F. Schumm (2026):

Images of Lichens *from Japan 06*

ARCHIVE FOR LICHENOLOGY Vol 116
ISSN 1868-4173

With this volume I document a collection of images mainly out of the Exsiccats of Kashiwadani, Kurokawa and Ohmura from Japan 06. I mostly omitted the search for description from the literature because most of them could be found in the earlier Vols. of Vezda

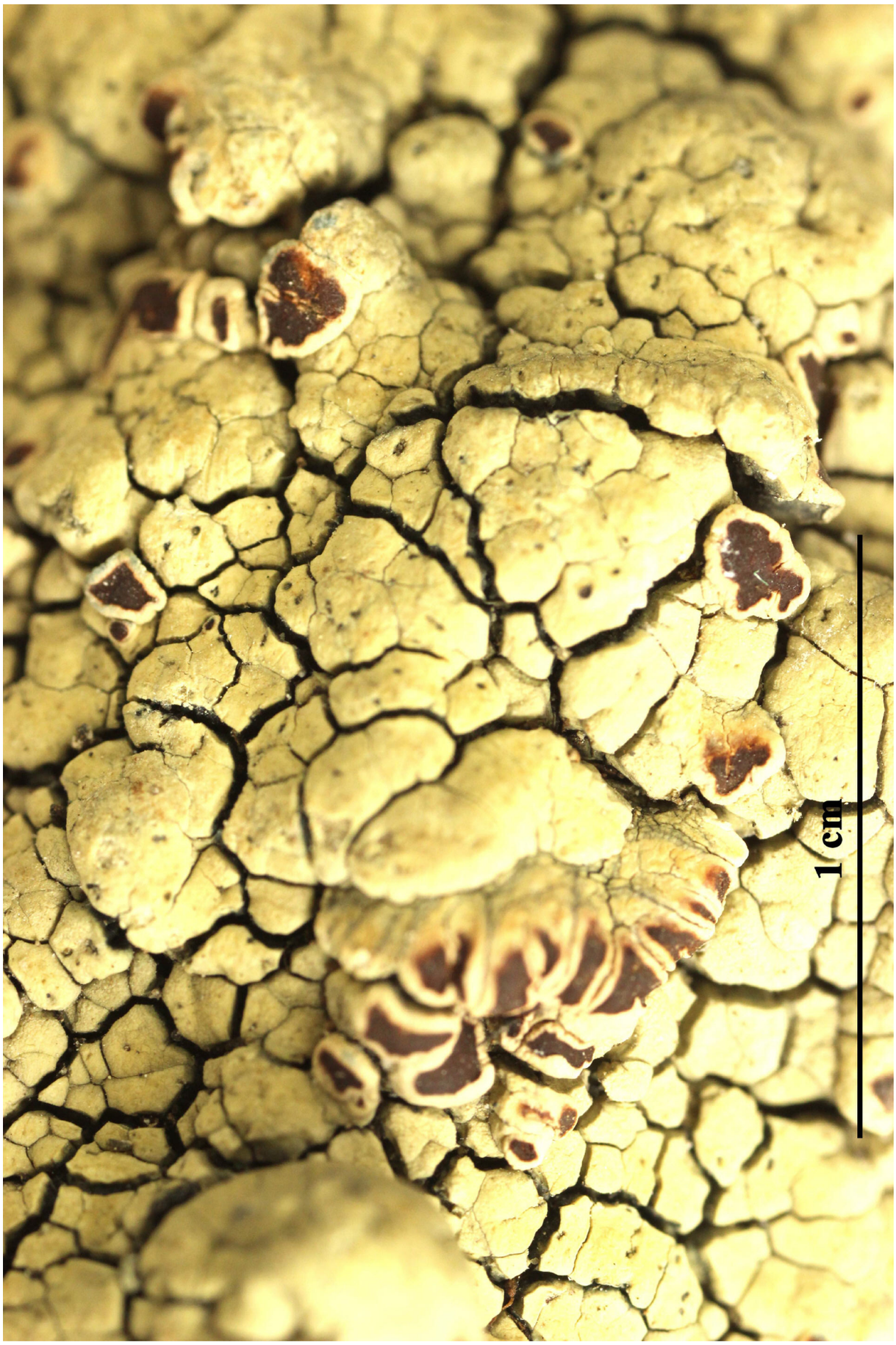
For the descriptions of europaean species I recomend the excellent descriptions that are provided in Prof. Nimis ITALIC 8 under the URL:
https://italic.units.it/

and the Australian Lichenslist under the Url:
https://www.anbg.gov.au/abrs/lichenlist/lichenchecklist_e_o.html

F. Schumm, 2026

Haematomma lapponicum Räsänen, Die Flecht. Estl. 1: 67 (1931)
= *Ophioparma lapponica* (Räsänen) Hafellner & R.W. Rogers, in Rogers & Hafellner, Lichenologist 20(2): 173 (1988)

[KU222], Japan. Hokkaido. Prov. Ishikari: Mt. Tomuraushi, Daisetsu Mts. On rock, 2000 m. Leg. M. Togashi, 18.7.1969, det. S. Kurokawa. Ex S. Kurokawa Lichenes Rariores Et Critici Exsiccati Nr. 222.



Haematomma lapponicum

Haematomma lapponicum

Lepraria finkii (B. de Lesd.) R.C. Harris, Evansia 2(3): 45 (1985)
= *Crocynia finkii* B. de Lesd. 1924
= *Lepraria lobificans* Nyl., Flora, Regensburg 56(13): 196 (1873)

[OH541], Japan. Honshu. Prov. Etchu (Pref. Toyama): Bijodaira, Tateyama-cho, Nakashinkawa-gun (36°34' N, 137°27' E). On bark of *Tilia japonica*, 970 m. Leg. H. Kashiwadani (no. 41472), 16.11.1994, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR.541.

Thallus corticolous, rarely saxicolous, folicolous or terricolous; placodioid leprose, i.e., developing upon a common, shared hypothallus, delimited by a byssoid arachnoid, 'cottony'prothallus forming an irregular to ±indistinctly lobed margin, but always lacking a distinct lip, not 'crisped'(finkii-type sensu Lendemer 2011a); surface greenish gray to bluish green, in the herbarium fading to a pale yellowish green; hypothallus well developed, loose, 'fluffy', 'cottony'; rhizohyphae sparse or absent; granules ecorticate, ill-defined, mealy (25–)60–80(–120) µm in diam., fairly even in size but often aggregating in larger clusters (up to 200 µm)], generally loosely packed, typically with abundantly tests and chemistry: P+ orange, K+ yellow, KC-, C-, UV- (pale);
atranorin, zeorin, stictic, cryptostictic, and constictic acids. - Cosmopolitan; widespread throughout the tropics (Flakus & Kukwa 2007, Kukwa & Flakus 2009, Flakus et al. 2011).

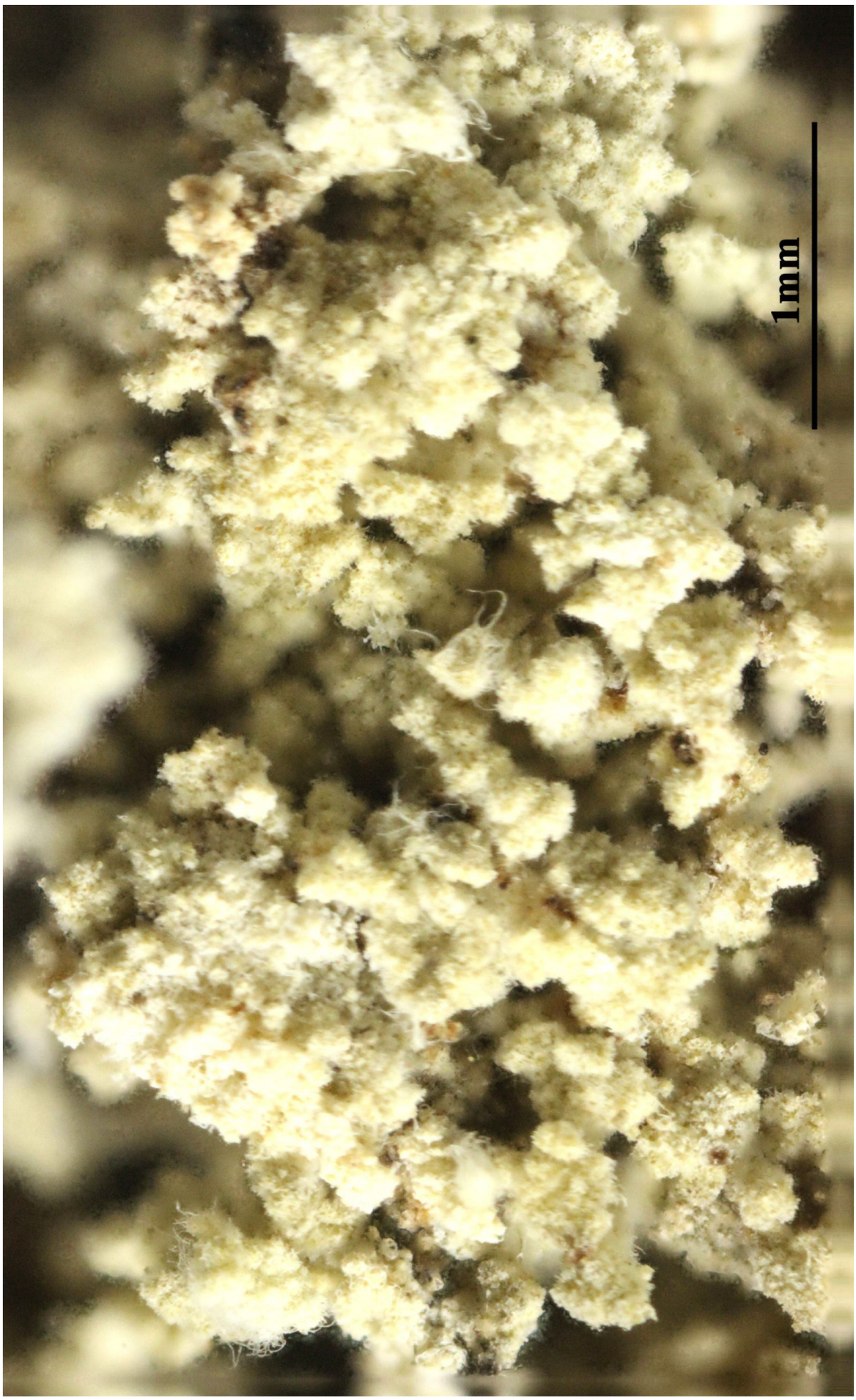
Lepraria finkii

Lepraria finkii

Leprocaulon arbuscula (Nyl.) Nyl., Lich. Ins. Guin.: 34 (1889)
= *Stereocaulon nanum subsp. arbuscula* Nyl. 1860
= *Lepraria arbuscula* (Nyl.) Lendemer & B.P. Hodk., Mycologia 105(4): 1005 (2013)

[OH510], Japan. Shikoku. Prov. Iyo (Pref. Ehime): W side of Mt. Iwaguro, Ishizuchi Mts. Kamiukena-gun (33°45' N, 133°09' E). On rock, 1550 m. Leg. Y. Ohmura (no. 10208), 8.11.2013, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 510.

Pseudopodetia in small, scattered groups or tufts, profusely dendroid-branched, distinctly dorsiventral, normally attached by a holdfast, or dying at base and then ± decumbent, flattened, branching dichotomous in one plane, soft and fragile, 1-2 cm tall and 0.4 mm thick towards base, upper branches much finer, to 0.15 mm thick, whitish, glaucous greyish-white or pale glaucous green, matt, tomentose or velvety, main branches glabrous, terminal branchlets very fine, coralloid. Phyllocladial granules on terminal branchlets, scarce to absent on ventral side, crowded, minute (to 0.1 mm diam.), softly pulverulent, often dissolving into smaller granules. Photobiont in irregular groups on surface of pseudopodetia and in powdery granules, loosely enveloped with hyphae. Chemistry: Two chemodemes are known, (i) Atranorin, protocetraric, grayanic and didymic acids and two unidentified compounds. (ii) Atranorin, protocetraric and physodalic acids. Several acid-deficient phases also occur in each chemodeme.



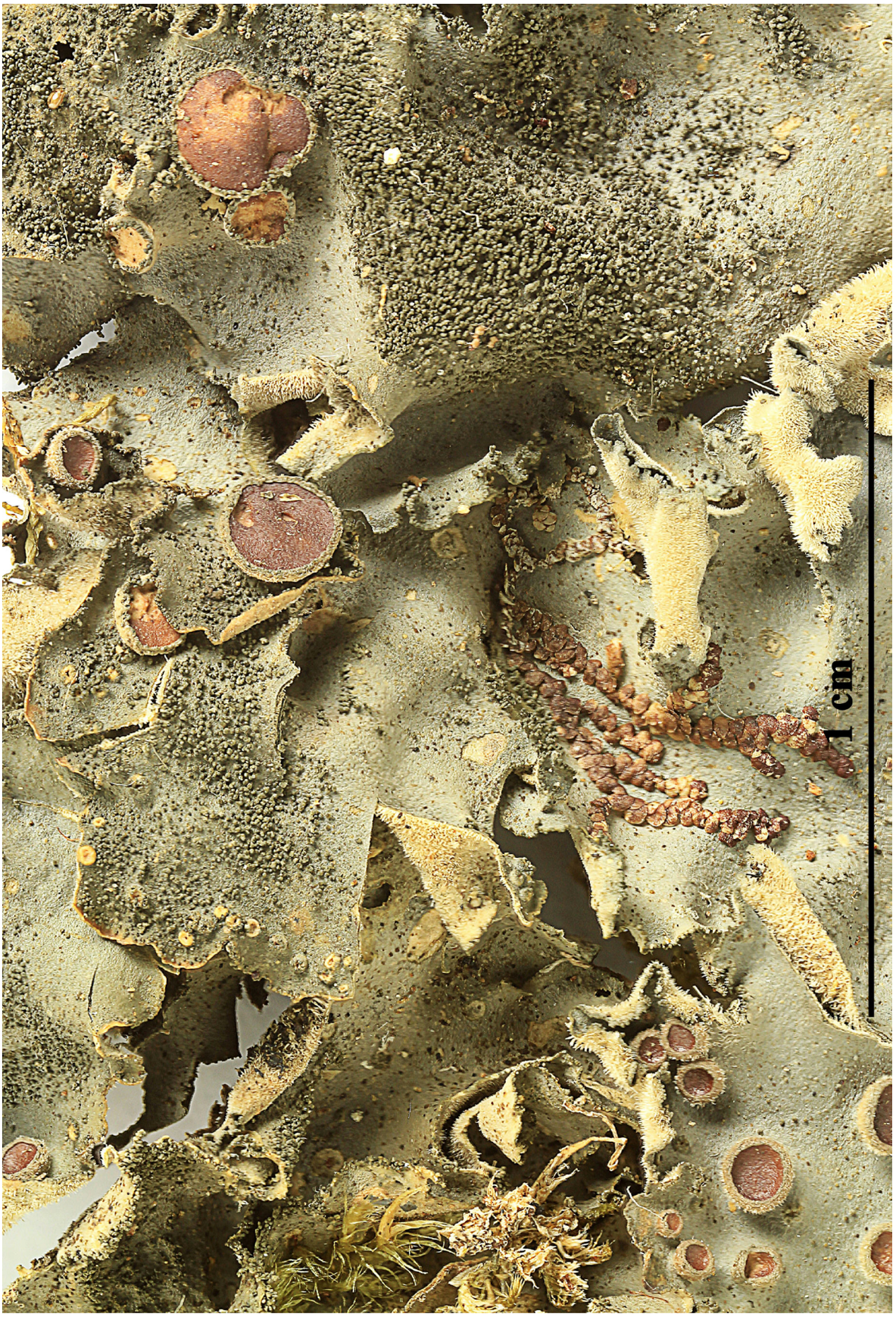
Leprocaulon arbuscula

Cetraria straminea

Leptogium burnetiae C.W. Dodge, Beih. Nova Hedwigia 12: 120 (1964)

[OH436], Japan. Hokkaido. Prov. Kushiro: Tomachise, Kushiro-cho, Kushiro-gun. On bark of *Fraxinus lanuginosa*, 100 m. Leg. H. Kashiwadani (no. 47422), 11-10.2004, det. Y. Ohmura. Ex Y. Ohmura Lichenes Minus Cogniti Exsiccati Nr. 436.

Thallus foliose, 3-10(-15) cm in diam., loosely adnate, subdichotomously to irregularly lobate; lobes elongate, flabellate, ±plane, separate to somewhat confluent, 3-15(20) mm wide, 100-150 µm thick; apices rotund, entire to crenate and isidiate, occasionally upturned; upper surface medium gray to bluish gray, dull to somewhat shiny, smooth, isidiate to sometimes phyllidiate. Isidia scattered to dense, usually laminal but sometimes marginal, initially semi-globular but soon cylindrical, simple or branched, often clustered, concolorous with the thallus or more often darker. Iinternal anatomy with upper and lower cortices consisting of a single layer of irregularly isodiametrical cells, internally with loosely interwoven chains of *Nostoc* and hyphae; lower surface pale to medium gray, smooth, with dense white to rarely pale brown tomentum of cylindrical hairs 0.2-1 mm long. Apothecia rare, laminal, stipitate, 0.5-2.5 mm wide; disc brown to red-brown, plane to convex; margin thalline concolorous with the thallus, isidiate, often pubescent; exciple euparaplectenchymatous, 20-25 µm; centrally hymenium hyaline below and thinly brown above, 100-125 µm tall; paraphyses unbranched, 1-2 µm wide, slightly inflated apically; subhymenium pale yellow, 20-25 µm thick; asci cylindrico-clavate, 8-spored; ascospores hyaline, muriform, 3-4-septate transversely, 1-septate longitudinally, ellipsoid to subfusiform, 30-45 x 12-18 µm. Pycnidia not observed. Spot tests all negative. Secondary metabolites none detected. - On bark, rocks and mosses in montane forests. World distribution: Asia, Africa, Europe and North America. L*eptogium burnetiae* may in certain forms be difficult to separate from *L. saturninum*. It is, however a thinner, bluer species with more coralloid isidia, that often form patchy clusters on the surface.



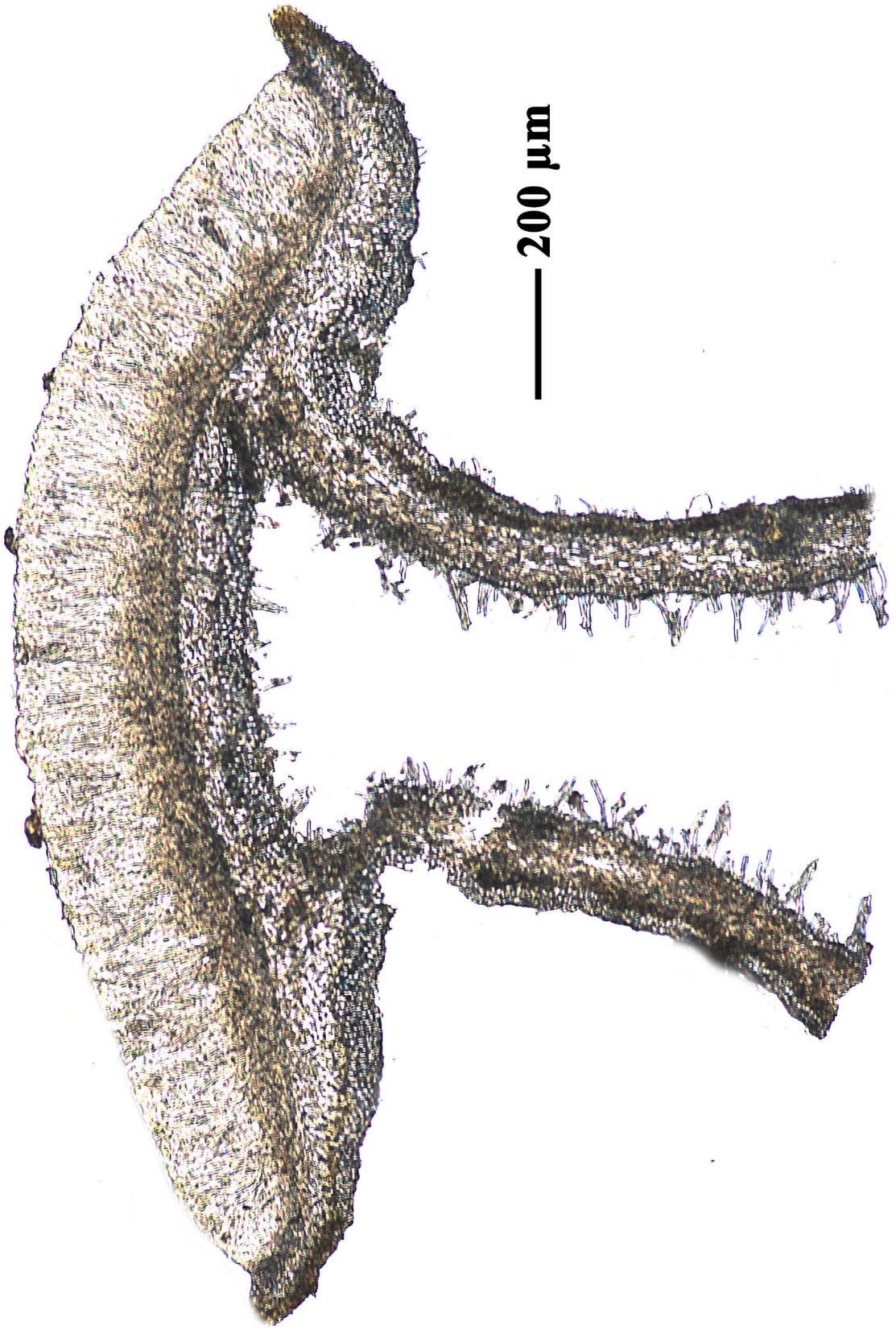
Leptogium burnetiae

Leptogium burnetiae

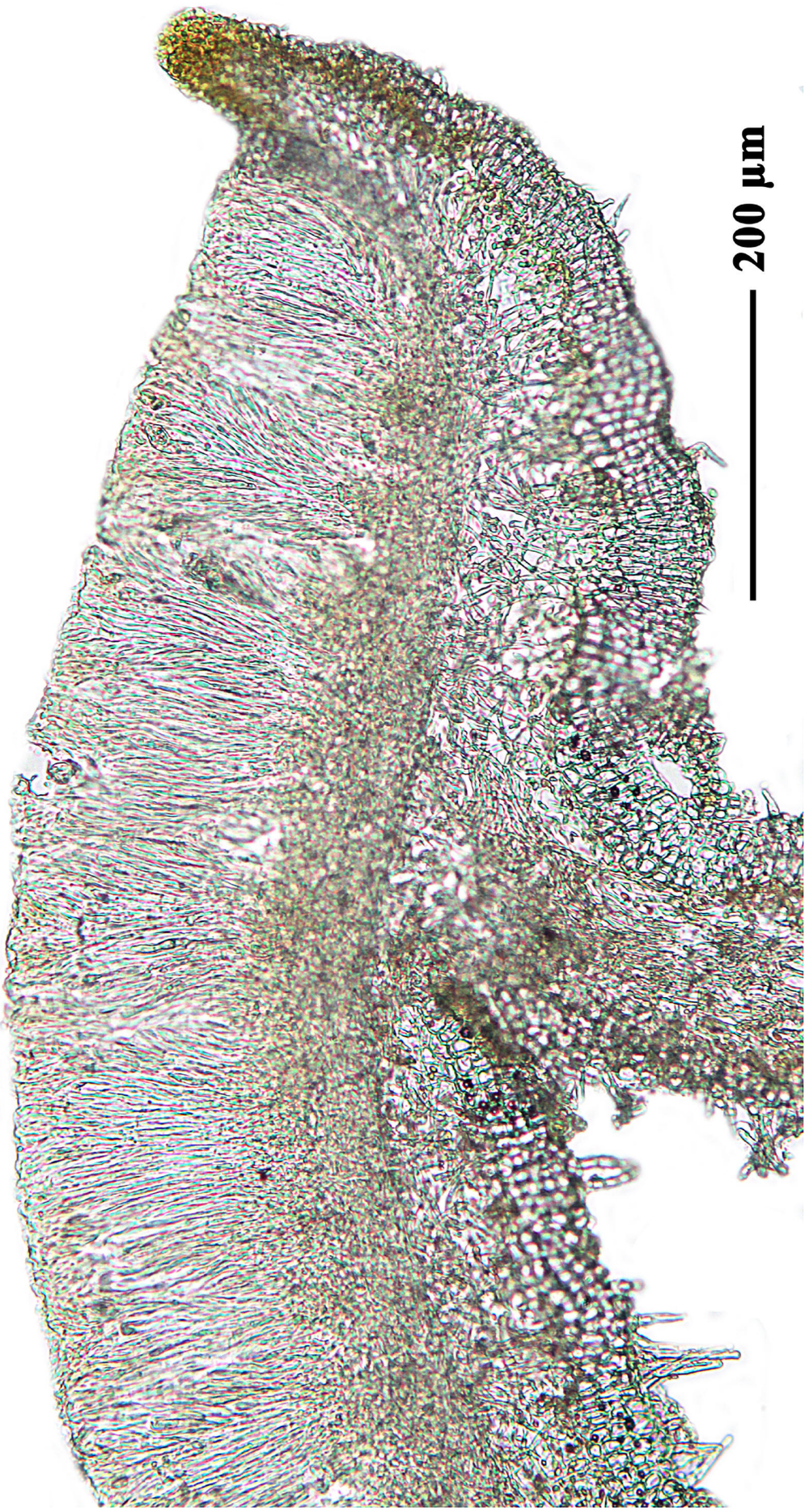
Leptogium burnetiae

Leptogium burnetiae

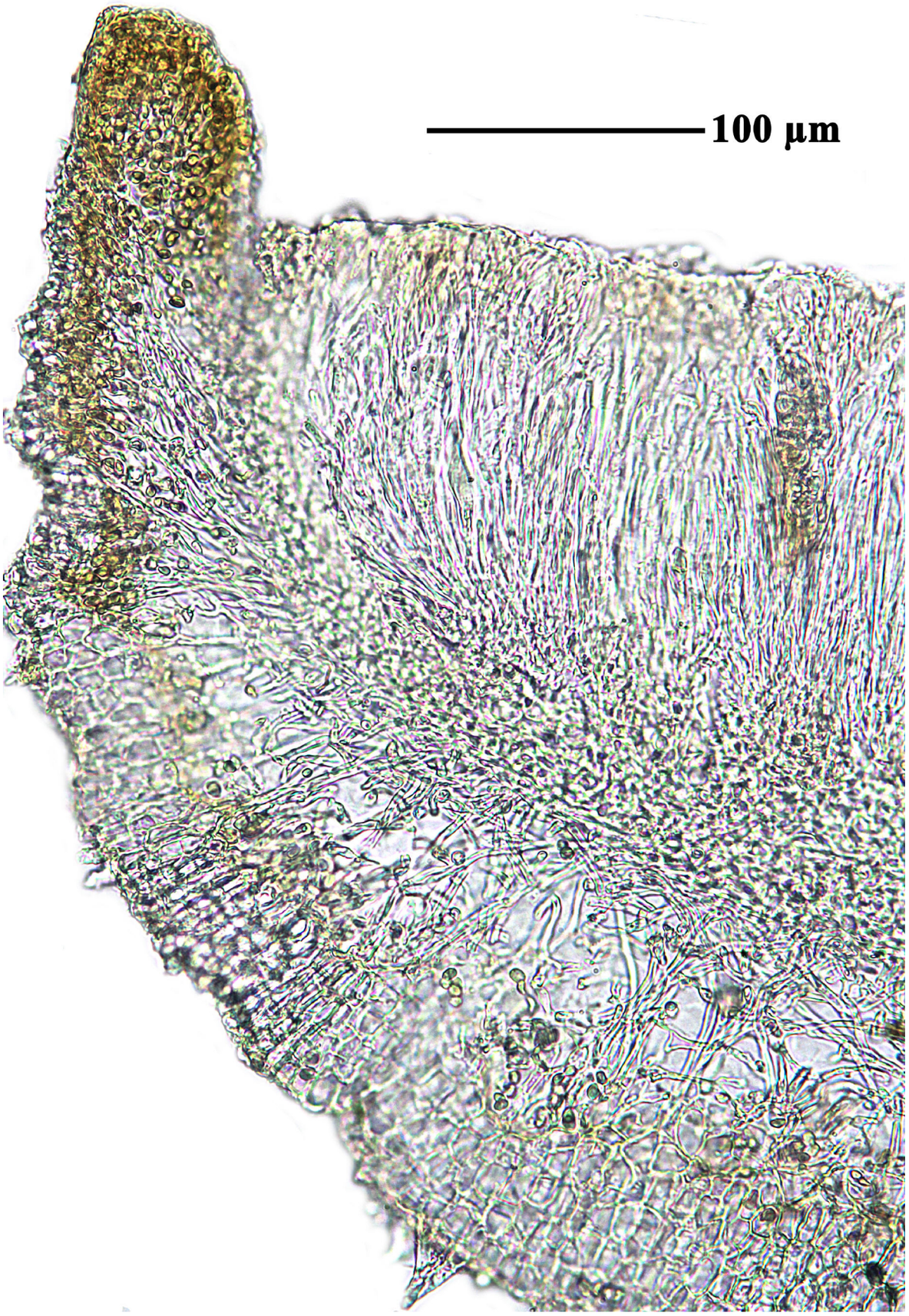
Leptogium burnetiae



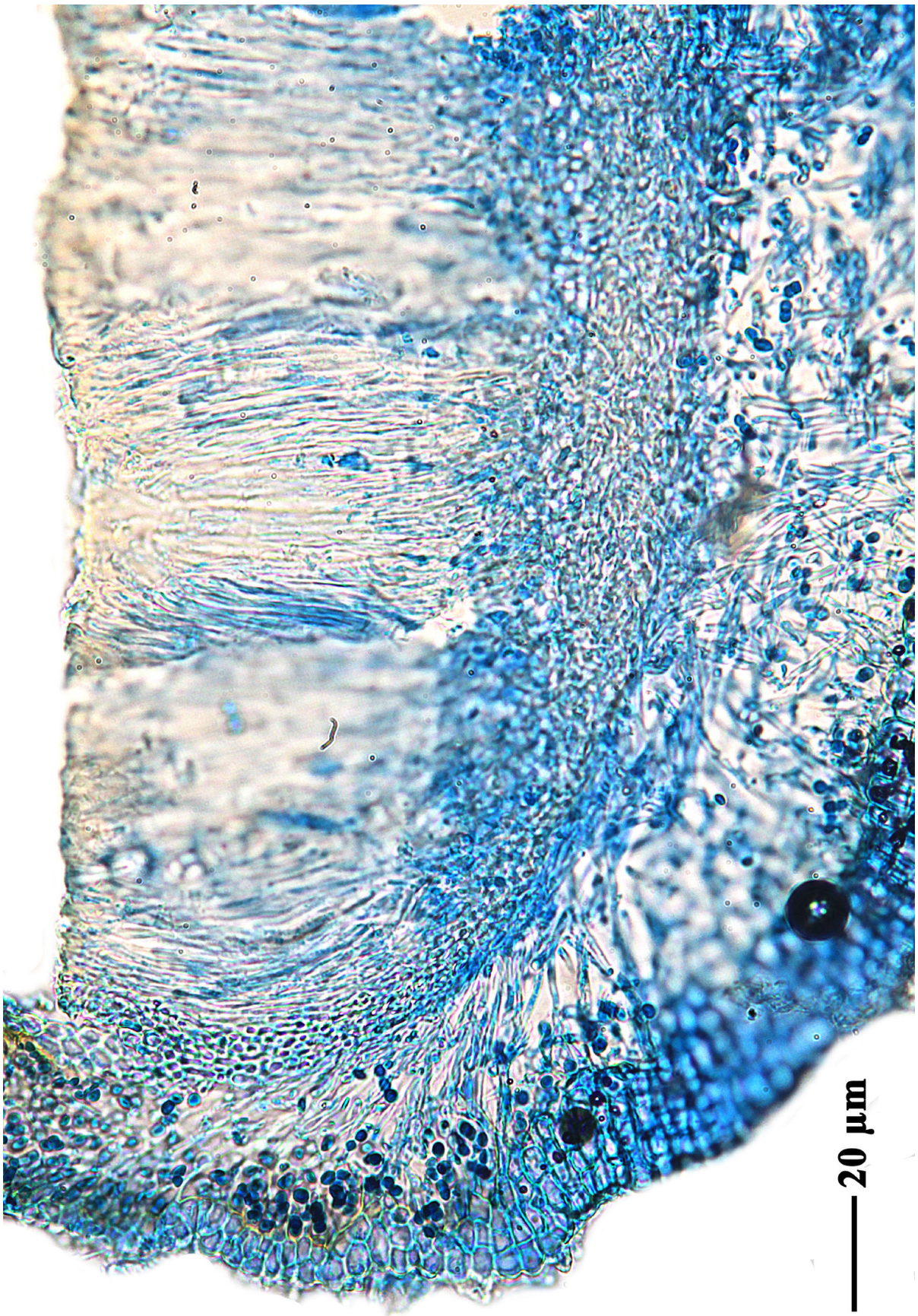
Leptogium burnetiae



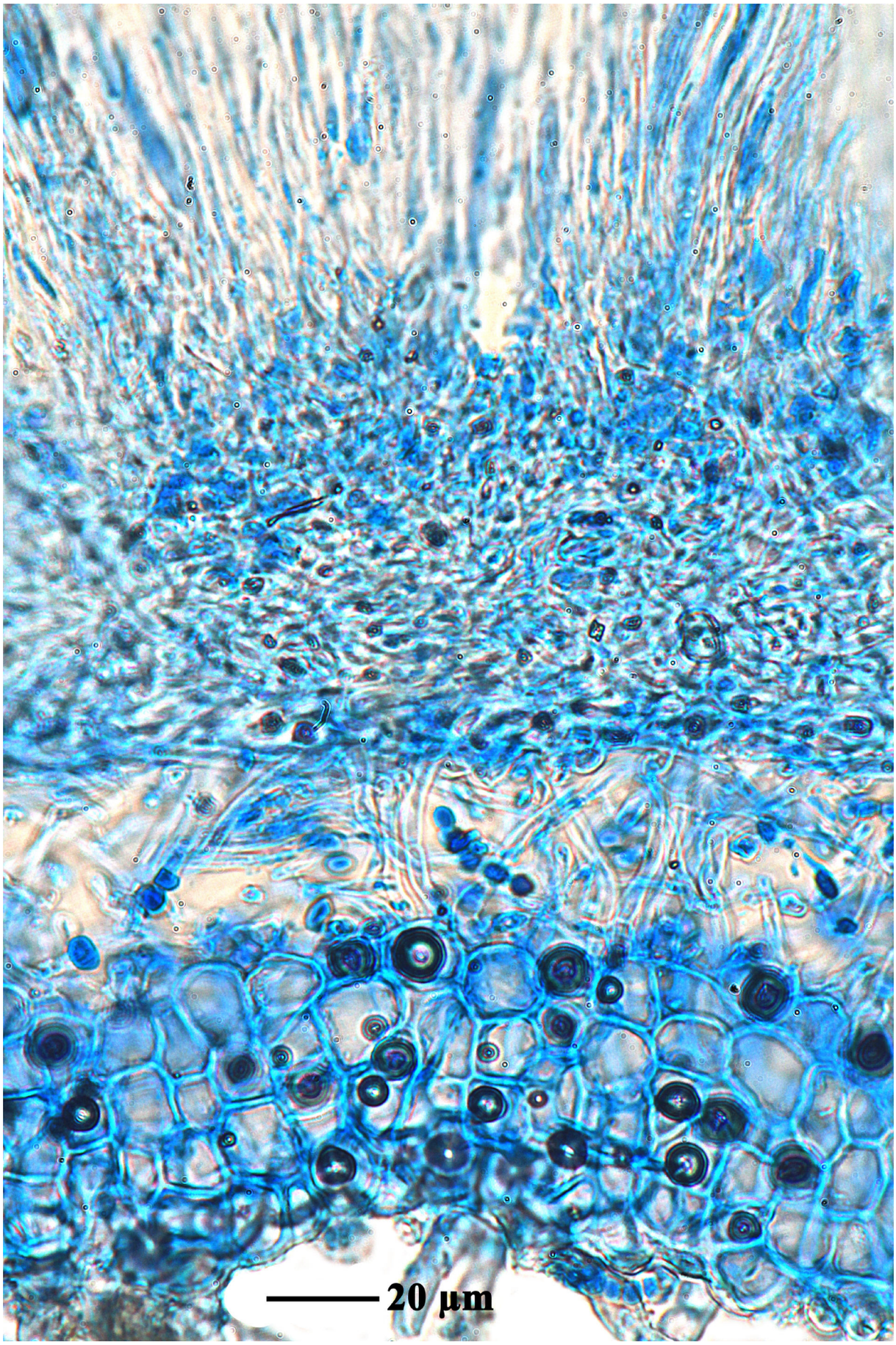
Leptogium burnetiae



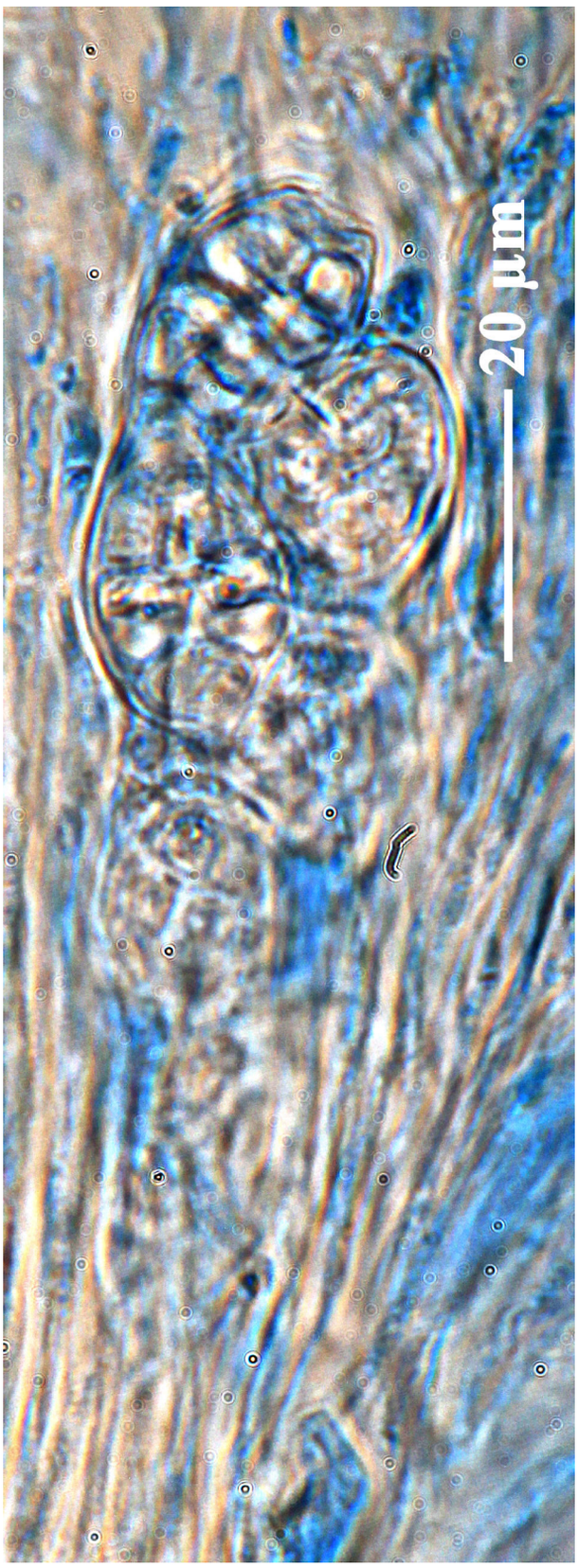
Leptogium burnetiae



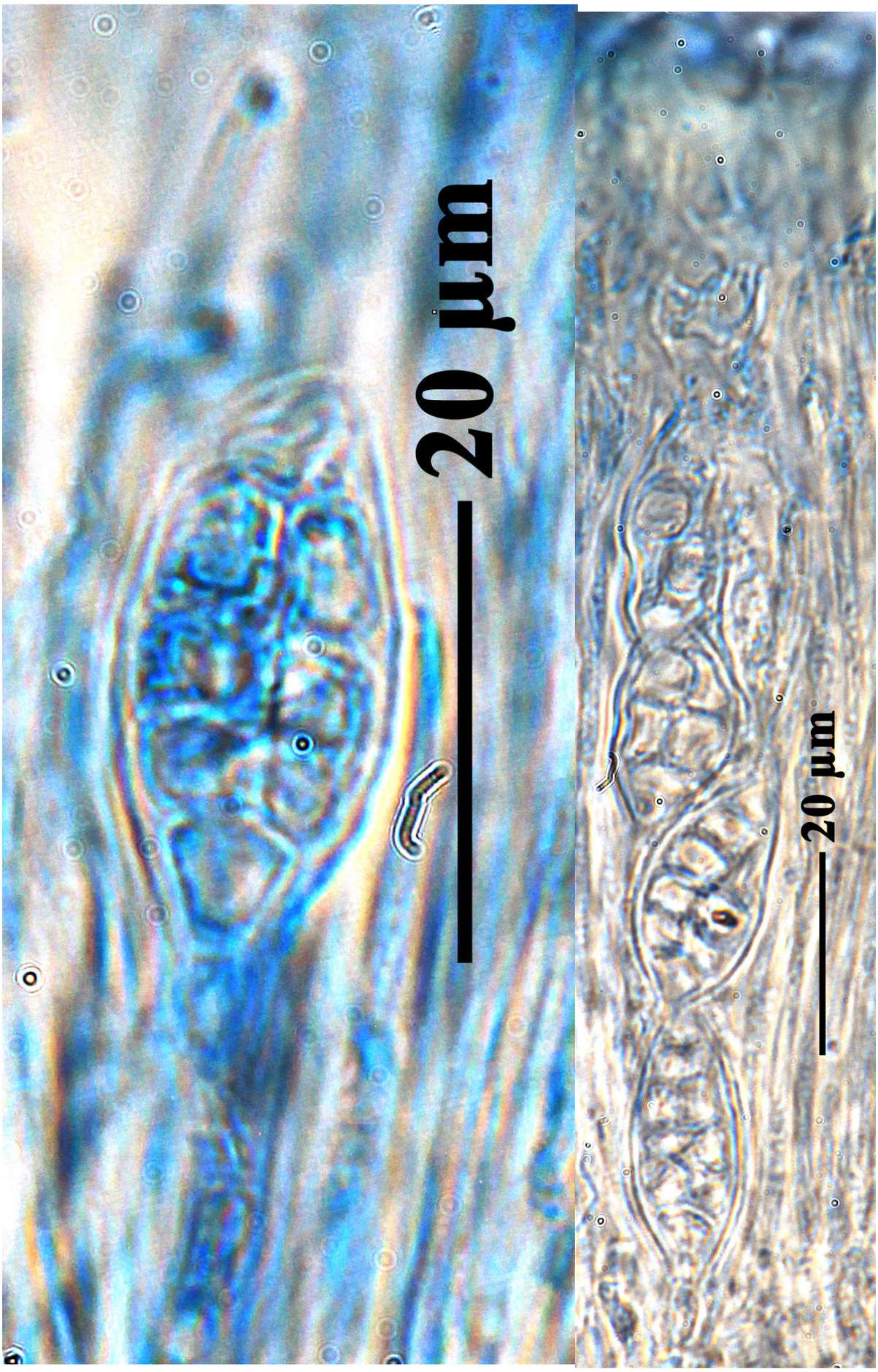
Leptogium burnetiae



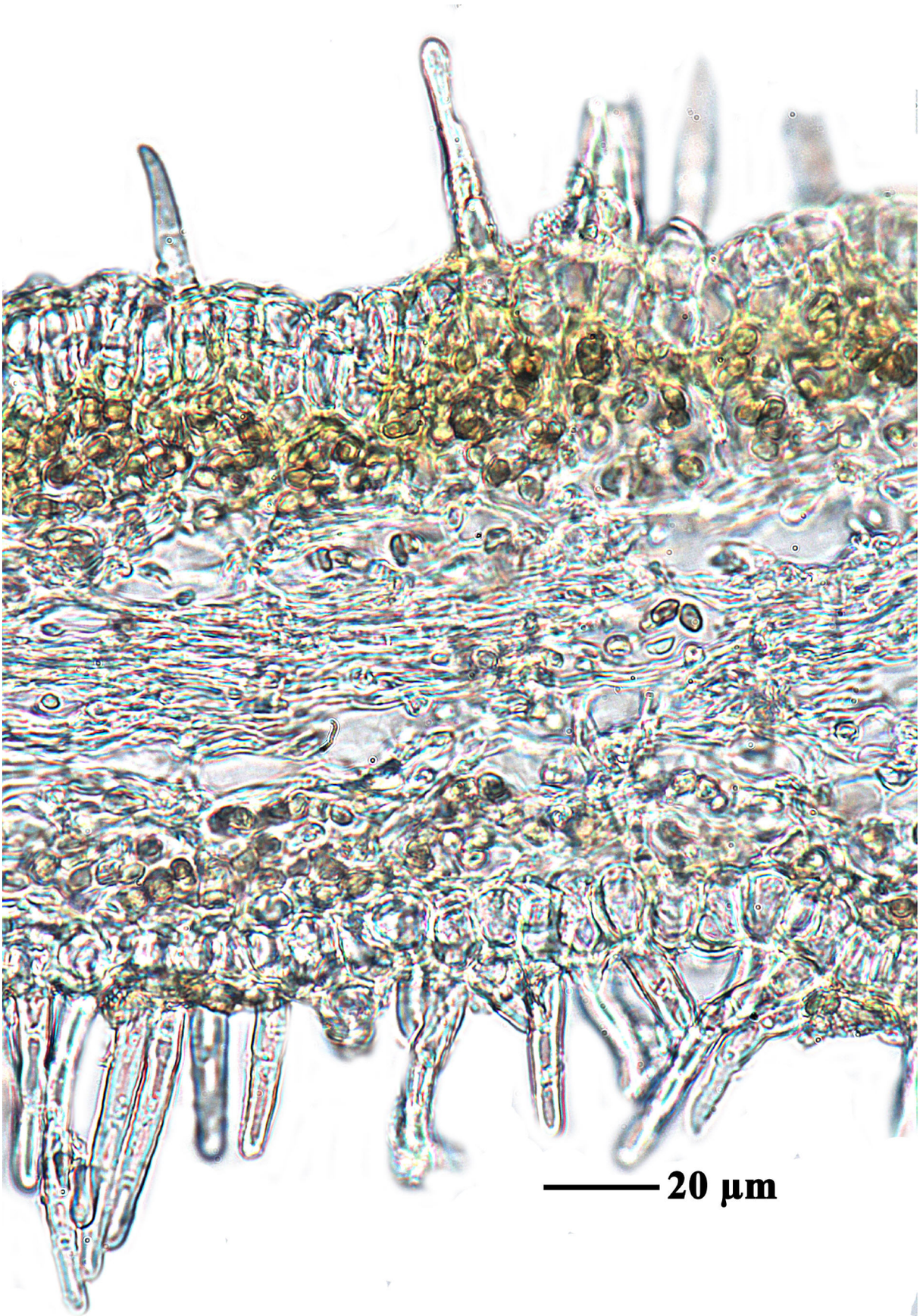
Leptogium burnetiae



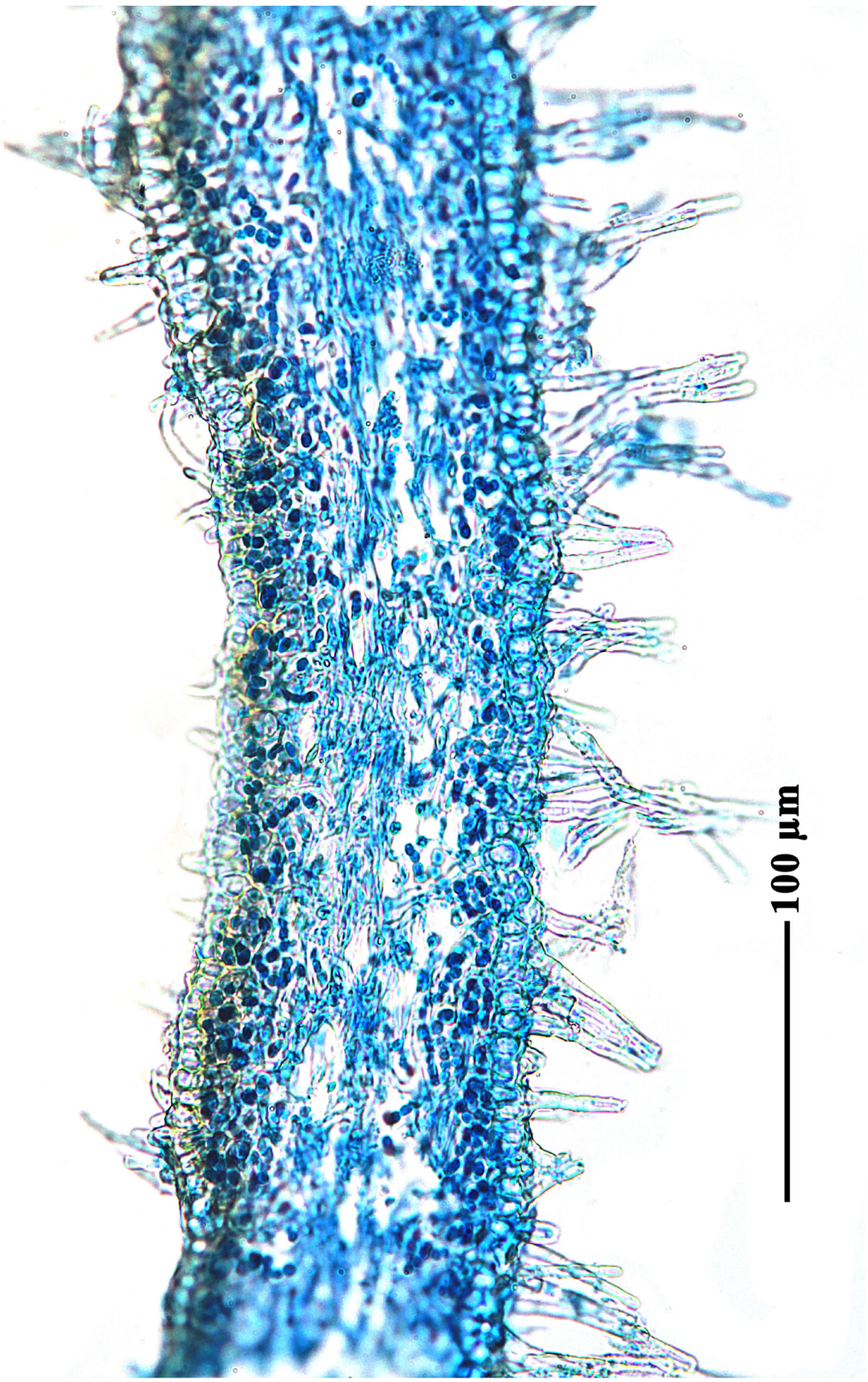
Leptogium burnetiae



Leptogium burnetiae



Leptogium burnetiae



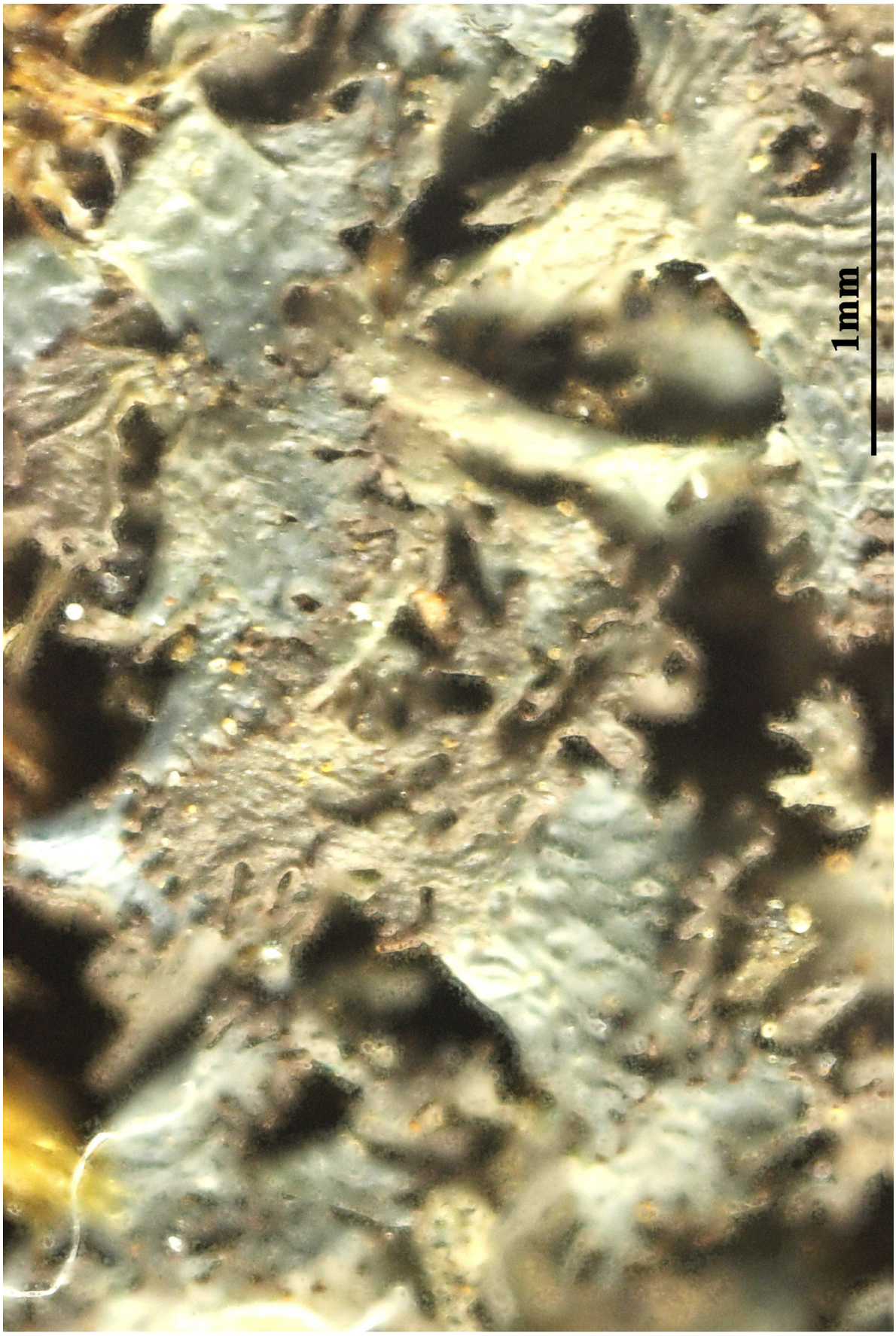
Leptogium burnetiae

Leptogium lichenoides (L.) Zahlbr., Cat. Lich. Univers. 3: 136 (1924) [1925]
= *Tremella lichenoides* L. 1753
= *Scytinium lichenoides* (L.) Otálora, P.M. Jørg. & Wedin, Fungal Diversity 64(1): 290 (2013) [2014]

[OH485], Japan. Honshu. Prov. Ohmi (Pref. Shiga): Kawachi, Tagacho. Inukami-gun. On calcareous rocks, 400-500 m. Leg. H. Kashiwadani (no 34682), 30.5.1987, det. H. Kashiwadani. Ex Y. Ohmura Lichenes Minus Cogniti Exsiccati Nr. 485.

Thallus minutely foliose to squamulose, slightly gelatinous when wet, of ascending, crowded lobes, often forming 2-4(-6) cm wide, very loose cushions, the lobes grey-brown to dark brown, usually somehow glossy, often paler and bluish grey in the basal, less exposed parts, thin, loosely attached, (0.3-)1-3(-4) mm broad, up to c. 1 cm long, 80-150 µm thick, ascending, more or less imbricate, the surface wrinkled, the edges deeply dilacerate-fimbriate, with cylindrical, isidia-like, often dense marginal outgrowths. Lower surface paler, erhizinate, with distinct, raised, longitudinal ribs and scattered white hapters. Upper and lower pseudocortex of 1-2 layers of angular, more or less isodiametrical cells, the layer inbetween of intertwined hyphae and loosely arranged chains of Nostoc. Apothecia rare, lecanorine, strongly constricted at base, 0.3-0.7(-1) mm across, with a brown, slightly concave to flat disc and a thalline margin often covered in coralloid outgrowths. Thalline exciple pseudocorticate; proper exciple euparaplectenchymatous, 20-70 µm wide laterally; epithecium brownish; hymenium colourless, 130-200 µm high, I+ blue; paraphyses coherent, mostly simple, 1-1.5 µm thick at mid-level, the apical cells slightly swollen; hypothecium pale yellow, 35-70 µm high. Asci 8-spored, cylindrical-clavate, the apex strongly thickened, the apical dome K/I+ pale blue, with a downwardly projecting K/I+ deep blue tubular structure. Ascospores submuriform to muriform, with 5-9 transverse septa and 1-3-longitudinal septa, thin-walled, hyaline, broadly ellipsoid to subfusiform, (20-)25-40(-50) x 11-16 µm. Photobiont cyanobacterial (Nostoc, the cells in short chains). Spot test: all negative. Chemistry: without lichen substances. -
Note: a widespread holarctic lichen mostly found on soil and amongst mosses in dry grasslands, more rarely on basal parts of trunks.

Leptogium lichenoides

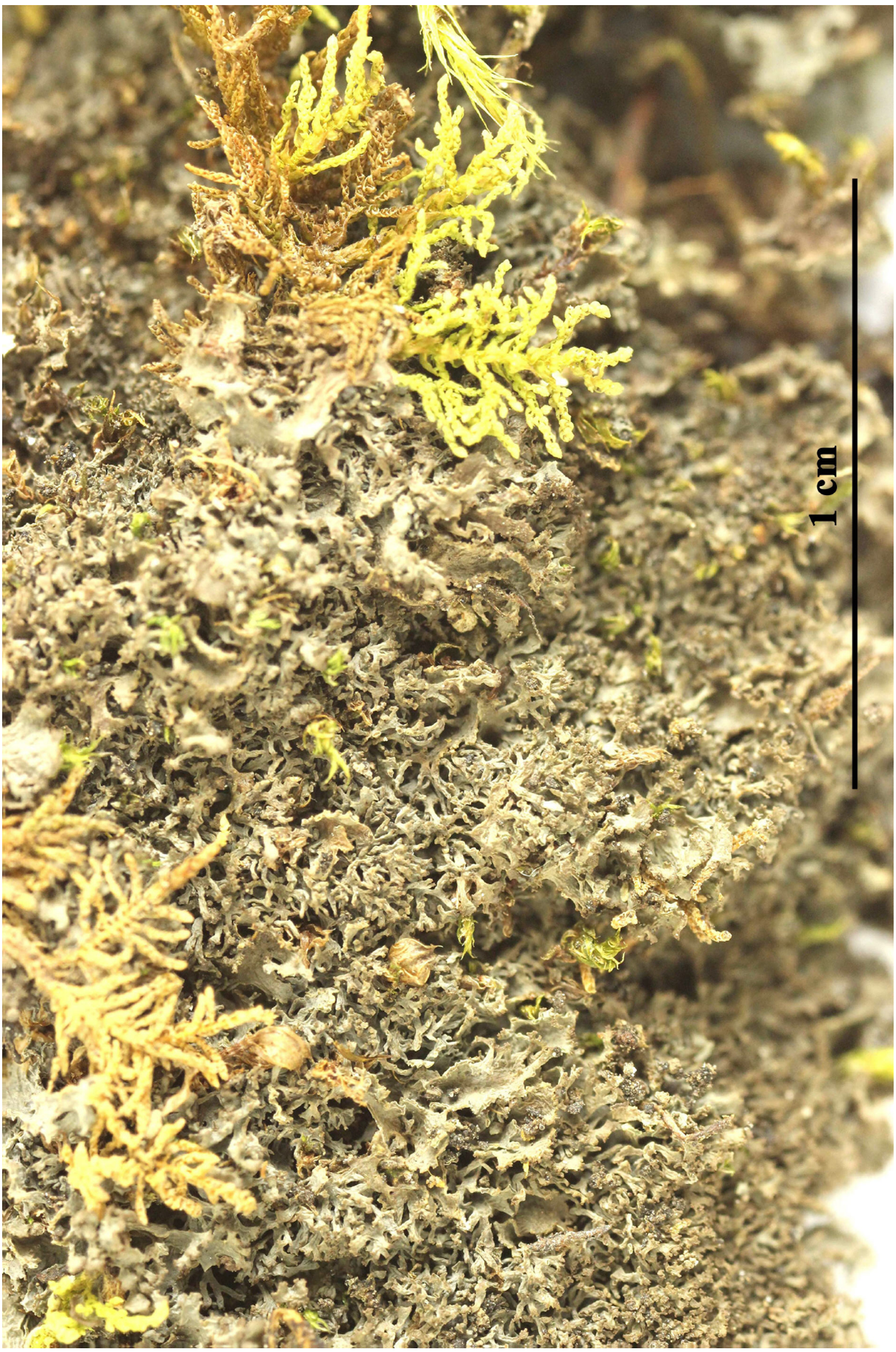


Leptogium lichenoides

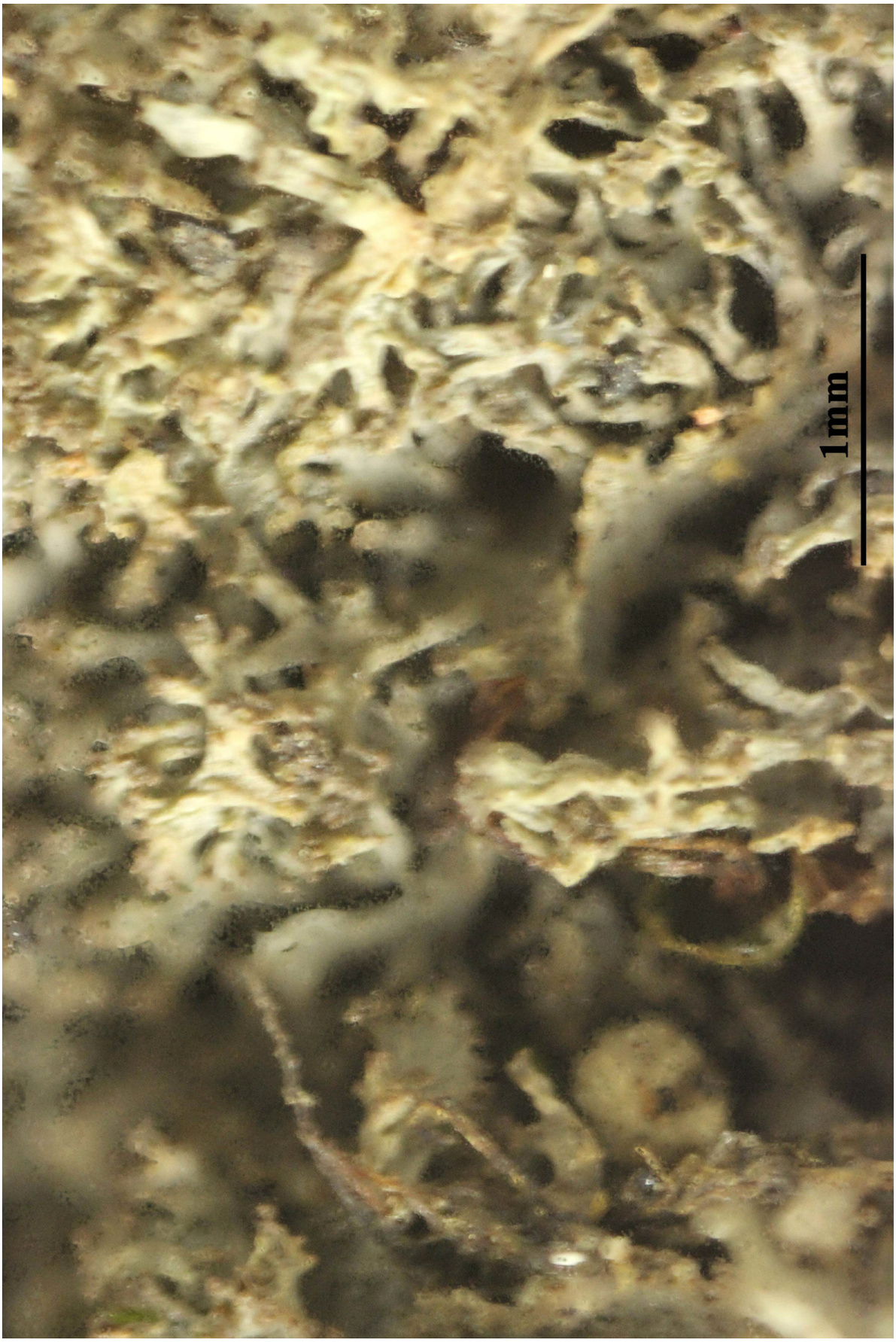
Leptogium lichenoides (L.) Zahlbr., Cat. Lich. Univers. 3: 136 (1924) [1925]
= *Tremella lichenoides* L. 1753
= *Scytinium lichenoides* (L.) Otálora, P.M. Jørg. & Wedin, Fungal Diversity 64(1): 290 (2013) [2014]

[OH462], Japan. Honshu. Prov. Ohmi (Pref. Shiga). Mt. Oike-dake. On moss on calcareous rock, 120 m. Leg. Y. Ohmura (no.9204), A. Frisch & G. Thor, 11.7.2012. Ex Y. Ohmura Lichenes Minus Cogniti Exsiccati Nr. 462.

Thallus minutely foliose to squamulose, slightly gelatinous when wet, of ascending, crowded lobes, often forming 2-4(-6) cm wide, very loose cushions, the lobes grey-brown to dark brown, usually somehow glossy, often paler and bluish grey in the basal, less exposed parts, thin, loosely attached, (0.3-)1-3(-4) mm broad, up to c. 1 cm long, 80-150 µm thick, ascending, more or less imbricate, the surface wrinkled, the edges deeply dilacerate-fimbriate, with cylindrical, isidia-like, often dense marginal outgrowths. Lower surface paler, erhizinate, with distinct, raised, longitudinal ribs and scattered white hapters. Upper and lower pseudocortex of 1-2 layers of angular, more or less isodiametrical cells, the layer inbetween of intertwined hyphae and loosely arranged chains of Nostoc. Apothecia rare, lecanorine, strongly constricted at base, 0.3-0.7(-1) mm across, with a brown, slightly concave to flat disc and a thalline margin often covered in coralloid outgrowths. Thalline exciple pseudocorticate; proper exciple euparaplectenchymatous, 20-70 µm wide laterally; epithecium brownish; hymenium colourless, 130-200 µm high, I+ blue; paraphyses coherent, mostly simple, 1-1.5 µm thick at mid-level, the apical cells slightly swollen; hypothecium pale yellow, 35-70 µm high. Asci 8-spored, cylindrical-clavate, the apex strongly thickened, the apical dome K/I+ pale blue, with a downwardly projecting K/I+ deep blue tubular structure. Ascospores submuriform to muriform, with 5-9 transverse septa and 1-3-longitudinal septa, thin-walled, hyaline, broadly ellipsoid to subfusiform, (20-)25-40(-50) x 11-16 µm. Photobiont cyanobacterial (Nostoc, the cells in short chains). Spot test: all negative. Chemistry: without lichen substances. - Note: a widespread holarctic lichen mostly found on soil and amongst mosses in dry grasslands, more rarely on basal parts of trunks.



Leptogium lichenoides



Leptogium lichenoides

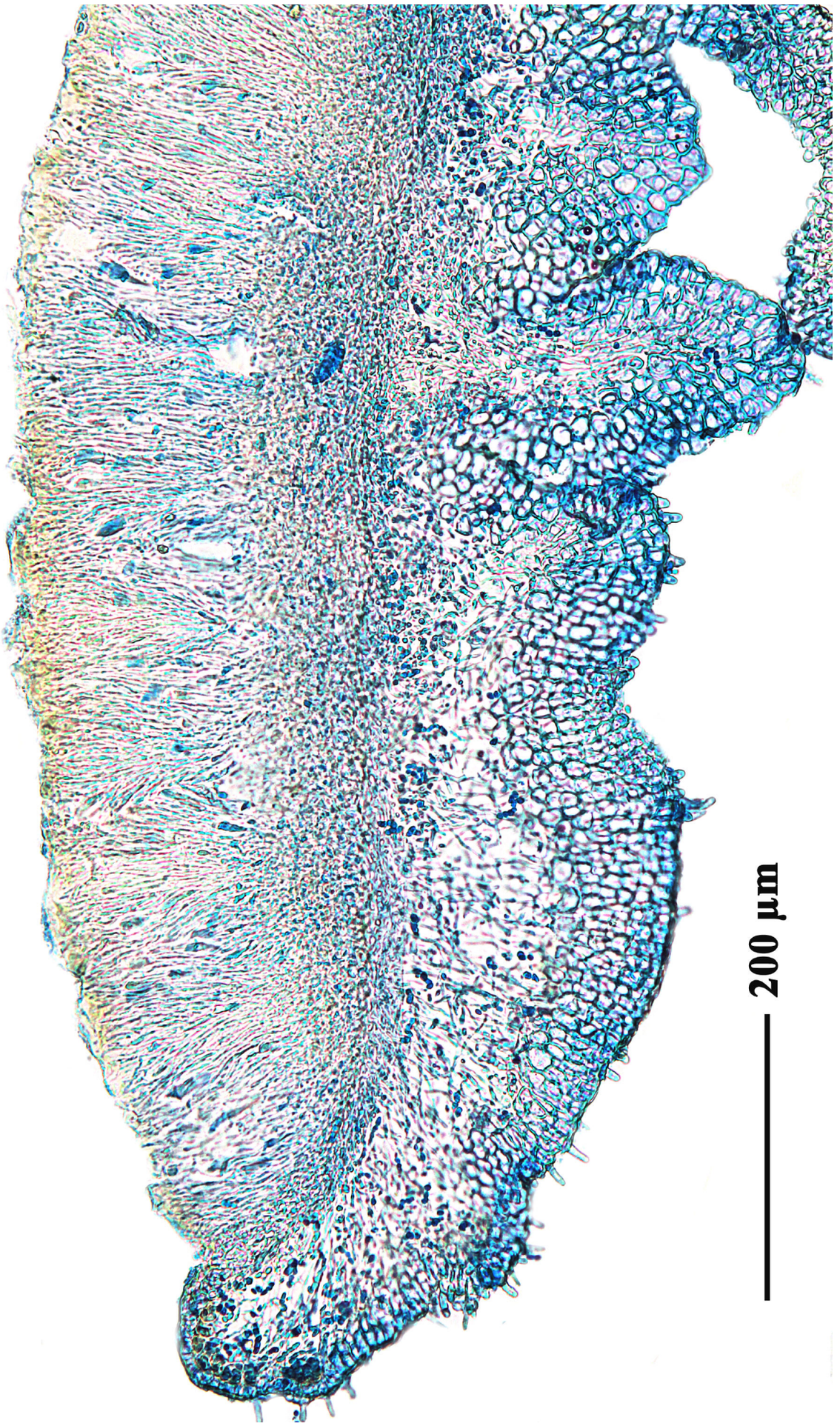
Leptogium menziesii (Sm.) Mont., Annls Sci. Nat., Bot., sér. 3 18: 313 (1852) = *Lichen menziesii* Sm. 1803

[KU169], Japan. Honshu. Prov. Izu: Amagi Pass. Over mosses on rocks, 700 m. Leg. S. Kurokawa (no. 67211), 15.11.1967, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 169.

