. Ascospores 1-celled, hyaline, ellipsoid to subglobose, 10–13(–17) x 9.5–1(–15) µm, the wall c. 1–2 µm thick. Pycnidia rare. Conidia bacilliform, 2.5–3.5 x c. 1 µm. Photobiont cyanobacterial, chroococcoid, the cells surrounded by a colourless to brown (in the peripheral parts of thallus) gelatinous sheath. Spot tests: all negative. Chemistry: without lichen substances. Note: on steeply inclined surfaces of calcareous rocks in rainy areas, mostly starting its life-cycle in fissures of the rocks.

[TSB_16667], Italy, Friuli Venezia Giulia, Carnic Pre-Alps, Poffabro (PN) below Mt. Coltaront, c. 700 m on vertical limestone rocks. Leg. G. Bolognini & M. Tretiach, 18.04.1993; conf. M. Schulz, 02.2015.



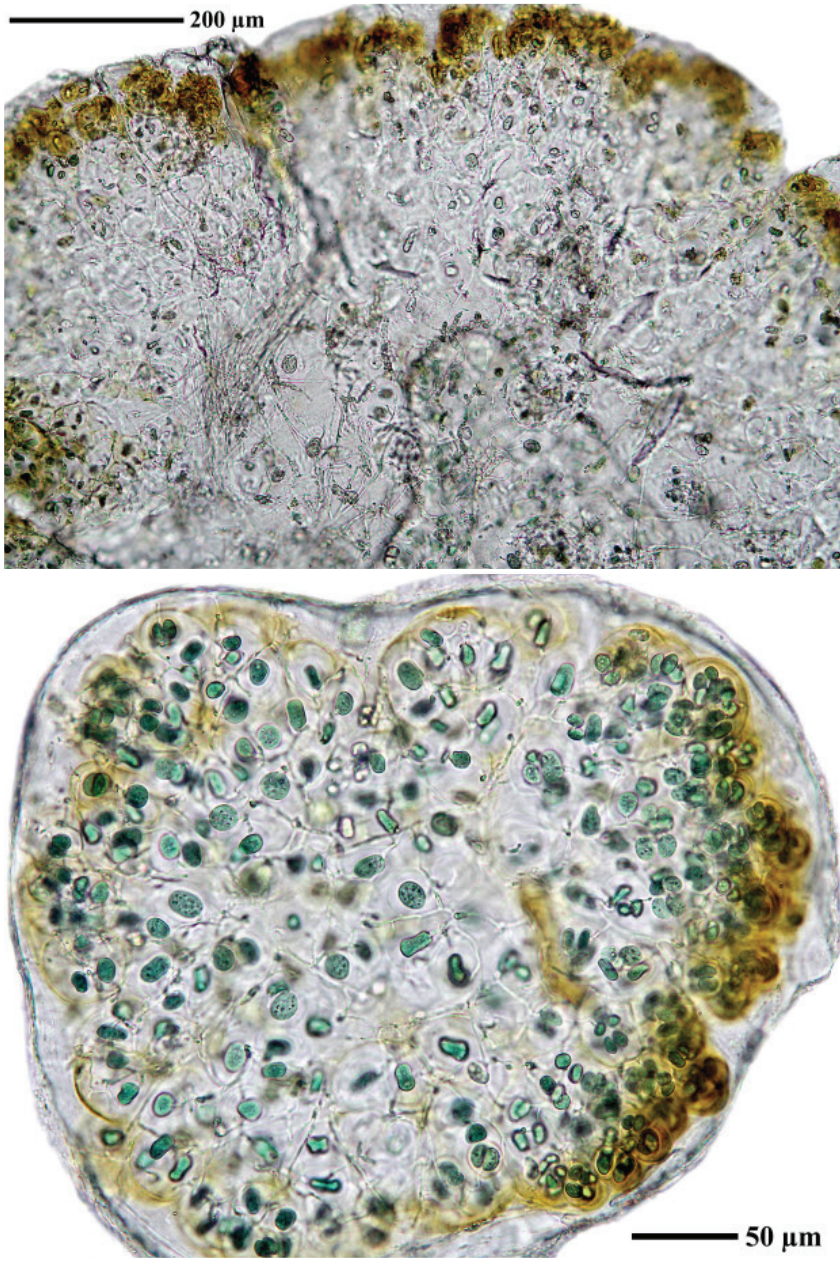

***Paulia glomerata***



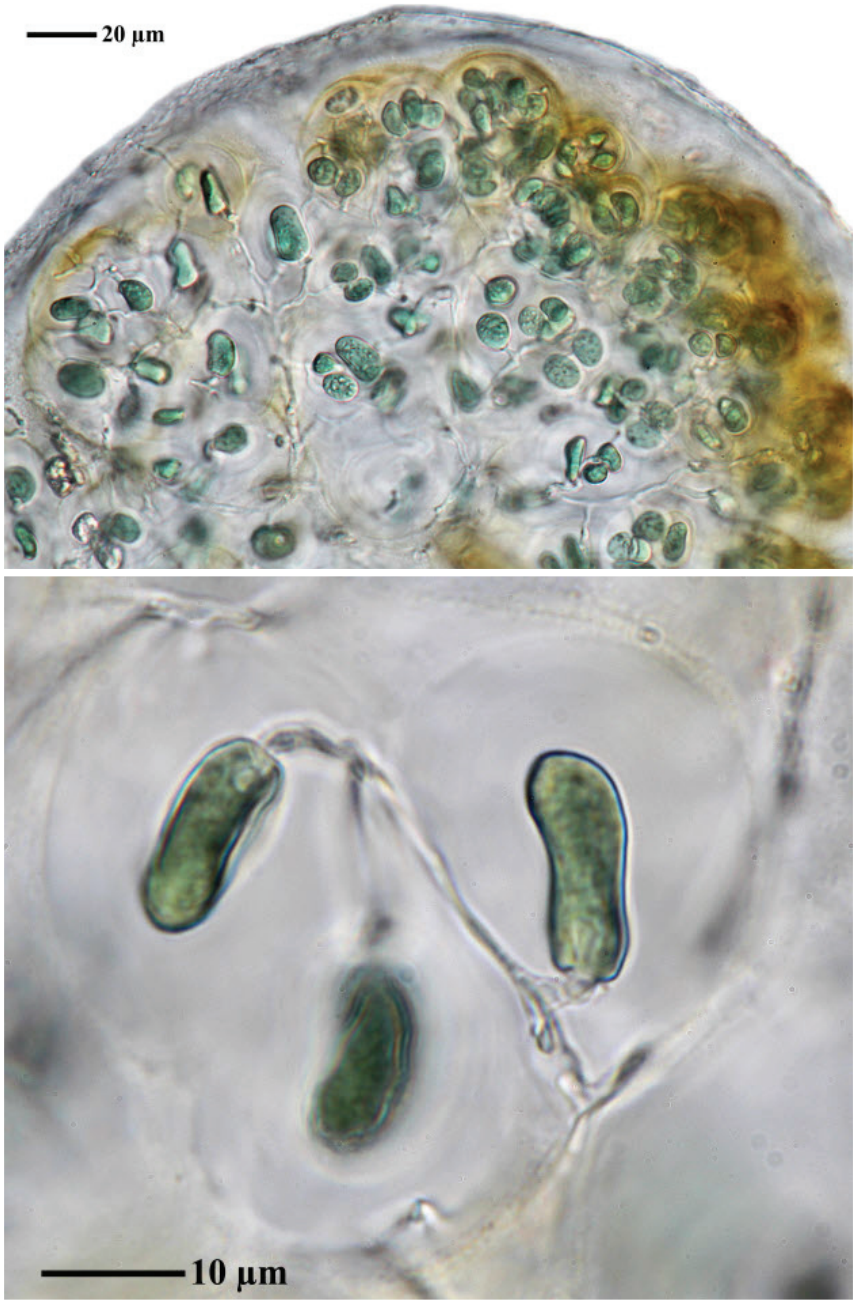

***Paulia glomerata***



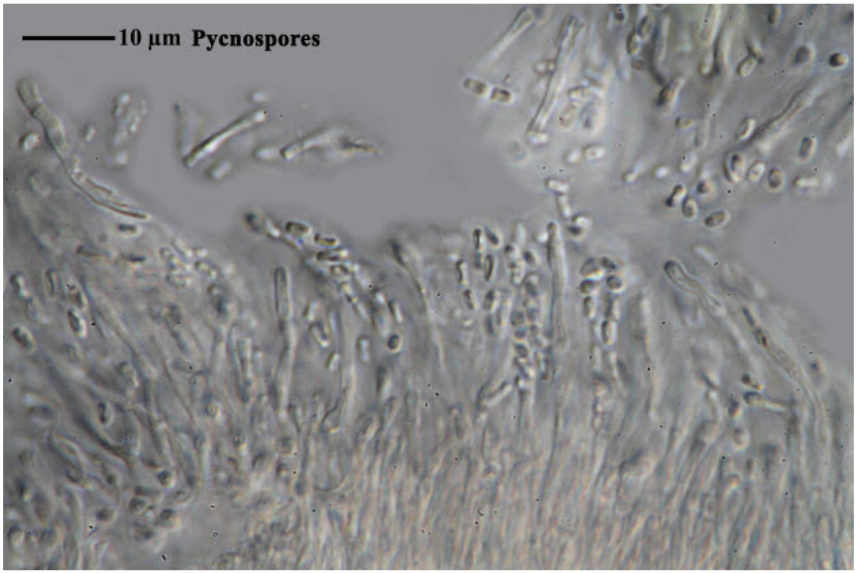

***Paulia glomerata***

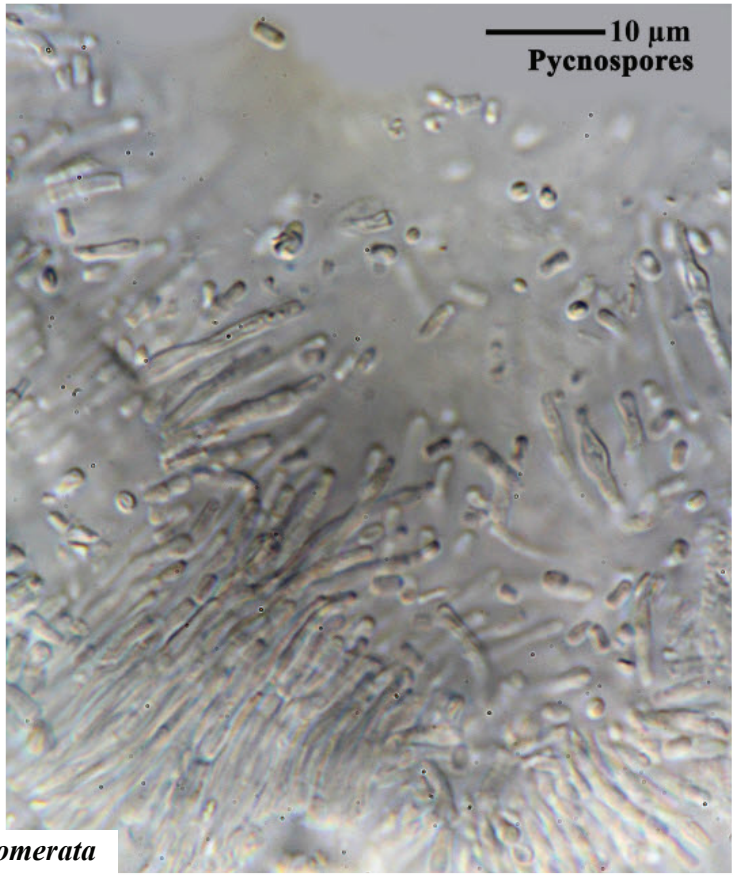



***Paulia glomerata***




***Paulia glomerata***



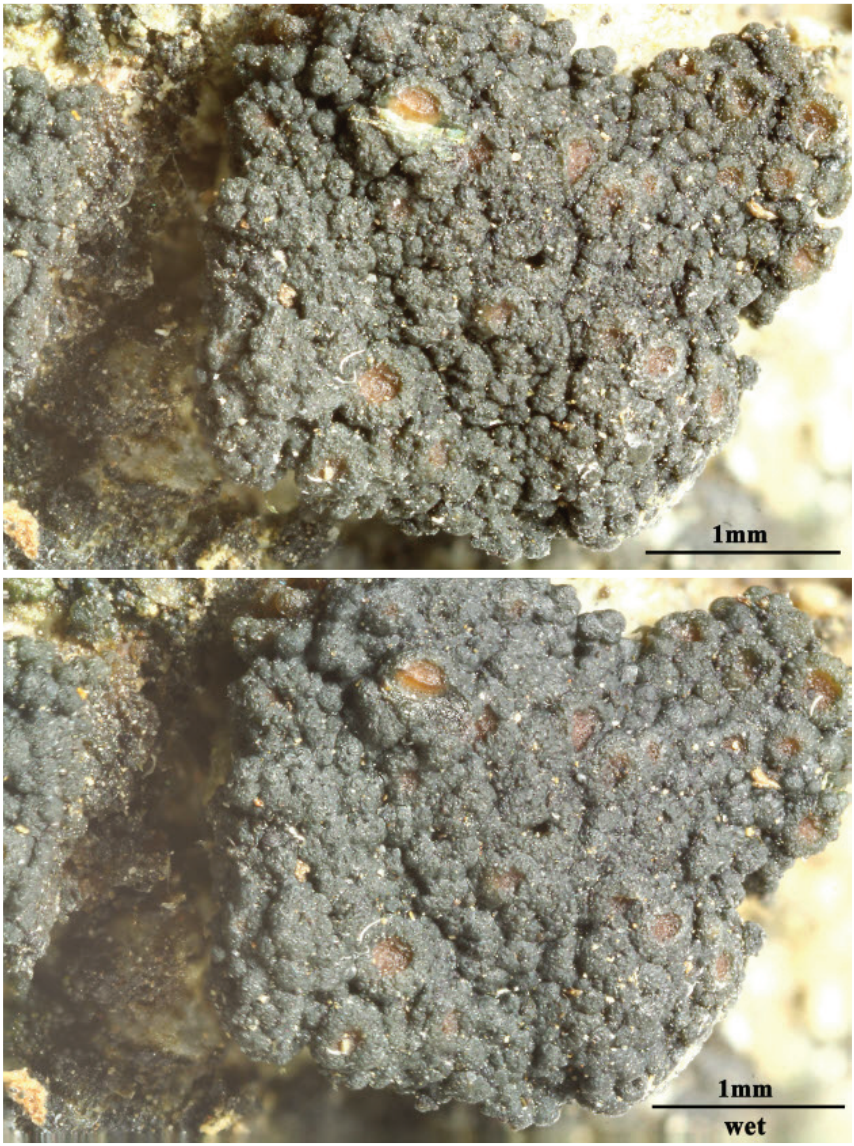

***Paulia glomerata***

***Paulia nitidula*** (Müll. Arg.) M. Schultz, in Schultz & Büdel, Mycotaxon 84: 25 (2002)
= *Synalissa nitidula* Müll. Arg., Proc. R. Soc. Edinb. 11: 457 (1882)

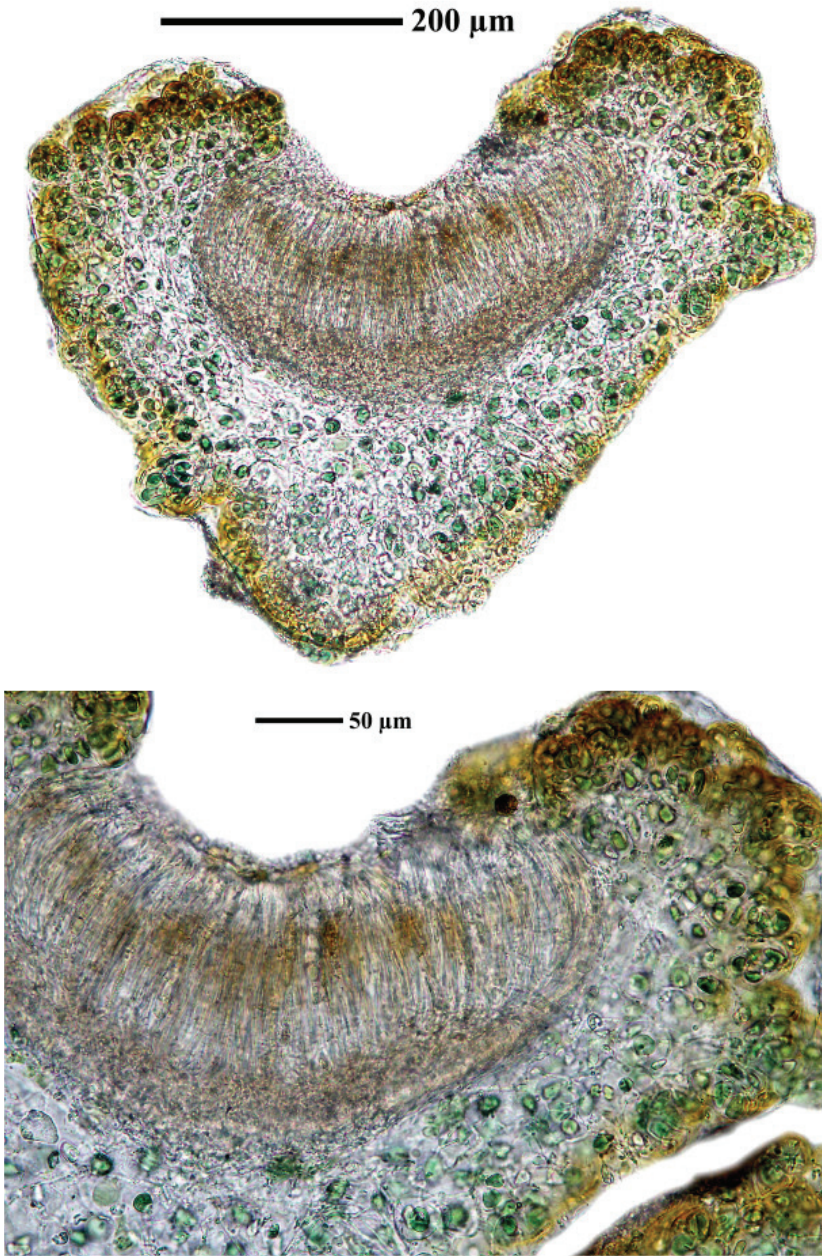
Anatomy loosely reticulate large photosymbont cells. Hymenium IKI–.

[ABL53068], Taiwan, Pingttung County, 45 km SE of Kaohsiung, near Fangshan, rock outcrops, on conglomeratic rock. 22°09’45’’ N, 120°41’54’’ E, 20 m. Leg. A. Aptroot (no 53068), 16.10.2001, det. M. Schultz, 01.2005.

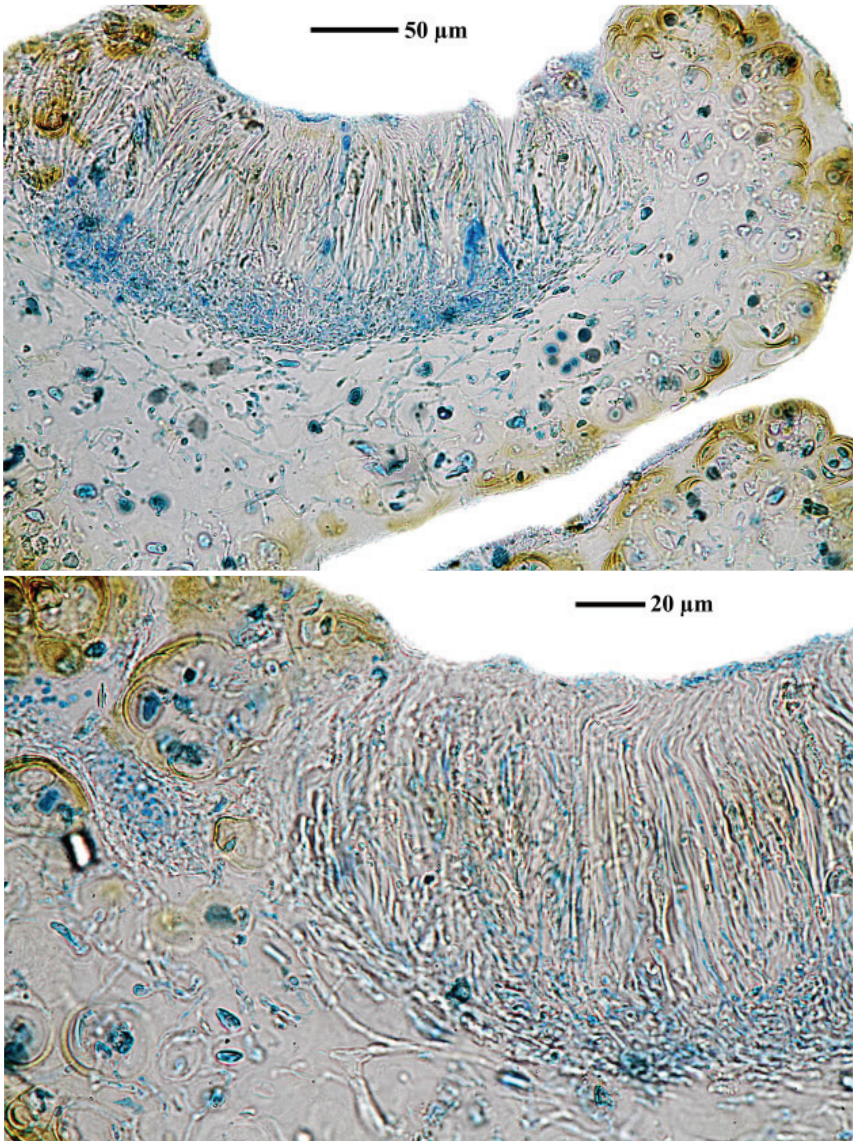




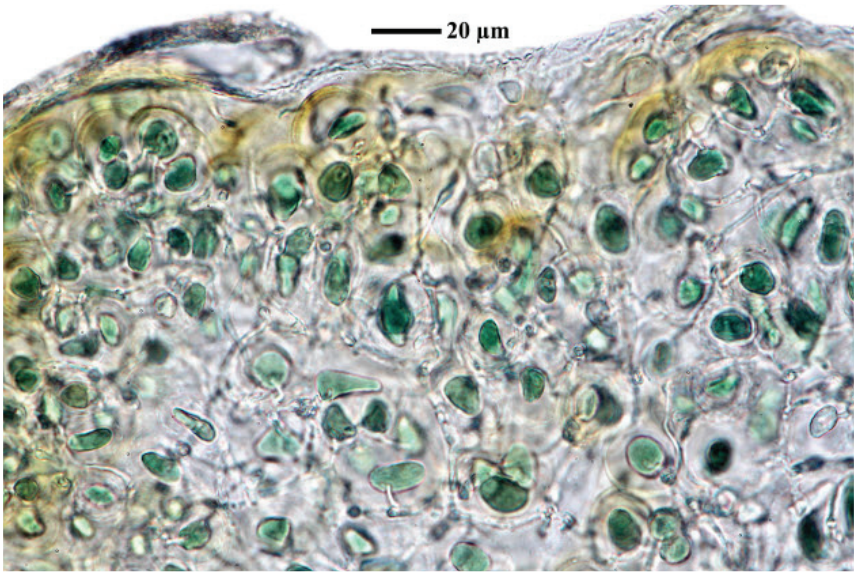

***Paulia nitidula***

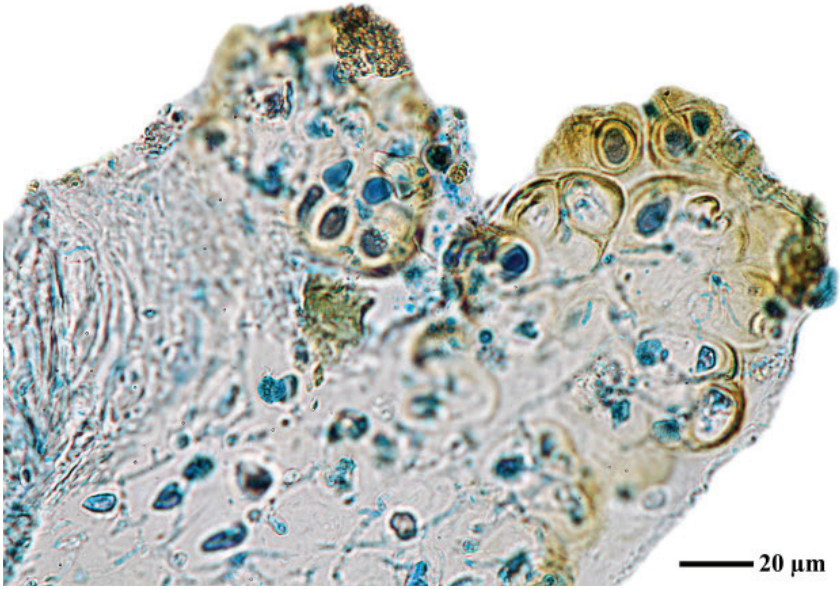



***Paulia nitidula***




***Paulia nitidula***




***Paulia nitidula***

***Paulia perforata*** (Pers.) Asahina, J. Jap. Bot. 33: 129 (1958)
= *Gyrophora perforata* Pers., in Gaudichaud-Beaupré in Freycinet 1827

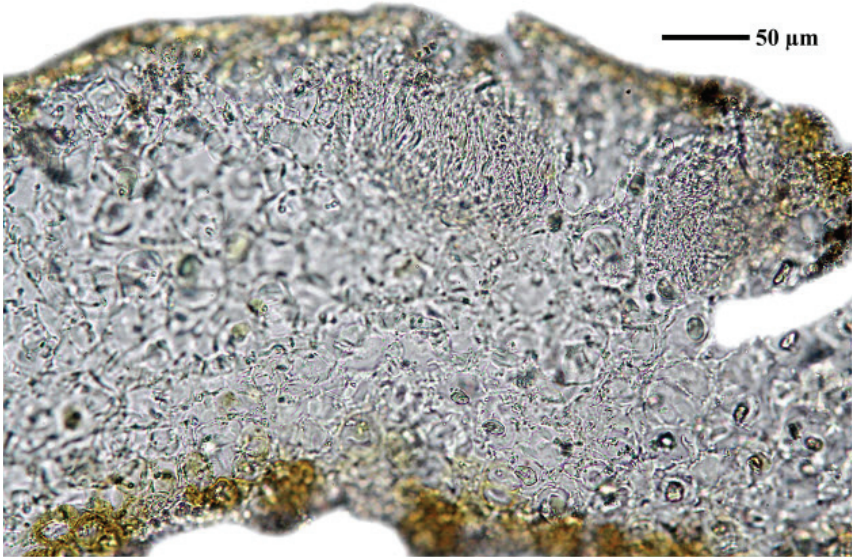
[Mies13005], Jemen Sokotra. Leg. B. Mies (no 13005), 1999, det. M. Schultz, 01.2005.



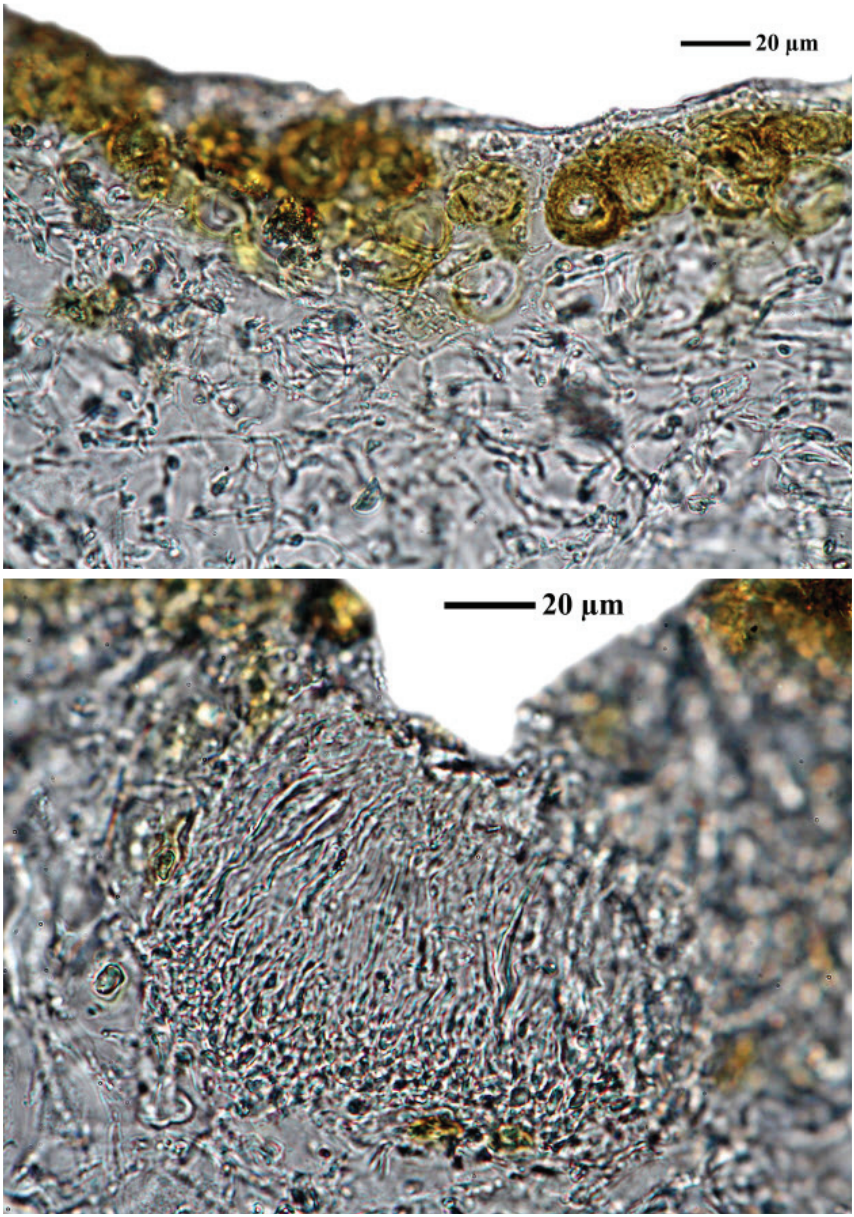




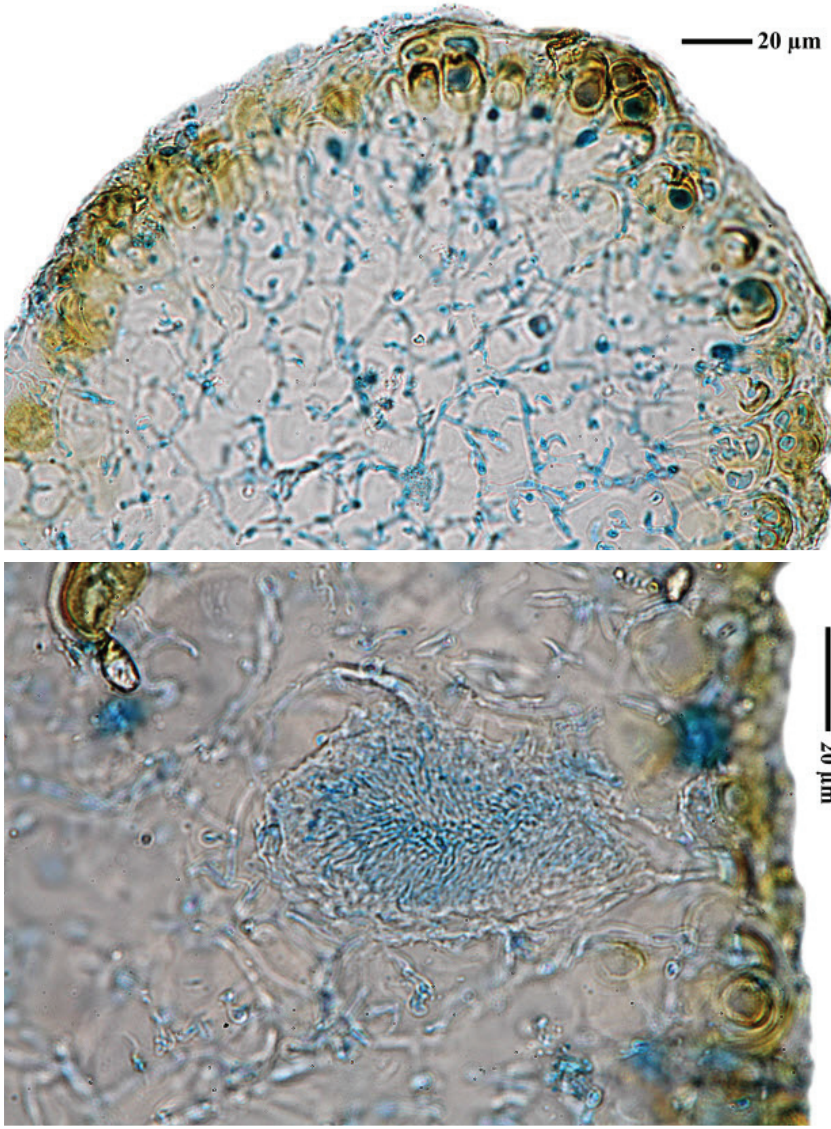




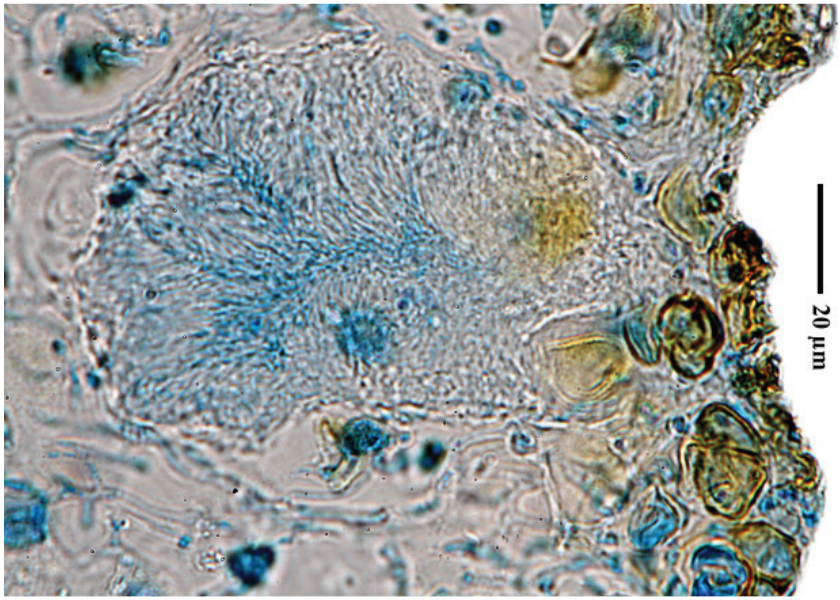

***Paulia perforata***

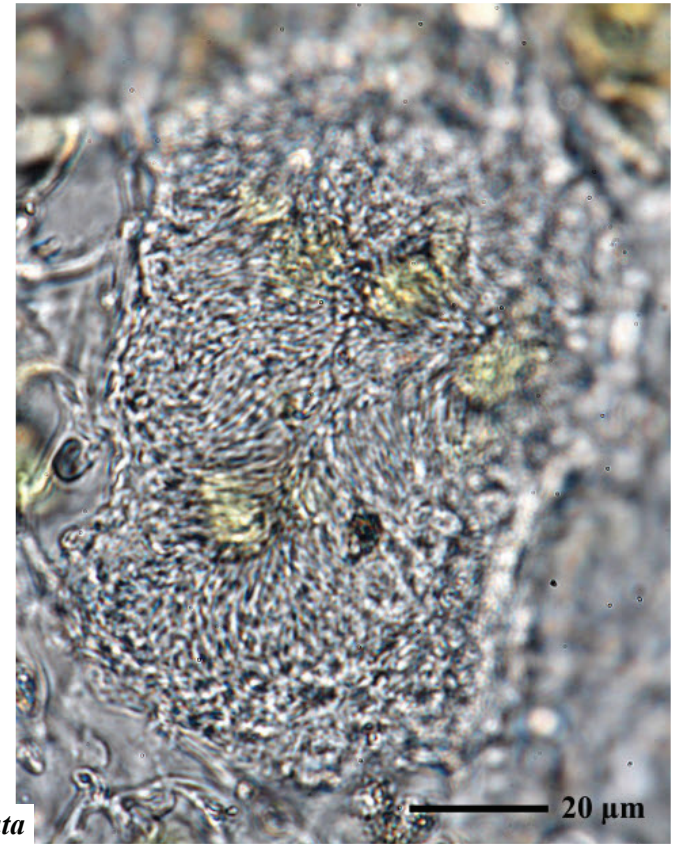



***Paulia perforata***

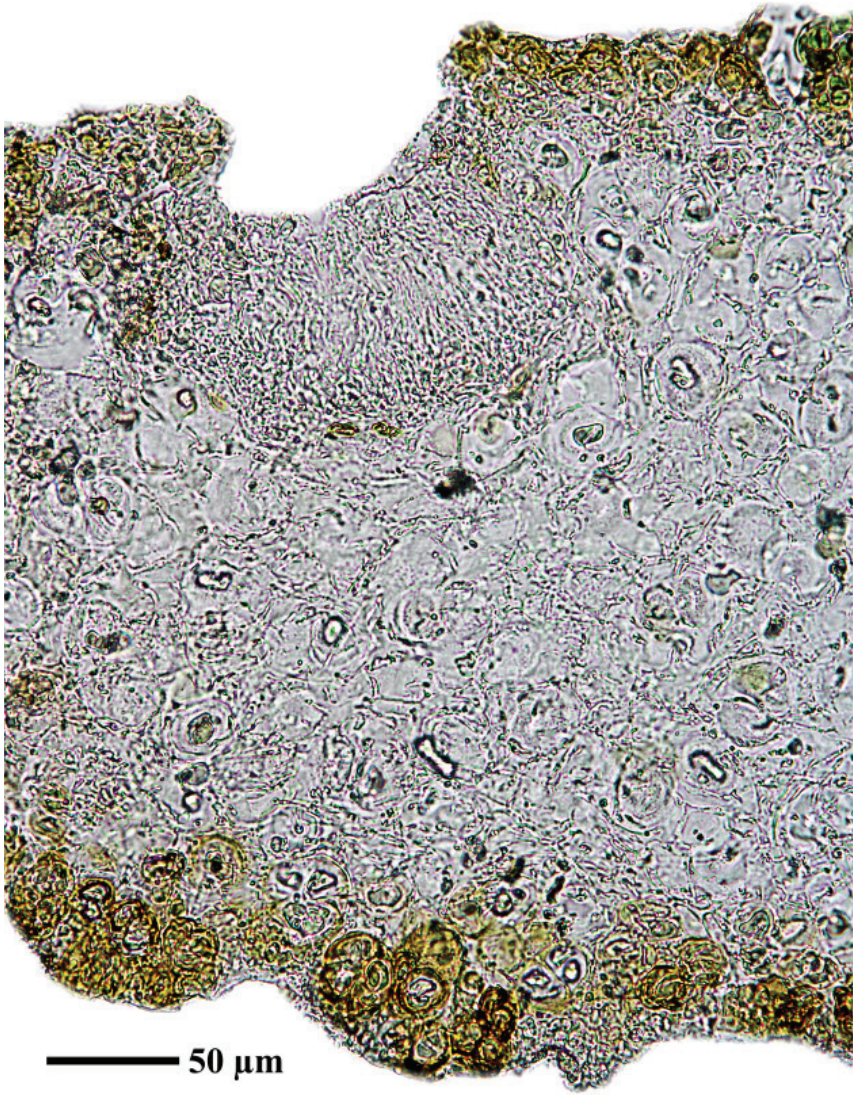



***Paulia perforata***




***Paulia perforata***

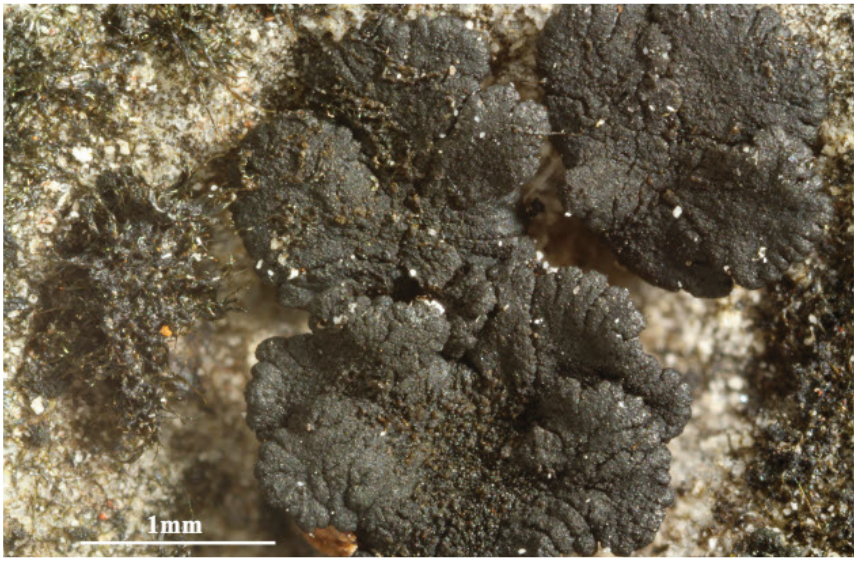


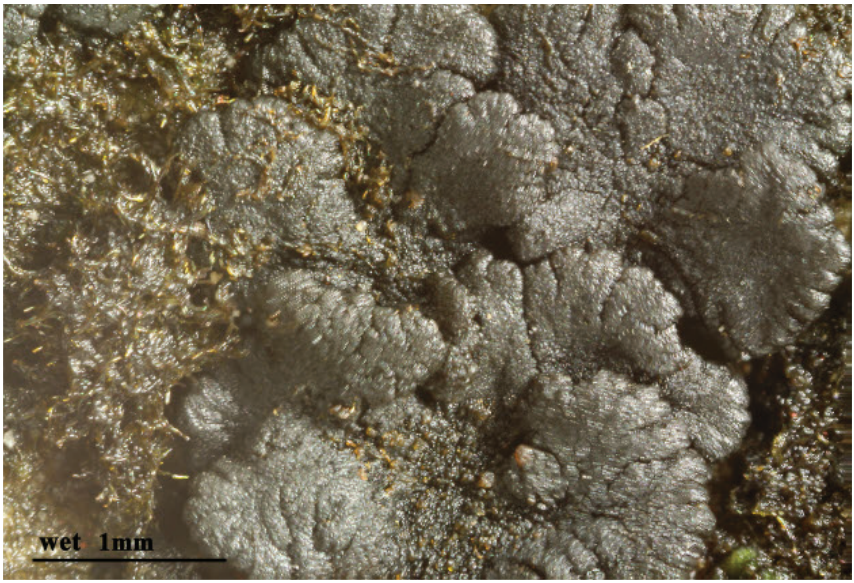

***Paulia perforata***

***Paulia tessellata*** Henssen, Lichenologist 18(3): 227 (1986)

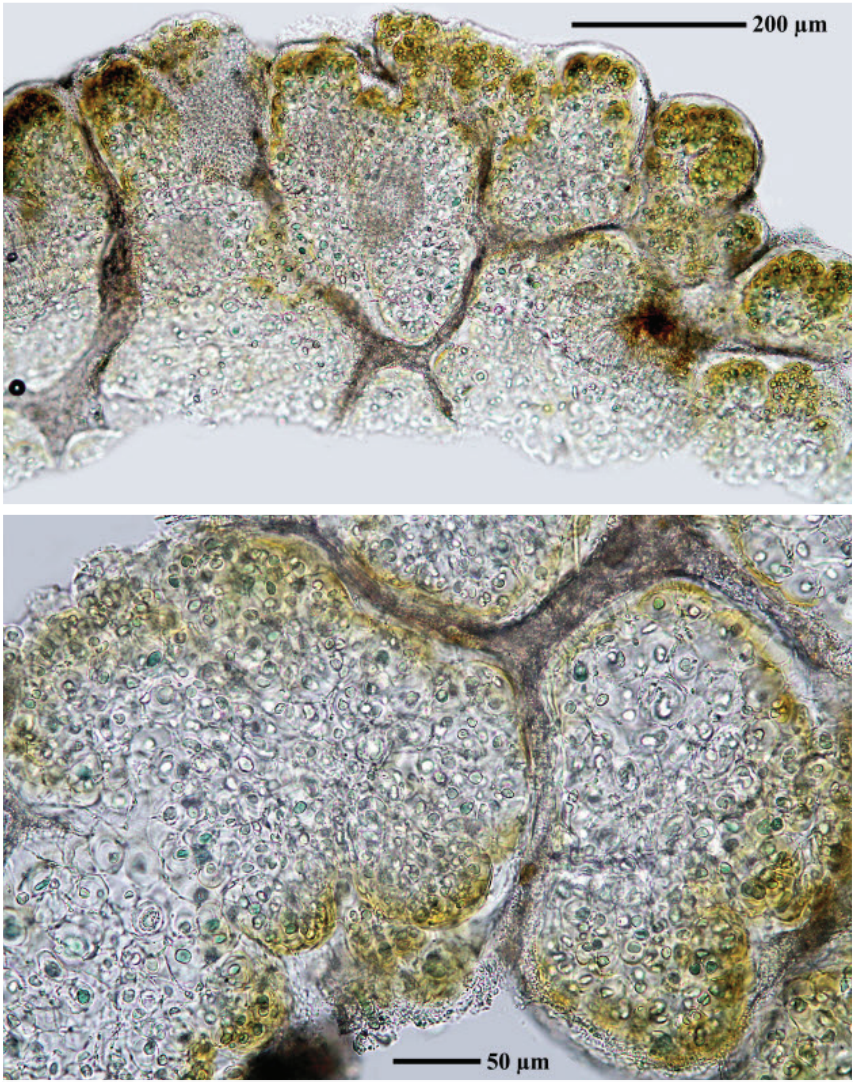
[ABL77813], Brazil, Mato Groso do Sul, Bodoquena, Dente de Cão, summit.In Atlantic rain forest area on exposed limestone. 20°47’05’’ S, 56°45’03’’ W, 450 m. Leg. A. Aptroot (no 77813), 7.11.2018, det. A. Aptroot, 2019.



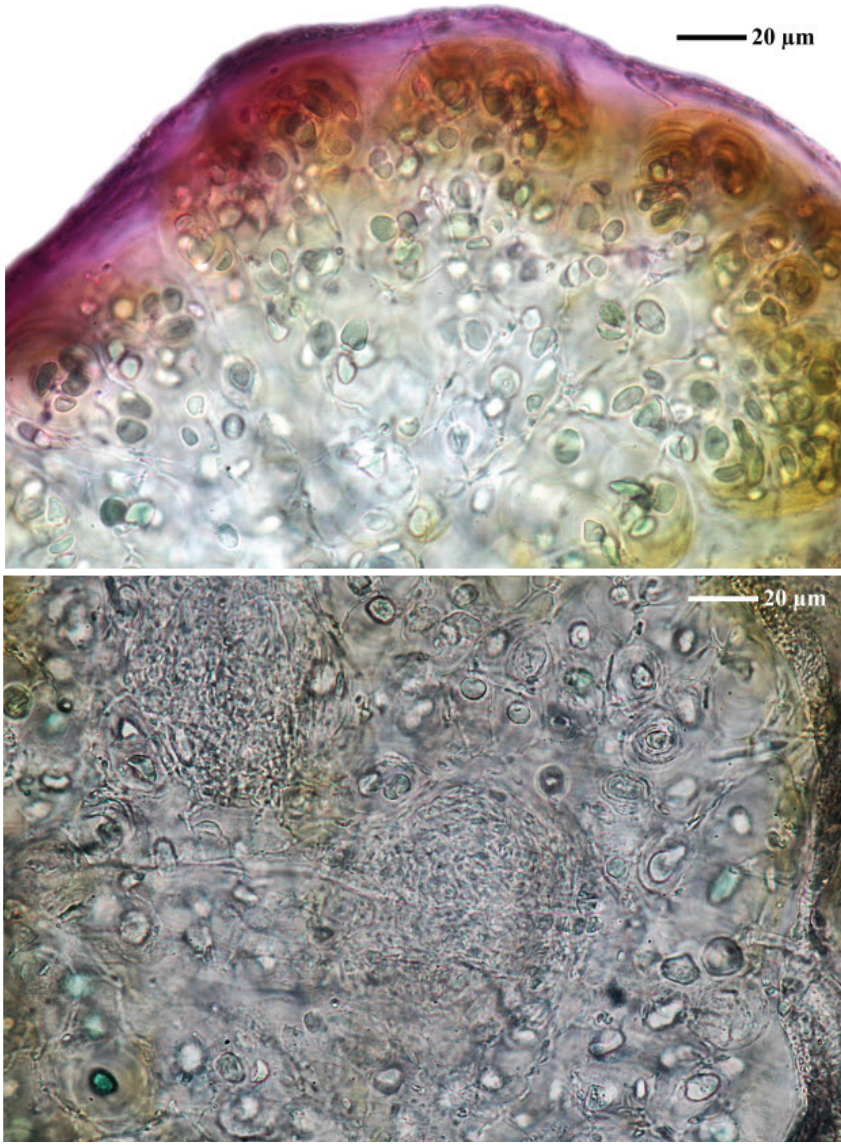



***Paulia tessellata***




***Paulia tessellata***




***Paulia tessellata***

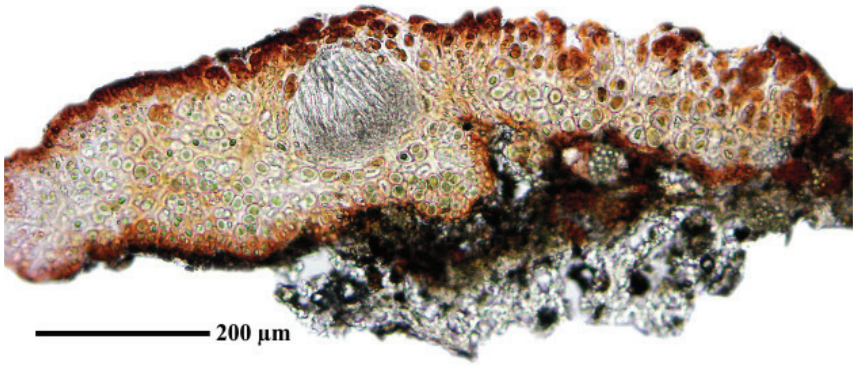
***Phyllisciella marionensis*** Henssen, in Henssen & Büdel, Beih. Nova Hedwigia 79: 385 (1984)

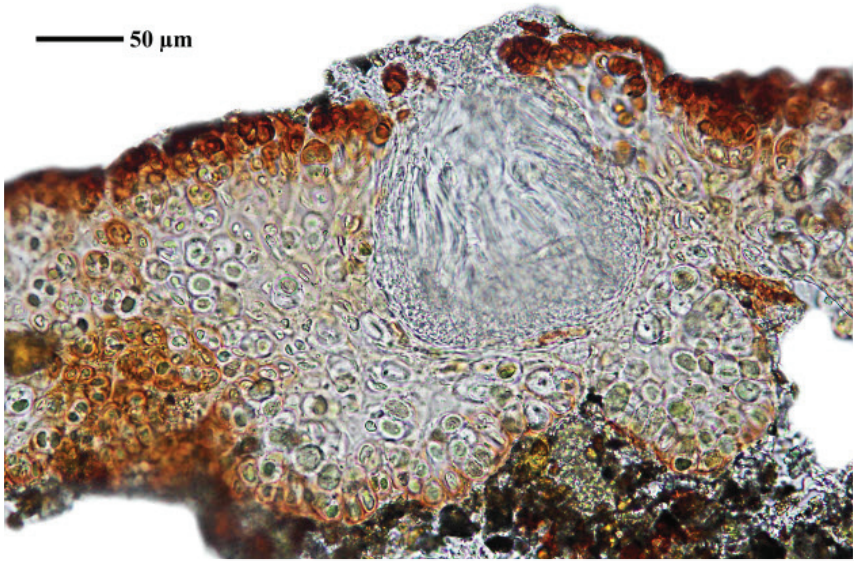
[GremmenM15-41], Prince Edward Islands, Marion Island, Junior's Kop, 46°52'58.4'' S, 37°49'58.9'' E, 245 m, on scoria on cinder cone. Leg. NJM Gremmen (no M15-41), 23.04.2015.

