NORDIC LICHEN FLORA

Volume 6

Verrucariaceae 1

Edited by

Roland Moberg, Sanja Tibell & Leif Tibell

2017

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Editorial Committee

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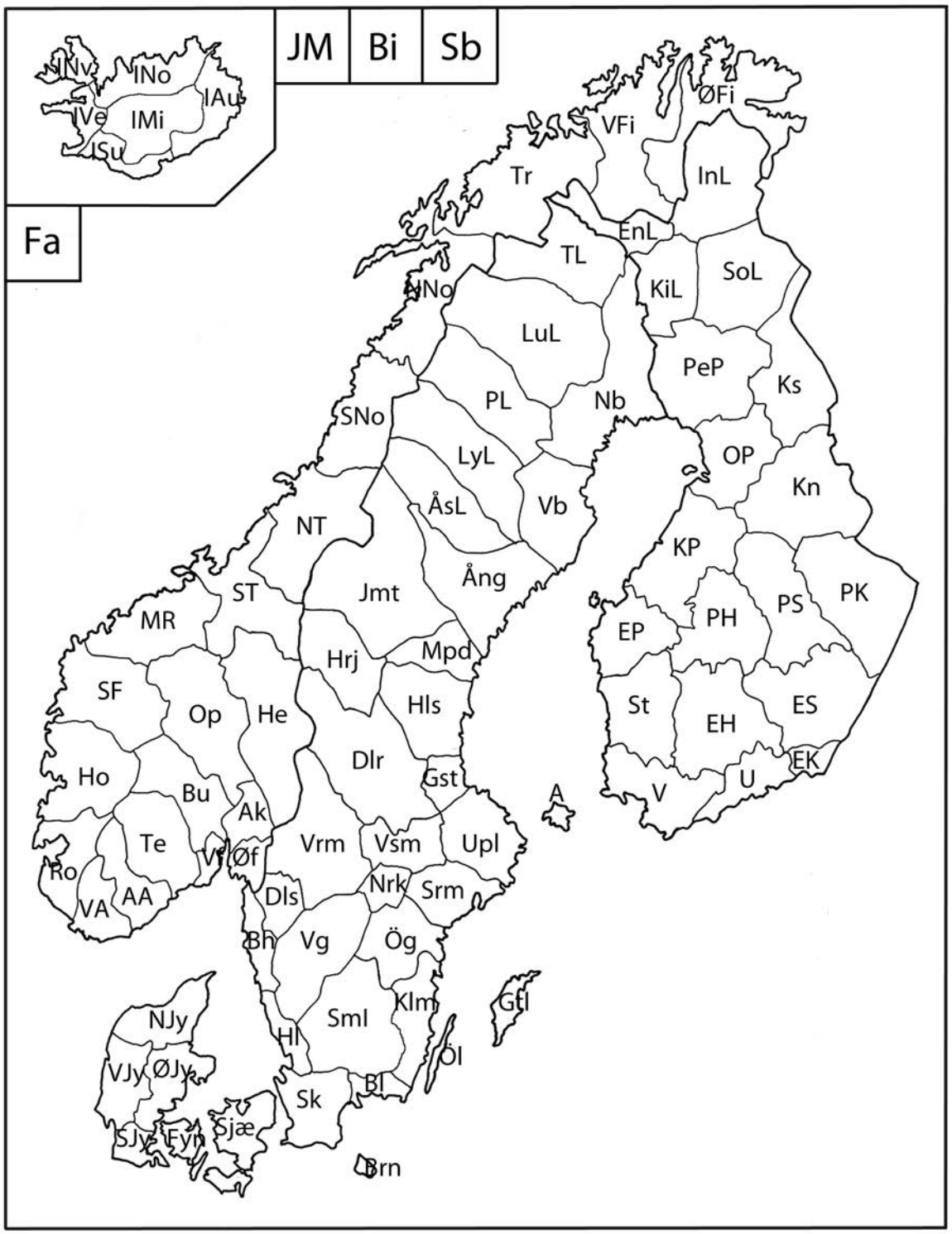
Preface

The sixth volume of *Nordic Lichen Flora* deals with parts of Verrucariaceae, both crustose, squamulose and foliose genera (see Contents). The large genus *Verrucaria* and additional genera are planned to be treated in a later volume.

Many species have previously been included in the collective genus *Verrucaria* but modern methods have revealed a different grouping and the present knowledge of Verrrucariaceae is presented in a tree based on phylogenetic relationships between and within the main genera of Verrucariaceae (Gueidan et al., Taxon 58: 184–208, 2009).

Most of the treated species are rare or perhaps just overlooked, except for those of the foliose *Dermatocarpon*-species, and hopefully this volume will inspire lichenologists to increase their efforts to search for them.

Sanja Savić Tibell & Leif Tibell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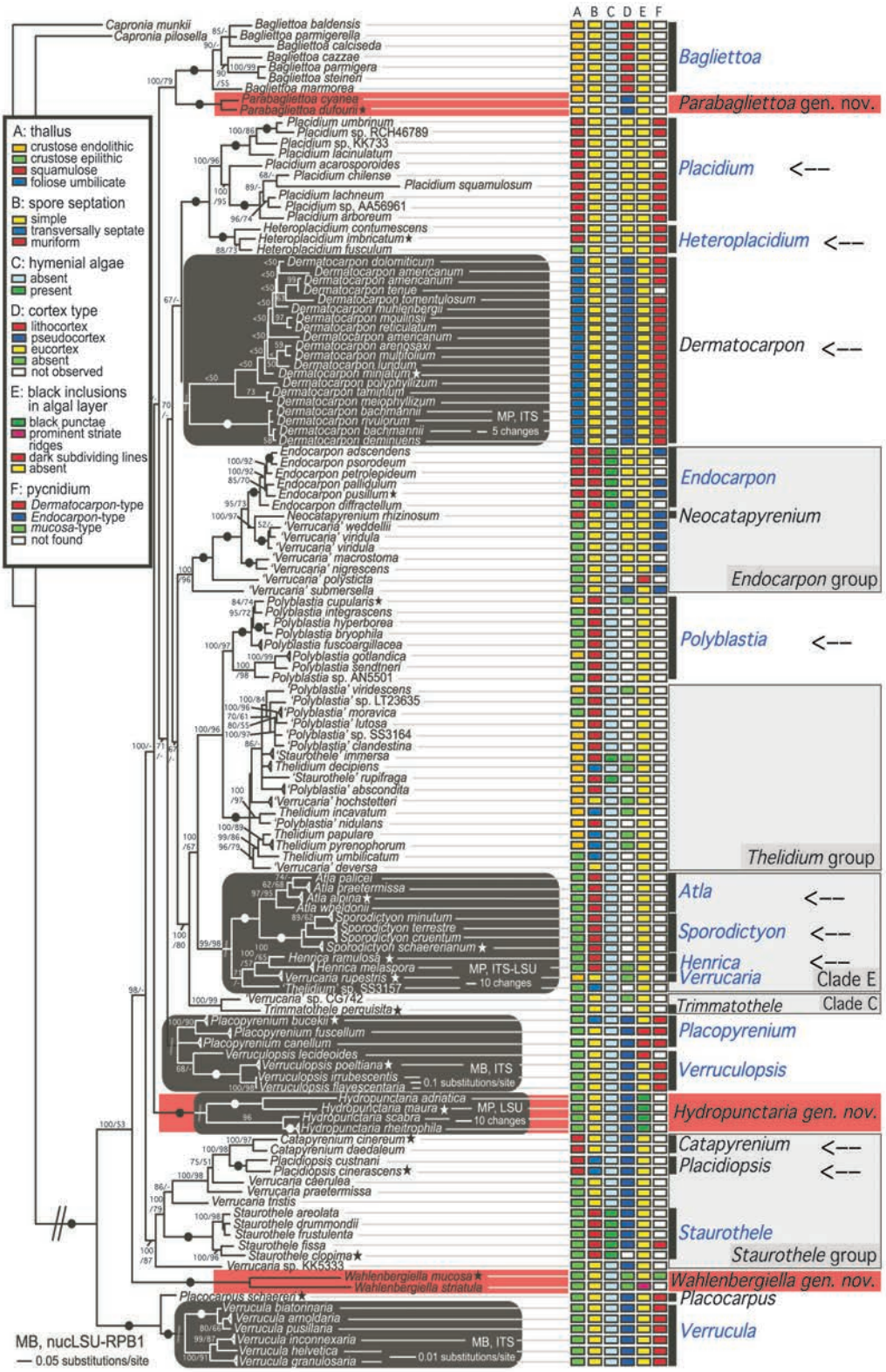
A B C D E F
A: thallus
crustose endolithic
crustose epilithic
squamulose
foliose umbilicate
B: spore septation
simple
transversally septate
muriform
C: hymenial algae
absent
present
D: cortex type
lithocortex
pseudocortex
eucortex
absent
not observed
E: black inclusions in algal layer
black punctae
prominent striate ridges
dark subdividing lines
absent
F: pycnidium
Dermatocarpon-type
Endocarpon-type
mucosa-type
not found
Bagliettoa
Parabagliettoa gen. nov.
Placidium
Heteroplacidium
Dermatocarpon
Endocarpon
Neocatapyrenium
Endocarpon group
Polyblastia
Thelidium group
Atla
Sporodictyon
Henrica
Verrucaria
Clade E
Trimmatothele
Clade C
Placopyrenium
Verruculopsis
Hydropunctaria gen. nov.
Catapyrenium
Placidiopsis
Staurothele
Staurothele group
Wahlenbergiella gen. nov.
Placocarpus
Verrucula
MB, nucLSU-RPB1
0.05 substitutions/site
MP, ITS
5 changes
MP, ITS-LSU
10 changes
MB, ITS
0.1 substitutions/site
MP, LSU
10 changes
MB, ITS
0.01 substitutions/site

Explanation to the tree on previous page.
Phylogenetic relationships between and within the main genera of Verrucariaceae. The main tree was obtained using a Bayesian approach (MB) with nucLSU and RPB1 gene regions (Savić et al., Mycol. Res. 112: 1307–1318, 2008; support values posterior probabilities (PP)/ML bootstrap). Dark boxes highlight phylogenetic analyses conducted independently. The genus *Dermatocarpon* was analyzed using MP and ITS (Amtoft et al., Bryologist 111: 1–40, 2008; support value MP bootstrap). *Verrucula* and the clade including *Verruculopsis* and *Placopyrenium* were analyzed using MB and ITS (Navarro-Rosinés et al., Bull. Soc. Linn. Provence 58: 133–180, 2007; support values PP/ML bootstrap). Clade E was analyzed using MP and ITS-nucLSU (Savić et Tibell, 2008; support values PP/MP bootstrap). *Hydropuncataria* was analyzed using MP and nucLSU (support values MP bootstrap). Relationships within the Placidium group were further studied in Prieto et al. 2012 Species that were represented by more than one specimen in the original analyses have a triangle at the top of the terminal branches. A dot indicates branches with support value(s) of 100%. Branch lengths are indicated by scale bars for each of the independent analyses. A star indicates generic types. New genera are highlighted in red. Genera that have been recently re-circumscribed are indicated in blue. Grey boxes show monophyletic groups for which additional taxonomical changes will be necessary. The distributions of six morphological characters are depicted across our taxon sampling. The three first columns correspond to characters traditionally used for generic classification (A: thallus structure; B: ascospore septation; C: hymenial algae), and the tree last columns to newly investigated characters (D: structure of the upper cortex; E: black thallus inclusions: F: pycnidium type). Character states were color-coded as indicated in the figure. (From Gueidan et al., Taxon 58: 184–208, 2009). Arrows indicates genera treatet.

Verrucariaceae

S. Tibell

Pyrenocarpous lichenized fungi have long been recognized as a major group of lichens. Thus numerous species have been described in *Verrucaria* since the dawn of lichenology, but not until late 19th century this name come to denote more closely related species, characterized as crustose pyrenocarpous lichens having non-septate ascospores. Comprehensive revisions of *Verrucaria* and related genera were published by Vainio (Lichenographia fennica I, 1921) and Zschacke (Rabenhorst's Krypt.-Fl., ed. 2, 9, 1(1) 1933–34). Verrucariaceae was described by Eschweiler in Goebel & Kunze (Syst. Lich.: 15, 1824), and characterizations by Poelt (in: V. Ahmadjian & M. E. Hale (eds.): The Lichens: 599–632, 1973) and Henssen & Jahns (Lichenes 1973 (1974)) paved the way for a modern circumscription of the family. Recent molecular investigations have supported the monophyly of Verrucariaceae (Gueidan et al., Mycol. Res. 111: 1145–1168, 2007) but also revealed many problems in the genera as traditionally circumscribed during the pre-molecular era (Savić et al., Mycol. Res. 112: 1307–1318, 2008). In the latter paper major monophyletic groups in Verrucariaceae were identified, and in subsequent papers some of the genera in the Verrucariaceae were given new circumscriptions (*Polyblastia*, Savić & Tibell 2012; *Henrica*, Savić & Tibell 2008), while other were reintroduced (*Sporodictyon*, Savić & Tibell 2009) or described as new (*Atla*, Savić & Tibell 2008). Another major group in Verrucariaceae, the *Thelidium*-clade, still awaits revision. Further it was discovered that non-septate ascospores, considered characteristic of Verrucaria, is a plesiomorphic feature, making the genus polyphyletic. It was also shown that *Staurothele*, as previously circumscribed, is not monophyletic. In a multi-authored paper (Gueidan et al., Taxon 58: 184–208, 2009) further investigations of generic relationships in Verrucariaceae were persued, now based on the nucLSU and RPB1 genes, in which further genera were recognized or described, such as *Hydropunctaria*, *Parabagliettoa* and *Wahlenbergiella*. *Dermatocarpon* has been revised using molecular data by Amtoft et al. (Bryologist 111: 1–40, 2008) and Heiðmarsson (2001, 2003) and *Catapyrenium s. str.*, *Placidiopsis* and *Placidium* group by Prieto et al. 2010, 2012. The current treatment of Nordic Verrucariaceae includes those parts of the family that have recently been revised, although this assemblage does not form a natural group. Secondary 'lichen substances' have not been found in the family.

Key to genera treated in this volume

1. Thallus foliose or squamulose ..... Key 1
– Thallus crustose ..... Key 2

Key 1

1. Spores septate ..... *Placidiopsis*
– Spores simple 2
2. Thallus foliose ..... *Dermatocarpon*
– Thallus crustose-areolate or squamulose 3
3. Thallus crustose-areolate, with small squamules or areoles (1–3 mm); laminal pycnidia; asci clavate ..... *Heteroplacidium fusculum*
– Thallus squamulose, squamules larger, (0.5 –)2–8(– 15) mm; laminal or marginal pycnidia; asci cylindrical or clavate 4
4. Perithecia between the squamules (sometimes in the margin), not immersed in the thallus, with involucrellum ..... *Involucropyrenium*
– Perithecia immersed in the thallus, without involucrellum 5
5. Upper cortex cinereum-type, thin (5–40 µm) and poorly delimited from the algal layer, with small roundish-subangular cells of 4–10 µm diam.; without pycnidia ..... *Catapyrenium*
– Upper cortex clearly delimited from the algal layer, from 20 to c. 100 µm thick, with roundish-angular cells of 4–15 µm diam.; with laminal or marginal pycnidia 6
6. With rhizines ..... *Clavascidium*
– Without rhizines ..... *Placidium*

Key 2

1. Spores hyaline or very pale yellow when mature 2
– Spores straw yellow to dark brown when mature 5
2. Spores 1-celled ..... *Heteroplacidium fusculum*
– Spores muriform 3
3. Perithecia with thalline cover ..... *Sporodictyon*
– Perithecia without thalline cover 4
4. Spores muriform, >40 long ..... *Atla*
– Spores pauciseptate to muriform, <40 µm long ..... *Polyblastia*
5. Spores straw yellow when mature ..... *Sporodictyon*
– Spores medium to dark brown when mature 6
6. Perithecia immersed in the substrate ..... *Atla*
– Perithecia not immersed in the substrate 7
7. Perithecia without thalline cover 8
– Perithecia with thalline cover 10
8. Thallus thick, fertile areoles ± peltate ..... *Henrica theleodes*
– Thallus thin to moderately thick, fertile areoles not peltate 9
9. Spores <40 µm long ..... *Henrica melaspora*
– Spores >40 µm long ..... *Atla*
10. Thalline cover of perithecia thin 11
– Thalline cover of perithecia thick 12
11. Perithecia 0.5–0.7 mm diam. ..... *Sporodictyon cruentum*
– Perithecia < 0.50 mm diam ..... *Atla*
12. Thallus blackish brown ..... *Atla palicei*
– Thallus pale, grey or ochraceous 13
13. Thallus with ± peltate areoles ..... *Henrica theleodes*
– Thallus areolate to verrucose 14
14. Thallus pale grey, areolate to verrucose ..... *Sporodictyon*
– Thallus ochraceous, rimose to areolate ..... *Atla tibelliorum*

Atla

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Atla Savić & Tibell

Lichenologist 40: 273 (2008). – Type: *Atla alpina* S.Savić & Tibell

F: vellamonjäkälät **S:** atlor

Literature: Savić & Tibell, Lichenologist 40: 269–282 (2008), Hafellner, Bibl. Lichenol. 104: 117–141 (2010); Tibell & Tibell, Lichenologist 47: 93–98 (2015); Pykälä & Myllys, Lichenologist 48: 111–120 (2016).

Thallus crustose, grey to black, verrucose to diffusely areolate or immersed. Ascomata perithecia, medium-sized to large, 0.3–0.9 mm diam., sessile to immersed. Excipulum spherical, pale to dark brown. Involucrellum well developed, in the upper part fused with the excipulum or missing. Asci when mature without apical thickening, ellipsoidal to clavate, 8-spored, 113–306×39–112 µm. Hamathecium at maturity without hyphal elements except pseudoparaphyses formed below the ostiolum. Ascospores 43–87×19–49 µm, ellipsoidal, when mature hyaline to dark brown, muriform, with 7–15 transverse and 2–5 longitudinal septa. Photobiont green alga but often overgrown or possibly also symbiotically associated with cyanobacteria.

Note. Atla was described (Savić & Tibell 2008) as part of an effort to revise generic circumscriptions in Verrucariaceae. Like most other recently revised or reintroduced genera in the family it is based on analyses of genetic similarities in ribosomal nuclear DNA. It cannot easily be characterized in terms of traditional morphological concepts where the species have

been or would have been placed in *Polyblastia s. lat*., i.e. crustose species with muriform ascospores but without hymenial algae. For reviews of the phylogeny of *Polyblastia s.lat*. and related Verrucariaceae, see Savić et al. (2008) and Gueidan et al. (Taxon 58: 184–208 , 2009).

1. Ascospores dark brown when mature 2
– Ascospores hyaline, yellowish or pale brown when mature 6
2. Perithecia without involucrellum, on soil ..... 8. *A. wheldonii*
– Perithecia with a distinct involucrellum, on rocks 3
3. Thallus thick; thalline cover of perithecia thick ..... 6. *A. tibelliorum*
– Thallus thin; thalline cover of perithecia thin 4
4. Perithecia 0.5–0.9 mm ..... 1. *A. alpina*
– Perithecia 0.25–0.5 mm 5
5. Involucrellum appressed to the exciple, some involucrella incurving under the exciple or enveloping the exciple ..... 2. *A. oulankaensis*
– Involucrellum often slightly diverging from the exciple, not incurving under the exciple ..... 7. *A. vitikainenii*
6. Thallus scurfy, blackish brown, diffusely areolate; ascospores 43–51×23–26 µm ..... 3. *A. palicei*
– Thallus very thin, smooth to fragmented 7
7. Thallus grey to dark green, fragmented; ascospores 45–49×19–22 µm, mature ascospores with 8–11 transverse septa reaching the periphery on one side and with 2–4 longi-septa in the central part ..... 4. *A. praetermissa*
– Thallus ochraceous to olivaceous brown, thin, smooth; ascospores 41–48×19–23 µm, mature ascospores with 9–15 transverse septa reaching the periphery on one side and with 3–4 longi-septa in the central part ..... 5. *A. recondita*

1. **Atla alpina** Savić & Tibell

Lichenologist 40: 273 (2008). – Type: Sweden, Härjedalen, Ljusnedal par., Mittåkläppen, 2006 Savić 3129 (UPS holotype).

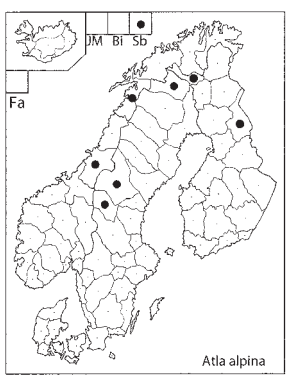
F: isovellamonjäkälä **S:** fjällatla

Literature: Savić & Tibell, The Lichenologist 40: 273–277 (2008). Hafellner, Biblioth. Lichenol. 104: 117–141 (2010).

Figs: Savić & Tibell 2008: 2A–C, 3A–B, 4A.

Thallus crustose, thin, minutely areolate, areoles 0.4–0.6 mm wide, irregular and with slightly uneven surface, grey to dark greenish grey, sometimes minutely granular, thin, matt or partly immersed and only emerging as blackish green patches, sometimes almost completely immersed. Perithecia rather large, 0.71–0.87 mm diam., shining black, almost spherical, adnate, broadly attached at the base, without a thalline cover, when old with verrucose surface in the upper part and impressed ostiolum. Involucrellum thick, thickened around the ostiolum, c. 80–120 µm thick, in the outermost part forming a continuous, strongly carbonized, black layer fused with the excipulum. Excipulum 15–25 µm thick, brown, in section, pale in the lowermost part. Pseudoparaphyses 55–98 µm long, numerous, slender, 1.5–2.5 µm wide, branching at wide angles; gel I+ red, KI+blue. Asci 153–178×70–112 µm, broadly ellipsoidal to clavate, 8-spored. Ascospores 65–85×39–49 µm, ellipsoidal to broadly ellipsoidal, when mature very dark brown, muriform; 7–8 transverse septa reaching the periphery along one side of the ascospores in a median optical section, and with 3–4 longi-septa in the central part; peripheral septa, however, are often difficult to observe since the mature ascospores are very dark. Photobiont: the areoles of well-developed thalli contain an unidentified green alga; small, almost black, verrucose colonies of the cyanobacterium *Nostoc* are frequently associated with these thalli containing green algae and may also participate in a symbiotic relationship.

Habitat. On calcareous rocks in humid situations, often on steep rocks or by water. Alt. 185–1170 m (2700 m in Central Europe).



Distribution. Probably not rare on wet calcareous rocks in the Scandinavian mountains, in Arctic areas and in alpine areas of Central Europe. **F:** *Ks EnL.* **N:** *NT NNo*, **AI:** *Sb*. **S:** *Hrj Jmt TL*. Also known from Novaya Zemlya and the Austrian and German Alps.

Note. Atla alpina is a rather conspicuous lichen among the Verrucariaceae, but has nevertheless been overlooked and misidentified when collected, usually as '*Polybastia theleodes*'. It was appropriately referred

to by Hafellner (Biblioth. Lichenol. 104: 117–141, 2010) as a 'frequently confused species'.

2. Atla oulankaensis Pykälä & Myllys

Lichenologist 48: 115 (2016). – Type: Finland, Koillismaa, Kuusamo, Juuma, Oulanka National Park, gorge Jäkälävuoma, 2010 Pykälä 40105 (H holotype).

F: oulanganvellamonjäkälä **S:** finsk atla

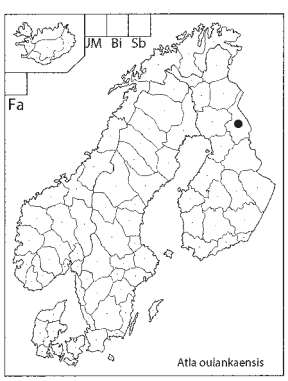
Literature: Pykälä & Myllys 2016: 115–117.

Figs. Pykälä & Myllys 2016: 2A.

Thallus thin, c. 10–50 µm thick, continuous, grey to greenish grey. Perithecia 0.3–0.38 mm diam., 1/4-immersed, young perithecia thinly covered by a thalline layer except at apex, thalline cover c. 8–15 µm thick, old perithecia without thalline cover. Involucrellum to the exciple base level or incurving under the exciple or enveloping the exciple, 40–80 µm thick, appressed to the exciple. Exciple 0.25–0.37 mm diam., in section medium brown to dark brown, c. 30–35 µm thick. Hamathecium without hyphal elements except for pseudoparaphyses; pseudoparaphyses c. 30–63 µm long and 1–2 µm wide, branching to anastomosing. Asci c. 147–177×63–72 µm, 8-spored. Ascospores (42–) 51–69(–75)×(20–)23–28(–32) µm, dark brown (a few mature ascospores pale), muriform, with (10–)12–16 transverse septa reaching the periphery along one side of the ascospores in a median optical section, and with 4–6(–7) longi-septa in the central part. Photobiont a green alga, thallus rather frequently covered by cyanobacteria (*Nostoc*), some forming cephalodia or cephalodia-like structures.

Habitat. On the shady wall of a calciferous rock in a gorge. Alt. 208 m.

Distribution. Known from one locality in Finland and one in Canada (the latter only a sequence from a soil sample). **F:** *Ks*. Probably rare in Europe.



Note. Rather similar to *Atla vitikainenii* in which the involucrellum is often slightly diverging from the exciple and not incurving under the exciple.

3. Atla palicei Savić & Tibell

Lichenologist 40: 277 (2008). – Type: Sweden, Torne Lappmark, Jukkasjärvi par., Låktatjåkka, Kärkevagge valley, 2002 Palice 7182 (UPS holotype).

F: kuruvellamonjäkälä **S:** skorvatla

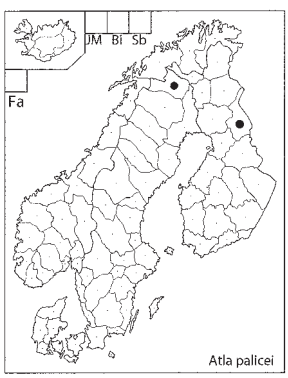
Literature: Savić & Tibell 2008: 277–279.

Figs: Savić & Tibell 2008: 2D, 3C, 4B.

Thallus superficial, scurfy, thin, blackish brown to black, diffusely areolate. Perithecia rather small, 0.43–0.49 mm diam., hemispherical, emerging from small areoles surrounding the perithecium like a cuff, and immersed only at the base, without a thalline cover. Involucrellum well developed apically, c. 90–110 µm thick, dark brown in section, strongly carbonized outer part and fused with the excipulum; central part formed by a pseudoparenchyma of rounded to slightly elongated cells. Excipulum greenish brown, consisting of narrow, concentrically arranged hyphae. Hamathecium without hyphal elements except for pseudoparaphyses formed below the ostiolum; pseudoparaphyses 75–110 µm long, very slender and numerous; gel I+ red, KI+ blue. Asci when mature without apical thickening, 139–146×40–44 µm, ellipsoidal to clavate, 8-spored. Ascospores 44–51×23–26 µm ellipsoidal, when mature hyaline, muriform, with 12–15 transverse septa reaching the periphery along one side of the ascospores in a median optical section, and with 4–5 longi-septa in the central part. Photobiont the thalline areoles in the type specimen consistently contain a mixture of an unidentified green alga, and unnamed species of *Nostoc* and *Chroococcus*. Which of these potential photobionts that actually enter a symbiotic relationship with *A. palicei* is presently not known.

Habitat. On calcareous rocks close to streams. Alt. 180–650 m.

Distribution. In addition to the Swedish type locality it is only known only from Kuusamo in Sweden, but probably overlooked elsewhere. **F:** *Ks.* **S:** *TL*.



Note. Recognized by the blackish, areolate thallus, the rather small perithecia without thalline cover, and the hyaline, rather large ascospores. Like *Atla praetermissa* it is a species with rather small perithecia, an inconspicuous thallus, and rather large, nonpigmented ascospores, but *A. praetermissa* differs in having a thinner, mesh-like, dark green thallus, smaller perithecia, and narrower ascospores with fewer septa. The ITS sequence of the Finnish specimen of *A. palicei* moderately differs from the type (97% similarity), and it may represent another undescribed species closely related to *A. palicei*. The Finnish specimen has slightly thinner involucrellum (70–90 µm thick) and less developed non-areolate thallus than the type of *A. palicei.*

4. Atla praetermissa Savić & Tibell

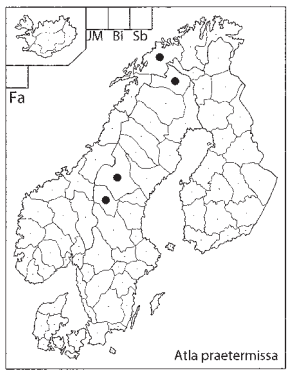
Lichenologist 40: 279 (2008). – Type: Sweden, Härjedalen, Funäsdalen par., 1.5 km NW of Hamra, Andersjöåforsen [Anderssjöfallet], 2006 Savić 3284 (UPS holotype).

S: dimmatla

Literature: Savić & Tibell 2008: 279–280.

Figs: Savić & Tibell 2008: 2E, 3D, 4C.

Thallus superficial, crustose, very thin, mesh-like to more or less confluent around the perithecia, grey to dark green or with a brownish hue. Perithecia rather small, 0.31–0.41 mm diam., almost spherical, adnate at the base, without thalline cover. Involucrellum well developed, c. 35–55 µm thick, almost reaching the base of the perithecium, where it diverges from the excipulum. Outermost layer 18–25 µm thick, black; interior of the involucrellum dark brown with irregularly intertwined, heavily sclerotized cells. Excipulum brown throughout, consisting of narrow, concentrically arranged cells 11–15×2–4 µm. Hamathecium without hyphal elements except for pseudoparaphyses formed below the ostiolum; pseudoparaphyses slender, 1.5–2 µm diam., septate, branching at wide angles; gel I+ red, KI+ blue. Asci when mature without apical thickening, 113–133×39–55 µm, ellipsoidal to clavate, 8-spored. Ascospores 44.7–49.2×19.0–22.4 µm, narrowly ellipsoidal, often asymmetrical with one end slightly widened, when mature hyaline, muriform, with 8–11 transverse septa reaching the periphery along one side of the ascospores in a median optical section, and with 2–4 longi-septa in the central part. Photobiont unidentified green alga.



Habitat. On calcareous rocks close to streams and in the mist of waterfalls. Alt. 165–955 m.

Distribution. Known only from Norway and Sweden, but probably overlooked elsewhere. **N:** *Tr*. **S:** *Hrj Jmt TL*.

Note. Recognized by the very thin, often mesh-like, dark green thallus, the small perithecia without thalline cover, and the hyaline, rather large ascospores. Both *A. praetermissa* and *A. palicei* are species with rather small perithecia (<0.5 mm diam.) and large ascospores (>40 µm long). Compared to *A. praetermissa*, however, *A. palicei* has a thicker and darker thallus, larger perithecia and wider ascospores.

5. Atla recondita Savić & Tibell

Lichenologist 47: 97 (2015) – Type: Sweden, Härjedalen, Ljusnedal par., Hamrafjället, 0.7 km NE of Röstavallen, 2007 Savić 3305 & Tibell (UPS holotype).

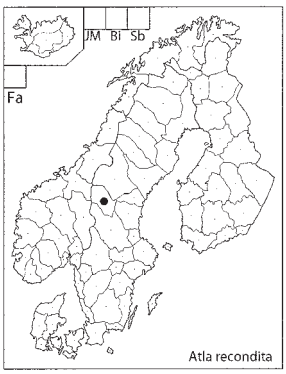
S: smygatla

Literature: SSavić & Tibell 2008: 279–280.

Figs: Tibell & Tibell 2015: 2B, D, F.

Thallus superficial, thin, ochraceous. Perithecia medium-sized, black, 0.28–0.37 mm diam., subspherical, with depressed ostiolum, sessile. Involucrellum c. 42–80 µm thick, thickened around the ostiolum, gradually thinner towards the base, blackish brown. Excipulum indistinctly delimited from the involucrellum, pale in the upper part, and pale brown at the base, where it is 15–19 µm thick. Hamathecium without hyphal elements except for pseudoparaphyses formed below the ostiolum; pseudoparaphyses slender, 28–48 µm long and 1.5 µm diam., septate, sparingly branching at the apices; I+ red, KI+ blue, except for the pseudoparaphyses. Asci 71–127×33–70 µm, ellipsoidal to clavate, 8-spored. Acsospores 41.3–48.7×19.1–22.6, hyaline or yellowish, ellipsoidal, muriform, with 9–15 trans-septa reaching the periphery along one side of

the ascospores in a median optical section, and with 3–4 longi-septa in the central part. Photobiont green alga, 8–9.5 µm diam., *Stigonema* is also found frequently, like some other cyanobacteria, which possibly also have a symbiotic association with *A. recondita*.



