

F. Schumm (2026):

Images of Lichens  
*from Japan 02*



With this volume I document a collection of images mainly out of the Exsiccats of Kashiwadani, Kurokawa and Ohmura from Japan 02. I 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 european species I recomend the excellent descriptions that are provided in Prof. Nimis ITALIC 8 under the URL:  
**<https://italic.units.it/>**

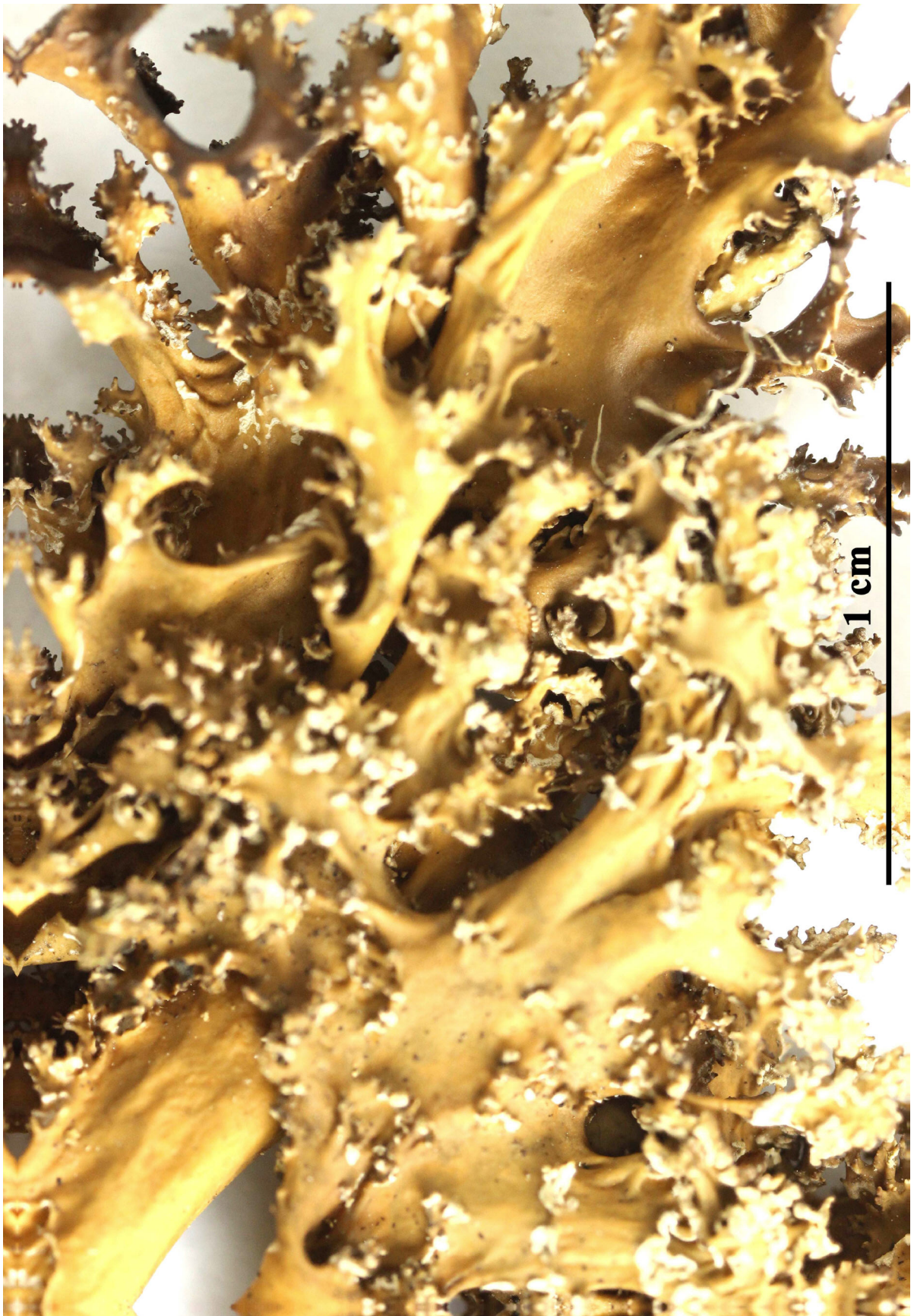
and the Australian Lichenslist under the Url:  
**[https://www.anbg.gov.au/abrs/lichenlist/lichenchecklist\\_e\\_o.html](https://www.anbg.gov.au/abrs/lichenlist/lichenchecklist_e_o.html)**

F. Schumm, 2026

*Cetraria delisei* (Bory ex Schaer.) Nyl., in Fries, K. svenska Vetensk-Akad.  
Handl., ny följd 7(no. 2): 11 (1867)  
= *Cetraria islandica*  $\gamma$  *delisei* Bory ex Schaer. 1850  
= *Cetrariella delisei* (Bory ex Schaer.) Kärnefelt & A. Thell, Bryologist  
96(3): 403 (1993)

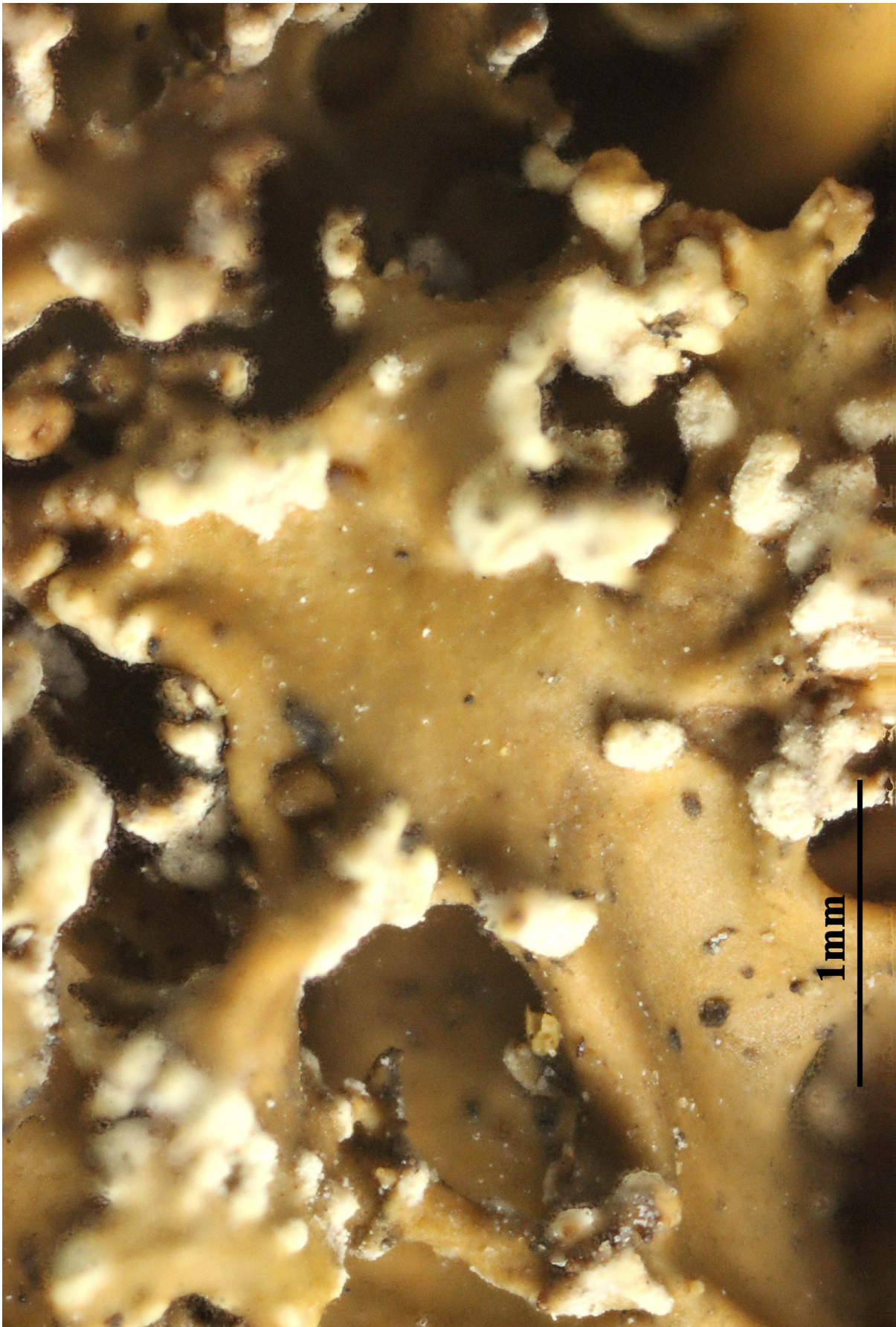
[KU204], Japan. Hokkaido. Prov. Ishikari: Southern slope of Mt. Akadake, Daisetsu Mts. On sil, 2000 m. Leg. S. Kurikava (no. 71132), 18.9.1971, det. A. Kurokawa. EX S. KUOKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 204.

Thallus fruticose, dichotomously branched into strap-shaped laciniae, often forming dense, up to 5-8 cm tall, loosely attached tufts. Laciniae erect, flattened, dorsiventral, canaliculate, 2-8 mm wide in central parts, 0.5-1 mm wide in apical parts, with pointed tips, the margins with scattered, up to 0.5 mm long, spinulose projections. Upper surface brown to dark brown in apical parts, slightly glossy, the basal parts yellowish; lower surface longitudinally ridged, usually paler than upper surface, with distinct whitish pseudocyphellae. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of periclinally arranged hyphae; medulla white. Apothecia very rare, lecanorine, submarginal on expanded lobes. Asci 8-spored, narrowly clavate, with a small axial body and a distinct, K/I+ blue ring-structure in the rather large tholus, approaching the Lecanora-type. Ascospores 1-celled, hyaline, ellipsoid, 6-8.5 x 2-2.5  $\mu$ m. Pycnidia blackish brown, immersed in the spinulose projections. Conidia simple, slightly swollen in the middle, (4-)7-9 x 0.5-1.5  $\mu$ m. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-; medulla and pseudocyphellae K-, C+ pink, KC+ pink, P-. Chemistry: medulla with gyrophoric and hiascic acids. - Note: an arctic-alpine species of acid soil in rather humid situations.



*Baeomyces brevis*





*Baeomyces brevis*

*Cetraria delisei* (Bory ex Schaer.) Nyl., in Fries, K. svenska Vetensk-Akad.  
Handl., ny följd 7(no. 2): 11 (1867)  
= *Cetraria islandica*  $\gamma$  *delisei* Bory ex Schaer. 1850  
= *Cetrariella delisei* (Bory ex Schaer.) Kärnefelt & A. Thell, Bryologist  
96(3): 403 (1993)

[KU553], Japan. Hokkaido. Prov. Kitami: En route from Mt. Minami-  
dake to Mt. Iou, Shari-gun. Among mosses, 1480 m. Leg. H. Kashi-  
wadani (no. 20087) & Y. Endo, 14-8-1983, det. H. Kashiwadani. EX S.  
KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI  
EXSICCATI NR. 553.

Thallus fruticose, dichotomously branched into strap-shaped laciniae, often forming dense, up to 5-8 cm tall, loosely attached tufts. Laciniae erect, flattened, dorsiventral, canaliculate, 2-8 mm wide in central parts, 0.5-1 mm wide in apical parts, with pointed tips, the margins with scattered, up to 0.5 mm long, spinulose projections. Upper surface brown to dark brown in apical parts, slightly glossy, the basal parts yellowish; lower surface longitudinally ridged, usually paler than upper surface, with distinct whitish pseudocyphellae. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of periclinally arranged hyphae; medulla white. Apothecia very rare, lecanorine, submarginal on expanded lobes. Asci 8-spored, narrowly clavate, with a small axial body and a distinct, K/I+ blue ring-structure in the rather large tholus, approaching the Lecanora-type. Ascospores 1-celled, hyaline, ellipsoid, 6-8.5 x 2-2.5  $\mu$ m. Pycnidia blackish brown, immersed in the spinulose projections. Conidia simple, slightly swollen in the middle, (4-)7-9 x 0.5-1.5  $\mu$ m. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-; medulla and pseudocyphellae K-, C+ pink, KC+ pink, P-. Chemistry: medulla with gyrophoric and hiassic acids. - Note: an arctic-alpine species of acid soil in rather humid situations.





*Baeomyces brevis*





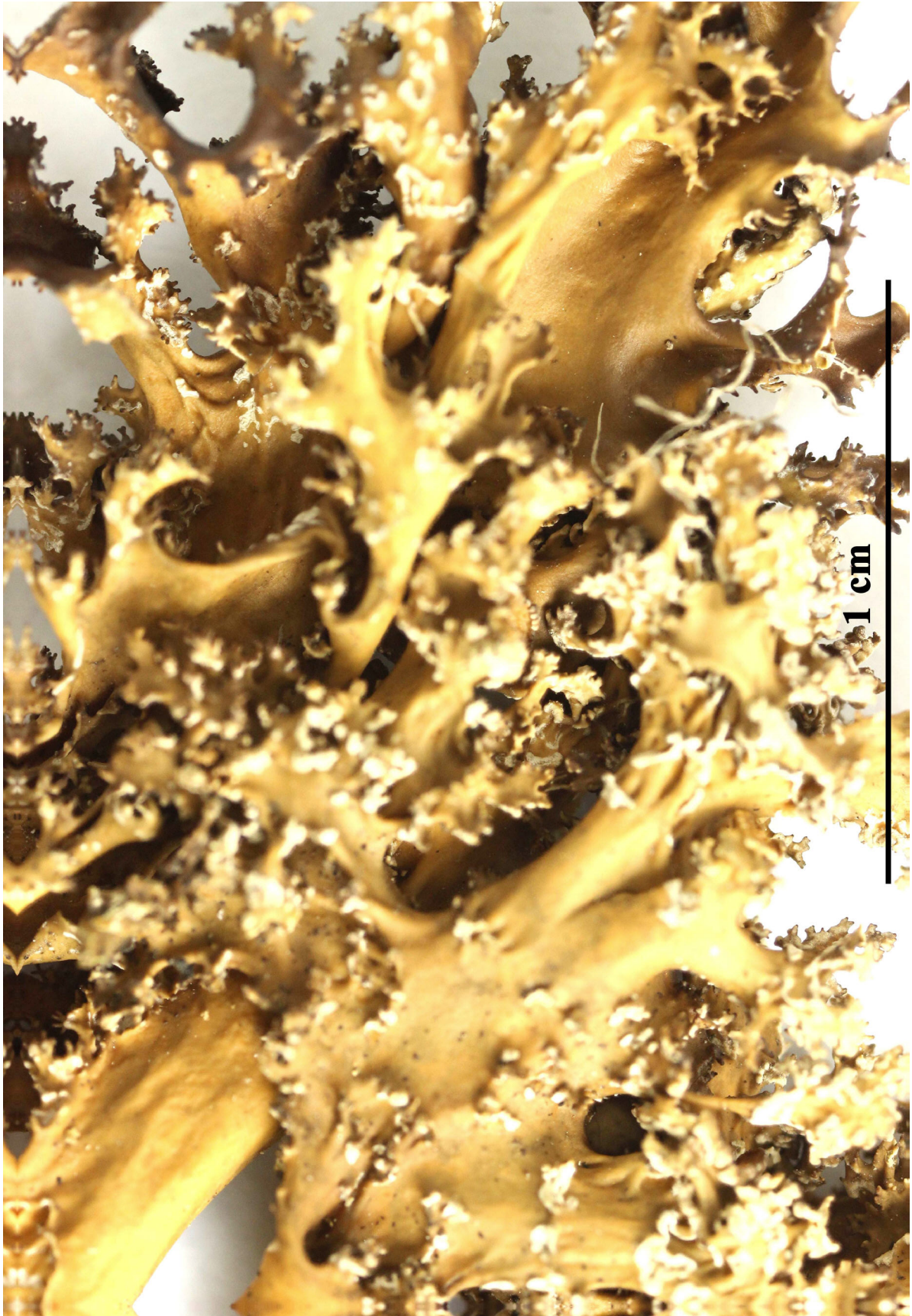
*Baeomyces brevis*

*Cetraria delisei* (Bory ex Schaer.) Nyl., in Fries, K. svenska Vetensk-Akad. Handl., ny följd 7(no. 2): 11 (1867)  
= *Cetraria islandica*  $\gamma$  *delisei* Bory ex Schaer. 1850  
= *Cetrariella delisei* (Bory ex Schaer.) Kärnefelt & A. Thell, Bryologist 96(3): 403 (1993)

[KU204], Japan. Hokkaido. Prov. Ishukari: Southern slope of Mt. Akadake, Daisetsu Mzs. On soil, 2000 m. Leg. S. Kurokawa (no. 71132), 18.9.1971, det. S. Kurokawa. EX S. KUOKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 204-

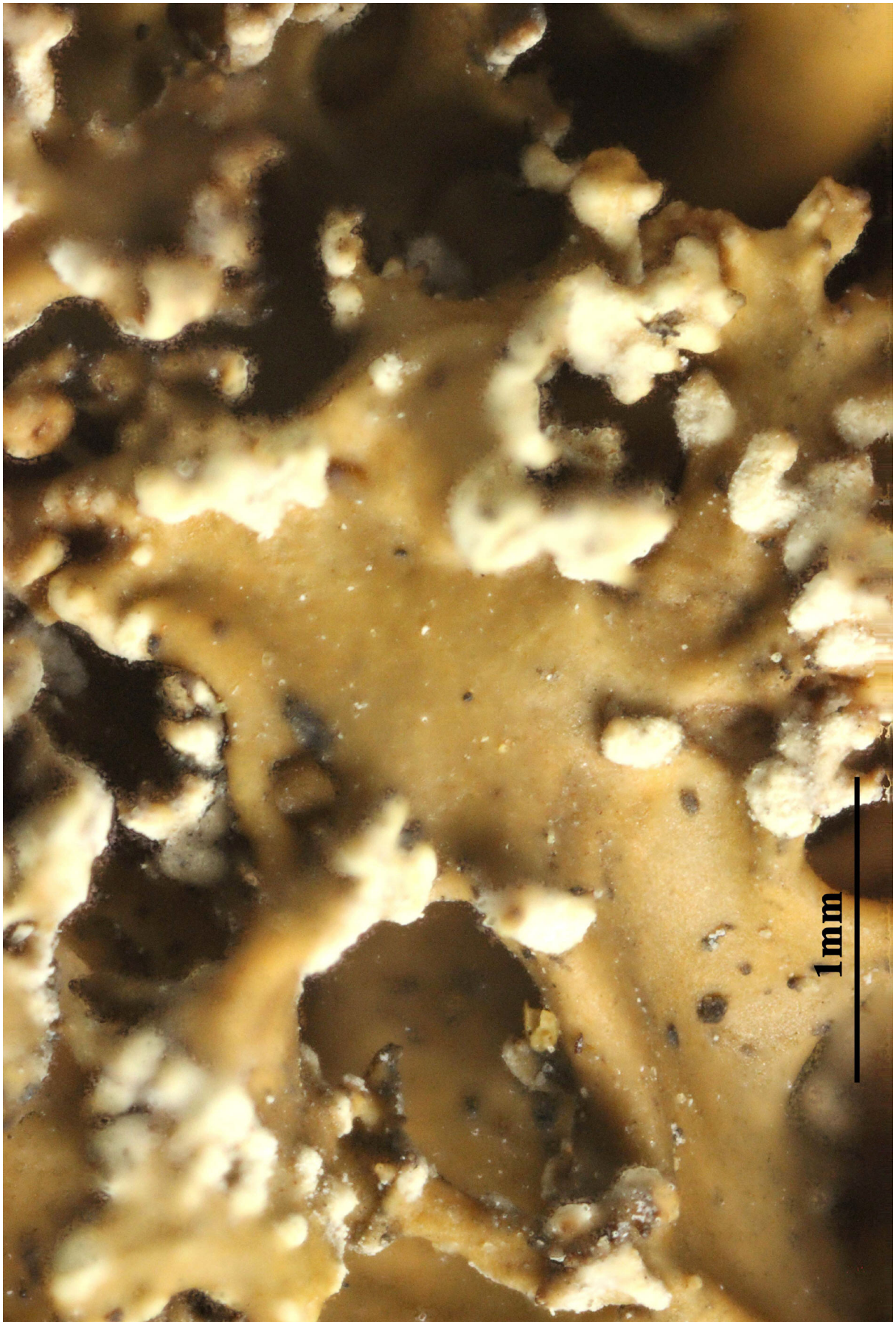
Thallus fruticose, dichotomously branched into strap-shaped laciniae, often forming dense, up to 5-8 cm tall, loosely attached tufts. Laciniae erect, flattened, dorsiventral, canaliculate, 2-8 mm wide in central parts, 0.5-1 mm wide in apical parts, with pointed tips, the margins with scattered, up to 0.5 mm long, spinulose projections. Upper surface brown to dark brown in apical parts, slightly glossy, the basal parts yellowish; lower surface longitudinally ridged, usually paler than upper surface, with distinct whitish pseudocyphellae. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of periclinally arranged hyphae; medulla white. Apothecia very rare, lecanorine, submarginal on expanded lobes. Asci 8-spored, narrowly clavate, with a small axial body and a distinct, K/I+ blue ring-structure in the rather large tholus, approaching the Lecanora-type. Ascospores 1-celled, hyaline, ellipsoid, 6-8.5 x 2-2.5  $\mu$ m. Pycnidia blackish brown, immersed in the spinulose projections. Conidia simple, slightly swollen in the middle, (4-)7-9 x 0.5-1.5  $\mu$ m. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-; medulla and pseudocyphellae K-, C+ pink, KC+ pink, P-. Chemistry: medulla with gyrophoric and hiascic acids. - Note: an arctic-alpine species of acid soil in rather humid situations.





*Baeomyces brevis*



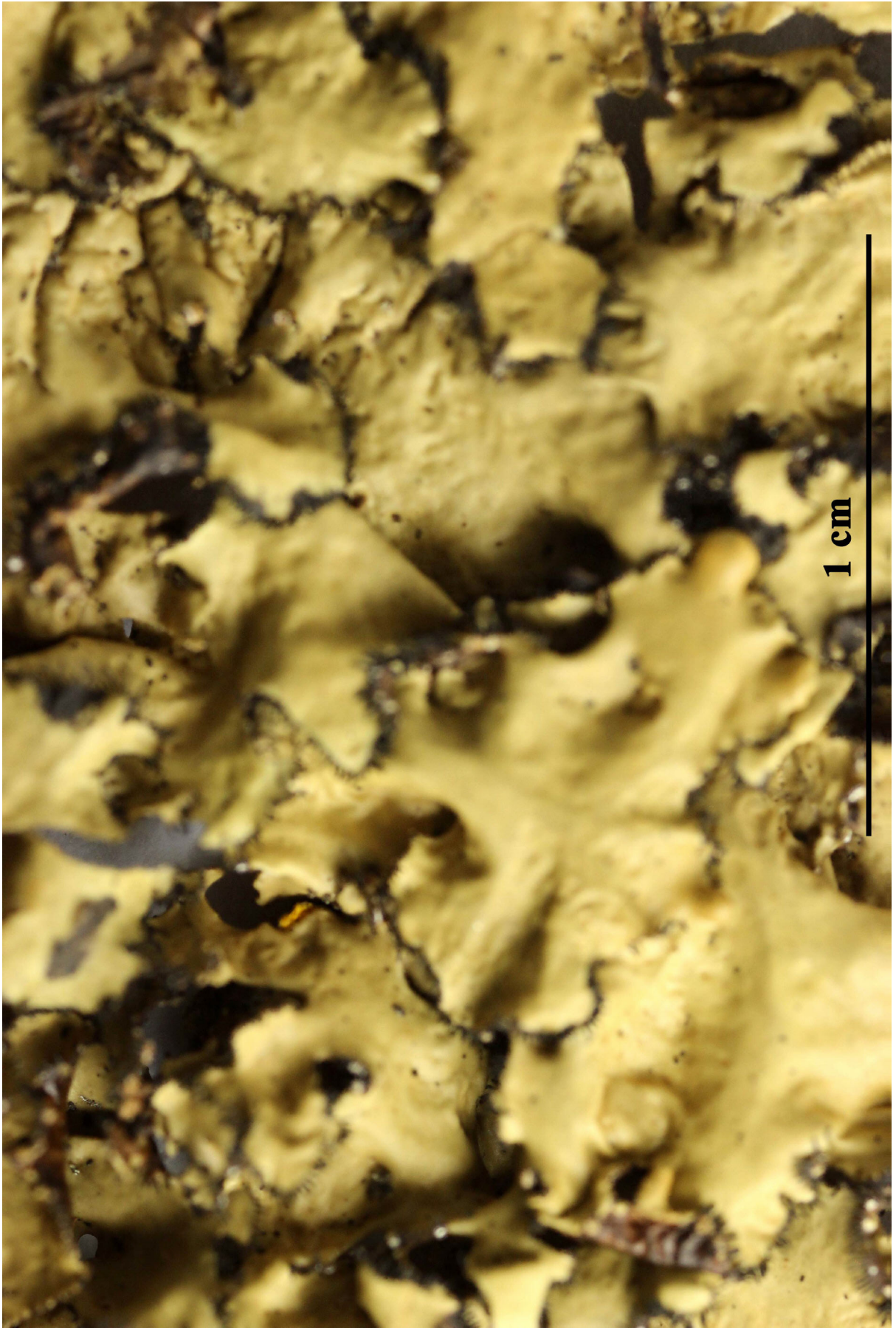


*Baeomyces brevis*



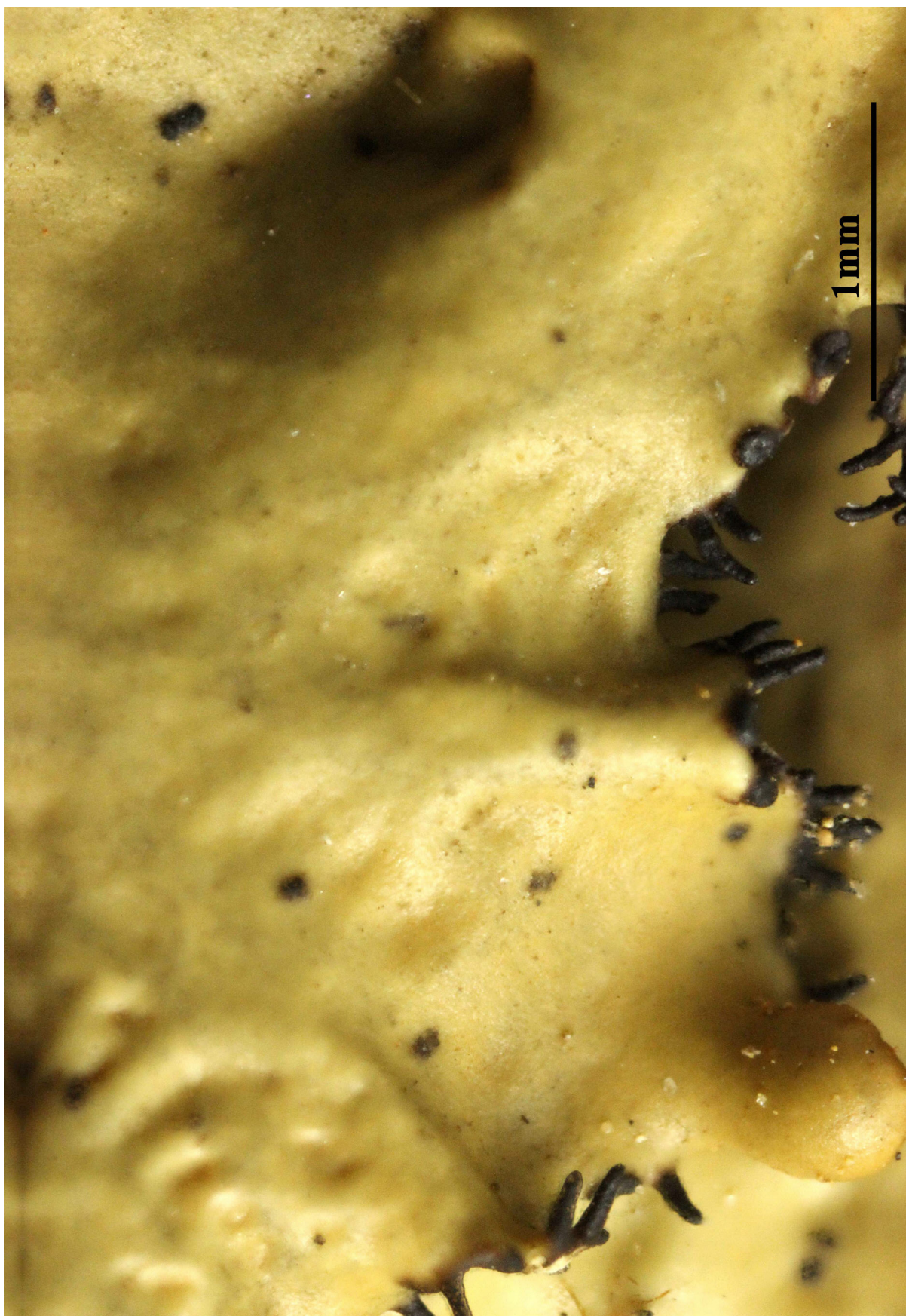
***Cetraria endocrocea*** (Asahina) M. Satô, in Nakai & Honda, Nov. fl. jap. 5:  
37 (1939)  
= *Nephromopsis endocrocea* Asahina 1935

[KU152], Japan. Honshu. Prov. Kai: Mt. Kimpu, Higa shi-Yamanashi-gun. On trunk of *Abies veitchii*, 2550 m. Leg. H. Shibuichi (no. 4572) and K Yoshida, 25.7.1972, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI NR. 152.



*Cetraria endocrocea*



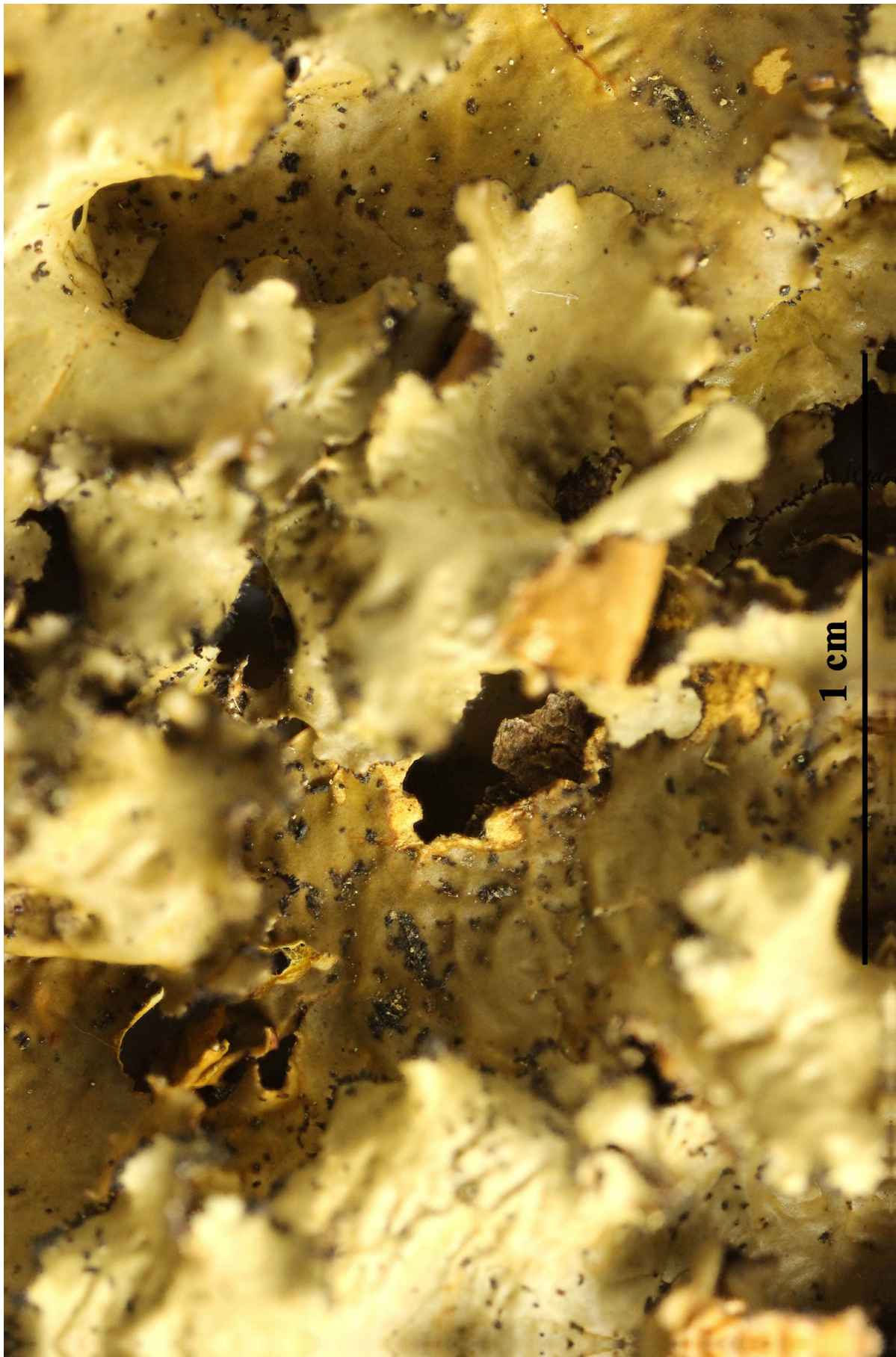


*Cetraria endocrocea*

*Cetraria endocrocea* (Asahina) M. Satô, in Nakai & Honda, Nov. fl. jap. 5:  
37 (1939)  
= *Nephromopsis endocrocea* Asahina 1935

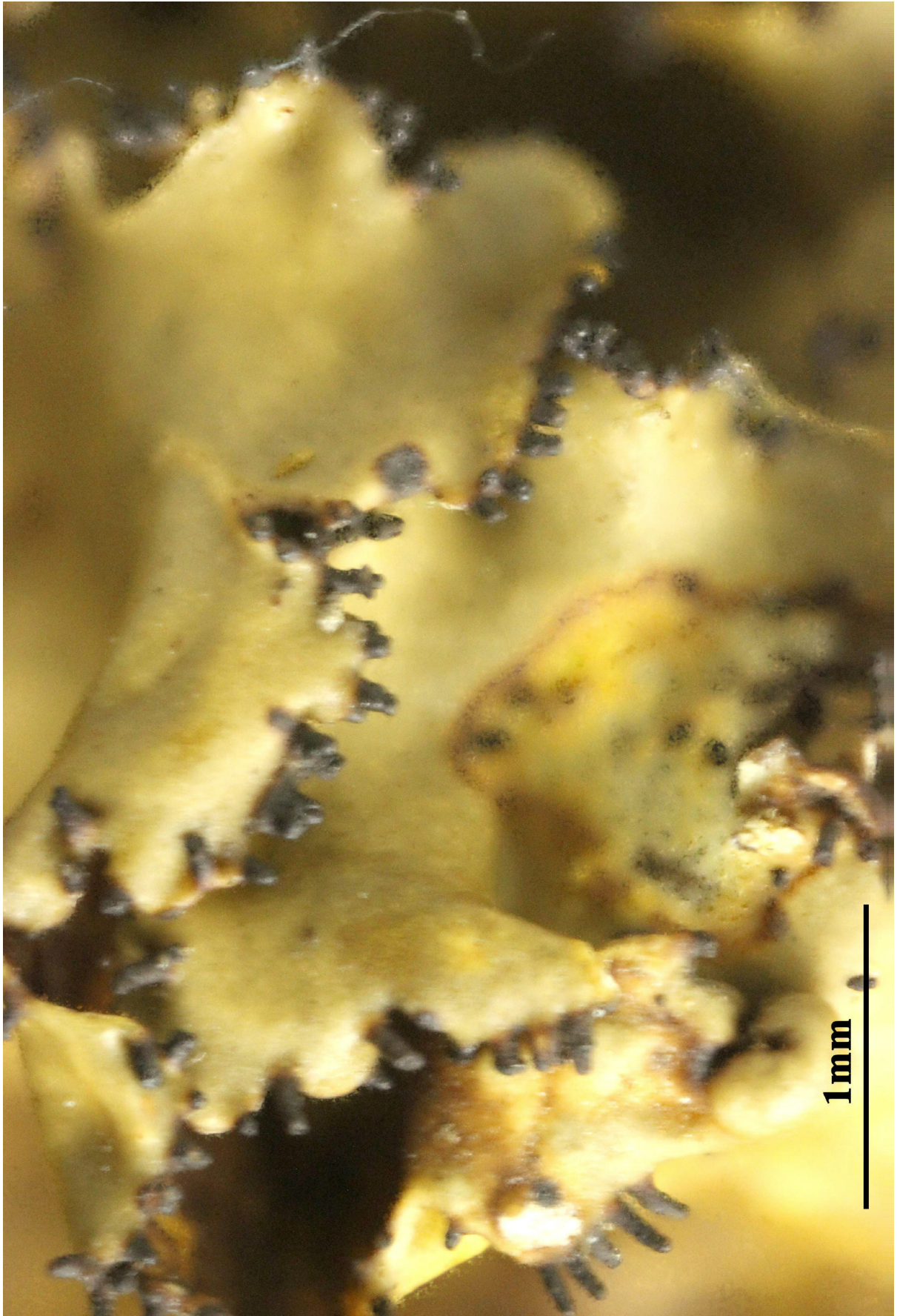
[KU404], Japan. Honshu. Prov. Shinano: Mt. Senjogatake. On bark of  
*Tsuga diversifolia*, 2200m. Leg. S. Kurokawa (no. 79055), M. Naka-  
nishi, K. Yoshida, 28.7.1979, det. S. Kurokawa. EX S. KUOKAWA AND  
H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 404.





*Cetraria endocrocea*





*Cetraria endocrocea*



*Cetraria halei* W.L. Culb. & C.F. Culb., Bryologist 70: 161 (1967)

[KU255], Japan. Honshu. Prov. Shinano: Mt. Nyukasa. On tree trunks, 1900 m. Leg. H. Kashiwadani (no. 13318), 6.7.1976, det. H. Kashiwadani. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 255.

EX THOMPSON, J., 1984. AMERICAN ARCTIC LICHENS: THE MACROLICHENS:

Thallus small, foliose, lobes to 1-3 mm broad, forming rosettes, flat; the upper surface more or less wrinkled, the margins with short cilia and also pycnidia, dull or shining, greenish brown to brown or olive-brown above, the underside white to brown with scattered rhizinae. Upper cortex 12-50  $\mu$  thick, algal layer very uneven, the medulla very loose; lower cortex like the upper. Apothecia common, marginal, pedicellate, to 3 mm broad, the margin concolorous with the thallus, inflexed, irregular, the disk brown, dull, epruinose; hypothecium hyaline, upper part of the hymenium and the epithecium brown, hymenium 50  $\mu$ ; asci subcylindric; spores 8, simple, hyaline, nearly globose, 5-7  $\mu$ . Reactions: medulla K + yellow or K -, C - , KC+ red. P-. UV +. Contents: alectoronic acid, with accessory atranorin and/or a-collatolic acid. - This species grows on conifers and old conifer wood as well as *Betula* and *Alnus*. In North America it is common in the eastern deciduous forest but ranges westward into British Columbia and Alaska. It reaches the Arctic along the northern edge of the tree line and on isolated tree stands. This species is also reported from Finland.



*Cetraria halei*





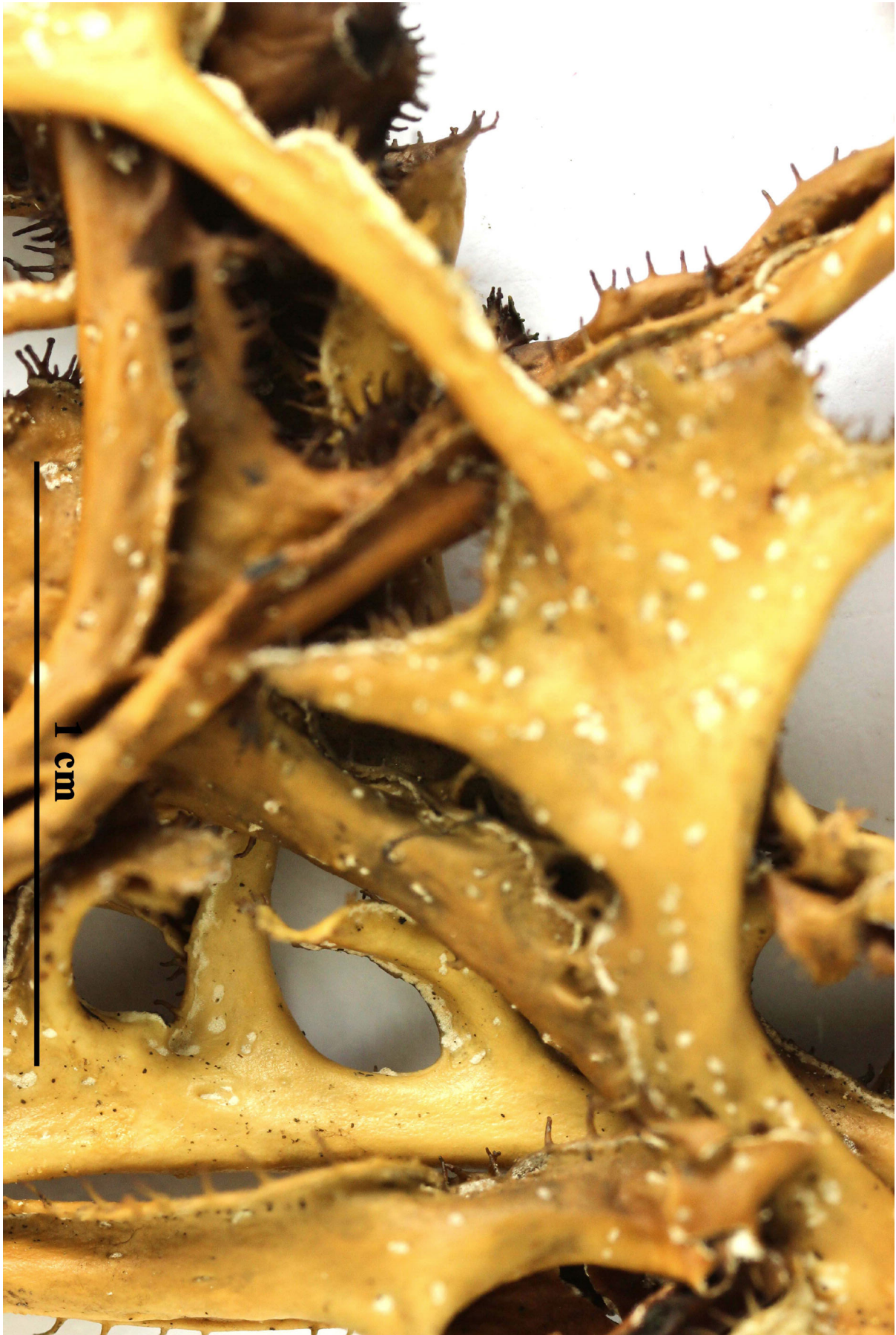
*Cetraria halei*

*Cetraria islandica* (L.) Ach., Methodus qua omnes detectos Lichenes  
Secundum Organa Carpomorpha ad Genera, Species et Varietates  
Redigere atque Observationibus Illustrare Tentavit Erik Acharius:  
293 (1803)  
= *Lichen islandicus* L. 1753

[KU459], Japan. Hokkaido. Prov. Ishikari: Mt. Chubetsu, Baisetsu Mts.  
Among mosses, 1850 m. Leg. H. Kashiwadani (no. 16301) and Y. Endo,  
5.8.1980, det. H. Kashiwadani. EX S. KUOKAWA AND H. KASHIWADA-  
NI LICHENES RARIORS ET CRITICI EXSICCATI NR. 459.

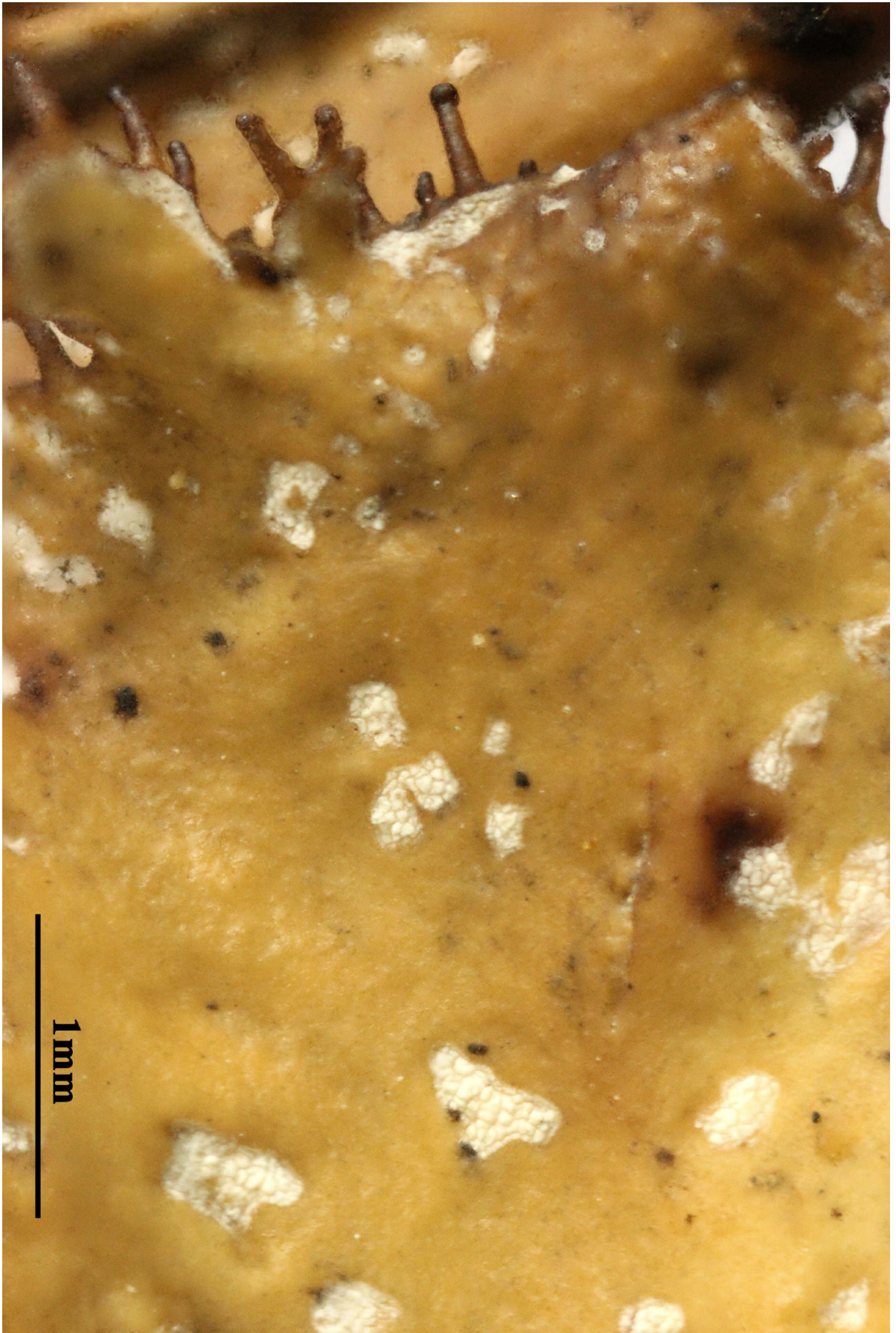
Thallus subfoliose to subfruticose, loosely attached, often forming large tufts, consisting of dorsiventral, flattened, elongate, ascending, 1-3(-4) cm wide and up to 6(-10) cm tall, often sparingly branched laciniae with often in-rolled margins bearing short (0.2-1 mm) marginal, pycnidia-bearing spinulose outgrowths. Upper surface dark brown in sun-forms to pale olive-green in shade, matt or somehow glossy, smooth or often slightly wrinkled, the basal parts often reddish; lower surface usually paler, with large, maculiform, irregular, white pseudocyphellae spread throughout the surface and the margins. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of periclinally arranged hyphae; medulla white. Apothecia extremely rare, lecanorine, mostly subterminal, with a dark brown disc and an often crenulate thalline margin. Epithecium brownish; hymenium and hypothecium colourless. Asci 8-spored, narrowly clavate, with a small axial body and a distinct, K/I+ blue ring-structure in the rather large tholus, approaching the *Lecanora*-type. Ascospores 1-celled, hyaline, ellipsoid to ovoid, 6-10 x 3.5-5 µm. Pycnidia immersed at the top of the marginal spinules, often empty. Conidia simple, hyaline, elongate and slightly swollen in the middle or clavate, 6-7 x c. 1 µm. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-; medulla K- or K+ yellow-orange, C-, KC-, P+ yellow to orange or P-, UV-. Chemistry: medulla with fumarprotocetraric acid, and variable amounts of protocetraric and protolichesterinic acids. - Note: an arctic-alpine to boreal-montane, circumpolar lichen found on mineral and organic soil, amongst thick moss carpets, exceptionally on bark or lignum near the ground, with optimum near treeline.