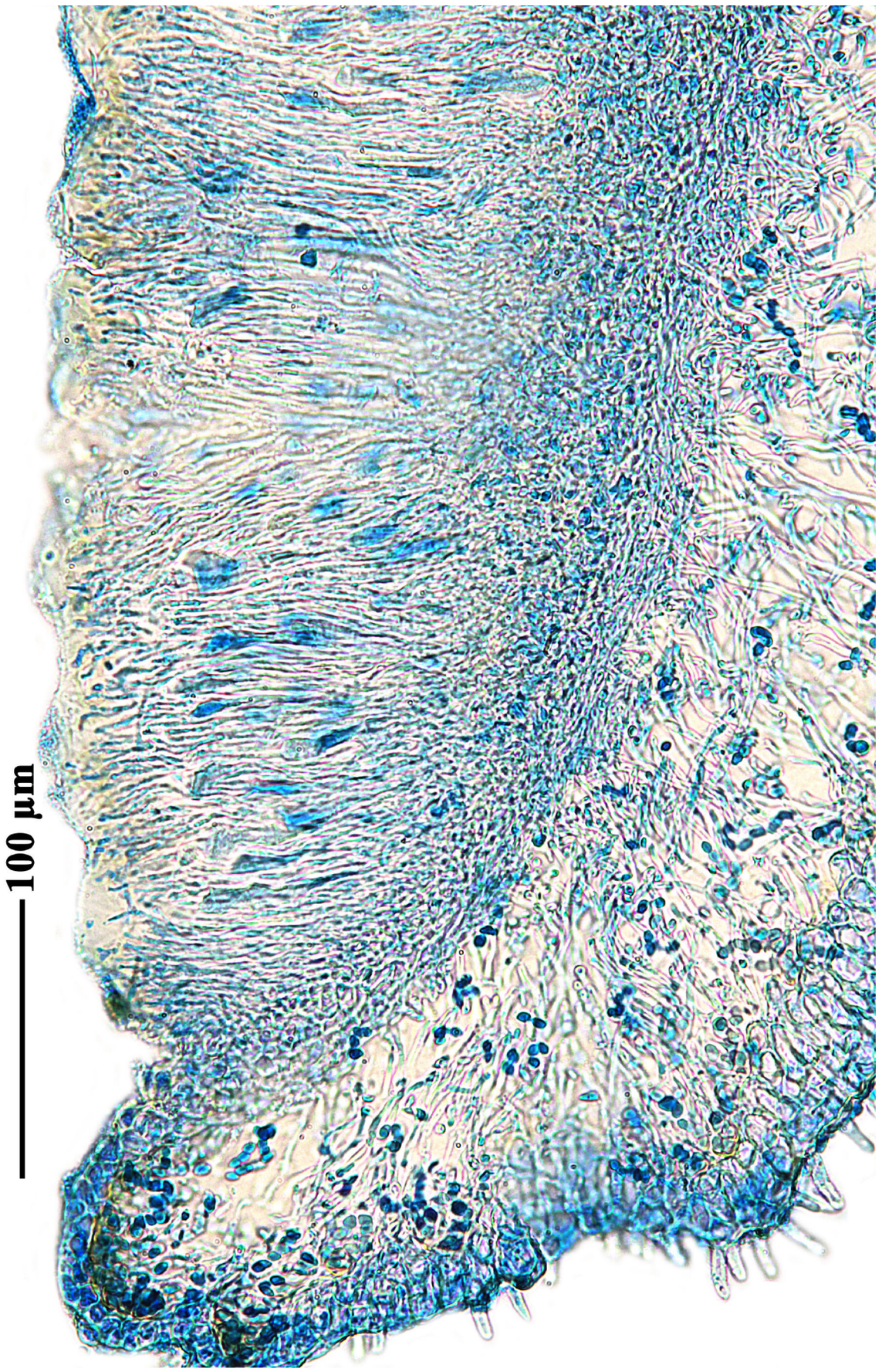
Thallus foliose, adnate to subpulvinate, 2–6 cm wide, 70–130 µm thick, leaden grey to greenish blue, rarely dull leaden grey, often browned. Lobes rotund to oblong, flat to undulate, 2–7 mm broad; margins entire to lacerate, rarely lobulate, ±undulate. Upper surface smooth to roughened, not isidiate, rarely lobulate where damaged. Lower surface with usually dense whitish tomentum and ±glabrous margin. Apothecia laminal, ±sessile, 0.8–2 mm wide; thalline exciple ocasionally nodulose, ±concolorous with thallus; base ±hairy; disc concave to flat, pale orange-brown to red-brown. Ascospores ellipsoidal, ±muriform, 20–30 × 7–10 µm; apices acute or rarely obtuse. Pycnidia not seen.- Occurs in Australia, southern South American, Peru, New Zealand and South Africa.

Leptogium menziesii

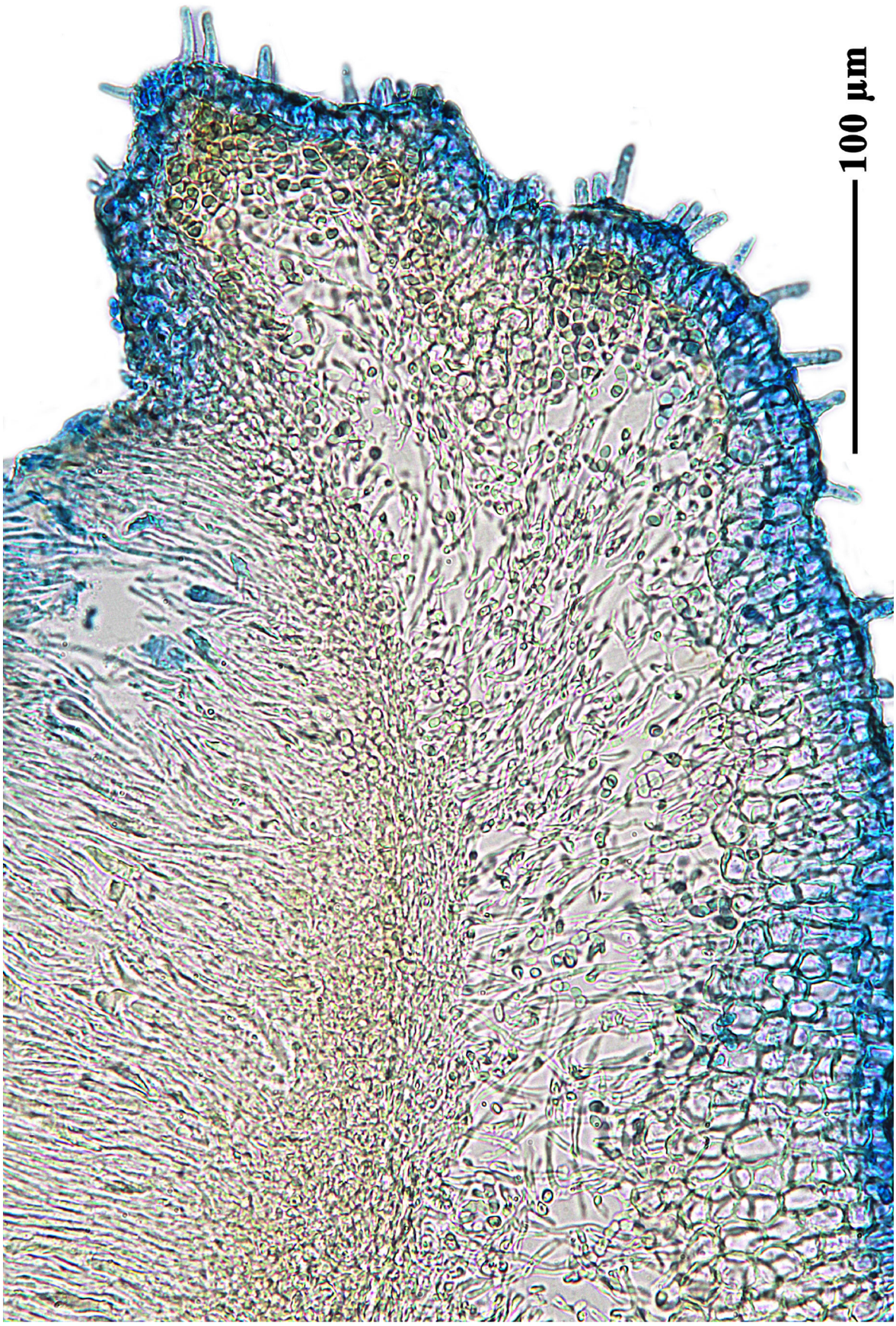
Leptogium menziesii



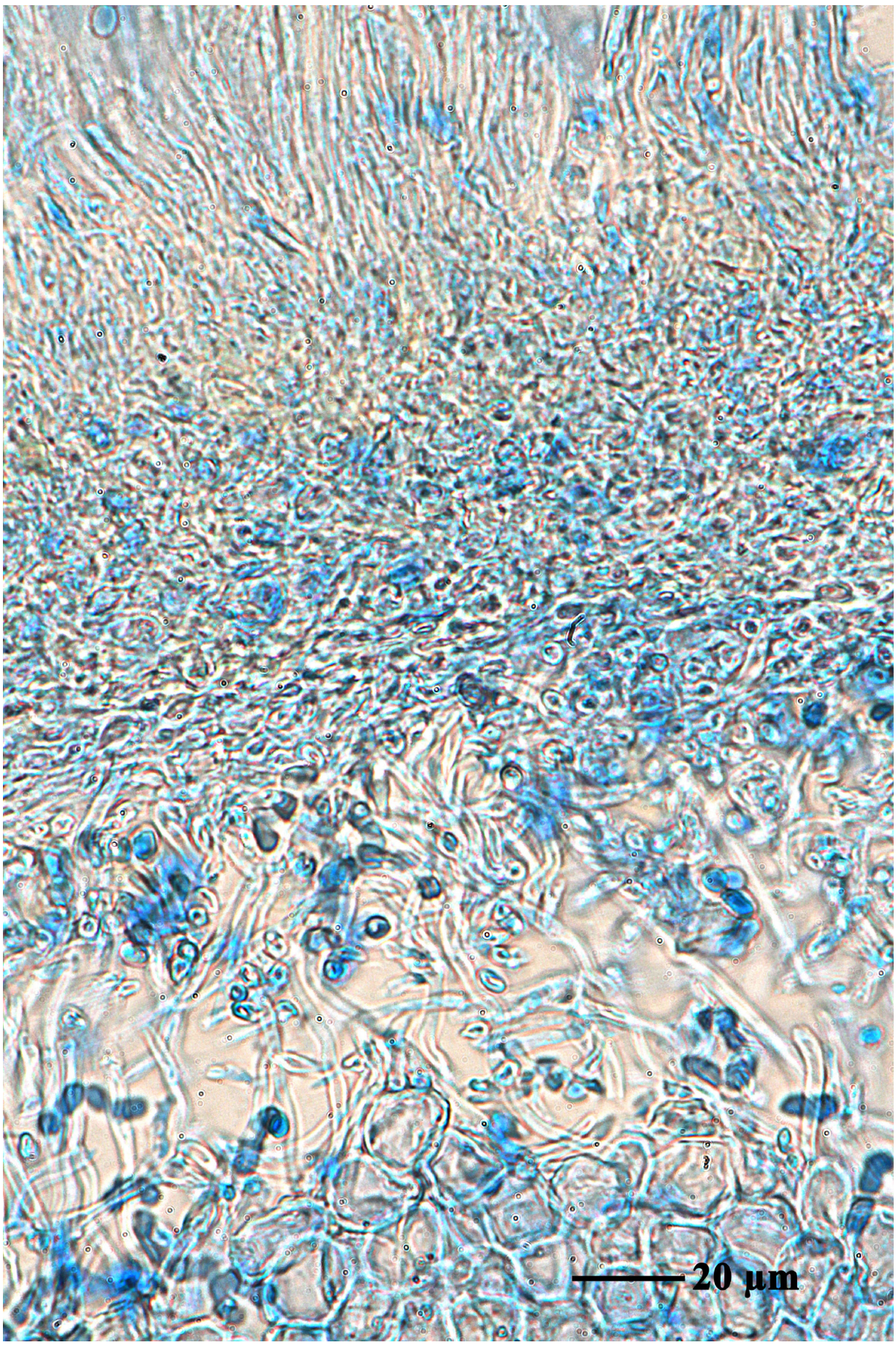
Leptogium menziesii



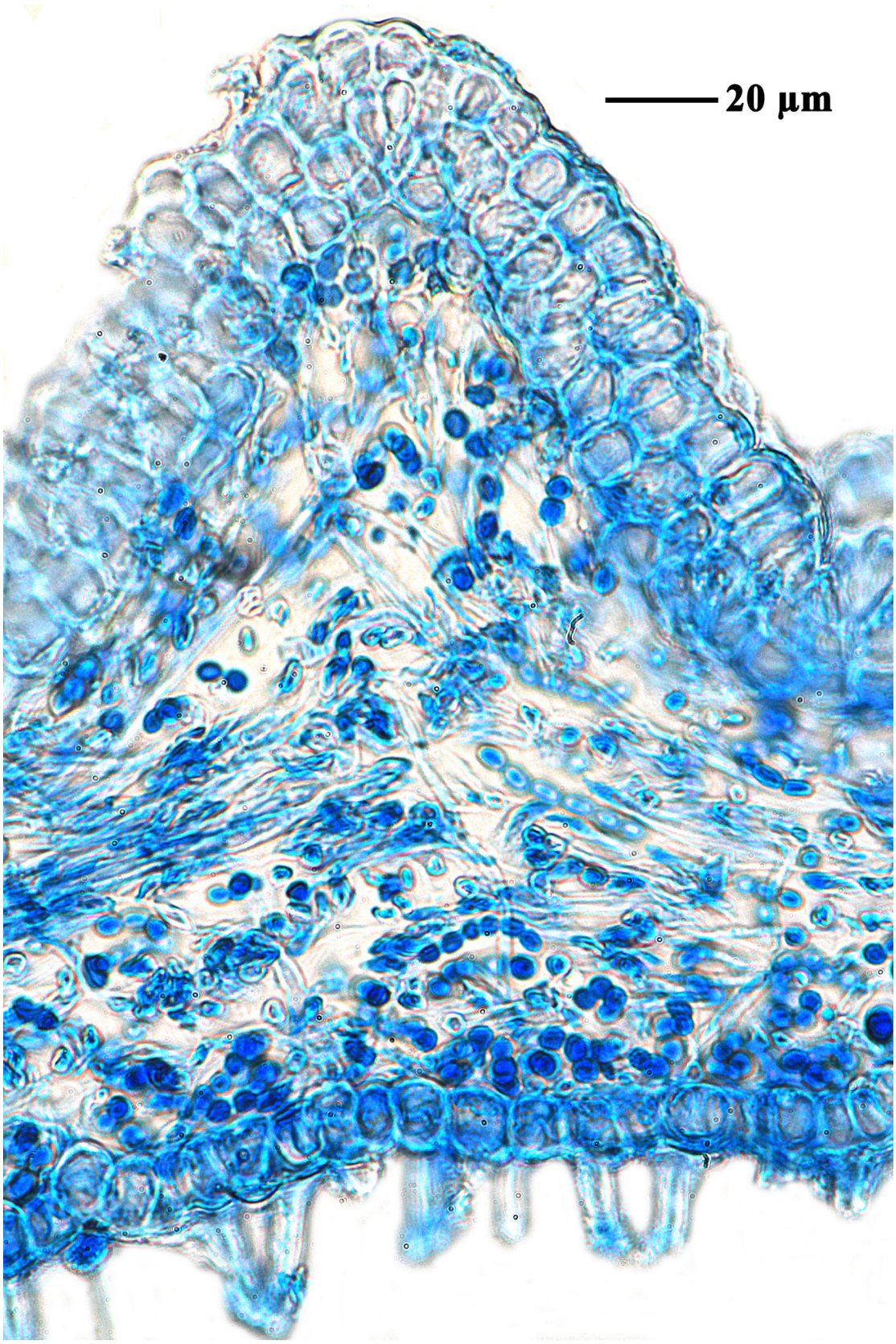
Leptogium menziesii



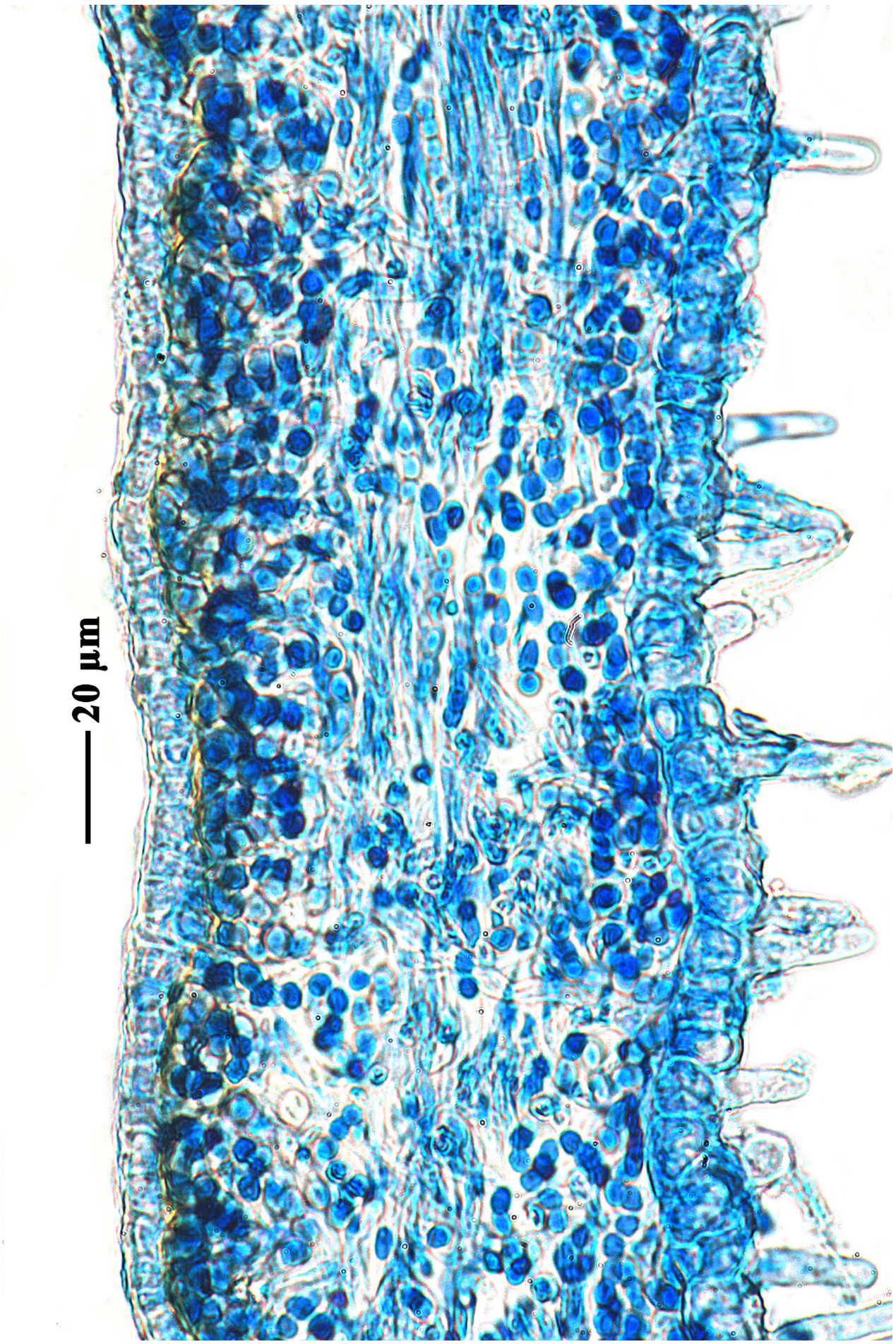
Leptogium menziesii



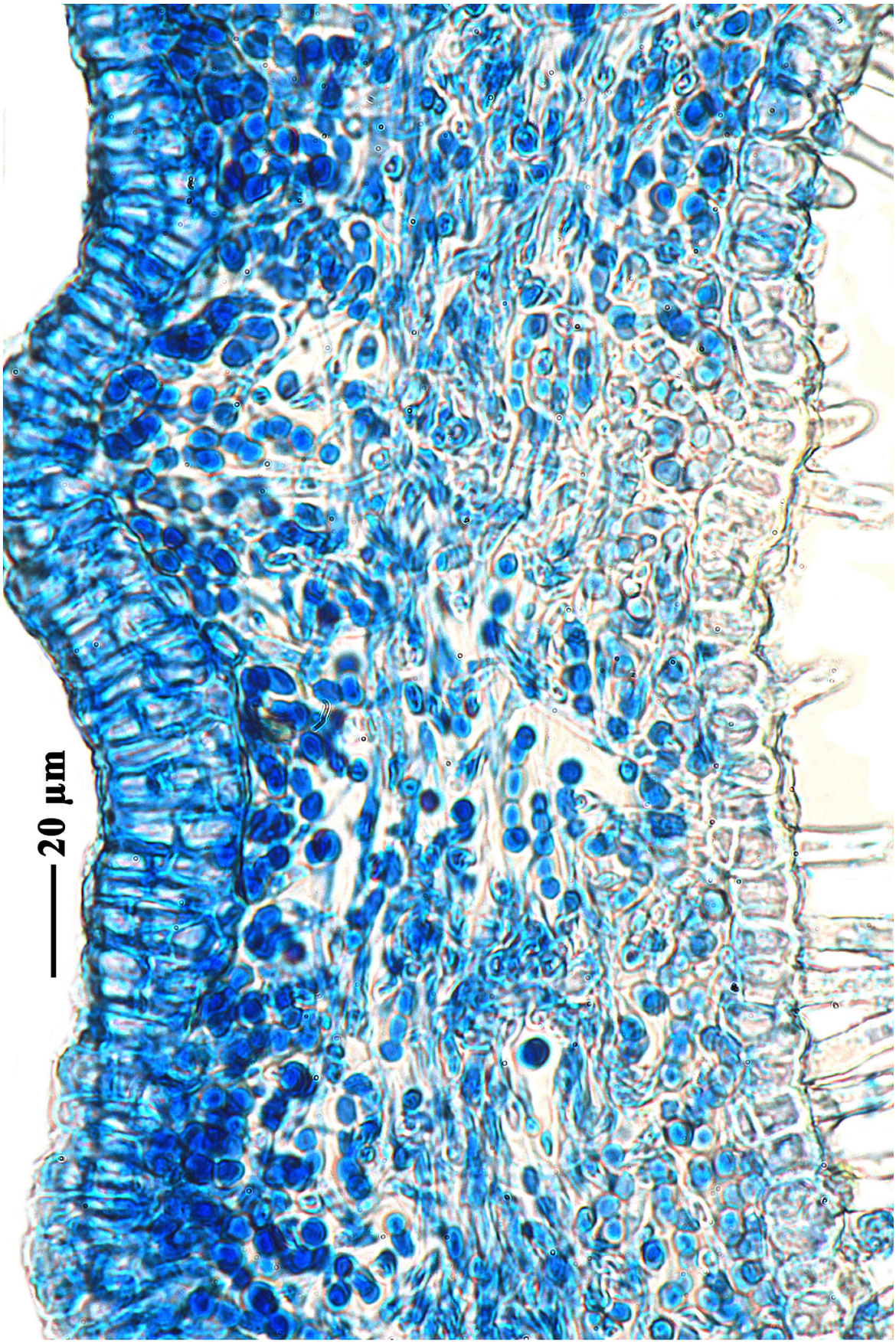
Leptogium menziesii



Leptogium menziesii



Leptogium menziesii

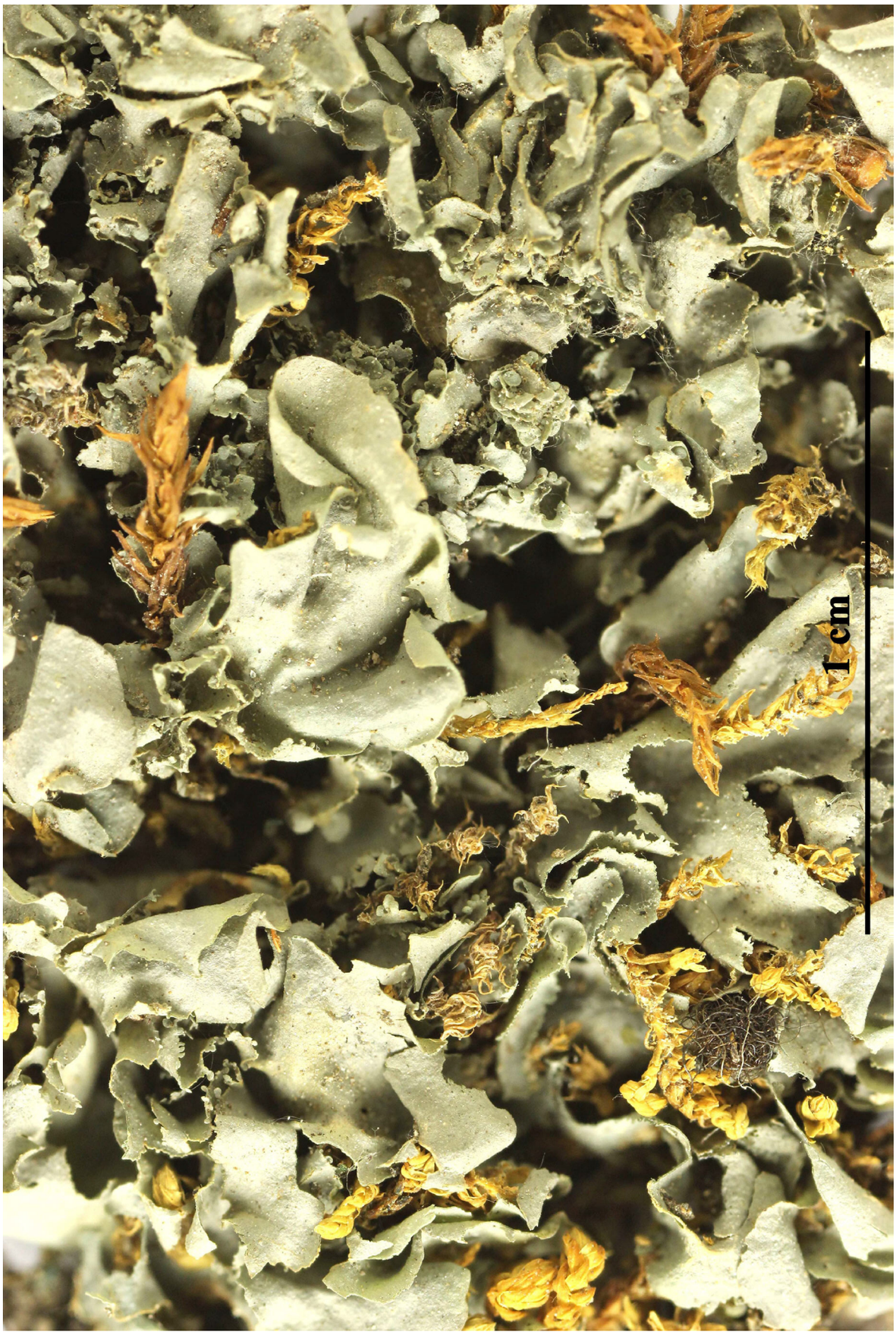


Leptogium menziesii

Leptogium moluccanum* var. *myriophyllinum (Müll. Arg.) Asahina, J. Jap. Bot. 8(6): 28 (1932)
= *Leptogium tremelloides* var. *myriophyllinum* Müll. Arg. 1891

[OH511], Japan. Honshu. Prov. Inaba (Pref. Tottori): Mt. Kyusyo-zan, Rottori-city. On stone wall, 230 m. Leg. Y. Ikoma, 8.6.1951, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 511.

Thallus corticolous or terricolous, loosely adnate, to 4 cm across; lobes orbicular, 4-10 mm wide, 40-60 µm thick; upper side grey to lead-grey, smooth, lacking isidia; lower side paler, etomentose. Apothecia sessile to substipitate, 1.2 mm in diam; thalline exciple creamish; cortex of thalline exciple muiticell layered at base; proper exciple euparaplecten-chymatous only at margin, indistinct at centre; ascospores muriform with 3-5 transverse and 0-1 longitudinal septa, 16-25(-32) x 6-13 µm. - var *myriophyllinum*: Lobes on the margins and on the upper surface minute isidio-microphyllin; like isidia that changed into small leafy lobes.



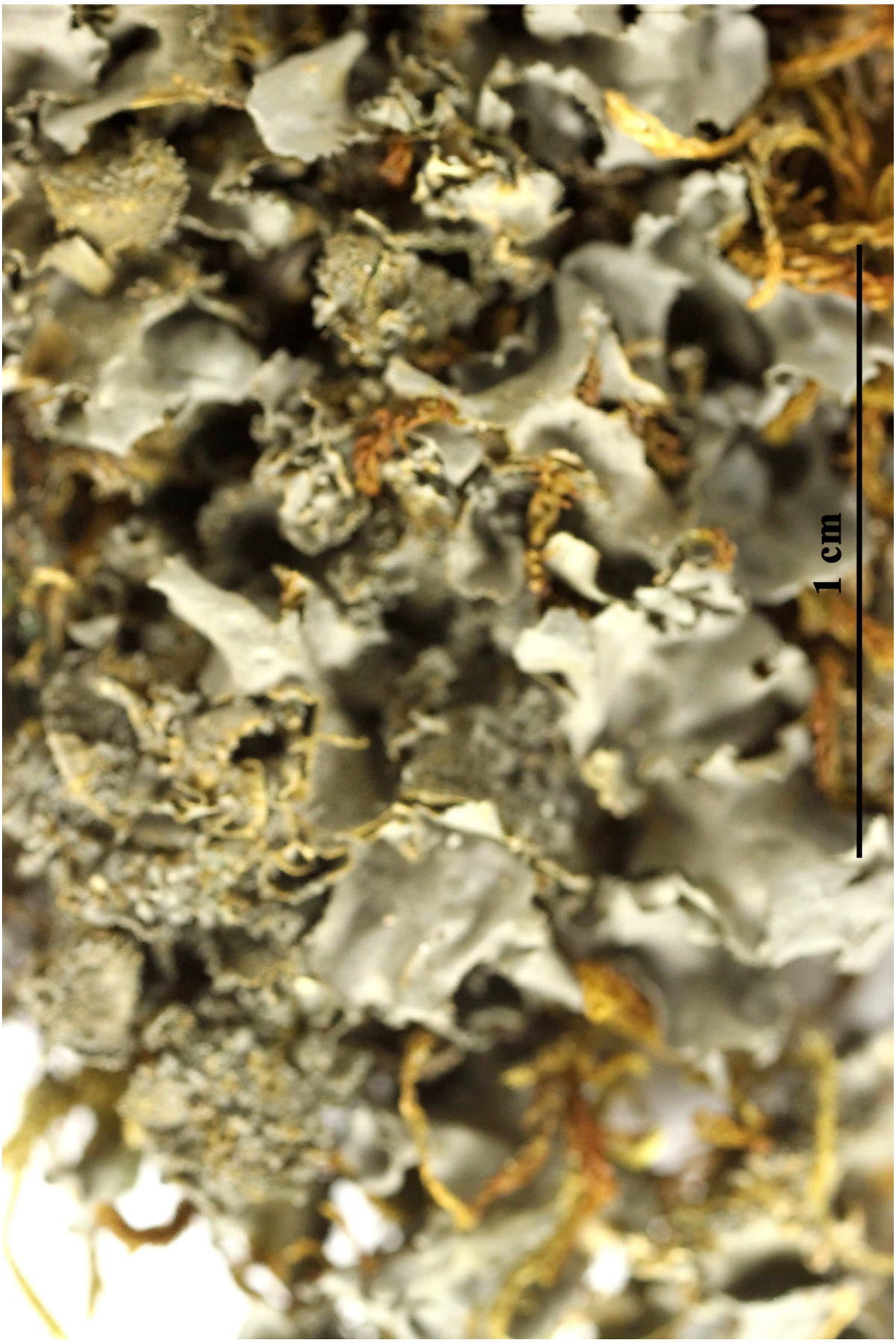
Leptogium moluccanum* var. *myriophyllinum

Leptogium moluccanum* var. *myriophyllinum (Müll. Arg.) Asahina, J. Jap. Bot. 8(6): 28 (1932)
= *Leptogium tremelloides* var. *myriophyllinum* Müll. Arg. 1891

[KA284], Japan. Kyushu. Prov. Bungo (Pref. Ohita): Futago Temple, Aki-cho. Higashikunisaki-gun. On stone works, 360 m. Leg. H. Kashiwadani (no. 44991), 21.10.2002, det. H. Kashiwadani. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 284.

Thallus corticolous or terricolous, loosely adnate, to 4 cm across; lobes orbicular, 4-10 mm wide, 40-60 µm thick; upper side grey to lead-grey, smooth, lacking isidia; lower side paler, etomentose. Apothecia sessile to substipitate, 1.2 mm in diam; thalline exciple creamish; cortex of thalline exciple muiticell layered at base; proper exciple euparaplectenchymatous only at margin, indistinct at centre; ascospores muriform with 3-5 transverse and 0-1 longitudinal septa, 16-25(-32) x 6-13 µm. - var *myriophyllinum*: Lobes on the margins and on the upper surface minute isidio-microphyllin; like isidia that changed into small leafy lobes.

Leptogium moluccanum* var. *myriophyllinum

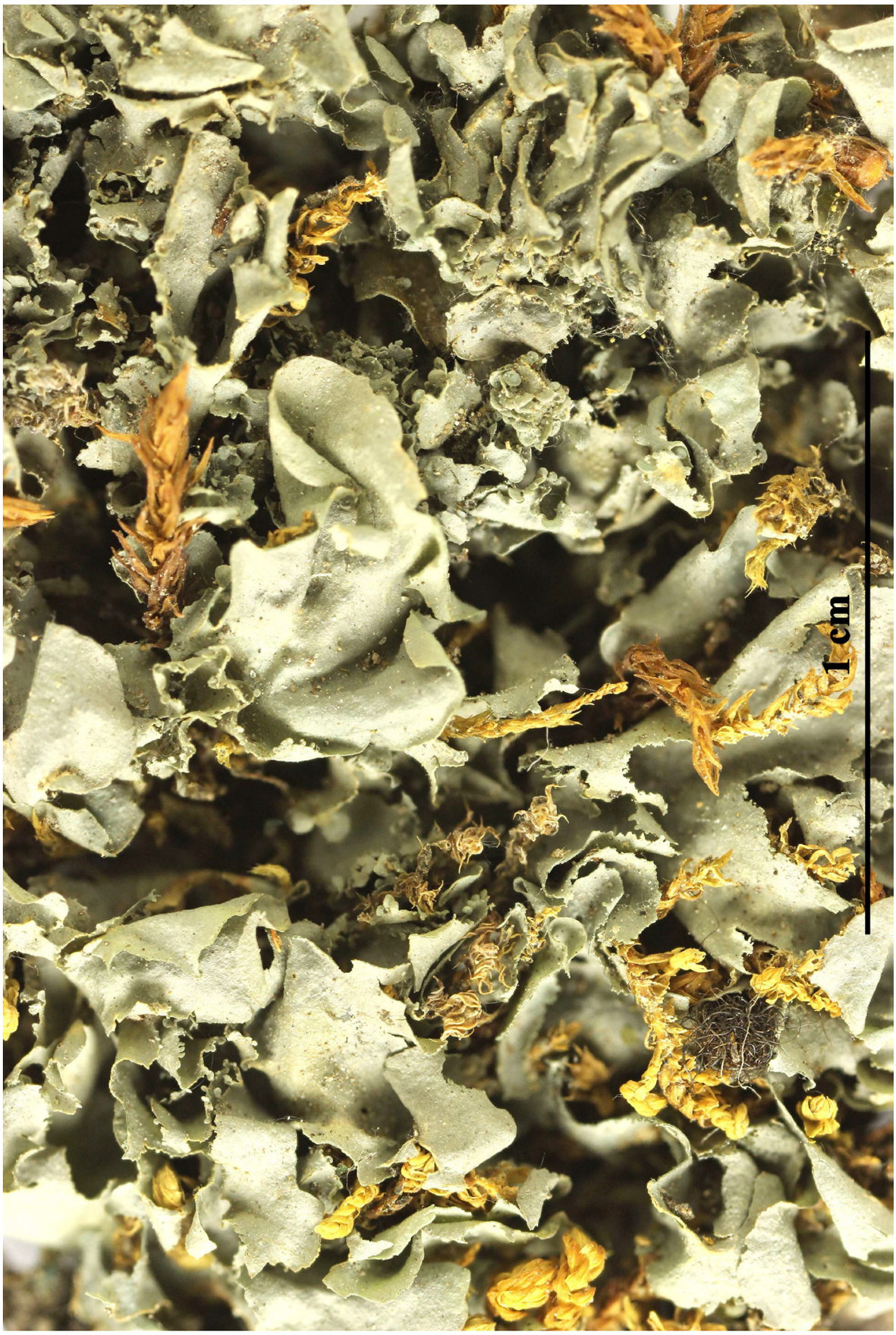


Leptogium moluccanum* var. *myriophyllinum

Leptogium moluccanum* var. *myriophyllinum (Müll. Arg.) Asahina, J. Jap. Bot. 8(6): 28 (1932)
= *Leptogium tremelloides* var. *myriophyllinum* Müll. Arg. 1891

[OH511], Japan. Honshu. Prov. Inaba (Pref. Tottori): Mt. Kyusyo-zan, Rottori-city. On stone wall, 230 m. Leg. Y. Ikoma, 8.6.1951, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 511.

Thallus corticolous or terricolous, loosely adnate, to 4 cm across; lobes orbicular, 4-10 mm wide, 40-60 µm thick; upper side grey to lead-grey, smooth, lacking isidia; lower side paler, etomentose. Apothecia sessile to substipitate, 1.2 mm in diam; thalline exciple creamish; cortex of thalline exciple muiticell layered at base; proper exciple euparaplecten-chymatous only at margin, indistinct at centre; ascospores muriform with 3-5 transverse and 0-1 longitudinal septa, 16-25(-32) x 6-13 µm. - var *myriophyllinum*: Lobes on the margins and on the upper surface minute isidio-microphyllin; like isidia that changed into small leafy lobes.

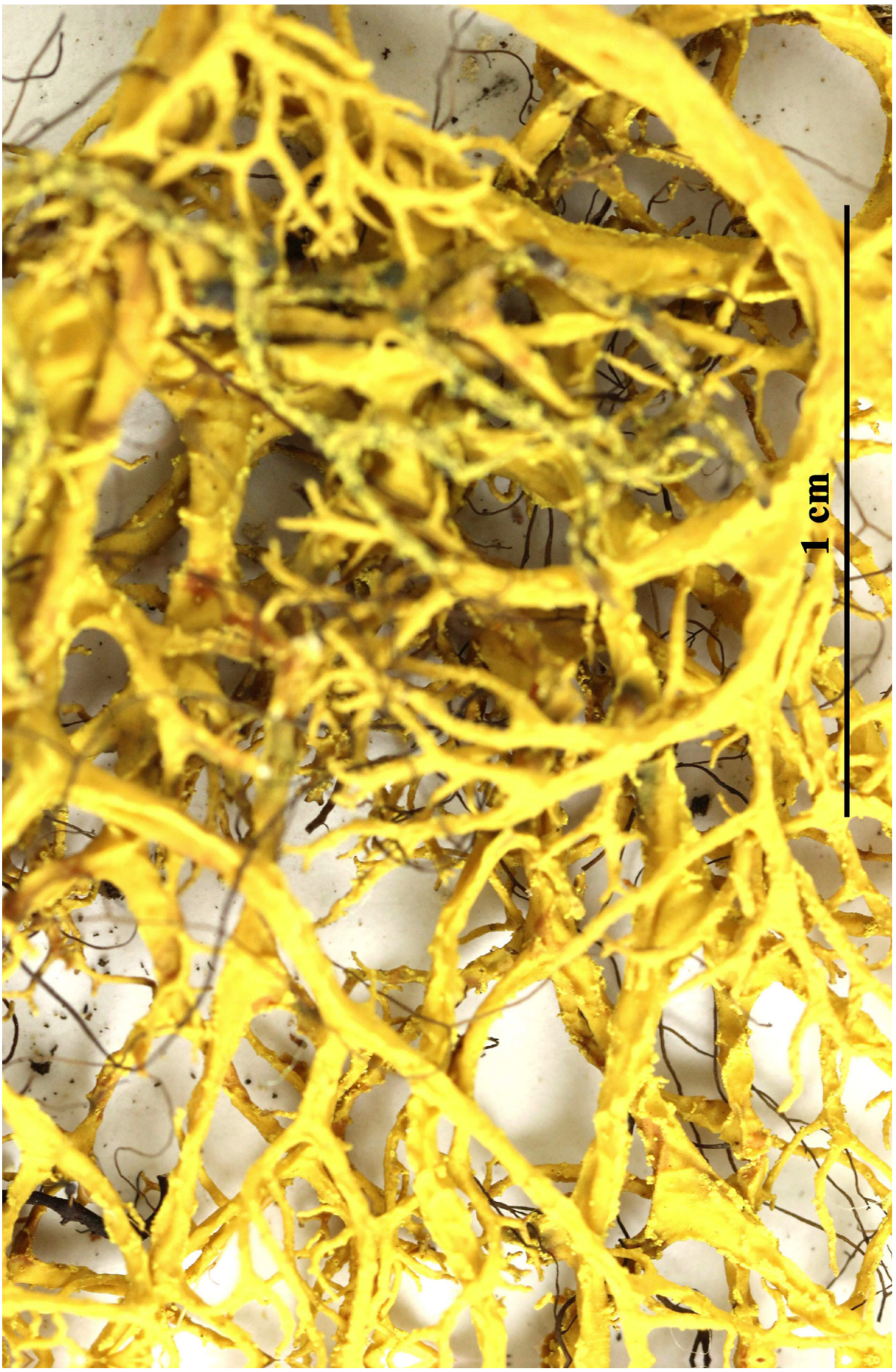


Leptogium moluccanum* var. *myriophyllinum

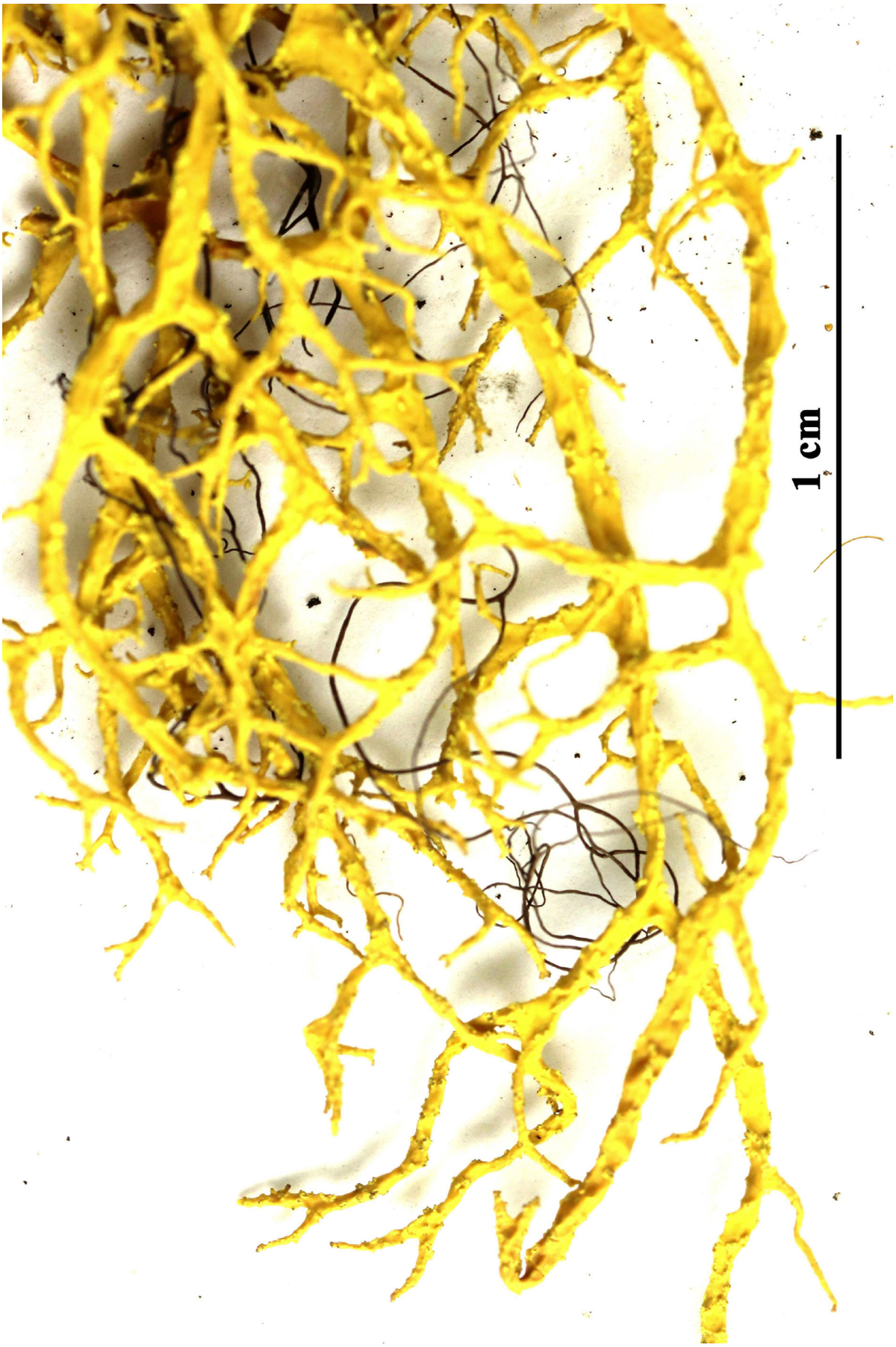
Letharia vulpina (L.) Hue, Nouv. Arch. Mus. Hist. Nat., Paris, 4 sér. 1: 57 (1899)
= *Lichen vulpinus* L. 1753

[KU226], Canada. British Columbia: Paint Brush Trail, Manning Park. On tree trunks, 2100 m. Leg. S. Kurokawa (no. 8692), 4.9.1974, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 226.

Thallus fruticose, attached with a basal holdfast, bushy when young to subpendent when well-developed, bright lemon- to sulphur yellow, to 20 cm long (usually much less), irregularly branched, the main branches up to 4 mm wide, angular, often foveolate, the secondary branches thinner, subulate, often forked. Isidia diffuse, granular-sorediose to cylindrical, generally dense, usually developing from cracks on the angles and ridges, where the cortex has degenerated. Cortex c. 40-60 µm thick, filled with yellowish crystals soluble in K, of anticlinally arranged, thick-walled hyphae; medulla white, arachnoid with medullary strands which are thinner in the upper branches, thicker and fusing into a single strand near the base; cell walls with the Cetraria-type lichenan. Apothecia very rare, lecanorine, to 8 mm across, with a brown disc and short marginal projections on the thalline margin. Epithecium brown; hymenium and hypothecium colourless. Asci 8-spored, clavate, the K/I+ blue tholus penetrated by a faintly amyloid apical cushion with parallel or diverging flanks, the wall K/I-, surrounded by a K/I+ blue outer layer, Lecanora-type. Ascospores 1-celled, hyaline, ellipsoid, 5-8 x 4-5 µm. Pycnidia rare, slightly projecting, black. Conidia sublageniform, (7-)8-9 x c. 1 µm. Photobiont chlorococcoid. Spot tests: cortex and medulla K-, C-, KC-, P-. Chemistry: cortex with vulpinic acid and atranorin; apothecia (hymenium) with norstictic acid. - Note: a circumboreal-montane lichen growing on the bark of coniferous trees, mostly on *Larix* and *Pinus cembra*, more rarely on lignum, near treeline; common and locally abundant.



Letharia vulpina

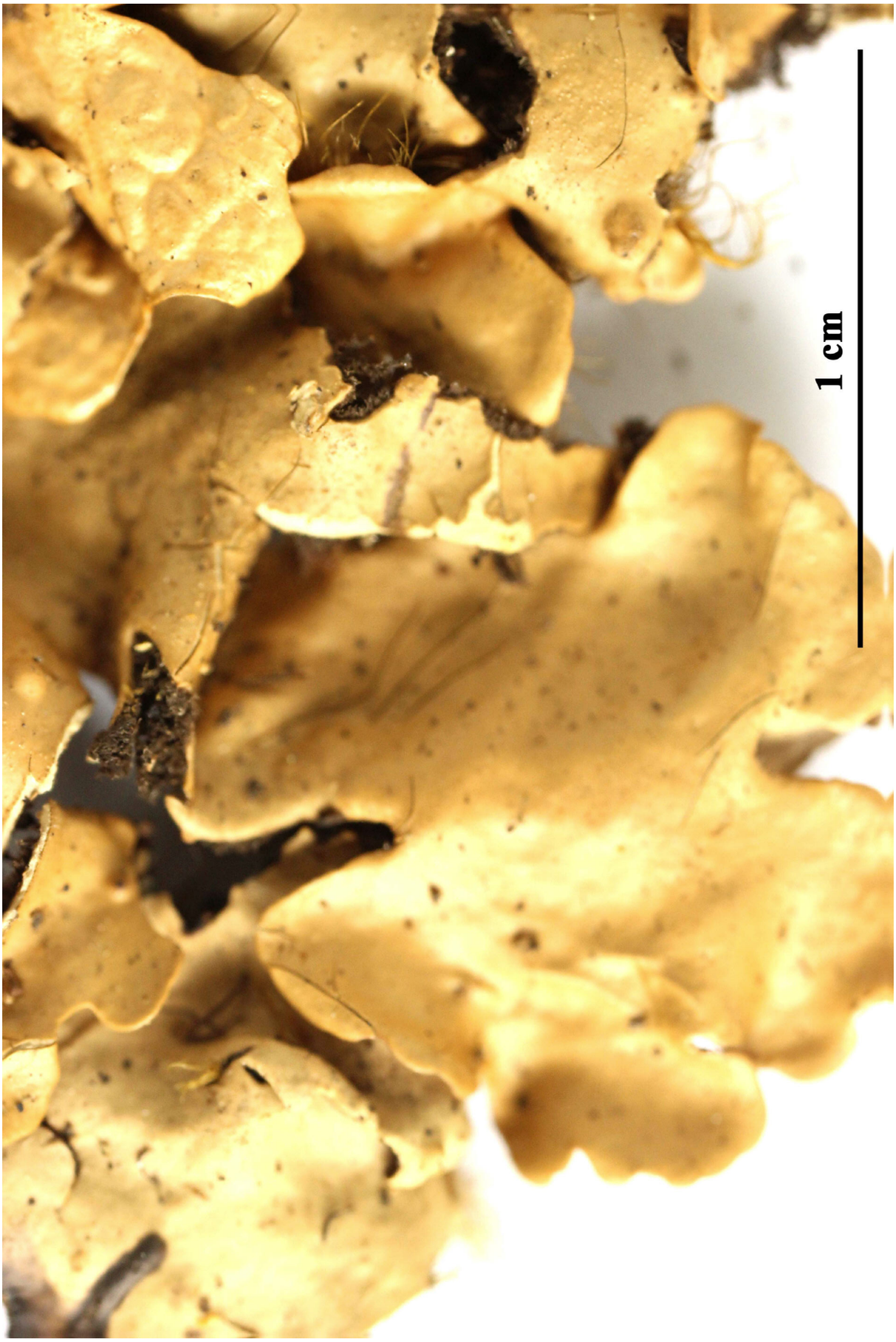


Letharia vulpina

Lobaria discolor (Bory ex Delise) Hue, Nouv. Arch. Mus. Hist. Nat., Paris, 4 sér. 3: 23 (1901)
= *Sticta discolor* Bory ex Delise 1822

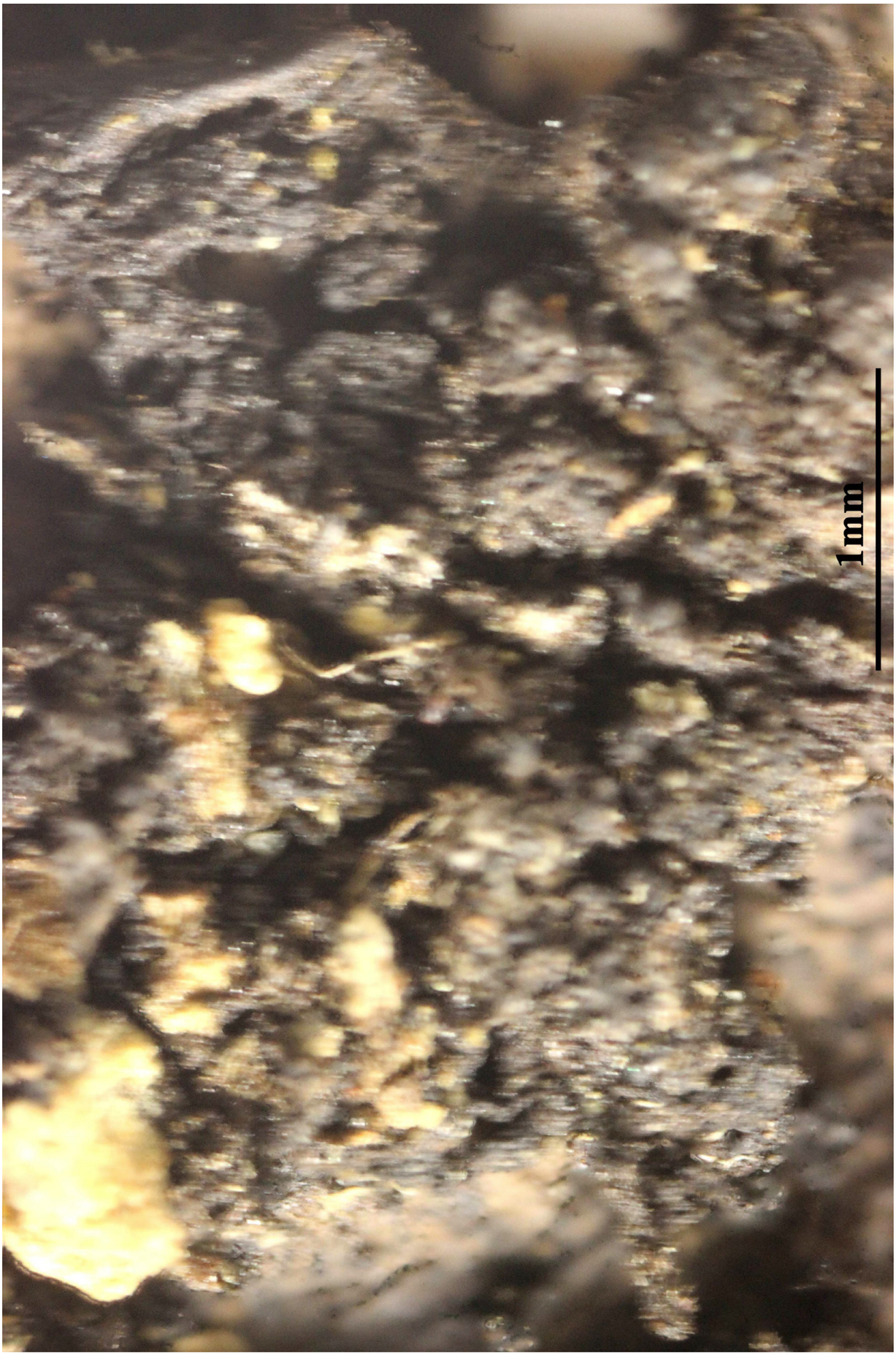
[OH560], Japan. Honshu. Prov. Yamato (Pref. Nara). Ohdaigahara Mts. On tree trunk. Leg. M. Togashi, 13-14.8.1961, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 560.

Thallus medium-sized to large, up to 10-20 cm wide, grayish green to oliveochre, deeply laciniate, lobes rotundate, 1-1.5 cm wide, concave, the apical part of lobes ascending, margins crenulate; dorsal surface of thallus smooth, shining, without isidia, soredia, and lobules; ventral surface of thallus pale, sparsely tomentose and rhizinate only at older portion; dorsal cortex paraplectenchymatolls, ca. 25 p thick, composed of 4-5 layers ofcells with thin walls and large lumina (up to 10 µm in diameter); algal layer 12-15 µm thick, algae grass-green; ventral cortex paraplectenchymatolls, 15-20 µm thick, composed of 4-5 layers of thin-walled cells with large lumina (up to 5 µm in diameter), medullary hyphae 3-5 µm wide. Apothecia on lamina, up to 4-5 mm in diameter, substipitate, constricted at base, almost entire along margin, disc reddish brown; parathecium well-developed, 200 µm thick at margin, united with edge of excipulum thallinum and surrounding algae; epithecium 10-20 µm thick; hypothecium about 90 µm thick; hymenium 130 µm thick; spores pale yellowish brown, 3-septate at maturity, fusiform, ca. 35-40 x 9 µm. Pycnidia more or less prominent, immersed in the thallus; conidia rod-shaped, ca. 5 x1 µm. Reaction: Thallus K+yellow; medulla KC+rose. Chemical substance: Gyrophoric acid. Range: Madagascar, Reunion, and Indonesia. - Diagnostic characteristics for the species are: saucer-shaped or flat, not scrobiculate lobes, fusiform spores, apothecia of type I, the tomentose portion which is diffused on the ventral surface of lobes, and the presence of gyrophoric acid.



Lobaria discolor

Lobaria discolor



Lobaria discolor

Lobaria discolor* var. *inactiva (Asahina) Yoshim., J. Hattori bot. Lab. 34: 265 (1971)
= *Lobaria adscripta* f. *inactiva* Asahina 1933

[KU170], Japan. Hokkaido. Prov. Kushiro: Mt. Me-Akan. Ontrunk of trees, 580 m. Leg. S. Kurokawa (mo. 65518), 26.8.1965, det. I. Yoshimura. Ex S. Kurokawa Lichcenes Rariore Et Critici Exsiccati Nr. 170.

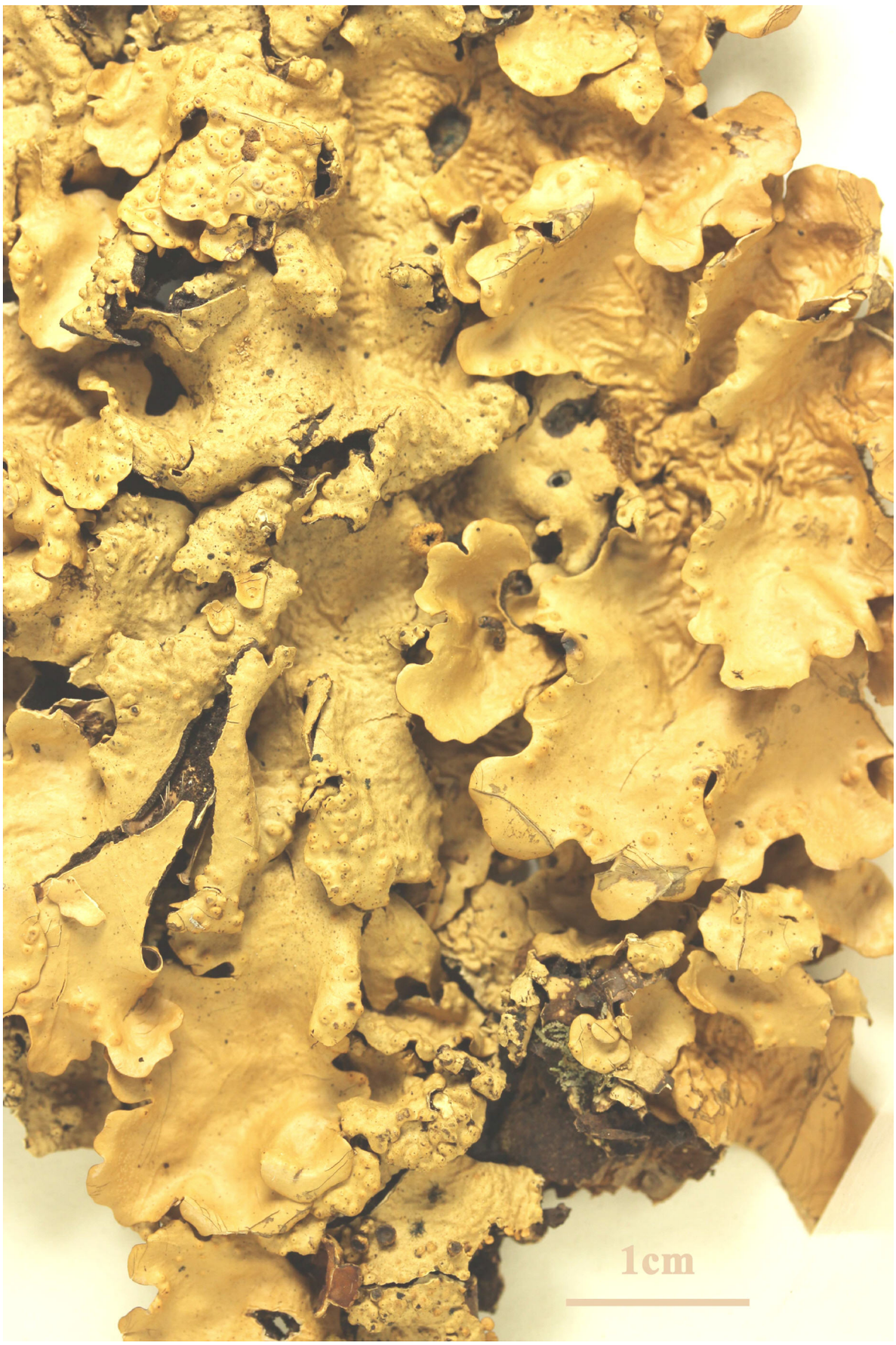
Thallus medium-sized to large, up to 10-20 cm wide, grayish green to oliveochre, deeply laciniate, lobes rotundate, 1-1.5 cm wide, concave, the apical part of lobes ascending, margins crenulate; dorsal surface of thallus smooth, shining, without isidia, soredia, and lobules; ventral surface of thallus pale, sparsely tomentose and rhizinate only at older portion; dorsal cortex paraplectenchymatolls, ca. 25 p thick, composed of 4-5 layers ofcells with thin walls and large lumina (up to 10 µm in diameter); algal layer 12-15 µm thick, algae grass-green; ventral cortex paraplectenchymatolls, 15-20 µm thick, composed of 4-5 layers of thin-walled cells with large lumina (up to 5 µm in diameter), medullary hyphae 3-5 µm wide. Apothecia on lamina, up to 4-5 mm in diameter, substipitate, constricted at base, almost entire along margin, disc reddish brown; parathecium well-developed, 200 µm thick at margin, united with edge of excipulum thallinum and surrounding algae; epithecium 10-20 µm thick; hypothecium about 90 µm thick; hymenium 130 µm thick; spores pale yellowish brown, 3-septate at maturity, fusiform, ca. 35-40 x 9 µm. Pycnidia more or less prominent, immersed in the thallus; conidia rod-shaped, ca. 5 x1 µm. Reaction: Thallus K+yellow; medulla KC+rose. Chemical substance: Gyrophoric acid. Range: Madagascar, Reunion, and Indonesia. - Diagnostic characteristics for the species are: saucer-shaped or flat, not scrobiculate lobes, fusiform spores, apothecia of type I, the tomentose portion which is diffused on the ventral surface of lobes, and the presence of gyrophoric acid.

-var. *inactiva* (Asah.) Yoshim.
Thallus medium-sized, up to ca. 15 cm wide, papery, deeply laciniate, lobes 0.5 - 1.5 cm wide, concave, somewhat ascending, sparsely tomentose and less rhizinate, nude in broad zones along margin of the ventral surface, tomenta deep brown, 130 µm long, rhizines pale to brown, up to 5 mm long. Pycnidia more or less prominent, immersed in thallus margins: Reaction: Thallus K-; medulla KC+rose. Chemical substance: Gyrophoric

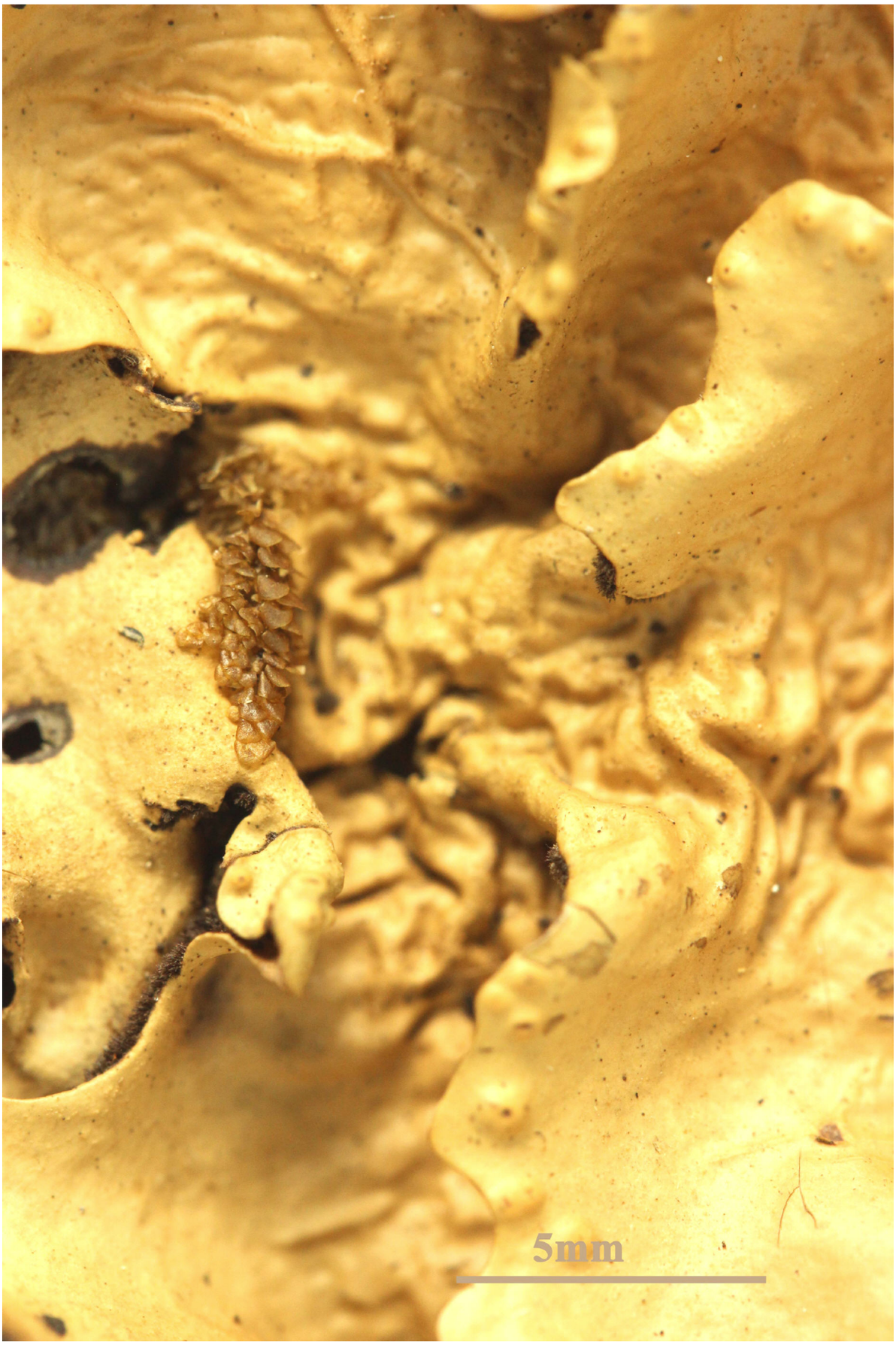
- f. *subadscripta* Yoshim.

This form shows a positive thalline reaction with K, while f. *inactiva* negative. by the thalline reaction with K. Although the K- population ,has slightly thinner thalli than those of the K+ population as suggested by Asahina (1933c), any significant morphological differences could not be found between the two, and the difference of the thalline reaction with K is considered as a taxonomic criterion for forma-level.

Lobaria discolor* var. *inactiva



Lobaria discolor* var. *inactiva



Lobaria discolor* var. *inactiva

Lobaria discolor* var. *subsinuosa (Vain.) Yoshim., J. Hattori bot. Lab. 34: 266 (1971)
= *Lobaria ferax* var. *subsinuosa* Vain. 1913

[KU171], Java. Mountain Garden of Tjibodas. On trunk of trees,1400 m. Leg. S. Kurokava (no. 2128), 12-13. 3.1964, det. Y. Yoshimura. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 171.

Thallus medium-sized to large, up to 10-20 cm wide, grayish green to oliveochre, deeply laciniate, lobes rotundate, 1-1.5 cm wide, concave, the apical part of lobes ascending, margins crenulate; dorsal surface of thallus smooth, shining, without isidia, soredia, and lobules; ventral surface of thallus pale, sparsely tomentose and rhizinate only at older portion; dorsal cortex paraplectenchymatolls, ca. 25 p thick, composed of 4-5 layers ofcells with thin walls and large lumina (up to 10 μm in diameter); algal layer 12-15 μm thick, algae grass-green; ventral cortex paraplectenchymatolls, 15-20 μm thick, composed of 4-5 layers of thin-walled cells with large lumina (up to 5 μm in diameter), medullary hyphae 3-5 μm wide. Apothecia on lamina, up to 4-5 mm in diameter, substipitate, constricted at base, almost entire along margin, disc reddish brown; parathecium well-developed, 200 μm thick at margin, united with edge of excipulum thallinum and surrounding algae; epithecium 10-20 μm thick; hypothecium about 90 μm thick; hymenium 130 μm thick; spores pale yellowish brown, 3-septate at maturity, fusiform, ca. 35-40 x 9 μm. Pycnidia more or less prominent, immersed in the thallus; conidia rod-shaped, ca. 5 x1 μm. Reaction: Thallus K+yellow; medulla KC+rose. Chemical substance: Gyrophoric acid. Range: Madagascar, Reunion, and Indonesia. - Diagnostic characteristics for the species are: saucer-shaped or flat, not scrobiculate lobes, fusiform spores, apothecia of type I, the tomentose portion which is diffused on the ventral surface of lobes, and the presence of gyrophoric acid.

- var. *subsinuosa* (Vain.) Yoshim.
Thallus medium-sized but rarely up to 15 em wide, olive-ochre dorsally, more or less dichotomously laciniate-Iobate, lobes 5-10 mm wide; ventral surface of lobes densely tomentose and dark brown with age, nude and pale brown along margin, occasionally rhizinate and densely tomentose, rhizines simple, fasciculately branched, brown, up to 4mm long, tomenta brown, dimorphous, short tomenta up to 10 μm long, long tomenta 200 μm long or often more elongate. Pycnidia laminal,

obscure, fully immersed in thallus, ca. 300 μm in diameter. Reaction: Thallus K+yellow; medulla KC+rose. Chemical substances: Gyrophoric acid. Habitat: On bark of trees. Range: Tropical Asia and tropical America. This variety differs from the other varieties (var. discolor and var. inactiva) in the following features: (1) ventral lobes are densely and more or less uniformly tomentose, (2) lobes are flat and not lacunose, and (3) pycnidia are not warty. In both var. discolor and var. inactiva the lobes are concave and often saucer-shaped, the ventral lobes are sparsely tomentose with age and almost nude at apex, and the pycnidia are more or less prominent. However, the differences in concavity of lobes and tomentose pattern can not be used for an important taxonomic criteria, because intermediate forms are often seen.

Lobaria discolor* var. *subsinuosa

Lobaria discolor* var. *subsinuosa

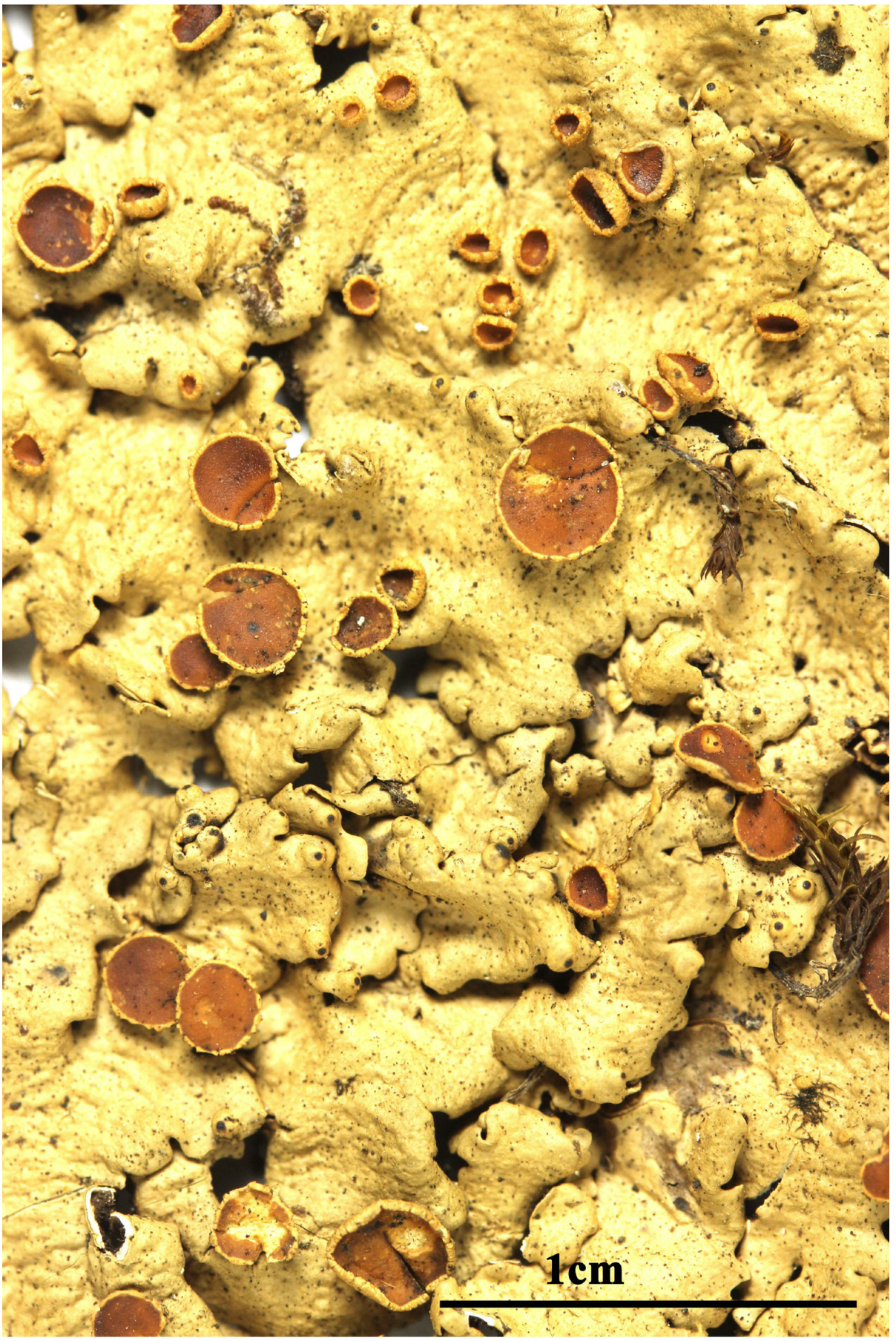
Lobaria discolor* var. *subsinuosa

Lobaria fuscotomentosa Yoshim., J. Hattori bot. Lab. 34: 311 (1971)

[KU173], Japan. Honshu. Prov. Musashi: Mt. Hakutai, Chichibu. On rocks, 1500 m. Leg. S. Kurokawa (no. 70098), 23.5.1970, det. I. Yoshimura. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 173.