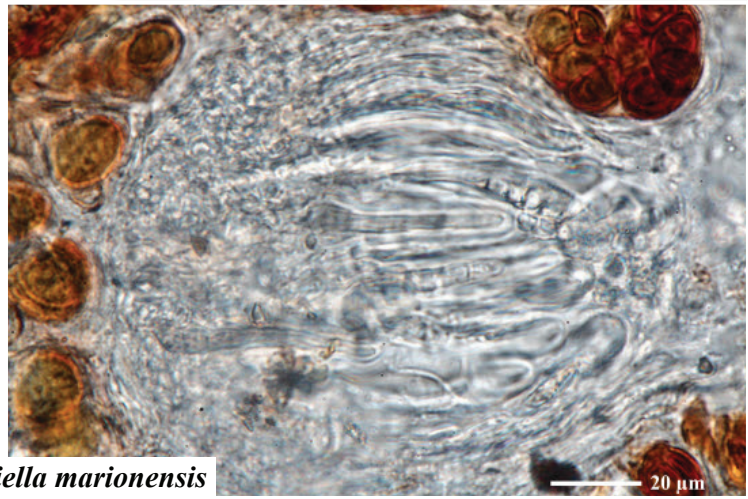




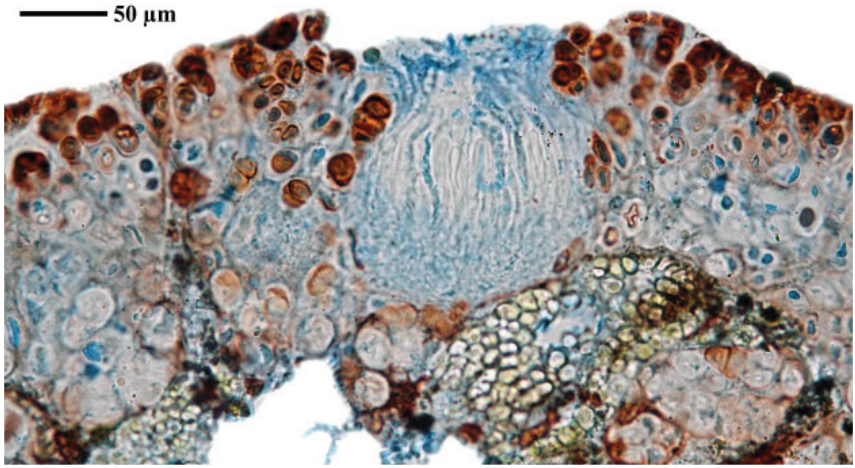

***Phyllisciella marionensis***

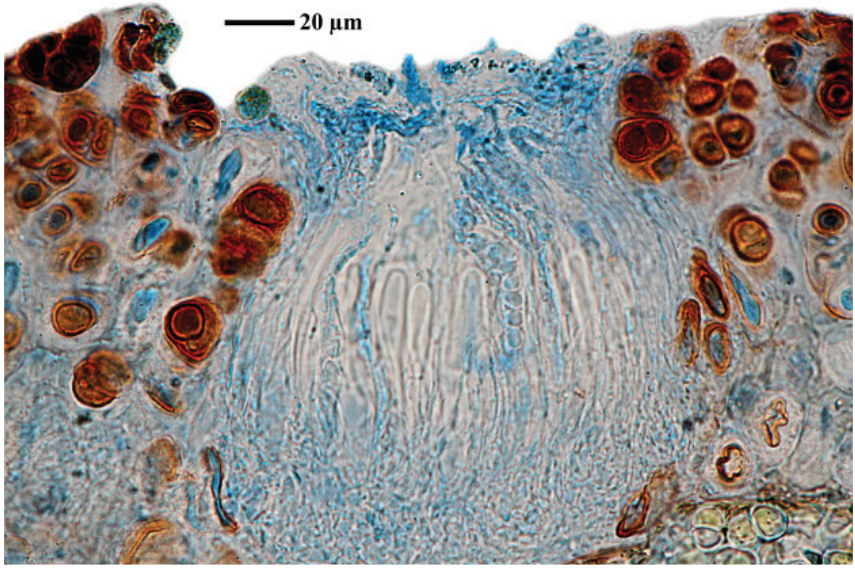


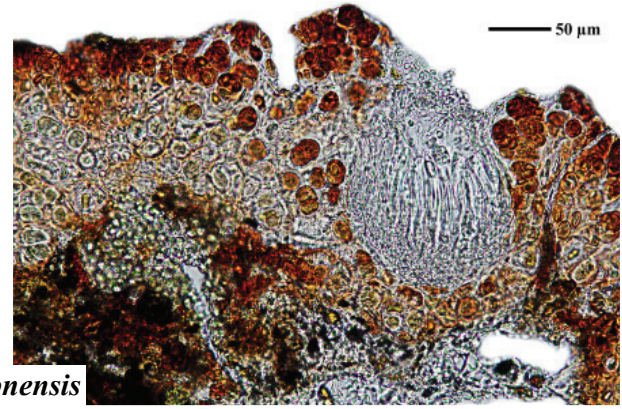



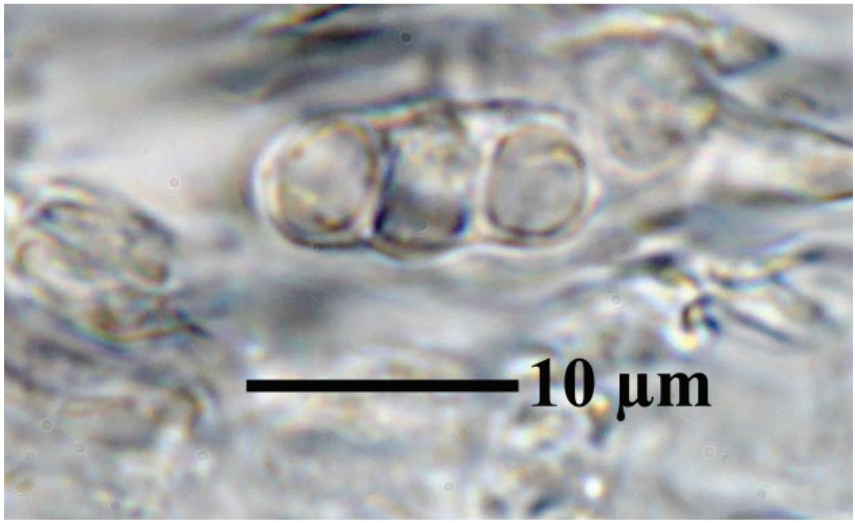

***Phyllisciella marionensis***

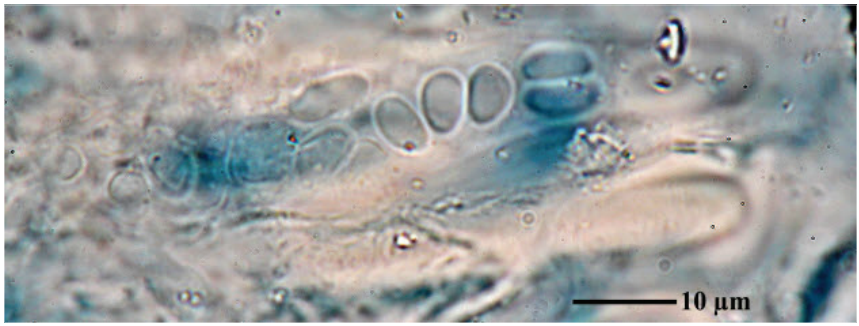



***Phyllisciella marionensis***

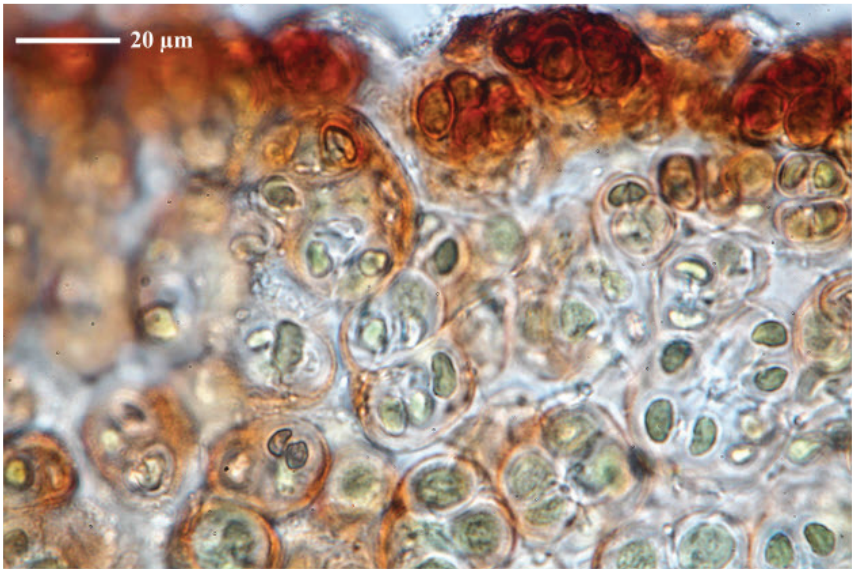






***Phyllisciella marionensis***




***Phyllisciella marionensis***

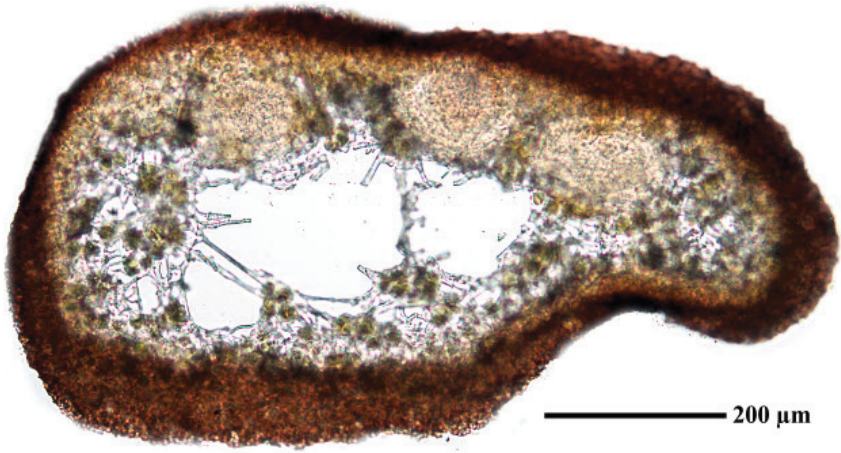
***Phylliscum japonicum*** Zahlbr., Bot. Mag., Tokyo 41: 320 (1927)

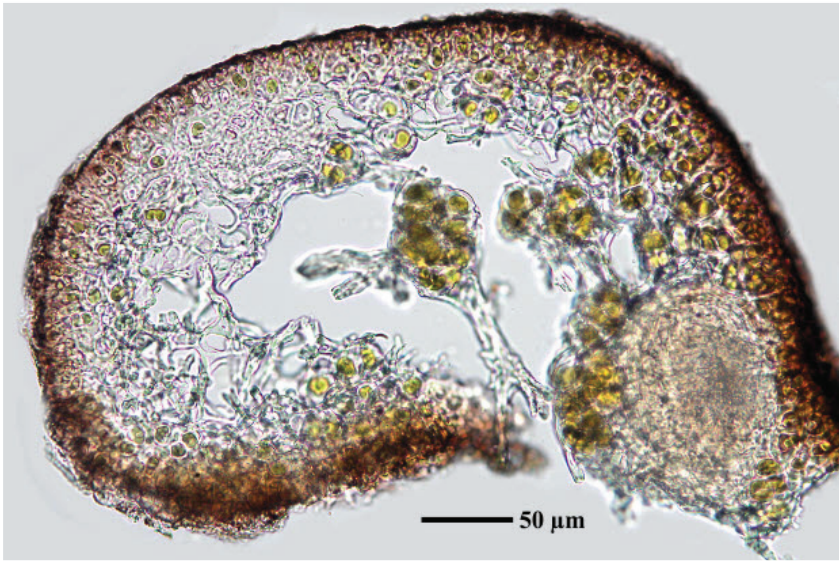
[ABL71446], Korea, Prov. Jeollanam-do, Goheumg-gun Distr., Jeomam-myeun, St. Palbong-gil, Mt. Palyeoungaround Yuyoung-bong. On siliceous rock. 34°37’42’’ N, 127°25’48’’ E, 430-490 m. Leg. A. Aptroot (no 71446), 17.10.2013, det. A. Aptroot, 2013.



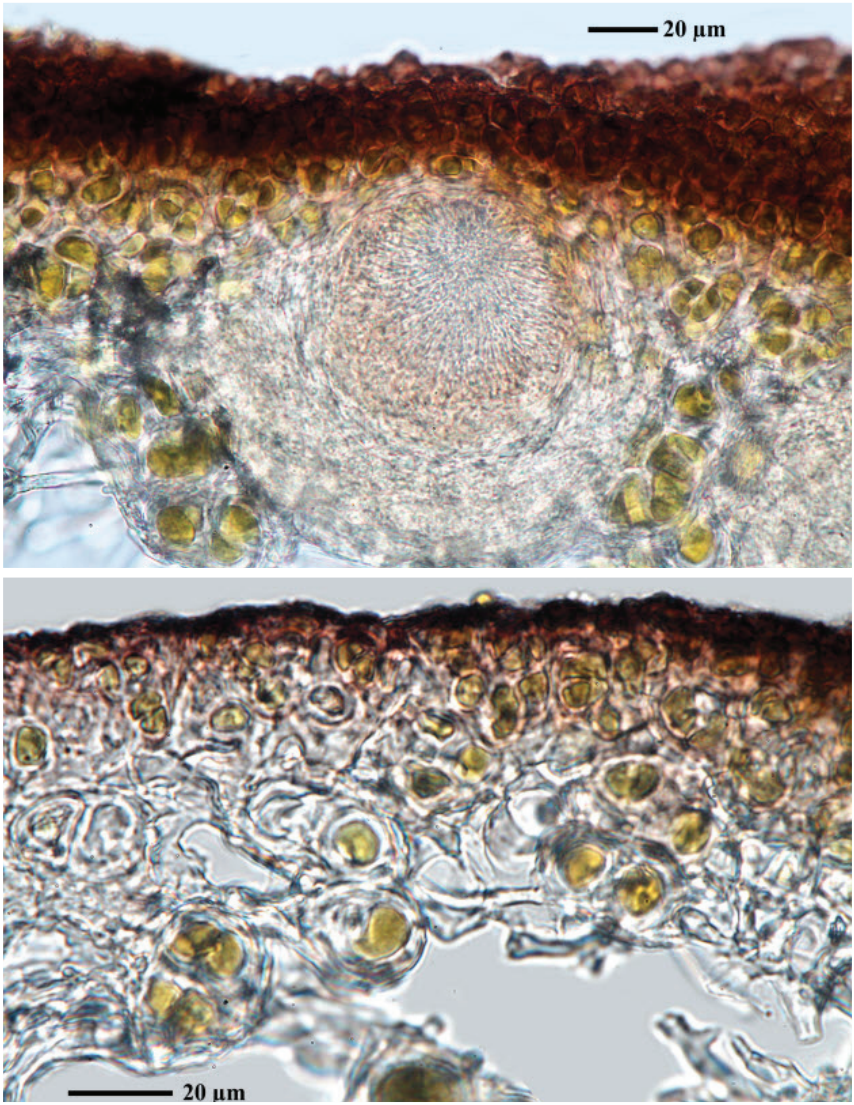



***Phylliscum japonicum***

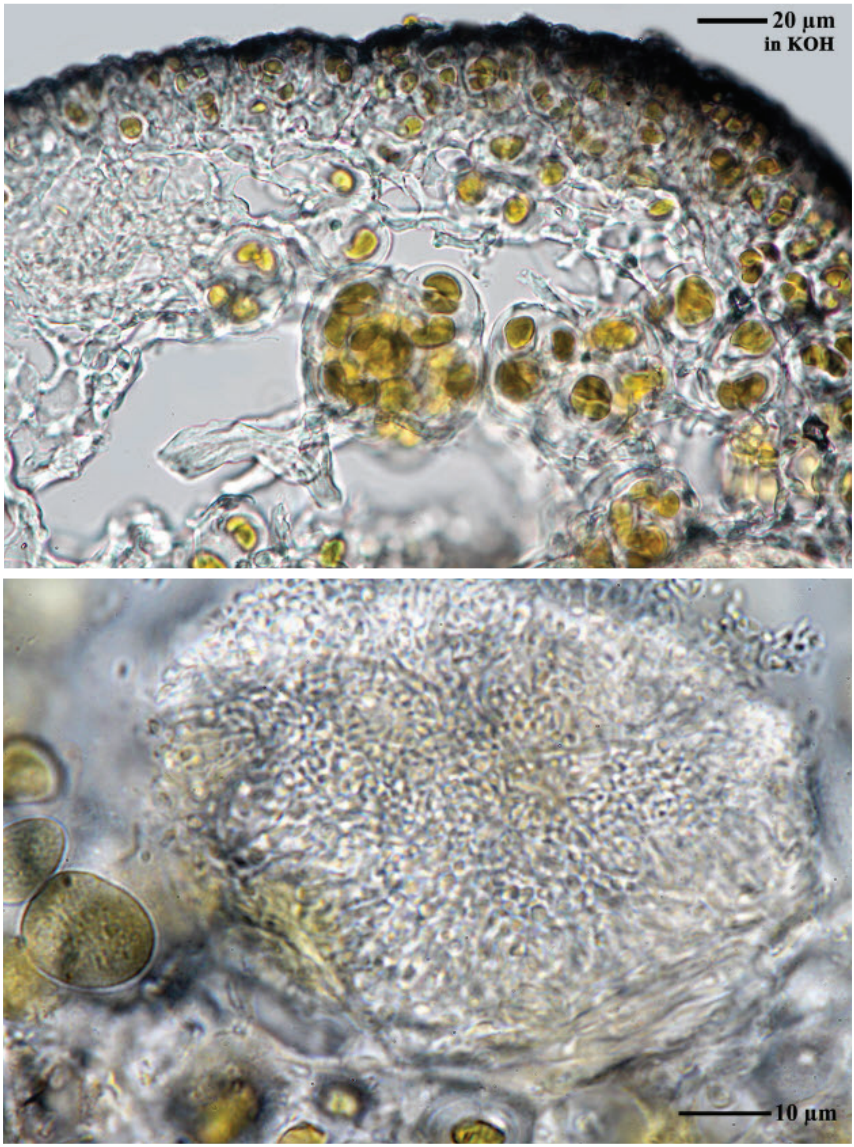


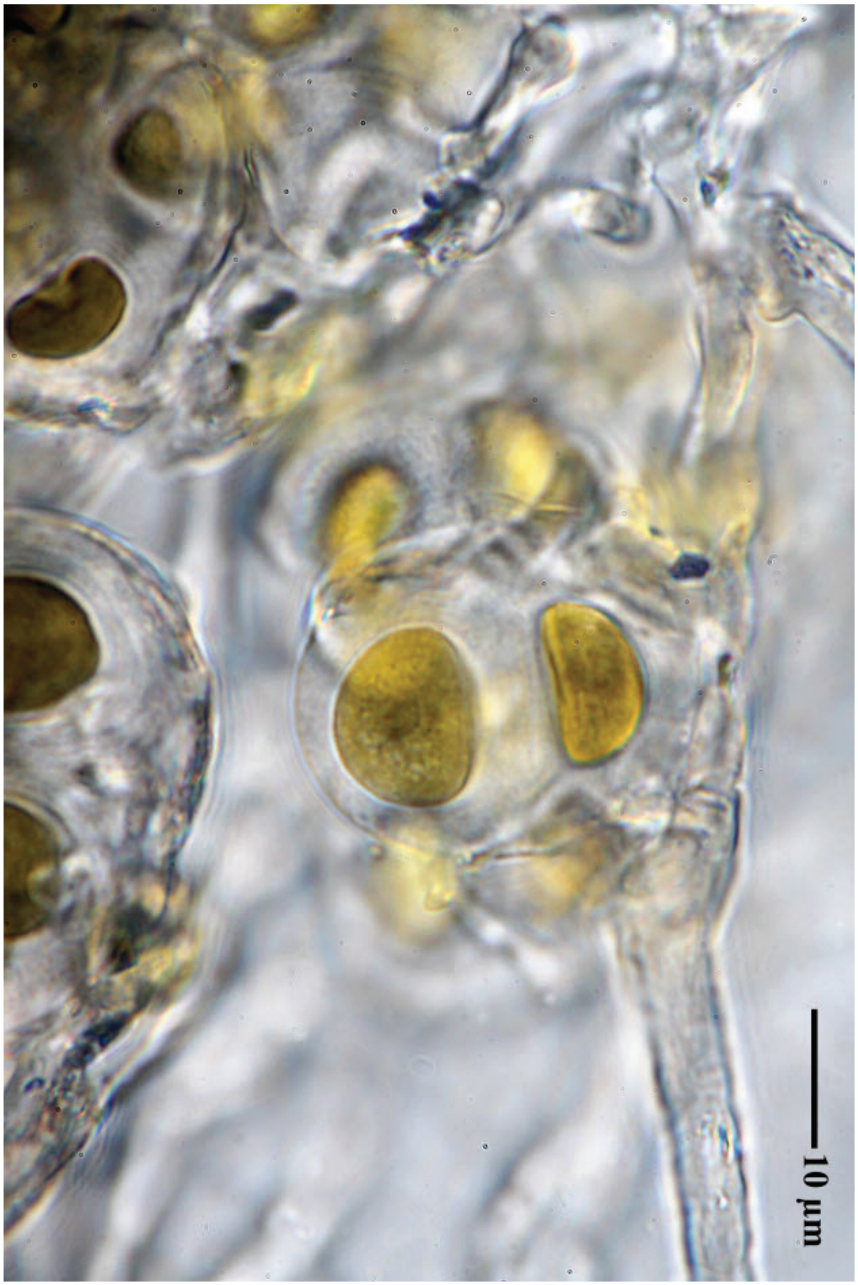

***Phylliscum japonicum***




***Phylliscum japonicum***




***Phylliscum japonicum***



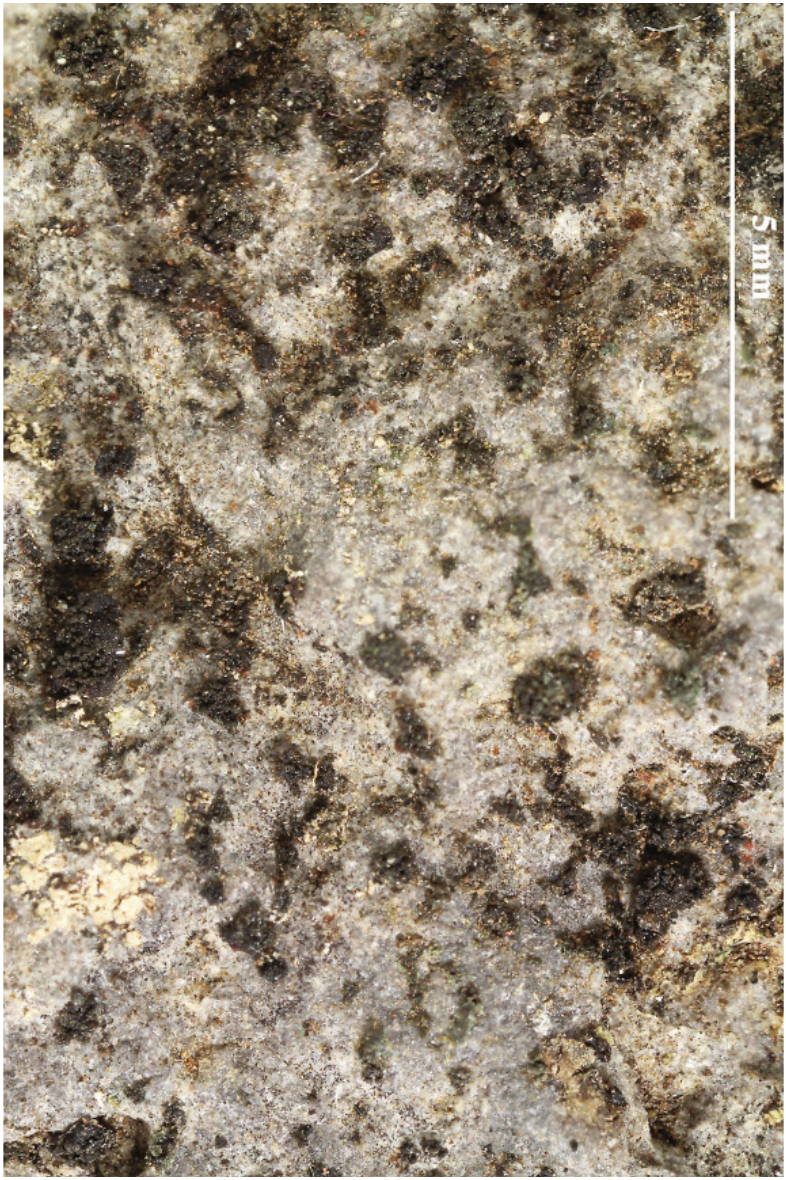

***Phylliscum japonicum***

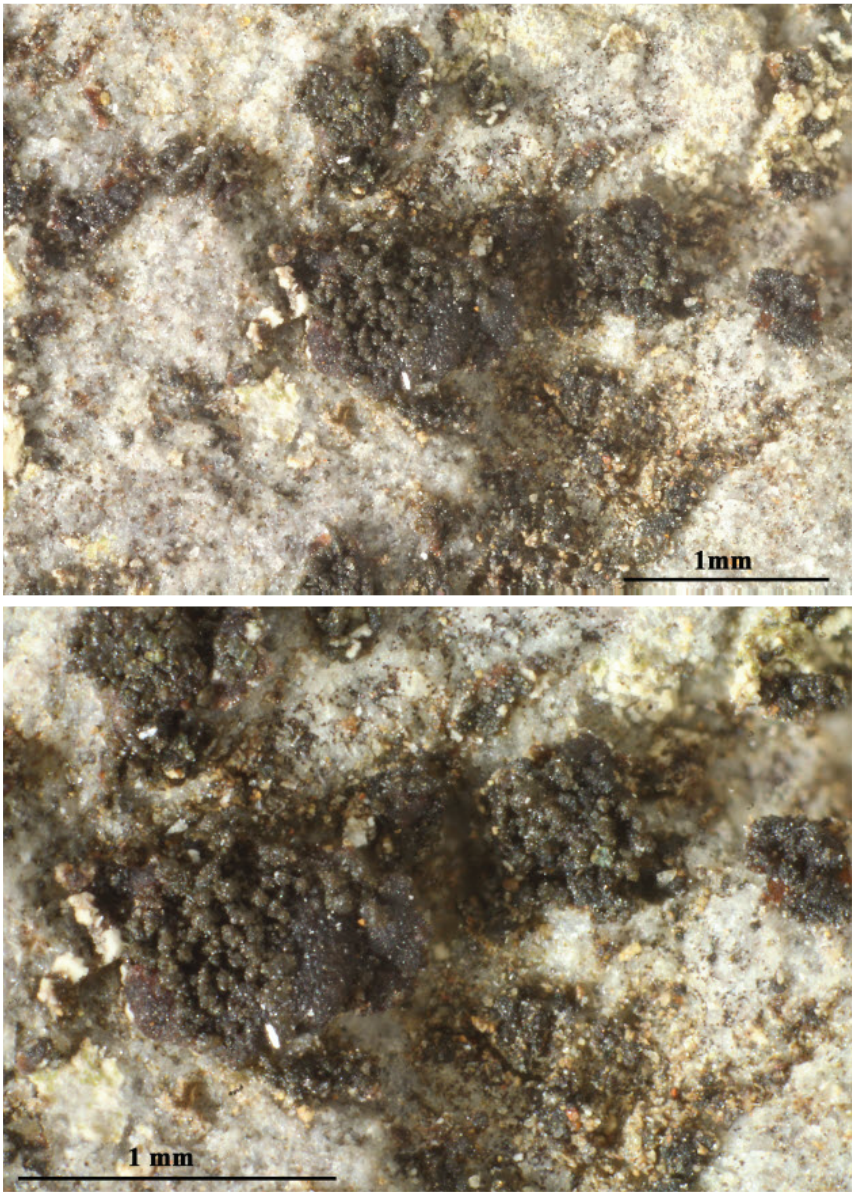
***Porocyphus coccodes*** Flot. ex Körb., Syst. lich. germ. (Breslau): 426 (1855)
= *Collema areolatum* Flot., Linnaea 23: 153 (1850)
= *Collema coccodes* Flot., Linnaea 23: 152 (1850)
= *Collema furfurellum* Nyl., Not. Sällsk. Fauna et Fl. Fenn. Förh., Ny Ser. 1: 229 (1859) [1858-59]
= *Collemopsis furfurella* (Nyl.) Nyl., in Lamy, Bull. Soc. bot. Fr. 25(5): 343 (1880) [1878]
= *Collemopsis lecanopsoides* (Nyl.) Cromb., J. Bot., Lond. 12: 332 (1874)
= *Porocyphus areolatus* Flot. ex Körb., Syst. lich. germ. (Breslau): 426 (1855)
= *Porocyphus furfurellus* (Nyl.) Forssell, Nova Acta R. Soc. Scient. upsal., Ser. 3 13(no. 6): 87 (1885)
= *Psorotichia coccodes* (Flot. ex Körb.) Arnold, Verh. zool.-bot. Ges. Wien 47: 292 (1897)
= *Psorotichia furfurella* (Nyl.) Boistel, Nouv. Fl. Lich. 2: 312 (1903)
= *Psorotichia lecanopsoides* (Nyl.) Boistel, Nouv. Fl. Lich. 2: 312 (1903)
= *Pyrenopsis lecanopsoides* Nyl., Syn. meth. lich. (Parisiis) 2: 38 (1869)

Thallus crustose, areolate, black to blackish-olive-green, the areoles angular to irregular in outline, 0.25–1.5(–2.5) mm wide, 0.2–0.5(–1) mm thick, the surface uneven, warted to granulose, usually with vertical, cylindrical, 0.1–0.3(–0.4) mm high, 50–90 µm thick outgrowths and thus appearing coralloid, attached by rhizohyphae originating from a sometimes indistinct, paraplectenchymatous basal layer. Apothecia pycnoascocarps, semi-immersed to sessile, laminal on the areoles or terminal on the vertical outgrowths, 1–3(–5) per areole, up to 0.3(–0.4) mm across, with an initially punctiform, later expanded, dark reddish brown disc and a persistent, entire, 30-40 µm wide thalline margin. Proper exciple deriving from a pycnidial wall, 15–25(–35) µm wide, colourless or yellowish brown in upper part, often visible as a paler ring in wet apothecia; epithecium pale reddish brown; hymenium colourless, (100–)110–150(–200) µm high, I+ blue; paraphyses 1–2 µm thick, indistinctly septate, sparingly branched and anastomosing, the apical cells slightly thickened, up to 3 µm wide. Asci 8-spored, prototunicate, thin-walled, cylindrical, K/I-, without thickened apex or amyloid structures. Ascospores 1-celled, hyaline, broadly ellipsoid to globose, (7.5–)10–14(–18) x (5–)7–12(–15) µm, thin-walled. Pycnidia immersed to slightly projecting, globose to broadly pyriform, 0.075–0.125 mm. Conidia short-cylindrical to broadly ellipsoid, 2–2.5 x 1–1.5 µm. Photobiont cyanobacterial (Calothryx), the cells isolated or arranged in short chains. Spot tests: all negative. Chemistry: without lichen substances. Note: a temperate to southern boreal-montane, probably

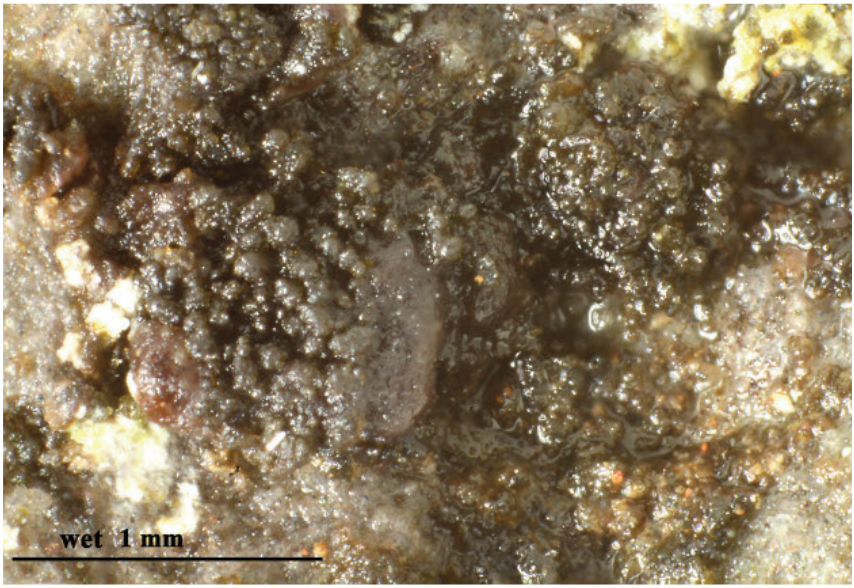
holarctic lichen found in seepage tracks on steeply inclined surfaces of basic siliceous rocks, e.g. with Peltula, more rarely along creeks and rivers.

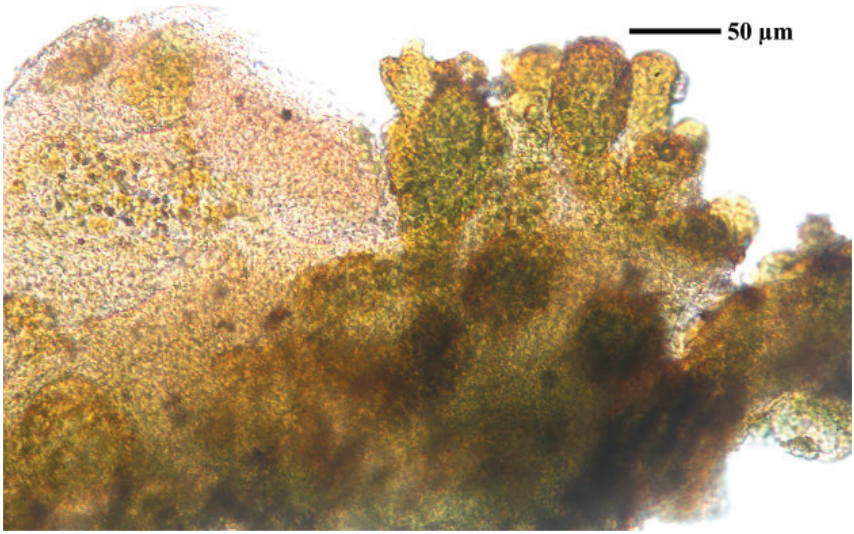
[ABL68247], Azores,Terceira, São Bartolomeu, near bridge on lava. 38°50.4’ N, 27°17.5’ W, 125 m. Leg. A. Aptroot (no 68247), 13.07.2009, det. A.Aptroot, 2008.



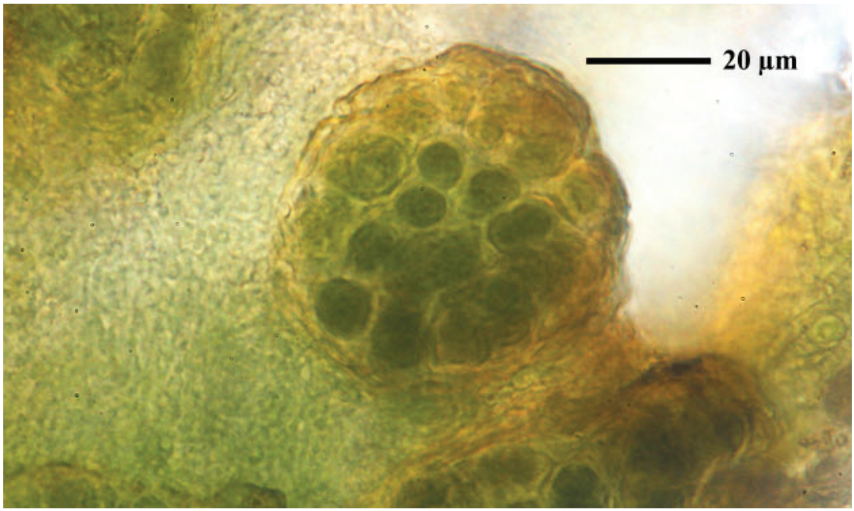


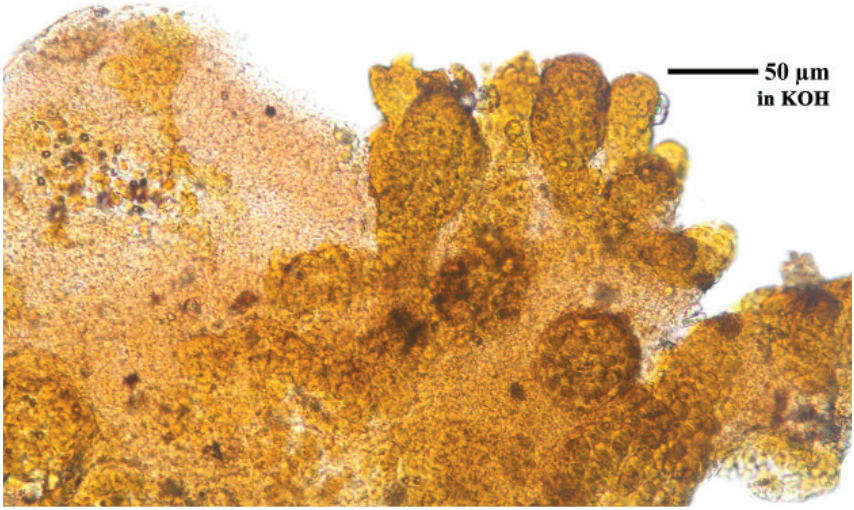

***Porocyphus coccodes***



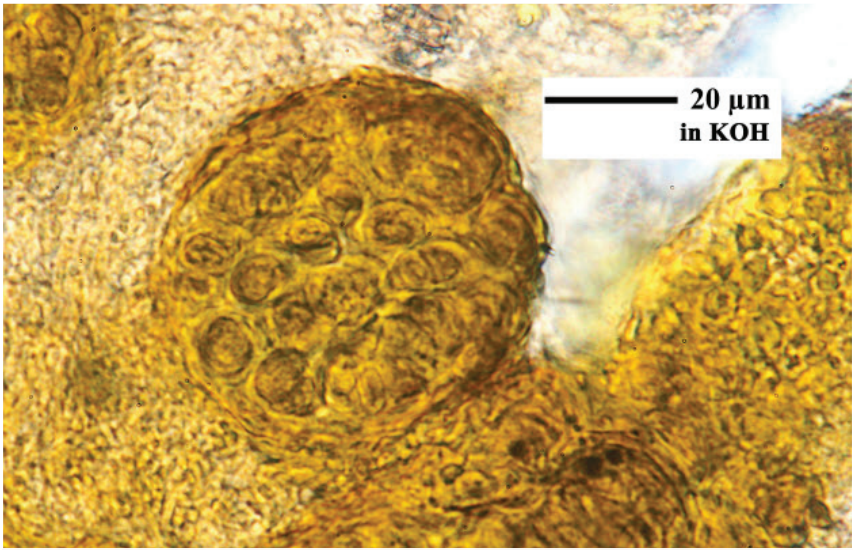




***Porocyphus coccodes***




***Porocyphus coccodes***

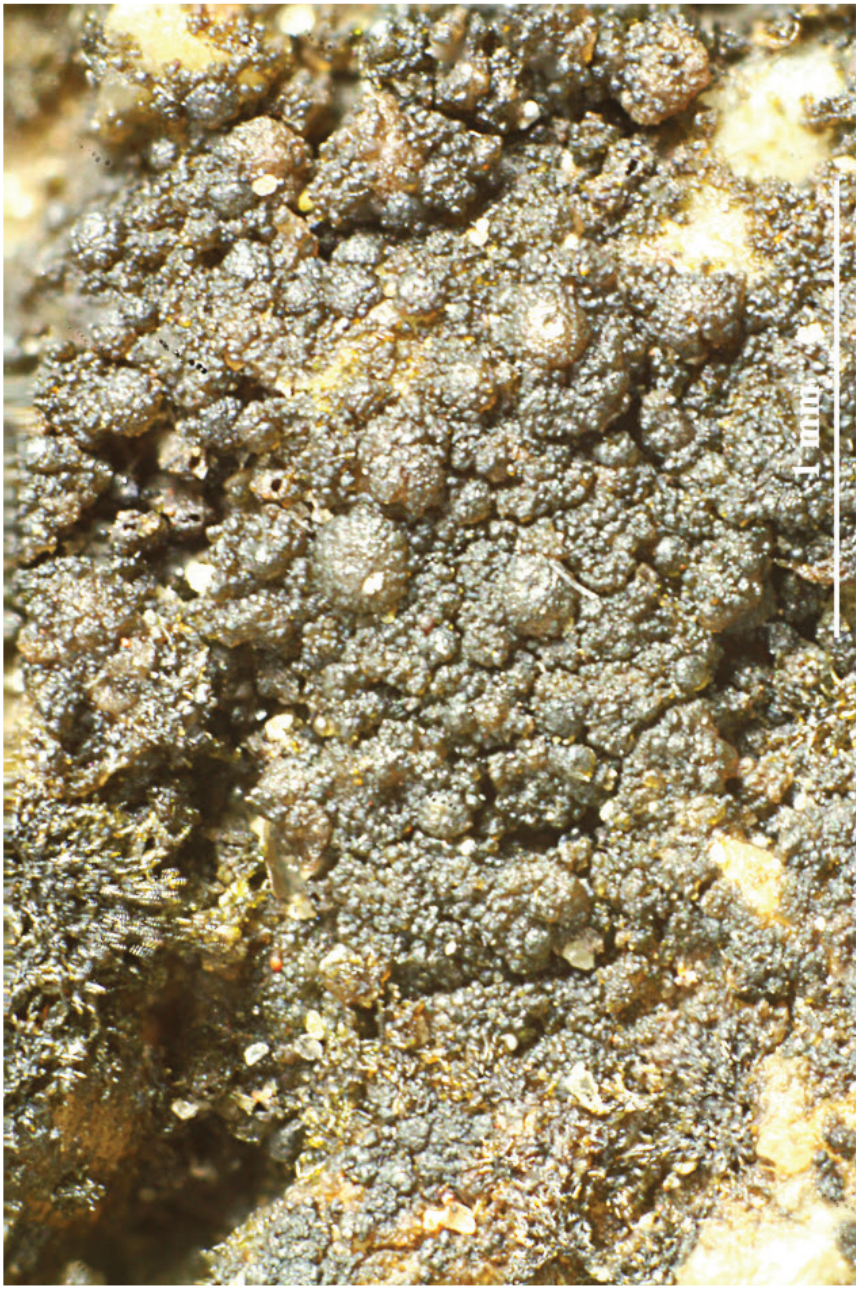



***Porocyphus coccodes***

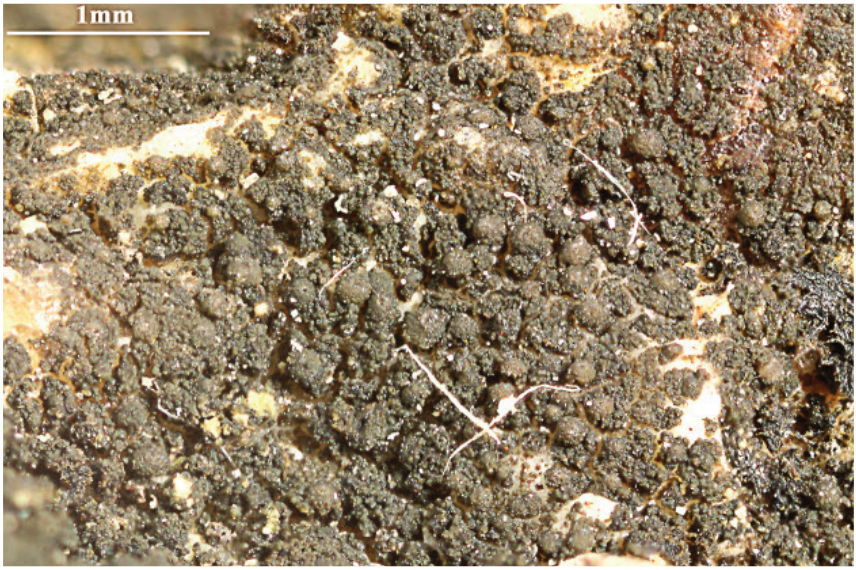
***Porocyphus dimorphus*** Henssen, Symb. bot. upsal. 18(no. 1): 66 (1963)

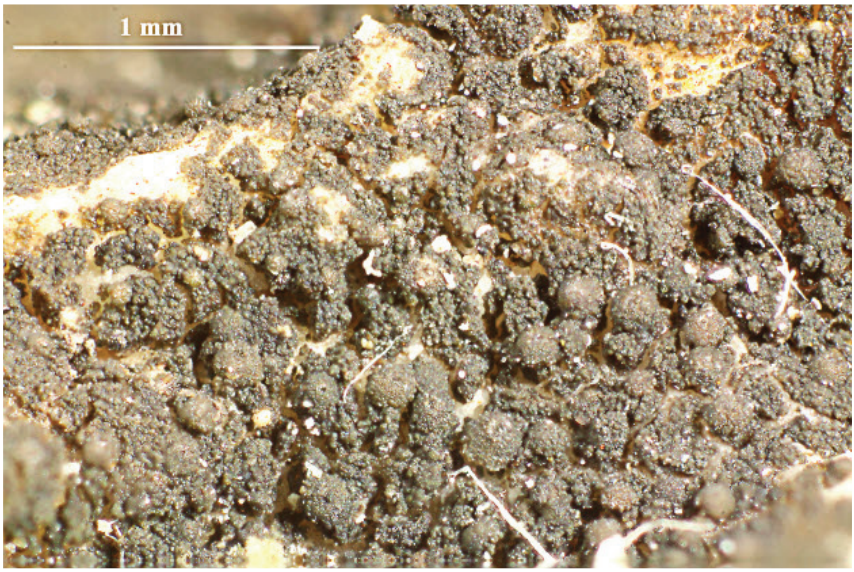
[ABL27901], Brazil, Santa Catarina, São Francisco do Sul, S of Prainha, on coastal granite. 26°14’06’’ S, 48°30’05’’ W, 10 m. Leg. M. Cáceres & A. Aptroot (no 27901), 08.10.2015, det. A. Aptroot, 2015



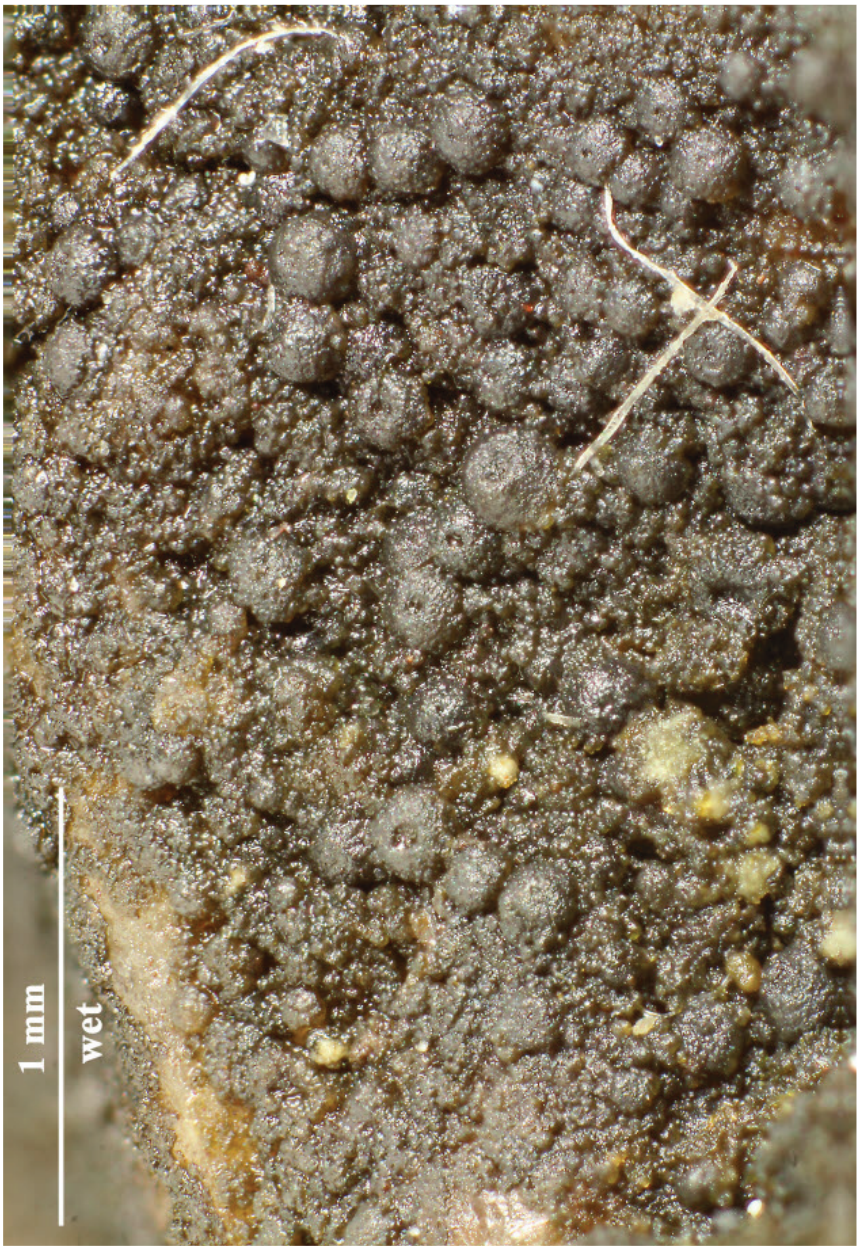



***Porocyphus dimorphus***

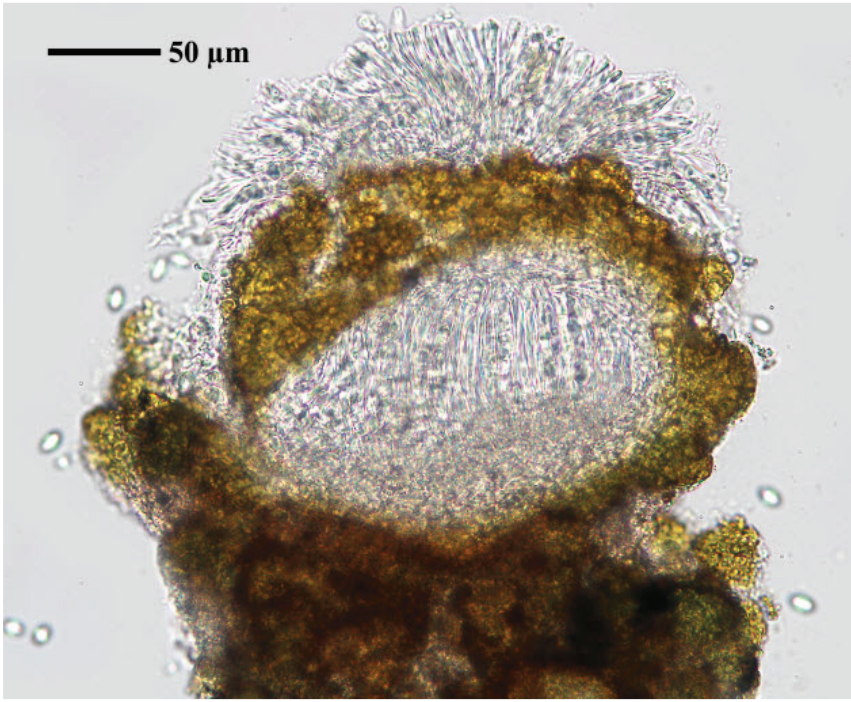


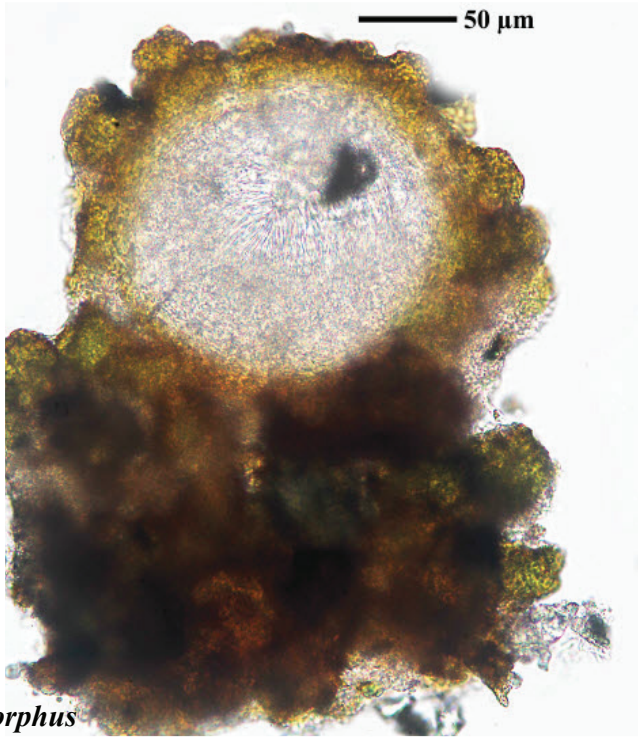




***Porocyphus dimorphus***

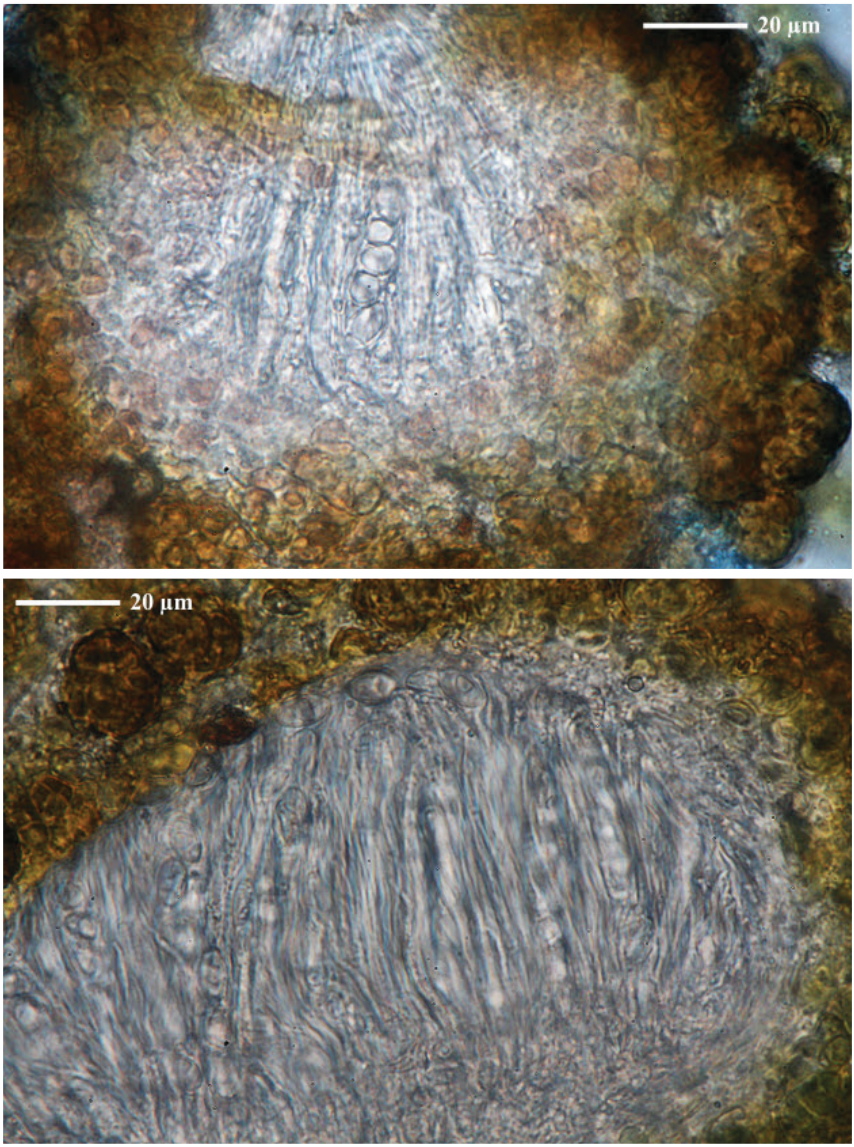



***Porocyphus dimorphus***

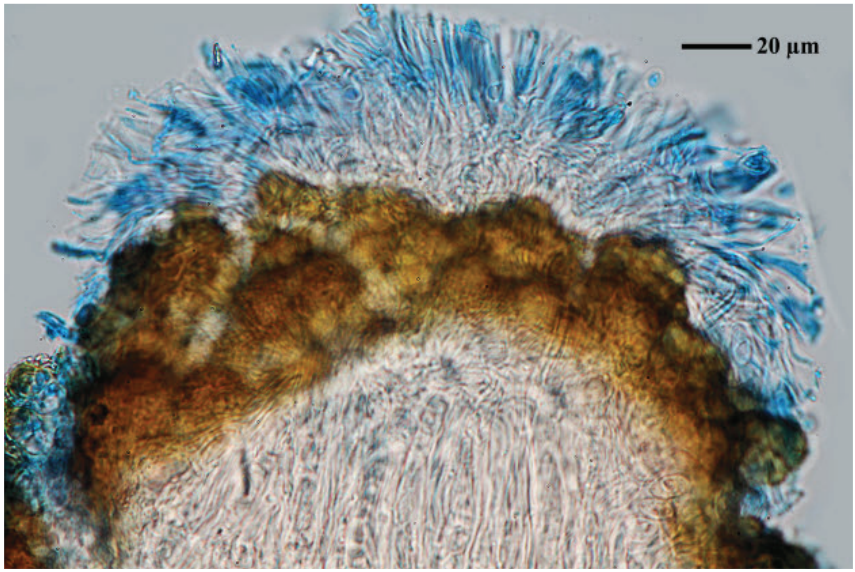


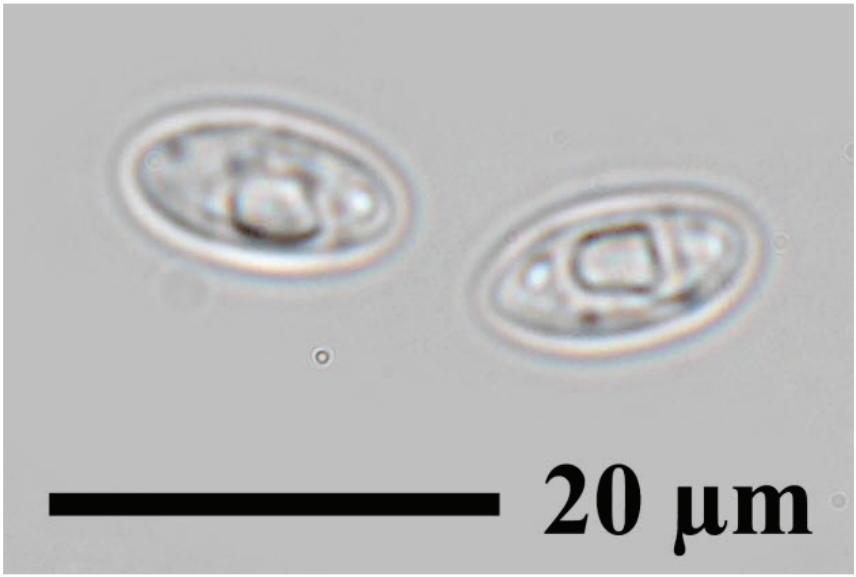




***Porocyphus dimorphus***

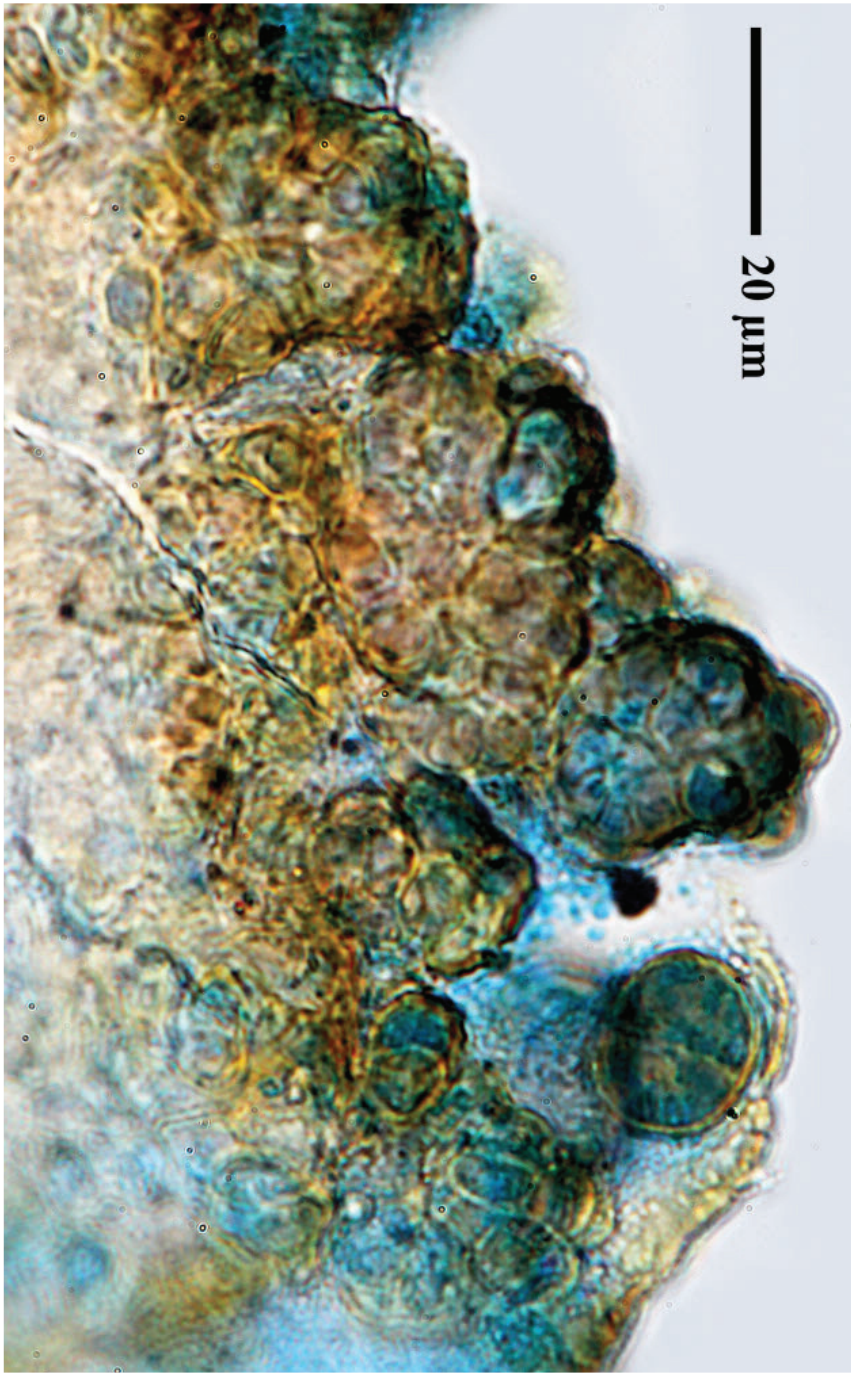



***Porocyphus dimorphus***




***Porocyphus dimorphus***

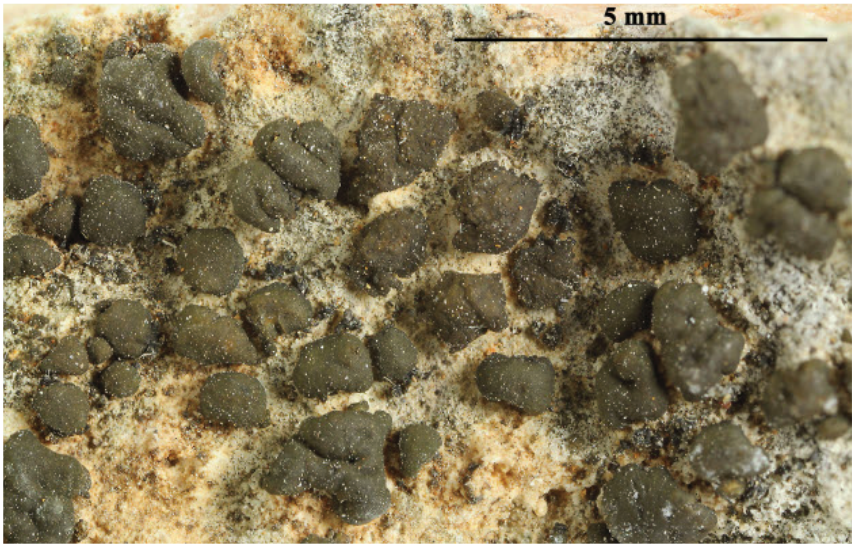



***Porocyphus dimorphus***

***Pseudopeltula myriocarpa*** Henssen, Lichenologist 27(4): 279 (1995)

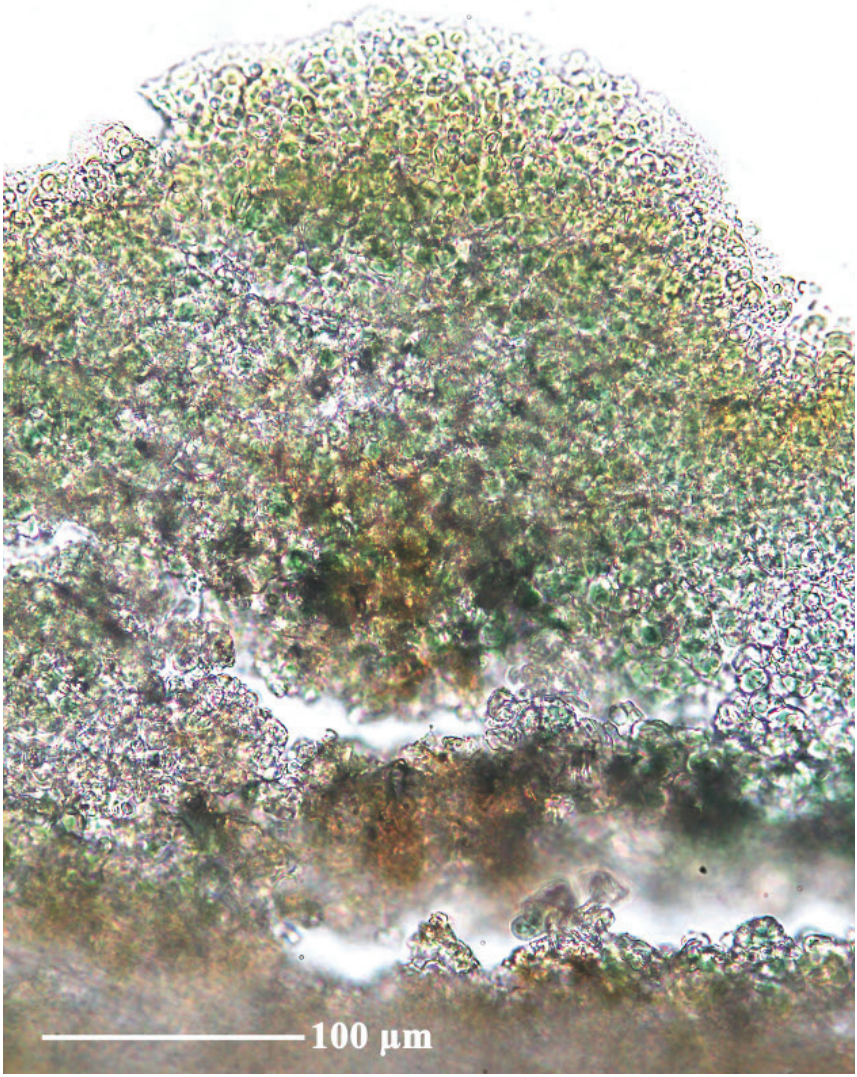
[ABL25792], USA, Puerto Rico, Distr. Ponce, Reserva forestal de Guanica, road 333, km 7.9, dry scrub forest on limestone. 17°57' N, 66°54' W, 10 m. Leg. A. & M. Aptroot (nr 25792, 21-31.05.1989, det. A. Aptroot, conf. M. Schultz, 2005.