Habitat. On calciferous rocks in open situations along watercourses. Alt. 610–1075m.

Distribution. Seemingly a rare alpine species so far only known from Härjedalen in the central Scandinavian mounts. **S:** *Hrj*.

Note. Recognized by the thin, olivaceous brown thallus, the moderately sized, emerging perithecia and the unpigmented ascospores with 9–15 trans-septa and 3–4 longi-septa.

6. **Atla tibelliorum** Pykälä & Myllys

Lichenologist 48: 116 (2016). – Type: Finland, Enontekiön Lappi, Enontekiö, Porojärvet, Toskalharji, Toskaljärvi N, fell, 2011 Pykälä 43330 (H holotype).

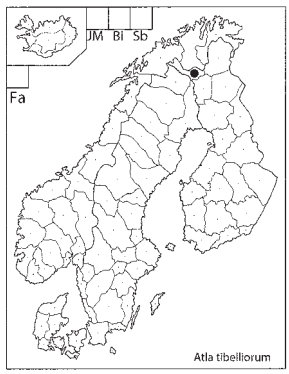
F: tundravellamonjäkälä **S:** blek atla

Literature: Pykälä & Myllys 2016: 116 –117.

Figs. Pykälä & Myllys 2016: 2B.

Thallus rimose to areolate, c. 200–280 µm thick, pale ochraceous, areoles 0.4–1.0 mm wide. Perithecia immersed in thalline warts, exposed only around ostiole, exposed part 0.1–0.15 mm wide, thalline cover of perithecia c. 50–150 µm thick. Involucrellum to the exciple base level, 50–70 µm thick, sometimes thickened towards the base to 60–110 µm thick, appressed to the exciple, sometimes somewhat diffusely pigmented at base. Exciple 0.25–0.48 mm in diam., in section dark brown. Hamathecium without hyphal elements except for pseudoparaphyses; pseudoparaphyses c. 55–93 µm long, 1–1.5 µm wide, branching. Asci c. 147–177×63–72 µm, 8-spored. Ascospores dark brown, muriform, (57–)63–73(–80)×(38–)40–46(–52) µm, with 10–15 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 5–7 longi-septa in the central part. Photobiont a green alga, few cephalodia or cephalodia-like structures (containing *Nostoc*) present.

Habitat. On a dolomite pebble on a fell in NW Finland.



Distribution. Apparently rare in Europe. Known from one locality in Finland and one in Alaska (the latter only a sequence from a soil sample). **F:** *EnL*.

Notes. Similar to *Sporodictyon arcticum* but that species has smaller ascospores and a pale exciple at the base.

7. **Atla vitikainenii** Pykälä & Myllys

Lichenologist 48: 118 (2016). – Type: Finland, Koillismaa, Salla, Oulanka National Park, W of Savikoski, 2010 Pykälä 40222 (H holotype).

F: orvonvellamonjäkälä **S:** dolomitatla

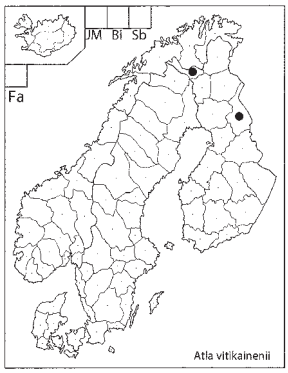
Literature: Pykälä & Myllys 2016: 118.

Figs. Pykälä & Myllys 2016: 2C.

Thallus thin, continuous or fleck-like, occasionally slightly rimose, grey, ochraceous, pale green or dark brown, c. 20–100 µm thick. Perithecia 0.25–0.46 mm in diam., 1/4–1/2(–3/4)-immersed, not leaving pits or leaving shallow pits, often with thin thalline cover except for the apex. Involucrellum to the exciple base level, 50–100 µm thick, appressed to the exciple or slightly diverging from the exciple. Exciple 0.25–0.38 mm diam., in section pale to dark brown, 25–34 µm thick. Hamathecium without hyphal elements except for pseudoparaphyses; pseudoparaphyses c. 44–54 µm long, 1.5–2.5 µm wide, branching. One mature ascus seen 150×63 µm, 8-spored. Ascospores dark brown, muriform, (40–)54–64(–70)×(25–)26–30(–33) µm, with (10–)12–16(–18) trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with (3–)4–6 longi-septa in the central part. Photobiont a green alga.

Habitat. Dolomite pebbles and from a dolomite boulder.

Distribution. A rare northern species Growing on calcareous rocks in the mountains. Only known from Finland. **F:** *Ks EnL*.



Note. A. vitikainenii is fairly similar to *A. oulankaensis* (see *A. oulankaensis* for differences).

8. Atla wheldonii (Travis) S.Savić & Tibell

Lichenologist 40: 280 (2008). – *Polyblastia wheldonii* Travis, North Western Naturalist 23: 240 (1947 as *Polyblastia wheldoni*), Anglia, terricola. – Type: England, On sand dunes, Hightown, Lancashire. Nov. 1924 Travis (BM lectotype, Swinscow, Lichenologist 5: 105, 1971).

F: maavellamonjäkälä **S:** jordatla

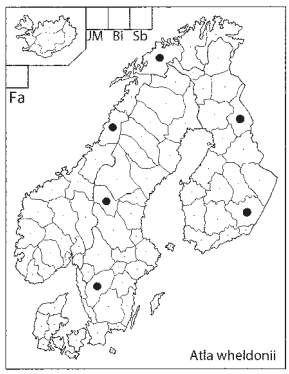
Literature: Savić & Tibell 2008: 280–28.

Figs: Savić & Tibell 2008: 2F & G, 3E & F, 4D.

Thallus crustose, thin, minutely verrucose, slightly glossy and often only observable close to the perithecia, gelatinous when wet, dark green. Perithecia rather small, 0.35–0.43 mm diam,, spherical, or with somewhat extended ostiolum, almost fully immersed; sometimes one third exposed and then with a thalline cover around the base; only in decaying thalli almost sessile; without involucrellum. Excipulum 35–60 µm thick, brown, consisting of narrow, concentrically arranged cells, paler in the innermost part and in surface view isodiametric, polygonal. Hamathecium without hyphal elements except for pseudoparaphyses formed below the ostiolum; pseudoparaphyses 75–95 µm long, numerous, slender, 1.0–1.5 µm wide, branching at wide angles; gel I+ faintly red, KI+ blue. Asci when mature without apical thickening, very variable in size, 159–306×69–87 µm, from broadly to narrowly ellipsoidal or clavate, containing 8 ascospores, but sometimes the number of developing ascospores is reduced to 6 or 4, larger than when eight ascospores are formed; occasionally some of the ascospores are extraordinarily large (to 150×80 µm). Asci 8-spored. pores 70–87×33–45 µm, ellipsoid to broadly ellipsoid or slightly asymmetrical with one end being thicker, soon becoming dark brown and strongly muriform; trans-septa reaching the periphery along one side of the ascospores in a median optical section 10–15, and with 4–5 longi-septa in the central part. Photobiont a green alga, but cyanobacterial colonies often occur in close connection with the perithecia and thallus.

Habitat. On damp basic, unstable soil colonized by cyanobacteria and mosses, often associated with *Thelocarpon impressellum* and *Solorina spongiosa*.

Distribution. Scattered in Norway and Sweden. **F:** *ES Ks*. **N:** *SNo Tr*. **S:** *Vg Hrj*. Widely distributed but scattered in Europe, although overlooked (see also Berger & Priemetzhofer, Herzogia 21: 125–146 (2005) and Breuss, Herzogia 21: 85–92, 2008).



Catapyrenium

Maria Prieto

Catapyrenium Flot.

Bot. Zeitung 8: 361 (1850). – Type: *Catapyrenium cinereum* (Pers.) Körb.

D: læderlav **F:** kilpiset **I:** pírur **S:** jordlavar

Literature: Breuss, Stapfia 23: 1–153 (1990a); Linzer Biol. Beitr. 22(1): 69–80 (1990b); Linzer Biol. Beitr. 26(2): 643–644 (1994); Ann. Naturhist. Mus. Wien 98: 35–50 (1996); Herzogia 23(2): 205–216 (2010); Prieto et al., Mycologia 102(2): 291–304 (2010a); Lichenologist 42: 637–684 (2010b).

Thallus squamulose; squamules small, (0.5) 1–4 mm wide, whitish, greenish grey or brownish, often pruinose, tightly contiguous to slightly overlapping, forming a continuous thallus; upper cortex of *cinereum*-type (i.e. poorly delimited from the algal layer and thin), algal layer irregularly delimited, medulla composed of globular or elongated cells and lower cortex paraplectenchymatous or lacking. Lower surface pale to black, with pale to black rhizohyphae. Ascomata perithecia, immersed in the thallus, appearing as

black dots on the upper surface. Exciple colourless, brown or black. Asci clavate, 8-spored, with biseriate ascospores, simple, colourless, 12–24×5–9 µm, and occasionally pseudoseptate. Pycnidia absent. Photobiont green algae.

Note. *Catapyrenium s. str*. is recognized by having a *cinereum*-type upper cortex, i.e. thin (5–40 µm), poorly delimited from the algal layer, paraplechtenchymatous, with small, roundish-subangular cells. Breuss (2010) reported seven species, including *Catapyrenium alvarense*, but morphology and DNA sequences exclude this species from the genus. Probably it belongs to *Clavascidium*. Thus, the species is here transferred to the latter genus (see explanation and details under *Clavascidium*). Six species worldwide.

1. Squamules with dark margins; upper surface whitish, rarely greenish grey or brownish, lower cortex well-developed, paraplectenchymatous, black; medulla composed of spherical hyphae; ascospores (15)17–23(25)×(6)6.5–8.5(9.5) µm.....1. *C. cinereum*
– Squamules without dark margins; lower cortex absent; medulla loose, composed of a mixture of elongated and spherical hyphae.....2
2. On soil or mosses; upper surface greenish grey to brownish, ascospores (15–)17–22(–24)×(5)6–8(–9) µm.....2. *C. daedaleum*
– On bark or mosses on rocks; upper surface greyish brown to brown, ascospores (12)13–17(–19)×(5)5.5–7(7.5) µm.....3. *C. psoromoides*

1. Catapyrenium cinereum (Pers.) Körb.

Syst. Lich. Germ.: 325 (1855). – *Endocarpon cinereum* Pers., Usteri's Ann. Bot. 1: 28 (1794). – Type: Germania ['Reperi hanc speciem prope Schanzfeld: circa die alte kirche & prope montem Meisner']. The type could not be located. However, there is a specimen in H-ACH (No. 851B) as *Endocarpon tephroides* from "Germania" annotated "*Endoc*. *cinereum* Pers.".

Syn. *Dermatocarpon cinereum* (Pers.) Th.Fr., *Dermatocarpon hepaticum* (Ach.) Th.Fr., *Endocarpon hepaticum* Ach., *Endopyrenium cinereum* (Pers.) Oxner, *Involucrocarpon cinereum* (Pers.) Servít, *Placidium cinereum* (Pers.) Szatala, *Verrucaria cinerea* (Pers.) Schaer.

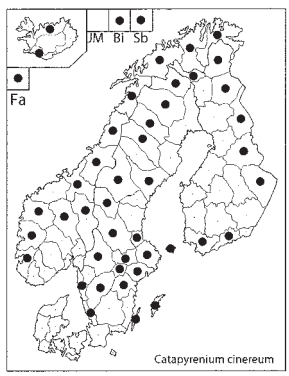
F: harmaakilpinen **I:** svarðpíra **S:** kalkjordlav

Literature: Breuss 1990a: 45-58; 1990b: 73; 1996: 37; Prieto et al. 2010b: 644–649.

Figs: Breuss & Hansen, Pl. Syst. Evol. 159: 102 (1988): Breuss1990a: Fig. 1, picture 1f. Breuss 1990b: 71 (map); Prieto et al. 2010: 1B, 2B; Wirth, et al. 2013 (1): 330. Stenroos et al. 2016: 128.

Thallus squamulose; squamules small, (0.5) 1–3 mm wide, tightly contiguous, forming a continuous thallus, finely lobulate; upper surface whitish, rarely greenish grey or brownish, pruinose, with dark margins; lower surface black. Medulla composed of globular cells; lower cortex paraplectenchymatous, blackish, with roundish-angular cells in two or three layers. Rhizohyphae thin, 3–5 µm, brown to black. Perithecia to 0.35 mmm wide, subglobose; exciple to 30 µm diam, initially pale, later brown to black, Asci clavate, ascospores biseriate, simple (occasionally pseudoseptate), (15–)17–23(–25)×(6–)6.5–8.5(–9.5) µm. Pycnidia absent.

Habitat. Grows predominantly over soil or in fissures, frequently mixed with mosses. The species usually occurs together with *C. daedaleum* and *Placidium lachneum*.



Distribution. Widely distributed in the region. **Fa. F:** *A V U PK Kn Ks SoL EnL InL*. **I:** *ISu INo*. **N:** *He Op Ro Ho SF ST NT SNo NNo Tr Vfi ØFi*. **AI:** *Bi Sb*. **S:** *Öl Gtl Hl Bh Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Ång Hrj Jmt LyL PL LuL TL*. An arctic-alpine taxon, found in Africa, Asia, Australia, Europe, New Zealand and North and South America.

2. Catapyrenium daedaleum (Kremp.) Stein

In Cohn, Krypt.-Fl. Schlesien (Breslau) 2(2): 312 (1879). – *Endocarpon daedaleum* Kremp., Flora 38: 66 (1855). – Type: Germany, Bayern, Berchtesgadener Alpen, Steinthal und Vorderberg zwischen Hochkalter und Kammerlinghorn, 1854 Rauchenberger (M lectotype, Breuss 1990a: 59).

Syn. *Dermatocarpon daedaleum* (Kremp.) Th. Fr., *Endocarpon cartilagineum* (Nyl.) Zahlbr. *nom. illeg.*, *Placidiopsis cartilaginea* (Nyl.) Vain. *nom. illeg.*,*Placidiopsis daedalea* (Kremp.) Creveld, *Placidium cartilagineum* (Nyl.) Arnold, *nom. illeg.*, *Placidium daedaleum* (Kremp.) Kremp., *Placocarpus daedaleus* (Kremp.) Trevis., *Rhodo-*

carpon daedaleum (Kremp.) Lönnr., *Verrucaria cinerea* var. *cartilaginea* Nyl., *Verrucaria daedalea* (Kremp.) Nyl.

F: sirokilpinen **I:** bleðlapíra **S:** stor jordlav

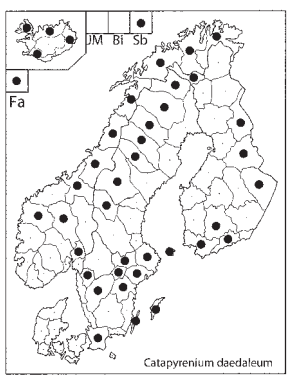
Literature: Breuss 1990a: 59–65; 1990b: 73; 1996: 37; Prieto et al. 2010b: 649.

Figs: Breuss 1990a: Fig. 2, 3; picture 3b. Breuss 1990b: 72 (map). Stenroos et al. 2016: 129.

Thallus squamulose; squamules small, 1–4 mm wide, adnate or with slightly raised margins, finely crenulate, tightly contiguous, forming a continuous thallus; upper surface greenish grey to brownish, faintly pruinose, never darker at margins; lower surface dark, with dark rhizohyphae. Medulla composed mainly of elongated cells, loose, becoming darker below; lower cortex lacking; rhizohyphae thin, 3–4 (–4.5) µm, dark. Perithecia to 0.30 mm wide, subglobose; exciple hyaline to brown, to 30 µm diam, darker at the ostiole. Asci clavate, ascospores biseriate, simple (occasionally pseudoseptate), (15–)17–22(–24)×(–5)6–8(–9) µm. Pycnidia absent.

Habitat. Grows predominantly over calcareous soils, frequently mixed with mosses. The species usually occurs together with *C. cinereum* and *Placidium lachneum*.

Distribution. Widely distributed in the region. **F:** A *V U EH*? *PK Kn Ks EnL*. **Fa**. **AI:** *Sb*. **I:** *ISu IAu INv INo*. **N:** *Ak Op SF ST NT SNo NNo Tr Vfi ØFi*. **S:** *Sk Öl Gtl Dls Vg Ög Nrk Srm Vsm Upl Hrj Jmt ÅsL LyL PL LuL TL*. An arctic-alpine taxon, found in Asia, Europe, North and South America.



Note. This species could be confused with *C. cinereum* because of their similar thallus morphology. The lack of a lower cortex in *C. daedaleum* is a reliable distinguishing character.

3. Catapyrenium psoromoides (Borrer) R. Sant.

In Hawksworth, James & Coppins Lichenologist 12: 106 (1980). – *Verrucaria psoromoides* Borrer, in Hooker & Sowerby, Engl. Bot. [Suppl. 1, tab. 2612, Fig. 1] (1831). – Type: England, on elm at Hurstpierpoint and on ash at Beeding, Sussex, Borrer (BM syntypes).

Syn. *Dermatocarpon daedaleum* var. *corticola* H.Magn., *Placidium cartilagineum* var. *muscicolum* Arnold

F: rosokilpinen **S:** grå jordlav

Red-listed in: **N S**

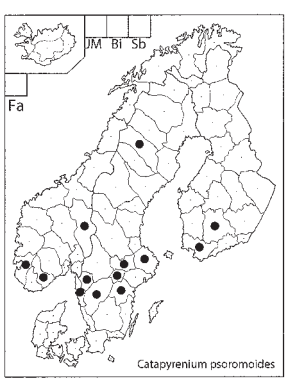
Literature: Breuss 1990a: 65–69; 1990b: 78; 1996: 37; Prieto et al. 2010b: 649–651; Bratli et al., Graphis Scripta 22: 9 (2010).

Figs: Breuss 1990a: picture 3a; Prieto et al. 2010b: 1B, 2B; Bratli et al. 2010, Fig. 1–3: Stenroos et al. 2016: 130.

Thallus squamulose; squamules small, 1–3 mm wide, adnate, tightly contiguous to slightly overlapping, forming a continuous thallus; upper surface greyish brown to brown, pruinose, never darker at margins; lower surface dark, whitening at the margins, with dark rhizohyphae. Medulla composed mainly of elongated cells, loose, with some spherical cells and interhyphal spaces; lower cortex lacking; rhizohyphae thin, 3–4 µm, brown to black. Perithecia to 0.20 mmm wide, pyriform; exciple to 25 µm diam., hyaline to pale brown, darker at the ostiole. Asci clavate, ascospores biseriate, simple (occasionally pseudoseptate), (12)13–17(19)×(5)5.5–7(7.5) µm. Pycnidia absent.

Habitat. A nitrophilous species growing on old trees and occasionally between mosses on calcareous rocks.

Distribution. Rare species found in southern Finland, Norway and Sweden. **F:** *V EH*. **N:** *He AA Ro*. **S:** *Bh Dls Vg Ög Nrk Vsm Upl LyL*. Also known from Asia, eastern Africa, Europe, New Zealand and North America.



Note. The only corticolous species of *Catapyrenium s. str*. It is very similar to *C. daedaleum,* but it differs by its significantly smaller ascospores and ecology and distribution (*C. daedaleum* is terricolous and arctic-alpine whereas *C. psoromoides* is corticolous from temperate areas).

Clavascidium

Maria Prieto & Martin Westberg

Clavascidium Breuss

Ann. Naturhist. Museum Wien 98B Suppl.: 41 (1996). – Type: *Clavascidium umbrinum* (Breuss) Breuss

S: jordlavar

Literature: Breuss, Linzer Biol. Beitr. 22(1): 69–80 (1990); Ann. Naturhist. Museum Wien 98B Suppl.: 35–50 (1996). Gueidan et al. Taxon 58: 184–208 (2009). Prieto et al., Am. J. Bot. 99: 23–35 (2012).

Thallus squamulose; squamules 1–8 mm wide, brown, dispersed or loosely aggregated, barely overlapping, appressed or with ascending margins, rounded or lobed; upper cortex 20–100 µm thick, algal layer and medulla well developed; medulla mixed type or prosoplectenchymatous; lower cortex weakly differentiated or lacking. Lower surface pale to blackish with colorless or brown rizohyphae; rhizines pale, brown or black. Ascomata perithecia, immersed in the thallus, appearing as black dots on the upper surface; exciple colorless, brown or black. Asci clavate, 8-spored, with biseriate ascospores, simple, colourless. Pycnidia laminal or marginal, *Dermatocarpon*-type, with oblong-ellipsoidal, bacilliform or cylindrical conidia. Photobiont green algae.

Note. *Clavascidium* differs from the very closely related *Placidium* by the clavate asci and the presence of rhizines. The distinction between *Clavascidium* and *Placidium* has been confirmed by molecular data (Prieto et al. 2012).Species within *Clavascidium*, and especially varieties belonging to *C. lacinulatum* are not fully understood and further work is necessary in order to delimitate them. *Catapyrenium alvarense* is here transferred to *Clavascidium* based on morphology and confirmed by molecular analyses. Nine species world-wide.

1. Rhizines white; rhizohyphae colorless; exciple pale, thallus thick..... 2. *C. lacinulatum*
– Rhizines brown to black; rhizohyphae colorless to dark; exciple brownish to black, darkening with age; thallus thin..... 1. *C. alvarense*

1. **Clavascidium alvarense** (Breuss) M.Prieto

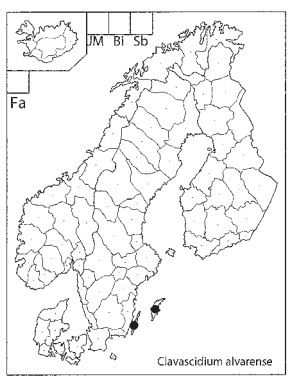
Nord. Lich. Flora 6: 56 (2017). – *Catapyrenium alvarense* Breuss, Linzer Biol. Beitr. 26(2): 643–644 (1994). – Type: Sweden, Öland: Vicklebys Stora Alvaret, 1958 W.A. & L. Weber (COLO no. 126458 holotype).

S: alvarjordlav

Literature: Breuss, Linzer Biol. Beitr. 26(2): 643–644 (1994); Arup et al., Graphis Scr. 23: 42–46 (2011). Westberg et al., Lavbulletinen 2015(1): 28–29 (2015).

Figs. Arup et al. 2011: 43; Westberg et al. 2015: 28–29 (both as *Clavascidium umbrinum*).

Thallus squamulose, squamules 2–4 mm wide, tightly contiguous to overlapping, adnate or with slightly raised margins; upper surface brown, with pruina irregularly accumulating; lower surface pale on margins, black in central parts. Rhizohyphae colorless to dark, 4–5 µm, absent at the margins. Rhizines present, few to many per squamule, brown to black. Thallus 180–280 µm thick, upper cortex 15–40 µm thick, paraplectenchymatous; epinecral layer 5–20 µm. Algal layer 20–60 µm thick. Medulla to 140 µm, composed of filamentous and globular cells; lower cortex not clearly delimited from the medulla, of more densely aggregated cells forming a blackish basal layer. Perithecia to 0.45 mm diameter, with brownish to black excipla, darkening with age, 25 µm thick. Ascospores simple, ellipsoidal, 10–15×6–7 µm. Pycnidia not found.



Habitat. On calcareous soils or rocks.

Distribution. **S:** *Öl Gtl*. Apparently very rare and only found in Sweden. It might, however, have been overlooked or confused with other *Clavascidium* or *Placidium* species.

Note. *C. alvarense* was described within *Catapyrenium* as similar to *C. daedaleum*. However, morphology and anatomy clearly places it in *Clavascidium*. DNA sequences also support this position. It has a very characteristic appearance with raised margins reminding of *Endocarpon adscendens*, the latter with

muriform ascospores and hymenial alge. The delimitation between species and varieties in *Clavascidium* need further studies.

C. alvarense differs from *C. umbrinum* mainly in the ascospore size and the thallus morphology. The exciple is dark in *C. umbrinum* but the colorless to yellowish exciple in *C. alvarense* becomes dark with age and this character is thus not very useful. Further studies are necessary to delimitate them.

2. Clavascidium lacinulatum (Ach.) M.Prieto

Am. J. Bot. 99: 28 (2012). – *Endocarpon hepaticum* var. *lacinulatum* Ach., Lich. Univ.: 299 (1810); – Type: Helvetia (H-ACH no 853 sub *Endocarpon hepaticum* var. "*laciniatum*" lectotype, Breuss, Stapfia 23: 92, 1990).

Syn. *Catapyrenium lacinulatum* (Ach.) Breuss, *Placidium lacinulatum* (Ach.) Breuss.

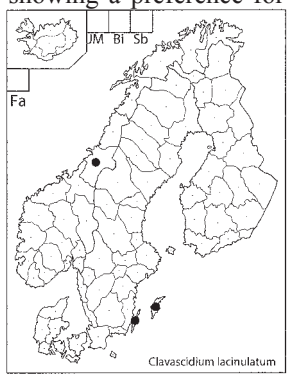
S: rotjordlav

Literature: Breuss, Stapfia 23: 92–95, (1990a); 1996: 39; *Placidium*, in Lichen Flora of the Greater Sonoran Desert Region I (Nash et al. eds): 384–393 (2002); Prieto, et al. 2012: 28.

Figs: Breuss 1990: Fig. 16, map (Eur.). Breuss 1995: 179, map (world). Prieto et al. 2012: 1B, 1C.

Thallus squamulose; squamules to 8 mm wide, scattered to contiguous, rarely overlapping, closely appressed to the substratum or with slightly raised margins, roundish to deeply lobate, flat to concave or convex. Upper surface pale to dark brown, matt, epruinose or slightly pruinose; lower surface pale to dark. Thallus 300–600 µm thick, upper cortex 40–100 µm thick, paraplectenchymatous, cells 6–13 µm diam.; epinecral layer thin, to 25 µm or lacking. Algal layer 55–155 µm thick, cells 5–15 µm. Medulla 60–230 µm, composed of globular cells, 6–13 µm diam., lower cortex not clearly delimited from the medulla, of more densely aggregated cells. Rhizohyphae 3–5 µm, colourless. Rhizines pale, few to many per squamule, simple to branched, to 0.3 mm thick, and more than 10 mm long, easily broken in dry conditions and sometimes inconspicuous. Perithecia broadly pyriform to subglobose, to 0.60 mm wide, with a pale exciple. Asci clavate; ascospores biseriate, simple, 12–15(17)×(5.5)6–7(7.5) µm. Pycnidia laminal, immersed; conidia oblong-ellipsoid, 3–5×1.2–2 µm.

Habitat. Growing on soil, showing a preference for calcareous, fine grained and bare soils.



Distribution. Rare in the region. **N:** *NT*. **S:** *Öl Gtl*. Widespread, known from the Americas, Africa, Asia and Europe, showing clear preferences for Mediterranean to mild temperate regions.

Note. Easily distinguished by its rhizines, the deeply lobed squamules and the presence of laminal pycnidia. In cases when rhizines are inconspicuous or individuals are young, the species could be confused with *Placidium squamulosum* which has thicker epinecral and algal layers, longer and narrower ascospores and thicker rhizohyphae.

Excluded species.

Clavascidium umbrinum (Breuss) Breuss – *Placidium umbrinum* Breuss.

Samples from Sweden reported as *Clavascidium umbrinum* by Arup et al (Graphis Scripta, 23: 42–46, 2011) and Westberg et al. (Lavbulletinen, 2015(1): 27, 2015) belong to *Clavascidium alvarense*.

Dermatocarpon

Starri Heiðmarsson

Dermatocarpon Eschw.

Systema lichenum: 21 (1824). – Type: *Dermatocarpon miniatum* (L.) W. Mann (lectotype Clements & Shear, The genera of fungi: 289, 1931).

Syn. *Rhodocarpon* Lönnr., *Entosthelia* (Wallr.) Hue

D: prikbladlav **I:** korpur **N:** lærlav **S:** sipperlavar

Literature: Magnusson, Arkiv Bot. 2, 2(2): 73–76 (1952); Harada, Nat. Hist. Research, Chiba (Japan) 2: 113–152 (1993); Heiðmarsson, Bryologist 99: 315–320 (1996); Ann. Bot. Fenn. 35: 59–70 (1998); Nord. J. Bot. 20: 605–639 (2001); Amtoft et al., Bryologist 111: 1–40 (2008).

Thallus foliose to almost squamulose in one species, upper surface brownish to grey or greyish white caused by pruinose appearance, lower surface light to dark brown, umbilicate or with several scattered holdfasts. Ascomata perithecia usually higher than wide, completely immersed in the thallus or slightly protruding; ostiolum brown to almost black in transection, appearing as black dots on the upper surface. Asci clavate to cylindrical, fissitunicate, 8-spored. Conidiomata *Dermatocarpon*-type, conidia bacilliform, 3–6 µm long and c. 1 µm wide. Photobiont green algae.

Chemistry. K–, C– P–. The hymenium is amyloid and stains blue with iodine. The medulla can also show Iodine reaction when exposed to Melzer´s Iodine. In some species the medulla turns reddish brown with Melzer‘s, a character of debated taxonomic value (Heiðmarsson 2001, Amtoft 2008: 1–40) but useful when identifying materal. Some specimens have been shown to produce cyanide (Bergman & Ebinger, Castanea 55(3), 1990).

Note. The genus is easily recognized as the sole member of the Verrucariaceae being foliose. Nordic species are without rhizinomorphs which can be found in other parts of the world.

1. Thallus multi-lobed with many holdfasts scattered on the lower surface 2
– Thallus single-lobed, or umbilicate, consisting of few lobes 4
2. Medulla I+ (Melzer´s Reagent) 3
– Medulla I– (Melzer´s Reagent) ..... 6. *D. miniatum*
3. Large “colonies”, to 30 cm, green when wet; ascospores 13.5–18 µm long ..... 4. *D. luridum*
– Small “colonies”, to 5 cm, not changing colour when wet; ascospores 10–13.5 µm long ..... 7. *D. polyphyllizum*
4. Ascospores mostly >15 µm long 5
– Ascospores <15 µm long 9
5. Upper surface brown; epinecral layer consisting of compressed hyphae, almost never appearing pruinose 6
– Upper surface usually grey; epinecral layer consisting of air filled hyphae, usually appearing pruinose at least on young lobes 7
6. Lower surface smooth or finely granulose; thallus small (lobe size 6–12 mm), ± rounded and thick (when dry 0.36–0.62 mm, when wet 0.29–0.51 mm) ..... 5. *D. meiophyllizum*
– Lower surface distinctly reticulate; thallus large (lobe size 13–30 mm), ± irregular and thin (when dry 0.24–0.42 mm, when wet 0.19 0.35 mm) ..... 8. *D. rivulorum*
7. Thallus very small (lobe size 1–4 mm), forming small aggregates ..... 3. *D. leptophyllodes*
– Thallus larger, individual thalli solitary 8
8. Thallus small (lobe size 7–13 mm), thin (when dry 0.36–0.39 mm); lower surface smooth to rugose or reticulate, light to dark brown ..... 2. *D. deminuens*
– Thallus large (lobe size 13–24 mm), thick (when dry 0.30–0.50); lower surface usually reticulate, dark brown ..... 1. *D. bachmannii*
9. Medulla I+ (Melzer´s Reagent) ..... 7. *D. polyphyllizum*
– Medulla I– (Melzer´s Reagent) ..... 6. *D. miniatum*

1. **Dermatocarpon bachmannii** Anders

Hedwigia 63: 271 (1922). – Type: Czech Republic, Nordböhmen, Berg Bösig, 550 m, 1920 Anders (UPS L-099391 lectotype, Heiðmarsson, Ann. Bot. Fenn. 35: 64, 1998).

F: valukilpijäkälä **I:** vætukorpa **S:** Bachmanns sipperlav

Red-listed in: **N**

Literature: Moberg, Thunbergia 2: 2 (1986); Heiðmarsson 1998: 64–67; 2001: 614–615; Thor & Arvidsson, Rödlistade lavar i Sverige: 157, map (S) (1999).

Figs. Heiðmarsson 1998: 67; Lichens of Finland 2016: 240.