Thallus foliaceus, mediocris, ca. 10 cm latus, profunde laciniati-lobatus, viridiflavescens aut viridi-olivaceus aut fuscescens aut glaucescenti-albidus, prostratus, parum expandus, opacus, multum fragilis, sorediis isidiisque destitutus, lobi 7-10 µm lati, crenulati aut repandi, axillis angustatis; dorsum thalli rugosum, intus albidum; venter thalli tomentosus (tomenta ad 200 µm longa), nigrescens, parvus. Cortex dorsalis ca. 30-40 µm crassus, paraplectenchymaticus, lumina ad 10 µm in diametro; stratum algarum ca. 30 µm crassum, algae *Myrmecias* pertinentes; medulla ca. 150 µm, crassa cortex ventralis 13-18 µm crassus, nigricas, pseudoparenchymaticlls. Apothecia supra thallus dispersa, sessilia, primum globosa, dein aperta et applanata, margine tenui, integro aut crenulato, disco obscuro, rufo. Cortex excipuli in margine ca. 65 µm crassus, in basi ca. 90-100 µm crassus, pseudoparenchymaticus cum hyphis 10-12 µm crassis; parathecium ad corticem excipuli arcte adhaerens, algae inter hyphas subcorticalis sparsae; medulla angusta; epithecium rufescens, ca. 10 µm crassum; subhymenium ca. 40 µm crassum; hypothecium ca. 40 µm crassum; hymenium ca. 130 µm altum, asci subclavati; sporae pallidae, demum 3-, raro 7-septatae, primo fusiformes, demum aciculares vel lineares, 40-50 x 5-7 µm. Pycnidia in marginibus loborum frequentia, valde prominentia, ostiolis nigratis, ca. 0.3 mm in diametro; conidia bacil1aria 3-4 x 1 µm. Thallus K+ lutescens; medulla KC+rosea, K-, p-: acidum gyrophoricum et congyrophoricum continens. - Habitat. On bark of trees, mostly in deciduous forests. Range. Eastern Asia.- The diagnostic characteristics for this species are: the thick and dark brown tomenta on the ventral surface of lobes, the positive thalline reaction with K, the presence of gyrophoric and congyrophoric acids, the rugose dorsal surface of lobes, the prominent pycnidia, the apothecium of type I, and the spores acicular at maturity.

Lobaria fuscotomentosa



Lobaria fuscotomentosa

Lobaria fuscotomentosa

Lobaria fuscotomentosa Yoshim., J. Hattori bot. Lab. 34: 311 (1971)

[KU72],Japan. Honshu. Prov.Echigo. On trail between the summit and Akaya, Mt. Nacha. On bark of trees. Leg. S. Kurokawa (no.57194), 15.8.1957, det. Y. Yoshimura. EX S. KUROKAWA ÖICHENES RARIORES ET KRITICI EXSICCATI NR. 172.

Thallus foliaceus, mediocris, ca. 10 cm latus, profunde laciniati-lobatus, viridiflavescens aut viridi-olivaceus aut fuscescens aut glaucescenti-albidus, prostratus, parum expandus, opacus, multum fragilis, sorediis isidiisque destitutus, lobi 7-10 µm lati, crenulati aut repandi, axillis angustatis; dorsum thalli rugosum, intus albidum; venter thalli tomentosus (tomenta ad 200 µm longa), nigrescens, parvus. Cortex dorsalis ca. 30-40 µm crassus, paraplectenchymaticus, lumina ad 10 µm in diametro; stratum algarum ca. 30 µm crassum, algae *Myrmecias* pertinentes; medulla ca. 150 µm, crassa cortex ventralis 13-18 µm crassus, nigricas, pseudoparenchymaticlls. Apothecia supra thallus dispersa, sessilia, primum globosa, dein aperta et applanata, margine tenui, integro aut crenulato, disco obscuro, rufo. Cortex excipuli in margine ca. 65 µm crassus, in basi ca. 90-100 µm crassus, pseudoparenchymaticus cum hyphis 10-12 µm crassis; parathecium ad corticem excipuli arcte adhaerens, algae inter hyphas subcorticalis sparsae; medulla angusta; epithecium rufescens, ca. 10 µm crassum; subhymenium ca. 40 µm crassum; hypothecium ca. 40 µm crassum; hymenium ca. 130 µm altum, asci subclavati; sporae pallidae, demum 3-, raro 7-septatae, primo fusiformes, demum aciculares vel lineares, 40-50 x 5-7 µm. Pycnidia in marginibus loborum frequentia, valde prominentia, ostiolis nigratis, ca. 0.3 mm in diametro; conidia bacil1aria 3-4 x 1 µm. Thallus K+ lutescens; medulla KC+rosea, K-, p-: acidum gyrophoricum et congyrophoricum continens. - Habitat. On bark of trees, mostly in deciduous forests. Range. Eastern Asia.- The diagnostic characteristics for this species are: the thick and dark brown tomenta on the ventral surface of lobes, the positive thalline reaction with K, the presence of gyrophoric and congyrophoric acids, the rugose dorsal surface of lobes, the prominent pycnidia, the apothecium of type I, and the spores acicular at maturity.

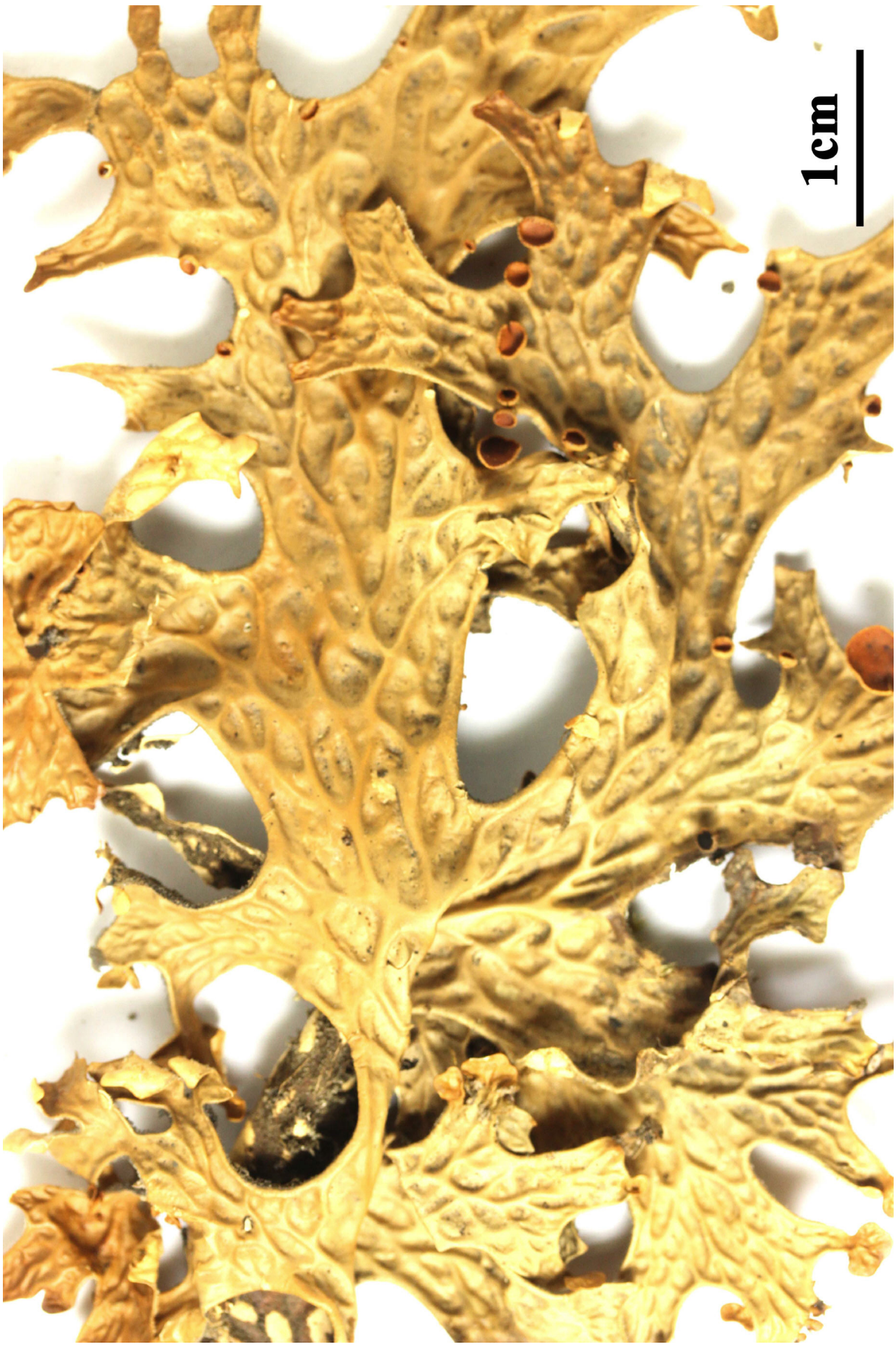
Lobaria fuscotomentosa

Lobaria fuscotomentosa

Lobaria gyrophorica Yoshim., J. Hattori bot. Lab. 34: 275 (1971)

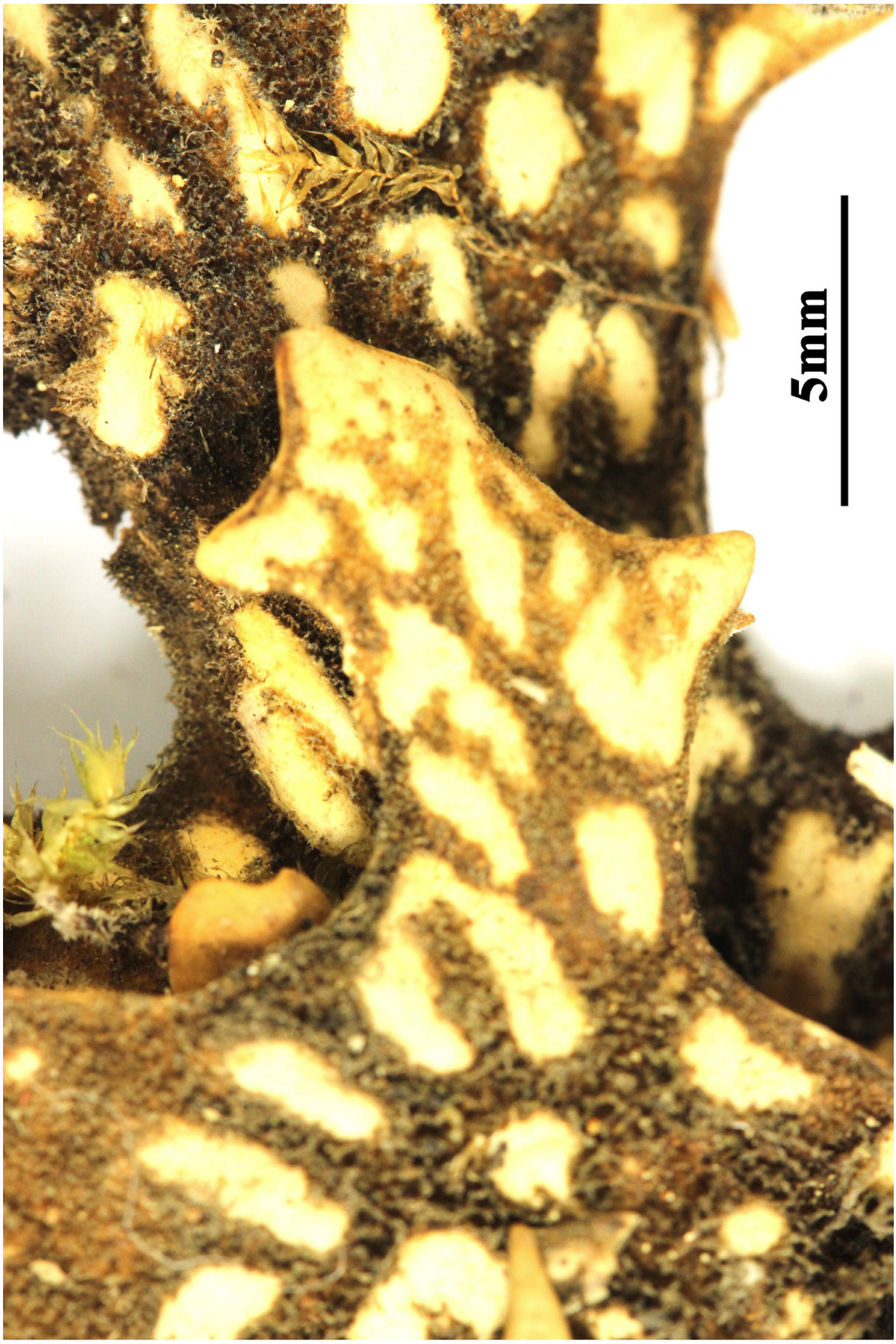
[KU365], Formosa. Prov. Ilan.: Piyanan Pass- On trees,1600-1900 m. Leg. S. Kurokawa (no. 794), 16.1.1964, det. I. Yoshimura. Ex S. Kurokawa and H. Kashiwadani Lichenes Rariores Exsiccati Nr. 365.

Thallus foliaceus, ad 20 cm latus, dense irregulariterque repetito-fulcatus, lobulis ultimis 5 mm longis, 3-4 mm latis, apicibus truncatis vel rotundatis, axillis rotundatis aut obtusis; dorsum thalli reticulati-scrobiculatum, fusci-pallescens aut pallidi- aut
cineri-glaucescens, vulgo nitidum, sorediis isidiisque destitum; venter thalli dilute pallidus aut albidus, canalibus inter bulas nudas tomentosis, tomenta brevi, pallido aut rufescente aut fuscescente aut nigricante. Cortex dorsalis paraplectenchymaticus ca. 28 µm crassus; stratum algarum 25-30 p. crassum, continuum; algae ad Myrmecias pertinentes; medulla 60-70 p crassa, ad locum costae saepe ad 300 p crassa; cortex ventralis paraplectenchymaticus, ca. 12 µm crassus. Apothecia supra laminam, basi bene constricta, substipitata aut sessilia, disco rufo aut fuscescente, ad 5 mm lato, margine tenui, excipulo verruculoso, subnitido; parathecium ad corticem excipuli arcte adhaerens; algae inter hyphas medullae subcorticalis sparsae; epithecium 10 µm crassum; subhymenium 25 µm crassum; hypothecium 25 µm crassum; hymenium ca. 90 µm altum; sporae hyalinae aut pallidae, demum 3-septatae fusiformes, 25-30 x 6-8 µm. Pycnidia in thalIa immersa; conidia bacillaria, ca. 5 x 1 µm. Thallus K-; medulla K-, P-, KC+roseus; in medulla acidum gyrophoricum continens; in tomentis et rhizinis saepe acidum thelephoricum continens. - Japan, Formosa, China



Lobaria gyrophorica

Lobaria gyrophorica



Lobaria gyrophorica

Lobaria isidiophora Yoshim., J. Hattori bot. Lab. 34: 276 (1971)

[KU622], Bhutan. En route from Chamsa to Yabu Thang. On rocks, 3200-3500 m. Leg. H. Harada, 15.5.1967, det. I. Yoshimura. Ex S. Kurokawa and H. Kashiwadani Lichenes Rariores Et Critici Exsiccati Nr. 622.

Thallus medium-sized to large, 10--15 cm wide, dichotomously laciniate-Iobate, lobes truncate at apex, the dorsal surface of thallus olive-ochre, reticulately ridged, shining, isidiate at ridged portions and margins, isidia cylindrical; ventral surface of thallus densely tomentose in grooves between nude, pale swellings, rhizines sparse, dark blue, 3-4 mm long, in tufts, tomenta dark blue or brown; dorsal cortex ca. 35 µm thick, paraplectenchymatous, composed of 6-7 layers of cells with large lumina (up to 7-8 µm in diameter) and thick walls; medulla mostly 130 µm thick, but thicker at ridged portions; algal layer 35 µm thick, algae belonging to *Myrmecia*; ventral' cortex 20 µm thick, paraplectenchymatous, brown, composed of about 3 layers of cells with large lumina (5 µm in diameter) and thick walls, densely tomentose, tomenta 6 µm wide, 120-200 µm long, often longer. Apothecia rare, located on ridged portions, up to 5 mm in diameter, margins entire, disc reddish brown; parathecium poorly developed, united with the edge of thalloid exciple and surrounding medulla, medulla with algae; epithecium 10 µm thick; subhymenium and hypothecium both 40 µm. thick; hymenium 80 µm thick; spores 3-septate at maturity, fusiform, 20--22 x 5-6 µm. Reactions: Thallus K-; medulla K+yellow or red, P+yellow to orange-red, KC+rose. Chemical substances: Gyrophoric acid and norstictic acid always present; constictic and stictic acids present in chemical race I, but lacking in chemical race II. -Chemical race I Containing gyrophoric, stictic, constictic, and norstictic acids.

Lobaria isidiophora

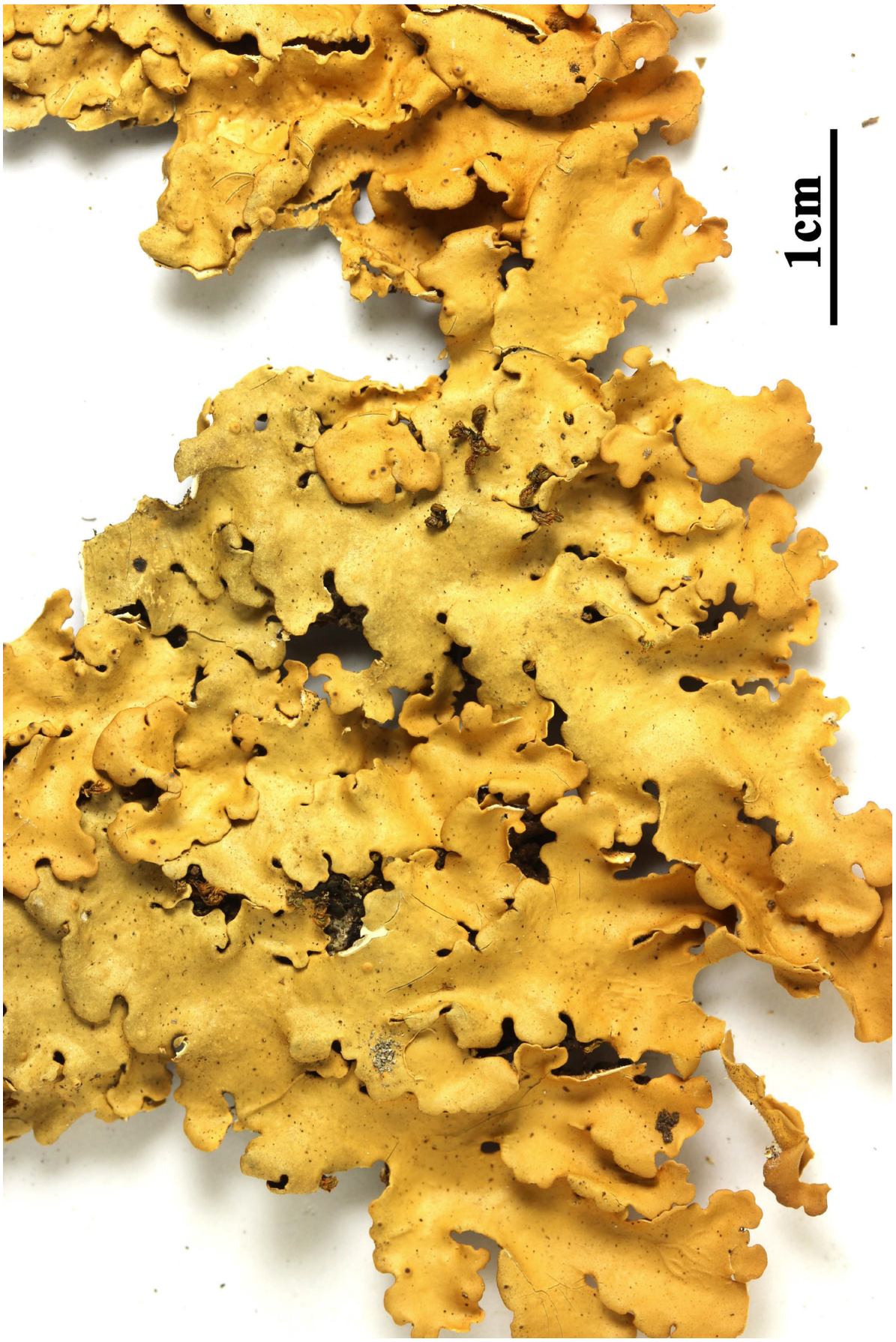
Lobaria isidiophora

Lobaria isidiophora

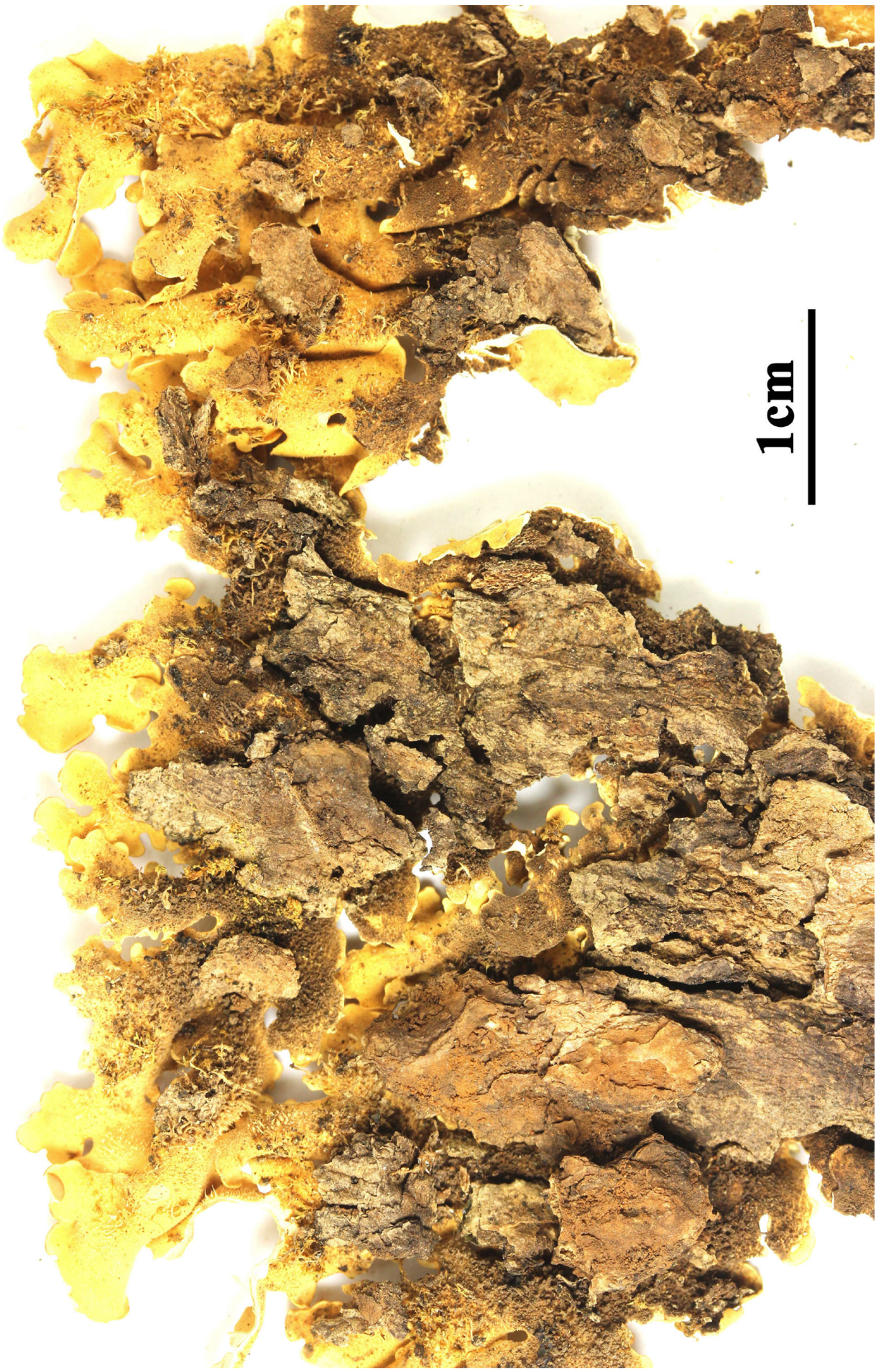
Lobaria japonica (Zahlbr.) Asahina, J. Jap. Bot. 9(7): 450 (1933)
= *Lobaria laciniata subsp. japonica* Zahlbr. 1927
= *Ricasolia japonica* (Zahlbr.) C. Cornejo, in Cornejo, Derr & Dillman, Lichenologist 49(6): 593 (2017)

[KU623], Japan. Honshu. Prov. Shimotsuke: Mt. Kohshin, Kamintsuga-gun. On bark of *Acer mono*, 1500 m. Leg. H. Shibuichi (no. 7759), K. Yoshida & M. Mineta, 26.9.1984, leg. H. Kashiwadani. Ex S. Kurokawa and H. Kashiwadani Lichenes Rariores Et Critici Exsiccati Nr. 623.

Thallus medium-sized to large, up to 15 cm wide, irregularly lobate; dorsal surface of thalli smooth, rarely tomentose, dull, olive-ochre to yellowish-brown; ventral surface: of thalli pale brown, densely tomentose and rhizinate; dorsal cortex ca. 40 µm thick, pale brown, paraplectenchymatous; medulla ca. 180 µm thick; algal layer ca. 25 µm thick. algae grass-green; ventral cortex 10-15 µm thick, composed of 2 rows of loosely aggregated cells; tomenta 20-30 (often up to 100) µm long; tomenta and rhizines pale brown. Apothecia cup-form, sessile, constricted at base, up to 4 mm in -diameter; margin incurved, not expanded horizontally even with age; disc reddish-brown; cortex of thalloid exciple developed; parathecium developed, united with edge of thalloid exciple (apothecium type I); epithecium ca. 20 µm thick; subhymenium ca. 70 µm thick; hypothecium ca. 50 µm thick; hymenium ca. 120 µm thick; spores 3-septate and acicular at maturity, 50-70 x 3-4 µm. Pycnidia immersed in thalli, prominent; conidia rod-shaped, ca. 3x l µm. Reaction: Thallus K - ; medulla KC-. Chemical substance: No lichen substances.
Habitat. On bark of trees. Range. Japan and Sakhalin. - This species is very similar to, and is difficult to distinguish from, *Lobaria quercizans* on a morphological basis. However, *L. quercizans* contains gyrophoric acid, whereas *L. japonica* lacks it.



Lobaria japonica

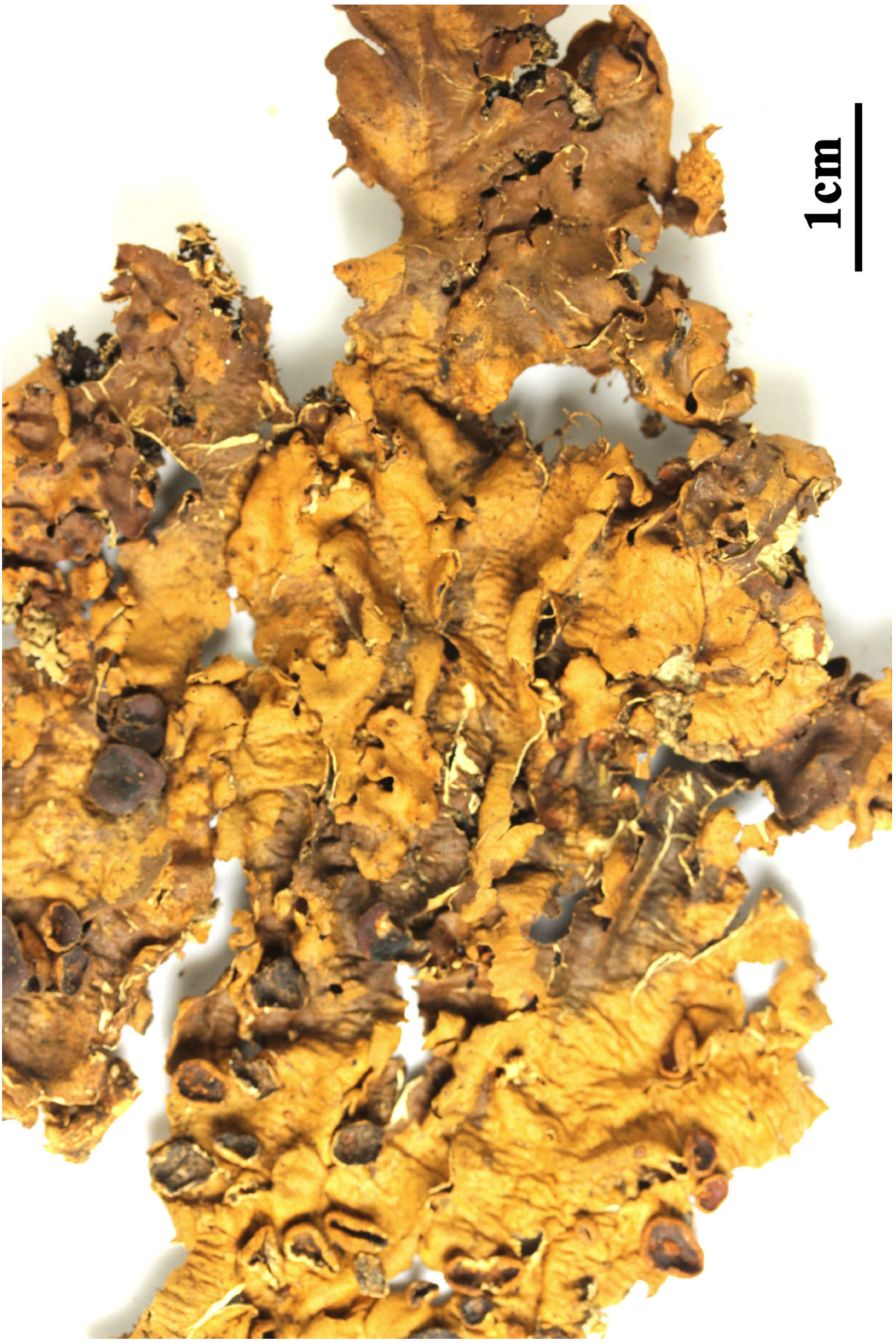


Lobaria japonica

Lobaria japonica (Zahlbr.) Asahina, J. Jap. Bot. 9(7): 450 (1933)
= *Lobaria laciniata subsp. japonica* Zahlbr. 1927
= *Ricasolia japonica* (Zahlbr.) C. Cornejo, in Cornejo, Derr & Dillman, Lichenologist 49(6): 593 (2017)

[OH561], Japan. Honshu. Prov. Shinano (Pref. Nagano): en route from Tsugaike to Ochikura. Hakuba-mura, Kitaazumi-gun. On tree bark with mosses. Legt. M. Togashi, Y. Asahina, S. Kurokawa & M. Nuno, 6.8.1957, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 561.

Thallus medium-sized to large, up to 15 cm wide, irregularly lobate; dorsal surface of thalli smooth, rarely tomentose, dull, olive-ochre to yellowish-brown; ventral surface: of thalli pale brown, densely tomentose and rhizinate; dorsal cortex ca. 40 µm thick, pale brown, paraplectenchymatous; medulla ca. 180 µm thick; algal layer ca. 25 µm thick. algae grass-green; ventral cortex 10-15 µm thick, composed of 2 rows of loosely aggregated cells; tomenta 20-30 (often up to 100) µm long; tomenta and rhizines pale brown. Apothecia cup-form, sessile, constricted at base, up to 4 mm in -diameter; margin incurved, not expanded horizontally even with age; disc reddish-brown; cortex of thalloid exciple developed; parathecium developed, united with edge of thalloid exciple (apothecium type I); epithecium ca. 20 µm thick; subhymenium ca. 70 µm thick; hypothecium ca. 50 µm thick; hymenium ca. 120 µm thick; spores 3-septate and acicular at maturity, 50-70 x 3-4 µm. Pycnidia immersed in thalli, prominent; conidia rod-shaped, ca. 3x l µm. Reaction: Thallus K - ; medulla KC-. Chemical substance: No lichen substances.
Habitat. On bark of trees. Range. Japan and Sakhalin. - This species is very similar to, and is difficult to distinguish from, *Lobaria quercizans* on a morphological basis. However, *L. quercizans* contains gyrophoric acid, whereas *L. japonica* lacks it.



Lobaria japonica

Lobaria japonica

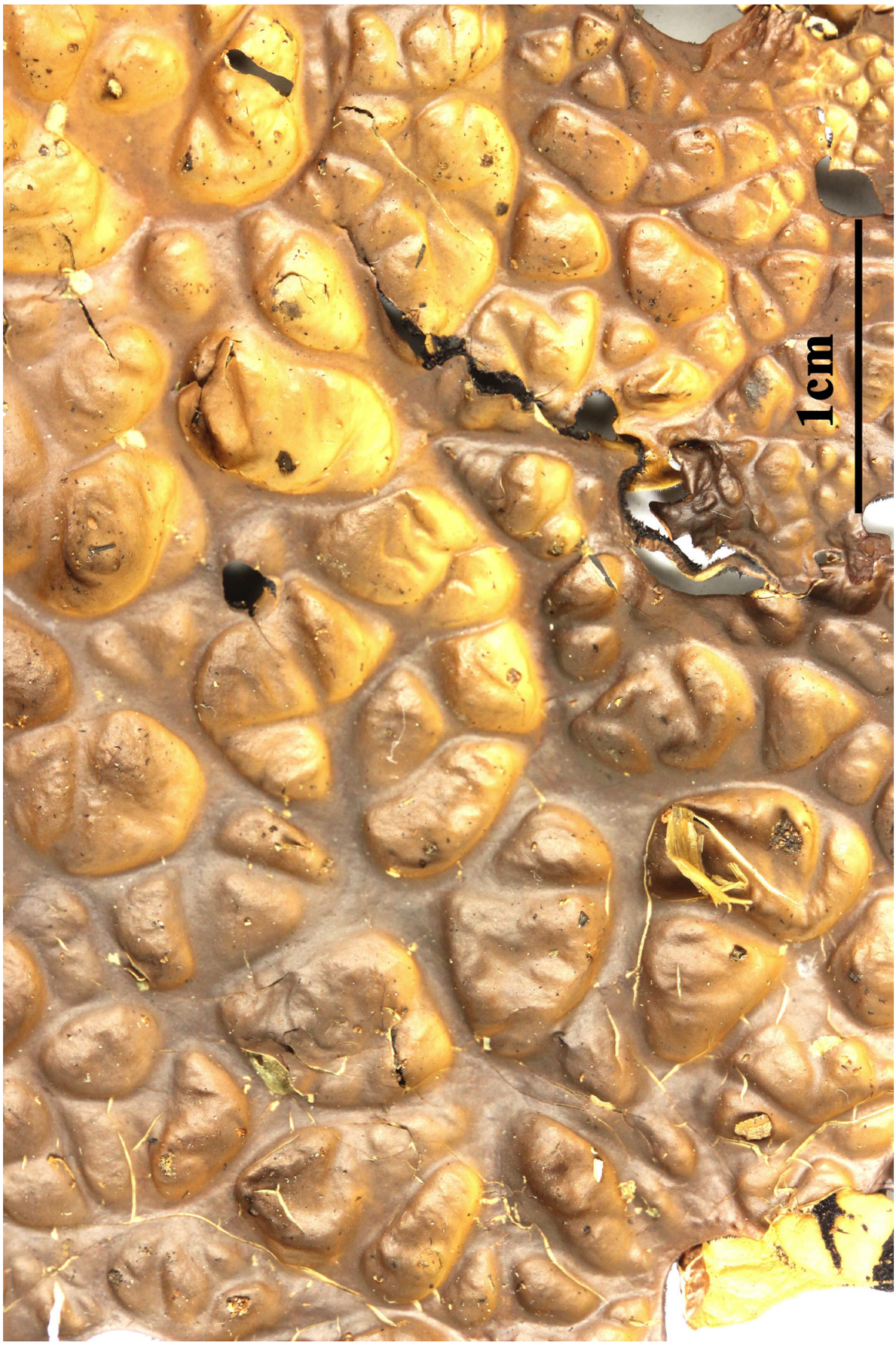
Lobaria japonica

Lobaria kurokawae Yoshim., J. Hattori bot. Lab. 34: 297 (1971)

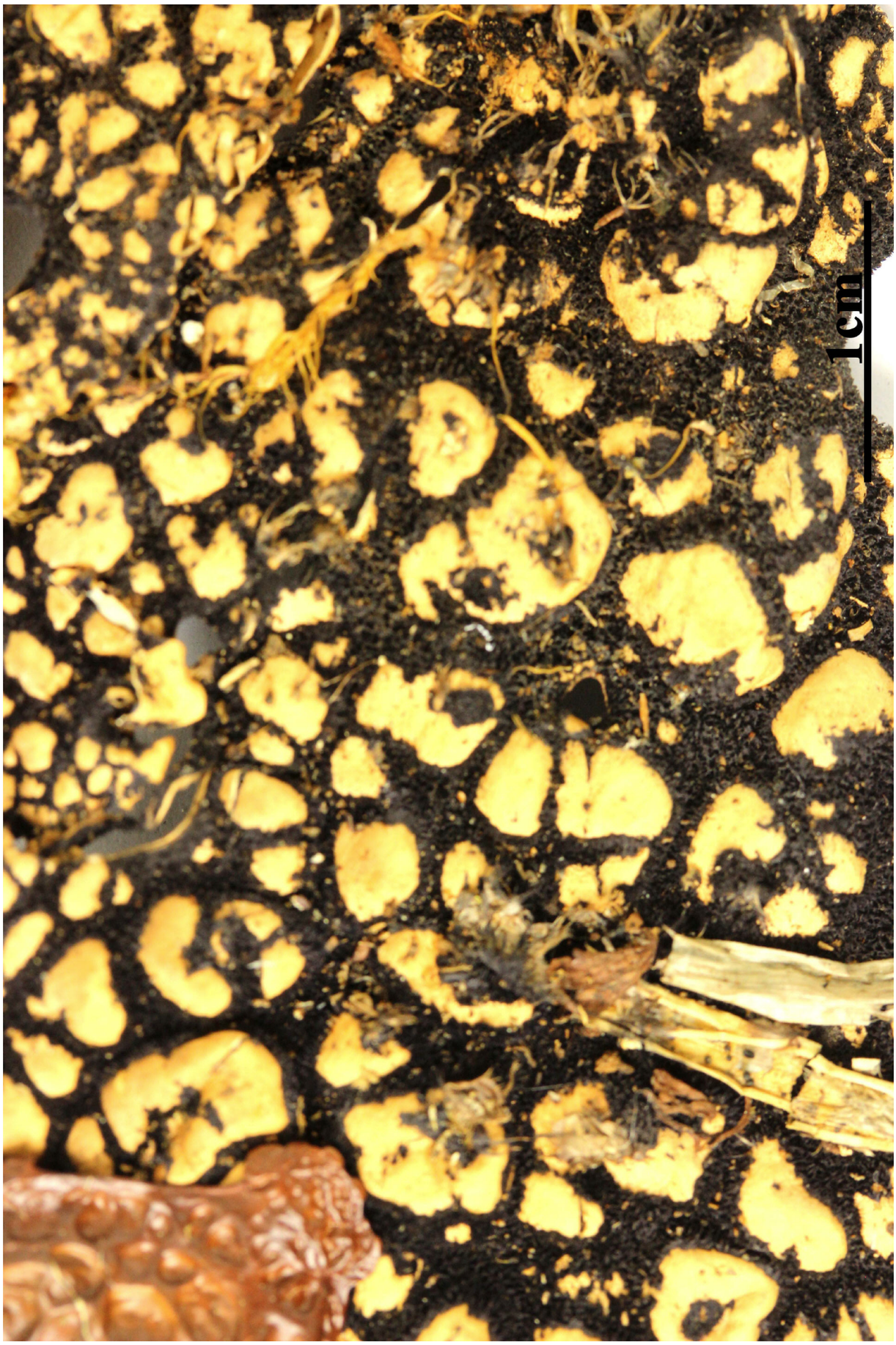
[KA310], Formosa (Taiwan). Mt. Nan-Fu-San, 2600-3000 m- Leg. S. Kurokawa (no. 1140), 21.1.1964, det. I. Yoshimura. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 310.

Thallus foliaceus, ad 20 cm latus, dense irregulariterque repetito-fulcatus, apicibus saepe subtruncatis, axillis rotundatis aut obtusis; dorsum thalli pallidi- aut olivaceiglaucescens, leviter nitidum, reticulati-costatum scrobiculatumque, sorediis et isidiis
destitutum; venter thalli pallidus, canalibus inter bullas glabras pallidas tomentosis, tomento brevi, nigricante, penicillato; cortex dorsalis paraplectenchymatieus, ca. 40 µm crassus, cellulis subrotundatis, ad 13-15 µm latis; stratum algae ca. 40 µm crassum; stratum medullae ex hyphis intricatis formatum, 120-130 µm crassum; cortex ventralis paraplectenchymaticus, ca. 25 µm crassus; algae ad Nostoc pertinentes. Apothcia marginalia aut supra laminam, sat elevata, substipitata aut sessilia, primum cupuliformia, dein applanata, disco 2-3 mm lato, margine tenui, subintegro, exipulo tessellati-verruculoso; algae absentes; parathecium ad corticem excipuli arcte adhaerens; epithecium ca. 10 µm crassum; subhymenium ca. 20 µm crassum; hypothecium ex hyphis conglutinatis instructum, ca. 40 µm crassum; hymenium ca. 90 µm altum; sporae hyalinae aut pallidae, demum 3-septatae, fusiformes, ca. 20 x 8 µm. Pycnidia in thallo immersa; conidia bacillaria, 7 x 1 µm. Thallus K-; medulla K-, P-, KC-; in medulla materia triterpenoides continens; in tomentis et in rhizinis saepe acidum thelephoricum continens.

The diagnostic characteristics for this species are: the reticulately ridged, dorsal surface of lobes, the absence of isidia and soredia, the absence of algae in the excipulum thallinum, the fusiform spores, the presence of triterpenoids, and the absence of stictic and norstictic acids. *L. pseudopulmonaria* resembles this species, but can be ;eparated by the presence of stictic and norstictic acids. Japanese material of this species has been erroneously applied to *L. retigera* by Hue (1901), Asahina (1933b),
Yoshimura (1962), and others. - The specific epithet "kurokawae" is proposed for this new species in honor of Dr. S. Kurokawa who has made a large collection of *Lobaria* from eastern Asia including the type material of this new species.



Lobaria kurokawae



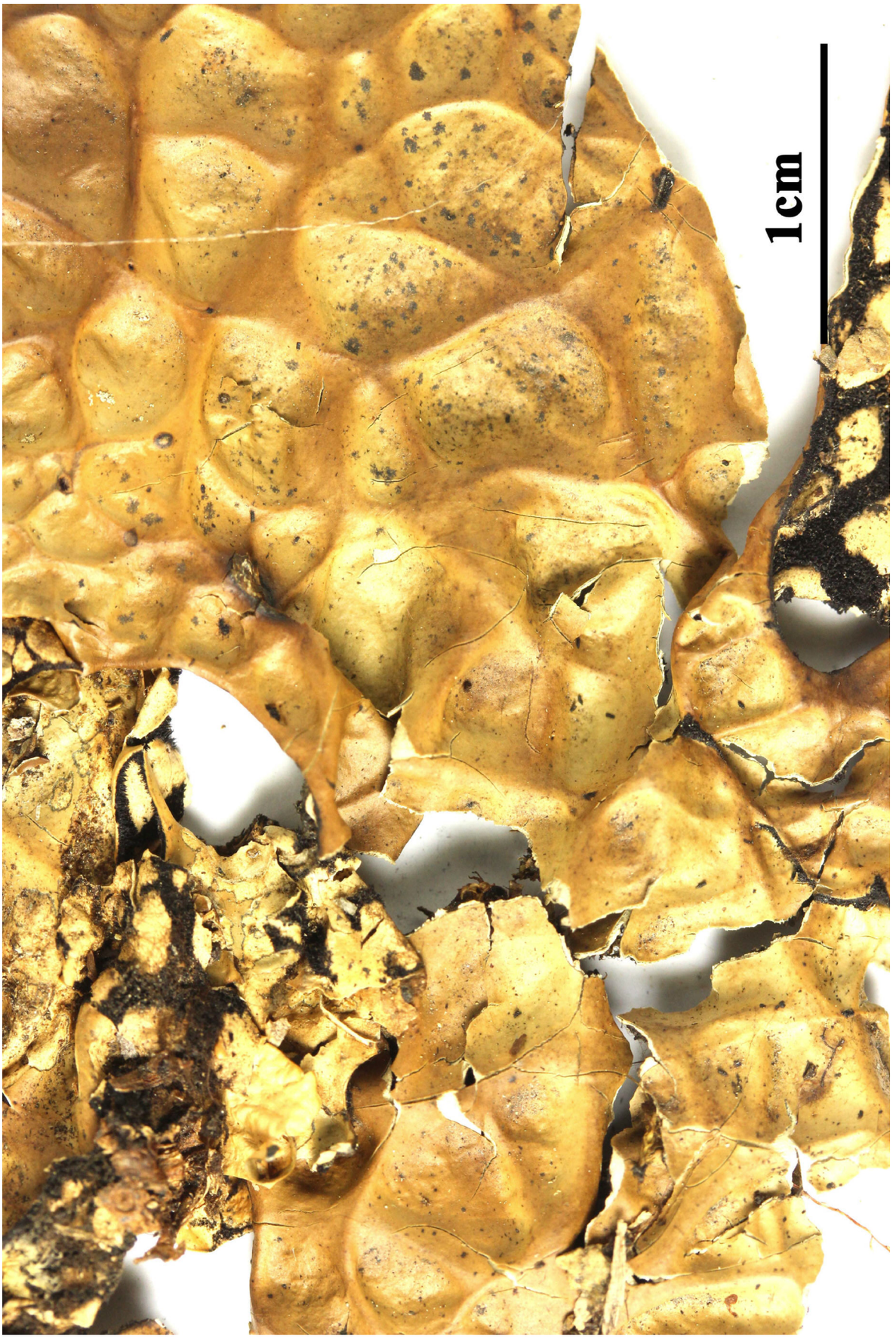
Lobaria kurokawae

Lobaria kurokawae Yoshim., J. Hattori bot. Lab. 34: 297 (1971)

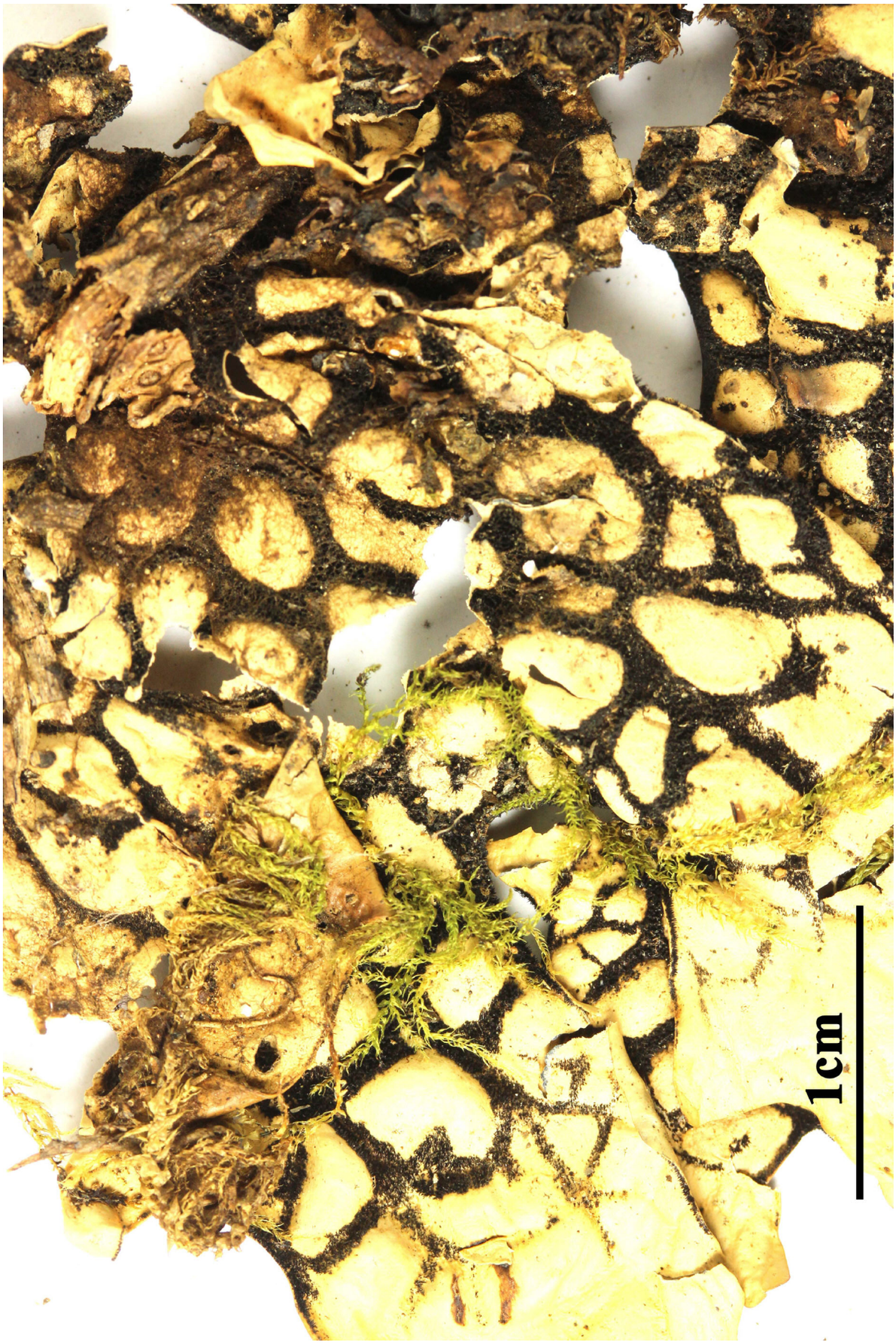
[KU674], Taiwan. Hwalien C.: Mt. Hohusan-shan. Hsiulin-gun. On trunks of tree with mosses,3100m. Leg. H. Shibuichi (no. 7962), K. Yoshida & M. Mineta, 31.7.1985, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 674.

Thallus foliaceus, ad 20 cm latus, dense irregulariterque repetito-fulcatus, apicibus saepe subtruncatis, axillis rotundatis aut obtusis; dorsum thalli pallidi- aut olivaceiglaucescens, leviter nitidum, reticulati-costatum scrobiculatumque, sorediis et isidiis
destitutum; venter thalli pallidus, canalibus inter bullas glabras pallidas tomentosis, tomento brevi, nigricante, penicillato; cortex dorsalis paraplectenchymatieus, ca. 40 µm crassus, cellulis subrotundatis, ad 13-15 µm latis; stratum algae ca. 40 µm crassum; stratum medullae ex hyphis intricatis formatum, 120-130 µm crassum; cortex ventralis paraplectenchymaticus, ca. 25 µm crassus; algae ad Nostoc pertinentes. Apothcia marginalia aut supra laminam, sat elevata, substipitata aut sessilia, primum cupuliformia, dein applanata, disco 2-3 mm lato, margine tenui, subintegro, exipulo tessellati-verruculoso; algae absentes; parathecium ad corticem excipuli arcte adhaerens; epithecium ca. 10 µm crassum; subhymenium ca. 20 µm crassum; hypothecium ex hyphis conglutinatis instructum, ca. 40 µm crassum; hymenium ca. 90 µm altum; sporae hyalinae aut pallidae, demum 3-septatae, fusiformes, ca. 20 x 8 µm. Pycnidia in thallo immersa; conidia bacillaria, 7 x 1 µm. Thallus K-; medulla K-, P-, KC-; in medulla materia triterpenoides continens; in tomentis et in rhizinis saepe acidum thelephoricum continens.

The diagnostic characteristics for this species are: the reticulately ridged, dorsal surface of lobes, the absence of isidia and soredia, the absence of algae in the excipulum thallinum, the fusiform spores, the presence of triterpenoids, and the absence of stictic and norstictic acids. *L. pseudopulmonaria* resembles this species, but can be ;eparated by the presence of stictic and norstictic acids. Japanese material of this species has been erroneously applied to *L. retigera* by Hue (1901), Asahina (1933b),
Yoshimura (1962), and others. - The specific epithet "kurokawae" is proposed for this new species in honor of Dr. S. Kurokawa who has made a large collection of *Lobaria* from eastern Asia including the type material of this new species.



Lobaria kurokawae

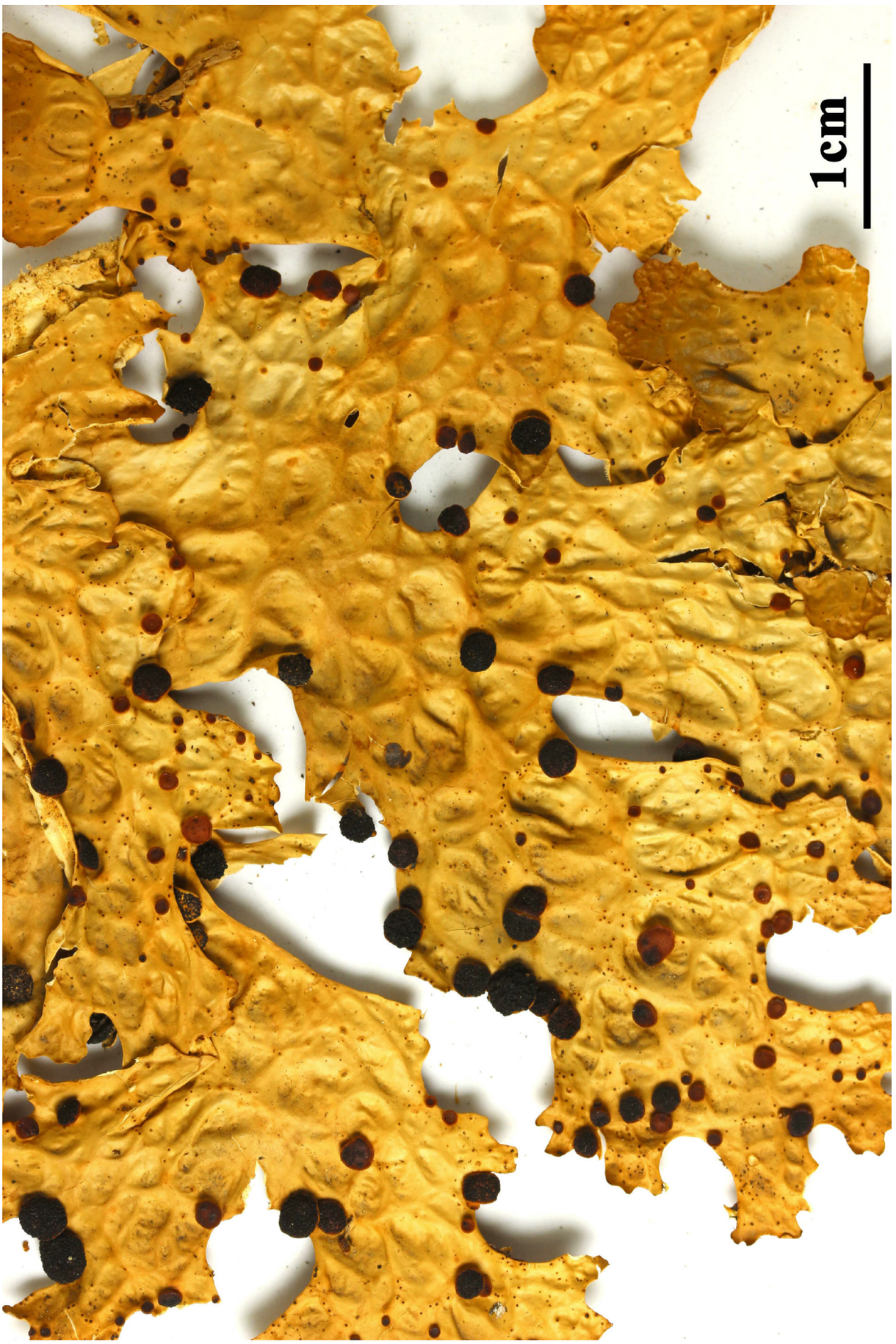


Lobaria kurokawae

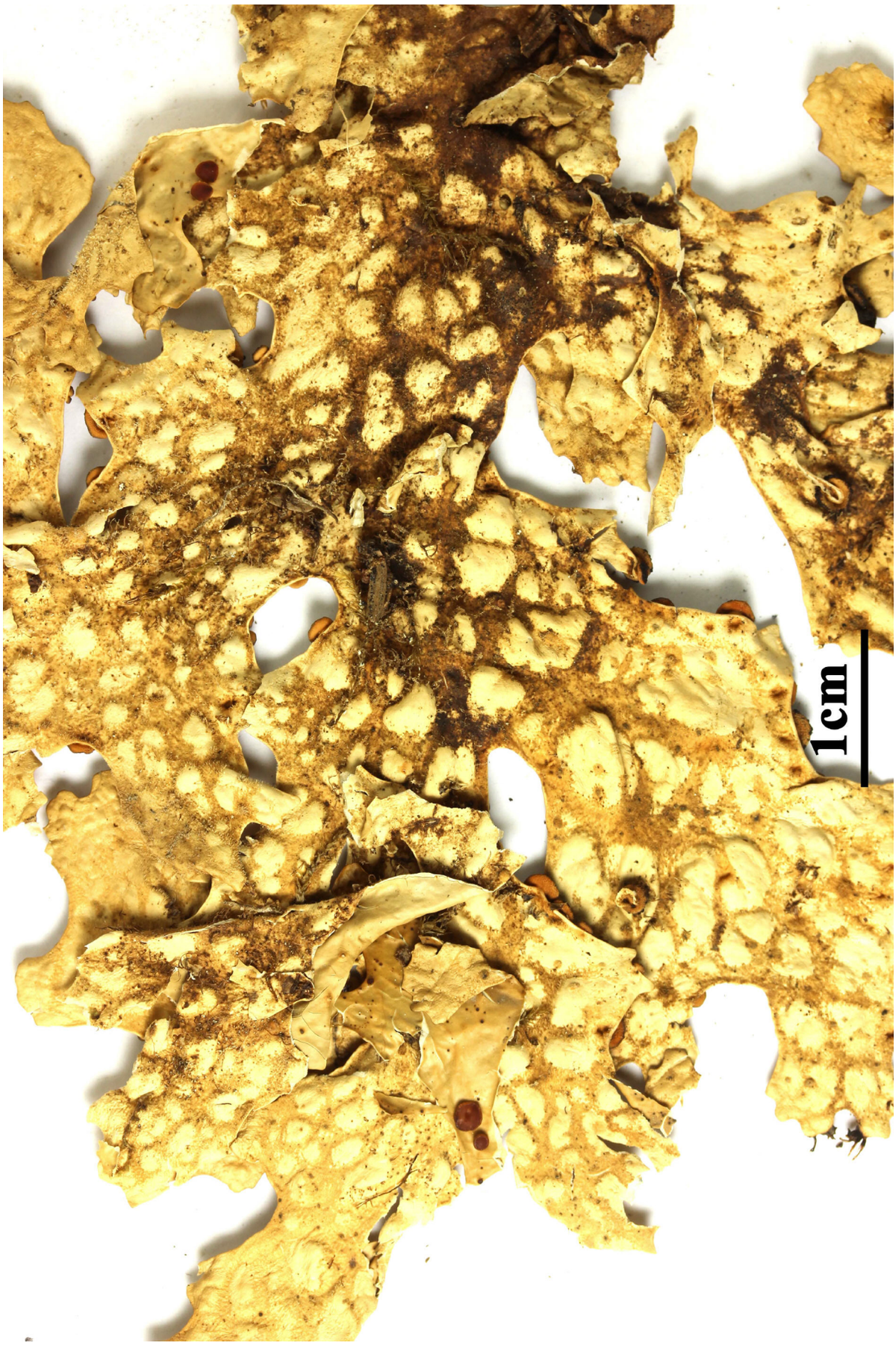
Lobaria linita (Ach.) Rabenh., Deutschl. Krypt.-Fl. (Leipzig) 2(1): 65 (1845) = *Sticta linita* Ach. 1814

[KU276], Canada. British Columbia: Yvonne Peak, 20 miles north-east of Stewart, 1000 m. Leg. S. Kurokawa (no. 8933), 18.8.1975, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 276.

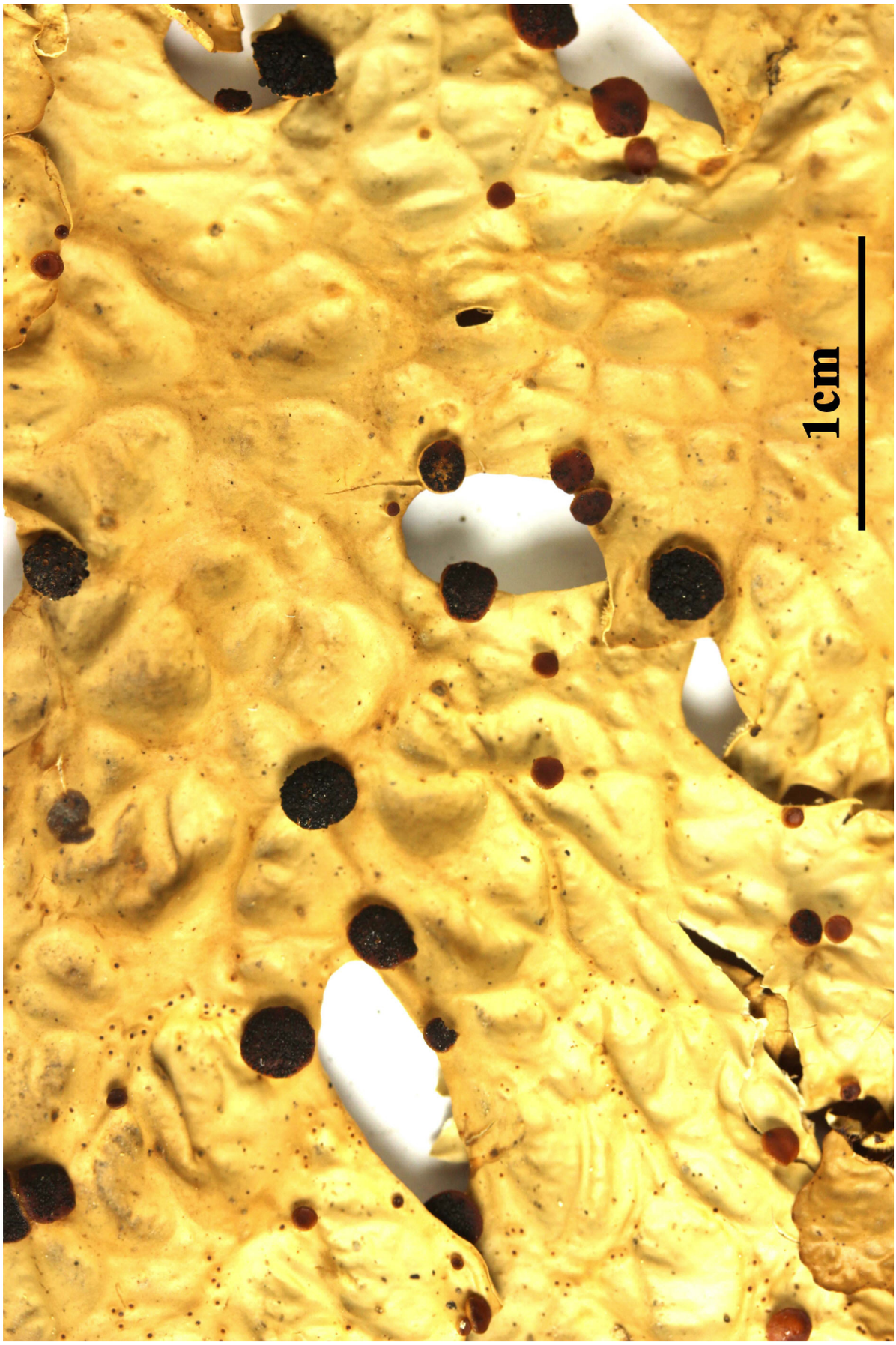
Thallus variable in size, 5-20 cm wide, often more than 30 cm wide, irregularly and densely lobate, lobes wide, margins arched; dorsal surface of thallus greenish gray to brown, more or less reticulately ridged, isidia and soredia lacking; ventral surface of thallus tomentose and sparsely rhizinate but usually nude in swellings and at lobe-apices, tomenta pale brown; dorsal cortex 30-50 µm thick, paraplectenchymatous, composed of 5-6 layers of cells with large lumina (up to 10 µm in diameter) and thin walls; algal layer 15-20 µm thick, algae grass-green; ventral cortex 12-15 µm thick, paraplectenchymatous, composed of 4-5 layers of cells with lumina (3-4 µm in diameter) and thin walls. Cephalodia immersed in thalli (endogenous), portions of thallus containing cephalodia often swollen and externally prominent. Apothecia located on dorsal surface of thalli, disc 1-4 mm in diameter, often more than 5 mm, expanded horizontally, strongly constricted at base, surface of thalloid exciple with numerous protuberances; parathecium united with edge of thalloid exciple, algal cells usually located at basal portion of thalloid exciple, often scattered throughout; epithecium 10 µm thick; hypothecium ca. 50 µm thick; subhymenium ca. 20 µm thick; hymenium ca. 100 µm thick; spores 3-septate at maturity, fusiform, 27-30 x 7-8 µm. Pycnidia immersed in thalli, obscure; conidia rod-shaped. Reactions: Thallus K-; medulla K-, KC- (rarely+rose). Chemical substances: Tenuiorin, linitin A, linitin B, and linitin C. Habitat. On tree-bases, rocks or ground, freqeuntly associated with mosses, in subalpine conifer forests, alpine scrubs, or subarctic-arctic regions. Range. Circumpolar. The diagnostic characteristics of this species are: more or less reticulately ridged lobes, the absence of soredia and isidia, the thalloid exciple almost lacking in algal cells, the fusiform spores, prominent cephalodia, and the presence of tenuiorin. *Lobaria arientalis* and *L. gyrophoriea* often resemble *L. linita*, but differ in the presence of gyrophoric acid and the absence of tenuiorin. *L. arientalis* and *L. gyrophariea* usually occur in montane deciduous forests in Japan, Formosa, and China, while *L. linita* occurs in subalpine coniferous forests or alpine scrubs of Japan, Sakhalin, Kuriles.



Lobaria linita



Lobaria linita

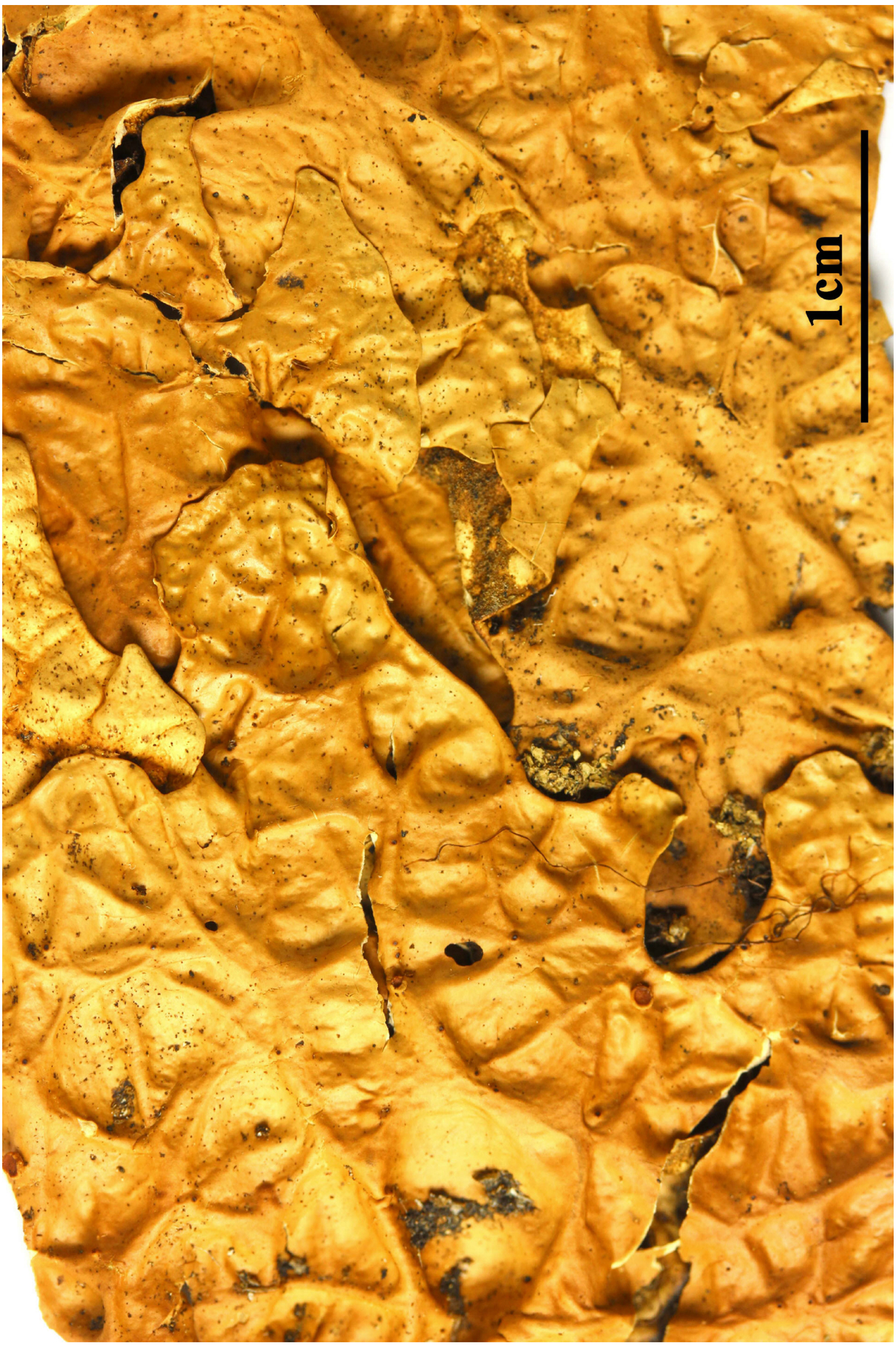


Lobaria linita

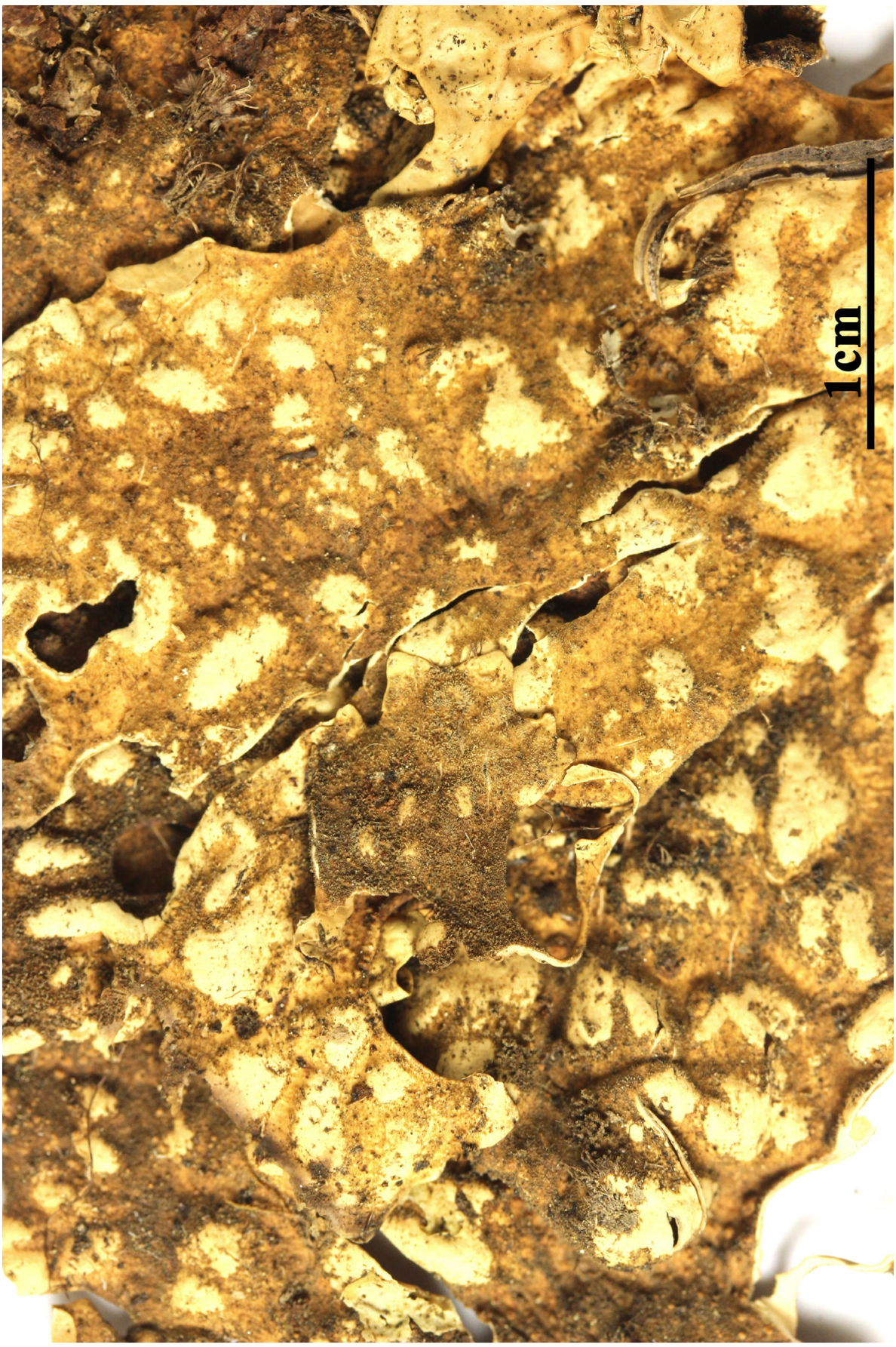
Lobaria linita (Ach.) Rabenh., Deutschl. Krypt.-Fl. (Leipzig) 2(1): 65 (1845) = *Sticta linita* Ach. 1814

[KU424}, Japan. Honshu. Prov. Shinano: Mt. Sampoh, Minami-Saku-gun: On bark of tree, 2450 m. Leg. Shibuichi (no. 5587) and K. Yoshida, 12.7.1979, det. H. Kashiwadani. Ex S. Kurokawa Lichenes Rariores Et Critici Exsiccati Nr. 424.