Thallus olivaceous, squamulose to peltate, margin curved downwards, lower side ± tomentose. Squamules single or aggregated, subglobose to elongated, up to 7 mm long and 4–5 mm thick, attached by rhizoidal strands and an umbilicus up to 4 mm long and 1–4 mm thick. Thallus in sections (260–)380–480 um tall, tomentum (60–)140–280 µm thick. Apothecia finally aggregated in stromata; stromata brown to blackish, circular to rosette-shaped spots, up to 2 mm diam. Hymenium 110–115 µm tall, becoming divided by strands of sterile hyphae; hymenium 1+ deep blue turning brown-red, subhymenium 1+ bluish; exciple rudimentary. Asci 6-8-spored, cylindrical, 75–95 × 11–11.5 µm; ascospores simple or rarely twocelled, 11.5–13 × 6–7.5 µm. Sectioned pycnidia up to 215 µm broad and 240 um tall; conidia *c.* 2–2.5 × 1 µm.

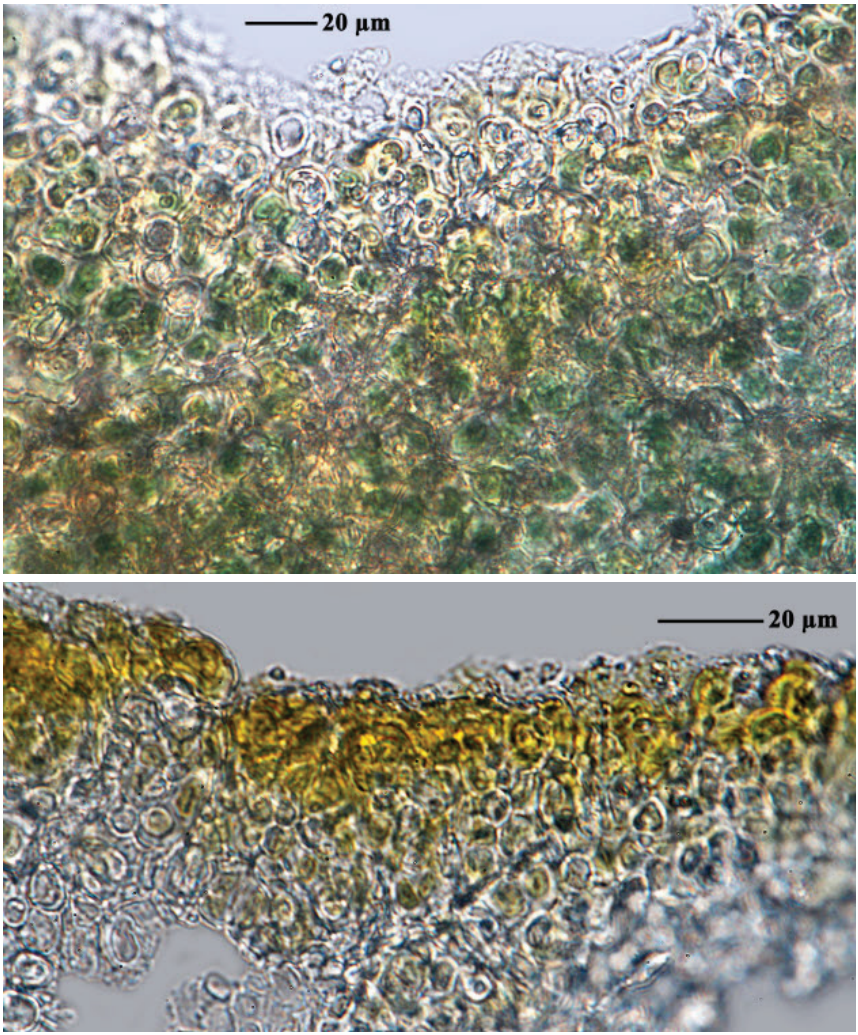




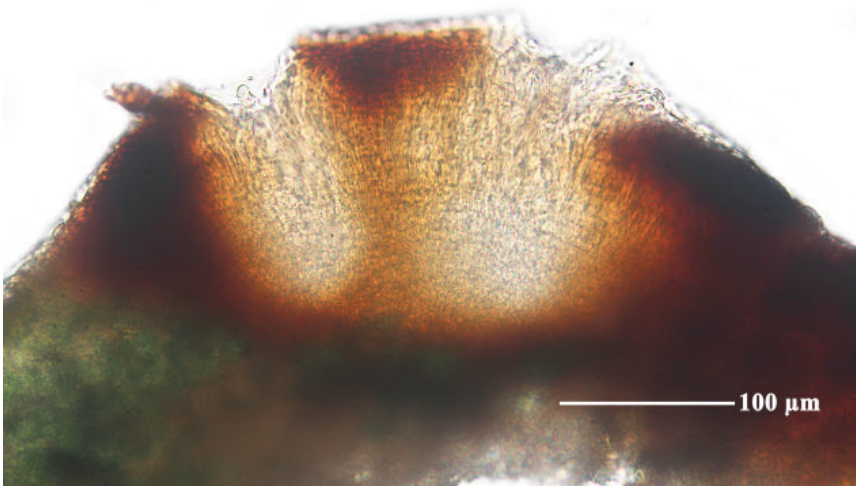

***Pseudopeltula myriocarpa***

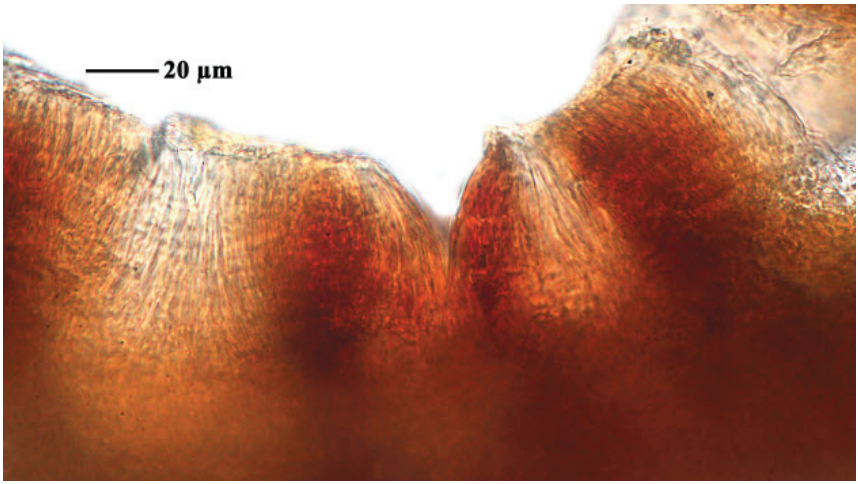



***Pseudopeltula myriocarpa***

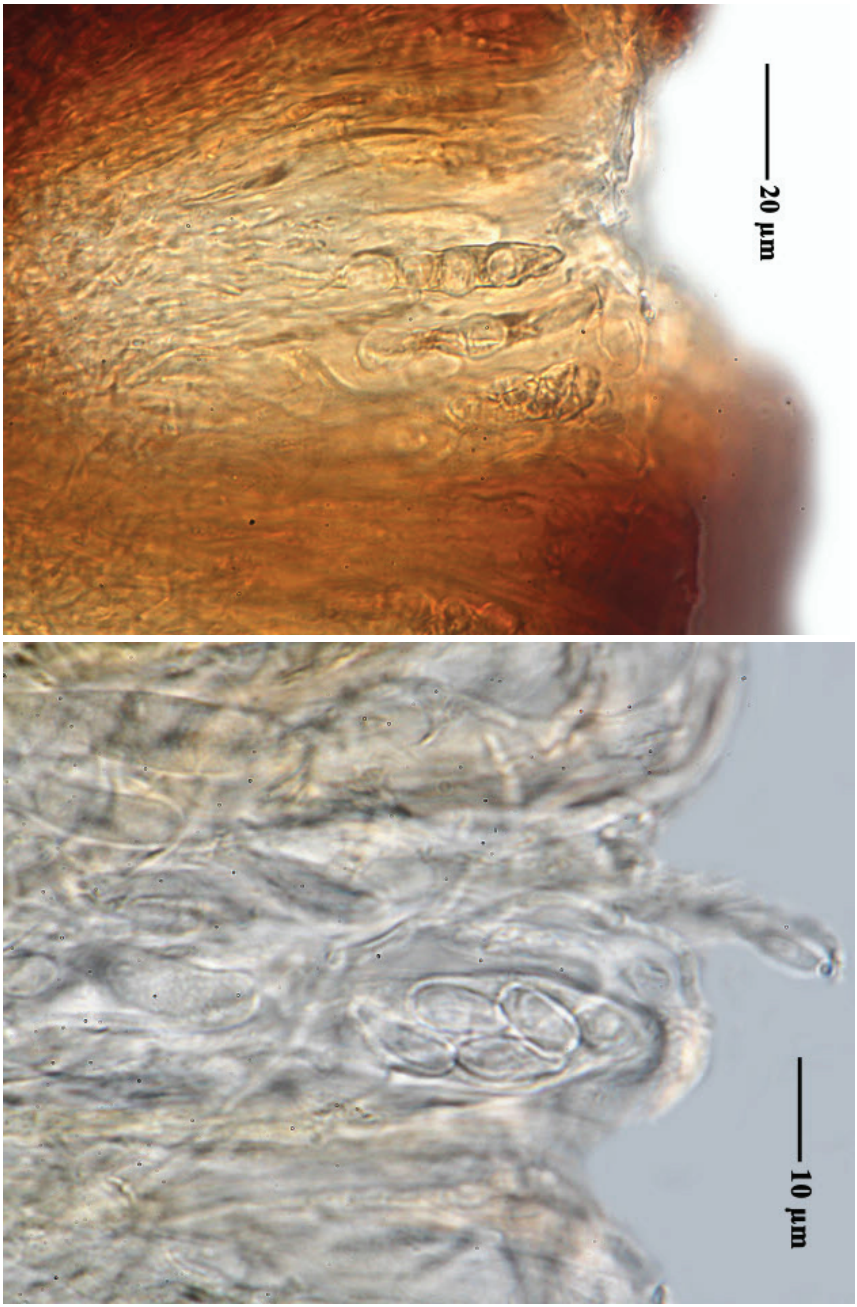



***Pseudopeltula myriocarpa***



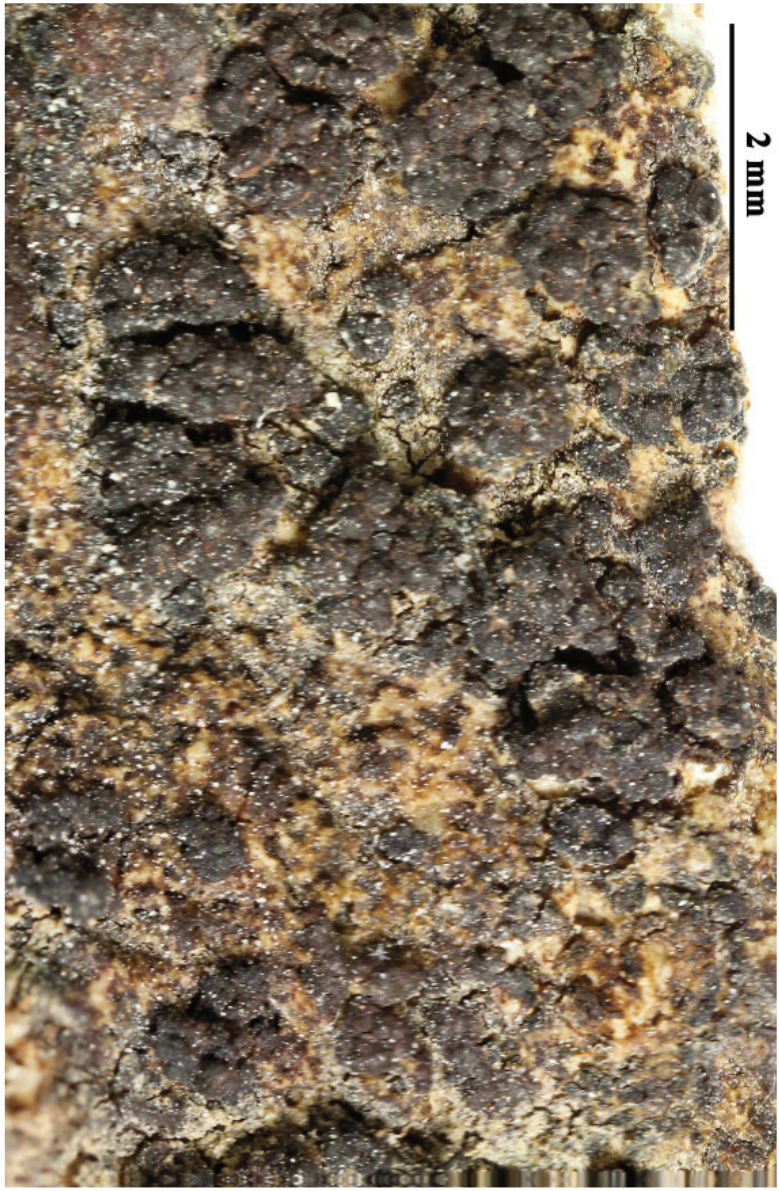

***Pseudopeltula myriocarpa***




***Pseudopeltula myriocarpa***

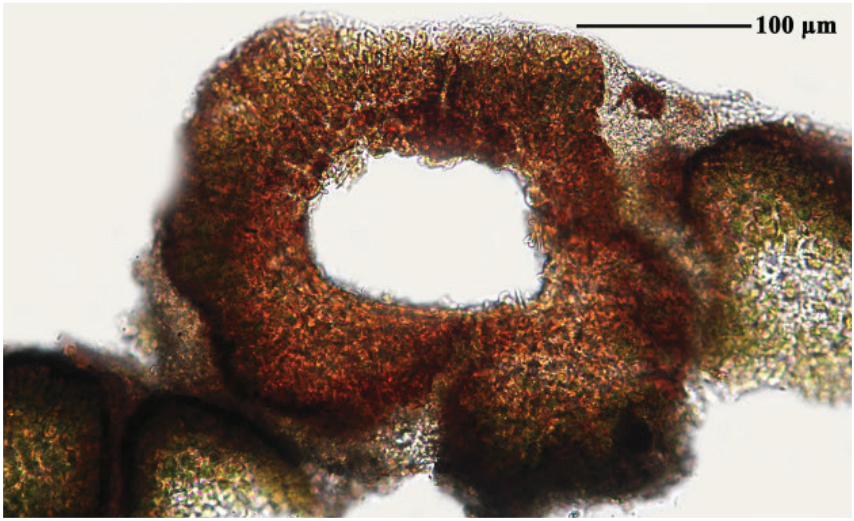
***Psorotichia americana*** Vain., J. Bot., Lond. 34: 71 (1896)

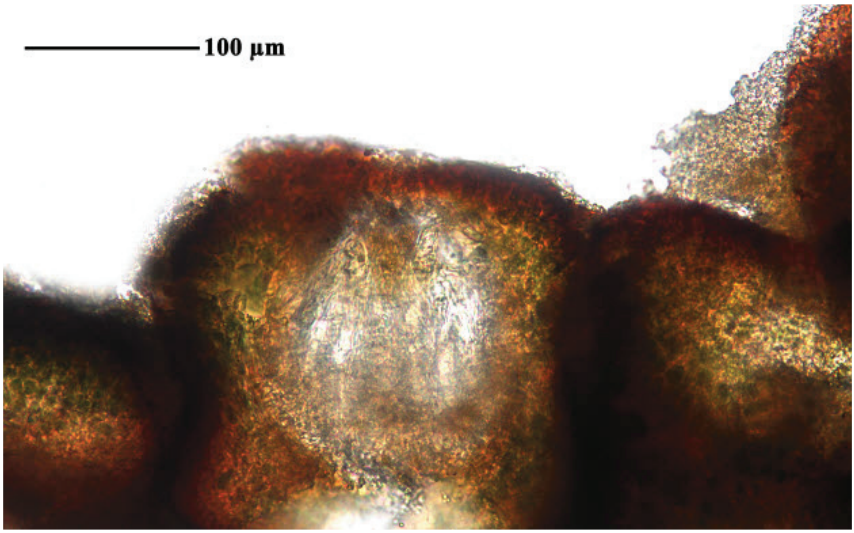
[ABL78846], Brazil. Santa Catarina, Sao Bento do Sul, APA Rio Vermelho, in Atlantic rain forest, rock near river. Leg. A. Aptroot (no. 78846), 01.04.2019, det. A. Aptroot, 2019.



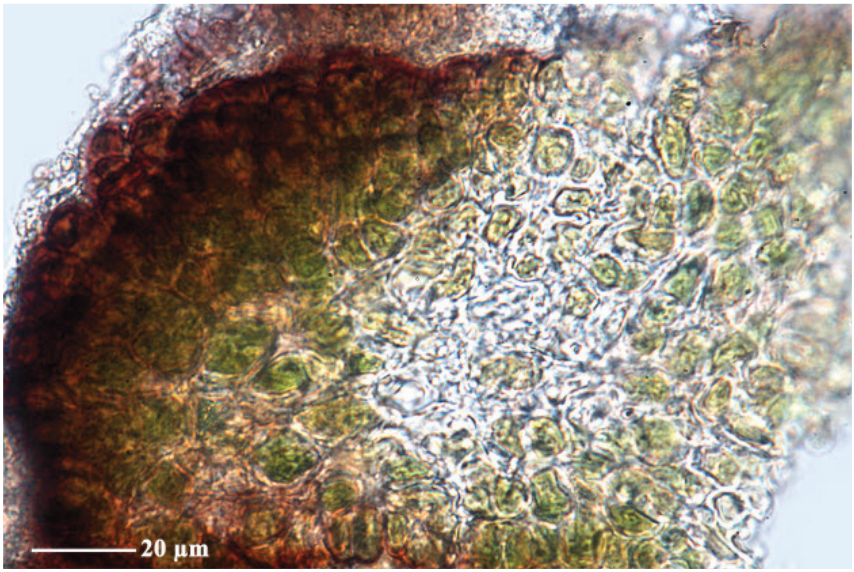



***Psorotichia americana***



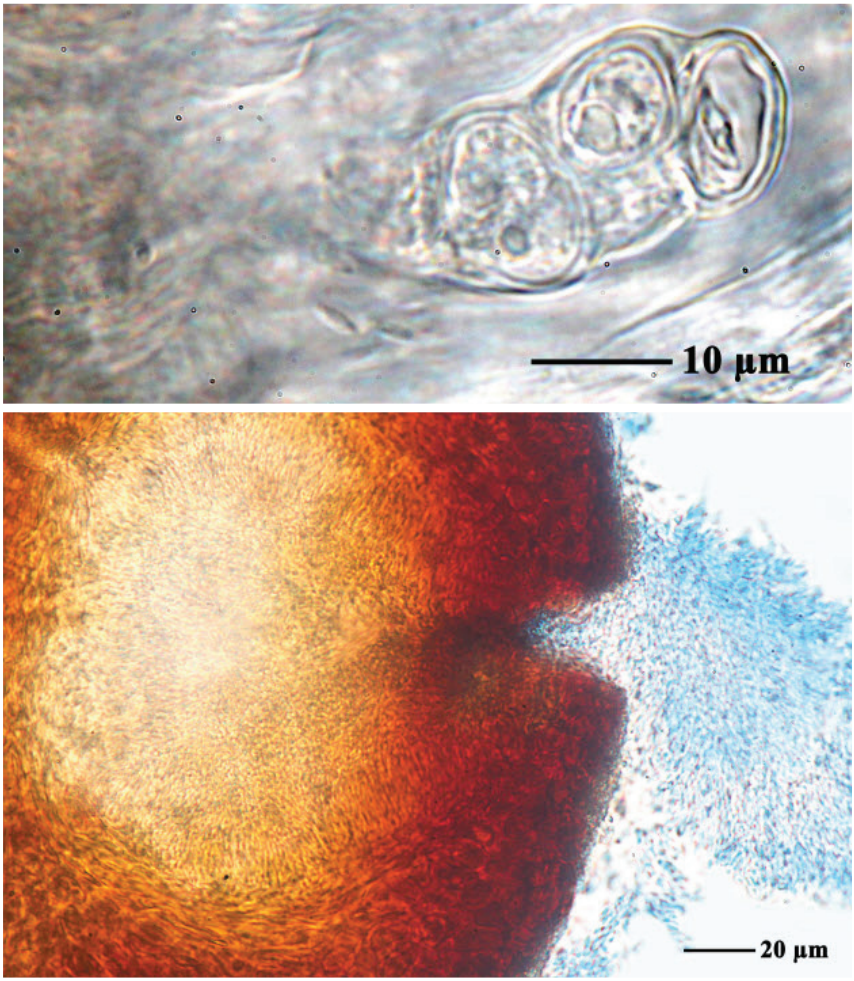

***Psorotichia americana***



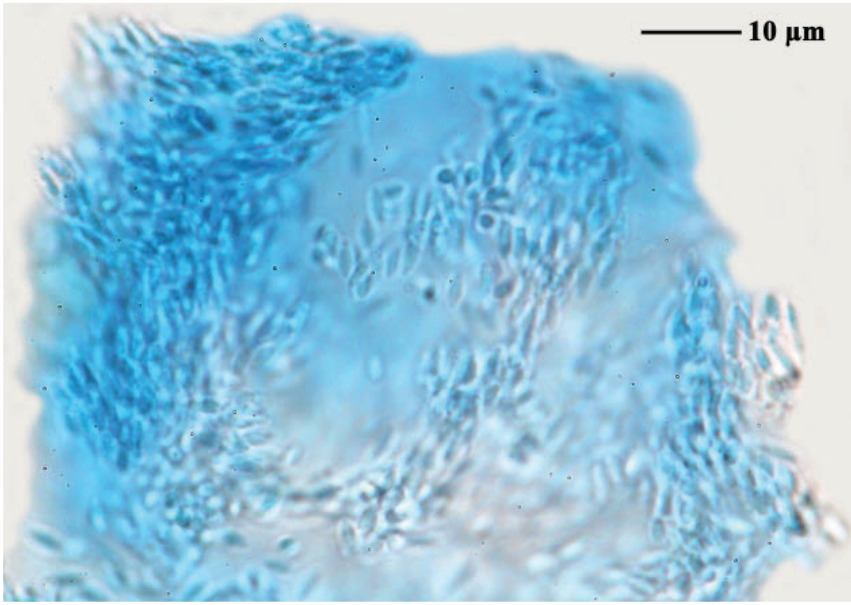




***Psorotichia americana***




***Psorotichia americana***




***Psorotichia americana***

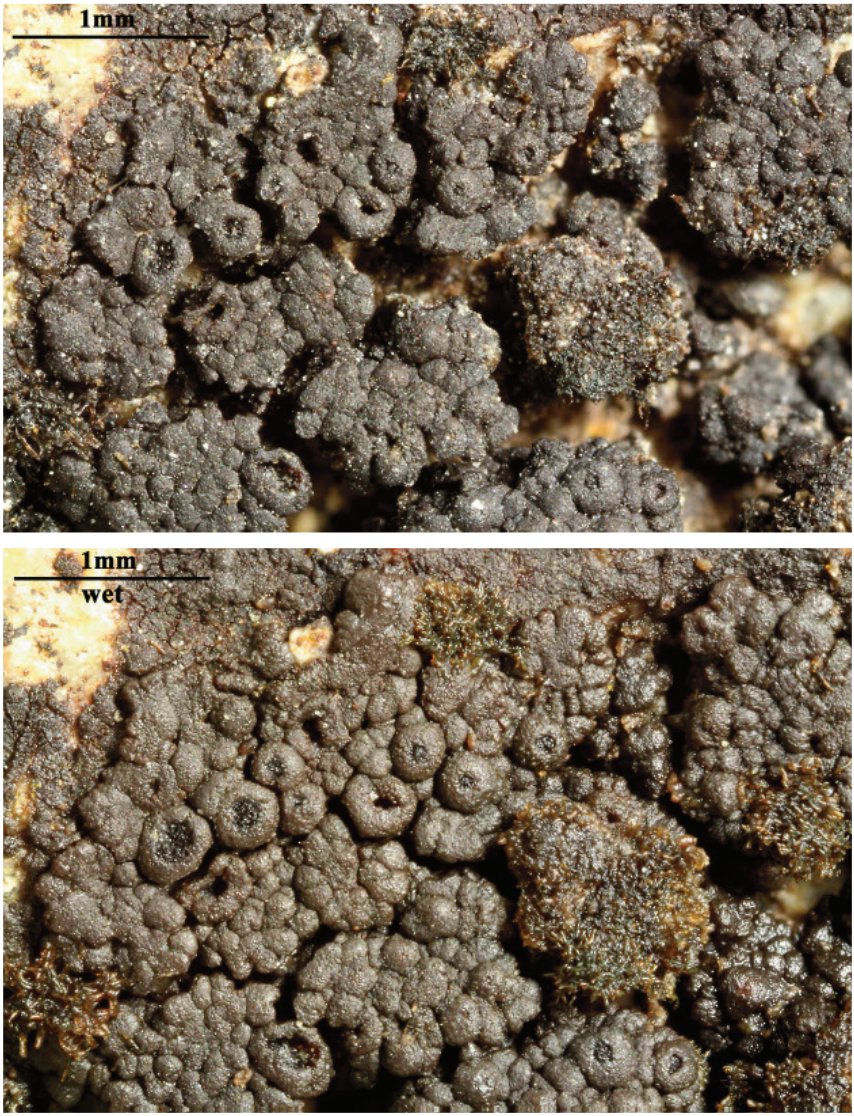
***Psorotichia americana*** Vain., Bot., Lond. 34: 71 (1896)

[ABL78844], Brazil. Santa Catarina, Sao Bento do Sul, APA Rio Vermelho, in Atlantic rain forest, rock near river. Leg A.Aptroot (no. 788991), 04.2019, det. A. Aptroot, 2019.

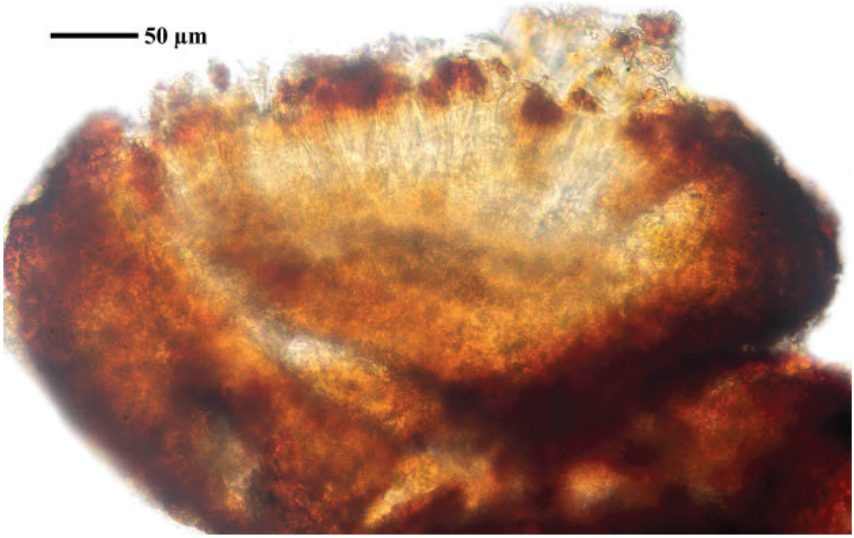


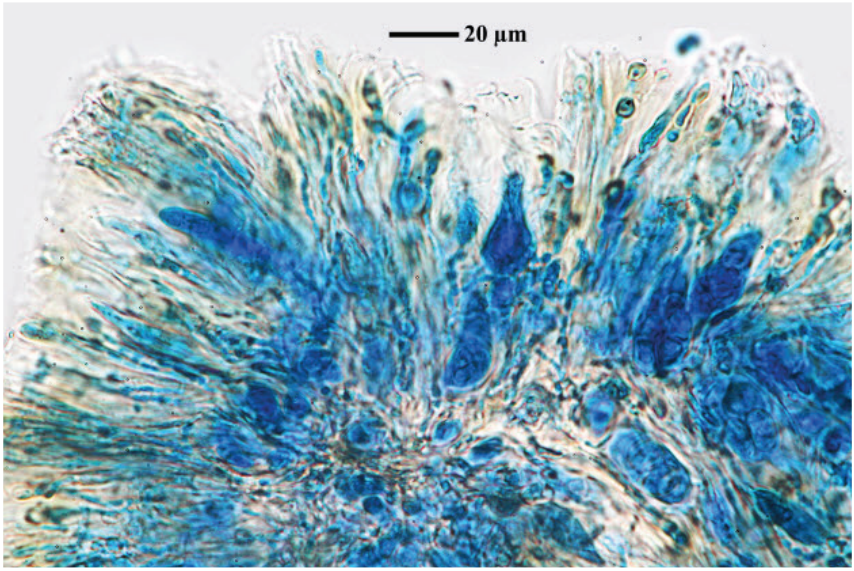



***Psorotichia americana***

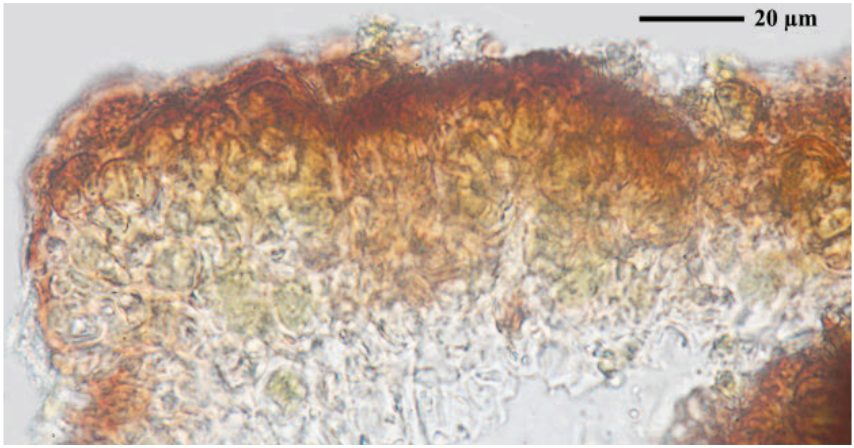


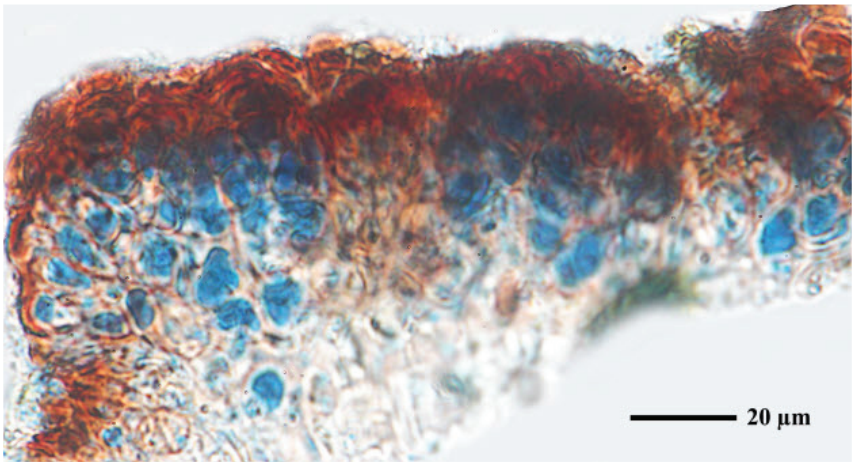

***Psorotichia americana***




***Psorotichia americana***



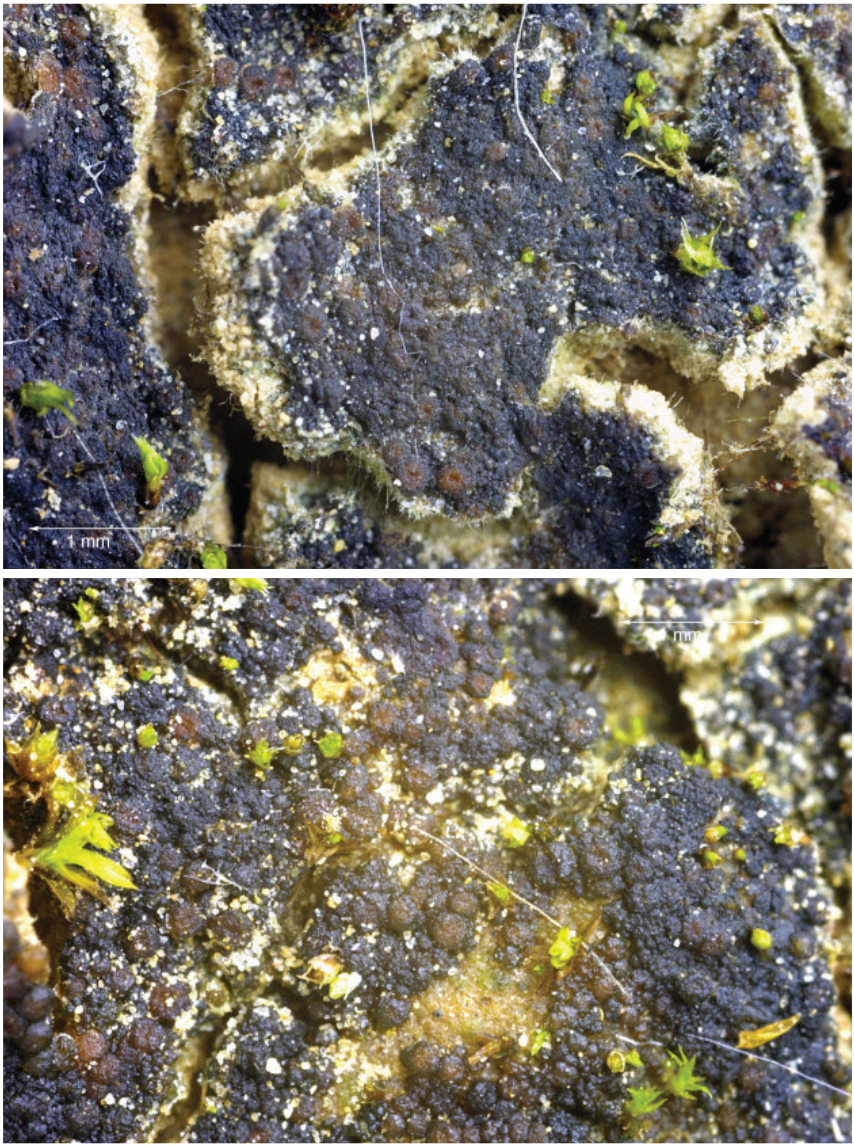

***Psorotichia americana***

***Psorotichia lutophila*** Arnold, Ber. bayer. bot. Ges. 1(Anh.): 129 (1891)

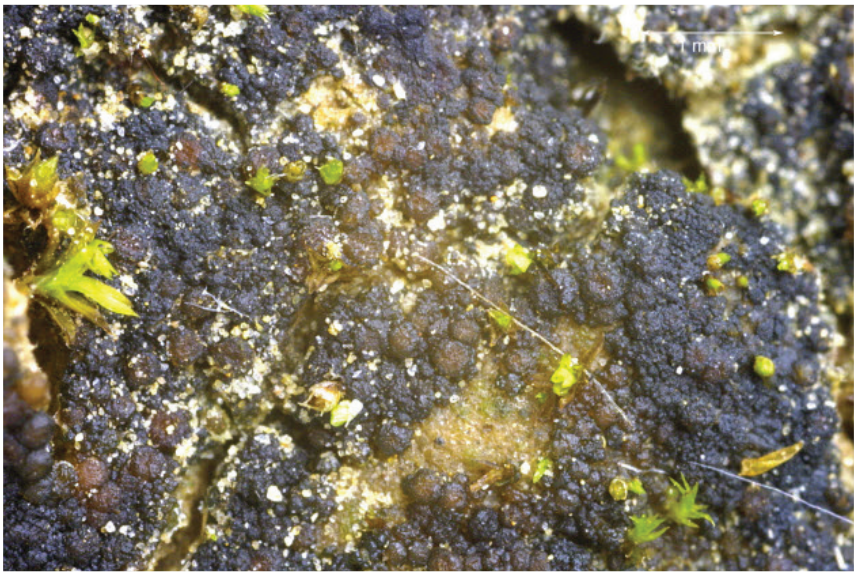
[13237], Germany, Nordrhein-Westfalen, Bergisches Land, Wuppertal, am Eskesberg, Kalkerdeaufschüttung im Jahr 2005 im ehemaligen Kalksteinbruch, 250 m. Leg. et det. G. Zimmermann, 01.07.2007.

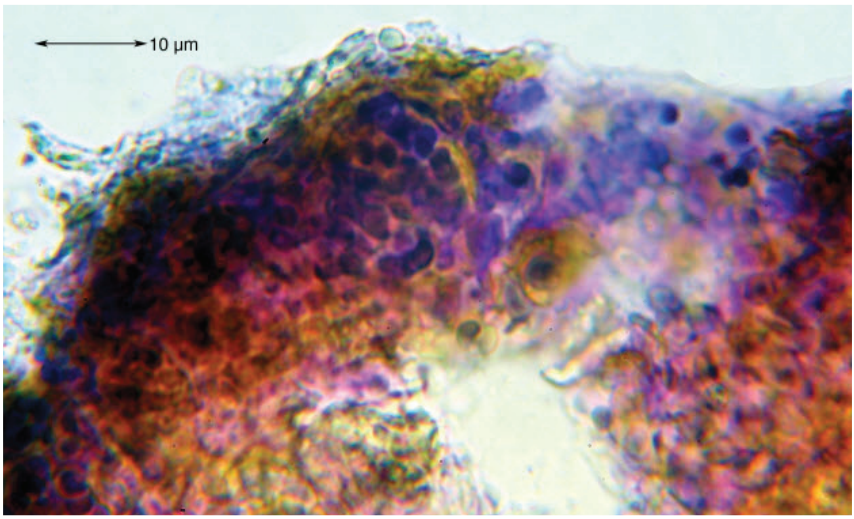
Sporen zu 8, hyalin, einzellig, 16,4-28,3 x 6,5-9,8; Asci dünnwandig, J-; Hymenialgallerte J+ hellblau; Photobiont: 4,4 µm, Cyanobakterien, Xanthocapsa.



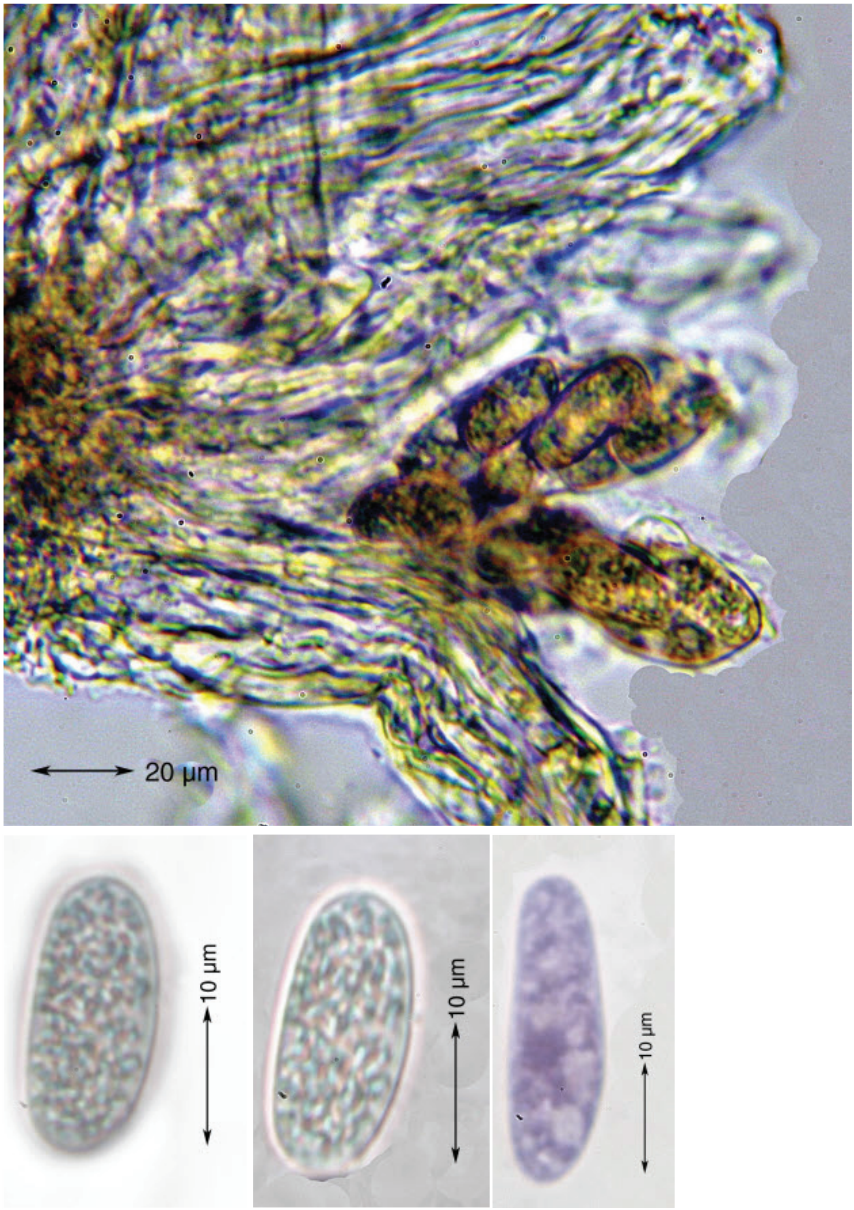



***Psorotichia lutophila***




***Psorotichia lutophila***




***Psorotichia lutophila***

***Psorotichia murorum*** A. Massal., Framm. Lichenogr.: 15 (1855)
= *Collemopsis murorum* (A. Massal.) Stizenb., Ber. Tät. St Gall. naturw. Ges.: 270 (1882)

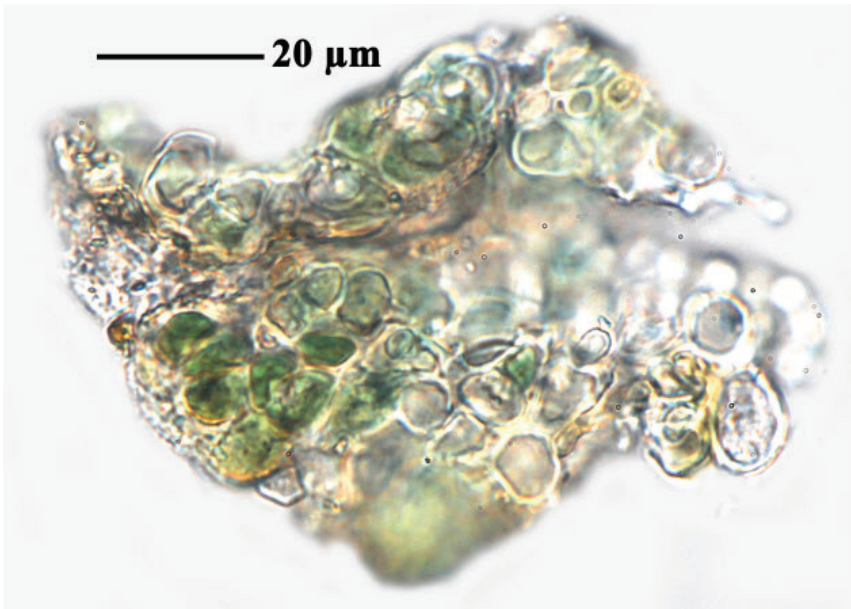
[ABL53572A], Taiwan, Taipei County, 25 km N of Taipei, seashore, on volcanic rock, outcrop near Sanji. 25°17'21'' N, 121°30'41'' E, 0-5 m. Leg. A. Aptroot (no 53572A), 22.10.2001, det.A. Aptroot, 2002, conf. M. Schultz, 2007.



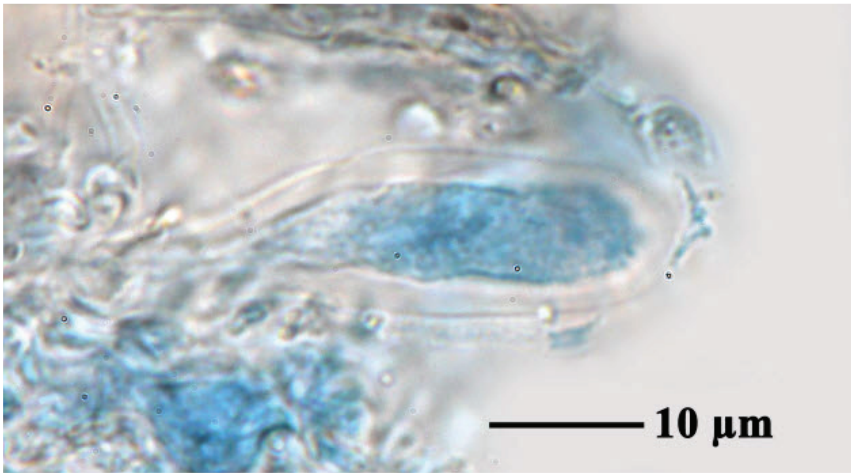


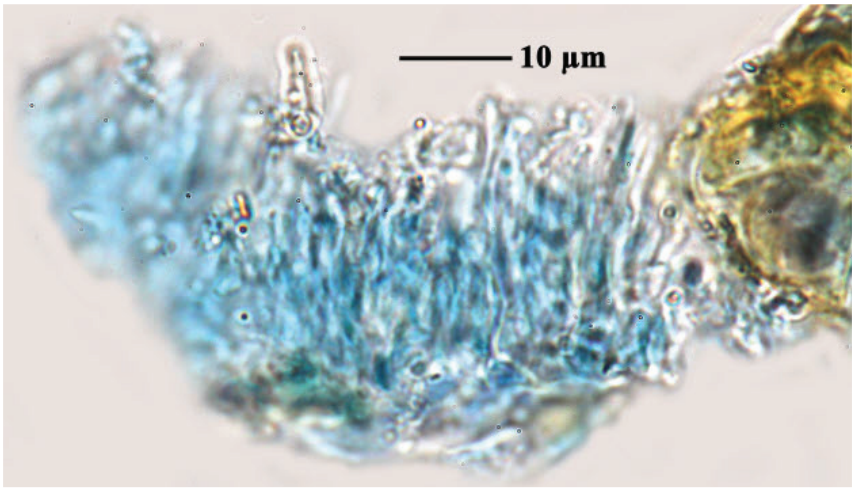

***Psorotichia murorum***




***Psorotichia murorum***



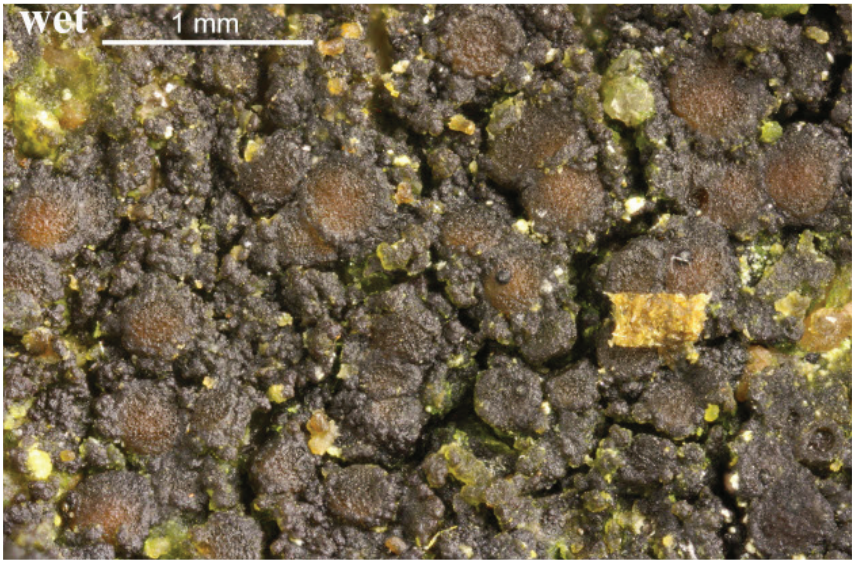



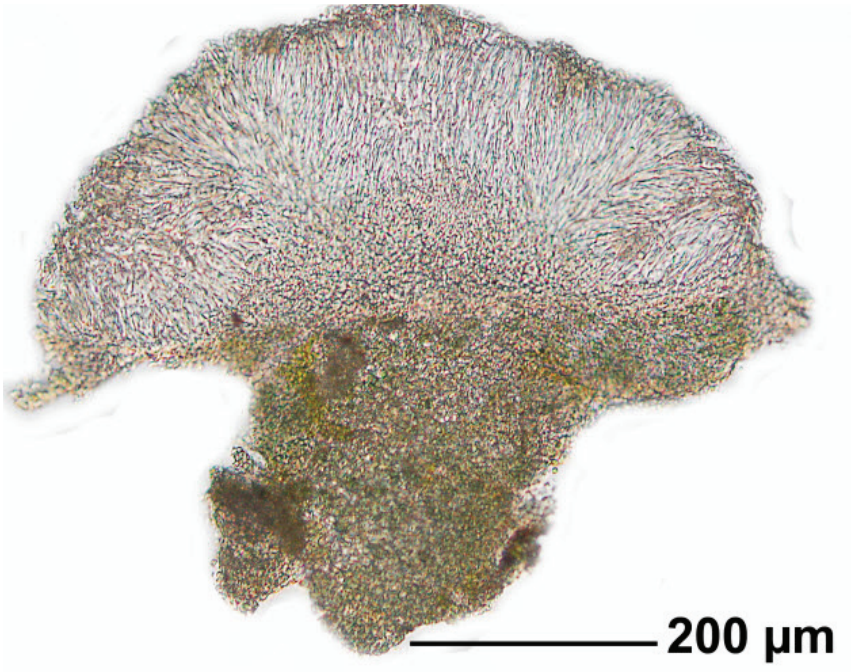

***Psorotichia murorum***

***Psorotichia schaereri*** (A. Massal.) Arnold, Flora, Regensburg 52: 265 (1869)
= *Biatora schaereri* (A. Massal.) Hepp, Flecht. Europ. 9: no. 496 (1860)
= *Collemopsis schaereri* (A. Massal.) Cromb., J. Bot., Lond. 12: 332 (1874)
= *Pannaria schaereri* A. Massal. [as 'schaererii'], Ric. auton. lich. crost. (Verona): 114 (1852)
= *Pyrenopsis schaereri* (A. Massal.) Nyl., Syn. meth. lich. (Parisiis) 2: 38 (1869)
= *Synalissa schaereri* (A. Massal.) Tuck., Gen. lich. (Amherst): 80 (1872)
= *Trachyderma schaereri* (A. Massal.) Trevis., Lichenoth. Veneta 3-4: no. 98 (1869)

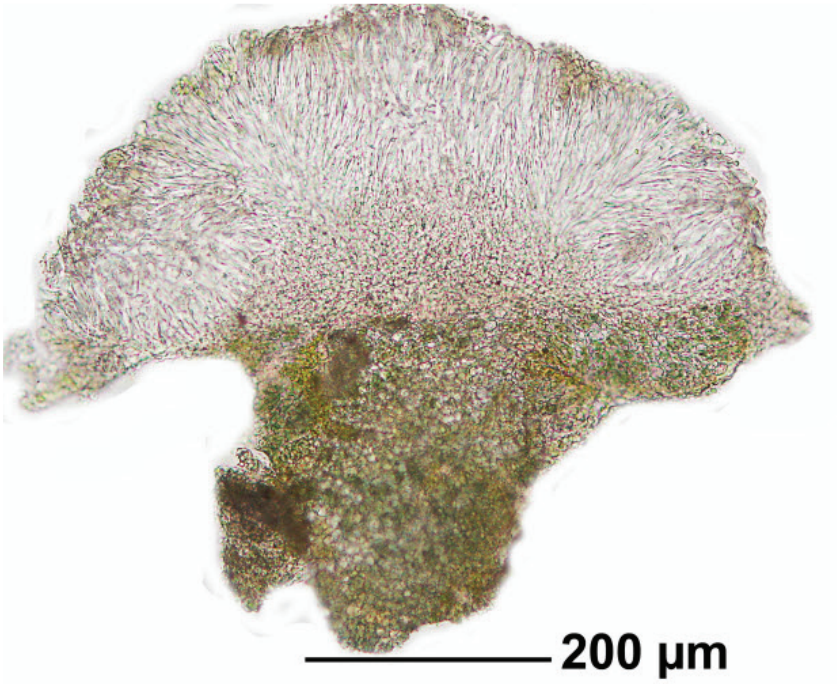
[16648], Germany, Rheinland-Pfalz, Burgruine Diemerstein bei Frankenstein, 49.444392° N, 7.961653° E, 275 m, an schattiger Mauer. Leg. Schumm, 02.09.2010, det. M.Schultz.. - Spores hyaline, simple, 14.6-18.7 × 6.6-7.5 µm.