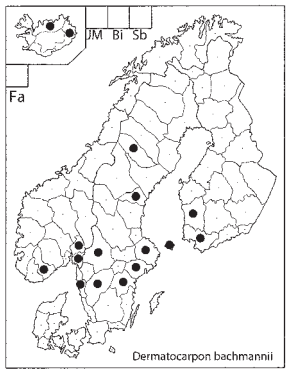
Thallus foliose, single-lobed with the lobe ends sometimes strongly inrolled. Lobe size (9–)13–24(–40) mm. Upper surface grey; lower surface usually distinct reticulate, dark brown to almost black. Perithecia common, (0.16–)0.20–0.30(–0.38) mm high and (0.09–)0.19–0.33(–0.46) mm wide; ostiolum immersed or slightly protruding. Ascospores simple although occasionally 1-septate, (13.0–)16.0–20.0(–25.5)×(4.5–) 6.0–8.0(–9.0) µm. Pycnidia rare; ostiolum similar to that of the perithecia. Conidia bacilliform.

Chemistry. No secondary substances detected.

Habitat. Saxicolous, mainly growing on seepages or otherwise wet rocks. Prefers basic rocks such as serpentine and calcareous rocks, in Iceland found on basalt.

Distribution. With scattered occurences in southern Fennoskandia. Few localities known in Greenland

and Iceland. **Gr**. **F:** *A V St*. **I:** *IAu INo*. **N:** *Øf Ak AA*. **S:** *Bh Vg Ög Srm Vrm Upl Mpd ÅsL*. Also found in northwestern part of Russia and in several countries in central Europe, furthermore recorded in North America.



Note. Usually easily recognized by its fairly large thalli and the distinctly reticulate lower surface which is dark brown. Small thalli of *D. bachmannii* can, however, be difficult to distinguish from *D. deminuens* but then the reticulation is usually the most distinctive character.

2. Dermatocarpon deminuens Vain.

Acta Soc. Fauna Fl. Fenn. 49: 15 (1921). – Type: Finland. Varsinais-Suomi, Finby, Korkmäki, 22.VIII 1920 Vainio (TUR-V 30064 lectotype, Heiðmarsson, Ann. Bot. Fenn. 35: 66, 1998).

Syn. *Dermatocarpon laatokkaënse* Räsänen

F: härmäkilpijäkälä **I:** vætlukorpa, **S:** tjock strandsipperlav

Literature: Santesson, Medd. Lunds Univ. Limn. Inst. 1: 7 (1939); Magnusson, Bot. Notiser 1942: 12 (1942); Hasselrot, Svensk Bot. Tidskr. 47: 533 (1953); Heiðmarsson, 1998: 66–67; 2001: 615–616.

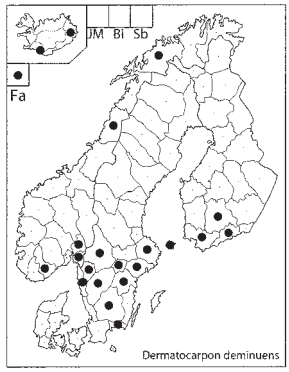
Figs. Heiðmarsson 1998: 67; Stenroos et al. 2015: 241.

Thallus single-lobed. Lobe size (4–)7–13(–16) mm. Upper surface grey, lower surface smooth to rugose to reticulate, light to dark brown. Perithecia common, (0.16–)0.20–0.30(–0.38) mm high and (0.12–)0.17–0.28(–0.40) mm wide; ostiolum immersed or slightly protruding. Ascospores simple although occasionally 1–3 septate (11.5–)15,5–20.0(–23.0)×(4.5–)5.5–7.0(–8.5) µm. Pycnidia not as common as perithecia, ostiolum similar to that of the perithecia. Conidia bacilliform.

Chemistry. No secondary substances detected.

Habitat. Saxicolous, often growing in the splash zone of lake shores or along streams or in seepages on slightly sloping rocks, even occasionally on vertical rocks.

Distribution. Fairly common in southern Fennoscandia, **Fa F:** *A V U EH*. **I:** *ISu IAu*. **N:** *Øf Ak AA SNo Tr*. **S:** *Bl SmI Bh Dls Vg Ög Nrk Srm Vrm Upl*. It has also been recorded in the Great Britain.



Note. Frequently growing together with *D. meiophyllizum* and *Staurothele* spp. and *Verrucaria* spp. on lake shores and close to rivers and creeks. Usually easily recognized by its relatively small, greyish thallus which is rather thin compared to *D. meiophyllizum* which has a brown upper surface and thicker thallus

3. Dermatocarpon leptophyllodes (Nyl.) Vain. ex Hav.

in Lynge, Nytt. Mag. Naturvid. 54: 248 (1916). – *Endocarpon leptophyllodes* Nyl. [as *leptophylloides*], Flora 59: 576 (1876). – Type: France, Haute-Vienne, Bessines, sur les rochers au bord de la Gartempe, 1869 Ripart (H-NYL 3960 lectotype, Heiðmarsson, Nord. J. Bot. 20: 616, 2001).

Syn. *Dermatocarpon miniatum* var. *diffractum* Th.Fr., *Dermatocarpon lorenzianum* Anders

F: ruutukilpijäkälä, **S:** fjällig sipperlav

Literature: Heiðmarsson 2001: 616–617; Mycol. Research 107: 459–468 (2003); Orange, Lichenologist 30: 8–13 (1998); Pykälä, Graphis Scripta 23: 48–49 (2011).

Figs. Orange 1998: 9; Heiðmarsson 2001: 616: Stenroos et al. 2015: 241.

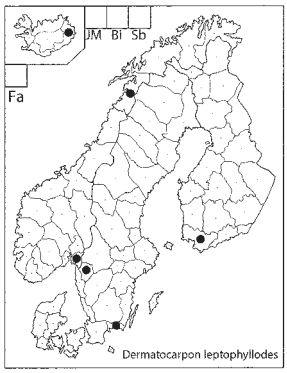
Thallus single-lobed. Lobe size 1–4 mm. Upper surface grey, lower surface usually smooth, brown to dark brown. Perithecia common, 0.20–0.29 mm high and 0.16–0.26 µm wide; ostiolum slightly immersed. Ascospores simple 13–21×5–8 µm. Pycnidia fairly common, ostiolum similar to that of the perithecia. Conidia bacilliform.

Chemistry. No secondary substances detected.

Habitat. Saxicolous, mainly found on somewhat basic rock types in the Nordic countries but has been found on siliceous rocks in Great Britain (Orange 1998).

Distribution. The relatively few localities known in

the Nordic countries might be because the species is easily overlooked and that it does not appear as a typical *Dermatocarpon*. **F:** *V.* **I:** *IAu.* **N:** *Ak NNo* **S:** *Bl Dls*. Recorded in Great Britain, central Europe and in Arizona, California, Utah and Wyoming in the USA and in British Columbia in Canada.



Note. Havås (1914) gave the combination in the hand-written label of his Lich. Norv. Exs., but it was published by Lynge. Can appear as squamulose because of the small lobe size. The *Dermatocarpon*-type of the lower cortex in transect does reveal the true identity.

4. Dermatocarpon luridum (With.) J.R. Laundon

Lichenologist 16: 222 (1984). – *Lichen luridus* With., Bot. Arr. Veg. Gr. Br.: 720 (1776). – Type: Icon in Dillenius, Hist. Musc. t. 30, fig. 128, 1742 (holotype); corresponding specimen in herb Dillenius, the large specimen in the upper right half (OXF, epitype, Nordic Lichen Flora 6: 56, 2017).

Syn. *Lichen aquaticus* L. *Dermatocarpon aquaticum* (Weiss) Zahbr. (*illeg.*), *Dermatocarpon fluviatile* (Weber) Th.Fr. (*illeg.*) *Dermatocarpon weberi* (Ach.) W.Mann (illeg.)

F: purokilpijäkälä **N:** bekkelær, **S:** bäcklav

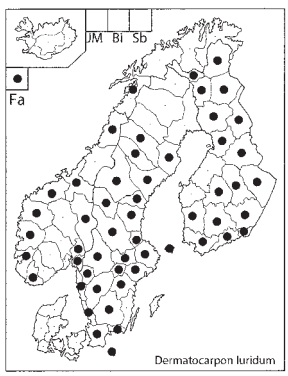
Literature: Heiðmarsson 2001: 620–621.

Figs. Brodo et al., Lichens of North America: 297 (2001); Heiðmarsson 2001: 620; Krog et al. 1994: 188; Moberg & Holmåsen 1990: 214; Stenroos et al. 2015: 242.

Thallus multilobed. Lobe width (4–)6–13(–25) mm. Upper surface epruinose, light to dark brown or occasionally somewhat greyish, usually turning green when wet, lower surface usually smooth or sometimes slightly rugose or moderately reticulate, light to dark brown. Perithecia rather common, 0.21–0.49 mm high and 0.15–0.52 mm wide; ostiolum brown. Ascospores simple (10.5–)13.5–18.0(–20.0)×5.5–7.0(–8.5) µm. Pycnidia common, sometimes located in warts, ostiolum similar to that of the perithecia. Conidia bacilliform (3.5–)4.0–5.0(–6.0)×ca 1 µm.

Chemistry. Medulla turning reddish brown with Melzer´s Iodine. No secondary substances detected.

Habitat. Saxicolous, hydrophilic, growing in seepages and on shores of streams, rivers and lakes where they are inundated at least part of the year.



Distribution. Common in the southern part of Fennoscandia. **D:** *Brn*. **Fa F:** *A V U EK St EH ES PH PS PK Kn Op PeP Ks Kil SoL EnL InL*. **N:** *Øf Ak Op VA Ro Ho SF MR ST SNo NNo*. **S:** *Sk Bl SmI Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb ÅsL LyL*. Widely distributed in Europe and North America.

Note. Easily recognized by its multi-lobed thallus and the upper surface that appear greenish when wet. The nomenclature of *D. luridum* is fairly complicated and it was earlier referred to as *D. aquaticum*, *D. fluviatile* or *D. weberi*. For a more thorough discussion on the nomenclature Laundon (Lichenologist 16: 211–239, 1984) and Jørgensen, James & Jarvis (Bot. J. Linn. Soc. 115: 261–405, 1994) can be consulted

5. Dermatocarpon meiophyllizum Vain.

Acta Soc. Fauna Fl. Fenn. 49: 14 (1921). – Type: Finland. Uusimaa, Helsinki, Tali, 1894 Vainio (TUR-V 30061 lectotype, Heiðmarsson, Ann. Bot. Fenn. 35: 67, 1998).

Syn. *Dermatocarpon bachmannii* var. *inundatum* Klement, *Dermatocarpon meiophyllum* Vain.

F: kääpiökilpijäkälä **I:** brúnkorpa, **S:** strandsipperlav

Literature: Santesson, Meddeland. Lunds Univ. Limnl. Inst. 1: 6 (1939); Magnusson, Bot. Notiser 1942: 12 (1942); Dahl, Nytt Mag. Naturv. 78: 128 (1938); Heiðmarsson 1998: 67–68; 2001: 621–623.

Figs. Heiðmarsson 1998: 67; Stenroos et al. 2016: 243.

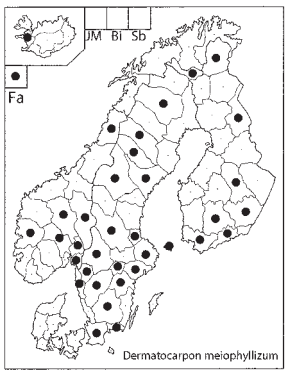
Thallus single-lobed. Lobe size (4–)6–15(–31) mm. Upper surface light to dark brown, lower surface smooth or finely granulose, usually with darker colour than the upper surface. Perithecia common, ostiolum immersed, black, 0.20–0.42 mm high and 0.12–0.42

mm wide. Ascospores simple (11.0–)14.0–18.0(–20.5)×(5.0–)6.0–8.0(–10.5) µm. Pycnidia common, more or less spherical, ostiolum similar to that of the perithecia. Conidia bacilliform.

Chemistry. No secondary substances detected.

Habitat. Saxicolous in somewhat wet habitats, often on shores of lakes or strems.

Distribution. Scattered in the Nordic countries and in central and northern Europe. **Fa F:** *A V U EH ES PS Ks EnL InL*. **I:** *IVe*. **N:** *Øf Ak He Op Bu Ho SNo*. **S:** *Sk Bl SmI Bh Dls Vg Ög Nrk Srm Vrm Upl Dlr Gst Ång Jmt ÅsL LyL LuL*. Also recorded from British Columbia in Canada, and in Colorado and Minnesota and on higher altitudes in California in the USA.



Note. Easily recognized by its small, thick thallus. Often growing together with *D. deminuens*.

6. **Dermatocarpon miniatum** (L.) W.Mann

Lich. Bohem. Obs. Dispos.: 66 (1825). – *Lichen miniatus* L., Sp. Pl. 2: 1149 (1753) – Type: Icon in Dillenius, Hist. Musc. t. 30, fig. 127B, (1742) lectotype; (OXF-Dillenius epitype, Jörgensen et a1, Bot. J. Linn. Soc. 115: 378, 1994).

Syn. *Dermatocarpon arnoldianum* Degel., *Dermatocarpon caesium* Räsänen, *Dermatocarpon intestiniforme* (Körb.) Hasse, *Dermatocarpon leptophyllum* (Ach.) K.G.W.Lång, *Dermatocarpon linkolae* Räsänen, *Dermatocarpon miniatum* var. *cirsodes* (Ach.) Zahlbr., *Dermatocarpon miniatum* v. *complicatum* (Lightf.) Th.Fr., *Dermatocarpon miniatum* f. *hypomelanum* Räsänen, *Dermatocarpon miniatum* var. *complicatissimum* (Nyl.) Lettau

D: klippe-prikbladlav **F:** kalliokilpijäkälä **I:** blaðkorpa, þarmakorpa **N:** glatt lærlav, putelær **S:** sipperlav

Literature: Harada 1993: 143–146; Heiðmarsson 2001: 623–629; Mycol. Research 107: 459–468 (2003).

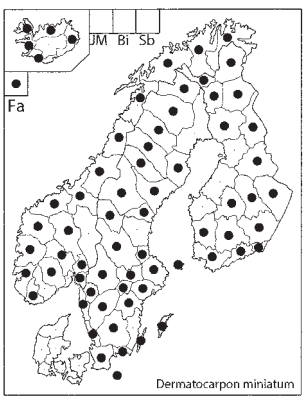
Figs. Heiðmarsson 2001: 617, 619, 624, 626, 627; Krog et al. 1994: 188, 189; Moberg & Holmåsen 1990: 213; Stenroos et al. 2016: 244.

Thallus single-lobed to multi-lobed, umbilicate or with scattered holdfasts when multi-lobed. When single-lobed lobe size (6–)13–35(–50) mm, when multi-lobed lobe width (3–)5–15(–34) mm. Upper surface grey, lower surface light brown to brown, usually smooth but occasionally rugose, slightly reticulate or distinctly papillose (former recognized as var. *cirsodes*). Perithecia common, (0.19–)0.22–0.39(–0.52) mm high and (0.14–)0.19–0.35(–0.44) mm wide; ostiolum often slightly protruding or in level with upper surface,. Ascospores simple (5.5–)9.0–14.0(–17.0)×(4.0–)5.0–6.0(–8.5) µm. Pycnidia fairly common, especially in multi-lobed thalli, ostiolum similar to that of the perithecia. Conidia bacilliform, 4–5×1 µm.

Chemistry. No secondary substances detected.

Habitat. Saxicolous, prefers basic rock types but is also found on siliceous rocks. Seems to prefer somewhat moist habitat as seasonal seepages but also found in dryer habitats.

Distribution. **D:** *Brn*. **Gr Fa F:** *A V U EK St EH ES PH PS PK Kn PeP Ks KiL SoL EnL InL*. **I:** *ISu IVe IAu INv INo*. **N:** *Øf Ak Op Bu Te VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi*. **S:** *Sk Bl Öl Gtl SmI Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Mpd Ång Hrj Jmt Vb ÅsL LyL PL LuL TL*. The most widely distributed *Dermatocarpon* species, known from most parts of Eurasia and North America and is also recorded from New Zealand.



Note. Variable species with more than 20 varieties described. Here the author's thesis (Heiðmarsson 2000) are followed i.e. *D. leptophyllum* and *D. linkolae* are considered synonyms of *D. miniatum* and the three varieties, var. *miniatum*, var. *cirsodes* and var. *complicatum* are considered conspecific. The phylogeny of the *D. miniatum* complex has not been unanimously solved yet (Heiðmarsson 2003, Heiðmarsson & Thüs, The 7th International Association for Lichenology Symposium 2012, Book of Abstracts p. 157, 2012).

There are, however, indications that the *D. miniatum* complex contains clades that call for species recognition as argued by Heiðmarsson & Thüs (2012). As *D. miniatum s. lat*. is a highly variable taxon the photos of the three varieties earlier recognized by the author (Heiðmarsson 2001) viz. var. *miniatum*, var. *cirsodes* and var. *complicatum* are shown as well as a picture of *D. leptophyllum*, a taxon which was recognized by its thin thallus and the short ascospores which are uniseriate in the asci. A key to the formerly recognized taxa can be found in Heiðmarsson 2001.

7. **Dermatocarpon polyphyllizum** (Nyl.) Blomb. & Forssell

Enumerantur Plantae Scandinaviae: 96 (1880). – *Endocarpon polyphyllizum* Nyl., Flora 58: 262 (1875) – Type: Russia, Karelia ladogensis, Kirjavalaks, Variskallio, 1874 Norrlin (H-Nyl 3353 lectotype, Heiðmarsson, Nord. J. Bot. 20: 629, 2001).

Syn. *Dermatocarpon spitsbergense* Lynge, *Dermatocarpon caesium* var. *frigida* Räsänen

F: tyrskykilpijäkälä **I:** krumpinkorpa, **S:** mångbladig sipperlav

Literature: Degelius, Svensk Bot. Tidskr. 36: 18 (1942); Heiðmarsson 2001: 629–630.

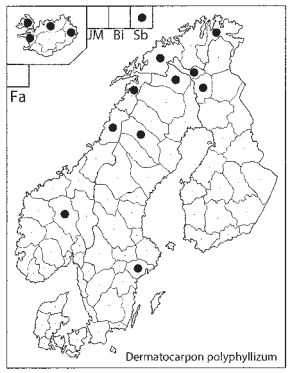
Figs. Heiðmarsson 2001: 629; Stenroos et al. 2016: 245.

Thallus single-lobed or consisting of few umbilicate lobes forming a kind of rosette or of many interconnected lobes with many holdfasts. Lobe width (5–)7–15(–19) mm. Upper surface brown to greyish, lower surface at least partly reticulate, usually light brown to brown and mostly dark brown towards the margin in large specimens. Perithecia common, 0.21–0.32 mm high and 0.18–0.30 mm wide; ostiolum brown to dark brown, sometimes slightly protruding. Ascospores (8.5–)10.0–13.5(–16.0)×(4.5–)5.5–7.0(–8.5) µm. Pycnidia rare, ostiolum similar to that of the perithecia. Conidia bacilliform.

Chemistry. Medulla turning reddish or reddish brown with Melzer´s Iodine.

Habitat. Saxicolous, on basalt or calcareous rocks. Occurs in seepages or otherwise at least temporarily wet localities.

Distribution. Scattered in northwestern Russia and the northern part of Fennoscandia with occurences as far north as northern Greenland and Svalbard. **Gr F:** *KiL EnL InL*?. **I:** *IVe IAu INv INo*. **N:** *ST Op SNo NNo Tr ØFi*. **AI:** *Sb*. **S:** *Srm LyL TL*. Also few localities in North America such as British Columbia in Canada and at high altitudes in Arizona in the USA and from Antarctica.



Note. Characterized by its light brown and at least partly reticulate lower surface as well as the Melzer´s reaction of the medulla which, however, is not as prominent as that of *D. luridum*.

8. **Dermatocarpon rivulorum** (Arnold) Dalla Torre & Sarnth.

Fl. Tirol, 4: 405 (1902). – *Endocarpon rivulorum* Arnold, Verh. Zool. Bot. Ges. Wien 34: 249 (1874) – Type: Austria, Tyrol, Rosskogel, 1867 Arnold (M lectotype, Degelius, Nytt Mag. Naturvid. 75: 152, 1934).

F: verkkokilpijäkälä **I:** lækjakorpa, **N:** brunlær **S:** nätsipperlav

Literature: Degelius, Nyt Mag. Naturv. 75: 151–161 (1934); Svensk Bot. Tidskr 42: 71–72 (1948); Bot. Notiser 1948: 138; Dahl, Nytt Mag. Naturv. 78: 127 (1938); Hasselrot, SBT 47: 533 (1953); Håkanson, Svensk Bot. Tidskr 44: 217 (1950); Rui, Blyttia 1943: 96; Heiðmarsson 1998: 68–69; 2001: 630–632.

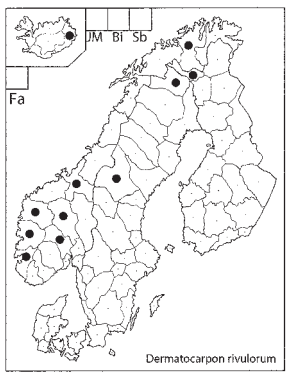
Figs. Heiðmarsson 1998: 67; Krog et al. 1994: 189; Stenroos et al. 2016: 246.

Thallus single-lobed. Lobes (10–)13–30(–44) mm. Upper surface brown to dark brown; lower surface reticulate, brown to dark brown. Perithecia common, (0.21–)0.27–0.40(–0.48) mm high and (0.18–)0.23–0.37(–0.41) mm wide; ostiolum immersed or slightly protruding,. Ascospores simple, sometimes 1-septate and occasionally 2–4–septate, (14.0–)16.0–21.0(–26.0)×(5.5–)6.0–8.0(–10.5) µm. Pycnidia rather common, ostiolum similar to that of the perithecia but sometimes located in warts. Conidia bacilliform.

Chemistry. No secondary substances detected.

Habitat. Saxicolous, growing in seepages, often be-

low persistent snowbeds and along small streams and creeks in alpine to arctic habitats.



Distribution. Mainly in the northern part of the Nordic countries and on higher altitudes in the Scandinavian Mts. **Gr F:** *EnL*. **I:** *IAu*. **N:** *Op Bu Ro Ho SF ST VFi*. **S:** *Jmt TL*. Also found in the Alps, Tatra mountains, Russia, the northern part of North America and at higher altitudes in the southern part.

Note. Characterized by the brown bulging upper surface and distinctly reticulate lower surface. Small specimens might be confused with *D. meiophyllizum* but the thallus is always thin.

Henrica

Sanja Tibell

Henrica B.de Lesd.

Bull. Soc. Bot. France 68: 201 (1921). – Type: *Henrica ramulosa* B. de Lesd.

F: kaarijäkälät **S:** henrikor

Literature: Savić & Tibell, Nord. J. Bot. 26: 237–247 (2008). Hafellner, Biblioth. Lichenol. 104: 117–141 (2010).

Thallus crustose, white, pale grey to fawn, almost immersed to episubstratic, thin to thick, smooth to verrucose to strongly areolate or almost peltate and with subcrenulate margins, non-pruinose to strongly white pruinose. Ascomata perithecia, medium-sized to rather large, 0.5–0.9 mm diam., hemispherical, sessile or partly immersed. Excipulum spherical, black to dark brown. Involucrellum well developed, in the upper part fused with the excipulum. Asci without apical thickening when mature, ellipsoidal to clavate, 8-spored, 73–173×33–101 µm. Hamathecium consisting of short pseudoparaphyses. Ascospores muriform, 30–71×17–33 µm, ellipsoidal, when mature medium to dark brown, with 5–16 trans-septa and 1–5 longi-septa. Cephalodia not known. Photobiont a green alga.

Note. Henrica was recently revised (Savić & Tibell 2008). The species have earlier often been included in *Polyblastia* (*s. lat*.). The thallus of the type species forms a well-developed cushion extended to a 'stalk' at the base. Such morphotypes have not been observed in northern Europe, although a tendency to form a central umbilicus is sometimes observed.

1. Thallus verrucose, thin to areolate, with even margins; ascospores 27–39×16–20 µm ..... 1. *H. melaspora*
– Thallus of scattered areoles to peltate and with a crenulate margin; ascospores 53–69×26–32 µm ..... 2. *H. theleodes*

1. **Henrica melaspora** (Taylor) Savić & Tibell

Nord. J. Bot. 26: 243 (2008). – *Verrucaria melaspora* Taylor in Hook., London J. Bot. 6: 153 (1847). – Type: Craig Mountain, Kerry County, rocks over which water trickled, 1836 (FH holotype, see Hawksworth, Nova Hedw. 30: 553, 1978).

Syn. *Polyblastia melaspora* (Taylor) Zahlbr.

F: pikkukaarijäkälä **S:** strandhenrika

Literature: Savić & Tibell 2008: 243–244. Hafellner 2010; 117–141.

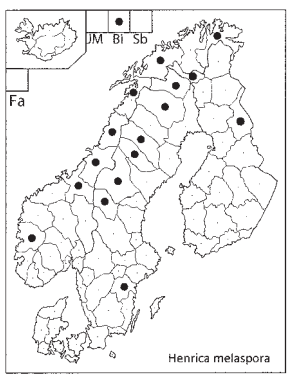
Figs: Savić & Tibell 2008: 2A–B, F, 3A–E.

Thallus superficial, subimmersed to episubstratic, thin to moderately thick, matt to slightly glossy, white to dirty grey or with a brownish tinge, sometimes slightly ochraceous, when well-developed forming a crust of angular areoles 0.3–0.6 mm wide, separated by narrow cracks, pseudo-parenchymatic throughout, consisting of cells 3–5 µm diam., outermost layer without photobiont, forming a 28–36 µm thick, hyaline pseudocortex of hyaline, spherical cells 3–4 µm in diameter; thallus often including fragments of the substrate, particularly when growing on slate. Perithecia of moderate size, 0.5–0.8 mm diam., hemispherical to clearly flattened, formed singly or in groups of 2–5, without thalline cover, ostiole often depressed also in young perithecia; outer surface of the upper part of the perithecium uneven, sometimes at the base covered by a very thin thalline layer. Involucrellum dimidiate, reaching down to the thallus, diverging towards the base, gradually thickened, at the base,

120–140 µm thick, strongly carbonized, in the central part where the hyphae are indiscernable, at the surface they have isodiametric apices, 3.5–4.5 µm diam., involucrellum sometimes incorporating rock fragments from the substrate and when expanding laterally also including strands of photobiont cells; excipulum 22–31 µm thick, medium to pale brown, in section consisting of a paraplectenchyma formed by short, concentrically arranged, cylindrical cells 6–10×3–5 µm, dark brown or sometimes almost hyaline at the base; periphyses thin, ca 1–2 µm wide, conspicuously uneven and sparingly branched. Hymenium I– red, KI+ blue. Asci 102–120×36–47 µm, ellipsoidal to clavate, 8-spored; ascospores 27–39×16–20 µm, ellipsoidal, often slightly asymmetric and curved; primary trans-septum often at oblique angle compared to the long axis of the ascospore and the longi-septa and subsequently formed trans-septa causing the septa to form a skewed crisscross pattern; when young hyaline but soon medium to dark brown, muriform, with 5–7 trans-septa reaching the periphery along one side of the ascospore in a median optical section, and with 2–4 longi-septa in the central part; surface minutely punctate.

Habitat. On siliceous to somewhat calcareous wet rocks or pebles in open situations, often on slate, usually along rivers or by lakeshores at least intermittently flushed by running water; in northern Norway also close to the sea. Altitudinal range 10–1285 m.

Distribution. Widely distributed but scattered in Scandinavia. At Lake Vättern in southern Sweden it might be a glacial relict. **Gr. F:** *Ks EnL*. **N:** *Ho ST NT NNo SNo Tr ÖFi*. **AI**: *Bi* **S:** *Ög Hjd Jmt ÅsL LyL LuL TL*. Also known from the British Isles and at high altitudes in central and southern Europe.



2. **Henrica theleodes** (Sommerf.) Savić, Tibell & Nav.-Ros.

Nord. J. Bot. 26: 244 (2008). – *Verrucaria theleodes* Sommerf., Suppl. Fl. Lapp. (1826, p. 140). – Type: 'Hab. in rupibes interdum stillicidiis irrigatis per Nordlandiam saltensem ex. gr. Ad Fiskevaagsosen Saltdalen copiosae' (UPS lectotype, Savić & Tibell 2008: 244).

Syn, *Polyblastia theleodes* (Sommerf.) Th.Fr.

F: isokaarijäkälä **I:** hrímstrympa **S:** kråshenrika.

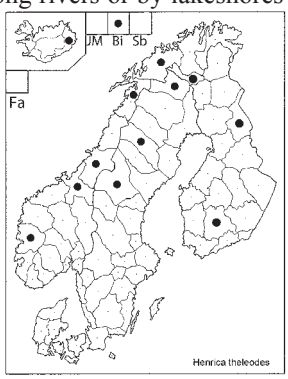
Literature: Savić & Tibell 2008: 244–246; Hafellner 2010: 117–141.

Figs: Savić & Tibell 2008: 2C–E, F, 3F.

Thallus superficial, moderately thick to thick, matt, pale grey to fawn, when young consisting of scattered, convex granules, later forming 0.7–3.1 mm wide, confluent or scattered, flattened and sometimes peltate areoles with subcrenulate margins, often appearing pruinose, basal part of peltate areoles sometimes extending to a distinct, black stalk; pseudoparenchymatic throughout, consisting of cells 3.5–7.0 µm diam., outermost layer forming a 18–29 µm thick, hyaline pseudocortex of spherical cells 3–4 µm in diameter with aggregates of vacuolized cells forming irregular projections from the surface, rendering the thallus a pruinose appearance; photobiont cells distinctly arranged in vertical columns separated by strands of mycobiont cells; lower side of peltate verrucae and stalk covered by a dark brown, pseudoparenchymatic cortex 15–19 µm thick, with individual cells being 4–5 µm wide; interior of stalk with numerous living photobiont cells. Perithecia rather large, 0.6–0.8 mm diam., hemispherical, emerging from the base of the thalline areoles, in later stages semi-immersed in the thallus with only the ostiole exposed; upper part of the perithecia with rather smooth surface. Involucrellum well developed apically, 110–130 µm thick, strongly carbonized and fused with the excipulum, diverging from the excipulum at half the height of the perithecium; medium brown in section, consisting of a paraplectenchyma of short cylindrical cells 10–13×4–8 µm; excipulum very pale brown or almost hyaline at the base; hamathecium formed by periphyses and numerous short pseudoparaphyses, the latter covering the inner perithecium wall halfway down, thin, ca 1 µm wide, branching at wide angles and anastomosing. Hymenium I+ red, KI+ blue. Asci 151–169×62–101 µm, ellipsoidal to clavate, 8-spored. Ascospores 53–69×26–32 µm, ellipsoidal to narrowly ellipsoidal, often slightly curved and primary septum not at right angle to the long axis of the ascospore; when mature

medium brown, muriform, with 8–11 trans-septa reaching the periphery along one side of the ascospore in a median optical section, and with 3–5 longi-septa in the central part.

Habitat. On calcareous, periodically wet rocks in open situations, usually along rivers or by lakeshores in high latitude/altitude areas. Altitudinal range 20 m to the alpine zone.



Distribution. Widely distributed but scattered in Nordic countries, probably also in the Arctic. **Gr**. **F:** *EH Ks EnL.* **I:** *IAu N: Ho ST NT NNo Tr.* **AI:** *Bi.* **S:** *Jmt LyL TL*.

Heteroplacidium

Maria Prieto & Martin Westberg

Heteroplacidium Breuss

Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 40 (1996). – Type: *Heteroplacidium imbricatum* (Nyl.) Breuss.

Literature: Breuss, Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 35–50 (1996); Gueidan et al. Mycol. Res. 111: 1145–1168 (2007); Gueidan et al. Taxon 58: 184–208 (2009); Prieto et al. Lichenologist 42: 637–684 (2010); Prieto et al. Amer. J. Bot, 99: 23–35 (2012).

Thallus crustose-areolate to small squamulose, squamules or areoles 1–3 mm, paraplectenchymatous or subparaplectenchymatous throughout. Ascomata perithecia, conspicuous; excipule generally turning brown when mature. Asci clavate with biseriate ascospores. Pycnidia laminal, of *Dermatocarpon*-type and with oblong-ellipsoidal to cylindrical-bacilliform conidia.

Note. Differs from *Placidium* mainly in squamule size, thallus anatomy and asci. Differences between species are mainly based on the size of the ascospores and conidia, and on the morphology of rhizohyphae and exciple. Twelve species worldwide. The species grow on soil and rock in warm-temperate regions.