*Cetraria islandica*





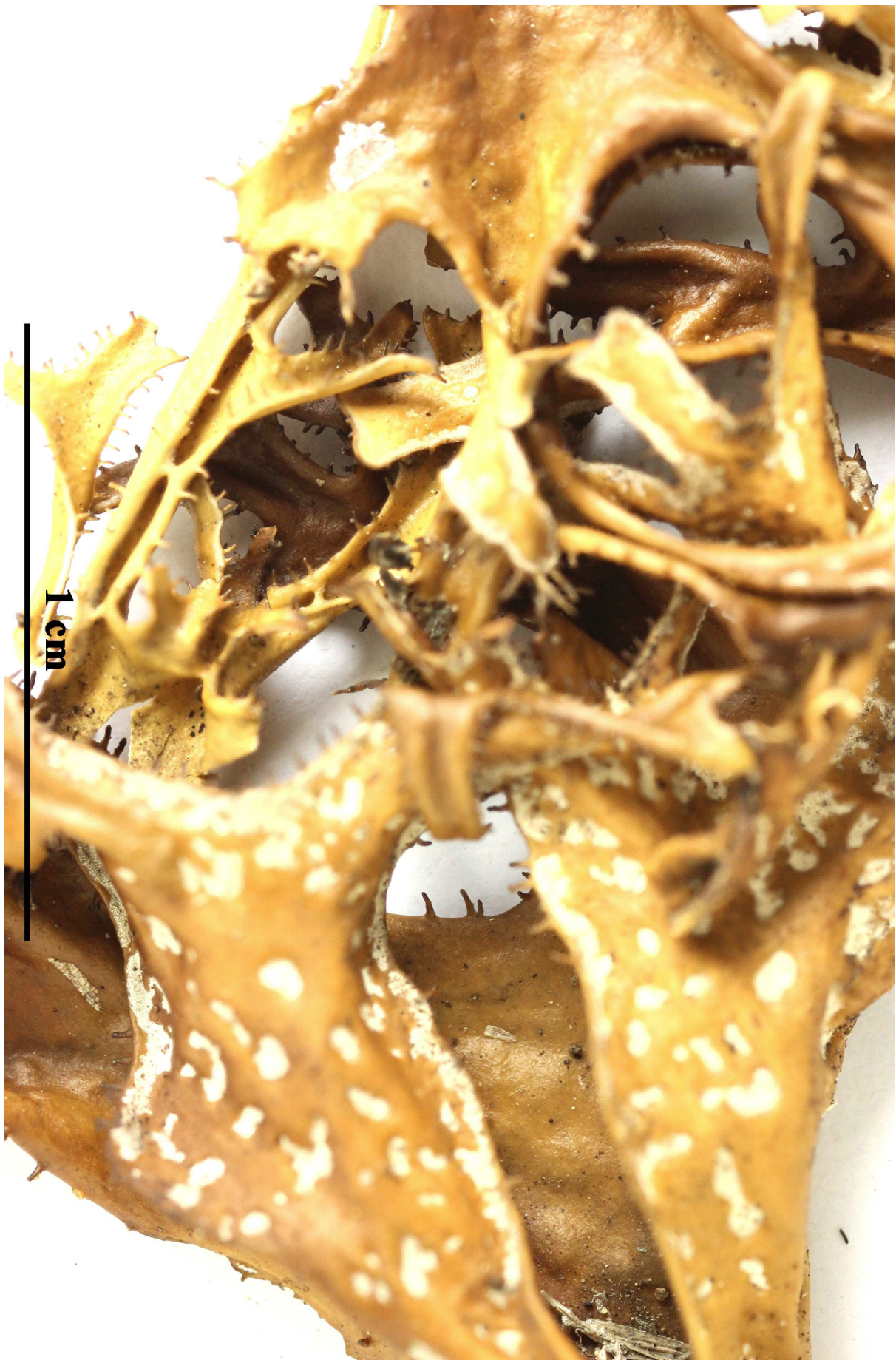
*Cetraria islandica*



*Cetraria islandica* (L.) Ach., Methodus qua omnes detectos Lichenes  
Secundum Organa Carpomorpha ad Genera, Species et Varietates  
Redigere atque Observationibus Illustrare Tentavit Erik Acharius:  
293 (1803)  
= *Lichen islandicus* L. 1753

[OH552], Japan. Honshu. Prov. Rikuchu (Pref. Twate): Mt. Hayachine.  
Hienuki-gon. Among mosses on soil, 1800 m. Leg. H. Shibuichi (no.  
8340) & Y. Yoshida, 31.7.1987, det. H. Shibuichi. EX Y. OHMURA  
LICHENES MINUS COGNITI EXSICCATI NR.552.

Thallus subfoliose to subfruticose, loosely attached, often forming large tufts, consisting of dorsiventral, flattened, elongate, ascending, 1-3(-4) cm wide and up to 6(-10) cm tall, often sparingly branched laciniae with often in-rolled margins bearing short (0.2-1 mm) marginal, pycnidia-bearing spinulose outgrowths. Upper surface dark brown in sun-forms to pale olive-green in shade, matt or somehow glossy, smooth or often slightly wrinkled, the basal parts often reddish; lower surface usually paler, with large, maculiform, irregular, white pseudocyphellae spread throughout the surface and the margins. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of periclinally arranged hyphae; medulla white. Apothecia extremely rare, lecanorine, mostly subterminal, with a dark brown disc and an often crenulate thalline margin. Epithecium brownish; hymenium and hypothecium colourless. Asci 8-spored, narrowly clavate, with a small axial body and a distinct, K/I+ blue ring-structure in the rather large tholus, approaching the *Lecanora*-type. Ascospores 1-celled, hyaline, ellipsoid to ovoid, 6-10 x 3.5-5 µm. Pycnidia immersed at the top of the marginal spinules, often empty. Conidia simple, hyaline, elongate and slightly swollen in the middle or clavate, 6-7 x c. 1 µm. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-; medulla K- or K+ yellow-orange, C-, KC-, P+ yellow to orange or P-, UV-. Chemistry: medulla with fumarprotocetraric acid, and variable amounts of protocetraric and protolichesterinic acids. - Note: an arctic-alpine to boreal-montane, circumpolar lichen found on mineral and organic soil, amongst thick moss carpets, exceptionally on bark or lignum near the ground, with optimum near treeline.



*Cetraria islandica*





*Cetraria islandica*

*Cetraria islandica* (L.) Ach., Methodus qua omnes detectos Lichenes  
Secundum Organa Carpomorpha ad Genera, Species et Varietates  
Redigere atque Observationibus Illustrare Tentavit Erik Acharius:  
293 (1803)  
= *Lichen islandicus* L. 1753

[KU656], Svalbard. Spitzbergen. Bohemanflya. On ground in rich  
humus, 100-200 m. Leg. H. Kashiwadani (no 23350), 1.8.1985, det. H.  
Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES  
RARIORES ET CRITICI EXSICCATI NR. 656.

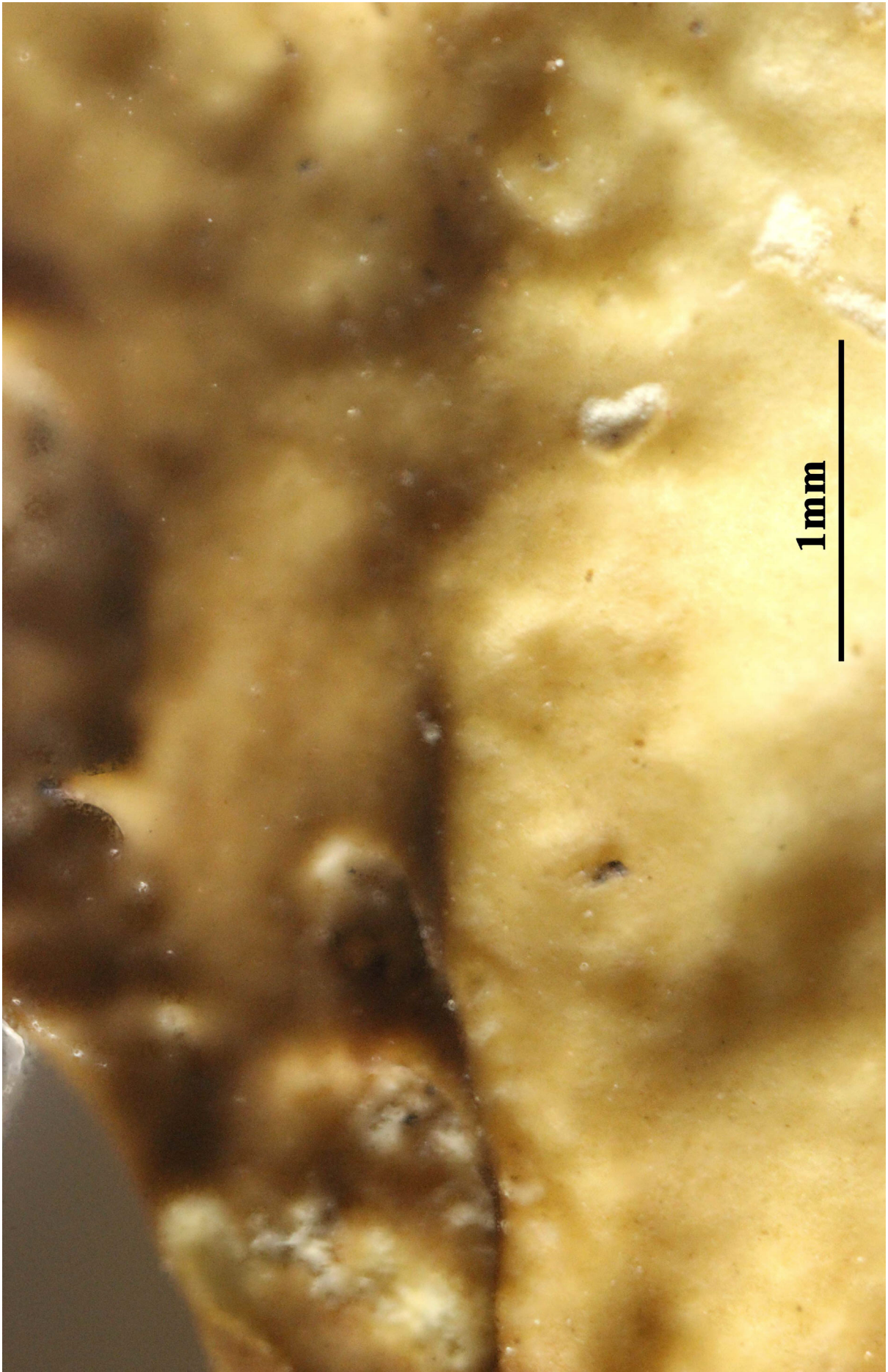
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tufts, consisting of dorsiventral, flattened, elongate, ascending, 1-3(-4)  
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throughout the surface and the margins. Cortex 2-layered, with an  
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and an inner layer of periclinally arranged hyphae; medulla white.  
Apothecia extremely rare, lecanorine, mostly subterminal, with a dark  
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clavate, with a small axial body and a distinct, K/I+ blue ring-structure  
in the rather large tholus, approaching the *Lecanora*-type. Ascospores  
1-celled, hyaline, ellipsoid to ovoid, 6-10 x 3.5-5 µm. Pycnidia immer-  
sed at the top of the marginal spinules, often empty. Conidia simple,  
hyaline, elongate and slightly swollen in the middle or clavate, 6-7 x c.  
1 µm. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-;  
medulla K- or K+ yellow-orange, C-, KC-, P+ yellow to orange or P-,  
UV-. Chemistry: medulla with fumarprotocetraric acid, and variable  
amounts of protocetraric and protolichesterinic acids. - Note: an arctic-  
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*Cetraria islandica*





*Cetraria islandica*



*Cetraria islandica* (L.) Ach., Methodus qua omnes detectos Lichenes  
Secundum Organa Carpomorpha ad Genera, Species et Varietates  
Redigere atque Observationibus Illustrare Tentavit Erik Acharius:  
293 (1803)  
= *Lichen islandicus* L. 1753

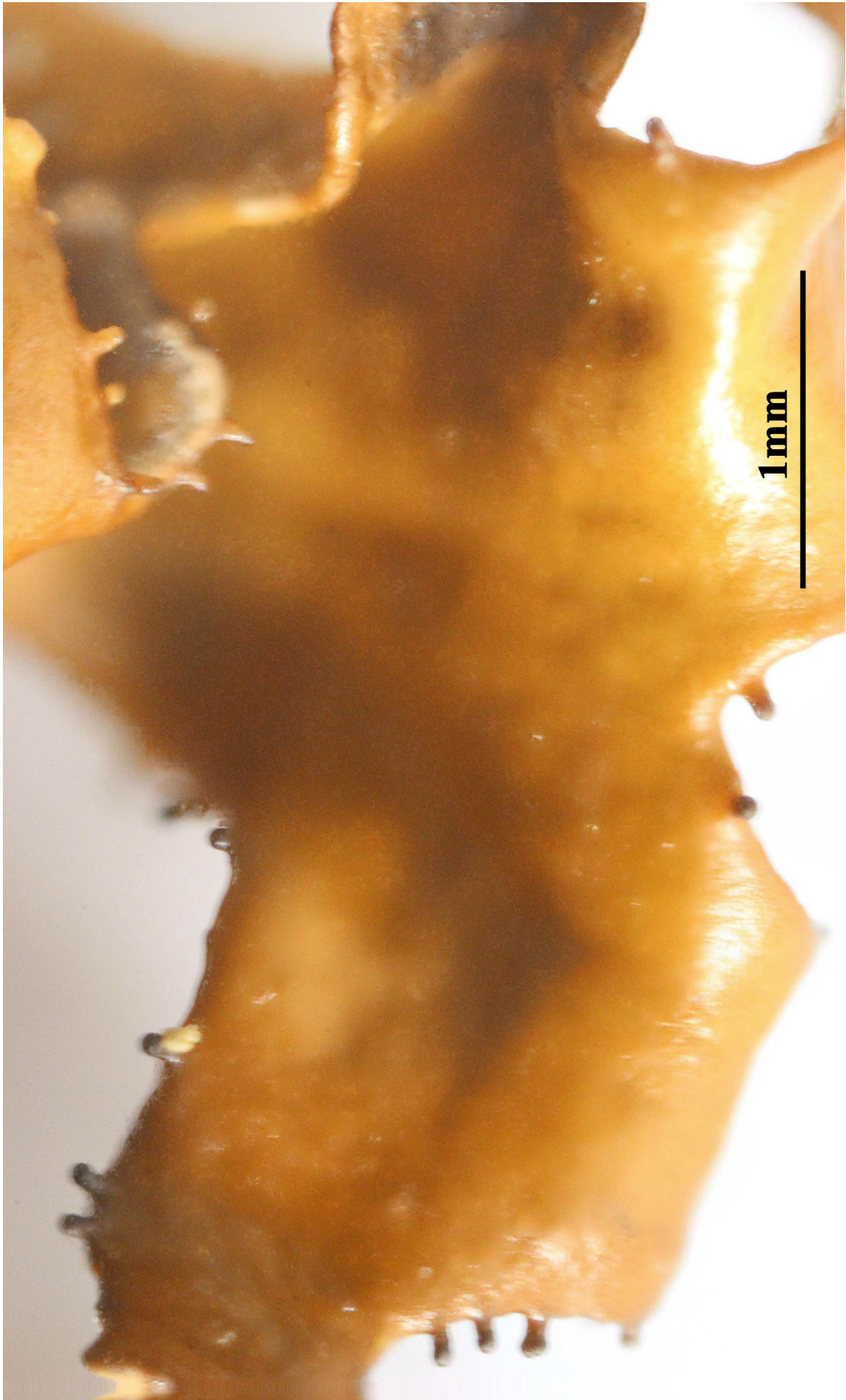
[KU604], Japan. Honshu. Prov. Etchu: Mt. Shirouma, Shimo-Niikawa-  
gun. On soil. 2700 m. Leg. H. Shibuichi (no. 7159), 6.8.1982, det. H.  
Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES  
RARIORES ET CRITICI NR. 604.

Thallus subfoliose to subfruticose, loosely attached, often forming large tufts, consisting of dorsiventral, flattened, elongate, ascending, 1-3(-4) cm wide and up to 6(-10) cm tall, often sparingly branched laciniae with often in-rolled margins bearing short (0.2-1 mm) marginal, pycnidia-bearing spinulose outgrowths. Upper surface dark brown in sun-forms to pale olive-green in shade, matt or somehow glossy, smooth or often slightly wrinkled, the basal parts often reddish; lower surface usually paler, with large, maculiform, irregular, white pseudocyphellae spread throughout the surface and the margins. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of periclinally arranged hyphae; medulla white. Apothecia extremely rare, lecanorine, mostly subterminal, with a dark brown disc and an often crenulate thalline margin. Epithecium brownish; hymenium and hypothecium colourless. Asci 8-spored, narrowly clavate, with a small axial body and a distinct, K/I+ blue ring-structure in the rather large tholus, approaching the *Lecanora*-type. Ascospores 1-celled, hyaline, ellipsoid to ovoid, 6-10 x 3.5-5 µm. Pycnidia immersed at the top of the marginal spinules, often empty. Conidia simple, hyaline, elongate and slightly swollen in the middle or clavate, 6-7 x c. 1 µm. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-; medulla K- or K+ yellow-orange, C-, KC-, P+ yellow to orange or P-, UV-. Chemistry: medulla with fumarprotocetraric acid, and variable amounts of protocetraric and protolichesterinic acids. - Note: an arctic-alpine to boreal-montane, circumpolar lichen found on mineral and organic soil, amongst thick moss carpets, exceptionally on bark or lignum near the ground, with optimum near treeline.



*Cetraria islandica*





*Cetraria islandica*

*Cetraria islandica* (L.) Ach., Methodus qua omnes detectos Lichenes  
Secundum Organa Carpomorpha ad Genera, Species et Varietates  
Redigere atque Observationibus Illustrare Tentavit Erik Acharius:  
293 (1803)  
= *Lichen islandicus* L. 1753

[OH529], Norway. Svalbard. Spitsbergen. 3 km WSW of Ny-Alesund, Kongsfjorden. On ground with mosses, 50-100 m. Leg. H. Kashiwadani (no.23147), 24.7.1985, det. H. Kashiwadani. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 529.

Thallus subfoliose to subfruticose, loosely attached, often forming large tufts, consisting of dorsiventral, flattened, elongate, ascending, 1-3(-4) cm wide and up to 6(-10) cm tall, often sparingly branched laciniae with often in-rolled margins bearing short (0.2-1 mm) marginal, pycnidia-bearing spinulose outgrowths. Upper surface dark brown in sun-forms to pale olive-green in shade, matt or somehow glossy, smooth or often slightly wrinkled, the basal parts often reddish; lower surface usually paler, with large, maculiform, irregular, white pseudocyphellae spread throughout the surface and the margins. Cortex 2-layered, with an external layer of brownish, thick-walled, paraplectenchymatous cells, and an inner layer of periclinally arranged hyphae; medulla white. Apothecia extremely rare, lecanorine, mostly subterminal, with a dark brown disc and an often crenulate thalline margin. Epithecium brownish; hymenium and hypothecium colourless. Asci 8-spored, narrowly clavate, with a small axial body and a distinct, K/I+ blue ring-structure in the rather large tholus, approaching the *Lecanora*-type. Ascospores 1-celled, hyaline, ellipsoid to ovoid, 6-10 x 3.5-5 µm. Pycnidia immersed at the top of the marginal spinules, often empty. Conidia simple, hyaline, elongate and slightly swollen in the middle or clavate, 6-7 x c. 1 µm. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC-, P-; medulla K- or K+ yellow-orange, C-, KC-, P+ yellow to orange or P-, UV-. Chemistry: medulla with fumarprotocetraric acid, and variable amounts of protocetraric and protolichesterinic acids. - Note: an arctic-alpine to boreal-montane, circumpolar lichen found on mineral and organic soil, amongst thick moss carpets, exceptionally on bark or lignum near the ground, with optimum near treeline.





*Cetraria islandica*





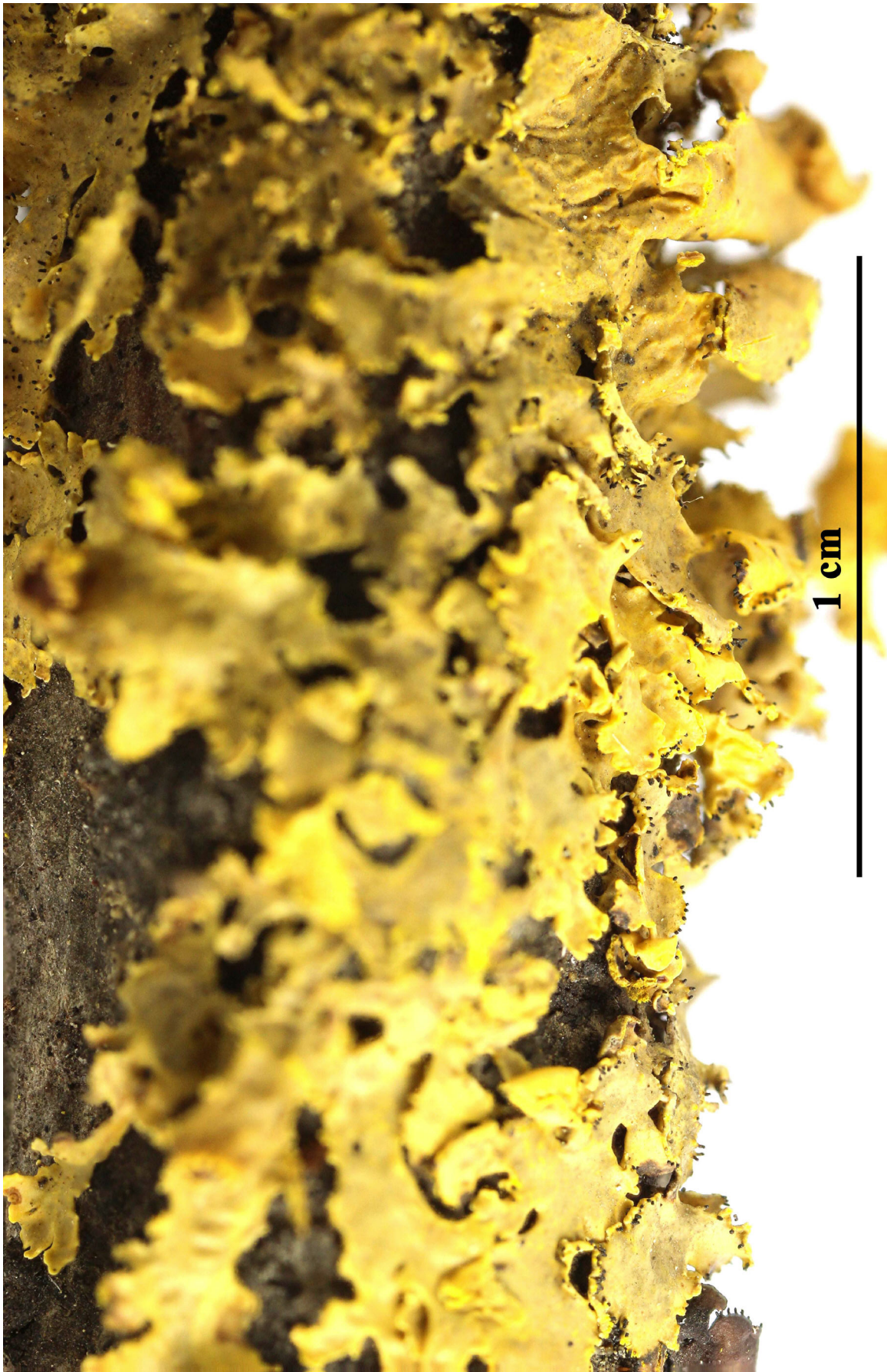
*Cetraria islandica*



*Cetraria juniperina* (L.) Ach., Methodus qua omnes detectos Lichenes  
Secundum Organa Carpomorpha ad Genera, Species et Varietates Redigere  
atque Observationibus Illustrare Tentavit Erik Acharius: 299 (1803)  
= *Lichen juniperinus* L. 1753  
= *Vulpicida juniperus* (L.) J.-E. Mattson & M.J. Lai, Mycotaxon 46: 427  
(1993)

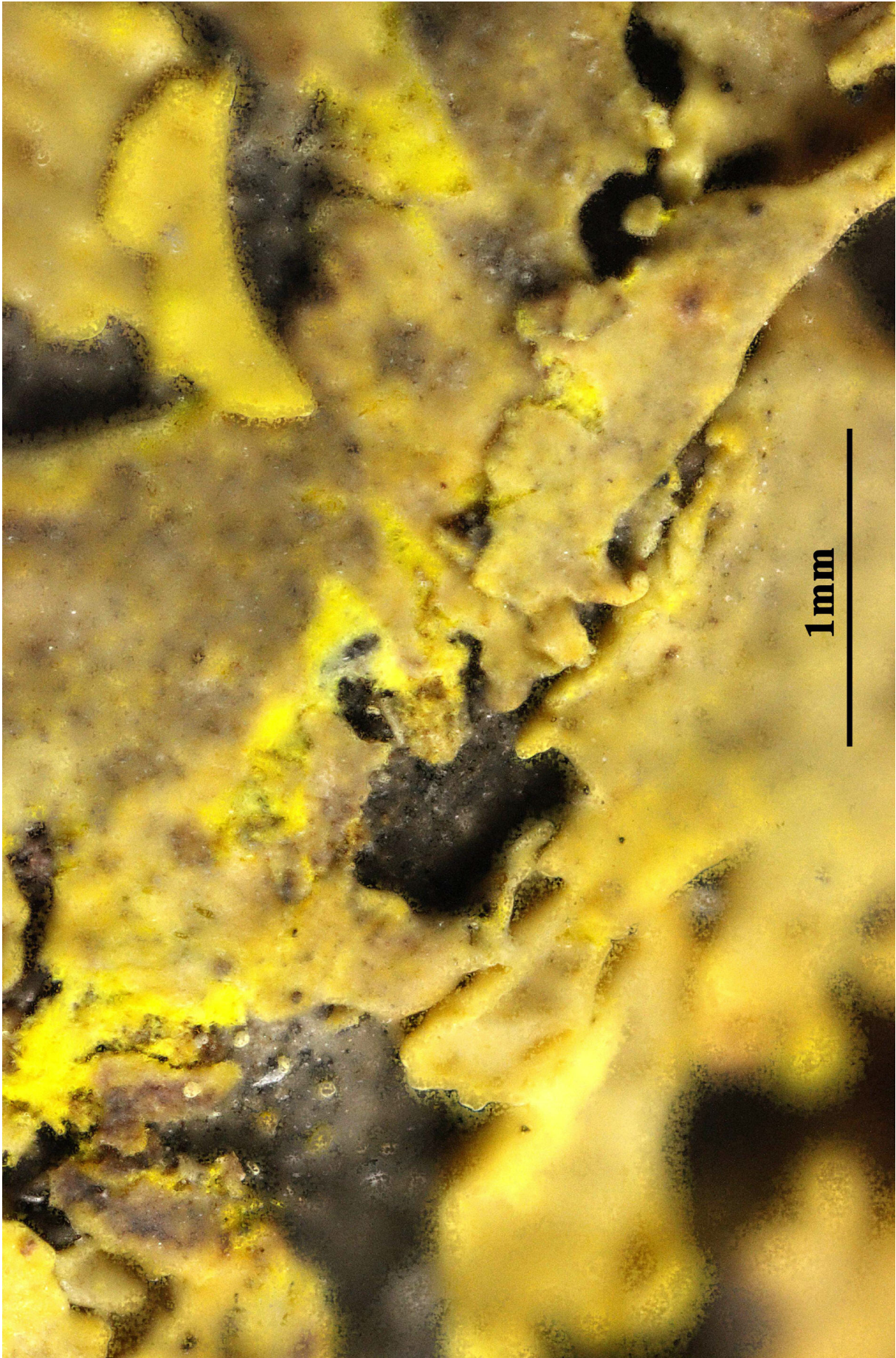
[KU460], Japan. Hokkaido. Prov. Ishikari: Mt. Tairoku, Furano-city.  
On bark of *Pinus pumila*, 1450 m. Leg. H. Shibuichi (no. 6154), and K.  
Yoshida, 5.8.1980, det. Kashiwadani. EX S. KUROKAWA AND H. KASHI-  
WADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 460.

Thallus foliose to subfruticose, loosely attached, forming irregular  
rosettes or dense tufts to 5 cm across. Lobes 1-5 mm wide, usually  
narrower in terricolous forms, dorsiventral, slightly canaliculate or  
terete, ascending to erect. Upper surface bright yellow in open habitats  
to greenish yellow in shaded habitats; lower surface pale yellow to tan  
or whitish, more or less veined, with pale, simple to squarrose rhizines.  
Upper and lower cortex paraplectenchymatous; medulla yellow, very  
loose. Apothecia frequent especially in epiphytic forms, lecanorine,  
submarginal to almost laminal, 2-6 mm across, with a brown to brown-  
black disc and a smooth, yellow thalline margin. Asci 8-spored, narrow-  
ly clavate, with a small axial body and a distinct, K/I+ blue ring-  
structure in the rather large tholus, approaching the *Lecanora*-type.  
Ascospores 1-celled, hyaline, broadly ellipsoid to subglobose, 5-6 x c.  
5 µm. Pycnidia frequent, black, marginal to laminal, immersed or on  
short black projections. Conidia simple, swollen at one end, 6-8 x 1-2  
µm. Photobiont chlorococcoid. Spot tests: cortex K-, C-, KC+ yellow,  
P-; medulla K-, C-, KC-, P-, UV+ blackish red. Chemistry: cortex with  
usnic acid; cortex and medulla with vulpinic and pinastric acids. - Note:  
this mainly subarctic-subalpine to boreal-montane species is found on  
calciferous mineral soil in dry Alpine grasslands and on wind-exposed  
ridges, more rarely on the twigs of shrubs; the epiphytic forms were  
often treated as a separate species, but molecular data do not support  
this distinction (Saag & al. 2014).



*Cetraria juniperina*





*Cetraria juniperina*

*Cetraria platyphylla* Tuck., Syn. N. Amer. Lich. (Boston) 1: 34 (1882)

[KU256], Canada. British Columbia: Paint Brush Trail, Manning Park, 2100m. Leg. S. Kurokawa (no. 8684), 4.8.1974, det. S. Kurokawa.  
EX S. KUOKAWA LICHENES RARIORE ET CRITICI EXSICCATI NR. 256.





*Cetraria platyphylla*





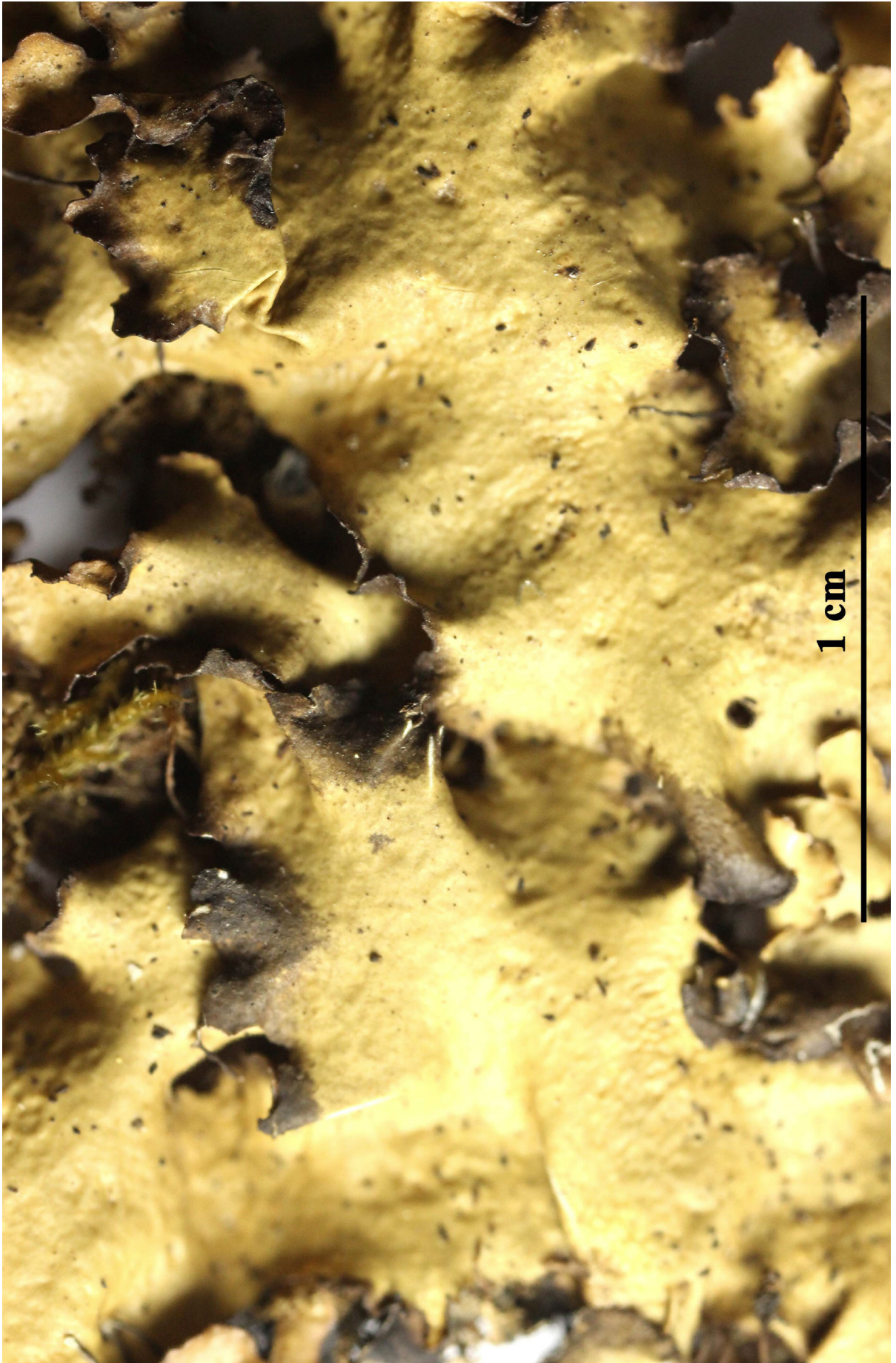
*Cetraria platyphylla*



*Cetraria rhytidocarpa* Mont. & Bosch, in Montagne, Syll. gen. sp. crypt.  
(Paris): 322 (1856)

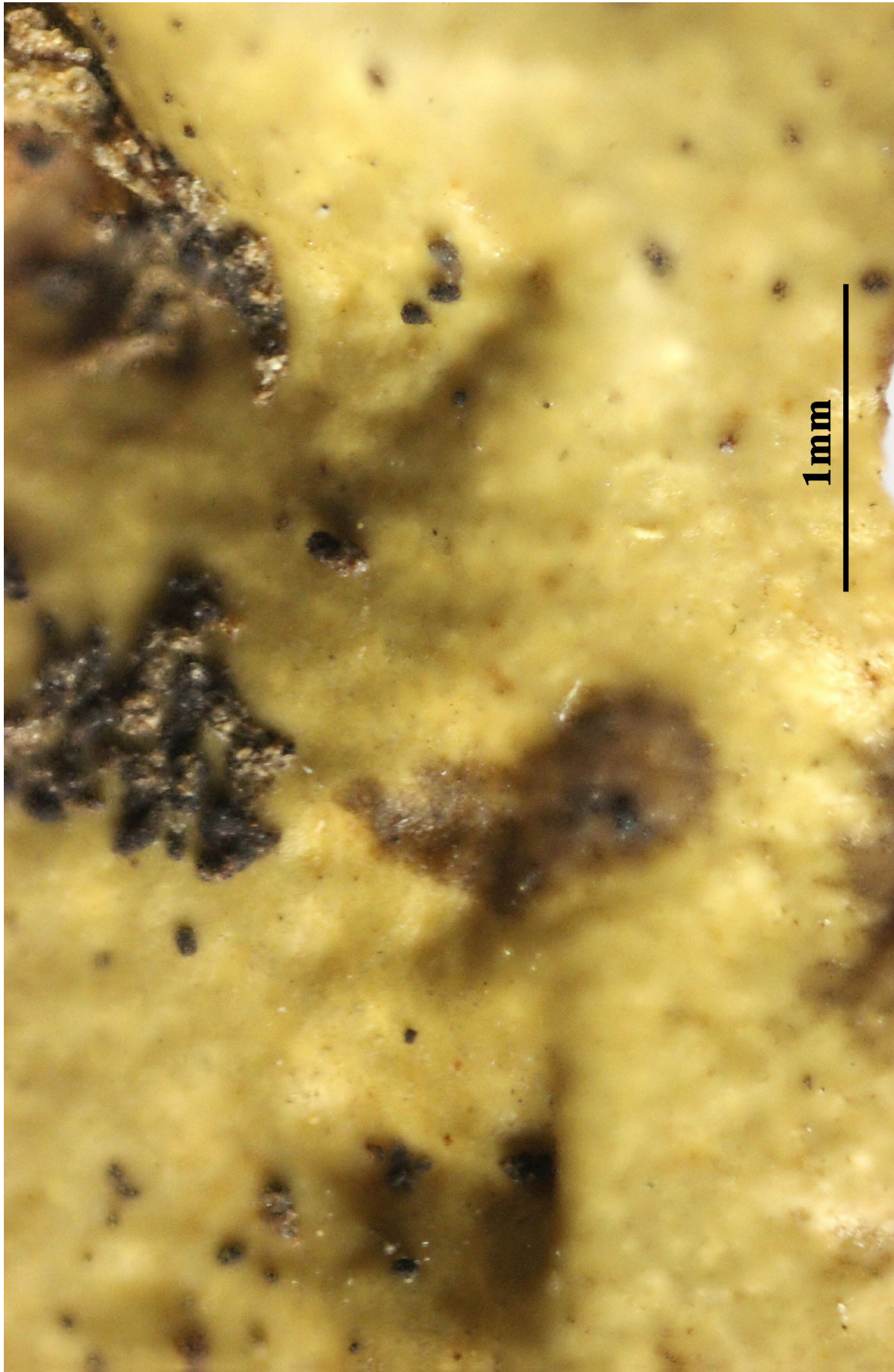
= *Cetreliaopsis rhytidocarpa* (Mont. & Bosch) Randlane & Saag, in  
Randlane, Thell & Saag, Mem. Natn Sci. Mus, Tokyo 13: 218 (1980)

[KU153], Japan. Honshu. Prov. Musashi: Mt. Kumotori. On trunc of  
*Tsuga diversifolia*, 1900 m. Leg. H. Shibuichi (no. 4553), 13.8.1971,  
det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI  
NR. 153.



*Cetraria rhytidocarpa*



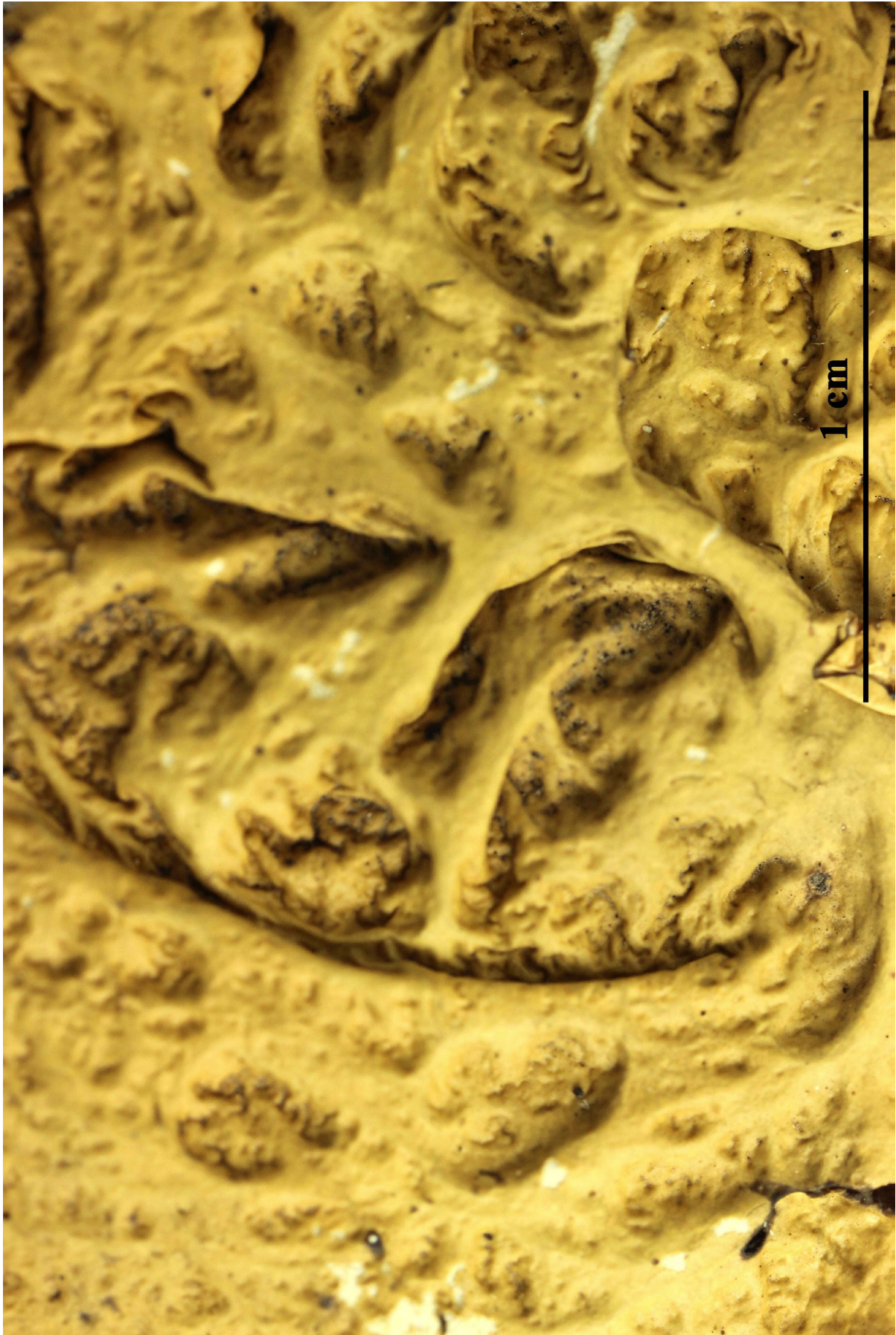


*Cetraria rhytidocarpa*

***Cetraria rugosa*** (Asahina) M. Satô, in Nakai & Honda, Nov. fl. jap. 1: 46 (1939)  
= *Nephromopsis rugosa* Asahina 1935

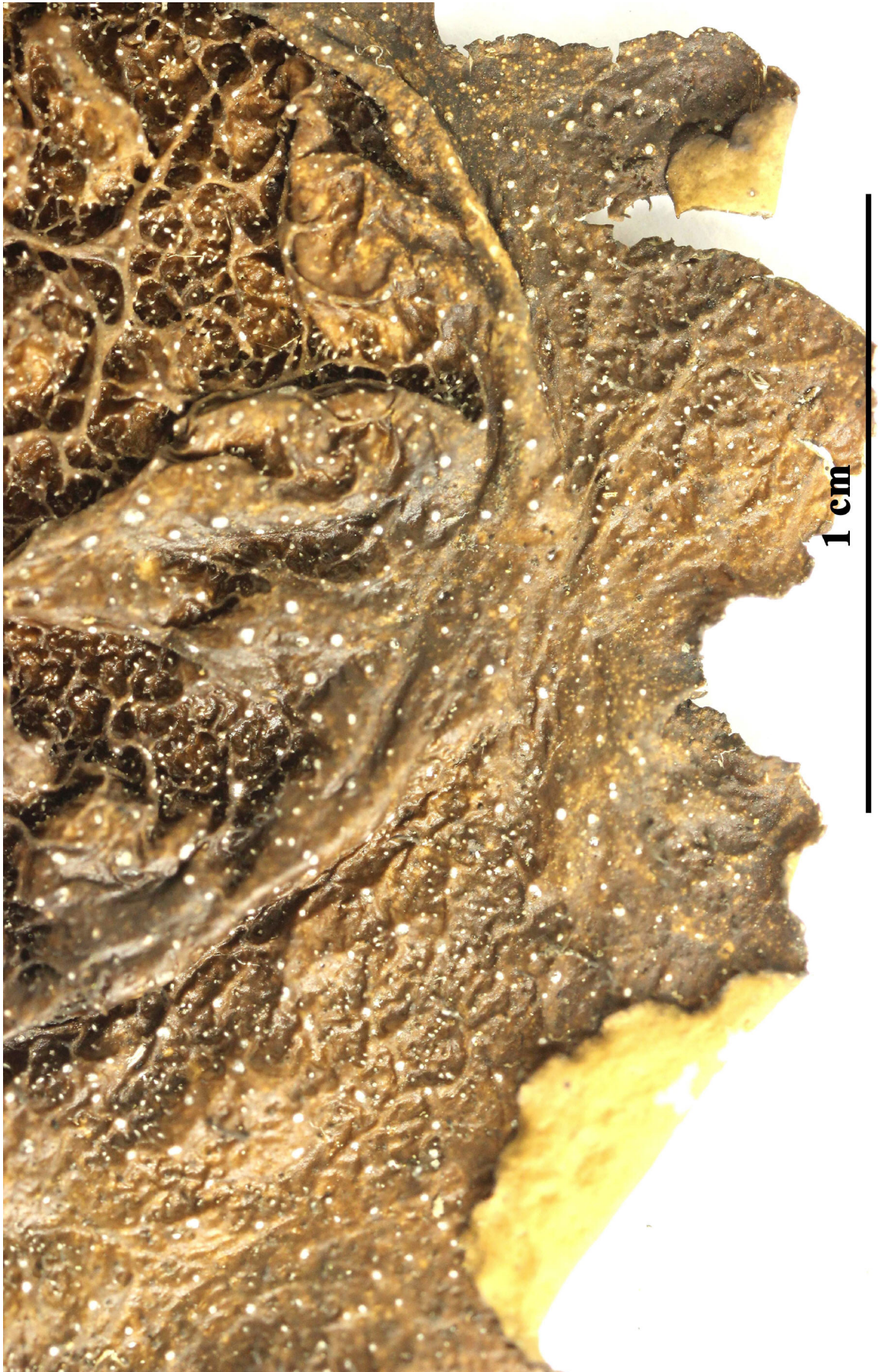
[KU154], Japan. Honshu. Prov. Musashi: Mikuni Pass, Chichibu-gun.  
On trunc of *Quercus crispula*, 1750 m. Leg. H. Sibuichi (no. 4706),  
9.8.1972, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET  
CRITICI EXSICCATI NR. 154.





*Cetraria rugosa*





*Cetraria rugosa*



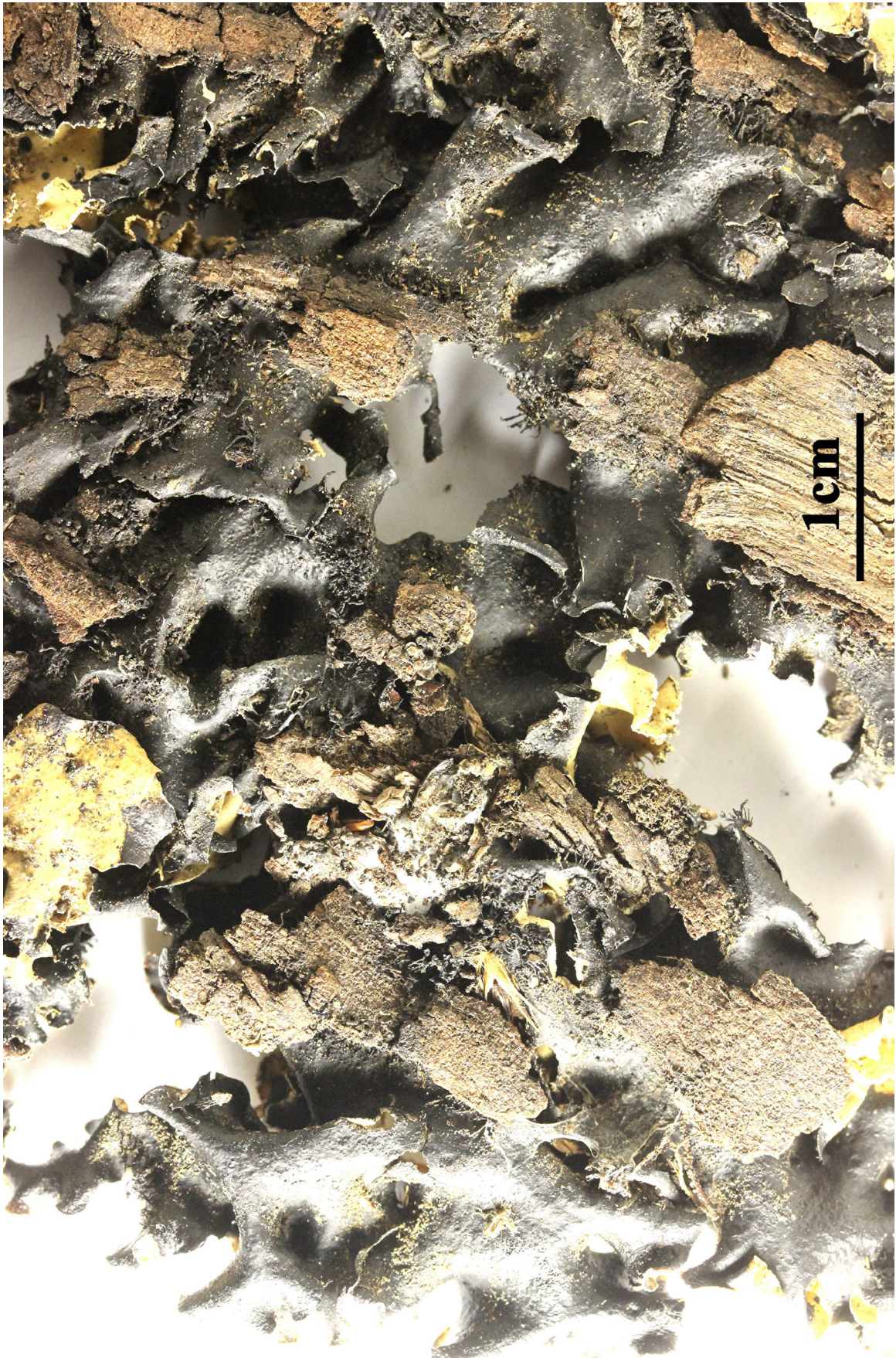
*Cetraria straminea* Vain., Philipp. J. Sci., C, Bot. 4(5): 657 (1909)  
= *Cetraria straminea* Kremp. ex Schwend. 1860

[KU111], Formosa. Prov. Chiayi: Mt. Tsutson-san. Mt. Ali. On tree-trunks. 2200-2600 m. Leg. S. Kurokawa (no. 478), 4.1.1964, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 111.