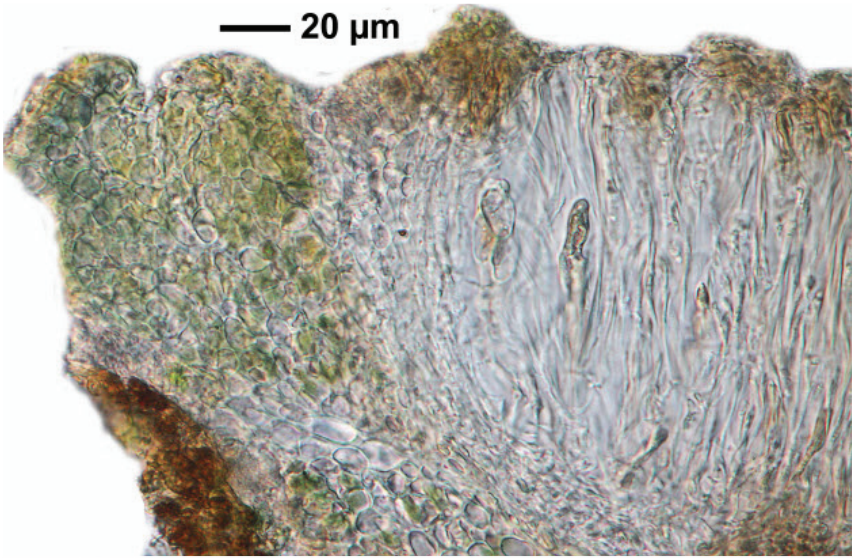


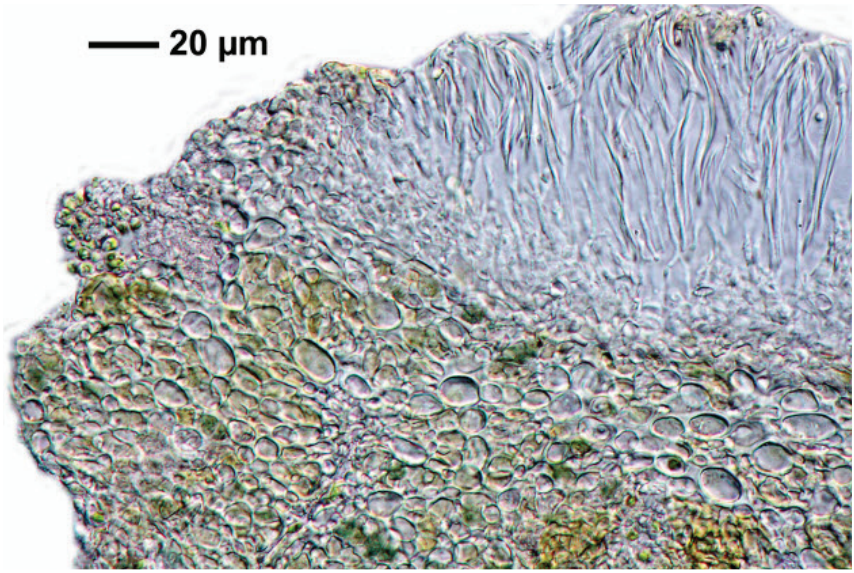




***Psorotichia schaereri***

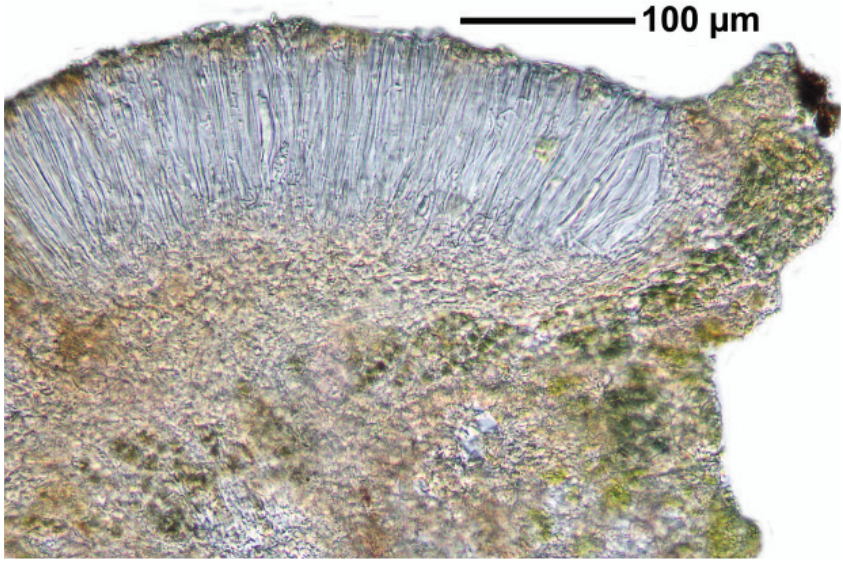


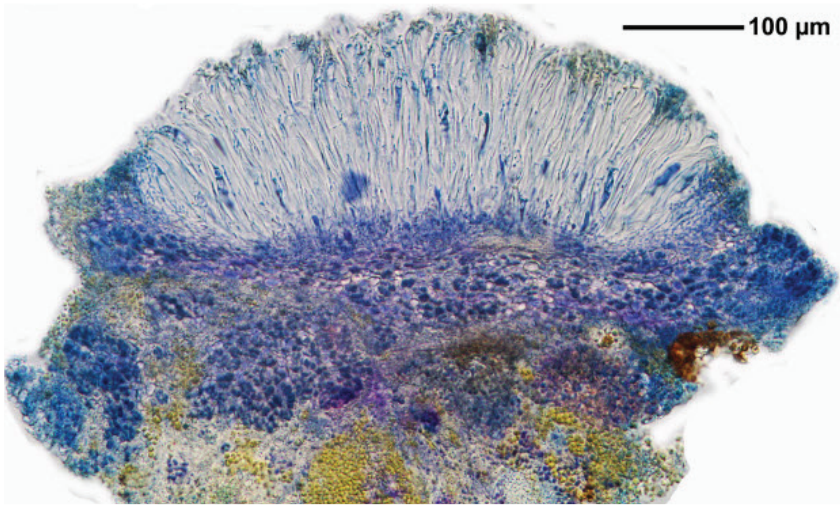

***Psorotichia schaereri***



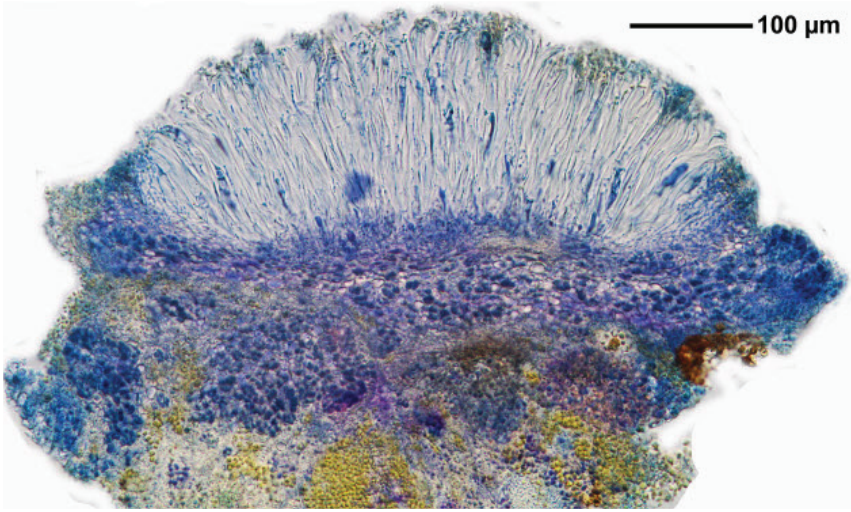



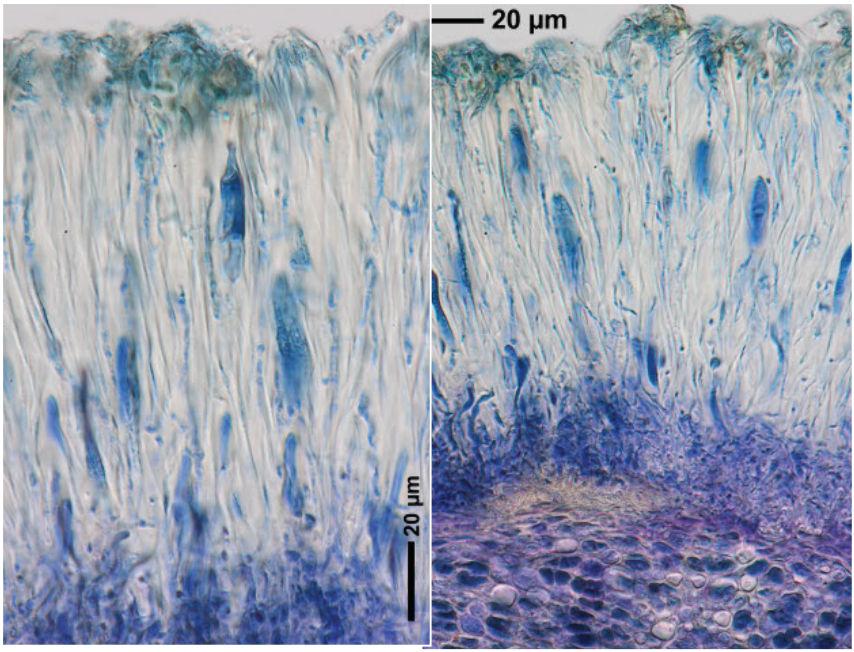

***Psorotichia schaereri***




***Psorotichia schaereri***




***Psorotichia schaereri***




***Psorotichia schaereri***

***Psorotichia schaereri*** (A. Massal.) Arnold, Flora, Regensburg 52: 265 (1869)
= *Biatora schaereri* (A. Massal.) Hepp, Flecht. Europ. 9: no. 496 (1860)
= *Collemopsis schaereri* (A. Massal.) Cromb., J. Bot., Lond. 12: 332 (1874)
= *Pannaria schaereri* A. Massal. [as 'schaererii'], Ric. auton. lich. crost. (Verona): 114 (1852)
= *Pyrenopsis schaereri* (A. Massal.) Nyl., Syn. meth. lich. (Parisiis) 2: 38 (1869)
= *Synalissa schaereri* (A. Massal.) Tuck., Gen. lich. (Amherst): 80 (1872)
= *Trachyderma schaereri* (A. Massal.) Trevis., Lichenoth. Veneta 3-4: no. 98 (1869)

[ABL51739], Taiwan,Taichung County, 15 km E of Taichung, citrus garden, on sandstone, 24°9’20’’ N, 120°49’45’’ E, 450 m. Leg. A. Aptroot (no 51739), 7.10.2001, det. A. Aptroot, 2002.






***Psorotichia schaereri***

***Psorotichia vermiculata*** (Nyl.) Forssell, Nova Acta R. Soc. Scient. upsal., Ser. 3 13(no. 6): 73 (1885)
= *Collemopsis vermiculata* Nyl., Flora, Regensburg 64(34): 529 (1881)

[ABL56114], China, Yunnan Prov., Lijiang Co., SE of the city center of Lijiang, Elephant Moutain, on dolomitic limestone. 26°53'13'' N, 100°14'05'' E, 2500-2600 m. Leg. A. Aptroot (no 56114), 20.10.2002, det. M. Schultz, 2007.

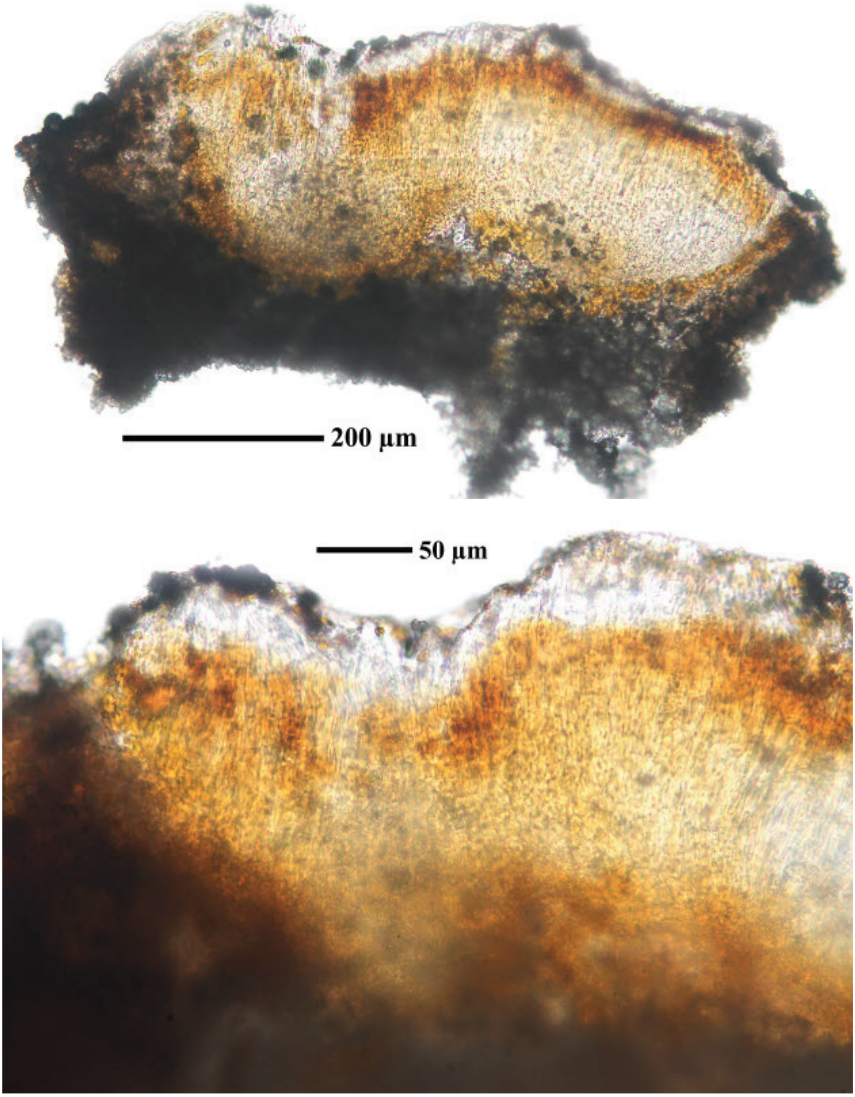




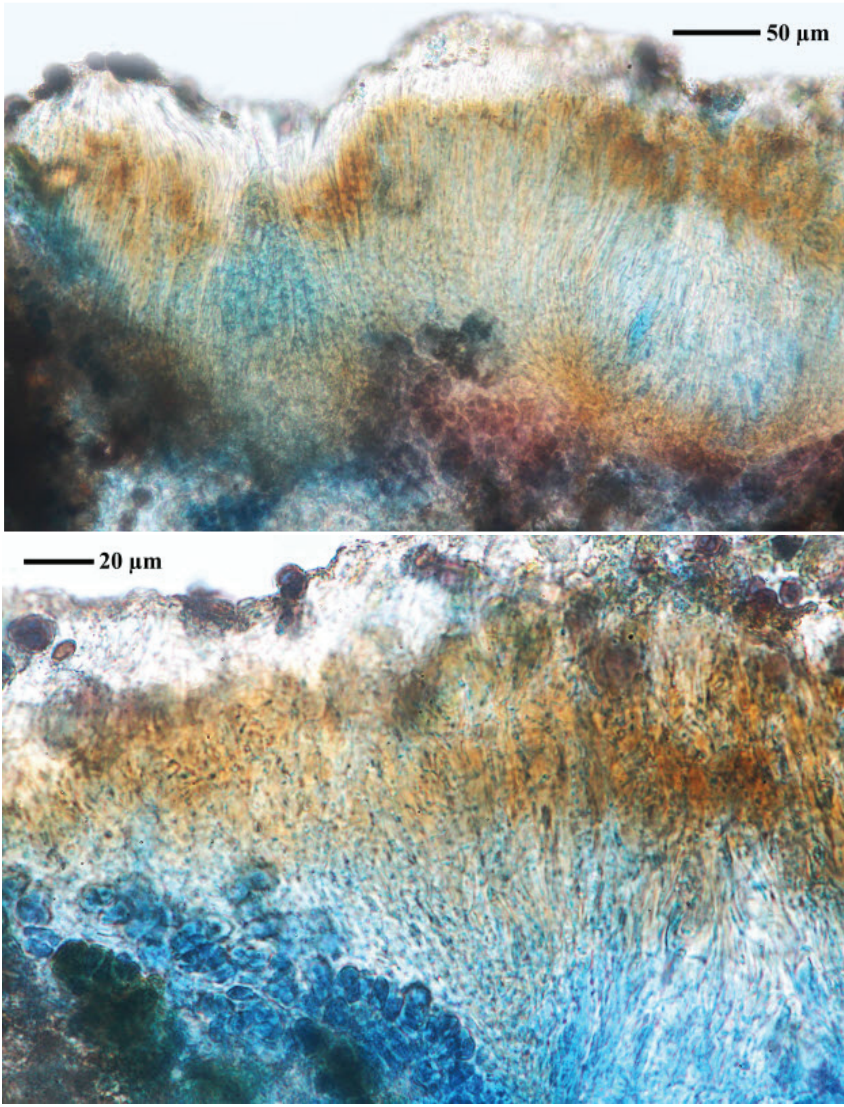




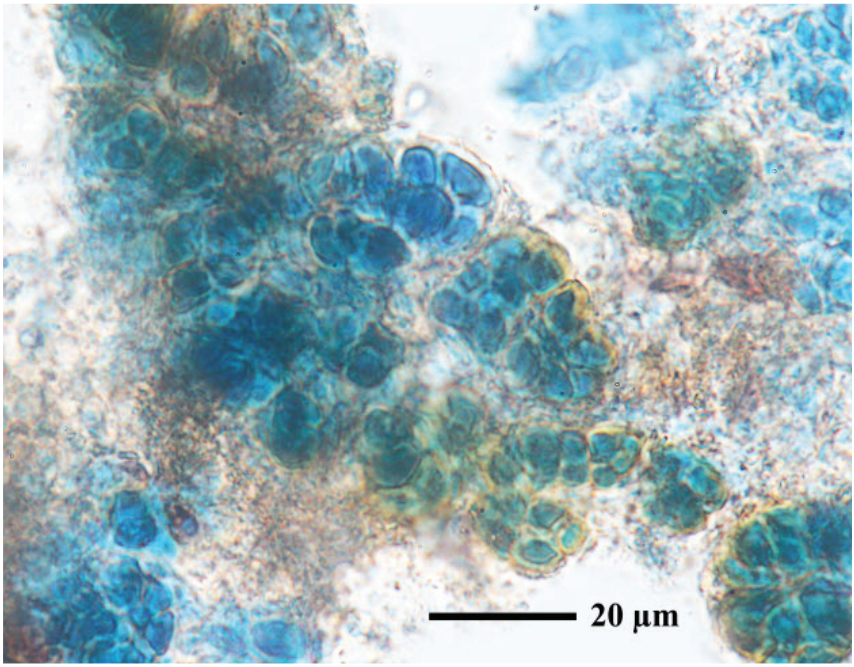
***Psorotichia vermiculata***




***Psorotichia vermiculata***




***Psorotichia vermiculata***




***Psorotichia vermiculata***

***Pterygiopsis atra*** Vain., Acta Soc. Fauna Flora fenn. 7(no. 1): 239 (1890)

[ABL40087], Brazil, Maranhão, Riachão, Poço Azul,in cerrado on sandstone. 7°13’28’’ S46°27’10’’ W, 450 m. Leg. A. Aptroot (no 40087) & M. Cáceres, 27.10.2016, det. A, Aptroot, 2016.

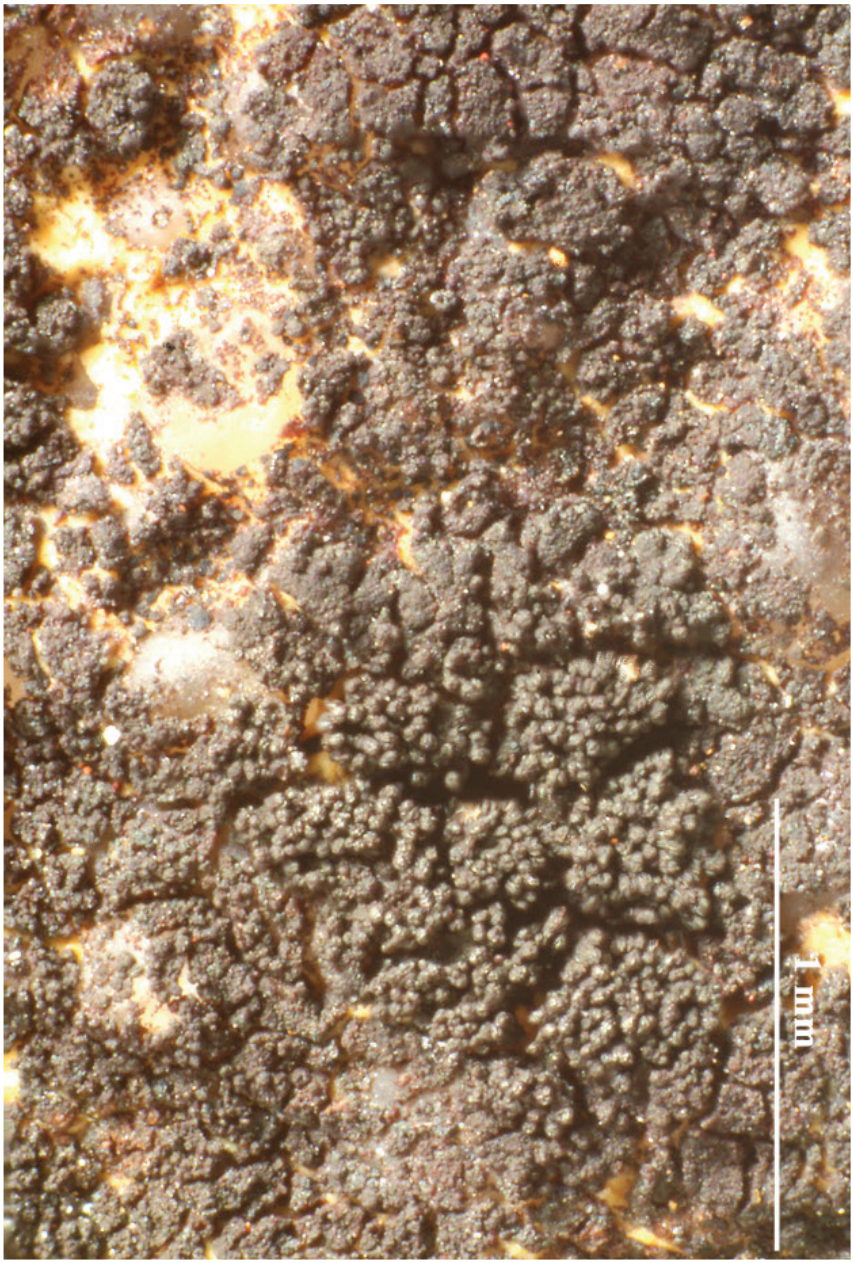




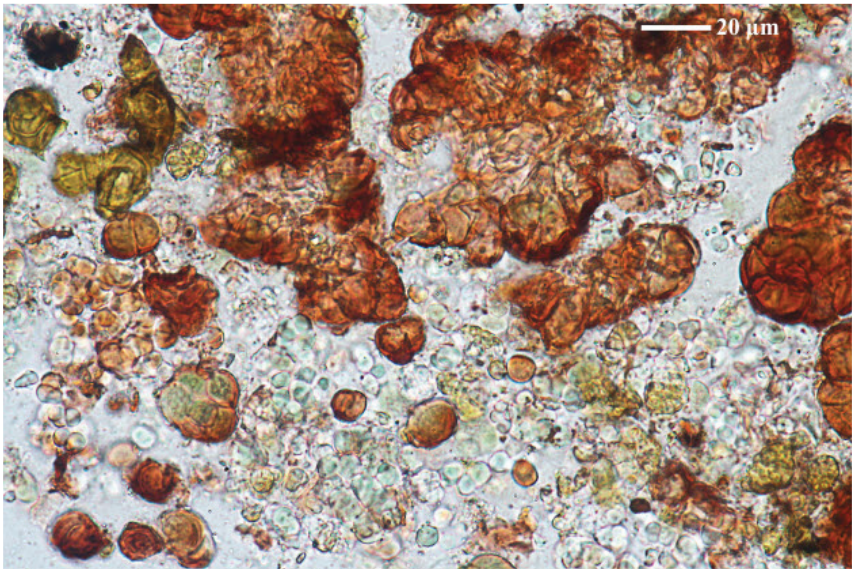


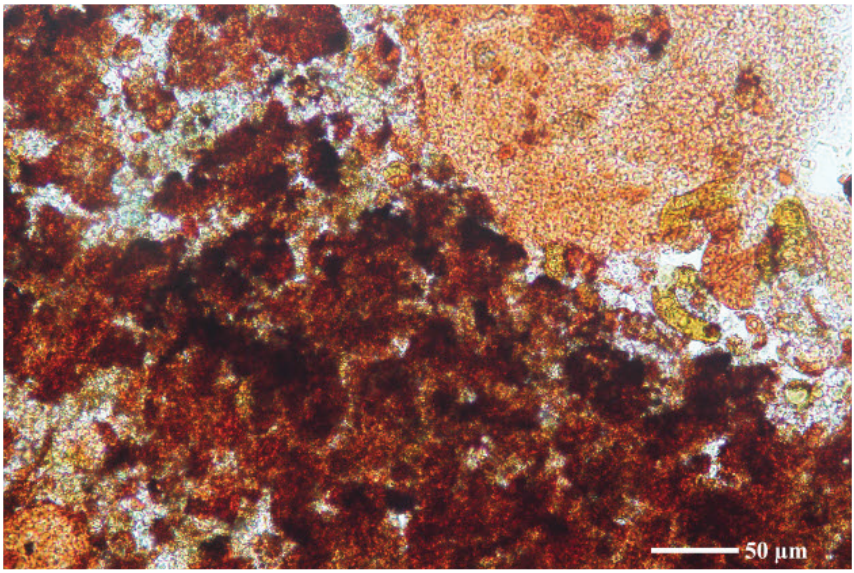


***Pterygiopsis atra***

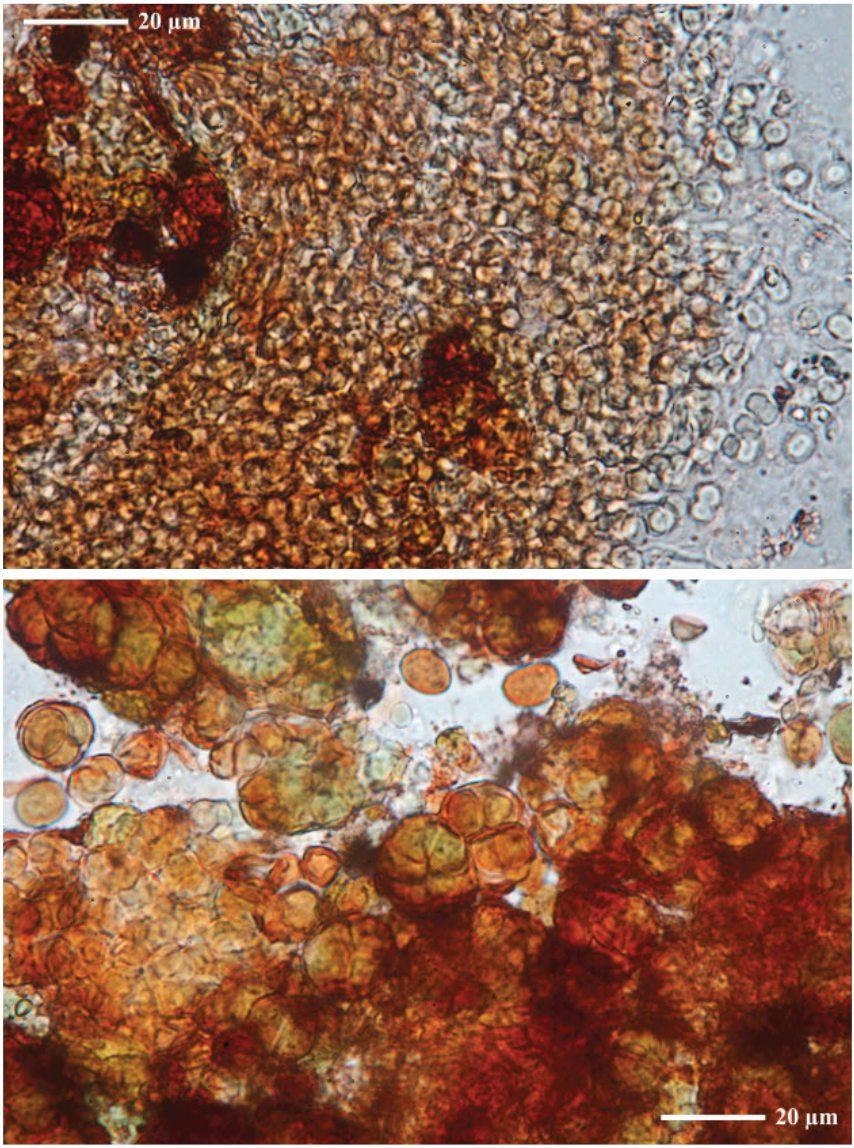



***Pterygiopsis atra***




***Pterygiopsis atra***

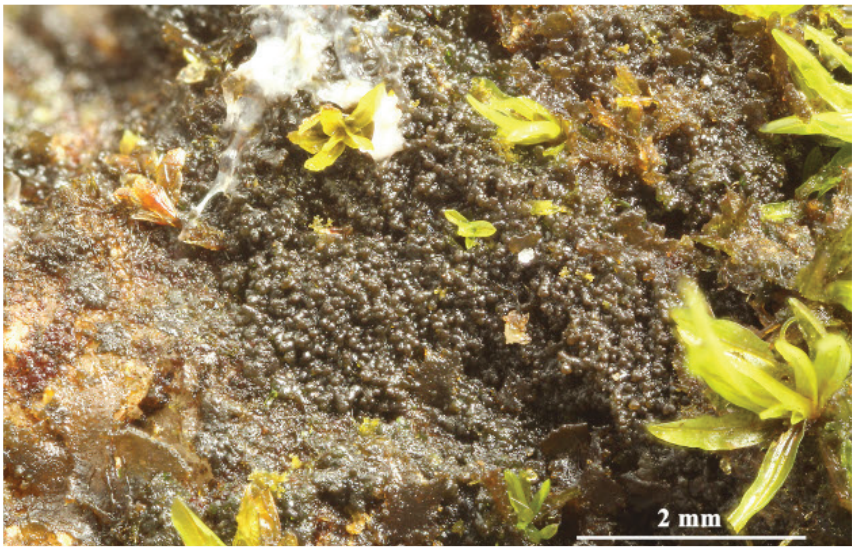


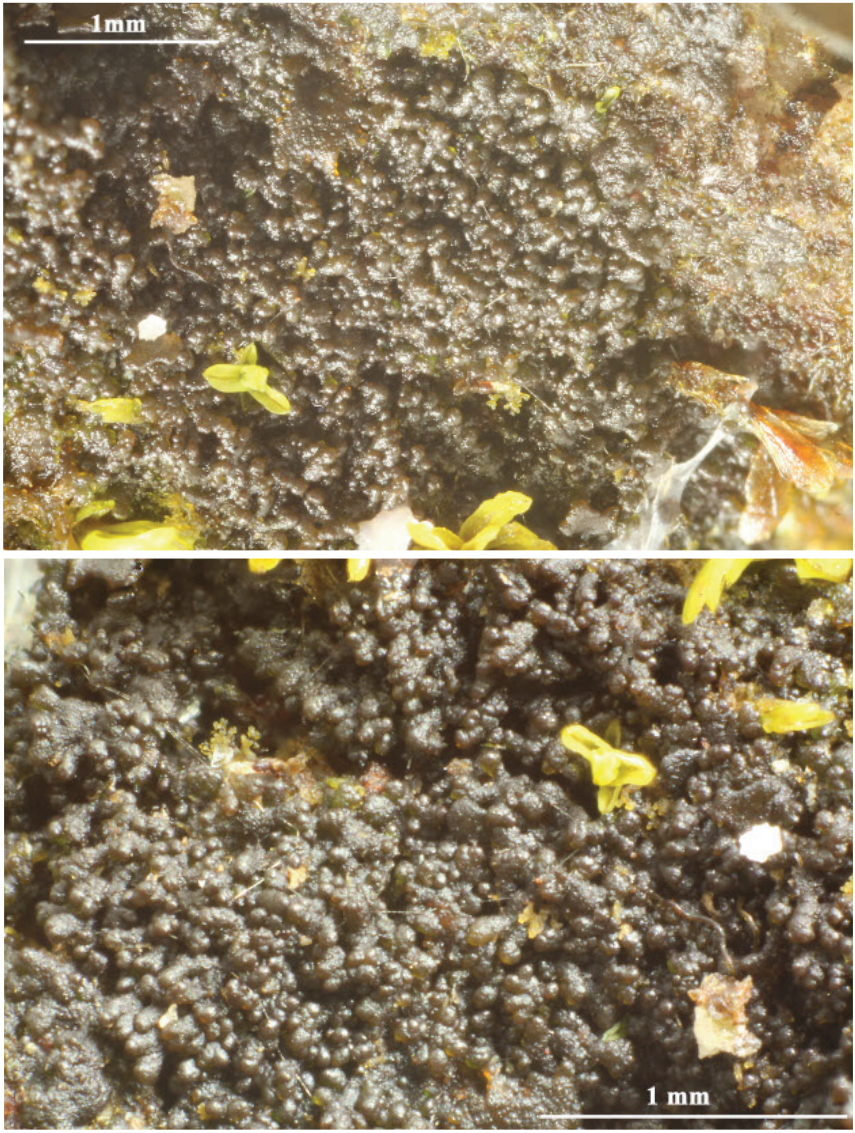

***Pterygiopsis atra***

***Pterygiopsis densisidiata*** Aptroot, Oliveira Junior & M. Cáceres, in Oliveira Junior, Aptroot, Santos, Cavalcante, Kosůthová & Cáceres, Bryologist 123(4): 628 (2020)

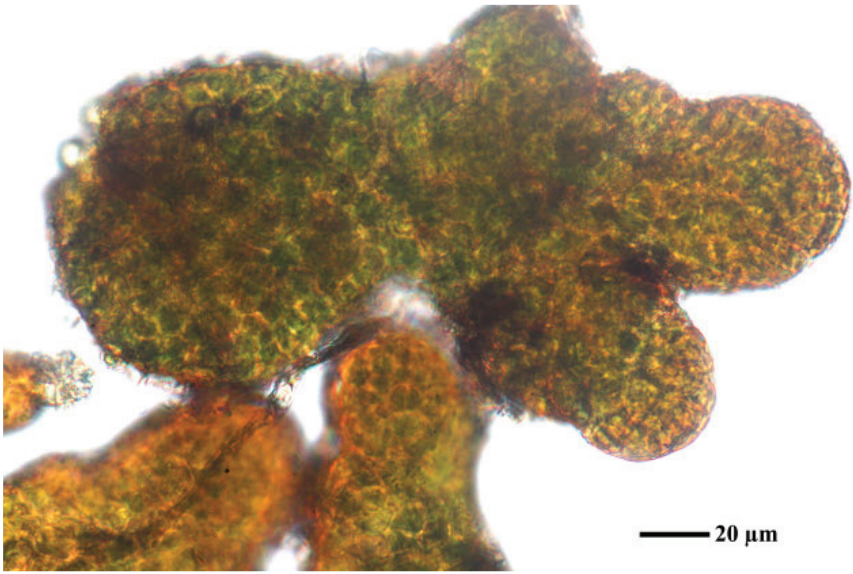
[ABL42415], Brazil, Algoas, Quebrangulo, Pedra Talhda private area, in Atlantic rain forrest on granite. 9°15' S, 36°25'35'' W, 500-700 m. Leg. A. Aptroot (no 42415) & M. Cáceres, 21-23.10.2017, det. A. Aptroot, 2017. ISOTYPE

Thallus placodioid, closely appressed to the substratum, corticate on upper and lower surface, smooth or with some faint lines, individual thalli ca. 1 cm diam., combined thalli covering areas up to 25 cm diam., ca. 75–95 µm thick, greyish brown, internal parts densly covered with isidia. Lobes relatively indistinct, partly much dissceted, marginally effigurate, mostly 0.5–1.0 mm wide and long. Upper and lower cortex ca. 5–7 µm thick, brown, lumina flattened. Medulla quasihomiomerous, with cyanobacteria distinctly more abundant in upper half, cells 7–17 3 7–13 µm. Cyanobacteria in the thallus copious, single, 10–17 x 7–14 µm, in the isidia grouped in groups of 1–8, groups measuring 7–17 µm diam., individual cells 5–8 µm diam. Isidia densely covering most of the thallus, cylindrical, irregularly but densely branched, somewhat moniliform, up to 0.7 mm high, at the base ca. 100–150 µm thick, at the tips rather regularly 40–60 µm thick. Ascomata unknown. Chemistry. Thallus UV–, K–. TLC: no substances detected.





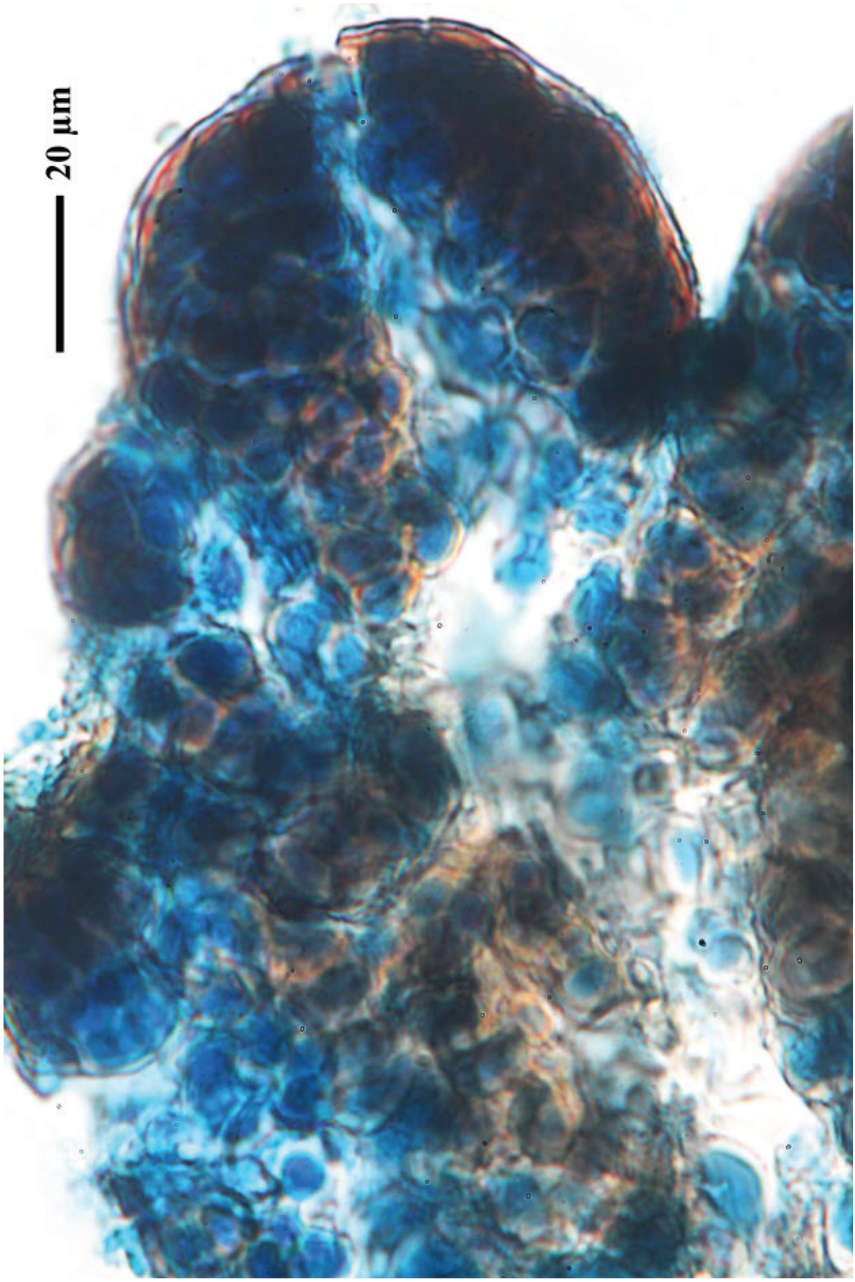

***Pterygiopsis densisidiata***







***Pterygiopsis densisidiata***




***Pterygiopsis densisidiata***

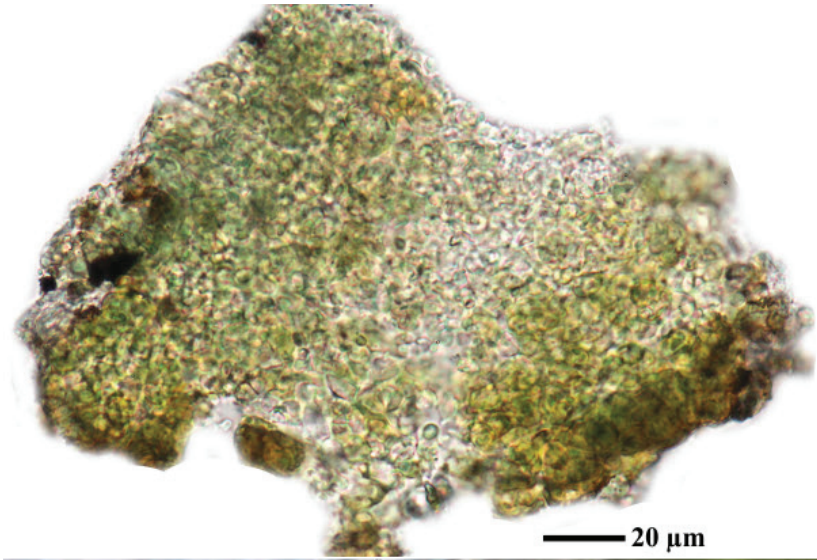
***Pterygiopsis neglecta*** (Erichsen) M.Schultz
= *Forsellia neglecta* Erichs.]

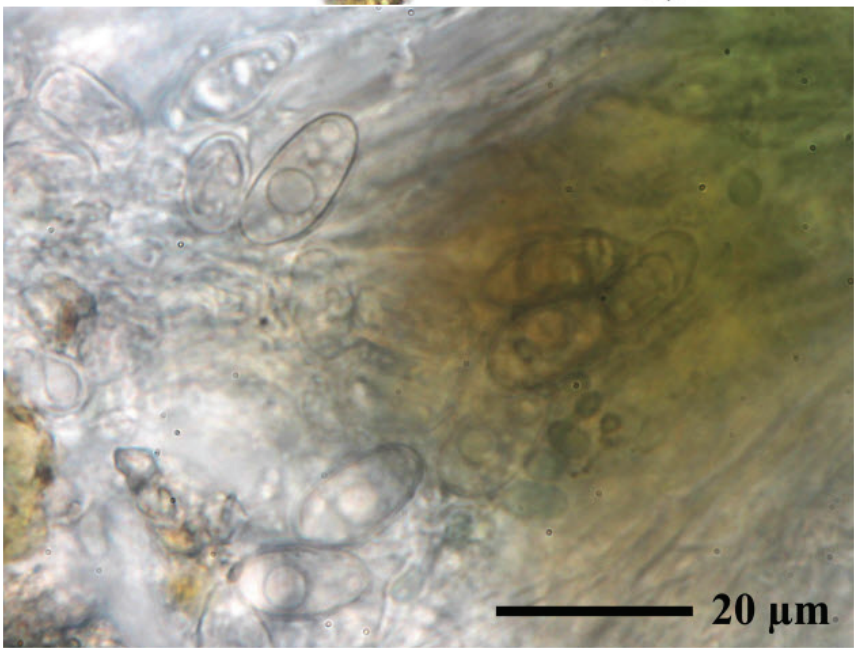
[ABL76639], Netherlands, Prov. Limburg, Baarlo, along Maas river, on pebbles, temporary inudated. Leg. A. Aptroot (no 76639), 8.9.2018, det. A. Aptroot, 2018.



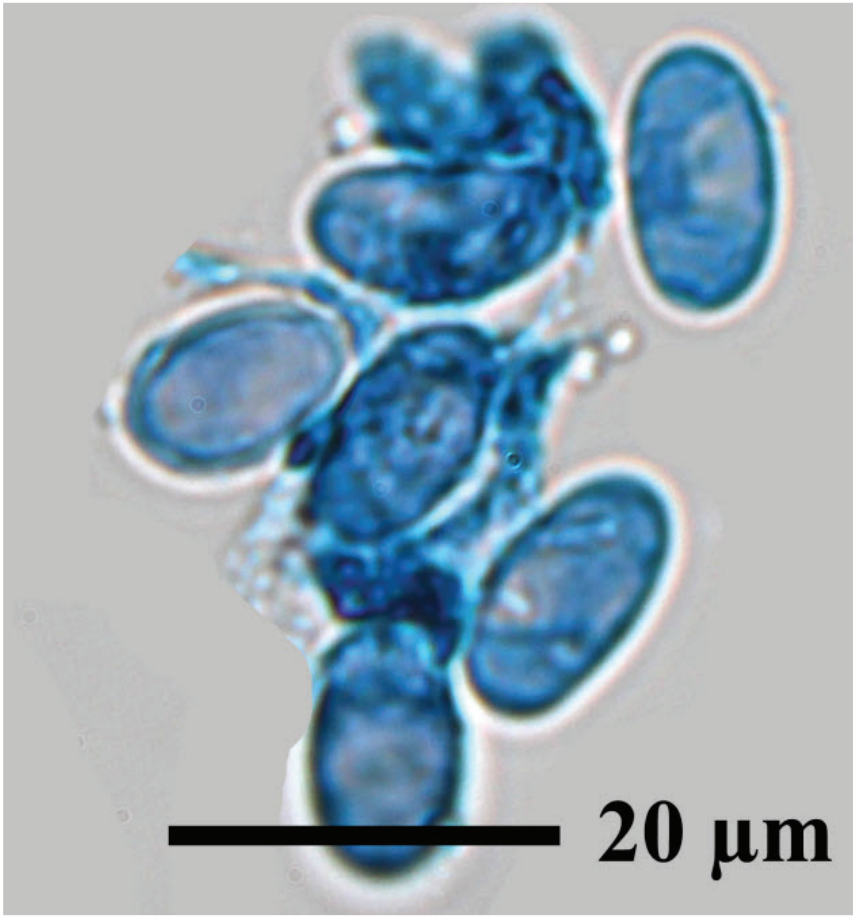



***Pterygiopsis neglecta***




***Pterygiopsis neglecta***

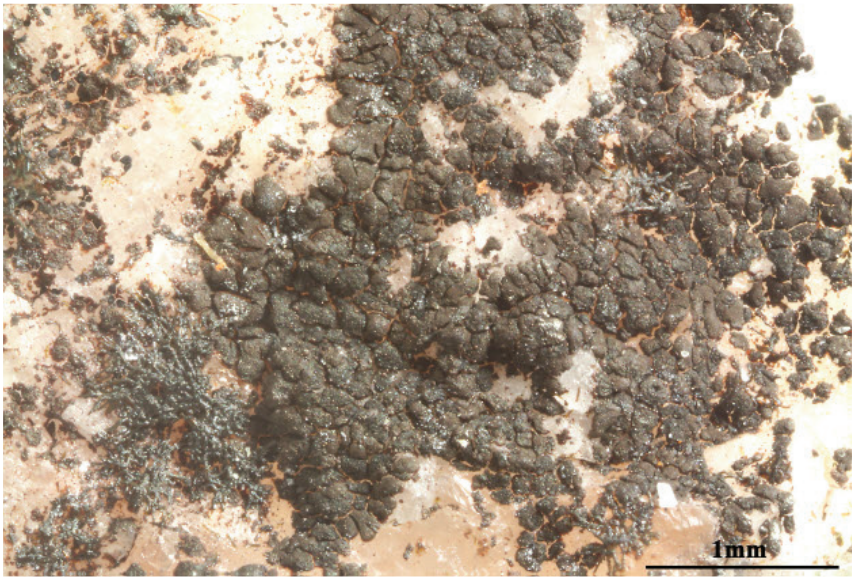


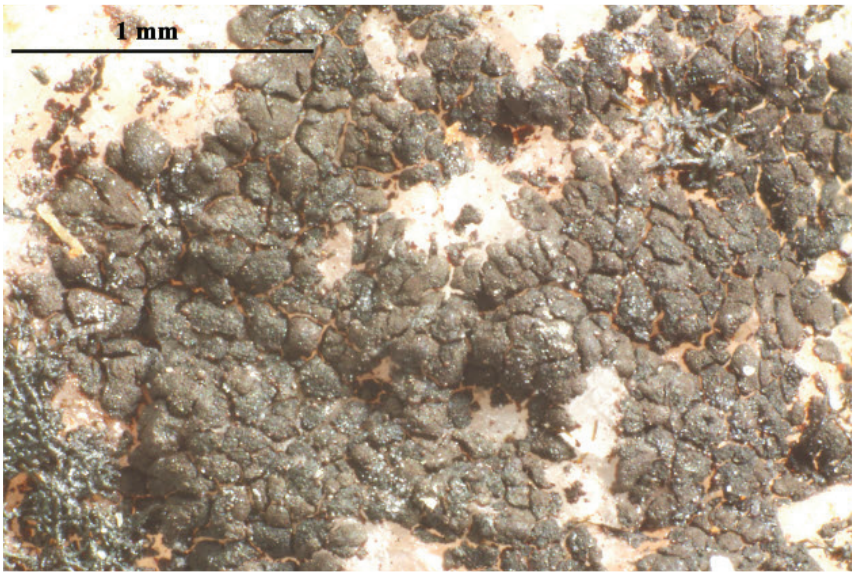

***Pterygiopsis neglecta***

***Pterygiopsis guyanensis*** M. Schultz, Porembski & Büdel, Pl. Biol. 2(4): 489 (2000)

[ABL50938], Brazil,Alagoas, Quebrangulo, Pedra Talhada, Serra do Boi. On exposed siliceous rock in Atlantic rain forest. 9°14’28’’ S, 36°25’11’’ W, 800 m. Leg. A. Aptroot (no 50938) & M. Cáceres & J.G. Cavalcante, 25.97.2019, det. A. Aptroot, 2019.