Heteroplacidium fusculum (Nyl.) Gueidan & Cl.Roux

in Gueidan et al., Mycol. Res. 111: 1145–1168 (2007). – *Verrucaria fuscula* Nyl., Bot. Not. 1853: 161 (1853). – Type: [France] Prope "Chateau d. Cambouse", ad Montpelier. W. Nylander (H lectotype, Nordic Lichen Flora 6: 56, 2017).

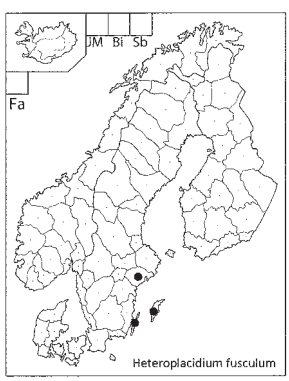
Syn. *Catapyrenium compactum* (A.Massal.) R.Sant., *Heteroplacidium compactum* (A. Massal.) Gueidan & Cl.Roux *Dermatocarpon insulare* (A.Massal.) Mig., *Placidium insulare* A.Massal., *Verrucaria compacta* (A.Massal.) Jatta

S: rutvårtlav

Literature: Breuss, Österr. Z. Pilzk., N.S. 3: 15–20 (1994); Fröberg, Calc. Lich. Great Alvar, Öland, Sweden, diss.: 84–85 (1989, as *Verrucaria insularis*); Gueidan et al., 2007: 1145–1168; Prieto et al. 2010: 653–654.

Figs. Prieto et al. 2012: 1E

Thallus epilithic, areolate to subsquamulose, areoles to 2 mm diam., angular to rounded, flat to slightly convex, often forming dense crustose thalli; upper surface medium to dark brown, dull to somewhat shiny; thallus to 600 µm thick; upper cortex 10–25 µm thick, with cells 5–8 µm diam., the uppermost layer with a brown tinge; epinecral layer to 20 µm thick. Algal layer 100–200 µm thick, with cells, 8–15 µm diam. Medulla composed of globular cells, 7–10 µm diam., or with some cylindrical hyphae; lower cortex not clearly delimited. Rhizohyphae 4–6 µm. Perithecia immersed, nearly spherical, 0.25–0.40 mm wide, with pale exciple, darkening with age. Asci clavate 55–70×13–20 µm; ascospores either 11–18×7.5–10 µm (*H. compactum*) or 9–14×7–9.5 µm (*H. fusculum*). Pycnidia laminal; conidia either 3–5×1.5(–2) µm (*H. fusculum*) or 5–7×1.5(–2) µm (*H. compactum*).



Habitat. On exposed calcareous rocks.

Distribution. Scattered on Öland and Gotland, otherwise only known from Mörkö, Södermanland. **S:** *Öl Gtl Srm*. Known from Asia, Europe, northern Africa.

Note. *Heteroplacidium fusculum* and *H. compactum* have for some time been considered synonymous by Swedish authors (Fröberg 1989, Santesson, The lichens and lichenicolous fungi of Sweden and Norway, 1993). Breuss (1994), however, concluded that *H. compactum* is characterized by bacilliform conidia (5–7 µm long), thin-walled and longer ascospores (11–18 µm), a cellular texture in the medulla, and by beeing either autotrophic or parasitic on various crustose lichens. In contrast, *H. fusculum* has short cylindrical conidia (3–5 µm long), a medulla with some cylindrical hyphae, shorter ascospores (9–14 µm) with a thick wall (1 µm), beeing parasitic on *Circinaria calcarea* (L.) A.Nordin, Savić & Tibell or later becoming autotrophic. Prieto et al. (2010) found that the distinction between the two species needs further investigation and here we follow a broad species concept. The Swedish material appears to be homogenous and agrees better with *H. compactum* in being mostly autotrophic with broadly ellipsoid, thin-walled ascospores, 12.5–15×9–11 µm and bacilliform conidia, 4.5–6 µm long.

A careful study and evaluation of ascospores, conidia and ascus size based on more material is needed in order to distinguish between these two species.

Involucropyrenium

Maria Prieto

Involucropyrenium Breuss

Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 38 (1996). – Type: *Involucropyrenium waltheri* (Kremp.) Breuss

S: jordlavar

Literature: Breuss, Stapfia 23: 1–153 (1990); Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 38 (1996); Herzogia 23: 205–216 (2010); Herzogia 29: 196–197 (2016); Navarro-Rosinés & Breuss, Candollea 51: 144 (1996). Prieto et al., Lichenologist 42: 637–684 (2010); Am. J. Bot. 99: 27–28 (2012). Breuss & Türk, Beitr. Naturk. Oberösterreichs 13: 213–216 (2004).

Figs: Breuss, 1990: 134, Fig 4; Prieto et al. 2010: 1D, 2E.

Thallus composed of small squamules (0.1–3 mm), thin (50–300 um), continuous (sub-crustose), adjacent or imbricate. Upper surface grey, beige or brown, matt; lower surface pale or dark. Thallus anatomy similar to that of the genus *Catapyrenium s. str*. (i.e. upper cortex of *C. cinereum*-type), algal layer occupying almost the entire thallus: medulla not clearly defined. Lower cortex developed or not. Rhizohyphae colourless to dark brown. Ascomata perithecia, situated between the squamules, surrounded by an involucrellum (complete, dimidiate or apical). Exciple colorless, brown or black. Asci clavate, 8-spored, with biseriate ascospores, simple, colourless, 11–27×6–13 µm. Pycnidia observed only in one species (*Involucropyrenium romeanum* (de Lesd.) Breuss) and described as unilocular (*Endocarpon*-type). Photobiont green algae. Eight species world-wide.

Note. Recognized by having perithecia between the squamules and not immersed in the thallus as in the members of *Catapyrenium s.l.*, and by the presence of an involucrellum around the exciple. It includes species occurring on calcareous and gypsiferous soils, in rock fissures or directly on limestones, also on artificial substrates as old bricks or mortar. They occupy semi-arid to alpine and temperate environments. One of the most useful characters to separate species is the type of involucrellum which must be checked carefully not to be confused with the exciple.

The genus must be regarded as poorly known, since several species are known only from their types, or very few localities, and are probably often mistaken as species of *Verrucaria*. Phylogenetic analyses show that the genus is probably polyphyletic (Prieto et al. 2012).

1. Thallus squamulose, brown to grey, surrounded by a dark hypothallus; involucrellum entire, enclosing the perithecium; rhizohyphae dark brown 1. *I. waltheri*
– Thallus squamulose to sub-crustose, beige to pale brown; without hypothallus; involucrellum partial, not enclosing the entire perithecium; rhizohyphae colourless .....2. *I. tremniacense*

1. **Involucropyrenium tremniacense** (A. Massal.) Breuss

Ann. Naturhist. Mus. Wien 98B Suppl.: 38 (1996). – *Catapyrenium tremniacense* A.Massal., Lotos 6: 79 (1856). – Type: Italien, Veneto, Tregnano, M. Brojo, 1855 Massalongo s. n. (M lectotype, Breuss, Stapfia 23: 135, 1990).

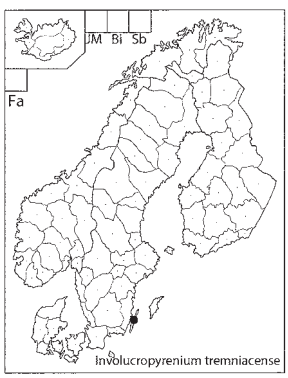
Syn. *Dermatocarpon tremniacense* (A.Massal.) Steiner, *Involucrocarpon tremniacense* (A.Massal.) Servit, *Verrucaria tremniacensis* (A.Massal.) Nyl.

S: tunn jordlav

Literature: Breuss 1990: 135–137; 1996: 38; Breuss & Türk, Beitr. Naturk. Oberösterreichs 13: 213–216, (2004). Nimis & Martellos, Keys to the Lichens of Italy I. Terricolous species: 152 (2004).

Thallus squamulose to sub-crustose; squamules 0.3–1.5(–2) mm, tighly contiguous, roundish to slightly lobulate, flattened to slightly convex, epruinose, closely appressed to the substratum; upper surface beige to pale brown; thallus 100–150 µm thick; upper cortex paraplectenchymatous, 10–25 µm thick, with roundish-angular cells, 6–9 µm diam.; epinecral layer 20–50 µm; algal layer 60–120 µm thick, with cells, 6–10 µm diam.; medulla and lower cortex not clearly differentiated; rhizohyphae colourless, c. 4 µm thick. Perithecia frequent, developed between the squamules, globose, to 0.35 mm diam; exciple brown to black, with an apical involucrellum. Asci clavate; ascospores biseriate, ellipsoid, 13–17×6–7 µm. Pycnidia not seen.

Habitat. In alvar on soils.



Distribution. Very rare in Sweden, being the northernmost occurrence of the species. **S:** *Öl*. Scattered distribution in central and southern Europe reaching the Mediterranean region.

Note. Characterized by its almost crustose thallus composed by contiguous small squamules, and the incomplete apical involucrellum. Similar to *Involucropyrenium sbarbaronis* (Servít) Breuss, the latter with an entire involucrellum, pyriform perithecia, thicker thallus and larger ascospores.

2. Involucropyrenium waltheri (Kremp.) Breuss

Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 38 (1996). – *Verrucaria waltheri* Kremp., Flora 38: 69 (1855). – Type: BRD, Bayern, Karwendel, 26 viii 1850, Krempelhuber (M lectotype, Breuss, Stapfia 23: 137, 1990).

Syn. *Catapyrenium waltheri* (Kremp.) Körb., *Dermatocarpon waltheri* (Kremp.) Blomb. & Forss.

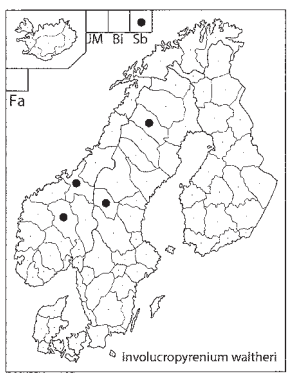
S: skorpjordlav

Literature: Breuss & Hansen, Plant Syst. Evol. 159: 101 (1988); Breuss 1990: 137–139; 1996: 38; Breuss & Türk, Beitr. Naturk. Oberösterreichs 13: 213–216 (2004).

Figs. Breuss 1990: Fig. 4. Prieto et al., Lichenologist 42: 641 Fig. 2E (2010).

Thallus squamulose; squamules less than 1.5 mm diam., brown to grey, matt, flattened to slightly convex, tighly contiguous, forming a continuous thallus; margins entire to crenate-lobulate, surrounded by a dark hypothallus; lower surface dark, with 4–5 µm thick, dark rhizohyphae; thallus (70–)100–200(–300) µm thick; with a paraplectenchymatous upper cortex, 10–25 µm thick; epinecral layer thin or absent, to 25 um; algal layer distributed over nearly the entire thallus, with algal cells, 6–11 µm; medulla not clearly differentiated; lower cortex composed of polygonal cells, dark; rhizohyphae dark brown, 4–5 µm thick. Perithecia globose, often aggregated, developed between the squamules; exciple brown to black with an entire carbonaceous involucrellum. Asci clavate, with biseriate ascospores (15–)17–21(–23–)×(7.5–)8–10(–11) µm. Pycnidia not seen.

Habitat. Predominantly on calcareous soils, frequently mixed with mosses.



Distribution. A rare species with some occurrences in Sweden, Norway and Svalbard. **N:** *Op ST*. **AI:** *Sb*. **S:** *Hrj PL*. The species has an arctic-alpine distribution, occurring mainly in north and central Europe with some occurrences in Asia and North America.

Note. Easily recognized by its nearly crustose thallus, with brown to grey squamules and perithecia developed from a black hypothallus growing between the squamules. It is the only species in the genus with dark rhizohyphae. Sometimes it can resemble *Catapy-*

renium cinereum, from which it differs in the perithecia which are not immersed in the squamules and by the presence of the involucrellum.

Excluded species

Involucropyrenium nuriense (Nav-Ros.& Breuss) Breuss.

The specimen reported from Finland (Pykälä, Graphis Scripta 22: 56, 2010) has been revised. It is a very interesting sample with a complete involucrellum and ascospores, 11–13×8–9 um, but it does not fit with *I. nuriense.*

Placidiopsis

Maria Prieto

Placidiopsis Beltr.

Lich. Bassan. (1858): 212. – Type: *Placidiopsis grappae* Beltr. (=*Placidiopsis cinerascens*).

Syn. *Bohleria* Trevis., *Endocarpidium* Müll. Arg., *Paraplacidiopsis* Servit.

S: väggjordlavar

Literature: Breuss, Öst. Z. Pilz. 5: 65–94 (1996); Pl. Syst. Evol. 142: 247–250 (1983); Prieto et al., Mycotaxon 114: 463–472 (2010); Arup et al., Graphis Scripta 23: 42–46; Westberg et al., Lavbulletinen 2015(1): 28–29 (2015).

Thallus squamulose; squamules (1) 2–8 (15) mm wide, pale to dark brown or greenish grey, pruinose or not. Upper cortex absent or cinereum–type; medulla paraplectenchymatous or filamentous; lower cortex paraplectenchymatous or lacking. Lower surface pale to blackish. Ascomata perithecia, immersed in the thallus, appearing as black dots on the upper surface. Exciple colorless, brown or black. Asci clavate, 8–spored, ascospores 1-septate, colourless. Pycnidia absent. Photobiont green algae. Twelve species worlwide.

Note. Differs from the closely related genus *Catapyrenium s. str.* by the septate ascospores.

1. Squamules ascending, attached to the substrate with a central holdfast of dark rhizohyphae, forming a rhizine-like structure.....1. *P. custnani*

– Squamules not ascending, attached to the substrate with a dense rhizohyphal web, without rhizine-like structures.....2. *P. pseudocinerea*

1. **Placidiopsis custnani** (A.Massal.) Körb.

Parerga Lichenol. 305 (1863, Figs. 1d, 2b). – *Placidium custnani* A.Massal., Lotus 6: 78 (1856). – Type: in opp. Sc-organo (Custnano), Verona, A. Massalongo, (M lectotype, Lich exs. Ital. 187).

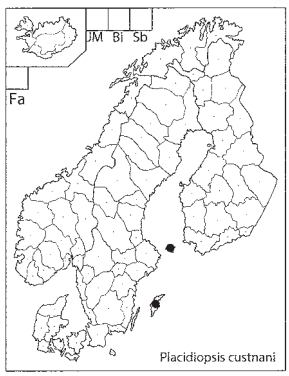
Syn. *Placidiopsis crenulata* (Nyl.) Zsch., *P. cartilaginea* (Nyl.) Vain.

F: alvarijäkälä **S:** fjällig väggjordlav

Literature: Breuss 1996: 75–77; Prieto et al. 2010: 469–471.

Figs: Breuss 1996: Figs 1–3. Prieto et al. 2010: 1D. Westberg et al. 2015: Fig 2.

Thallus squamulose, composed of scattered to contiguous squamules; squamules lobulate to crenate, to 2(–3) mm wide, with margins ascending and downrolled; upper surface olive green to brownish or greyish, pruinose or not; lower surface dark brown to black or carbonaceous but pale at margins; attached by a central holdfast of dark rhizohyphae, forming a rhizine-like structure. Thallus 200–300(–400) µm thick, upper cortex thin, to 30 µm thick, paraplectenchymatous, with roundish-subangular cells, 3–10 µm diam; with or without epinecral layer, to 50 µm when present. Algal layer irregular, 55–175 µm thick, with cells, 5–11 µm diam. Medulla thin, to 150 µm, composed mainly of globular cells, 4–10 µm diam; lower cortex not clearly delimited from the medulla. Rhizohyphae dark, 3–4 µm, attached into a central holdfast, forming a rhizine-like structure. Perithecia pyriform to globose, to 0.20 mm wide, exciple hyaline to brown or black, darker at the ostiole, to c. 20 µm thick; asci clavate, 50–70×10–14 µm; ascospores biseriate, hyaline, 1-septate, (12–)15–21(–22)×5–7.5 µm.



Habitat. Calcareous soils.

Distribution. Very rare in the region. **F:** *A*. **S:** *Gtl*. Distributed in central Europe reaching northern Europe and the Mediterranean Region.

Note. Easily identified by the presence of ascending squamules with down-rolled margins.

2. Placidiopsis pseudocinerea Breuss

Plant Syst. Evol. 142 (1983): 248. – Type: Österreich, Land Salzburg, Rädstädter Tauern, Speiereck, 1981 Breuss 2392 (W holotype).

S: daggig väggjordlav

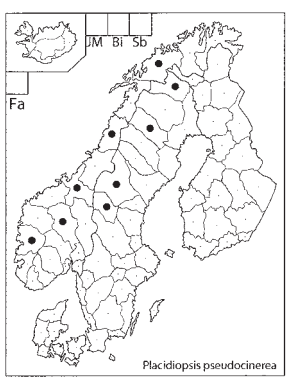
Literature: Breuss 1983: 247–250; 1996: 88–91.

Figs: Breuss & Hansen. Pl. Syst. Evol. 159: 102 (1988); Breuss 1996: Figs IV–VII.

Thallus squamulose; squamules 1.5–5 mm wide, tightly contiguous, forming a continuous thallus, small, finely lobulate, (150–)200–350(–400) µm thick; upper surface whitish, rarely greenish grey or brownish, pruinose; underside black, with dense dark rhizohyphae. Upper cortex 10–30(–40) µm thick, paraplectenchymatous, with roundish-subangular cells, 5–8 µm diam; with epinecral layer, to 50 µm. Algal layer irregular. Medulla composed mainly of globular cells, 5–8 µm diam; lower cortex clearly delimited with polygonal cells with black pigmented walls. Rhizohyphae dark, 4–5 µm, forming a dense hypothallus. Perithecia pyriform to subglobose, 0.20–0.35 mm wide, exciple hyaline to brown or black, darker on the ostiole; asci clavate, 55–65×15–22 µm; ascospores biseriate, hyaline, 1-septate, sometimes slightly constricted in the septum, (14–)15–19(–21)×(6.5–)7.5–9(–10) µm.

Habitat. On soil, humus and dying ground mosses.

Distribution. Scattered in the region. **N:** *Op Ho ST SNo Tr*. **AI:** *Sb*. **S:** *Hrj Jmt PL TL*. An arctic-alpine species with circumpolar distribution.



Note. Very similar to *Catapyrenium cinereum* from which it mainly differs by the septate ascospores. Further the squamules are larger and more dispersed over the substrate and have less incised margins.

Placidium

Maria Prieto

Placidium A.Massal.

Schedulae criticae in Lichenes exsiccatos italiae: 100 (1856). – Type: *Placidium michelii* A.Massal.

D: læderlav **F:** ruskokilpiset **I:** pírur **S:** jordlavar

Literature: Breuss, Stapfia 23: 1–153 (1990); Ann. Naturhist. Mus. Wien 98: 35–50 (1996); Herzogia, 23(2): 205–216 (2010); Prieto et al., Lichenologist 42(6): 637–684 (2010); Am. J. Bot. 99(1): 23–35 (2012); Westberg et al., Lavbulletinen 2015(1): 28–29 (2015).

Thallus squamulose; squamules (1–)2–8(–15) mm wide, brown; upper cortex 20–100 µm thick; algal layer, medulla and lower cortex well developed. Ascomata perithecia, immersed in the thallus, appearing as black dots on the upper surface. Asci cylindrical, 8-spored; ascospores uniseriate, simple, colourless, 12–24×5–9 µm. Pycnidia laminal or marginal, *Dermatocarpon*-type, with oblong–ellipsoidal, bacilliform or cylindrical conidia. Photobiont green algae. Twenty seven species worldwide.

Note. Differs from the very closely related genus *Clavascidium* by the cylindrical asci and the absence of rhizines. Important characters to distinguish species are: pycnidia position, thallus thickness, medulla type and size of conidia, ascospores and rhizohyphae.

1. Lower cortex of anticlinally arranged angular cells .. ..1. *P. lachneum*
– Lower cortex of irregularly arranged cells 2
2. Medulla composed of globular cells.....3
– Medulla prosoplectenchymatous .....5. *P. rufescens*
3. Pycnidia marginal ..... 4. *P. pilosellum*
– Pycnidia laminal 4
4. Thallus thin, < 250 µm; perithecial wall black, thin, <20 µm thick..... 2. *P. michelii*
– Thallus thicker, >250 µm; perithecial wall pale, >20 µm thick.....5
5. Conidia 2.5–5×1.3–2 µm; ascospores 12–17×6–8 µm; rhizohyphae 5–7 µm.....6. P. *squamulosum*
– Conidia 5–8×1.5–2 µm; ascospores 15–24×7.5–11.5 µm; rhizohyphae 6–8 µm..... 3. *P. norvegicum*

1. **Placidium lachneum** (Ach.) B.de Lesd.

Ann. Cryptog. Exot. 5: 100 (1932). – *Lichen lachneus* Ach., Lich. Svec. Prodr.: 140 (1799). – Type: Suecia (H-ACH no 854 lectotype, Breuss 1990: 82).

Syn. *Catapyrenium lachneum* (Ach.) R.Sant., *Endocarpon lachneum* (Ach.) Ach., *Endopyrenium lachneum* (Ach.) Hav., *Dermatocarpon lachneum* (Ach.) A.L.Sm.

D: rødbrun læderlav **F:** pohjankilpinen **I:** stallapíra **S:** brun jordlav

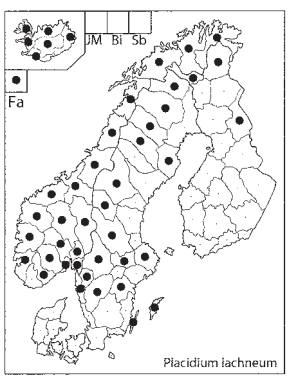
Literature: Breuss 1990: 82–92; 2010: 205–216; Prieto et al., 2010: 637–684; 2012: 23–35.

Figs: Breuss 1990: Figs 12–15; picture 4b. Prieto et al. 2010: 5C. Stenroos et al. 2016: 519.

Thallus squamulose; squamules to 7 mm wide, scattered to contiguous or slightly overlapping thick (0.25–0.6 mm), roundish to lobate or crenate, appressed to the substratum or with raised margins. Upper surface dark brown to red-brown, matt; lower surface black throughout. Thallus 250–700 µm thick; upper cortex 40–60 µm thick, paraplectenchymatous; epinecral layer thin or lacking, to 20 µm; algal layer 80–160 µm thick; medulla 50–325 µm, prosoplectenchymatous, with elongated hyphae; lower cortex sharply delimited from the medulla, 30–125 um thick, composed of angular cells, conglutinated in vertical rows, the lowermost cells with black pigment; rhizohyphae thick, 5–8 µm diam., colourless or dark at the margins, lacking in the edges. Perithecia broadly pyriform, to 0.55 mm wide, with a pale exciple c. 30 µm. Asci cylindrical, ascospores uniseriate, simple, 12–19×6–9 µm. Pycnidia marginal, relatively prominent; conidia bacilliform, 4.5–7.5×1–2 µm.

Habitat. Growing on soil, between mosses or in fissures.

Distribution. One of the most common species of the group (*Catapyrenium s. lat.*) in the region. **F:** *Ks EnL InL*. **Fa**. **I:** *ISu IVe IMi IAu INv INo*. **N:** *Øf Ak He Op Bu Vf Te AA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi*. **S:** *Öl Gtl Bh Dls Vg Ög Vrm Vsm Upl Dlr Hrj Jmt Vb LyL PL LuL TL*. Arctic-alpine distribution in northern and mountainous regions of Asia, Europe and North and South America.



Note. Two varieties were described by Breuss (1990). *P. lachneum* var. *globiferum* (Breuss) Breuss, characterized by the presence of pycnidia substantially larger than in the type variety, and by auriculiform squamules. This variety is reported from Russia (Breuss 1990). The other variety, *P. lachneum* var. *oleosum* (Breuss) Breuss, is characterized by the presence of oil drops in the lower cortex and medulla, and by the rarity or even absence of pycnidia. The distribution is similar to the type variety (arctic-alpine), although it is less common (Breuss 1990). Prieto et al. (2010) reported the presence of oil drops in the lower cortex in other species of the genus, including *P. squamulosum* and *P. pilosellum*. As the distinction of the varieties is not fully clear, they are not considered here.

2. **Placidium michelii** A.Massal.

Sched. Crit. Lich. 5: 100 (1856). – Type: Massalongo, Lich. exs. Ital. 161 (W lectotype, Breuss 1990: 95).

Syn. *Catapyrenium michelii* (A.Massal.) R.Sant.

S: kupjordlav

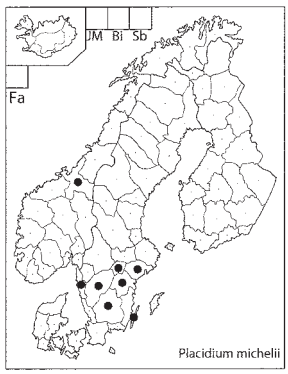
Literature: Breuss 1990: 95–96; 2010: 205–216; Prieto et al., 2010: 637–684; 2012: 23–35.

Figs: Prieto et al. 2012: Fig. 1I. Westberg, M., et al., Lavbulletinen 1–2015: Fig 3.

Thallus squamulose; squamules to 5 mm wide, scattered to contiguous, appressed to the substratum; squamules thin (to 0.25 mm), roundish to slightly lobed. Upper surface pale to dark chestnut brown, matt; lower surface black throughout. Thallus thin, 120–250 µm thick; upper cortex 25–67 µm thick, paraplectenchymatous; epinecral layer thin or lacking, to 20 µm; algal layer 37–105 µm thick; medulla 37–125 µm, composed of globular cells; lower cortex not clearly delimited from the medulla; rhizohyphae 4–6 µm thick, colourless. Perithecia pyriform, to 0.35 mm wide, with a thin, 15–25 µm, dark brown exciple. Asci cylindrical; ascospores uniseriate, simple, 10–15×4–6 µm. Pycnidia laminal, immersed; conidia oblong-ellipsoid, 3–4×1.2–1.5 µm.

Habitat. Predominantly in dry, open habitats, on calcareous soils, in rock crevices and on rock ledges, with a preference for sandy soils.

Distribution. Scattered in Sweden and Norway. **N:** *ST*. **S:** *Öl SmI Bh Vg Ög Nrk Srm*. Widely distributed but scattered in Asia, Europe and North America.



Note. The thin thallus and the dark and thin exciple clearly separates *P. michelii* from the other treated species.

3. Placidium norvegicum (Breuss) Breuss

Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 39 (1996). – *Catapyrenium norvegicum* Breuss, Plant Syst. Evol. 159: 100 (1988). – Type: Norvegia, Troms, in jugo inter Kilpisjärvi-Lyngen, 1867 Norrlin (H holotype).

F: tunturikilpinen **S:** polarjordlav

Literature: Breuss & Hansen, Pl. Syst. Evol. 159: 102 (1988). Breuss 1990: 97–98; 2010: 205–216; Prieto et al., 2010: 637–684; 2012: 23–35.

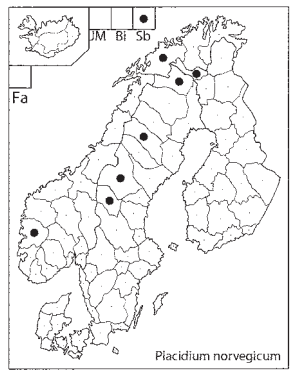
Figs: Breuss 1990: Fig. 17; picture 4a. Breuss & Hansen 1988: 102. Stenroos et al. 2016: 520.

Thallus squamulose; squamules 3–6 mm wide, scattered to contiguous, appressed to the substratum, thick, 350–550 µm, forming rosettes. Upper surface medium to dark brown, matt; lower surface black throughout. Upper cortex 40–60 µm thick, paraplectenchymatous; epinecral layer thin; algal layer 100–130 µm thick; medulla 160–400 µm, composed of globular cells; lower cortex clearly delimited, with roundish to polygonal cells with brown pigment between them; rhizohyphae 6–8 µm thick, hyaline but brownish in the proximal zone. Perithecia broadly pyriform, to 0.60 mm wide, with a colourless to pale brown exciple. Asci cylindrical; ascospores uniseriate, simple, 15–24×7.5–11.5 µm. Pycnidia laminal, immersed; conidia bacilliform, 5–8×1.3–2 µm.

Habitat. On mossy soil in alpine grasslands.

Distribution. Scattered in the region. **AI:** *Sb*. **F:** *EnL*. **N:** *Ho Tr*. **S:** *Hrj Jmt LyL TL*. It has an arctic-alpine distribution in the boreal zone of Europe and North America, also in the Alps, over 2000 m (Breuss 1990).

Note. Characterized by its thallus shape (forming rosettes rather than isolated squamules), the large and wide ascospores and the bacilliform conidia. It could be confused with *P. rufescens*, because both species have a thick thallus; *P. rufescens,* however, has a prosoplectenchymatous medulla and marginal pycnidia.



4. Placidium pilosellum (Breuss) Breuss

Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 39 (1996). – *Catapyrenium pilosellum* Breuss, Stapfia 23: 98 (1990). – Type: Ireland, Clare, limestone pavement near Crusheen, 1977 Burnet (holotype hb. Seaward no 102259).

S: hårig jordlav

Literature: Breuss 1990: 98–103; 2010: 205–216; Prieto et al., 2010: 637–684; 2012: 23–35.

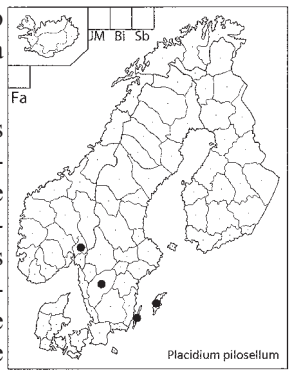
Figs: Breuss 1990: Fig. 18; Westberg et al. 2015: Fig. 4, 5.

Thallus squamulose; squamules to 6 mm wide, scattered to contiguous and partly overlapping, roundish to lobate, flat and fully appressed to the substrate or with margins free, with thin hairs on the margin. Upper surface yellowish to medium or dark brown, usually with an orange tinge, matt; lower surface usually pale throughout, rarely dark. Thallus relatively thin, 210–350 µm thick; upper cortex thick, paraplectenchymatous; epinecral layer thick to c. 65 µm; algal layer 80–130 µm thick; medulla 60–170 µm, composed of globular cells; lower cortex indistinctly sepatated from the medulla; rhizohyphae 4–6 µm thick, hyaline. Perithecia pyriform, to 0.55 mm wide, with a colourless exciple, to 35 µm thick. Asci cylindrical, ascospores uniseriate, simple, 10–19×5–7.5 µm. Pycnidia marginal; conidia oblong-ellipsoid, 5–8×1.3–2 µm.

Habitat. On soil and plant debris often among mosses.

Distribution. Very rare in in the area. **N:** *Ak*. **S:** *Öl Gtl Vg*. It occurs in Australia, Europe, the north of Africa, North America and SW Asia (Breuss, Lichen Flora of the Greater Sonoran Desert Region I: 384–393, 2002),

and South America (Prieto et al., Bol. Soc. Argentina Bot. 43: 205–210, 2008).



Note. Hyphal outgrowths are common but not always present on the lobe margin. In other *Placidium* species they are less common. When the medulla is hardly discernible *P. pilosellum* could also be confused with *P. rufescens* (with thicker thallus and rhizohyphae, and larger ascospores).

5. Placidium rufescens (Ach.) A.Massal.

Sched. Crit. Lich. 6: 114 (1956). – *Endocarpon rufescens* Ach., Lich. Univ.: 304 (1810). – Type: Helvetia (H-ACH no. 868 lectotype, Breuss 1990: 104).

Syn. *Catapyrenium rufescens* (Ach.) Breuss, *Dermatocarpon rufescens* (Ach.) Th.Fr., *Endopyrenium rufescens* (Ach.) Körb., *Endocarpon rufopallens* Nyl. *Rhodocarpon rufescens* (Ach.) Lönnr., *Verrucaria rufescens* (Ach.) Jatta

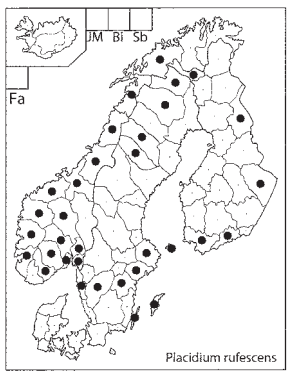
F: ruskokilpinen **S:** rödbrun jordlav

Literature: Breuss: 1990: 104–111; 2010: 205–216; Prieto et al., 2010: 637–684; 2012: 23–35.