*Cetraria straminea*





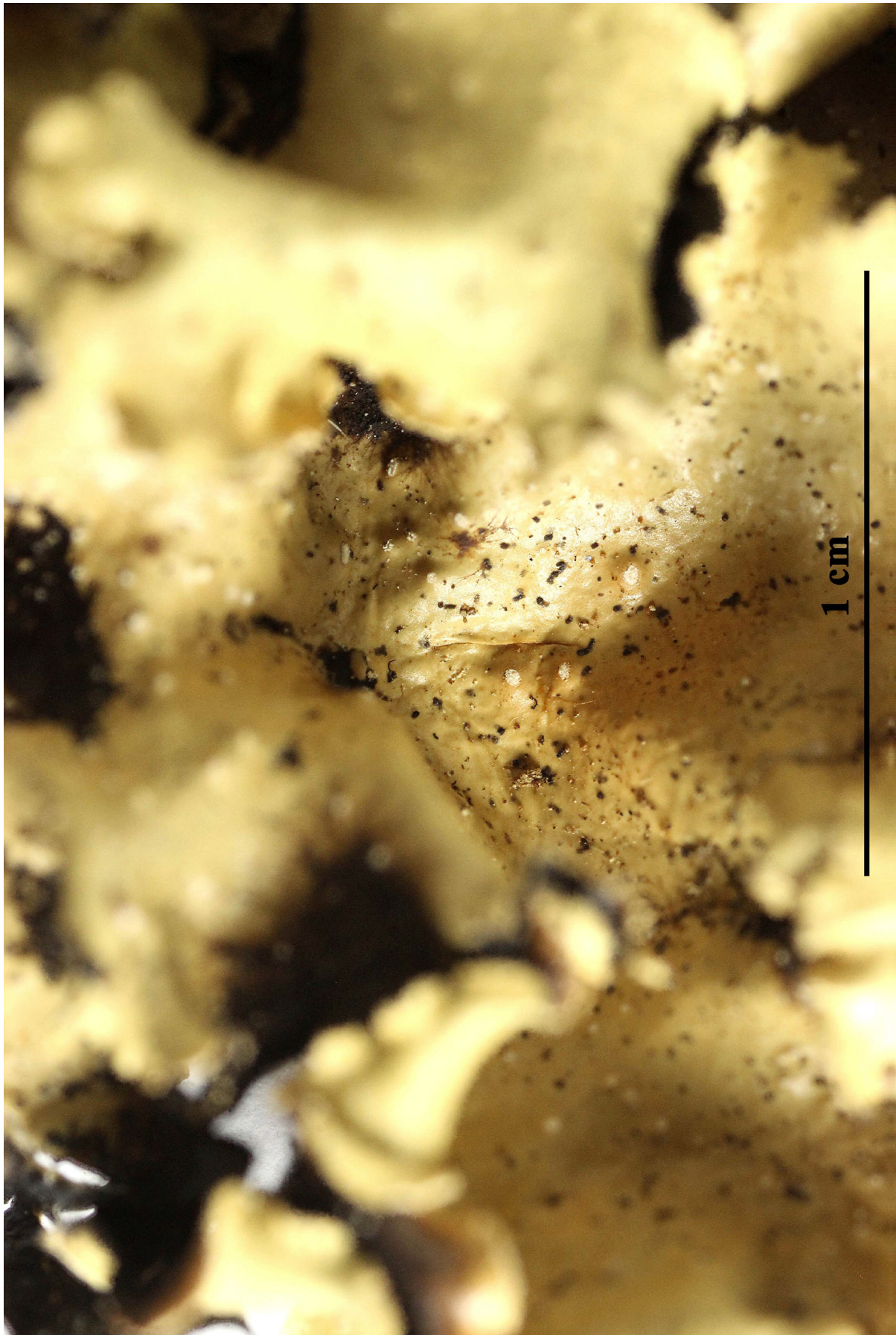
*Cetraria straminea*



*Cetraria straminea* Vain., Philipp. J. Sci., C, Bot. 4(5): 657 (1909)  
= *Cetraria straminea* Kremp. ex Schwend. 1860

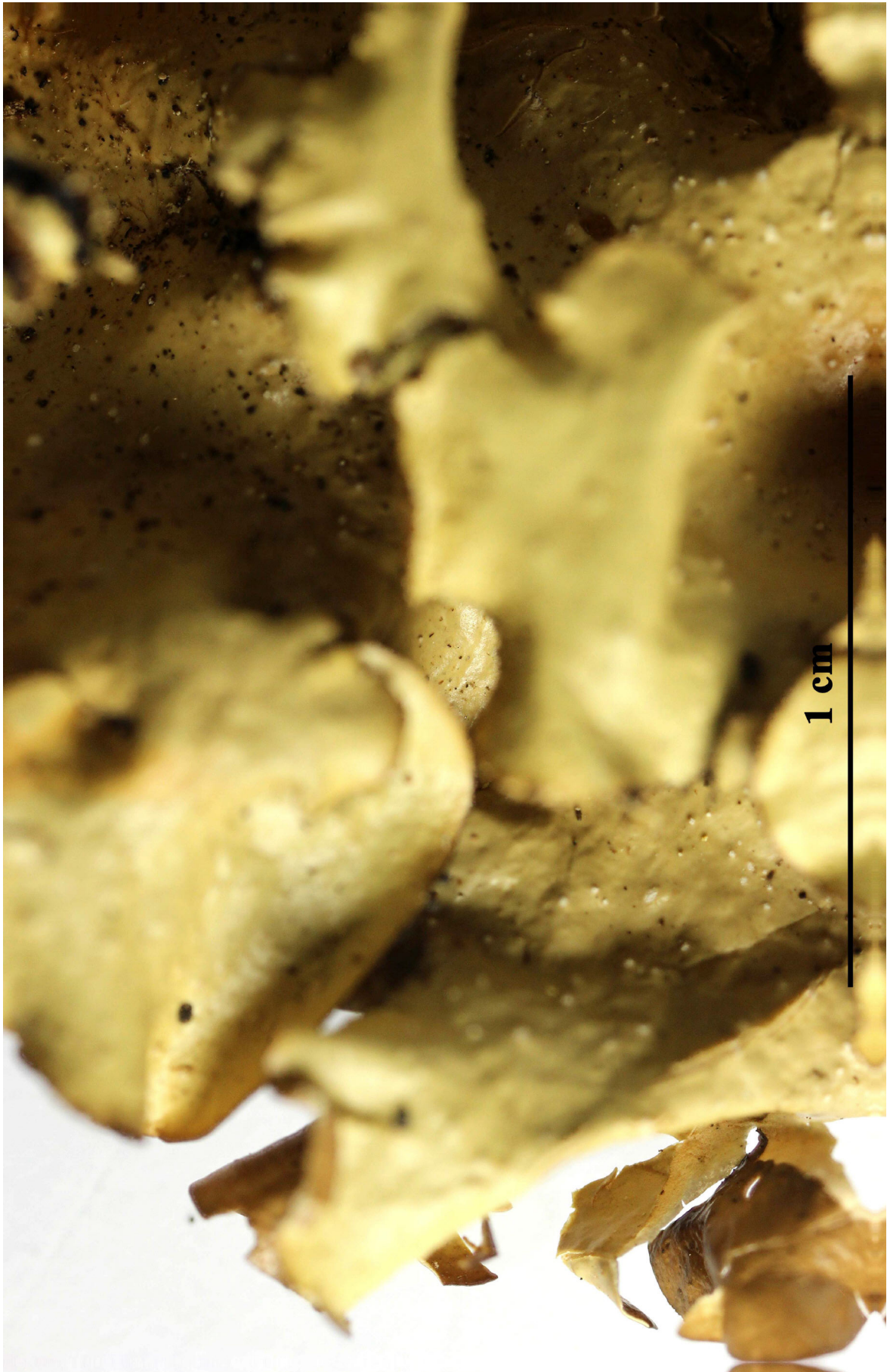
[KU205], Formosa. Prov. Taitung: Mt. Lachialachiaerh. On trees,  
1800m. Leg. S. Kurokawa (no.2473), 22.2.1965, det. S. Kurokawa. EX  
S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 205.





*Cetraria straminea*





*Cetraria straminea*



*Cetraria ulophylloides* Asahina, J. Jap. Bot. 28(5): 138 (1953)

= *Nephromopsis ulophylloides* (Asahina) Divakar, A. Crespo & Lumbsch, in Divakar, Crespo, Kraichak, Leavitt, Singh, Schmitt & Lumbsch, Fungal Diversity 84: 113 (2017)

[KU112], Japan. Honshu. Prov. Mino: Kirii Shirakawa-machi, Kamogun. On stone-work, 500 m. Leg. S. Kurokawa (no. 68002), 26-27.8.1968, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 112.





*Cetraria ulophylloides*





*Cetraria ulophylloides*

***Cetraria ulophylloides*** Asahina, J. Jap. Bot. 28(5): 138 (1953)

= *Nephromopsis ulophylloides* (Asahina) Divakar, A. Crespo & Lumbsch, in Divakar, Crespo, Kraichak, Leavitt, Singh, Schmitt & Lumbsch, Fungal Diversity 84: 113 (2017)

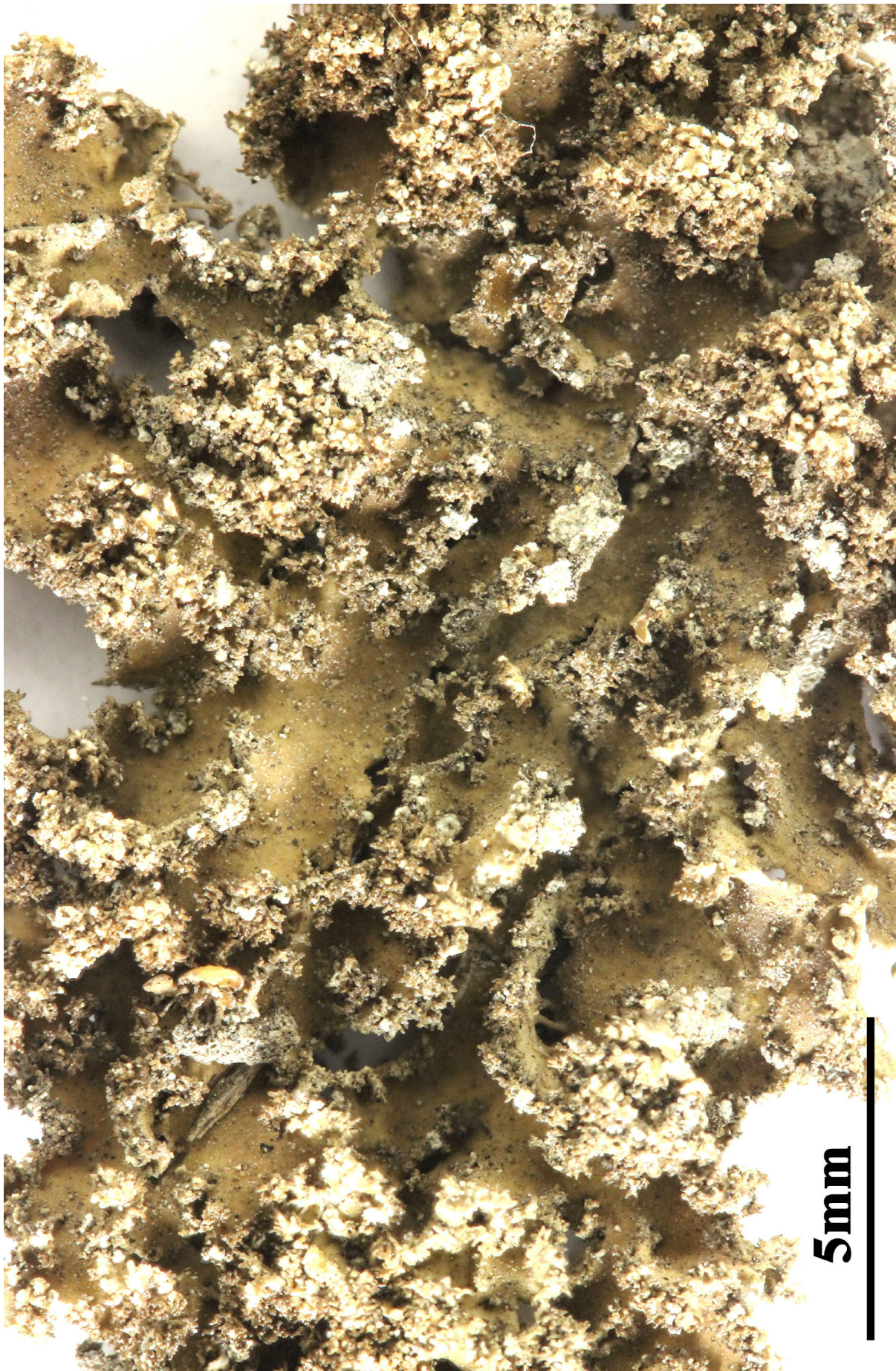
[KU353], Japan, Honshu. Prov. Iga: Byobu-iwa, Kohchi-kyo Gorge. On rocks, 400 m. Leg. H. Kashiwadani (no. 14701) 26.7.1978, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 353.





*Cetraria ulophylloides*





*Cetraria ulophylloides*



***Cetrariastrum cirrhatum*** (Fr.) W.L. Culb. & C.F. Culb., Bryologist 84(3): 283 (1981)

= *Parmelia cirrhata* Fr. 1825

= *Hypotrachyna cirrhata* (Fr.) Divakar, A. Crespo, Sipman, Elix & Lumbsch, in Divakar, Crespo, Núñez-Zapata, Flakus, Sipman, Elix & Lumbsch, Phytotaxa 132(1): 31 (2013)

[KA352], Taiwan. Prov. Chiayi: Mt. Ali. On twigs of *Rhododendron* sp., 2200 m. Leg. H. Izumi & M. Togashi, 35.10.1976, det. H. Kashiwadani. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR.352.

Thallus foliose to subcaespitose, very loosely adnate, up to 15 (-25) cm across, richly dichotomously or subdichotomously lobate; lobes 0.5-2 (-4) mm broad, strongly to moderately involute or flat or nearly so; apices: abundantly ciliate; cilia: up to 4 mm long, simple or more commonly branched upper surface: pale gray to gray; not sorediate or isidiate lower surface: black or brown or pale brown at the tips of the lobes, mostly erhizinate but some specimens with a few short, usually simple, black rhizines Apothecia: relatively infrequent, 4-6 mm diam. asci: clavate, 8-spored ascospores: ellipsoid or slightly reniform, 16-21 x 8-10  $\mu$ m Pycnidia: common, 0.1-0.2 mm diam. conidia: bacilliform, straight, 5-7 (-8) x <1  $\mu$ m Spot tests: upper cortex K+ yellow, C-, KC-, P+ yellow; medulla K+ yellow then turning deep red, C-, KC-, P+ yellow then orange Secondary metabolites: cortex with atranorin and chloroatranorin; medulla with salazinic acid (major), consalazinic acid (minor), galbinic and protocetraric acids (accessory) and a fatty acid. Substrate and ecology: on trees and shrubs, rarely on rock or soil World distribution: Mexico, Central and South America, southern Asia.





*Cetrariastrum cirrhatum*





*Cetrariastrum cirrhatum*

*Cetrariastrum cirrhatum* (Fr.) W.L. Culb. & C.F. Culb., Bryologist 84(3): 283 (1981)  
= *Parmelia cirrhata* Fr. 1825  
= *Hypotrachyna cirrhata* (Fr.) Divakar, A. Crespo, Sipman, Elix & Lumbsch, in Divakar, Crespo, Núñez-Zapata, Flakus, Sipman, Elix & Lumbsch, Phytotaxa 132(1): 31 (2013)

[KA301], Taiwan. Hwalien C: Tayuling Hsiulin-gun. On cliff, 2700m. Leg. H. Shibuichi (no. 8080) & K. Yoshida, det. S. Kurokawa. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 301.

Thallus foliose to subcaespitose, very loosely adnate, up to 15 (-25) cm across, richly dichotomously or subdichotomously lobate; lobes 0.5-2 (-4) mm broad, strongly to moderately involute or flat or nearly so; apices: abundantly ciliate; cilia: up to 4 mm long, simple or more commonly branched upper surface: pale gray to gray; not sorediate or isidiate lower surface: black or brown or pale brown at the tips of the lobes, mostly erhizinate but some specimens with a few short, usually simple, black rhizines Apothecia: relatively infrequent, 4-6 mm diam. asci: clavate, 8-spored ascospores: ellipsoid or slightly reniform, 16-21 x 8-10  $\mu$ m Pycnidia: common, 0.1-0.2 mm diam. conidia: bacilliform, straight, 5-7 (-8) x <1  $\mu$ m Spot tests: upper cortex K+ yellow, C-, KC-, P+ yellow; medulla K+ yellow then turning deep red, C-, KC-, P+ yellow then orange Secondary metabolites: cortex with atranorin and chloroatranorin; medulla with salazinic acid (major), consalazinic acid (minor), galbinic and protocetraric acids (accessory) and a fatty acid. Substrate and ecology: on trees and shrubs, rarely on rock or soil World distribution: Mexico, Central and South America, southern Asia.





*Cetrariastrum cirrhatum*





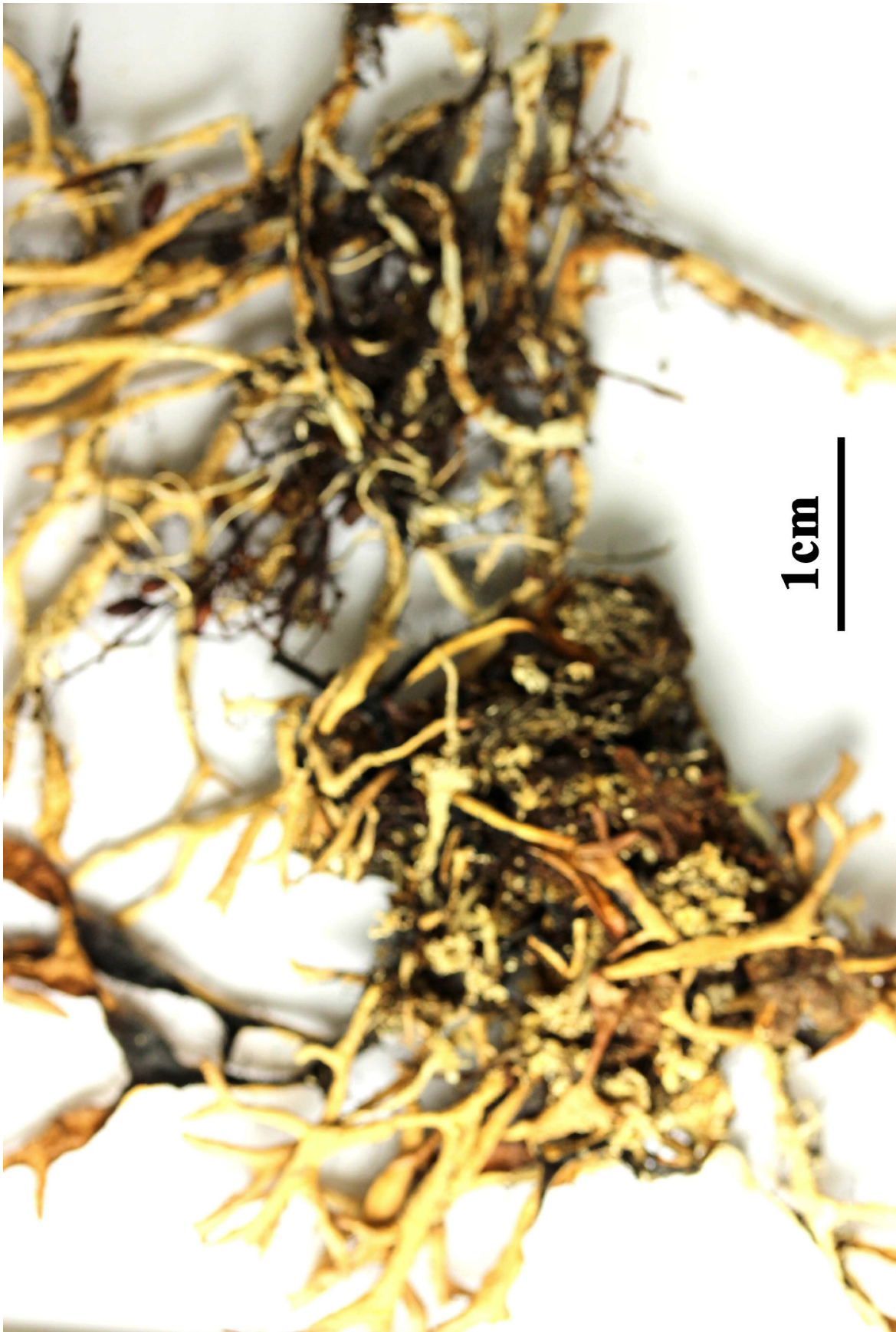
*Cetrariastrum cirrhatum*



***Cetrariastrum neocirrhatum*** (Hale & M. Wirth) W.L. Culb. & C.F. Culb., Bryologist 84(3): 289 (1981)  
= *Parmelia neocirrhata* Hale & M. Wirth 1971  
= *Hypotrachyna neocirrhata* (Hale & M. Wirth) Divakar, A. Crespo, Sipman, Elix & Lumbsch, in Divakar, Crespo, Núñez-Zapata, Flakus, Sipman, Elix & Lumbsch, Phytotaxa 132(1): 32 (2013)

[KA353], Peru. Dept. Cuzco. Prov. Quispicanchis: Between Marcapata and Achubamba, along the road from Marcapata to Qquincemille; in wet forest in "Ceja de Selva" zone, 2600-2800 m. Leg. H. Kashiwadani (no. 21643), 13.9.1984, det S. Kurokawa. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 353.

Thallus foliose to subcaespitose, very loosely adnate, up to 13 (-19) cm across, dichotomously or subdichotomously lobate lobes: 1-2 (-3) mm broad, strongly to moderately involute or occasionally nearly flat; apices: ciliate; cilia: sparse to moderately abundant, up to 2.5 mm long, usually simple upper surface: pale gray; not sorediate or isidiate lower surface: black or brownish colored at the tips of the lobes or pale throughout with darker zones here and there, smooth and slightly wrinkled, very rarely with a few short scattered rhizines Apothecia: abundant, 3-10 mm diam. asci: clavate, 8-spored ascospores: ellipsoid to reniform, (14-) 16-22 x (6-) 8-10  $\mu$ m Pycnidia: abundant, 0.1-0.2 mm diam., immersed conidia: bacilliform, straight, 6-7 x 1  $\mu$ m Spot tests: upper cortex K<sup>+</sup> yellow, C<sup>-</sup>, KC<sup>-</sup>, P<sup>+</sup> yellow; medulla K<sup>+</sup> yellow then red, C<sup>-</sup>, P<sup>+</sup> orange Secondary metabolites: cortex with atranorin and chloroatranorin; medulla with salazinic acid (major), norstictic and consalazinic acids (minor) and a fatty acid. Substrate and ecology: common on trees and relatively rare on rocks World distribution: common only in Mexico.



*Cetrariastrum neocirrhatum*



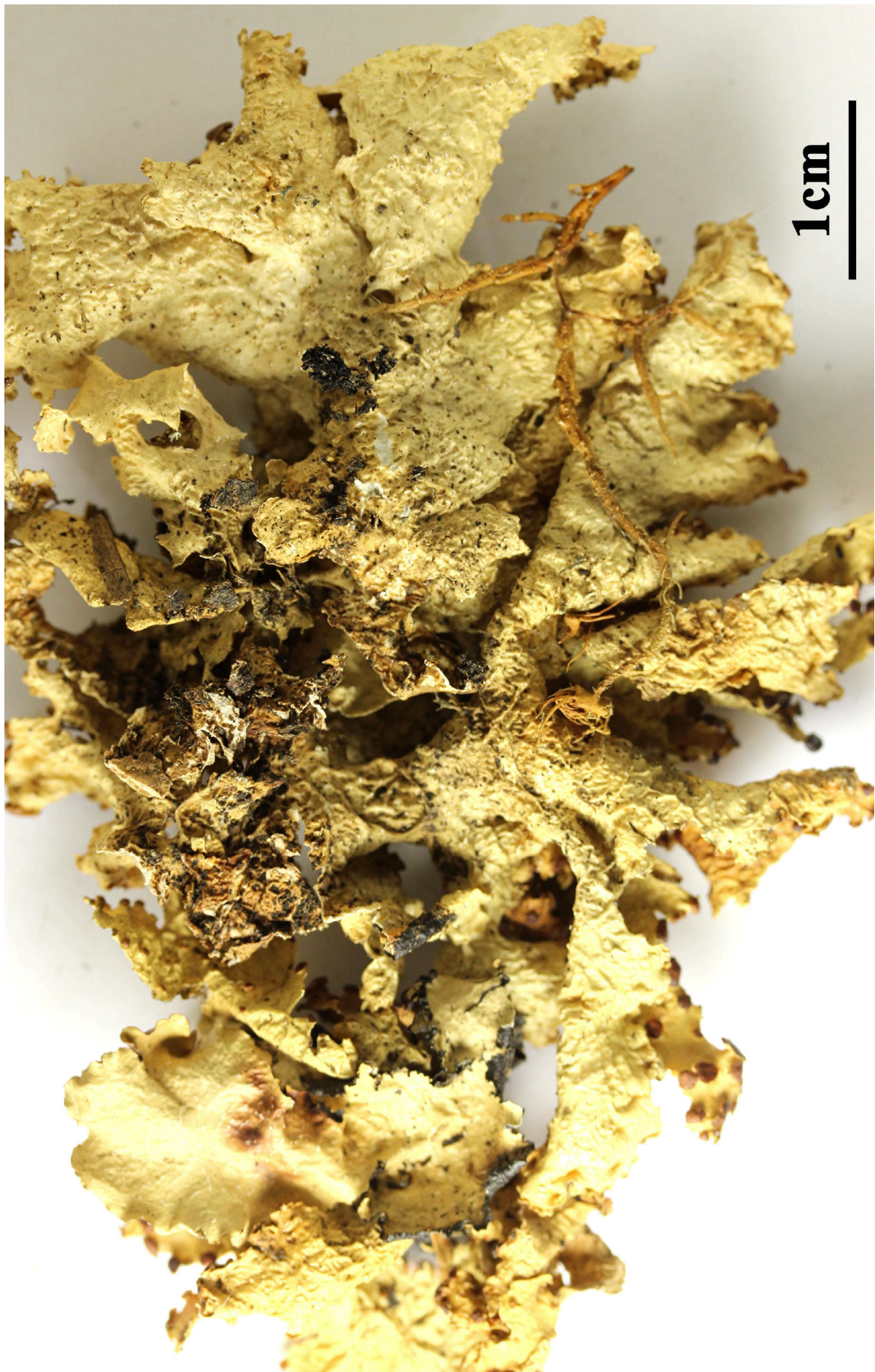


*Cetrariastrum neocirrhatum*

*Cetrariopsis wallichiana* (Taylor) Kurok., Mem. Natn Sci. Mus, Tokyo 13:  
140 (1980)  
= *Sticta wallichiana* Taylor 1847

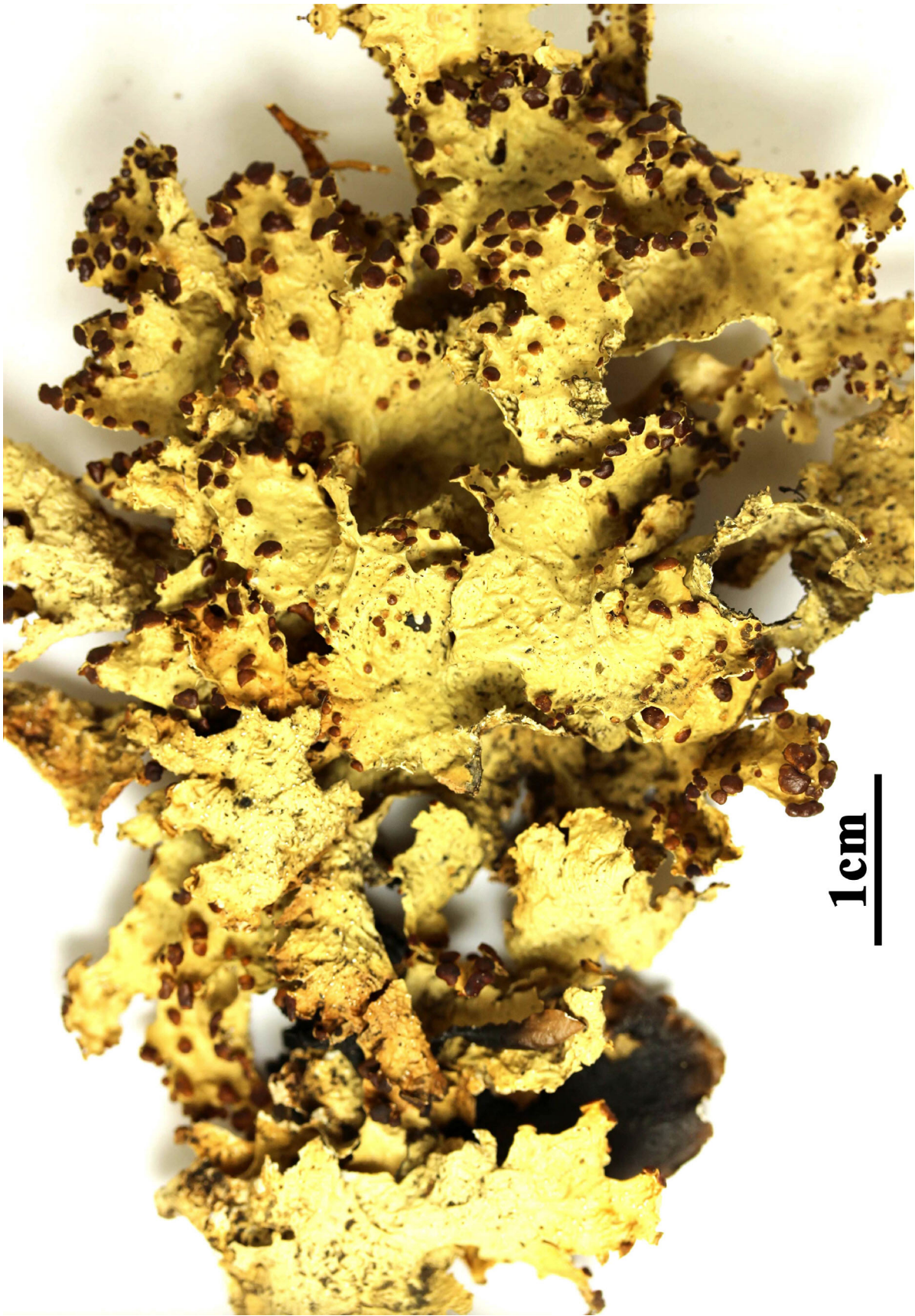
[KA354], Taiwan. Nantou Co: Along route 820. Hohuanshan Mts.,  
Jen-Ai Hsiang (24°17' N, 120°31' E). On bark of *Stramvaesia niitaka-*  
*yamaesis*, 2590 m. Leg. H. Kashiwadani (no. 45597), 9.3.2003, det. H.  
Kashiwadani. EX H. KASHIWADANI LICHENES MINUS COGNITI ESICCA-  
TI NR. 354.





*Cetrariopsis wallichiana*





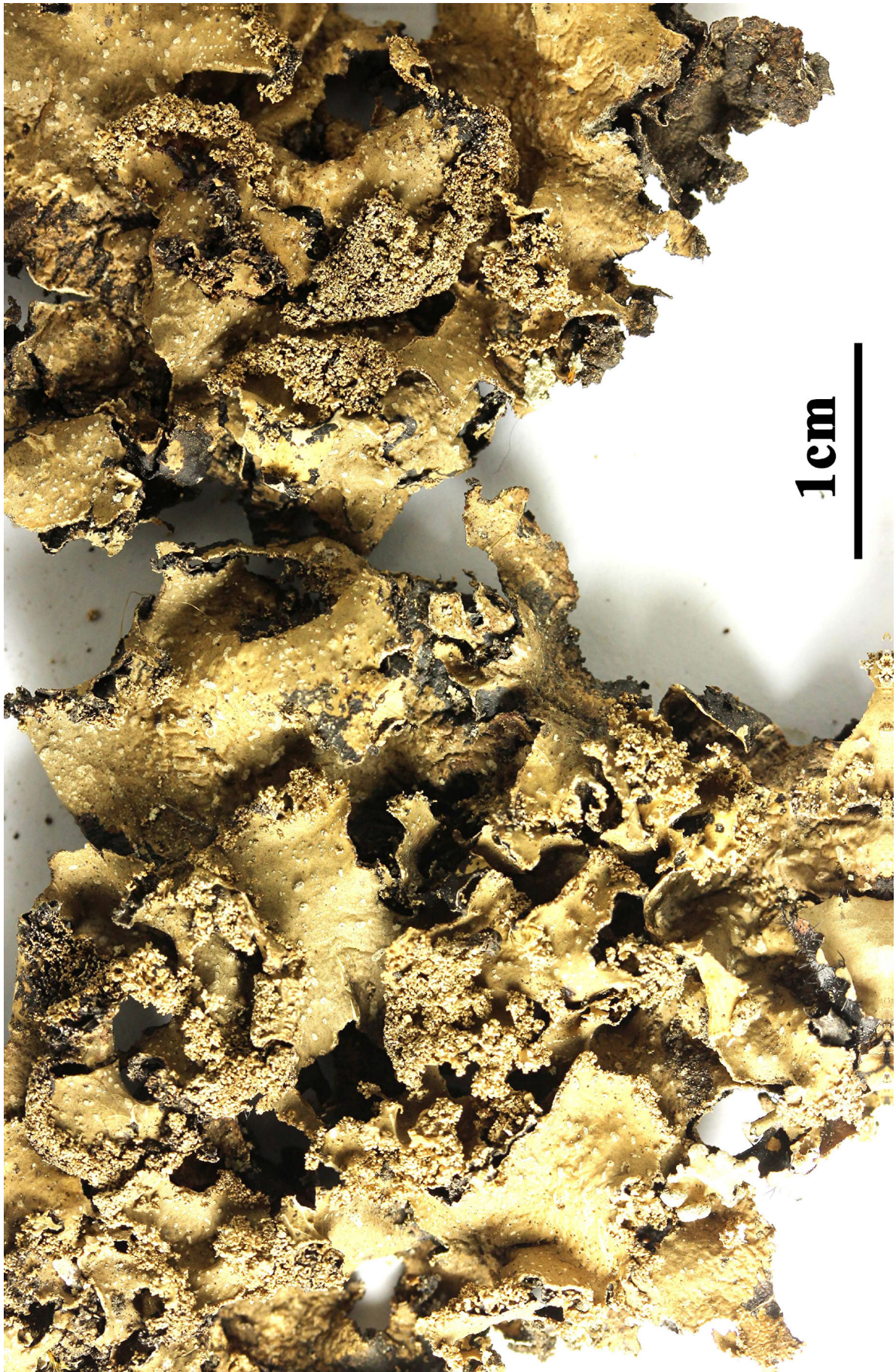
*Cetrariopsis wallichiana*



***Cetrelia braunsiana*** (Müll. Arg.) W.L. Culb. & C.F. Culb., Contr. U.S.  
natnl. Herb. 34(7): 493 (1968)  
= *Parmelia braunsiana* Müll. Arg. 1881

[KU113], Japan. Honshu. Prov. Rikuchu: Yokomichi, Iwaizumi-cho,  
Shimo-Hei-gun. On rocks, 200 m. Leg. S. Kurokawa (67171),  
28.7.1967, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES  
ET CRITICI EXSICCAT NR. 113.

Spot tests, Medulla: K-, C-, P-, KC-, UV+light yellow; pseudocyphel-  
lae UV+Y; pseudocyphellae on upper surface, black lower surface to  
tan/cream; erhizinate marginal zone; marginal isidia



*Cetrelia braunsiana*





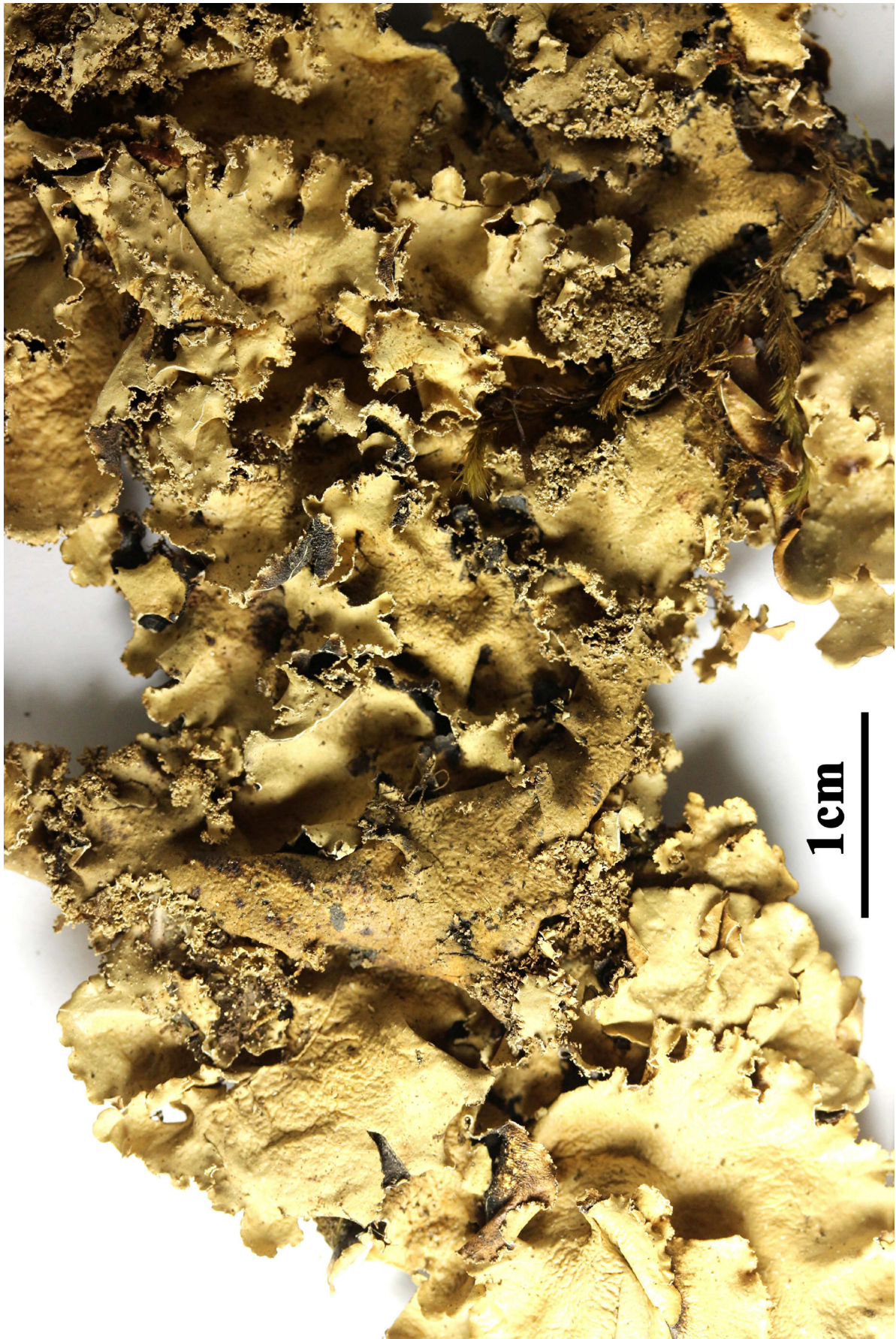
*Cetrelia braunsiana*

*Cetrelia braunsiana* (Müll. Arg.) W.L. Culb. & C.F. Culb., Contr. U.S.  
natnl. Herb. 34(7): 493 (1968)  
= *Parmelia braunsiana* Müll. Arg. 1881

[OH479], China. Prov. Sichuan. Pref. Lingshan. Mianning Coutry:  
Lingshan Temple (28°33' N, 102°17' E) on bark of *Schima* sp., 2380 m.  
Leg. H. Kashiwadani (no. 42425), 22.9.1888, det. H. Kashiwadani. EX  
Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 479.

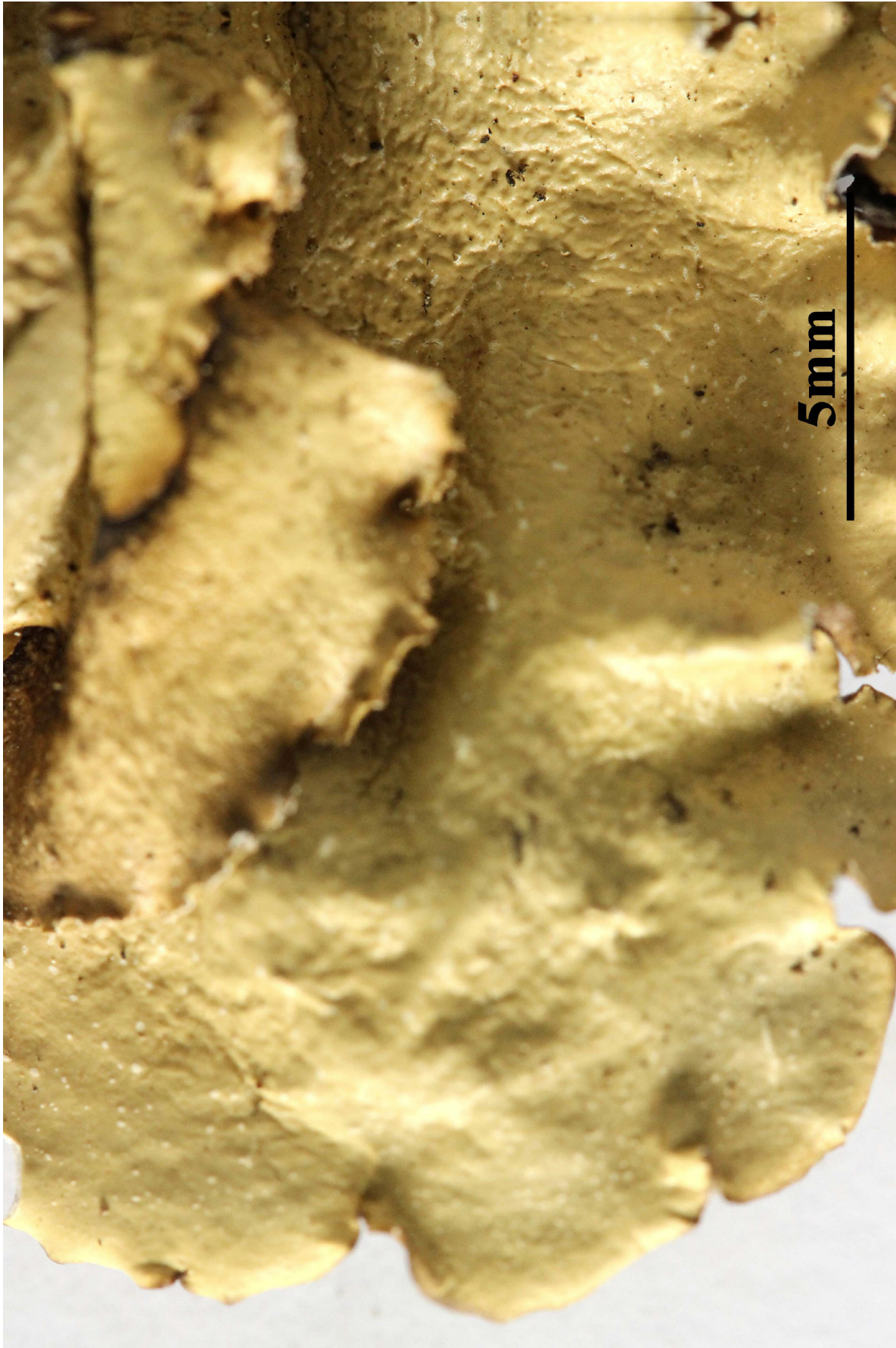
Spot tests, Medulla: K-, C-, P-, KC-, UV+light yellow; pseudocyphel-  
lae UV+Y; pseudocyphellae on upper surface, black lower surface to  
tan/cream; erhizinate marginal zone; marginal isidia





*Cetrelia braunsiana*





*Cetrelia braunsiana*





*Cetrelia braunsiana*

***Cetrelia braunsiana*** (Müll. Arg.) W.L. Culb. & C.F. Culb., Contr. U.S.  
natnl. Herb. 34(7): 493 (1968)  
= *Parmelia braunsiana* Müll. Arg. 1881

[OH677], China. Sichuan Prov., Liangshan Pref.: around  
Xianrendong, Chontu, N slope of Mt. Luoji, Xichang-city (27°42' N,  
102°18' E ). On rock, 1950 M. Leg. H. Kashiwadani (no. 42328),  
29.9.1999, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI  
EXSICCATI NR. 677.

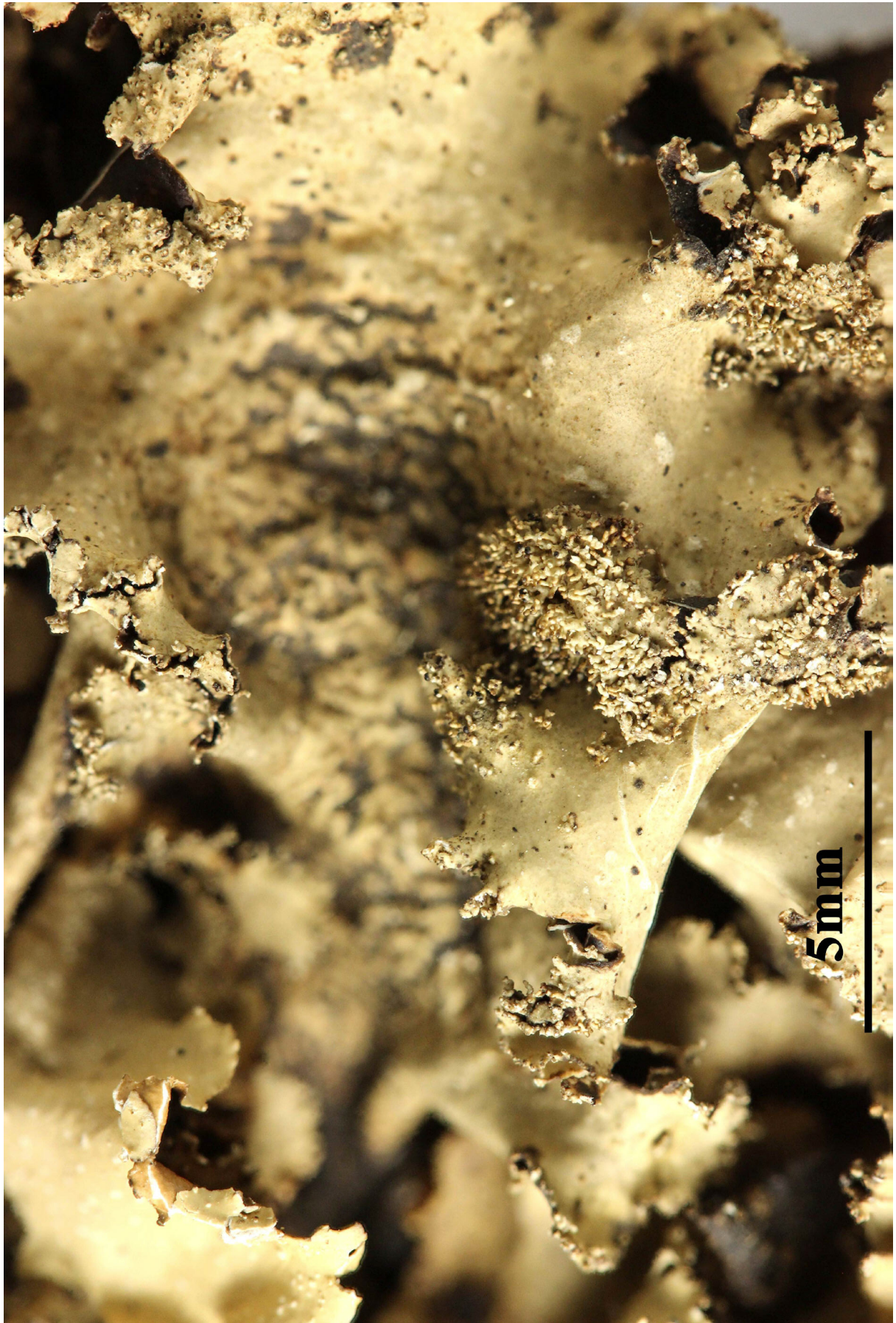
Spot tests, Medulla: K-, C-, P-, KC-, UV+light yellow; pseudocyphel-  
lae UV+Y; pseudocyphellae on upper surface, black lower surface to  
tan/cream; erhizinate marginal zone; marginal isidia





*Cetrelia braunsiana*





*Cetrelia braunsiana*

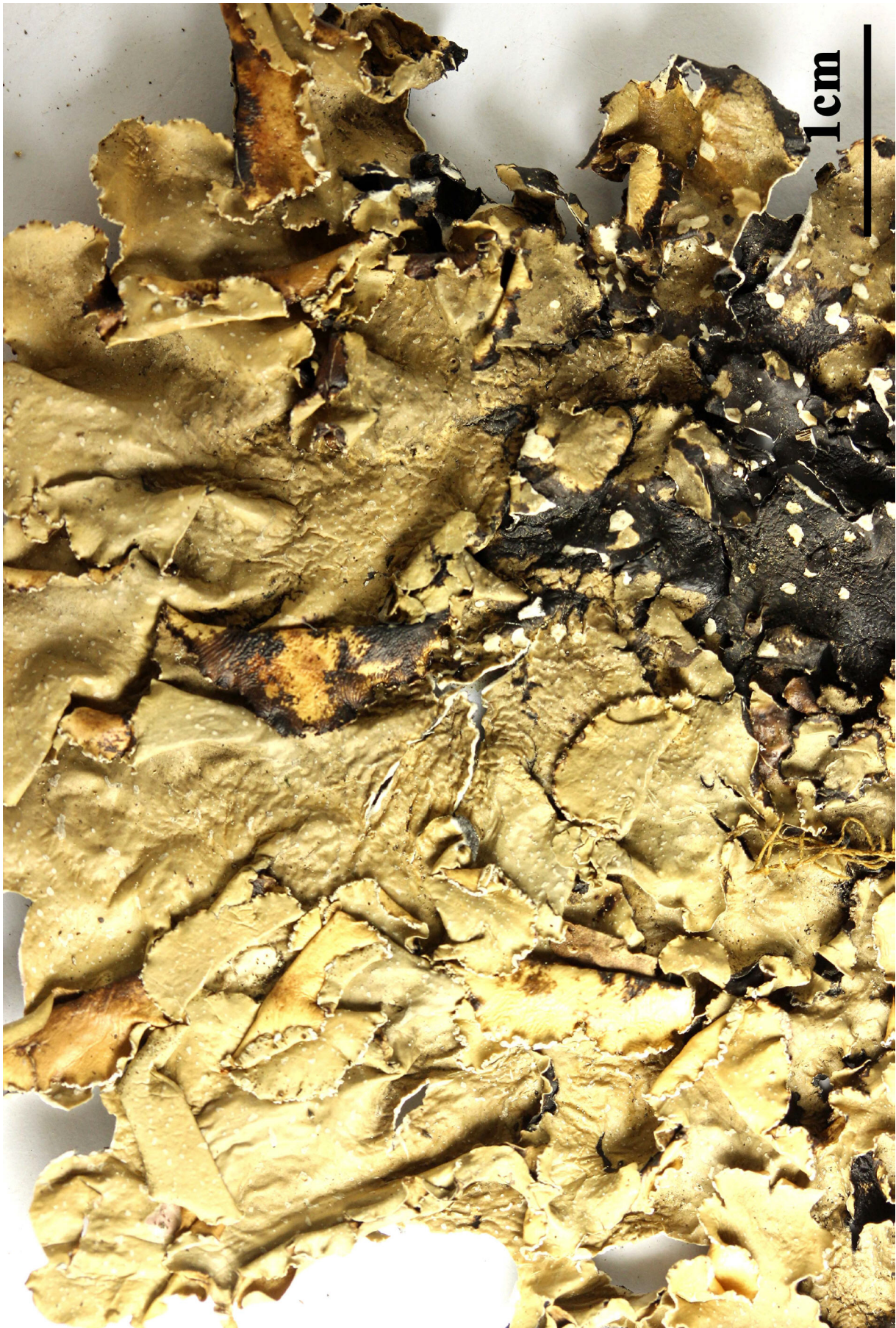


*Cetrelia cetrarioides* (Duby) W.L. Culb. & C.F. Culb., Contr. U.S. natnl. Herb. 34(7): 498 (1968)  
= *Parmelia perlata*  $\beta$  *cetrarioides* Duby 1830

[KU114], Japan. Hokkaido. Prov. Ishikari: Furebetsu, Mt. Furano. On tree-trunks, 800 m. Leg. S. Kurokawa (no. 65357), 21.8.1965, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 114.