Thallus variable in size, 5-20 cm wide, often more than 30 cm wide, irregularly and densely lobate, lobes wide, margins arched; dorsal surface of thallus greenish gray to brown, more or less reticulately ridged, isidia and soredia lacking; ventral surface of thallus tomentose and sparsely rhizinate but usually nude in swellings and at lobe-apices, tomenta pale brown; dorsal cortex 30-50 μm thick, paraplectenchymatous, composed of 5-6 layers of cells with large lumina (up to 10 μm in diameter) and thin walls; algal layer 15-20 μm thick, algae grass-green; ventral cortex 12-15 μm thick, paraplectenchymatous, composed of 4-5 layers of cells with lumina (3-4 μm in diameter) and thin walls. Cephalodia immersed in thalli (endogenous), portions of thallus containing cephalodia often swollen and externally prominent. Apothecia located on dorsal surface of thalli, disc 1-4 mm in diameter, often more than 5 mm, expanded horizontally, strongly constricted at base, surface of thalloid exciple with numerous protuberances; parathecium united with edge of thalloid exciple, algal cells usually located at basal portion of thalloid exciple, often scattered throughout; epithecium 10 μm thick; hypothecium ca. 50 μm thick; subhymenium ca. 20 μm thick; hymenium ca. 100 μm thick; spores 3-septate at maturity, fusiform, 27-30 x 7-8 μm. Pycnidia immersed in thalli, obscure; conidia rod-shaped. Reactions: Thallus K-; medulla K-, KC- (rarely+rose). Chemical substances: Tenuiorin, linitin A, linitin B, and linitin C. Habitat. On tree-bases, rocks or ground, freqeuntly associated with mosses, in subalpine conifer forests, alpine scrubs, or subarctic-arctic regions. Range. Circumpolar. The diagnostic characteristics of this species are: more or less reticulately ridged lobes, the absence of soredia and isidia, the thalloid exciple almost lacking in algal cells, the fusiform spores, prominent cephalodia, and the presence of tenuiorin. *Lobaria arientalis* and *L. gyrophoriea* often resemble *L. linita*, but differ in the presence of gyrophoric acid and the absence of tenuiorin. *L. arientalis* and *L. gyrophariea* usually occur in montane deciduous forests in Japan, Formosa, and China, while *L. linita* occurs in subalpine coniferous forests or alpine scrubs of Japan, Sakhalin, Kuriles.



Lobaria linita



Lobaria linita

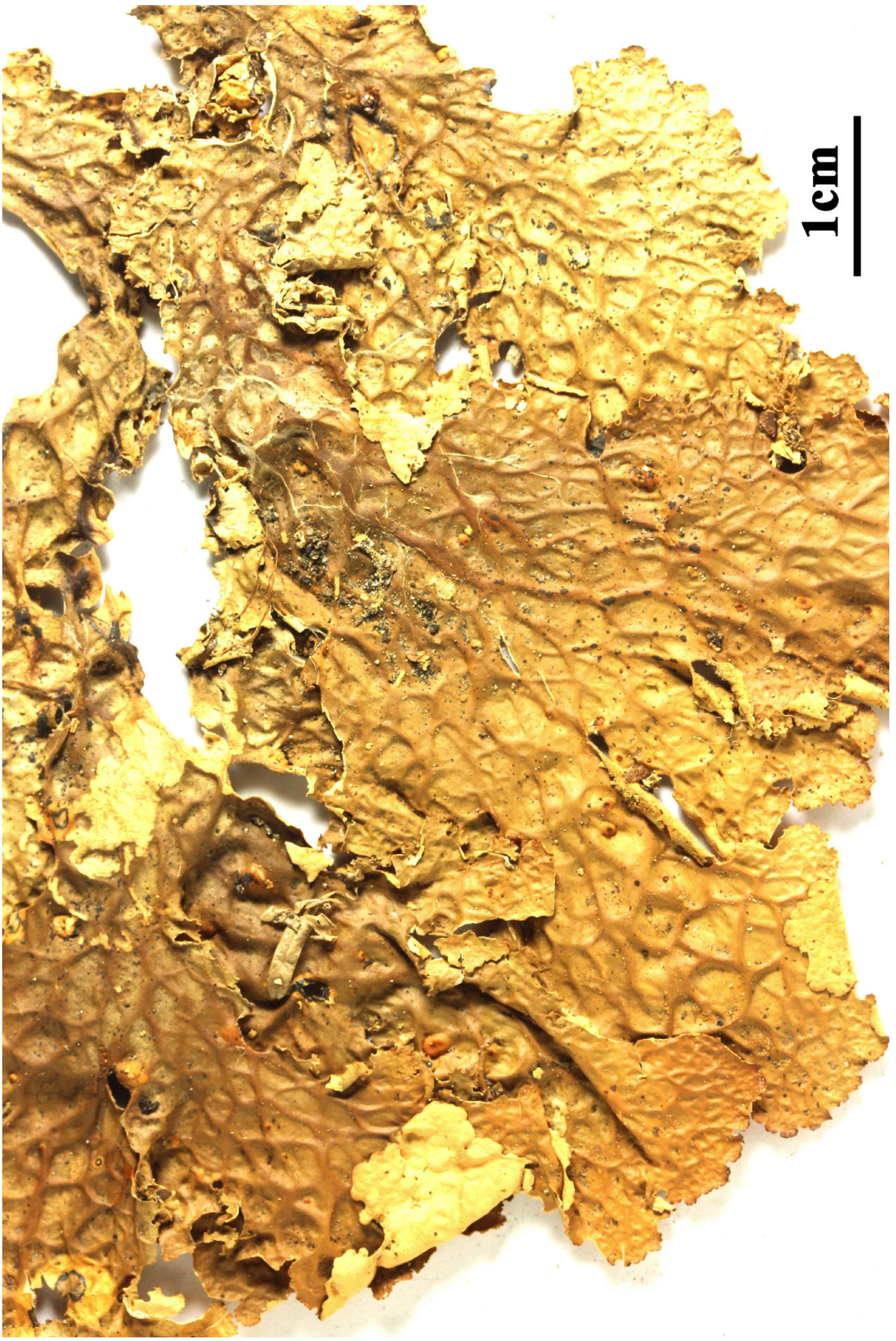
Lobaria oregana (Tuck.) Müll. Arg., Flora, Regensburg 72: 364 (1889)
= *Sticta oregana* Tuck. 1874

[KU227], Canada. British Cokumbia: Englishman River Falls Park, Vancouver Island. On trees, 170 m. Leg. Kurokawa (no. 8759), 7.9.1974, det. S. Kurokawa. EX. S. KUROKAWA LICHENES RARIOES ET CRITICI EXSICCATI NR. 227.

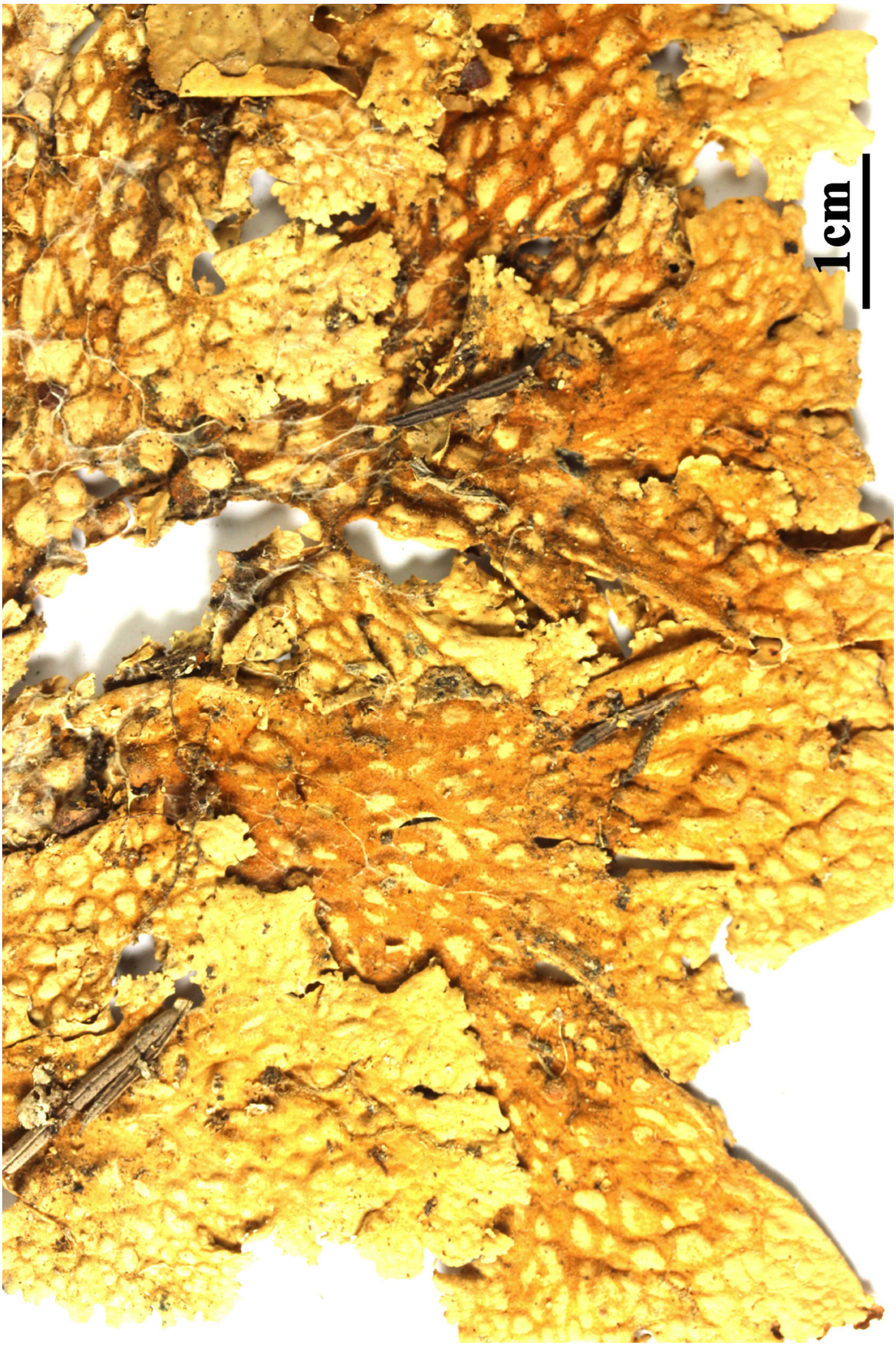
Thallus up to 25 cm broad; central portions firmly attached, loosely so or free at periphery; coriaceous-membranaceous, strongly reticulately ribbed and pitted; Tea Green, Warm Buff, and darker when dry, greener when wet. Lobes spatulate, often subdivided, rarely linear, up to 6 x 10 cm. Margins not thickened, undulate-crenate and fringed with concolorous lobules. Lobules often abundant in older portions, usually present on lamella in clusters. Soredia and isidia absent. Undersurface with smooth to wrinkled bulliform, generally naked areas that are separated by smooth to wrinkled tomentose veins. Lower cortex Cream Color to Chamois and darker in older portions and veins. Tomentum becoming dark with age, usually lacking from marginal zone; rhizines to 3 mm long. Thallus thickness of pit 130-180 µm, vein 270-420 µm. Upper cortex 18-25 µm thick, of 5-6 cell layers, lumen to 10 µm diam., outer layers brown. Algal layer usually dense, 25-35 µm thick; algae green, 4-12 µm diam. Medulla thickness of pit 65-90 µm, rib 230-350 µm; compact in veins, hyphae 2.5-4.5 µm diam. Lower cortex 12-20 µm thick, 3-5 cells thick, more or less paraplectenchymatous, lumen 1.5-4.5 µm diam., hyaline or brownish. Tomentum hyaline, unbranched, clustered or single, up to 300 µm long and 4.5-6.5 µm diam. Cephalodia internal, abundant, appearing cal or globose swellings up to 2.2 mm across, blue-green algae 3-6 µm diam. Pycnidia absent or numerous, visible diam., with a dark ostiole. Pycnidiophores 1.5 µm.. Apothecia common, lamellar, scattered, oid scales when young, flat and becoming parasitized. Thalline exciple pubescent smooth to crenulate. Proper exciple ca. 80 µm thick. Hypothecium 50-85 µm thick, yellowish and becoming brownish, cells indistinct. Hymenium 90-115 µm thick, faint violet to brownish, with reddish brown epithecial gelatin. Paraphyses simple, tips occasionally forked, 1.5-2.5 µm diam. Asci 90-113 x 12-16 µm; spores often aborting, 6-8/ascus, hyaline, usually 1-septate but also 3-septate, acicular, straight or strongly curved, often more attenuate at one end, 42-73(-85) x 4.5-9.5 µm. Reactions: medulla K+ yellow and

P+ orange, upper cortex K-, C-, KC-. Microchemical: usnic, norstictic, stictic, unknown 3, constictic always present Lobaria oregana can be identified on the the basis of the presence of abundant lobules on the dorsaldorsal surface which give the thallus a fringed appearance and, in fresh specimens, a yellow tinge that is imparted by usnic usnic acid.

Lobaria oregana



Lobaria oregana



Lobaria oregana

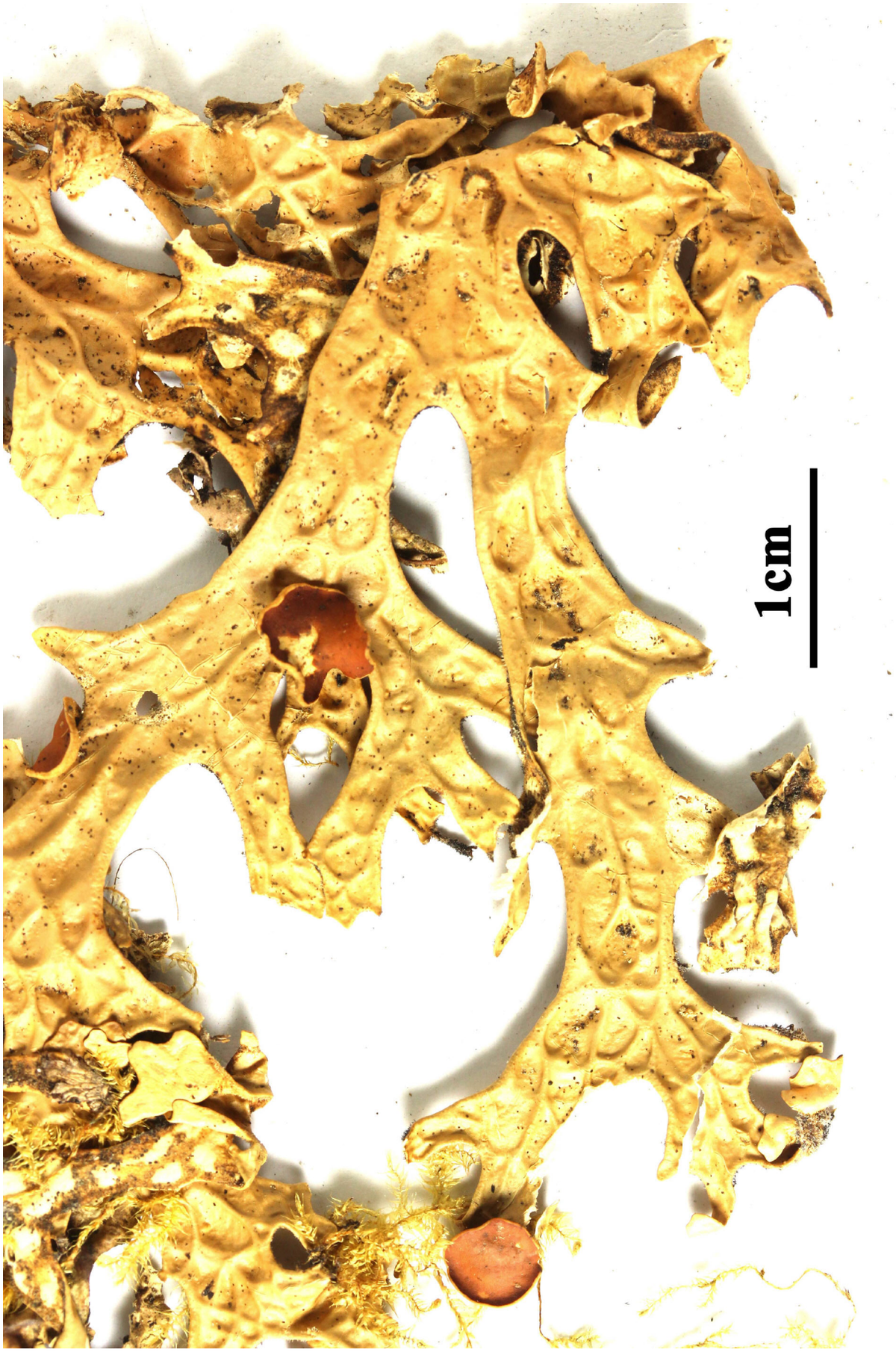
Lobaria orientalis (Asahina) Yoshim., J. Hattori bot. Lab. 32: 75 (1969)
= *Lobaria pulmonaria var. orientalis* Asahina 1949

[KU175], Formosa. Prov. Taitung: Mt. Lachialachiaerh. On trunk of trees, 1800-2200 m. Leg. S. Kurokawa (no. 2334), 21.1.1965, det. Y. Yoshimora. EX S. KUROKAWA LICHENES RARIORES ET CRITICE EXICCATI NR, 175.

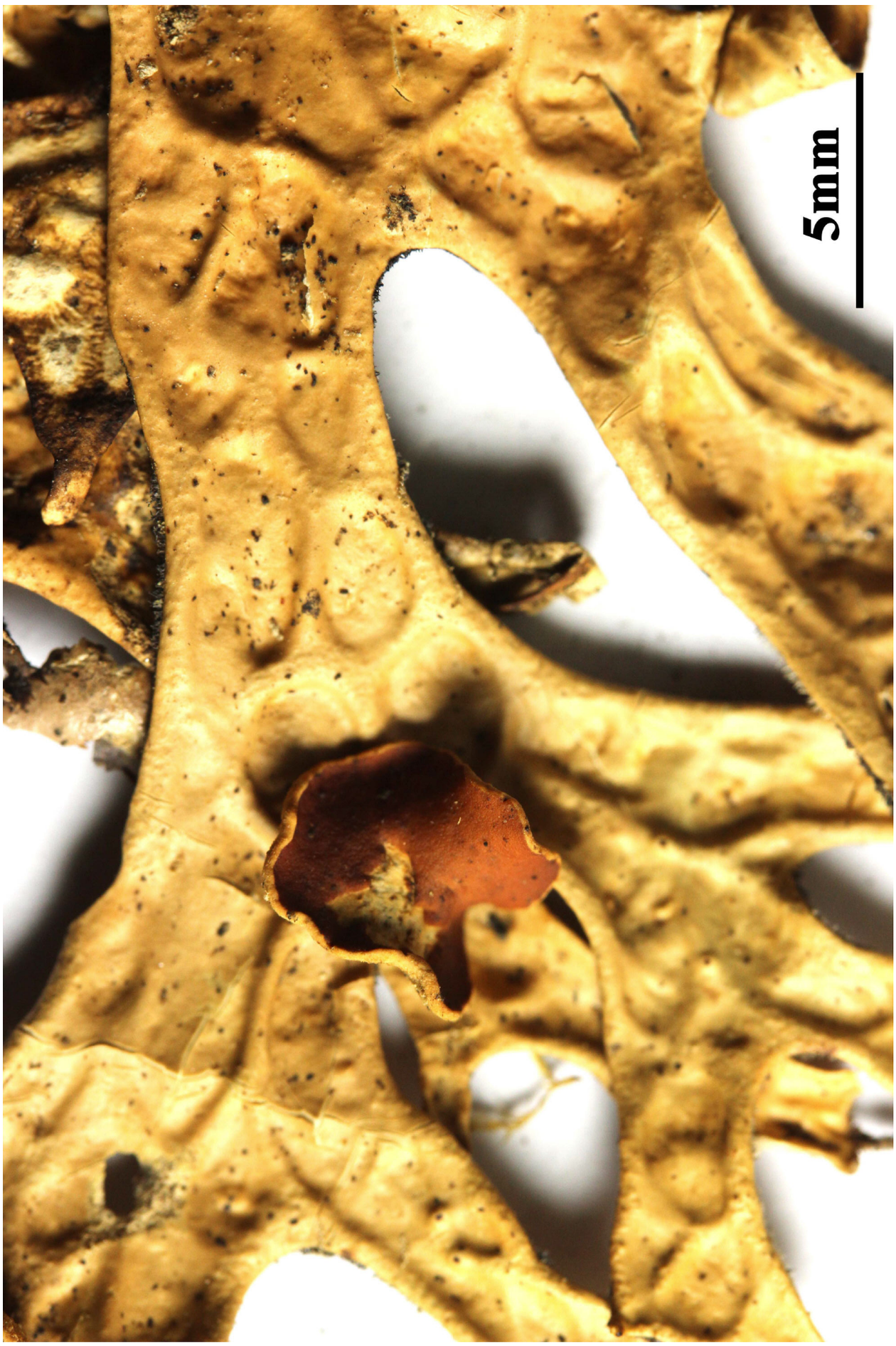
Thallus large, 10-20 cm wide, often more than 30 cm wide, 2-3 (or more) times divaricately laciniate, antler-like, with shorter internodes near apex, apex more or less truncate; dorsal surface of thallus olive-ochre in herbaria, distinctly reticulately ridged, glabrous, shining; ventral surface of thallus pale brown, densely tomentose and rhizinate in grooves between swellings, rh~zines and tomenta brown, both ca. 4 mm long; dorsal cortex 35-60 µm thick, paraplectenchymatous, composed of 7-8 layers of cells with large lumina, the outermost layer brown, ca. 25 µm thick, inner layers pale, ca. 30 µm thick; medulla mostly ca. 200 µm thick, up to 400 µm thick at ridged portions; algal layer 50 µm thick, algal cells grass-green; ventral cortex 20-25 µm thick, pale brown, paraplectenchymatous, composed of 4-5 layers of thick-walled cells with large lumina, densely tomentose, tomenta up to 300 µm long, simple, rarely branched, pale brown to deep-blue. Inner cephalodia often present. Apothecia located on ridged portion of dorsal surface of lobes, strongly constricted at base, disc reddish brown, 1-3 mm in diameter; margin entire, excipulum thallinum verruculose; parathecium united with edge of excipulum thallinum and surrounding algal cells in medullary layer; epithecium 10 µm thick, subhymenium 40 µm thick; hypothecium 20 µm thick; hymenium 90 µm thick; spores colorless, 3-septate at maturity, fusiform, 25-30 x 6-9 µm. Pycnidia immersed along ridged portion of thalli, obscure, ostiole blackish brown, punctiform; conidia rod-shaped, 5 x 1 µm. Reaction: Thallus K-; medulla KC+rose, P+ orange-red, K+yellow or re . Chemical substances: Gyrophoric acid and norstictic acid always present: in addition, constictic

acid and stictic acid are present in chemical race I, but lacking in chemical race II. Thelephoric acid often present in tomenta and rhizines. Chemical race I Containing gyrophoric, norstictic, and constictic acids.

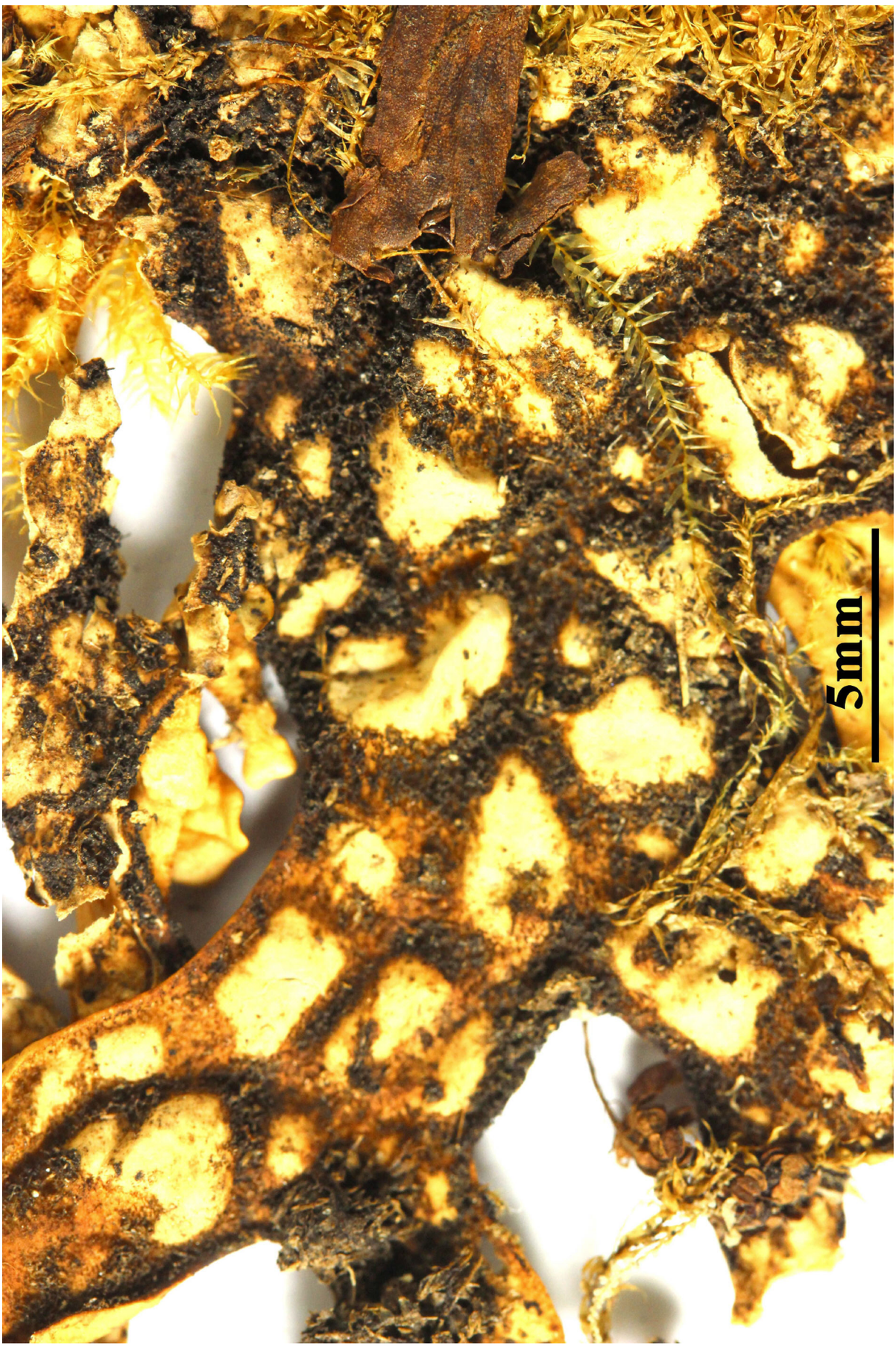
Lobaria orientalis



Lobaria orientalis



Lobaria orientalis



Lobaria orientalis

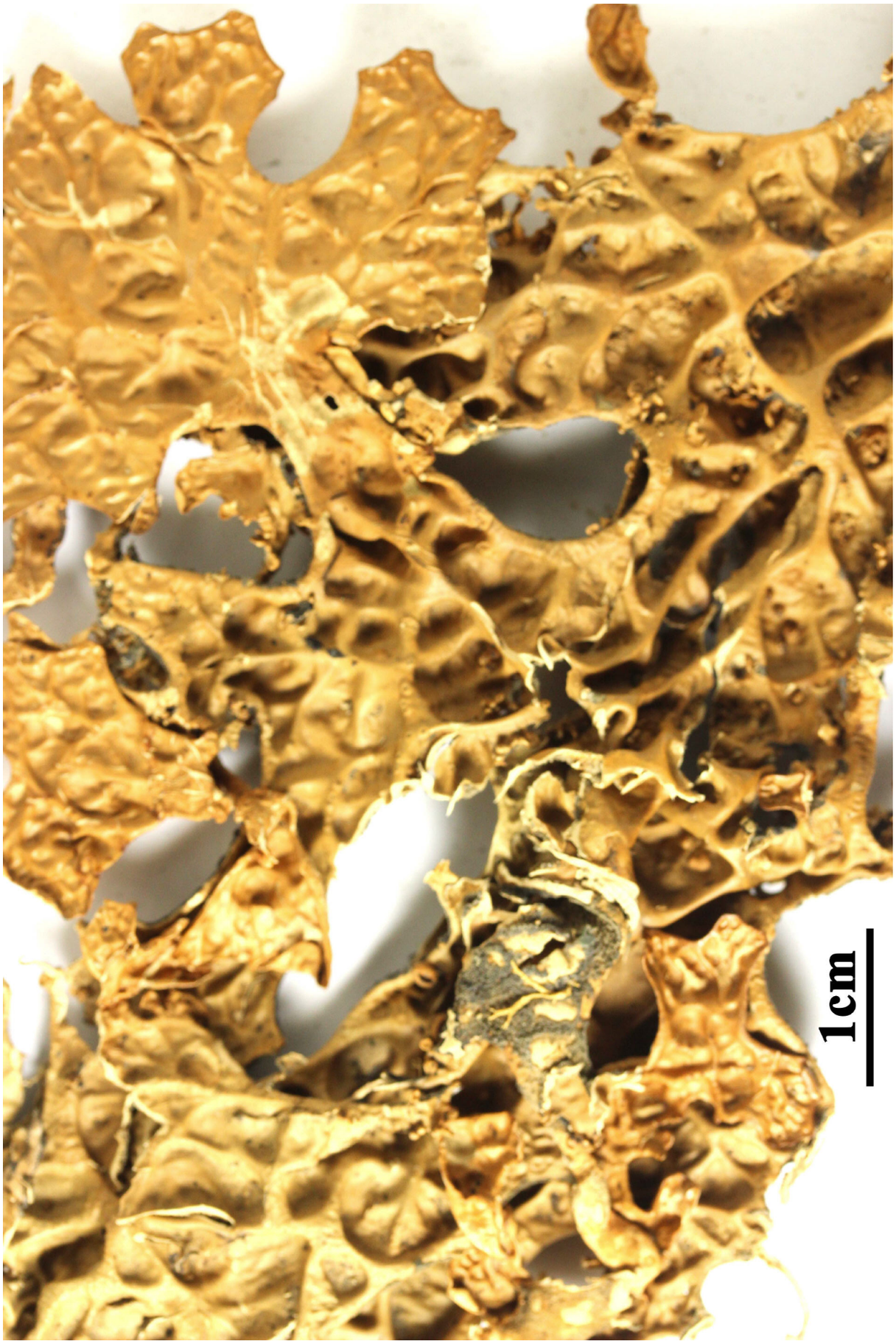
Lobaria orientalis (Asahina) Yoshim., J. Hattori bot. Lab. 32: 75 (1969)
= *Lobaria pulmonaria var. orientalis* Asahina 1949

[KU174], Japan. Hokkaido. Prov. Nemuro: Ochiishi. On trees, 50 m. Leg. S. Kurokawa (no. 65766), 1.9.1965, det. Y. Yoshimura. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 174.

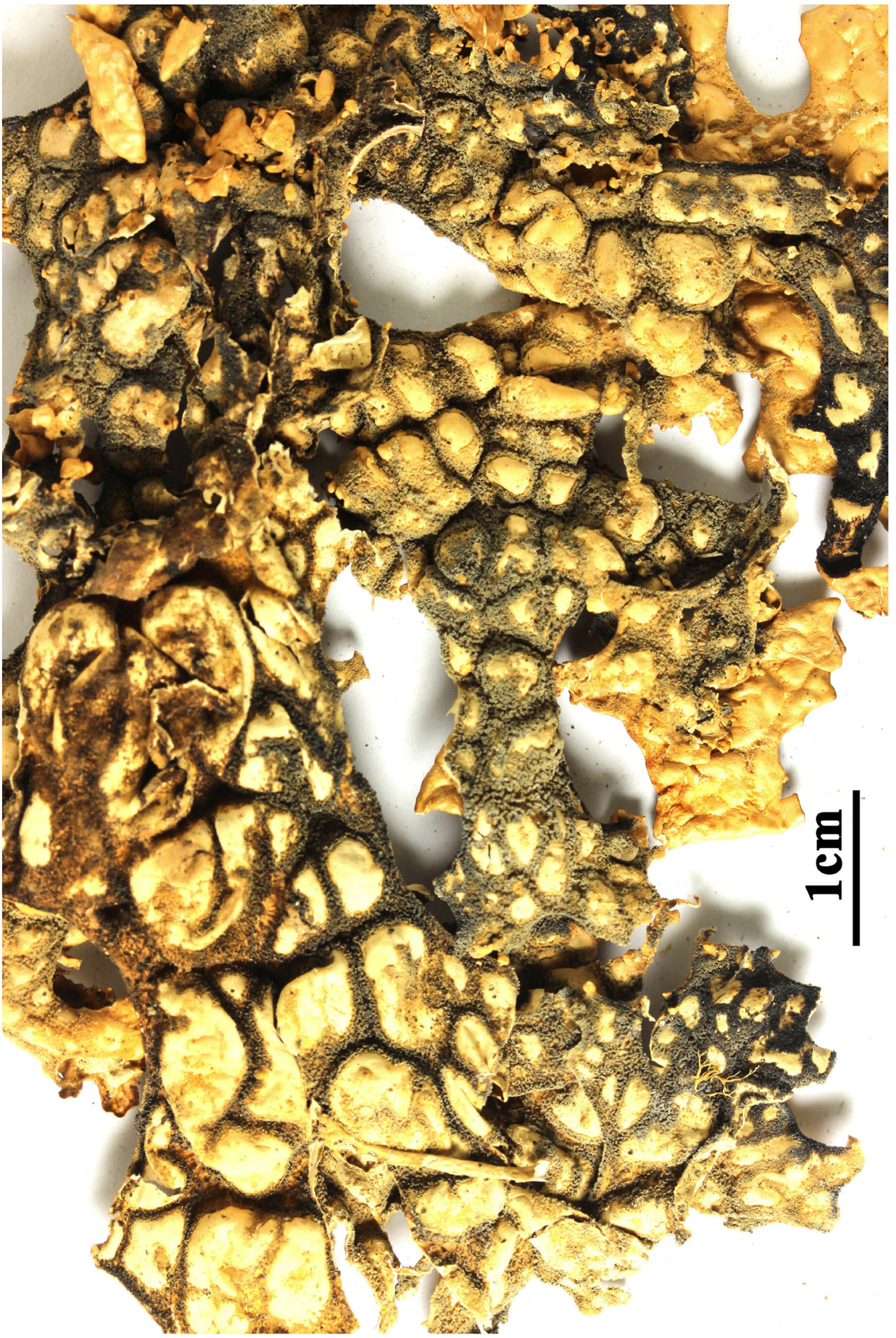
Thallus large, 10-20 cm wide, often more than 30 cm wide, 2-3 (or more) times divaricately laciniate, antler-like, with shorter internodes near apex, apex more or less truncate; dorsal surface of thallus olive-ochre in herbaria, distinctly reticulately ridged, glabrous, shining; ventral surface of thallus pale brown, densely tomentose and rhizinate in grooves between swellings, rh~zines and tomenta brown, both ca. 4 mm long; dorsal cortex 35-60 µm thick, paraplectenchymatous, composed of 7-8 layers of cells with large lumina, the outermost layer brown, ca. 25 µm thick, inner layers pale, ca. 30 µm thick; medulla mostly ca. 200 µm thick, up to 400 µm thick at ridged portions; algal layer 50 µm thick, algal cells grass-green; ventral cortex 20-25 µm thick, pale brown, paraplectenchymatous, composed of 4-5 layers of thick-walled cells with large lumina, densely tomentose, tomenta up to 300 µm long, simple, rarely branched, pale brown to deep-blue. Inner cephalodia often present. Apothecia located on ridged portion of dorsal surface of lobes, strongly constricted at base, disc reddish brown, 1-3 mm in diameter; margin entire, excipulum thallinum verruculose; parathecium united with edge of excipulum thallinum and surrounding algal cells in medullary layer; epithecium 10 µm thick, subhymenium 40 µm thick; hypothecium 20 µm thick; hymenium 90 µm thick; spores colorless, 3-septate at maturity, fusiform, 25-30 x 6-9 µm. Pycnidia immersed along ridged portion of thalli, obscure, ostiole blackish brown, punctiform; conidia rod-shaped, 5 x 1 µm. Reaction: Thallus K-; medulla KC+rose, P+ orange-red, K+yellow or re . Chemical substances: Gyrophoric acid and norstictic acid always present: in addition, constictic acid and stictic acid are present in chemical race I, but lacking

in chemical race II. Thelephoric acid often present in tomenta and rhizines. Chemical race I Containing gyrophoric, norstictic, and constictic acids.

Lobaria orientalis



Lobaria orientalis



Lobaria orientalis

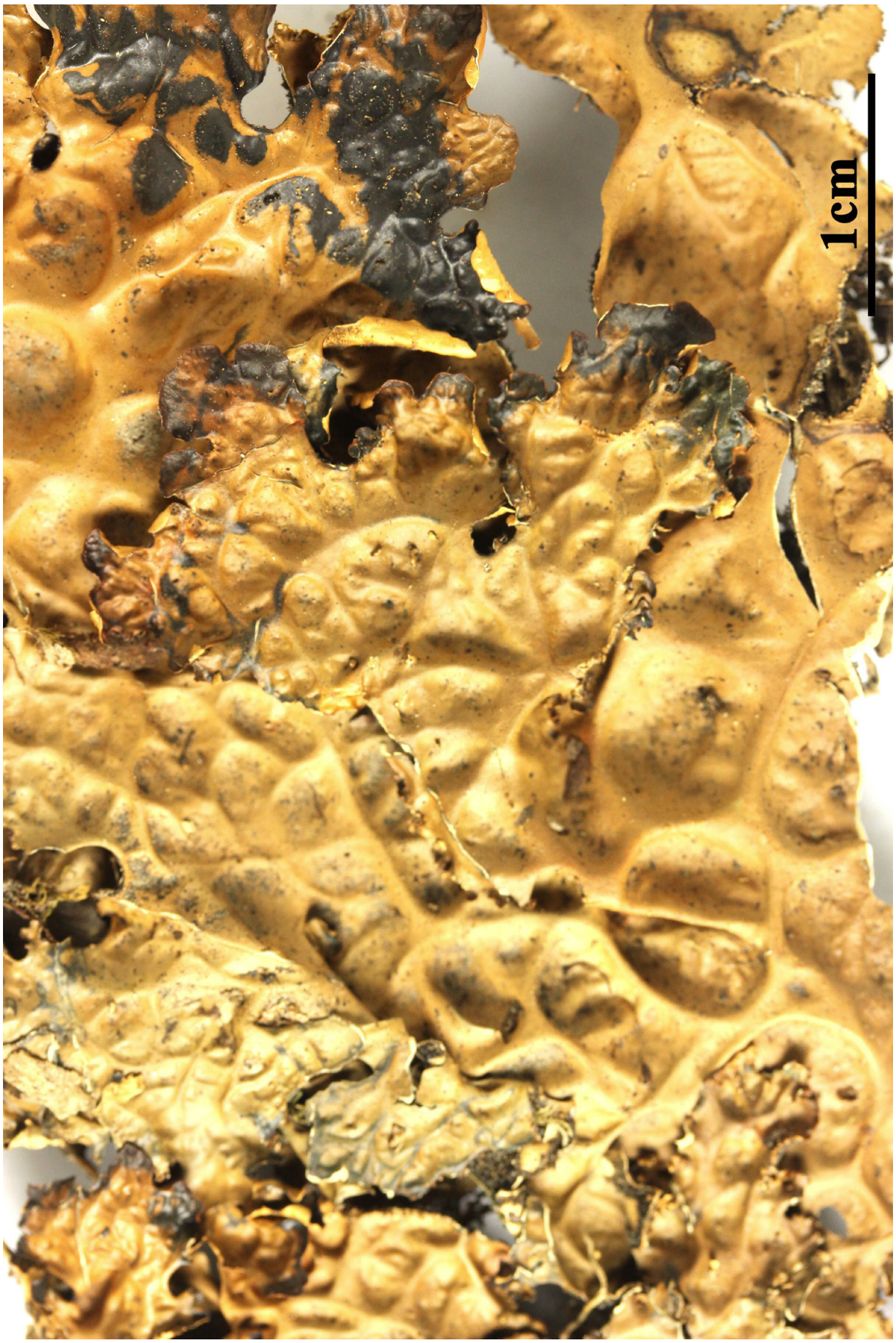
Lobaria pseudopulmonaria Gyeln., Acta Faun. Fl. Univers., Ser. 2, Bot. 2(no. 5): 6 (1933)

[KU177], Japan. Honshu. Prov. Izu: Amagi Pass. Over mosses on rocks, 700 m. Legt. S. Kurokawa (no. 67212), 15.11.1967, det. Y. Yoshimura. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 177.

Thallus medium-sized to large, 10-15 cm wide, irregularly or rarely dichotomously laciniate-Iobate, lobes more or less truncate at apices; dorsal surface of thallus reticulately ridged, brown to yellowish brown; ventral surface of thallus reddish brown to pale brown on swellings and along margins, densely tomentose and sparsely rhizinate, tomenta blackish brown in grooves between swellings, lacking on swellings, rhizines simple, up to 7 mm long; dorsal cortex ca. 25 µm thick, hyaline but outer layer pale brown, composed of 4-5 layers of cells with large lumina (up to 6 µm in diameter) and thin-walls; medulla usually 75 µm thick, but 200-400 µm at ridges; algal layer 25-40 µm thick, algae belonging to *Nostoc* of Polycoccus-type; ventral cortex 12-17 µm thick, paraplectenchymatous, composed of 2-3 layers of cells with lumina up to 5 µm. in diameter. Apothecia located on ridges of lamina, cup-form, strongly-constricted at base, margins entire, disc reddish brown, 1-2 mm in diameter; parathecium well-developed, united with edges of thalloid exciple, algae absent in medulla of thalloid exciple, the surface of thalloid exciple verruculose; epithecium ca. 10 µm thick; hypothecium +subhymenium ca. 80 µm thick; hymenium ca. 110 µm thick; spores 3-septate at maturity, fusiform, ca. 25 x 7-8 µm. Pycnidia immersed in thalli, globose; conidia rod-shaped, ca. 5 x 1 µm. Reactions: Thallus K-; medulla K+yellow or red, P+yellow or orange-red. Chemical substances: Norstictic acid and triterpenoids always present; in addition, stictic and constictic acids present in chemical race I, but lacking in chemical race II. Thelephoric acid often present in tomenta and rhizines of both chemical races. Chemical race I Containing triterpenoids, stictic, constictic, and norstictic acids. - Habitat. Growing over mosses on rocks or on soil; in New Guinea often on tree-bases in mossy forests or on branches of mossy shrubs. Range. Southern Japan, Formosa, Yunnan, Himalayas, Sumatra, Java, New Guinea, Alaska. Chemical race II Containing triterpenoids and norstictic acid. Habitat. Same as chemical race I. Range. Japan and Malaya. - The diagnostic characteristics for the species are: the reticulately ridged, dorsal surface of lobes,

the absence of isidia and soredia, the absence of algae in the thalloid exciple, the fusiform spores, and the presence of triterpenoids and stictic or norstictic acid. - This species is easily separated from the allied species by the P+ medullary reaction and the absence of isidia. It is widely distributed in eastern Asia and Alaska; it has been recorded under different names such as *Lobaria retigera* and *L. subretigera* rather than *L. pseudopulmonaria*.

Lobaria pseudopulmonaria



Lobaria pseudopulmonaria

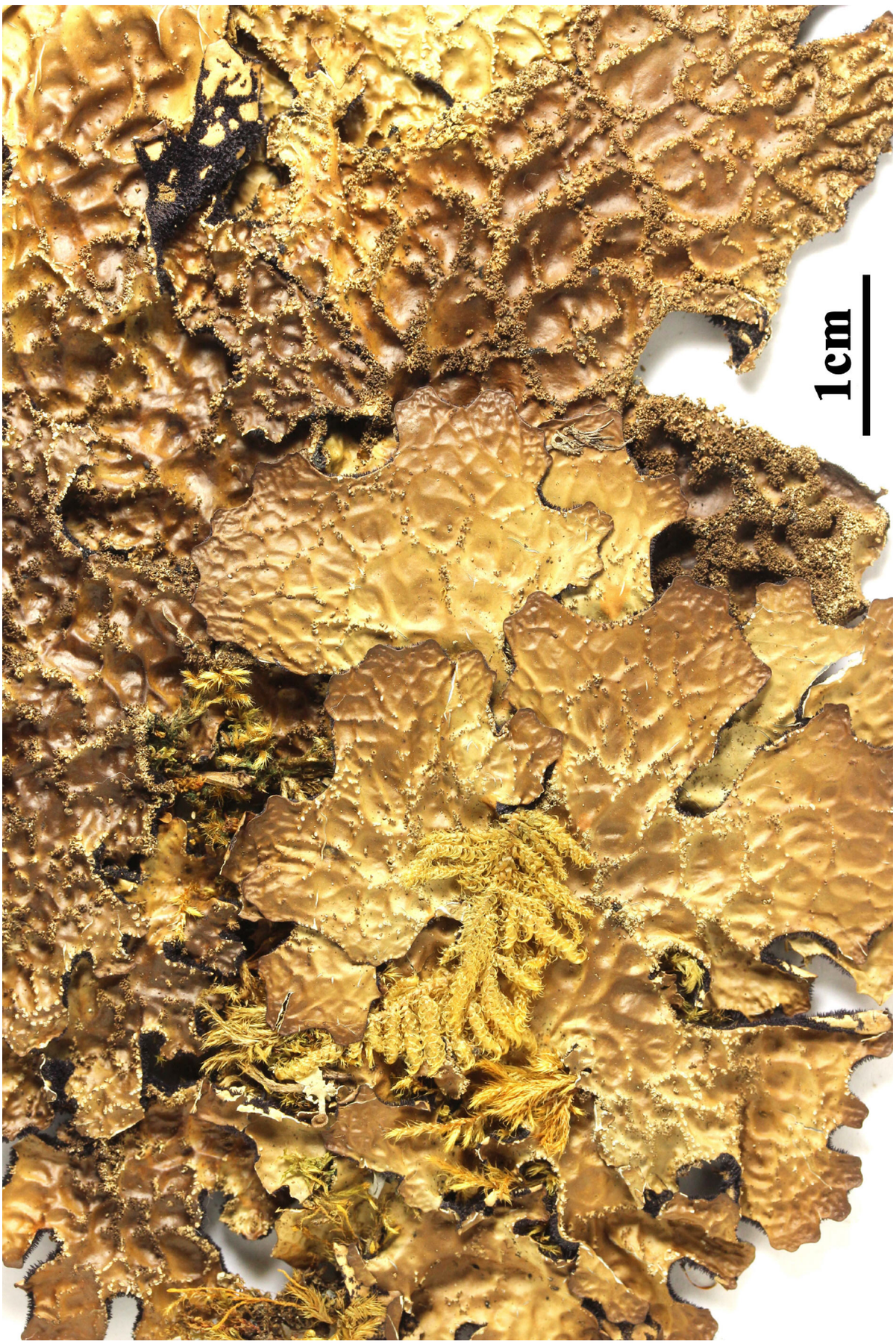
Lobaria pseudopulmonaria

Lobaria pseudopulmonaria

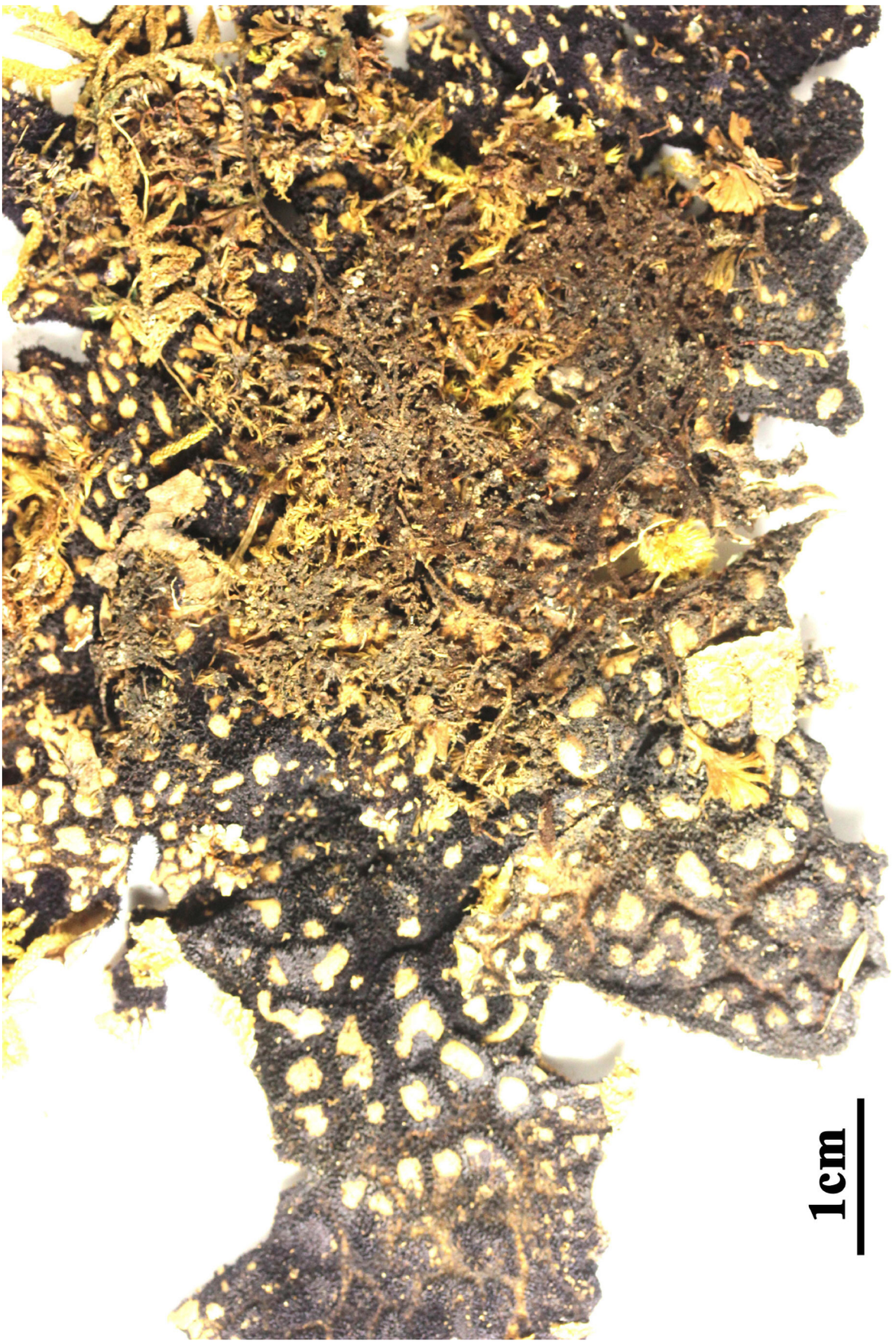
Lobaria retigera (Bory) Trevis., Lichenoth. Veneta 1-2: no. 75 (1869)
= *Lichen retiger* Bory 1804

[KU517], Japan. Shikoku. Prov. Awa: Kangase, Kainan-cho, Kaibu-gun. On rocks with mosses, 180 m. Leg. H. Kashiwadani (no. 14396), 29.3.1978, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 517.

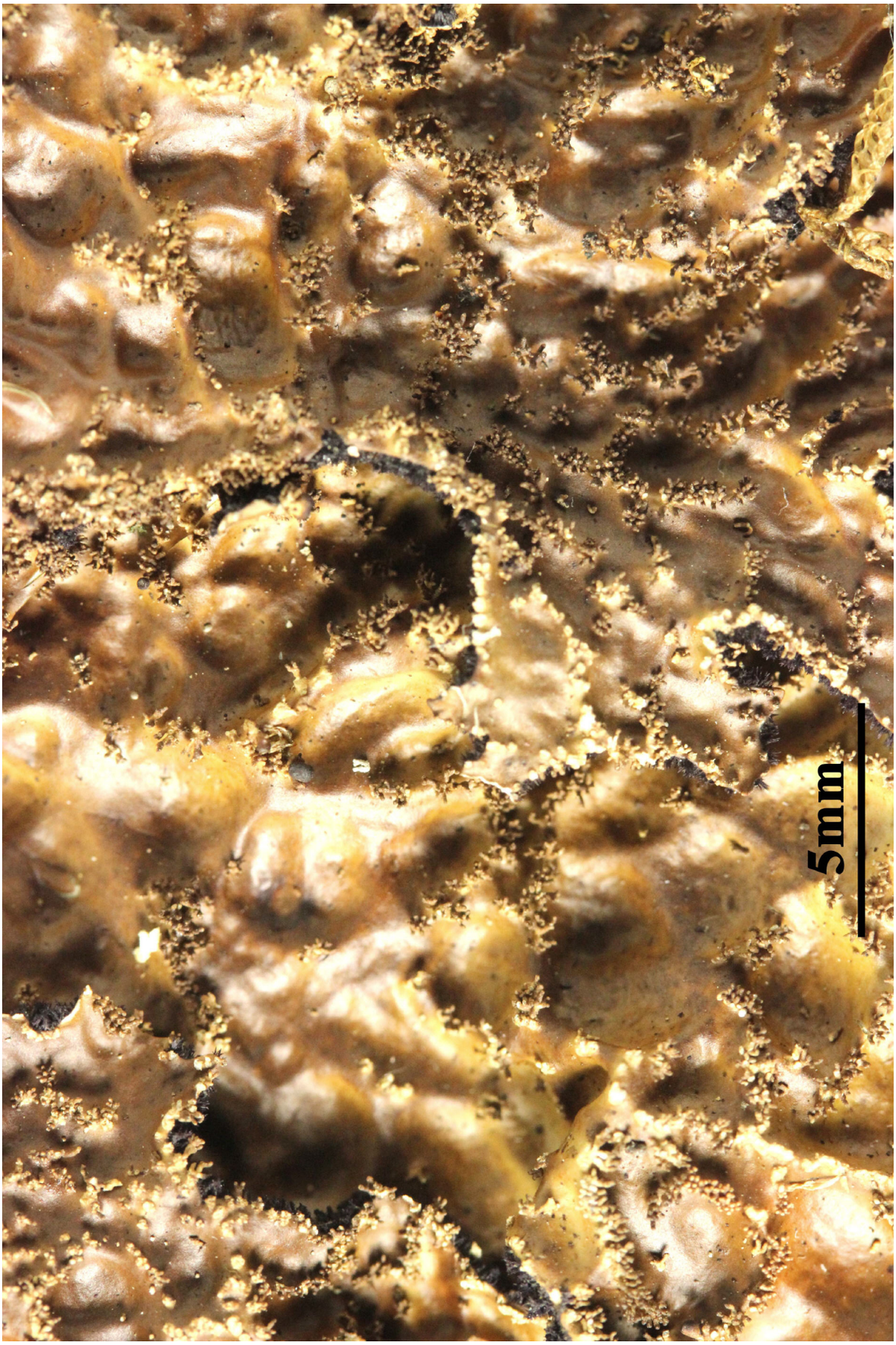
Thallus medium-sized to large, up to 15-25 cm wide, irregularly lobed, lobes reticulately ridged on dorsal surface, mostly isidiate in ridged portion, isidia cylindrical, often lobulate; ventral surface of thalli scarcely rhizinate and thickly tomentose in grooves between swellings, but portions of the swelling nude, tomenta and rhizines blackish blue or often pale brown; dorsal cortex ca. 25 µm thick, paraplectenchymatous, composed of 5-6 layers of cells with large lumina (ca. 5 µm in diameter); algal layer ca. 18 µm , thick, algae belonging to *Nostoc* of Polycoccus-type; medulla variable in thickness; ventral cortex 15-20 µm , thick, paraplectenchymatous, composed of 4-5 layers of cells with large lumina (up to 5 µm in diameter). Apothecia located mostly on ridges, sessile, constricted at base, disc brown, 2-4 mm in diameter, margins entire, surface of thalloid exciple verruculose with protuberances; parathecium' united with edges of thalloid exciple (apothecium type I), algae absent in medulla of thalloid exciple; epithecium ca. 10 µm thick; subhymenium ca. 20 µm thick; hypothecium ca. 50 µm thick; hymenium ca. -70 µm thick; spores 3-septate at maturity, fusiform, 30-40 x 6-8 µm,. Pycnidia not seen. Reactions: Thallus K-; medulla K-, P-, KC-. Chemical substances: Triterpenoids. Thelephoric acid often present in tomenta and rhizines. Range. Japan, Himalayas, western Pacific islands, Australia, South Africa, and Alaska. Lobaria retigera is distinguished from related species by the presence of isidia and the absence of norstictic acid.



Lobaria retigera



Lobaria retigera



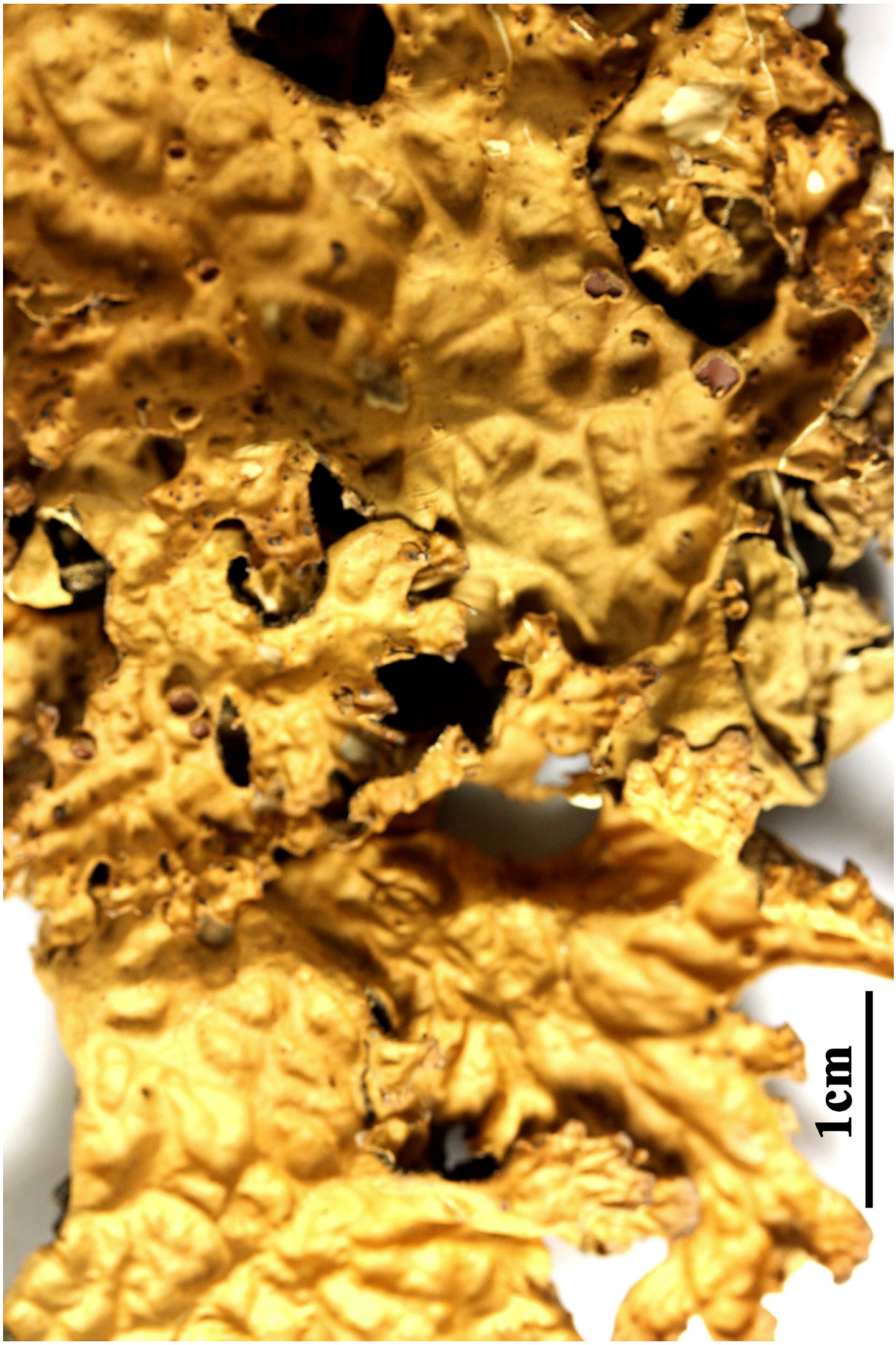
Lobaria retigera

Lobaria retigera

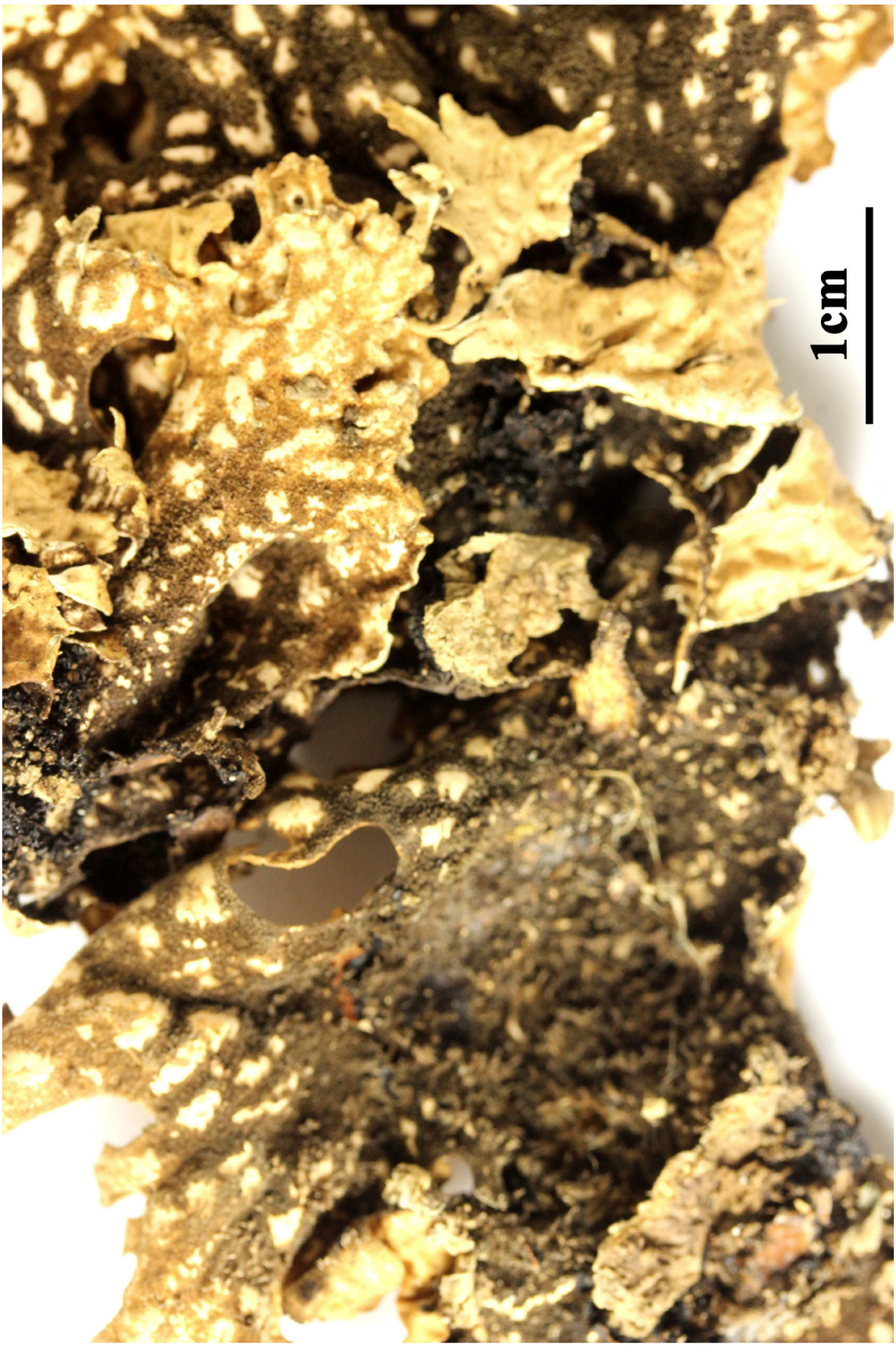
Lobaria sachalinensis Asahina, J. Jap. Bot. 23(5-6): 68 (1949)

[OH614], Japan. Hokkaido. Prov. Kitami: Utanoboripenkenai, Esashi-cho. Esashi-gun (44°47'12" N, 142°31'08" E). On trunc of *Fraxinus mandshurica* var. *japonica*, 100 m. Leg. Y. Ohmura (no. 11182), 20.6.2016, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 614.

Thallus foliose, medium-sized to large, 10-15 cm wide, more or less dichotomously laciniate-lobate, lobes 5-10 mm wide, truncate at apices; dorsal surface of thallus olive-ochre, oil-shiny, reticulately ridged; ventral surface of thallus blackish brown and densely tomentose on older portions and in grooves between swellings, sparsely rhizinate, rhizines blackish brown, up to 3 mm long, swellings nude; dorsal cortex 40-65 µm thick, paraplectenchymatous, composed of 10-12 layers of cells with large lumina (up to 5 µm in diameter); algal layer about 35 µm thick, algae grass-green; medulla 150-200 µm thick, often more thickened at ridges; ventral cortex 25-40 µm thick, composed of ca. 5 layers of cells with large lumina (up to 6 µm in diameter) and thick walls. Apothecia on lamina, constricted at base, disc reddish brown, up to 4 mm in diameter, margin entire; parathecium poorly differentiated, united with edge ofthalloid exciple, surrounding algae in medullary layer; epithecium 20 µm thick; hypothecium 65 µm thick; spores 3-septate at maturity, colorless, fusiform, 15-25 x 8.5-9 µm. Pycnidia on lamina, mostly along ridged portions, fully immersed in thalli, conidia 4 x 1 µm. Reactions: Thallus K-; medulla KC-, P-. Chemical substances: Triterpenoids. Habitat. On bark of trees. Range. Sakhalin and northern Japan. The diagnostic characteristics for this species are: the reticulately ridged, dorsal surface of lobes, the absence of isidia and soredia, the well-developed cortex, the presence of algae in the excipulum thallinum, the fusiform spores, the presence of triterpenoids, and the absence of depsides and depsidones. - The following five species are neither sorediate nor isidiate and also in other features more or less resemble the present species: *L. orientalis, L. gyroph0 rica, L. linita, L. yunnannensis,* and *L. chinensis*. However, they can be distinguished easily from *L. sachalinensis* by the absence of triterpenoids.



Lobaria sachalinensis

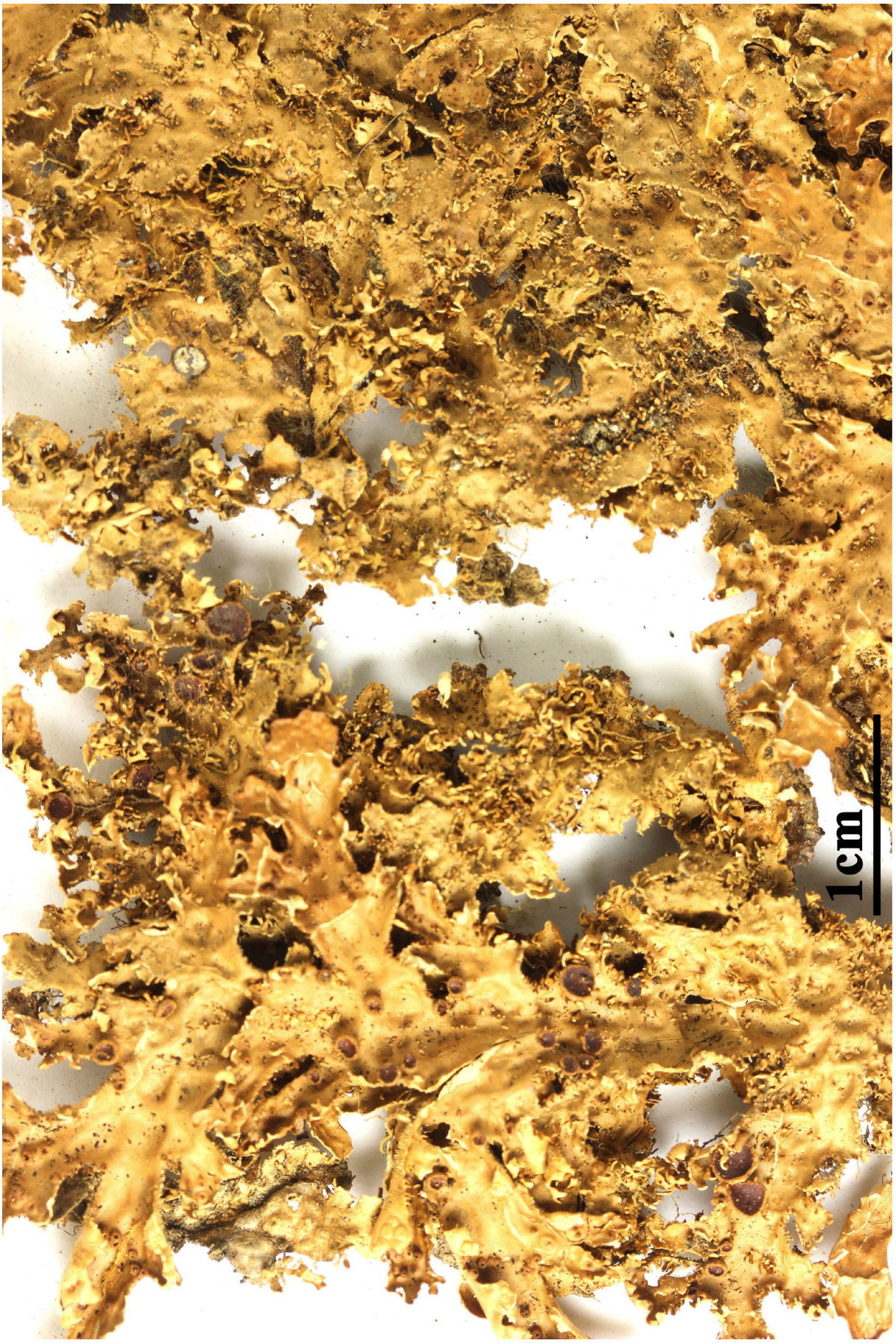


Lobaria sachalinensis

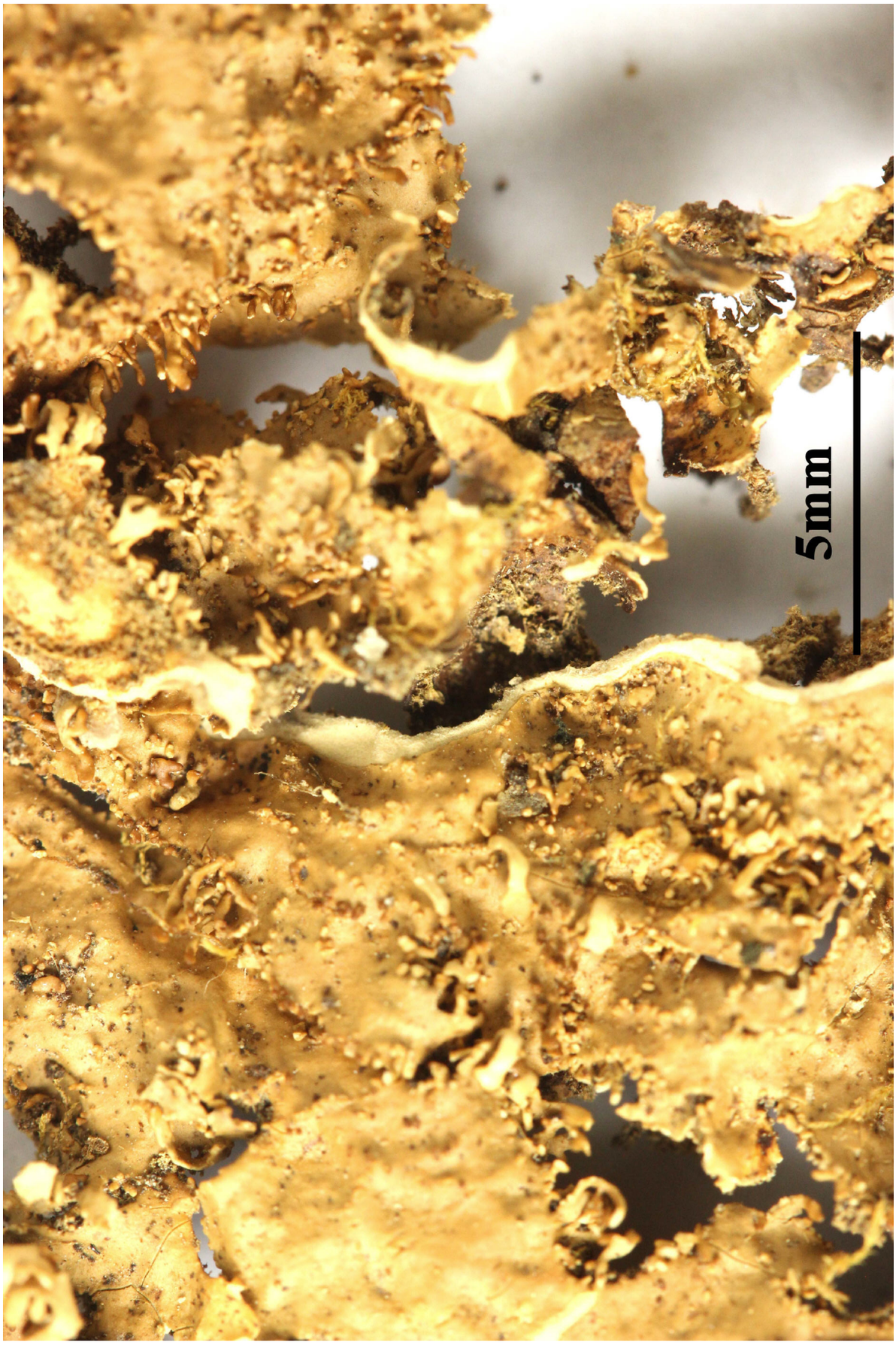
Lobaria spathulata (Inumaru) Yoshim., J. Hattori bot. Lab. 34: 278 (1971)
= *Lobaria meridionalis* var. *spathulata* Inumaru 1943

[OH410], Japan. Honshu. Prov. Sagami (Pref.Kanagawa):en route fromAmazakechaya to Hatajuku, Hakone-machi, Ashigarashimo. On tree bark, 400-800 m. Leg.Y. Asahina & M. Nuno, 20.8.1957, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR.410.