Figs: Breuss 1990: pictures 1e, 4c. Prieto et al. 2012: 1L. Wirth et al. 2013(2): 887. Stenroos et al. 2016: 521.

Thallus squamulose to almost foliose; squamules large, to 15 mm wide, densely aggregated and overlapping; roundish to lobate, with broad lobes and undulated margins free from the substratum, 300–600 µm thick. Upper surface medium to dark brown, red-brown or chestnut-brown, matt or glossy; lower surface pale brown at the margins, turning black toward the centre, without rhizohyphae in marginal areas. Upper cortex 30–80 µm thick, paraplectenchymatous; epinecral layer sometimes lacking, to 50 µm; algal layer 60–200 µm thick; medulla 100–300 µm thick, predominantly prosoplectenchymatous, lower cortex clearly delimited from the medulla, with rounded to angular cells; rhizohyphae thick, 5–8 µm, hyaline. Perithecia pyriform, to 0.55 mm wide, with a colourless exciple, to 30 µm. Asci cylindrical; ascospores uniseriate, simple, 14–22×6–11 µm. Pycnidia laminal, immersed; conidia oblong–ellipsoid, 3–5×1–2.5 µm.

Habitat. Occupies a wide range of habitats, commonly growing directly on rocks but also on mortar, in fissures and cavities and on soil.



Distribution. Widely distributed in Finland, Norway and Sweden. **F:** *V U Ks EnL*. **N:** *Øf Ak Op Bu Vf Te AA Ro Ho SF MR ST NT SNo NNo Tr*. **S:** *Öl Gtl Bh Vg Ög Srm Upl ÅsL LyL LuL TL*. Widespread, known from Asia, Europe, northern Africa and North America (Breuss, Lichen Flora of the Greater Sonoran Desert Region I: 384–393, 2002).

Note. Easily recognized by its large and thick squamules, large ascospores and thick rhizohyphae; the marginal pycnidia are quite conspicous, with oblong-ellipsoid conidia. The medulla is typically prosoplectenchymatous, but in some specimens it is obscured by numerous globular cells.

6. Placidium squamulosum (Ach.) Breuss

Ann. Naturhist. Mus. Wien, Ser. B, Bot. Zool. 98 (Suppl.): 39 (1996). – *Endocarpon squamulosum* Ach., Method. Lich.: 126 (1803). – Type: Germania, Sprengel (H-ACH no. 855 lectotype, Breuss 1990: 114).

Syn. *Catapyrenium squamulosum* (Ach.) Breuss, *Dermatocarpella squamulosa* (Ach.) Harada.

F: maksakilpinen **S:** gyttrad jordlav

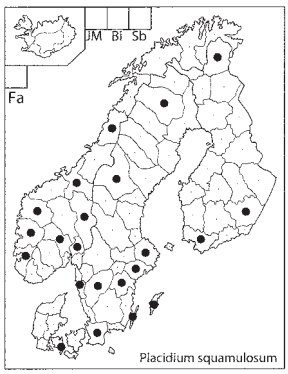
Literature: Breuss 1990: 114–125; 2010: 205–216; Prieto et al., 2010: 637–684; 2012: 23–35.

Figs: Breuss 1990: Fig. 20; pictures 1d. Prieto et al. 2010: 5B. Prieto et al. 2012: 1L. Wirth et al. 2013(2): 888 (2013). Stenroos et al. 2016: 521.

Thallus squamulose; squamules to 6 mm wide, scattered or contiguous to densely aggregated or slightly overlapping, nearly completely adnate to the substrate; roundish to lobate. Upper surface pale to dark brown, matt; lower surface pale to brown, rarely blackish. Thallus 240–450 µm thick, upper cortex 30–100 µm thick, paraplectenchymatous; epinecral

layer sometimes lacking, to 50 µm when present; algal layer 60–160 µm thick; medulla 60–175 µm, composed of globular cells; lower cortex with rounded to angular cells of more densely aggregated rounded to angular cells but not clearly delimited from the medulla; rhizohyphae 5–7 µm thick, colourless. Perithecia pyriform, to 0.65 mm wide, with a colourless exciple. Asci cylindrical; ascospores uniseriate, simple, 12–17×6–8 µm. Pycnidia laminal, immersed; conidia oblong-ellipsoid, 2.5–5×1.3–2 µm.

Habitat. On calcareous soils.



Distribution. Widely distributed in Finland, Norway and Sweden. **D:** *Fyn*. **F:** *V ES InL*. **N:** *Ak He Bu Ro Ho SF ST SNo*. **S:** *Sk Öl Gtl Bh Vg Ög Srm Upl Jmt LuL*. Reported as the most common member of the genus worldwide, and the most cosmopolitan species (Breuss 1993).

Note. Characterized by the laminal pynidia, the absence of rhizines and the globular cells of the medulla.

Polyblastia

Sanja Tibell & Leif Tibell

Polyblastia A.Massal.

Ric. Auton. Lich. Crost.: 147 (1852). – Type: *Polyblastia cupularis* A.Massal.

F: konnanjäkälät **I:** strympur **S:** mursporingar

Literature: Savić et al., Mycol. Res. 112: 1307–1318, (2008); Savić & Tibell, Symb. Bot. Upsal. 36(1): 1–69 (2012).

Thallus crustose, immersed to superficial, continuous, verrucose to areolate. Ascomata perithecia, sessile to immersed, with or without distinct involucrellum. Ascospores colorless, pauciseptate to multiseptate, muriform, small to medium-sized. Photobiont an unidentified green alga.

Note. As delineated by Savić & Tibell (2012), *Polyblastia* is characterized by molecular data from the nuLSU rDNA, the nuITS rDNA and the RPB1 region A–D. It can be only vaguely characterized by morphological features. *Polyblastia s. lat*. traditionally has included species in the *Thelidium*-clade (Savić et al. 2008), like *P. abscondita* (Nyl.) Arnold, *P. clandestina* (Arnold) Jatta, *P. dermatodes* A.Massal., *P. epomphala* (Nyl.) Zschacke, *P. magnussoniana* Servít, *P. moravica* Zschacke, and *P. nidulans* (Stenh.) Arnold. In addition, some species traditionally placed in *Polyblastia* do not belong in Verrucariaceae, e.g. *P. gothica* Th.Fr. and *P. helvetica* Th.Fr. These species are, along with those belonging in the *Thelidium*-clade, not included in this treatment. Ascospore septation is indicated as follows: 5–7/4–5 indicates that 5–7 trans-septa are discernable along the long side of the ascospore and that the central part of the ascospore has 4–5 longi-septa.

1. On mosses and soil 2
− On rocks 4
2. Thallus well-developed, white, verrucose to subareolate 3
− Thallus poorly developed, dull greyish green, very thin to disappearing; ascospores 27–33×15–17 µm; ascospore septation 5–8/2–3, with 17–21 lumina visible in optical median section ..... 17. *P. nordinii*
3. Ascospores 32–38×17–23 µm; ascospore septation 5–7/4–5, with 25–36 lumina visible in optical median section ..... 5. *P. bryophila*
− Ascospores 20–27×10–12 µm; ascospore septation: 5–7/2–3, with 12–17 lumina visible in optical median section ..... 23. *P. sendtneri*
4. On siliceous rocks 5
− On calcareous rocks 10
5. Longi-septa in central part of the ascospore 1–2 6
− Longi-septa in central part of the ascospore 2–4 9
6. Excipulum pale at the base; ascospores 22–26×13–17 µm; ascospore septation 3–7/1–24 ..... 23. *P. septentrionalis*
− Excipulum brown at the base 7
7. Thallus dark brown or patchily ochraceous; ascospores 22–26×9–11 µm; ascospore septation 6–7/1–2 ..... 22. *P. schisticola*
− Thallus pale to greyish brown; ascospore septation 3–4/1 8
8. Thallus pale beige to greyish; ascospores 16–22×10–12 µm; ascospore septation 3–4/1 ..... 15. *P. media*
− Thallus greyish brown; ascospores 11–13×6–9 µm; ascospore septation 1–3/0–1 ..... 21. *P. quartzina*

9. Thallus pale ochraceous; involucrellum reaching the base of the perithecia; ascospores 32–37×16–18 µm; ascospore septation 6–9/2–3 ..... 6. *P. cataractae*
− Thallus ferrugineous to ochraceous or dirty grey; involucrellum dimidiate; ascospores 24–29×15–19 µm, ascospore septation 6–7/3–4 10. *P. fuscoargillacea*
10. Ascospores 9–22×7–12 µm 11
− Ascospores > 22 µm and >12 µm wide, but <40 µm long and <25 µm wide 16
11. Perithecia >0.25 mm diam.; ascospores 16–22×10–12 µm, ascospore septation 3–4/1 ..... 15. *P. media*
− Perithecia 0.15–0.25 mm diam. 12
12. Ascospores subspherical, 8.5–11×7.0–8.0 µm, often with cruciate septation ..... 25. *P. singularis*
− Ascospores ellipsoidal, 11–20×7–10 µm, not with cruciate septation 13
13. Ascospores with 3–4 trans-septa, 17–20×8.0–10 µm, often with thin perispore when young; thallus immersed to superficial, grey to brownish ..... 14. *P. intermedia*
− Ascospores with 1–5 trans-septa, 11–20×7–10 µm, without perispore 14
14. Ascospores with 1–3 trans-septa, 11–14.5×5.5–8 µm; thallus superficial, grey ..... 18. P. *plicata*
− Ascospores with 3–6 trans-septa, 15–20×8.5–10 µm 15
15. Thallus superficial, dull brown to ochraceous; as-co-spores 15–20×8.5–10 µm, ascospore septation 3–5/1–(2) ..... 9. *P. fusca*
− Thallus immersed, pale ochraceous; ascospores 18–21×9–11 µm; ascospore septation 4–6/2–3 ..... 20. *P. pulchra*
16. Perithecia except for the tip immersed in the substrate, leaving deep pits after decay ..... 1. *P. albida*
− Perithecia emergent with at least half of their size 17
17. Ascospores with thick (2–3 µm) gelatinous perispore 18
− Ascospores without gelatinous perispore 19
18. Thallus thin; perithecia 0.24–0.31 mm diam. ..... 8. *P. eumecospora*
− Thallus moderately thick; perithecia 0.34–0.39 mm diam. ..... 19. *P. potamophila*
19. Thallus ferrugineous ..... 10. *P. fuscoargillacea*
− Thallus not ferrugineous, grey to white, beige or pale ochraceous to only patchily ochraceous 20
20. Ascospores <26 µm long 21
− Ascospores >26 µm long 23
21. Ascospores <11 µm wide ..... 22. *P. schisticola*
− Ascospores >11 µm wide 22
22. Ascospores 21.5–24.5×14–16 µm; ascospore septation 5–6/2–3 ..... 4. *P. borealis*
− Ascospores 19.5–24.0×12.0–14.5 µm; ascospore septation 2–5/1 ..... 3. *P. baltica*
23. Excipulum blackish brown to black at the base (section) 24
− Excipulum pale to pale brown at the base (section) .. 25
24. Thallus moderately thick; ascospores 24.3–31.1×14.3–17.5 µm, with 3–4 longi-septa in the central part; perithecia 0.31–0.40 mm diam. ..... 10. *P. fuscoargillacea*
− Thallus immersed or very thin; ascospores 29–34×14.5–17.5 µm, with 2–3 longi-septa in the central part; perithecia 0.39–0.47 mm diam. ..... 16. *P. neglecta*
25. Longi-septa in the central part of the ascospore 1–2 . 26
− Longi-septa in the central part of the ascospore 3–4 . 27
26. Involucrellum apical; longi-septa in the central part of the ascospore 1 or rarely 2; ascospores 28–33×11–14 µm ..... 19. *P. potamophila*
− Involucrellum dimidiate; longi-septa in the central part of the ascospore 1–2; ascospores 25.7–35.4×14.5–19.0 µm ..... 13. *P. integrascens*
27. Perithecia appearing pruinose; ascospores 26–33×17–21 µm ..... 2. *P. aurorae*
− Perithecia not appearing pruinose; ascospores 26–33×11–22 µm 28
28. Longi-septa 2–3 in the central part of the ascospore; ascospores 24.5–29.7×14.9–17.4 µm 11. *P. hyperborea*
− Longi-septa 3–4 in the central part of the ascospore; ascospores 25.9–33.5×15.5–21.5 µm 29
29. Involucrellum diverging from the pale excipulum in the lowermost part; ascospores 25.9–31.5×18–21.5 µm; ascospore septation 5–8/3–4 ..... 12. *P. inconspicua*
− Involucrellum adhering to the medium brown to dark excipulum also in the lowermost part; as-cospores 28–33.5×15.5–17 µm; ascospore septation 6–8/3–4 ..... 7. *P. dimidiata*

1. **Polyblastia albida** Arnold

Flora 41: 551 (1858). – Type: Zwischen Dollnstein und Eberswang (735!)…Wintershofer bergs (599!). Obereichstätt (599b)'. '*Polyblastia albida* m. (Flora 1858 p. 251. An einem Kalkfelsen der Bergschlucht zwischen Dollnstein under Eberswang bei Eichstätt',1858 (Arnold, Lich exs. 28, UPS lectotype, Nordic Lichen Flora 6: 56, 2017).

F: valkokonnanjäkälä **S:** vit mursporing

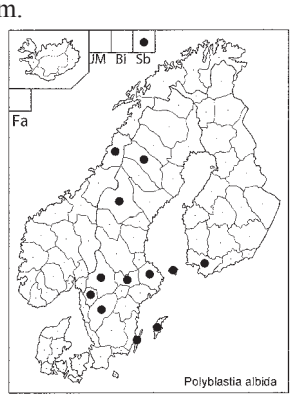
Literature: Savić & Tibell 2012: 19–21.

Figs: Savić & Tibell 2012: 1.

Thallus semi-immersed, forming a farinose, thin, sometimes rimose, white to slightly cream-coloured or greyish brown crust, or totally immersed and not changing the colour of the substrate. Perithecia rather

small, spherical, emerging only with the often slightly depressed apical part; at maturity the emerging part is 0.24–0.32 mm diam., leaving deep pits when removed. Involucrellum more or less well developed. When a thick thallus is present the involucrellum is rather well-developed apically, 38–56 µm, appressed to the excipulum, reaching halfway down the excipulum, merging with the excipulum in the ostiolar region, but when well-developed diverging laterally, consisting of intertwined, heavily sclerotized cells. In specimens with an immersed thallus the apical part of the perithecium wall is thickened. This part might be formed from both the involucrellum and excipulum. Excipulum 0.23–0.32 mm diam., dark brown throughout but occasionally quite pale at the base, 15–43 µm thick, consisting of 8–12 layers of concentrically arranged, 8–13 µm long and 2–3 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum; periphysoids slender, 65–75 µm long and c. 1 µm wide, septate, branched and anastomosing; I+ red, KI+ blue, except for the periphysoids. Asci 73–98×27–37 µm, ellipsoidal to clavate, 8-spored. Ascospores 23–29×11.5–14 µm, ellipsoidal, muriform, with 6–8 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 3–4 longi-septa in the central part. Photobiont a green alga.

Habitat. On calcareous rocks and pebbles in open, exposed regions. Alt. 5–730 m.



Distribution. Widely distributed in southern Sweden and a few localities in Finland, central Sweden, Norway and Svalbard. **F:** *A V*. **N:** *SNo*. **AI:** *Sb*. **S:** *Öl Gtl Vg Dls Vrm Vsm Upl Jmt LyL*. Also recorded from Continental Europe and the British Isles.

Note. Perhaps the least uncommon species in the genus, particularly in the southern areas where it occurs on calcareous, hard rocks. It has a very thin thallus and small, deeply immersed perithecia leaving distinctive pits when removed. It occurs together with and is often confounded with '*Polyblastia abscondita* (Nyl.) Arnold' (which belongs to the *Thelidium*-clade), a species that likewise has almost completely immersed perithecia, but differs in having larger ascospores and larger perithecia. *Amphoroblastia gotlandica* Servít was described as having no involucrellum but only an apically thickened excipulum. Involucrellum thickness and development varies considerably in *P. albida*, and *A. gotlandica* might be a synonym of *P. albida*.

2. Polyblastia aurorae S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 22 (2012). – Type: Sweden. Jämtland: Åre par., Tännforsen, 2004 Savić 3071 (UPS holotype).

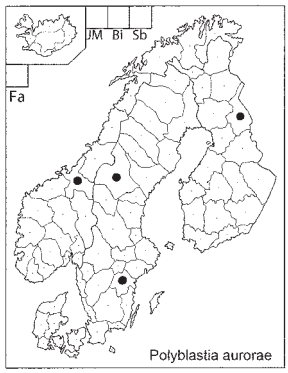
S:auroramursporing

Literature: Savić & Tibell 2012: 22–23.

Figs: Savić & Tibell 2012: 2.

Thallus superficial, moderately thick, rimose to areolate; when areolate the areoles are 0.2–0.4 mm diam., rounded, with convex, slightly verrucose, matt surface; ash-grey; cortex 25–34 µm thick, hyaline over a photobiont-layer with cells arranged in columns. Perithecia medium-sized to rather small, 0.42–0.48 mm diam., slightly flattened, formed from the centre of the areoles and gradually emerging, matt, appearing pruinose from a thin cover of remaining cortex, 5–12 µm thick. Involucrellum well-developed, 20–30 µm thick, reaching halfway down the perithecia, diverging from the excipulum in the lowermost part, consisting of dark brown, irregularly intertwined, heavily sclerotized cells. Excipulum 110–130 µm diam., in section pale except for in the uppermost part where it is dark and merged with the involucrellum and at the very base; pseudoparenchymatic, consisting of 10–12 layers of concentrically arranged, 5–6 µm long and 2–3 µm wide cells. Hamathecium without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue except for the periphysoids; periphysoids slender, 1.5–2 µm diam., septate, branching,. Asci 86–96×27–41 µm, ellipsoidal to clavate, 8-spored. Ascospores 28.5–35×19–21.5 µm, ellipsoidal, muriform, with 5–7 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 3–4 longi-septa in the central part. Photobiont a green alga, more or less clearly arranged in vertical columns.

Habitat. In the type locality it is growing on N-facing, shaded calcareous rocks in the mist of a waterfall, alt. 410 m. The locality in Östergötland is low-altitude and close to the cool Lake Vättern. The species may here be relictual, occurring in a similar locality as *Henrica melaspora*.



Distribution. Seemingly rare and known from a few localities only in south and central Scandinavia. **N:** *ST*. **S:** *Ög Jmt*. **F:** Ks. *Note.* Characterized by having a grey, rimose to areolate thallus, and perithecia, with a greyish, thin cover.

3. Polyblastia baltica S.Savić & Tibell

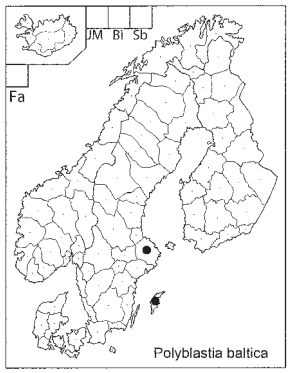
Symb. Bot. Upsal. 36(1): 23 (2012). – Type: Sweden. Gotland: Fårö par., Gotska Sandön, 2006 Tibell 24355 (UPS holotype).

S: baltmursporing

Literature: Savić & Tibell 2012: 23–24 (2012).

Figs: Savić & Tibell 2012: 3.

Thallus immersed to epilithic and slightly rimose. Perithecia medium-sized, exposed part 0.24–0.50 mm diam., gradually emerging, semi-immersed to sessile; not leaving deep pits when removed. Involucrellum well developed subapically, c. 140 µm wide and 70–75 µm thick, upper part diverging to merge with the thallus surface, in specimens with poorly developed thallus well developed, dimidiate or almost reaching the base of the perithecium. Excipulum 0.12 mm diam., in section dark brown, pale brown at the base, 22–28 µm thick, merged with the involucrellum in the uppermost part; pseudoparenchymatic, consisting of 10–12 layers of concentrically arranged, 6–10 µm long and 2–3 µm wide cells, pale brown below, at the base consisting of 8–9 layers of hyaline cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum; periphysoids slender, 42–56 µm long and 2–3 µm wide, septate, sparingly branching, basal cells swollen, ellipsoidal, moniliform; hamathecium I+ red, KI+ blue, except for the periphysoids. Asci 53×31 µm, broadly clavate, 8-spored. Ascospores pauciseptate, 19–24.5×10.5–14 µm, broadly ellipsoidal, with 3–5 oblique trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1–2 oblique longi-septa. Photobiont a green alga.



Habitat. On calcareous rocks in open, dry coastal areas. Alt. 0–10 m.

Distribution. Only known from Sweden. **S:** *Gtl Upl*.

Note. Characterized by the thin, pale grey thallus, the moderately sized and at least partly emerging perithecia and the rather small, pauciseptate, and broadly ellipsoidal ascospores with 3–4/1 septa.

4. Polyblastia borealis S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 24 (2012). – Type: Sweden: Torne Lappmark: Jukkasjärvi par., Abisko National Park, Abisko Canyon, 2005 Savić 3151a (UPS holotype)

I: hjarastrympa **S:** nordmursporing

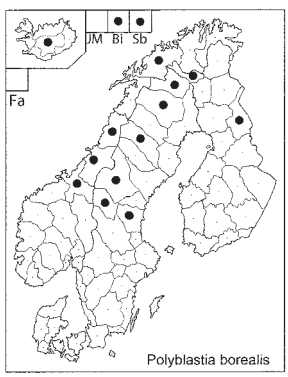
Literature: Savić & Tibell 2012: 24–26.

Figs: Savić & Tibell 2012: 4.

Thallus crustose, superficial, in thin thalli continuous to usually rimose or areolate; areoles 0.30–0.50 mm diam., angular, with flat, slightly verrucose, matt surface, almost white to pale grey or pale brown to beige. Perithecia medium sized to rather small, 0.29–0.36 mm diam., spherical to slightly depressed, emerging, at maturity sessile or immersed only at the base, not leaving pits when removed. Involucrellum well developed, 40–45 µm thick, distinct from the excipulum except for in the ostiolar region, reaching halfway down the perithecia, appressed to the excipulum or slightly diverging from the excipulum in the lowermost part, merging with the excipulum in the ostiolar region; consisting of intertwined, heavily sclerotized cells. Excipulum 0.27–0.35 mm diam., pale or occasionally slightly brown in the lowermost part, 20–25 µm thick, pseudoparenchymatic, consisting of 10–12 layers of concentrically arranged, 8–11 µm long and 1.5–2 µm

wide, hyaline cells, but in the ostiolar region dark brown and merged with the involucrellum. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue except for the periphysoids; periphysoids 25–35 µm long, slender and branched in the apical part, but with short cells at the base ('perlschnurartig'), 1.5–3 µm diam. Asci 62–77×31–36 µm, ellipsoidal to clavate, 8-spored. Ascospores pauciseptate, 21–25.5×14–16 µm, broadly ellipsoidal, muriform, with 5–6 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 2–3 longi-septa in the central part.

Habitat. On both calcareous and siliceous rocks, often close to streams or along seepages, or on low rocks on wet soil. Alt. 250–1075 m.



Distribution. Widely distributed in central and northern part of the region including Iceland and Bjørnøya. **F:** *Ks EnL*. **I:** *IMi*. **N:** *ST NT SNo Tr ØFi*. **AI:** *BI Sb*. **S:** *Hls Hrj Jmt LyL LuL TL*. Not uncommon Arctic regions.

Note. Often misidentified as the similar *Polyblastia hyperborea* which, however, has larger ascospores and a thick involucrellum that extends horizontally from the ostiolum.

5. Polyblastia bryophila Lönnr.

Flora 41: 631 (1858). – Type: Sweden, Gotland Fårön, på stranden nedanför Landsnäs, 1853 Lönnroth s. n. (UPS lectotype, Savić & Tibell 2012: 26).

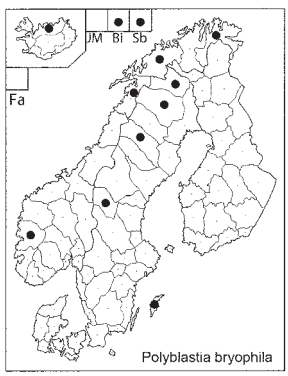
I: mosastrympa **S:** mossmursporing

Literature: Savić & Tibell 2012: 26–29.

Figs: Savić & Tibell 2012: 5.

Thallus superficial, moderately thick, continuous to almost subsquamulose; areoles 0.40–0.80 mm diam., angular, with somewhat convex, sometimes cracked, slightly glossy surface; white to greyish; prothallus black, particularly well visible at the edge of the thallus, sometimes also in the central parts. Cortex 17–30 µm thick; photobiont irregularly arranged to arranged in columns in a 30–67 µm thick layer resting on the thick, black prothallus. Perithecia medium sized, 0.26–0.35 mm diam., spherical, sessile or somewhat immersed at the base, abundant, formed along the margins of the areoles, scattered or often confluent in groups of 2–5 along the margin of the areoles. Involucrellum well developed, c. 23–39 µm thick, covering the upper half of the perithecium, merged with the excipulum in the ostiolar region and further down continuous with the prothallus, consisting of intertwined, heavily sclerotized cells, ostiolar area thickened. Excipulum c. 0.30–0.35 mm diam., in section dark brown, in the lower part pale, pseudoparenchymatic, consisting of 10–12 layers of concentrically arranged, short cylindrical cells measuring 4.5–6.5 µm. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids 40–50 µm long, 1–2 µm wide, septate, branching at wide angels. Asci 90–98×39–53 µm, ellipsoidal to clavate, 8-spored. Ascospores 29–35×15.5–19 µm, broadly ellipsoidal, muriform, with 5–7 oblique trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 4–5 oblique longi-septa in the central part.

Habitat. On mosses over calcareous soil. Alt. 10–1170m.



Distribution. Widely distributed, not infrequent in the northern part of the region. The type locality on Gotland might be relictual. **Gr**. **I:** *INo*. **N:** *Ho NNo Tr ØFi*. **AI:** *BI Sb*. **S:** *Gtl Hrj LyL LuL TL*. Known also from Russia and North America.

Note. Conspicuous and one of our few terricolous *Polyblastia* species. Like *P. sendtneri* it has a well-developed, greyish to white thallus, but differs in having larger ascospores with more numerous lumina.

6. Polyblastia cataractae S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 29 (2012). – Type: Sweden. Jämtland, Undersåker par., Ristafallet, N shore, 2005 Savić 5000 (UPS holotype).

S: fallmursporing

Literature: Savić & Tibell 2012: 29–30.

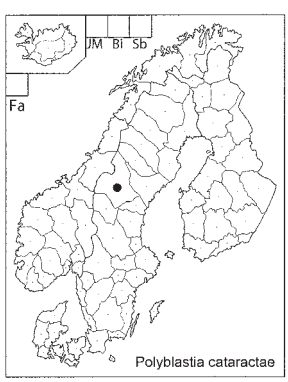
Figs: Savić & Tibell 2012: 6.

Thallus superficial, thin to moderately thick, smooth, adjacent to the perithecia areolate; areoles 0.43–0.55 mm diam., angular, with flat, slightly verrucose, matt surface, pale ochraceous. Perithecia medium sized, 0.43–0.58 mm diam., slightly flattened, often with depressed ostiolum, formed in the smooth thallus and gradually emerging; at maturity immersed only at the base. Involucrellum well developed, 76–101 µm thick, clearly distinct from the excipulum except for in the ostiolar region, reaching down to the substrate, appressed to the excipulum, but slightly diverging from the excipulum in the lowermost part, consisting of intertwined, heavily sclerotized cells. Excipulum c. 0.4 mm diam., in section dark brown throughout, 25–38 µm thick; pseudoparenchymatic, consisting of 6–7 layers of concentrically arranged, 8–11 µm long and 1.5 µm wide, dark brown cells, with an inner layer of shorter, pale cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue; periphysoids 47–55 µm long, 1.5 µm diam., septate, branching at wide angels. Asci 100–111×35–38 µm, ellipsoidal to clavate, 8-spored. Ascospores 32–37×15–18 µm, ellipsoidal, muriform, with 6–9 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 2–3 longi-septa in the central part

Habitat. On quartz intrusions in calcareous rocks in shade in the mist of a waterfall. Alt. 360 m.

Distribution. Hitherto only known from the type locality in Central Sweden. **S:** *Jmt*.

Note. A poorly known species closely related to *Polyblastia fuscoargillacea*, but having larger perithecia and longer ascospores with only 1–2 longi-septa.



7. Polyblastia dimidiata S Savić & Tibell

Symb. Bot. Upsal. 36(1): 30 (2012). – Type: Sweden, Gotland, Gotska Sandön, W of Arna Grop, 2006 Savić & Tibell 24353 (UPS holotype).

S: sandömursporing

Literature: Savić & Tibell 2012: 30–31.

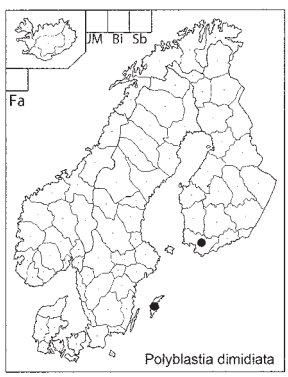
Figs: Savić & Tibell 2012: 7.

Thallus immersed to thin, when immersed not altering the colour of the substrate, when thin greenish grey. Perithecia medium-sized, 0.39–0.47 mm diam., slightly depressed, at maturity immersed only at the base; only leaving shallow pits when removed; scattered. Involucrellum well developed, 45–62 µm thick, clearly distinct from the excipulum except for in the ostiolar region, dimidiate, diverging from the excipulum halfway down. Excipulum c. 0.3 mm diam., in section brown, pale brown at the base/pale, 30–45 µm thick, merged with the involucrellum in the uppermost part, pseudoparenchymatic, consisting of 6–8 layers of almost isodiametric cells, c. 4 µm diam., pale below, at the base consisting of 8–11 layers of hyaline cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids. Asci c. 110×35 µm, narrowly ellipsoidal/clavate/broadly clavate, 8-spored. Ascospores 28–34×16–17 µm, ellipsoidal or slightly asymmetric, muriform, with 6–8 oblique trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 3–4 oblique/longi-septa in the central part.

Habitat. On calcareous pebbles in open, dry, wind-swept areas. Alt. 5 m

Distribution. Known only from the type and one collection from Finland. **F:** *V*. **S:** *Gtl*.

Note. Closely related to *Polyblastia neglecta* and characterized by the im-



mersed or very thin thallus, the moderately sized, emerging perithecia, and the rather large ellipsoidal ascospores with 6–8/3–4 septa.

8. **Polyblastia eumecospora** Zschacke

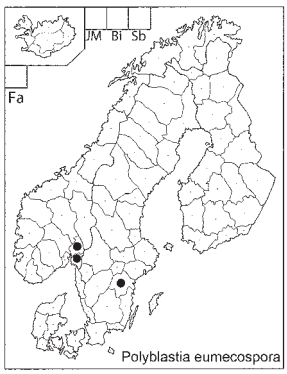
Epigloeaceae, Verrucariaceae und Dermatocarpaceae. In: Rabenhorst's Krypt.-Fl., ed. 2, 9, 1(1): 418 (1934). – Type: [Germany] 'Auf Kalkstein im Harz bei grund' (not seen).

S: halomursporing

Literature: Savić & Tibell 2012: 31–33.

Figs: Savić & Tibell 2012: 8.

Thallus superficial, thin, continuous to rimose with matt, slightly farinose surface. white to greyish. Perithecia medium-sized, 0.24–0.31 mm diam., flattened, not leaving pits when removed, appearing slightly pruinose at the periphery. Involucrellum well developed apically, c. 30–55 µm thick, distinct from the excipulum except for in the ostiolar region, reaching a third down the ascomata, merging with the excipulum in the ostiolar region, consisting of intertwined, heavily sclerotized cells. Excipulum c. 0.3 mm diam., in section pale brown in the upper part, but inner part pale at the base, 14–27 µm thick; pseudoparenchymatic, consisting of 8–10 layers of concentrically arranged, 6–14 µm long and 2–3 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids 60–80 µm long and 2 µm wide, septate, branching at wide angels, at the apices slender. Asci when mature without apical thickening, 50–81×17–34 µm, ellipsoidal, 8-spored. Ascospores pauciseptate, halonate, 23–29×9–15 µm, narrowly ellipsoidal to broadly or ellipsoidal spherical, with 4–6 oblique/trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1–2 oblique/longi-septa in the central part.