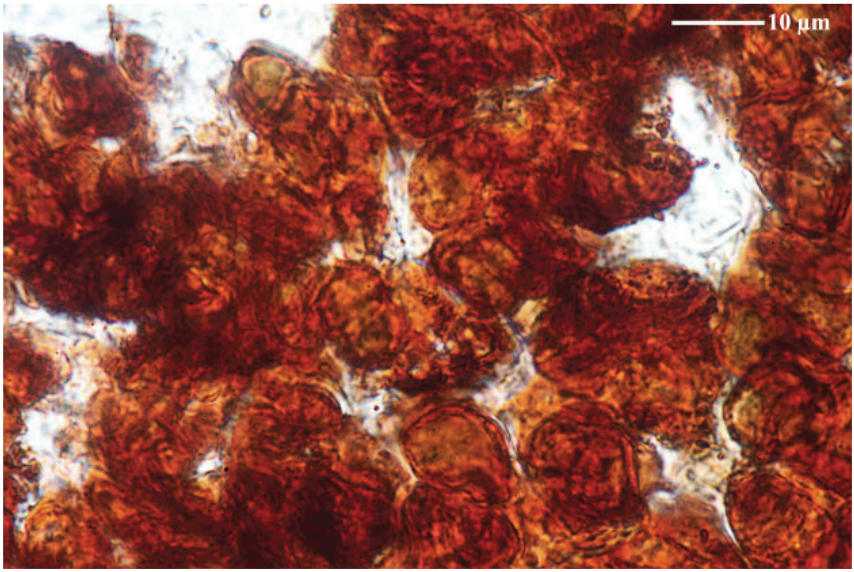


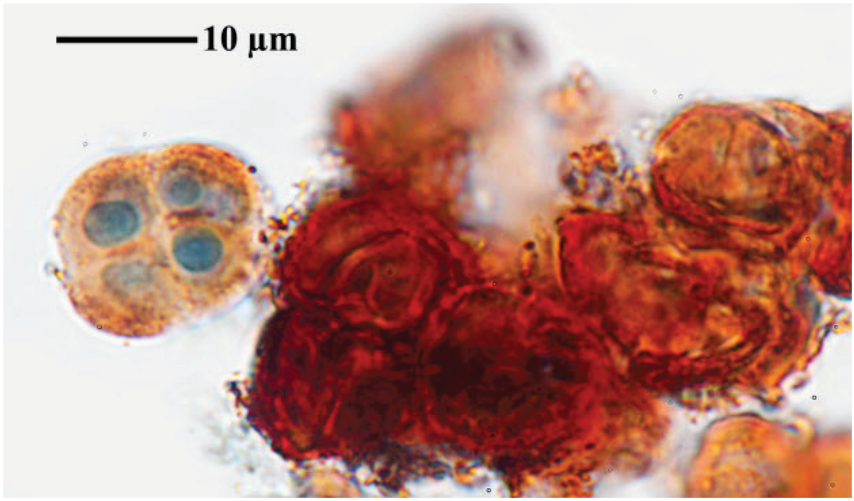




***Pterygiopsis guyanensis***

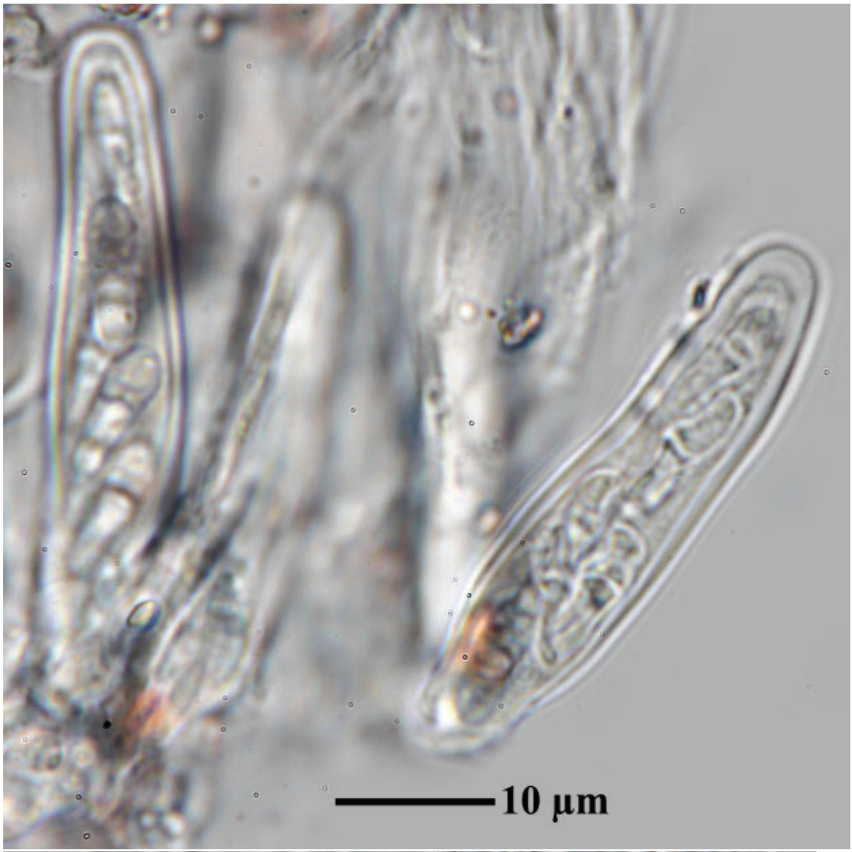


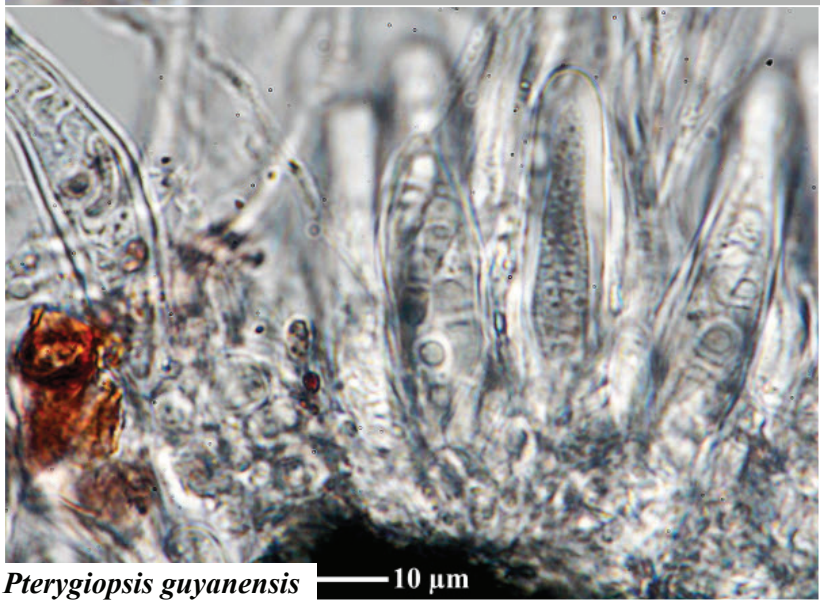

***Pterygiopsis guyanensis***



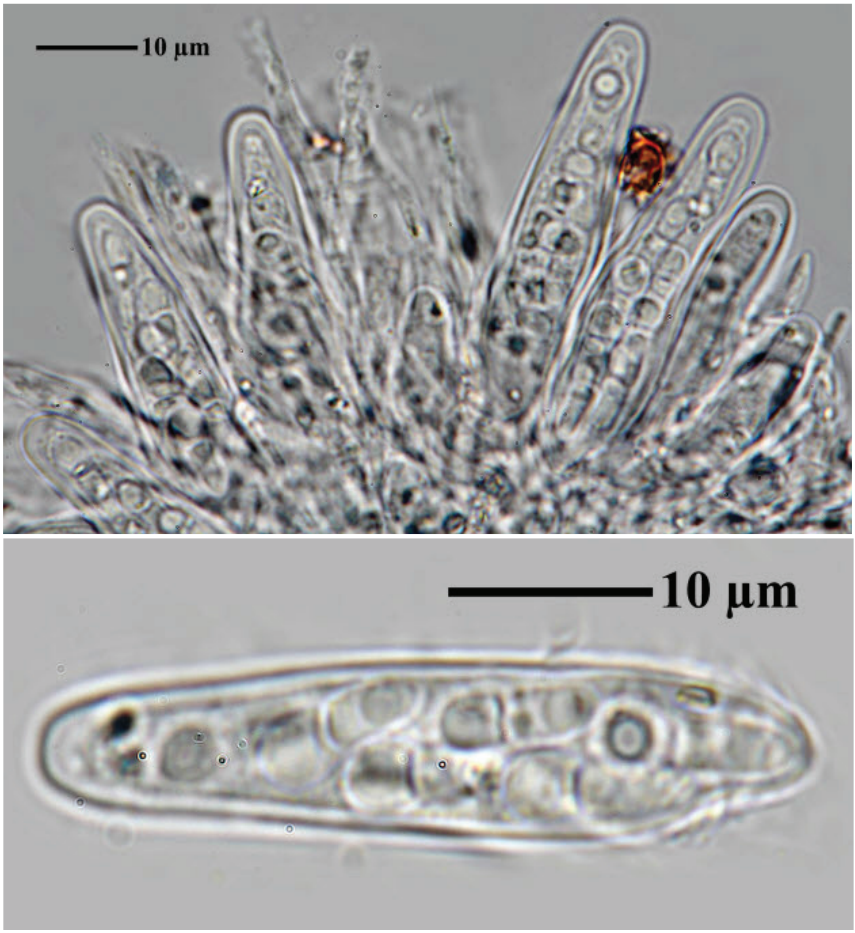




***Pterygiopsis guyanensis***

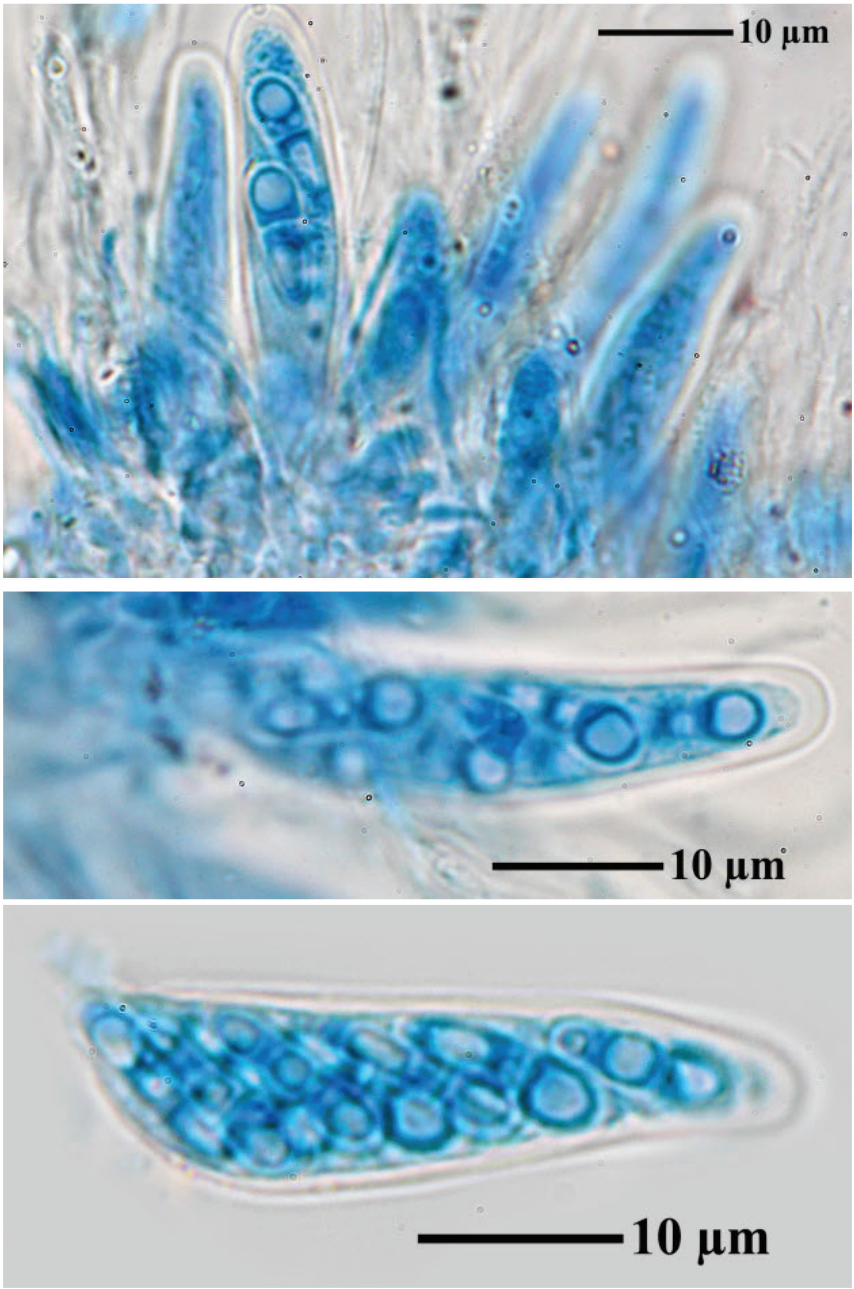



***Pterygiopsis guyanensis***




***Pterygiopsis guyanensis***

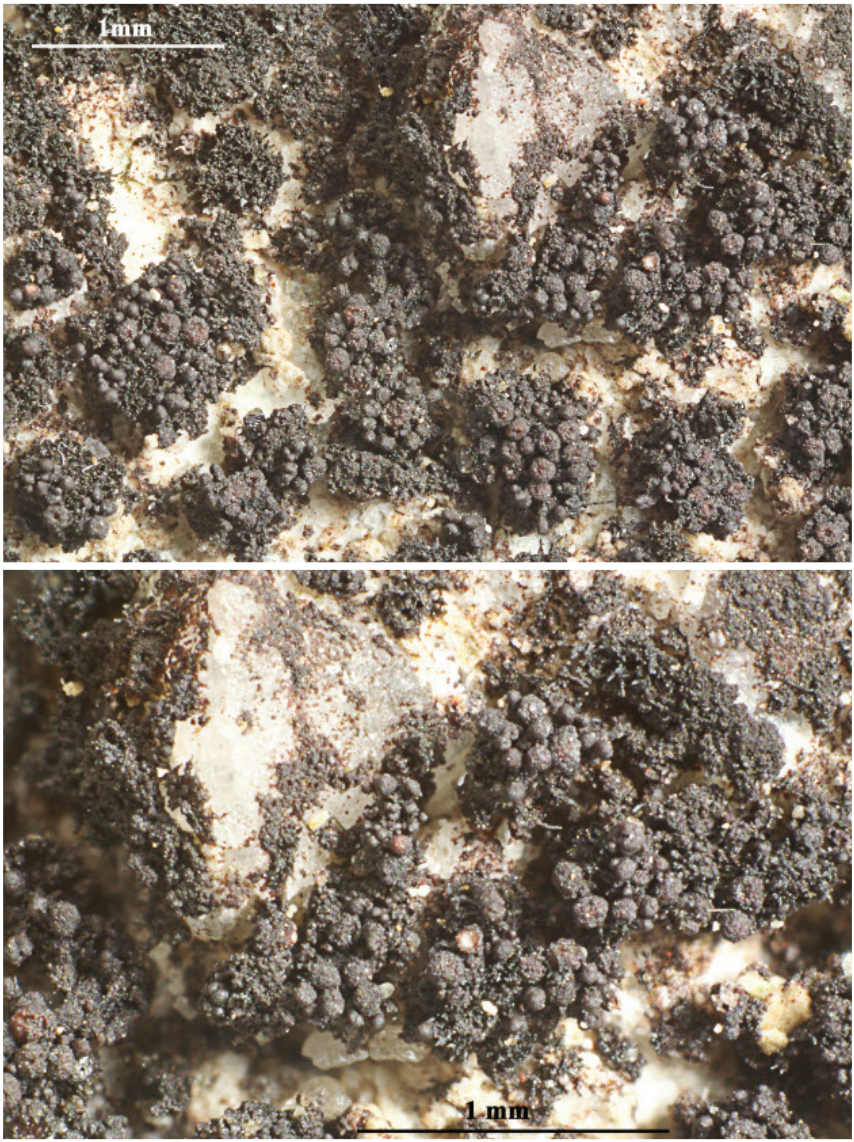



***Pterygiopsis guyanensis***

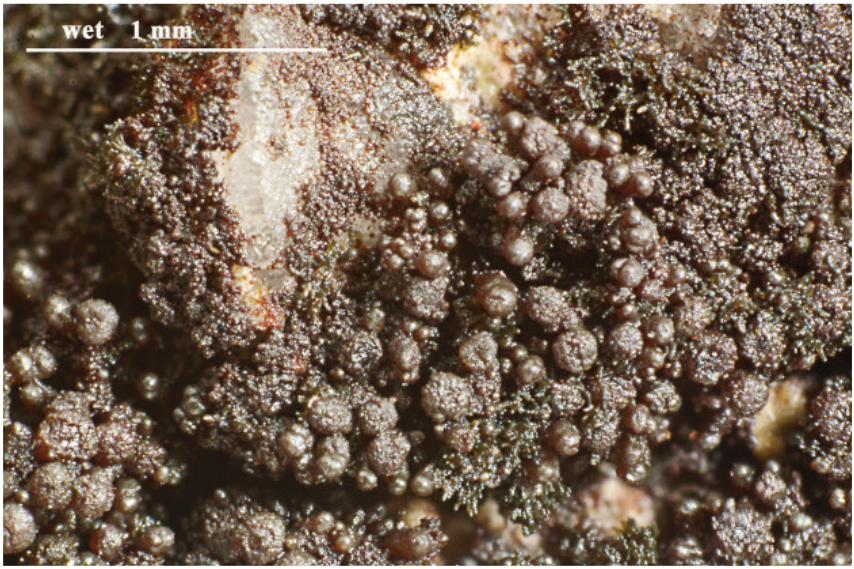
***Pyrenopsis carassensis*** Vain., Acta Soc. Fauna Flora fenn. 7(no. 1): 242 (1890)

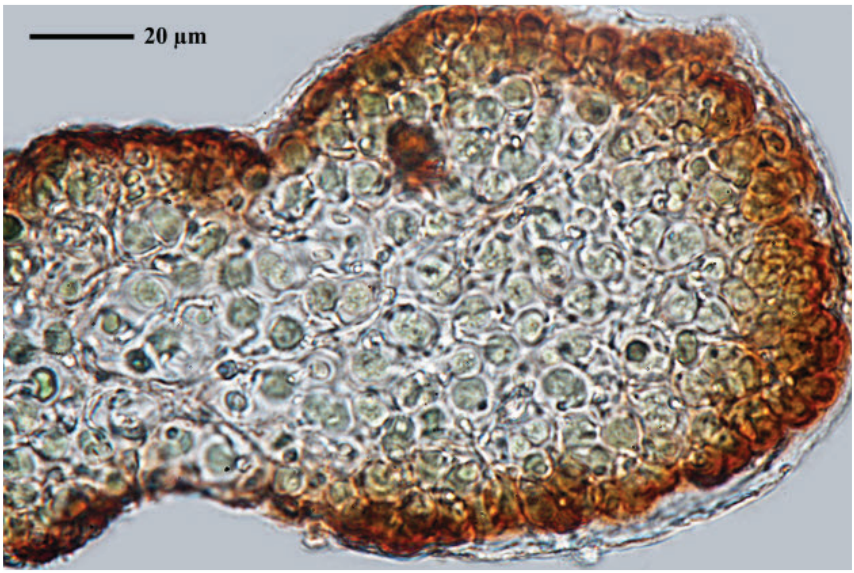
[ABL27967], Brazil, Santa Catarina, São Francisco do Sul, N of Prainha, on coastal granite. 26°13'44'' S, 48°29'54'' W, 10 m. Leg. M. Cáceres & A. Aptroot (no 27967), 9.10.2015, det. A. Aptroot, 2015.



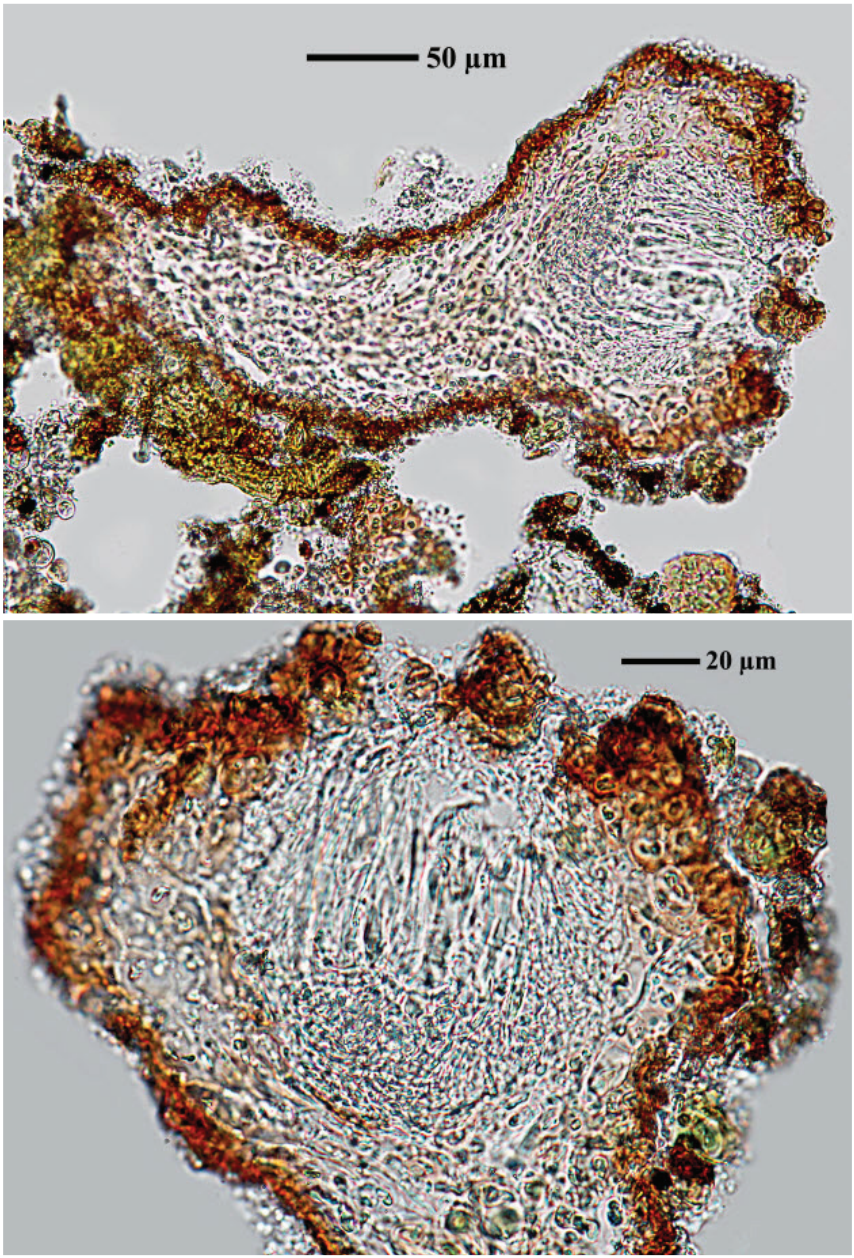



***Pyrenopsis carassensis***

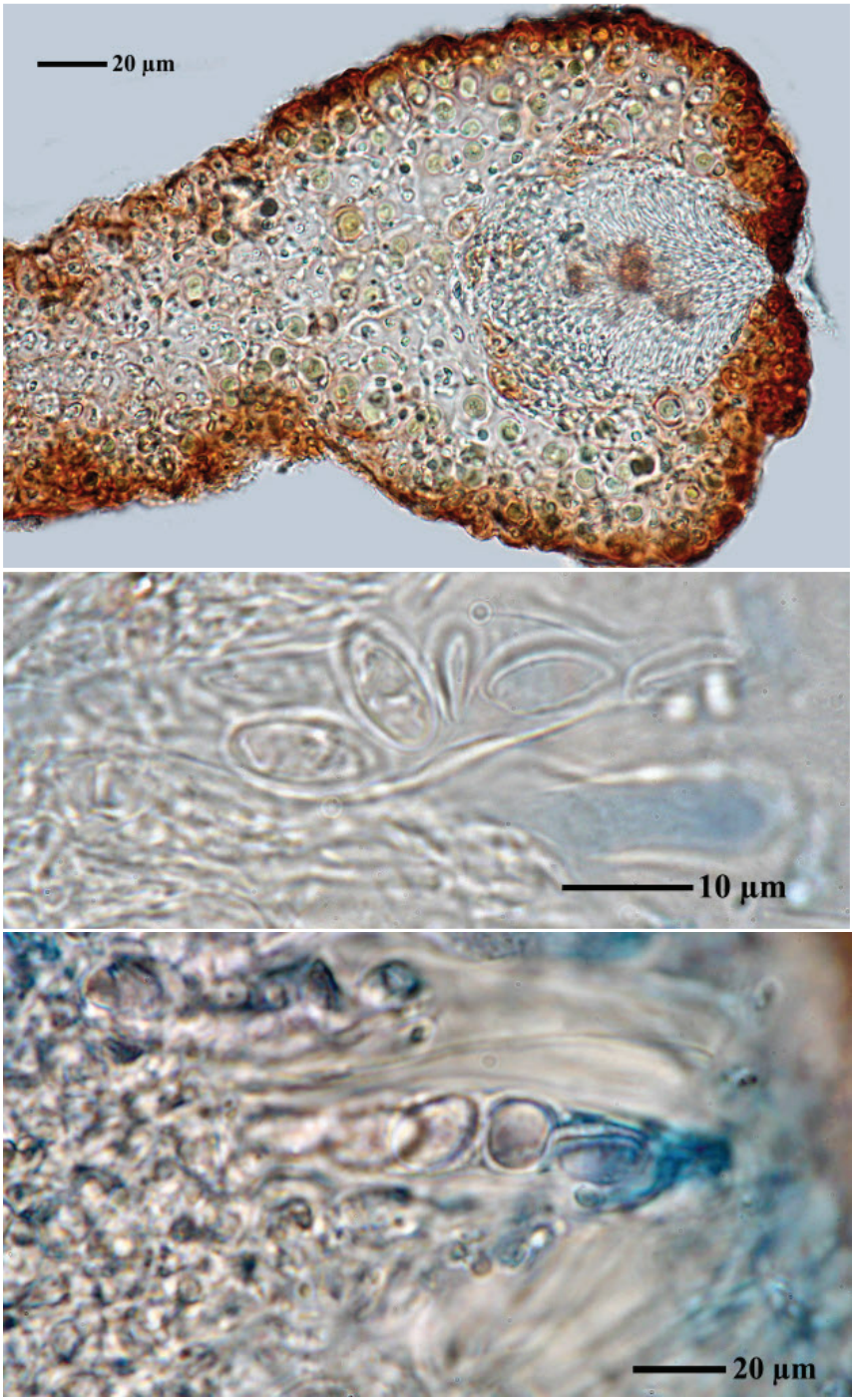



***Pyrenopsis carassensis***



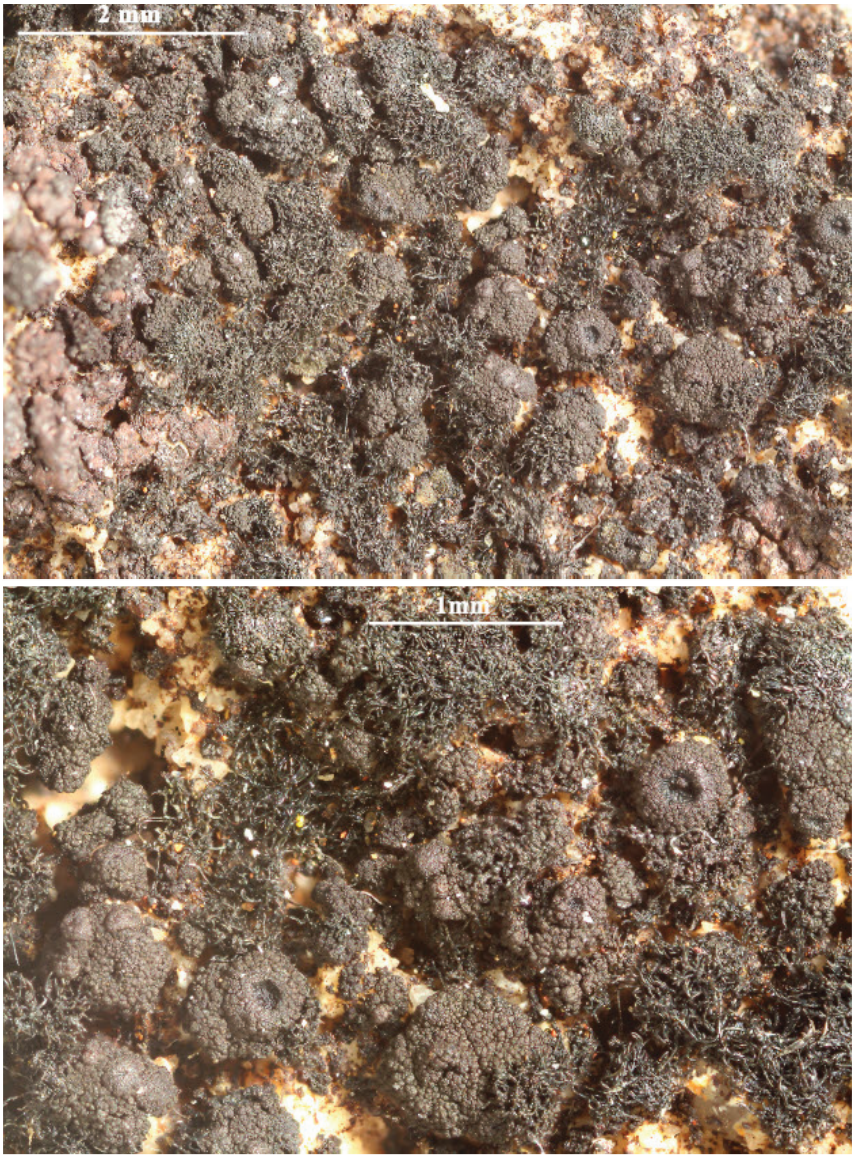

***Pyrenopsis carassensis***

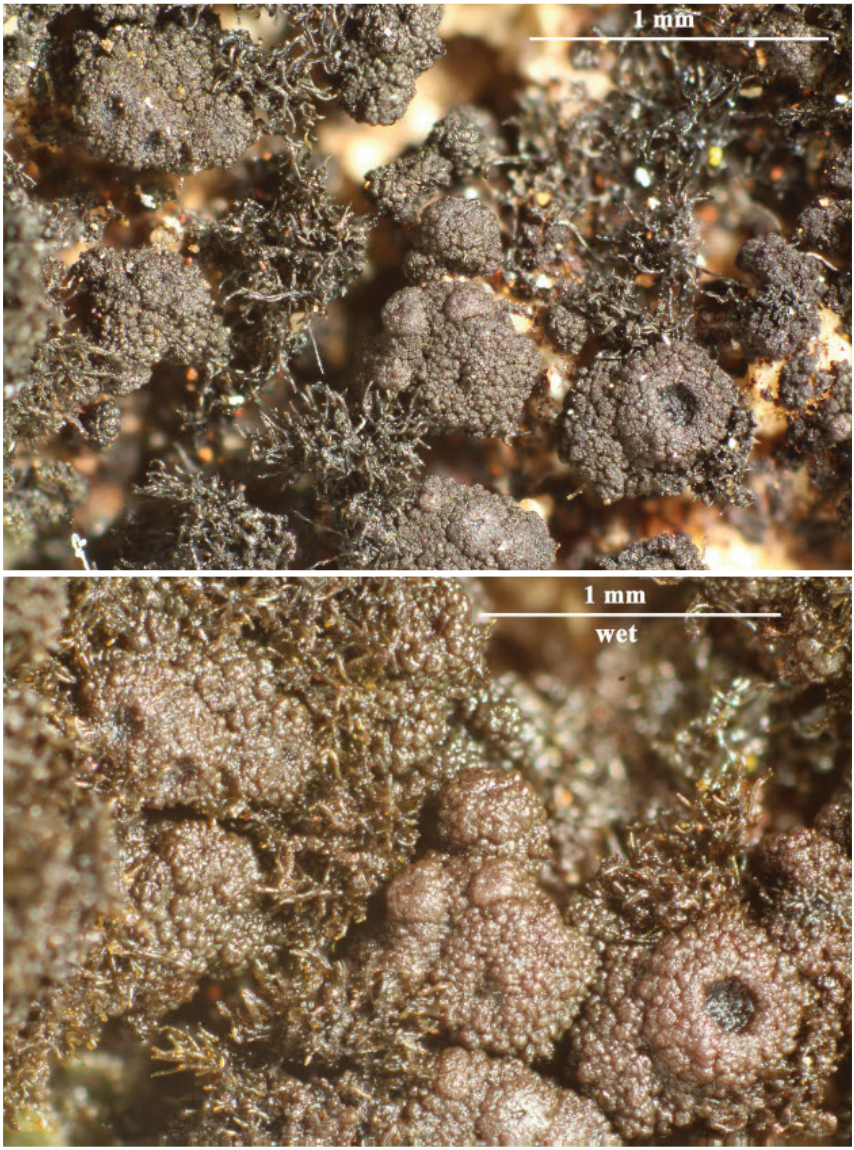



***Pyrenopsis carassensis***

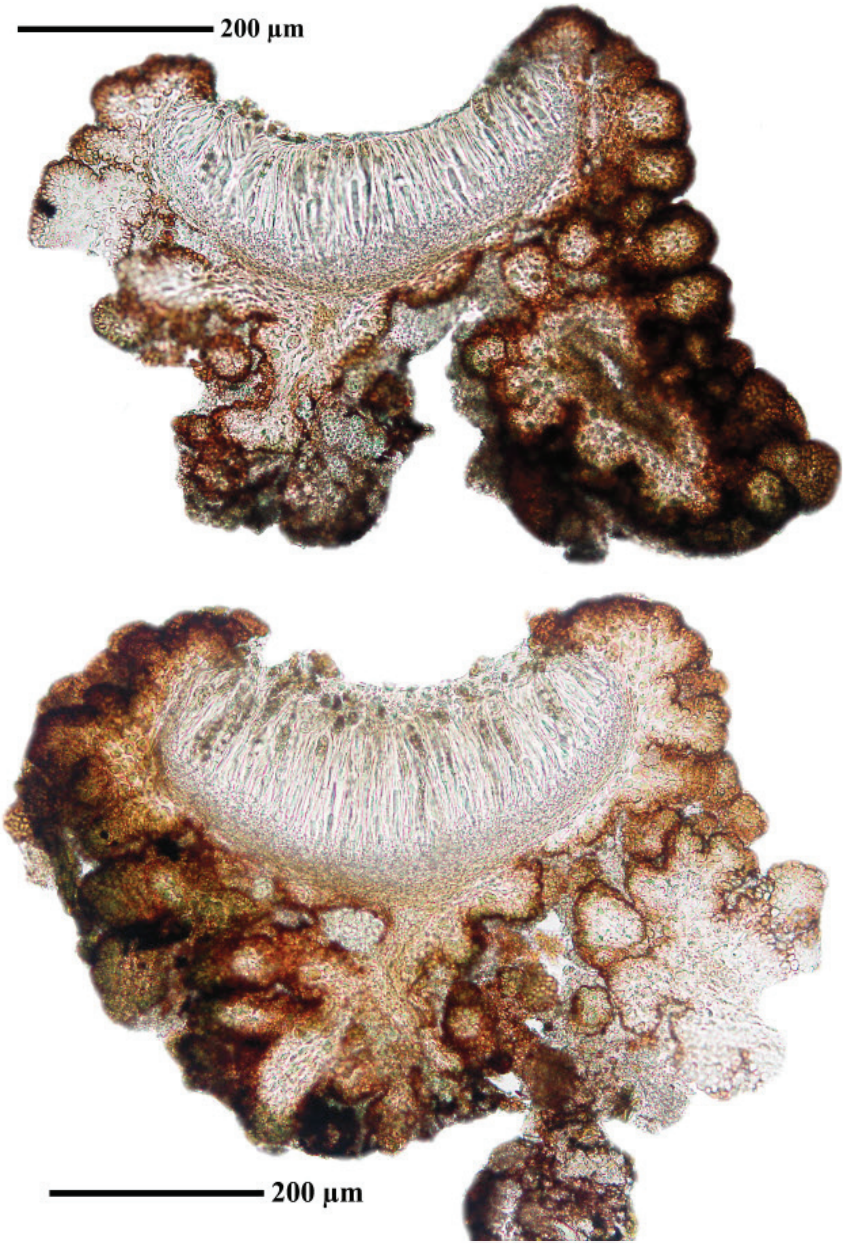
***Pyrenopsis cylindrophora*** Vain., Acta Soc. Fauna Flora fenn. 7(no. 1): 241 (1890)

[ABL40050], Brazil, Maranhão, Riachão, Poço Azul, in cerrado on sandstone. 7°13’28’’ S, 46°27’10’’ W, 250 m. Leg. M. Cáceres & A. Aptroot (no 40050), 27.10.2016, det. A. Aptroot, 2016.

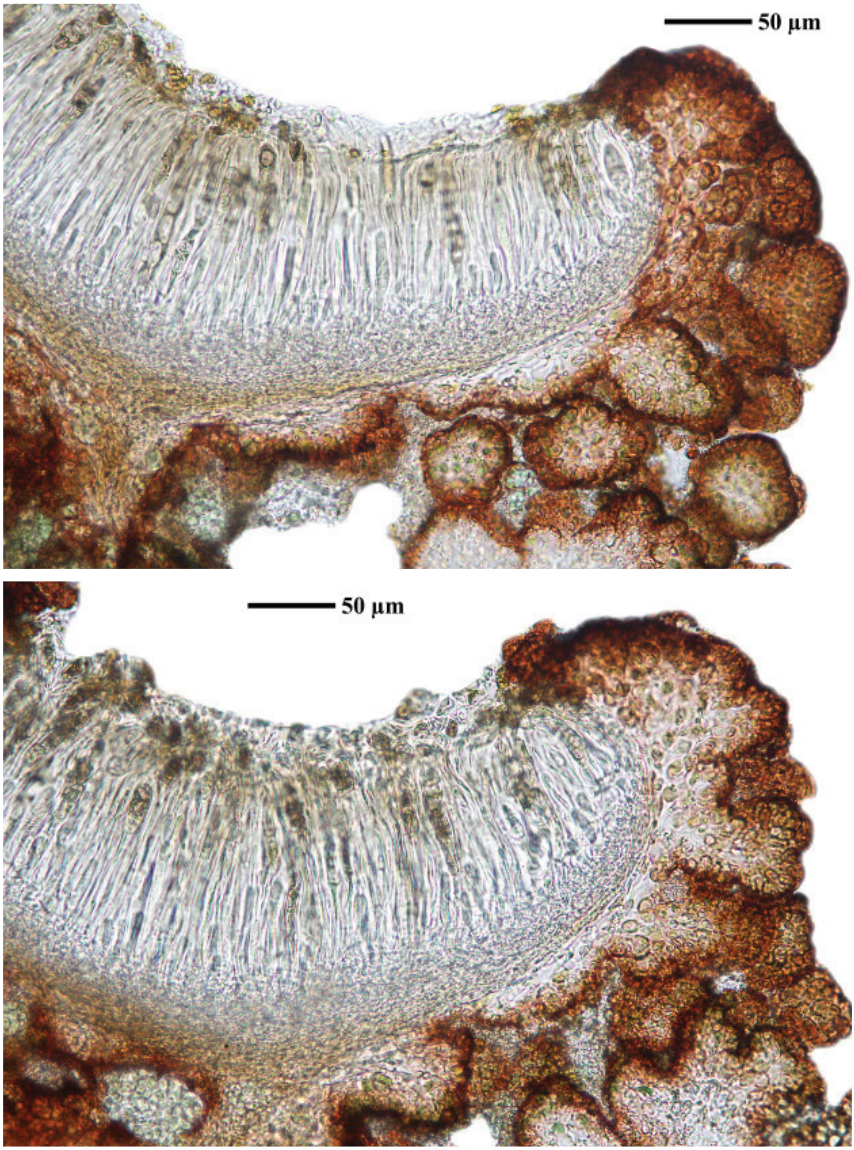




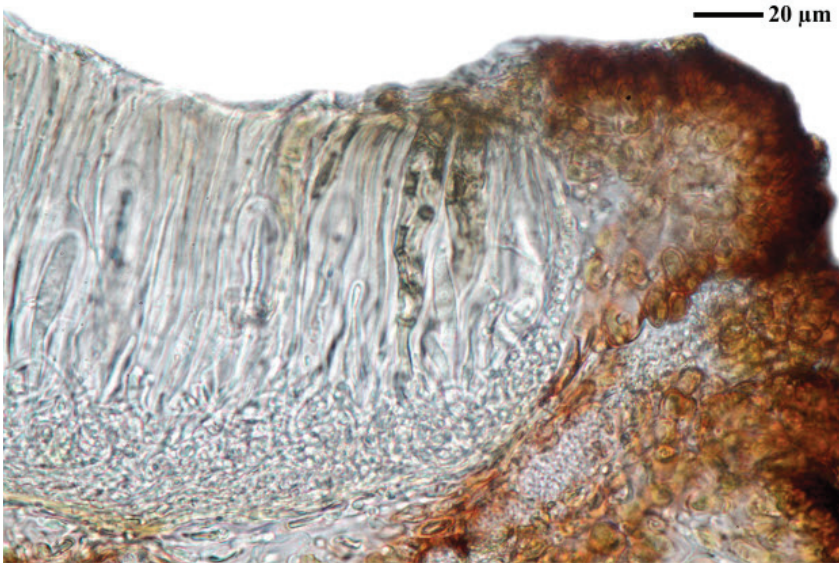

***Pyrenopsis cylindrophora***

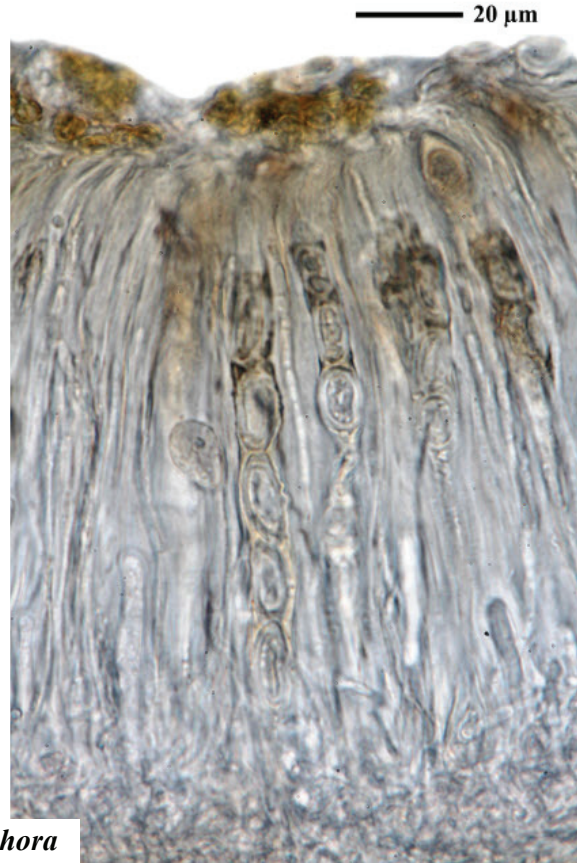



***Pyrenopsis cylindrophora***

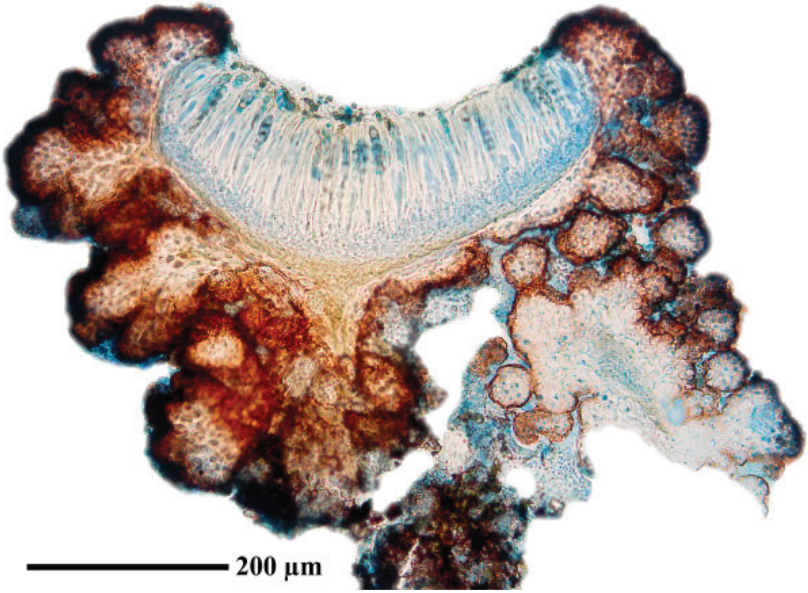


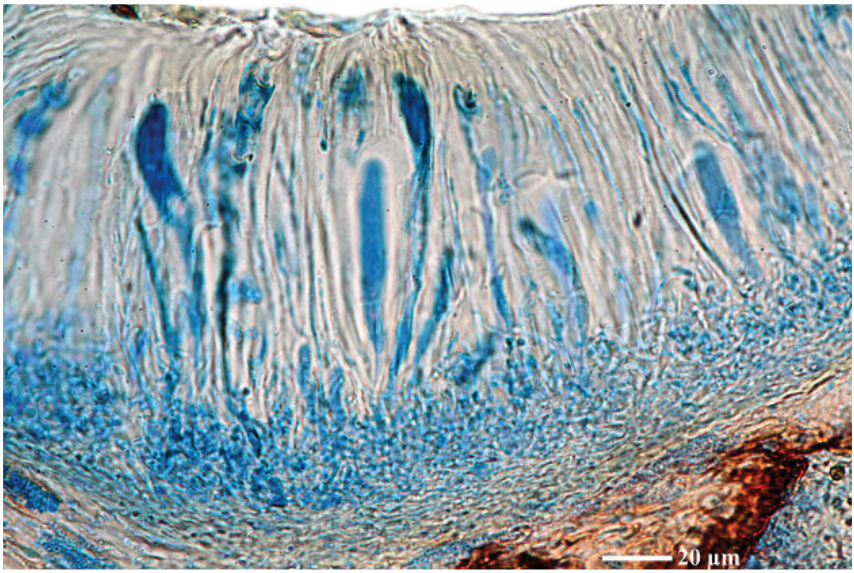

***Pyrenopsis cylindrophora***



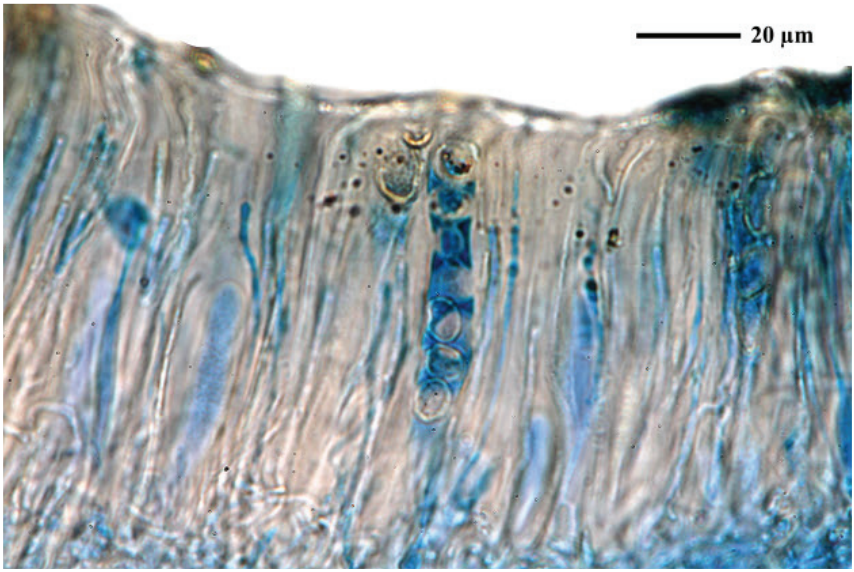



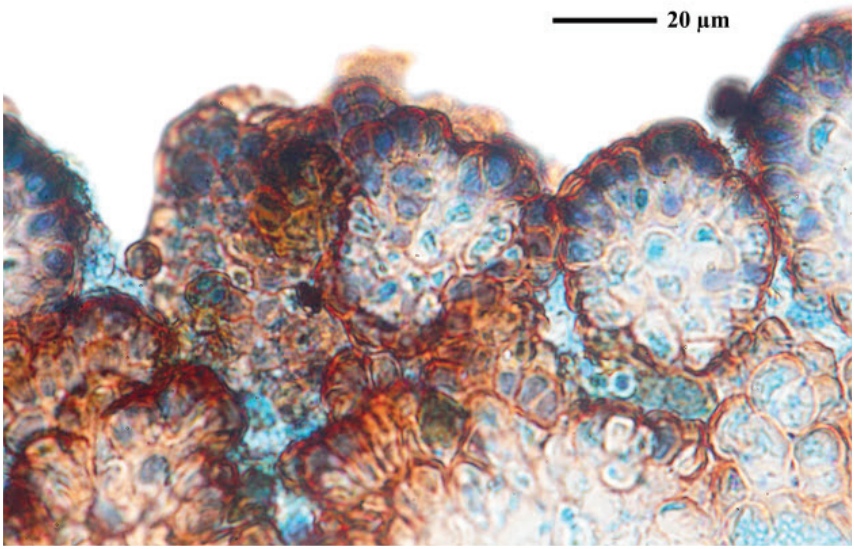

***Pyrenopsis cylindrophora***




***Pyrenopsis cylindrophora***



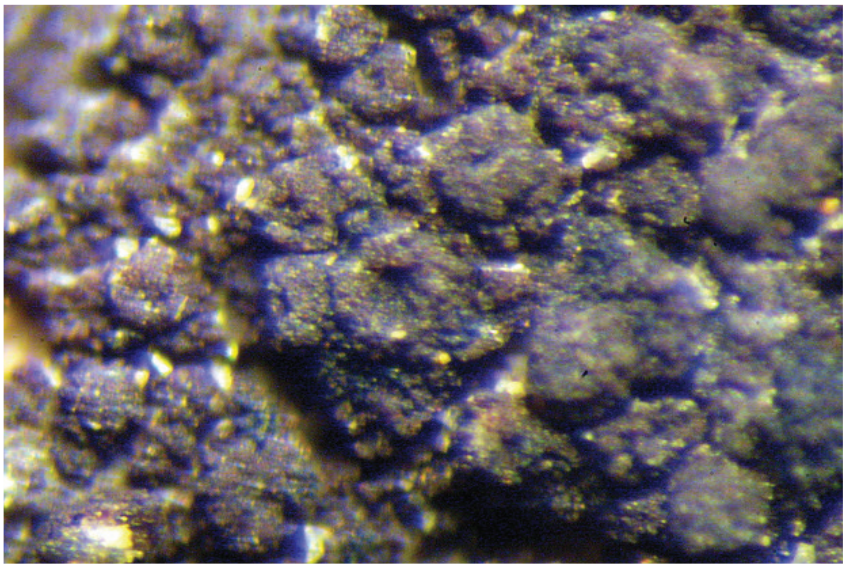

***Pyrenopsis cylindrophora***

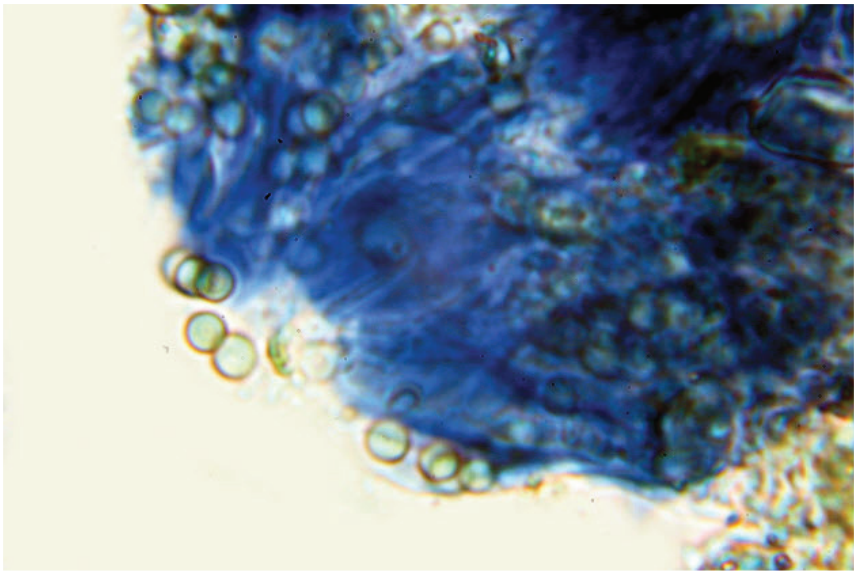
***Pyrenopsis impolita*** Th. Fr. ex Forssell, Nova Acta R. Soc. Scient. upsal., Ser. 3 13(no. 6): 48 (1885)

Spores globose, 8/ascus, zu 8, 3.3–4.4 µm; hymenium K/KJ+ blue. Algae with red gel.

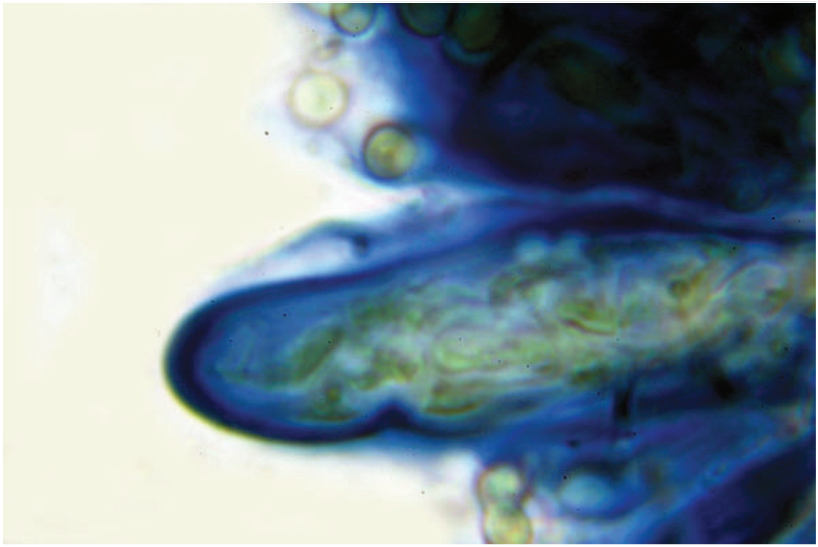
[11212], Portugal, Azoren, Sao Miguel, an schwarzen Lavafelsen bei der Küste von Mosteiros bei Beira - Mar de Baixo; 37°53.320' N, 25°49.426' W, 0 m. Leg. F. Schumm (no11212). 06.06.2003.