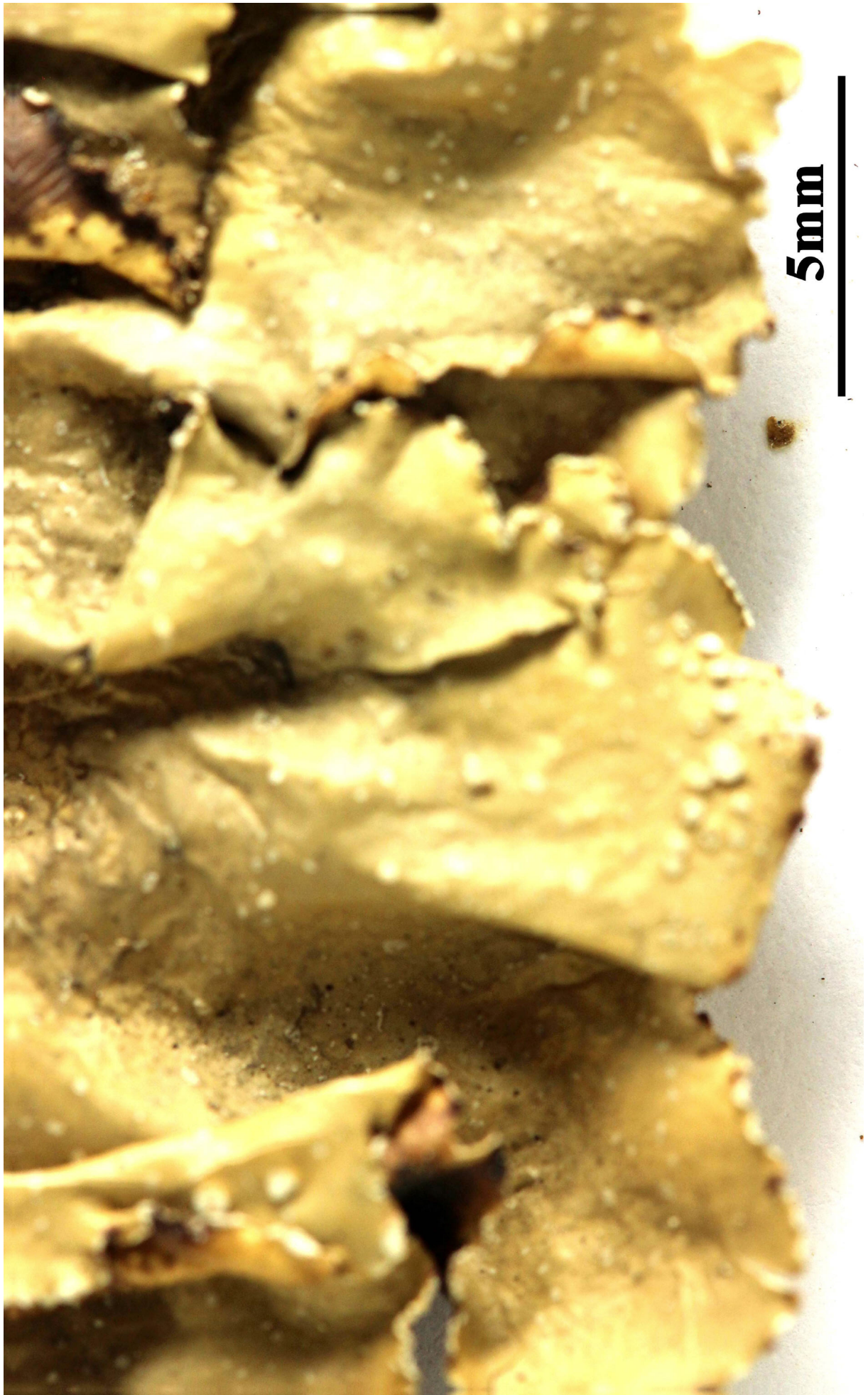
Thallus foliose, heteromerous, dorsiventral, loosely attached, forming wavy, wide-spreading, usually orbicular, 6-20(-40) cm wide patches. Lobes broad and rotund, (0.5-)1-1.5(-2) cm wide, with raised margins, greenish grey (sometimes tinged brown), pseudocyphellate; pseudocyphellae on upper surface punctiform, small to rather large, usually not raised, often lacking in the central parts of thallus, those on the lower surface frequently present, at least on some ascending, contorted lobe apices. Soralia primarily marginal, elongated, usually very smooth and strongly convex, with fine, 25-35(-40)  $\mu$ m thick soredia. Lower surface black, wrinkled, with scattered, simple, black rhizines and a brown, rhizine-free zone along the margin. Upper and lower cortices prosoplectenchymatous, the upper one with a non-pored epicortex, of densely agglutinated hyphae with tiny lumina; medulla white, with isolichenan, I-. Apothecia very rare, lecanorine. Asci 8-spored, Lecanora-type. Ascospores 1-celled, hyaline, ellipsoid, 12-15 x 7-10  $\mu$ m. Pycnidia: unknown. Photobiont chlorococcoid. Spot tests: cortex K<sup>+</sup> (weakly) yellow, C<sup>-</sup>, KC<sup>-</sup>, P<sup>-</sup>; medulla and soralia K<sup>+</sup> yellow, C<sup>-</sup> or C<sup>+</sup> faintly pink/violet, KC<sup>+</sup> pale pink or pale reddish brown, P<sup>-</sup>. Chemistry: cortex with atranorin and chloroatranorin (in lower amounts than in soralia); soralia (and medulla) with atranorin, perlatic acid (major), imbricatic acid (traces), 4-O-methylolivetic acid (UV<sup>+</sup> blue-white, best seen on TLC plates under short-wave light), and anziaic acid (traces), sometimes with a fatty acid. - Note: a species with the perlatic acid syndrome plus traces of imbricatic acid, found on the bark of broad-leaved trees and on epiphytic mosses, more rarely on silicicolous mosses in humid, old, mostly montane forests.





*Cetrelia cetrarioides*





*Cetrelia cetrarioides*

*Cetrelia cetrarioides* (Duby) W.L. Culb. & C.F. Culb., Contr. U.S. natnl. Herb. 34(7): 498 (1968)  
= *Parmelia perlata*  $\beta$  *cetrarioides* Duby 1830

[1973], Germany, Baden-Württemberg, Kreis Göppingen, Zell bei Börtlingen, im Marbachtal auf Fichte, ca. 360 m, TK: 7223, leg. F. Schumm 14.12.1971, det. F. Schumm, 2018. - Chemistry p066/9 und p404/2: atranorin, perlatolic acid; Thallus K- bis gelblich, C-, P-; Mark: k-, C-, P-, J-. - EX HERBARIO F. SCHUMM NR. 1973.

Thallus foliose, heteromerous, dorsiventral, loosely attached, forming wavy, wide-spreading, usually orbicular, 6-20(-40) cm wide patches. Lobes broad and rotund, (0.5-)1-1.5(-2) cm wide, with raised margins, greenish grey (sometimes tinged brown), pseudocyphellate; pseudocyphellae on upper surface punctiform, small to rather large, usually not raised, often lacking in the central parts of thallus, those on the lower surface frequently present, at least on some ascending, contorted lobe apices. Soralia primarily marginal, elongated, usually very smooth and strongly convex, with fine, 25-35(-40)  $\mu$ m thick soredia. Lower surface black, wrinkled, with scattered, simple, black rhizines and a brown, rhizine-free zone along the margin. Upper and lower cortices prosoplectenchymatous, the upper one with a non-pored epicortex, of densely agglutinated hyphae with tiny lumina; medulla white, with isolichenan, I-. Apothecia very rare, lecanorine. Asci 8-spored, Lecanora-type. Ascospores 1-celled, hyaline, ellipsoid, 12-15 x 7-10  $\mu$ m. Pycnidia: unknown. Photobiont chlorococcoid. Spot tests: cortex K+ (weakly) yellow, C-, KC-, P-; medulla and soralia K+ yellow, C- or C+ faintly pink/violet, KC+ pale pink of pale reddish brown, P-. Chemistry: cortex with atranorin and chloroatranorin (in lower amounts than in soralia); soralia (and medulla) with atranorin, perlatolic acid (major), imbricatic acid (traces), 4-O-methylolivetic acid (UV+ blue-white, best seen on TLC plates under short-wave light), and anziaic acid (traces), sometimes with a fatty acid. - Note: a species with the perlatolic acid syndrome plus traces of imbricatic acid, found on the bark of broad-leaved trees and on epiphytic mosses, more rarely on silicicolous mosses in humid, old, mostly montane forests.





*Cetrelia cetrarioides*





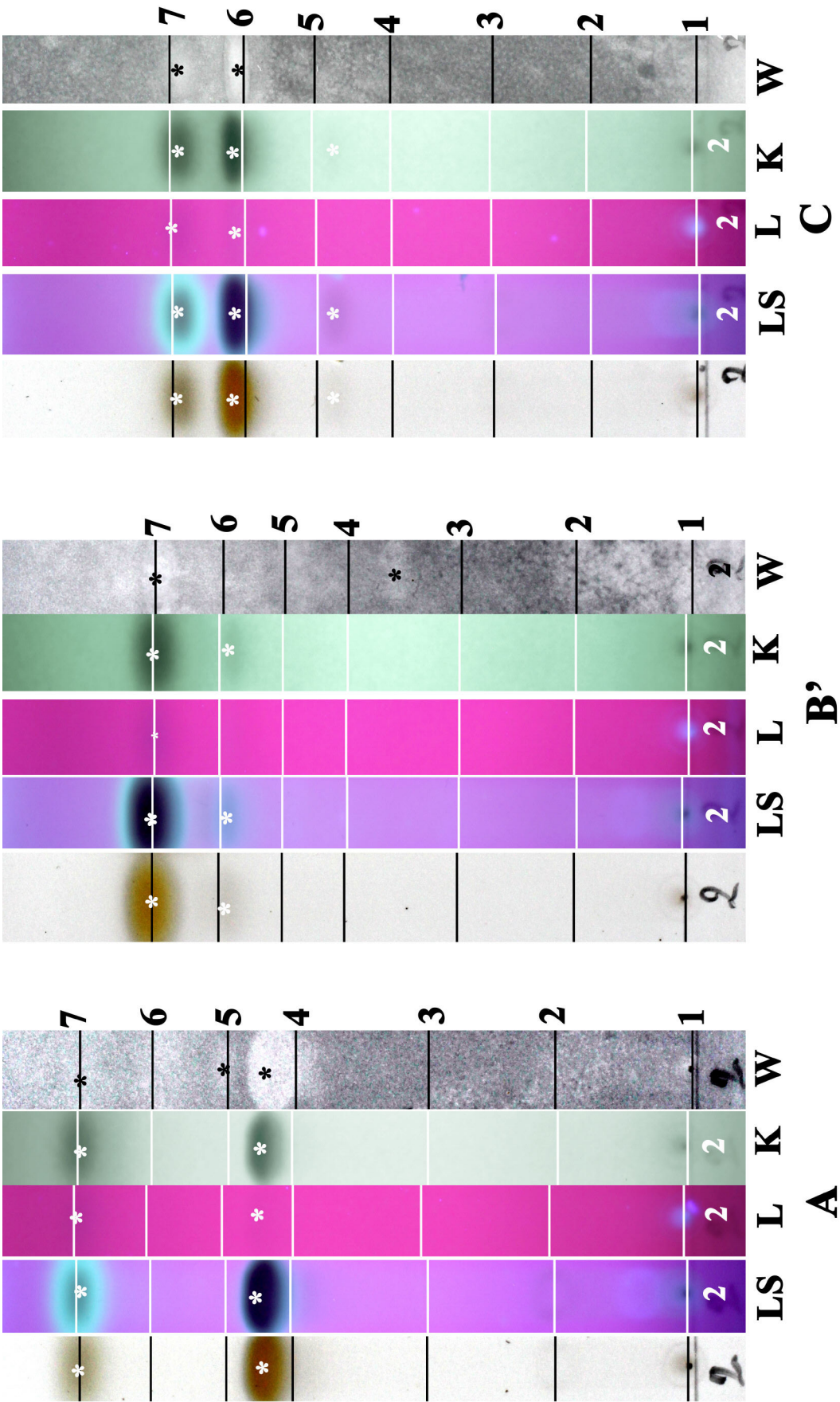
*Cetrelia cetrarioides*





*Cetrelia cetrarioides*





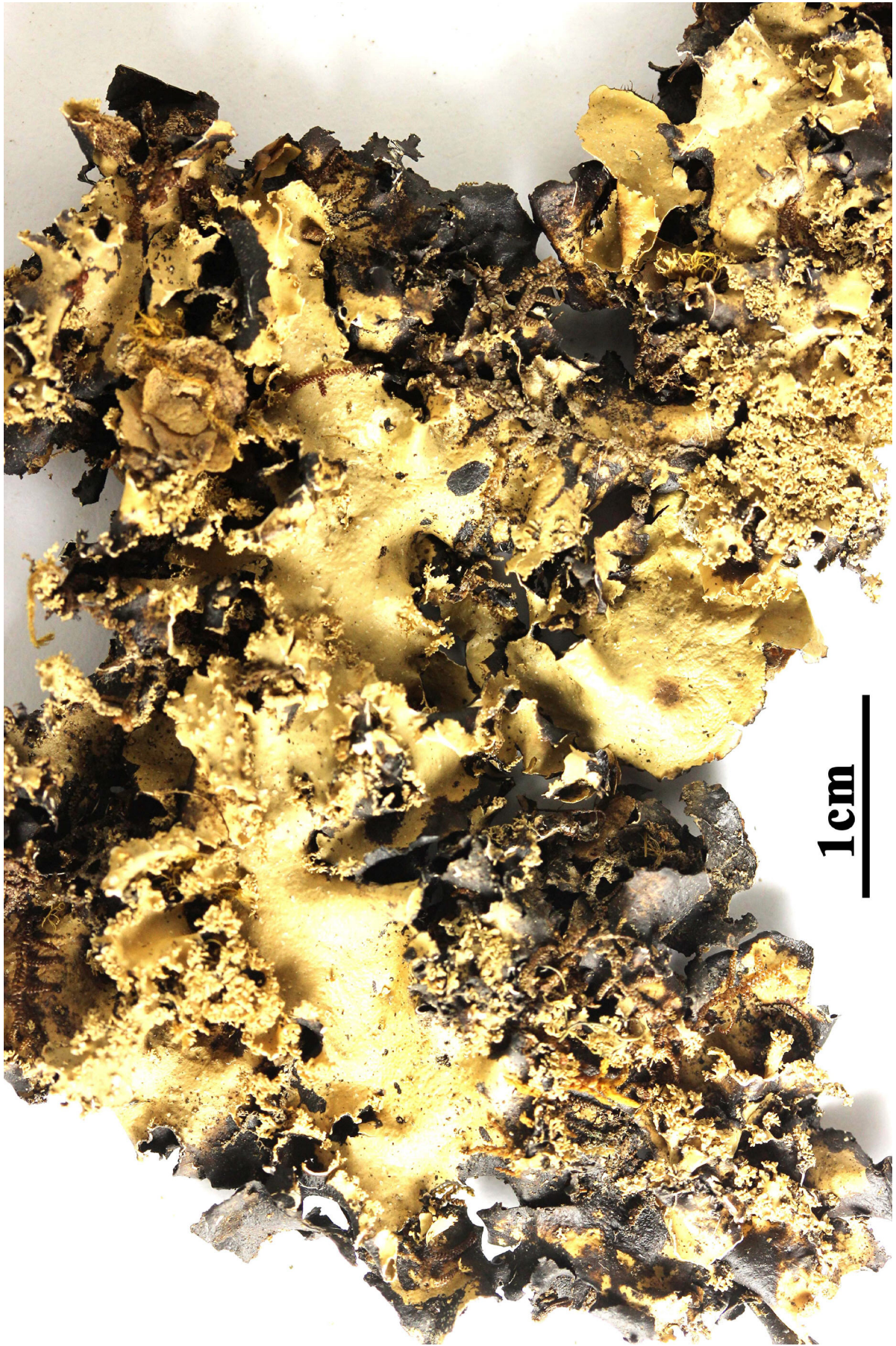
[1973], p404/2



*Cetrelia japonica* (Zahlbr.) W.L. Culb. & C.F. Culb., Contr. U.S. natnl.  
Herb. 34(7): 511 (1968)  
= *Cetraria japonica* Zahlbr. 1916

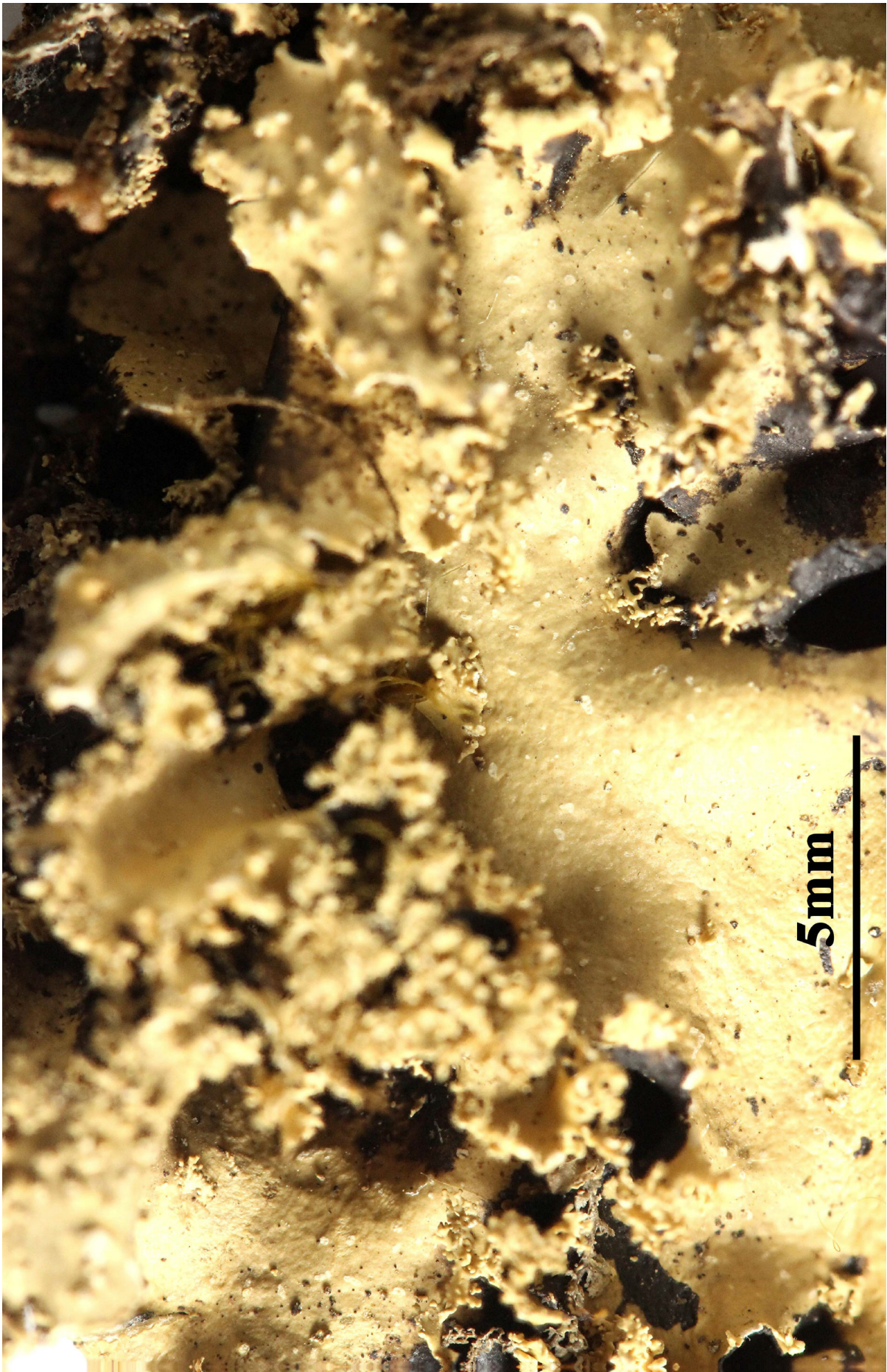
[KU115], Japan. Honshu. Prof. Musashi: Karisaka Pass, Chichibu. Leg.  
S. Kurokawa (no. 70131), 24.5.1970, det. S. Kurokawa. EX S. KUROKA-  
WA LICHENES RARIORES ET CRITICI NR. 115.





*Cetrelia japonica*





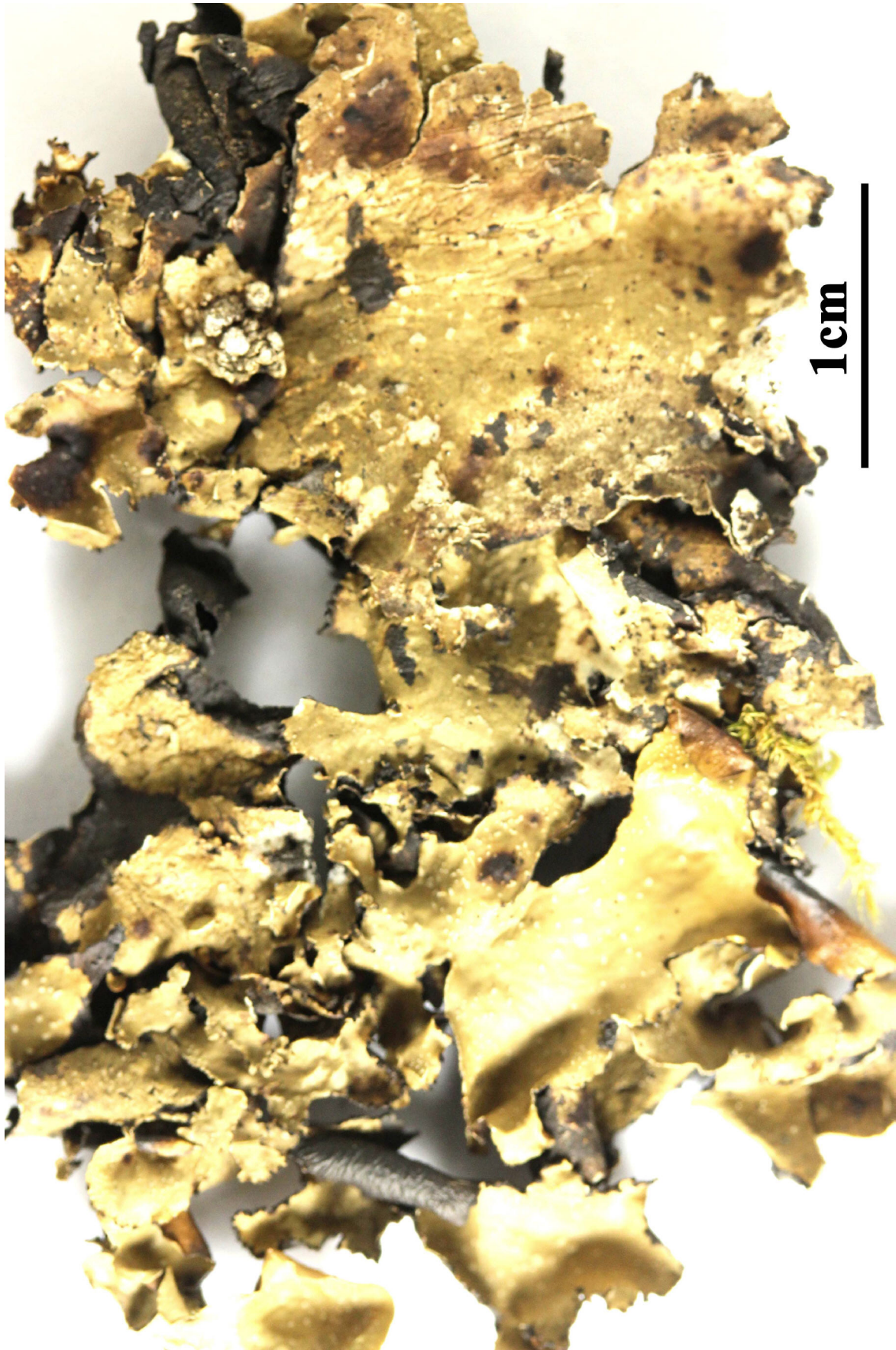
*Cetrelia japonica*



*Cetrelia nuda* (Hue) W.L. Culb. & C.F. Culb., Contr. U.S. natnl. Herb.  
34(7): 513 (1968)  
=*Platysma collatum* f. *nudum* Hue 1899

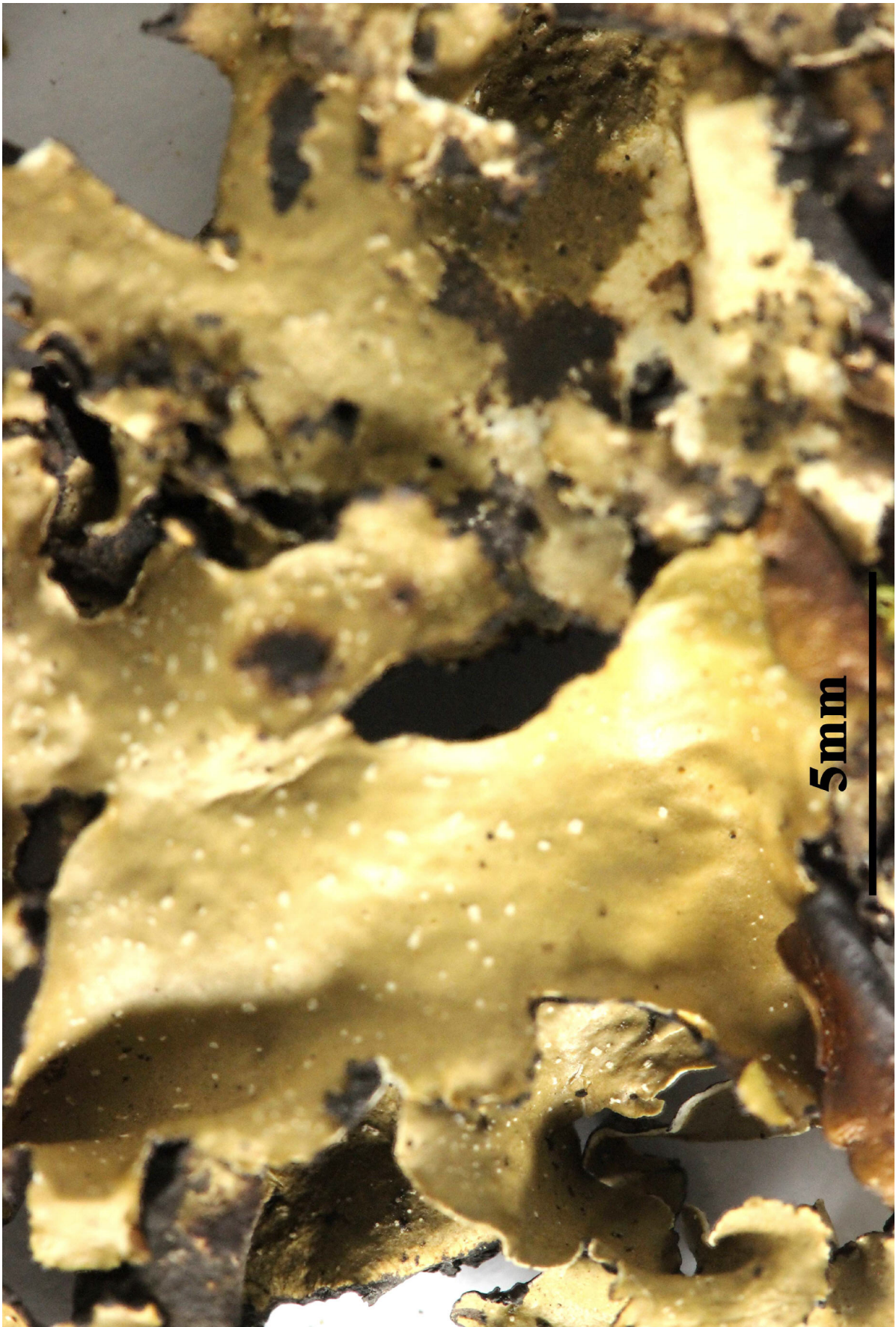
[KU155], Japan.Honshu. Prov. Musashi: Mt Ryogami. on trunc of  
*Fagus crenata*, 1650 m. Leg. H. Sibuichi (no. 4494) and K. Yoshida,  
3.8.1971. EX S. KASHIWADANI LICHENES RARIORES ET CRITICI EXSIC-  
CATI NR. 155.





*Cetrelia nuda*





*Cetrelia nuda*



*Cetreliaopsis rhytidocarpa* (Mont. & Bosch) Randle & Saag, in Randle, Thell & Saag, Mem. Natn Sci. Mus, Tokyo 13: 218 (1980)  
= *Cetraria rhytidocarpa* Mont. & Bosch 1856

[KA355], Taiwan. Hualien Co.: Mt. Hohuan-shan, Hsiulin-gun. On trunc of *Pinus* sp., 3000 m. Leg. H. Shibuichi (no. 8035), K. Yoshida & M. Moon, 2.8.1985, det. H. Kashiwadani. EX H. KASHIWADANI LICHENES MINUS COGNITI EXSICCATI NR. 355.





*Cetreliopsis rhytidocarpa*

***Chaenotheca hygrophila*** Tibell, Symb. bot. upsal. 23(no. 1): 37 (1980)

[OH530], Japan, Honshu. Prov. Musashi (Tokyo Metropolis): around Kamido-kan-bori Moat, Imperial Palace grounds, Chiyoda-ku (35°40'45" N, 139°45'15" E). On bark of *Cryptomeria japonica*, 20 m. Leg. A. Frisch (no. 13/Jp8), Y. Ohmura & G. Thor, 03.03.2013; det. Y. Ohmura. EX Y. OHMURA: LICHENES MINUS COGNITI EXSICCATI NO. 530.

Thallus epiphloeodic or epixylic, ecorticate, forming a  $\pm$  contiguous crust of minute, spherical granules or sometimes immersed. Colour dull greenish grey. Phycobiont belonging to Chlorococcales. Apothecia short-middle sized, 0.8-1.3 mm. Stalk 0.06-0.12 mm in diam., dull dark brown, epruinose. Capitulum lenticular, with well developed excipulum. Excipulum 0.2-0.3 mm in diam. Hypothecium broadly obconical with flat or convex upper surface. Excipulum without pruina but often pale brown or almost white below. Asci cylindrical, 12-16 x 1.7-2.2  $\mu$ m, with a 3-6  $\mu$ m long stalk. Asci produced singly from ascogenous hyphae with hooks. Spores spherical, 2.7-4.3  $\mu$ m in diam., smooth. Spores uniseriately arranged in the asci. CHEMISTRY: Seven specimens from Japan, Canada and the U.S.A. were investigated and the thallus was found to contain Unknown B and Unknown C in all specimens. Thallus K-, C-, KC- and PD+ yellow-orange red.