Habitat. On calcareous rocks.

Distribution. Rarely recorded from southern part of the region. **N:** *Øf Ak*. **S:** *Ög*. Described from Germany.

Note. Characterized by the thin, farinose, white to grey thallus, the moderately sized, emerging perithecia, and the rather small, ellipsoidal, halonate ascospores.

9. **Polyblastia fusca** S.Savić & Tibell

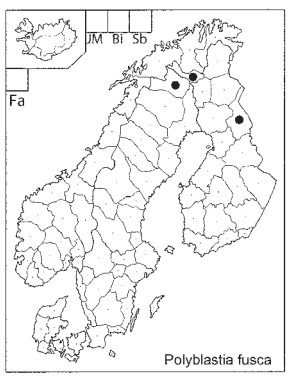
Symb. Bot. Upsal. 36(1): 33 (2012). – Type: Torne Lappmark: Jukkasjärvi par., Abisko National Park, Abisko Canyon, 2005 Savić & Tibell 25472 (UPS holotype).

S: brun mursporing

Literature: Savić & Tibell 2012: 33–35.

Figs: Savić & Tibell 2012: 9.

Thallus superficial, thin, even, semi-endolithic, occasionally slightly rimose, dull brown to somewhat ochraceous. Perithecia small, 0.19–0.24 mm diam., almost spherical, gradually emerging from the thallus and at maturity sessile. Involucrellum well developed, 43–61 µm thick, clearly distinct from the excipulum except for in the ostiolar region, reaching the base of the ascomata, appressed to the excipulum and only slightly diverging from the excipulum in the lowermost part, consisting of intertwined, heavily sclerotized cells. Excipulum 0.24–0.27 mm diam., in section dark brown throughout, at least in the outermost part; pseudoparenchymatic, 15–23 µm thick, consisting of 10–12 layers of concentrically arranged, 8–11 µm long and 2–3 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids slender, 31–39 µm long, c. 1 µm diam., septate, branched, towards the base with shorter and wider cells. Asci when young with strongly thickened apex, at maturity still with thick apex and a wide ocular chamber, 63–74×22–25 µm, ellipsoidal to clavate, 8-spored. Ascospores pauciseptate, 15–20×9–10 µm, narrowly ellipsoidal, with 3–5 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and 1 or more rarely 2 longi-septa.



Habitat. On open calcareous rocks along rivers. Alt. 320 m (type).

Distribution. Only known from Finland and Sweden. **F:** *Ks EnL*. **S:** *TL*.

Note. P. fusca is characterized by having a dull brown or slightly ochraceous thallus, small, sessile perithecia, and small, narrowly ellipsoidal, pauciseptate ascospores with 3–5/1(–2) septa.

10. Polyblastia fuscoargillacea Zschacke

Symb. Lich. Rar. vel nov. Italiae superioris (1826): 26. – Type: 'Ad saxa calcarea supra terminum arboretum in Rhaetica. Val Pisella.' (Anzi, Lich. rar. Lang. exs. 368, UPS lectotype, Nordic Lichen Flora 6: 56, 2017).

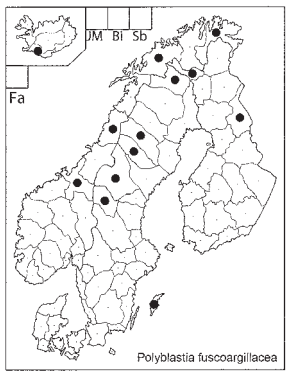
F: kypäräkonnanjäkälä **I:** ryðstrympa **S:** rostmursporing

Literature: Savić & Tibell 2012: 35–37.

Figs: Savić & Tibell 2012: 10.

Thallus superficial, moderately thick, minutely verrucose to areolate; areoles 0.4–0.6 mm diam., angular, with flat, slightly verrucose, matt surface, ferrugineous, patchily ochraceous or rarely ash-grey. Perithecia medium sized to rather small, 0.32–0.41 mm diam., almost spherical, often with depressed ostiolum, formed in the centre of the areoles and gradually emerging, at maturity immersed only at the base. Basal parts of ascomata and surroundings sometimes K+ deep red. Involucrellum well developed, 43–53 µm thick, clearly distinct from the excipulum except for in the ostiolar region, reaching halfway down the ascomata, appressed to the excipulum or only slightly diverging from the excipulum in the lowermost part, consisting of intertwined, heavily sclerotized cells. Excipulum 0.27–0.29 mm diam., in section dark brown throughout, 18–23 µm thick; pseudoparenchymatic, consisting of concentrically arranged, 6.5–11 µm long and 3–4 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids slender, branched, 31–39 µm long, c. 1.5 µm diam., septate. Asci 71–90×32.5–46 µm, ellipsoidal to clavate, 8-spored. Ascospores 24.5–31.5×14.5–17.5 µm, broadly ellipsoidal, muriform, with 6–7 oblique trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 3–4 oblique longi-septa in the central part.

Habitat. On calcareous rocks, frequently slate, on basalt, often along streams or on seepages in open situations. Alt. 160–1075 m.



Distribution. Mainly a northern species in the region. Probably relictual in Gotska Sandön **F:** *Ks EnL*. **I:** *ISu*. **N:** *ST SNo Tr ØFi*. **S:** *Gtl Hrj Jmt ÅsL LyL TL*. Widely distributed in alpine areas of Continental Europe.

Note. Recognized in the field by the ferrugineous to patchily ochraceous thallus, and the medium sized, emerging perithecia. It is the least uncommon species at moderate to high altitudes in the Skandes.

11. Polyblastia hyperborea Th.Fr.

Lichenes Arctoi: 366 (1860). – Type: '*Polyblastia hyperborea* Th.Fr. Øst-Finmark. Varanger, Mortensnaes, 26.VIII.1857. Th. Fries' (UPS lectotype, Savić & Tibell 2012: 36).

F: pohjankonnanjäkälä **I:** freðstrympa **S:** ishavsmursporing

Literature: Savić & Tibell 2012; 37–38.

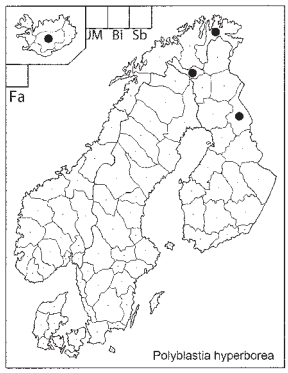
Figs: Savić & Tibell 2012: 11.

Thallus superficial, moderately thick, rimose to areolate; areoles 0.3–0.5 mm diam., angular, with flat, slightly verrucose, matt surface, grey mottled in brown to beige. Perithecia medium sized to rather small, 0.28–0.36 mm diam., spherical to slightly depressed at the ostiolum, at maturity emerging; semi-immersed or almost sessile. Involucrellum well developed, 110–125 µm thick, reaching halfway down the ascomata, appressed to the thickened apical part of the excipulum and diverging in the lower part, merging with the excipulum in the ostiolar region, consisting of dark brown, irregularly intertwined, heavily sclerotized cells and with crystalline inclusions. Excipulum 0.32 mm diam., in the ostiolar area to 30–40 µm thick, strongly sclerotized, pseudoparenchymatic, laterally

hyaline, 25–30 µm thick, consisting of c. 10 layers of narrow, concentrically arranged, interwoven hyphae 1.5–2.5 µm thick; at the base to 50 µm thick and with c. 20 layers of 6–10 µm long and 2–3 µm wide cells concentrically arranged cells, in the lowermost part pale. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids slender, branched, septate, c. 50 µm long, 1.5–2 µm wide. Asci 86–106×38–44 µm, ellipsoidal to clavate, 8-spored. Ascospores 25–30×15–18 µm, ellipsoidal to broadly ellipsoidal, when mature hyaline, muriform, with 5–7 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and 2–3 longi-septa in the central part.

Habitat. On calcareous rocks at low altitudes.

Distribution. Seemingly an Arctic or subarctic species, so far only known from the northernmost part of the region. **F:** *Ks EnL*. **I:** *IMi*. **N:** *ØFi*. Also known from Novaya Zemlya. Recorded from Svalbard by Øvstedal et al., (Sommerfeltia 33: 393, 2009), an identification that needs verification.



Note. The name *Polyblastia hyperborea* has very often been misapplied in herbaria and publications. Many collections thus named belong to *Polyblastia borealis*, and literature records need confirmation.

12. Polyblastia inconspicua S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 38 (2012). – Type: Norway, Sör-Tröndelag. Oppland par., Vinstradalen, 1.6 km NNW of Ryphusan, 2007 Savić 3215 & Tibell (UPS holotype).

S: skuggmursporing

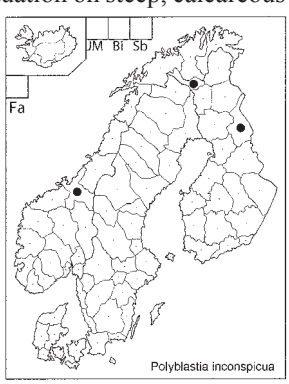
Literature: Savić & Tibell 2012: 38–39.

Figs: Savić & Tibell 2012: 12.

Thallus immersed or very thin and slightly rimose, patchy, with irregular ochraceous areas. Perithecia medium sized, 0.38–0.46 mm diam., almost spherical, gradually emerging, at maturity sessile. Involucrellum well developed, reaching halfway down the ascomata, thickened in the upper part, 70–85 µm, merging with the excipulum in the ostiolar region, diverging from the excipulum in the lowermost part, consisting of irregularly intertwined, heavily sclerotized cells. Excipulum subspherical, 0.29 mm wide and 0.22 mm high, in section pale throughout, except for at the ostiolum, where it is dark and merged with the involucrellum, consisting of 10–12 layers of narrow, concentrically arranged cells 8–11µm long and c. 3 µm wide cells. Hamahecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids slender, branched. 39–45 µm long c. 1 µm diam., septate, branching at wide angels. Asci 66–73×36–44 µm, ellipsoidal to clavate, 8-spored. Ascospores 26–32×18–22 µm broadly ellipsoidal, muriform, with 5–8 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 3–4 longi-septa in the central part.

Habitat. In semi-shaded situation on steep, calcareous rocks and pebbles. Alt. 180 –1055 m.

Distribution. **F:** *Ks EnL*. **N:** *ST*. Only known from northern Finland and central Norway.



Note. Characterized by having a very thin, patchily ochraceous thallus, medium-sized, emerging perithecia, a pale excipulum, and the broadly ellipsoidal ascospores with 5–8/3–4 septa.

13. Polyblastia integrascens (Nyl.) Vain.

Acta Soc. Fauna Fl. Fenn. 49,2: 104 (1921). – *Verrucaria intercedens* ** *integrascens* Nyl., Bull. Soc. Linn. Normandie 4,1: 237, sep. p. 42 (1887). – Type: Freti behringii [Behring Strait] (not seen).

S: snedmursporing

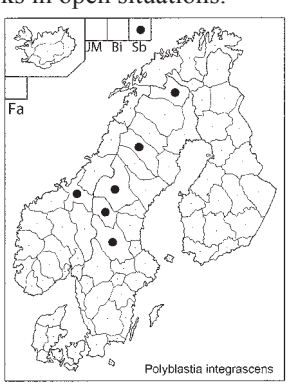
Literature: Savić & Tibell 2012: 40–41.

Figs: Savić & Tibell 2012: 13.

Thallus superficial, thin, rimose to areolate; areoles 0.2–0.4 mm diam., angular, with flat, slightly verrucose, matt surface; ash grey. Perithecia medium sized, 0.3–0.5 mm diam., almost spherical, with depressed ostiolum, formed in the centre of areoles, gradually emerging, at maturity semi-immersed to sessile; not leaving pits when removed, formed in the centre of the areoles and gradually emerging. Involucrellum well developed, 25–40 µm thick, clearly distinct from the excipulum except for in the ostiolar region, reaching halfway down the ascomata, appressed to the excipulum, slightly diverging from the excipulum in the lowermost part, consisting of intertwined, heavily sclerotized cells; ostiolar area thickened. Excipulum 0.18–0.40 mm diam., in section brown, merged with the involucrellum in the upper part, 62–98 µm thick (together with the involucrellum) consisting of concentrically arranged, 6–10 µm long and 2–3 µm wide cells., pale to medium brown below, at the base consisting of 8–9 cell layers. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids 39–45 µm long and c. 2 µm wide, septate, branching at wide angels at the apices. Asci when mature 72–103×25–39 µm, narrowly ellipsoidal to broadly clavate, 8-spored. Ascospores 26–36×15–19 µm, narrowly ellipsoidal to ellipsoidal, with 4–6 oblique trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1–2 oblique longi-septa in the central part.

Habitat. On calcareous rocks in open situations.

Distribution. Widely distributed in the central and northern part of the region. **N:** *ST*. **AI:** *Sb*. **S:** *Dlr Hrj Jmt LyL TL*. Also known from eastern Russia (type locality).



Note. The name has often been misapplied in herbaria and in the literature (see Savić & Tibell 2012: 41. Characterized by a distinct thallus and medium-sized to rather small, finally emerging perithecia. The ascospores are medium-sized, having 4–6 oblique trans- and 1–2 oblique longi-septa.

14. Polyblastia intermedia Th.Fr.

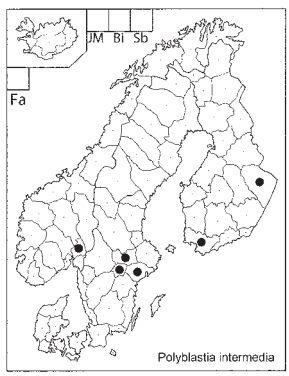
Reg. Soc. Sci. Upsal. 1877: 24. – Type: Nerike, Ödeskärr, i Lerbäck, 1869 Hellbom (S lectotype, Savić & Tibell 2012: 41).

F: pikkukonnanjäkälä **S:** mellanmursporing

Literature: Savić & Tibell 2012: 41–43.

Figs: Savić & Tibell 2012: 14.

Thallus superficial, thin, smooth, beige. Perithecia small, 0.2–0.3 mm diam., slightly depressed, with depressed ostiolum, at maturity emergent, with lower part immersed in the thallus. Involucrellum well developed, 20–45 µm thick, distinct from the excipulum except for in the ostiolar region, reaching halfway down the perithecia, appressed to the excipulum except for in the lowermost part, merging with the excipulum in the ostiolar region, consisting of intertwined, heavily sclerotized cells, ostiolar area thickened. Excipulum 0.14–0.18 mm diam., outer part in section brown throughout, 10–16 µm thick; pseudoparenchymatic, consisting of 4–5 layers of concentrically arranged, 8–9 µm long and 1.5–2 µm wide cells covering 3–4, hyaline layers of thinner, inner cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids 34–44 µm long and 2 µm wide, septate, sparingly branching towards the apices. Asci when mature 41–58×16–23 µm, ellipsoidal, 8-spored, with a very low and wide ocular chamber in semi-mature asci. Ascospores pauciseptate, 17–20×8–10 µm, ellipsoidal, with 3(–4) trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1 longiseptum in the central part, in semi- mature stages with a gelatinous coat surrounding the ascospores, particularly well visible after adding 1% K.



Habitat. On calcareous rocks.

Distribution. A southern species in the region. **F:** *V PK*. **N:** *Ak*. **S:** *Nrk Srm Vsm*.

15. Polyblastia media S.Savić & Tibell

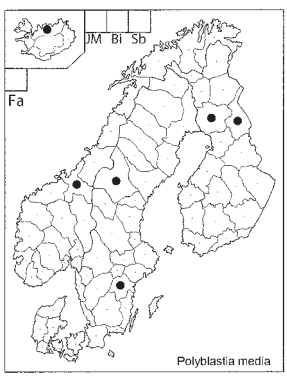
Symb. Bot. Upsal. 36(1): 43 (2012). – Type: Sweden: Jämtland. Kall par., 2 km SW of Huså, Husåfallet, 2008 Savić & Tibell 25403 (UPS holotype).

I: vætustrympa **S:** enkelmursporing

Literature: Savić & Tibell 2012: 43–44.

Figs: Savić & Tibell 2012: 15.

Thallus superficial, thin, continuous to slightly rimose, pale beige to greyish. Perithecia medium sized to rather small, 0.3–0.4 mm diam., almost spherical to slightly flattened, emergent, at maturity sessile. Involucrellum well developed, 25–35 µm thick, clearly distinct from the excipulum except for in the ostiolar region, reaching the level of the base of the excipulum, but clearly diverging from the excipulum in the lowermost part, consisting of intertwined, heavily sclerotized cells. Excipulum 0.24–0.35 mm diam., in section dark brown throughout; pseudoparenchymatic, consisting of 6–8 layers of concentrically arranged 6–9 µm long and 2 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids 31–39 µm long, septate, sparingly branched, c. 2 µm diam. Asci 56–72×22–36 µm, ellipsoidal to clavate, 8-spored. Ascospores pauciseptate, 17–22×10–12 µm, ellipsoidal, broadly ellipsoidal or often asymmetric with one end thicker, with few cells, with 3–4 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and one longiseptum in the central part.



Habitat. On N-facing, shaded calcareous and siliceous rocks in the mist from waterfalls or on lakeshores. Alt. 410–610 m. The localities in Östergötland may be relictual, and here the species occurs in the same locality as *P. aurorae* and *Henrica melaspora*.

Distribution. Occurring in central part of the region and possibly as a relict in Östergötland. **F:** *PeP Ks*. **I:** *INo* **N:** *ST*. **S:** *Ög Jmt*.

Note. Th. Fries included *Polyblastia media* in his concept of *Polyblastia intermedia*.

16. Polyblastia neglecta S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 44 (2012). – Type: Sweden: Torne Lappmark. Jukkasjärvi par., 3 km W of Abisko, Marmorbrottet, 2005 Savić 3112B (UPS holotype).

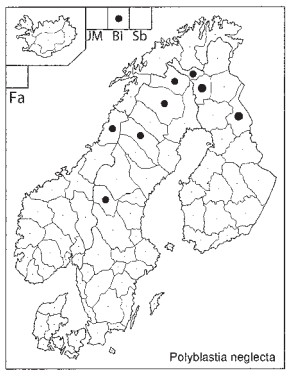
S: tunn mursporing

Literature: Savić & Tibell 2012: 44–46.

Figs: Savić & Tibell 2012: 16.

Thallus immersed or very thin, scurfy, rendering the substrate a very pale ochraceous tinge to grey or later dirty blackish, due to the colonization of various, dark cyanobacteria, sometimes surrounding the perithecia as a small cuff. Perithecia medium sized, 0.35–0.50 mm diam., almost spherical, early emerging, at maturity becoming sessile, leaving no or only very shallow pits when removed. Involucrellum well developed, thick in the upper part, 43–71 µm thick, reaching halfway down the perithecia, where it diverges slightly from the excipulum, merged with the excipulum in the ostiolar area, sometimes with crystalline inclusions and rather irregular, consisting of dark brown, irregularly intertwined, heavily sclerotized cells. Excipulum 0.21–0.31 mm in diam., in section dark throughout, at least in the outer part; pseudoparenchymatic, consisting of of 7–10 layers of concentrically arranged, 8–11 µm long and 3–4 µm wide cells. Hamathecium without hyphal elements except for the periphysoids formed below the ostiolum, I+ red, KI+ blue; periphysoids slender, 30–45 µm long and c. 1 µm wide. Asci 80–109×31–50 µm, ellipsoidal to clavate, 8-spored. Ascospores 29–35×15–18 µm, broadly ellipsoidal or with one end slightly wider, muriform, with 5–7 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 2–3 longi-septa in the central part, sometimes in young ascospores with a gelatinous perispore. Photobiont green alga, but the thallus often heavily overgrown by a mixture of cyanobacteria.

Habitat. On dolomite and other calcareous rocks, frequently carbonate-containing schists, in open to semi-shaded situations, often along rivers and shores.



Distribution. Widely distributed and probably not rare in arctic-alpine areas from Härjedalen in Sweden and northwards **F:** *Ks Kil EnL.* **N:** *SNo*. **AI:** *Bi*. **S:** *Hrj LyL LuL TL*.

17. Polyblastia nordinii S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 46 (2012). – Type: Sweden: Lycksele Lappmark: Tärna par., Lake Över-Uman, Rörsundet, 2002 Nordin 5501 (UPS holotype).

S: markmursporing

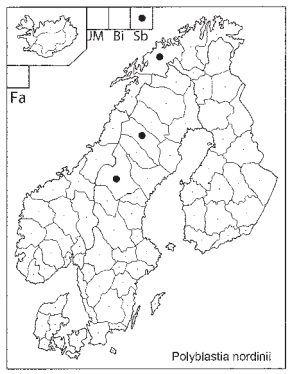
Literature: Savić & Tibell 2012: 46–48.

Figs: Savić & Tibell 2012: 17.

Thallus superficial, thin, developed over decaying mosses, continuous, gelatinous, dull greenish grey. Perithecia small, 0.20–0.25 mm diam., spherical, with depressed ostiolum, emerging from the thallus, finally semi-immersed. Excipulum 0.23–0.28 mm diam., 43–65 µm thick, strongly developed apically to form a flat area around the ostiolum, possibly merged with an unclearly delineated involucrellum in the ostiolar area, in section blackish brown except for in the lower part where it is pale to medium brown, pseudoparenchymatic, in the lower part consisting of 12–16 layers of narrow, concentrically arranged 8–12 µm long and 2–3 µm wide, pale cells. Hamathecium without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the slender periphysoids, 62–75 µm long and 1.5 µm diam., septate, sparingly branching at the apices. Asci 47–71×25–33 µm, ellipsoidal to clavate, 8-spored. Ascospores 26–31×14–18 µm, ellipsoidal, muriform, with 5–6 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 2–3 longi-septa in the central part.

Habitat. On decaying mosses on calcareous ground.

Distribution. A rare species known from alpine areas and the Arctic. **N:** *Tr*. **AI:** *Sb*. **S:** *Jmt LyL*.



Note: The rarest of the muscicolous *Polyblastia* species. Recognized by a thin thallus in contrast to *P. bryophila* and *P. sendtneri* which have a well-developed, whitish thallus.

18. Polyblastia plicata (A.Massal.) Lönnr.

Flora 41: 613 (1858). – *Verrucaria plicata* A.Massal., Lotos 6: 80 (1856). – Type: 'Ad saxa dolomitica Franconiae superioris (Hohlberg prope Muggendorf legit cl. Arnold' (Anzi Lich. Rar. Ven. 141; UPS lectotype, Savić & Tibell 2012: 48).

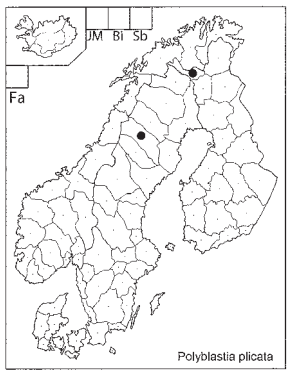
S: sköldmursporing

Literature: Savić & Tibell 2012: 48–49.

Figs: Savić & Tibell 2012: 18.

Thallus superficial, moderately thick, smooth to slightly areolate/rimose, grey, greyish brown to subochraceous, sometimes with black prothallus. Perithecia small, immersed in the thallus, emerging only with their uppermost parts, top flattened and widened, visible part 0.15–0.19 mm diam. Involucrellum well developed around the ostiolum, 19–28 µm thick, clearly distinct from the excipulum except for in the ostiolar region, sometimes diverging from the excipulum, shield-like, spreading almost horizontally at the surface of the thallus 110–125 µm away from the ostiolum, consisting of irregularly intertwined, heavily sclerotized cells. Excipulum 0.13–0.18 mm diam., in section pale to very pale brown throughout; pseudoparenchymatic, consisting of 8–10 layers of narrow, concentrically arranged cells 6–11 µm long and 2–3 µm wide. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids 16–23 µm long and 1.5–2 µm wide, septate, sparingly branched in the uppermost part. Asci 32–52×13–18 µm, broadly ellipsoidal to clavate, 8-spored. Ascospores pauciseptate, rather small, 11–15×6–8 µm, ellipsoidal, but thickened towards one end, with 1–3 trans-septa reaching the pe-

riphery along one side of the ascospores in a median optical section, with 1 longiseptum in the central parts of the ascospore.



Habitat. On calcareous rocks or stones along lakeshores or on wet ground. Alt. 520–750 m.

Distribution. A northern species rarely collected. **F:** *EnL*. **S:** *LyL*.

Note. May be confused with *P. singularis*, which however has smaller, cruciately septate ascospores and a thin, whitish thallus.

19. Polyblastia potamophila S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 48 (2012). – Type: Sweden: Torne Lappmark, Abisko National Park, Abisko Canyon, 2005 Savić & Tibell 3151E (UPS holotype).

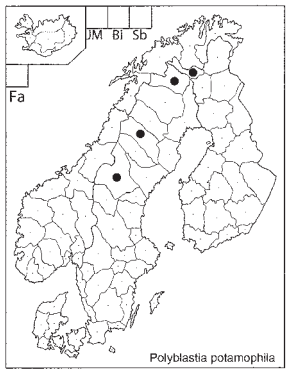
S: älvmursporing

Literature: Savić & Tibell 2012: 48–51.

Figs: Savić & Tibell 2012: 19.

Thallus superficial, moderately thick, rimose to areolate, areoles 0.27–0.45 mm diam., angular, with matt surface, pale ochraceous to pale grey. Perithecia medium sized to rather small, 0.35–0.40 mm diam., spherical, formed in the centre on areoles and gradually emerging, at maturity semi-immersed. Involucrellum well developed, 23–45 µm thick, diverging markedly at the ostiolum and spreading along the surface of the thallus, reaching out a little further than the side of the excipulum, merging with the excipulum in the ostiolar region, consisting of irregularly intertwined, heavily sclerotized cells. Excipulum 0.30–0.33 mm diam., in section pale throughout, but dark in the upper part; consisting of 8–10 layers of concentrically arranged 8–11 µm long and 2–3 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, hamathecium I+ red, KI+ blue, except for the periphysoids; periphysoids unbranched, 42–53 µm long and 1.5 µm wide, septate. Asci 66–87×29–35 µm, ellipsoidal to clavate, 8-spored. Ascospores 28–33×11–14 µm, narrowly ellipsoidal, sometimes with a gelatinous perispore, often asymmetric and tapering towards one end, muriform, with 6–7 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and usually just one, less frequently two longi-septa in the central part.

Habitat. On dolomite and siliceous rocks close to rivers. Alt. 375–550 m.



Distribution. Rare, only known from central and northern Sweden and Finland. **F:** *EnL*. **S:** *Jmt LyL TL*.

Note. Characterized by the pale ochraceous to pale grey, rimose to areolate thallus, the rather small, emerging perithecia, and the apical, spreading involucrellum. It is similar to *P. inconspicua* in having an ochraceous thallus and a pale excipulum.but *P. inconspicua* differs, however, by a thinner thallus and broader, symmetric ascospores with 3–4 longi-septa

20. Polyblastia pulchra S.Savić & Tibell

Symb. Bot. Upsal. 36(1): 51 (2012). – Type: Sweden, Torne Lappmark, Jukkasjärvi par., Abisko Canyon, 2005 Savić 5002 & Tibell (UPS holotype).

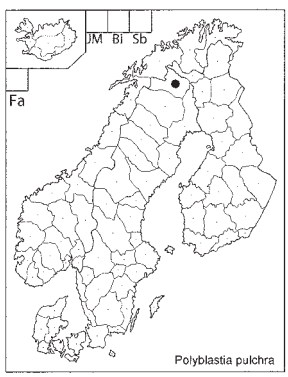
S: kristallmursporing

Literature: Savić & Tibell 2012: 51–52.

Figs: Savić & Tibell 2012: 20.

Thallus immersed, rendering the substrate a very pale ochraceous tinge. Perithecia rather small, 0.3–0.4 mm diam., almost spherical, emerging early and sessile at maturity, not leaving pits when removed. Involucrellum well developed, thick throughout, 51–63 µm thick, appressed to and enclosing the entire excipulum, thickest in the upper part, merging with the excipulum in the ostiolar region, consisting of intertwined, heavily sclerotized cells, more patchily sclerotized beneath the excipulum, with irregular, crystalline inclusions. Excipulum 0.18–0.20 mm diam., in section dark in the outer part but pale in the inner, 18–23 µm thick, pseudoparenchymatic, consisting of

7–10 layers of concentrically arranged, 6–11 µm long and 2–3 µm wide cells, the innermost cells being short. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, hamathecium I+ red, KI+ blue, except for the periphysoids; periphysoids to 40 µm long and 1.5–2 µm wide, septate, simple. Asci 66–76×23–31 µm, ellipsoidal to clavate, 8-spored. Ascospores 19–21×11–12 µm, ellipsoidal, pauciseptate, with 4–6 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 2–3 longi-septa in the central part.



Habitat. On dolomite in semi-shaded situation along rivers. Alt. 345–410 m.

Distribution. So far known only from two adjacent localities in Abisko National Park, Northern Sweden. **S:** *TL*.

21. Polyblastia quartzina Lynge

Rep. Sci. Res. Norw. Exp. Novaya Zemlya 1921: 24 (1928). – Type: Novaya Zemlya. Chalkonik Valley, Matotchkin Shar (O lectotype, Savić & Tibell 2012: 52).

S: kvartsmursporing

Literature: Savić & Tibell 2012: 52–53.

Figs: Lynge 1928: 24, pl. I: 18–20; Savić & Tibell, 2012: 21.

Thallus superficial, thin to moderately thick, forming indistinct patches, irregularly rimose, brown. Perithecia rather small, 0.24–0.31 mm diam., immersed, emerging only with the apical part, spherical, not abundant. Involucrellum well developed, thick, dimidiate, appressed to the excipulum in the ostiolar area, in the lower part diverging from the excipulum. Excipulum thin, below blackish brown at the base. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum; I+ red, KI+ blue, except for the periphysoids. Asci subcylindrical, 8-spored, 60–65×12–14 µm. Ascospores pauciseptate, sometimes cruciate, 11–13×6–8.5 µm, broadly ellipsoidal, with 1–3 oblique/trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1 longiseptum.

Habitat. On quartzite.

Distribution. Known from the type locality in Novaya Zemlya and has also been reported from the British Isles. It may, however, occur in the Nordic region.

22. Polyblastia schisticola Servít

Rozpravy Československé Akad. Věd 63: 26 (1953). – Type: '*Thelidium papulare*.' Sweden, Torne Lappmark, Jukkasjärvi, Jebrinjokk, 1916 Magnusson 3316a, with additional note: '= *Pol. schisticola* sp. nov.' (UPS lectotype, Savić & Tibell 2012: 53.

I: dökkvastrympa **S:** skiffermursporing

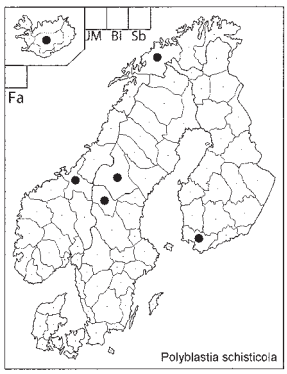
Literature: Savić & Tibell 2012: 53–55.

Figs: Servít 1953: 27; Savić & Tibell 2012: 22.

Thallus superficial, very thin or almost immersed, smooth glossy, dark brown, sometimes patchily ochraceous. Perithecia rather small, 0.26–0.34 mm diam., slightly flattened, with flattened or depressed ostiolar area, at maturity sessile, shining black. Involucrellum well developed, 37–48 µm thick, uniform halfway down the ascomata and below here lax and irregular, almost totally enclosing the excipulum, merging with the excipulum in the ostiolar region, consisting of intertwined, heavily sclerotized cells. Excipulum 0.21–0.25 mm diam., in section the outermost part brown; pseudoparenchymatic, consisting of 6–8 layers of rather short cylindrical, concentrically arranged cells 6–8 µm long and 2–3 µm wide, inner part with 8–10 layers of hyaline cells, towards the centre gradually smaller, pale cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids slender, branched, 55–62 µm long and 1–1.5 µm wide, septate. Asci 63–83×20–25 µm, ellipsoidal to clavate, 8-spored. Ascospores pauciseptate, 22–26×9–11 µm, narrowly ellipsoidal, slightly assymetric with one end narrower and often slightly curved, when mature hyaline, submuriform, with 6–7 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1–2 longi-septa in the central part.

Habitat. On siliceous rocks, frequently slate, often along streams or on seepages in open situations. Alt. 250–870 m.