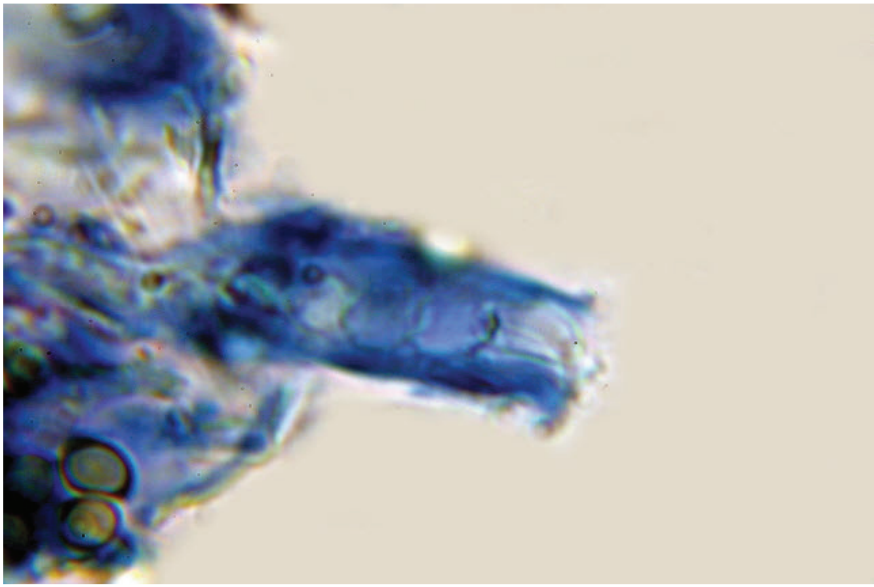




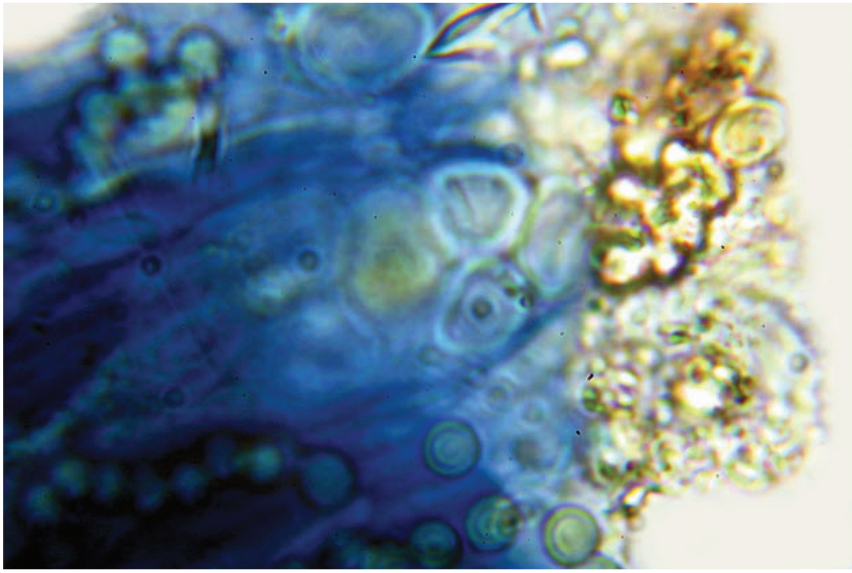


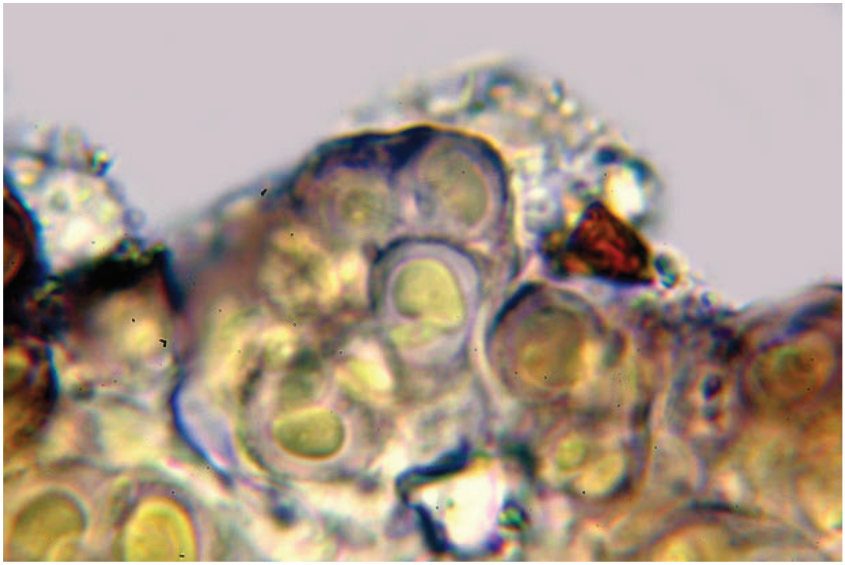
***Pyrenopsis impolita***





***Pyrenopsis impolita***



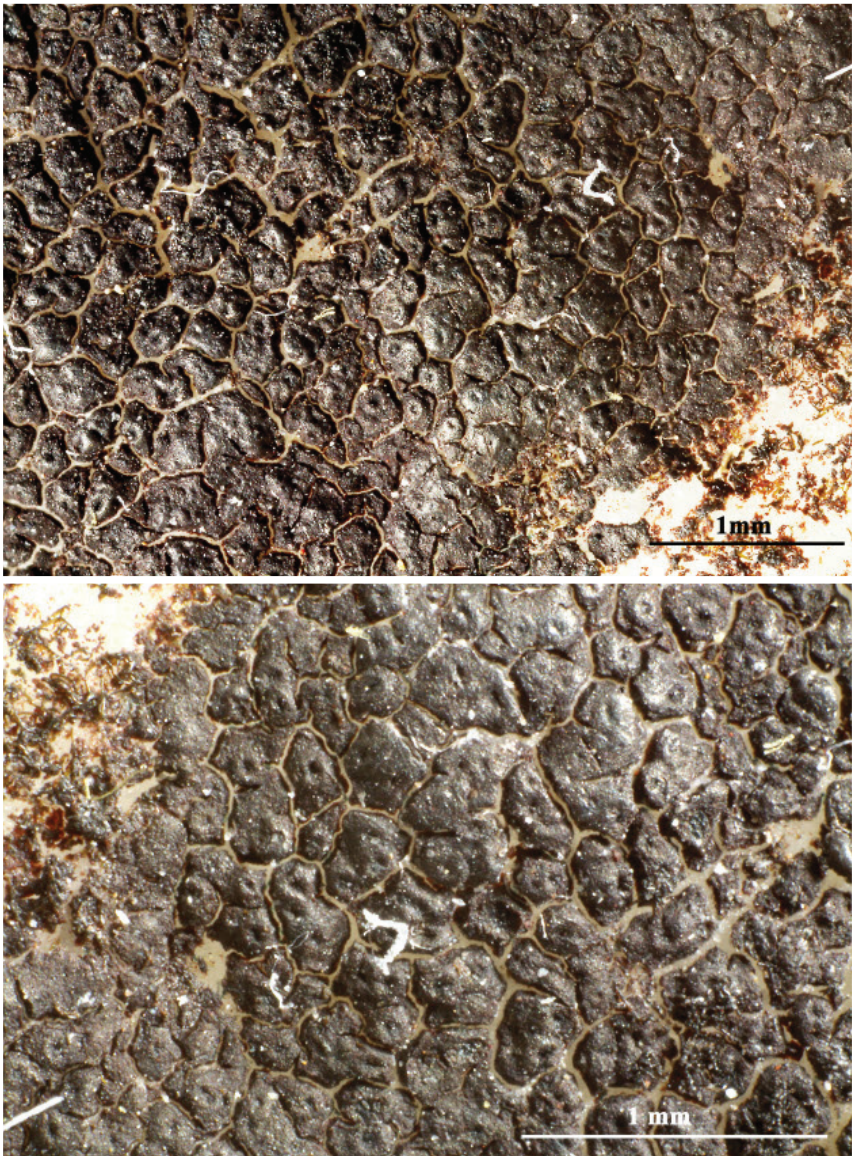


***Pyrenopsis impolita***

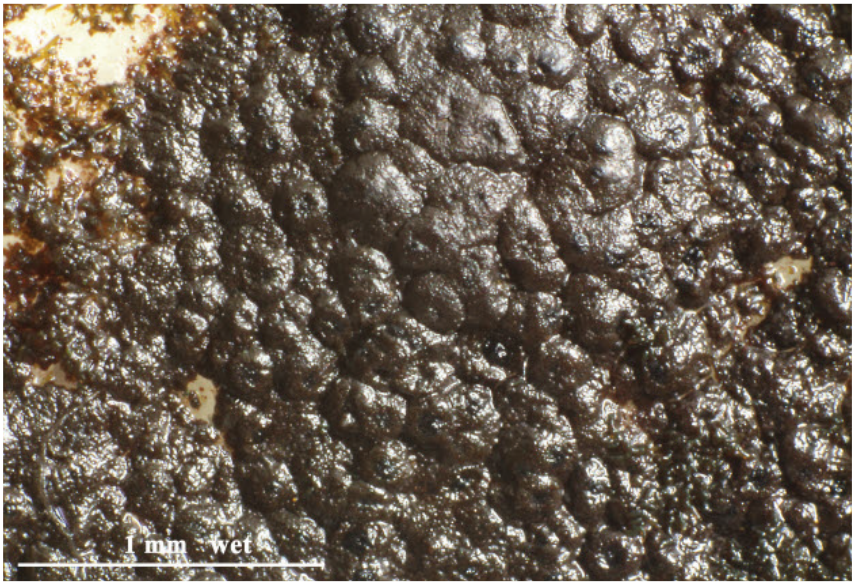
***Pyrenopsis olivacea*** Vain., Acta Soc. Fauna Flora fenn. 7(no. 1): 241 (1890)

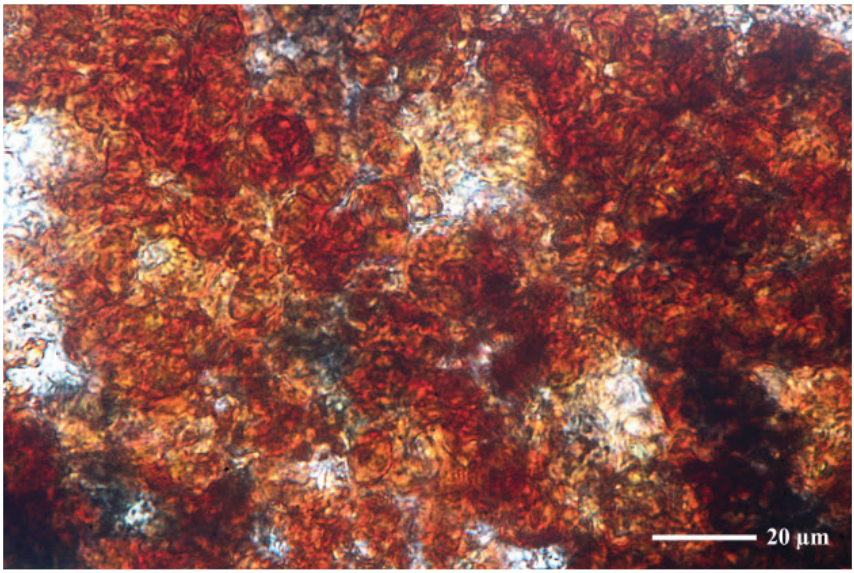
[ABL18135], Brazil, Sergipe, Parque Nacional Serra de Itabaiana, on quarzite rock along waterfall. 400 m, 10°44’35’’ S, 37°20’25’’ W. Leg. M. Cáceres & A. Aptroot (no 18135), 27.07.2013, det. A. Aptroot, 2013.



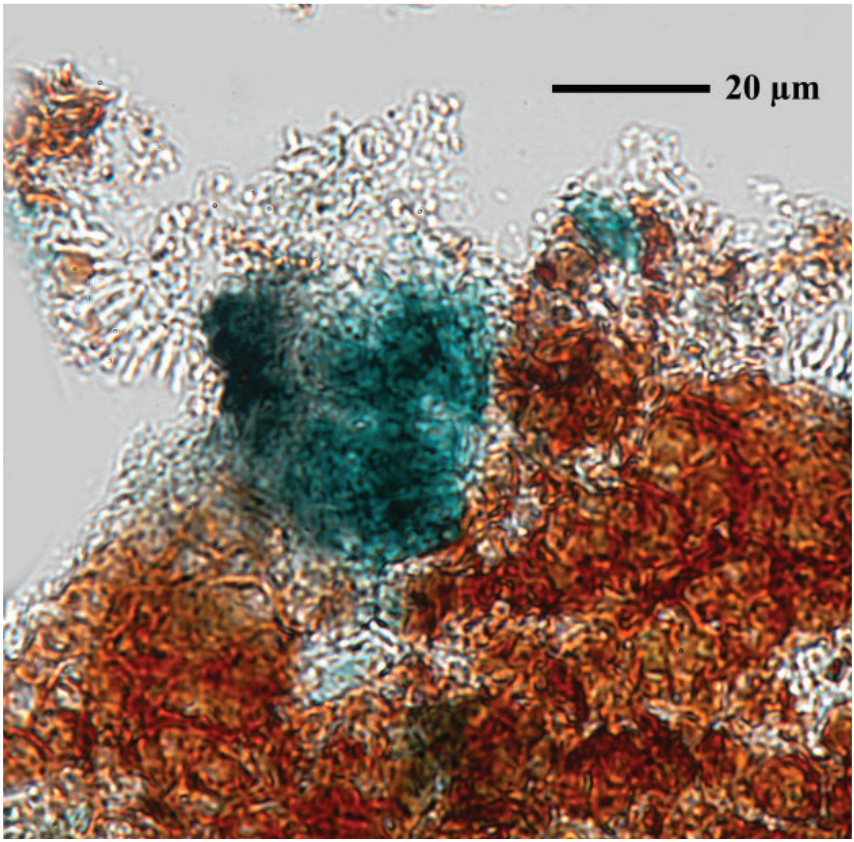


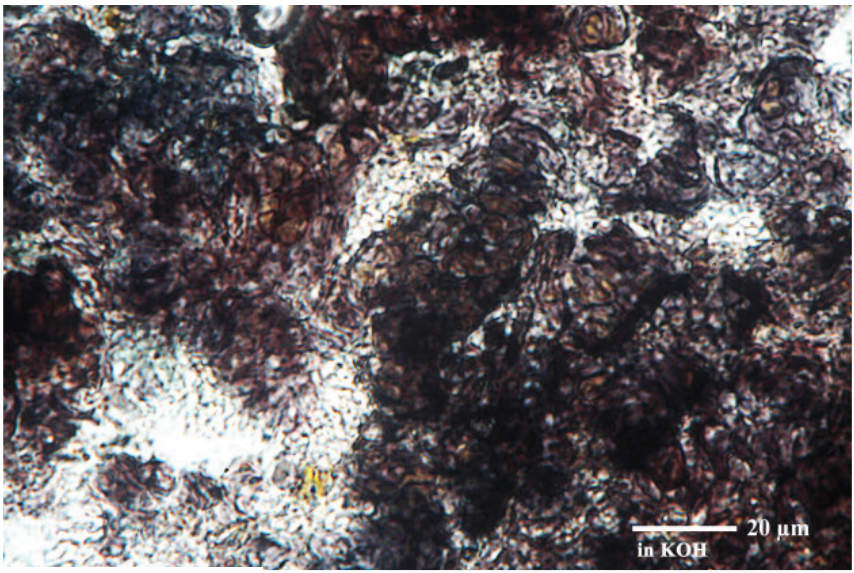

***Pyrenopsis olivacea***




***Pyrenopsis olivacea***



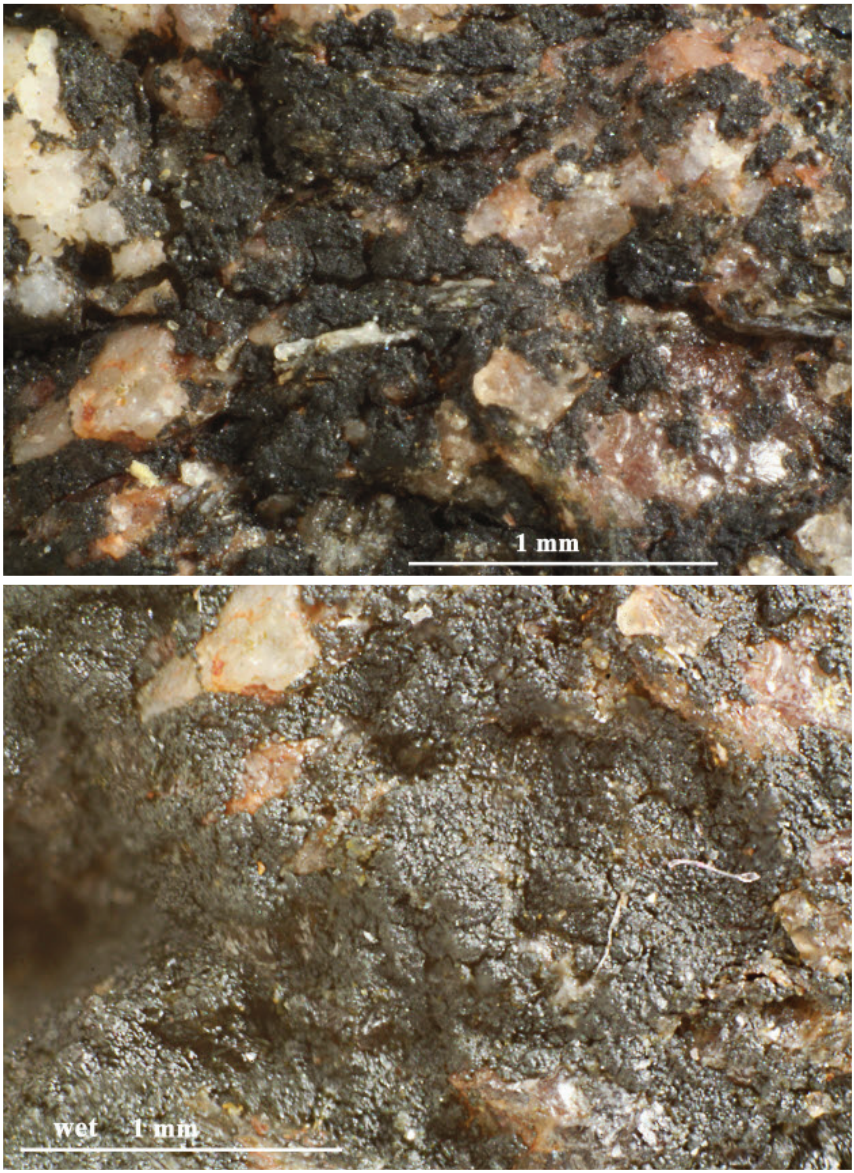

***Pyrenopsis olivacea***

***Pyrenopsis picina*** (Nyl.) Forssell, Nova Acta R. Soc. Scient. upsal., Ser. 3 13(no. 6): 45 (1885)
= *Synalissa picina* Nyl. 1857

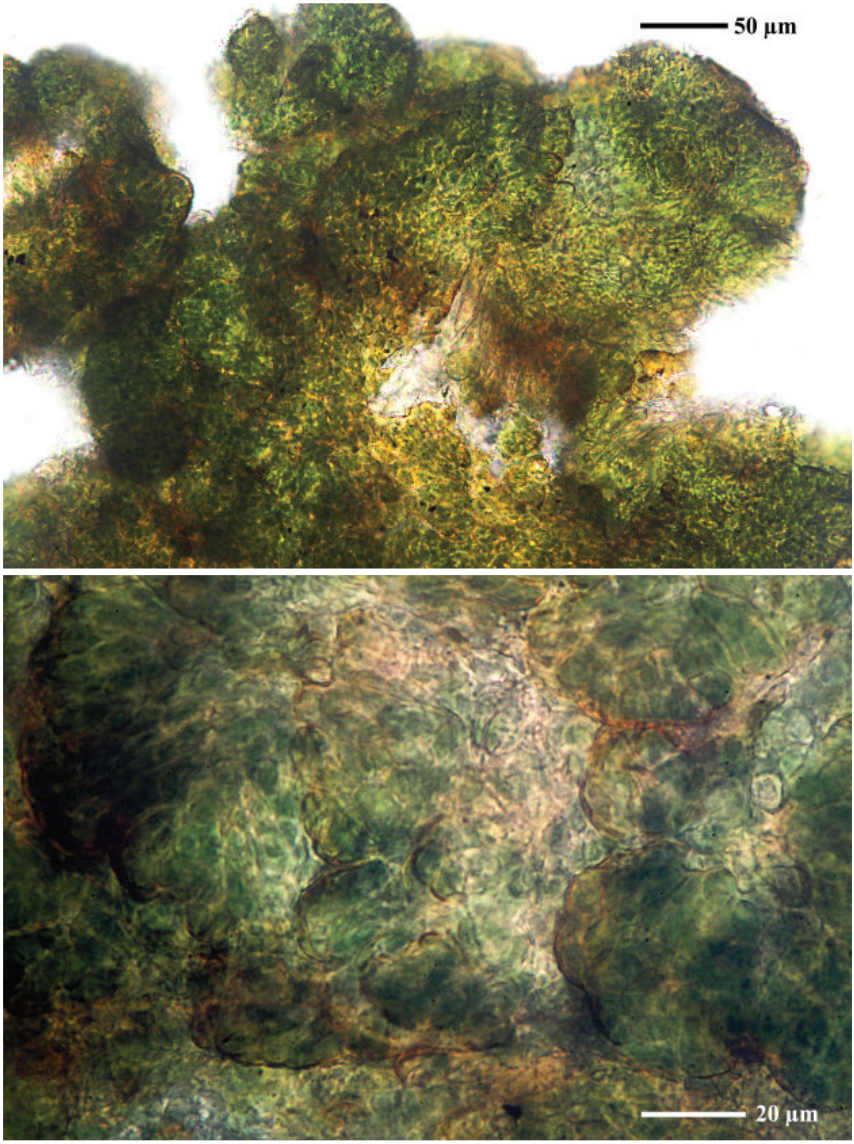
Thallus crustose, thinly episubstratic and film-like, effuse and poorly delimited, continuous to finely rimose, black when dry, dark reddish brown when wet. Apothecia immersed, perithecioid, 0.1–0.2 mm across, with a punctiform disc. Proper exciple poorly developed; epithecium grey-brown; hymenium colourless, I+ deep blue; paraphyses sparingly branched and anastomosing, 1–1.5 µm thick; hypothecium colourless. Asci (16–)24–32-spored, broadly clavate, functionally unitunicate, with a strongly amyloid cap, Ascospores 1-celled, hyaline, ellipsoid, 4–6(–7) x 3–4(–5) µm, Pycnidia immersed. Conidia thread-like. Photobiont cyanobacterial, chroococcoid (Gloeocapsa), the cells surrounded by a reddish-violet gelatinous sheath. Spot tests: all negative. Chemistry: without lichen substances. Note: a species close to P. grumulifera, from which it is not always distinguished, but with an effuse, thin, black thallus overgrowing mosses on humid siliceous rocks.

[ABL71548], Korea, Prov. Jeollanam-do, Goheung-gun Distr., Geumsanmyeoun, Geogeum-do, Shinjeon-ri, Yeonson beach, on siliceous rock. 34°26’48’’ N, 127°07’03’’ E, 2 m. Leg. A. Aptroot (no 71548), 19.10.2013, det., A. Aptroot, 2013.

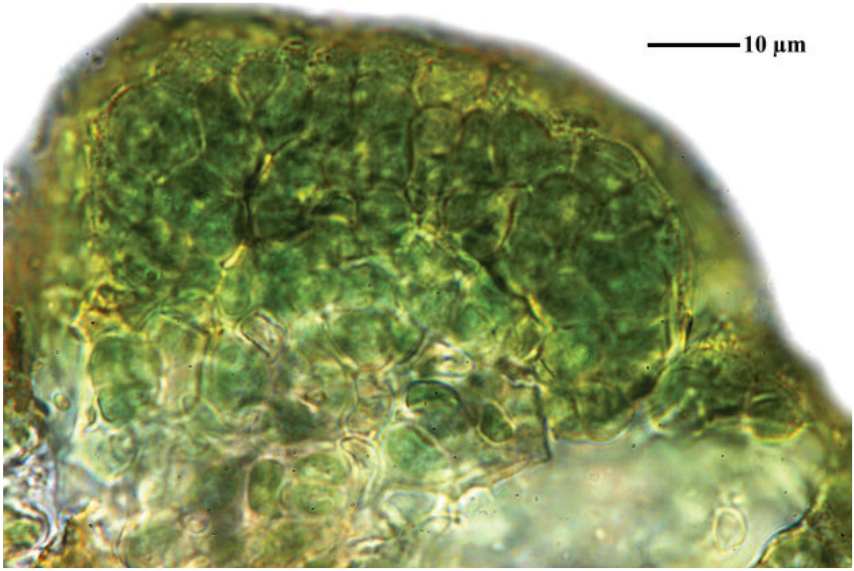


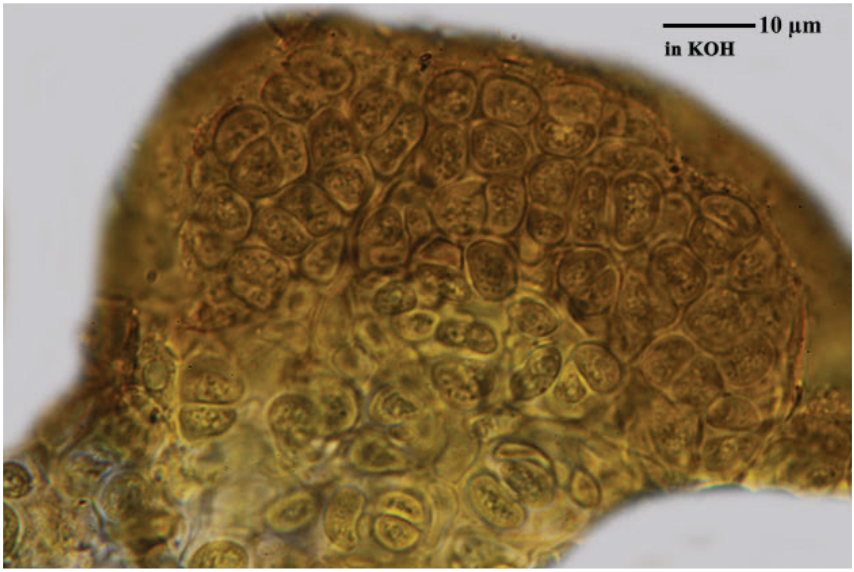



***Pyrenopsis picina***

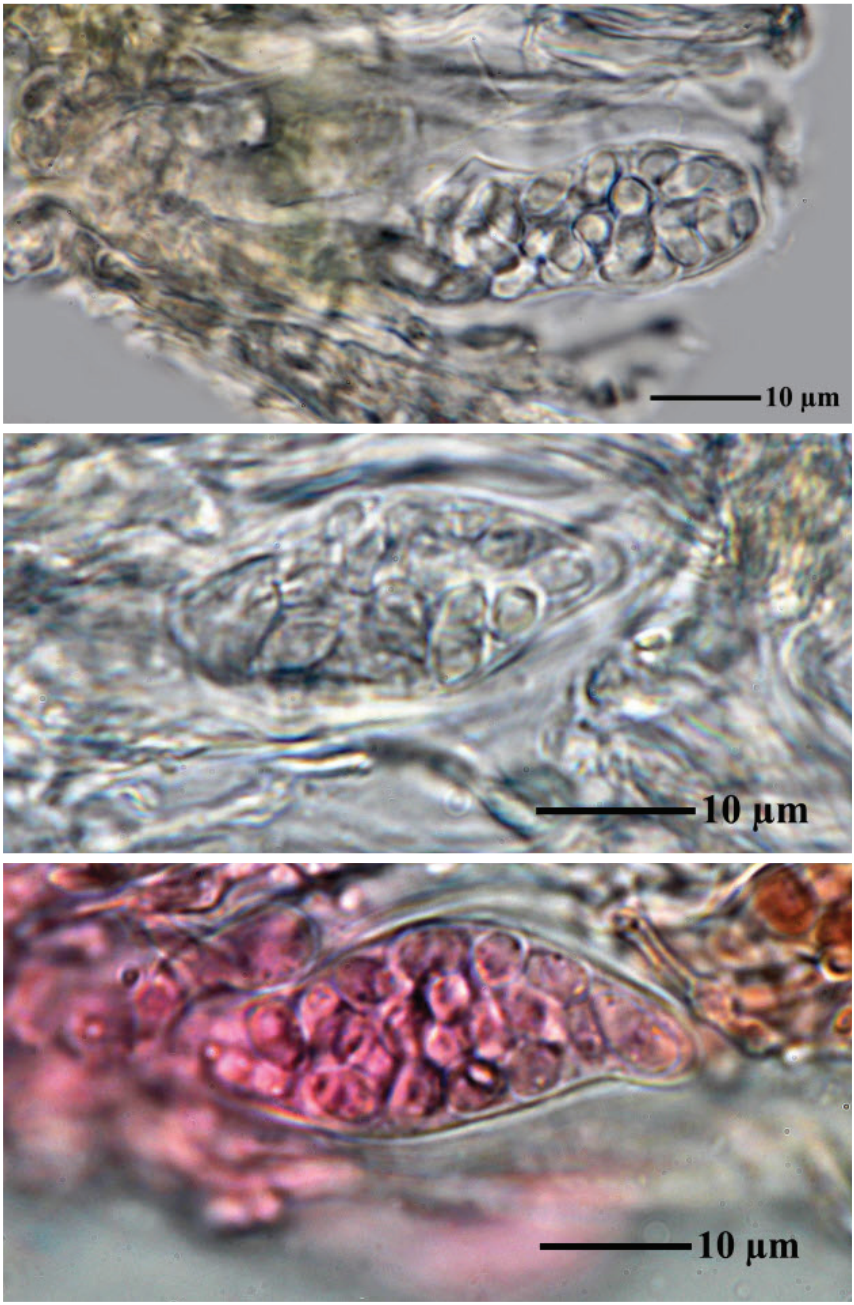



***Pyrenopsis picina***



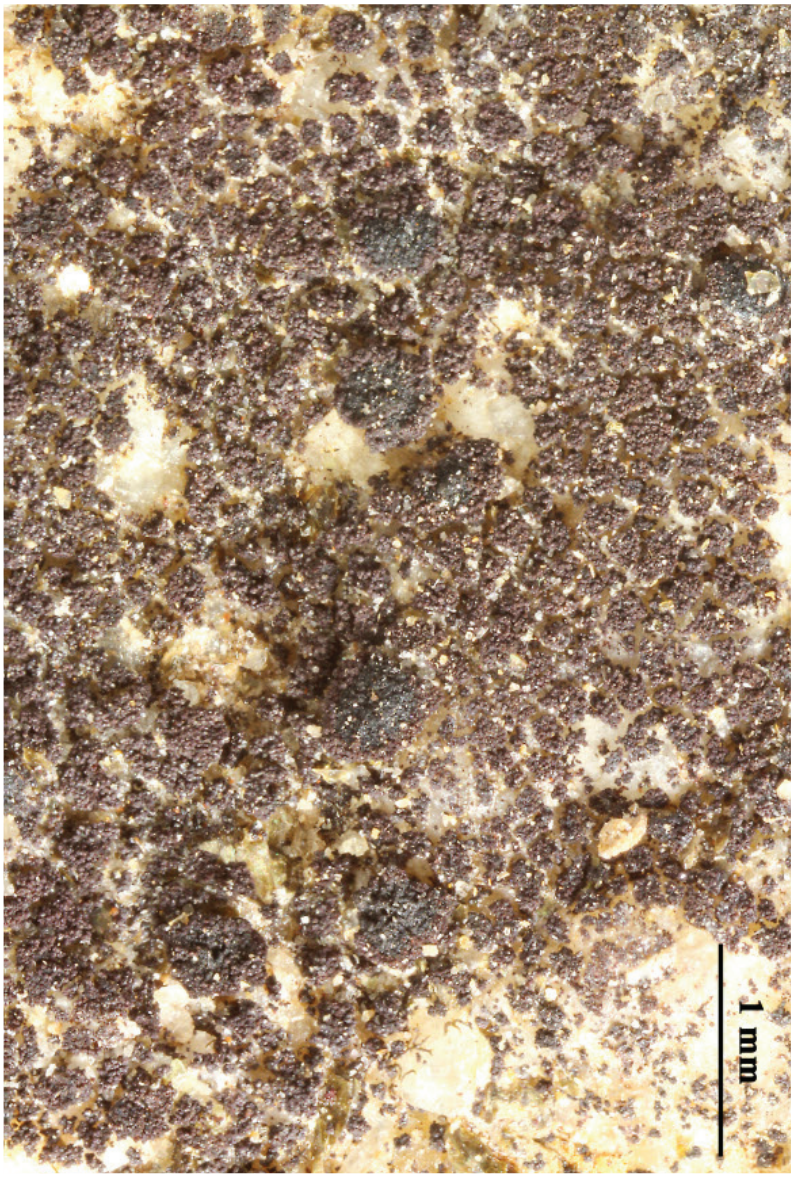

***Pyrenopsis picina***

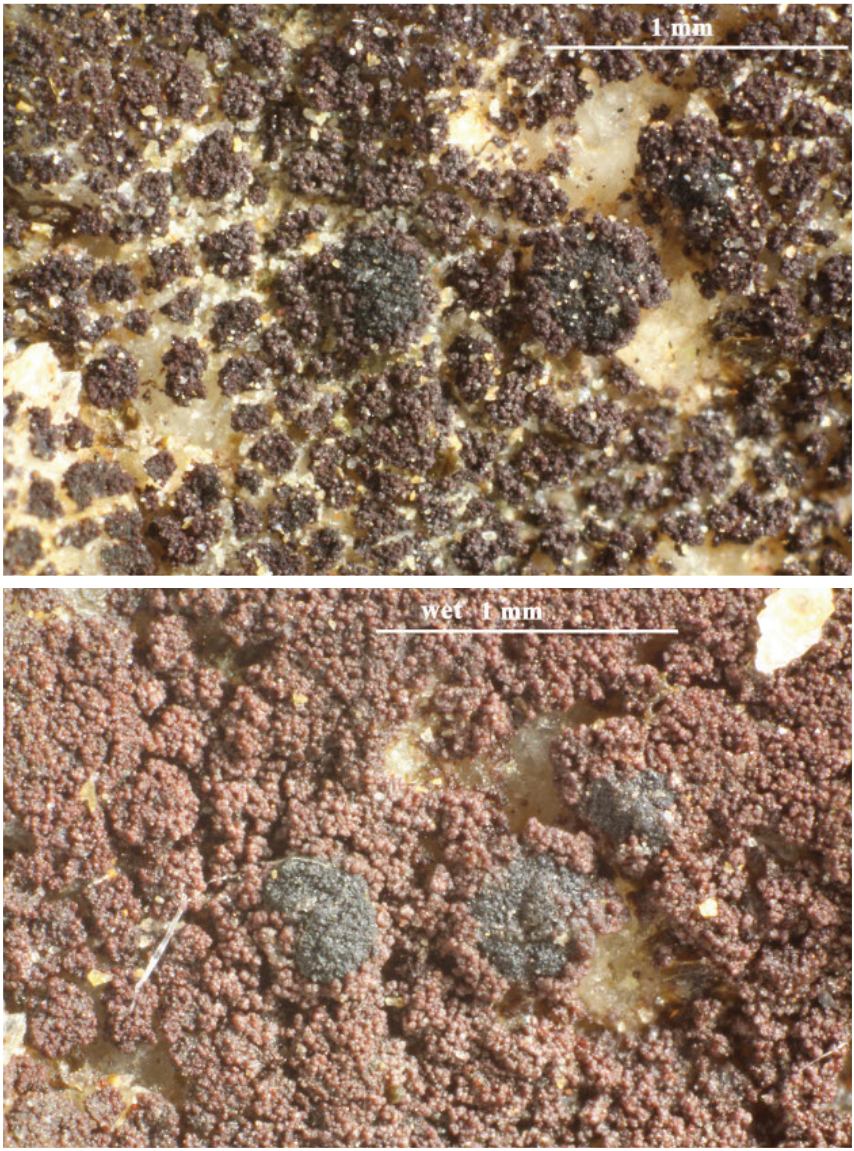



***Pyrenopsis picina***

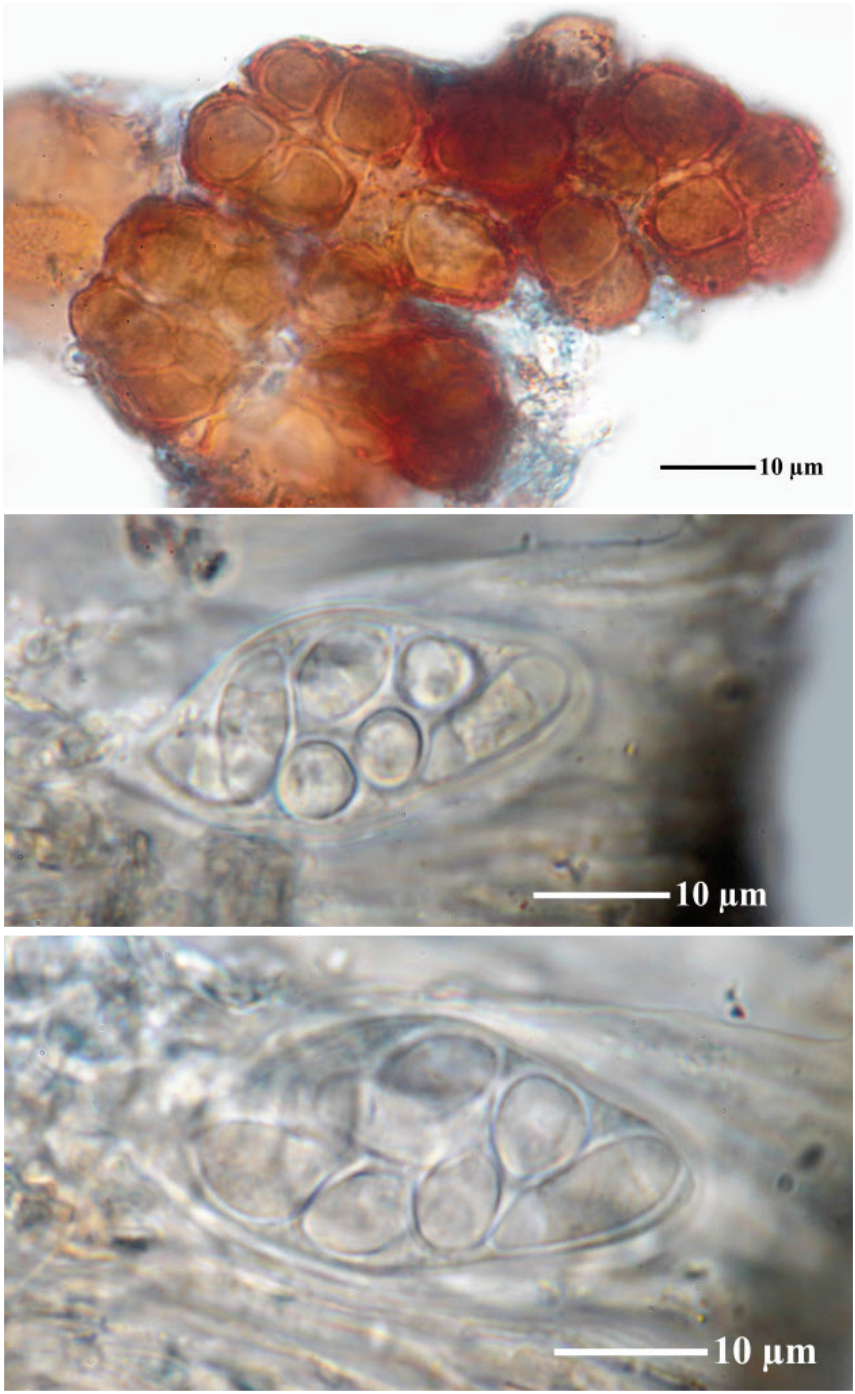
***Pyrenopsis portoricensis*** Zahlbr., Mycologia 22(2): 72 (1930)

[ABL21438], Brazil, Ceará, Quixadá. Serra do Estevão, near chapel, on schistose rock in Caatinga. 250 m, 04°55'44'' S, 39°08'50'' W. Leg. M. Cáceres & A. Aptroot (no 21438),1.4.2014, det. M. Schultz (dupl.), 2014.

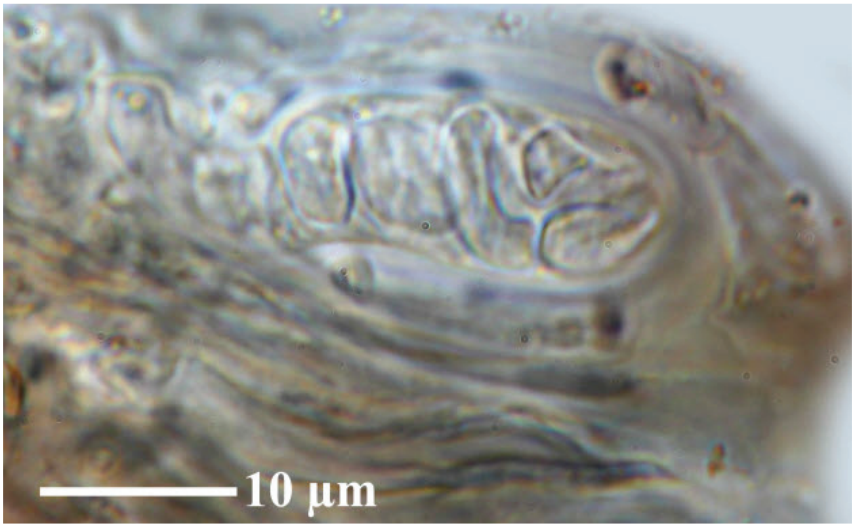


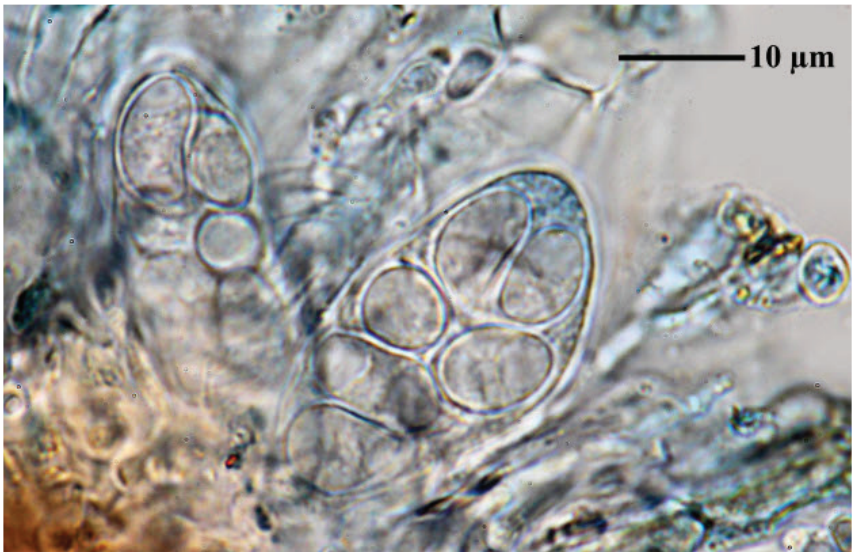



***Pyrenopsis portoricensis***




***Pyrenopsis portoricensis***




***Pyrenopsis portoricensis***

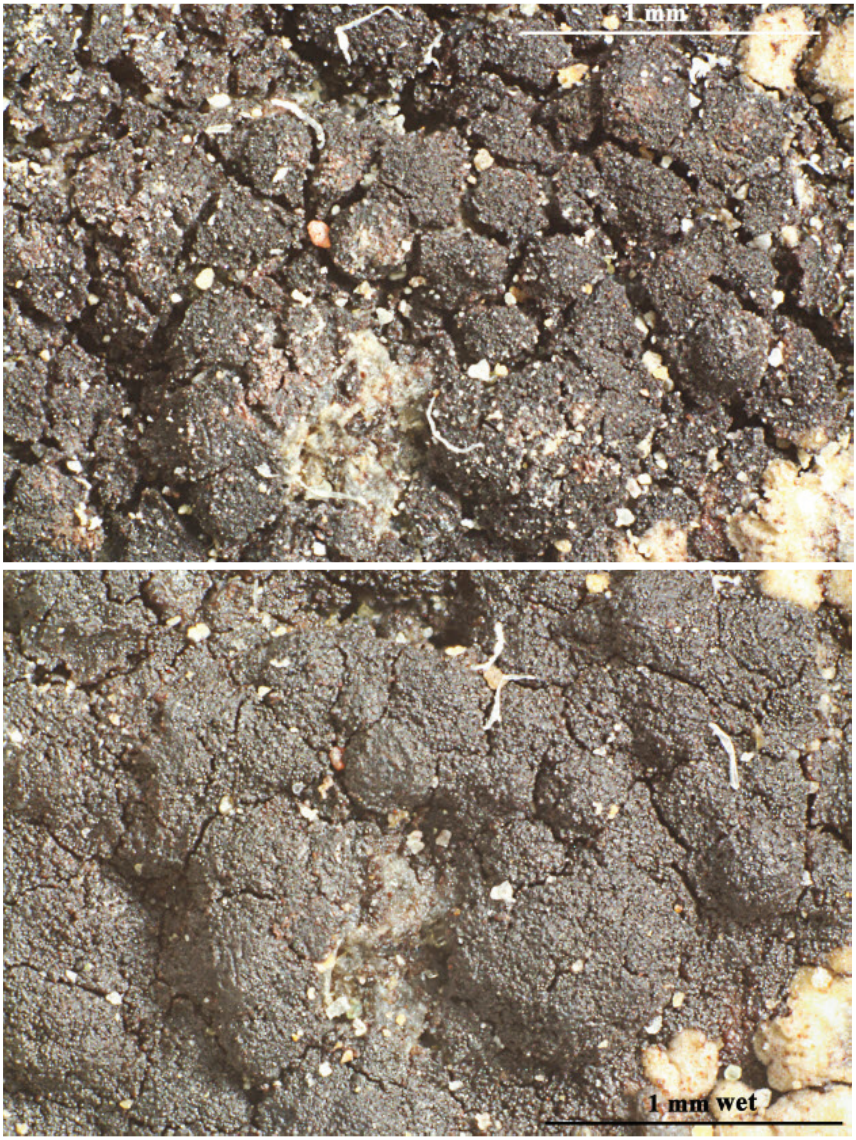
***Pyrenopsis subareolata*** (Nyl. ex Malbr.) Cromb., Monogr. Lich. Brit.: 24 (1894)
= *Collemopsis fuscatula* (Nyl.) H. Olivier, Flora Lich. Orne 1: 111 (1882)
= *Collemopsis subareolata* Nyl. ex Malbr., Bull. Soc. Amis Sci. Nat. Rouen, Sér. II 17: 84 (1881)
= *Pyrenopsis fuliginea* var. *subareolata* (Nyl. ex Malbr.) Boistel, Nouv. Fl. Lich. 2: 315 (1903)
= *Pyrenopsis fuscatula* Nyl., Mém. Soc. Imp. Sci. Nat. Cherbourg 5: 143 (1858)

Thallus crustose-areolate, slightly gelatinous when wet, homoiomerous and densely paraplectenchymatous throughout, dark reddish brown to brownish black, red-brown when wet, to 0.1 mm thick, continous to areolate, the areoles up to 0.8 mm wide, flat to slightly convex, usually smooth (but sometimes granulose at margins). Apothecia pycnoascocarps, immersed, 1(–2–3) per areole, perithecioid, 0.2–0.4 mm across, with a pore-like disc and a distinct thalline margin. Epithecium colourless to brownish; hymenium colourless, 85–100 µm high, I+ blue-green turning red-brown; paraphyses simple or sparingly branched in upper part. Asci 8-spored, subcylindrical, the outer wall I+ blue, without apical amyloid structures. Ascospores 1-celled, hyaline, broadly ellipsoid, 9–15(–18) x 6–9(–11) µm. Pycnidia immersed, pyriform. Conidia ellipsoid, c. 3 x 1–1.5 µm. Photobiont cyanobacterial, chroococcoid (Gloeocapsa), the cells single or clustered, surrounded by reddish-violet gelatinous sheaths, 7–10 µm wide (incl. sheats). Spot tests: all negative. Chemistry: without lichen substances. Note: on siliceous rocks with a prolonged water seepage after rain.

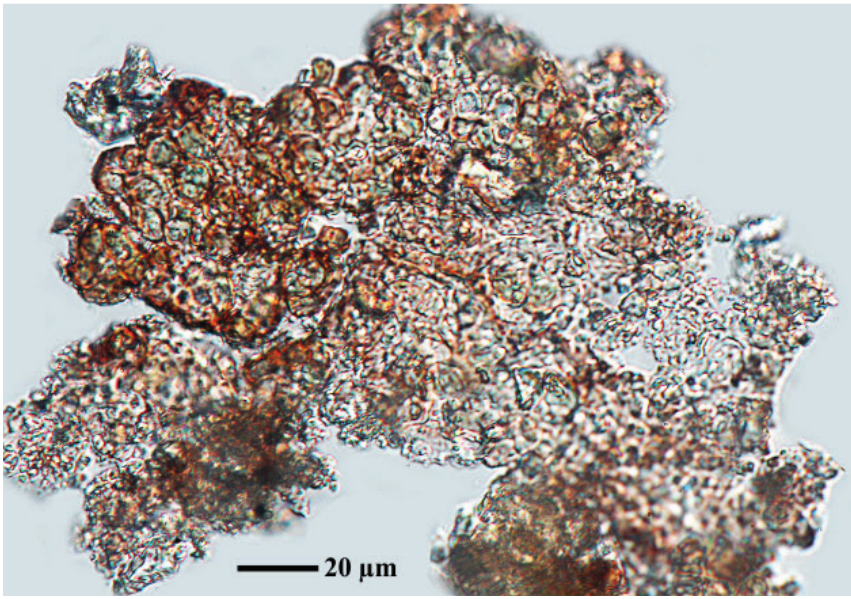
[ABL53572], Taiwan,Taipei County, 25 km N of Taipai, seashore, volcanic rock outcrop mear Sanji, 0-5 m, 25°17’21’’ M, 121°30’41’’ E, on volcanic rock. Leg. A. Aptroot (no 53572), 22.10.2001, det. M. Schultz, 2007.

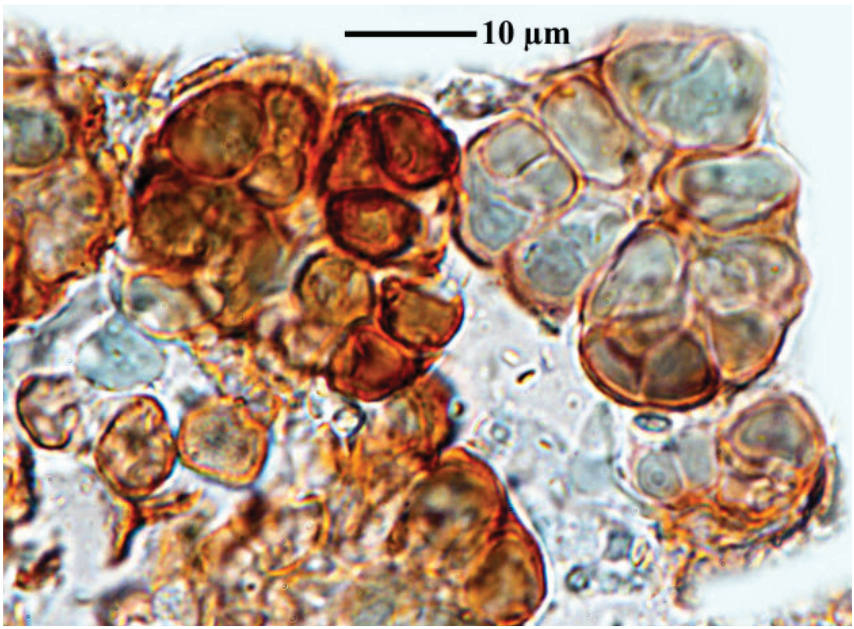



***Pyrenopsis subareolata***

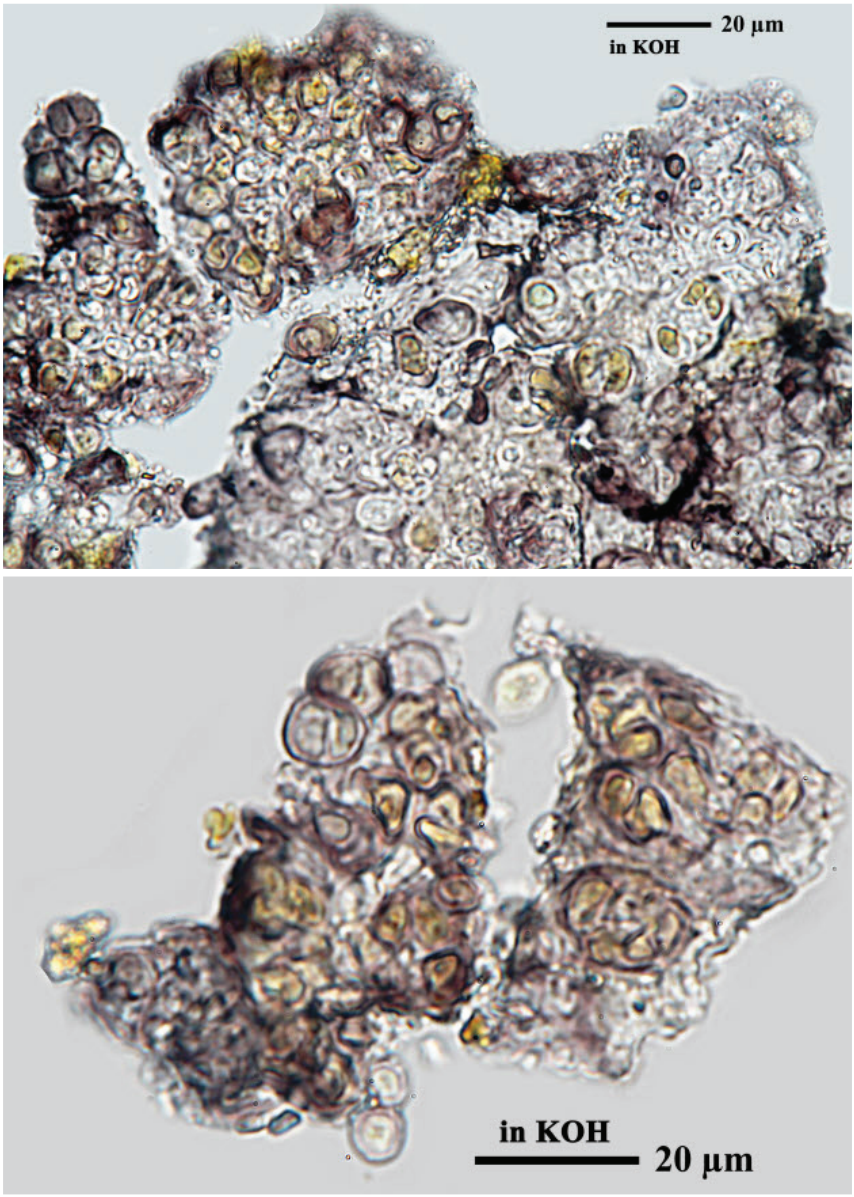



***Pyrenopsis subareolata***

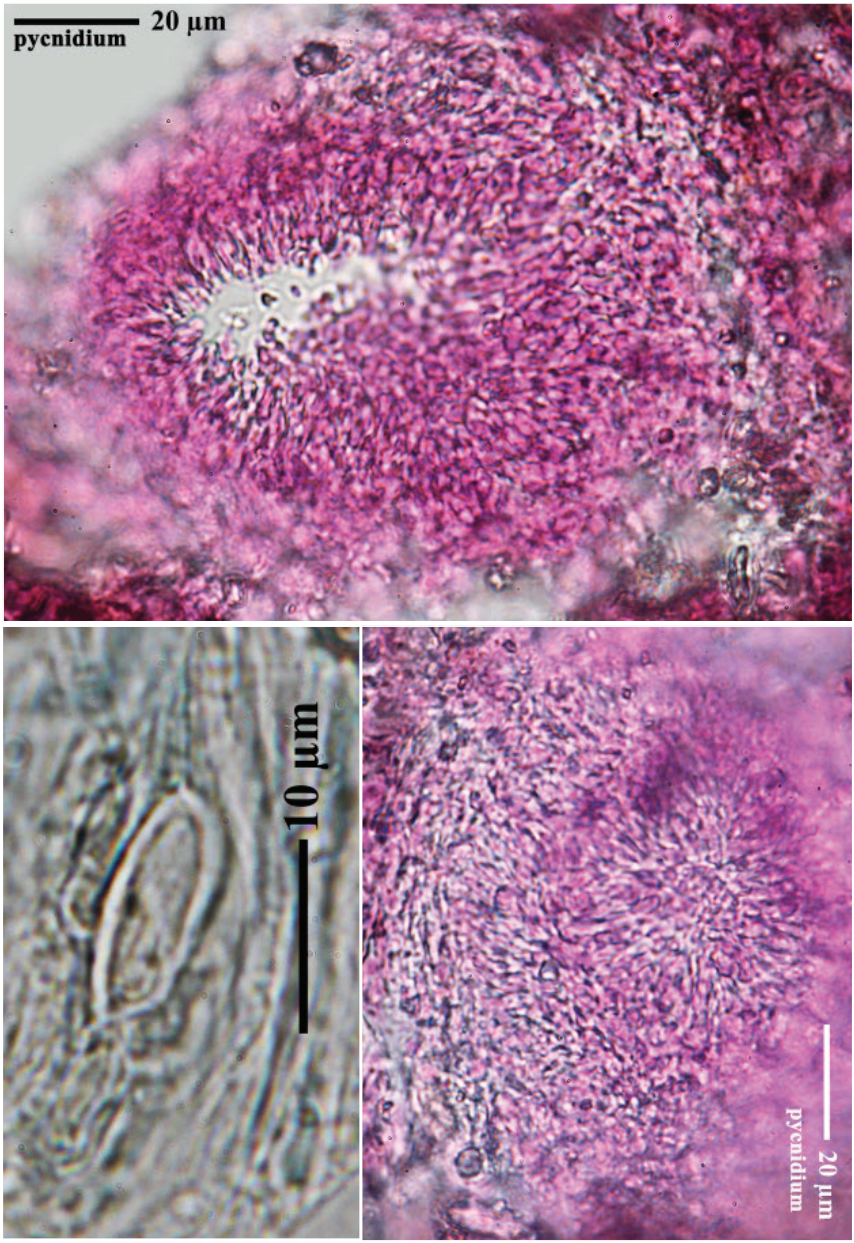



***Pyrenopsis subareolata***




***Pyrenopsis subareolata***

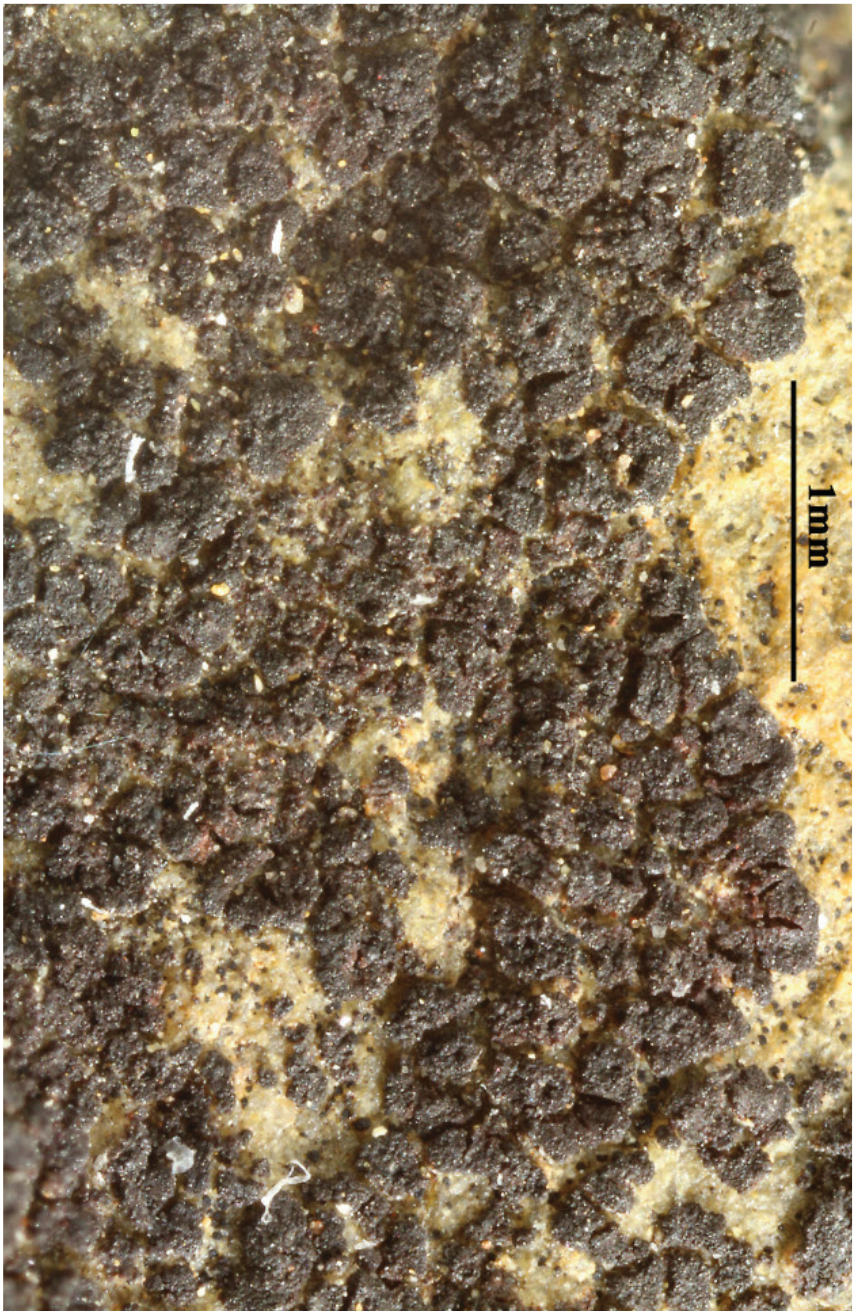



***Pyrenopsis subareolata***

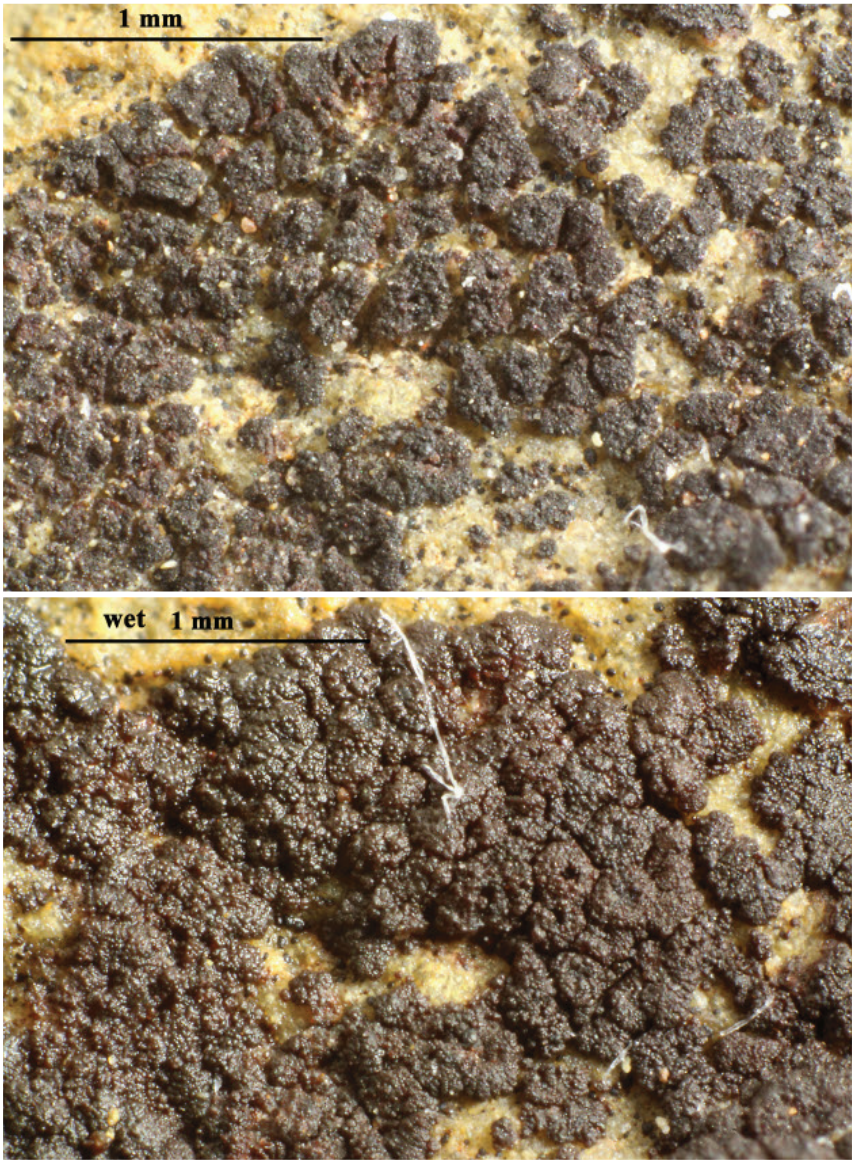
***Pyrenopsis triptococca*** Nyl., Flora, Regensburg 64: 2 (1881)

Thallus crustose, episubstratic, slightly gelatinous when wet, dark reddish brown to brownish black, granulose, the granules aggregated into irregular, 0.15–0.75 mm wide, smooth to verruculose, flat to slightly convex areoles separated by thin fissures, the peripheral ones sometimes slightly elongated and radiating. Thallus anatomy homoiomerous and paraplectenchymatous throughout, with a network of 2–3 µm thick hyphae encloising the photobiont cells, Apothecia pycnoascocarps, immersed, 0.2–0.45 µm across, at first almost perithecioid with a pore-like disc, then with a slightly expanded, black, concave disc and a thin, granulose thalline margin. Proper exciple cupuliform, prosoplectenchymatous, 7–10 µm wide; epithecium dark orange-brown, 5–12 µm high; hymenium colourless, 90–120 µm high, I+ blue turning red-brown, K/I+ blue; paraphyses simple or sparingly branched and anastomosing in upper part, more or less constricted at septa, 2–3 µm thick, the apical cells capitate; subhymenium colourless, 30–60 µm high, thicker in central part. Asci 8-spored, subcylindrical, the wall I+ blue, with an apical amyloid tholus surrounded by a strongly amyloid outer gelatinous sheath. Ascospores 1-celled, hyaline, broadly ellipsoid, 9–13 x 7–8 µm. Pycnidia immersed, pyriform. Conidia ellipsoid. Photobiont cyanobacterial, chroococcoid, the cells single or clustered, measuring 7–11 x 4–7 µm, surrounded by reddis-violet (at the periphery) to colourless (in inner parts) gelatinous sheaths. Spot tests: all negative. Chemistry: without lichen substances. Note: on basic siliceous rocks, especially basalt, in sunny seepage tracks.