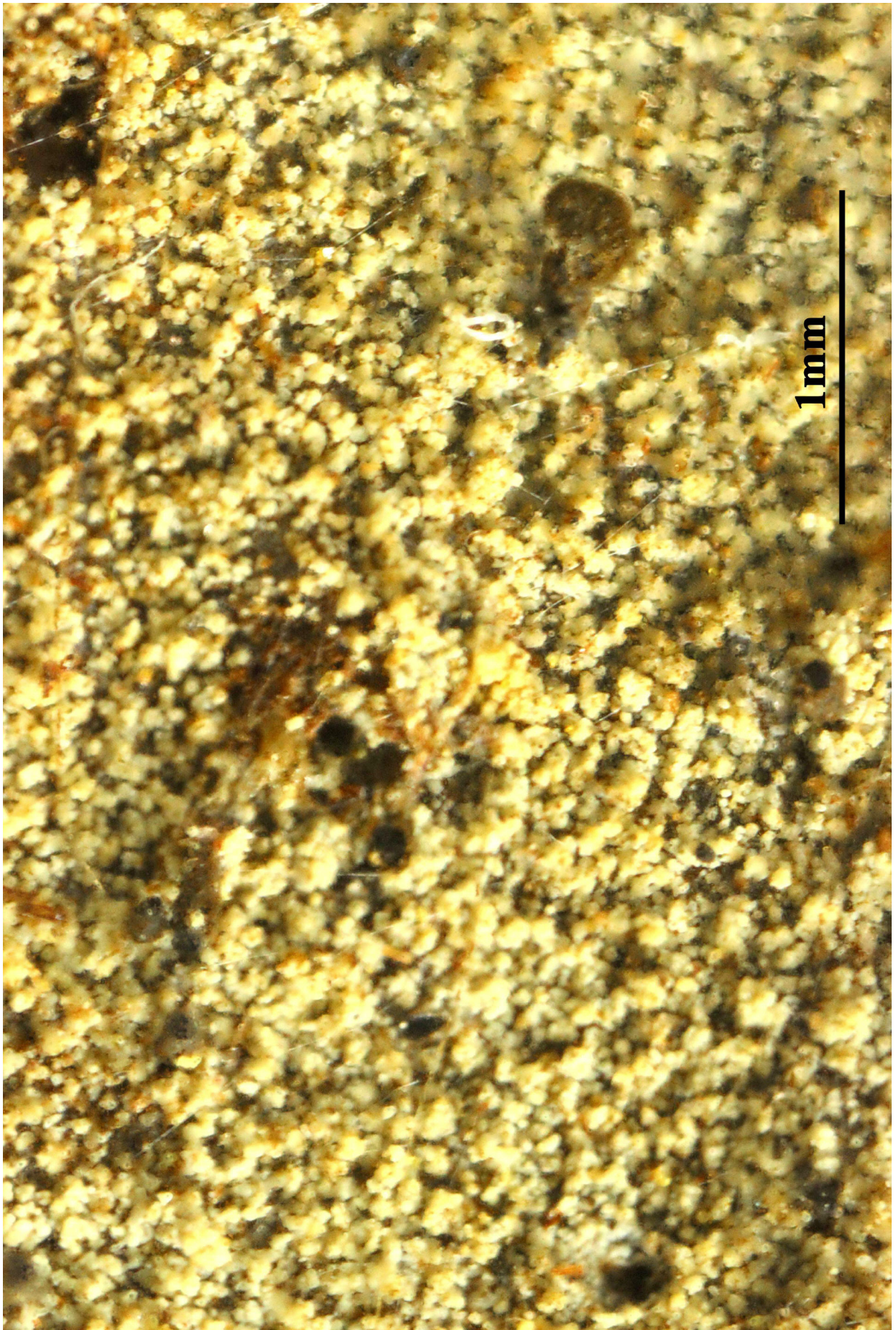
*Chaenotheca hygrophila*





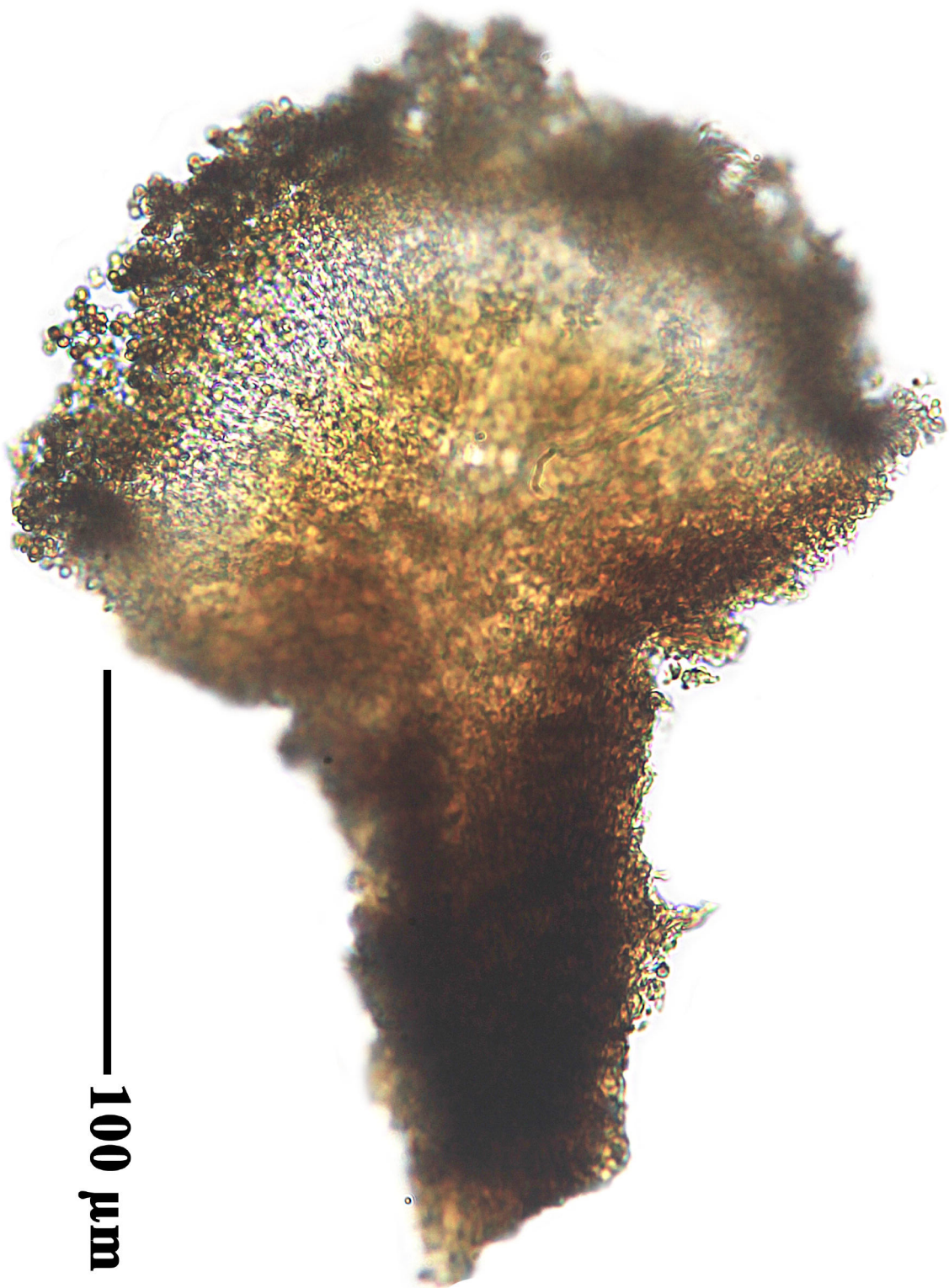
*Chaenotheca hygrophila*





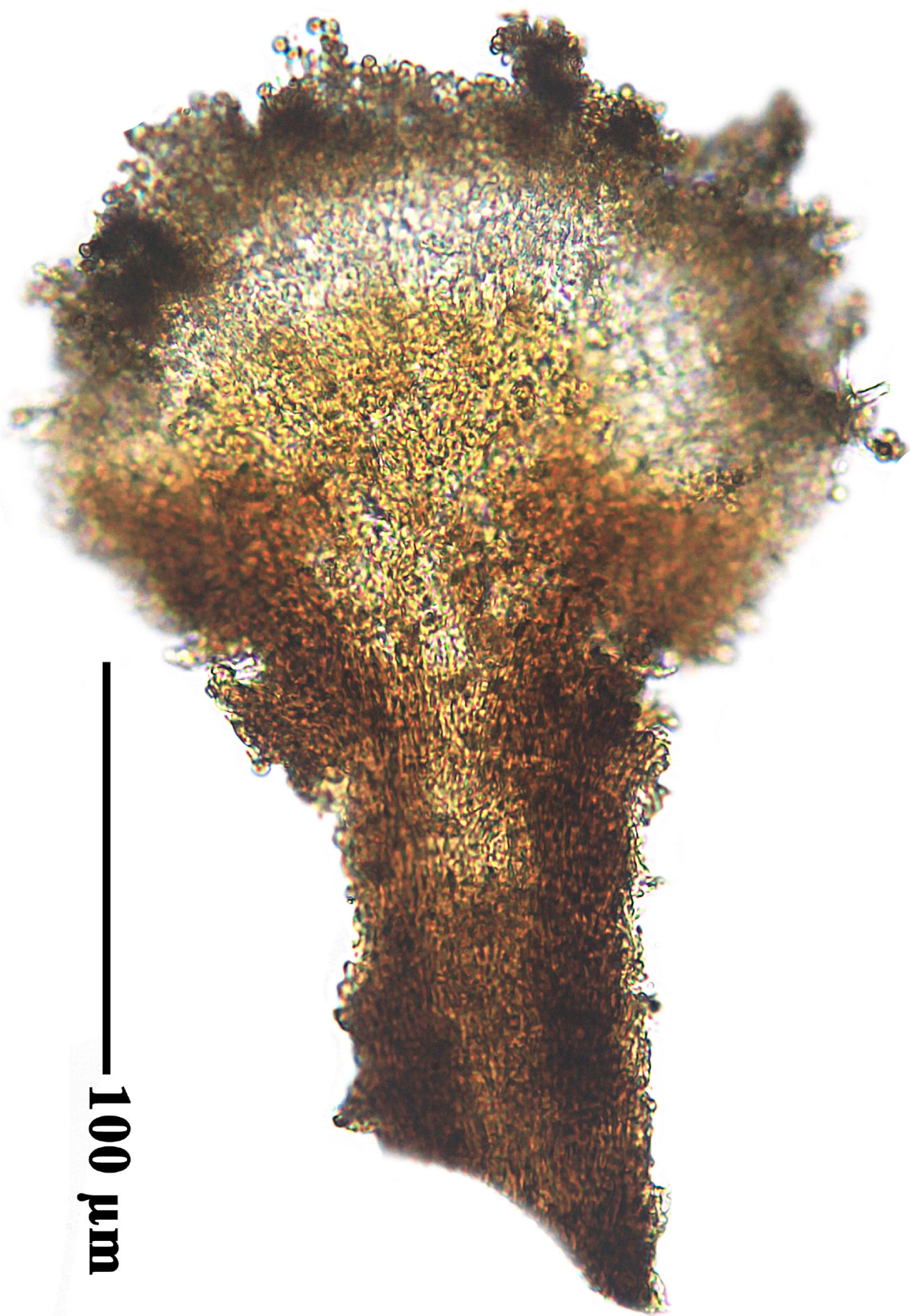
*Chaenotheca hygrophila*





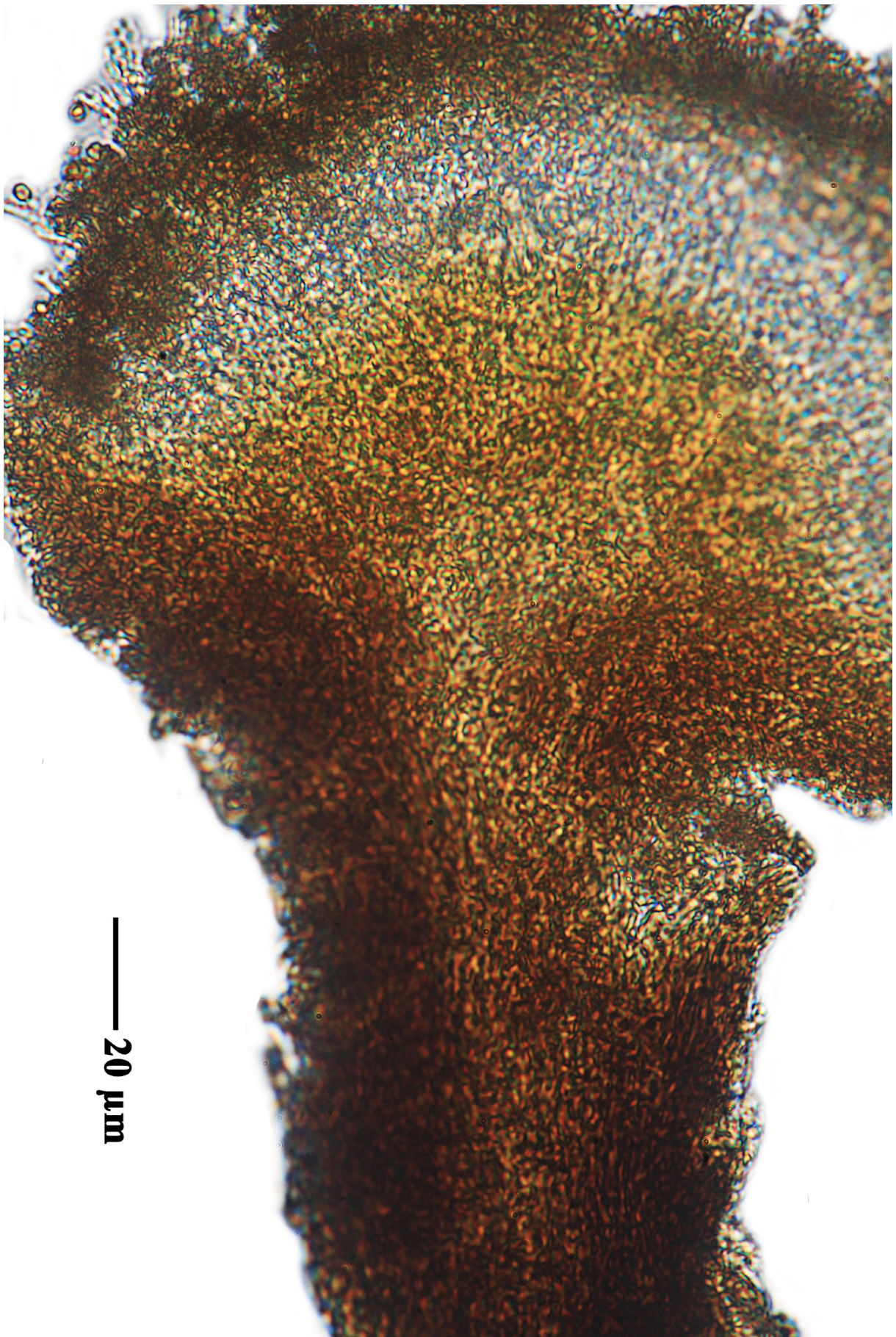
*Chaenotheca hygrophila*





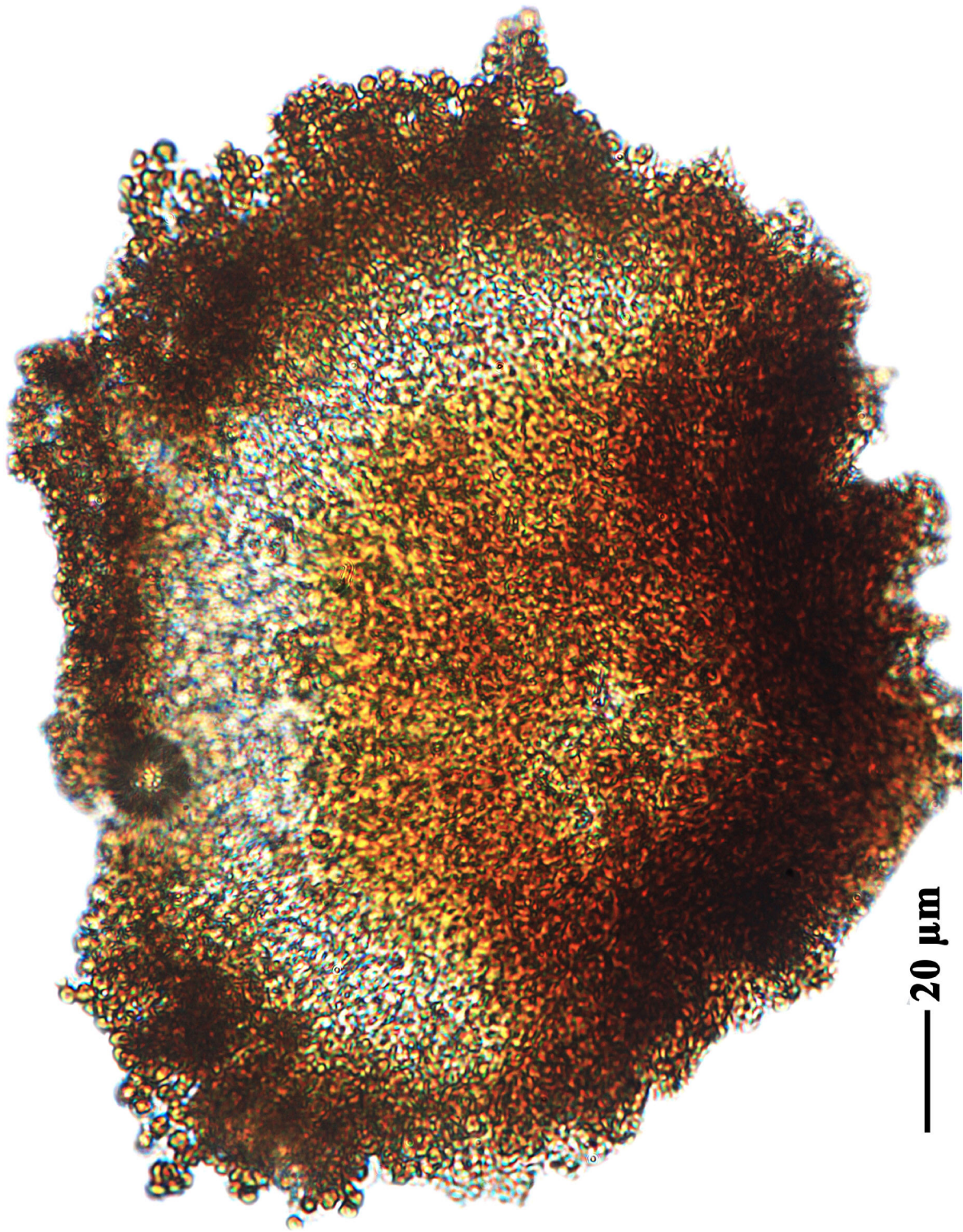
*Chaenotheca hygrophila*





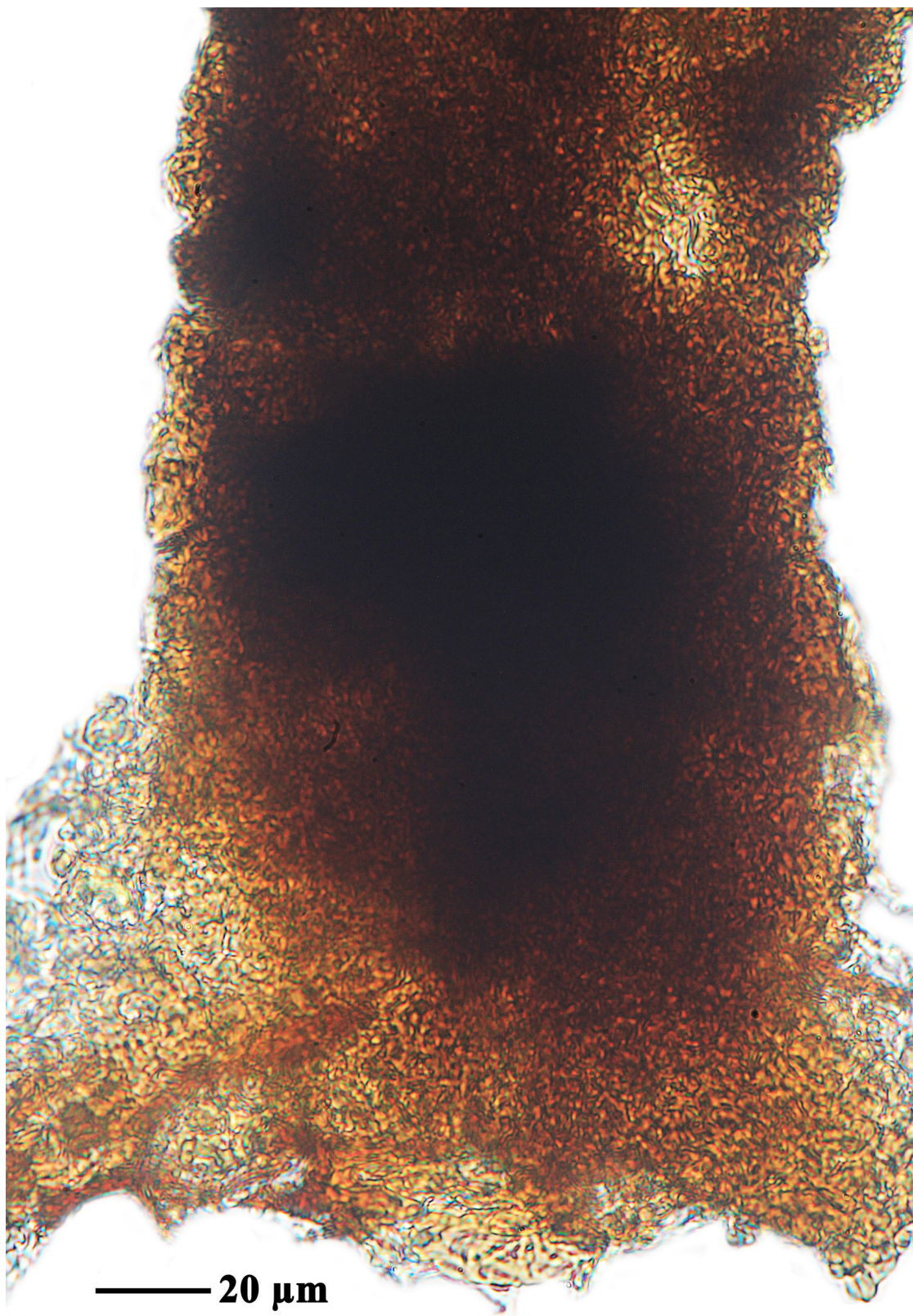
*Chaenotheca hygrophila*





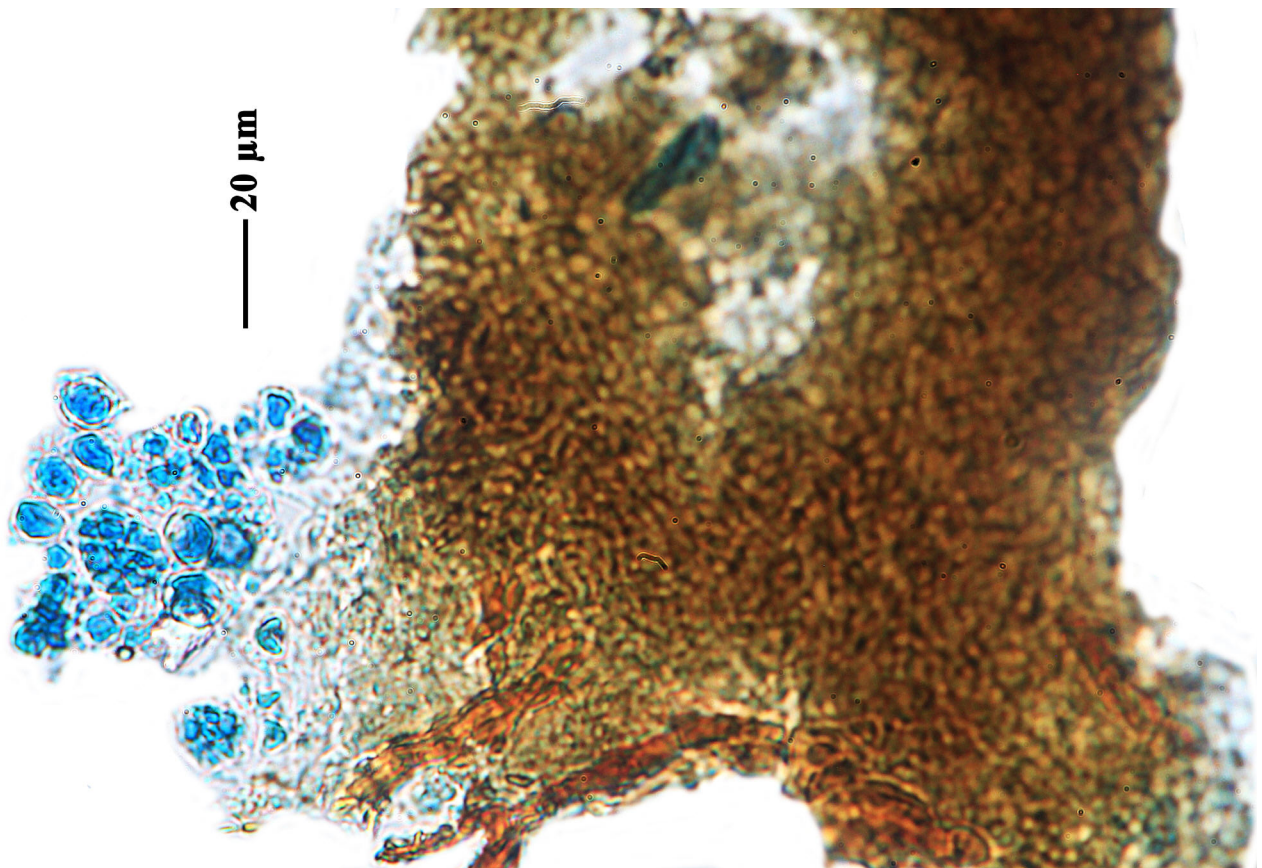
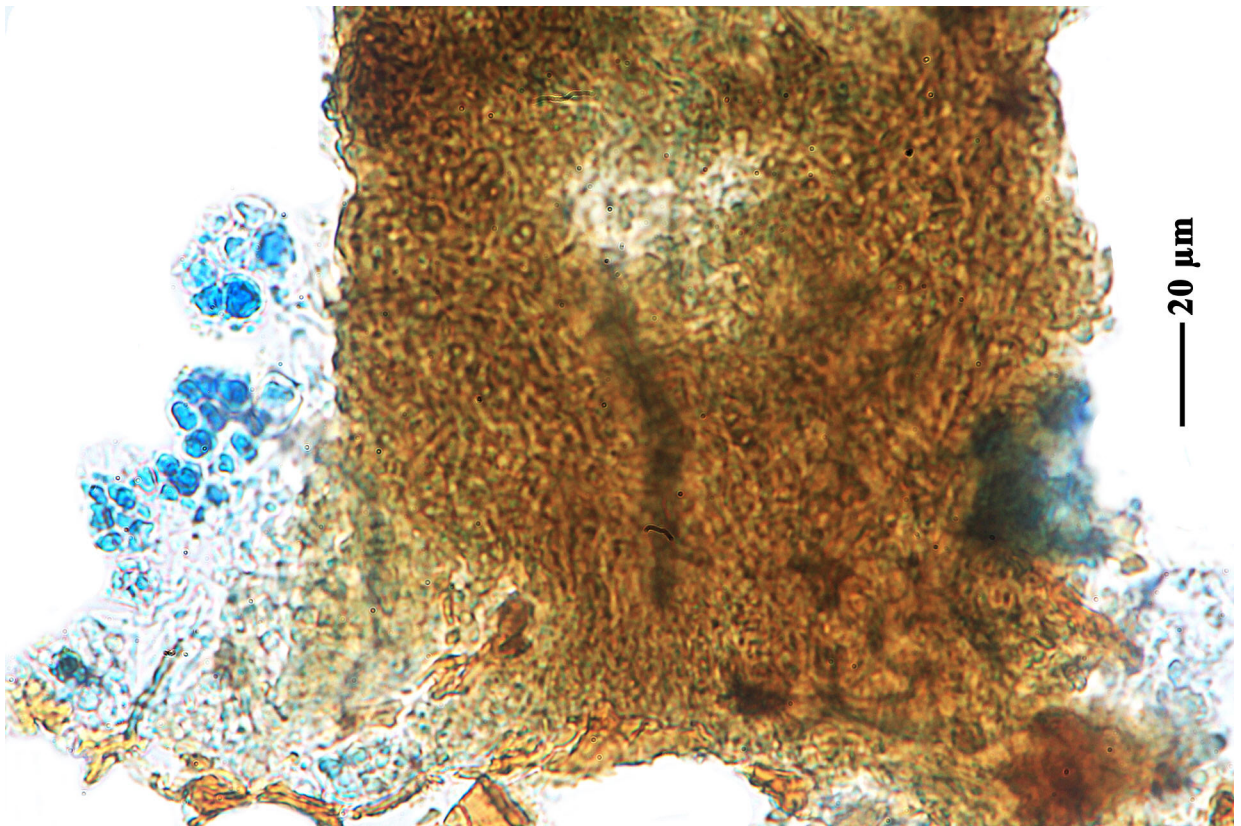
*Chaenotheca hygrophila*





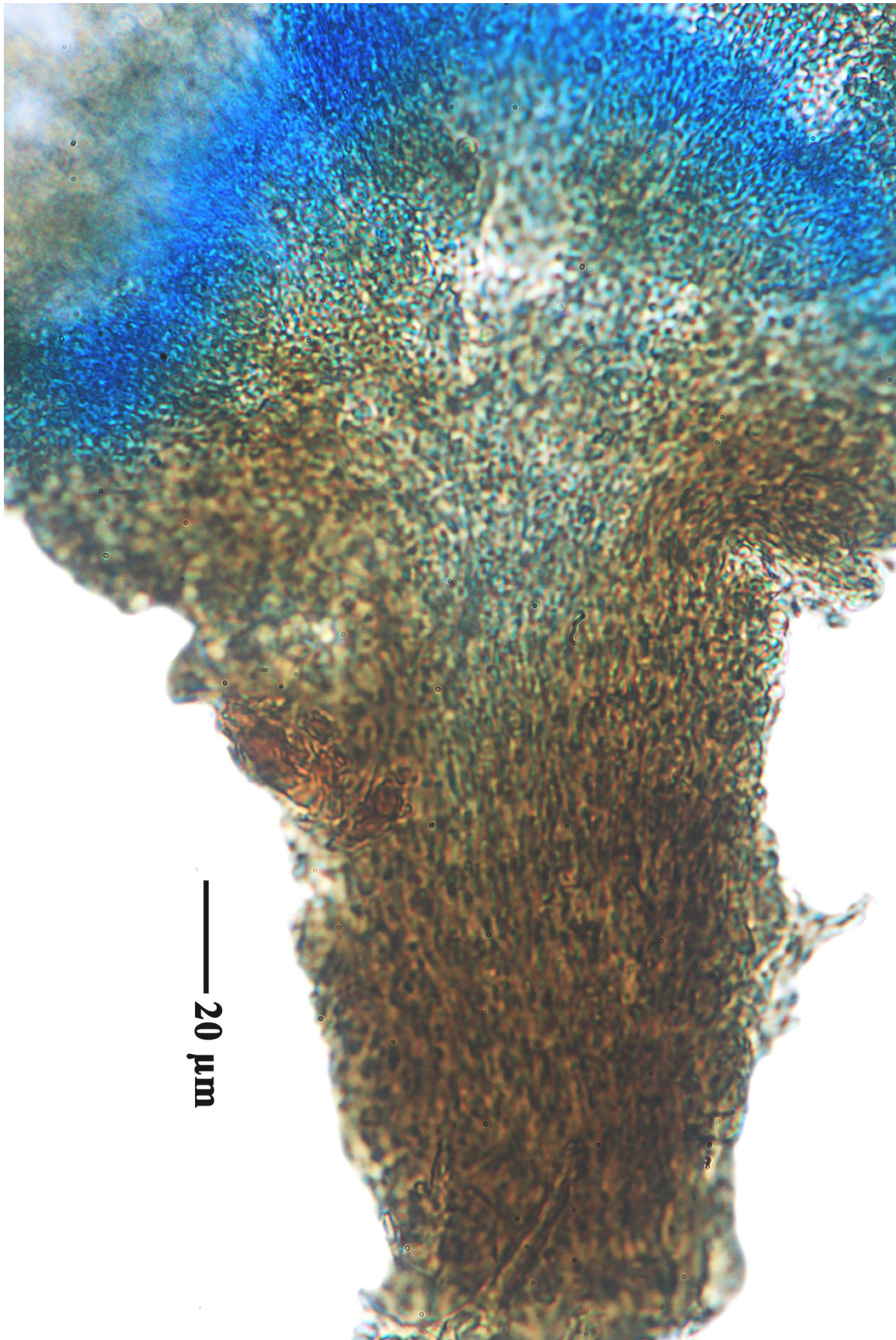
*Chaenotheca hygrophila*





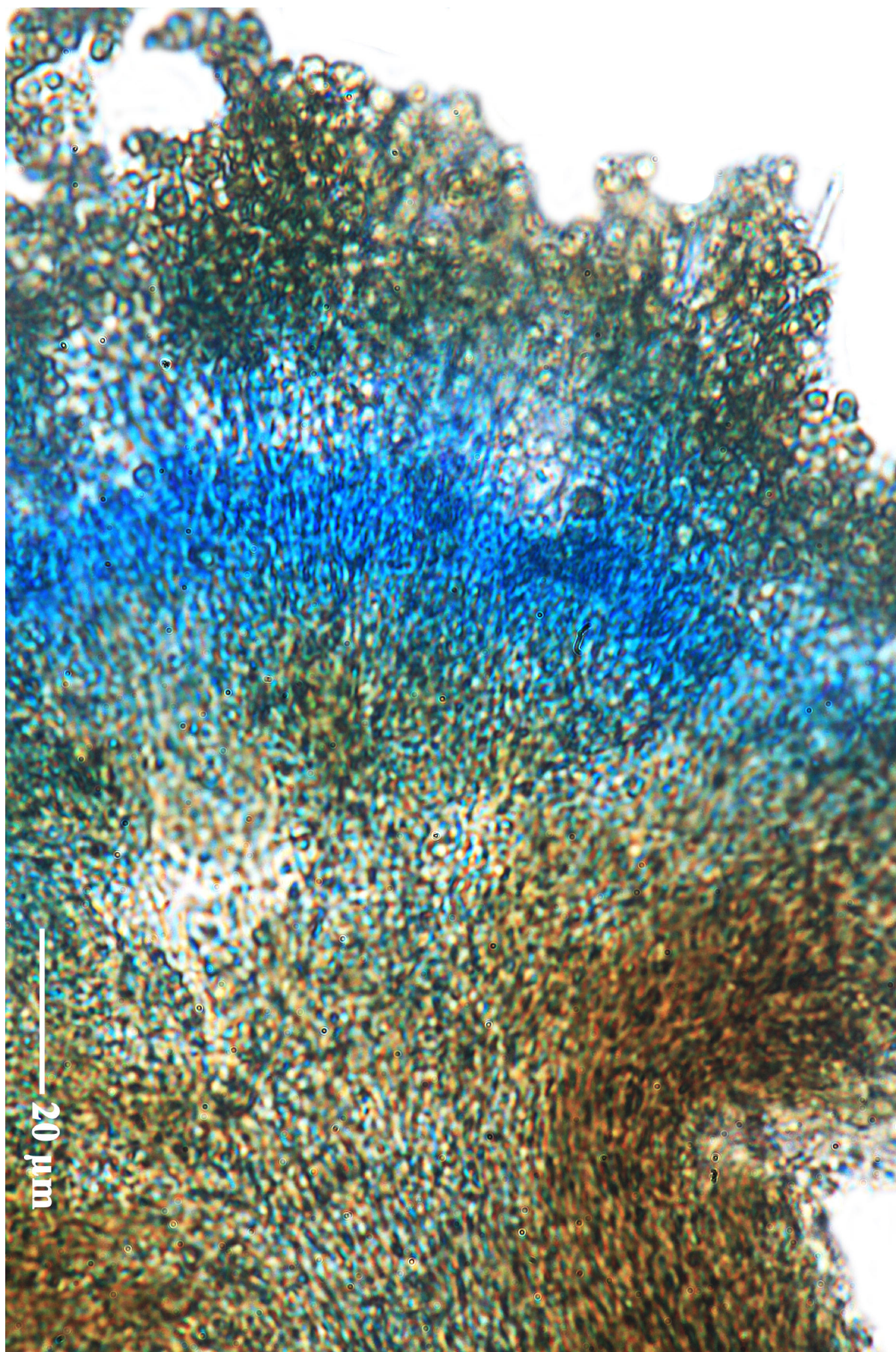
*Chaenotheca hygrophila*





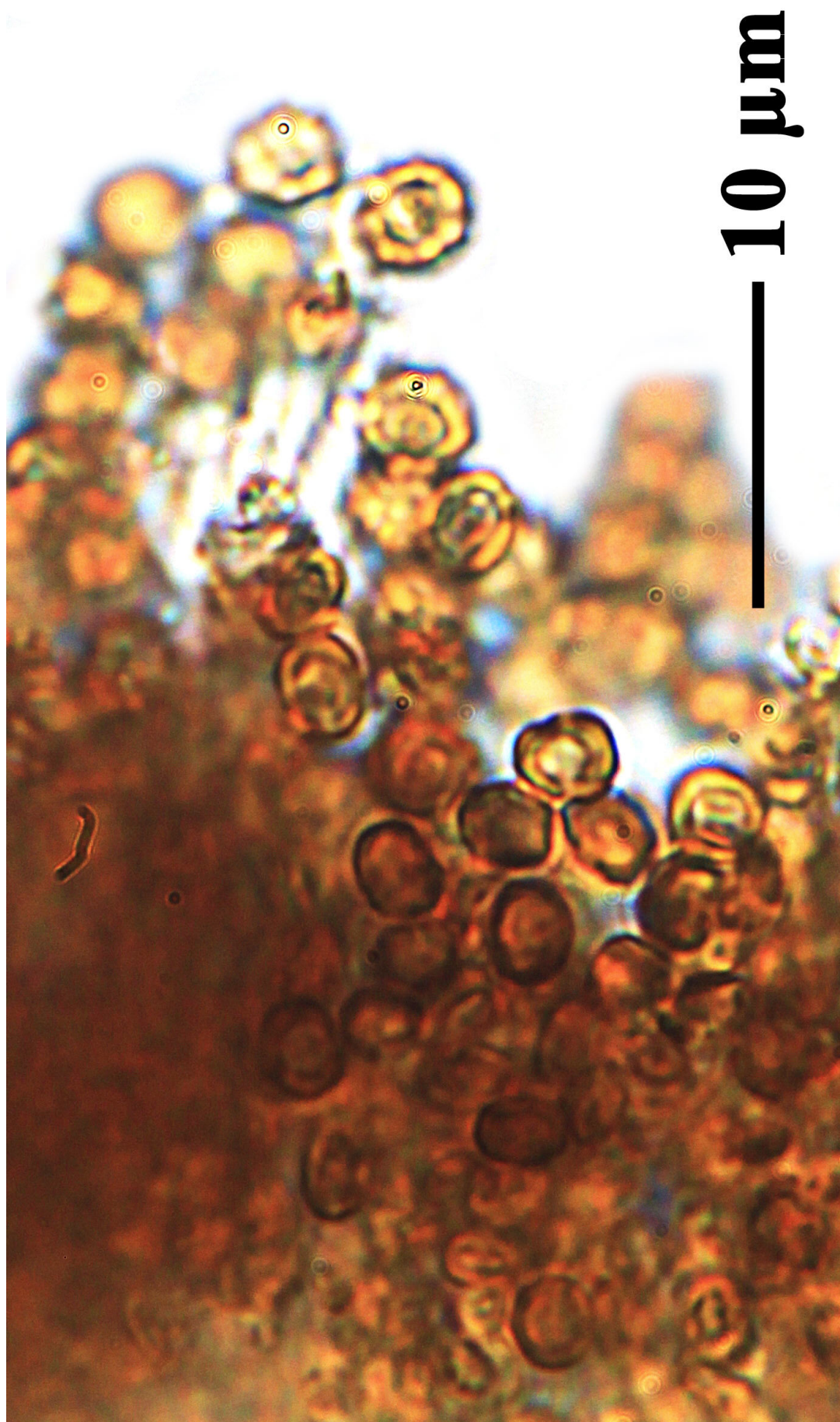
*Chaenotheca hygrophila*





*Chaenotheca hygrophila*





*Chaenotheca hygrophila*



*Chrysothrix candelaris* (L.) J.R. Laundon, Lichenologist 13(2): 110 (1981)  
= *Byssus candelaris* L. 1753

[9588], Germany, Baden-Württemberg, Kreis Schramberg, westliche Talseite im Schiltachtal, 3 km südlich Schramberg, auf Kiefernrinde, 550 m, TK: 7716/SW. Leg. V. Wirth & U. Schwarz 21.11.1992, det. V. Wirth 1992. Chemistry (p124/9): calycin, pinastric acid. Ex Herbario F. Schumm Nr.9588

Thallus leprose, woolly-textured, poorly delimited, usually thin (less than 0.4 mm thick), sometimes of scattered granules, but usually continuous to rarely cracked, covering rather large surfaces, bright lemon-yellow, golden yellow, greenish yellow in very shaded situations, sometimes tinged orange on old bark, consisting of a mass of fine soredia-like granules measuring (10-)25-50(-100)  $\mu\text{m}$ ; medulla usually not evident, in thick thalli sometimes indistinctly present, yellow. Apothecia very rare, biatorine, 0.2-0.5 mm across, round or angular, with a flat to slightly convex, pale orange-yellow, often yellow-pruinose disc, and a thin, ecorticate, soon excluded proper margin. Proper exciple poorly developed, up to 10  $\mu\text{m}$  thick; epithecium colourless, up to 18  $\mu\text{m}$  high; hymenium colourless, up to 50  $\mu\text{m}$  high; paraphysoids 1-1.5  $\mu\text{m}$  thick, richly branched and anastomosing, intertwined in epithecium; hypothecium colourless, poorly developed. Asci 8-spored, clavate, with a K/I+ blue layer between the two walls which is thicker in the apical part, becoming more diffuse downwardly. Ascospores (1-)3-septate, constricted in the middle septum, hyaline, 9-14 x c. 3  $\mu\text{m}$ . Photobiont chlorococcoid. Spot tests: K- or K+ faintly orange, C-, KC- or KC+ faintly orange, P- or P+ faintly orange, UV- or UV+ dull orange. Chemistry: calycin or pinastric acid, rarely both. - Note: a cool-temperate to circumboreal-montane lichen found on dry, shaded parts of trunks of deciduous and coniferous trees, on faces protected from rain, sometimes on lignum.





*Chrysothrix candelaris*





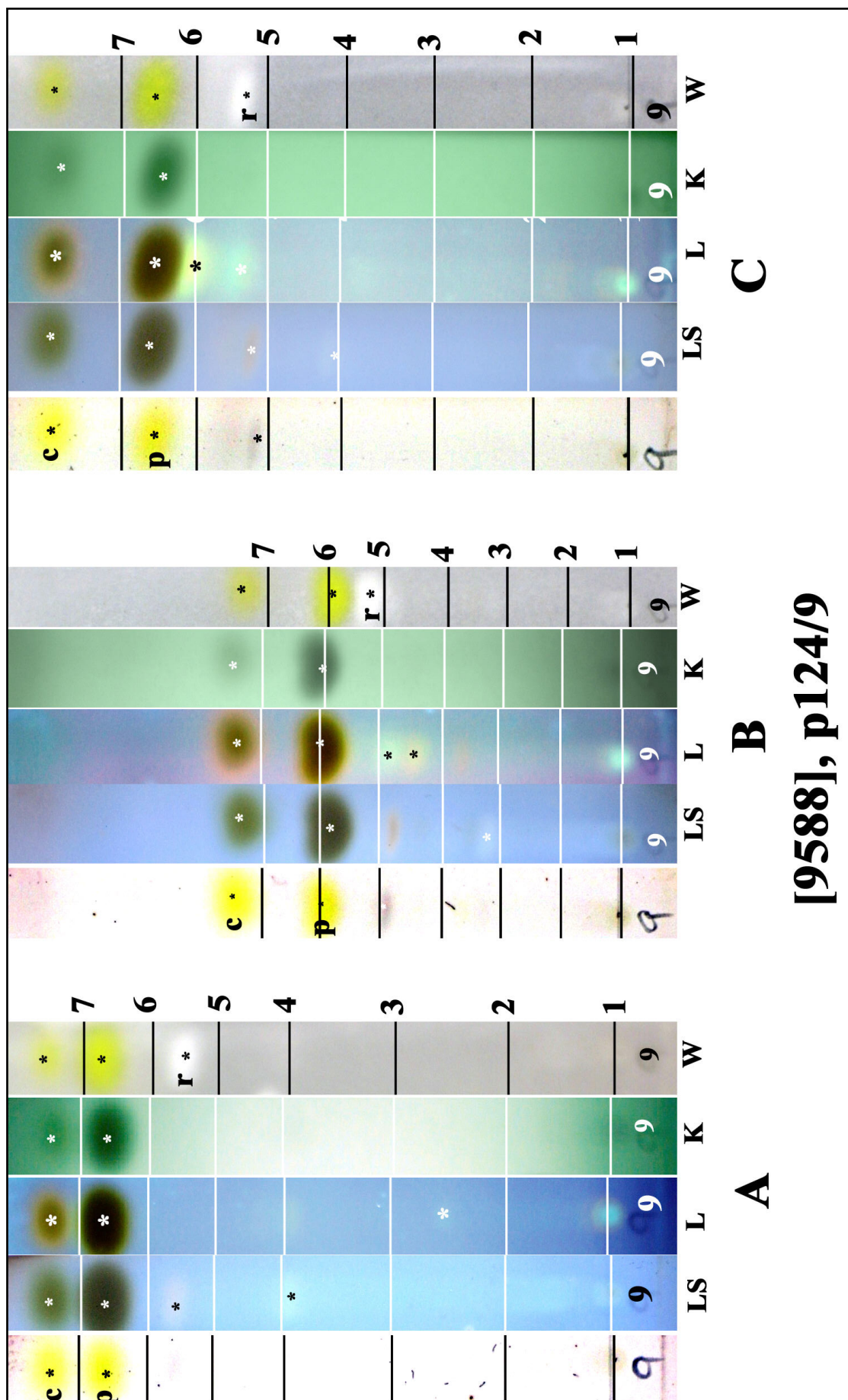
*Chrysothrix candelaris*





*Chrysothrix candelaris*





c: calycin, p: pinastric acid, r: roccellic acid ?



*Chrysothrix candelaris* (L.) J.R. Laundon, Lichenologist 13(2): 110 (1981)  
= *Byssus candelaris* L. 1753

[OH604], Russia. Primorsky Territory: Kuchelinova (43°24'30" N, 132°32'09" E), On bark of coniferous tree, 260 m. Leg. Y. Ohmura (no. 12096), det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 604.

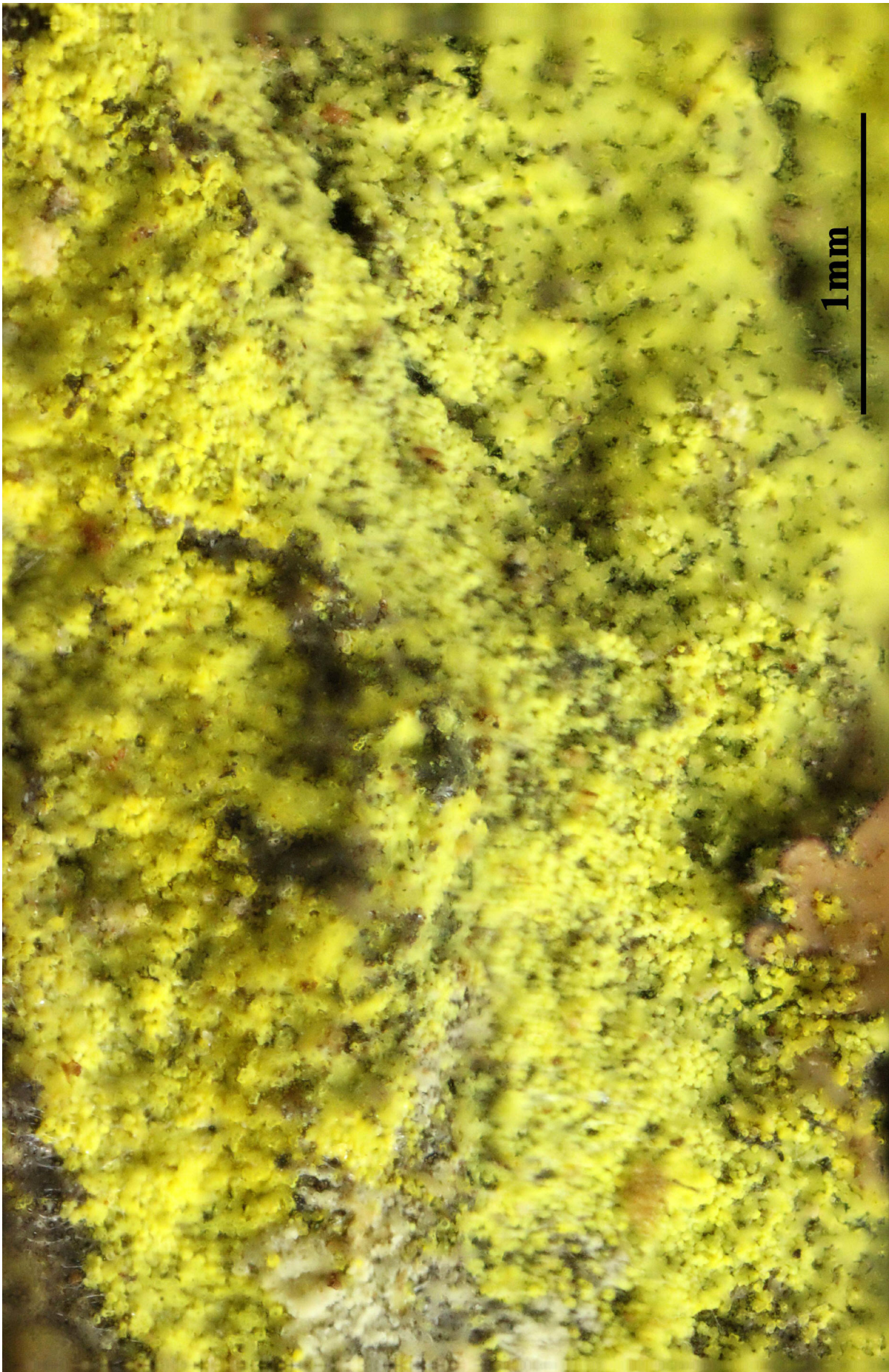
Thallus leprose, woolly-textured, poorly delimited, usually thin (less than 0.4 mm thick), sometimes of scattered granules, but usually continuous to rarely cracked, covering rather large surfaces, bright lemon-yellow, golden yellow, greenish yellow in very shaded situations, sometimes tinged orange on old bark, consisting of a mass of fine soredia-like granules measuring (10-)25-50(-100) µm; medulla usually not evident, in thick thalli sometimes indistinctly present, yellow. Apothecia very rare, biatorine, 0.2-0.5 mm across, round or angular, with a flat to slightly convex, pale orange-yellow, often yellow-pruinose disc, and a thin, ecorticate, soon excluded proper margin. Proper exciple poorly developed, up to 10 µm thick; epithecium colourless, up to 18 µm high; hymenium colourless, up to 50 µm high; paraphysoids 1-1.5 µm thick, richly branched and anastomosing, intertwined in epithecium; hypothecium colourless, poorly developed. Asci 8-spored, clavate, with a K/I+ blue layer between the two walls which is thicker in the apical part, becoming more diffuse downwardly. Ascospores (1-)3-septate, constricted in the middle septum, hyaline, 9-14 x c. 3 µm. Photobiont chlorococcoid. Spot tests: K- or K+ faintly orange, C-, KC- or KC+ faintly orange, P- or P+ faintly orange, UV- or UV+ dull orange. Chemistry: calycin or pinastric acid, rarely both. - Note: a cool-temperate to circumboreal-montane lichen found on dry, shaded parts of trunks of deciduous and coniferous trees, on faces protected from rain, sometimes on lignum.





*Chrysothrix candelaris*





*Chrysothrix candelaris*



*Chrysothrix candelaris* (L.) J.R. Laundon, Lichenologist 13(2): 110 (1981)  
= *Byssus candelaris* L. 1753

[OH628], Japan. Honshu. Prov. Shinano (Nagano Pref.): Azusayama, Kawakami-mura, Minami- Saku-gun (35°57'59" N, 138°39'38" E) , on trunc of *Larix kaempferi*, 1300m. Leg. H. Kashiwadani (no. 15796), K. Yoshima & M. Sugimoto, 2.4.2017, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 628.

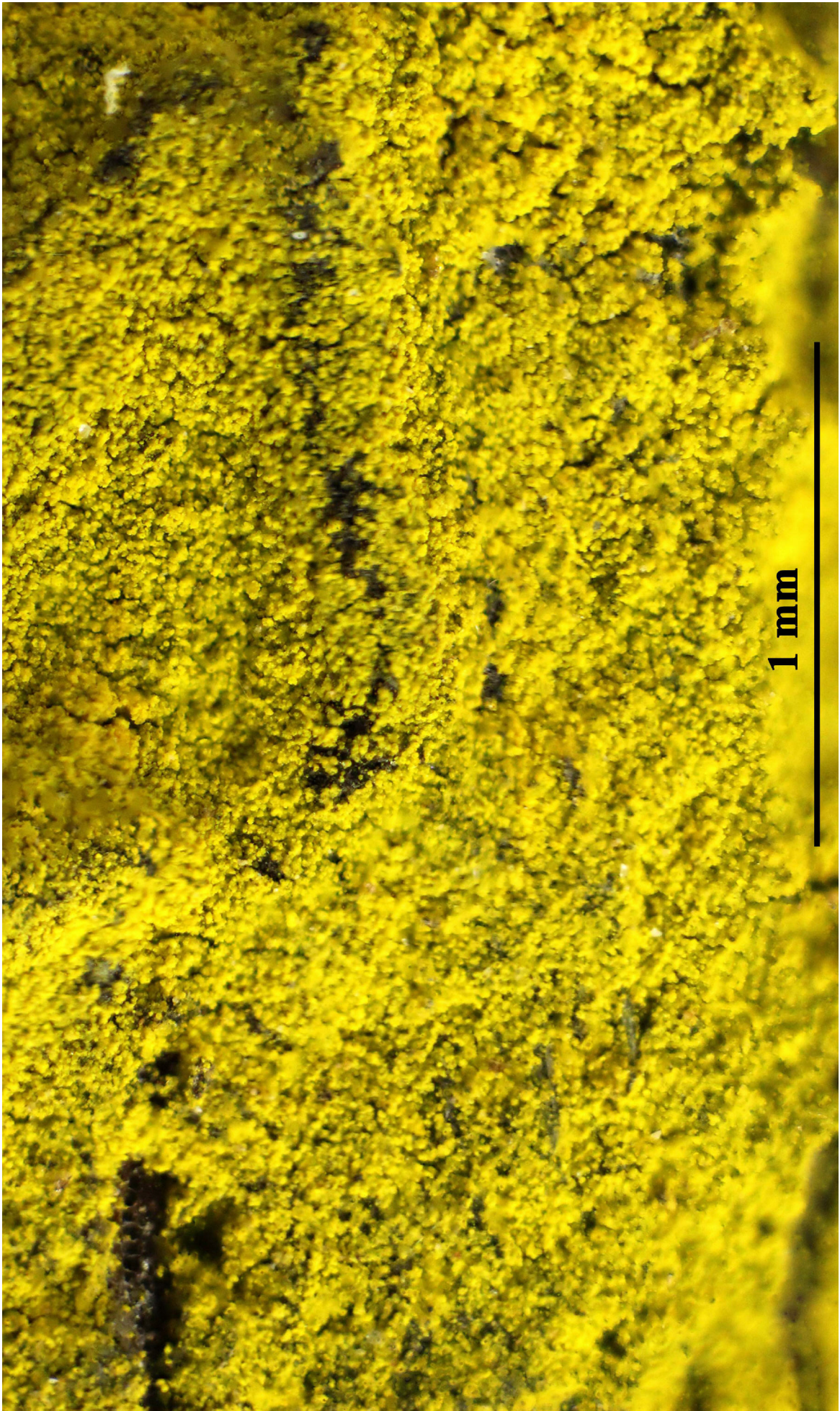
Thallus leprose, woolly-textured, poorly delimited, usually thin (less than 0.4 mm thick), sometimes of scattered granules, but usually continuous to rarely cracked, covering rather large surfaces, bright lemon-yellow, golden yellow, greenish yellow in very shaded situations, sometimes tinged orange on old bark, consisting of a mass of fine soredia-like granules measuring (10-)25-50(-100)  $\mu\text{m}$ ; medulla usually not evident, in thick thalli sometimes indistinctly present, yellow. Apothecia very rare, biatorine, 0.2-0.5 mm across, round or angular, with a flat to slightly convex, pale orange-yellow, often yellow-pruinose disc, and a thin, ecorticate, soon excluded proper margin. Proper exciple poorly developed, up to 10  $\mu\text{m}$  thick; epithecium colourless, up to 18  $\mu\text{m}$  high; hymenium colourless, up to 50  $\mu\text{m}$  high; paraphysoids 1-1.5  $\mu\text{m}$  thick, richly branched and anastomosing, intertwined in epithecium; hypothecium colourless, poorly developed. Asci 8-spored, clavate, with a K/I+ blue layer between the two walls which is thicker in the apical part, becoming more diffuse downwardly. Ascospores (1-)3-septate, constricted in the middle septum, hyaline, 9-14 x c. 3  $\mu\text{m}$ . Photobiont chlorococcoid. Spot tests: K- or K+ faintly orange, C-, KC- or KC+ faintly orange, P- or P+ faintly orange, UV- or UV+ dull orange. Chemistry: calycin or pinastric acid, rarely both. - Note: a cool-temperate to circumboreal-montane lichen found on dry, shaded parts of trunks of deciduous and coniferous trees, on faces protected from rain, sometimes on lignum.





*Chrysothrix candelaris*





*Chrysothrix candelaris*



*Cladia aggregata* (Sw.) Nyl., Bull. Soc. linn. Normandie, sér. 2 4(2): 167 (1870)  
= *Lichen aggregatus* Sw. 1788

[KU206], Japan. Honshu. Prov Mikawa: Chiiwa Gorge, Minami-Shidara-gun. On rock, 500 m. Leg. S. Kurokawa (no. 71173), 25.10.1971, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 206.

Pseudopodetia 1–8 cm tall, hollow, fragile when dry, green through shades of cream, straw, brown to almost black. Sterile pseudopodetia horny, rigid when dry, extremely variable in size, from 0.5–8 mm wide, dichotomously or irregularly branched, flexuose, prostrate or ascending, sometimes smaller branches terminating in cilia-like spines. Fertile pseudopodetia much thicker and taller than sterile pseudopodetia, usually more perforate and more branched towards apex. Apothecia solitary or tiered, to 0.3 mm wide; disc slightly concave to flat, matt, brownish black to black. Ascospores  $12\text{--}15 \times 4\text{--}5 \mu\text{m}$ . Pycnidia ellipsoidal,  $320 \times 120 \mu\text{m}$ . Conidia  $5 \times 1 \mu\text{m}$ . CHEMISTRY: thallus K-, C-, KC-, P-. Barbatic, 4-O-demethylbarbatic, fumarprotocetraric, ursolic acids, unknown triterpenes and 13 unidentified products. Occurs in Hawaii, Asia, South America and South Africa. Tolerant of a wide range of habitats; often growing on rotten wood, and also often epiphytic.





*Cladia aggregata*





*Cladia aggregata*



*Cladia aggregata* (Sw.) Nyl., Bull. Soc. linn. Normandie, sér. 2 4(2): 167 (1870)  
= *Lichen aggregatus* Sw. 1788

[OH629], Japan. Honshu. Prov. Bizen (Okayama Pref.) Ohatahara, Wake-cho, Wake-gun (34°48'45" N, 134°09'07" E). On humus, 209 m. Leg. M. Sugimoto (no. 591), 19.3.2019, det. M. Sugimoto & Y. Ohmura. EX Y, OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 629.

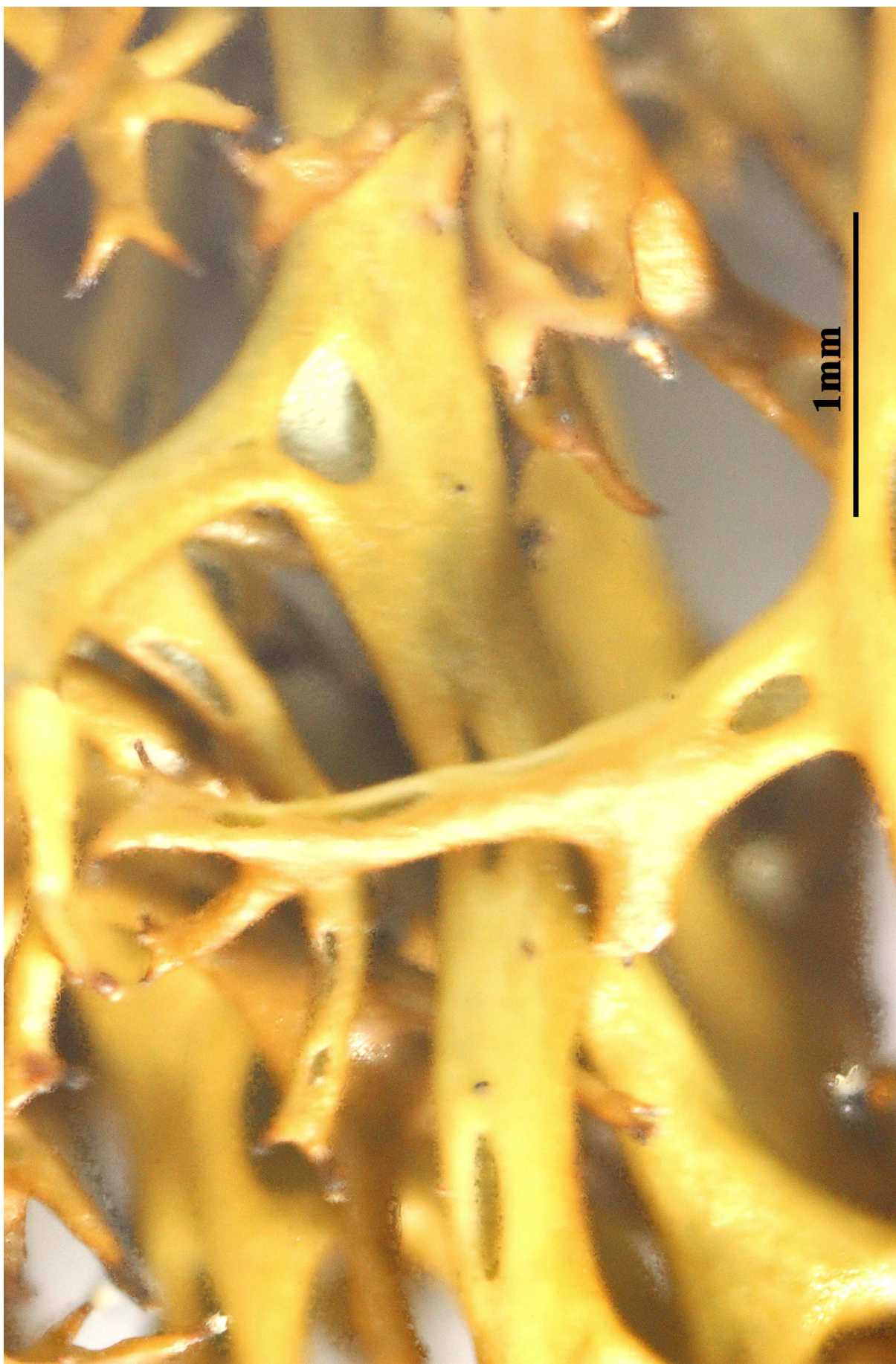
Pseudopodetia 1–8 cm tall, hollow, fragile when dry, green through shades of cream, straw, brown to almost black. Sterile pseudopodetia horny, rigid when dry, extremely variable in size, from 0.5–8 mm wide, dichotomously or irregularly branched, flexuose, prostrate or ascending, sometimes smaller branches terminating in cilia-like spines. Fertile pseudopodetia much thicker and taller than sterile pseudopodetia, usually more perforate and more branched towards apex. Apothecia solitary or tiered, to 0.3 mm wide; disc slightly concave to flat, matt, brownish black to black. Ascospores 12–15 × 4–5 µm. Pycnidia ellipsoidal, 320 × 120 µm. Conidia 5 × 1 µm. CHEMISTRY: thallus K-, C-, KC-, P-. Barbatic, 4-O-demethylbarbatic, fumarprotocetraric, ursolic acids, unknown triterpenes and 13 unidentified products. Occurs in Hawaii, Asia, South America and South Africa. Tolerant of a wide range of habitats; often growing on rotten wood, and also often epiphytic.





*Cladia aggregata*





*Cladia aggregata*



*Cladia aggregata* (Sw.) Nyl., Bull. Soc. linn. Normandie, sér. 2 4(2): 167  
(1870)  
= *Lichen aggregatus* Sw. 1788

[OH378], Japan. Honshu. Prov. Settsu (Pref. Hyogo): Nishi-Rokko, Mt. Rokko. On soil. Leg. H. Muroi, 1.8.1956, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 378.

Pseudopodetia 1–8 cm tall, hollow, fragile when dry, green through shades of cream, straw, brown to almost black. Sterile pseudopodetia horny, rigid when dry, extremely variable in size, from 0.5–8 mm wide, dichotomously or irregularly branched, flexuose, prostrate or ascending, sometimes smaller branches terminating in cilia-like spines. Fertile pseudopodetia much thicker and taller than sterile pseudopodetia, usually more perforate and more branched towards apex. Apothecia solitary or tiered, to 0.3 mm wide; disc slightly concave to flat, matt, brownish black to black. Ascospores  $12\text{--}15 \times 4\text{--}5 \mu\text{m}$ . Pycnidia ellipsoidal,  $320 \times 120 \mu\text{m}$ . Conidia  $5 \times 1 \mu\text{m}$ . CHEMISTRY: thallus K-, C-, KC-, P-. Barbatic, 4-O-demethylbarbatic, fumarprotocetraric, ursolic acids, unknown triterpenes and 13 unidentified products. Occurs in Hawaii, Asia, South America and South Africa. Tolerant of a wide range of habitats; often growing on rotten wood, and also often epiphytic.