Distribution. Widely distributed but scattered and probably rather rare in central and northern part of the region. **F:** *V*. **I:** *IMi*. **N:** *ST Tr*. **S:** *Hrj Jmt*.



Note. Recognized by a thin, dark or patchily ochraceous small thallus, sessile perithecia, and narrowly ellipsoidal, often slightly curved and asymmetric ascospores with 6–7 trans-septa and usually only one, sometimes two longi-septa. Similar to *P. pulchra*, which, however, has a completely immersed thallus, shorter and wider, symmetric ascospores and occurs on calcareous rocks.

23. Polyblastia sendtneri Kremp.

Flora, 38: 67 (1855). – Type: '*Polyblastia sendtneri* Krplhbr., spec. nov., Gebirge Berchtesgarden, Krph, popideo tantum unicum exemplare' (UPS lectotype, Savić & Tibell 2012: 55).

F: tunturikonnanjäkälä **I:** alpastrympa **S:** hedmursporing

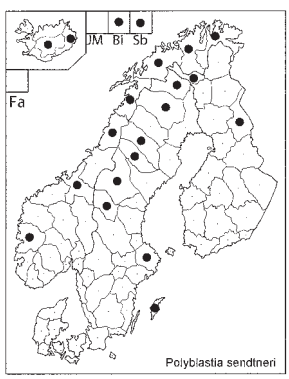
Literature: Savić & Tibell 2012: 55–57.

Figs: Savić & Tibell 2012: 23.

Thallus superficial, moderately thick, smooth but uneven, slightly glossy, forming white to greyish or slightly brownish crusts, often mottled in grey and brown, over decaying mosses, sometimes reaching a diameter of 8–10 cm; well-structured with a cartilaginous, 17–30 µm thick cortex consisting of very thin, slightly intertwined, hyaline hyphae parallel with the surface; a black prothallus is more or less well developed, particularly at the margin. Perithecia rather small, emerging part 0.25–0.31 mm diam., almost spherical, at first immersed in the thallus, gradually emerging and finally semi-immersed to sessile, abundant, scattered or often confluent in groups of 5–25. Involucrellum well developed, 28–56 µm thick, merged with the excipulum in the uppermost part, covering the upper half of the perithecium and slightly widened towards the base and further down continuous with the prothallus, consisting of intertwined, heavily sclerotized cells. Excipulum 0.17–0.24 µm diam., in section dark brown, 21–31 µm thick, pseudoparenchymatic, consisting of 10–12 layers of concentrically arranged, 6–8 µm long and 2–3 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids 36–44 µm long and 1.5 µm wide, septate, sparingly branched. Asci 53–86×18–31 µm, ellipsoidal to clavate, 8–spored. Ascospores 23–27×11–15 µm, ellipsoidal, pauciseptate, with 5–7 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1–3 longi-septa. Larger ascospores occasionally occur, but these are narrow (<16 µm wide) and have only 1–3 trans-septa.

Habitat. On mosses on calcareous soil, in the north often in *Dryas* heaths; once recorded from mosses at the base of *Betula* and *Quercus*. Alt. 10–1100 m.

Distribution. Widely distributed in the Arctic and the mountains of the region. The populations in southern Sweden may be isolated and possibly relictual. These occur at low altitudes adjacent to the Baltic, and are thus influenced by the cooling Baltic water body. **Gr**. **F:** *Ks EnL*. **I:** *IMi IAu.* **N:** *Ho ST SNo NNoTr VFi ØFi*. **AI:** *BI Sb*. **S:** *Gtl Upl Hrj Jmt ÅsL LyL LuL TL*. Described from a high altitude locality in Bavaria (Germany). Also reported from the mts of Scotland and from Russia and North America



Note. With a pale, moderately thick thallus, and semi-immersed to almost sessile perithecia it may be mistaken for *P. bryophila*, which has a similar thallus, but larger ascospores with 5–7 longi-septa and thus much more numerous cells in the ascospores.

24. Polyblastia septentrionalis Lynge

Rep. Sci. Res. Norw. Exp. Novaya Zemlya 1921: 27 (1928) – Type: Novaya Zemlya, Northern Kristovi Island, 1921 Lynge (O lectotype, Savić & Tibell 2012: 57).

S: arktisk mursporing

Literature: Savić & Tibell 2012: 57–58.

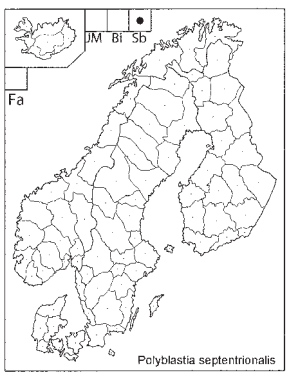
Figs: Savić & Tibell 2012: 24.

Thallus thin, to almost invisible, mainly developed around the perithecia, consisting of minute granules almost forming a pale, beige, continuous crust. Perithecia small, spherical, 0.23–0.32 mm diam., slightly appressed, immersed in the thallus only at the base, black, matt. Involucrellum well developed, thick, dimidiate, in the upper part black, paler at the base. Hamathecium I+ red. Ascospores pauciseptate, 19–26×10–13 µm, ellipsoidal, with 3–7 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1–3 longi-septa in the central part.

Habitat. On siliceous rocks.

Distribution. An arctic species only known from two collections including the type. **AI:** *Sb*.

Note. With small perithecia, a thin thallus, and moderately sized, pauciseptate ascospores.



25. Polyblastia singularis (Kremp.) Arnold

Verh. zool.-bot. Ges. Wien 18: 949 (1868) − *Verrucaria singularis* Kremp., Denkschr. K. bayer. bot. Ges. Regensburg 4B: 291 (1861). – Type: 'Wurde von Herrn Dr. Rehm auf Dolomitfelsen auf der Obermädeli-Alpen in den Algäuer-Alpen in den Sommer 1858 gefunden.' (not seen).

S: dvärgdmursporing

Literature: Savić & Tibell 2012: 58–60.

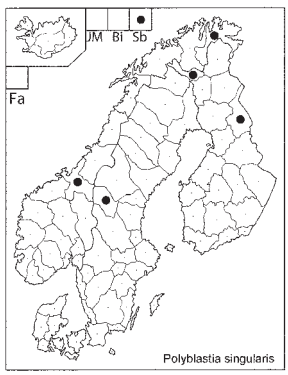
Figs: Savić & Tibell 2012: 25.

Thallus superficial, very thin, farinose to slightly glossy, rimose or subareolate, pale grey to whitish. Perithecia very small, 0.14–0.16 mm diam., slightly flattened, with depressed ostiolum, semi-immersed. Involucrellum well developed around the ostiolum, 30–45 µm thick, reaching down a third of the perithecium, merging with the excipulum in the ostiolar region, consisting of intertwined, heavily sclerotized cells, ostiolar area thickened. Excipulum 0.11–0.14 mm diam., 8–15 µm thick, in section pale or in ageing perithecia pale brown; pseudoparenchymatic, consisting of 3–8 layers of concentrically arranged, 6–8 µm long and 1.5 µm wide cells. Hamathecium at maturity without hyphal elements except for periphysoids formed below the ostiolum, I+ red, KI+ blue, except for the periphysoids; periphysoids slender, 16–22 µm long, septate, sparingly branching. Asci, when semi–mature with small and narrow apical chamber; 31–47×15.0–22 µm, ellipsoidal to clavate, 8-spored. Ascospores pauciseptate to cruciate, very small, 9–11×7–8 µm, subspherical, when mature hyaline, with 1–2 trans-septa reaching the periphery along one side of the ascospores in a median optical section, and with 1 longitudinal wall or septation cruciform.

Habitat. On calcareous rocks in semi-shaded situations.

Distribution. Alpine to arctic, rather rare in the region. **F:** *Ks EnL*. **N:** *ST ÖFi*. **AI:** *Sb*. **S:** *Hrj*.

Note. Easily identified by the tiny perithecia, the thin thallus, and the very small subspherical, often cruciate septate ascospores.



Excluded species

Polyblastia abscondita (Nyl.) Arnold

This species belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008) and hence not to *Polyblastia s. str.* Material of '*Polyblastia*. *abscondita*' in Nordic countries has often been misidentified as *Polyblastia cupularis* (see below) or *Polyblastia albida*.

Polyblastia agraria Th.Fr.

No recent collection of this species has been available, and its status is unclear. The type material ('Stockholm, Huddinge, på leråker, ymnigt, 1863 Lindberg'; S) contains minute perithecia among colonies of cyanobacteria, having two muriform, hyaline ascospores per ascus, but among the perithecia could also be observed numerous larger, dark brown ascospore that might belong to '*Polyblastia helvetica*' (see below). There is a possibility that *Polyblastia agraria* was just described from immature perithecia of '*P. helvetica*'.

Polyblastia bombospora Th.Fr. & Almq. ex Th.Fr.

No recent collections of this species are available, and its status is unclear. It probably belongs to *Sporodictyon*. See Savić & Tibell, Taxon 58(2): 585–605 (2009).

Polyblastia circularis Blomb. & Th.Fr. ex Th.Fr.

Forms distinctive, greyish patches and has partly immersed perithecia. The ascospores are larger than in *Polyblastia albida*. It is very similar to and perhaps also belongs to '*Polyblastia abscondita*', but may possibly be a distinct species. For further notes see Savić & Tibell, Symb. Bot. Upsal. 36(1): 60 (2012).

Polyblastia clandestina (Arnold) Jatta

This species belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia cupularis A.Massal.

This species seems not to occur in Northern Europe. Material of several (if not most!) species with moderately sized to large perithecia and ascospores have been misidentified as *Polyblastia cupularis* and sorted as such in major herbaria in Scandinavia.

Polyblastia decipiescens (Vain.) Zschacke

No recent collection of this species has been available for study, and its status is unclear.

Polyblastia dermatodes A Massal.

Reported from Vega in Norway (Degelius, Acta Reg. Soc. Sci. Litt. Gothobergensis, Bot. 2: 102, 1982, identified or confirmed by Swinscow). However, judging from the description and figures of ascospore morphology given by Swinscow (1971) this taxon most probably belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia dominans (Arnold) Zahlbr.

Judging from ascospore morphology it probably belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia epigaea A.Massal.

The specimen reported by Henssen (Crypt. Bot. 5: 150, 1995) as *Polyblastia epigaea* belongs to *Polyblastia sendtneri*, and hence there is no record of *Polyblastia epigaea* from the region.

Polyblastia epomphala (Nyl.) Zschacke

Belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia forana (Anzi) Arnold

Status unclear.

Polyblastia friesii Lynge

Judging from its ascospore structure it belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia gothica Th.Fr.

According to Hafellner (Biblioth. Lichenol. 106: 75–93, 2011) this is a synonym of *Merismatium nigritellum* (Nyl.) Vouaux.

Polyblastia hellbomiana (Servít) R.Sant. et al., comb. ined.

(Santesson, et al., Lichen forming and lichenicolous fungi of Fennoscandia, 2004). Status unclear.

Polyblastia helvetica Th.Fr.

A widely distributed, enigmatic species, which, however, does not seem to be closely related to *Polyblastia s. str.* It probably does not belong in Verrucariaceae.

Polyblastia intercedens (Nyl.) Lönnr.

There has been a lot of confusion surrounding this species/or name. Thus Th. M. Fries considered *Polyblastia hyperborea* to be a synonym of *Polyblastia intercedens*, and very many rock-inhabiting species have been identified by this name in the herbaria we have investigated. Status unclear.

Polyblastia magnussoniana Servít

Belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia moravica Zschacke

Belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia nidulans (Stenh.) Arnold

Belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia peminosa (Nyl.) Zahlbr.

Belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia quinqueseptata (Hepp) Zschacke

Judging from ascospore morphology this species belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia sakkobanensis Zschacke

No material seen, and its status is unclear. It probably belongs to *Sporodictyon*, see Savić & Tibell 2008b.

Polyblastia sepulta A.Massal.

Belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia subocellata Th.Fr.

Status unclear, but probably belongs to *Sporodictyon* (Savić & Tibell, Taxon 58(2): 585–605, 2009).

Polyblastia terrigena Th.Fr.

Status unclear.

Polyblastia theleodes (Sommerf.) Th.Fr.

=*Henrica theleodes* (Sommerf.) Savić (Savić & Tibell, Nord. J. Bot. 26: 237–2472009). Most identifications and records have erroneously been based on specimens of *Sporodictyon schaererianum* A.Massal. (Savić & Tibell, Taxon 58(2): 600. 2009).

Polyblastia torrentis Servít

Belongs to the *Thelidium*-clade (Savić et al., Mycol. Res. 112: 1307–1318, 2008).

Polyblastia velata Th.Fr.

This name has been used for various specimens in which the involucrellum surface has become heavily incrustated by calcium carbonate to form what resembles a thick, cup-like cover around the ostiolum. This phenomenon is especially frequent in *Polyblastia borealis*.

Sporodictyon

Sanja Tibell

Sporodictyon A.Massal.

Flora 35: 326 (1852). – Type: *Sporodictyon schaererianum* A.Massal.

I: strympur **S:** nätsporingar

Literature: Savić & Tibell, Taxon 58: 585–605 (2009); Hafellner, Biblioth. Lichenol. 104: 117–141 (2010).

Thallus grey, greenish grey or brownish, thin to thick, smooth to rimose or areolate or sometimes almost immersed. Ascomata perithecia, medium-sized to rather large 0.4–1.1 mm diam., hemispherical, with a thalline cover at least in the lower part. Excipulum spherical, dark brown throughout or sometimes pale at the base. Involucrellum well developed, in the upper part fused with the excipulum. Pseudoparaphyses thin, 1.0–1.5 µm diam., septate, branched and anastomosing. Asci very variable in shape, also in the same specimen, 105–236×34–118 µm, ellipsoidal to clavate, 8-spored, sometimes with fewer ascospores. Ascospores 39–84×19–47 µm, ellipsoidal or often slightly curved with one end being somewhat wider, sometimes ovoid, when mature yellowish to medium or dark brown, muriform. Photobiont green alga, but cyanobacteria (*Nostoc* sp.) occur as an additional symbiont in cephalodia in some species. The species grow on rocks, more rarely secondarily overgrowing soil and mosses.

Chemistry. No lichen substances detected by HPTLC.

Note. Sporodictyon was resurrected and revised by Savić & Tibell (2009), and the species have earlier often been included in *Polyblastia*.

1. Ascospores dark brown when mature 2
– Ascospores hyaline or yellowish when mature 4
2. Thallus thin; thalline cover of perithecia very thin and irregular; ascospores 45–62×25–28 µm ..... 2. *S. cruentum*
– Thallus thick to moderately thick; thalline cover of perithecia uniformly thick or with lobe-like projections, just leaving the ostiolum free; ascospores 59–77×31–43 µm 3

3. Perithecia initiated from the central part of thalline verrucae; thallus cover of perithecia uniform, just leaving the ostiolum free; ascospores 63–77× 36–43 µm ..... 1. *S. arcticum*
– Perithecia initiated from the lower side of thalline verrucae which later are often covered by thick, lobe-like projections; ascospores 59–73×31–39 µm ..... 4. *S. schaererianum*
4. Perithecia 0.34–0.46 mm diam.; ascospores 47–57×22–27 µm ..... 3. *S. minutum*
– Perithecia 0.47–0.68 mm diam.; ascospores 51–65×23–30 µm ..... 5. *S. terrestre*

1. Sporodictyon arcticum Savić & Tibell

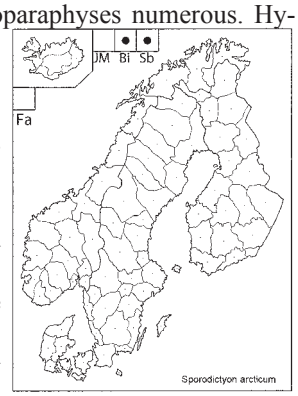
Taxon 58: 596 (2009). – Type: Spitsbergen. Van Mijen Bay, bak ved Kap Blix. 1926, Lynge (O holotype).

S: nordnätsporing

Literature: Savić & Tibell 2009: 596–597; Hafellner 2010: 117–141.

Figs: Savić & Tibell 2009: 5A, 6F.

Thallus superficial, moderately thick, matt, whitish to pale grey, minutely areolate to verrucose, with slightly irregular surface, areoles 0.3–0.7 mm wide, slightly convex, reaching 1–2 cm diam.; pseudocortex 25–33 µm thick. Cephalodia frequent, dark olivaceous brown, forming verrucose aggregations on the thallus. Perithecia large, 0.8–1.2 mm diam., hemispherical, almost completely covered by the thallus with only the ostiolum being exposed. Perithecia initiated in the centre of the verrucae and always symmetrically surrounded by the thallus. Thalline cover of the perithecia smooth to minutely verrucose, in the middle 90–130 µm thick and provided with a 18–24 µm thick pseudocortex. Involucrellum well developed apically, 50–70 µm thick, strongly carbonized in its outer part. Excipulum 45–60 µm thick, in its upper part dark brown in section; pseudoparaphyses numerous. Hymenium I+ red, KI+ blue. Asci 146–211×54–118 µm, ellipsoidal to clavate, 8-spored. Ascospores 63–77×36–43 µm, ellipsoidal to broadly ellipsoidal, often slightly curved with one end being somewhat wider, when mature dark brown, muriform. First trans-septum usually oblique and secondary longi-septa not parallel with the long axis of the ascospore. Photobiont green alga; cephalodia frequent, with *Nostoc*.



Habitat. On calciferous rocks.

Distribution. Widely distributed in the Arctic. **Gr. AI:** *Bi Sb*. Also known from Novaya Zemlya.

2. Sporodictyon cruentum (Körb.) Körb.

Parerga Lichenol.: 332 (1863). – *Segestrella cruenta* Körb., Denkschr. Feier 50-jähr. Best. Scles. Ges. Vaterl. Kultur: 237 (1853). – Type: 'Poland-Czechoslovakia, Sudeten Mountains, near Petzkretscham, Aupagrund, 1848, Körb. Stammherbar no. 910, 213–1264' (L lectotype, Swinscow, Lichenologist 5: 110, 1971).

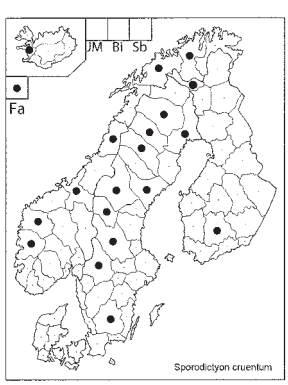
Syn. *Polyblastia cruenta* (Körb.) P.James & Swinscow.

F: puroverkkojäkälä **I:** flæðistrympa **S:** strandnätsporing

Literature: Savić & Tibell 2009: 597; Hafellner 2010: 117–141.

Figs: Savić & Tibell 2009: 5F, 6A.

Thallus superficial, continuous, medium to dark brown, greyish or greenish when wet, thin, slightly glossy, sometimes with a few cracks around the perithecia. Perithecia medium-sized to rather large, 0.5–0.7 mm diam., hemispherical to slightly flattened, with a thin and often irregular thalline cover in the lower part sometimes reaching irregularly almost to the ostiolum. Excipulum dark brown throughout or sometimes pale at the base. Involucrellum consisting of pseudoparenchymatic, concentrically or irregularly arranged cells. Hymenium I+ intensely red, KI+ blue. Asci 106–216×36–65 µm, ellipsoidal to clavate, 8-spored, rarely 4-spored. Ascospores 50–60×24–31 µm, ellipsoidal or often slightly curved with one end somewhat wider, sometimes ovoid, when mature medium to dark brown, muriform. Photobiont green alga; no cephalodia found.



Habitat. On siliceous rock by water, mostly submerged in streams or along riverbeds, on lake-shores on at least temporarily in-

undated rocks, more rarely in drier conditions. Rare at low elevations and in southern areas, more frequent in mountainous and northern areas. Alt. 40–850 m.

Distribution. Widely distributed but scattered in the region. **Fa. F:** *EH EnL*. **I:** *IVe*. **N:** *Ho SF ST SNo Tr VFi*. **S:** *Sm Vrm Dlr Ång Hrj Jmt Nb LyL PL LuL*. Also occurring in montane parts of Central Europe.

3. Sporodictyon minutum Savić & Tibell

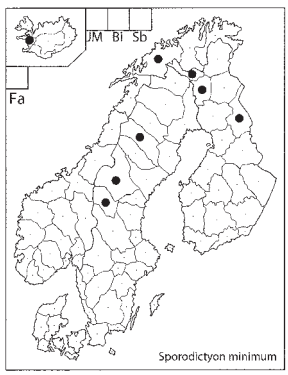
Savić & Tibell, Taxon 58: 597 (2009). – Type: Sweden. Jämtland: Undersåker par., Upper Handölsforsen, 2006 Savić 3111 (UPS holotype).

F: pikkuverkkojäkälä **I:** dulstrympa **S:** smånätsporing

Literature: Savić & Tibell 2009: 597–600.

Figs: Savić & Tibell 2009: 5B, 6C.

Thallus poorly developed, superficial, continuous, dull brown or slightly olivaceous brown to greenish grey, smooth to minutely verrucose when better developed. Cephalodia not found. Perithecia small, 0.34–0.46 mm diam., hemispherical, with a thin but irregular thalline cover mainly in the lower part or sometimes reaching almost to the ostiolum. Excipulum dark brown throughout or paler at the base, 11–15 µm thick, pseudoparenchymatic, consisting of concentrically arranged, elongated cells 3–6 times as long as wide. Involucrellum 28–40 µm thick, consisting of pseudoparenchymatic, concentrically or irregularly arranged cells with strongly carbonized walls, at the base widened and forming a more or less carbonized tissue enclosing the excipulum. Thalline cover of the perithecia sometimes almost lacking, irregularly covering the outer wall of the perithecia. Hymenium I+ intensely red, KI+ blue. Asci 109–138×34–73 µm, ellipsoidal to clavate, 8-spored. Ascospores 47–57×22–27 µm, ellipsoidal or slightly curved with one end somewhat wider, when mature hyaline or very pale yellowish, muriform. Photobiont green alga.



Habitat. On slate and calcareous rocks in humid locations, often on shaded, steep rocks. Altitudinal range 160–1170 m.

Distribution. Subalpine and alpine in central and northern part of the region. **F:** *Ks KiL EnL*. **I:** *IVe*. **N:** *Tr*. **S:** *Hrj Jmt LyL*.

4. Sporodictyon schaererianum A.Massal.

Flora 35: 327 (1852). – Type: 'Viget ad saxa arenaria aqua suffusa in monte Gurnigel agri Beruensis, ubi legit clar. Schaerer, cujus nomini speciem dicatam voluimus.' – Material in the Massalongo herbarium not seen, but an isosyntype (Schaerer, Lich. helv. exs. 538, UPS) was studied.

F: rantaverkkojäkälä **I:** úðastrympa **S:** nätsporing

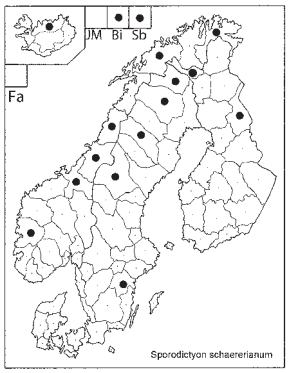
Literature: Savić & Tibell 2009: 600–601; Hafellner 2010: 117–141.

Figs: Savić & Tibell 2009: 5E, 6D.

Thallus superficial, moderately thick to thick, grey to pale grey, verrucose; verrucae when young almost spherical, 0.4–0.8 mm diam., later irregularly elongated and aggregated with other verrucae, forming lobe-like extensions; thalline surface minutely areolate sometimes appearing pruinose; photobiont cells in radiating rows. Cephalodia frequent, dark brown to black, forming flattened, irregular, granular aggregations to 1.5 mm diam. Perithecia rather large, 0.7–0.9 mm diam., spherical, formed from the bases of the thalline verrucae, later usually irregularly covered by thick lobe-like thalline flaps, sometimes, however, the thalline cover is very poorly developed or missing; exposed outer surface of the involucrellum uneven. Involucrellum 55–130 µm thick, strongly thickened around the often distinctly depressed ostiolum; pseudoparaphyses numerous. Hymenium I+ red, KI+ blue. Asci 130–236×57–92 µm, ellipsoidal to clavate, 8-spored. Ascospores 59–73×31–39 µm, ellipsoidal or often somewhat asymmetric, slightly curved with one end somewhat wider, sometimes ovoid, when mature dark brown, muriform. At high magnification a very minute dotted pattern in the ascospore wall is visible under the light microscope. This might be caused by a surface ornamentation or irregular distribution of a pigment. Photobiont trebouxioid alga; in the cephalodia *Nostoc*.

Habitat. On calcareous rocks and on slate, along rivers and in the mist of waterfalls; montane, but also oc-

curring at low elevations in the northernmost part of the area and the Arctic. Alt. 10–1170 m.



Distribution. Scattered but widely distributed in the region. **F:** *Ks EnL*. **I:** *INo*. **N:** *Ho ST NT SNo Tr ØFi.* **AI:** *Bi Sb.* **S:** *Ög Jmt LyL LuL TL*. Also occurring in mountainous parts of Central Europe.

5. Sporodityon terrestre (Th.Fr.) Savić & Tibell

in Savić et al. Mycol. Res. 112: 1311 (2008). – *Polyblastia terrestris* Th.Fr. Nova Acta Reg. Soc. Sci. Upsal. 3,3: 365 (1861). – Type: Øst-Finmark, Varanger, Mortensnes, 1857. Fries (UPS lectotype, Savić et al. 2008: 1311).

Syn. *Polyblastia inumbrata* (Nyl.) Arnold: *Polyblastia sommerfeltii* Lynge

F: lapinverkkojäkälä **I:** hjúpstrympa **S:** fjällnätspor-ing

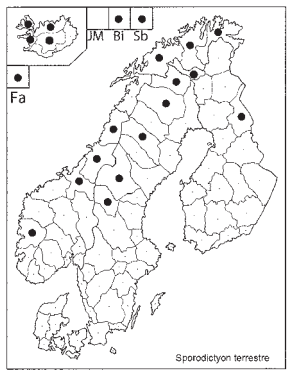
Literature: Savić & Tibell 2009: 601–603; Hafellner 2010: 117–141.

Figs: Savić & Tibell 2009: 5C, D, 6B, E.

Thallus superficial, moderately thick, matt, greenish grey to grey, verrucose; pseudocortex thin, 6–10 µm thick. Cephalodia frequent, almost black, forming verrucose aggregations. Perithecia intermediate, 0.5–0.7 mm diam., protruding and in the lower part usually with a moderately thick thalline cover; sometimes with a thick thalline cover only leaving the ostiolum exposed. Thalline cover of the perithecia well developed with a minutely verrucose surface and a thin, paraplectenchymatic cortex containing minute crystals. Involucrellum well developed, 80–125 µm thick. Excipulum 20–25 µm thick; pseudoparaphyses numerous, Hymenium I+ red, KI+ blue. Asci 105–195×58–115 µm, ellipsoidal to clavate, 8-spored. Ascospores 51–65×23–30 µm, ellipsoidal or often slightly curved with one end somewhat wider, sometimes ovoid, when mature yellowish, strongly muriform. Photobiont green alga; cephalodia frequent, with *Nostoc*.

Habitat. On calciferous to neutral or acidic rocks by streams, often in the splash-zone, rarely on base-rich soil and then often among bryophytes, where it establishes on small pebbles on the surface of the soil and secondarily spreads over adjacent soil; montane but also occurring at low elevations in the northernmost part of Scandinavia. Alt. 15–1040 m.

Distribution. **Gr. Fa F:** *Ks EnL*. **I:** *IVe IMi INv INo.* **N:** *Ho ST NT SNo Tr VFi ØFi.* **AI:** *Bi Sb.* **S:** *Hrj Jmt LyL LuL TL*. Widely distributed in central and northern Fennoscandia. Also occurring in mountainous parts of Central Europe.



Note. Quite often attacked by the lichenicolous *Stigmidium superpositum* (Nyl.) D.Hawksw.

APPENDIX

Nomenclatural novelties

Clavascidium

M. Prieto & M. Westberg

Clavascidium alvarense (Breuss) M.Prieto *comb. nov.*

Basionym: *Catapyrenium alvarense* Breuss, Linzer Biol. Beitr. 26(2): 643 (1994). – Type: Sweden, Öland: Vicklebys Stora Alvaret, 1958 W.A. & L. Weber (COLO no. 126458 holotype).

Dermatocarpon

Starri Heiðmarsson

Dermatocarpon luridum (With.) J.R. Laundon

Lichenologist 16: 222 (1984). – *Lichen luridus* With., Bot. Arr. Veg. Gr. Br. 1: 720 (1776). – Type: Dillenius, Historia muscorum, tab. 30, fig. 128, 1742 (holotype); corresponding specimen in herb Dillenius, the large specimen in the upper right half (OXF epitype, designated here).

Heteroplacidium

M. Prieto & M. Westberg

Heteroplacidium fusculum (Nyl.) Gueidan & Cl.Roux

in Gueidan et al., Mycol. Res. 111: 1145–1168 (2007). – *Verrucaria fuscula* Nyl., Bot. Not. 1853: 161 (1853). – Type: [France] Prope "Chateau d. Cambouse", ad Montpelier. W. Nylander (H lectotype, designated here).

Polyblastia

Sanja Tibell & Leif Tibell

Polyblastia albida Arnold

Flora 41: 551 (1858). – Type: Zwischen Dollnstein und Eberswang (735!)…Wintershofer bergs (599!). Obereichstätt (599b)'. '*Polyblastia albida* m. (Flora 1858 p. 251. An einem Kalkfelsen der Bergschlucht zwischen Dollnstein under Eberswang bei Eichstätt',1858 (Arnold, Lich exs. 28, UPS lectotype, designated here).

Polyblastia fuscoargillacea Zschacke

Symb. Lich. Rar. vel nov. Italiae superioris (1826): 26. – Type: 'Ad saxa calcarea supra terminum arboretum in Rhaetica. Val Pisella.' (Anzi, Lich. rar. Lang. exs. 368, UPS lectotype, designated here).