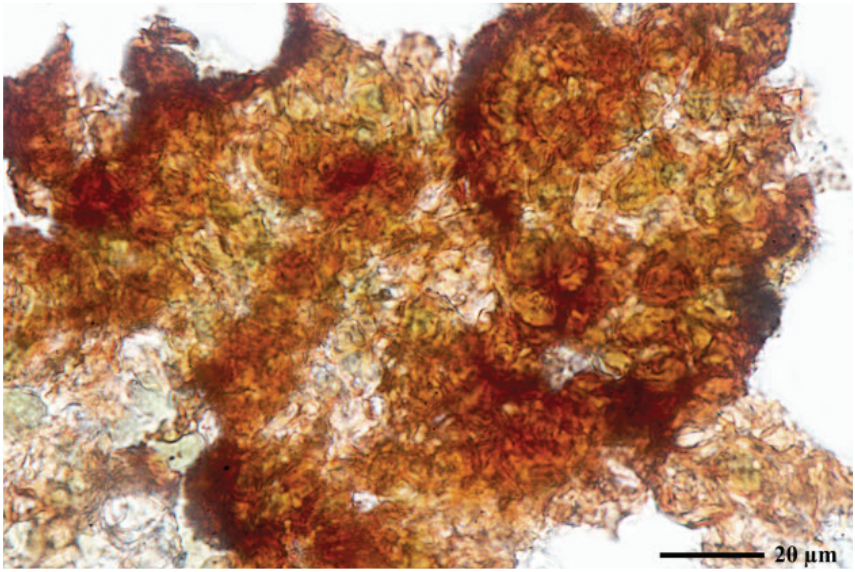
[ABLsn], South Africa, Western Cape prov., Bontebok National Park near Swellendam, 170 km E of Kapstad, on rock along river. Leg. C.M. van Herk (s.n.), 5.10.1997, det. M. Schulz, 2005.

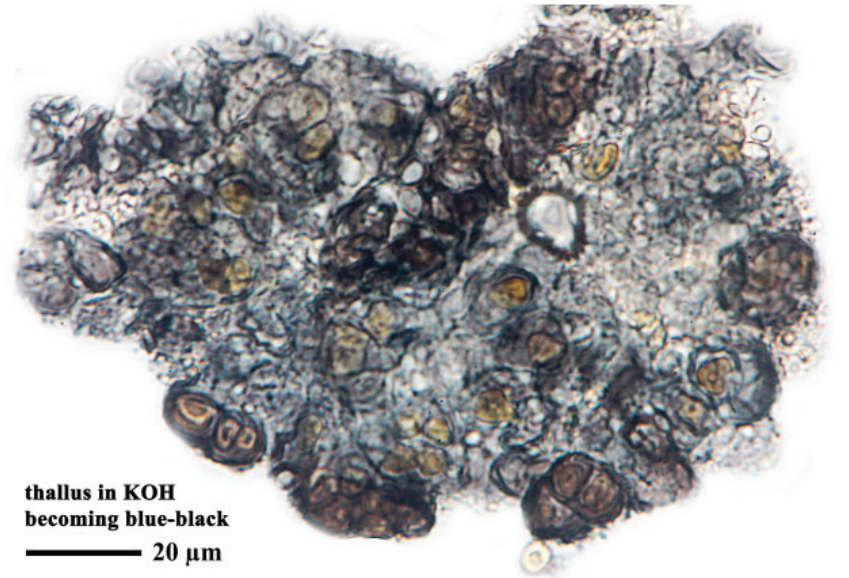



***Pyrenopsis triptococca***

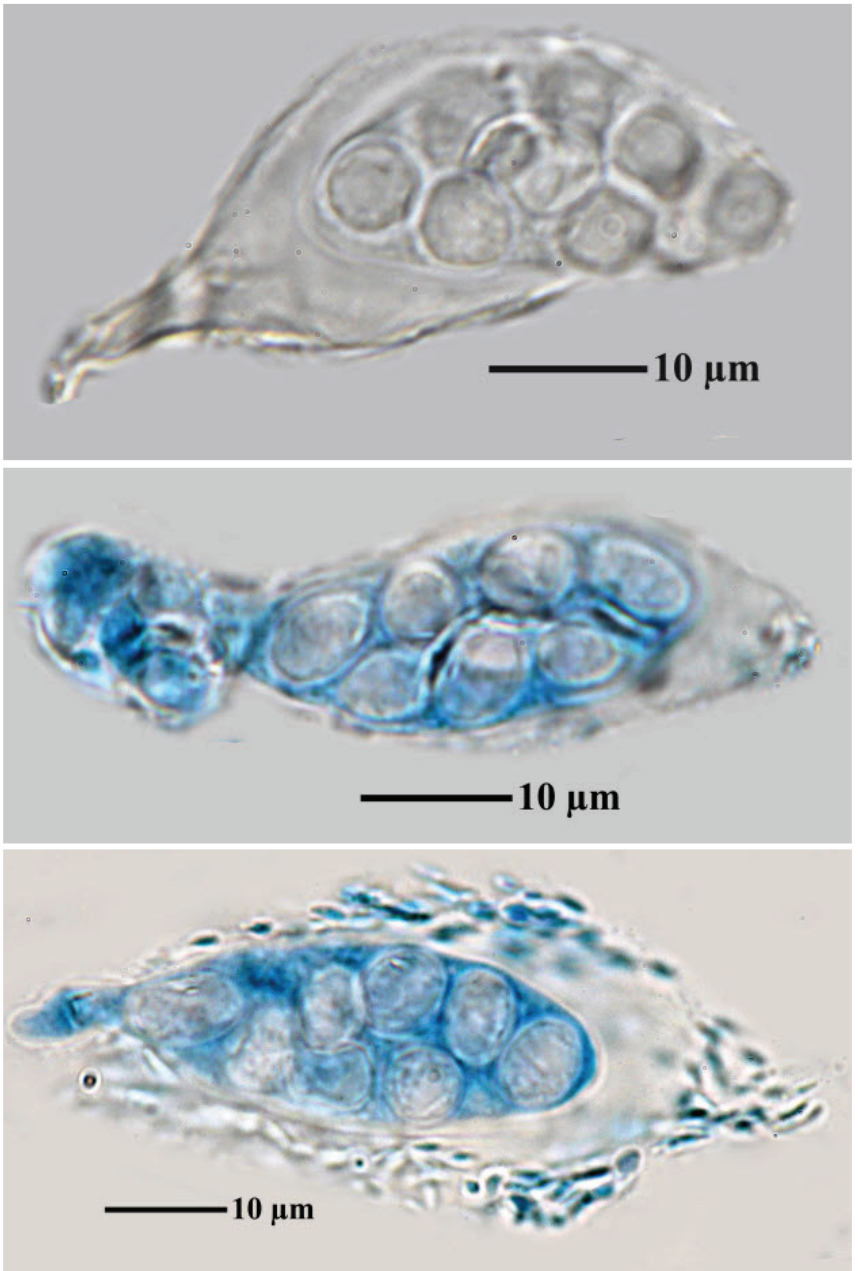



***Pyrenopsis triptococca***




***Pyrenopsis triptococca***



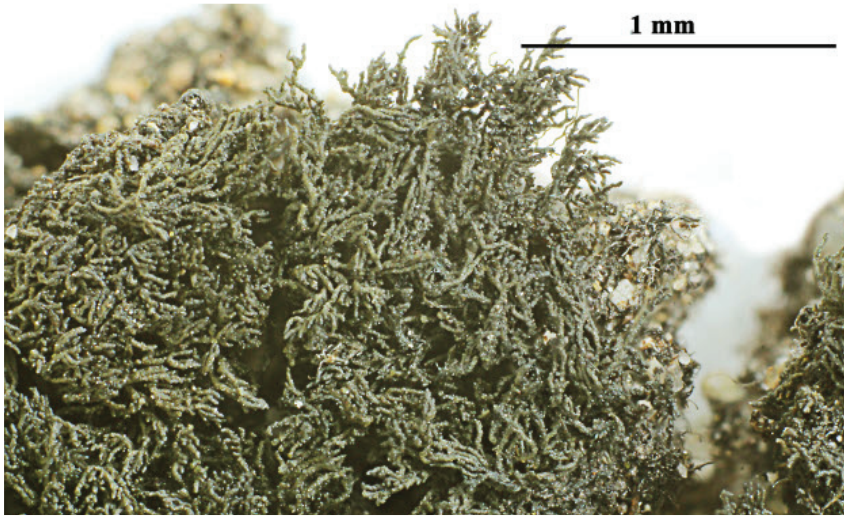

***Pyrenopsis triptococca***

***Spilonema revertens*** Nyl., Flora, Regensburg 48: 601 (1865)
= *Spilonemopsis revertens* (Nyl.) Vain., Ark. Bot. 8(no. 4): 98 (1909)

Photobiont: *Stigonema*. with distinct bluish-black hypothallus.Note: belongs now to the Coccocarpiaceae.

[ABL55952], China, Yunnan Prov., Jianchuan Co., 75 km S of Lijiang, along ridge road in Mt. Shibaoshan Park. *Pinus yunannensis* and sclerophyll shrubs among sandstone outcrops, 2500 m, 26°22'50" N, 99°49'47" E, on sandstone. Leg. A. Aptroot (no 55952), 19.10.2002, det. M. Schulz, 2005.

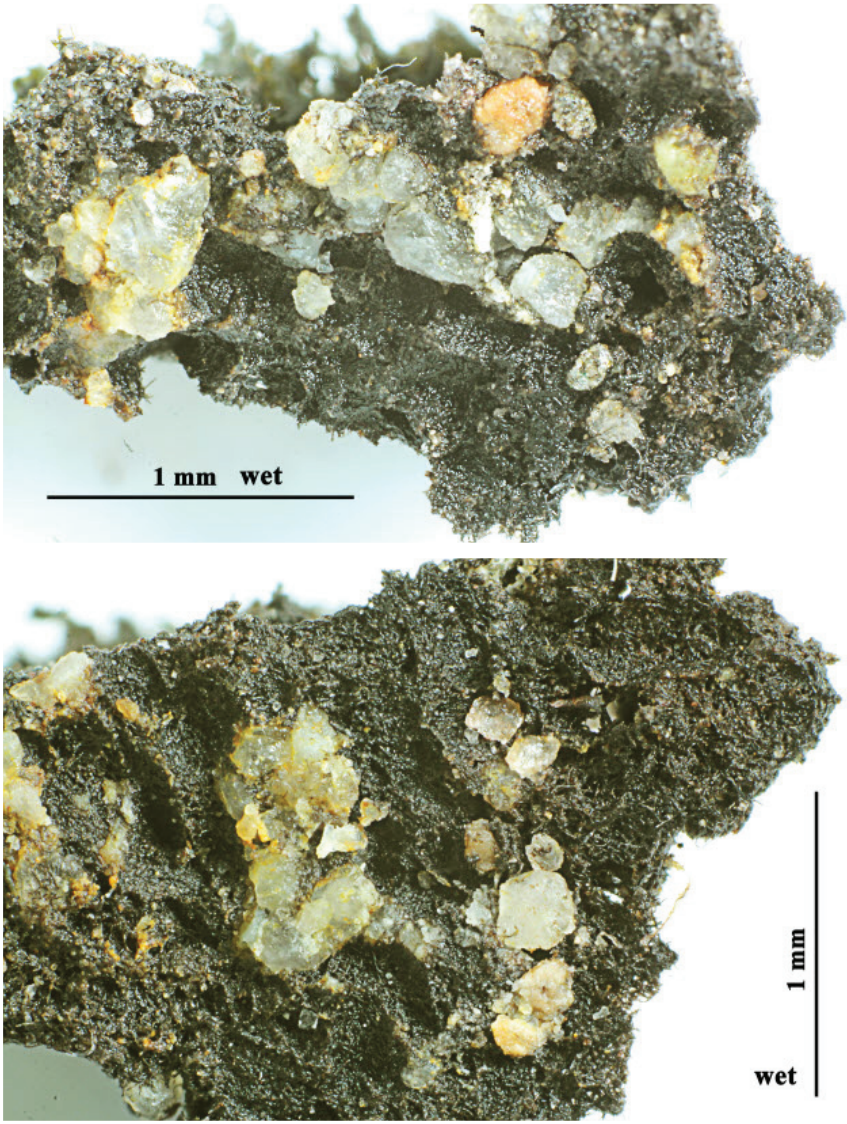








***Spilonema revertens***




***Spilonema revertens***







***Spilonema revertens***




***Spilonema revertens***

***Stromatella bermudana*** (Riddle) Henssen, Lichenologist 21(2): 112 (1989)
= *Psorotichia bermudana* Riddle, Bull. Torrey bot. Club 43: 154 (1916)

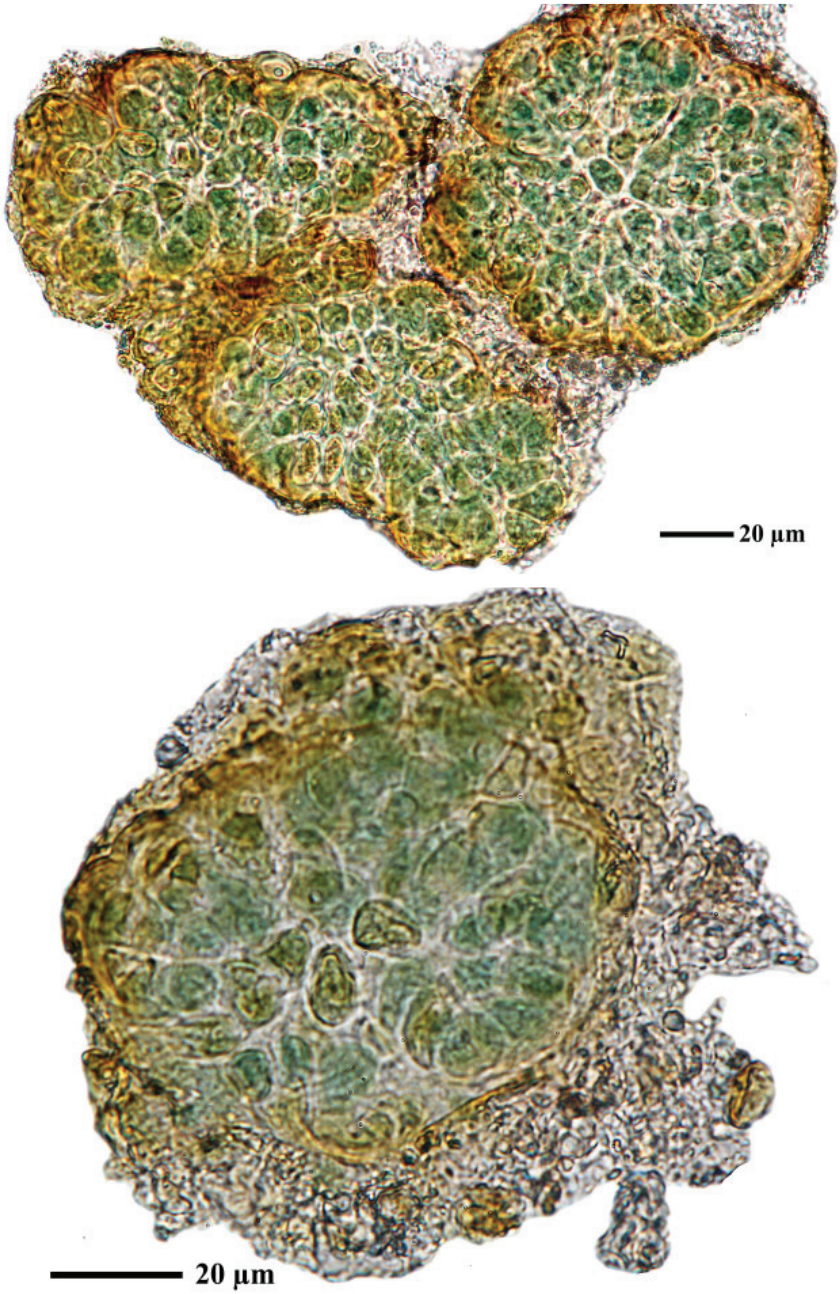
Apothecia umbonate. Spores ellisoid, simple, hyaline, 8/ascus, c. 12-16 x 7-7.5 µm.

[ABL53071], Taiwan, Pingtung County, 45 km SE of Kaohsiung, near Fangshan, rock outcrops, on conglomeratic rock. 22°09'45'' N, 120°41'54'' E, 20 m. Leg. A. Aptroot (no 53071), 16.10.2001, det. A. Aptroot, 2002, conf. M. Schulz, 2007.

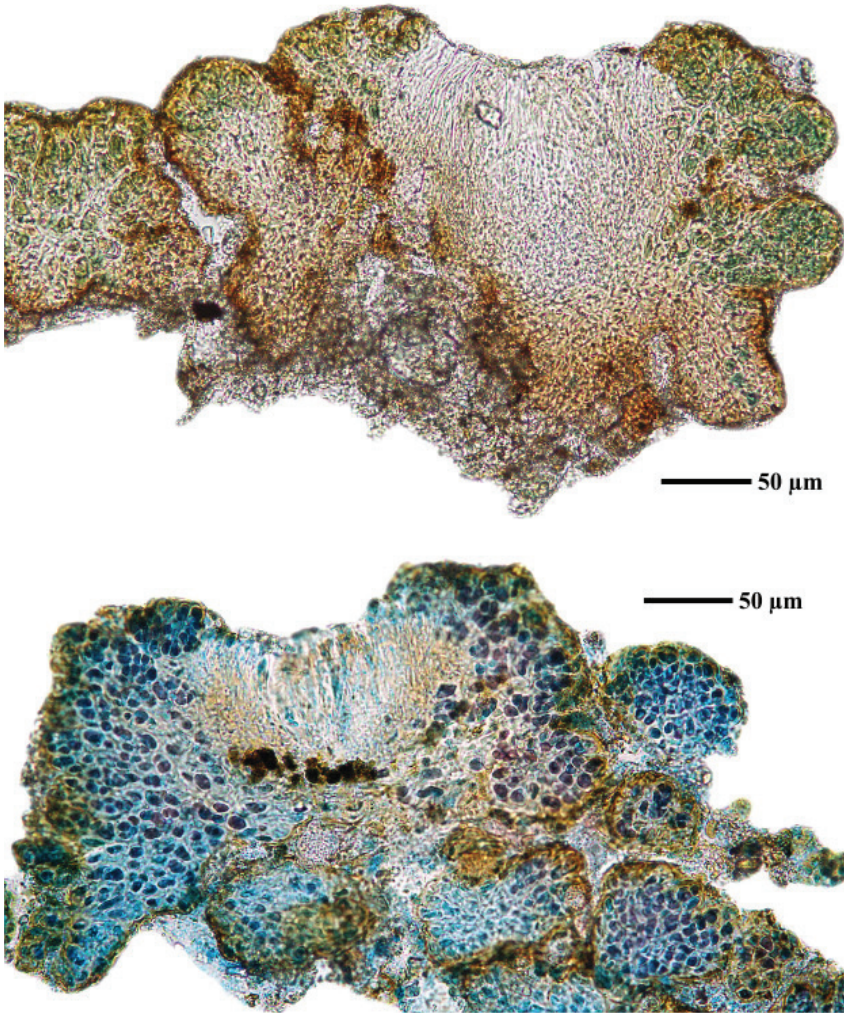




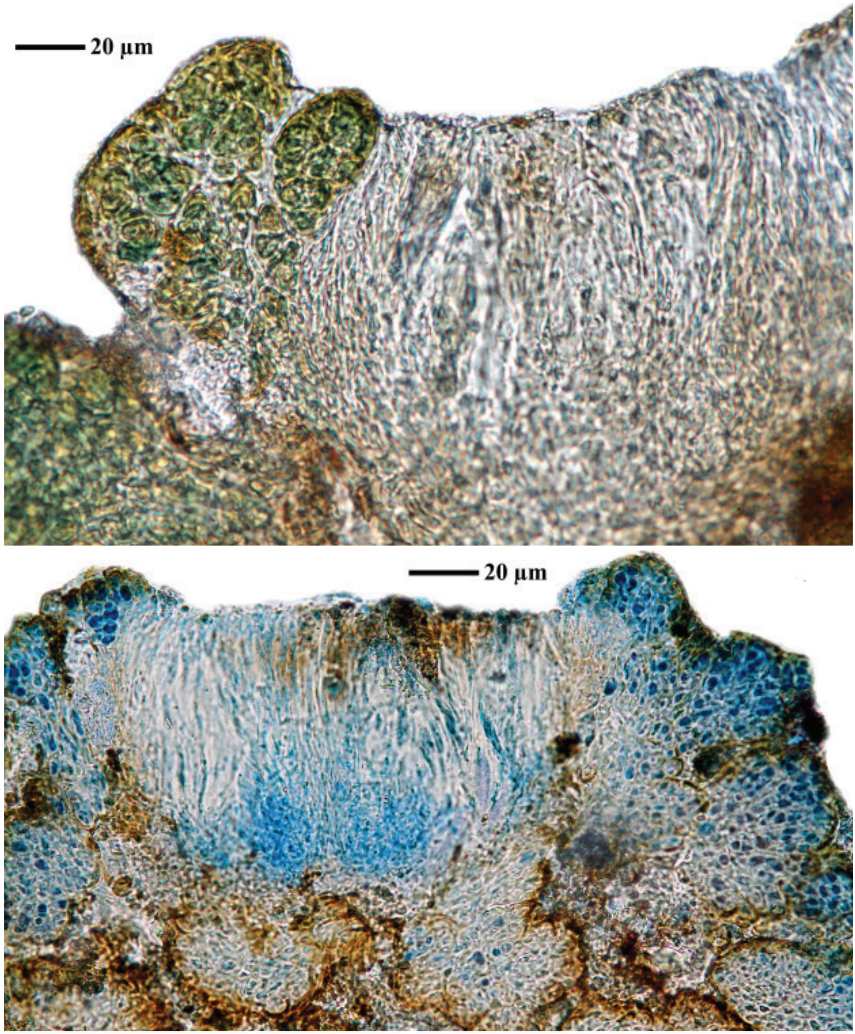

***Stromatella bermudana***



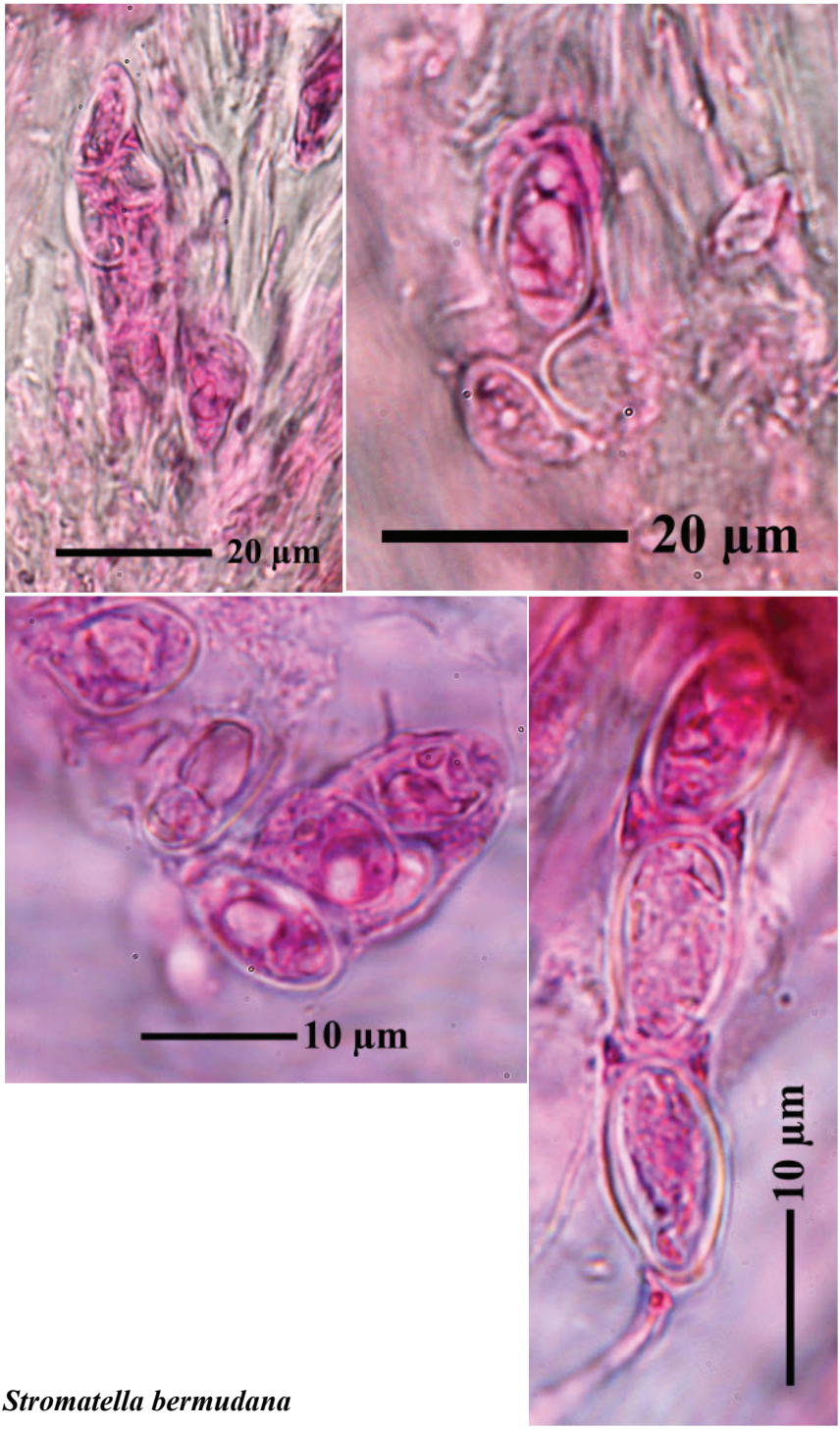

***Stromatella bermudana***




***Stromatella bermudana***




***Stromatella bermudana***

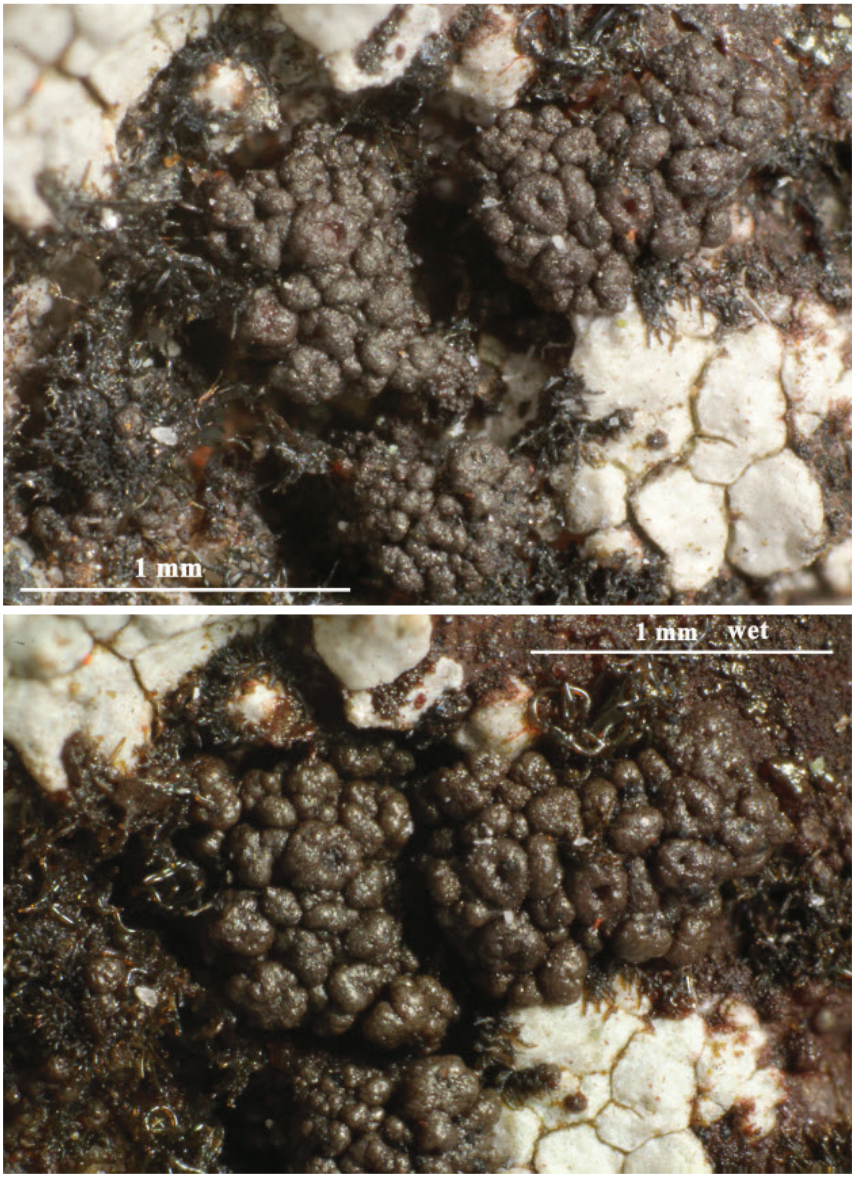



***Stromatella bermudana***

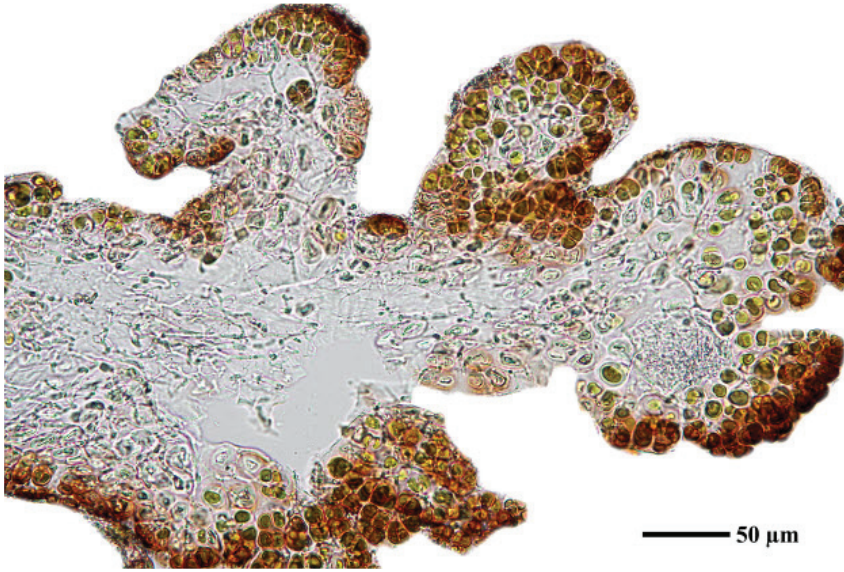
***Synalissa mattogrossensis*** (Malme) Henssen, Ber. dt. bot. Ges. 92(2-3): 486 (1980)
= *Peccania mattogrossensis* Malme 1937

[ABL50933], Brazil, Alagoas, Quebrangulo, Pedra Talhada, Serra do Boi, on exposed granite rock in Atlantic rain forest, 9°14’28’’ S, 36°25’1’’ W, 800 m, A. Aptroot (no 50933) & J.G. Cavalcante, 25.07.2019, det. A. Aptroot, 2019.





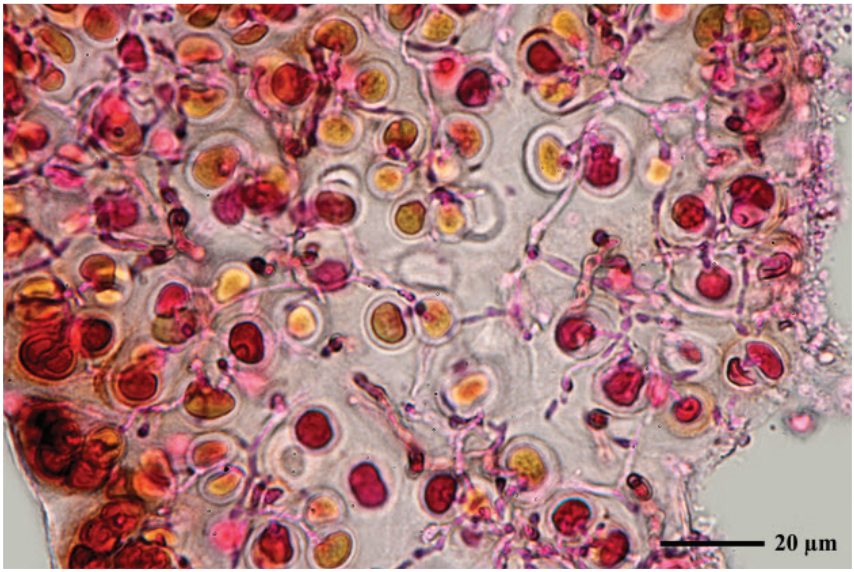

***Synalissa mattogrossensis***

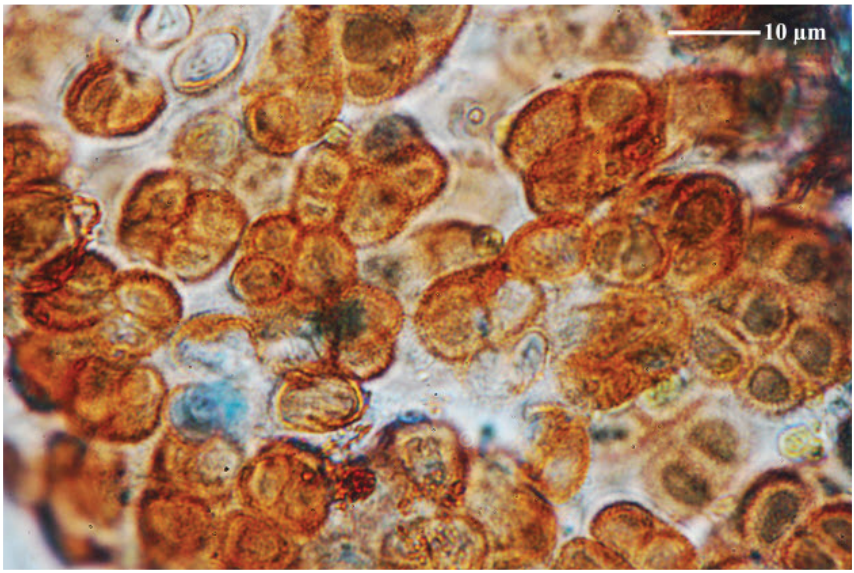




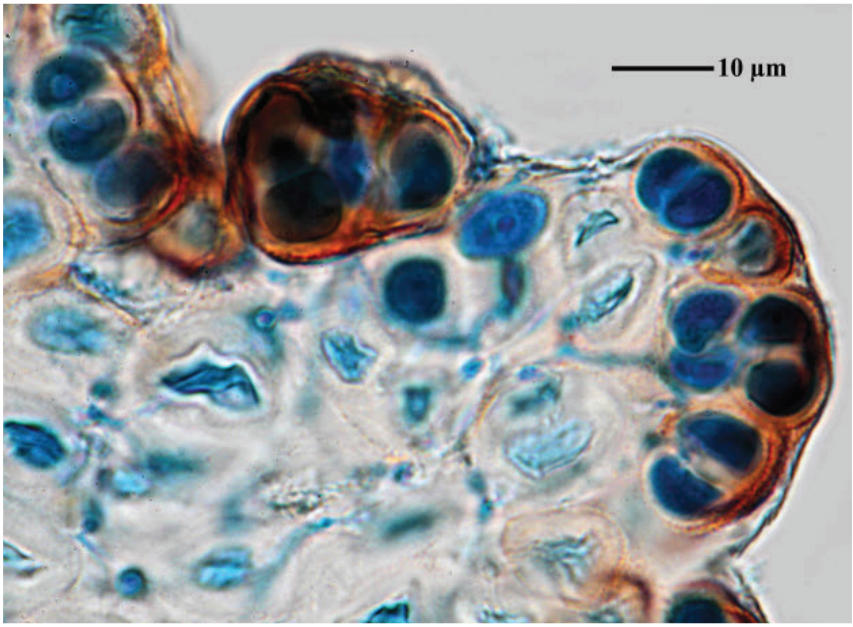


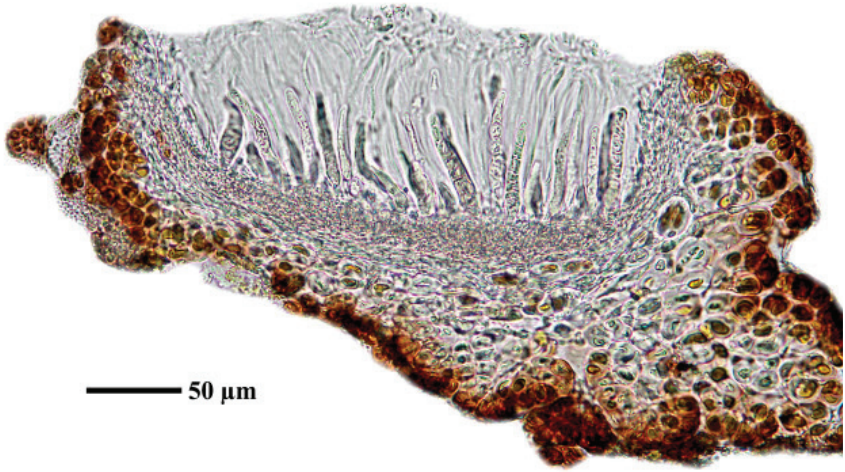
***Synalissa mattogrossensis***



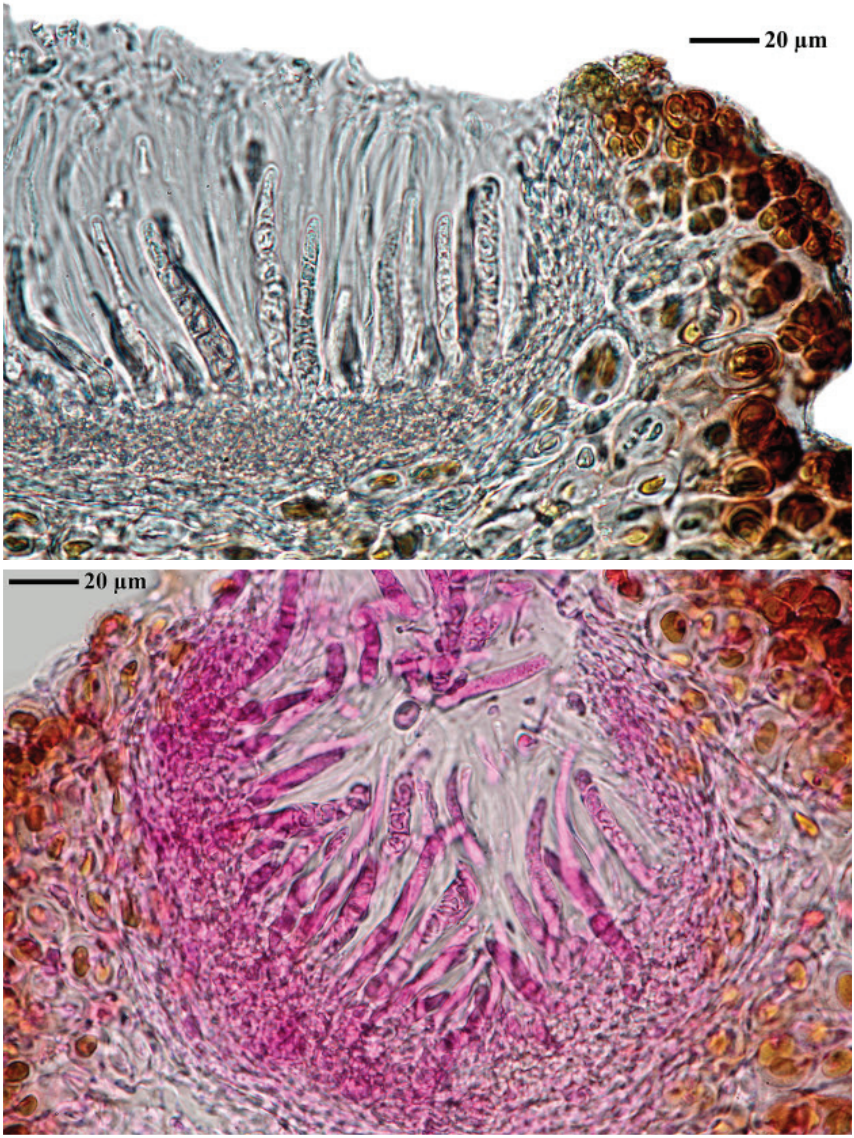




***Synalissa mattogrossensis***

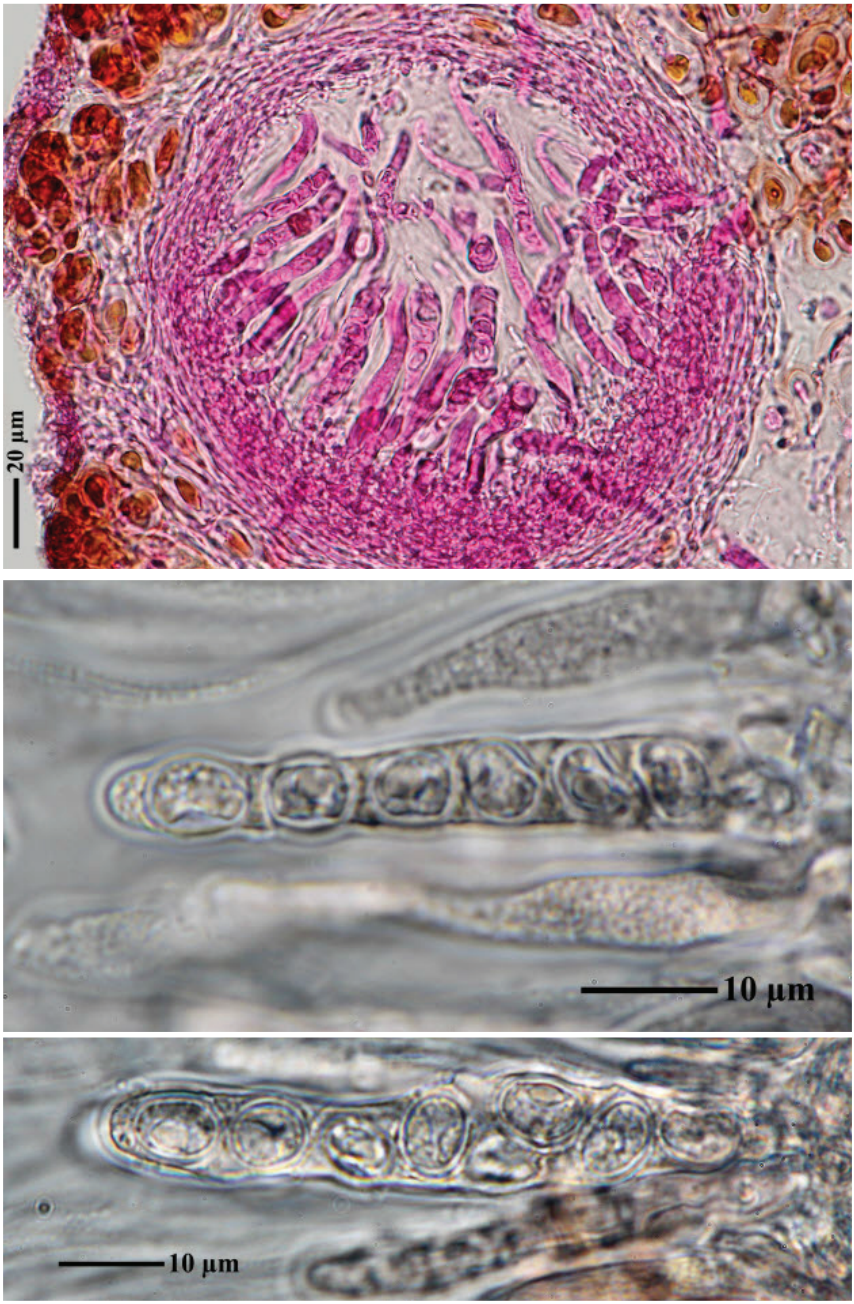


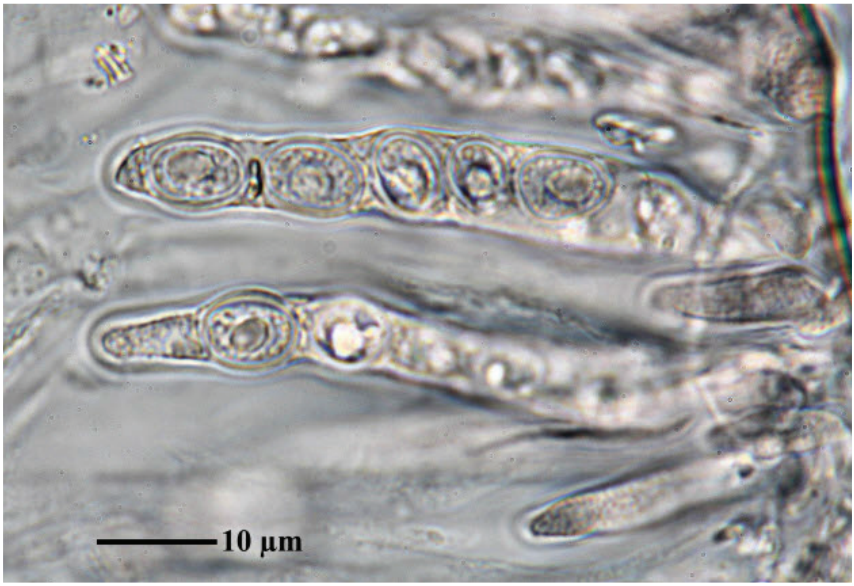

***Synalissa mattogrossensis***

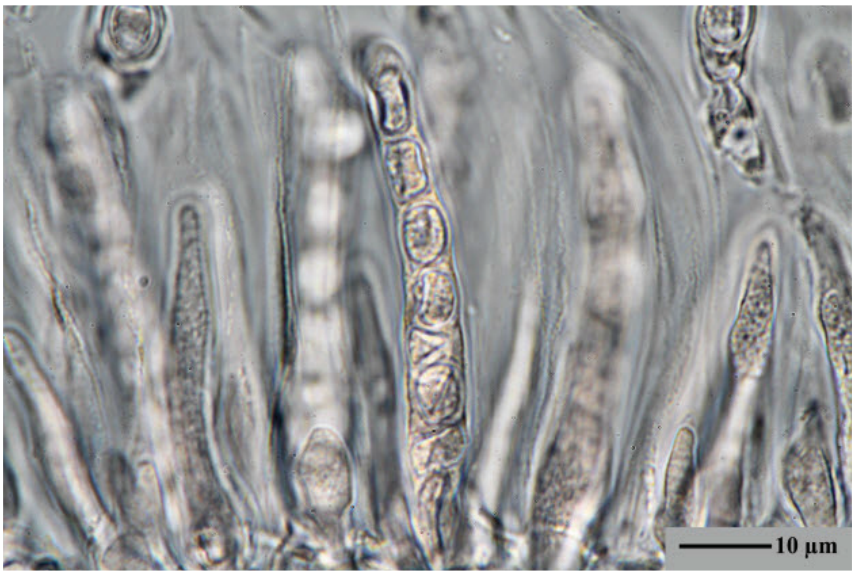



***Synalissa mattogrossensis***

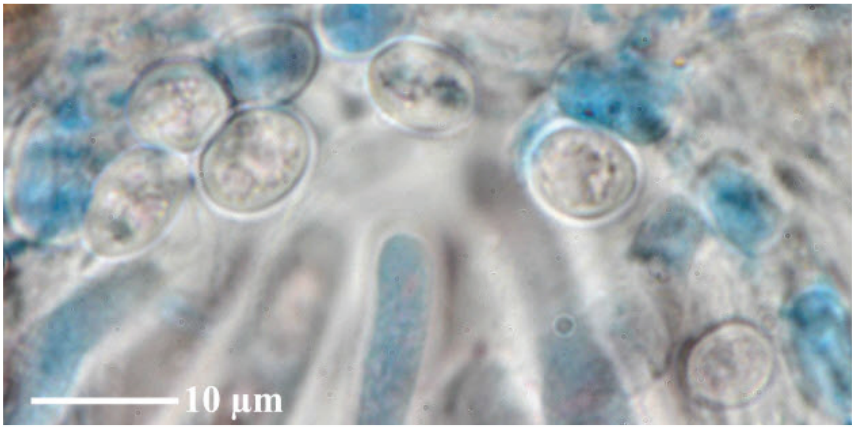


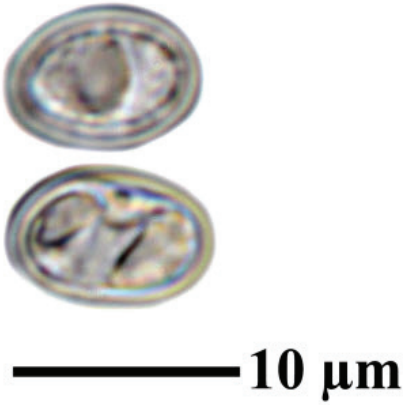

***Synalissa mattogrossensis***




***Synalissa mattogrossensis***



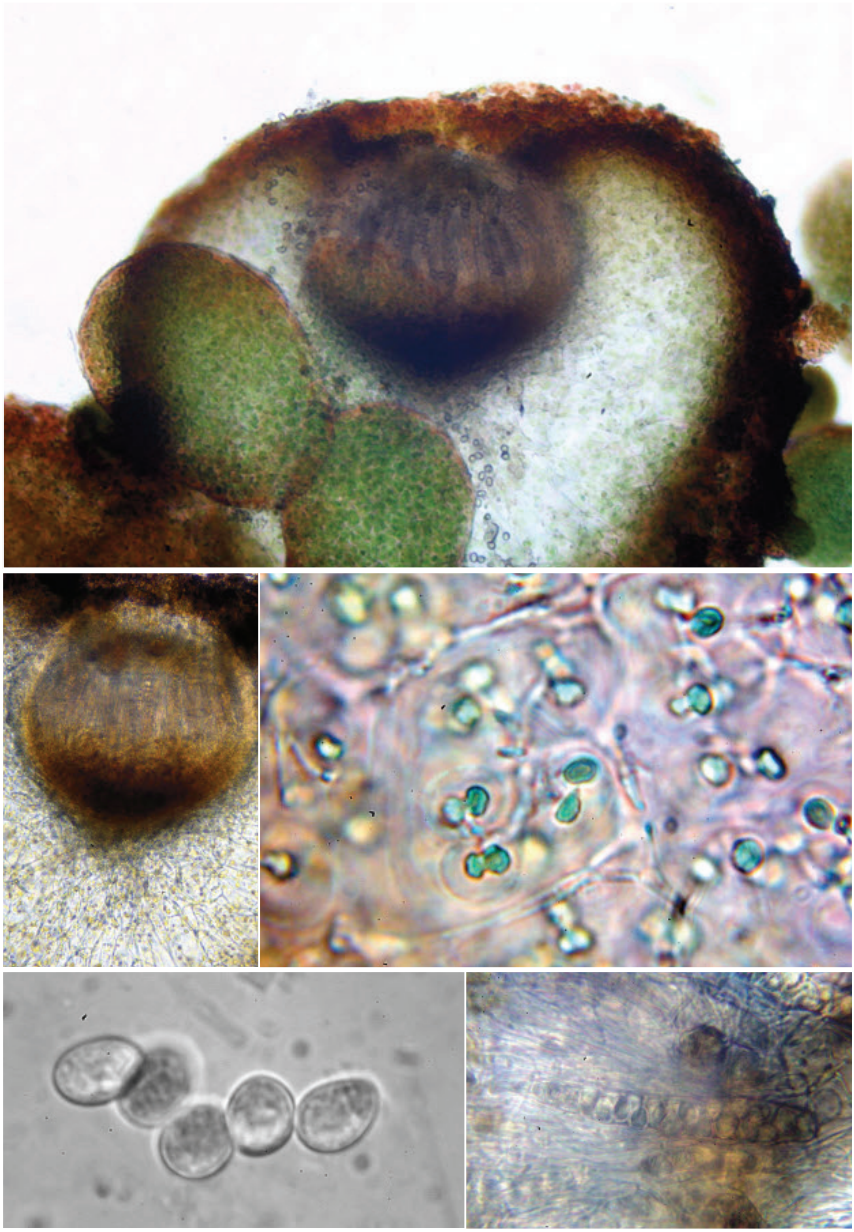

***Synalissa mattogrossensis***

***Synalissa symphorea*** (Ach.) Nyl., Act. Soc. linn. Bordeaux 21(4): 264 (1857) [1856]
=*Collema ramulosum* Hoffm., Deutschl. Fl., Zweiter Theil (Erlangen): 161 (1796) [1795]
= *Lempholemma fasciculare* Zahlbr., Cat. Lich. Univers. 3: 16 (1924) [1925]
= *Lichen fascicularis* Wulfen, in Jacquin, Collnea bot. 3: 137 (1791) [1789]
= *Lichen symphoreus* Ach., Lich. suec. prodr. (Linköping): 135 (1799) [1798]
= *Omphalaria symphorea* (Ach.) Tuck., Syn. N. Amer. Lich. (Boston) 1: 139 (1882)
= *Parmelia ramulosa* (Hoffm.) Ach., Methodus, Sectio post. (Stockholmiæ): 249 (1803)
= *Synalissa ramulosa* (Hoffm.) Körb., Syst. lich. germ. (Breslau): 297 (1855)

Spores hyaline, simple, globose, c. 16/ascus, 9,8 x 7,6 µm. Hymenium without colour, c. 167 µm, hypothecium brownish, c. 50 µm

[11010], Germany, Baden-Württemberg, Kreis Göppingen, Hohenstaufen, auf Kalkblöcken im Halbrockenrasen südlich der Spielburg, 48°44.401' N, 9°42.666' E, 560 m. Leg. et det. Schumm, 10.07.2003.