*Cladia aggregata*





*Cladia aggregata*

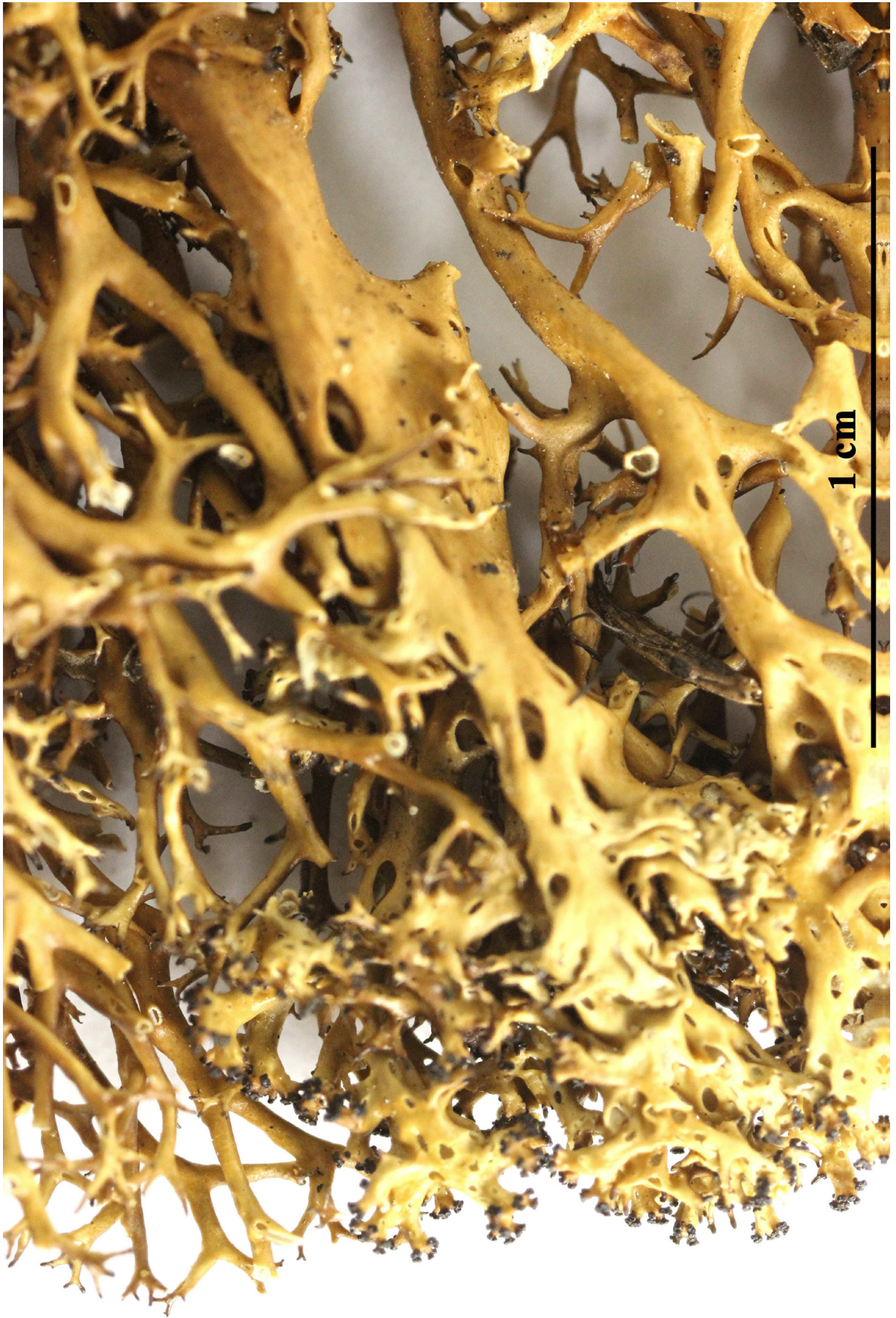


*Cladia aggregata* (Sw.) Nyl., Bull. Soc. linn. Normandie, sér. 2 4(2): 167 (1870)  
= *Lichen aggregatus* Sw. 1788

[KU257], Japan. Honshu. Prov. Settsu : Mt. Sushio-yama. Rokko Mts. On soil, 620 m. Leg. H. Kashiwadani (no. 13209), 28.12.1975, det H. Kashiwadani. EX S. KUOKAWA LICHENES RARIORES ET CRITICI EX-SICCATI NR. 257.

Pseudopodetia 1–8 cm tall, hollow, fragile when dry, green through shades of cream, straw, brown to almost black. Sterile pseudopodetia horny, rigid when dry, extremely variable in size, from 0.5–8 mm wide, dichotomously or irregularly branched, flexuose, prostrate or ascending, sometimes smaller branches terminating in cilia-like spines. Fertile pseudopodetia much thicker and taller than sterile pseudopodetia, usually more perforate and more branched towards apex. Apothecia solitary or tiered, to 0.3 mm wide; disc slightly concave to flat, matt, brownish black to black. Ascospores  $12\text{--}15 \times 4\text{--}5 \mu\text{m}$ . Pycnidia ellipsoidal,  $320 \times 120 \mu\text{m}$ . Conidia  $5 \times 1 \mu\text{m}$ . CHEMISTRY: thallus K-, C-, KC-, P-. Barbatic, 4-O-demethylbarbatic, fumarprotocetraric, ursolic acids, unknown triterpenes and 13 unidentified products. Occurs in Hawaii, Asia, South America and South Africa. Tolerant of a wide range of habitats; often growing on rotten wood, and also often epiphytic.





*Cladia aggregata*





*Cladia aggregata*



*Cladia aggregata* (Sw.) Nyl., Bull. Soc. linn. Normandie, sér. 2 4(2): 167 (1870)  
= *Lichen aggregatus* Sw. 1788

[KU354], Japan. Izu Islands: Mt. Tenjo, Kohzu-shima Island. On soil, 520 m. Leg. H. Kashiwadani (no. 14225), 9.3.1978, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI KICHENES RARIORES ET CRITICI EXSICCATI NR. 354.

Pseudopodetia 1–8 cm tall, hollow, fragile when dry, green through shades of cream, straw, brown to almost black. Sterile pseudopodetia horny, rigid when dry, extremely variable in size, from 0.5–8 mm wide, dichotomously or irregularly branched, flexuose, prostrate or ascending, sometimes smaller branches terminating in cilia-like spines. Fertile pseudopodetia much thicker and taller than sterile pseudopodetia, usually more perforate and more branched towards apex. Apothecia solitary or tiered, to 0.3 mm wide; disc slightly concave to flat, matt, brownish black to black. Ascospores  $12\text{--}15 \times 4\text{--}5 \mu\text{m}$ . Pycnidia ellipsoidal,  $320 \times 120 \mu\text{m}$ . Conidia  $5 \times 1 \mu\text{m}$ . CHEMISTRY: thallus K-, C-, KC-, P-. Barbatic, 4-O-demethylbarbatic, fumarprotocetraric, ursolic acids, unknown triterpenes and 13 unidentified products. Occurs in Hawaii, Asia, South America and South Africa. Tolerant of a wide range of habitats; often growing on rotten wood, and also often epiphytic.





*Cladia aggregata*





*Cladia aggregata*

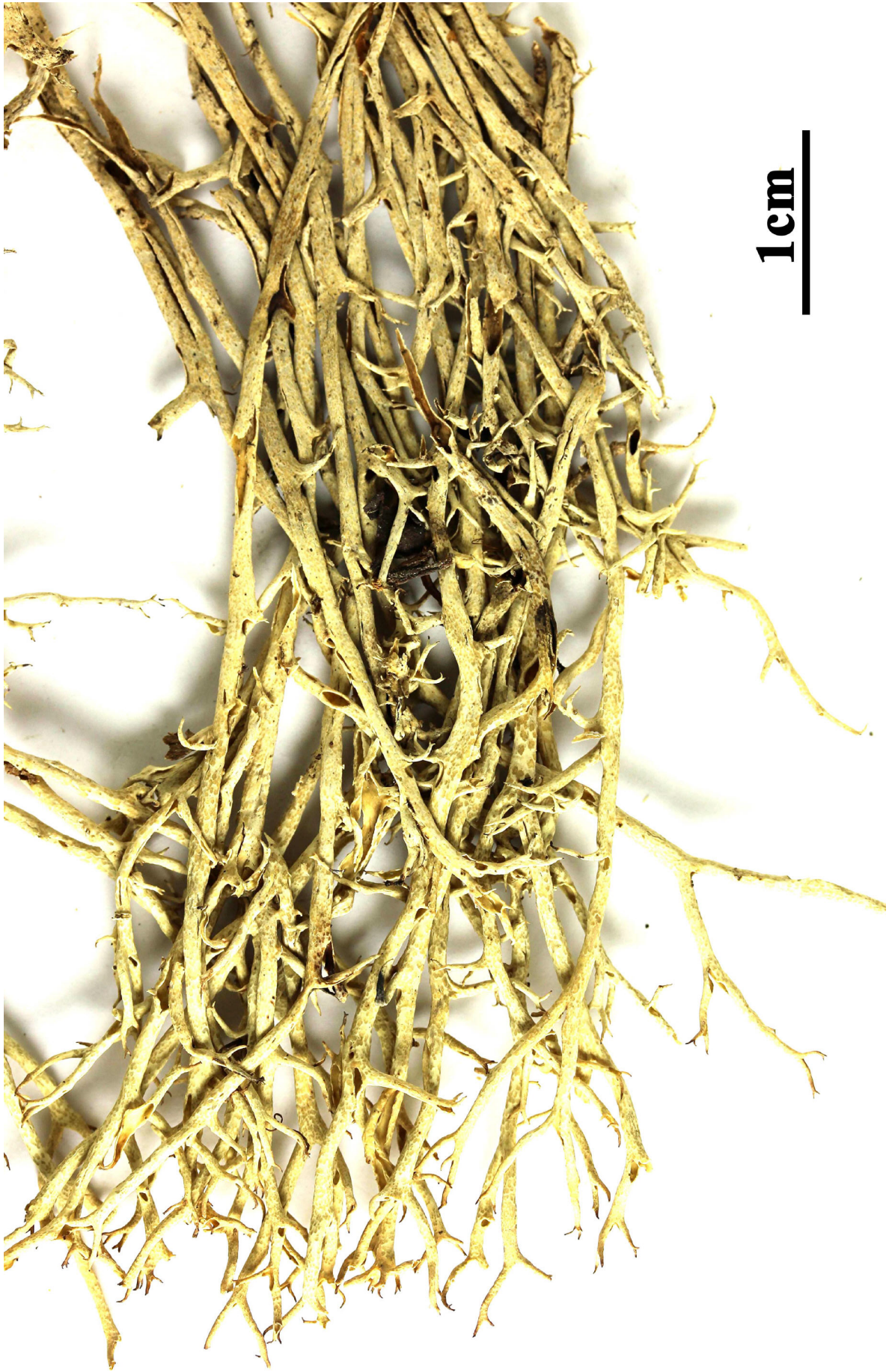


*Cladonia amaurocraea* (Flörke) Schaer., Enum. critic. lich. europ. (Bern):  
197 (1850)  
= *Capitularia amaurocraea* Flörke 1810

[KU463], Japan. Hokkaido. Prov. Tokachi: Mt. Goshiki, Daisetsu Mts. Among mosses, 1860 m. Leg. H. Kashiwadani (no. 16491) and Y. Endo, 7.8.1980, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 463.

Primary thallus ephemeral and rarely seen, of small, crenate to incised, up to 1.5 mm broad and long squamules. Podetia hollow inside, yellowish green to yellowish grey, non-squamulose, to 12(-15) cm tall and up to 1.5(-3) mm thick, not melanotic at base, more or less anisotomic dichotomously branched, often forming large tufts, the tips of branchlets often brownish, pointed or terminating in narrow cups which flare rapidly, the cups perforate or closed, often with thorn-like brownish lateral projections. Axils mostly closed, more rarely slightly perforated; internal surface of podetia striated. Apothecia rare, brown to yellowish brown, convex. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, Cladonia-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed in the tips of podetia or along the margins of cups; pycnidial jelly colourless. Conidia hyaline, curved, rarely cylindrical. Photobiont chlorococcoid. Spot tests: K-, C-, KC+ yellowish, P-, UV-. Chemistry: usnic, barbatic and 4-O-demethylbarbatic acids. - Note: a circumpolar, boreal-subarctic-subalpine lichen found on acid soil and bryophytes in open habitats, mostly in sites with a long snow lie near and above treeline.





*Cladonia amaurocraea*





*Cladonia amaurocraea*



*Cladonia amaurocraea* (Flörke) Schaer., Enum. critic. lich. europ. (Bern):  
197 (1850)  
= *Capitularia amaurocraea* Flörke 1810

[OH678], Japan. Honshu. Rikuchu Prov. (Iwate Pref.): On the summit of Mt. Hayachine, 1900 m. Leg. S. Kurokawa (no. 67142A), 27.7.1967, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCAT NR. 678.

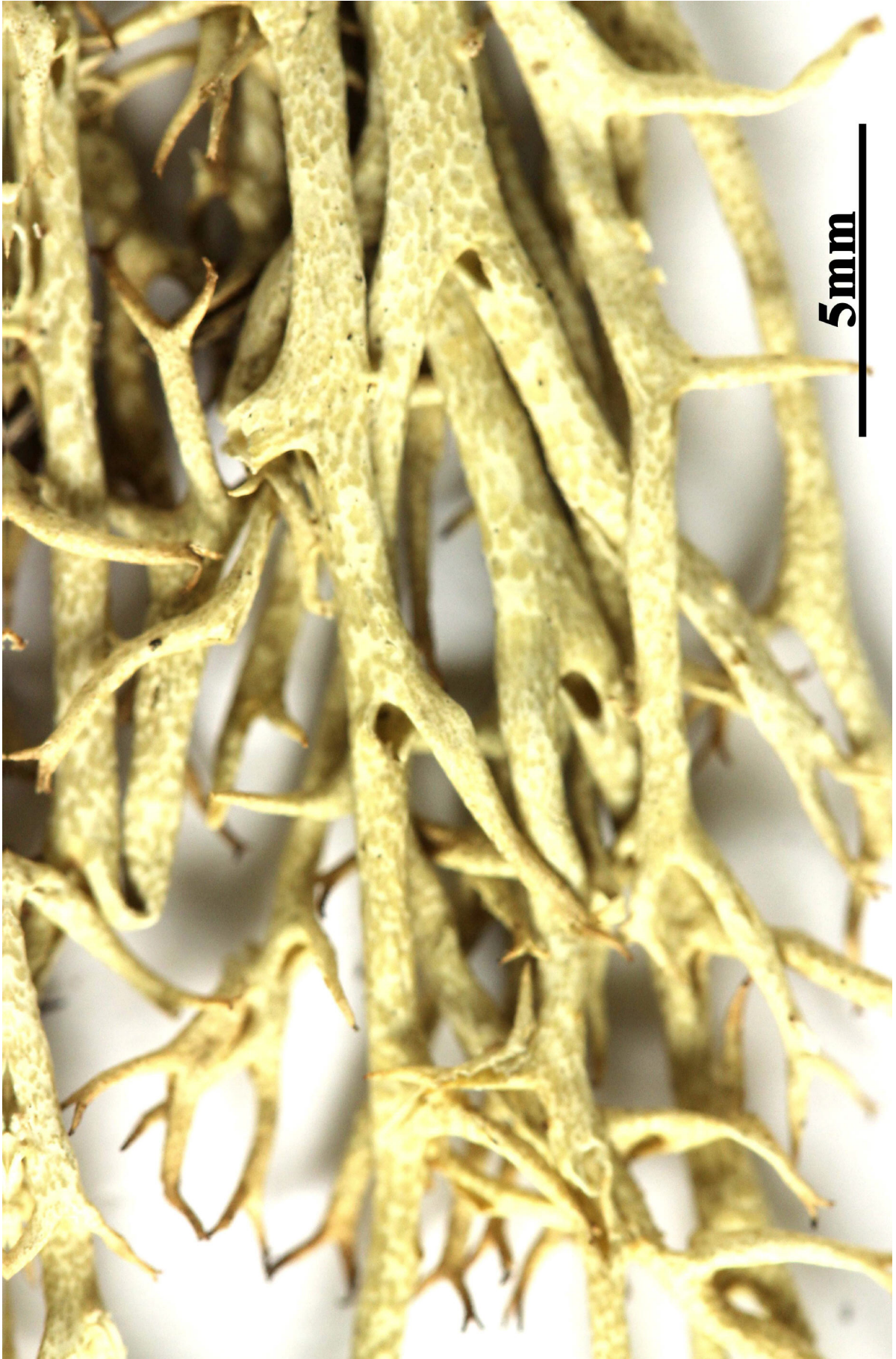
Primary thallus ephemeral and rarely seen, of small, crenate to incised, up to 1.5 mm broad and long squamules. Podetia hollow inside, yellowish green to yellowish grey, non-squamulose, to 12(-15) cm tall and up to 1.5(-3) mm thick, not melanotic at base, more or less anisotomic dichotomously branched, often forming large tufts, the tips of branchlets often brownish, pointed or terminating in narrow cups which flare rapidly, the cups perforate or closed, often with thorn-like brownish lateral projections. Axils mostly closed, more rarely slightly perforated; internal surface of podetia striated. Apothecia rare, brown to yellowish brown, convex. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, Cladonia-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed in the tips of podetia or along the margins of cups; pycnidial jelly colourless. Conidia hyaline, curved, rarely cylindrical. Photobiont chlorococcoid. Spot tests: K-, C-, KC+ yellowish, P-, UV-. Chemistry: usnic, barbatic and 4-O-demethylbarbatic acids. - Note: a circumpolar, boreal-subarctic-subalpine lichen found on acid soil and bryophytes in open habitats, mostly in sites with a long snow lie near and above treeline.





*Cladonia amaurocraea*





*Cladonia amaurocraea*

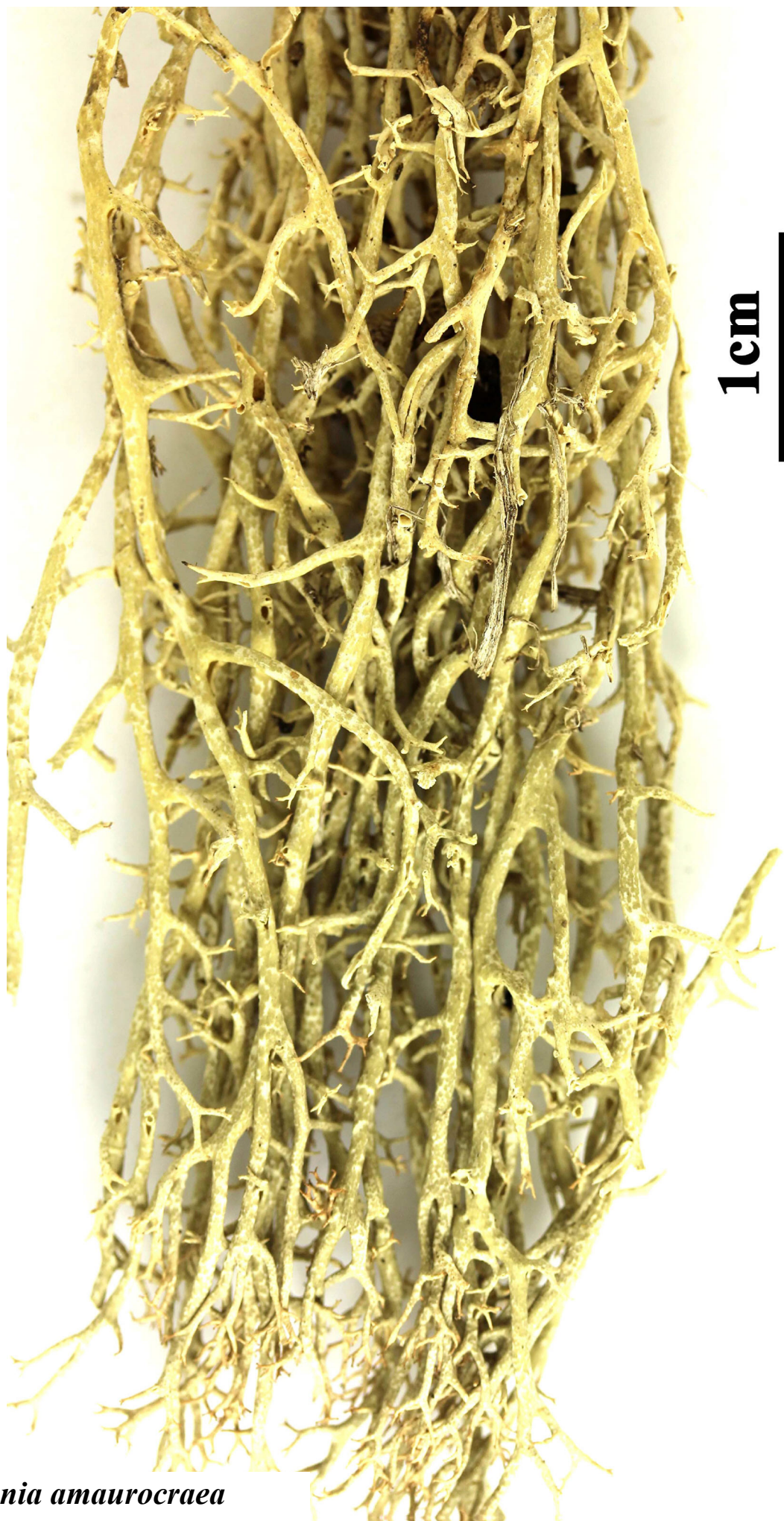


*Cladonia amaurocraea* (Flörke) Schaer., Enum. critic. lich. europ. (Bern):  
197 (1850)  
= *Capitularia amaurocraea* Flörke 1810

[OH578], Russia. Primorsky Territory: 19 km ESE of Monakino, Partizansky District (43°20'32" N, 133°39'18" E). On humus, 1600 m. Leg. Y. Ohmura (no. 11678), 12.9.2014, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI NR. 578.

Primary thallus ephemeral and rarely seen, of small, crenate to incised, up to 1.5 mm broad and long squamules. Podetia hollow inside, yellowish green to yellowish grey, non-squamulose, to 12(-15) cm tall and up to 1.5(-3) mm thick, not melanotic at base, more or less anisotomic dichotomously branched, often forming large tufts, the tips of branchlets often brownish, pointed or terminating in narrow cups which flare rapidly, the cups perforate or closed, often with thorn-like brownish lateral projections. Axils mostly closed, more rarely slightly perforated; internal surface of podetia striated. Apothecia rare, brown to yellowish brown, convex. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed in the tips of podetia or along the margins of cups; pycnidial jelly colourless. Conidia hyaline, curved, rarely cylindrical. Photobiont chlorococcoid. Spot tests: K-, C-, KC+ yellowish, P-, UV-. Chemistry: usnic, barbatic and 4-O-demethylbarbatic acids. - Note: a circumpolar, boreal-subarctic-subalpine lichen found on acid soil and bryophytes in open habitats, mostly in sites with a long snow lie near and above treeline.





*Cladonia amaurocraea*





*Cladonia amaurocraea*



*Cladonia amaurocraea* (Flörke) Schaer., Enum. critic. lich. europ. (Bern):  
197 (1850)  
= *Capitularia amaurocraea* Flörke 1810

[KU207}, Japan. Honshu. Prov. Kai: Mt. Komatsu-dake, Kaikomaga-dake Mts, Kita-Koma-gun. On soil, 2650 m. Leg. H. Shibuichi (no. 5010), 16.8.1974, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIOREA ET CRITICI EXSICCATI N. 207.

Primary thallus ephemeral and rarely seen, of small, crenate to incised, up to 1.5 mm broad and long squamules. Podetia hollow inside, yellowish green to yellowish grey, non-squamulose, to 12(-15) cm tall and up to 1.5(-3) mm thick, not melanotic at base, more or less anisotomic dichotomously branched, often forming large tufts, the tips of branchlets often brownish, pointed or terminating in narrow cups which flare rapidly, the cups perforate or closed, often with thorn-like brownish lateral projections. Axils mostly closed, more rarely slightly perforated; internal surface of podetia striated. Apothecia rare, brown to yellowish brown, convex. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, Cladonia-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed in the tips of podetia or along the margins of cups; pycnidial jelly colourless. Conidia hyaline, curved, rarely cylindrical. Photobiont chlorococcoid. Spot tests: K-, C-, KC+ yellowish, P-, UV-. Chemistry: usnic, barbatic and 4-0-demethylbarbatic acids. - Note: a circumpolar, boreal-subarctic-subalpine lichen found on acid soil and bryophytes in open habitats, mostly in sites with a long snow lie near and above treeline.





*Cladonia amaurocraea*





*Cladonia amaurocraea*



*Cladonia anomaea* (Ach.) Ahti & P. James, in Ahti, Lichenologist 12(1): 128 (1980)

= *Baeomyces anomaeus* Ach. 1803

= *Cladonia ramulosa* (With.) J.R. Laundon, Lichenologist 16(3): 225 (1984)

[KU606], Japan. Kyushu. Prov. Satsuma: Sen-nin-iwa, Kanmuridake, Kushikino. On rocks, 200 m. Leg. H. Kashiwadani (no. 30525), 16.2.1984, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWASANI LICHENES RARIORES ET CRITICI NR. 606.

Chemistry anal P. Dippl, 8.12.1985, Fumarprotocetraric acid, Protocetraric acid, Homosekikaic, secikaic, 4-O-Methylnorhomosekikaic, acid, physodalic acid, Malonprotocetraric acid ?.

Primary thallus squamulose, persistent or evanescent, the squamules small, 0.5-2(-5) mm long, 0.5-2 mm wide, elongate and deeply indented, fragile, glaucous green to greenish brown above, white beneath, rarely granulose-sorediate. Podetia simple or sparingly branched, hollow inside, greenish brown to brown, 0.5-3(-4) cm tall, 0.5-1(-3) mm thick, with pointed apices or with irregular, dentate and often marginally proliferating, small cups, squamulose-granular to partly decorticated, the areas without cortex usually with corticate granules or squamules, most abundant inside the cups. Apothecia frequent, pale to dark brown, convex, rather small, usually forming glomerules. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, Cladonia-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia developing on basal squamules and along margins of cups, subpedicellate, constricted at base, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ red, UV-. Chemistry: fumarprotocetraric acid complex, occasionally with low amounts of atranorin and zeorin. - Note: a mainly temperate to southern boreal-montane lichen found on epilithic bryophytes, rotting wood and organic soil, most common in upland areas with siliceous substrata. Specimens with delicate podetia with cortex plates detaching from the surface were described as *C. pseudopityrea*, which is distributed in temperate-humid climates of the Mediterranean region (Ahti & Puntillo 1995). However, according to Burgaz & al. (2020), unpublished molecular data do not support the hypothesis that *C. pseudopityrea* is different from *C. ramulosa*, and all European record of the N Ameri-



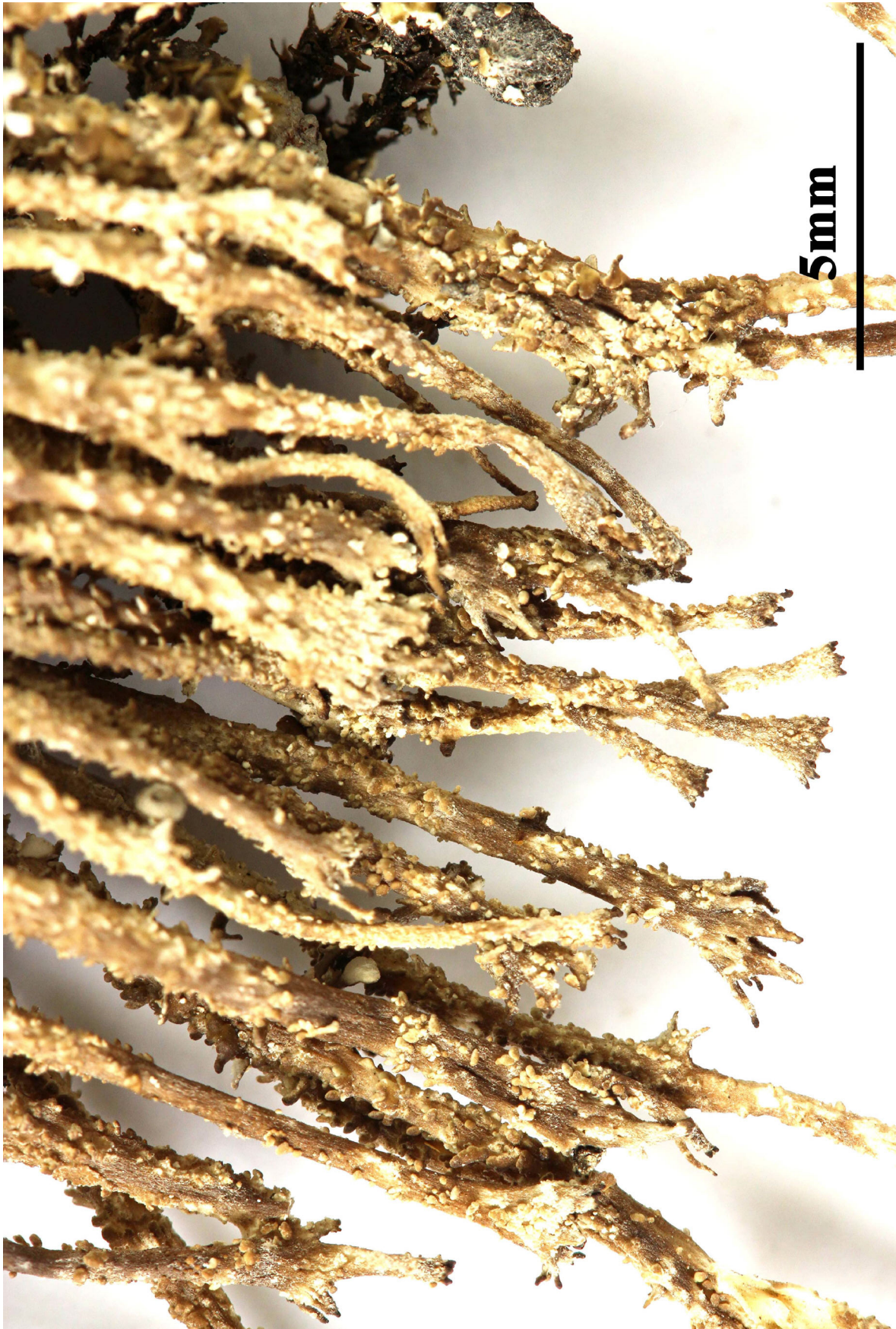
can species *C. prolifica* should be included in the variability of *C. ramulosa*, and European records of *C. prolifica* should be included in the variability of *C. ramulosa*. Primary thallus squamulose, persistent or evanescent, the squamules small, 0.5-2(-5) mm long, 0.5-2 mm wide, elongate and deeply indented, fragile, glaucous green to greenish brown above, white beneath, rarely granulose-soresiate. Podetia simple or sparingly branched, hollow inside, greenish brown to brown, 0.5-3(-4) cm tall, 0.5-1(-3) mm thick, with pointed apices or with irregular, dentate and often marginally proliferating, small cups, squamulose-granular to partly decorticated, the areas without cortex usually with corticate granules or squamules, most abundant inside the cups. Apothecia frequent, pale to dark brown, convex, rather small, usually forming glomerules. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, Cladonia-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia developing on basal squamules and along margins of cups, subpedicellate, constricted at base, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ red, UV-. Chemistry: fumarprotocetraric acid complex, occasionally with low amounts of atranorin and zeorin. - Note: a mainly temperate to southern boreal-montane lichen found on epilithic bryophytes, rotting wood and organic soil, most common in upland areas with siliceous substrata





*Cladonia anomaea*





*Cladonia anomaea*



*Cladonia arbuscula* subsp. *beringiana* Ahti, Ann. bot. Soc. Zool.-Bot. fenn. Vanamo 32(no. 1): 109 (1961)

[KU658], Taiwan. Hwalien: Mt. Hohuan-shan, Hsiulin-gun. On soil, 3100 m. Leg. H. Shibuichi (no. 7960), K. Yoshida & M. Mineta, 31.7.1982, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 658.





*Cladonia arbuscula* subsp. *beringiana*





*Cladonia arbuscula* subsp. *beringiana*



*Cladonia arbuscula* subsp. *beringiana* Ahti, Ann. bot. Soc. Zool.-Bot. fenn. Vanamo 32(no. 1): 109 (1961)

[KU156], Japan. Hokkaido. Prov. Kitami: 2 km nord-east of Hamatom-betsu, Esashi-gun. On soil, 2 m. Leg. S. Kurokawa (no. 70830), 18.8.1970, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 156.





*Cladonia arbuscula* subsp. *beringiana*





*Cladonia arbuscula* subsp. *beringiana*



***Cladonia arbuscula* subsp. *mitis*** (Sandst.) Ruoss, Bot. Helv. 97(2): 260 (1987)

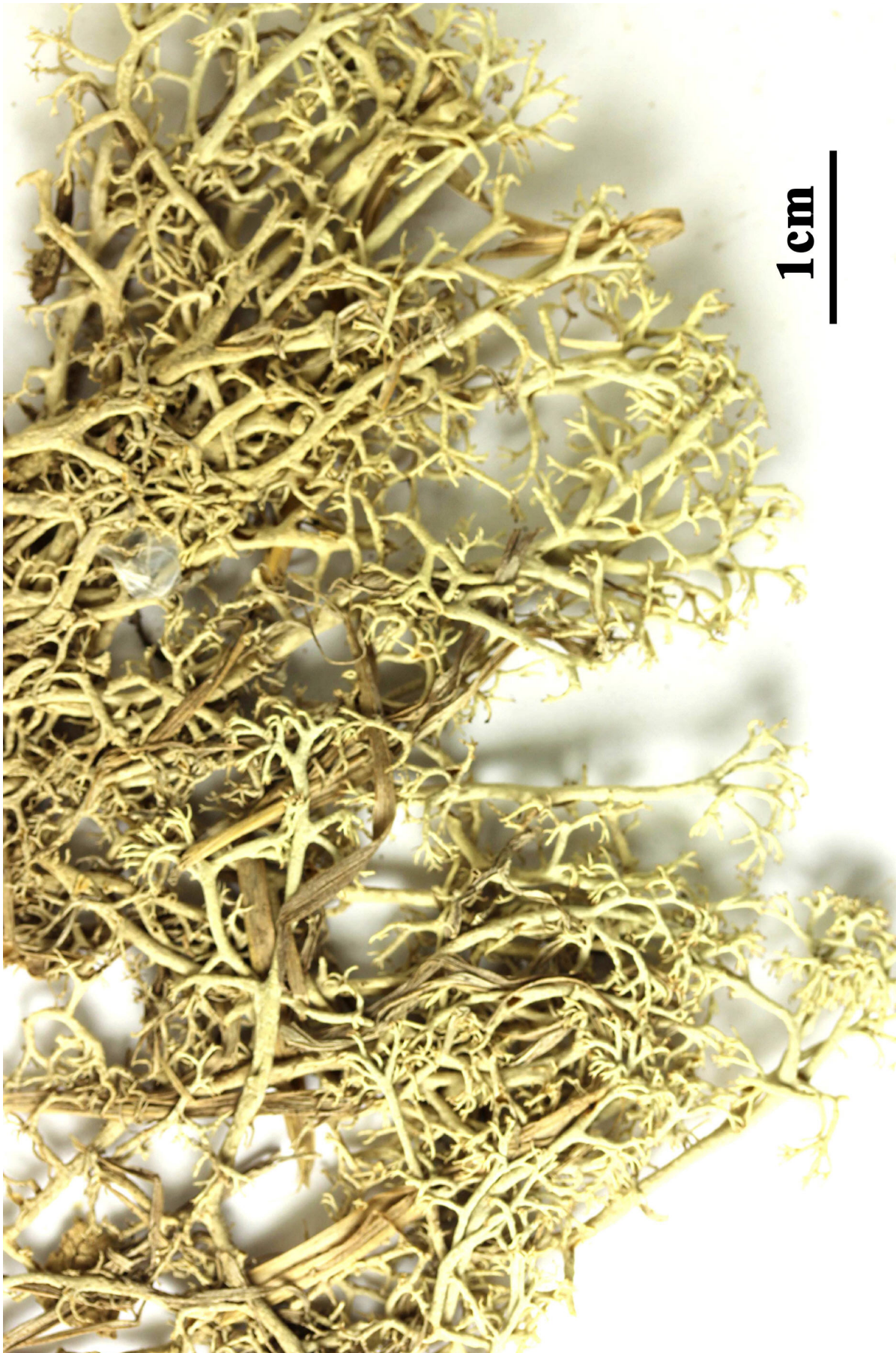
= *Cladonia mitis* Sandst. 1918

= *Cladonia mitis* Sandst., Cladon. Exsicc.: no. 55 (1918)

[OH402], Japan. Honshu. Prov. Rikuchu (Pref. Iwate) Higashihachimantai, Ajiro-cho, Ninohe-gun. On soil, 900 m. Leg. H. Shibuichi (no. 6398), 8.7.1981, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 402.

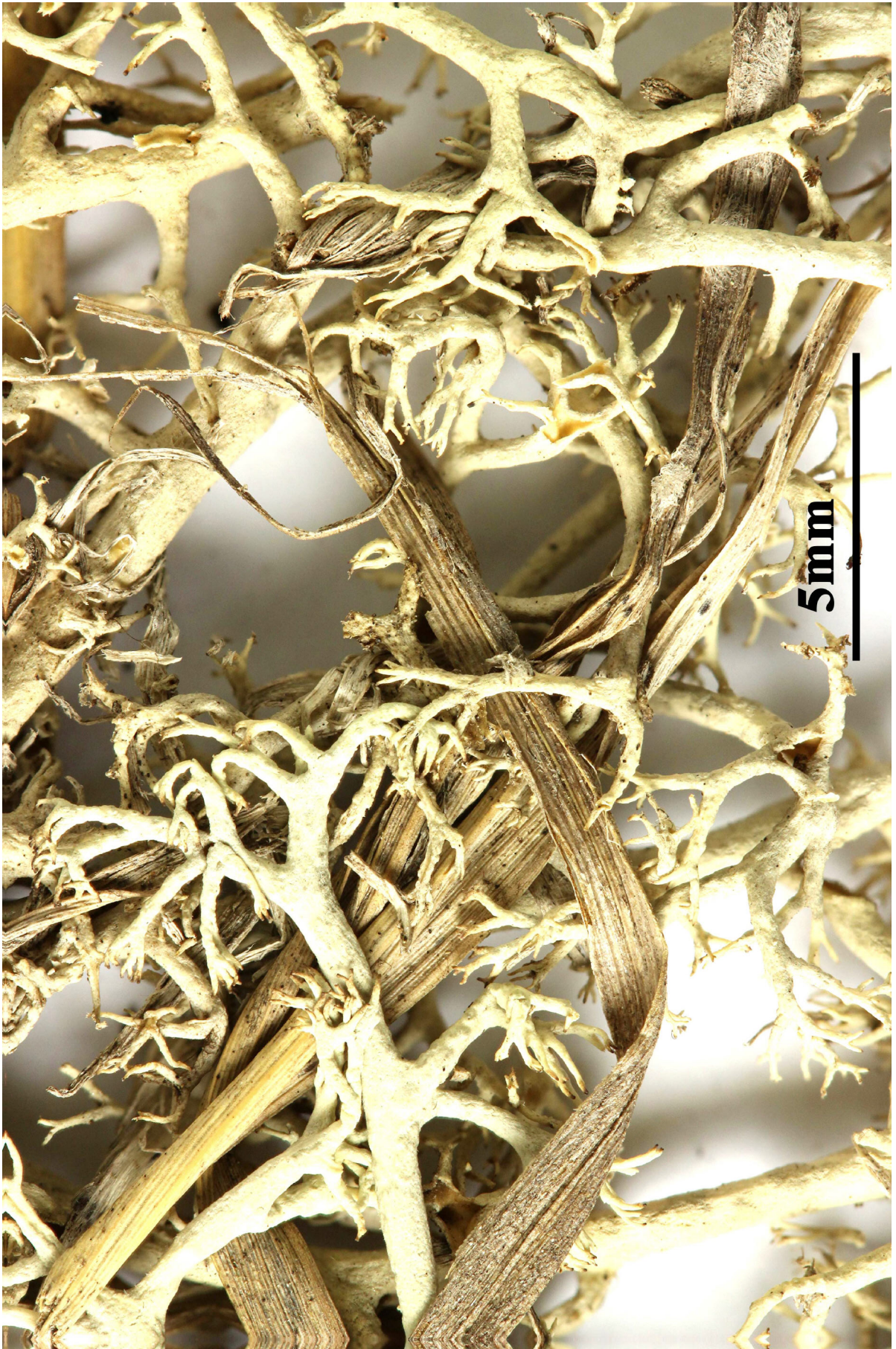
Primary thallus crustose, ephemeral, rarely seen. Podetia shrub-like, hollow inside, esquamulose, ecorticate, the surface compact or finely arachnoid, pale yellowish white, anisotomically (i.e. main branches thicker) mainly trichotomously branched, 4-12 cm tall, the terminal branchlets generally - not always - spreading in all directions, not or only slightly browned at tips. Apothecia rare, brown, convex, very small. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed, on the tips of podetia, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K-, C-, KC+ yellow, P-, UV-. Chemistry: mostly usnic, isousnic, rangiformic and norrangiformic acids; rarely rangiformic acid absent. - Note: a typical member of subalpine-alpine tundras, perhaps more common at higher altitudes than *C. arbuscula*, widespread in the Alps.





*Cladonia arbuscula* subsp. *mitis*





*Cladonia arbuscula* subsp. *mitis*



*Cladonia arbuscula* subsp. *beringiana* Ahti, Ann. bot. Soc. Zool.-Bot. fenn. Vanamo 32(no. 1): 109 (1961)

[KU2458], Canada, British Columbia: On boulder west of railroad, north of Garibaldi. On soil, 50 m. Leg. S. Kurokawa (no. 8617b), 31.8.1974, det. S. Kurokawa. EX S. KUOKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 258.





*Cladonia arbuscula* subsp. *beringiana*





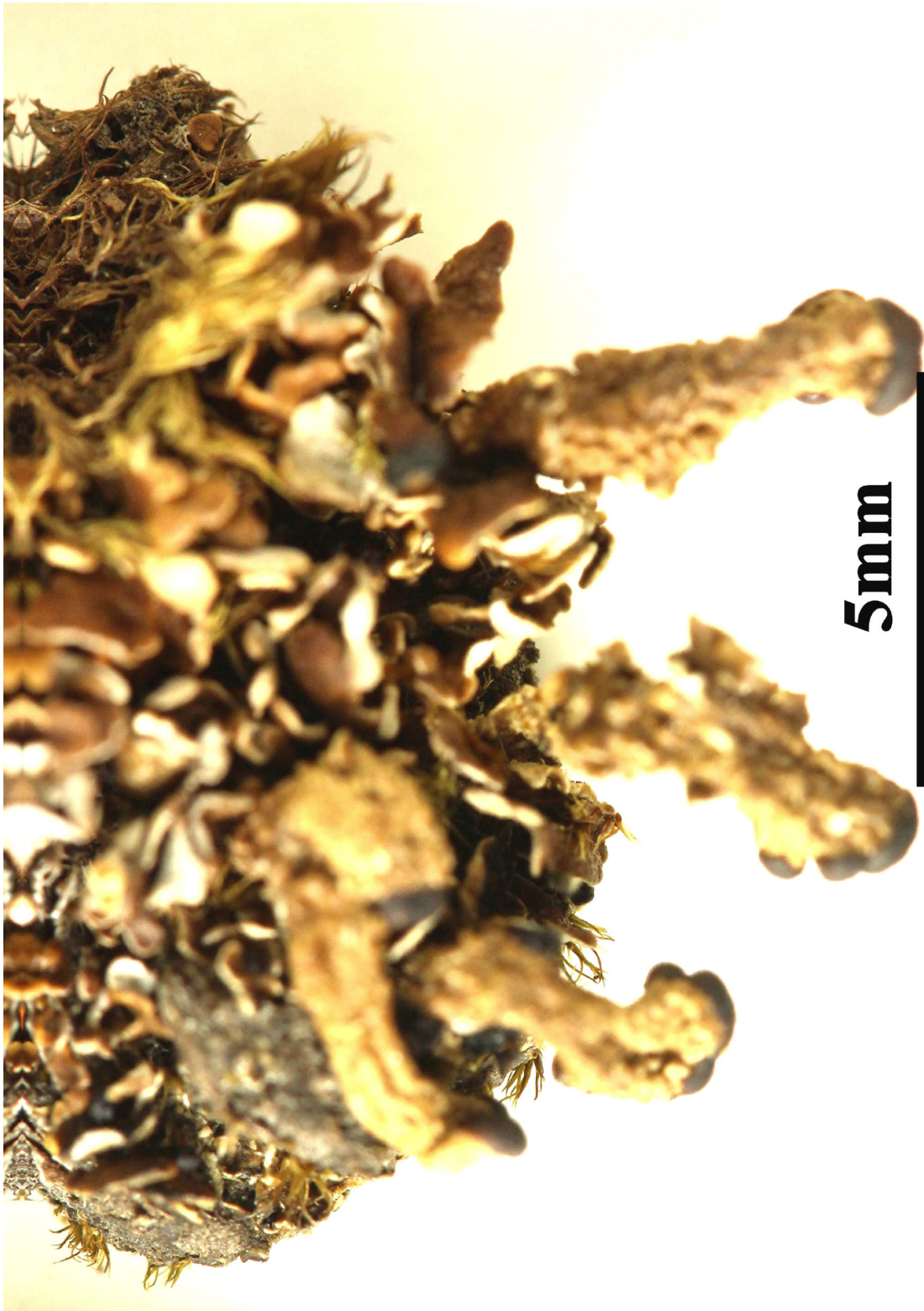
*Cladonia arbuscula* subsp. *beringiana*



*Cladonia brevis* (Sandst.) Sandst., Abh. naturw. Ver. Bremen 25: 192 (1922)  
= *Cladonia verticillata* f. *brevis* Sandst. 1918

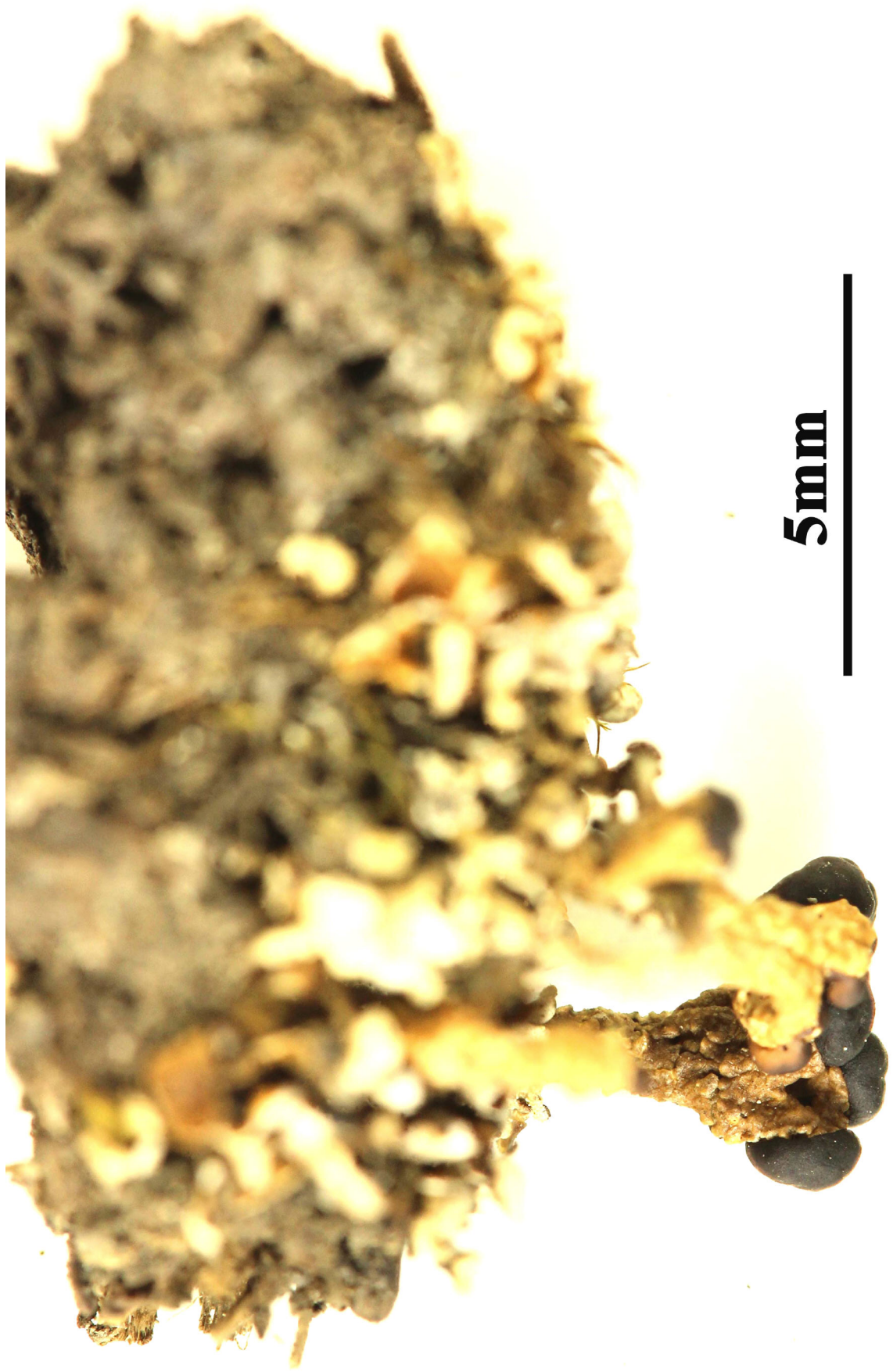
[KU259], Japan. Honshu. Prov. Kai: Motosu, Kamikuishiki-mura, Nishi-Yatsushiro-gun. On straw-thatched roof, 910 m. Leg. H. Kashiwadani (no. 13540) and S. Kurokawa, det. H. Kashiwadani. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 259.