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Atla alpina

Atla oulankaensis

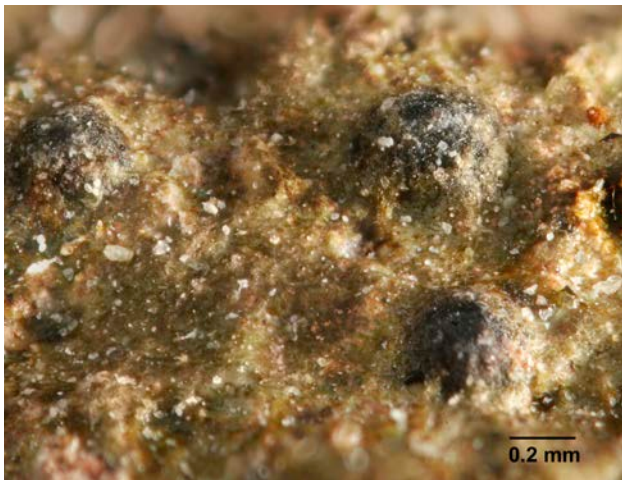
Atla palicei

Atla praetermissa

Atla recondita

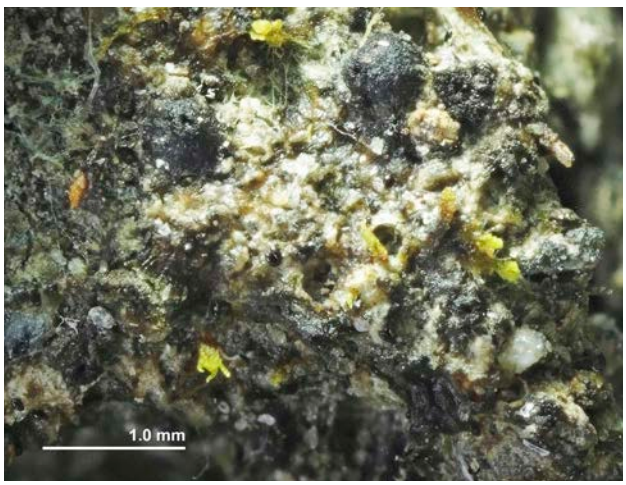
Atla recondita

Atla tibelliorum

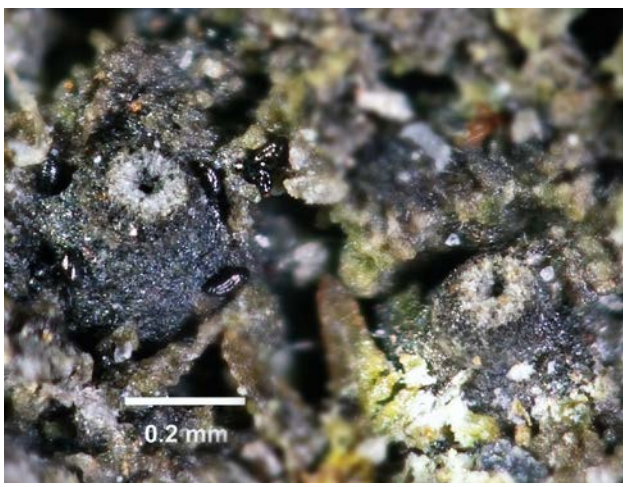


Atla vitikainenii

Atla vitikainenii



Atla wheldonii



Atla wheldonii

Catapyrenium cinereum

Catapyrenium daedaleum

Catapyrenium daedaleum

Catapyrenium psoromoides

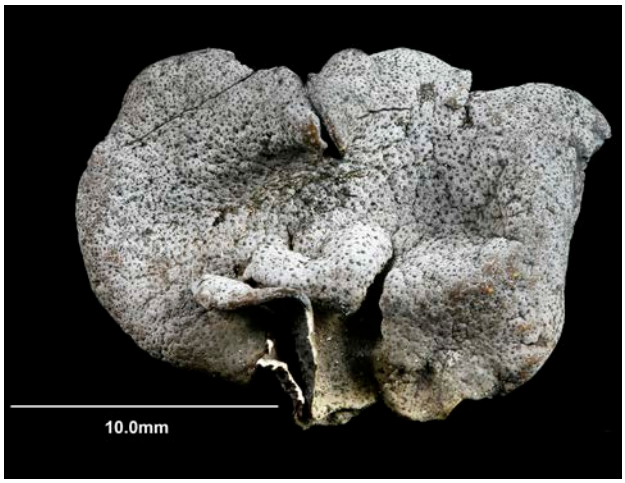
Catapyrenium psoromoides

Clavascidium alvarense

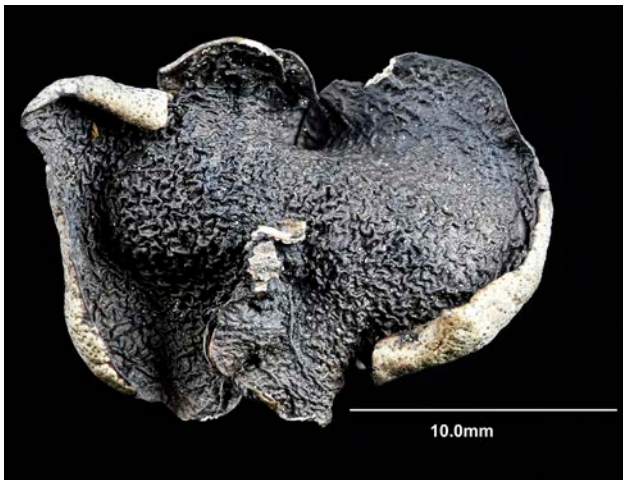
Clavascidium alvarense

Clavascidium lacinulatum

Clavascidium lacinulatum



Dermatocarpon bachmannii (upper surface)



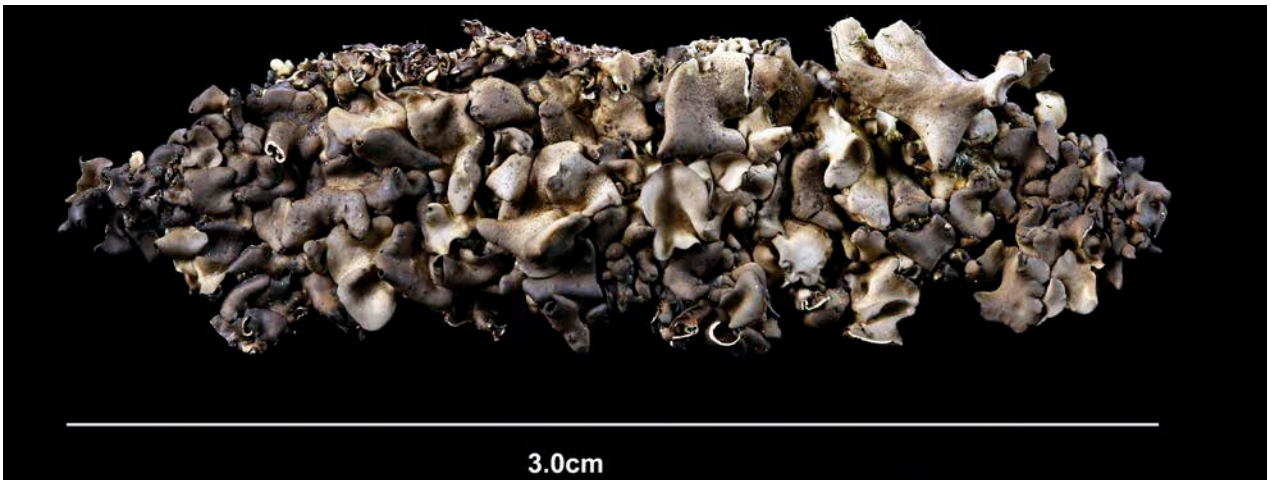
Dermatocarpon bachmannii (lower surface)

Dermatocarpon deminuens (upper surface)

Dermatocarpon deminuens (lower surface)

Dermatocarpon leptophyllodes

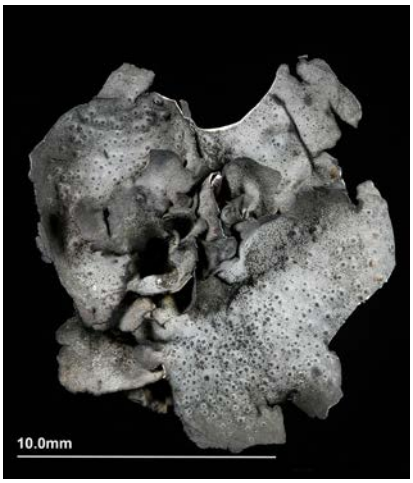
Dermatocarpon luridum (wet)



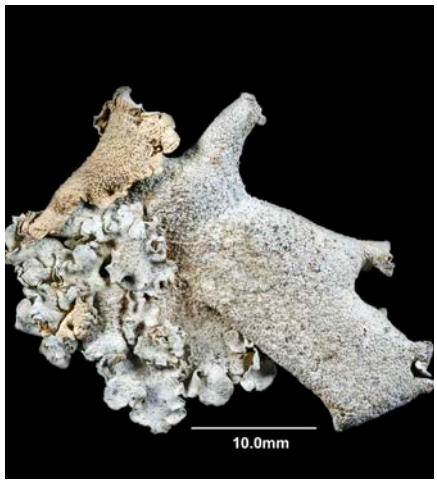
Dermatocarpon luridum (upper surface, dry)

Dermatocarpon meiophyllizum (upper surface)

Dermatocarpon meiophyllizum (lower surface)



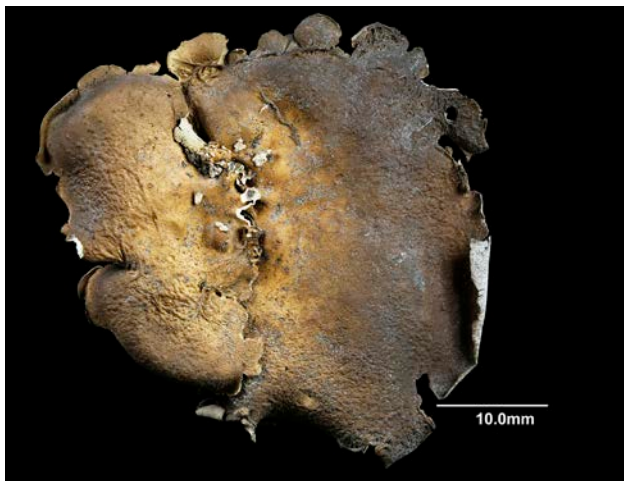
D. miniatum (*leptophyllum*; upper surface)



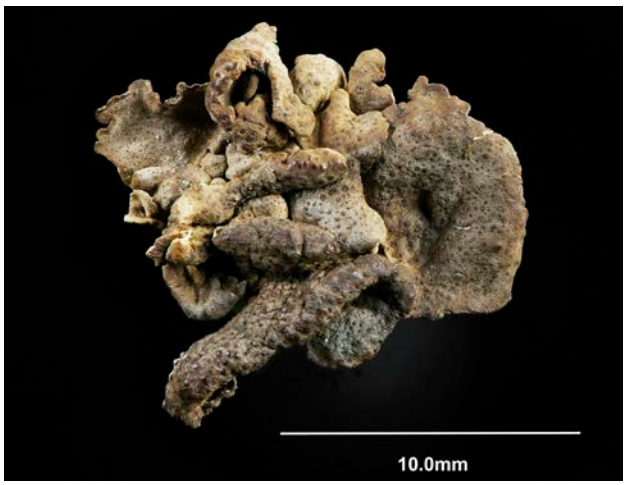
D. miniatum var. *circoides* (upper surface)

D. miniatum var. *complicatum*

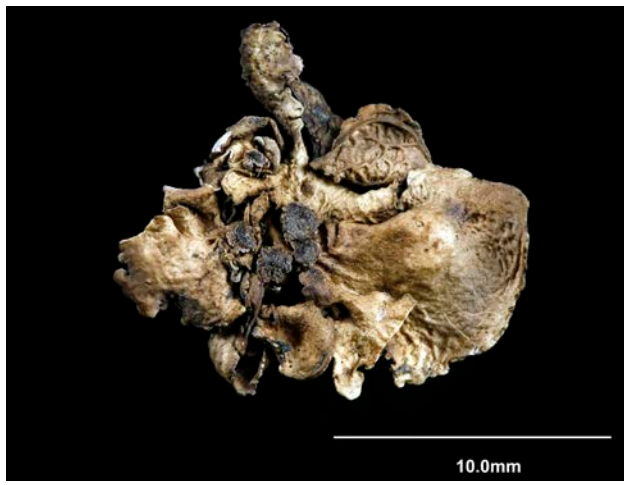
Dermatocarpon miniatum var. *miniatum* (upper surface)



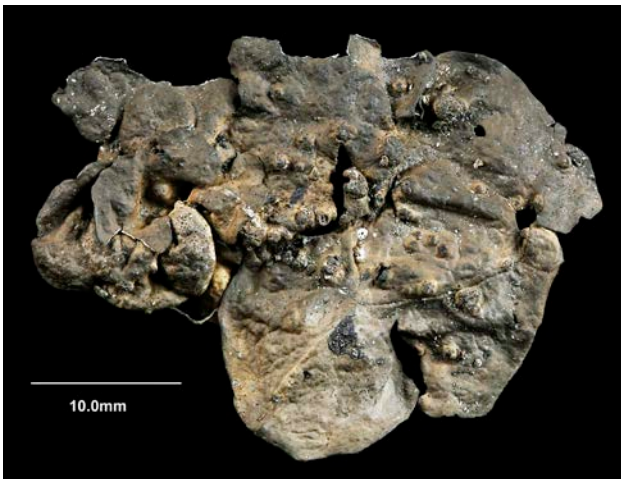
Dermatocarpon miniatum var. *miniatum* (lower surface)



Dermatocarpon polyphyllizum (upper surface)



Dermatocarpon polyphyllizum (lower surface)



Dermatocarpon rivulorum (upper surface)

Dermatocarpon rivulorum (lower surface)

Henrica melaspora

Henrica melaspora

Henrica theleodes

Henrica theleodes

Heteroplacidium fusculum

Heteroplacidium fusculum

Involucropyrenium tremniacense

Involucropyrenium tremniacense

Involucropyrenium waltheri

Involucropyrenium waltheri

Placidiopsis custnani

Placidiopsis custnani

Placidiopsis pseudocinerea

Placidium lachneum

Placidium lachneum

Placidium michelii

Placidium michelii

Placidium norvegicum

Placidium norvegicum

Placidium pilosellum

Placidium pilosellum

Placidium rufescens

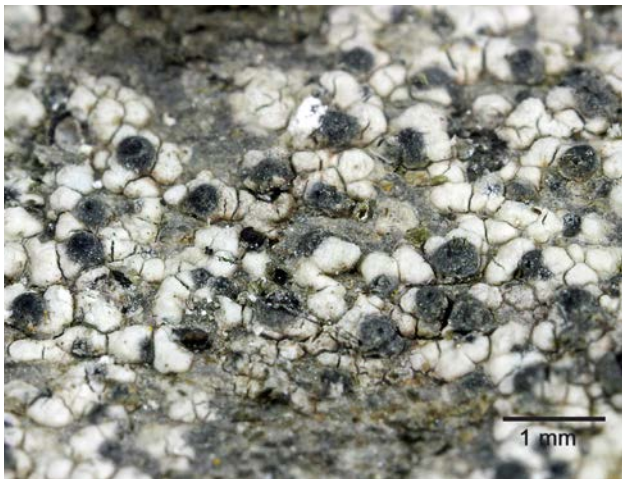
Placidium rufescens

Placidium squamulosum

Placidium squamulosum

Polyblastia albida

Polyblastia albida



Polyblastia aurorae

Polyblastia aurorae

Polyblastia baltica

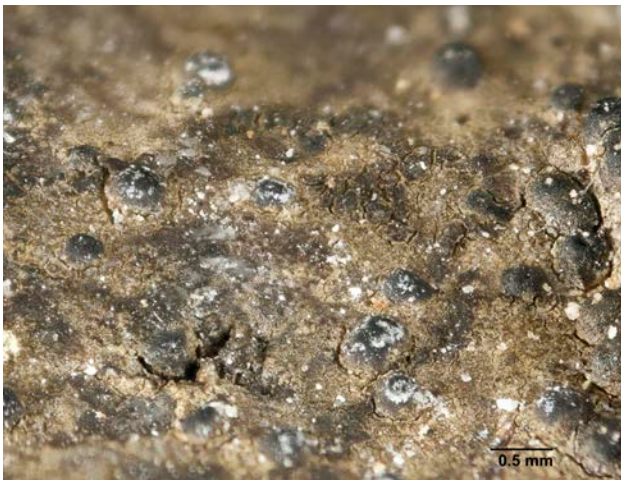
Polyblastia baltica

Polyblastia borealis

Polyblastia borealis

Polyblastia bryophila

Polyblastia bryophila



Polyblastia cataractae

Polyblastia cataractae

Polyblastia dimidiata

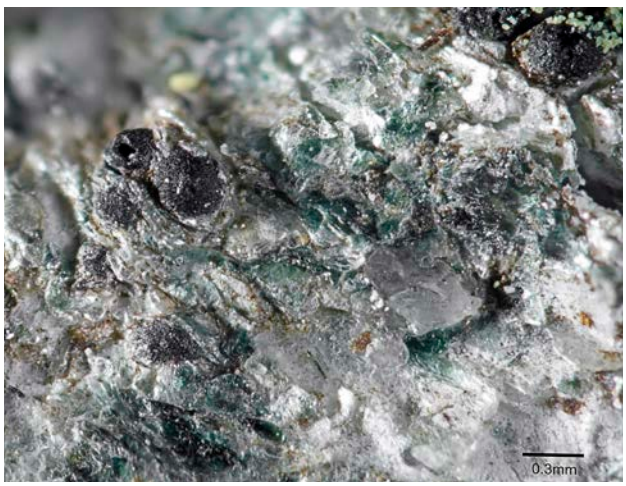
Polyblastia dimidiata

Polyblastia eumecospora

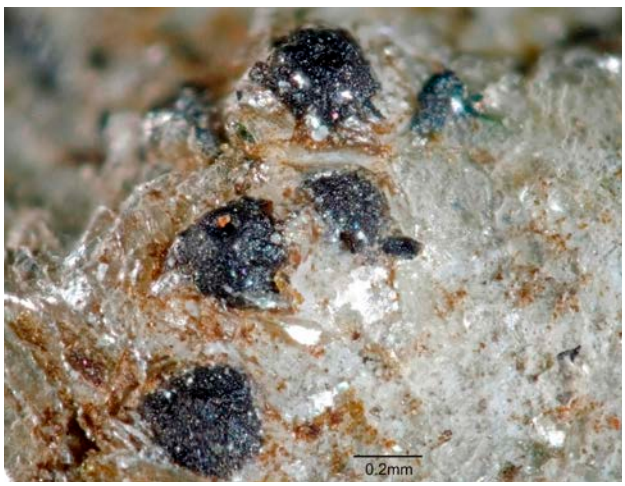
Polyblastia eumecospora

Polyblastia fusca

Polyblastia fusca



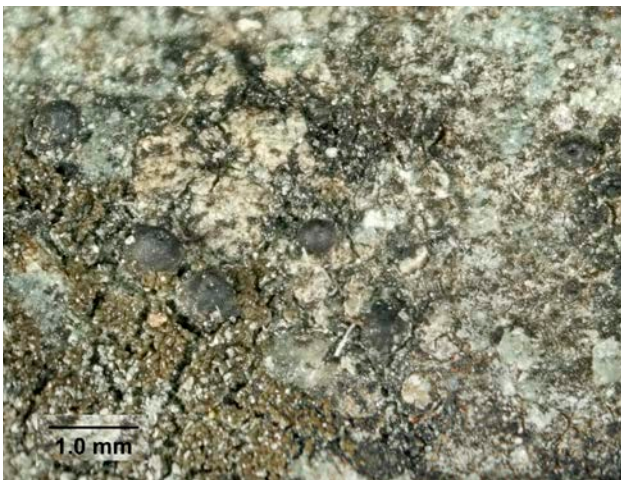
Polyblastia fuscoargillacea



Polyblastia fuscoargillacea

Polyblastia hyperborea

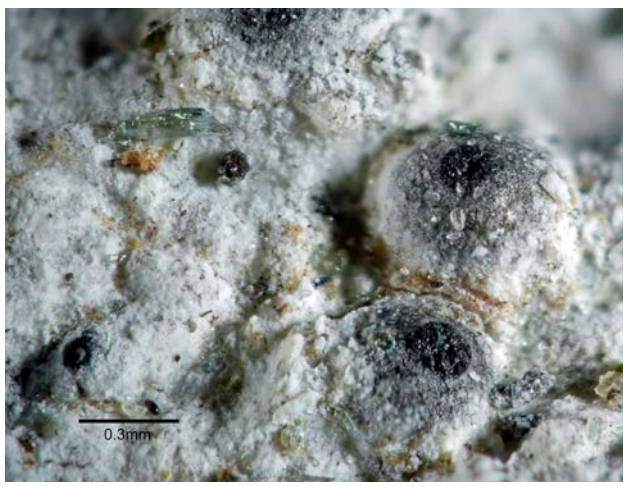
Polyblastia hyperborea



Polyblastia inconspicua

Polyblastia inconspicua

Polyblastia integrascens



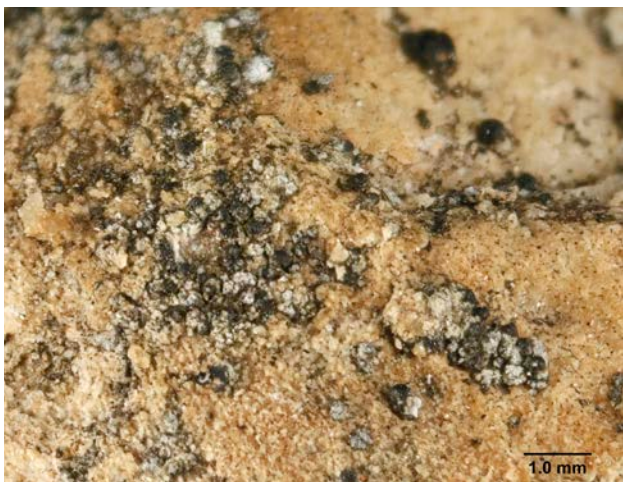
Polyblastia integrascens

Polyblastia intermedia

Polyblastia intermedia

Polyblastia media

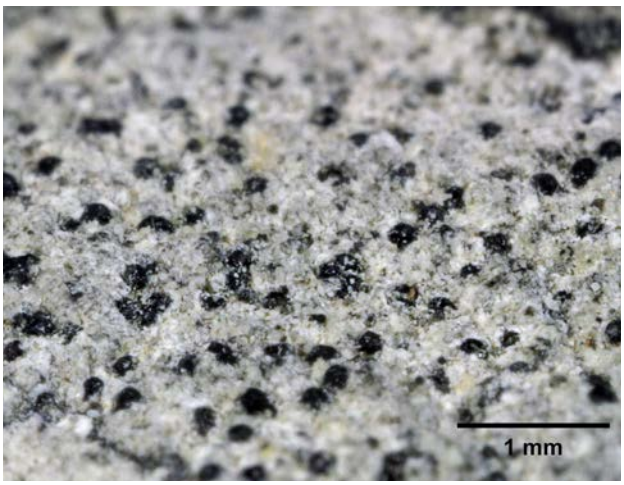
Polyblastia media



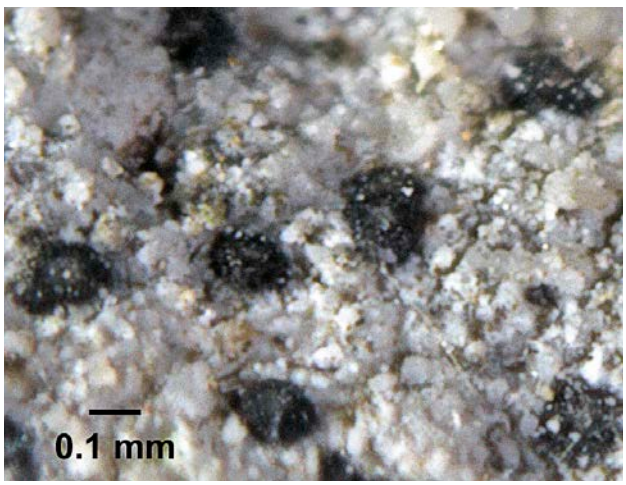
Polyblastia neglecta

Polyblastia neglecta

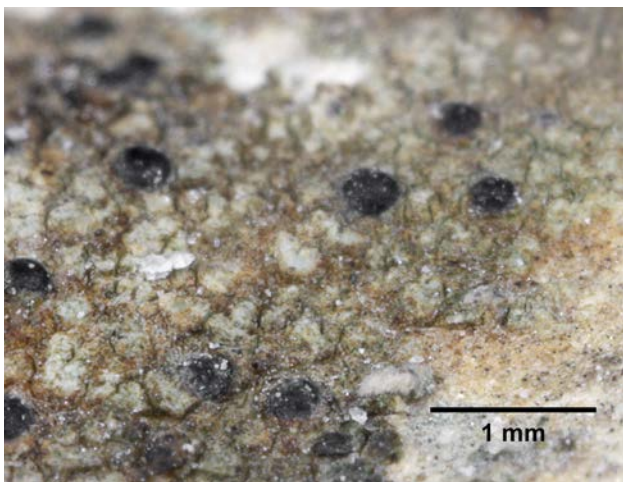
Polyblastia nordiniii



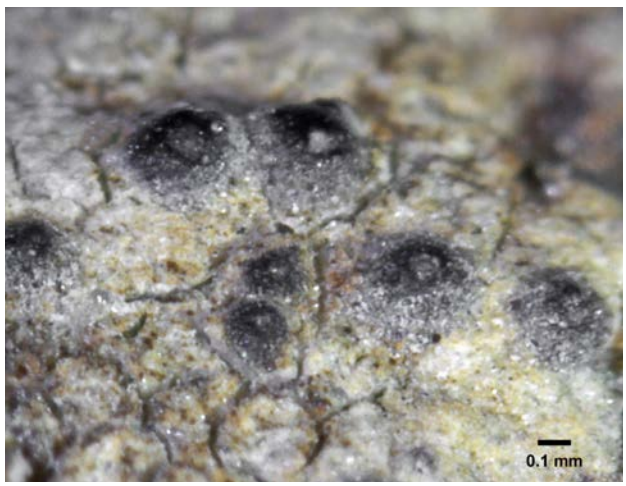
Polyblastia plicata



Polyblastia plicata



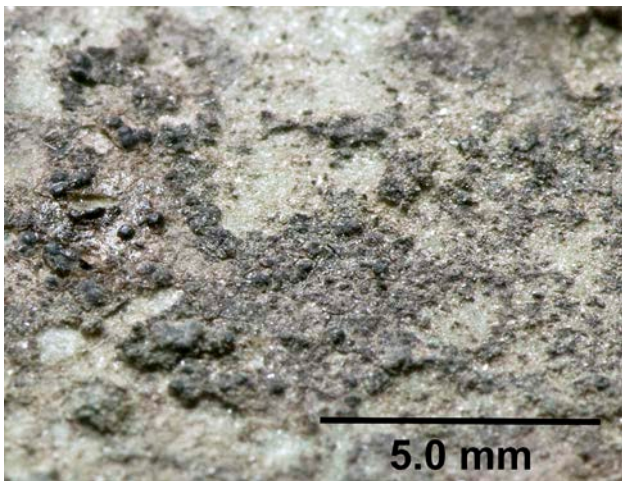
Polyblastia potamiphila



Polyblastia potamiphila

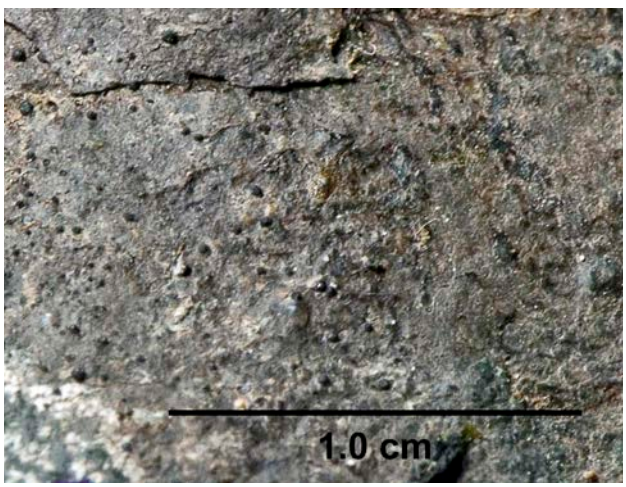
Polyblastia pulchra

Polyblastia pulchra



Polyblastia quartzina

Polyblastia quartzina



Polyblastia schisticola

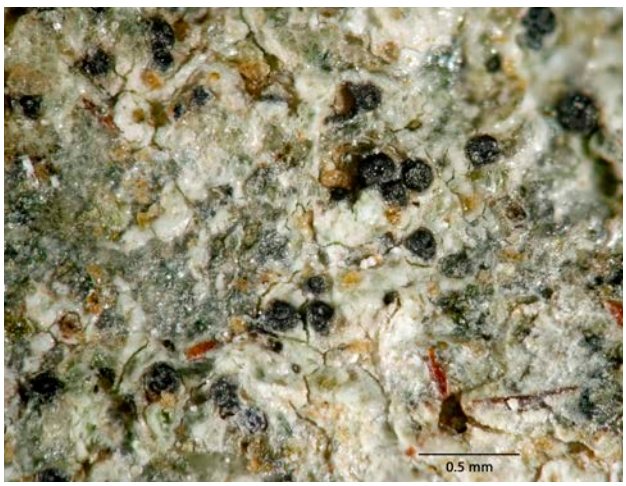
Polyblastia schisticola

Polyblastia sendtneri

Polyblastia sendtneri

Polyblastia septentrionalis

Polyblastia septentrionalis



Polyblastia singularis

Polyblastia singularis

Sporodictyon arcticum

Sporodictyon cruentum

Sporodictyon cruentum

Sporodictyon minutum

Sporodictyon schaererianum

Sporodictyon schaererianum

Sporodictyon terrestre

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Atla wheldonii, Sweden, Jämtland, Undersåker par., Ristafallet, N shore, 2005 Savić (s.n. UPS).

Catapyrenium cinereum Sweden, Torne lappmark, Karesuando, Pältsan 2011 Prieto s. n. (UPS).
Catapyrenium daedaleum Sweden, Pite Lappmark, Arjeplog par., S side of mt Lulep Iksjak, c 18 km NNW of the church, 1982 Löfgren 1490 (UPS).
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Clavascidium alvarense Sweden, Öland, Resmo par., Stora Alvaret, about 23 km ESE of the church of Resmo, 1962 Santesson 14692 (UPS).
Clavascidium lacinulatum Sweden, Öland, Stenåsa par., Stora Alvaret, about 4,5 km WNW of the church of Stenåsa, 1957 Santesson 11999 UPS).

Dermatocarpon bachmannii, Sweden, Åsele lappmark, Vilhelmina par., Röberg, c. 10 km E of Klimpfjäll, N of Lake Kultsjön, 1970 Santesson 22419 (UPS).
Dermatocarpon deminuens, Sweden, Uppland, Alsike par., Krusenberg, 400 m W of the mansion, 1987 Thor 7428 (UPS).
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Dermatocarpon luridum, Sweden, Östergötland, Västra Tollstad par., Hästholmen, rocks W of the village, 1995 Heidmarsson 68 (UPS).
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Dermatocarpon miniatum var. *miniatum,* Sweden, Uppland, Funbo par., c. 0,6 km S of Hallkved, 1960 Santesson 13682 (UPS).
Dermatocarpon miniatum var. *cirsodes,* Norway, Sör-Tröndelag, Oppdal par., 200 m E of Kongsvoll Fjellstue, 1964 Tibell 2237a (UPS).
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Involucropyrenium tremniascense Sweden, Öland, Resmo par., Gynge Nature Reserve, Gynge alvar, c. 2 km E of Resmo church, 2013 Westberg GYN099 (S).
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Placidiopsis custnani, Sweden, Gotland, Lärbro par., Röcklinge backe, c 1.3 km ESE Lärbro church, 2014 M. Prieto, M. Westberg & A. Kosuthova s. n. (S).
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Placidium norvegicum Sweden, Härjedalen, Tännäs par., Mt. Mittåkläppen, near the summit, 1975 Lundqvist 9911 (UPS).
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Polyblastia pulchra, Sweden, Torne lappmark, Jukkasjärvi par., 3 km W of Abisko, Marmorbrottet, 2005 Savić 3112c:1 (UPS).
Polyblastia quartzina, Russia, Novaya Zemlya, Chalkonik Valley, Matotchkin Shar, 1921 Lynge s. n. (O).
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Polyblastia singularis, Norway, Sør-Trøndelag, Vinstradalen, 1.6 km NNW of Ryphusan, 2007 Savić 3229 (UPS).

Sporodictyon arcticum, Svalbard, Insula Spetsbergen, Brandenwijnebay, 1861 Malmgren s. n. (UPS).
Sporodictyon cruentum, Sweden, Jämtland, Undersåker par., SW part of lake Ottsjön, rivulet Oterbäcken, c. 1.5 km from village Fångåmon, 2004 Savić 37/2004-07-20/4 (UPS).
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The lichen flora of the Nordic countries, containing more than 2000 species, is regarded as one of the best known in the world. Lichenological research of the region has been continuous since the time of Erik Acharius (1757—1819), the ”Father of Lichenology”, but it is a sad fact that there is no modern total treatment of the region’s impressive lichen flora, the last attempt being that of Th. M. Fries in the 1870’s. His major work, Lichenographia Scandinavica, unfortunately remained unfinished.

A number of lichen specialists have united forces to produce this much needed Nordic Lichen Flora. The present sixth volume, dedicated to some important genera of the family Verrucariaceae and edited by Roland Moberg, Sanja and Leif Tibell, includes treatments of 64 species representing the genera *Atla*, *Catapyrenium*, *Clavascidium*, *Dermatocarpon*, *Henrica*, *Heteroplacidium*, *Involucropyrenium*, *Placidiopsis*, *Placidium*, *Polyblastia* and *Sporodictyon*. The study is based on material in the major Nordic herbaria in addition to extensive field work in all the Nordic countries. DNA analyses of most species have also been conducted. The thorough work has resulted in many new findings, but also revealed new, often still unsolved problems, which are pointed out in the discussions after each species. The total distribution of each species is also carefully indicated, based on the authors knowledge.

Recent molecular investigations have supported the monophyly of Verrucariaceae, but also revealed many problems in the genera as traditionally circumscribed during the pre-molecular era. This volume is the beginning of a modern treatment of the family.

An Appendix with the new combination of *Clavascidium alvarense* and typification of *Dermatocarpon luridum*, *Heteroplacidium fusculum*, *Polyblastia albida* and *Polyblastia fuscoargillacea* is presented.