Thallus medium-sized to large, up to 20 cm wide, irregularly or dichotomously laciniate-Iobate, axils round, lobes 3-6 mm wide, truncate at apex; dorsal surface of thallus grayish green to olive-ochre in herbaria, reticulately ridged, isidiate mainly along ridged portions and margins; isidia cylindrical to dorsiventrally flattened often fringed at margins; ventral surface of thallus tomentose in grooves between naked, grayish swellings, rhizines sparse, pale to blackish blue, mostly 5 mm long, in tufts; tomenta brown or dark blue. Apothecia very rare, mostly on ridges, ca. 1-2 mm wide, disc reddish brown, margins entire, epithecium ca. 10 μm thick, subhymenium and hypothecium indistinct in their boundary, hymenium 100 μm; parathecium developed, united with edge ofthalloid exciple; algal cells scattered in medulla of thalloid -exciple; spores 3-septate at maturity, fusiform, 25-30 x 6-7 μm. Pycnidia fully immersed in the thalli. Reactions: thallus K-, medulla P-, K-, KC+rose. Chemical substances: Gyrophoric acid; thelephoric acid often present in rhizines and tomenta. - *Lobaria spathulata* is separated from *L. isidiophora* by the absence of 9-orcinoltype depsidones (norstictic and stictic acids). This taxon is also characterized by having lobulate isidia, while in *L. isidiophora* isidia are mostly cylindrical. *L. isidiophora* is known from much of eastern Asia and Australia, whereas *L. spathulata* is limitedly known only from Sakhalin, Japan, and Formosa. In Japanese lowlands, *L. spathulata* may be the most common "lung lichen".



Lobaria spathulata



Lobaria spathulata

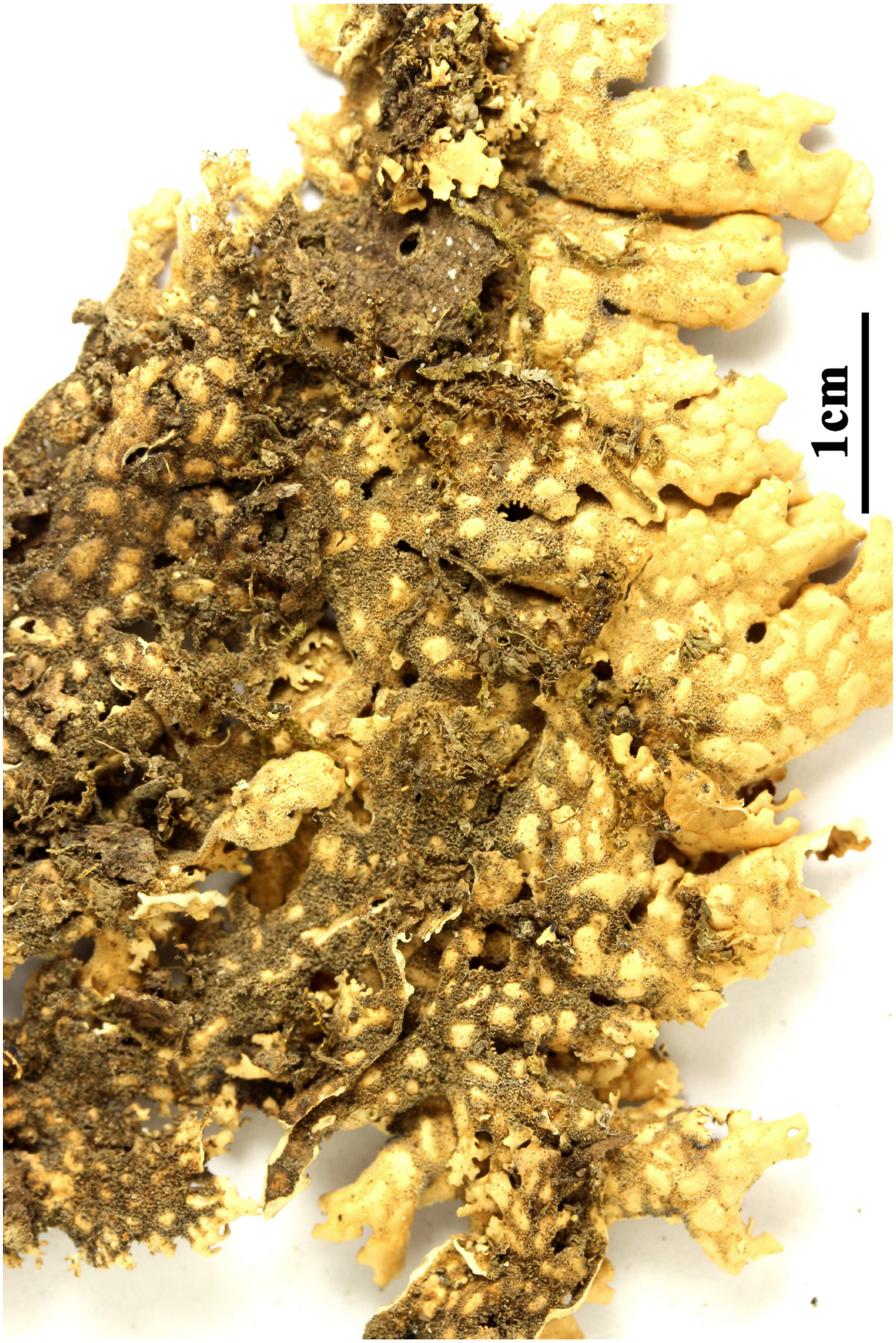
Lobaria spathulata

Lobaria spathulata (Inumaru) Yoshim., J. Hattori bot. Lab. 34: 278 (1971)
= *Lobaria meridionalis* var. *spathulata* Inumaru 1943

[OH486], Japan. Honshu. Prov. Hitachi (Pref. Ibaraki): Mt. Yamizo, Daigo-machi, Kuji-gun. Over mosses on rock, 650m. Leg. N Hattori (no.11), 26.6.2003, det. H. Kashiwadani. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 486.

Thallus medium-sized to large, up to 20 cm wide, irregularly or dichotomously laciniate-Iobate, axils round, lobes 3-6 mm wide, truncate at apex; dorsal surface of thallus grayish green to olive-ochre in herbaria, reticulately ridged, isidiate mainly along ridged portions and margins; isidia cylindrical to dorsiventrally flattened often fringed at margins; ventral surface of thallus tomentose in grooves between naked, grayish swellings, rhizines sparse, pale to blackish blue, mostly 5 mm long, in tufts; tomenta brown or dark blue. Apothecia very rare, mostly on ridges, ca. 1-2 mm wide, disc reddish brown, margins entire, epithecium ca. 10 μm thick, subhymenium and hypothecium indistinct in their boundary, hymenium 100 μm; parathecium developed, united with edge ofthalloid exciple; algal cells scattered in medulla of thalloid -exciple; spores 3-septate at maturity, fusiform, 25-30 x 6-7 μm. Pycnidia fully immersed in the thalli. Reactions: thallus K-, medulla P-, K-, KC+rose. Chemical substances: Gyrophoric acid; thelephoric acid often present in rhizines and tomenta. - *Lobaria spathulata* is separated from *L. isidiophora* by the absence of 9-orcinoltype depsidones (norstictic and stictic acids). This taxon is also characterized by having lobulate isidia, while in *L. isidiophora* isidia are mostly cylindrical. *L. isidiophora* is known from much of eastern Asia and Australia, whereas *L. spathulata* is limitedly known only from Sakhalin, Japan, and Formosa. In Japanese lowlands, *L. spathulata* may be the most common "lung lichen".

Lobaria spathulata



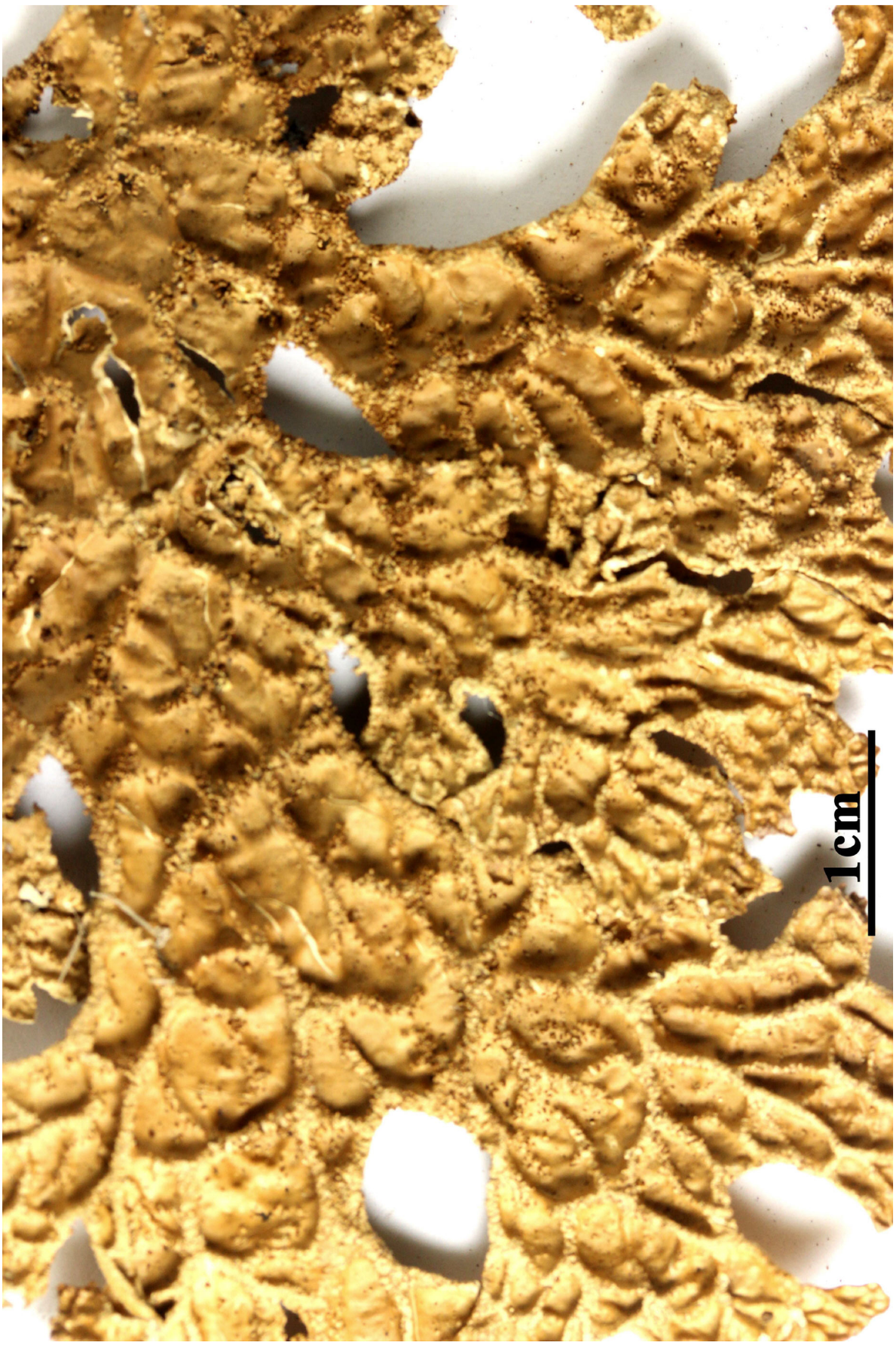
Lobaria spathulata

Lobaria tuberculata Yoshim., J. Hattori bot. Lab. 34: 280 (1971)

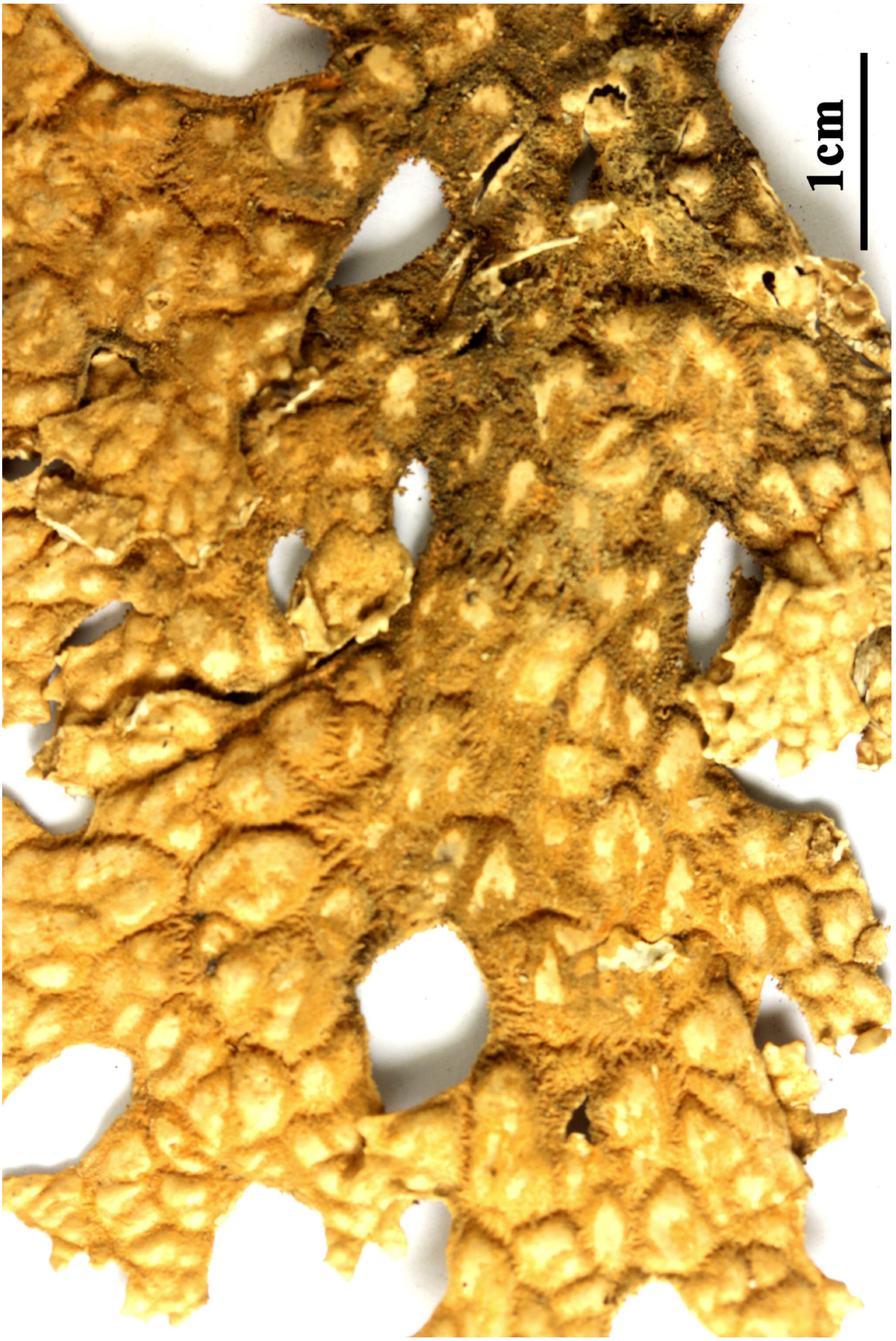
[KU178], Japan. Hokkaido. Prov. Nemuro:Ochiishi. On trunc of *Salix* sp., 50 m. Leg. S. Kurokawa (no. 65767), 1.9.1965, det. Y. Yoshimura.Ex S. Kurokawa Lichenes Rariores Et Critici Exsiccati Nr. 178.

Thallus foliaceus, ad 30 cm latus, dense irregulariterque repetito-fulcatus, apicibus vulgo obtusis, axillis rotundatis aut obtusis; dorsum thalli reticulati-costatum et scrobiculatum, fusci-pallescens aut pallidi- vel cinerei-glaucescens, vulge nitidum, sorediis destitutum, costis et marginibus tuberculatis vel dense isidiosis, isidiis brevibus, ad 4 mm longis, cylindricis vel granulatis, aggregatis; venter thalli dilute pallidus aut albidus, canalibus inter bullas nudas, tomentosis, tomento brevi, ad 100-200 μm longo et 3 μm lato, pallido aut rufescente aut fuscescente aut nigricante. Cortex dorsalis paraplectenchymaticus, 30-40 μm crassus; stratum algarum continuum, ca. 25 μm crassum; algae ad Myrmecias pertinentes, ca. 4 μm latae; medulla ca. 150 μμm crassa, ad locum costae ad 700 μm crassa; cortex ventralis paraplectenchymaticlls, ca. 13 μm crassus, tomentosus. Apothecia et pycnidia non visa. Thallus K-; medulla K-, P-, KC+ congyrophoricum continens.

Habitat. On bark of trees of subalpine and deciduous forests. Range. Northern Japan and Sakhalin. The southernmost locality is Mt. Omine, Kinki, Japan. The diagnostic characteristics for this speices are: the presence of gyrophoric and congyrophoric acids, and the tuberculate, ridged portion formed by aggregate isidia, which are nearly granulose. *Lobaria meridionalis*, *L. isidiophora*, and *L. spathulata* resemble *L. tuberculata* but differ in the absence of congyrophoric acid. The former two, in addition, differ in having P+ and K+ medullary reactions. In *L. spathulata* the chemical reactions are the same as those of *L. tuberculosa*; however, *L. spathulata* differs in having cylindrical or spathulate isidia, while L. *tuberculata* has short and granulose isidia. *Lobaria spathulata* occurs widely in lowlands and mountainous regions (broadleaved evergreen forests, montane coniferous forests, and deciduous forests) of Formosa and Japan, while *L. tuberculata* is found almost always in subalpine zones (above or at the upper limit of deciduous forests) of Sakhalin and northern Japan.



Lobaria tuberculata

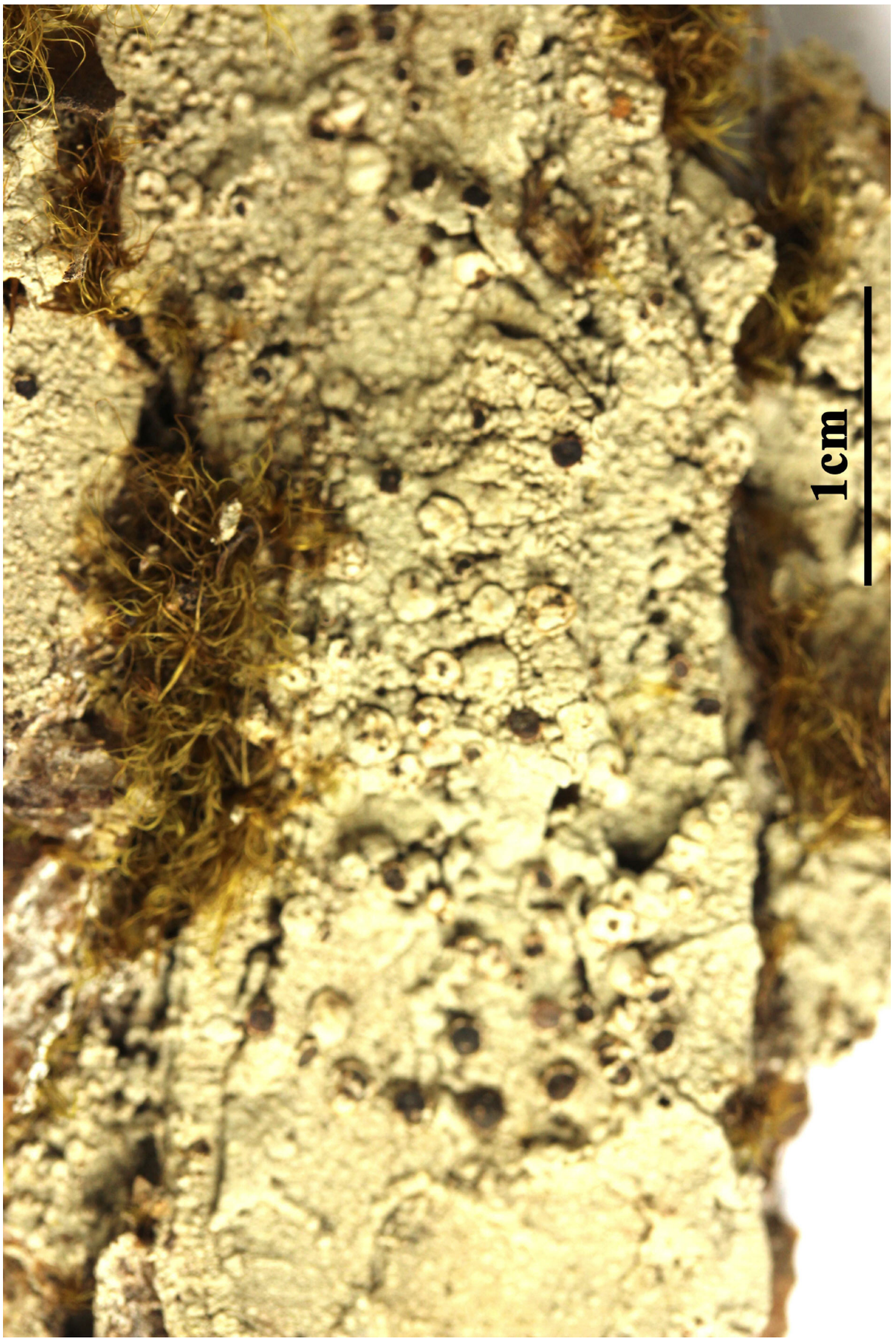


Lobaria tuberculata

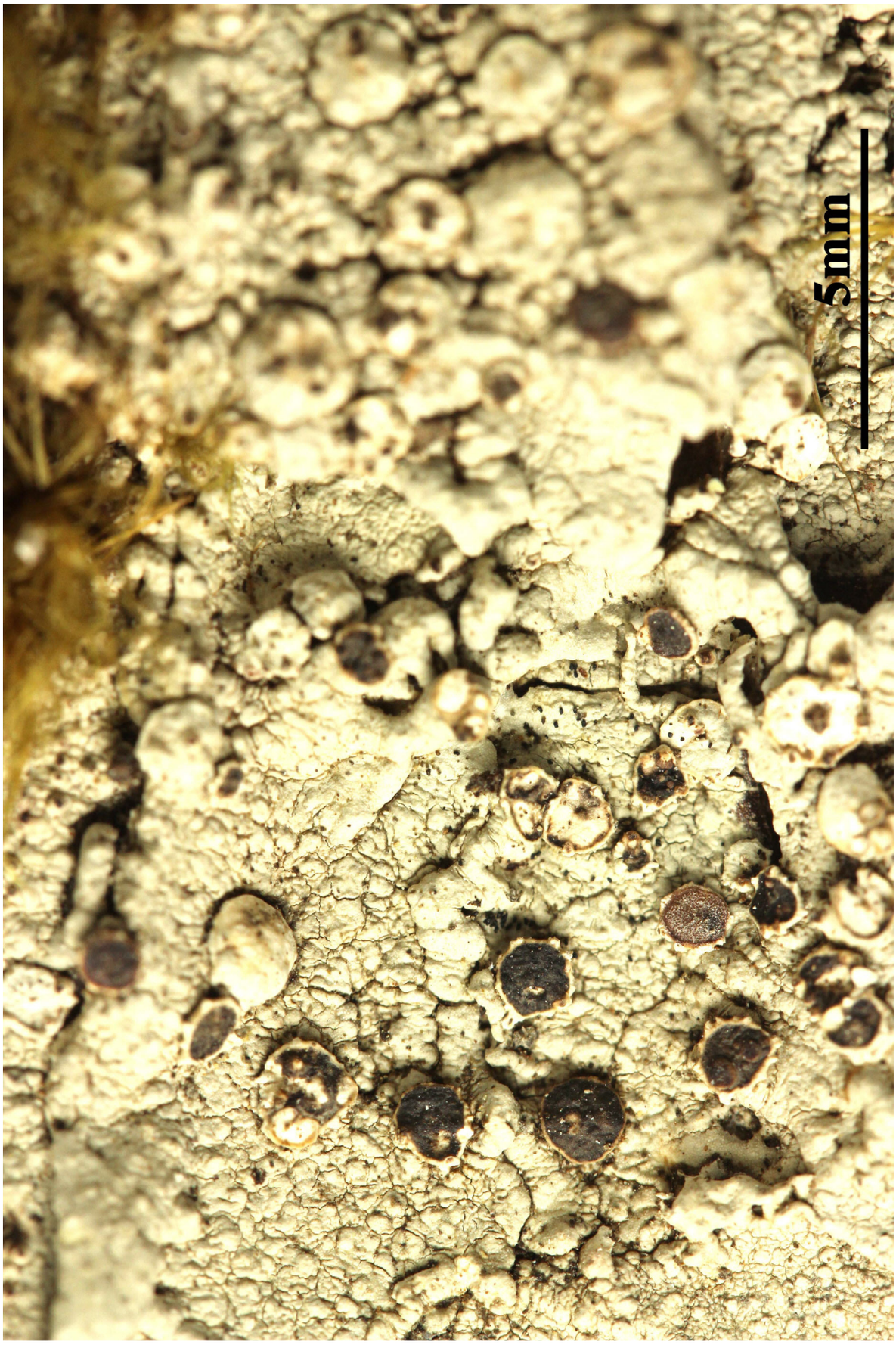
Loxospora ochrophaea (Tuck.) R.C. Harris, in Egan, Bryologist 93(2): 217 (1990)
= *Biatora ochrophaea* Tuck. 1848

[OH384}, Japan. Kyushu. Prov. Hyuga (pref. Myiazakij): en route from Ebino Highlands to Mt. Koshiki-dake, Ebino-city. On bark of *Kalopanax pictus*, 1200 m. Leg. Y. Ohmura (no. 4783) & S. Kurogi, 15.12.2001, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 384.

Thallus crustose, thick and verrucose; prothallus white, webby. Vegetative diaspores absent. Photobiont chlorococcoid alga. Ascomata lecanorine apothecia, large, up to 1.5 mm diam., constricted at base, somewhat raised; disk red-brown, lightly pruinose to epruinose; margin prominent, ragged. Paraphyses slightly branched. Asci clavate, with somewhat thickened tholus, K/I+ blue, 8-spored; ascospores hyaline, fusiform, ± curved or twisted (kidney-shaped), transversely 4-8-septate, 30-55 x 4-5.5 μm, septa often faint. Chemistry. K+ deep yellow, KC-, C-, PD+ orange; thamnolic acid detected by TLC. Substrate and habitat. Corticolous, mostly on conifers. Distribution. Northeastern North America.
Literature; Brodo, I.M., S. Duran Sharnoff & S. Sharnoff. (2001) Lichens of North America. Yale University Press, New Haven & London. 795 pp.



Loxospora ochrophaea

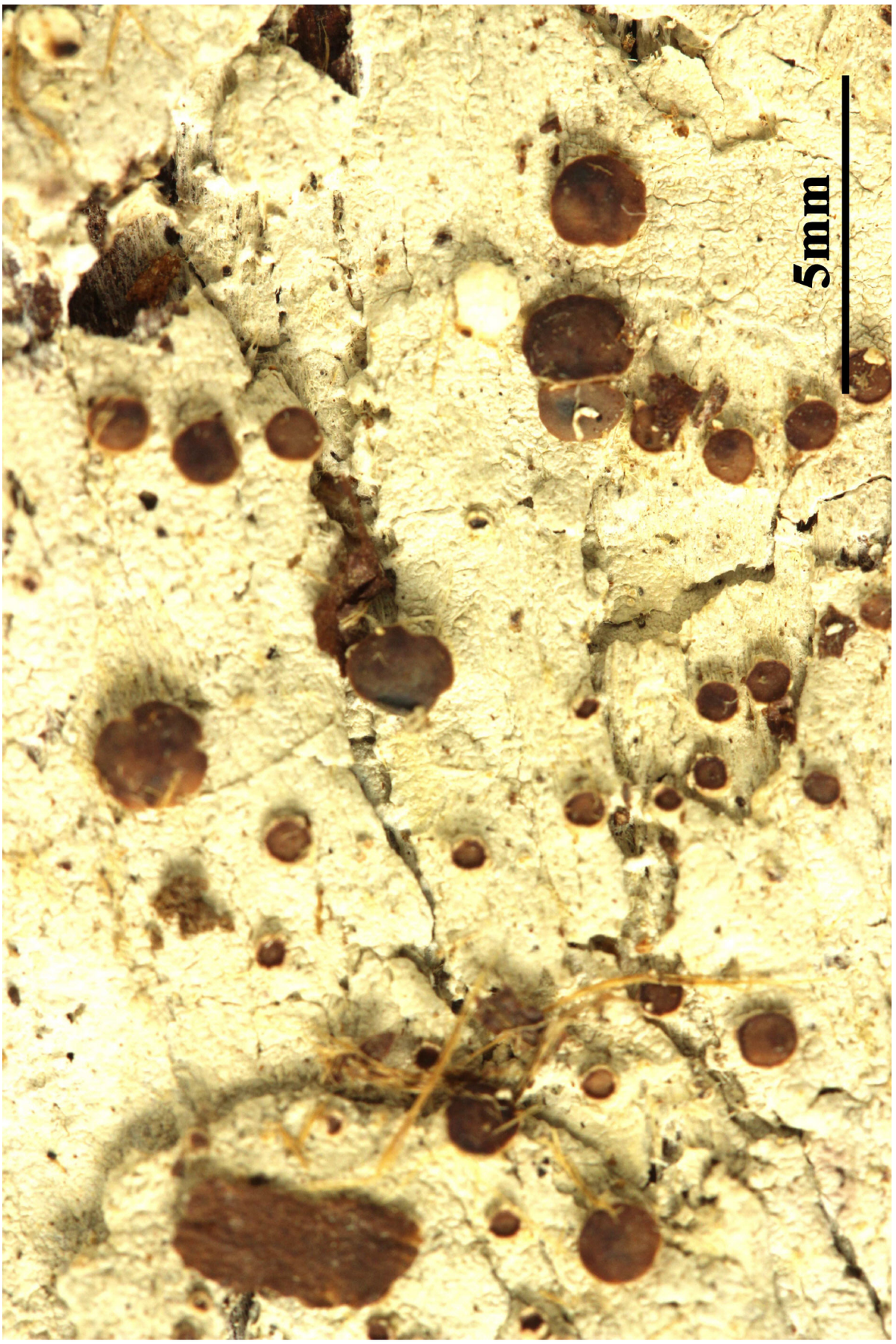


Loxospora ochrophaea

Loxospora ochrophaea (Tuck.) R.C. Harris, in Egan, Bryologist 93(2): 217 (1990)
= *Biatora ochrophaea* Tuck. 1848

[OH411]], Japan. Honshu. Prov. Mutsu (Pref. Aomori): Usoryiama Lakeside, Mt. Osorezan,Shimokita Peninsula. On tree bark, 200 m. Leg. M. Togashi, 10.1964, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR.411.

Thallus crustose, thick and verrucose; prothallus white, webby. Vegetative diaspores absent. Photobiont chlorococcoid alga. Ascomata lecanorine apothecia, large, up to 1.5 mm diam., constricted at base, somewhat raised; disk red-brown, lightly pruinose to epruinose; margin prominent, ragged. Paraphyses slightly branched. Asci clavate, with somewhat thickened tholus, K/I+ blue, 8-spored; ascospores hyaline, fusiform, ± curved or twisted (kidney-shaped), transversely 4-8-septate, 30-55 x 4-5.5 μm, septa often faint. Chemistry. K+ deep yellow, KC-, C-, PD+ orange; thamnolic acid detected by TLC. Substrate and habitat. Corticolous, mostly on conifers. Distribution. Northeastern North America.
Literature; Brodo, I.M., S. Duran Sharnoff & S. Sharnoff. (2001) Lichens of North America. Yale University Press, New Haven & London. 795 pp.



Loxospora ochrophaea

Masonhalea richardsonii (Hook.) Kärnefelt, Bot. Notiser 130(1): 104 (1977)
= *Cetraria richardsonii* Hook. 1823
= *Nephromopsis richardsonii* (Hook.) Divakar, A. Crespo & Lumbsch, in Divakar, Crespo, Kraichak, Leavitt, Singh, Schmitt & Lumbsch, Fungal Diversity 84: 113 (2017)

[OH463], Russia, Oblast Magadan: around a smal lake, 120 km NE of Atoka (61°11'45" N, 153°55'52" E). On humus, 935 m. Leg. Y. Ohmura (no. 9599), L. Yakovchenko & Z. Zheludeva, 8.8.2012, det. L. Yakovchenko & Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 463.

Ex: Thompson, J., 1984. American Arctic Lichens: The Macrolichens.
Thallus foliose, dichotomous to irregularly divided, when dry rolled up into ball-like masses, homy in texture; the lobes sharp pointed and antler-like; upper side chestnut-brown when dry, becoming olive-green to greenish brown when moist; underside paler brown with conspicuous pruinose patches, lacking rhizinae. Outer cortex prosoplectenchyma inner cortex of longitudinally oriented but interwoven hyphae, about arranged. Within this is a continuous layer of the algae and a loose medulla. The lower cortex is prosoplectenchymatous but lacks the inner fibrous layer of the upper cortex and is discontinuous, being lacking over the pruinose areas which appear to function as supersized pseudocyphellae for gas exchanges. The dual upper cortex reminds one of that of some of the *Ramalinas* but is not on both surfaces as in that genus. Apothecia rare, at the tips of lobes, the margin crenate, concolorous with the thallus, inflexed; disk 4-8 mm, brown, almost the same color as the thallus, shining; epithecium brownish, lower part brown. Reactions: medulla K— , C+ , KC+ orange red to red, P— . UV+ . Contents: alectoronic acid.

Masonhalea richardsonii

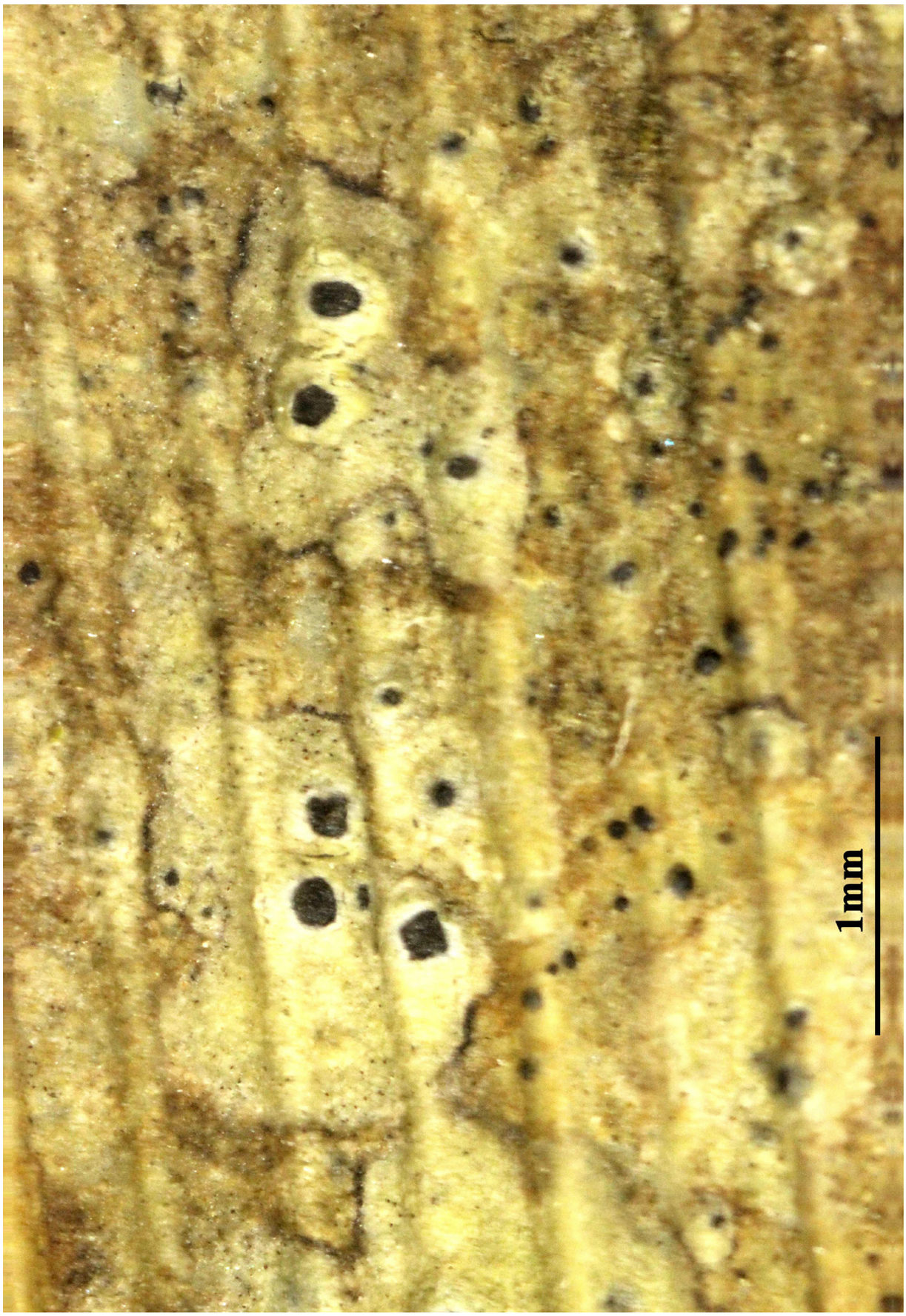
Masonhalea richardsonii

Masonhalea richardsonii

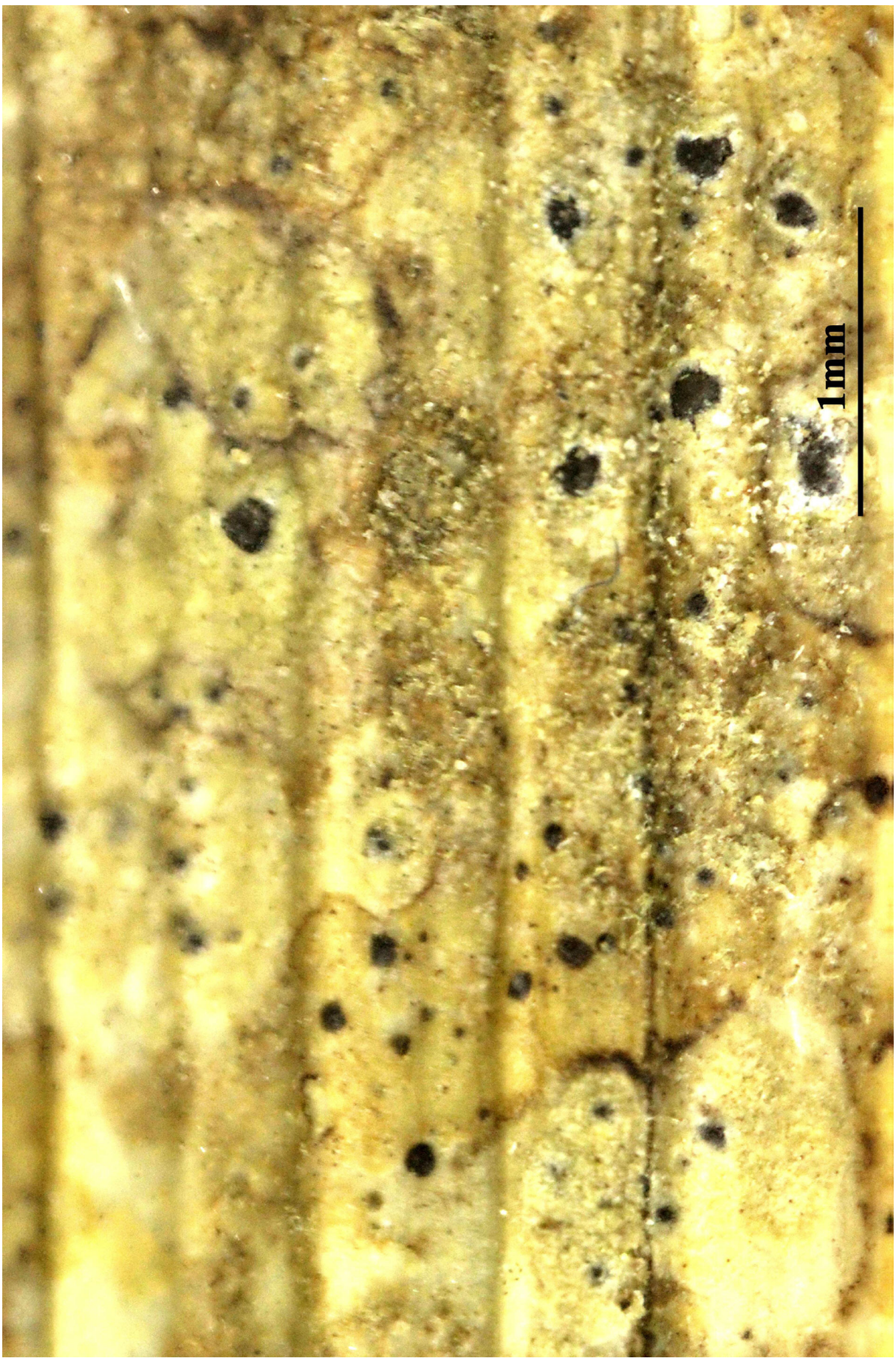
Mazosia melanophthalma (Müll. Arg.) R. Sant., Symb. bot. upsal. 12(no. 1): 117 (1952)
= *Opegrapha melanophthalma* Müll. Arg. 1883

[OH437], Japan.Yaeyama Islands.Iriomoto-jima Island, 6 km NNE of Ohara village and 1 km W of Komi village and the seashore, along the trail up to the montains, Taketomi-choi,Yaeyama-gun. On leaf of *Arenga engleri*,20 m. Leg. H. Kashiwadani (no. 38761), 9.2.1995, det. A. Frisch. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 437.

Thallus continuous but often marginally dispersed into rounded patches, finely verrucose, 5–15 mm across, thin (10–15 µm), pale greenish grey to pale green, slightly shiny; verrucae 0.05–0.1 mm diam., slightly paler than thallus. Photobiont cells rectangular, 8–15 x 4–5 µm, in radiate plates. Ascomata rounded, 0.3–0.7 mm diam. and 60–90 µm high; disc dark grey to black, translucent when moistened; margin gently sloping outwards. Excipulum 10–15 µm thick. Hypothecium 10–15 µm high, brown. Hymenium 50–75 µm high. Asci 45–55 x 8–12 µm. Ascospores fusiform, 3-septate, 15–22 x 3–5 µm, upper median cell slightly enlarged. Pycnidia low conical, 0.15–0.25 mm diam. Macroconidia bacillar, nonseptate, 5–8 x 2–3 µm. Microconidia fusiform ellipsoid, non-septate, 2–3 x 0.8–1.2 µm. Chemistry: no substances detected by TLC (unknown fatty acid in one specimen). Distribution: Pantropical. Besides *Mazosia phyllosema*, the most frequent representative of the genus, with similar ecological preferences.



Mazosia melanophthalma

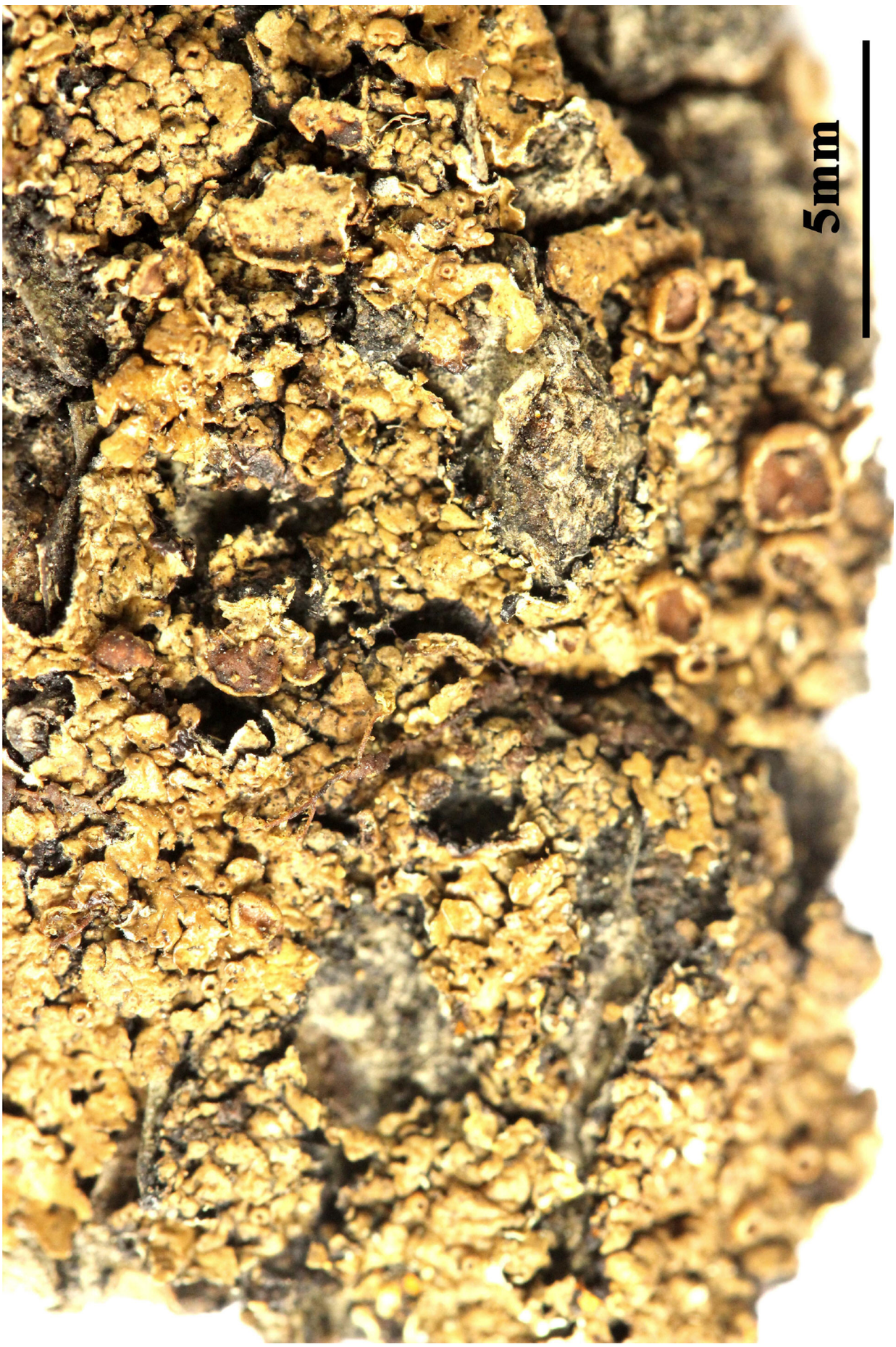


Mazosia melanophthalma

Melanelixia huei (Asahina) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch, Mycol. Res. 108(8): 882 (2004)
= *Parmelia huei* Asahina 1951

[OH542], Japan. Honshu. Prof. Etchu (Pref. Toyama): Mt. Asahi, Shimoshinkawa-gun (36°48' N, 137°42' E). On bark of *Quercus acutissima*, 1000 m. Leg. H. Kashiwadani)no.6829), 29.7.1969, det. H. Kashiwadani. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 542.

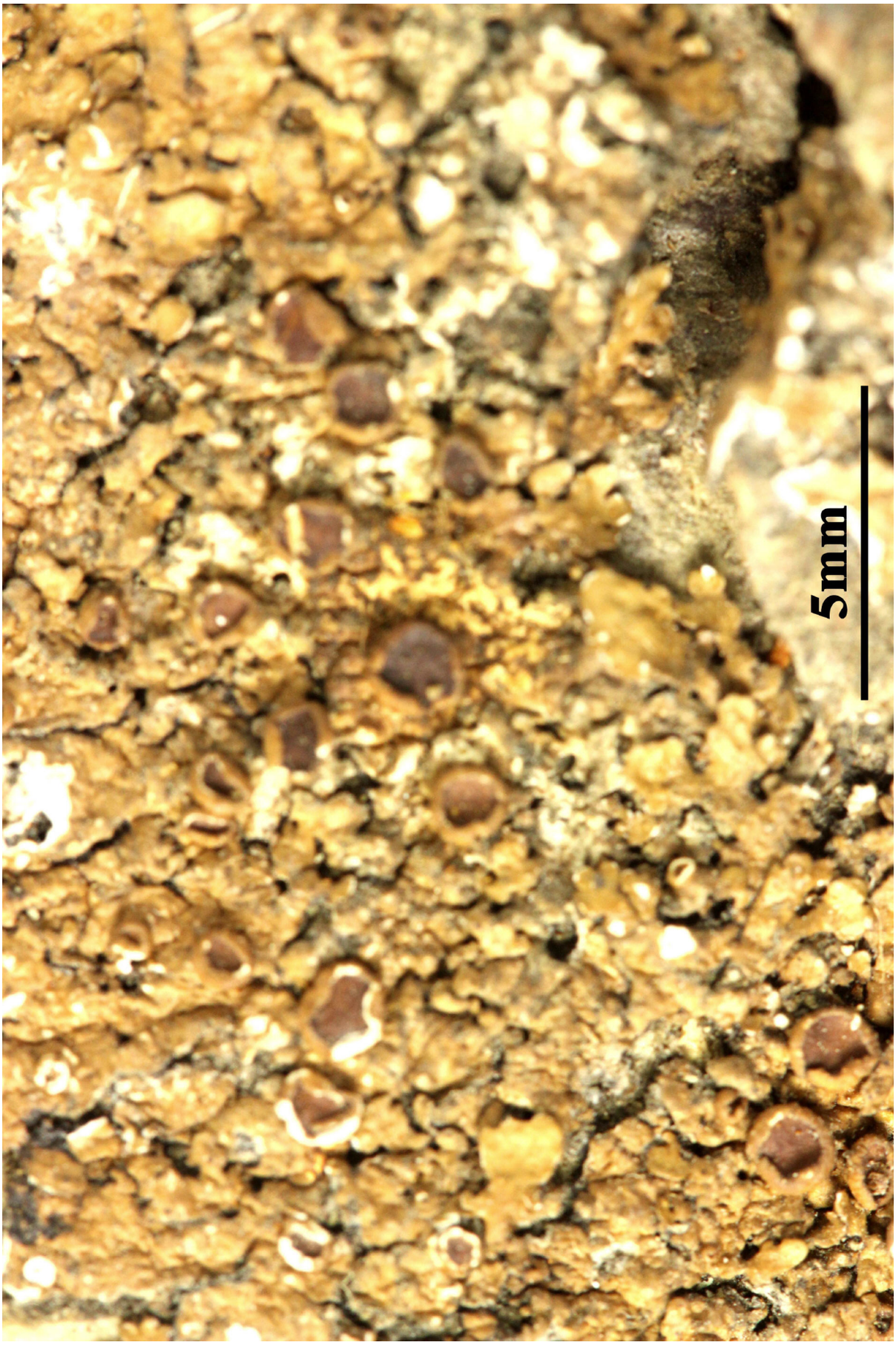
Melanelixia huei



Melanelixia huei

Melanelixia huei (Asahina) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch, Mycol. Res. 108(8): 882 (2004)
= *Parmelia huei* Asahina 1951

[OH562], Japan. Honshu. Prov. Mutsu (Pref. Aomori): Higashidori-mura. Shimokita-gun. On tree bark. Leg. S. Kurokawa, 5.8.1955, det. Y. Asahina. EX Y. OHMURA LICHENS MINUS COGNITI EXSICCATI NR. 562.



Melanelixia huei

Melanohalea olivacea (L.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch, Mycol. Res. 108(8): 883 (2004)
= *Lichen olivaceus* L. 1753

[OH412], Japan. Honshu. Prov. Shinano (Pref. Nagano): alng the route from Sugadaira Pasture to Mt. Azumaya., Ueda-city. On bark of *Betula ermanii*, 1723 m. Leg. Y. Ohmura (no. 7132) & A. Okamura, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR.412.

Chemistry: fumarprotocetraric acid, protocetraric acid, ? physodalic acid ?

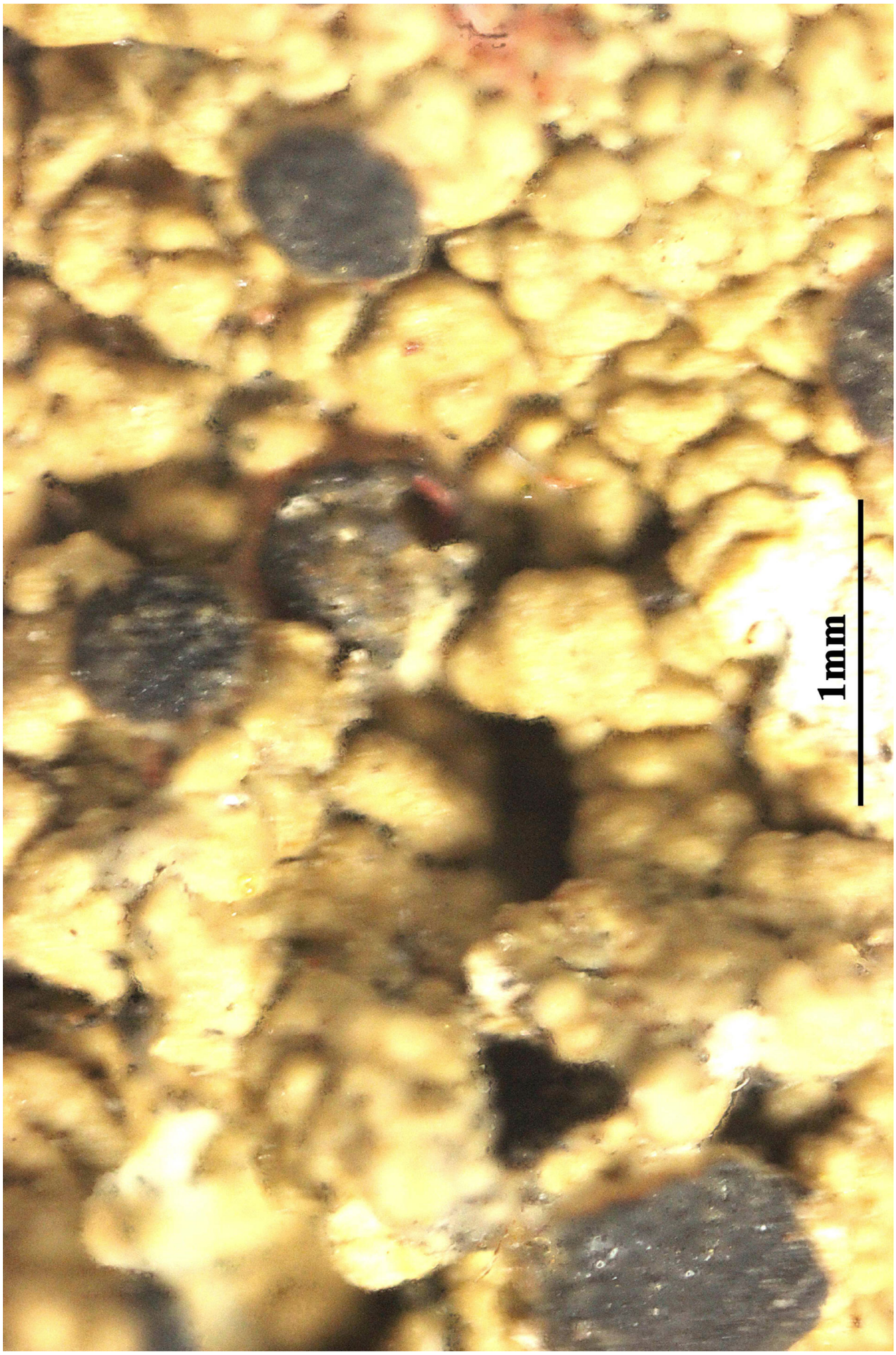
Melanohalea olivacea

Melanohalea olivacea

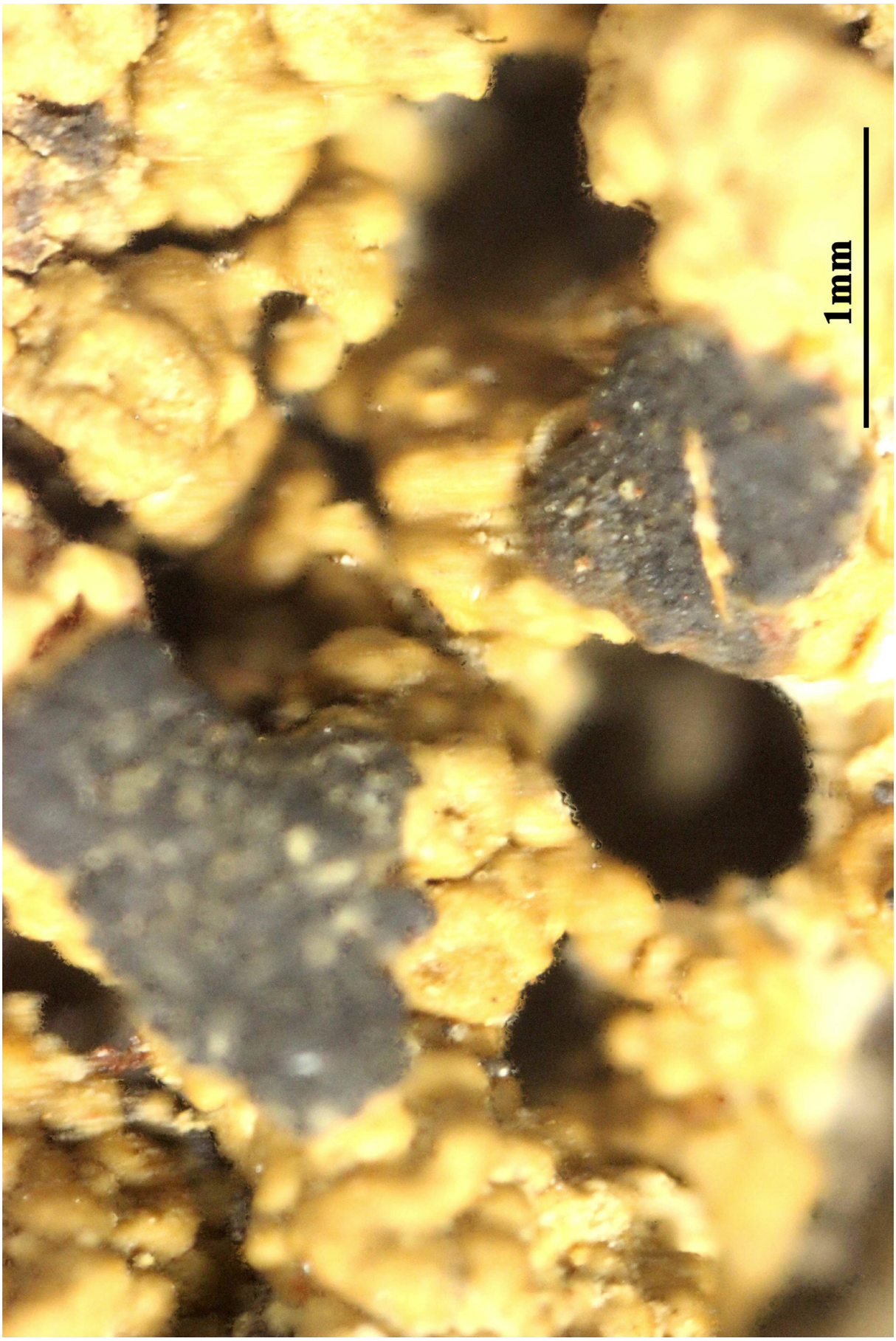
Mycoblastus sanguinarius (L.) Norman [as 'sanguinaria'], Conat. Praem. Gen. Lich.: 26 (1852)
= *Lichen sanguinarius* L. 1753

[OH464], Japan. Honshu. Prov. Shinano (Pref. Nagano): Komanoyu Hot springs, Shiga Highlands, Shimotakai-gun. On bark of coniferous tree, 1700 m. Leg. Y. Asahina & M. Togashi, det. Y. Asahina. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 464.
- TLC: Atranorin, Bourgeanic acid, Fumarprotocetraric acid, Succinprotocetraric acid (trace) anal. by Y. Ohmura 2013

Thallus crustose, episubstratic, pale to dark grey, turning greenish when wet, thick and verrucose, continuous or cracked, sometimes delimited by a pale to dark grey prothallus. Soralia rarely present, rounded, convex, discrete, widely dispersed in scattered groups, often few in number, usually occurring together with apothecia. Apothecia common, biatorine, 0.5-2(-3) mm across, black, with a flat to strongly convex disc and a thin, soon excluded proper margin, developing on a bright carmine-red thalline cushion that may be exposed when the thallus is abraded. Proper exciple reduced, the hyphae vertically arranged and resembling paraphyses; epithecium blue-black; hymenium greenish (Cinereorufa-green pigment), without crystals visible under polarized light; paraphyses branched and anastomosing; hypothecium red-brown in upper part, carmine-red in lower part. Asci 1(-3)-spored, cylindrical-clavate, thick-walled, the apical dome K/I+ blue, with a distinct ocular chamber, the outer layer thickened and forming a K/I+ dark blue apical cap, intermediate between the Biatora and the Bacidia-type. Ascospores 1-celled, hyaline, oblong to cylindrical with flattened apices, 65-100 x (28-)32-50 µm, the wall 5-7 µm thick. Pycnidia common, with a dark green wall K-, N+ reddish, the conidiogenous cells short. Conidia bacilliform, 6-9 x c. 1 µm. Photobiont chlorococcoid. Spot tests: thallus K+ dirty yellow, C-, KC-, P+ yellowish or P-, UV-; hypothecium and the underlying red tissue K+ red, P-, UV-. Chemistry: thallus with atranorin, chloratranorin, rhodocladonic acid, caperatic acid. - Note: a circumboreal-montane species found on lignum and bark of conifers (especially *Larix*).



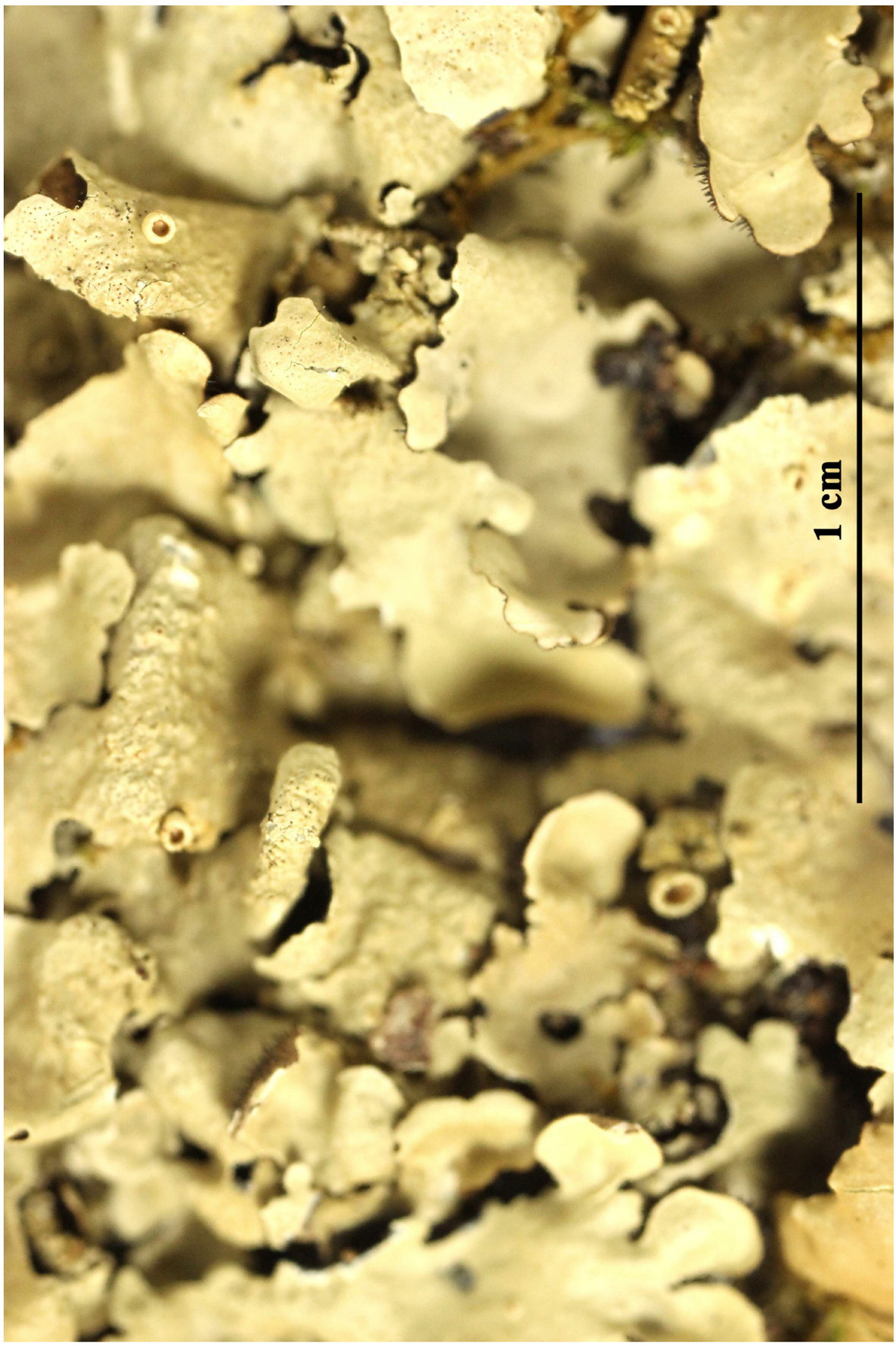
Mycoblastus sanguinarius



Mycoblastus sanguinarius

Myelochroa entotheiochroa (Hue) Elix & Hale, Mycotaxon 29: 240 (1987)
= *Parmelia entotheiochroa* Hue 1899

[OH615}, Japan. Honshu. Prov. Izu (Pref. Shizuoka): 3 km WSW of Haccho Pond, Amagi Mts. Izu-city (34°50'18" N, 138°55'59" E) On bark of *Zelkova serrata*, 700 m. Leg. Y. Ohmura (no. 12059), M. Sugimoto & H. Kashiwadani, 13.3.2019, det. Y. Ohmura. Ex Y. Ohmura Lichenes Minus Cogniti Exsiccati Nr. 615.

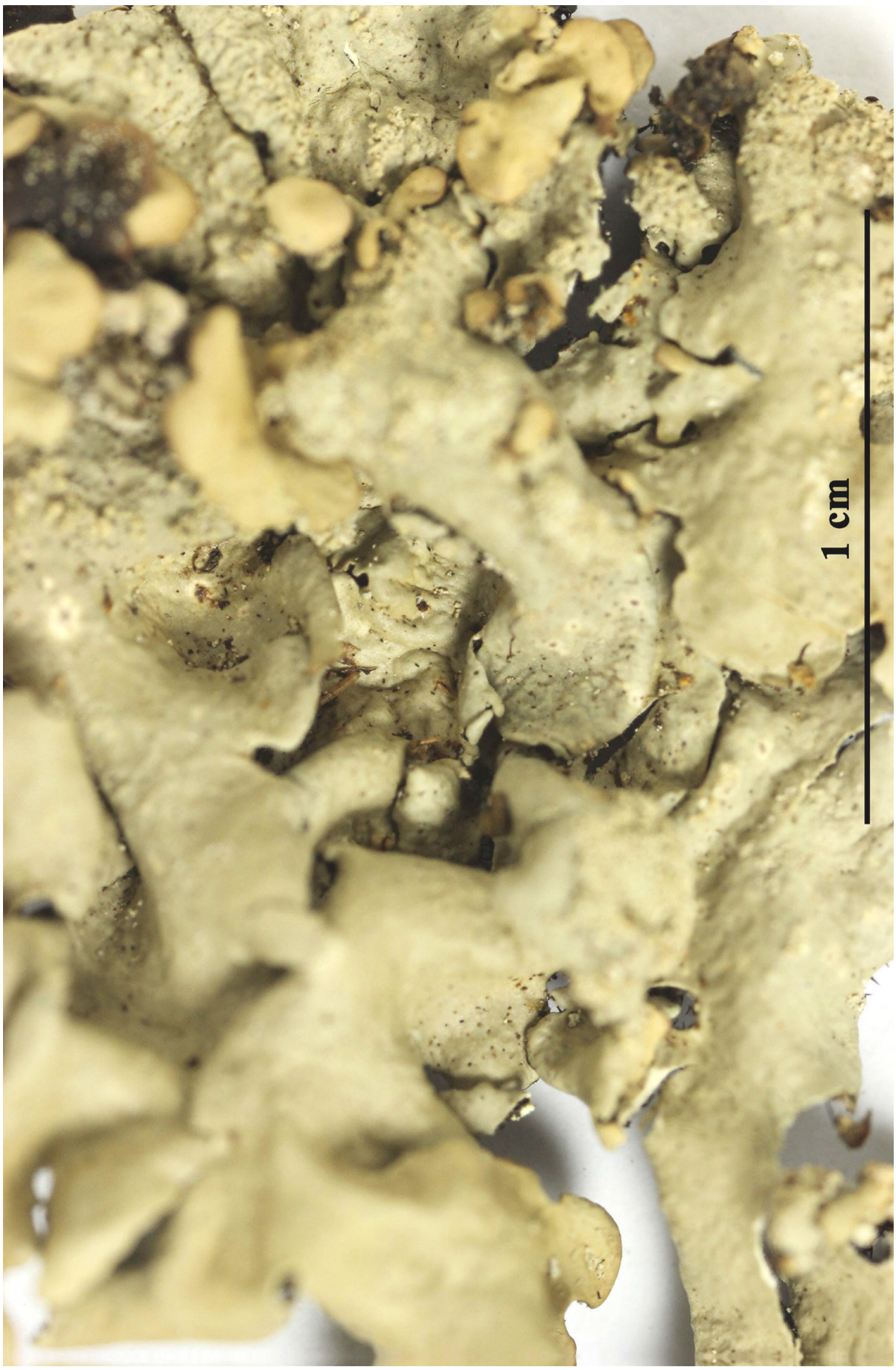


Myelochroa entotheiochroa

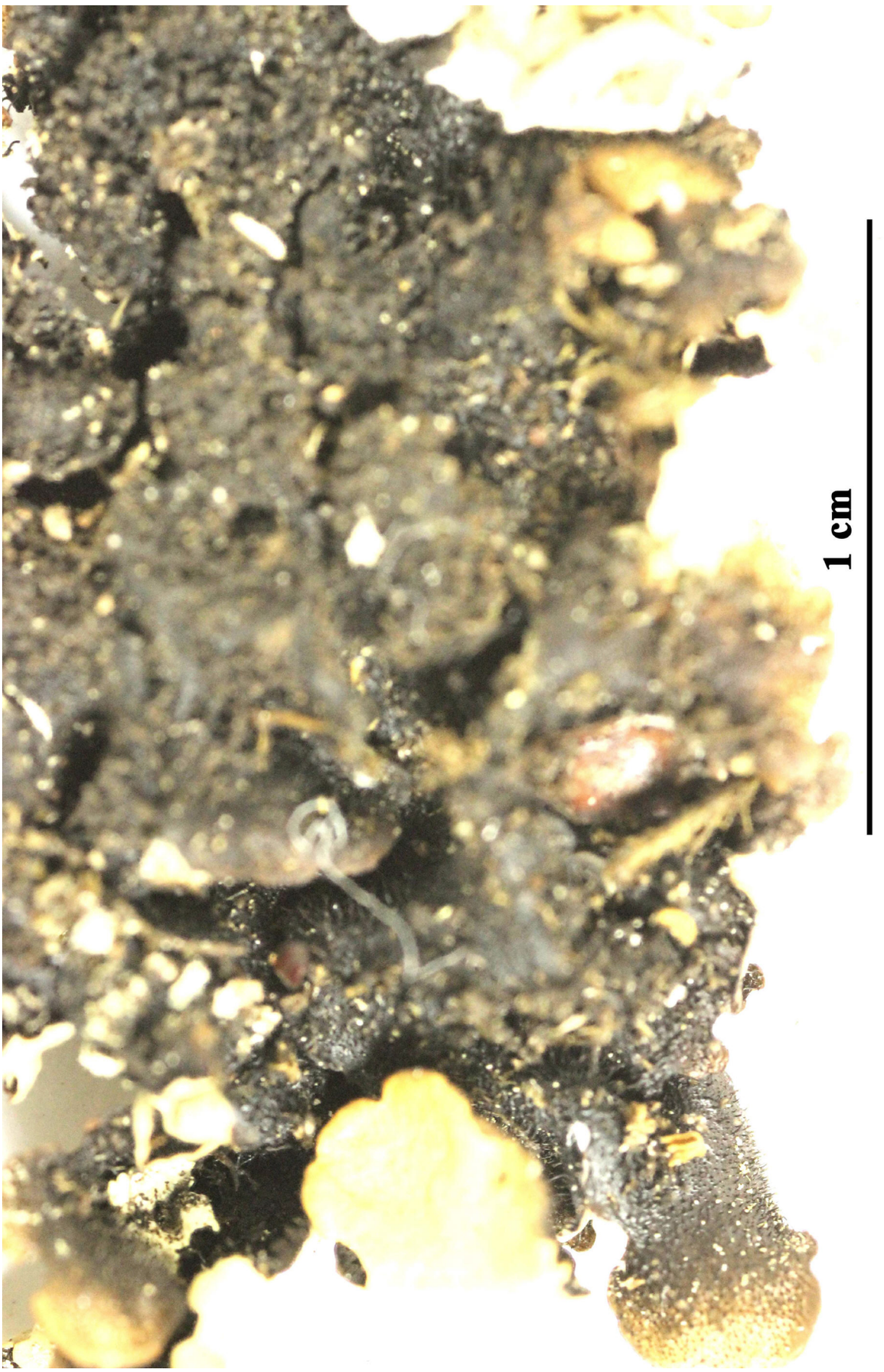
Myelochroa entotheiochroa

Myelochroa entotheiochroa (Hue) Elix & Hale, Mycotaxon 29: 240 (1987)
= *Parmelia entotheiochroa* Hue 1899

[OH635], Japan. Honshu. Prov. Bizen (Okayama Pref.): Ohtahara, Wake-cho, Wake-gun (34°48'12" N, 134°08'58" E). On rock, 182 m. Leg. M. Sugimoto (no. 586), 19.3.2019, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 635.