*Cladonia brevis*





*Cladonia brevis*



*Cladonia brevis* (Sandst.) Sandst., Abh. naturw. Ver. Bremen 25: 192 (1922)  
= *Cladonia verticillata* f. *brevis* Sandst. 1918

[KU208], Japan. Hokkaido. Prov. Iburi: Lakeside of Utonaito, Tomakomai City. On soil, 3 m. Leg. H. Kashiwadani (no. 13191), 211.9.1975, det. H. Kashiwadani. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR.208.

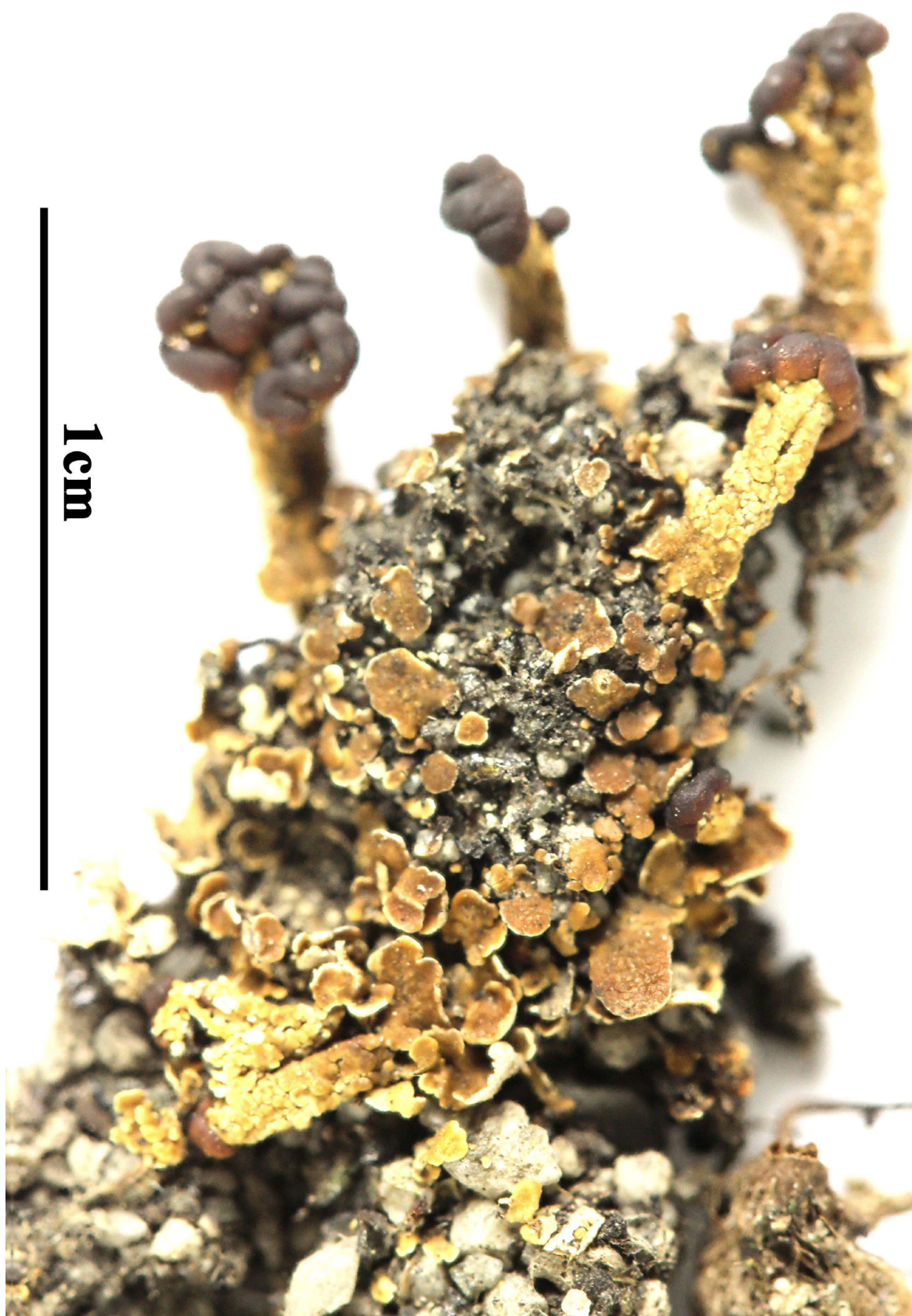
Primary thallus persistent. Squamules small, 1-3 mm long, shallowly lobed, glaucous green to a rich brown (dry), olive-brown (wet) and  $\pm$ cracked on the upper surface, white below with a smooth arachnoid surface, not sorediate. Podetia, appear rare in Britain, to 8 mm in length though sometimes undeveloped, clavate, unbranched or branched near the apex, flattened, the surface corticate and areolate. Apothecia brown, at the tips of podetia. Pycnidia large, black, constricted at the base, on the primary thallus. Thallus Pd+ yellow, K–, KC–, C–, UV– (psoromic and 2'-O-demethylpsoromic acids). *Cladonia brevis* has a scattered distribution in Europe and is more common in North America, though populations lacking podetia are probably overlooked. It is related to the predominantly northern species *C. macrophylla* which has a similar chemistry but much larger squamulose podetia. In the absence of podetia it can be confused with *C. pulvinata* and *C. symphycarpa* which react Pd+ yellow. However, *C. symphycarpa* grows on basic soils, is much larger and is often K+ yellow becoming red or K+ yellow. The squamules of *C. pulvinata* are slightly larger, more lobed, with a strongly tomentose underside and frequently have pruinose tips. For *Cladonia brevis*, the large black pycnidia constricted at the base are highly distinctive (but can be rare or absent) and are absent on other Pd+ yellow *Cladonia* species with small squamules. When glaucous green, the small rounded squamules with smooth white undersides are very similar to those of *Cladonia peziziformis*, but this is Pd+ orange-red. Habitats: Over small stones on soil in old lead mines in mid Wales and the Pennines, on acid humus over gravel on a little used tack in short grazed heathland in the New Forest and in open patches in well grazed heath in the New Forest. Associated with *Cladonia firma*, *Cladonia strepsilis* and *Pycnothelia papillaria* at the New Forest track site. Almost certainly overlooked





*Cladonia brevis*





*Cladonia brevis*



*Cladonia brevis* (Sandst.) Sandst., Abh. naturw. Ver. Bremen 25: 192 (1922)  
= *Cladonia verticillata* f. *brevis* Sandst. 1918

[KU551], Japan. Honshu. Prov. Shinano: Kattsuru, Hiojiri-city, on straw-thatches roof. Leg. H. Kashiwadani (no 23925), 30.10.1986, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI ESICCATI NR. 661.

Primary thallus persistent. Squamules small, 1-3 mm long, shallowly lobed, glaucous green to a rich brown (dry), olive-brown (wet) and  $\pm$ cracked on the upper surface, white below with a smooth arachnoid surface, not soresdiate. Podetia, appear rare in Britain, to 8 mm in length though sometimes undeveloped, clavate, unbranched or branched near the apex, flattened, the surface corticate and areolate. Apothecia brown, at the tips of podetia. Pycnidia large, black, constricted at the base, on the primary thallus. Thallus Pd+ yellow, K-, KC-, C-, UV- (psoromic and 2'-O-demethylpsoromic acids). *Cladonia brevis* has a scattered distribution in Europe and is more common in North America, though populations lacking podetia are probably overlooked. It is related to the predominantly northern species *C. macrophylla* which has a similar chemistry but much larger squamulose podetia. In the absence of podetia it can be confused with *C. pulvinata* and *C. symphycarpa* which react Pd+ yellow. However, *C. symphycarpa* grows on basic soils, is much larger and is often K+ yellow becoming red or K+ yellow. The squamules of *C. pulvinata* are slightly larger, more lobed, with a strongly tomentose underside and frequently have pruinose tips. For *Cladonia brevis*, the large black pycnidia constricted at the base are highly distinctive (but can be rare or absent) and are absent on other Pd+ yellow *Cladonia* species with small squamules. When glaucous green, the small rounded squamules with smooth white undersides are very similar to those of *Cladonia peziziformis*, but this is Pd+ orange-red. Habitats: Over small stones on soil in old lead mines in mid Wales and the Pennines, on acid humus over gravel on a little used tack in short grazed heathland in the New Forest and in open patches in well grazed heath in the New Forest. Associated with *Cladonia firma*, *Cladonia strepsilis* and *Pycnothelia papillaria* at the New Forest track site. Almost certainly overlooked





*Cladonia brevis*



*Cladonia calycantha* Delise ex Nyl., Syn. meth. lich. (Parisiis) 1(2): 192 (1860)

[KU508], Japan. Shikoku. Prov. Awa: Kangase, Kainan-cho, Kaibogun. On soil, 180 m. Leg. H. Kashiwadani (no 24895), 29.3.1978, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 508.

Primary thallus evanescent, consisting of elongate, slightly incised squamules ca. 6 x 0.5 mm, somewhat veined below. Podetia whitish gray, in sun-exposed apical parts strongly browning, 4-12(-15) cm tall (including long-persistent dead basal parts), verticillate-scyphose; scyphi in 6-12(-18) tiers; scyphal plates 2-14 mm wide, 2-3 mm high (flaring very abruptly), incurved or flat when young, recurved when old; margins soon becoming deeply divided into flat to terete teeth 1.5-2 mm long, branching 1-3 times; senile scyphi almost completely split into narrow divisions, or at least fissured; internodes 5-15 mm long, 0.4-1.5 mm thick. Surface of podetia verruculose, areolate-corticate, with many ecorticate cracks and patches, esorediate, matt, clearly tomentulose, rarely squamulose; medulla soon darkening even near podetial tops, especially scyphal teeth, emorient basal parts blackening conspicuously under paler cortical areolae so as to give podetia a checkered appearance. Podetial wall 280-360  $\mu$ m, rather soft; cortex up to 40  $\mu$ m; medulla 160-200  $\mu$ m; stereome 80-120  $\mu$ m, not hard cartilaginous, rather distinctly delimited from medulla; surface of central canal usually strongly minutely papillate. Conidiomata on scyphal margins, subspherical, sessile; containing hyaline slime; conidia 9-11 x 1  $\mu$ m, falciform. Hymenial disks on scyphal margins, with stalks ca. 1 mm long, pale to dark brown; spores oblong, 14-17 x 4-6  $\mu$ m. Chemistry. P+ orange red, K- or K+ red brown. Fumarprotocetraric acid and trace amounts of protocetraric, convirensic (rarely absent), and confumarprotocetraric acids. Distribution: High Andes from Colombia (rare) and southern Ecuador to Bolivia, at altitudes of (1200-)2000-4100 m, growing on soil or rocks.





*Cladonia calycantha*





*Cladonia calycantha*



*Cladonia calycantha* Delise ex Nyl., Syn. meth. lich. (Parisiis) 1(2): 192 (1860)

[KU209], Japan. Honshu. Prov.Kai: Ojira-gawa river, Kita-Koma-gun. On rock (granite), 850 m. Leg. H. Shibuichi (no. 4886) and K. Yoshida, 14.8.1974, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 209.

Primary thallus evanescent, consisting of elongate, slightly incised squamules ca. 6 x 0.5 mm, somewhat veined below. Podetia whitish gray, in sun-exposed apical parts strongly browning, 4-12(-15) cm tall (including long-persistent dead basal parts), verticillate-scyphose; scyphi in 6-12(-18) tiers; scyphal plates 2-14 mm wide, 2-3 mm high (flaring very abruptly), incurved or flat when young, recurved when old; margins soon becoming deeply divided into flat to terete teeth 1.5-2 mm long, branching 1-3 times; senile scyphi almost completely split into narrow divisions, or at least fissured; internodes 5-15 mm long, 0.4-1.5 mm thick. Surface of podetia verruculose, areolate-corticate, with many ecorticate cracks and patches, esorediate, matt, clearly tomentulose, rarely squamulose; medulla soon darkening even near podetial tops, especially scyphal teeth, emorient basal parts blackening conspicuously under paler cortical areolae so as to give podetia a checkered appearance. Podetial wall 280-360  $\mu\text{m}$ , rather soft; cortex up to 40  $\mu\text{m}$ ; medulla 160-200  $\mu\text{m}$ ; stereome 80-120  $\mu\text{m}$ , not hard cartilaginous, rather distinctly delimited from medulla; surface of central canal usually strongly minutely papillate. Conidiomata on scyphal margins, subspherical, sessile; containing hyaline slime; conidia 9-11 x 1  $\mu\text{m}$ , falciform. Hymenial disks on scyphal margins, with stalks ca. 1 mm long, pale to dark brown; spores oblong, 14-17 x 4-6  $\mu\text{m}$ . Chemistry. P+ orange red, K- or K+ red brown. Fumarprotocetraric acid and trace amounts of protocetraric, convirensic (rarely absent), and confumarprotocetraric acids. Distribution: High Andes from Colombia (rare) and southern Ecuador to Bolivia, at altitudes of (1200-)2000-4100 m, growing on soil or rocks.



*Cladonia calycantha*





*Cladonia calycantha*

*Cladonia calycantha* Delise ex Nyl., Syn. meth. lich. (Parisiis) 1(2): 192 (1860)

[KU464], Japan. Honshu. Prov. Kii: Yanoko Pass, Owase-city. On soil, 800 m. Leg. H. Kashiwadani (no 14684), 27.7.1978, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 464.

Primary thallus evanescent, consisting of elongate, slightly incised squamules ca. 6 x 0.5 mm, somewhat veined below. Podetia whitish gray, in sun-exposed apical parts strongly browning, 4-12(-15) cm tall (including long-persistent dead basal parts), verticillate-scyphose; scyphi in 6-12(-18) tiers; scyphal plates 2-14 mm wide, 2-3 mm high (flaring very abruptly), incurved or flat when young, recurved when old; margins soon becoming deeply divided into flat to terete teeth 1.5-2 mm long, branching 1-3 times; senile scyphi almost completely split into narrow divisions, or at least fissured; internodes 5-15 mm long, 0.4-1.5 mm thick. Surface of podetia verruculose, areolate-corticate, with many ecorticate cracks and patches, esorediate, matt, clearly tomentulose, rarely squamulose; medulla soon darkening even near podetial tops, especially scyphal teeth, emorient basal parts blackening conspicuously under paler cortical areolae so as to give podetia a checkered appearance. Podetial wall 280-360  $\mu\text{m}$ , rather soft; cortex up to 40  $\mu\text{m}$ ; medulla 160-200  $\mu\text{m}$ ; stereome 80-120  $\mu\text{m}$ , not hard cartilaginous, rather distinctly delimited from medulla; surface of central canal usually strongly minutely papillate. Conidiomata on scyphal margins, subspherical, sessile; containing hyaline slime; conidia 9-11 x 1  $\mu\text{m}$ , falciform. Hymenial disks on scyphal margins, with stalks ca. 1 mm long, pale to dark brown; spores oblong, 14-17 x 4-6  $\mu\text{m}$ . Chemistry. P+ orange red, K- or K+ red brown. Fumarprotocetraric acid and trace amounts of protocetraric, convirensic (rarely absent), and confumarprotocetraric acids. Distribution: High Andes from Colombia (rare) and southern Ecuador to Bolivia, at altitudes of (1200-)2000-4100 m, growing on soil or rocks.





*Cladonia calycantha*





*Cladonia calycantha*

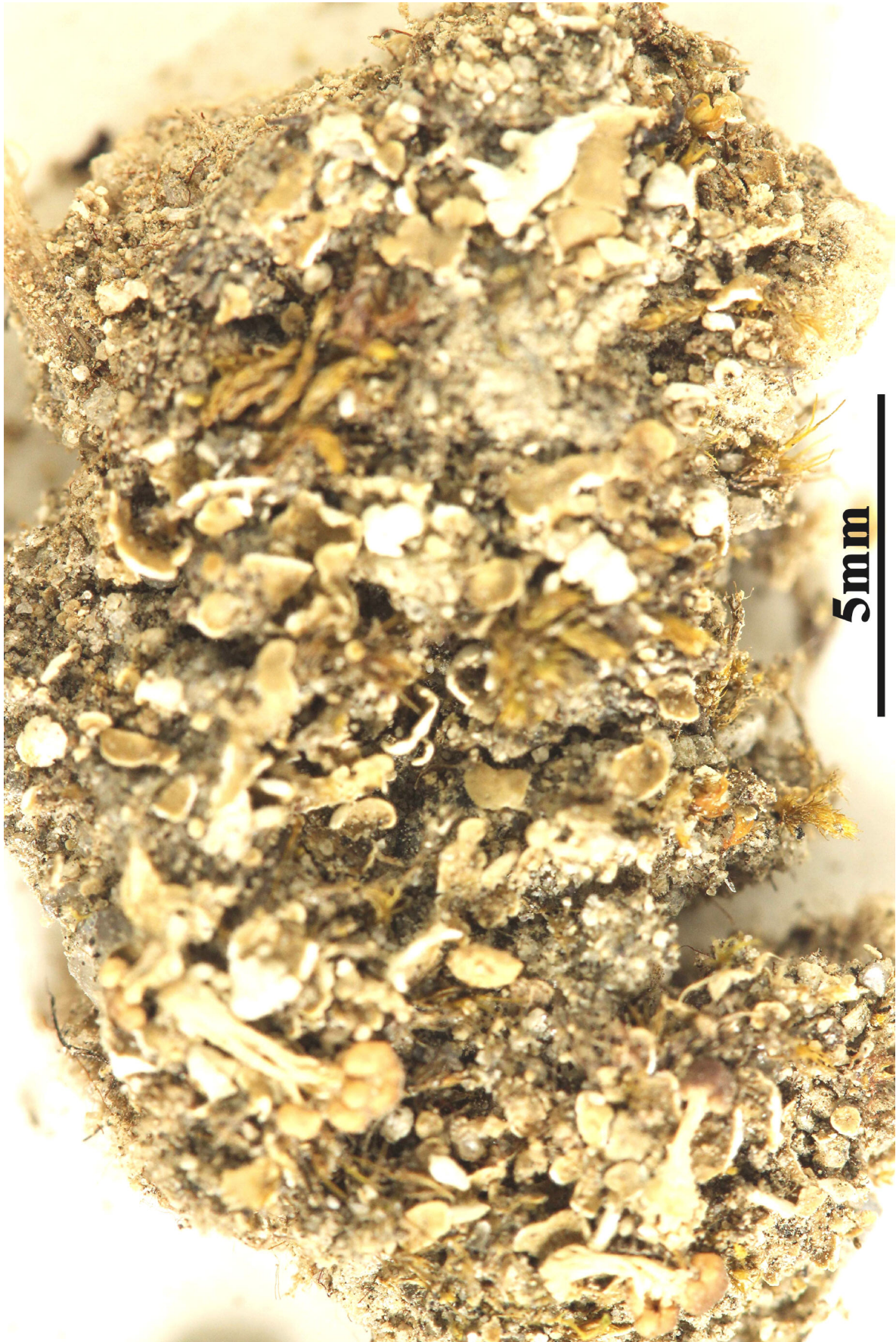


*Cladonia capitata* Spreng., Syst. veg., Edn 16 4(1): 271 (1827)

= *Cladonia peziziformis* (With.) J.R. Laundon, Lichenologist 16(3): 223 (1984)

[KU355], Japan. IzuIslands: Mt. Chichibu, Kohzu-shima Island. On soil, 100 m. Leg. H. Kashiwadani (no.14185), 8.3.1978, det, H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 355.

Primary thallus squamulose, persistent, the squamules very small, 1.2-2 mm long, 1.4-2 mm wide, granule-like to rounded and ear-shaped, with a more or less entire margin, often contiguous and forming flat crusts of convex areoles, yellowish green on upper side, white beneath. Podetia uncommon, pale greenish grey, 0.5-1.5(-2.5) cm tall, 0.3-0.8(-1.5) mm thick, hollow inside, usually simple or with a few apical branchlets, blunt and cupless, longitudinally grooved and cracked, almost continuously areolate-corticate and verruculose, sometimes sparsely squamulose at base. Apothecia frequent, brown, convex, terminal, often coalescing into 1-3 mm wide aggregations. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, Cladonia-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, sessile, developing on the primary squamules, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ rapidly red, UV-. Chemistry: fumarprotocetraric acid complex. - Note: a mainly temperate lichen found on soil in open woodlands (oak, pine) and Calluna-heaths, in areas with siliceous substrata.



*Cladonia capitata*





*Cladonia capitata*

*Cladonia carassensis* subsp. *japonica* (Vain.) Asahina, J. Jap. Bot.  
34(11): 348 (1959)  
= *Cladonia japonica* Vain. 1898

[KU609], Japan. Honshu. Prov. Rikuchu: Goshyogake Hot spring,  
Hachimantai. On soil, 1100 m. Leg. H. Shibuichi (no. 7734), 30.8.1984,  
det. H. Kashiwadani. EX KUROKAWA AND H. KASHIWADANI LICHENES  
RARIORES ET CRITICI EXSICCATI NR. 607.





*Cladonia carassensis* subsp. *japonica*





*Cladonia carassensis* subsp. *japonica*



*Cladonia carassensis* subsp. *japonica* (Vain.) Asahina, J. Jap. Bot.  
34(11): 348 (1959)  
= *Cladonia japonica* Vain. 1898

[KU118], Japan. Honshu. Prov. Mutsu: Lakeside of Usori, Mt. Osorezan. On soil, 220 m. Leg. M. Togashi, 10.1954, det. Y. Asahina. EX KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 118.



*Cladonia carassensis* subsp. *japonica*





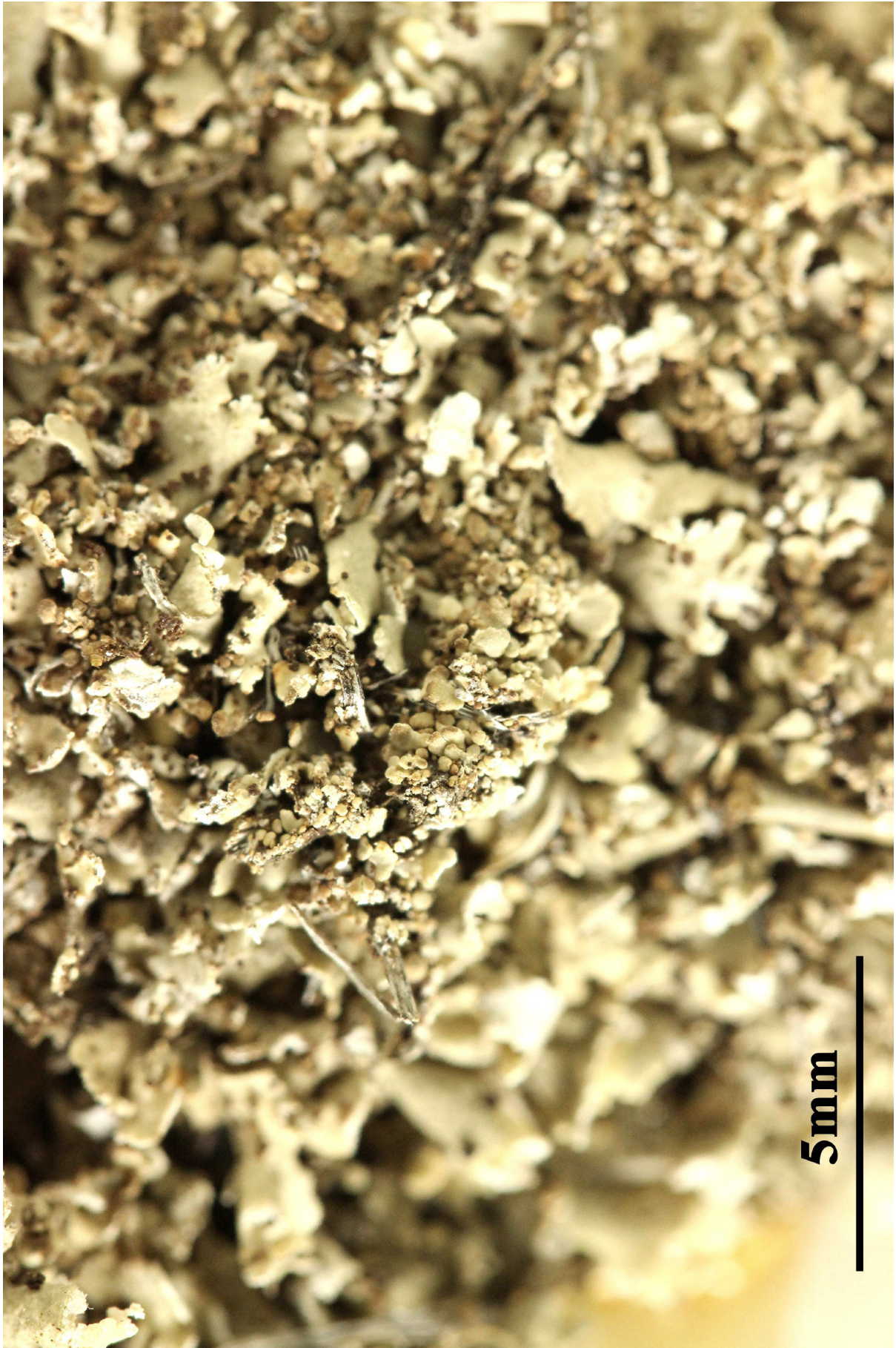
*Cladonia carassensis* subsp. *japonica*

*Cladonia cariosa* (Lilj.) Spreng., Syst. veg., Edn 16 4(1): 272 (1827)  
= *Lichen cariosus* Lilj. 1798

[OH531], Japan. Honshu. Prov. Shinano (Pref. Nagano), Kokemomono-niwa, Mugikusa Pass, Kita-Yatsugatake Mts, Chino-city (36°03'24" N, 138°20'20" E). On soil along a road, 2100 m. Leg. Y. Ohmura (no. 10747), 8.8.2015, det. Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI 531.

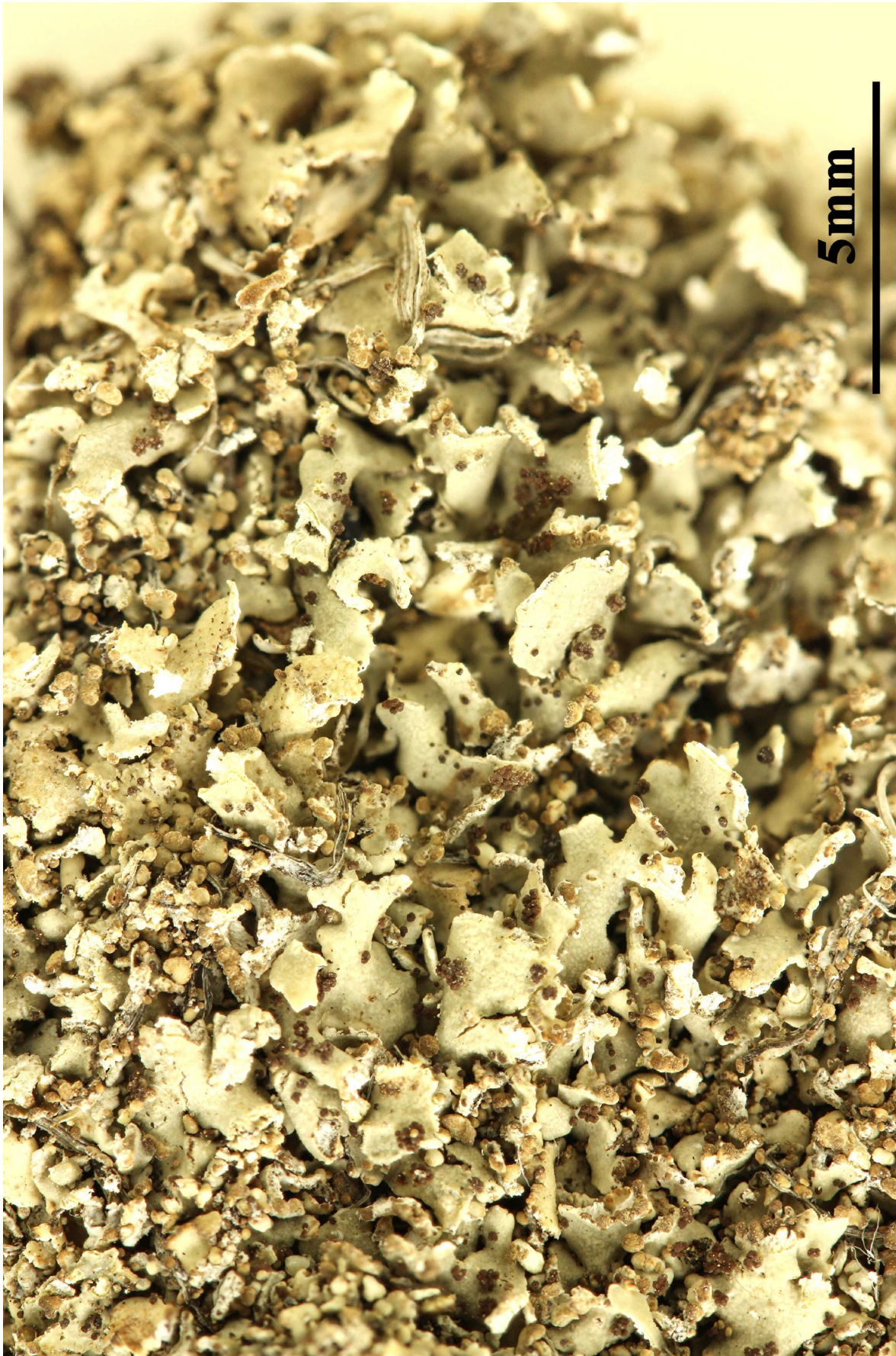
Primary thallus squamulose, persistent, forming cushions, the squamules small to middle-sized, 1-7(-10) mm long, 1-2(-3) mm broad, entire to incised, concave to reflexed-convex, greenish white to olive-green above, white and fibrillose beneath. Podetia rather rare, 0.5-2(-3) cm tall, up to 3 mm thick (often more below the apothecia), cupless, simple or sparingly branched in upper part, often terminated by large apothecia, partly decorticate-granulose, sometimes sparsely squamulose in lower part, longitudinally fissured, very thick-walled, with medullary hyphae running parallel to the surface. Apothecia frequent, terminal, dark brown, convex, usually clustered into corymb-like clusters. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, ovoid to conical, semi-immersed in the primary squamules. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests and chemistry: different chemotypes (all of them K+ yellow, C-, KC-, UV-): 1) P- (atranorin only, the most frequent chemotype), 2) P+ yellow (atranorin, norstictic and connorstictic acids), 3) P+ red (atranorin and fumarprotocetraric acid), 4) P- (atranorin and rangiformic acid), 5) P+ red (atranorin, fumarprotocetraric and rangiformic acids). - Note: a cool-temperate to subarctic-subalpine, circumpolar lichen found on disturbed mineral, often sandy soil.





*Cladonia cariosa*





*Cladonia cariosa*



*Cladonia cariosa* (Lilj.) Spreng., Syst. veg., Edn 16 4(1): 272 (1827)  
= *Lichen cariosus* Lilj. 1798

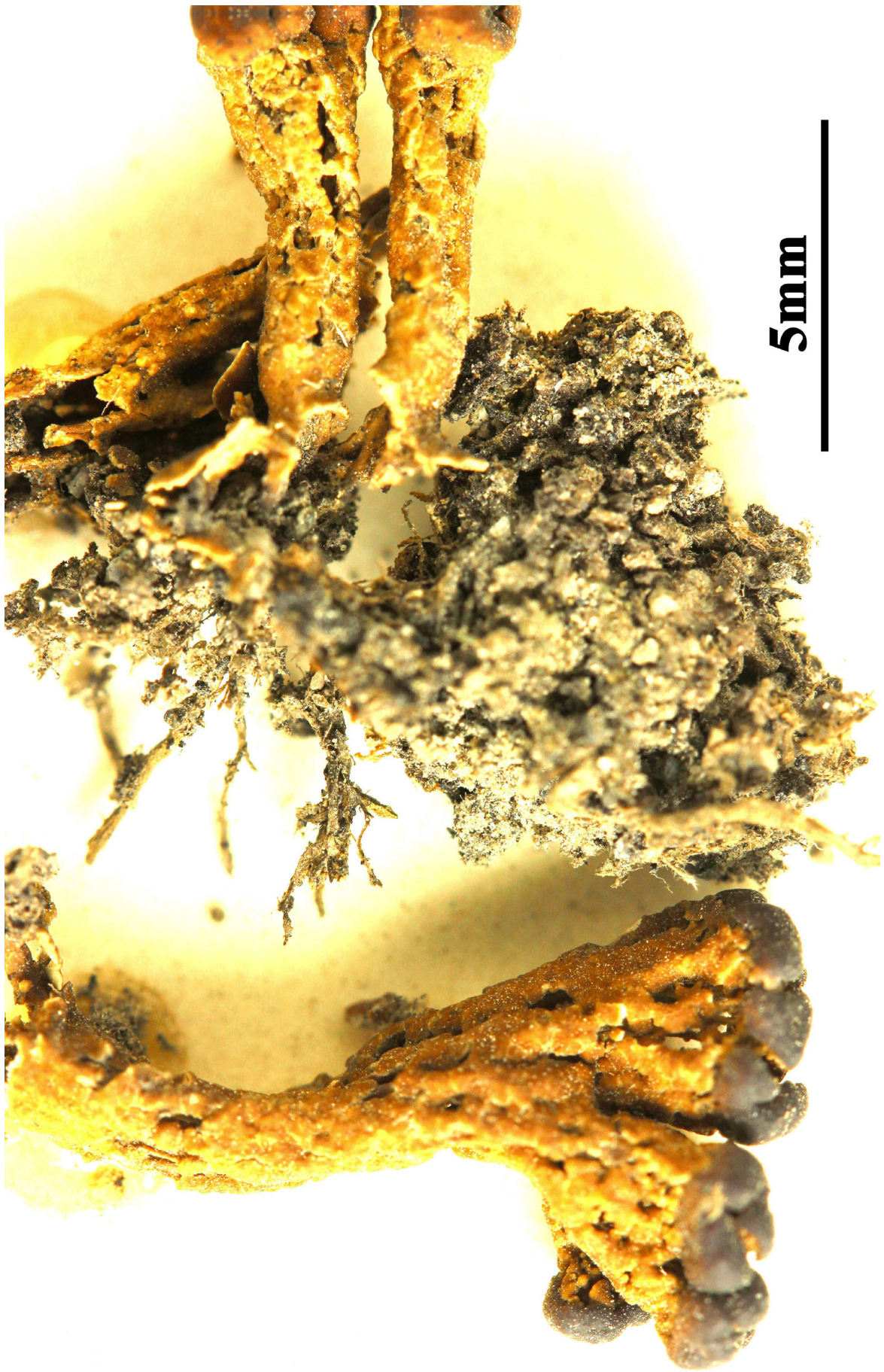
[KU157], Japan. Hokkaido. Prov. Iburi: Lakeside of Utonaito. On soil, 5 m . Leg. H. Kashiwadani, 29.10.1971, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 157.

Primary thallus squamulose, persistent, forming cushions, the squamules small to middle-sized, 1-7(-10) mm long, 1-2(-3) mm broad, entire to incised, concave to reflexed-convex, greenish white to olive-green above, white and fibrillose beneath. Podetia rather rare, 0.5-2(-3) cm tall, up to 3 mm thick (often more below the apothecia), cupless, simple or sparingly branched in upper part, often terminated by large apothecia, partly decorticate-granulose, sometimes sparsely squamulose in lower part, longitudinally fissured, very thick-walled, with medullary hyphae running parallel to the surface. Apothecia frequent, terminal, dark brown, convex, usually clustered into corymb-like clusters. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, ovoid to conical, semi-immersed in the primary squamules. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests and chemistry: different chemotypes (all of them K+ yellow, C-, KC-, UV-): 1) P- (atranorin only, the most frequent chemotype), 2) P+ yellow (atranorin, norstictic and connorstictic acids), 3) P+ red (atranorin and fumarprotocetraric acid), 4) P- (atranorin and rangiformic acid), 5) P+ red (atranorin, fumarprotocetraric and rangiformic acids). - Note: a cool-temperate to subarctic-subalpine, circumpolar lichen found on disturbed mineral, often sandy soil.



*Cladonia cariosa*





*Cladonia cariosa*

*Cladonia chlorophaea* (Flörke ex Sommerf.) Spreng., Syst. veg., Edn 16  
4(1): 273 (1827)  
= *Cenomyce chlorophaea* Flörke ex Sommerf. 1826

[KU260], Canada. British Columbia: Nass Valley. On rocks covered with humus, 150 ft. Leg. S. Kurokawa (no. 8900), 17.8.1975, det. S. Kurokawa. EX S. KUOKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 260.

Primary thallus squamulose, persistent, the squamules small to middle-sized. 3-4(-6) mm long and almost as broad, incised to crenate, greyish-green above, white beneath, but darkening towards the base, sometimes with granular soredia along the margins. Podetia frequent, hollow inside, greyish-green, often somewhat browned, non melanotic at the base, esquamulose, 0.5-3(-4) cm tall, ecorticate or corticate only at the base, with broad (to 1.2 cm) cups gradually tapered to a short stalk, regular or proliferating marginally, granulose-sorediate above and inside the cups, the soredia 60-170  $\mu\text{m}$  in diam., often mixed with corticate granules and microsquamules, the surface becoming denuded with age. Apothecia frequent, on the margin of the cups, brown, stipitate, convex, often arranged in up to 5 mm wide clusters. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed in small teeth along the margins of cups, often constricted at base, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ red, UV-. Chemistry: substances of the fumarprotocetraric acid complex, often with quaesitic acid and unknown fatty acids. - Note: this species belongs to a group of taxa containing only substances of the fumarprotocetraric acid complex. The main discriminating features are the presence of granular soredia on the outer and inner surfaces of the cups and the non-melanotic base of podetia. The discrimination towards *C. pyxidata*, *C. fimbriata* and other species of the complex is not always easy.





*Cladonia chlorophaea*



*Cladonia chlorophaea*



*Cladonia chondrotypa* Vain., Acta Soc. Fauna Flora fenn. 4(no. 1): 449 (1887)

[KU608], Chile. Llhanquichue: Around Machihue, along Rio Llieó. On decayed wood with mosses, 79 m Leg. H. Kashiwadani (no. 17957), 13.11.1981, det. H. Kashiwasani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIOERS ET CRITICI EXSICCATI NR. 608.



*Cladonia chondrotypa*





*Cladonia chondrotypa*

*Cladonia chondrotypa* Vain., Acta Soc. Fauna Flora fenn. 4(no. 1): 449 (1887)

[KU557], Chile, Llanoquihue: Around Machihue, along Rio Llieó. On weathered tree, 10 m. Leg. Kashiwadani (no. 17936), 15.11.1981, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 557.





*Cladonia chondrotypa*





*Cladonia chondrotypa*



*Cladonia clavulifera* Vain., in Robbins, Rhodora 26: 145 (1924)  
= *Cladonia subcariosa* Nyl.

[KU304], Japah. Honshu. Prov. Kai: Lakeside of Saiko, Mt. Fuji. On rocks, 800 m. Leg. H. Kashiwadani (no.13824), 11.4.1977, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 303.

Thallus dimorphic. Primary thallus squamulose, squamules 3-8(-10) x 0.5-1.5(-5) mm, ends obtuse, necrotic ends blackening. Podetia gray, smooth, slender, 0.4-1.5(-2.5) cm tall x 0.8-2.5 mm thick, flexuose, uniformly thick, unbranched or 2-4 times dichotomously branched. Podetial surface corticate, verruculose-areolate. Ascomata biatorine apothecia atop of podetia, brown, up to 1.5 mm diam. Ascospores hyaline, simple, oblong, 8-13 x 2-3.5  $\mu$ m. Pycnidia on squamules, frequent, globular, 150-300  $\mu$ m, pycnidial jelly clear; conidia strongly curved, 7-10 x 1  $\mu$ m. Chemistry. K<sup>+</sup> yellow turning red or K<sup>-</sup>; PD<sup>+</sup> red or yellow. According to Ahti (2000), *Cladonia subcariosa* consists of six major chemotypes, each of which has been considered a separate species:

- I. *C. subcariosa* s. str. – atranorin, norstictic and connorstictic (inconstant) acids, homoheveadride;
- II. *C. polycarpia* – those in I plus stictic, cryptostictic and constictic acids;
- III. *C. polycarpoides* – norstictic and connorstictic acids and homoheveadride;
- IV. *C. sobolescens* – fumarprotocetraric, protocetraric, and confumarprotocetraric acids;
- V. *C. subclavulifera* – norstictic and fumarprotocetraric acids as major substances;
- VI. *C. brevis* – psoromic, 2'-O-demethylpsoromic, and rangiformic acids.

Distribution. Eastern North America, Neotropics, western Europe, eastern Asia, New Guinea, Australia; in North Carolina throughout. The chemotypes have the following distributions:

- I. Cuba, southeastern US coastal plain, Brazil;

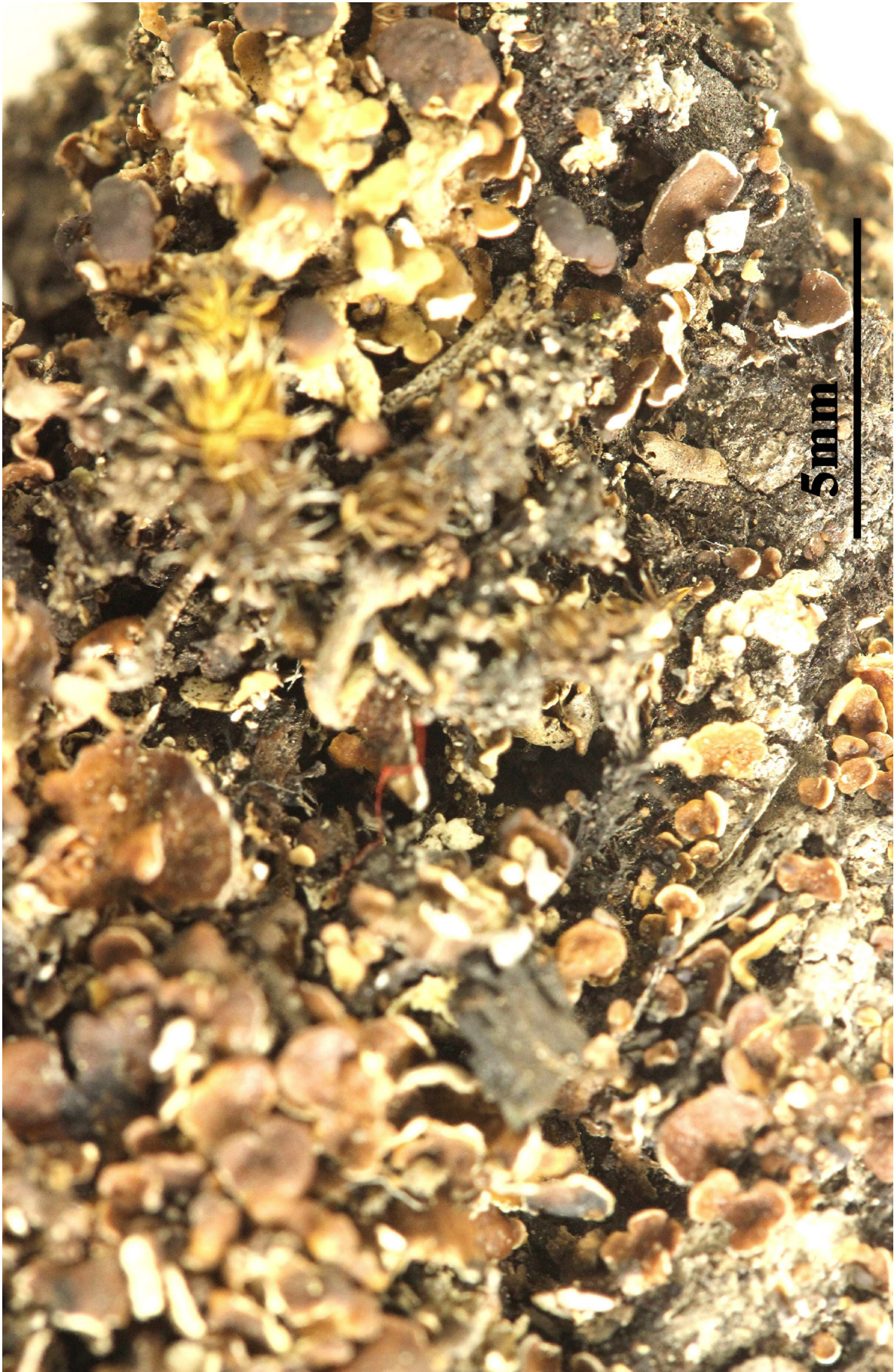
- II. Southeastern US coastal plain;
- III. Eastern North America, Caribbean, South America, Europe, Asia, Australia;
- IV. Eastern North America, Caribbean, eastern Asia;
- V. Japan;





*Cladonia clavulifera*





*Cladonia clavulifera*



*Cladonia clavulifera* Vain., in Robbins, Rhodora 26: 145 (1924)  
= *Cladonia subcariosa* Nyl.

[KU210], Japan. Honshu. Prov. Kai: Lakeside of Saiko, Mt. Fuji. On soil, 800 m. Leg. S. Kurokawa (no.71120), 23.4.1977, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 210.

Thallus dimorphic. Primary thallus squamulose, squamules 3-8(-10) x 0.5-1.5(-5) mm, ends obtuse, necrotic ends blackening. Podetia gray, smooth, slender, 0.4-1.5(-2.5) cm tall x 0.8-2.5 mm thick, flexuose, uniformly thick, unbranched or 2-4 times dichotomously branched. Podetial surface corticate, verruculose-areolate. Ascomata biatorine apothecia atop of podetia, brown, up to 1.5 mm diam. Ascospores hyaline, simple, oblong, 8-13 x 2-3.5 µm. Pycnidia on squamules, frequent, globular, 150-300 µm, pycnidial jelly clear; conidia strongly curved, 7-10 x 1 µm. Chemistry. K<sup>+</sup> yellow turning red or K<sup>-</sup>; PD<sup>+</sup> red or yellow. According to Ahti (2000), *Cladonia subcariosa* consists of six major chemotypes, each of which has been considered a separate species:

- I. *C. subcariosa* s. str. – atranorin, norstictic and connorstictic (inconstant) acids, homoheveadride;
- II. *C. polycarpia* – those in I plus stictic, cryptostictic and constictic acids;
- III. *C. polycarpoides* – norstictic and connorstictic acids and homoheveadride;
- IV. *C. sobolescens* – fumarprotocetraric, protocetraric, and confumarprotocetraric acids;
- V. *C. subclavulifera* – norstictic and fumarprotocetraric acids as major substances;
- VIC. *brevis* – psoromic, 2'-O-demethylpsoromic, and rangiformic acids.

Distribution. Eastern North America, Neotropics, western Europe, eastern Asia, New Guinea, Australia; in North Carolina throughout. The chemotypes have the following distributions:

- I. Cuba, southeastern US coastal plain, Brazil;
- II. Southeastern US coastal plain;

- III. Eastern North America, Caribbean, South America, Europe, Asia, Australia;
- IV. Eastern North America, Caribbean, eastern Asia;
- V. Japan;

*Cladonia clavulifera*





*Cladonia clavulifera*



*Cladonia clavulifera*



*Cladonia clavulifera* Vain., in Robbins, Rhodora 26: 145 (1924)  
= *Cladonia subcariosa* Nyl.

[KU211], Japan. Honshu. Prov. Mikawa: Chiiw Gorge, Minami-Shi-dara-gun. On soil. 300 m. Leg. S. Kurokawa (no. 71174), 25.10.1971, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 211.

Thallus dimorphic. Primary thallus squamulose, squamules 3-8(-10) x 0.5-1.5(-5) mm, ends obtuse, necrotic ends blackening. Podetia gray, smooth, slender, 0.4-1.5(-2.5) cm tall x 0.8-2.5 mm thick, flexuose, uniformly thick, unbranched or 2-4 times dichotomously branched. Podetial surface corticate, verruculose-areolate. Ascomata biatorine apothecia atop of podetia, brown, up to 1.5 mm diam. Ascospores hyaline, simple, oblong, 8-13 x 2-3.5 µm. Pycnidia on squamules, frequent, globular, 150-300 µm, pycnidial jelly clear; conidia strongly curved, 7-10 x 1 µm. Chemistry. K<sup>+</sup> yellow turning red or K<sup>-</sup>; PD<sup>+</sup> red or yellow. According to Ahti (2000), *Cladonia subcariosa* consists of six major chemotypes, each of which has been considered a separate species:

- I. *C. subcariosa* s. str. – atranorin, norstictic and connorstictic (inconstant) acids, homoheveadride;
- II. *C. polycarpia* – those in I plus stictic, cryptostictic and constictic acids;
- III. *C. polycarpoides* – norstictic and connorstictic acids and homoheveadride;
- IV. *C. sobolescens* – fumarprotocetraric, protocetraric, and confumarprotocetraric acids;
- V. *C. subclavulifera* – norstictic and fumarprotocetraric acids as major substances;
- VIC. *brevis* – psoromic, 2'-O-demethylpsoromic, and rangiformic acids.

