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New and interesting records of lichens from Pältsan (Mt Bealccan) in northernmost Sweden

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Austroplaca subtiroliensis, *Gyalidea lecideopsis*, *Phacographa protoparmeliae*, *Placynthium pulvinatum* and *Solorina octospora* are reported new to Sweden. Several other rare or rarely collected lichens are also reported: *Absconditella annexa*, *Arthrorhaphis vacillans*, *Farnoldia micropsis*, *Gyalidea polyspora*, *Ionaspis ventosa*, *Lecanora lecanoricola*, *L. leptacinella*, *Lecidea commaculans*, *Pachyascus lapponicus*, *Placidiopsis pseudocinerea*, *Schadonia fecunda*, *Scytinium aquale* and *Thelocarpon sphaerosporum*.

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Introduction

Pältsan, or Bealccan in Northern Sami, is the northernmost high mountain in Sweden. Pältsan has three peaks, of which the middle one is the highest at 1444 m a. s. l., and is located at c. 69°N, 20.22°E, about 14.5 km WSW of the Three-Country Cairn (Treriksröset) where the borders of Sweden, Norway and Finland meet. The geology is varied with amphibolite, mica schists and quartzite dominating at different elevations and dolomite appearing at several places. The area is famous for harbouring a number of rare vascular plants, including *Armeria scabra*, *Arnica angustifolia*, *Papaver radicatum* ssp. *laestadianum* and *Stellaria longipes*. The lichen flora, on the other hand, has never been thoroughly studied and the only substantial lichen collections from the area that we are aware of were made by Torsten Hasselrot who travelled through the area and collected several hundred specimens in 1929 and 1948 from Pältsan and other localities in the northernmost corner of Sweden. However, he never published any report of his findings and a large part of his material has remained undetermined in boxes stored at the Swedish Natural History Museum (S) in Stockholm. In 2011, we received funding to undertake an expedition to the area. During six days we collected as many lichen species as possible in this remote part of Sweden. Here we report some of the most interesting finds including five species that are new to the Swedish lichen flora of which one is also new to the northern hemisphere.

Material & Methods

The fieldwork was carried out 2–7 August 2011. We travelled to Pältsan and back by helicopter, which made it possible for us to collect and transport large amounts of material. From our campsite at the base of the northern slope of the mountain we made daily excursions to the different peaks. More than 2000 specimens were collected, the majority of which will be deposited at S, with substantial collections also at LD and UPS. In addition, we located three large boxes in S with unidentified collections from Hasselrot's excursions, which have been screened for interesting material. All specimens cited lie within Karesuando parish in the province Torne Lappmark, Sweden. Latitude and longitude coordinates are given in decimals in the reference system WGS 84.

Results

Our list of lichens from Pältsan currently contains c. 315 species but more than half of the material remains to be identified. A few interesting finds from Pältsan have already been reported in other publications. *Candelariella commutata* was discovered in Hasselrot's material and described by Otte et al. (2013). The little known *Rhizocarpon pycnocarpoides*, similar to *R. oederi* but differing in, for example, its colourless, muriform spores was collected for the first time in Sweden during the Pältsan excursion in 2011 and reported in Westberg et al. (2015).

Absconditella annexa (Arnold) Vězda
Like other *Absconditella* species, *A. annexa* is inconspicuous and easily overlooked, but nonetheless may be rare since it has only been collected in Sweden twice before (material in UPS). At Pältsan it was found at two different localities, overgrowing bryophytes. It forms minute patches of a thin white-grey thalline film with scattered minute yellowish-white apothecia, seldom more than 0.3 mm diam. The long spores (to 40 µm) make it easily distinguishable from the other species in the genus, and it appears to be the only *Absconditella* species growing in alpine heaths.

Specimens examined: Pältsan, SE part of the EW-oriented "saddle area" below (NW of) the highest ridge, on bryophytes (*Anthelia juratzkana*), alt. 1160 m, 69.01715°N, 20.20211°E. 5 Aug. 2011, *Nordin 7277* (UPS); 1.5 km N of the 1444-peak, alpine heath with scattered boulders, alt. 900 m, 69.02139°N, 20.23255°E. 7 Aug. 2011, *Svensson 2328* (herb. Svensson).