Myelochroa entotheiochroa



Myelochroa entotheiochroa

Myelochroa irrugans (Nyl.) Elix & Hale, Mycotaxon 29: 241 (1987)
= *Parmelia irrugans* Nyl. 1890

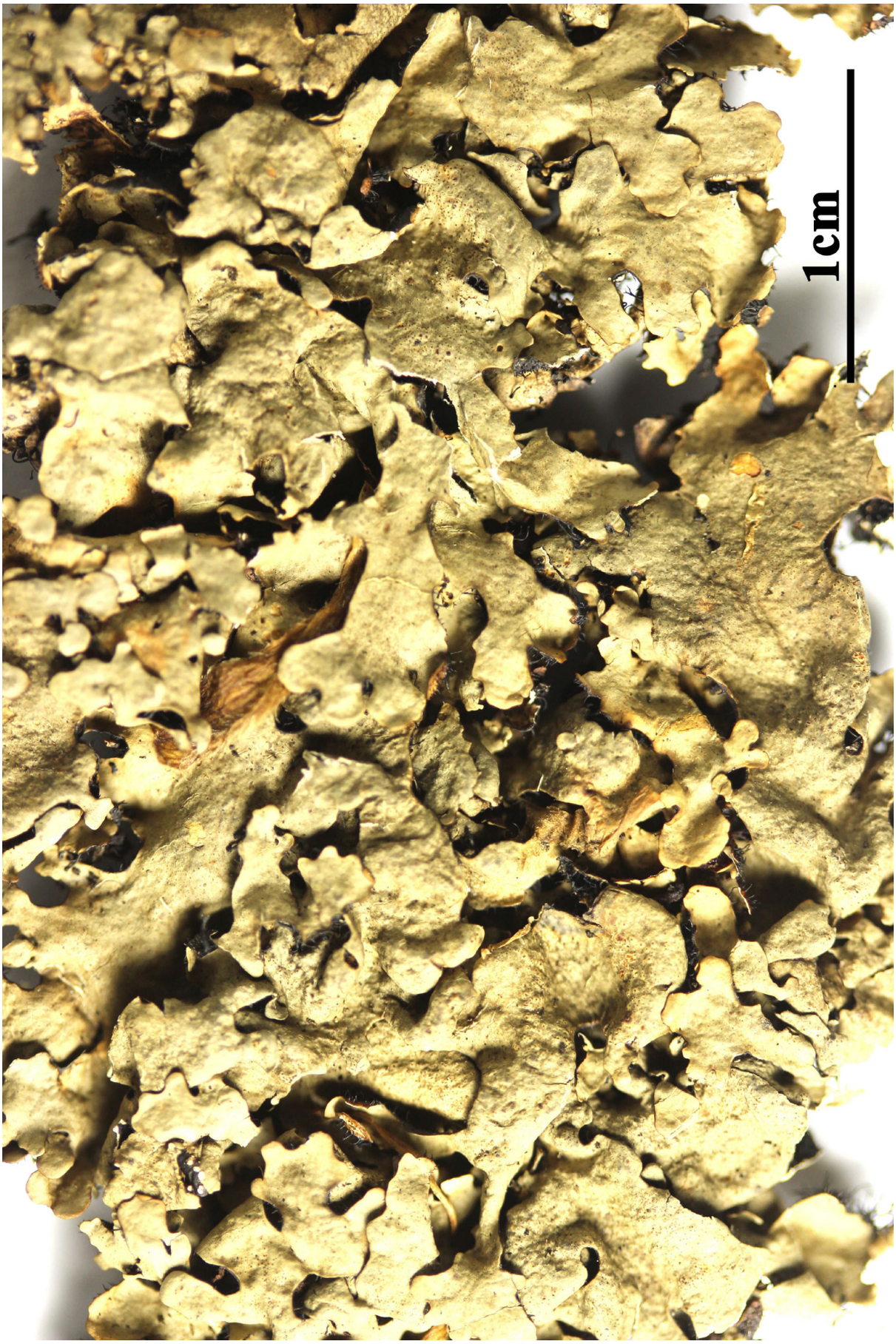
[KA359], Japan. Honshu. Prov. Shinano (Pref. Nagano): Ohgisawa, Ohmachi-city. On bark of *Qercus mongolica* var. *grosseserrata*, 1300m. Leg. H. Kashiwadani (no. 48306), 18.9.1994, det. H. Kashiwadani. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 359.

Myelochroa irrugans

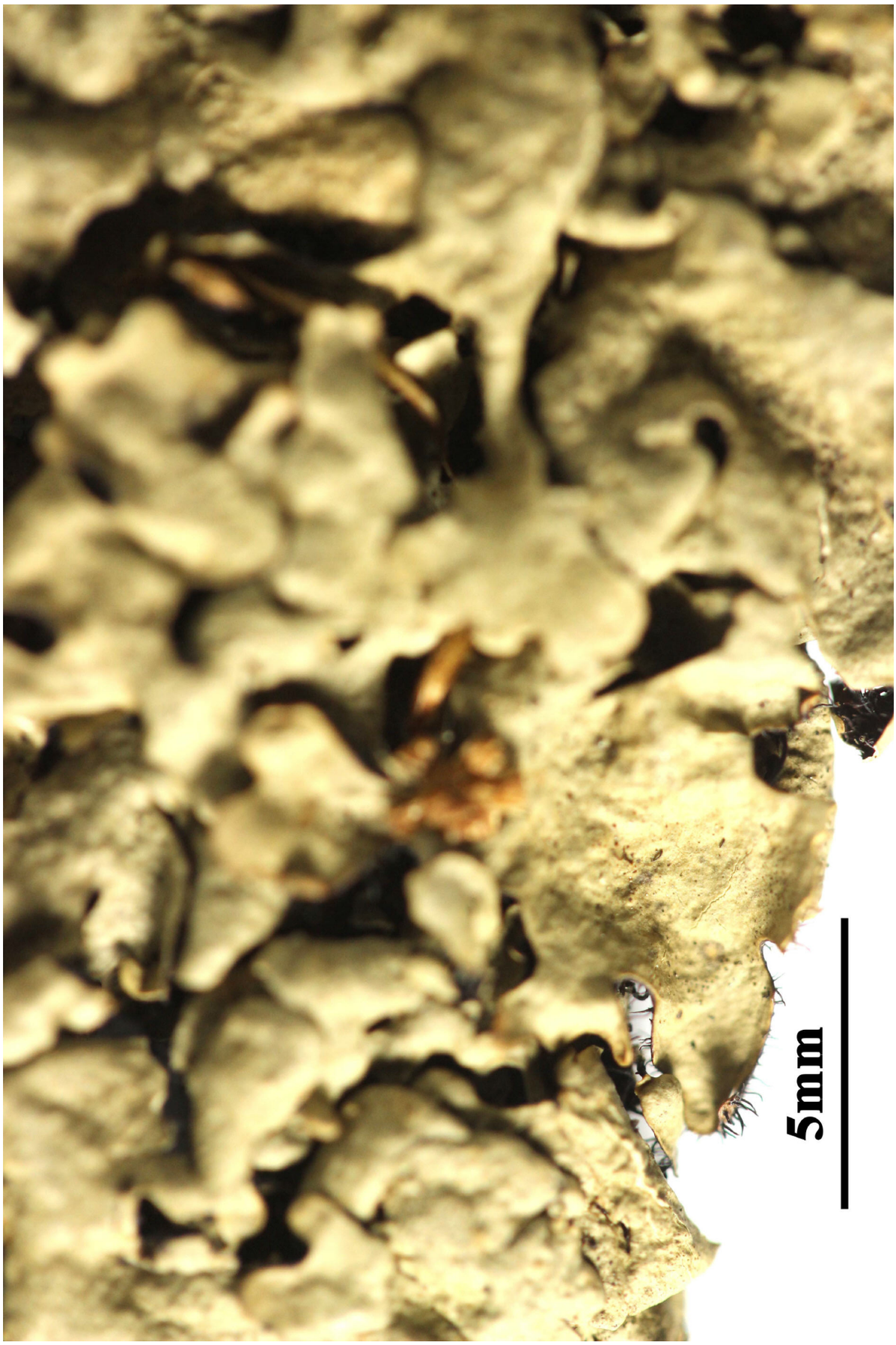
Myelochroa irrugans

Myelochroa irrugans (Nyl.) Elix & Hale, Mycotaxon 29: 241 (1987)
= *Parmelia irrugans* Nyl. 1890

[OH563], Japan. Honshu. Prov. Rikuchu (Pref. Iwate): Ohsawa-guchi to Tatemiishi in Mt. Goyo-zan. On rock with mosses, 400-950 m. Leg. H. Koyama & M. Hotta (no. 2554), 22.6.1967, det. S. Kurokawa. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 563.



Myelochroa irrugans

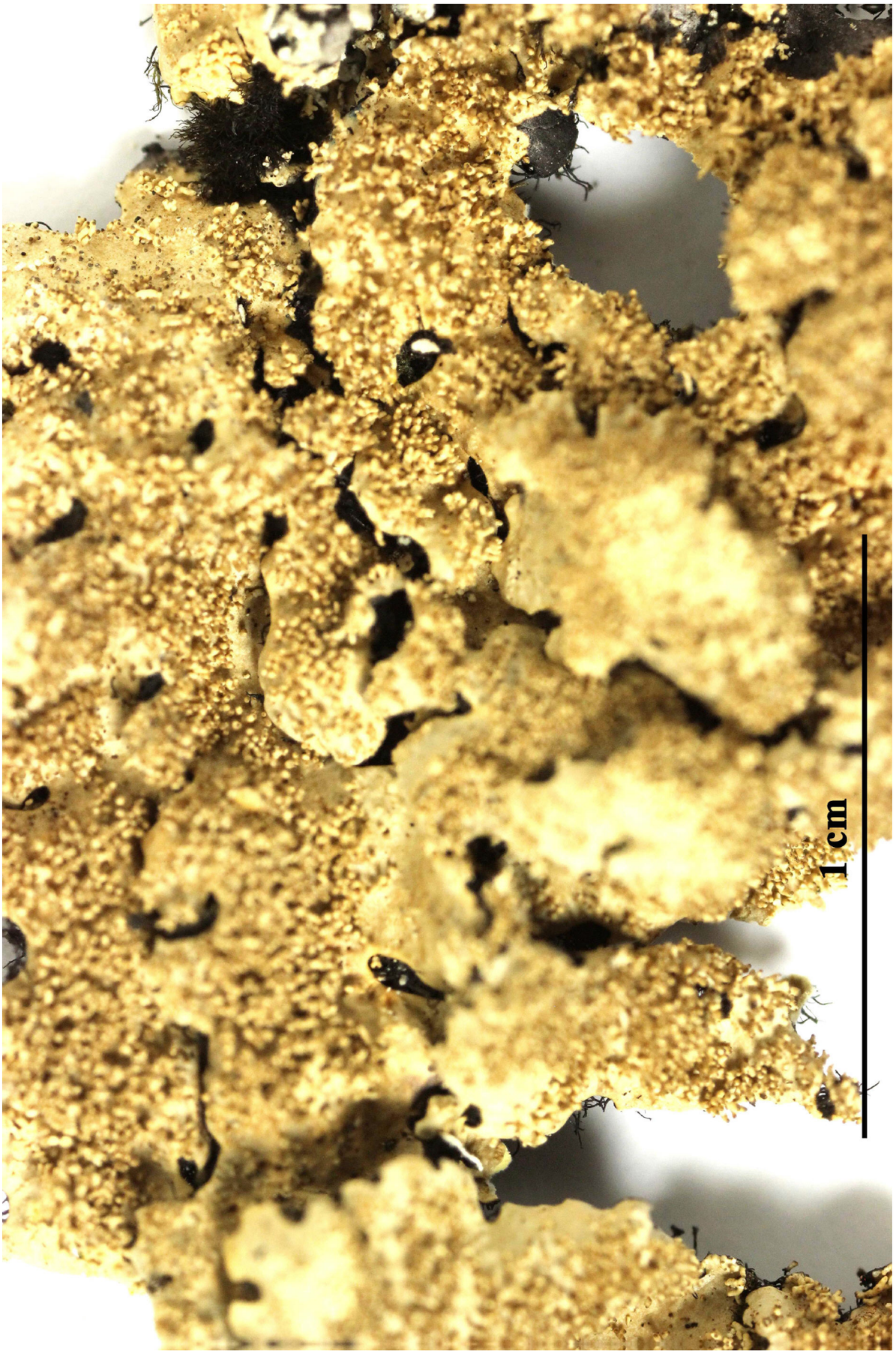


Myelochroa irrugans

Myelochroa perisidians (Nyl.) Elix & Hale, Mycotaxon 29: 241 (1987)
= *Parmelia perisidians* Nyl. 1900
= *Parmelina perisidians* (Nyl.) Hale, Phytologia 28: 483 (1974).

[KA360], Japan. Honshu. Prov. Mikawa (Pref. Aichi): Ebi, Horai-cho, Minamishitara-gun (35°02' N, 137°33' E). On stone works in paddy field, 170 m. Leg. K. H. Moon (no. 7119), 18.10.2003, det. K. H. Moon. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 360.

Thallus foliose, closely adnate to the substratum, lobes sublinear, short, 1~2 mm wide, margins entire, ciliate. Cilia sparse and mainly confined to axils. Upper surface greyish, smooth, densely isidiate. Isidia laminal, simple to branched, cylindrical. Medulla pale yellow to yellow. Lower surface black, densely rhizinate up to the margins. Rhizines black, simple or squarrosely branched, 0.5~1 mm long. Apothecia and pycnidia not seen. Chemistry: Cortex K+ (yellow), C-, KC-, P-; medulla K+ (pale yellow) C-, KC-, P-. TLC: atranorin, zeorin, leucotylin. Remarks: *M. perisidians* is characterized by an isidiate upper surface and yellow medulla. *M. indica* closely resembles *M. perisidians* in having an isidiate upper surface, but differs in having a white medulla.



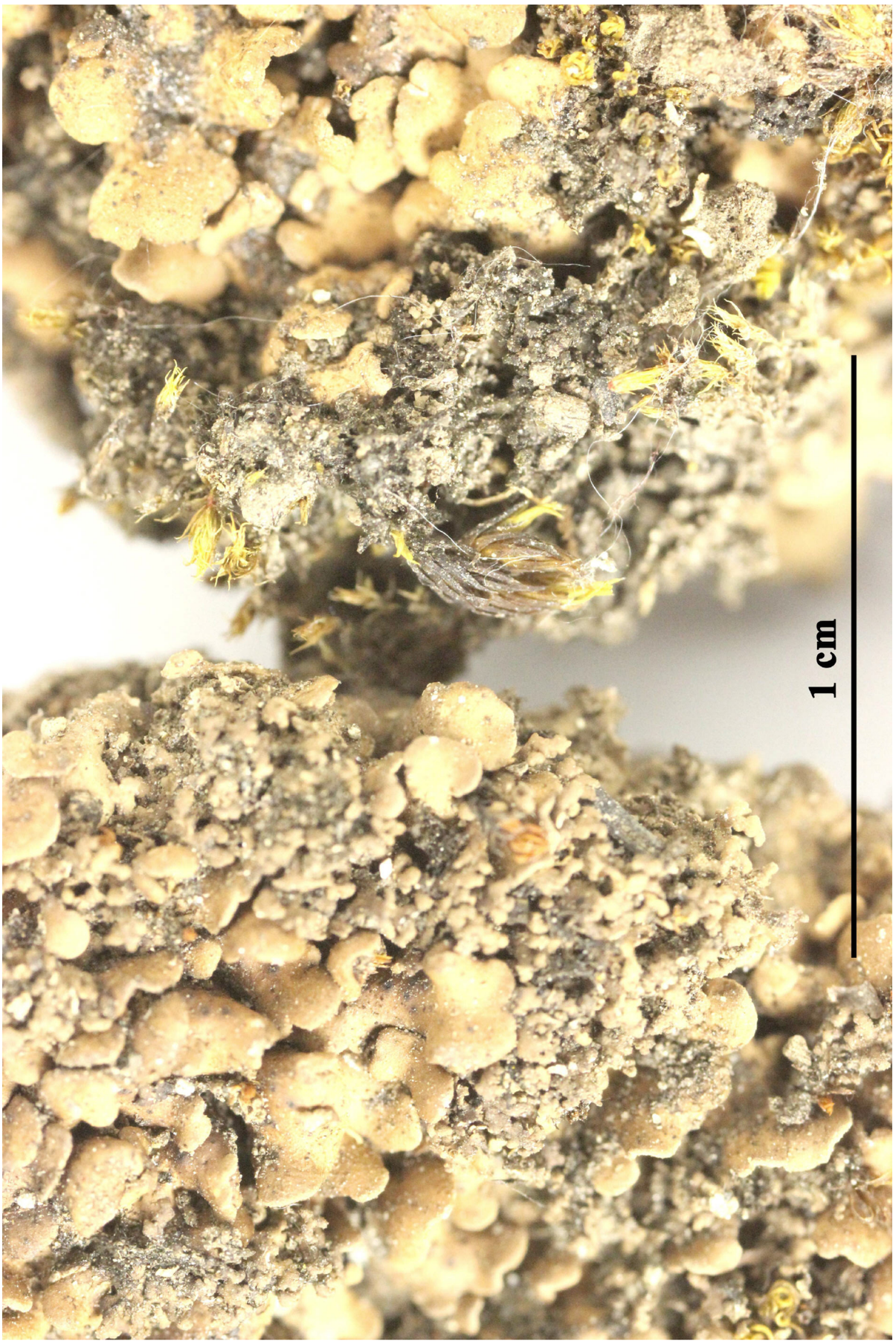
Myelochroa perisidians

Myelochroa perisidians

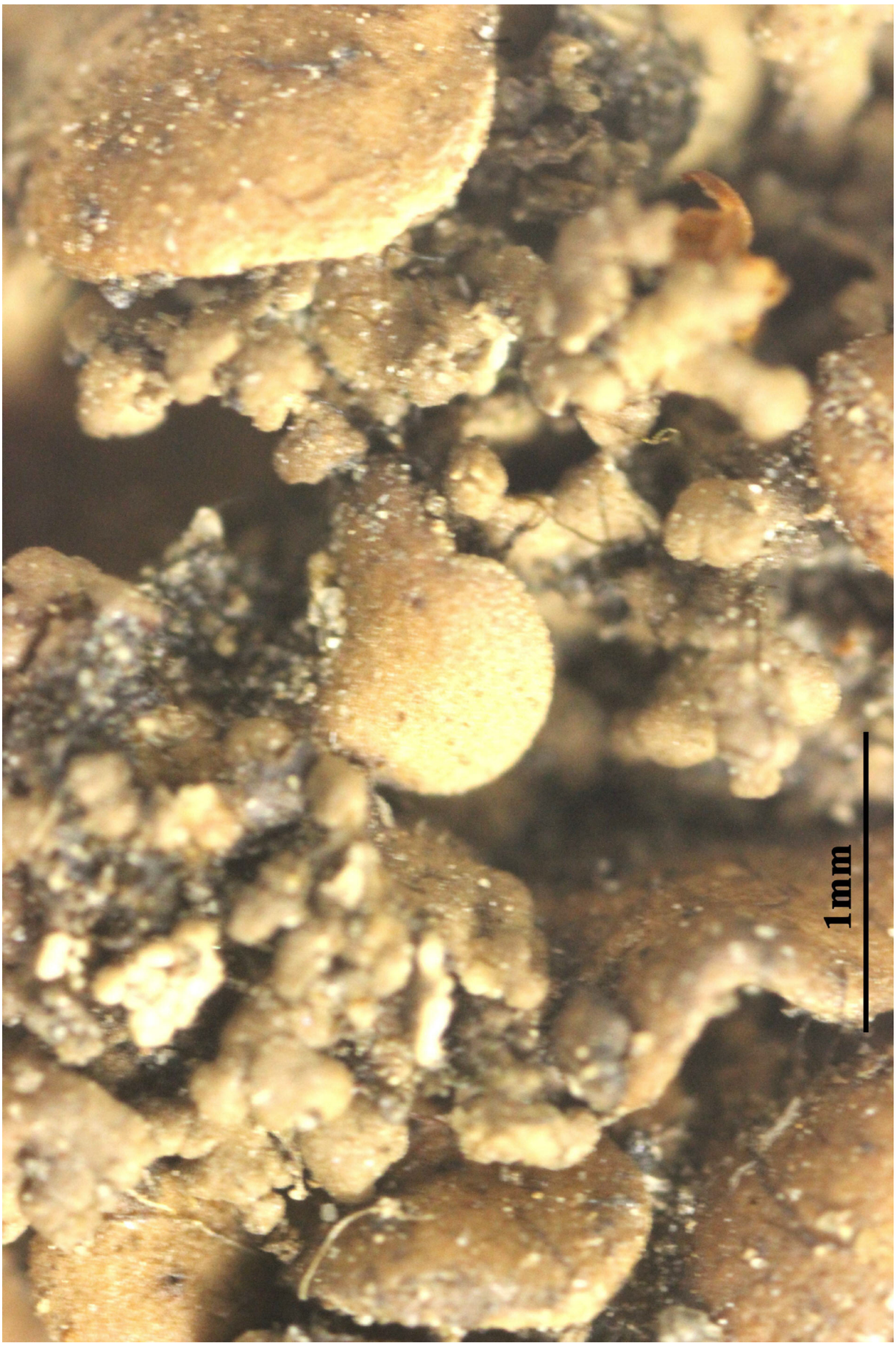
Neocatapyrenium cladonioideum (Vain.) H. Harada, Nat. Hist. Res. 2(2): 129 (1993)
= *Siphula cladonioidea* Vain. 1921

[KA361], Korea. Prov. Gangwon: Baekdam valley, Yongdae-ri, Inje-gun (Mt. Sorak National Park) (38°10'31" N, 128°22'15" E). On rocks, 430 m. Leg. K. H. Moon (no. 10016), 21.10.2006, det. K. H. Moon. EX H. KASHIWADANI LICHENES MINUS COGNITI NR. 361.

Tallus composed of loosely aggregated squamules. Squamules lobate, attached to the substratum only at the basal ends, usually up to 1.5 cm across. Lobes sublinear, 1-2.5 mm wide, sparsely, almost pinnately or irregularly branched, incurved at the apices, imbricate; upper surface flesh-colored, dull or a little glossy, smooth, epruinose, convex; lower surface pale brown, concolorous with the dorsal surface, dull, smooth, canaliculate, lacking rhizines and rhizohyphae. Perithecia laminal, rather common, usually sparse, immersed in the thallus. Pycnidia laminal, common, immersed in the thallus, indistinct. Anatomy: Thallus 300-400 µm thick. Upper cortex 40-80 µm thick, hyaline, but frequently pale brown in the uppermost parts, euparaplectenchymatous, lacking epinecral layer; lumina of hyphae more or less isodiametric, polygonal, 5-9 µm across; walls of hyphae 1-2 µm thick, but 2-3 µm thick in the upper part. Algal layer 50-130 µm thick. Medulla 100-200 µm thick, composed of filamentou
hyphae (4-5 µm in diameter), frequently with spheric ones only in the uppermost and lowermost parts. Lower cortex 30-90 µm thick, hyaline throughout, or brownish in the lowermost part, euparaplectenchymatous; lumina of hyphae 5-12 µm high, 5-8 µm wide; walls of hyphae usually 1-2 µm thick. Perithecia pyriform to almost spheric (but almost campanulate in largest ones), up to 400 µm high and 420 µm wide (but 450 µm across at the uppermost in largest ones); exciple hyaline (or pale brown at the uppermost), up to 100 µm thick in the sides and bottom; subhymenium ca. 30 µm thick; periphyses 20-35 µm long, ca. 3 µm in diameter; hymenium up to 300 µm high and 190 µm wide; asci clavate, ca. 60 x 15 µm; spores 8 in each ascus, hyaline, simple, oval, 15-17 c 7-8 µm. Pycnidia of the Staurothele-type; pycnoconidia bacilliform, 5-7 x ca. 1 µm. Habitat. On rocks, particularly rather fragile volcanic ones. Range. Japan, Korea.



Neocatapyrenium cladonioideum

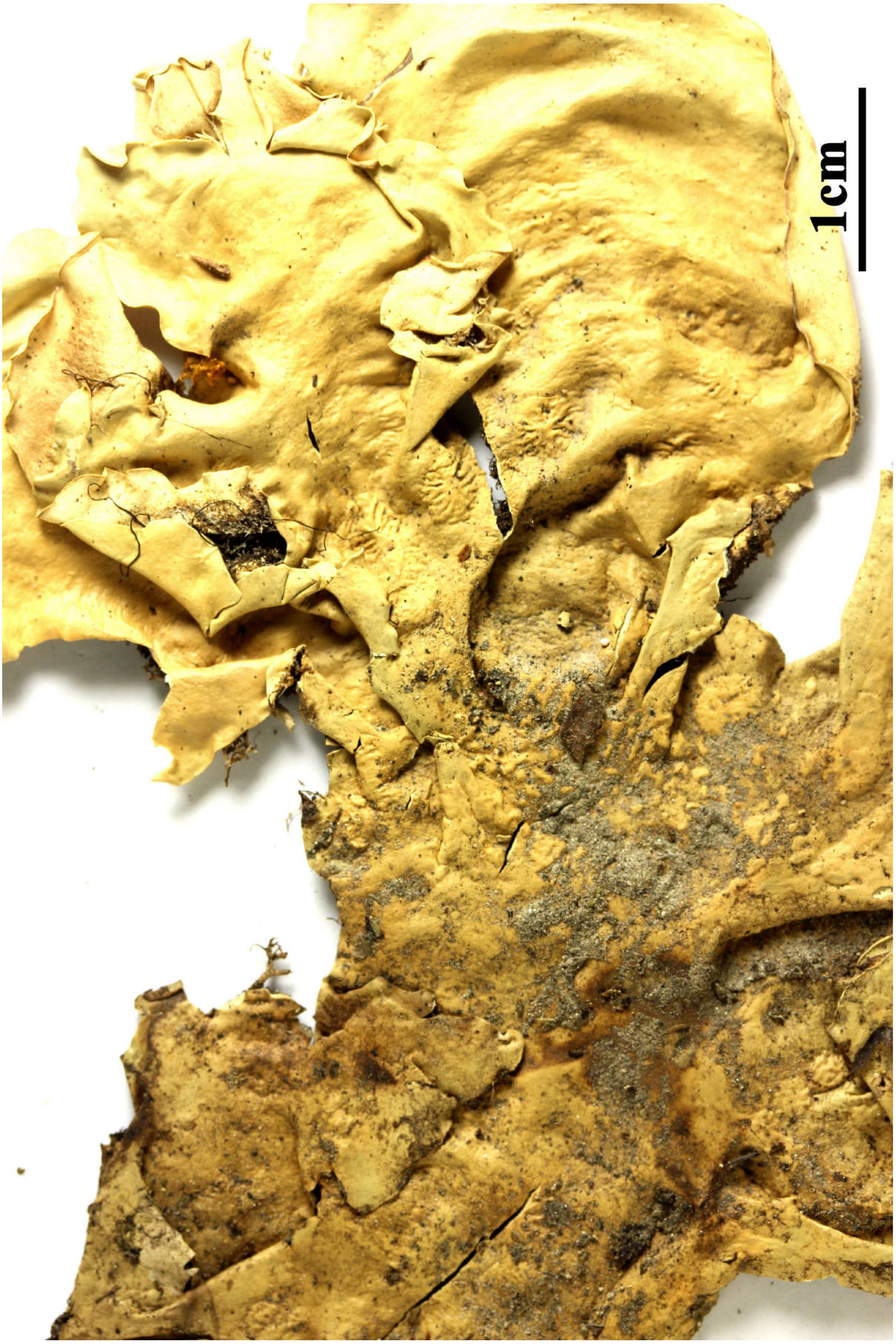


Neocatapyrenium cladonioideum

Nephroma arcticum (L.) Torss., Enum. Lich. Byssac. Scandin. (Upsaliae): 7 (1843)
= *Lichen arcticus* L. 1753

[KU319], Canada. British Columbia: 5 miles north of Cottonwood River Bridge, Cassiar Mountains. Over mosses on soil, 3100 ft. Leg. S. Kurokawa (no. 8987), 21.8.1975, det. S. Kurokawa. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 319.

Thallus 6–8 cm diam., forming rosettes or fragmented and irregularly spreading; lobes c. 15 mm broad, ± rounded, the margins entire, undulate, rarely crenulate; upper surface yellow-green when wet, strawcoloured when dry, smooth to partly wavy, glabrous, with convex cephalodial warts; medulla white; lower surface pale brown-white at the margins, with a conspicuous brownish black tomentum towards the centre; photobiont green in the medulla, blue-green in cephalodia. Apothecia to 20 (–30) mm diam., rufous-brown; thalline margin ±raised. Ascospores 23–27 × 4–6 µm, 3-septate, subfusiform. Pycnidia rare, marginal; conidia 3–4 × 1–2 µm. Thallus C–, K+ yellowish, KC+ yellow, Pd+ yellow; medulla UV+ (nephroarctin, phenarctin, zeorin, ± usnic acid). - Characterized by the yellow-green, large-lobed thallus, absence of soralia and the dark tomentose lower surface. Distinguished from *Peltigera* spp. by the presence of a smooth lower cortex and absence of a network of veins and rhizines.



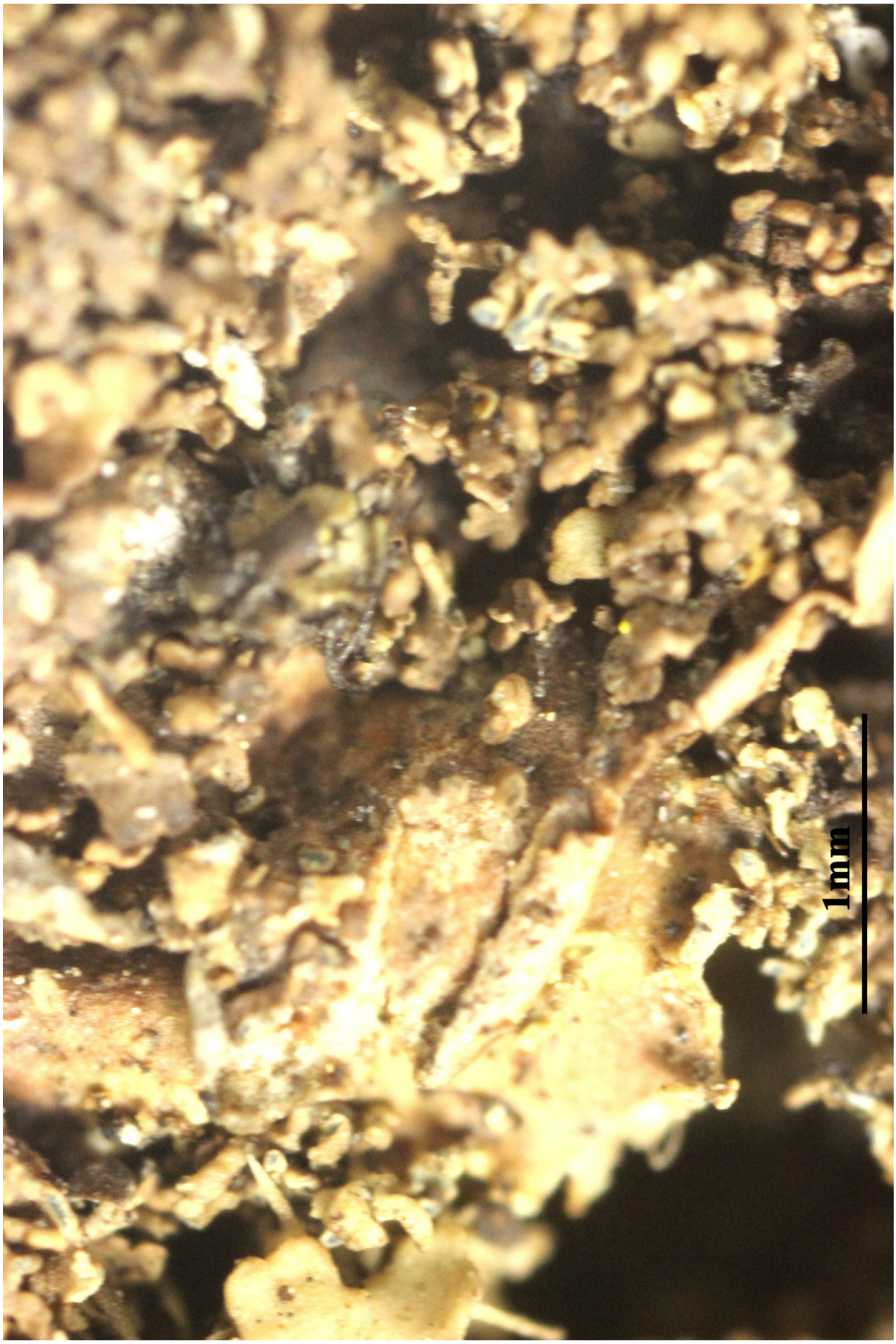
Nephroma arcticum

Nephroma arcticum

Nephroma helveticum Ach. [as 'helvetica'], Lich. Univ.: 523 (1810)

[=U666], Japan. Honshu. Shinano Prov. (Nagano Pref.): Hacchozaka, en route from Azayama to Jumonji Pass, Minamisaku-gun. Leg. M. Nuno, 13.8.1964, det. M. Nuno. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 666.

Thallus foliose, heteromerous, dorsiventral, loosely adnate, crisp, 0.15-0.20 mm thick, forming 3-4(-8) cm wide, regular to irregular rosettes. Lobes 2-5 mm wide, elongate, with subrotund apices, the margins frequently toothed, the fertile lobes with sharp teeth measuring 0.6-1 x c. 0.1 mm. Upper surface grey-brown to dark brown when dry, much darker when wet, smooth, finely pubescent, isidiate-phyllidiate, the isidia at first cylindrical, then flattened, 0.1-0.2 mm in diam., mostly marginal but later expanding on the upper surface. Lower surface dark brown to black, paler at margins, pubescent or tomentose, not papillate. Upper and lower cortex paraplectenchymatous; medulla white. Apothecia common, immersed on lower surface at tips of lobes, up to 8 mm across, cup-shaped, sessile, with a brown disc, emarginate, the dorsal surface rough and tomentose. Epithecium brownish; hymenium and hypothecium colourless. Asci 8-spored, fissitunicate, the thickened apex with a K/I+ blue ring, Peltigera-type. Ascospores 3-septate, pale brown, subfusiform, thick-walled, most of them 21-27 x 6-8 µm. Pycnidia black, mainly marginal, immersed, punctiform, Conidia bacilliform, 3-4 x 1-2 µm. Photobiont cyanobacterial (Nostoc, the cells not in long chains). Spot tests: upper cortex K-, C-, KC-, P-; medulla K+ pale yellow or K-, C-, KC-, P-. Chemistry: upper cortex with an unknown brown pigment; medulla with 7/β-acetoxyhopan-22-ol (Tl) (±), and hopane-7β,22-diol, plus unknown UV+ substances. - Note: a cool-temperate to southern boreal-montane, circumpolar lichen found on bark, exceptionally on siliceous rocks in humid, but somehow subcontinental upland areas.



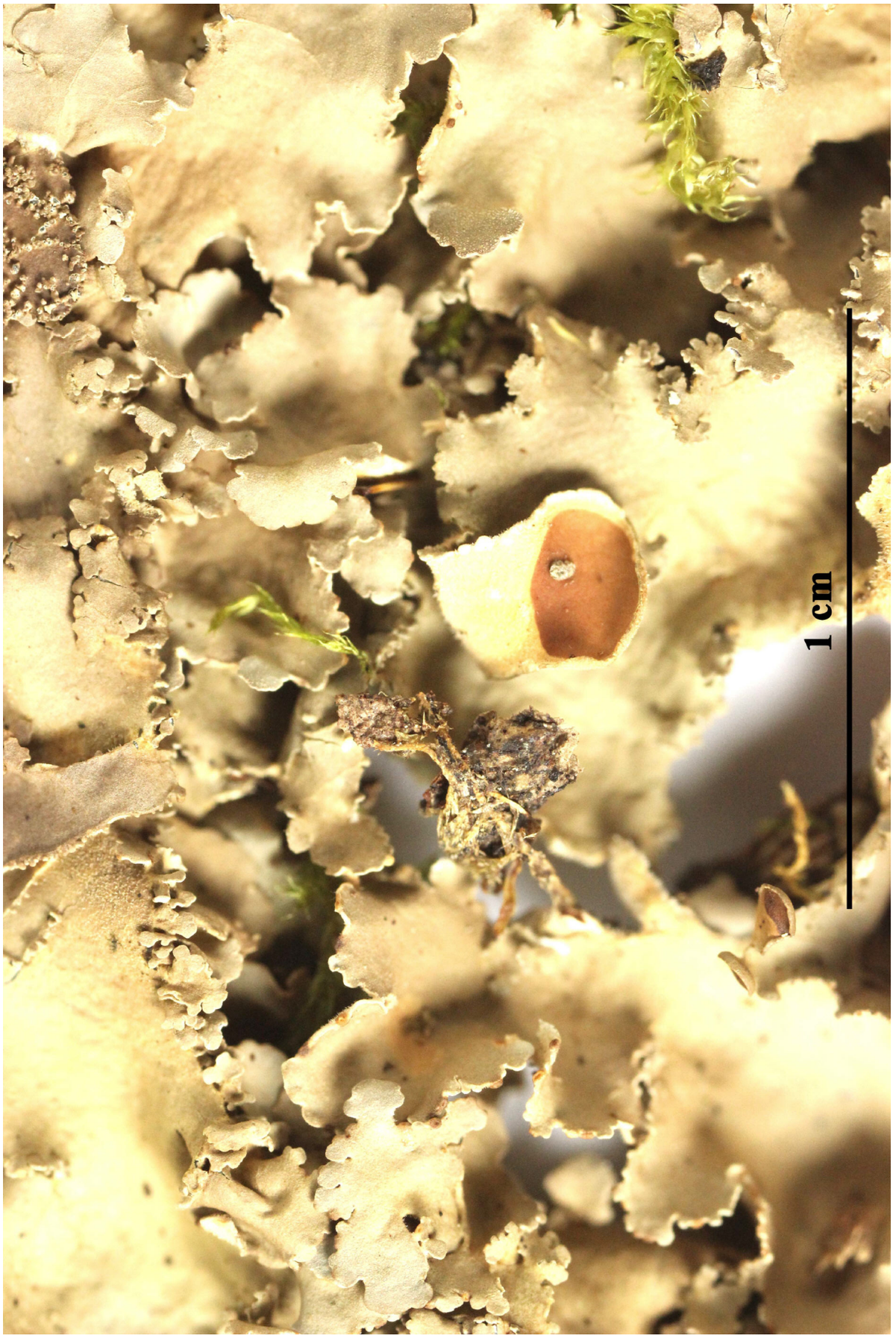
Nephroma helveticum

Nephroma helveticum

Nephroma resupinatum (L.) Ach. [as 'resupinata'], Lich. Univ.: 522 (1810) = *Lichen resupinatus* L. 1753

[OH616], Japan. Honshu. Prov. Shinano (Pref. Nagano): along a mountain path between Akadakesano Cabin and Akadakekosen, Yatsugatake Mts., Chino-city (35°59'20" N, 138°21'05" E). On trunk of *Salix* sp. 2090 m. Leg. Y. Ohmura (no. 12223), K. Tadome, & T. Shiba, 16.9.2017, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR.616.

Thallus foliose, heteromerous, dorsiventral, loosely adnate, forming 3-10 cm wide rosettes. Lobes 5-15 mm wide, elongate, entire or crenulate at margins, sometimes ascending and rarely with marginal or laminal phyllidia, the upper surface grey to grey-brown when dry, much darker when wet, dull, usually strongly pubescent; surface pale brown to whitish, densely tomentose, with scattered, raised, white papillae. Upper and lower cortex paraplectenchymatous; medulla white. Apothecia common, immersed on lower surface at tips of lobes, up to 15 mm across, cup-shaped, sessile, with a brown disc and a prominent, foveolate-reticulate, usually finely hairy thalloid dorsal surface. Epithecium brownish; paraphyses coherent; hymenium and hypothecium colourless. Asci 8-spored, fissitunicate, the thickened apex with a K/I+ blue ring, Peltigera-type. Ascospores 3-septate, pale brown, fusiform, thin-walled, 21-24 x 4-6 µm. Pycnidia rare, black, mainly marginal, immersed, punctiform. Conidia bacilliform, 4-5 x 1-2 µm, Photobiont cyanobacterial (Nostoc, the cells not in long chains). Spot tests: upper cortex and medulla: K-, C-, KC-, P-, UV-. Chemistry: without lichen substances. Note: a mainly temperate, holarctic lichen found on mossy trunks, rocks, more rarely on soil, in cool and sheltered habitats, with optimum in humid beech forests.



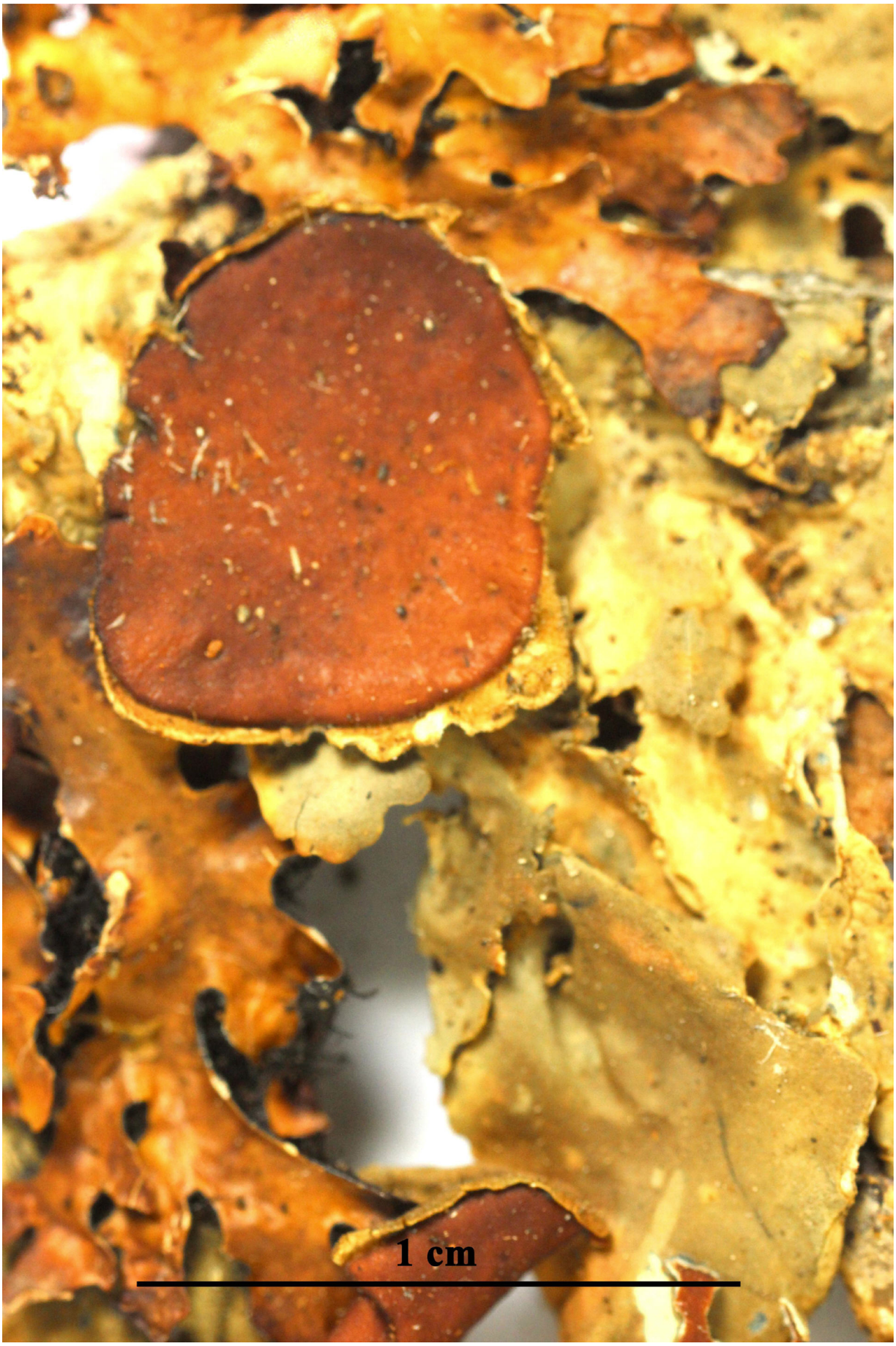
Nephroma resupinatum

Nephroma resupinatum

Nephroma resupinatum (L.) Ach. [as 'resupinata'], Lich. Univ.: 522 (1810) = *Lichen resupinatus* L. 1753

[OH413], Japan. Honshu. Prov. Shinano (Pref. Nagano):Jyogosawa, Yatsugatake Mts. On tree bark, 2200 m. Leg. M. Togashi & S. Kurokawa, 26.7.1969. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 413.

Thallus foliose, heteromerous, dorsiventral, loosely adnate, forming 3-10 cm wide rosettes. Lobes 5-15 mm wide, elongate, entire or crenulate at margins, sometimes ascending and rarely with marginal or laminal phyllidia, the upper surface grey to grey-brown when dry, much darker when wet, dull, usually strongly pubescent; surface pale brown to whitish, densely tomentose, with scattered, raised, white papillae. Upper and lower cortex paraplectenchymatous; medulla white. Apothecia common, immersed on lower surface at tips of lobes, up to 15 mm across, cup-shaped, sessile, with a brown disc and a prominent, foveolate-reticulate, usually finely hairy thalloid dorsal surface. Epithecium brownish; paraphyses coherent; hymenium and hypothecium colourless. Asci 8-spored, fissitunicate, the thickened apex with a K/I+ blue ring, Peltigera-type. Ascospores 3-septate, pale brown, fusiform, thin-walled, 21-24 x 4-6 µm. Pycnidia rare, black, mainly marginal, immersed, punctiform. Conidia bacilliform, 4-5 x 1-2 µm, Photobiont cyanobacterial (Nostoc, the cells not in long chains). Spot tests: upper cortex and medulla: K-, C-, KC-, P-, UV-. Chemistry: without lichen substances. Note: a mainly temperate, holarctic lichen found on mossy trunks, rocks, more rarely on soil, in cool and sheltered habitats, with optimum in humid beech forests.



Nephroma resupinatum

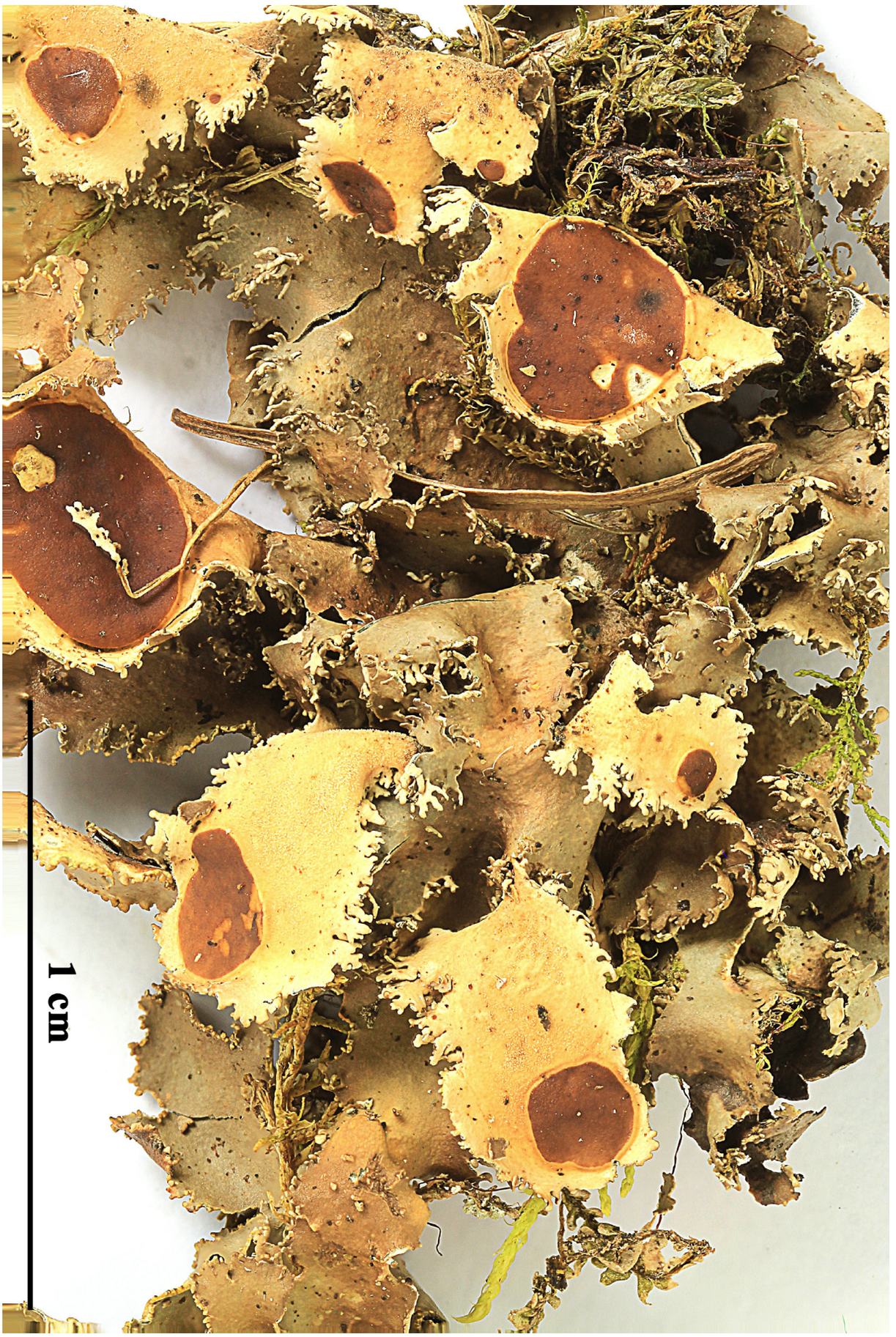
Nephroma resupinatum

Nephroma squamigerum Inumaru, Acta phytotax. geobot., Kyoto 8: 223 (1940) [1939]

[OH617], Japan, Honshu. Prov. Shinano (Pref. Nagano): along a mountain path between Akadakesano Cabin and Akadakekosen. Yatsigatake Mts. Chino-city (35°59'20" N, 135°21'05" E, 2090 m). On rock. Leg. Y. Ohmura (no. 12224, K. Tadome & T. Shiba, 16. 09.2017, det. Y. Ohmura. Ex Y. OHMURA: LICHENES MINUS COGNITI EXSICCATI NR. 617.

N. squamigerum differs morphologically, chemically and genetically from *N. bellum* and other *Nephroma* species, and should be treated as a distinct species. *Nephroma squamigerum* is morphologically similar to *N. bellum* and to glabrous morphotypes of *N. helveticum* and may have been frequently overlooked, especially in other parts of eastern Asia. However, the absence of lichen substances in *N. squamigerum* always allows a clear identification. Also, *N. squamigerum* can be clearly distinguished from all other *Nephroma* species based on the sequences of ITS rDNA and mtSSU rDNA.

Nephroma squamigerum



Nephroma squamigerum

Nephroma squamigerum

Nephroma squamigerum

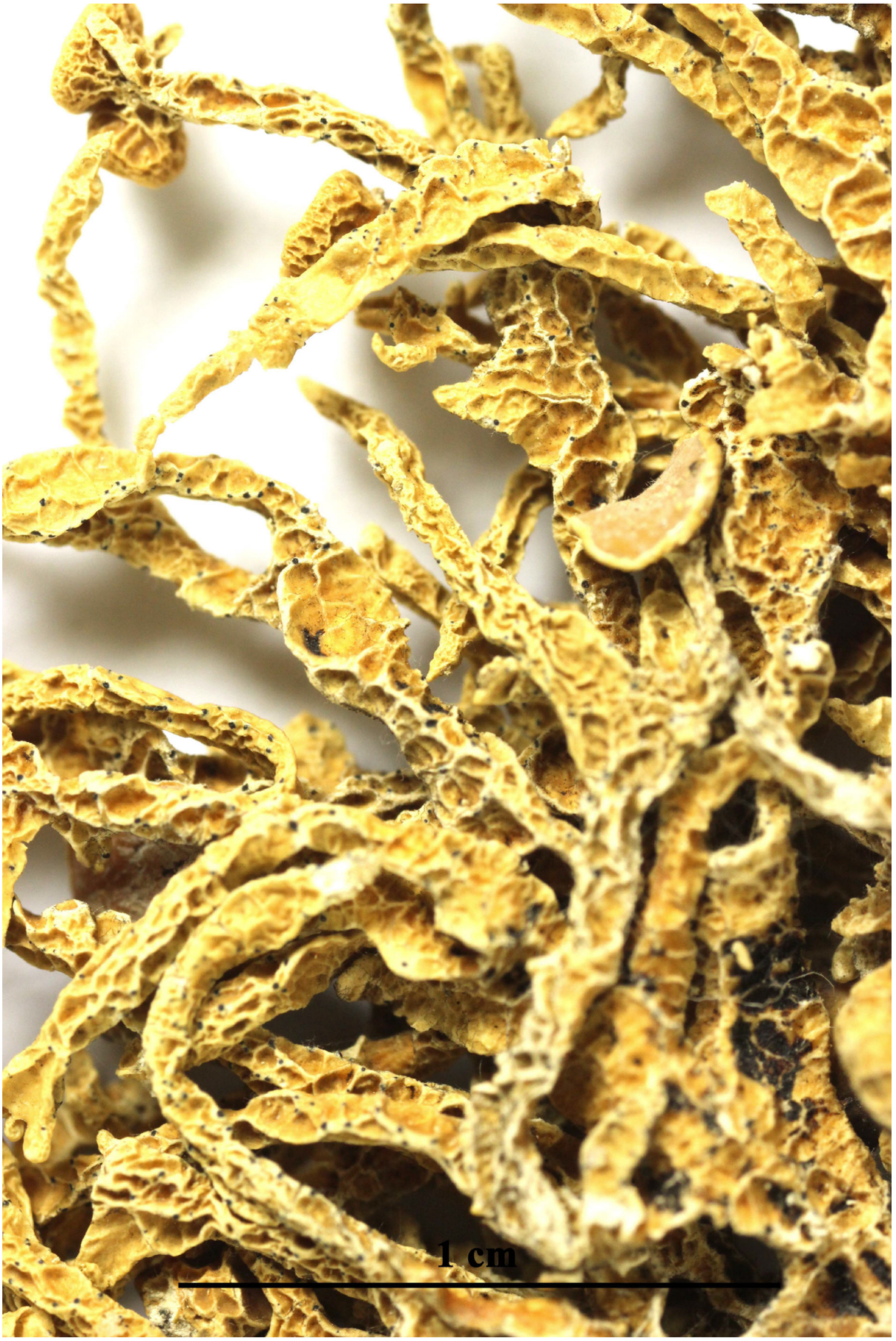
Niebla ceruchis (Ach.) Rundel & Bowler, Mycotaxon 6(3): 498 (1978)
= *Parmelia ceruchis* Ach. 1803

[KA285], Mexico. Estado de Baja California Sur: 17 km along road to Puerto Can Cun, Magdalena Region of the Sonoran Desert (24°33' N, 111°40' W). On bark of *Fouguieria diguetii*, 90 m. Leg. H. Kashiwadani (no. 37316), 30.5.1992, det. P. A. Bowler. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 285.

Thallus: caespitose, soft, highly variable in shape, but always bushy branches: pliable to rigid, thicker and lacunose in inland populations intergrading to thinner populations in coastal areas, up to 3 mm in diam. (usually less), 2-5 cm in length, with either pointed or blunt branch tips surface: pale yellow to green, wrinkled to smooth, often with black stippled maculation cortex: usually a sheath of prosoplectenchymatous tissue in a gelatinous matrix lacking supportive tissue, but variable, becoming rigid and thicker with supportive tissue in some forms; branches varying from rigid and breaking when bent to softer and flexible (not breaking) medulla: medulla white, cottony, hyphal aggregates of N. homalea absent, but a few hyphae occasionally adherent Apothecia: common, present on most thalli, terminal or subterminal, sometimes with a spur, solitary or in clumps, 2-5 mm in diam. disc: pale buff or the color of the cortex, concave or flat; margin: frequently black rimmed asci: clavate, 8-spored ascospores: hyaline, 1-septate, fusiform to oblong, curved, 4.5-15.5 x 2.5-5 µm Pycnidia: variably present, black, immersed conidia: straight, rod-shaped Spot tests: either all negative or K+ yellow to orange or deep red or P+ orange if salazinic or norstictic acids present Secondary metabolites: triterpenes, zeorin, (-)-16α-hydroxykaurane, +salazinic acid, usnic acid, T3 triterpene fide Spjut (1996) and +norstictic acid; or no acids but usnic acid in synonymized taxa fide Spjut (1996). Substrate and ecology: a common, caespitose species on shrubs, trees and cacti, rarely on rock, often with N. cephalota; extirpated in much of its historic range in southern California World distribution: western North America from central coastal California, the California Channel Islands, to the Vizcaíno Peninsula and islands adjacent Baja California Sur, and South America from central Peru to central Chile Sonoran distribution: central coastal California to Baja California Sur, the Channel Islands and the islands off the western coast of Baja California. Notes: Niebla ceruchis is the most common species in the genus occurring on shrubs and trees; the only other

Niebla on bark substrates being the sorediate N. cephalota. It is a highly variable and polymorphic taxon, ranging from thalli with wrinkled surfaces to more thinly branched and smoother morphologies, with a complete range of intergrades between them. The color is also variable, from yellowish green to green with black stippling. The degree of maculation varies from conspicuous to inconspicuous. Apothecia are common, and are either solitary or in clumps on the terminal areas of branches. Black pycnidia are also common. In lacunose morphologies the pycnidia occur along the ridges of the cortical wrinkles. A white, cottony exudate is exuded from thallus cracks in herbarium specimens. The extremes in morphology from the wrinkled, more yellow inland forms grading into thinner branched, stipled coastal forms are present in both North and South America and are not of taxonomic significance.

Niebla ceruchis



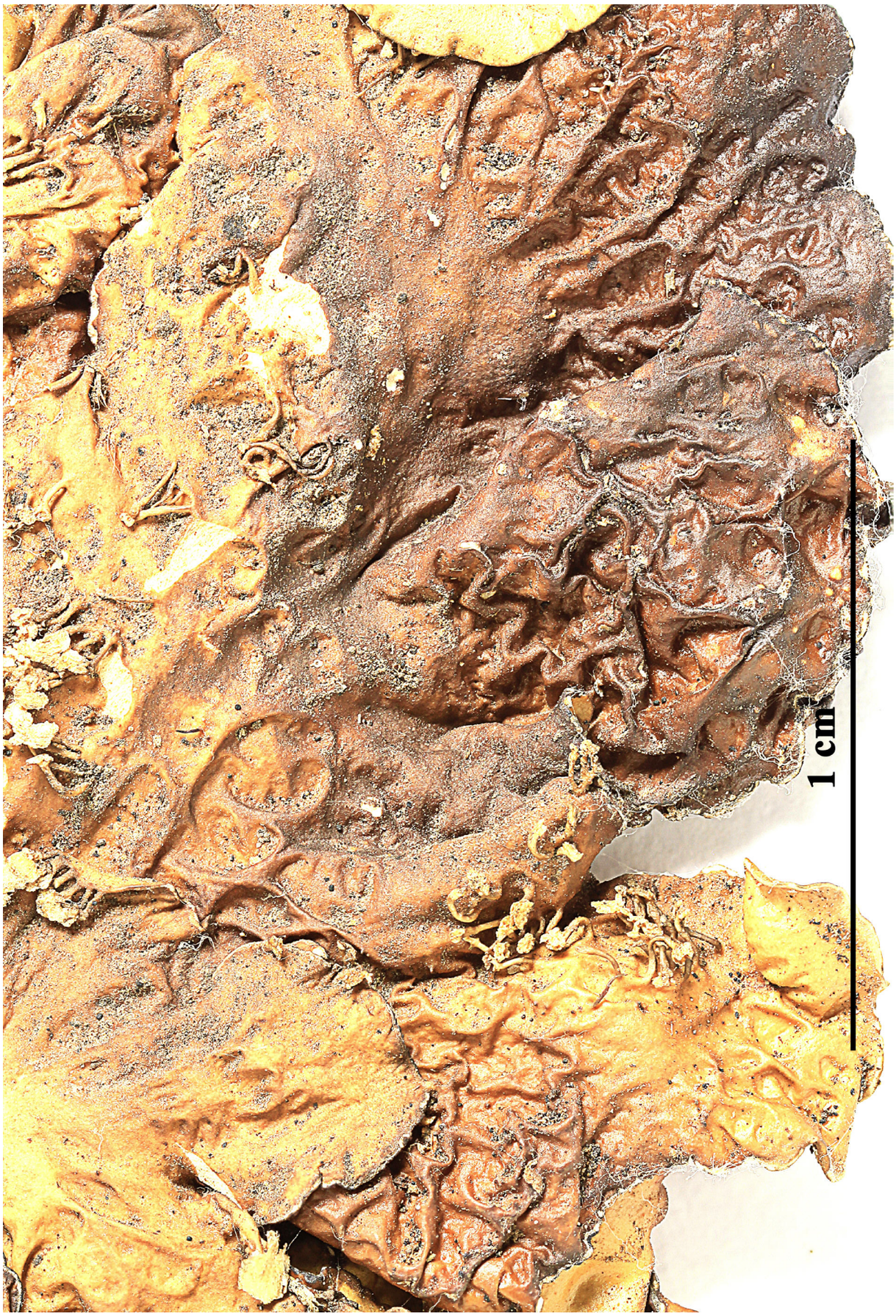
Niebla ceruchis

Niebla ceruchis

Nephromopsis ornata (Müll. Arg.) Hue, Nouv. Arch. Mus. Hist. Nat., Paris, 4 sér. 4(2): 90 (1900)
= *Cetraria ornata* Müll. Arg. 1891

[OH583], Japan. Hokkaido. Prov. Teshio: Mt. Tsurugi, Shimzu-cho, Kamikawagun. On tree bark, 900-950 m. Leg. M. Inoue (no. 8258), 28.07.1974, det. M. Inoue. Ex Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 583.

Thallus foliose, up to 15 cm in diameter, with prolonged ascending lobes up to 1.5 cm wide; upper surface greenish or yellowish grey, smooth or somewhat wrinkled; medulla pale yellow; lower surface brown or dark brown to almost black, regularly reticulated; pseudocyphellae in the form of minute white dots, mainly developed marginally on the lower surface or on ridges. Rhizines sparse, slender. Pycnidia marginal and laminal, located on the black emergent projections, sometimes very numerous. Pycnoconidia bifusiform, 5 x 1 µm. Apothecia marginal on the lower side of the thallus, rounded or reniform, up to 20 mm in diameter, disc brown, faced upwards. Exciple three-layered. Asci 40-45 x 10 µm, axial body extremely small (0.5-1.2 µm), tholus with an amyloid ring stucture, ascospores oblong, 7-9 x 4-5 µm. Chemical constituents: usnic acid in the cortex; secalonic acids A or C, traces of endocrocin and fumarprotocetraric acid (+/-), additionally some fatty acids (+/-) in the medulla. Medulla K+ deep yellow. - Distribution and habitat: Japan, Russian Far East; China (Wei, 1991), Taiwan (Lai, 1981), South Korea (Park, 1990); corticolous on coniferous (*Abies, Larix, Picea, Pinus, Taxus*) and deciduous trees (*Alnus, Betula, Padus, Phellodendron, Populus, Salix, Tilia*) or bushes (*Rhododendron*). The most common species among *Nephromopsis*. - Notes: N. ornata is a distinct taxon, easily recognized by its pale yellow medulla; systematically closely related and morphologically similar to *N. endocrocea*.



Nephromopsis ornata

Nephromopsis ornata

Nephromopsis ornata

Nephromopsis ornata

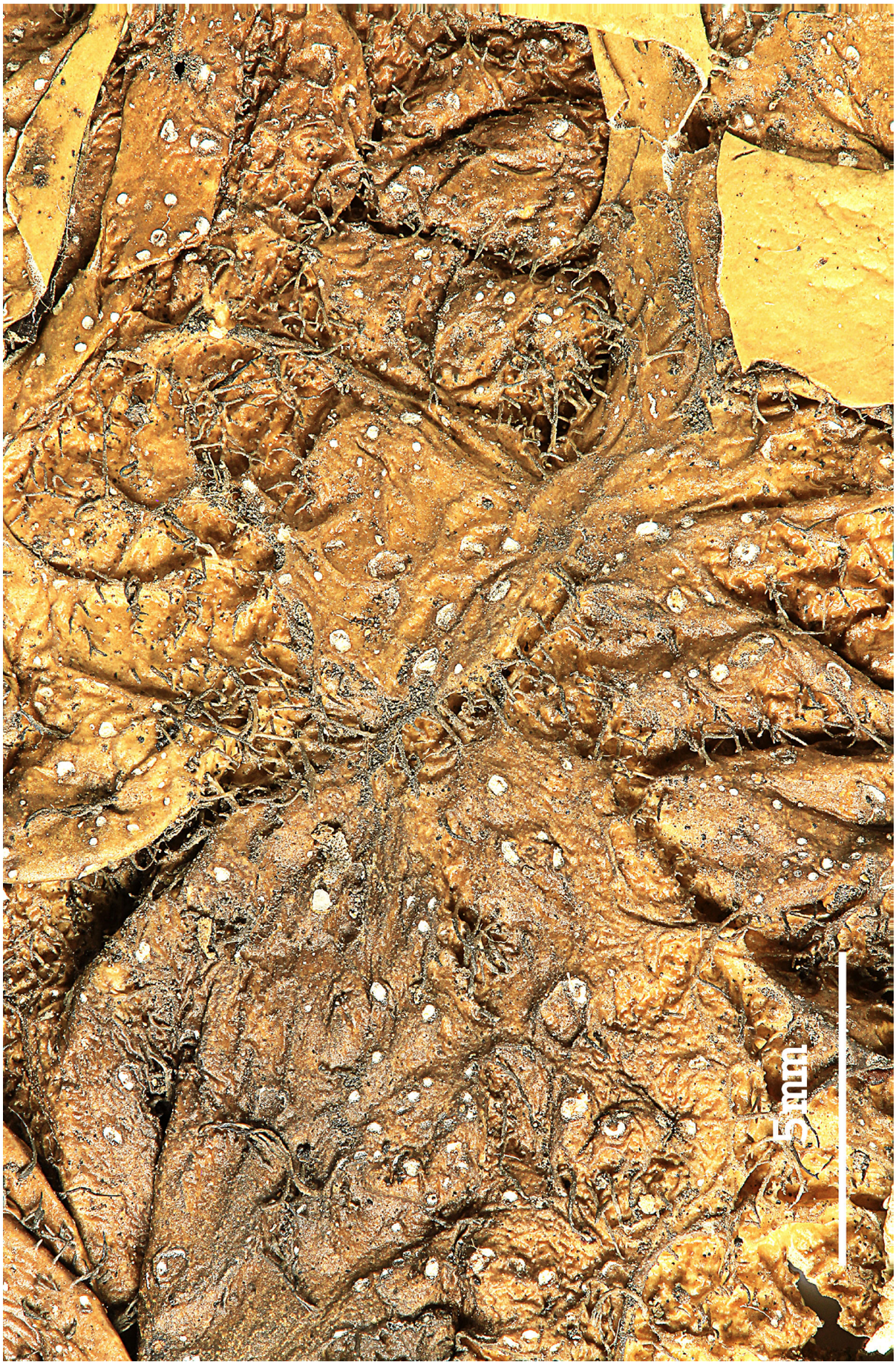
1 cm

Nephromopsis ornata

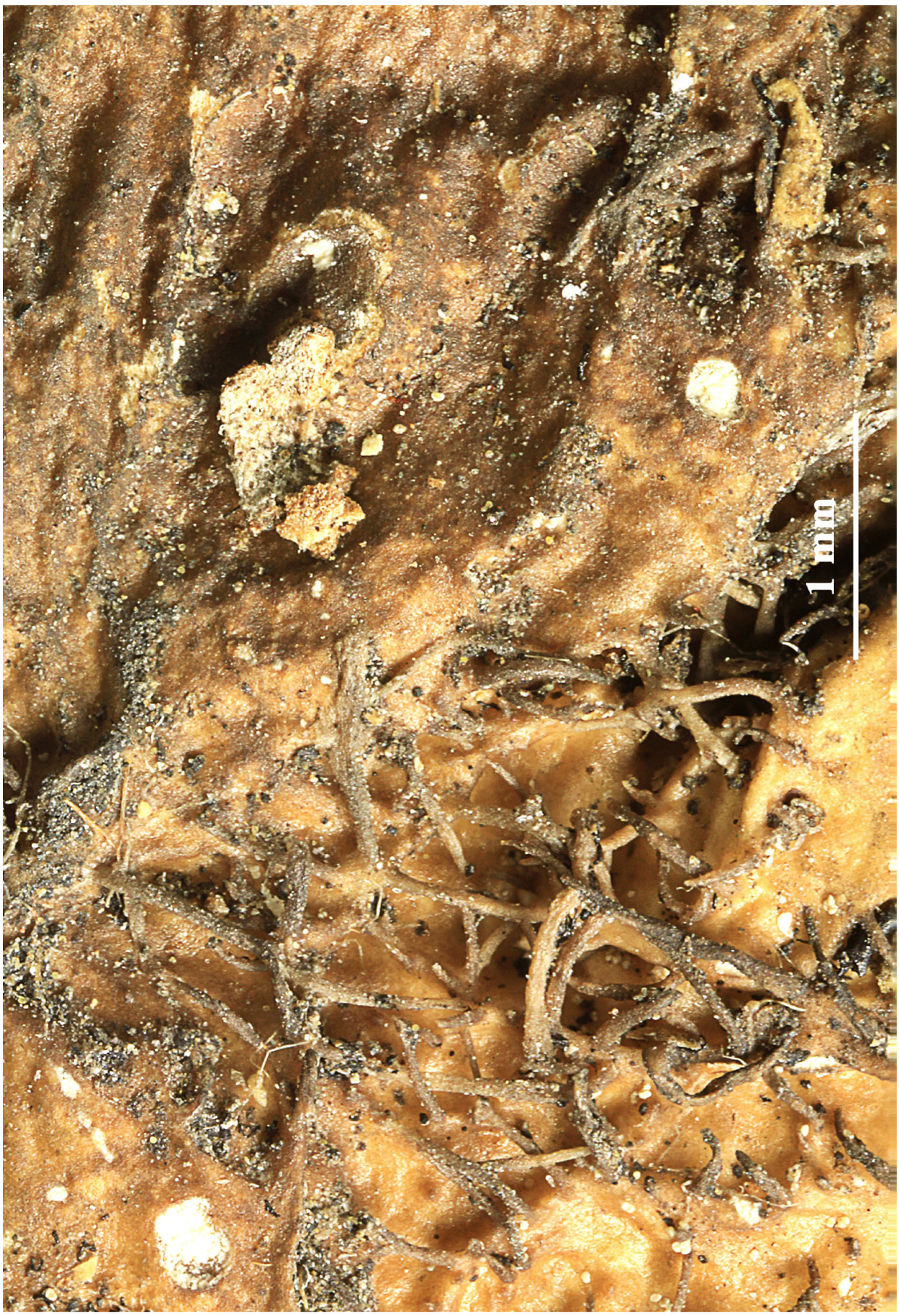
Nephromopsis rugosa Asahina, J. Jap. Bot. 11(1): 5-9 (1935)

[KU574], Japan. Honshu. Prov. Musashi: Mt. Ryogami. On bark of *Quercus crispula*, 1700 m. Leg. M. Togashi, 18.5.1968, det. H. Kashiwadani. Ex S. Kurokawa and H. Kashiwadani Lichenes Rariores Et Critici Exsiccati Nr. 574.

Thallus foliose, up to 20 cm in diameter, with rounded lobes up to 2.5 cm wide; upper surface yellowish or glaucous olive, often with a significant green tinge, remarkably regularly reticulated; medulla white; lower surface light brown, yellowish or whitish, strongly reticulated; pseudocyphellae on the lower side in the form of minute flat white spots located mainly on ridges. Rhizines sparse. Pycnidia marginal and laminal, on the black emergent projections, which are often situated along the ridges of the upper surface. Pycnoconidia bifusiform, 5 % 1-1,5 um. Apothecia marginal on the lower side of the thallus, rounded or reniform, up to 20 mm in diameter, disc brown, faced upwards. Exciple three-layered. Asci 35-40 x 10 µm, axial body 4 µm, ascospores oblong, 7-9 x 3-5 µm. Chemical constituents: usnic acid in the cortex; two chemotypes: I olivetoric acid; physodic and oxyphysodic acids, additionally fatty acids (+/-) in the medulla. Medulla C+ red; chemotype II: C—, KC+ red. - Distribution and habitat: Russian Far East, Japan; Mongolia (Schubert & Klement, 1971); corticolous on coniferous (*Abies, Larix, Picea*) or deciduous trees (*Quercus*) in forests between 700-1700 m elevation. - Notes: N. rugosa can be morphologically recognized by its significantly reticulated thallus which often has a characteristic greenish tinge. Spot tests with C and KC are also of great help.