***Synalissa symphorea***

***Synalissa symphorea*** (Ach.) Nyl., Act. Soc. linn. Bordeaux 21(4): 264 (1857) [1856]
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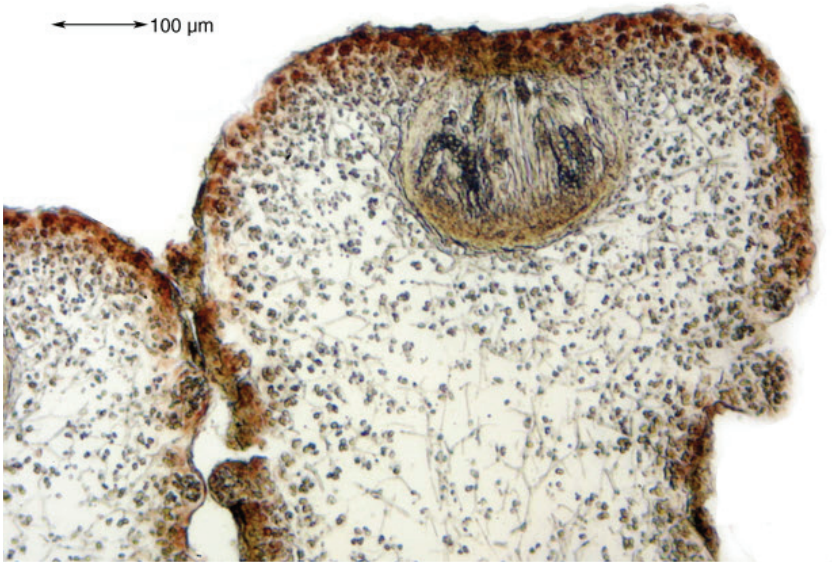
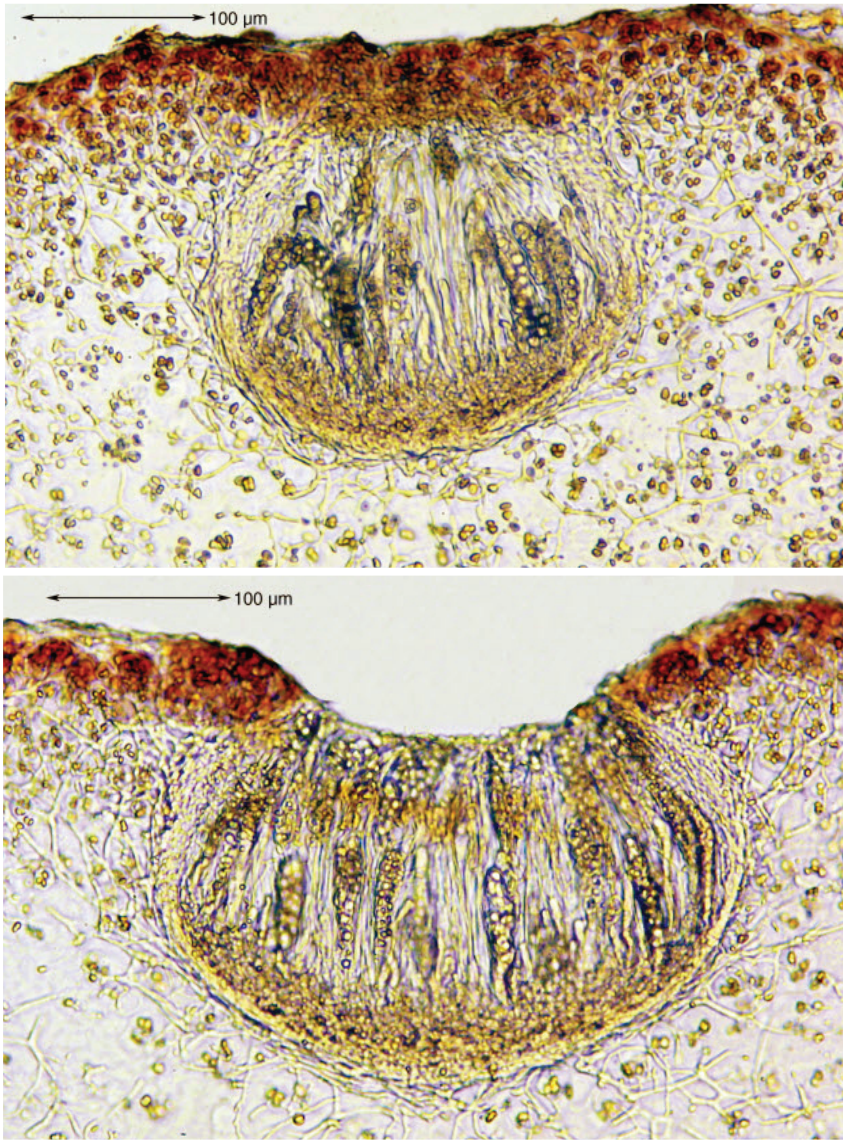
= *Omphalaria symphorea* (Ach.) Tuck., Syn. N. Amer. Lich. (Boston) 1: 139 (1882)
= *Parmelia ramulosa* (Hoffm.) Ach., Methodus, Sectio post. (Stockholmiæ): 249 (1803)
= *Synalissa ramulosa* (Hoffm.) Körb., Syst. lich. germ. (Breslau): 297 (1855)

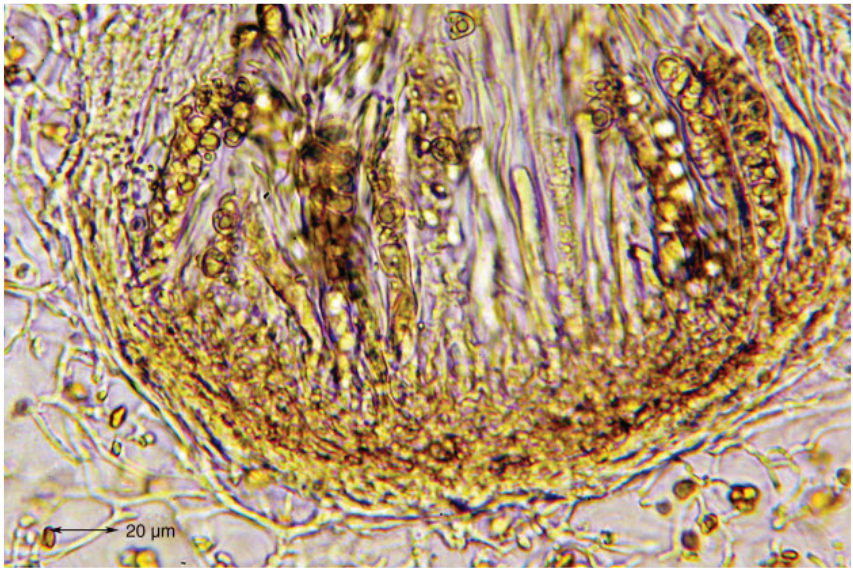
Spores hyaline, simple, globose, c. 16/ascus, 9,8 x 7,6 µm. Hymenium without colour, c. 167 µm, hypothecium brownish, c. 50 µm

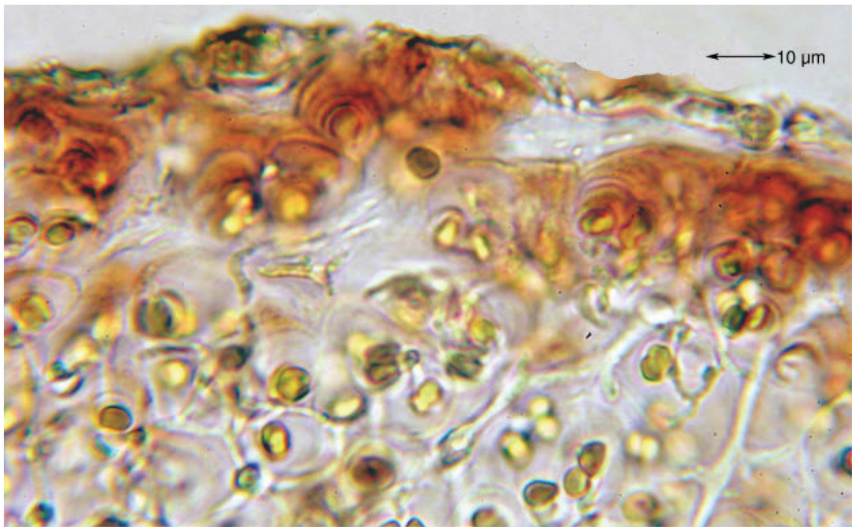
[13242], Germany, Kreis Göppingen, Hohenstaufen, auf Kalkblöcken bei der Spielburg, 570 m. Leg. et det. Schumm 06.07.2007.



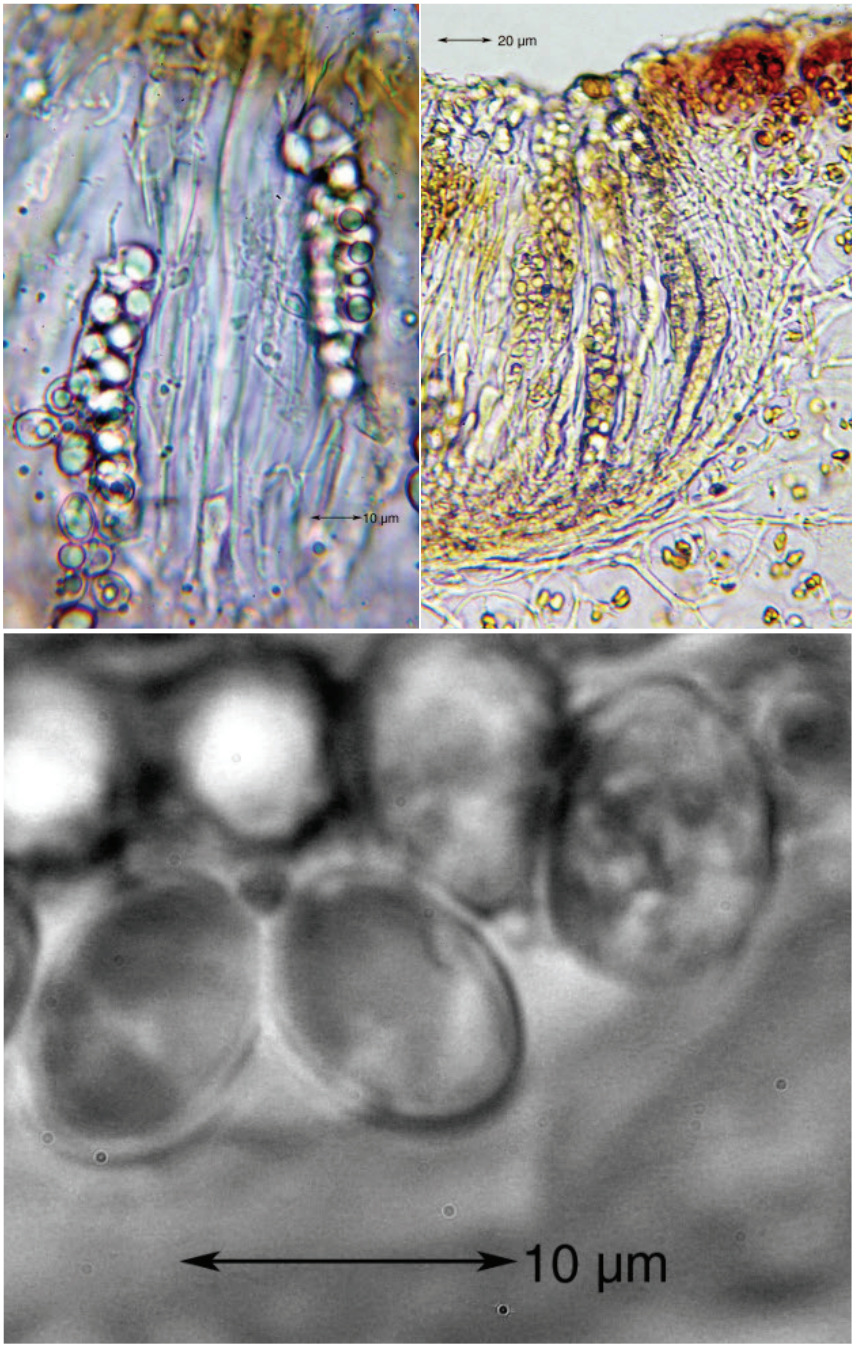



***Synalissa symphorea***




***Synalissa symphorea***



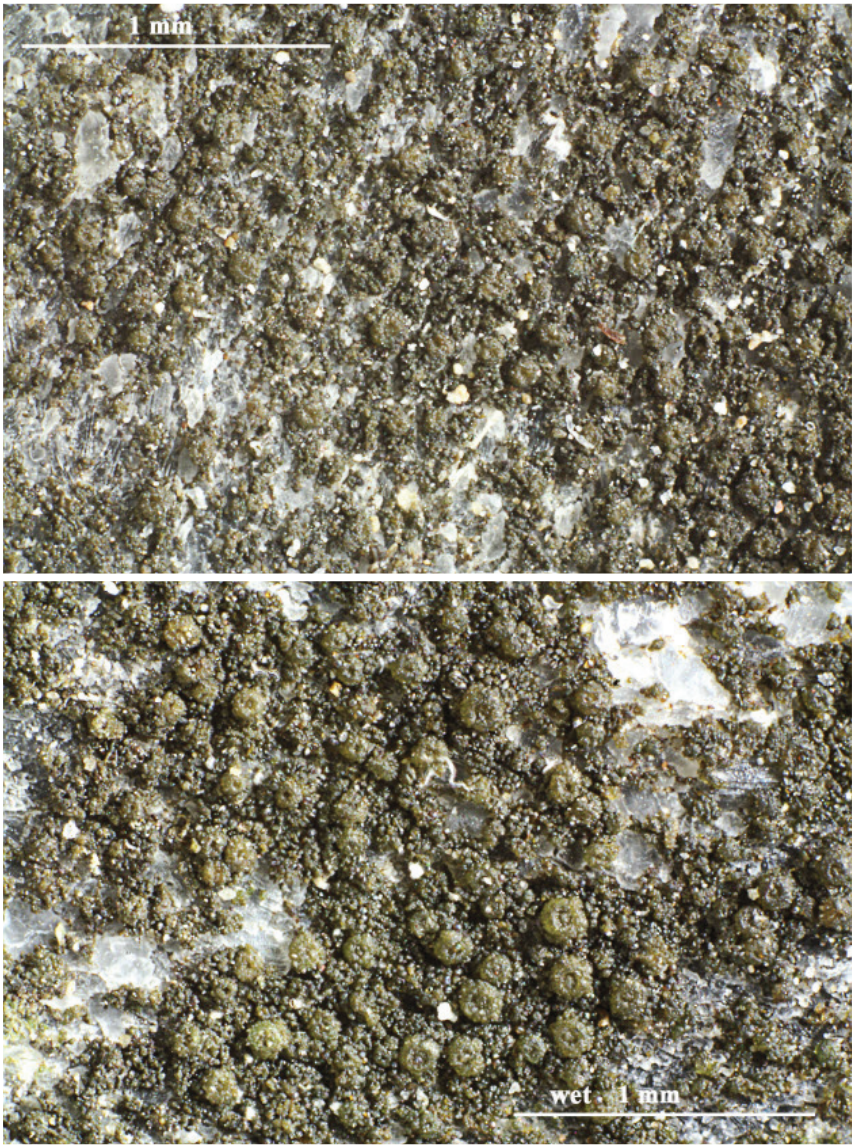

***Synalissa symphorea***

***Thelochroa montinii*** A. Massal., Symmict. Lich.: 86 (1855)

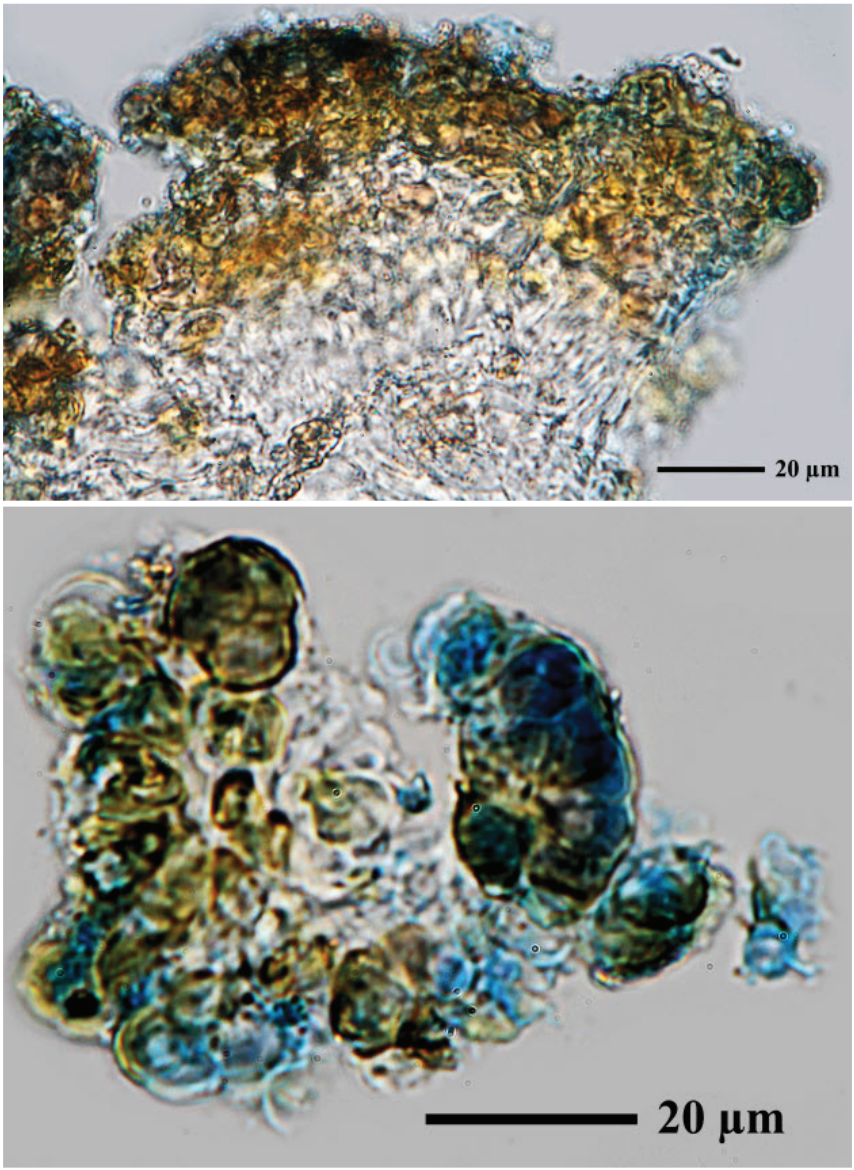
Ascospores 10 x 5 µm.

[ABL51579], Taiwan, Taichung County, park of Natural History Museum, on limestone, 100 m, 24°09’22’’ N, 120°40’03’’ E. Leg. A. Aptroot (no 51579), 6.10.2001, det. A. Aptroot, 2002, det. M. Schulz, 2005.

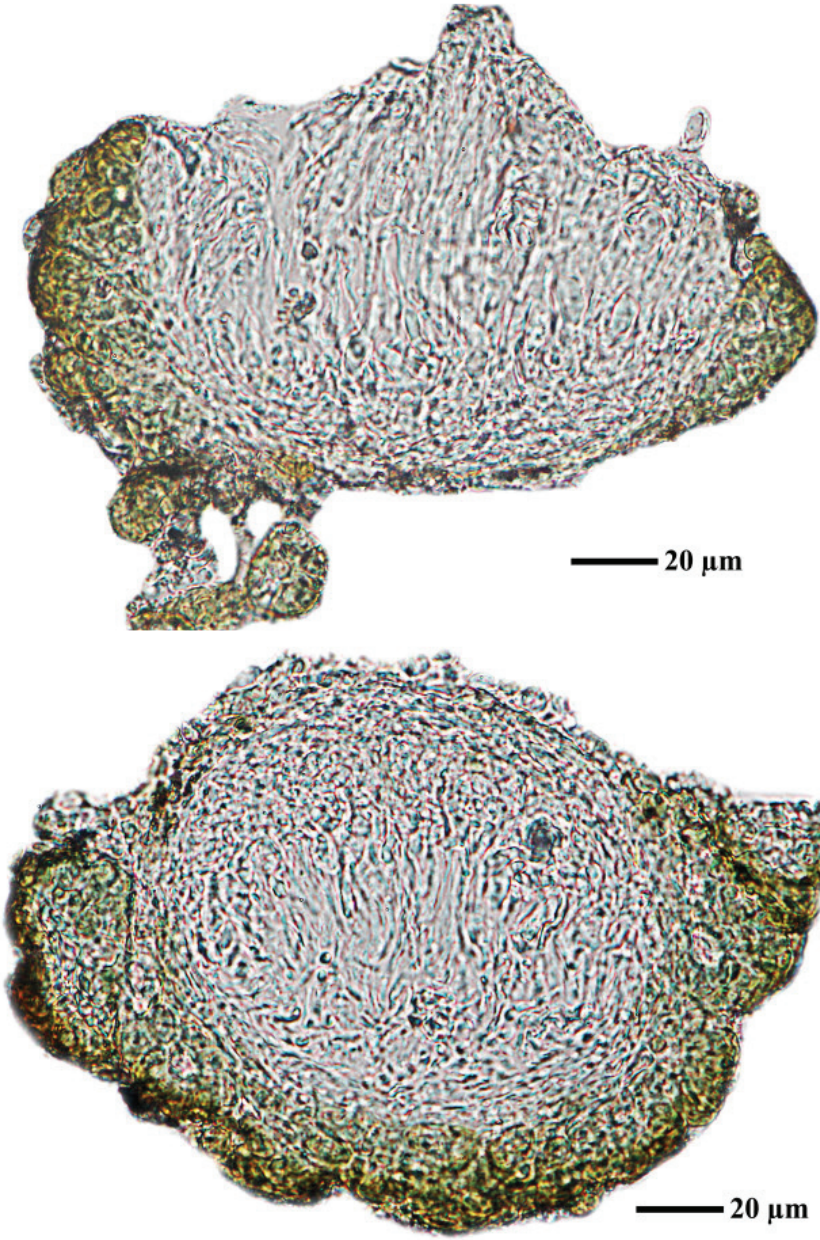




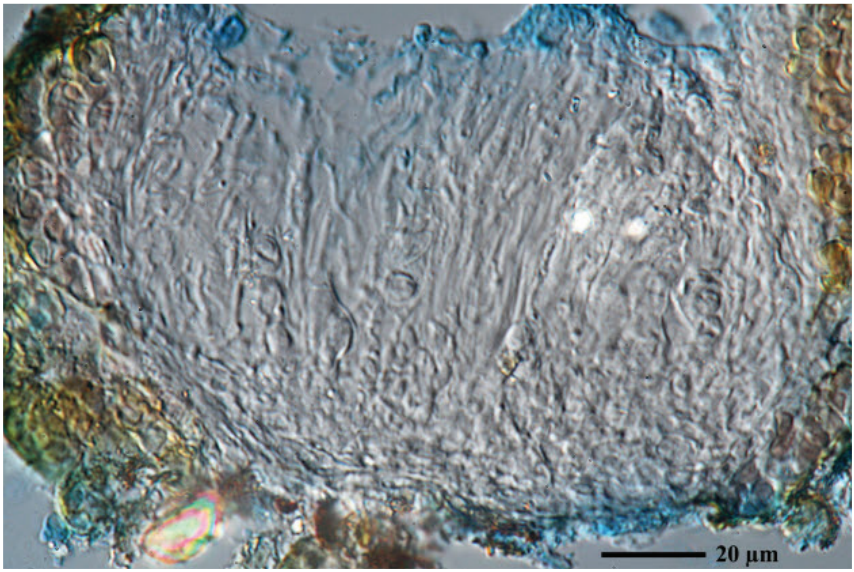

***Thelochroa montinii***

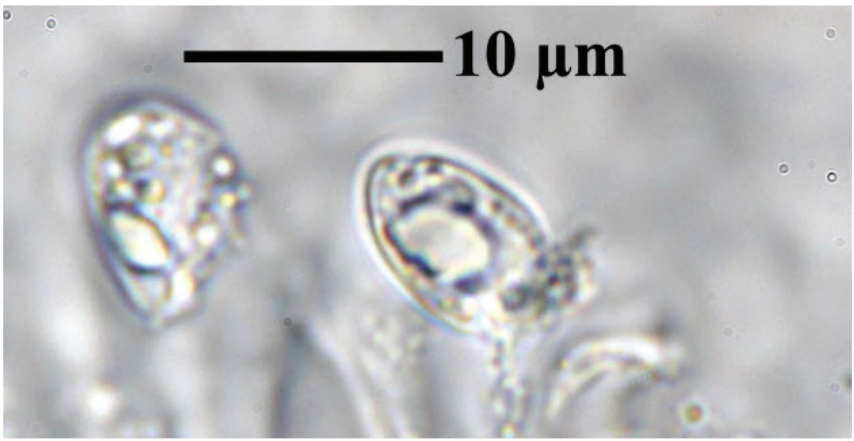



***Thelochroa montinii***




***Thelochroa montinii***



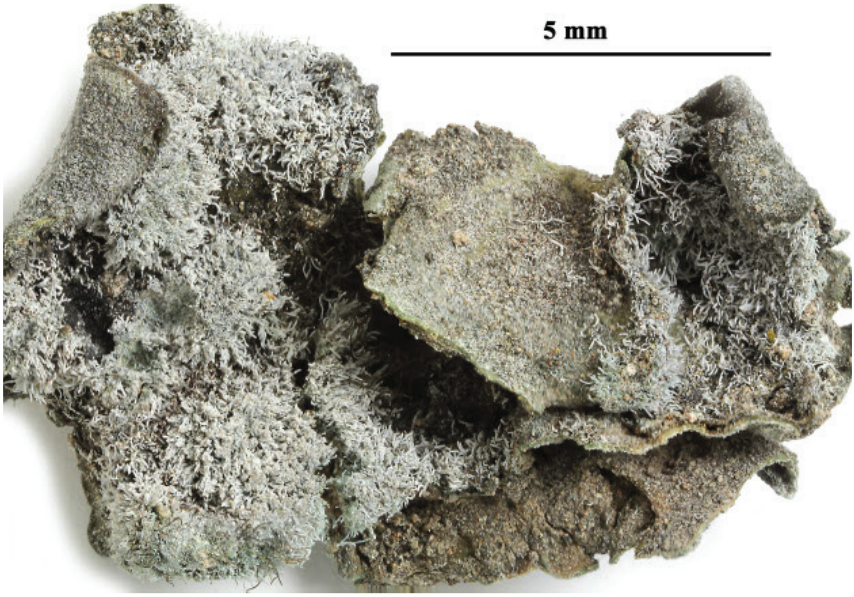

***Thelochroa montinii***

***Thyrea confusa*** Henssen, in Henssen & Jørgensen, Lichenologist 22(2): 146 (1990)

[ABL56996], China, Yunnan Prov., Yunnan Co., Stone Forest, Parkland with limestone outcrops, c.. 2000 m, 24°49’01’’ N, 103°19’27’’ E, on limestone. Leg. A. Aptroot (no 56996), 27.10.2002, det. A. Aptroot, 2003, conf. M. Schulz, 2005.





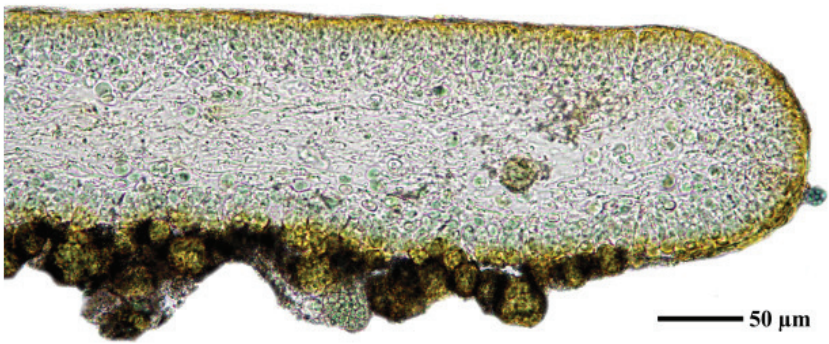





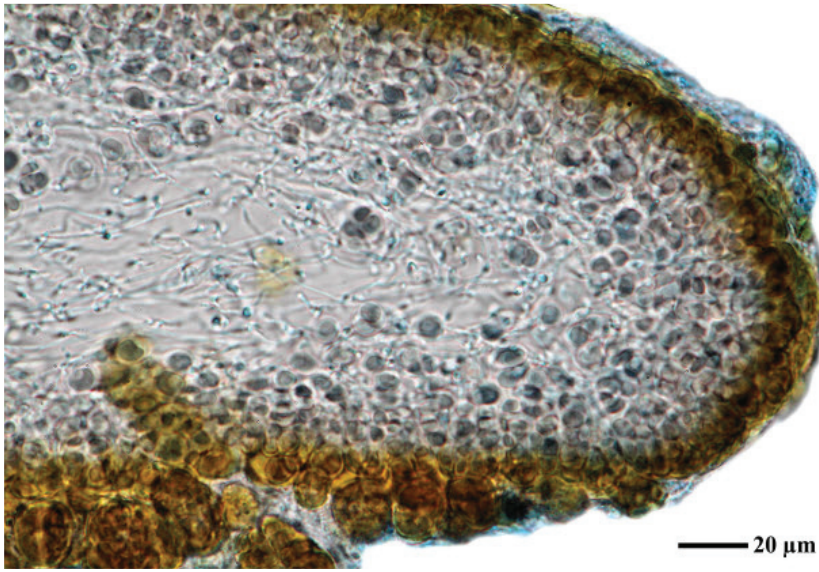


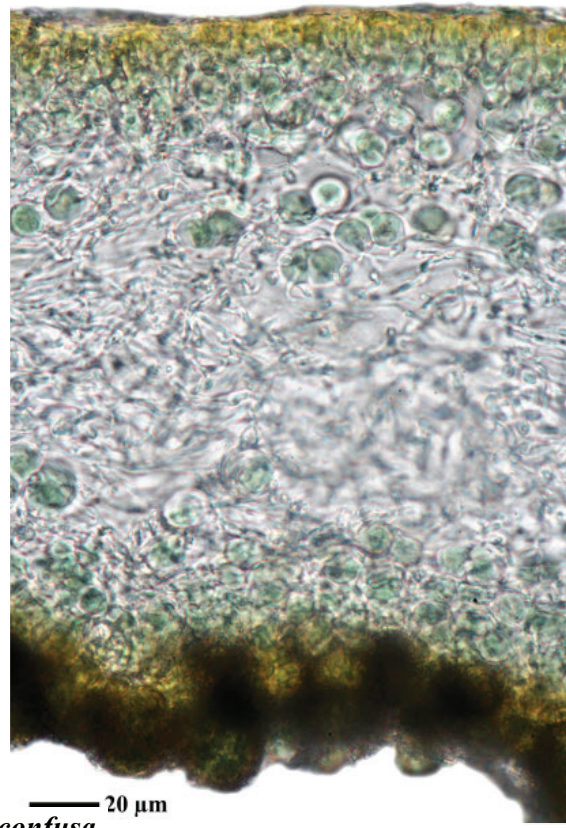
***Thyrea confusa***



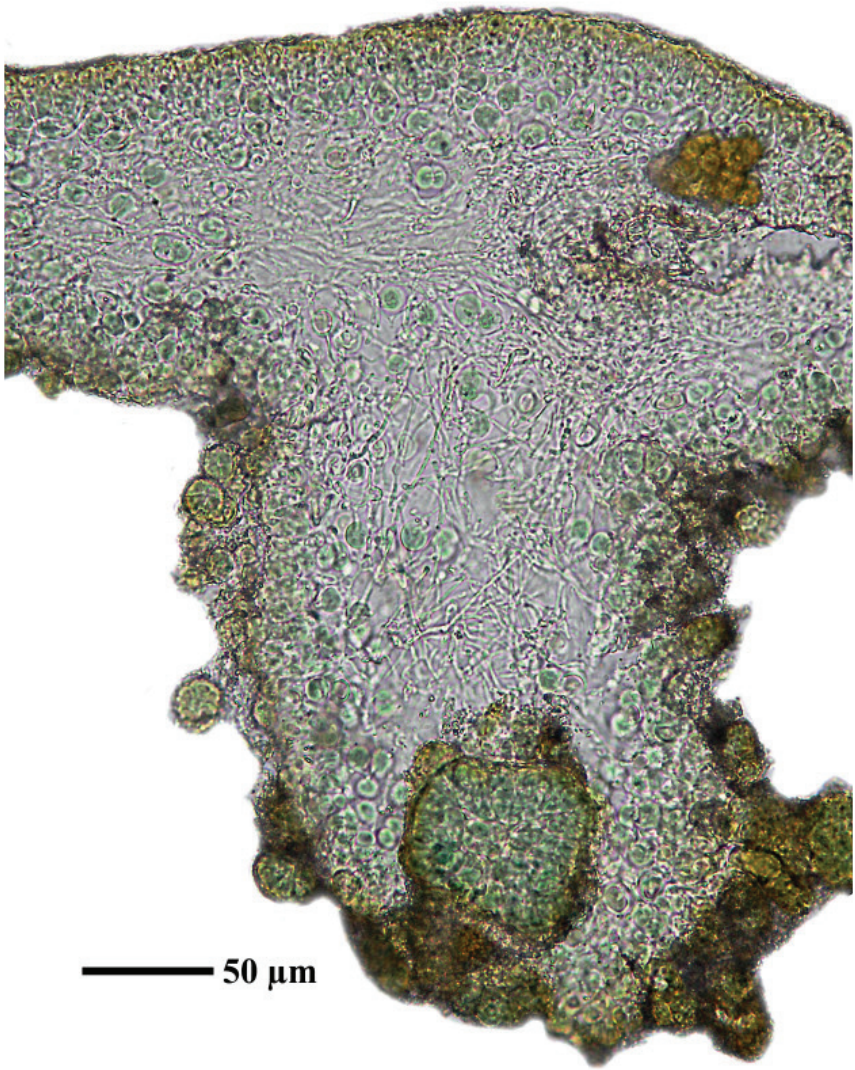




***Thyrea confusa***




***Thyrea confusa***




***Thyrea confusa***

***Thyrea confusa*** Henssen, in Henssen & Jørgensen, Lichenologist 22(2): 146 (1990)

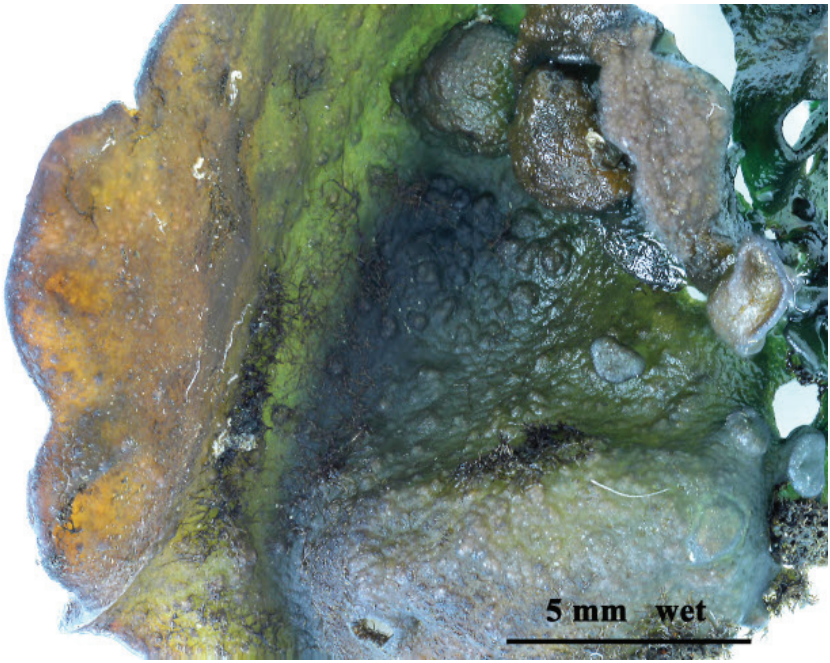
Thallus foliose to squamulose-umbilicate, polyphyllous, gelatinous when wet, forming small cushions or up to 2 cm wide rosettes. Squamules 2–5 mm wide, to 1 cm long, erect or ascending, flat or weakly channeled on lower surface, irregularly branched, broadly rounded at apex, black but most often bluish-grey pruinose, often with small, globose, granular isidia, otherwise smooth; lower surface plicate, often paler than upper surface. Thallus ecorticate, 250–500 µm thick; medulla 200–300 µm thick, of irregularly arranged, lax hyphae, in the upper and lower parts consisting of mainly anticlinally oriented hyphae enclosing the photobiont cells. Apothecia pycnoascocarps, rare, small, immersed to semi-immersed, the disc punctiform, slightly depressed, brownish, with a persisting thalline margin. Proper exciple colourless, up to 10 µm wide; hymenium colourless, up to 150 µm high, K/I+ blue; paraphyses distinctly septate, sparingly branched and anastomosing, the apical cells slightly thickened, up to 3 µm wide; hypothecium colourless. Asci 8-spored, cylindrical, thin-walled, with an external I+ blue cap. Ascospores 1-celled, hyaline, globose to broadly ellipsoid, thin-walled, (7.5–)8–12(–15) x 5–7.5(–10) µm. Pycnidia immersed, globose, unilocular, 90–120 µm across. Conidia cylindrical, 2–3 x 1–1.5 µm. Photobiont cyanobacterial, chroococcoid, with a few cells measuring (4–)6–8(–10) µm, surrounded by a brownish gelatinous sheath. Spot test: all negative. Chemistry: without lichen substances. Note: on steeply inclined, sunny faces of calcareous rocks with short periods of water seepage after rain.

[ABL77834], Brazil, Mato Grosso do Sul, Bodoquena, Dente de Cão, summit, in Atlantic rain forest on exposed limestone. 20°47’05’’ S, 56°45’0’’ W, 450 m. Leg. A. Aptroot (no 77834), 7.11.2018, det. A. Aptroot, 2019.




***Thyrea confusa***



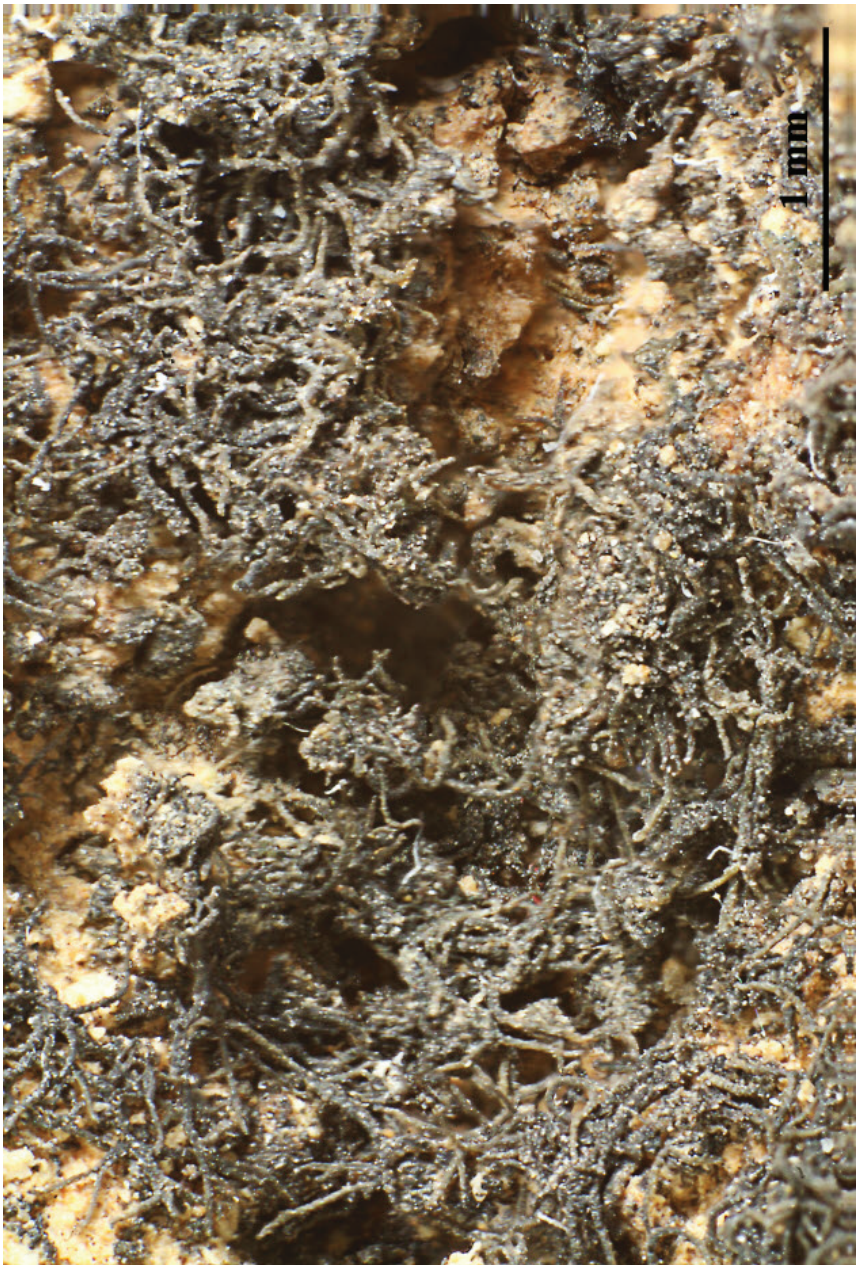

***Thyrea confusa***

***Zahlbrucknerella calcarea*** (Herre) Zahlbr., Cat. Lich. Univers. 2: 762 (1924)

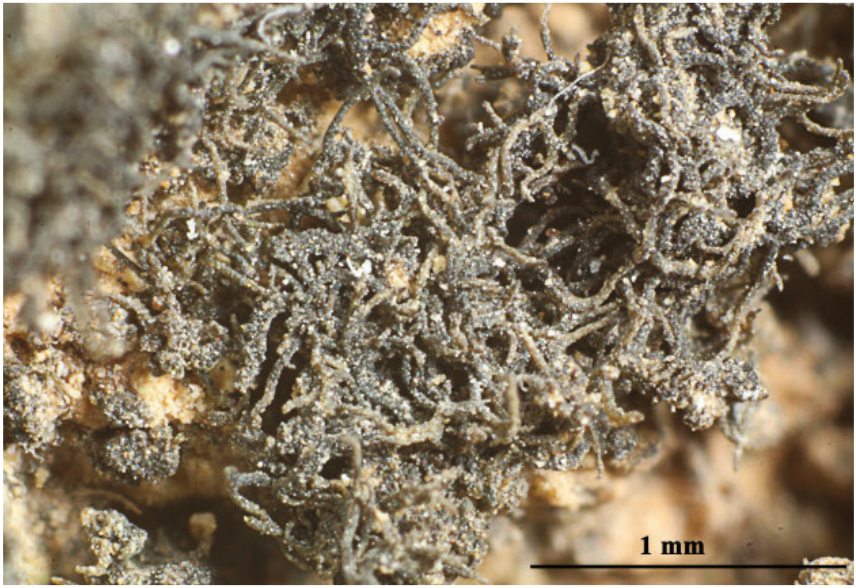
= *Zahlbrucknera calcarea* Herre, Proc. Wash. Acad. Sci. 12(2): 129 (1910)

Thallus minutely filamentous, dark olive-green to olive-black, forming up to c. 2 cm wide rosettes or scattered, 0.5 mm tall and 0.5–1 mm wide tufts, the central parts of the rosettes often dying off. Filaments prostrate, attached by short hapters, often paired but with free and diverging tips, (30–)40–60 µm thick, mostly 1–2 mm long, tapering to a c. 10 µm thick point; older, basal filaments 60–110 µm thick, with a prominent, persistent, up to c. 25 µm thick basal strand of conglutinated, rectangular to roundish hyphal cells. Apothecia lecanorine, lateral on the filaments, to 0.4 mm across, with a concave to flat, dark brown to blackish disc, and a persistent thalline margin. Proper exciple absent; epithecium dark green to brown, hymenium colourless, 100–130 µm high, K/I+ blue-green; paraphyses straight, branched and anastomosing, 1.5–2 µm thick; hypothecium colourless, 10–50 µm high. Asci (8–)24(–32)-spored, cylindrical to clavate, thin-walled, without a tholus. Ascospores 1-celled, hyaline, subglobose to broadly ellipsoid, 6–12 x 5–8 µm. Pycnidia c. 0.2 mm wide, lateral on the filaments, the ostiolar region dark green to brown. Conidia 1-celled, hyaline, bacilliform, 3–5 x c. 1 µm. Photobiont cyanobacterial (*Scytonema*-like), the trichomes up to c. 6 µm thick at apex, with 10–12(–20) µm wide cells; trichomes with false branchings, i.e. cell divisions exclusively anticlinal; when the trichome splits, the formerly connected ends start growing independently to form V-shaped branchings (visible at least in younger parts of the thallus). Spot tests: all negative. Chemistry: without lichen substances. Note: on limestone and dolomite, more rarely on basic siliceous rocks.

[ABL115], Turkey, Bitlis, Mutki, Balh köyü, 38°22’41.29’’ M, 41°38’52.68’’ E, 1462 m. Leg. K. Yazici (no 115), 19.08.2016, det. A. Aptroot, 2017.



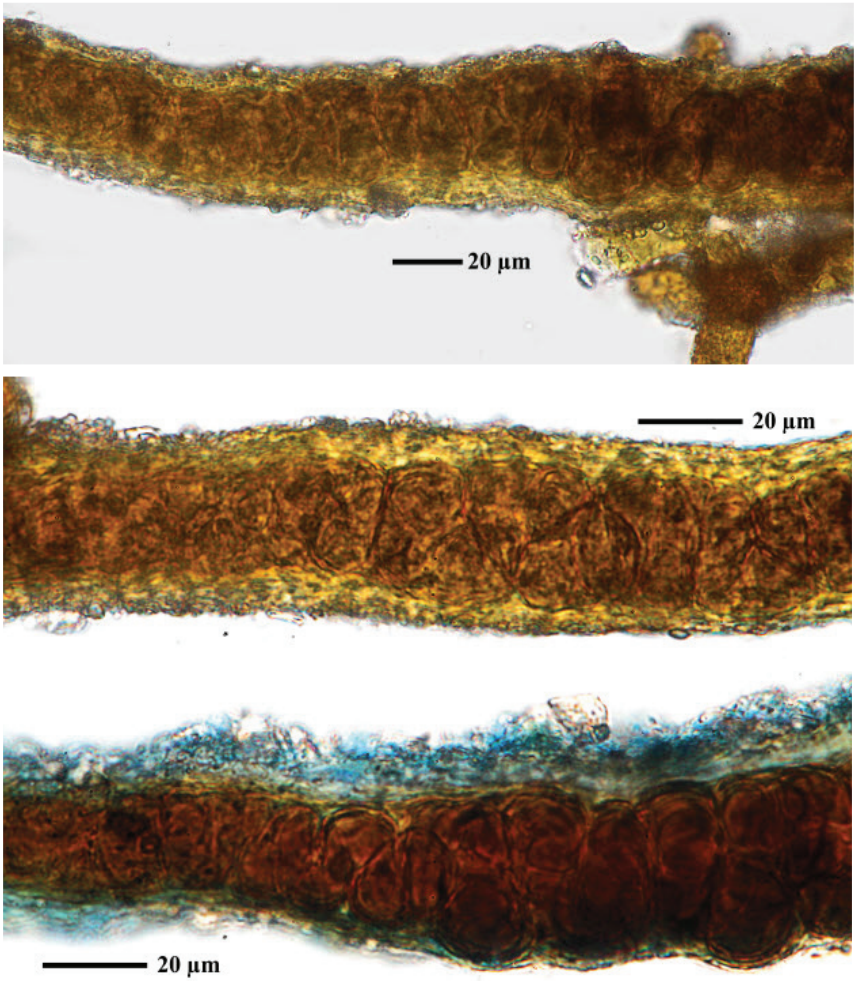

***Zahlbrucknerella calcarea***



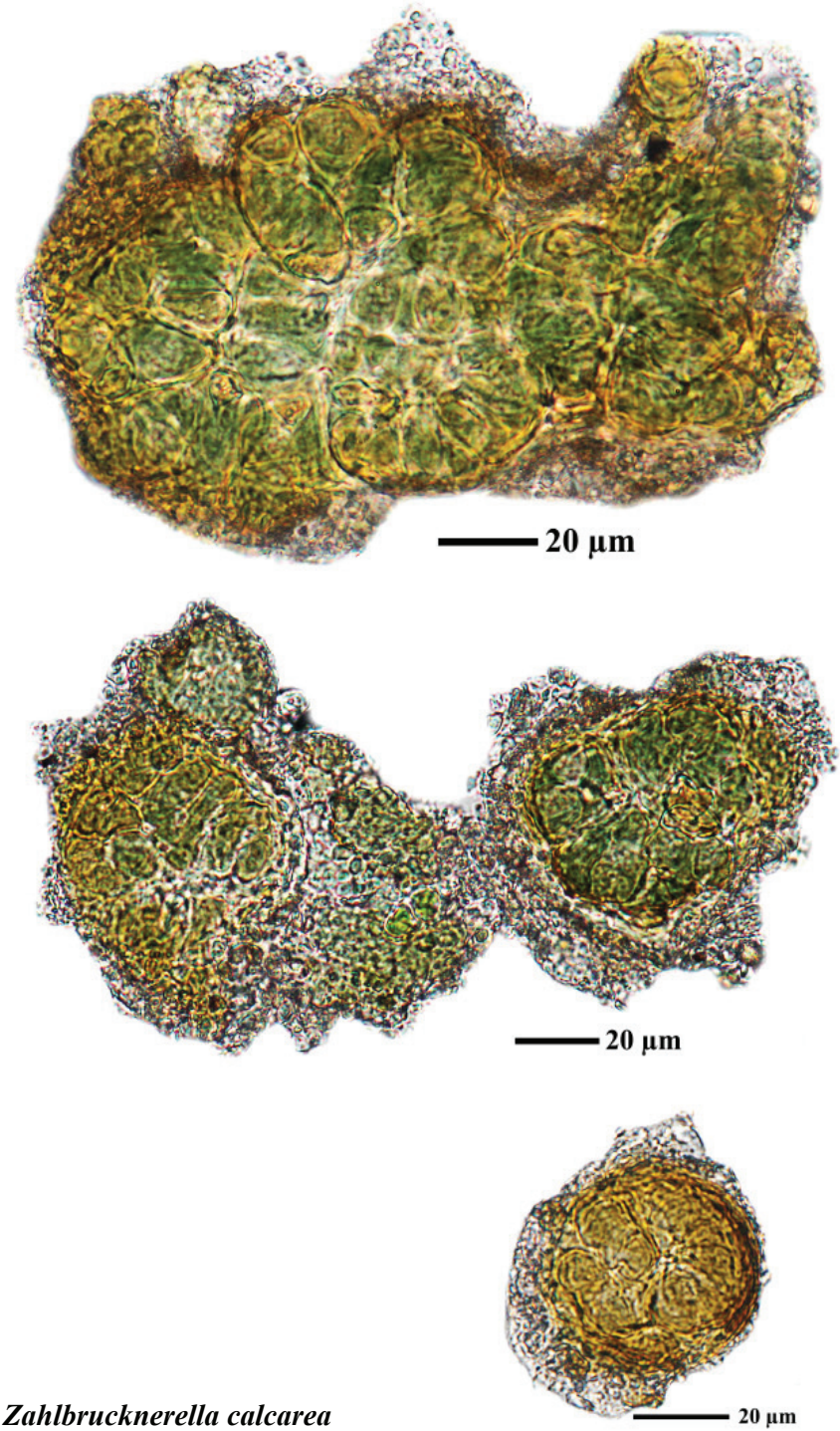




***Zahlbrucknerella calcarea***




***Zahlbrucknerella calcarea***




***Zahlbrucknerella calcarea***

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This book illustrates and describes various members of the Lichinaceae.For a reliable identification it is useful to make thin sections, and to have access to identified reference collections. This book aims to provide those, mostly for some tropical species.

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