Arthrorhaphis vacillans Th. Fr. & Almq. ex Th. Fr.
New to Torne Lappmark. The species is rare in Scandinavia and previously known only from one locality in Sweden (Härjedalen, material in UPS) and two localities in Norway (Timdal 2015). It is mainly characterized by its slightly to strongly convex, yellow to yellowish-green thallus with a medulla containing crystals. It is associated with *Baeomyces* species or free-living. Apothecia mostly flattened with a persistent, relatively thin proper margin, 3–5-septate spores, 17.5–22.5 × 4 µm, asci 60–75 µm. Similar species in Scandinavia include *Arthrorhaphis citrinella*, *A. alpina* and *Epilichen scabrosus*. *Arthrorhaphis citrinella* has a sorediate appearance, longer spores and lacks crystals in the medulla, while *A. alpina* has longer asci and longer, 8–12-septate spores. *Epilichen scabrosus* is easily distinguished by its brown, 1-septate spores. *Arthrorhaphis vacillans* was found on one location on Pältsan, growing on mosses on the ground in an open alpine heath.

Specimen examined: Pältsan, on N-facing slope of the middle peak (1444 m), alt. 1113 m, 69.01168°N, 20.24187°E. 3 Aug. 2011, *Berglund* (herb. Berglund).

Austroplaca subtiroliensis Søchting ad int.
New to Sweden and the Northern hemisphere. This lichen has a truly bipolar distribution with records mainly on the southern tip of South America (Søchting, in litt.) and now this remarkable occurrence at Pältsan. This is a parallel case to *A. soropelta* that has a similar distribution (Søchting & Castello 2012). Morphologically *A. subtiroliensis* is very similar to *Parvoplaca tiroliensis*, but has slightly orange rather than yellow apothecia (Fig. 1). The two species also share the same ecology growing on plant debris. It is also similar to *Athallia saxifragarum*, but differs in the longer spores, 12.5–15 µm rather than 10.0–12.0 µm.

Specimen examined: Pältsan, on N-facing slope of a central peak (1267 m), alt. 1125 m, 69.01951°N, 20.19434°E. On dead *Dryas* with *Blastenia ammiospila*. 5 Aug. 2011, *Arup L11057* (LD).



Figure 1. *Austroplaca subtiroliensis*, *Arup L11057* (LD). Scale bar = 1 mm.

Farnoldia micropsis (A. Massal.) Hertel
This species is only known from Åsele Lappmark and Torne Lappmark in Sweden (Nordin et al. 2015) and is apparently very rare. It is similar to the more common *F. jurana*, but differs in the non-pruinose apothecia, thicker thallus and often paler hypothecium. It was found growing on calcareous boulders.

Specimen examined: Pältsan, on dolomite boulders in E-facing slope with scattered boulders, alt. 880 m, 68.99600°N, 20.27199°E. 5 Aug. 2011. *Arup L11058* (LD).

Gyalidea lecideopsis (A. Massal.) Lettau
New to Sweden. This easily overlooked species has only been reported once from Scandinavia from the province of Nordland in northern Norway (Søchting & Alstrup 1986). Our specimen, collected from moist calcareous schist together with *Placynthium nigrum*, *Scytinium aquale* and *Staurothele succedens*, is small, consisting of just a few apothecia. The apothecia measure 0.2–0.3 mm and have a black exciple surrounded by a very thin whitish margin covering the lower part of the apothecia (Fig. 2). The spores are colourless, muriform with numerous septa and measure 21–31 × 10–15 µm in the collected specimen. *Gyalidea lecideopsis* was divided into three different varieties by Vězda & Poelt (1991); the status of these varieties, as well as their relationship to specimens that currently key out as *G. fritzei* and *G. rivularis*, deserve further attention.