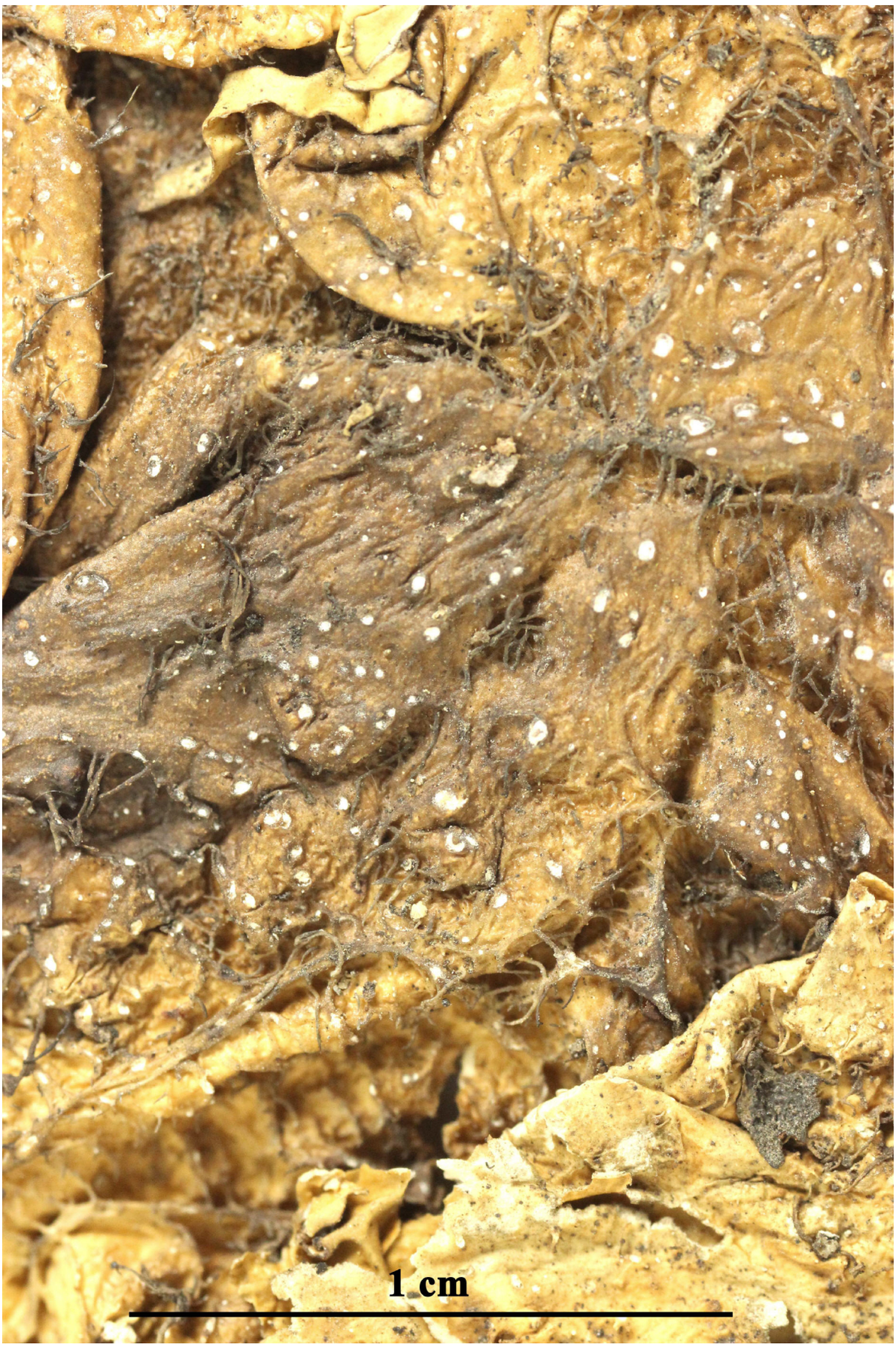


Nephromopsis rugosa



Nephromopsis rugosa

Nephromopsis rugosa



Nephromopsis rugosa

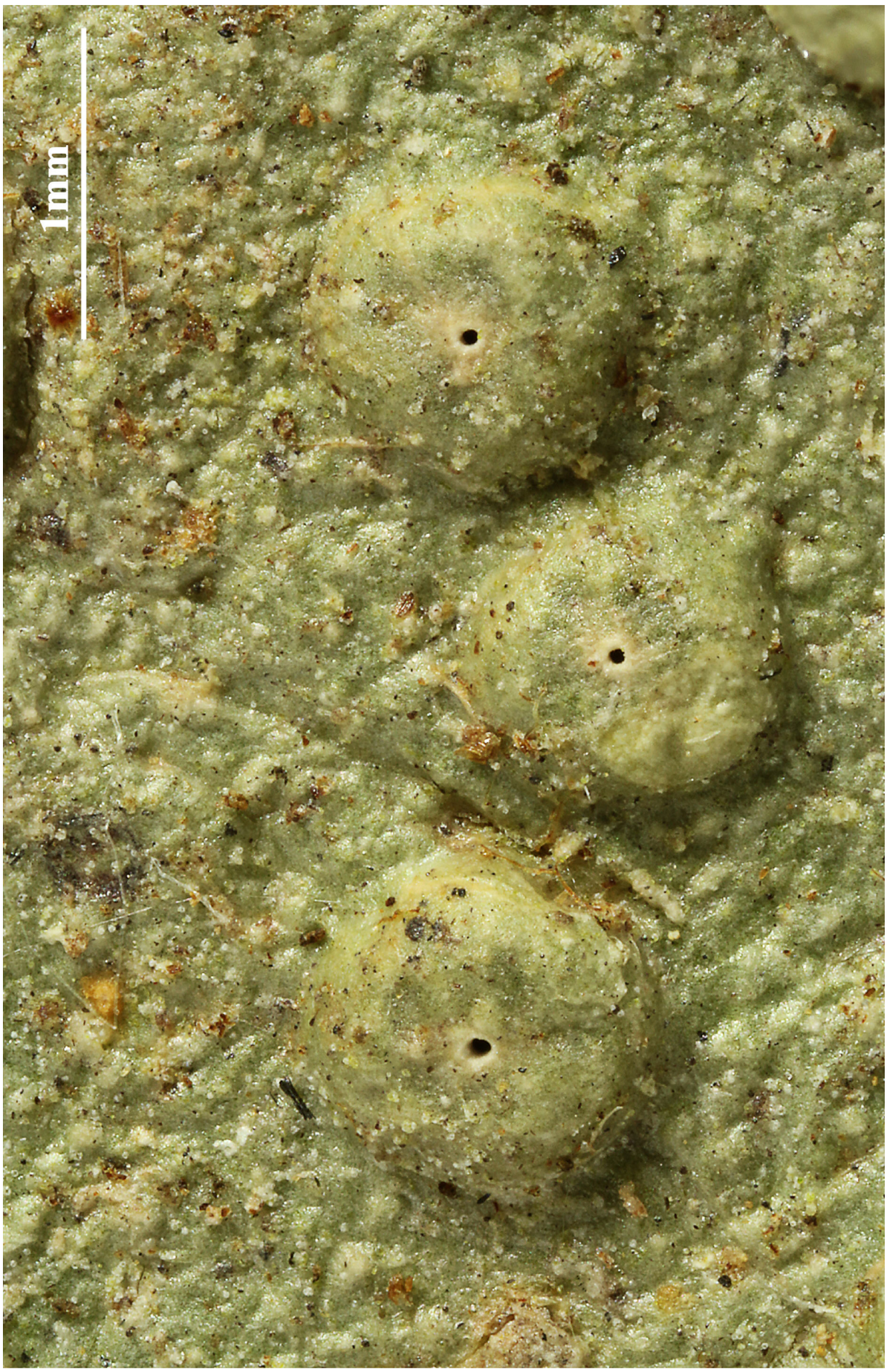
Nephromopsis rugosa

Ocellularia microstoma (Müll.Arg.) Hale
= *Thelotrema microstomum* Müll. Arg. 1891

[19354], Australia, Queensland, Eungella, c. 60 km W of Mackay, surroundings of Broken River Lodge, Rainforest Discovery Walk, in a tropical rainforest, 700 m, 21°10'03" S, 148°30'14" E. Leg. K. & D. Kalb 13.08.2015 (Nr. 40618, Dupl.), det. K. Kalb 09.2015. - Chemistry: protocetraric acid (major), fumarprotocetraric acid (major) anal. by K. Kalb. Ex Herbario F. Schumm Nr. 19354.

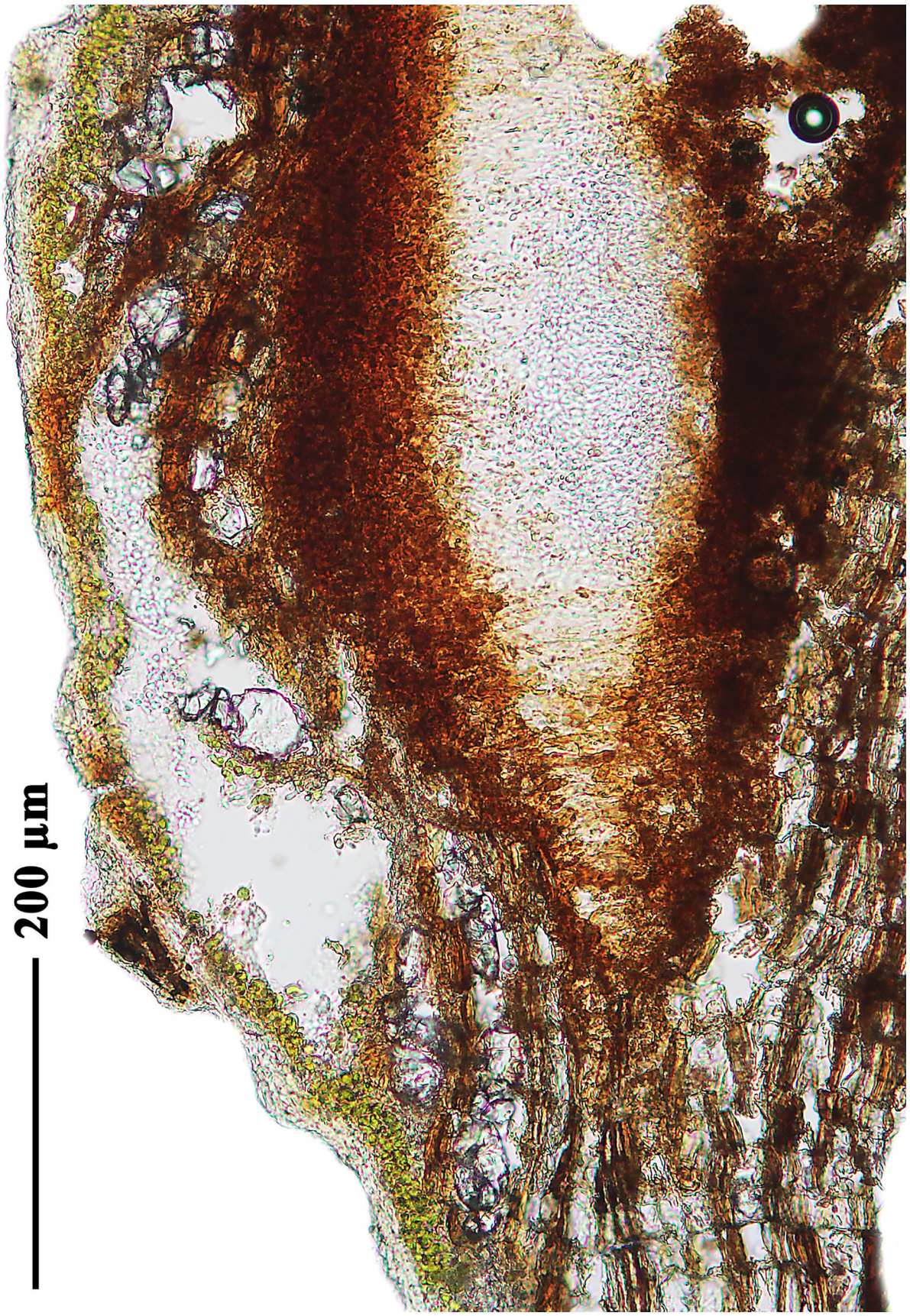
Thallus greenish grey, continuous to verrucose; cortex 16-17 µm, formed by periclinal hyphae; algal layer continuous, 17-25 µm high, calcium oxalate crystals large. Ascomata perithecioid, emergent, ca. 1.1 mm diam; ostiole 0.08-0.09 mm with pale margin (0.05 mm). Excipulum brown, not carbonized, prosoplectenchymatous. Columella absent. Hamathecium not inspersed, paraphyses 1.7 µm thick. Ascospores colourless, muriform, 200-250 x 36-43 µm, locules 2-3 µm, IKI+ blue.

Ocellularia microstoma

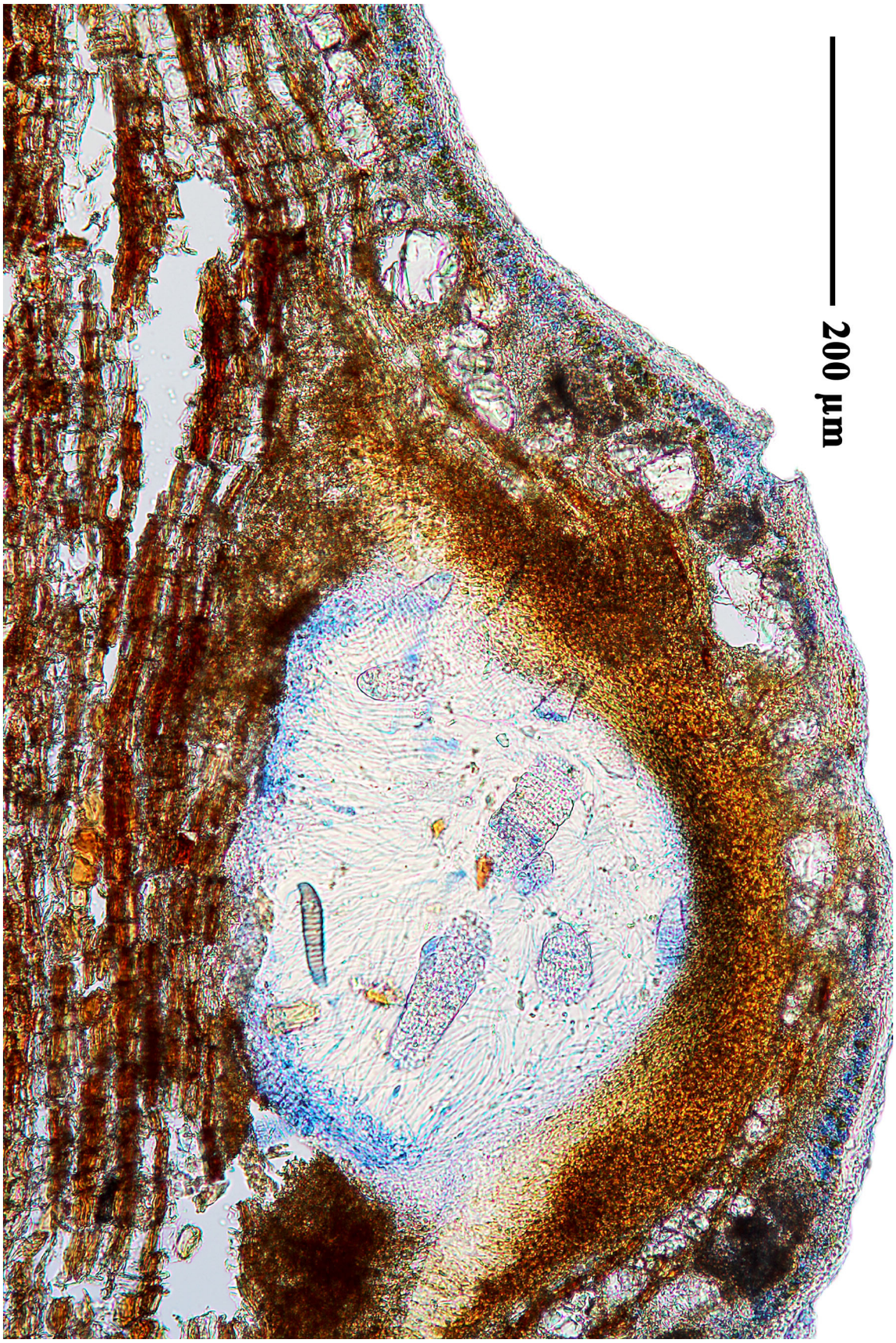


Ocellularia microstoma

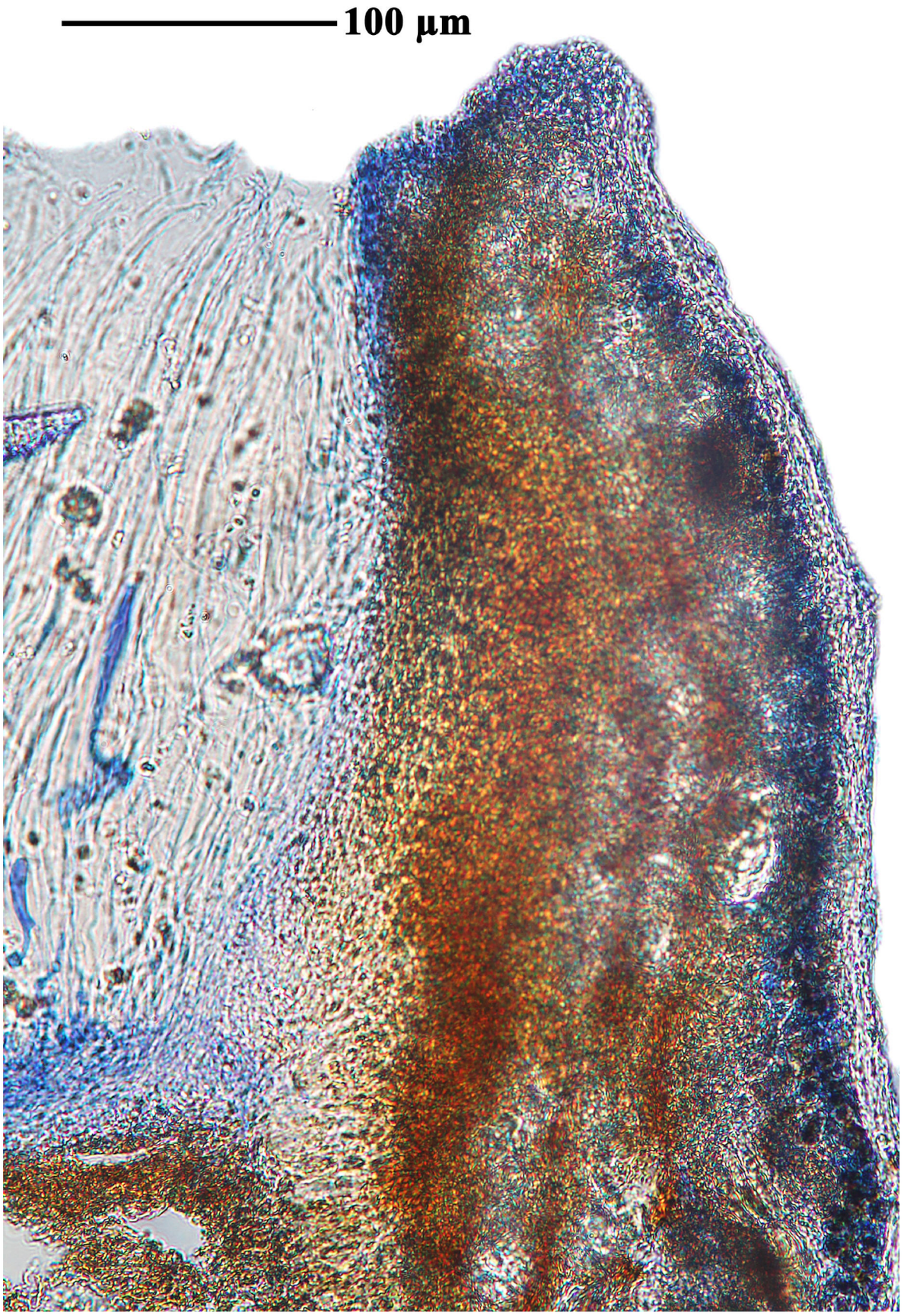
Ocellularia microstoma



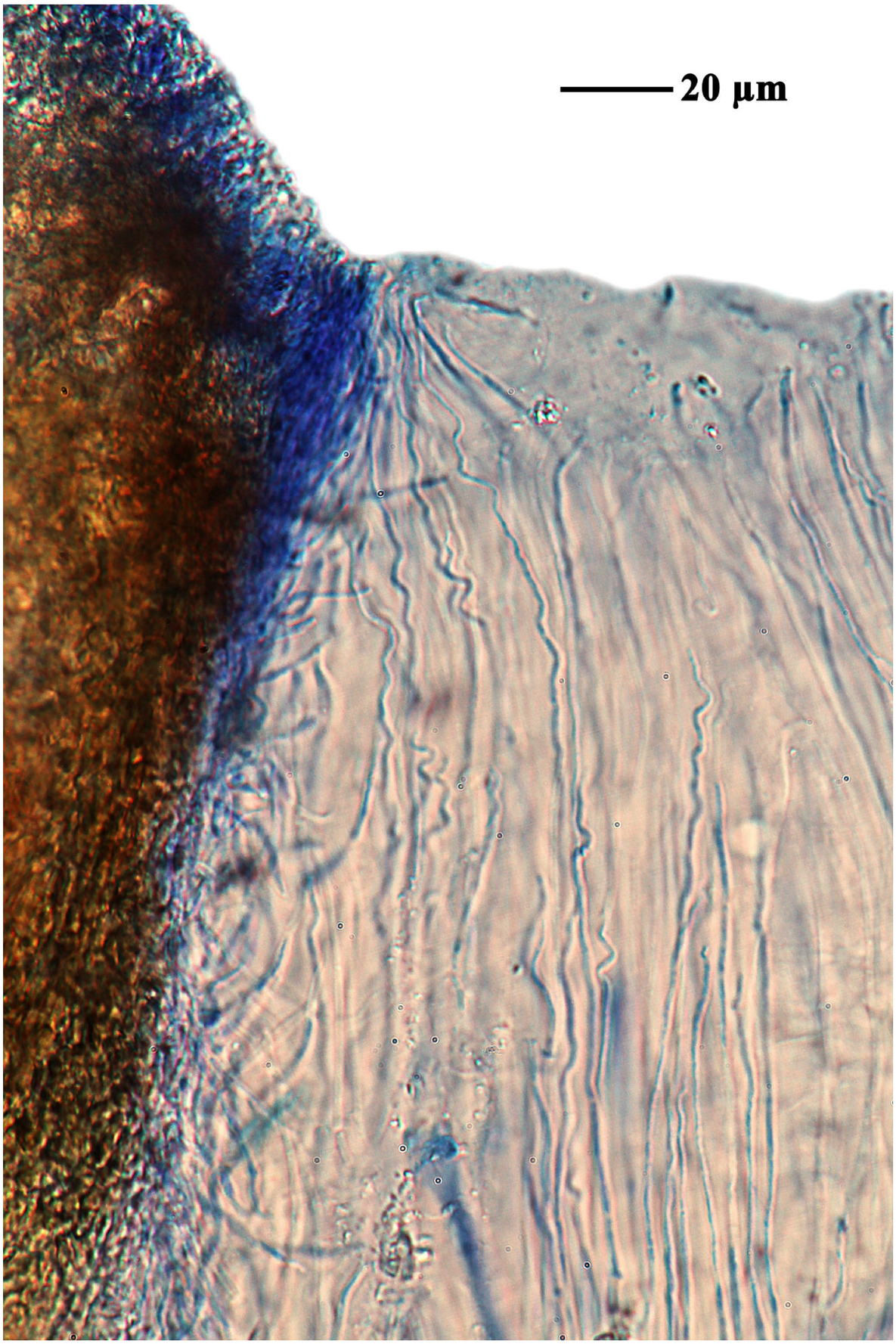
Ocellularia microstoma



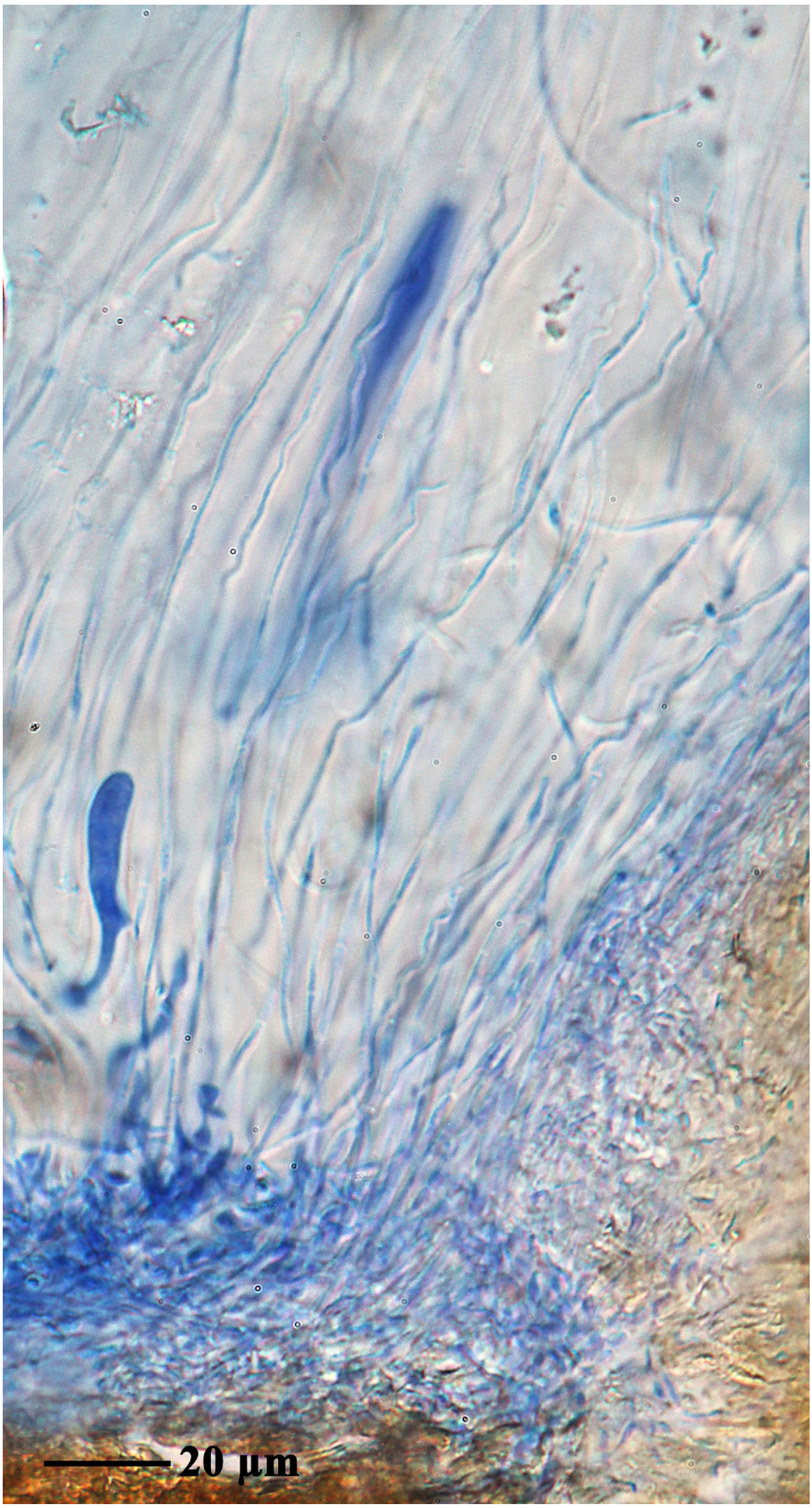
Ocellularia microstoma



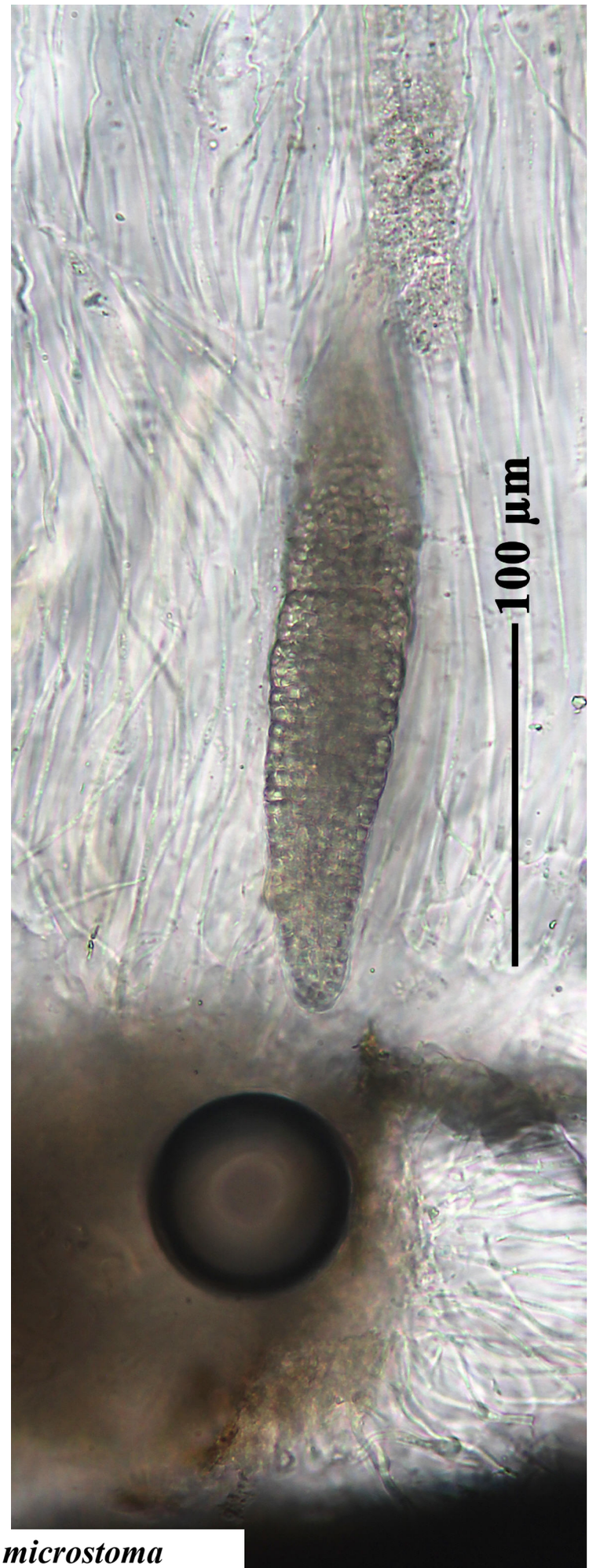
Ocellularia microstoma



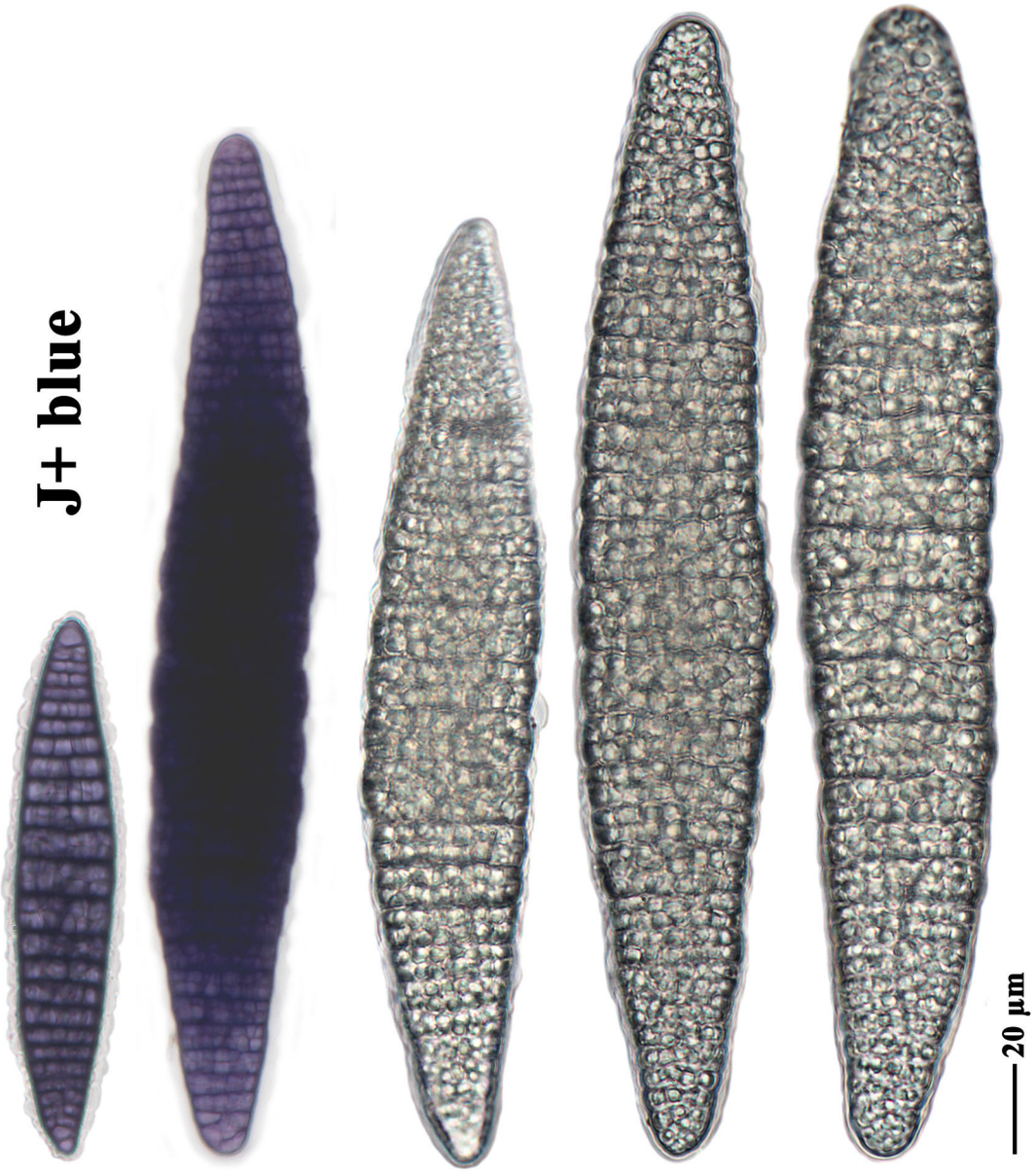
Ocellularia microstoma



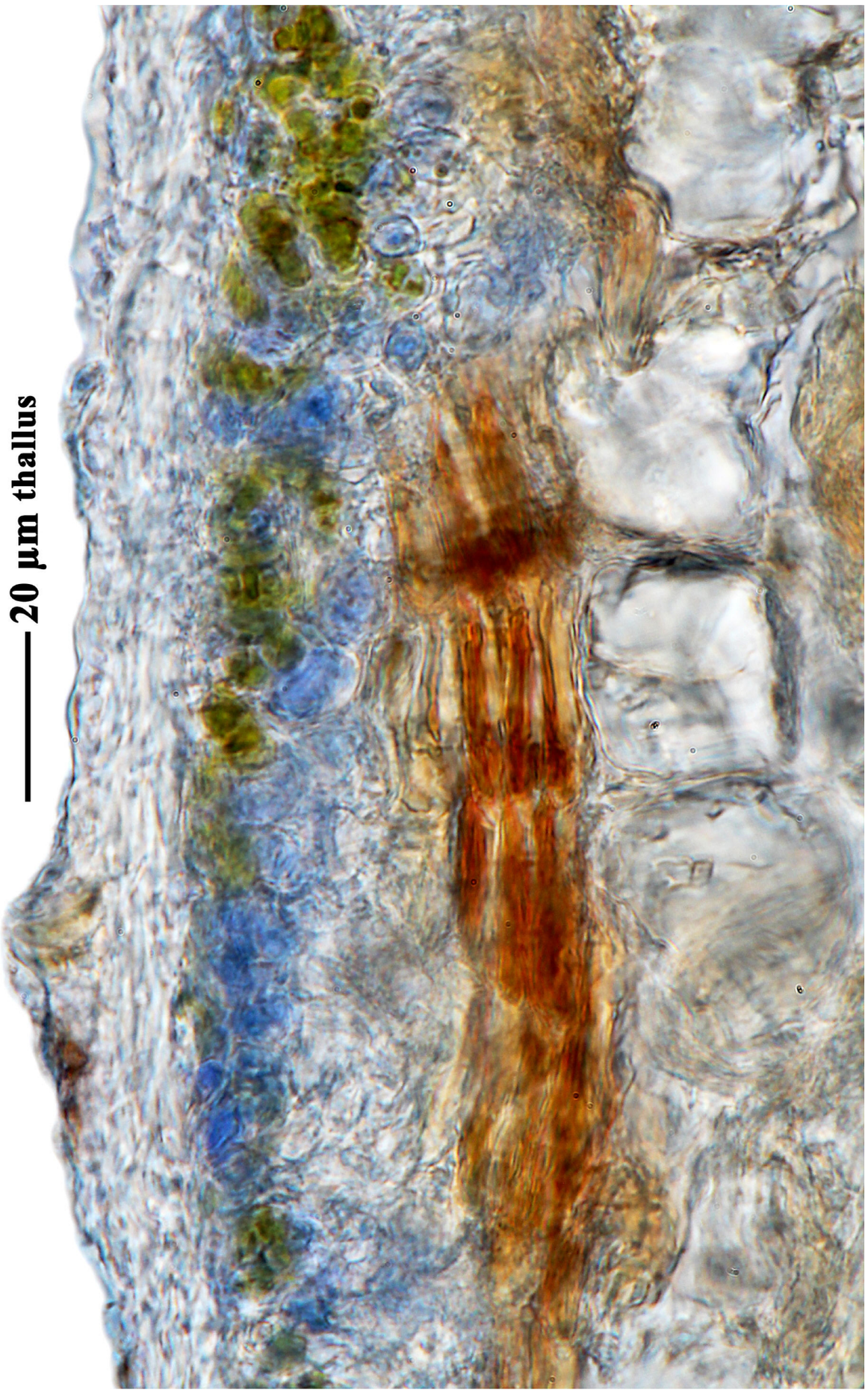
Ocellularia microstoma



Ocellularia microstoma



Ocellularia microstoma



Ocellularia microstoma

Ocellularia microstoma (Müll. Arg.) Hale, in Mangold, Elix & Lumbsch, in McCarthy (Ed.), Flora of Australia, Vol. 57. Lichens 5 (Melbourne): 324 (2009)

= *Thelotrema microstomum* Müll. Arg. 1891

[OH438], Japan. Honshu. Prov. Musashi (Pref. Saitama): Jyumonji Pass, Chichibu-gun. On bark of *Tsuga diversifolia*, 2100 m. Leg. H. Shibuichi (no. 5174), 25.8.1976, det. A. Frisch. EX Y. OHMURA LICHENES MINUS COGNITI NR. 438.

Thallus greenish grey, continuous to verrucose; cortex 16-17 µm, formed by periclinal hyphae; algal layer continuous, 17-25 µm high, calcium oxalate crystals large. Ascomata perithecioid, emergent, ca. 1.1 mm diam; ostiole 0.08-0.09 mm with pale margin (0.05 mm). Excipulum brown, not carbonized, prosoplectenchymatous. Columella absent. Hamathecium not inspersed, paraphyses 1.7 µm thick. Ascospores colourless, muriform, 200-250 x 36-43 µm, locules 2-3 µm, IKI+ blue.

Ocellularia microstoma

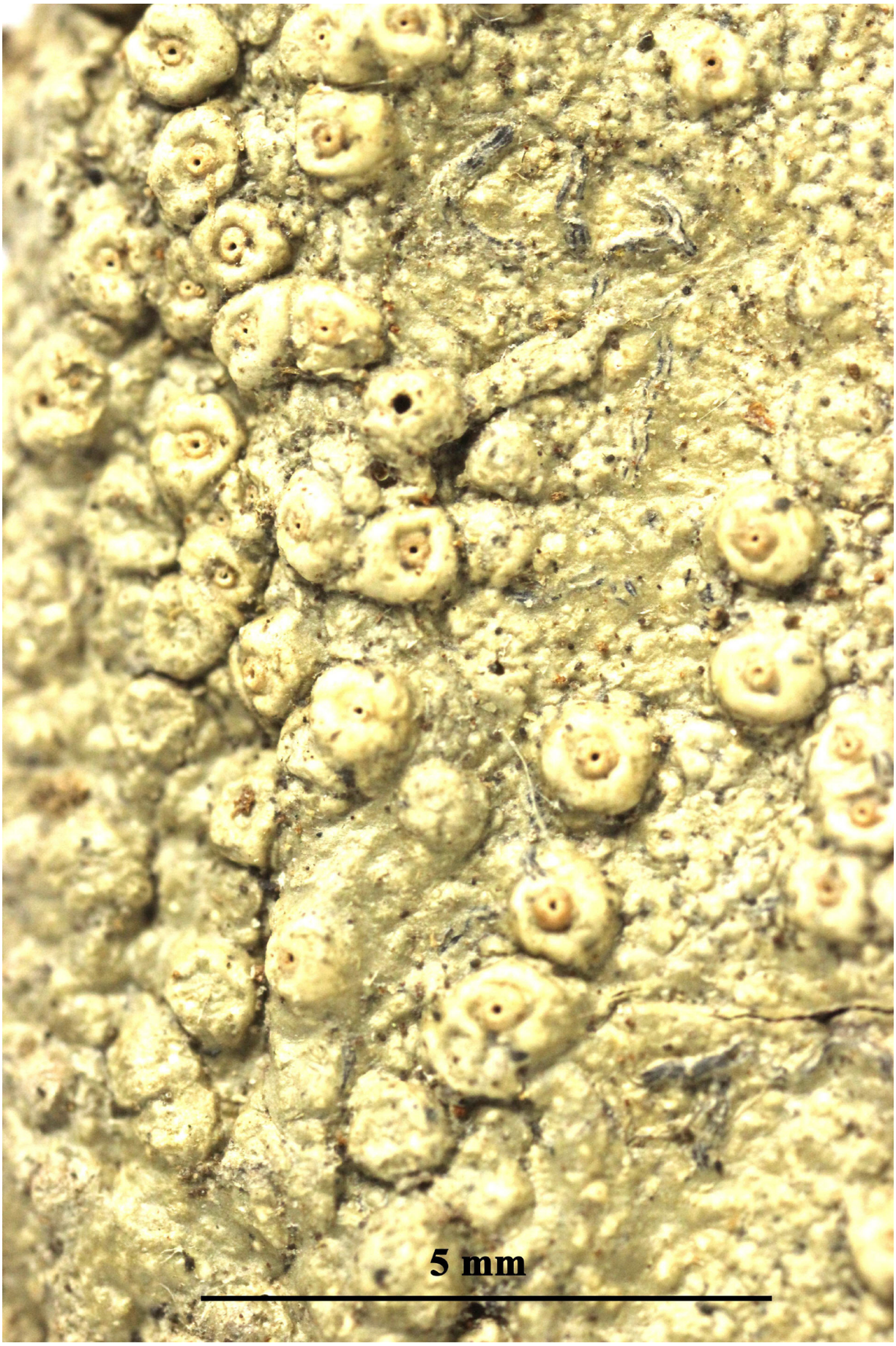
Ocellularia microstoma

Ocellularia microstoma (Müll. Arg.) Hale, in Mangold, Elix & Lumbsch, in McCarthy (Ed.), Flora of Australia, Vol. 57. Lichens 5 (Melbourne): 324 (2009)

= *Thelotrema microstomum* Müll. Arg. 1891

[OH439],Japan. Honshu. Prov. Izu (Pref. Shizuoka): Mt. Nesugata, Shimoda-city. On bark of *Quercus* sp., 170 m. Leg. Y. Ohmura (no. 8445) & A. Frisch,8.2.2012, det. A. Frisch. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 439.

Thallus greenish grey, continuous to verrucose; cortex 16-17 µm, formed by periclinal hyphae; algal layer continuous, 17-25 µm high, calcium oxalate crystals large. Ascomata perithecioid, emergent, ca. 1.1 mm diam; ostiole 0.08-0.09 mm with pale margin (0.05 mm). Excipulum brown, not carbonized, prosoplectenchymatous. Columella absent. Hamathecium not inspersed, paraphyses 1.7 µm thick. Ascospores colourless, muriform, 200-250 x 36-43 µm, locules 2-3 µm, IKI+ blue.



Ocellularia microstoma

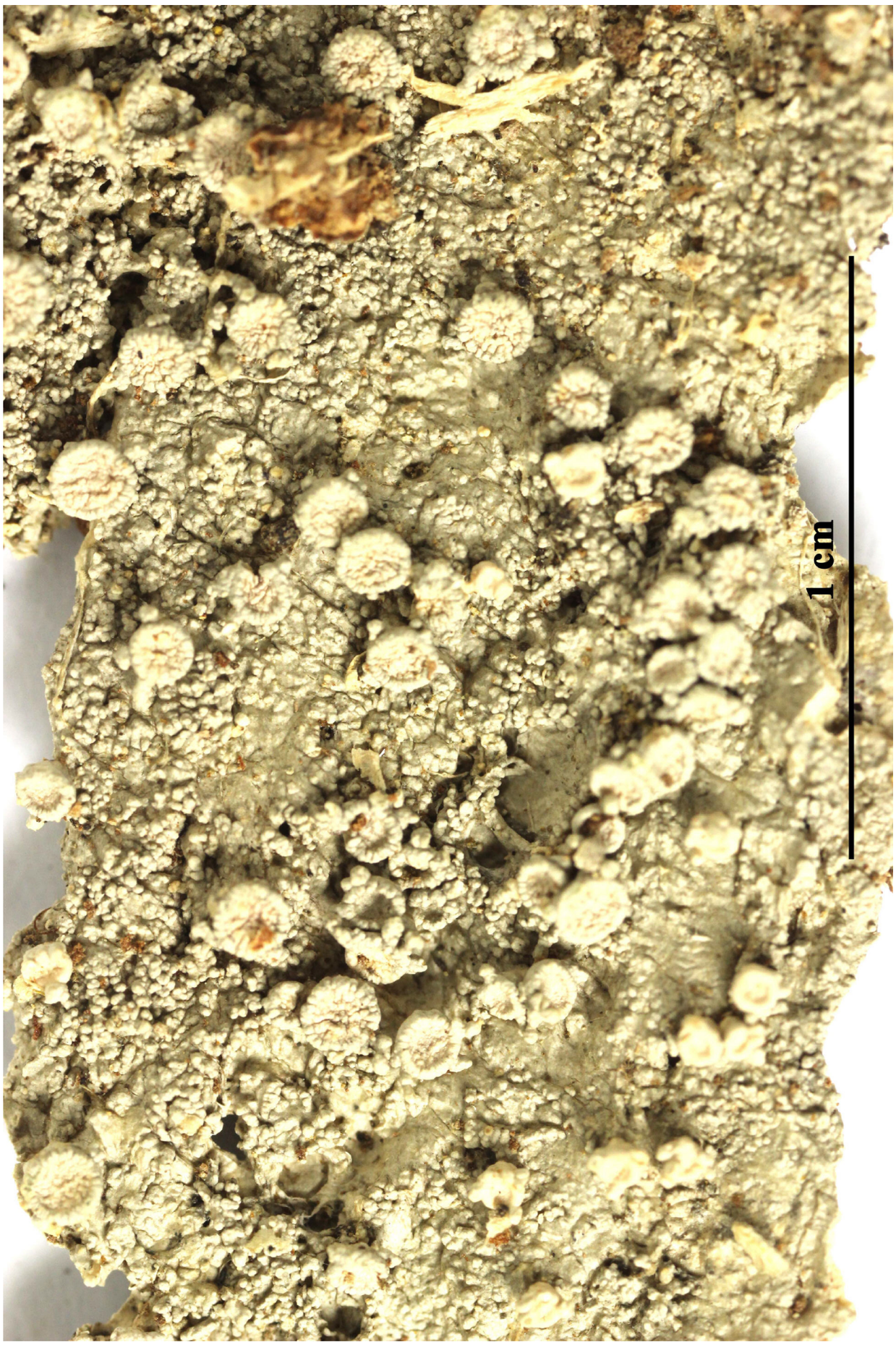
Ocellularia microstoma

Ochrolechia akagiensis Yasuda, in Wainio, Bot. Mag., Tokyo 35: 54 (1921)

[OH414], Japan. Honshu. Prov. Aki (Pref. Hiroshima): Mt. Kanmuri, Hatsukaichi-city. On bark of *Quercus crispula*, 710 m. Leg. Y. Ohmura (no. 7768), M. Tokizawa & T. Takeshita, 13.12.2010, det. Y. Ohmura. EX Y. OHMURA: LICHENES MINUS COGNITI EXSICCATI NR. 414.

Thallus gray, thick, continuous, isidiate, granular, isidia covers thallus, 0.2~0.5 mm tall, 0.1~0.2 mm wide. Apothecia abundant or indistinct, round, sessile, 0.8~1.5 mm diam., apothecial disc pinkish, concave, without pruina; margin concolorous with thallus, prominent, smooth becoming rugose to verrucose; well-developed, epihymenium brownish, 40~44.5 μm, hymenium hyaline, 294-338 μm, hypothecium hyaline, 75.6-100 μm, algal layer mainly confined to margin, with spotty algal below hypothecium. Ascospores, simple, hyaline, ellipsoid. 50-77 × 28-36 μm. Chemistry: Thallus and isidia: K-, C+ red, P-, UV-; apothecial disc and margin C+ red; gyrophoric acid. - Note: *Ochrolechia akagiensis* is confused with *O. yasudae*, which differs by having cylindrical isidia 0.1-0.3 mm in diam, and grows directly on rocks or moss-covered rocks, while *O. akagiensis* has granular isidia and grows on bark to moss-covered bark. *O. frigida* is also similar to *O. akagiensis*, but differs by having a yellowish apothecial disc and granular thallus with spine-like extensions.

Ochrolechia akagiensis



Ochrolechia akagiensis

Ochrolechia akagiensis

Ochrolechia akagiensis

Ochrolechia akagiensis Yasuda, in Wainio, Bot. Mag., Tokyo 35: 54 (1921)

[KA313], Japan. Hokkaido. Prov. Kushiro: Shiriba cape, Kushiro-cho, Kushiro-gun. On bark of *Qercus crispula*, 145 m. Leg. H. Kashiwasani (no. 47431), 10.10.2004. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 313.

Thallus gray, thick, continuous, isidiate, granular, isidia covers thallus, 0.2~0.5 mm tall, 0.1~0.2 mm wide. Apothecia abundant or indistinct, round, sessile, 0.8~1.5 mm diam., apothecial disc pinkish, concave, without pruina; margin concolorous with thallus, prominent, smooth becoming rugose to verrucose; well-developed, epihymenium brownish, 40~44.5 μm, hymenium hyaline, 294-338 μm, hypothecium hyaline, 75.6-100 μm, algal layer mainly confined to margin, with spotty algal below hypothecium. Ascospores, simple, hyaline, ellipsoid. 50-77 × 28-36 μm. Chemistry: Thallus and isidia: K-, C+ red, P-, UV-; apothecial disc and margin C+ red; gyrophoric acid. - Note: *Ochrolechia akagiensis* is confused with *O. yasudae*, which differs by having cylindrical isidia 0.1-0.3 mm in diam, and grows directly on rocks or moss-covered rocks, while *O. akagiensis* has granular isidia and grows on bark to moss-covered bark. *O. frigida* is also similar to *O. akagiensis*, but differs by having a yellowish apothecial disc and granular thallus with spine-like extensions.

Ochrolechia akagiensis

Ochrolechia akagiensis

Ochrolechia frigida (Sw.) Lynge, Rep. Sci. Res. Norweg. Exped. Novaya Zemlya, 1921 43: 182 (1928)
= *Isidium frigidum* (Sw.) Ach., K. Vetensk-Acad. Nya Handl. 15(3): 182 (1794)
= *Isidium gonatodes* (Ach.) Ach., Methodus, Sectio prior (Stockholmiæ): 137 (1803)
= *Lecanora frigida* (Sw.) Johnson, in Smith & Sowerby, Engl. bot., Edn 2 10: 90 (1843)
= *Lecanora pallescens* var. *frigida* (Sw.) Branth & Rostr., Bot. Tidsskr. 3: 202 (1869)
= *Lecanora tartarea* f. *frigida* (Sw.) Nyl., Lich. Lapp. Orient.: 135 (1866)
= *Lecanora tartarea* var. *frigida* (Sw.) Ach., Lich. Univ.: 372 (1810)
= *Lichen frigidus* Sw., Method. Muscor. Illustr. (Upsaliae): 36 (1781)
= *Lichen tartareus* var. *frigidus* (Sw.) Wahlenb., Fl. lapp.: 403 (1812)Novaya Zemlya, 1921 43: 183 (1928) Trans. Bot. Soc. Edinb., 150th anniversary supplement 43: 312 (1981)
= *Ochrolechia tartarea* f. *frigida* (Sw.) Körb., Parerga lichenol. (Breslau) 1: 92 (1859) [1865]
= *Ochrolechia tartarea* var. *frigida* (Sw.) Körb., Parerga lichenol. (Breslau) 1: 92 (1859) [1865]
= *Parmelia tartarea* var. *frigida* (Sw.) Ach., Methodus, Sectio post. (Stockholmiæ): 166 (1803)
= *Psora frigida* (Sw.) Hoffm., Deutschl. Fl., Zweiter Theil (Erlangen): 168 (1796) [1795]

[KU675], Svalbard. Spitzbergen. Ca. 3 km NW of Ny-Ålesund. Kongsfjorden. On mosses, 0-50 m. Leg. H. Kashiwadani (no. 22910), 20.07.1985, det, H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI: LICHENES RARIORES ET CRITICI WXSICCATI NR. 675.

THALLUS variable, thin, medium thick to very thick, with or without spines, membrane-like and almost invisible, but with small or large, dispersed or crowded papillate, subglobose to elongate areoles, or thallus more or less continuous with or without areoles, or thallus areolate, consisting of well developed, separated to crowded, subglobose, elongated or coralloid and branched areoles, sometimes with scabrid surface, or of elongated areoles, forming a subfruticose thallus, or thallus of ± swollen, soft and often fragile areoles, commonly dissolving into ± granular soredia or breaking into coarsely coralloid granules, with many intermediate forms; SWOLLEN AREOLES and whitish-grey or brownish-grey, usually ± matt; NOT SWOLLEN AREOLES, coralloid to elongated, grey, beige or grey-brown, sometimes

only the top has a brown tinge, matt to shiny, or covered with a thick epinecral layer, distinctly shiny and brown; SPINES short or long, in extreme forms up to 2 cm in length, simple or branched, sometimes covered partly with thallus areoles or soralia; when spines long, sometimes surrounded by thallus tissues and resembling stems of Usnea; prothallus usually not evident, visible only in corticolous material as a white zone around thallus; SOREDIA farinose or granular, forming ± discrete soralia on the continuous thallus, or on the top of areoles, or rarely formed at the base of spines, or areoles completely dissolving into soredia, or coarsely coralloid granules forming at the top of areoles, or areoles completely dissolving into few such granules; in several specimens areoles dissolving into soredia, crowded and forming sorediate crust; APOTHECIA frequent, up to c. 4 mm in diam., with well developed or rarely almost excluded thalline margin; THALLINE MARGIN rather thin, usually concolorous with the thallus, smooth, entire, or crenulate, with thalline areoles, with or without spines, non-sorediate or ± sorediate; EXCIPULUM PROPRIUM (SALMON DISCOID TISSUE) present in several specimens, prominent, visible as a well defined excipular ring around the disc or spreading over the thalline margin, brownish; DISC flat to concave, usually not pruinose, or sometimes with white farinose pruina, often with fissures radiating from the centre, commonly with secondary thalline areoles developing along the fissures, or disc ± rosulate; MARGIN CORTEX well developed c. 50–75 µm wide; ALGAL LAYER present in excipulum and/or below hypothecium; HYPOTHECIUM yellowish; HYMENIUM c. 170–250(–300) µm high; asci (4–)6–8(–12)-spored; ASCOSPORES variable in size and shape, even in one ascus or section, ellipsoid, broadly ellipsoid, pyriform and sometimes constricted in 1/3rd of length (in Argentinean material), ovoid, rarely globose or subglobose, (10–)20–50(–67) × (6–)12–30(–42) µm. Chemistry. SUBSTANCES (all present in thallus and apothecia): gyrophoric (+, major) and lecanoric (+, minor or trace) acids, very often with substances related to gyrophoric acid (minor or trace), pigments (±, minor), one fatty acid (in one instance, three fatty acids) of murolic acid complex (±, minor to submajor; detected in most sorediate specimens from Poland and Scotland, rarely from other regions, sometimes also in esorediate specimens), unknown fatty acids (±, minor to trace). SPOT TEST REACTIONS: epihymenium, soredia, margin and thalline cortex (often covered with C– layer), spines: C+ red; thalline and margin medulla:

Ochrolechia frigida

C–. Diagnostic characters and differentiation. Ochrolechia frigida is morphologically (shape and thickenss of thallus, spines, areoles and apothecia) and anatomically (size and shape of ascospores) the most variable species of the genus.

Ochrolechia frigida

Ochrolechia frigida

Ochrolechia frigida

Ochrolechia tartarea (L.) A. Massal., Ric. auton. lich. crost. (Verona): 30 (1852)
= *Lecanora pallescens* var. *tartarea* (L.) Branth & Rostr., Bot. Tidsskr. 3: 202 (1869)
= *Lecanora tartarea* (L.) Ach., Lich. Univ.: 371 (1810)
= *Lichen tartareus* L., Sp. pl. 2: 1141 (1753)
= *Parmelia parella* var. *tartarea* (L.) Schaer., Lich. helv. spicil. 8: 400 (1839)
= *Parmelia tartarea* (L.) Ach., Methodus, Sectio post. (Stockholmiæ): 165 (1803)
= *Patellaria tartarea* (L.) DC., in Lamarck & de Candolle, Fl. franç., Edn 3 (Paris) 2: 364 (1805)
= *Pertusaria tartarea* (L.) Müll. Arg., Flora, Regensburg 62(31): 484 (1879)
= *Scutellaria tartarea* (L.) Baumg., Fl. Lips.: 584 (1790)
= *Verrucaria tartarea* (L.) F.H. Wigg., Prim. fl. holsat. (Kiliae): 86 (1780)

[KU480], Japan. Honshu. Prov. Shinano: En route from Todai to Kita-zawa Pass. Kami-Ina-gun. On trunk of *Tsuga diversifolia*, 1700 m. Leg. S. Kurokawa (no. 79016) and K. Yoshida, 27.07.1979, det. S. Kurokawa. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIRORES ET CRITICI EXSICCATI NR. 480.

Thallus crustose, episubstratic, often very thick (1-4 mm), white to grey, soft, often powdery-tartareous, continuous or with irregular warts forming an uneven crust, sometimes delimited by a paler, zoned prothallus. Apothecia lecanorine, at first immersed and with a punctiform disc, later sessile, rounded or irregular, 2-5(-8) mm across, with a pale brown to orange-pink, concave to flat, often scabrose and pruinose disc, and a thick, wavy, sometimes proliferating thalline margin. Epithecium brownish, with granules dissolving in K, C+ and KC+ red; hymenium colourless; paraphyses thin, densely branched and anastomosing; hypothecium colourless. Asci 8-spored, with thick, amyloid walls, without recognizable apical structures, Pertusaria-like. Ascospores 1-celled, hyaline, broadly ellipsoid, (35-)40-70 x 20-40 µm. Photobiont chlorococcoid. Spot tests: thallus K- or K+ pale yellow, C+ orange-red, KC+ red, P-, UV-; apothecial disc C+ and KC+ red. Chemistry: medulla and apothecial disc with gyrophoric acid (major), and lecanoric acid (traces); thallus with additional androgyna B unknown 3 substance and 2 fatty acids (androgyna B unknowns 1-2 sensu sensu Tønsberg 1992). - Note: on siliceous rocks and on thin soil layers in humid situations,

mostly in upland areas. In the past the species was frequently confused with other taxa. Very similar to *O. androgyna*, which,is sorediate, and

Ochrolechia tartarea

Ochrolechia tartarea

Ochrolechia tartarea

Omphalodium pisacomense Meyen & Flot., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur., Suppl. 1 19: 223 (1843)

[KU575], Chile. Magellanes: Morro Chico, 130 km north of Punta Arenas. On dry rocky cliff in open place,230 m. Leg. H. Kashiwadani (no. 18955) & H. Inoue, 14.12.1981, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRICTICI EXSICCATI NR. 575.

In *Omphalodium pisacomense* and *Omphalora arizonica* the umbilicate thallus is limited on both sides by strongly gelatinized, prosoplectenchymatous cortices. Pseudocyphellae are formed abundantly on the top of tubercles and ridges; the tuberculate pseudocyphellae are predominantly confined to the upper surface in *Omphalodium pisacomense* and to the lower surface in *Omphalora arizonica*. Studies of the ascocarp ontogeny demonstrated the affiliation of *Omphalodium* and *Omphalora* to Parmeliaceae s. lat. In both genera, pycnidia and apothecia arise in the upper cortex, being differentiated entirely by cortical hyphae. The parmelioid development of the apothecia differs in the two genera. In *Omphalodium pisacomense* the apothecium is incompletely zeorine, since the upper margin of the exciple remains covered by the thalline cortex, while in *Omphalora arizonica* the upper margin of the exciple protrudes and develops gradually, together with the thalline stalk, into a pedicel for the hymenium. The differences in developmental morphology support the view that *Omphalodium* and *Omphalora* should be treated as separate genera.

Omphalodium pisacomense

Omphalodium pisacomense

Omphalodium pisacomense Meyen & Flot., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur., Suppl. 1 19: 223 (1843)

[KU576], Chile. Magellanes: Morro Chico, 130 km north of Punta Arenas. On dry rocky cliff in open place, 230 m. Leg. H. Kashiwadani (no. 18994), 14.12.1981, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 576.

In *Omphalodium pisacomense* and *Omphalora arizonica* the umbilicate thallus is limited on both sides by strongly gelatinized, prosoplectenchymatous cortices. Pseudocyphellae are formed abundantly on the top of tubercles and ridges; the tuberculate pseudocyphellae are predominantly confined to the upper surface in *Omphalodium pisacomense* and to the lower surface in *Omphalora arizonica*. Studies of the ascocarp ontogeny demonstrated the affiliation of *Omphalodium* and *Omphalora* to Parmeliaceae s. lat. In both genera, pycnidia and apothecia arise in the upper cortex, being differentiated entirely by cortical hyphae. The parmelioid development of the apothecia differs in the two genera. In *Omphalodium pisacomense* the apothecium is incompletely zeorine, since the upper margin of the exciple remains covered by the thalline cortex, while in *Omphalora arizonica* the upper margin of the exciple protrudes and develops gradually, together with the thalline stalk, into a pedicel for the hymenium. The differences in developmental morphology support the view that *Omphalodium* and *Omphalora* should be treated as separate genera.

Omphalodium pisacomense

Omphalodium pisacomense

Omphalodium pisacomense

Oropogon tanakae Asahina, J. Jap. Bot. 27(8): 242 (1952)

[KU180], Japan. Honshu. Prov. Yamato: Mt. Sanjogatake, Ohmine Mts.. On rocks, 1600 m. Leg. M. Togashi, 10.6.1952, det. Y. Asahina. Ex S. Kurokawa Lichenes Rariores Et Critici Exsiccati Nr. 180.

Oropogon tanakae

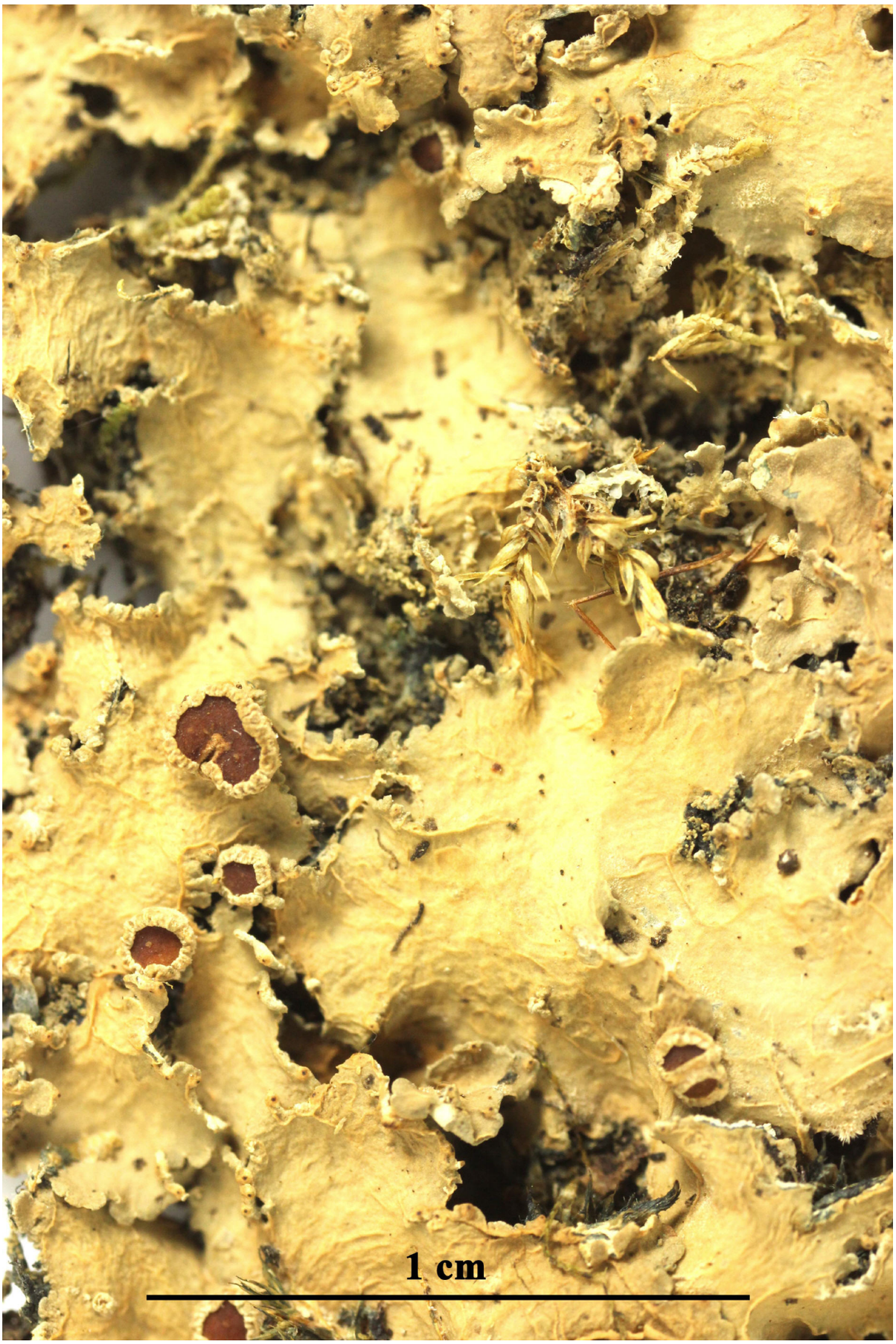
Oropogon tanakae

Pannaria lepidella (Räsänen) Kurok., Rep. Noto Marine Lab. 4: 75 (1964)
= *Pannaria fulvescens* var. *lepidella* Räsänen 1940

[KU128], Japan. Izu Islands; Mt. Hitachijo-Fuji, Hachijo Island. On trees. Leg. S. Kurokawa (no. 70023), 13.03.1970, det. S. Kurokawa. EX S. KUROKAWA: LICHENES RARIORES ET CRITICI EXSICCATI NR. 127.

Notes:
V. Räsänen (1940): Licbenes ab A. YASUDA et aliis in Japonia collecti. " Pannaria fulvescens Nyl. *var*. lepidella Räs. var. nov. : Thallus ad marginern et in margine apotheciorum casiolepideus."

according to
P. M. Jørgensen & H. Kashiwadani (2001): New and Misunderstood Species of Japanes Pannaria (Lichens). -J.Jpn. Bot. 76:1-10. - *P. lepidella* belongs to *P. lurida.*



Pannaria lepidella

Pannaria lepidella

Pannaria lepidella

Pannaria lepidella

Pannaria lepidella

Pannaria pezizoides (Weber) Trevis., Lichenoth. Veneta 3-4: no. 98 (1869)
= *Lichen pezizoides* Weber 1778
= *Protopannaria pezizoides* (Weber) P.M. Jørg. & S. Ekman, in Jørgensen, Bryologist 103(4): 699 (2000)

[KU676], Svalbard. Spitzbergen, Bohemanflya. On soil with mosses,100-200 m. Leg. H. Kashiwadani (no. 23275), 30.7.1985, det. H. Kashiwadani. Ex S. Kurokawa and H. Kashiwadani Lichenes Rariores Et Critici Exsiccati Nr.676.

Thallus small-squamulose to crustose, up to 200 µm thick, pale bluish grey, ochraceous, or reddish brown in sun-forms, bluish-green to blackish when moist, thick, forming dense, up to 8 cm wide, often cushion-like patches. Squamules 0.2(-1) mm wide, crenate to lobulate, flattened, contiguous to usually imbricate, when young developing on a poorly visible, blue-black hypothallus, closely adpressed to the substratum to form a compact crust; lower surface pale. Upper cortex paraplectenchymatous, 40-50 µm thick; medulla white, intricately plectenchymatous, 20-40 µm thick, merging into the hypothallus in loer part; lower cortex absent. Apothecia frequent and usually very abundant, lecanorine, sessile, up to 2.5 mm across, with an orange-brown to dark brown, flat to slightly convex disc, and a thick, granular to verruculose thalline margin. Thalline exciple pseudoparenchymatous in outer part, the inner part with densely packed photobiont cells; proper exciple thin, pale, more or less pseudoparenchymatous; epithecium brownish; hymenium colourless, 95-150 µm high, I+ dark blue; paraphyses simple, septate, slightly swollen at apices; hypothecium colourless. Asci 8-spored, cylindrical-clavate, without internal amyloid structures, but with a I+ deep blue external cap. Ascospores 1-celled, hyaline, ellipsoid, somewhat pointed at both ends, thick-walled, with a ridged and warted epispore, measuring 19-25 x 8-10 µm without epispore, 25-30 x 9-12 µm with epispore. Photobiont cyanobacterial (Nostoc the cells in clusters). Spot tests: cortex and medulla K-, C-, KC-, P-, UV-. Chemistry: without lichen substances. - Note: an arctic-alpine to boreal-montane, circumpolar lichen found on mosses, plant debris, and organic soil in open habitats, with optimum near and above treeline.

Pannaria pezizoides

Pannaria pezizoides

Pannaria pezizoides (Weber) Trevis., Lichenoth. Veneta 3-4: no. 98 (1869)
= *Protopannaria pezizoides* (Weber) P. M. Jørg. & S. Ekman, in Jørgensen 2000
= *Lichen pezizoides* Weber 1778

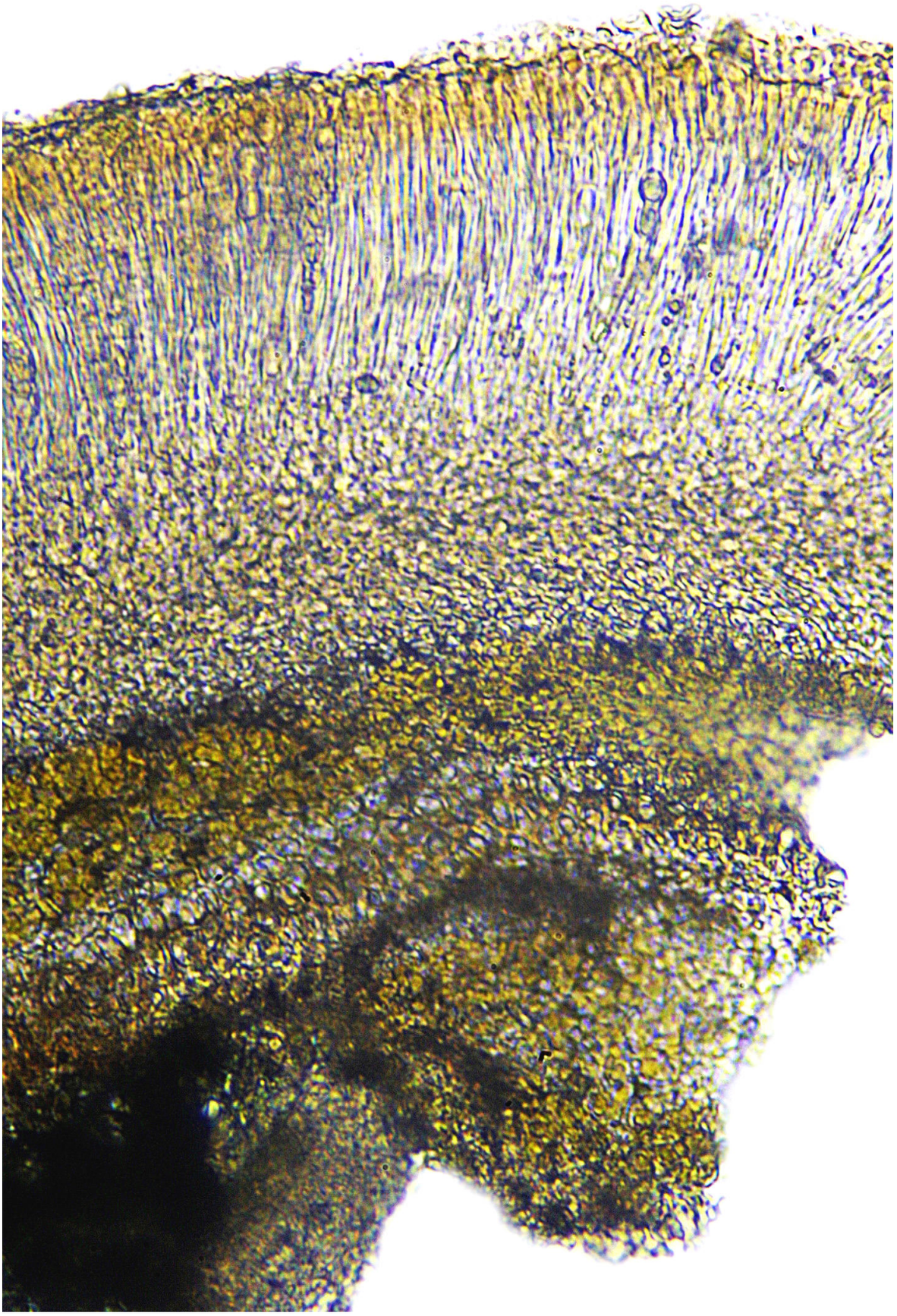
[11210], Portugal, Azoren, Sao Miguel: Südufer des Lagoa das Fumas, 37°45.022' N, 25°19.807' W, 270 m, Laubbaum. Leg. F. Schumm, 03.06.2003, det. F. Schumm. - Sporen zu 8, hyalin, mit warzigem Epispor, 16,4 x 9,8 µm; Hymenium J+ blau; Paraphysen einfach oder schwach verzweigt, am Ende etwas kopfig. EX HERBARIO F. SCHUMM NR.1120.