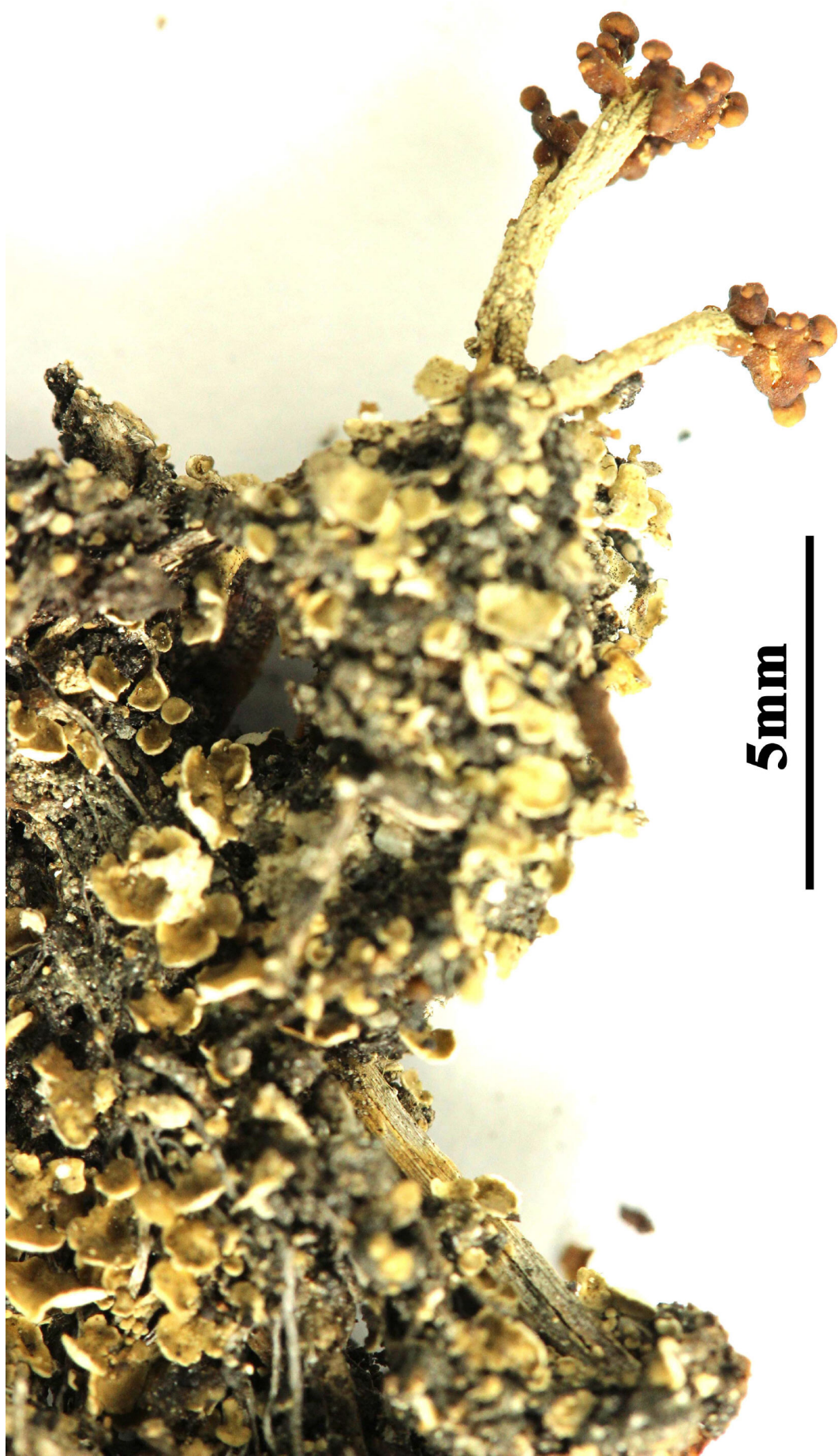
Distribution. Eastern North America, Neotropics, western Europe, eastern Asia, New Guinea, Australia; in North Carolina throughout. The chemotypes have the following distributions:

- I. Cuba, southeastern US coastal plain, Brazil;
- II. Southeastern US coastal plain;

- III. Eastern North America, Caribbean, South America, Europe, Asia,  
Australia;  
IV. Eastern North America, Caribbean, eastern Asia;  
V. Japan;

*Cladonia clavulifera*





*Cladonia clavulifera*



*Cladonia clavulifera*



*Cladonia coniocraea* (Flörke) Spreng., Syst. veg., Edn 16 4(1): 273 (1827)  
= *Cenomyce coniocraea* Flörke 1821

[OH654], Japan. Honshu. Iwshiro Prov. (Fukushima Pref.): Ozegahara, Oze National Park, Honoemata-mura, Minamiaizu-gun (36°56'05" N, 139°15'06" E). On trunc base of *Alnus* sp., 1408 m. Leg. Y. Ohmura (no. 13015A), 15.10.201<sup>9</sup>, det Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 654.

Primary thallus squamulose, usually persistent, the squamules middle-sized, 1-5 mm long, crenate to entire, convex to concave, grey, olive-green or brownish in upper part, white beneath, often becoming sorediate. Podetia grey-green (whitish in the parts where the soredia have fallen off), bacilliform, corticate only at base, 1-2(-3) cm tall, 0.5-1(-1.5) mm thick, usually unbranched and with pointed ends, only occasionally with very small cups, with a corticate and sometimes squamulose zone in lower part, farinose-sorediate in upper part, the soredia 20-50 µm in diam. Apothecia rather rare, terminal, brown, convex. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark brown to black, semi-immersed in the tips of podetia, often also developing on the primary squamules. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ red; medulla UV-. Chemistry: fumarprotocetraric acid, rarely also quaesitic acid. - Note: a widespread holarctic species found on a wide variety of organic substrata, incl. bark, and then mostly on the basal parts of boles, but mostly on soil rich in humus and rotten wood, with a wide altitudinal range. According to Burgaz & al. (2020), molecular data do not confirm the distinction at species level of the morphologically and chemically very similar *C. ochrochlora*.



*Cladonia coniocraea*





*Cladonia coniocraea*

*Cladonia coniocraea* (Flörke) Spreng., Syst. veg., Edn 16 4(1): 273 (1827)  
= *Cenomyce coniocraea* Flörke 1821

[OH654], Japan. Honshu. Iwshiro Prov. (Fukushima Pref.): Ozegahara, Oze National Park, Honoemata-mura, Minamiaizu-gun (36°56'05" N, 139°15'06" E). On trunc base of *Alnus* sp., 1408 m. Leg. Y. Ohmura (no. 13015A), 15.10.201<sup>9</sup>, det Y. Ohmura. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR. 654.

Primary thallus squamulose, usually persistent, the squamules middle-sized, 1-5 mm long, crenate to entire, convex to concave, grey, olive-green or brownish in upper part, white beneath, often becoming sorediate. Podetia grey-green (whitish in the parts where the soredia have fallen off), bacilliform, corticate only at base, 1-2(-3) cm tall, 0.5-1(-1.5) mm thick, usually unbranched and with pointed ends, only occasionally with very small cups, with a corticate and sometimes squamulose zone in lower part, farinose-sorediate in upper part, the soredia 20-50 µm in diam. Apothecia rather rare, terminal, brown, convex. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark brown to black, semi-immersed in the tips of podetia, often also developing on the primary squamules. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ red; medulla UV-. Chemistry: fumarprotocetraric acid, rarely also quaesitic acid. - Note: a widespread holarctic species found on a wide variety of organic substrata, incl. bark, and then mostly on the basal parts of boles, but mostly on soil rich in humus and rotten wood, with a wide altitudinal range. According to Burgaz & al. (2020), molecular data do not confirm the distinction at species level of the morphologically and chemically very similar *C. ochrochlora*.





*Cladonia coniocraea*





*Cladonia coniocraea*



*Cladonia coniocraea* (Flörke) Spreng., Syst. veg., Edn 16 4(1): 273 (1827)  
= *Cenomyce coniocraea* Flörke 1821

[OH379], Japan. Honshu. Prov. Mutsu (Pref. Aomori): Masukawa, Minmaya-mura, Higashi-Tsugaru-gun. On bark of *Quercus crispula*, 100m. Leg. H. Kashiwadani (no. 45917), 21.8.1986, det. T. Ahti. EX Y. OHMURA LICHENES MINUS COGNITI EXSICCATI NR.379.

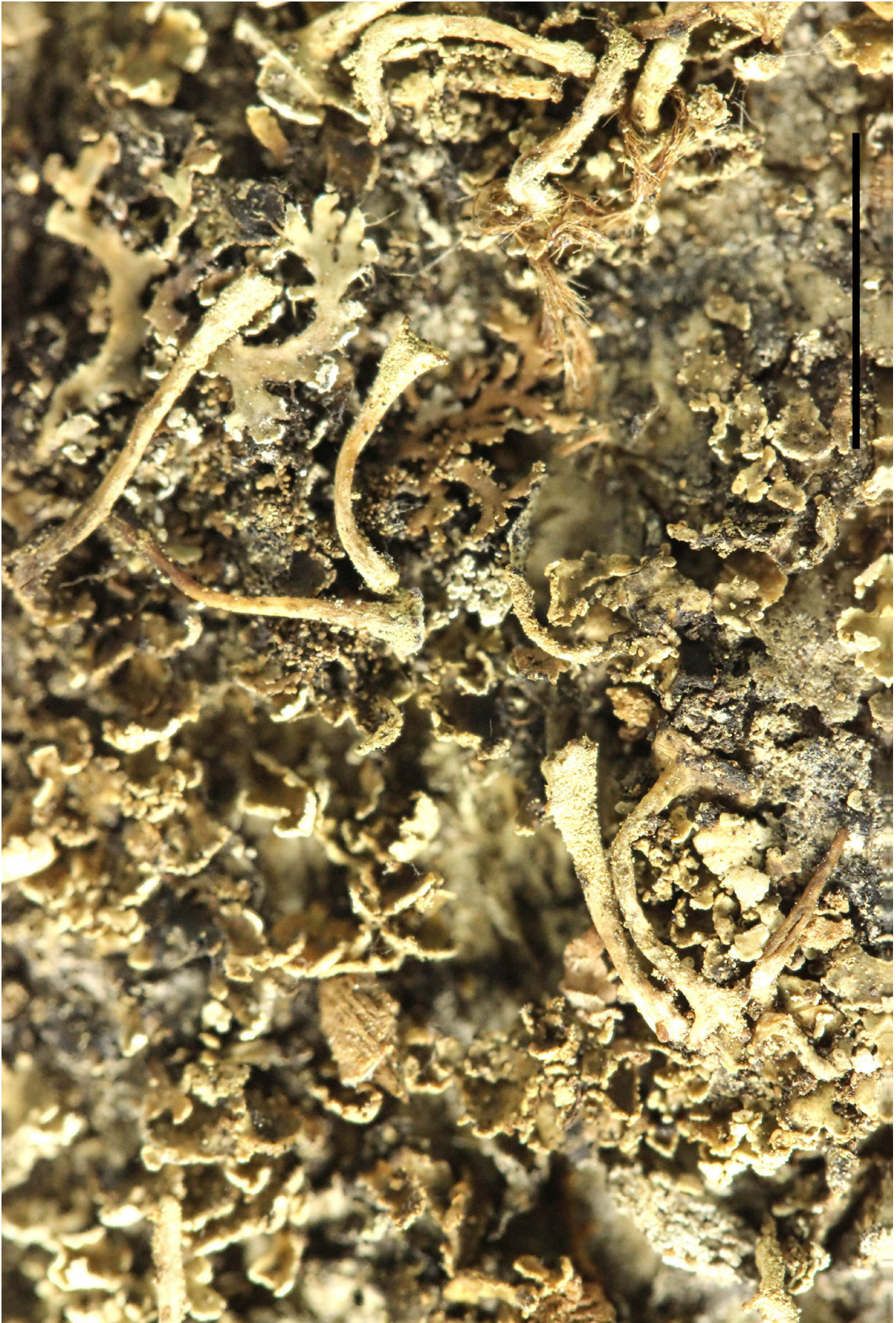
Primary thallus squamulose, usually persistent, the squamules middle-sized, 1-5 mm long, crenate to entire, convex to concave, grey, olive-green or brownish in upper part, white beneath, often becoming sorediate. Podetia grey-green (whitish in the parts where the soredia have fallen off), bacilliform, corticate only at base, 1-2(-3) cm tall, 0.5-1(-1.5) mm thick, usually unbranched and with pointed ends, only occasionally with very small cups, with a corticate and sometimes squamulose zone in lower part, farinose-sorediate in upper part, the soredia 20-50 µm in diam. Apothecia rather rare, terminal, brown, convex. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark brown to black, semi-immersed in the tips of podetia, often also developing on the primary squamules. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ red; medulla UV-. Chemistry: fumarprotocetraric acid, rarely also quaesitic acid. - Note: a widespread holarctic species found on a wide variety of organic substrata, incl. bark, and then mostly on the basal parts of boles, but mostly on soil rich in humus and rotten wood, with a wide altitudinal range. According to Burgaz & al. (2020), molecular data do not confirm the distinction at species level of the morphologically and chemically very similar *C. ochrochlora*.





*Cladonia coniocraea*





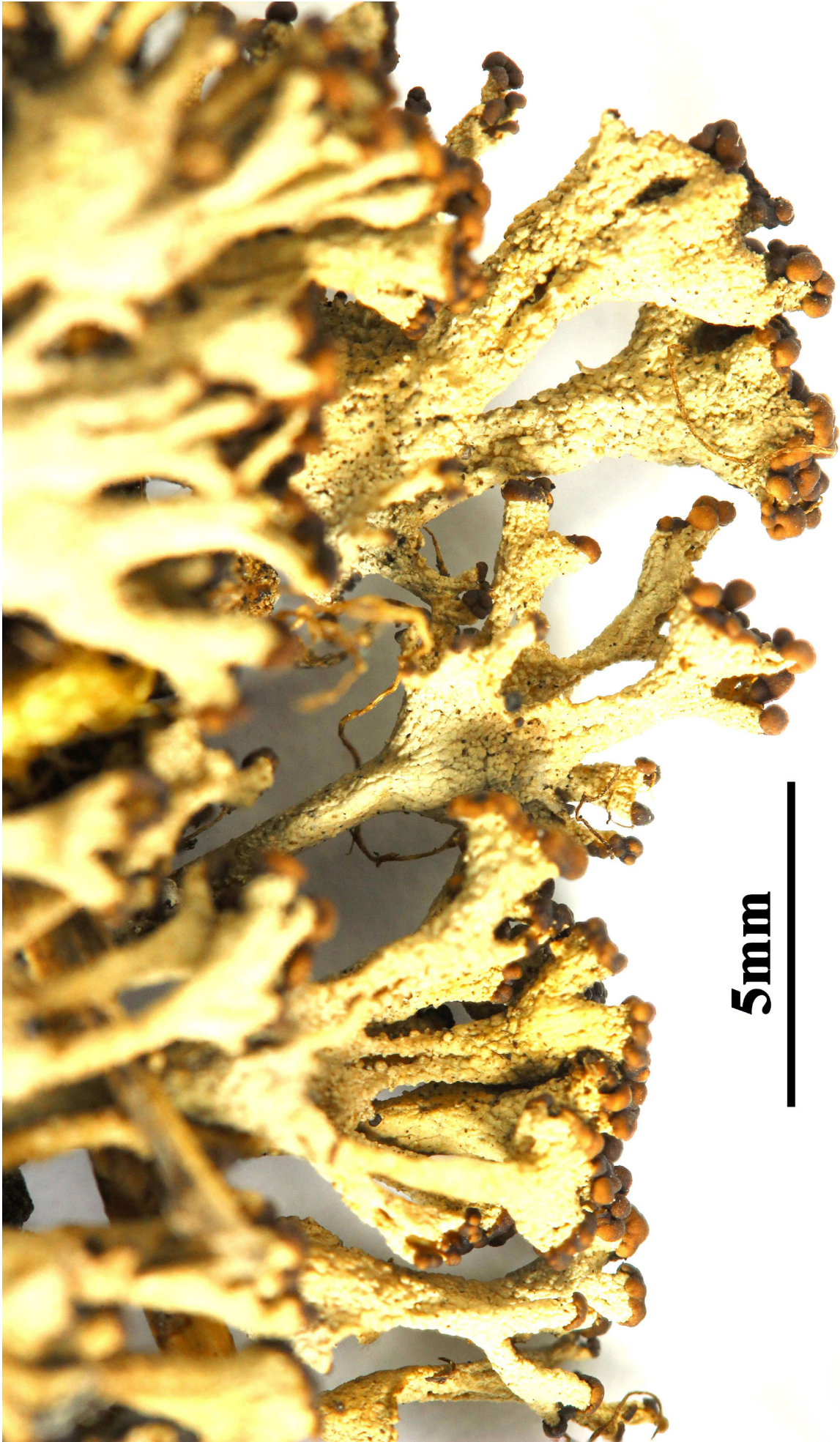
*Cladonia coniocraea*

*Cladonia conistea* (Delise) Asahina, J. Jap. Bot. 19(8): 234 (1943)  
= *Cenomyce pyxidata* var. *conistea* Delise 1830  
= *Cladonia humilis* (With.) J.R. Laundon, Lichenologist 16(3): 220 (1984)

[KU662], Japan. Honshu. Prov. Suruga: Umagaeshi, Goten-ba-guchi: Mt. Fuji. On soil with mosses, 1000 m. Leg. H. Kashiwadani (no. 16594), 15.10.1980, det. H. Kashiwadani. Ex S. Kurokawa and H. Kashiwadani EX LICHENES RARIORES ET CRITICI EXSICCATI NR. 662.

Primary thallus squamulose, persistent, the squamules 3-10 mm long, 1-3 mm wide, rounded to sparingly incised, white and often slightly veined beneath, rarely sorediate at margins. Podetia goblet-shaped, hollow inside, greyish-green, smoothly corticate only at base or almost up to the margin of the cups, generally squamulose, 4-11 mm tall, with regular, 3-4(-8) mm wide cups abruptly tapering to a very stalk which is shorter than the diameter of cups (the cups appearing sessile), finely pruinose from the base to the cups, but farinose-sorediate in upper parts and inside the cups, the soredia 20-60  $\mu$ m in diam. Apothecia rare, brown, convex, stipitate along the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, ovoid, developing along the margins of cups, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests and chemistry: four chemotypes (all of them C-, KC-, UV-): 1) K+ yellow, P+ red (atranorin, fumarprotocetraric acid complex), 2) K- or K+ yellowish slowly turning brown, P+ red (bourgeanic and fumarprotocetraric acids), 3) K+ yellow, P+ red (atranorin, fumarprotocetraric and bourgeanic acids), 4) K- or K+ yellowish slowly turning brown, P+ red (fumarprotocetraric acid complex). Chemotype 1) is the most frequent. - Note: a mild-temperate, widespread species found on disturbed, often sandy soil, more rarely on lignum and mossy trees.





*Cladonia conistea*





*Cladonia conistea*

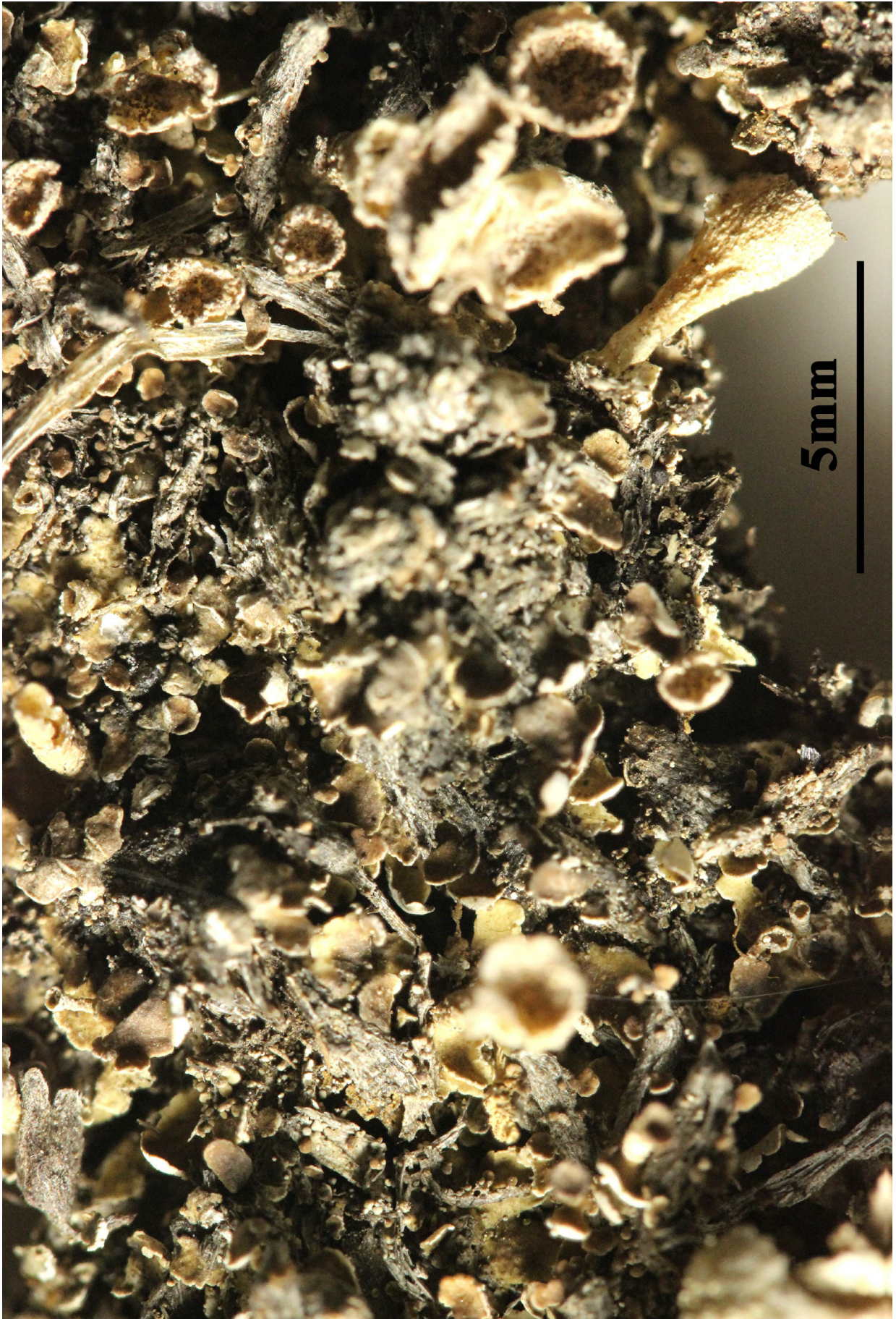


*Cladonia conistea* (Delise) Asahina, J. Jap. Bot. 19(8): 234 (1943)  
= *Cenomyce pyxidata* var. *conistea* Delise 1830  
= *Cladonia humilis* (With.) J.R. Laundon, Lichenologist 16(3): 220 (1984)

[KU465]], Japan. Honshu. Prov Kai: Kenmarubi, Mt. Fuji. On soil, 1350 m. Leg. H. Kashiwadani (no. 15814), 6.6.1980, det. H. Kashiwadani. EX S. KUOKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 465. EX S. KUOKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 355.

Primary thallus squamulose, persistent, the squamules 3-10 mm long, 1-3 mm wide, rounded to sparingly incised, white and often slightly veined beneath, rarely sorediate at margins. Podetia goblet-shaped, hollow inside, greyish-green, smoothly corticate only at base or almost up to the margin of the cups, generally esquamulose, 4-11 mm tall, with regular, 3-4(-8) mm wide cups abruptly tapering to a very stalk which is shorter than the diameter of cups (the cups appearing subsessile), finely pruinose from the base to the cups, but farinose-sorediate in upper parts and inside the cups, the soredia 20-60  $\mu$ m in diam. Apothecia rare, brown, convex, stipitate along the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, ovoid, developing along the margins of cups, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests and chemistry: four chemotypes (all of them C-, KC-, UV-): 1) K+ yellow, P+ red (atranorin, fumarprotocetraric acid complex), 2) K- or K+ yellowish slowly turning brown, P+ red (bourgeanic and fumarprotocetraric acids), 3) K+ yellow, P+ red (atranorin, fumarprotocetraric and bourgeanic acids), 4) K- or K+ yellowish slowly turning brown, P+ red (fumarprotocetraric acid complex). Chemotype 1) is the most frequent. - Note: a mild-temperate, widespread species found on disturbed, often sandy soil, more rarely on lignum and mossy trees.





*Cladonia conistea*





*Cladonia conistea*

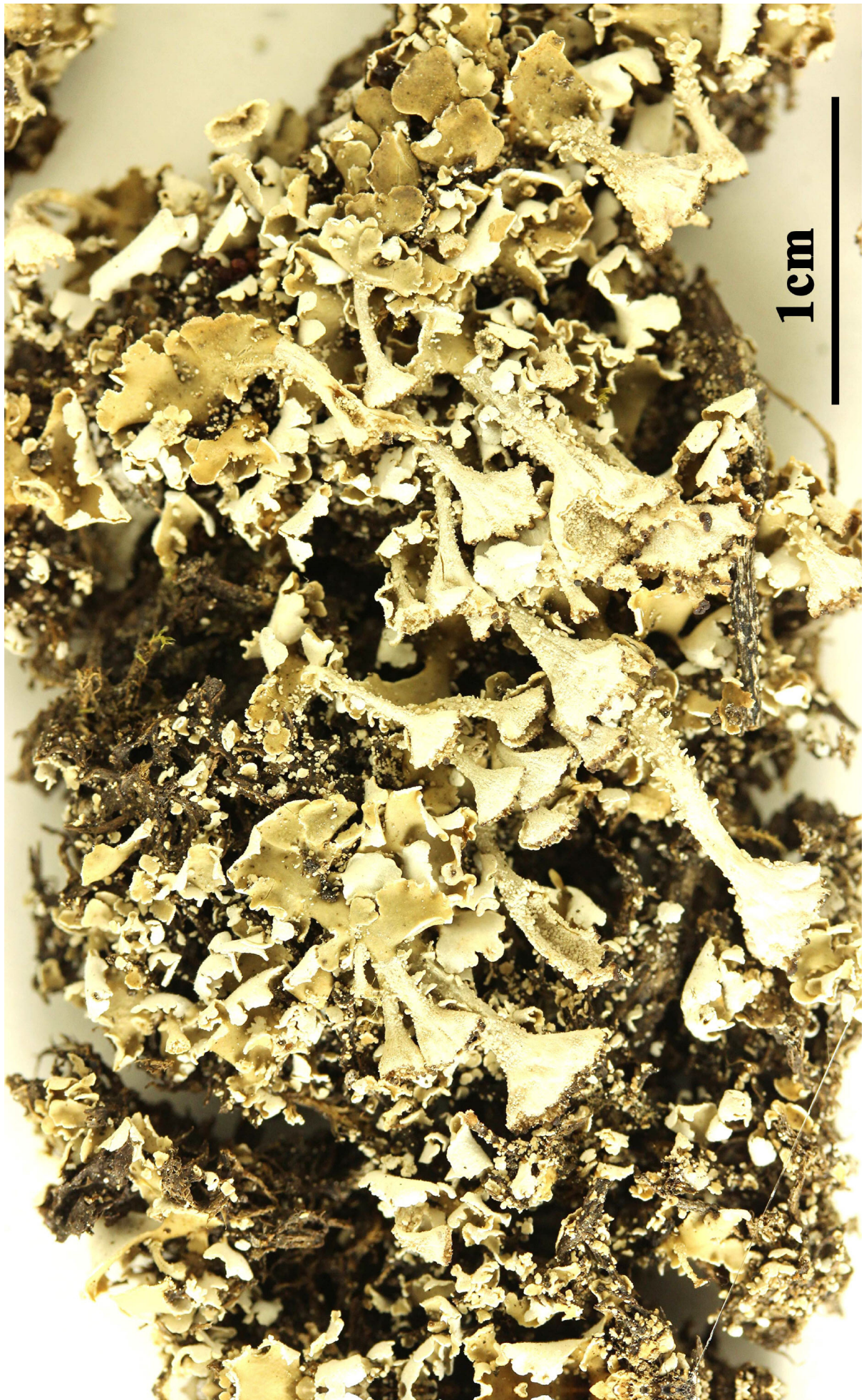


***Cladonia conistea*** (Delise) Asahina, J. Jap. Bot. 19(8): 234 (1943)  
= *Cenomyce pyxidata* var. *conistea* Delise 1830  
= *Cladonia humilis* (With.) J.R. Laundon, Lichenologist 16(3): 220 (1984)

[KU407], Japan. Honshu. Prov. Bitchu: Mt. Gagyū Takahashi-city. On rocks, 70 m. Leg. H. Kashiwadani (no. 14975), 25.3.1979, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES EWT CRITICI EXSICCATI NR. 407.

Primary thallus squamulose, persistent, the squamules 3-10 mm long, 1-3 mm wide, rounded to sparingly incised, white and often slightly veined beneath, rarely sorediate at margins. Podetia goblet-shaped, hollow inside, greyish-green, smoothly corticate only at base or almost up to the margin of the cups, generally esquamulose, 4-11 mm tall, with regular, 3-4(-8) mm wide cups abruptly tapering to a very stalk which is shorter than the diameter of cups (the cups appearing subsessile), finely pruinose from the base to the cups, but farinose-sorediate in upper parts and inside the cups, the soredia 20-60 µm in diam. Apothecia rare, brown, convex, stipitate along the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, ovoid, developing along the margins of cups, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests and chemistry: four chemotypes (all of them C-, KC-, UV-): 1) K+ yellow, P+ red (atranorin, fumarprotocetraric acid complex), 2) K- or K+ yellowish slowly turning brown, P+ red (bourgeanic and fumarprotocetraric acids), 3) K+ yellow, P+ red (atranorin, fumarprotocetraric and bourgeanic acids), 4) K- or K+ yellowish slowly turning brown, P+ red (fumarprotocetraric acid complex). Chemotype 1) is the most frequent. - Note: a mild-temperate, widespread species found on disturbed, often sandy soil, more rarely on lignum and mossy trees.





*Cladonia conistea*





*Cladonia conistea*



*Cladonia cornuta* (L.) Baumg., Fl. Lips.: 574 (1790)

= *Lichen cornutus* L. 1753

[KU558], Chile. Magallanes: Around Lago Parrillar, Peninsula de Brunswick. Among mosses (*Sphagnum*) in *Nothofagus pumilio* forest, 300 m. Leg. H. Kashiwadani (no.18186), 12.12.1981, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 558.

Primary thallus squamulose, the squamules usually ephemeral, 3-4(-8) mm long, 1-4 mm broad, crenate to irregularly lobed, ascending, glaucescent to olive-green above, whitish below. Podetia bacilliform, hollow inside, 4-10(-17) cm tall, up to 2(-3) mm thick, mostly unbranched and with pointed apices, rarely with a few branches or with small terminal cups, greenish brown to dark brown, melanotic at base, corticate for at least half of their length (the cortex smooth, finely areolate), patchily farinose-soresiate in upper part, esquamulose. Apothecia rare, brown, convex, terminal. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia rare, dark, semi-immersed, usually along the margins of cups, with a colourless jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K- or K+ yellowish slowly turning brown, C-, KC-, P+ red, UV-. Chemistry: fumarprotocetraric acid complex. - Note: a boreal-montane to subarctic-subalpine, circumpolar species found on mineral and organic soil, but also on wood, with optimum near treeline in areas with siliceous substrata.



*Cladonia cornuta*





*Cladonia cornuta*

*Cladonia cornuta f. scyphosa* Schaer., Enum. critic. lich. europ. (Bern): 196  
(1850)

[KU408], Japan. Honshu. Prov. Shinano: Jumonji Pass, Minami-Sakugun. On decayed wood, 200 m. Leg. H. Shibuichi (no. 5849) and K. Yoshida, 12.7.1979, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 408.





*Cladonia cornuta* f. *scyphosa*





*Cladonia cornuta* f. *scyphosa*



*Cladonia crispata* (Ach.) Flot., Flechten Hirschberg-Warmbrunn: 4 (1839)  
= *Baeomyces turbinatus* var. *crispatus* Ach. 1803

[KU610], Japan. Honshu. Prov. Shinano: Lake side of Hakuba-Ohike, Shirouma Mts., Kita- Azumi-gun. On soil, 2400 m. Leg. H. Shibuichi (no. /189) & K. Yoshida, 7.8.1982, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI NR. 610.

Primary thallus squamulose, persistent or evanescent, the squamules middle-sized, 1-4 mm long, c. 0.5 mm broad, indented, grey-green above, white beneath. Podetia hollow inside, greenish grey to brown, extremely polymorphic, slender, 2-7 cm tall and up to 4 mm thick (usually much less), unbranched or sparingly branched in upper part, with open axillary or terminal funnels which proliferate from margins, thus terminating in a cup-like perforation with spinulose margins, not melanotic at base, continuously corticate to areolate, esorediate, sometimes squamulose. Apothecia dark brown, convex, usually stipitate, developing at the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed, mostly in the margins of cups or on the primary squamules, often constricted at base, with a reddish jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K-, C-, KC-, P-, UV+ white. Chemistry: squamatic acid and variable amounts of barbatric acid. In Central Europe rarely also with thamnolic acid (K+ and P+ yellow). - Note: a boreal-montane to subarctic-subalpine, circumpolar species found on soil, more rarely on lignum, in open habitats, in areas near treeline with siliceous substrata.



*Cladonia crispata*





*Cladonia crispata*

*Cladonia crispata* (Ach.) Flot., Flechten Hirschberg-Warmbrunn: 4 (1839)  
= *Baeomyces turbinatus* var. *crispatus* Ach. 1803

[KU261], Japan. Hokkaido. Prov. Ishikari: Along trail between Bogaku-dai and Shirogane Hot Spring, Mt. Tokachi. On soil, 670-1200 m. Leg. S. Kurokawa (no. 72105), 2.9.1972, det. S. Kurokawa. EX S. KUROKAWA LICHENES RARIORES ET CRITICI EXSICCATI NR. 261.

Primary thallus squamulose, persistent or evanescent, the squamules middle-sized, 1-4 mm long, c. 0.5 mm broad, indented, grey-green above, white beneath. Podetia hollow inside, greenish grey to brown, extremely polymorphic, slender, 2-7 cm tall and up to 4 mm thick (usually much less), unbranched or sparingly branched in upper part, with open axillary or terminal funnels which proliferate from margins, thus terminating in a cup-like perforation with spinulose margins, not melanotic at base, continuously corticate to areolate, esorediate, sometimes squamulose. Apothecia dark brown, convex, usually stipitate, developing at the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed, mostly in the margins of cups or on the primary squamules, often constricted at base, with a reddish jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K-, C-, KC-, P-, UV+ white. Chemistry: squamatic acid and variable amounts of barbatolic acid. In Central Europe rarely also with thamnolic acid (K+ and P+ yellow). - Note: a boreal-montane to subarctic-subalpine, circumpolar species found on soil, more rarely on lignum, in open habitats, in areas near treeline with siliceous substrata.





*Cladonia crispata*





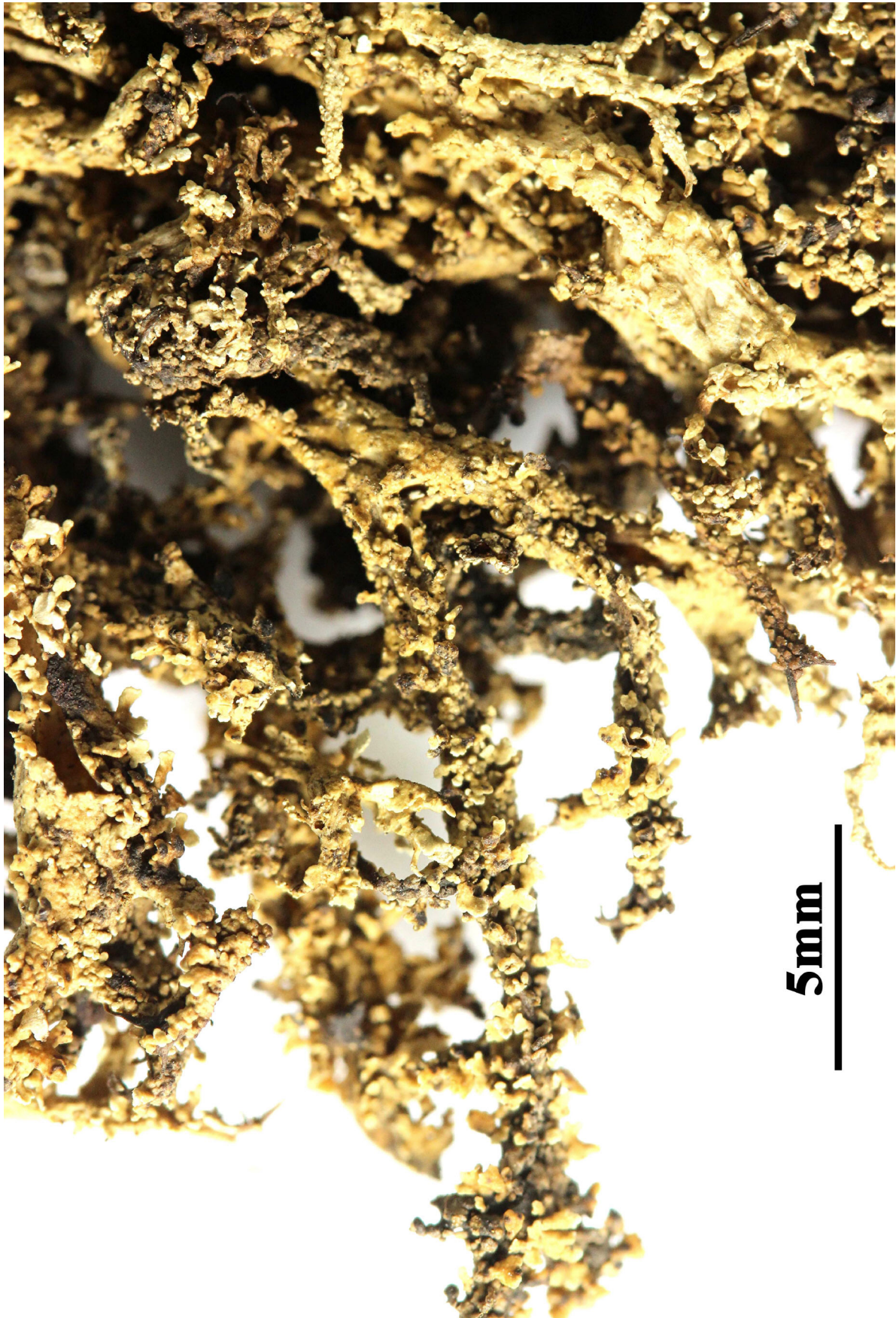
*Cladonia crispata*



*Cladonia crispata* (Ach.) Flot., Flechten Hirschberg-Warmbrunn: 4 (1839)  
= *Baeomyces turbinatus* var. *crispatus* Ach. 1803

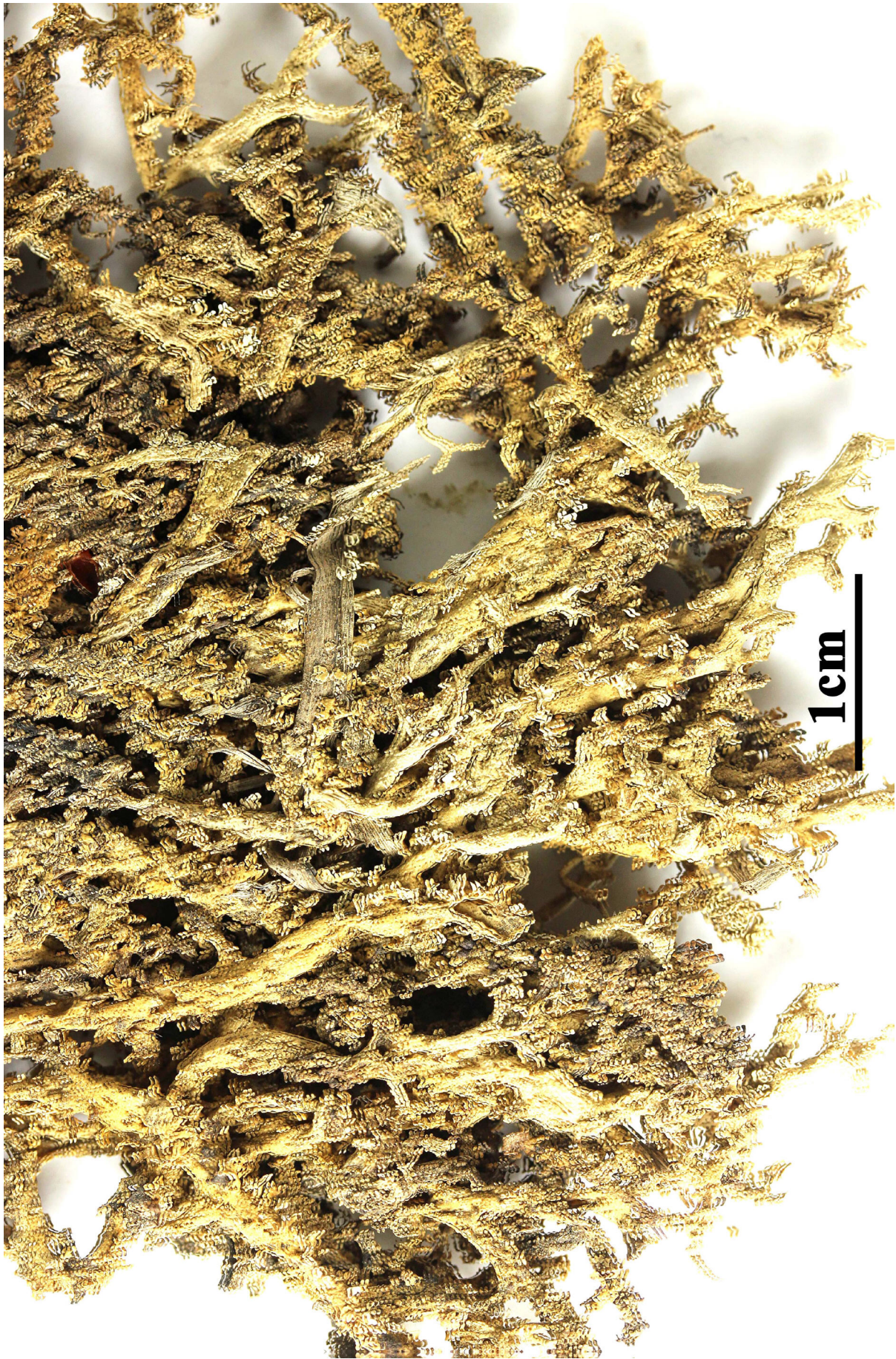
[KU409], Japan. Honshu. Prov. Ugo: Arayu Hot Spring, Mt. Kurikoma, Ogachi-gun. On soil, 550 m. Leg. K. Yoshida (no. 3330), 13.7.1978, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI NR. 409.

Primary thallus squamulose, persistent or evanescent, the squamules middle-sized, 1-4 mm long, c. 0.5 mm broad, indented, grey-green above, white beneath. Podetia hollow inside, greenish grey to brown, extremely polymorphic, slender, 2-7 cm tall and up to 4 mm thick (usually much less), unbranched or sparingly branched in upper part, with open axillary or terminal funnels which proliferate from margins, thus terminating in a cup-like perforation with spinulose margins, not melanotic at base, continuously corticate to areolate, esorediate, sometimes squamulose. Apothecia dark brown, convex, usually stipitate, developing at the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed, mostly in the margins of cups or on the primary squamules, often constricted at base, with a reddish jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K-, C-, KC-, P-, UV+ white. Chemistry: squamatic acid and variable amounts of barbatric acid. In Central Europe rarely also with thamnolic acid (K+ and P+ yellow). - Note: a boreal-montane to subarctic-subalpine, circumpolar species found on soil, more rarely on lignum, in open habitats, in areas near treeline with siliceous substrata.



*Cladonia crispata*





*Cladonia crispata*



*Cladonia crispata* (Ach.) Flot., Flechten Hirschberg-Warmbrunn: 4 (1839)  
= *Baeomyces turbinatus* var. *crispatus* Ach. 1803

[KU609}, Japan. Kyushu. Prov. Satsuma: Fukiagehama, Hioki-gun. On soil with rich humus, 20 m. Leg. H. Kashiwadani (no20451), 15.2.1984, det. H. Kashiwadani. EX S. KUROKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR.609.

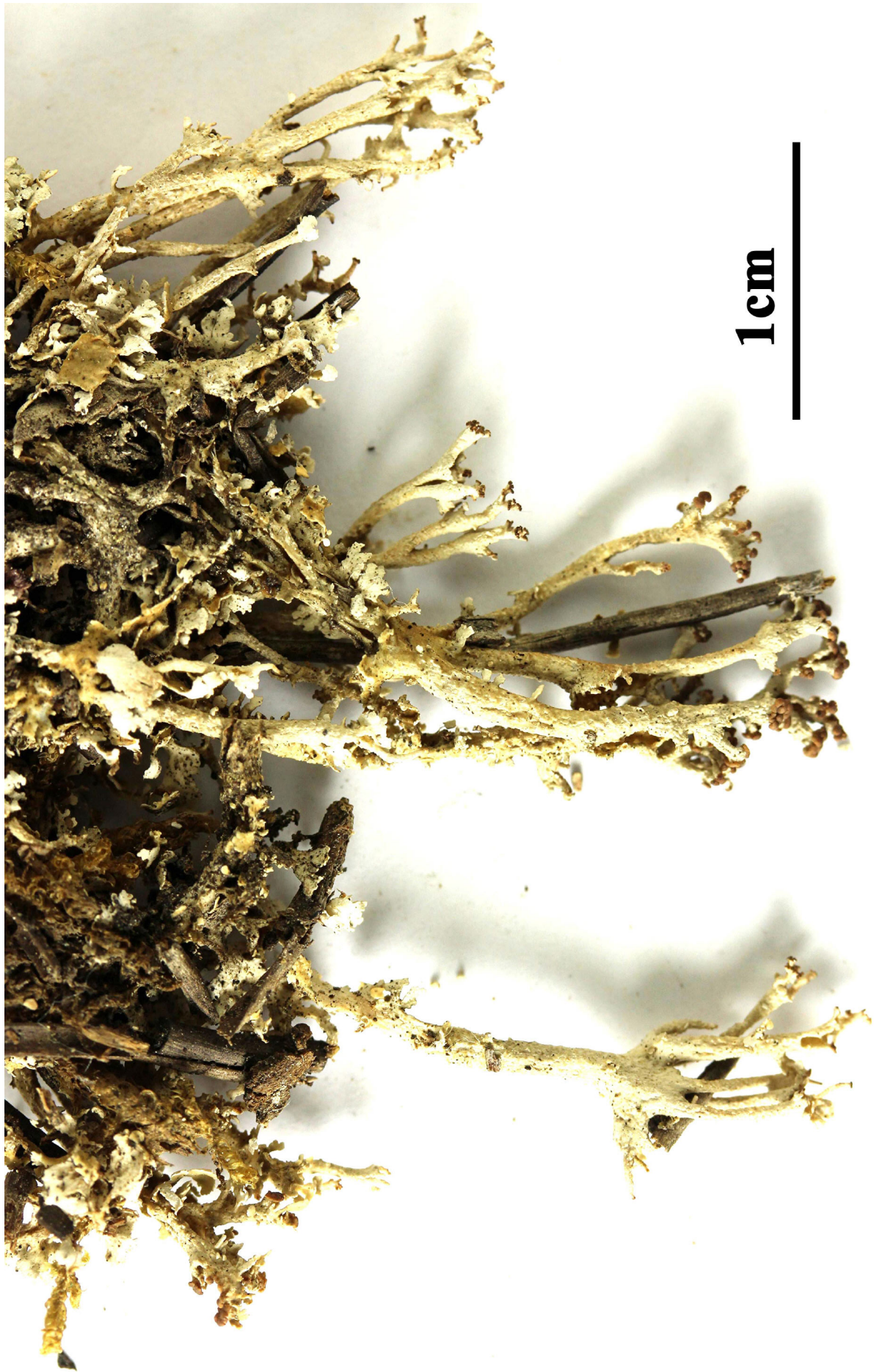
Primary thallus squamulose, persistent or evanescent, the squamules middle-sized, 1-4 mm long, c. 0.5 mm broad, indented, grey-green above, white beneath. Podetia hollow inside, greenish grey to brown, extremely polymorphic, slender, 2-7 cm tall and up to 4 mm thick (usually much less), unbranched or sparingly branched in upper part, with open axillary or terminal funnels which proliferate from margins, thus terminating in a cup-like perforation with spinulose margins, not melanotic at base, continuously corticate to areolate, esorediate, sometimes squamulose. Apothecia dark brown, convex, usually stipitate, developing at the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed, mostly in the margins of cups or on the primary squamules, often constricted at base, with a reddish jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K-, C-, KC-, P-, UV+ white. Chemistry: squamatic acid and variable amounts of barbatolic acid. In Central Europe rarely also with thamnolic acid (K+ and P+ yellow). - Note: a boreal-montane to subarctic-subalpine, circumpolar species found on soil, more rarely on lignum, in open habitats, in areas near treeline with siliceous substrata.





*Cladonia crispata*





*Cladonia crispata*



*Cladonia crispata* (Ach.) Flot., Flechten Hirschberg-Warmbrunn: 4 (1839)  
= *Baeomyces turbinatus* var. *crispatus* Ach. 1803

[KU664], Taiwan. Hwalien: Mt. Hohuan-shan, Hsiulin-gun. On soil 3100m. Leg. H. Shibuichi (no7957), K. Yoshida & M. Mineta, 31.7.1985. det. H. Kashiwadani. EX S. KUOKAWA AND H. KASHIWADANI LICHENES RARIORES ET CRITICI EXSICCATI NR. 664.

Primary thallus squamulose, persistent or evanescent, the squamules middle-sized, 1-4 mm long, c. 0.5 mm broad, indented, grey-green above, white beneath. Podetia hollow inside, greenish grey to brown, extremely polymorphic, slender, 2-7 cm tall and up to 4 mm thick (usually much less), unbranched or sparingly branched in upper part, with open axillary or terminal funnels which proliferate from margins, thus terminating in a cup-like perforation with spinulose margins, not melanotic at base, continuously corticate to areolate, esorediate, sometimes squamulose. Apothecia dark brown, convex, usually stipitate, developing at the margins of cups. Asci 8-spored, clavate, thickened at apex, with a K/I+ blue tholus and a K/I+ strongly blue outer gelatinous sheath, *Cladonia*-type. Ascospores 1-celled, hyaline, ellipsoid. Pycnidia dark, semi-immersed, mostly in the margins of cups or on the primary squamules, often constricted at base, with a reddish jelly. Conidia hyaline, curved. Photobiont chlorococcoid. Spot tests: K-, C-, KC-, P-, UV+ white. Chemistry: squamatic acid and variable amounts of barbatolic acid. In Central Europe rarely also with thamnolic acid (K+ and P+ yellow). - Note: a boreal-montane to subarctic-subalpine, circumpolar species found on soil, more rarely on lignum, in open habitats, in areas near treeline with siliceous substrata.



*Cladonia crispata*





*Cladonia crispata*

## Lichens of Japan 02

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