Thallus small-squamulose to crustose, up to 200 µm thick, pale bluish grey, ochraceous, or reddish brown in sun-forms, bluish-green to blackish when moist, thick, forming dense, up to 8 cm wide, often cushion-like patches. Squamules 0.2(-1) mm wide, crenate to lobulate, flattened, contiguous to usually imbricate, when young developing on a poorly visible, blue-black hypothallus, closely adpressed to the substratum to form a compact crust; lower surface pale. Upper cortex paraplectenchymatous, 40-50 µm thick; medulla white, intricately plectenchymatous, 20-40 µm thick, merging into the hypothallus in loer part; lower cortex absent. Apothecia frequent and usually very abundant, lecanorine, sessile, up to 2.5 mm across, with an orange-brown to dark brown, flat to slightly convex disc, and a thick, granular to verruculose thalline margin. Thalline exciple pseudoparenchymatous in outer part, the inner part with densely packed photobiont cells; proper exciple thin, pale, more or less pseudoparenchymatous; epithecium brownish; hymenium colourless, 95-150 µm high, I+ dark blue; paraphyses simple, septate, slightly swollen at apices; hypothecium colourless. Asci 8-spored, cylindrical-clavate, without internal amyloid structures, but with a I+ deep blue external cap. Ascospores 1-celled, hyaline, ellipsoid, somewhat pointed at both ends, thick-walled, with a ridged and warted epispore, measuring 19-25 x 8-10 µm without epispore, 25-30 x 9-12 µm with epispore. Photobiont cyanobacterial (*Nostoc* the cells in clusters). Spot tests: cortex and medulla K-, C-, KC-, P-, UV-. Chemistry: without lichen substances. - Note: an arctic-alpine to boreal-montane, circumpolar lichen found on mosses, plant debris, and organic soil in open habitats, with optimum near and above treeline. Previously often confused with *Psoroma hypnorum*, which has a green photobiont and often concave apothecial discs.

Pannaria pezizoides

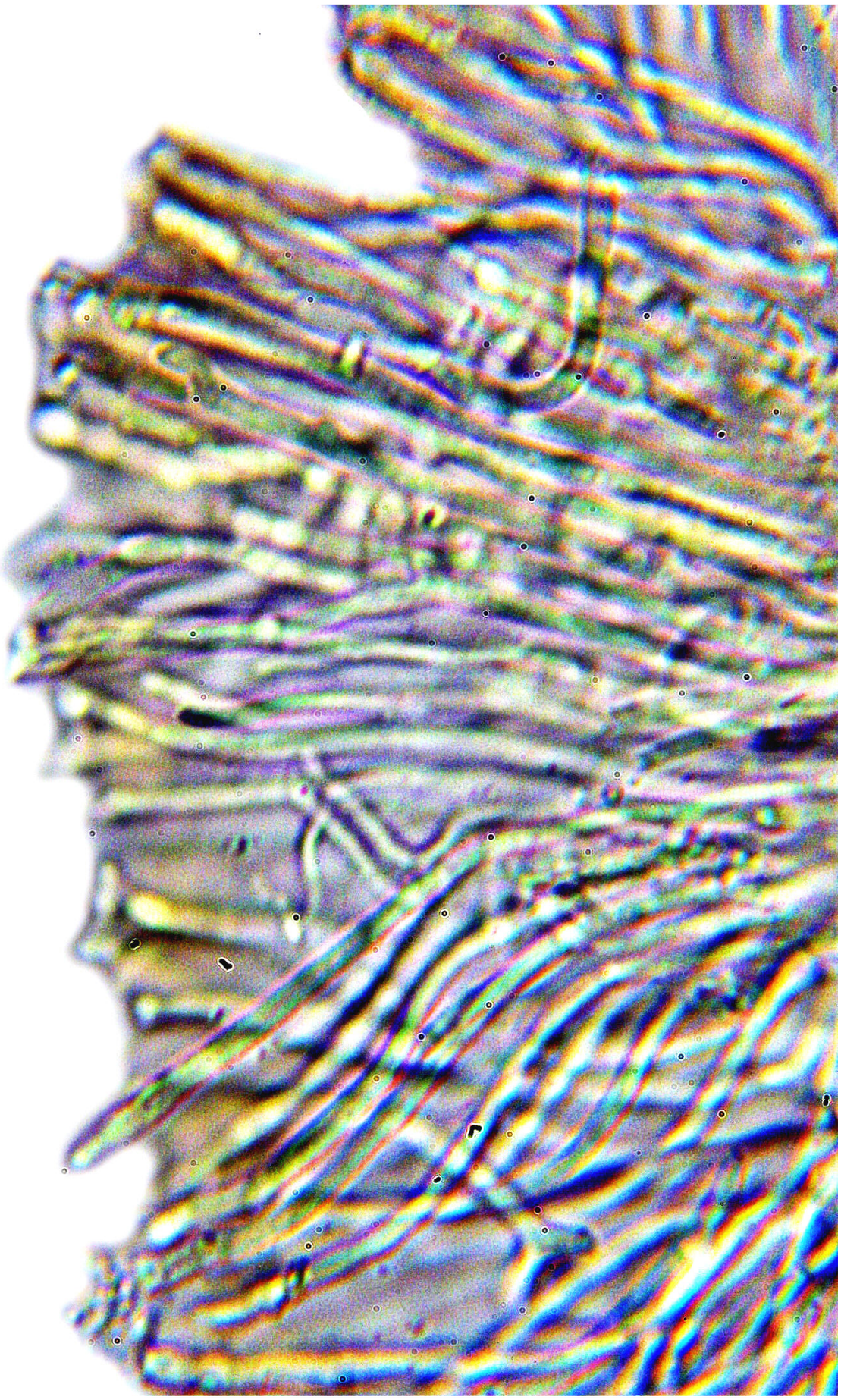
Pannaria pezizoides

Pannaria pezizoides

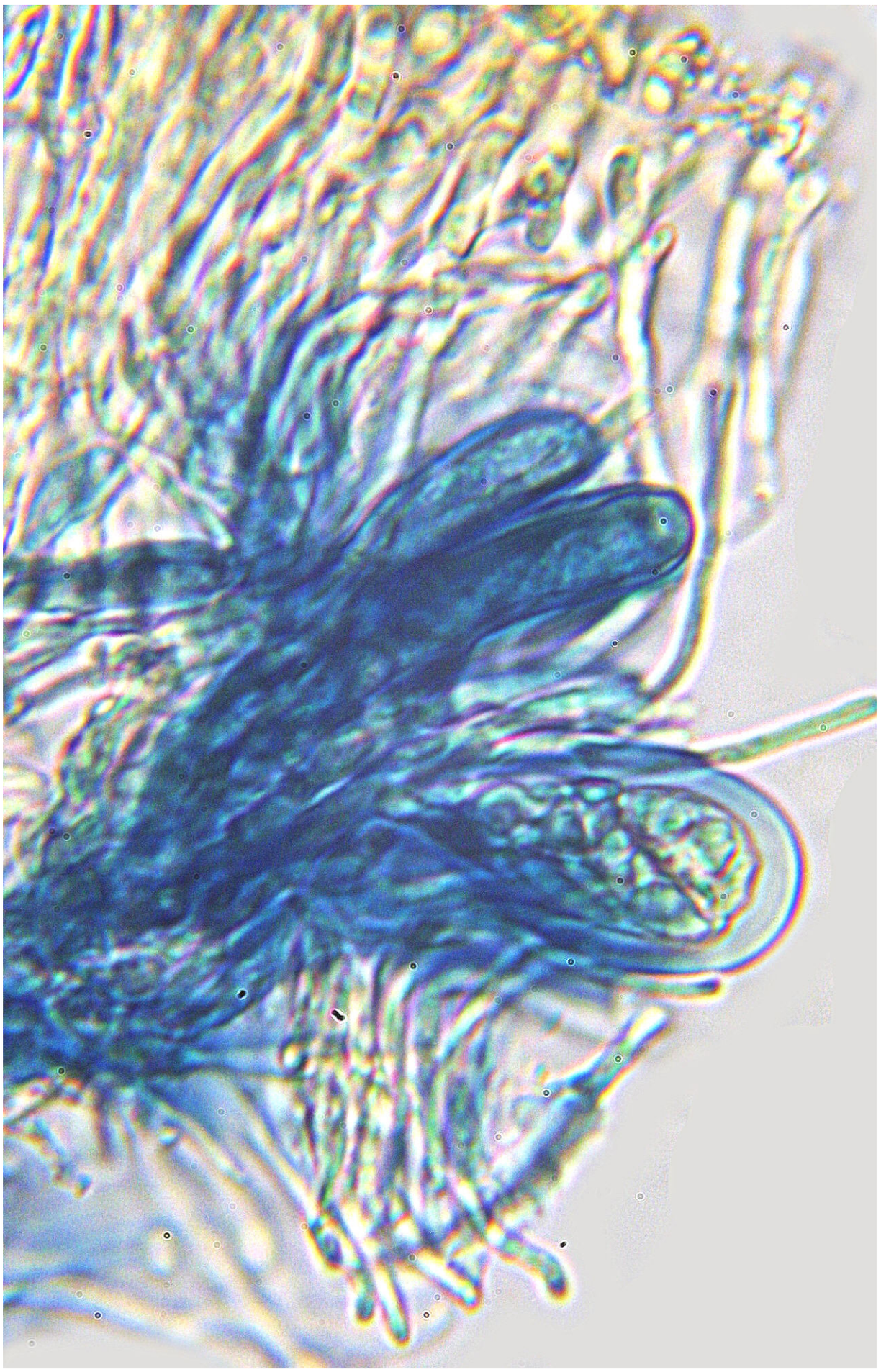


Pannaria pezizoides

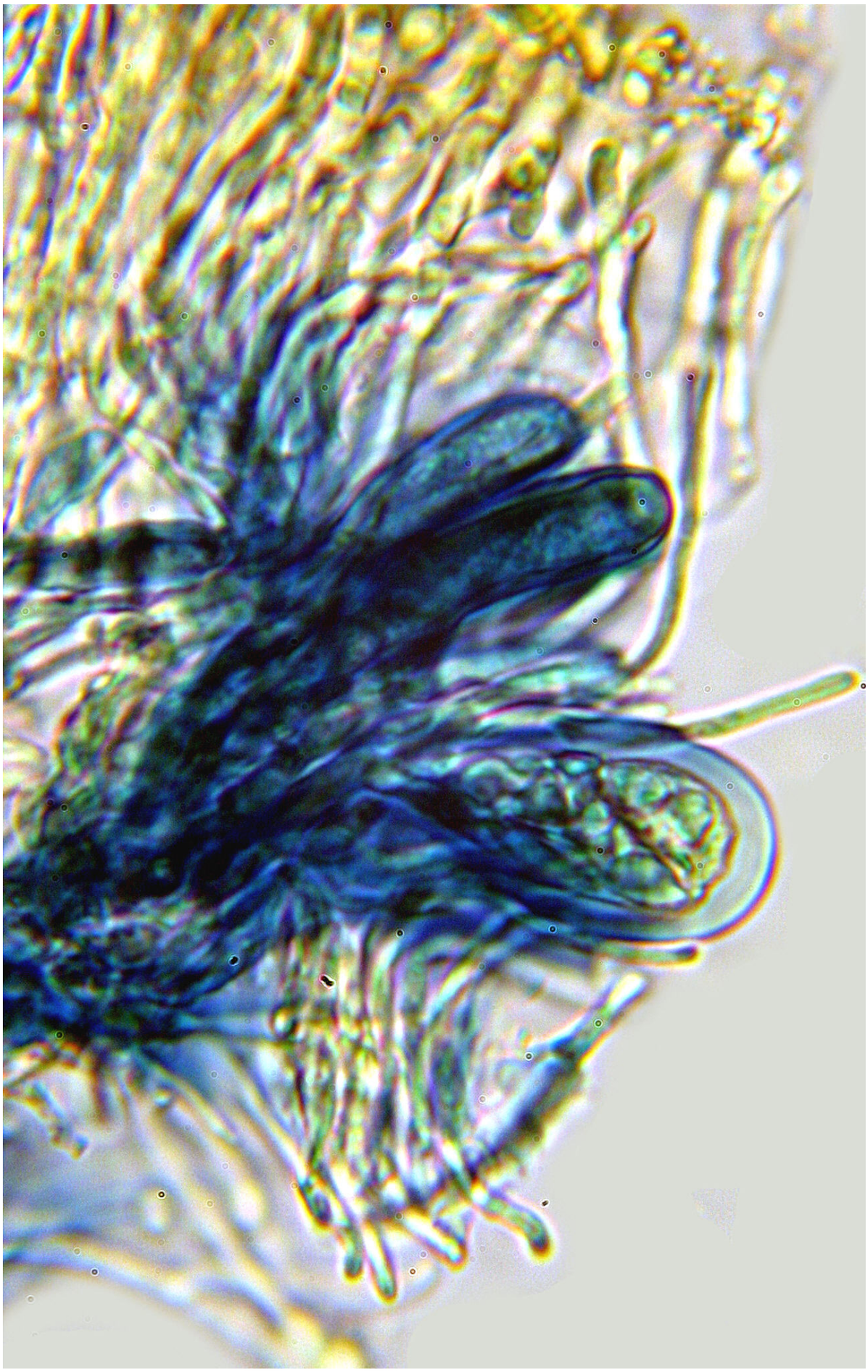
Pannaria pezizoides



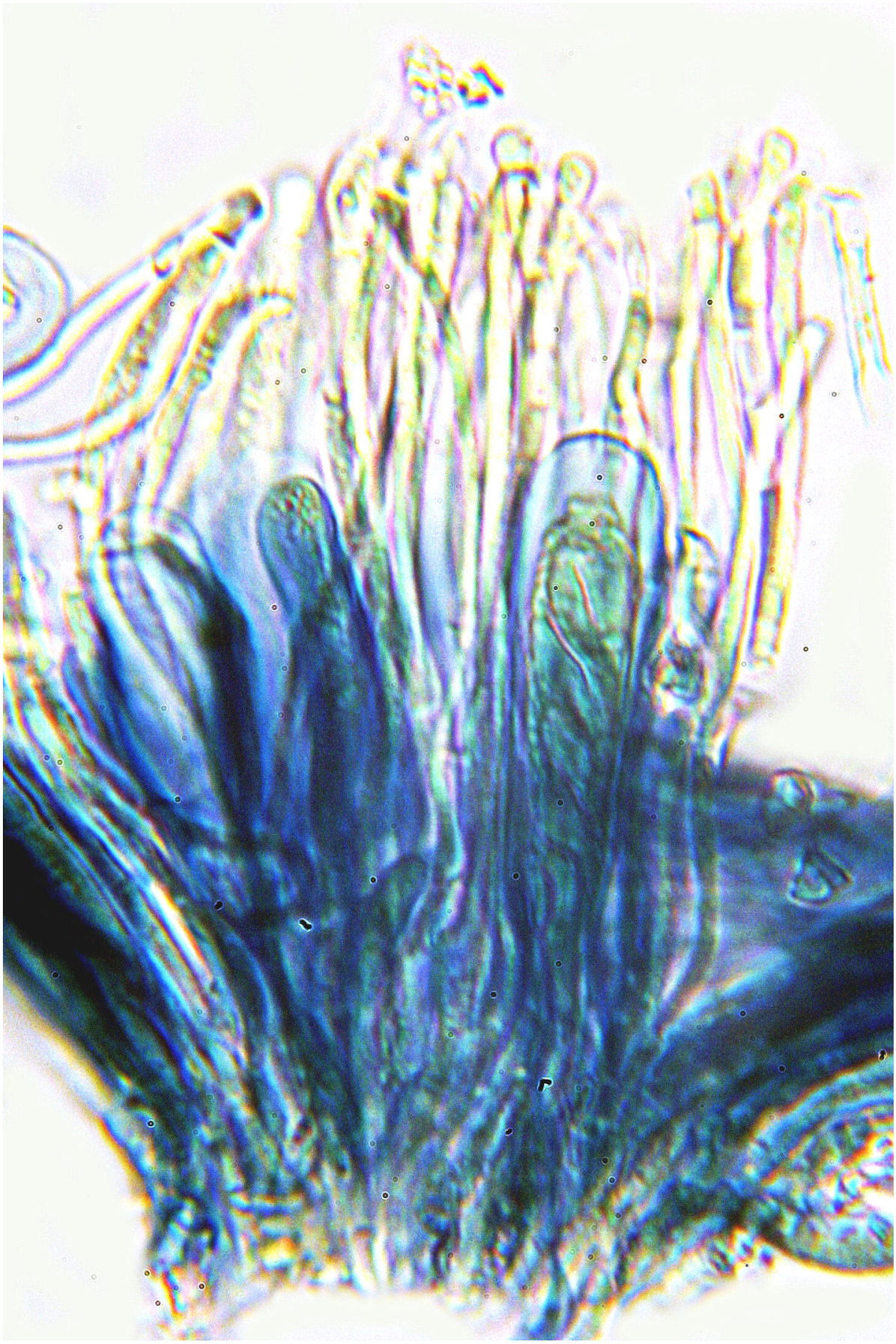
Pannaria pezizoides



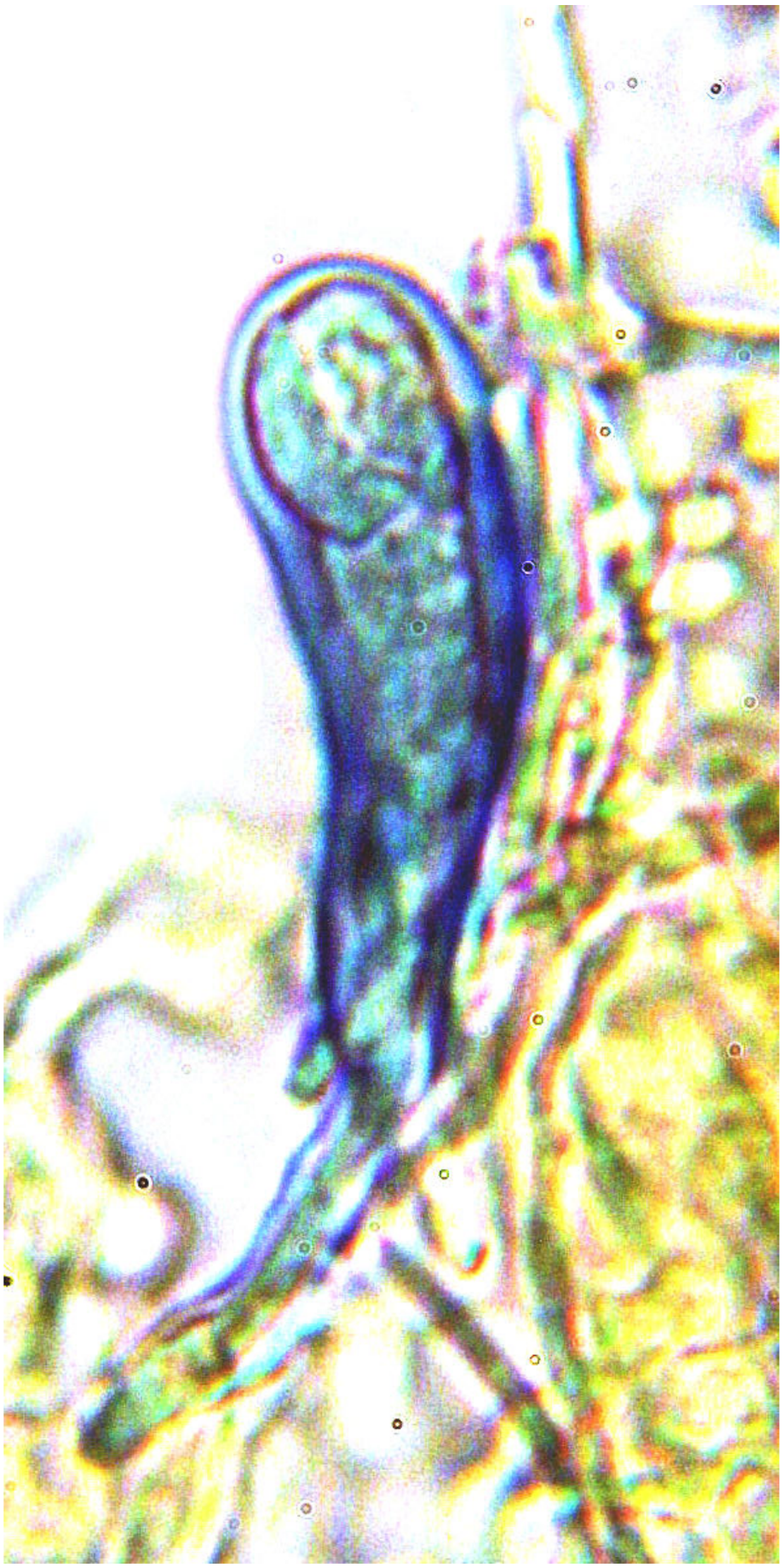
Pannaria pezizoides



Pannaria pezizoides

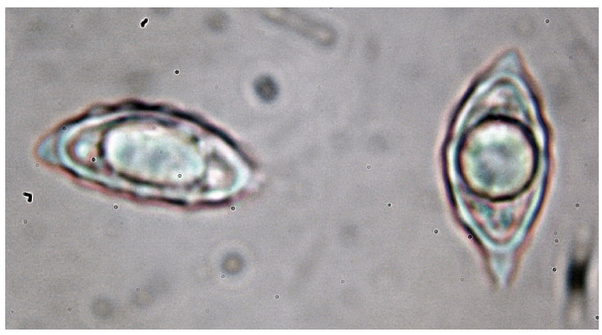


Pannaria pezizoides



Pannaria pezizoides

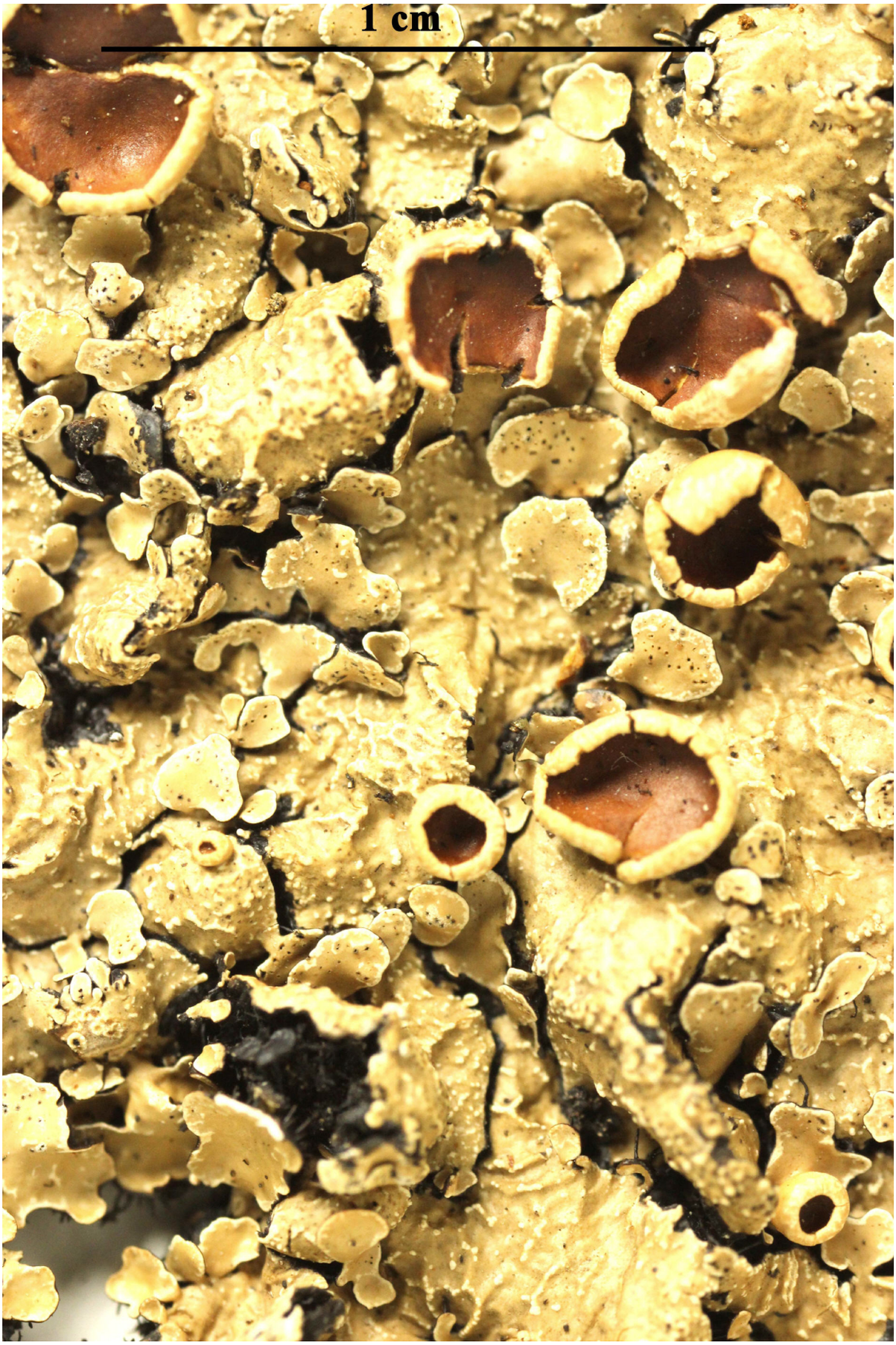
Pannaria pezizoides



Pannaria pezizoides

Parmelia cochleata Zahlbr., Bot. Mag., Tokyo 41: 350, tab. XII, fig. 3 (1927)

[KU182], Japan. Hokkaido. Prov. Kushiro: Lakeside of Onnetoh, Mt. Me-Akan. On trunk o Alnus *hirsuta*, 610 m. Leg.S. Kurokawa (no. 65583), 28.8.1965, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 182.



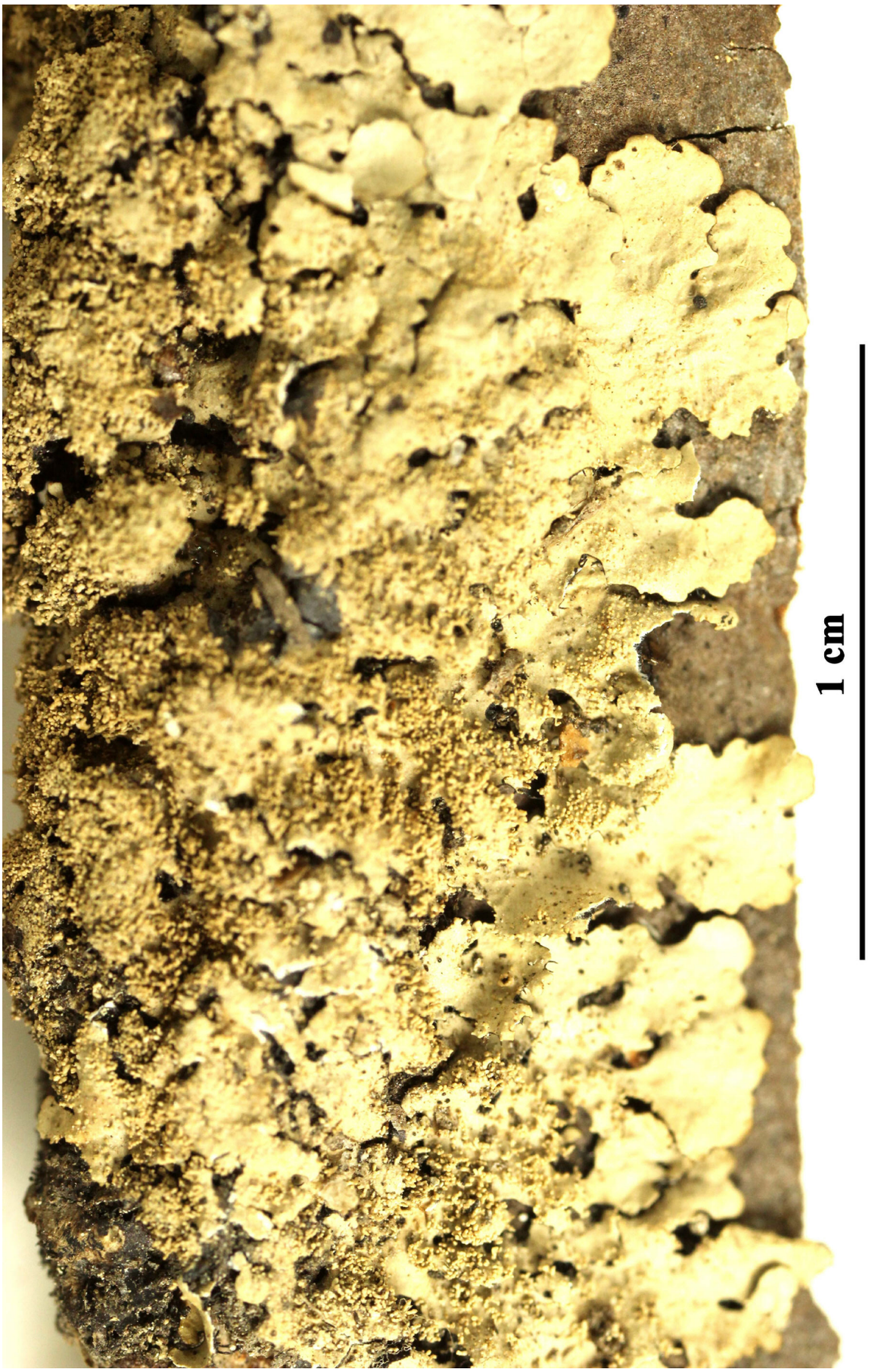
Parmelia cochleata

Parmelia cochleata

Parmelia dissecta Nyl., Flora, Regensburg 65(29): 451 (1882)
= *Hypotrachyna horrescens* (Taylor) Krog & Swinscow, Lichenologist 19(4): 420 (1987)

[KU278], Japan. Honshu. Prov. Iwaki: Nakasu, Matsukawa-ura. On trunk of *Pinus thunbergii*. Leg. S. Kurokawa (no. 72068), 30.7.1972, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 278.

Thallus foliose, heteromerous, dorsiventral, loosely to tightly attached, forming 2-5(-7) cm wide, irregular rosettes, isidiate. Lobes narrow, 0.2-3 mm wide, irregularly branched with rounded axils, contiguous and often imbricate, with truncate to subrotund apices, the margins indented and often laciniate, apparently with simple, black up to 0.8 mm long marginal cilia (actually projecting rhizines). Upper surface whitish grey to greenish grey, smooth, shiny, epruinose, usually emaculate, densely covered in cylindrical to lobulate-coralloid, apically often brownish, short-ciliate isidia, the cilia black, 0.1-0.4 mm long. Lower surface black, shiny, densely rhizinate, with a narrow, naked, brown marginal zone; rhizines black, shiny, simple to rarely dichotomously branched or occasionally squarrose, usually projecting beyond lobe margins. Upper cortex of tightly packed, anticlinally oriented hyphae, with a pored epicortex, the cell walls with isolichenan; medulla white; algal layer continuous; lower cortex brown, of anticlinally oriented hyphae. Apothecia very rare, lecanorine, laminal, to 5 mm across, with a brown disc and an isidiate thalline margin. Epithecium brown; hymenium and hypothecium colourless. Asci 8-spored, clavate, Lecanora-type. Ascospores 1-celled, hyaline, broadly ellipsoid, (12-)15-19 x 7-10(-12) µm. Pycnidia rare, immersed. Conidia cylindrical, 3-5 x c. 0.5 µm. Photobiont chlorococcoid. Spot tests: upper cortex K+ yellow, C-, KC-, P- or P+ faintly yellow; medulla K-, C-, KC+ pink, P-, UV-. Chemistry: upper cortex with atranorin and chloroatranorin; medulla with gyrophoric acid (major), lecanoric and umbilicaric acids (minor), and related accessory substances (hiascic, 4,5-di-0-methylhiascic, 4-0-methylhiascic acids). - Note: a mild-temperate to humid subtropical lichen found on old trees in ancient, open, humid forests.



Parmelia dissecta

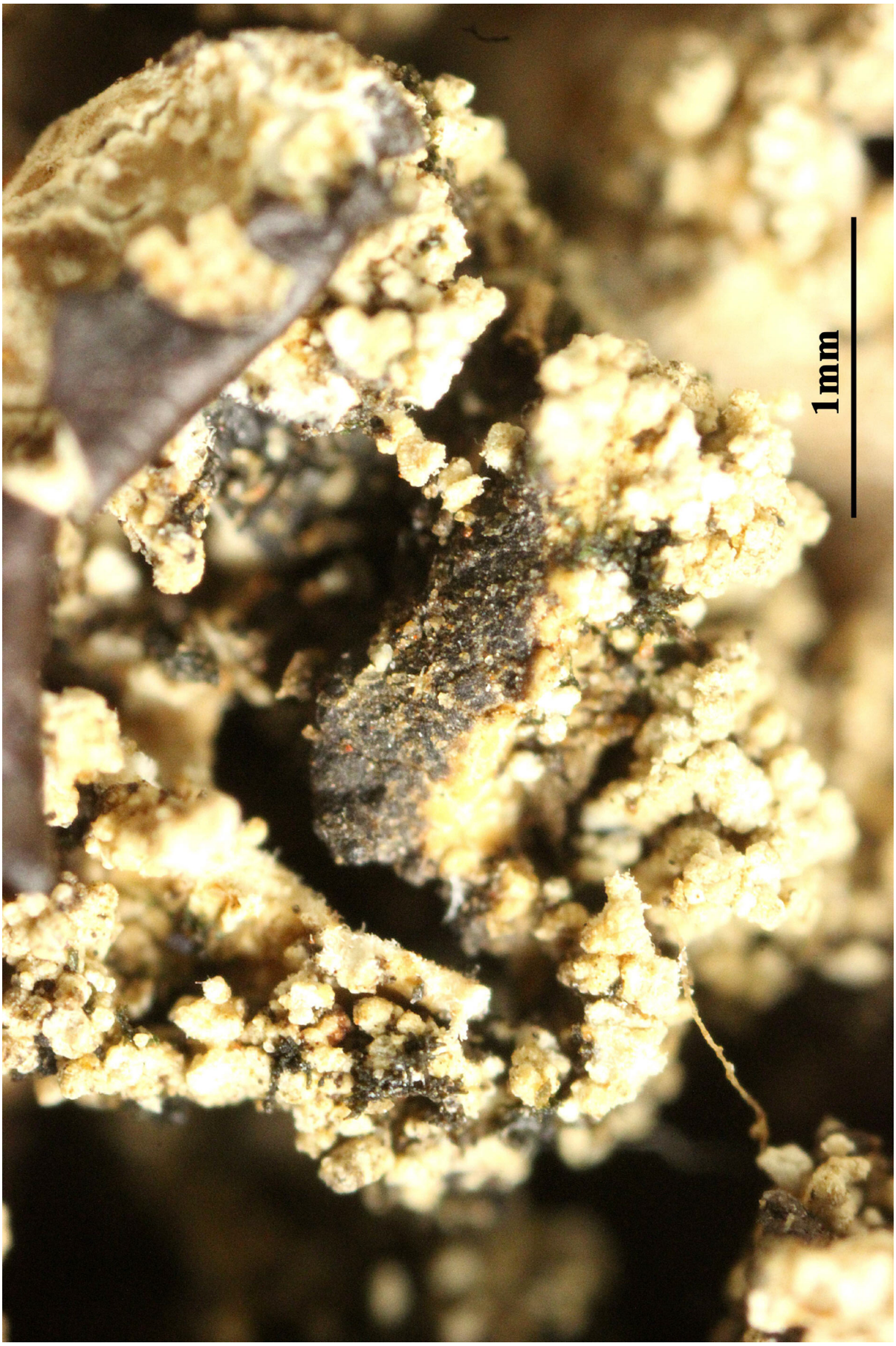
Parmelia dissecta

Parmelia erumpens Kurok., Lichenes Rariores et Critici Exsiccati 2: 74 (1969)
= *Notoparmelia erumpens* (Kurok.) A. Crespo, Ferencová & Divakar, Lichenologist 46(1): 63 (2014)

[KU425], Australia. New South Wales: Moonbi Lookout, Moonbi Ranges, Main Divide, 17 miles north of Tamworth. Leg. S. Kurokawa (no. 5151), 28.10.1965, det. S. Kurokawa. Ex S. Kurokawa and H. Kashiwadani Lichenes Rariores Et Critici Exsiccati Nr. 425.

Thallus loosely adnate to adnate, to 8–20 cm wide. Lobes imbricate, subirregular, apically rotund, short, 2–8 mm wide. Upper surface pale greenish grey to pale grey, flat, shiny, white-reticulate becoming conspicuously cracked and pseudocyphellate; pseudocyphellae effigurate, somewhat raised, dense, fusing into a reticulate network over the entire surface; dactyls (pustular isidia) developing from pseudocyphellae, erumpent apically; soredia derived from cracks or dactyls, coarse and becoming corticate in part, forming dense laminal and rarely marginal soralia and/or extended, granular, coralloid-isidioid outgrowths. Lower surface moderately densely rhizinate; rhizines simple or squarrosely branched, 1–2 mm long. Apothecia rare, pedicellate, 5–15 mm wide; disc concave, then flattening and splitting radially; thalline exciple reticulately cracked, pseudocyphellate, sorediate. Ascospores 10–12 × 6–8 µm. Pycnidia scattered. Conidia bacilliform to weakly bifusiform, 5–7 × 1 µm. CHEMISTRY: cortex K+ yellow; medulla K+ yellow then dark red, C-, P+ red-orange; containing atranorin, chloroatranorin, salazinic acid (major), consalazinic acid (minor), lobaric acid (minor) and ±protocetraric acid (trace). - A very common species in southern Australia (W.A., S.A., Qld, N.S.W., A.C.T., Vic. and Tas.); also on Norfolk Is. and Lord Howe Is. In the coastal forests of eastern Australia and Tas., this species is generally epiphytic on trees and shrubs in undisturbed forests or scrub habitats, whereas in the drier inland areas of W.A., S.A., N.S.W. and Vic., moist, shaded rock is the most common habitat. It also occurs in South Africa, India, Indonesia, Taiwan, Japan and New Zealand.

Parmelia erumpens

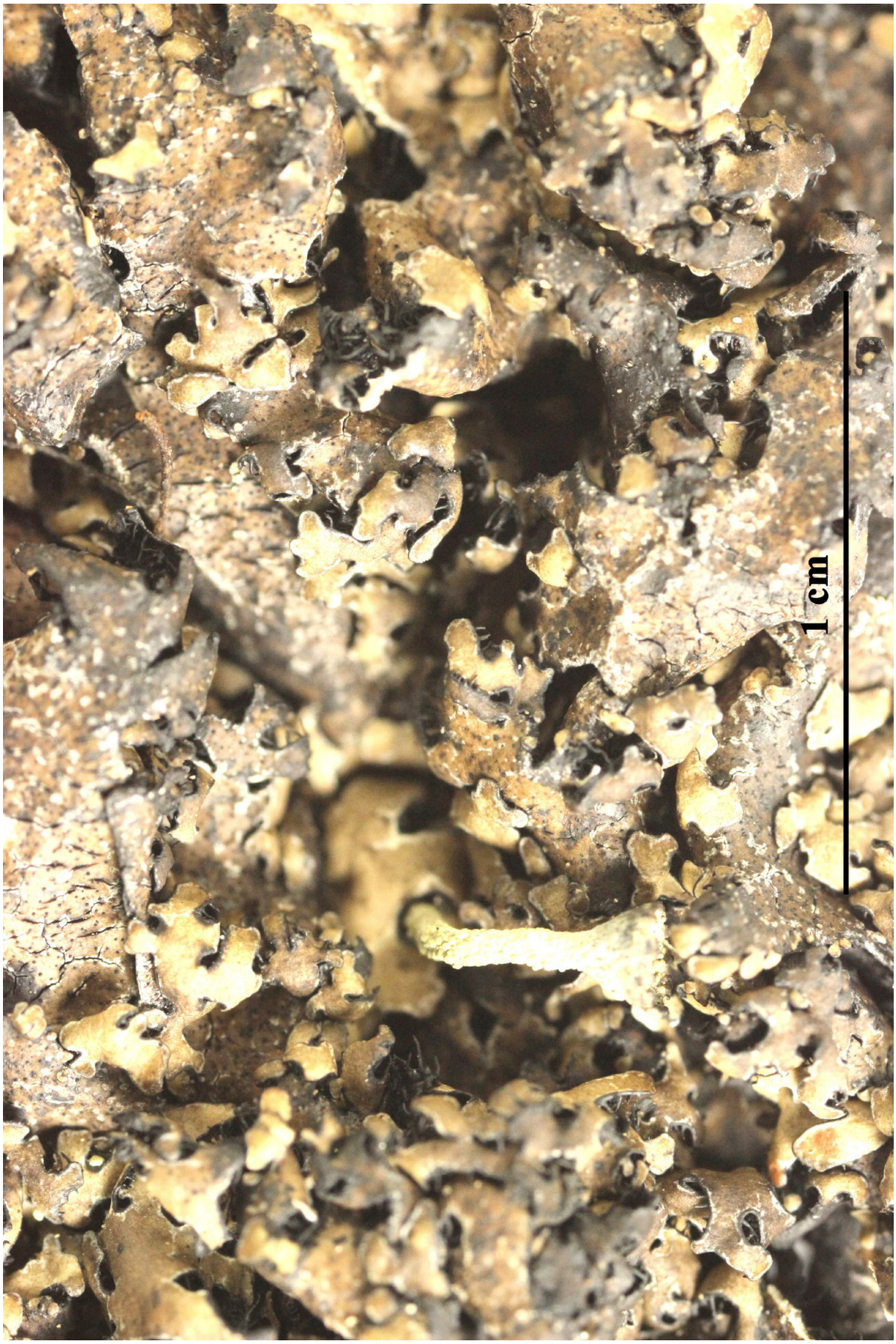


Parmelia erumpens

Parmelia fertilis Müll. Arg., Flora, Regensburg 70: 316 (1887)

[KA286], Japan. Hokkaido. Prov. Ishikari: Mt. Tomuraushi, Daisetsu Mts. On rocks, 2000 m. Leg. M. Togashi, 19.7.1969, det. K. H. Moon. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR.286.

Parmelia fertilis is a distinctive species, with reticulate white markings on the upper surface, and abundant apothecia.



Parmelia fertilis

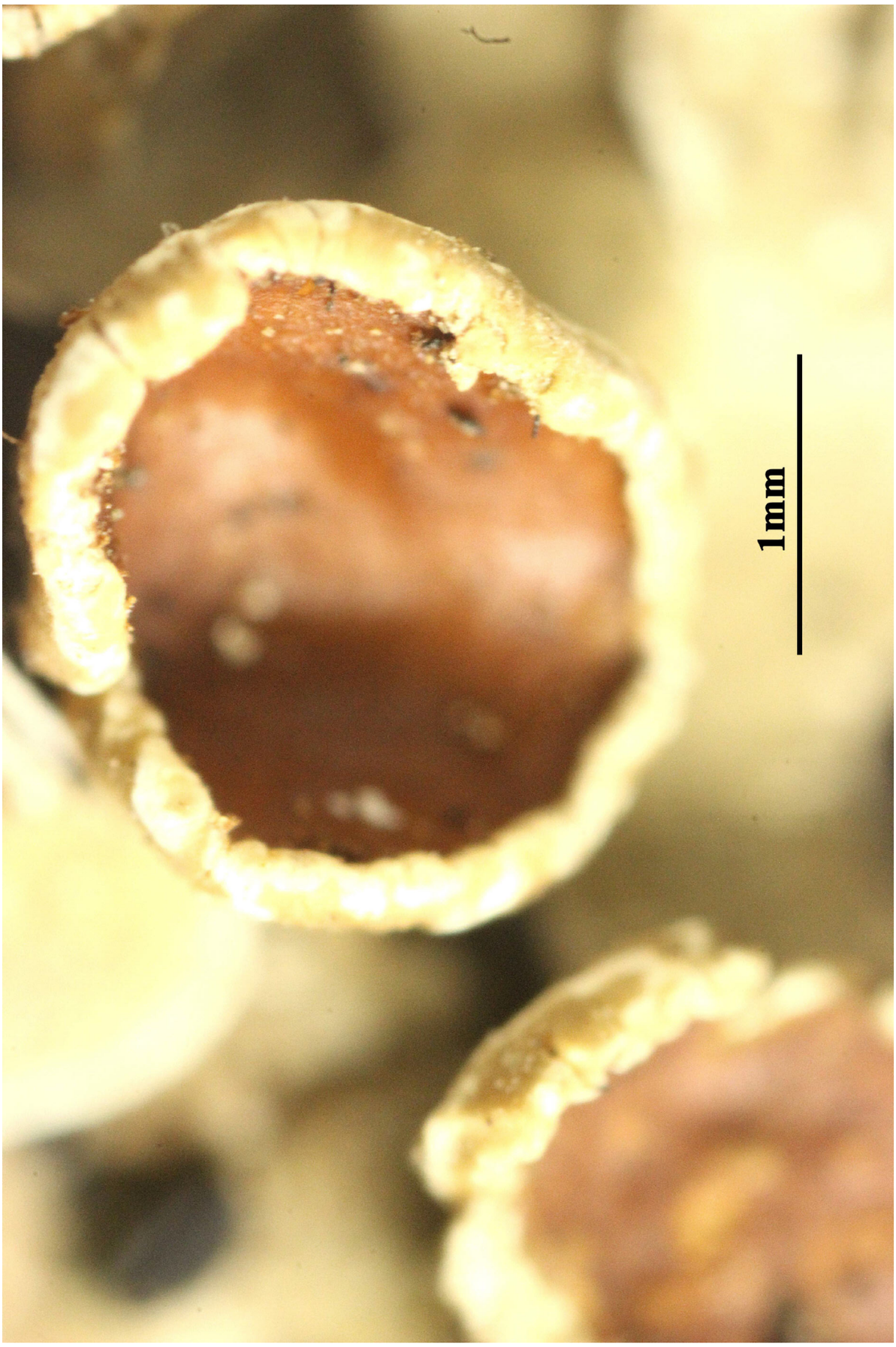
Parmelia fertilis

Parmelia fertilis Müll. Arg., Flora, Regensburg 70: 316 (1887)

[KU426], Japan. Honshu. Prov. Iwaki: Mt. Kasshi-yama, Nishi-Shirakawa-gun. On bark of tree, 1350 m. Leg. S. Kurokawa (no. 18009), 1.8.1978, det. S. Kurokawa. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 426.

Parmelia fertilis is a distinctive species, with reticulate white markings on the upper surface, and abundant apothecia.

Parmelia fertilis

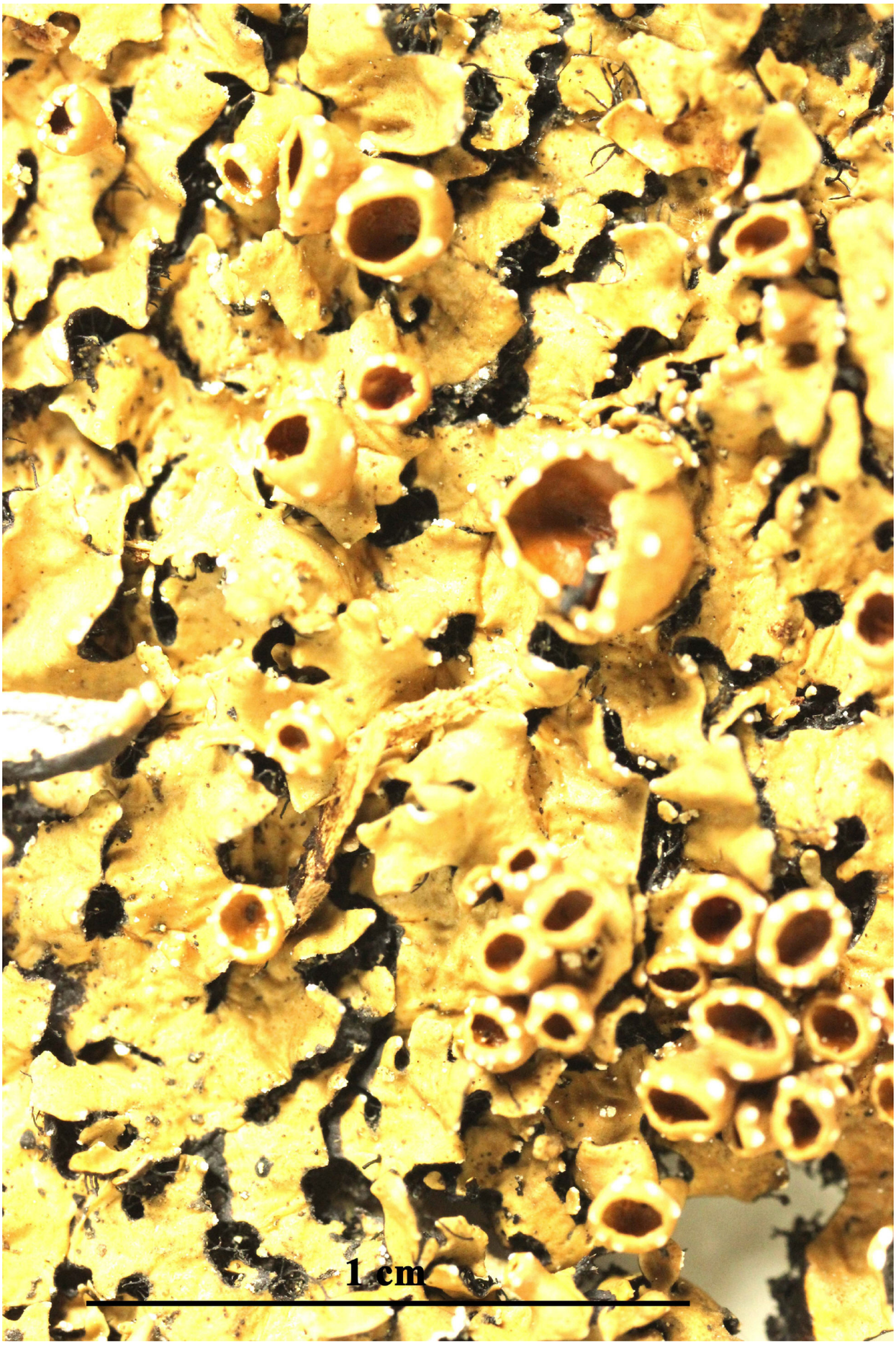


Parmelia fertilis

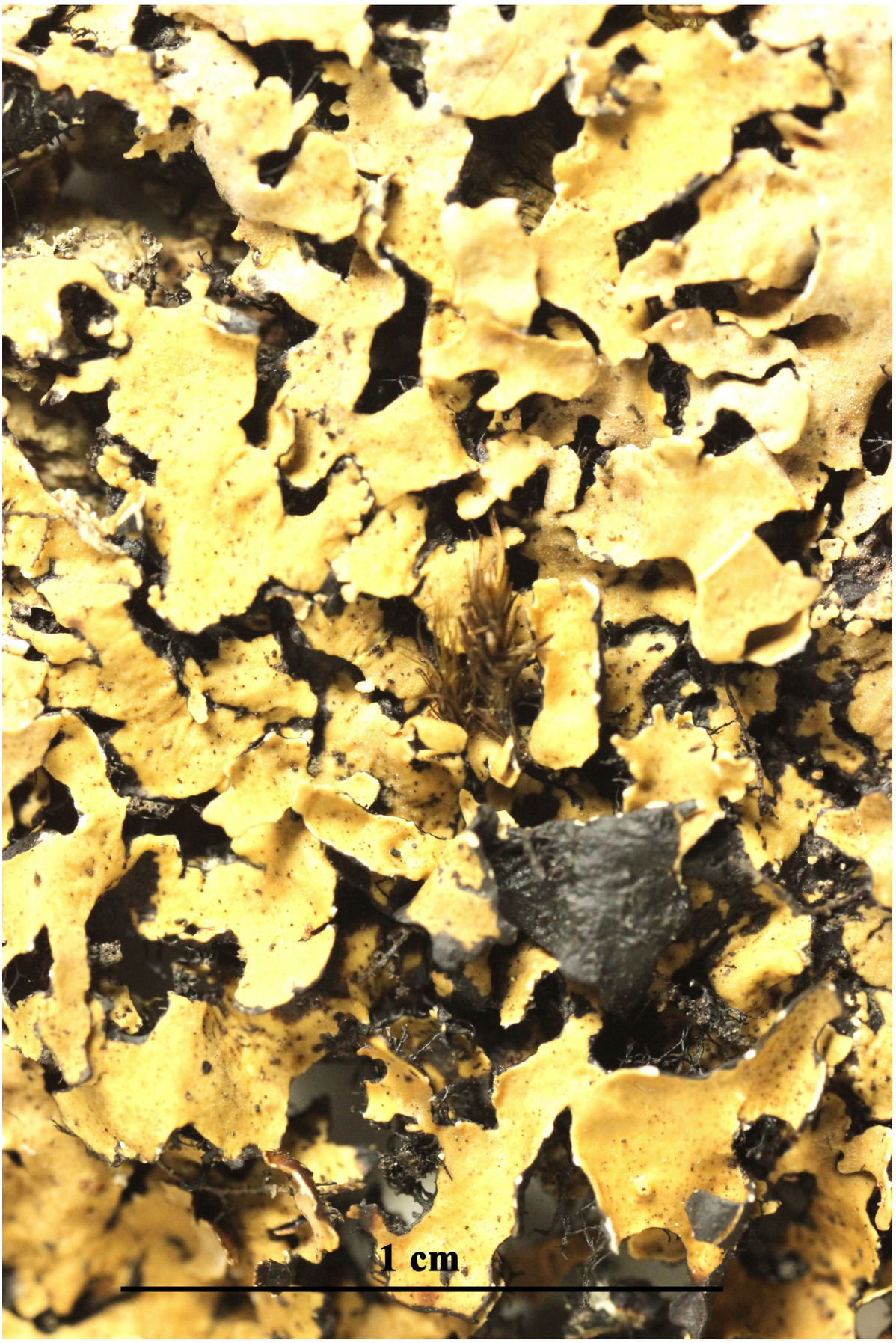
Parmelia laevior Nyl., Lich. Japon.: 28 (1890)
= *Nipponoparmelia* laevior (Nyl.) K.H. Moon, Y. Ohmura & Kashiw., in Crespo et al., Taxon 59(6): 1749 (2010)

[KU183], Japan. Honshu. Prov. Musashi: Mt. Kumotori. On trunk of *Tsuga diversifolia*, 1900 m. Leg. H. Shibuichi (no. 4546), det. S. Kurokawa. Ex S. Kurokawa Lichenes Rariores Et Critici Exsiccati Nr. 183.

Nipponoparmelia laevior forms a foliose (leafy) thallus that sits loosely attached (adnate) on bark and is firm, pale greenish to brownish mineral grey. It typically spans 6–15 cm across. The lobes are narrow and mostly parallel-sided (sublinear), crowded edge-to-edge, 1.5–4 mm wide, and may show small side lobes. The upper surface is shiny and flat to faintly wrinkled, becoming sparsely cross-cracked with age. Tiny aeration pores (pseudocyphellae) are arranged along the sides of the lobe edges; they are round to slightly elongated and about 0.2 mm long. The underside is black and moderately covered with rhizines, which are fine, root-like holdfasts. These structures are simple to forked, sometimes sparsely squarrose at maturity, and 1–2 mm long. Small black pycnidia are common; they release straight to slightly curved cylindrical conidia 6–8 μm long. Fruiting bodies (apothecia) are frequent, usually on a short stalk and urn-shaped when young (stipitate, urceolate); they open at maturity to a radially split disc 5–10 mm across. The thallus-derived rim (amphithecium) bears scattered wart-like pseudocyphellae. The spore-bearing layer (hymenium) is 60–65 μm tall; ascospores are 8–9 × 14–16 μm with an outer wall about 1 μm thick.[5] The cortex contains atranorin and chloroatranorin; spot tests are K+ (yellow), C−, KC−, and P−. The medulla contains salazinic acid with traces of consalazinic acid; spot tests are K+ (bright yellow → red), P+ (strong yellow), C−, and KC−.



Parmelia laevior



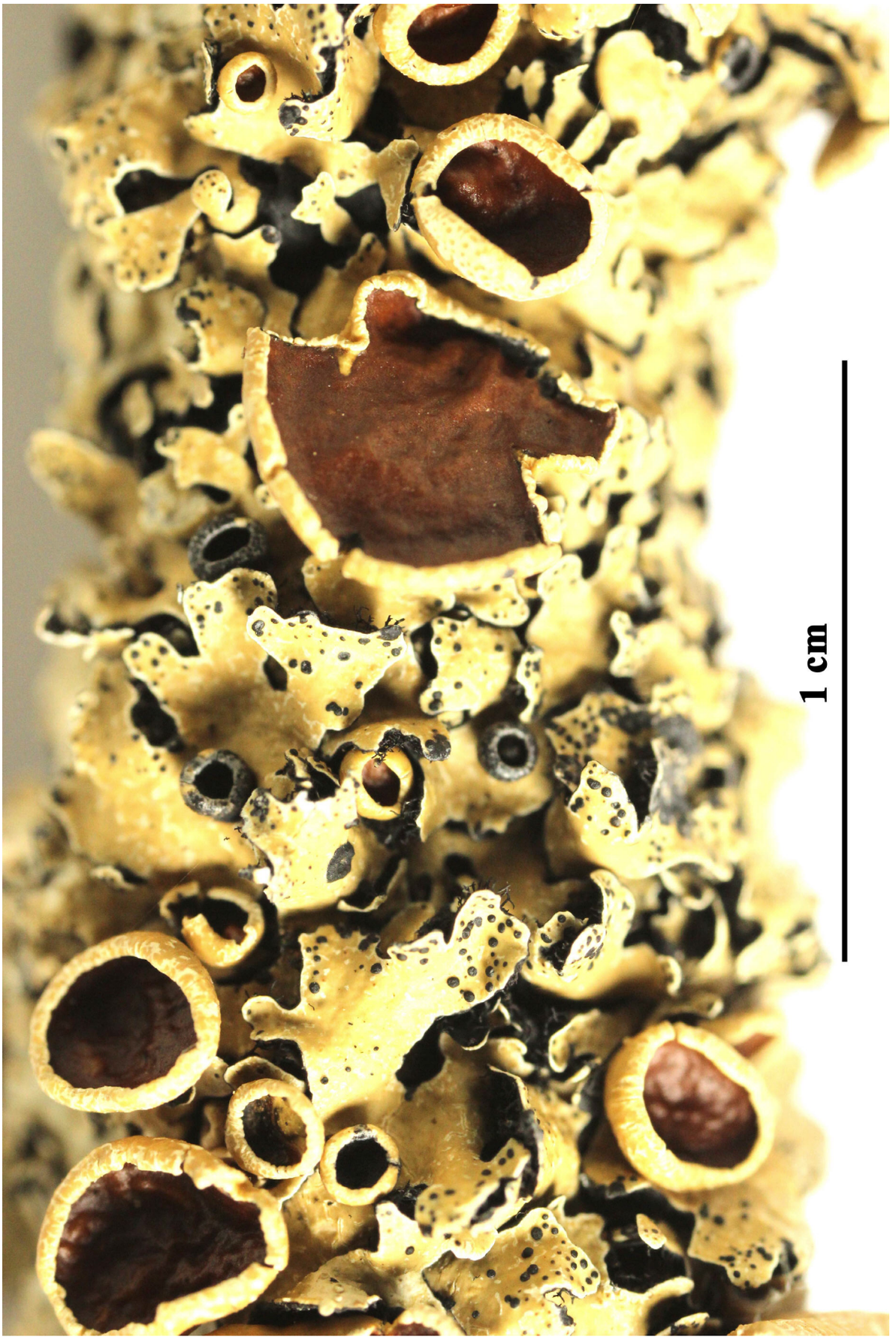
Parmelia laevior

Parmelia fertilis Müll. Arg., Flora, Regensburg 70: 316 (1887)

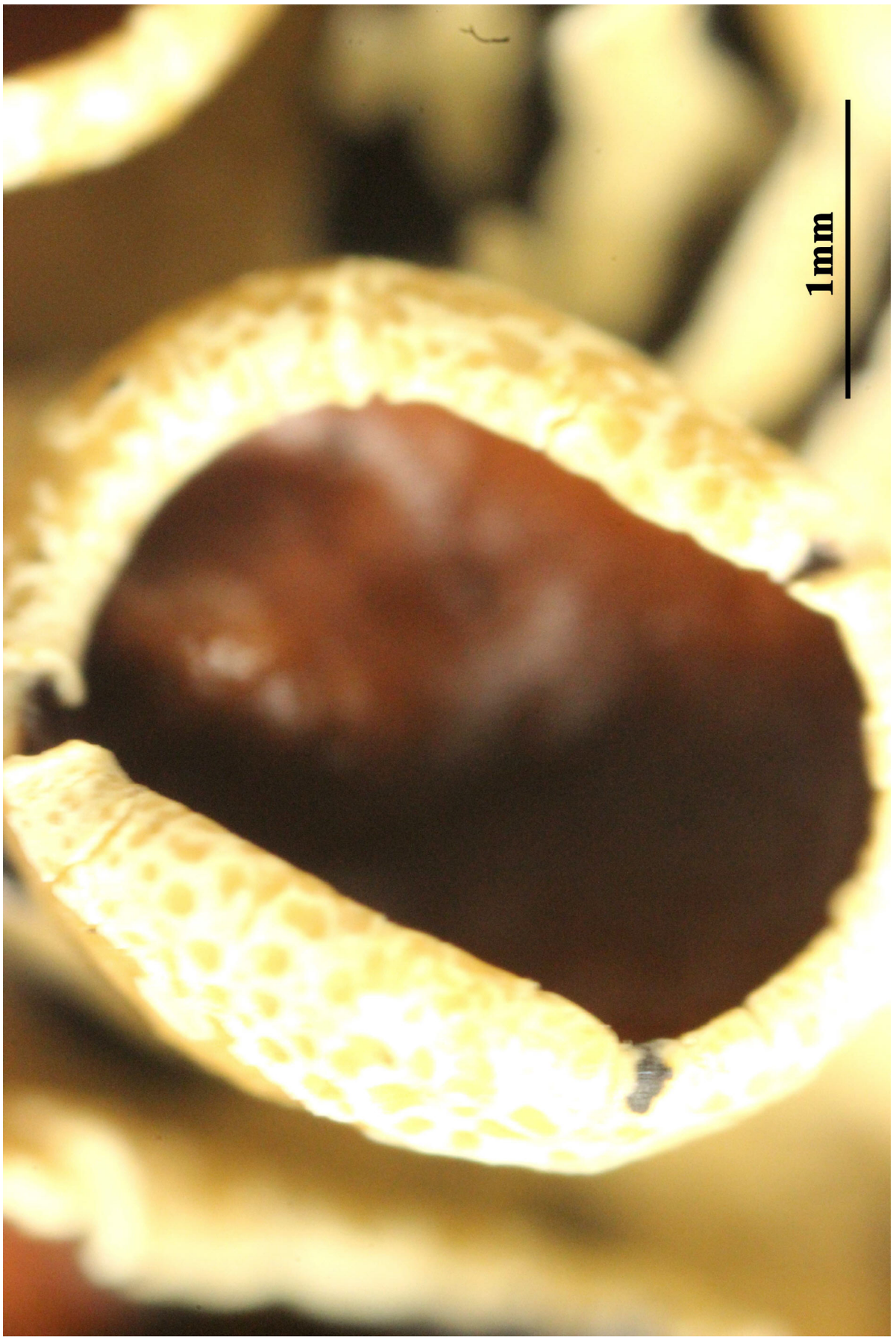
[KA336], Japan. Hokkaido. Prov. Nemuro: Hashirikotan, Bekkai-cho. Netsuke-gun. On bark of *Quercus dentata*, 10 m. Leg. H. Kashiwadani (no. 45831), 25.7.2003, det. H. Kashiwadani. EX H. KASHIWADANI LICHENES MINUS COGNITI RXSICCATI NR.336.

Parmelia fertilis is a distinctive species, with reticulate white markings on the upper surface, and abundant apothecia.

Morphologische Merkmale: Es handelt sich um eine blattartige (foliose) Flechte, die flache, rosettenförmige Lager (Thalli) bildet. Je nach Region (z. B. Asien im Vergleich zu Teilen Nordamerikas) variiert die Wuchsform von eher offen und groß-rosettig bis hin zu kompakt und eng dem Substrat angefugt. Oberfläche und Lappen: Die zentralen Lappen sind oft breit miteinander verschmolzen. Im Gegensatz zu einigen verwandten Arten (wie Parmelia sulcata oder Parmelia saxatilis) besitzt *Parmelia fertilis* weder Soredien noch Isidien.Unterseite: Die Unterseite ist dunkel bis schwarz und mit dichten, verzweigten Rhizinen besetzt. Ein wesentliches Merkmal ist die häufige und üppige Bildung von Apothecien 3. Lebensraum und Verbreitung Substrat: *Parmelia fertilis* ist eine kortikole Flechte, das bedeutet, sie wächst primarily auf der Baumrinde von Laubbäumen oder Nadelhölzern. Die Art ist in borealen und gemäßigten Zonen der Nordhalbkugel zu finden. Historische und neuere Funde stammen unter anderem aus Teilen Asiens (Sibirien, Japan, Taiwan) sowie aus Nordamerika (z. B. dem östlichen Kanada).



Parmelia fertilis



Parmelia fertilis

B
Biatora ochrophaea Tuck..... 135, 138
C
Cetraria richardsonii Hook..... 140
Crocynia finkii B. de Lesd..... 5
H
Haematomma lapponicum Räsänen..... 2
Hypotrachyna horrescens (Taylor) Krog & Swinscow..... 280
I
Isidium frigidum (Sw.) Ach..... 236
Isidium gonatodes (Ach.) Ach..... 236
L
Lecanora frigida (Sw.) Johnson..... 236
Lecanora pallescens var. frigida (Sw.) Branth & Rostr..... 236
Lecanora pallescens var. tartarea (L.) Branth & Rostr..... 241
Lecanora tartarea (L.) Ach..... 241
Lecanora tartarea f. frigida (Sw.) Nyl..... 236
Lecanora tartarea var. frigida (Sw.) Ach..... 236
Lepraria arbuscula (Nyl.) Lendemer & B.P. Hodk..... 8
Lepraria finkii (B. de Lesd.) R.C. Harris..... 5
Lepraria lobificans Nyl..... 5
Leprocaulon arbuscula (Nyl.) Nyl..... 8
Leptogium burnetiae C.W. Dodge..... 11
Leptogium lichenoides (L.) Zahlbr..... 26, 29
Leptogium menziesii (Sm.) Mont..... 32
Leptogium moluccanum var. myriophyllinum (Müll. Arg.) Asahina
42, 44, 47
Leptogium tremelloides var. myriophyllinum Müll. Arg..... 42, 44, 47
Letharia vulpina (L.) Hue..... 49
Lichen arcticus L..... 176
Lichen frigidus Sw..... 236
Lichen menziesii Sm..... 32
Lichen olivaceus L..... 152
Lichen pezizoides Weber..... 261
Lichen resupinatus L..... 182, 185
Lichen retiger Bory..... 117
Lichen sanguinarius L..... 155
Lichen tartareus L..... 241
Lichen tartareus var. frigidus (Sw.) Wahlenb..... 236
Lichen vulpinus L..... 49

Lobaria adscripta f. inactiva Asahina..... 56
Lobaria discolor (Bory ex Delise) Hue..... 52
Lobaria discolor var. inactiva (Asahina) Yoshim..... 56
Lobaria discolor var. subsinuosa (Vain.) Yoshim..... 60
Lobaria ferax var. subsinuosa Vain..... 60
Lobaria fuscotomentosa Yoshim..... 64, 68
Lobaria gyrophorica Yoshim..... 71
Lobaria isidiophora Yoshim..... 75
Lobaria japonica (Zahlbr.) Asahina..... 79, 82
Lobaria kurokawae Yoshim..... 86, 89
Lobaria laciniata subsp. japonica Zahlbr..... 79, 82
Lobaria linita (Ach.) Rabenh..... 92, 96
Lobaria meridionalis var. spathulata Inumaru..... 125, 129
Lobaria oregana (Tuck.) Müll..... 99
Lobaria orientalis (Asahina) Yoshim..... 103, 108
Lobaria pseudopulmonaria Gyeln..... 112
Lobaria pulmonaria var. orientalis Asahina..... 103, 108
Lobaria retigera (Bory) Trevis..... 117
Lobaria sachalinensis Asahina..... 122
Lobaria spathulata (Inumaru) Yoshim..... 125, 129
Lobaria tuberculata Yoshim..... 132
Loxospora ochrophaea (Tuck.) R.C. Harris..... 135, 138
M
Masonhalea richardsonii (Hook.) Kärnefelt..... 140
Mazosia melanophthalma (Müll. Arg.) R. Sant..... 144
Melanelixia huei (Asahina) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch..... 147, 150
Melanohalea olivacea (L.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch..... 152
Mycoblastus sanguinarius (L.) Norman..... 155
Myelochroa entotheiochroa (Hue) Elix & Hale..... 158, 161
Myelochroa irrugans (Nyl.) Elix & Hale..... 164, 167
Myelochroa perisidians (Nyl.) Elix & Hale..... 170
N
Neocatapyrenium cladonioideum (Vain.) H. Harada..... 173
Nephroma arcticum (L.) Torss..... 176
Nephroma helveticum Ach..... 179
Nephroma resupinatum (L.) Ach..... 182, 185
Nephromopsis richardsonii (Hook.) Divakar, A. Crespo & Lumbsch 140
Nephromopsis rugosa Asahina..... 204

Niebla ceruchis (Ach.) Rundel & Bowler..... 193
Nipponoparmelia laevior (Nyl.) K.H. Moon, Y. Ohmura & Kashiw. 292
Notoparmelia erumpens (Kurok.) A. Crespo, Ferencová & Divakar 283
O
Ocellularia microstoma (Müll. Arg.) Hale..... 222, 225
Ochrolechia akagiensis Yasuda,..... 228, 233
Ochrolechia frigida (Sw.) Lynge..... 236
Ochrolechia tartarea (L.) A. Massal..... 241
Ochrolechia tartarea f. frigida (Sw.) Körb..... 236
Ochrolechia tartarea var. frigida (Sw.) Körb..... 236
Omphalodium pisacomense Meyen & Flot..... 245, 248
Opegrapha melanophthalma Müll. Arg..... 144
Ophioparma lapponica (Räsänen) Hafellner & R.W. Rogers..... 2
Oropogon tanakae Asahina..... 252
P
Pannaria fulvescens var. lepidella Räsänen..... 255
Pannaria lepidella (Räsänen) Kurok..... 255
Pannaria pezizoides (Weber) Trevis..... 264
Pannaria pezizoides (Weber) Trevis..... 261
Parmelia ceruchis Ach..... 193
Parmelia cochleata Zahlbr..... 277
Parmelia dissecta Nyl..... 280
Parmelia entotheiochroa Hue..... 158, 161
Parmelia erumpens Kurok..... 283
Parmelia fertilis Müll. Arg..... 286, 289, 295
Parmelia huei Asahina..... 147, 150
Parmelia irrugans Nyl..... 164, 167
Parmelia laevior Nyl..... 292
Parmelia parella var. tartarea (L.) Schaer..... 241
Parmelia perisidians Nyl..... 170
Parmelia tartarea (L.) Ach..... 241
Parmelia tartarea var. frigida (Sw.) Ach..... 236
Parmelina perisidians (Nyl.) Hale..... 170
Patellaria tartarea (L.) DC..... 241
Pertusaria tartarea (L.) Müll. Arg..... 241
Protopannaria pezizoides (Weber) P. M. Jørg. & S. Ekman..... 264
Protopannaria pezizoides (Weber) P.M. Jørg. & S. Ekman..... 261
Psora frigida (Sw.) Hoffm..... 236
R

Ricasolia japonica (Zahlbr.) C. Cornejo..... 79, 82
S
Scutellaria tartarea (L.) Baumg..... 241
Scytinium lichenoides (L.) Otálora, P.M. Jørg. & Wedin..... 26, 29
Siphula cladonioidea Vain..... 173
Stereocaulon nanum subsp. arbuscula Nyl..... 8
Sticta discolor Bory ex Delise..... 52
Sticta linita Ach..... 92, 96
Sticta oregana Tuck..... 99
T
Thelotrema microstomum Müll. Arg..... 210, 222, 225
Tremella lichenoides L..... 26, 29
V
Verrucaria tartarea (L.) F.H. Wigg..... 241