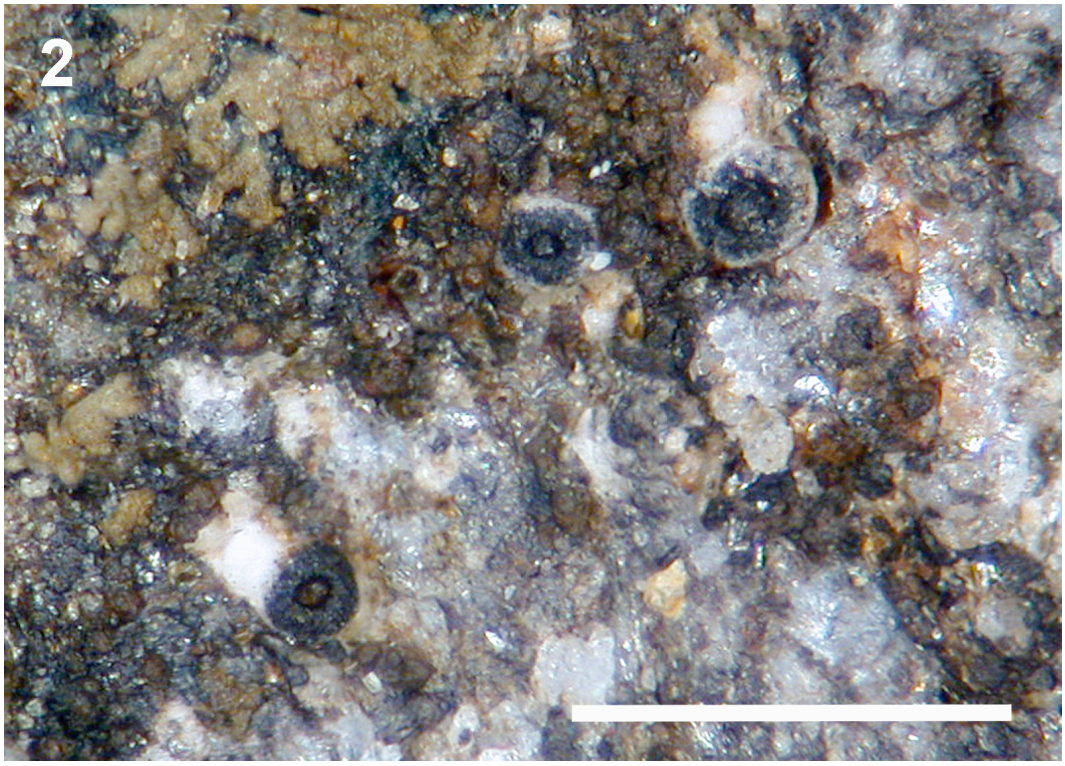


Figure 2. *Gyalidea lecideopsis*, *Westberg P123* (S F273321). Scale bar = 1 mm.

Specimen examined: Pältsan, on N-facing slope c. 1.7 km NW of the middle peak (1444 m), alt. 1110 m, 69.01946°N, 20.19632°E. 6 Aug. 2011, *Westberg P123* (S F273321, filed under *Scytinium aquale*).

Gyalidea polyspora R. Sant.
New to Torne Lappmark. The world distribution of this species currently consists of two localities in Sweden in the southern montane region, and three collections from a small area in south central Norway (Nordin et al. 2007). Here we add the first locality from the northern part of Scandinavia. As the name implies, *G. polyspora* has polyspored asci (10–16 spores/ascus) which makes

identification of this species easy. The species was found on rocks by a stream and apparently prefers rather humid situations. It usually grows on copper-rich rocks (Nordin et al. 2007).

Specimen examined: Pältsan, on N-facing slope c. 1.8 km NW of the middle peak (1444 m), alt. 880 m, 69.02519°N, 20.21326°E. 6 Aug. 2011, *Westberg* (S).

Ionaspis ventosa P. M. Jørg. & R. Sant.
New to Torne Lappmark. Species of *Ionaspis* are generally found in humid situations, but *I. ventosa* differs in preferring dry acidic rocks in wind-swept, alpine situations. In Sweden, it was earlier known from three localities in Härjedalen, including the type locality (Jørgensen & Santesson 1989, Svensson & Palice 2009). In Scandinavia, *I. ventosa* is also known from Nord-Trøndelag in Norway (Nordin et al. 2015).

Specimen examined: Pältsan, c. 450 m N of the N peak, alt. 1090 m, 69.02011ºN, 20.19770ºE. 6 Aug. 2011, *Svensson 2293* (herb. M. Svensson).

Lecanora lecanoricola (Alstrup et al.) Rambold & Triebel
This lichenicolous fungus was found growing on *Lecanora cenisia* on a siliceous boulder in a SE-facing slope. There are very few collections of this species in the Swedish herbaria. It was first reported from Scandinavia by Haugan (1994) from a collection made by Lynge in 1910. In Sweden, it was collected by Du Rietz in 1963 from Vilasund in Lycksele Lappmark and by Santesson in 1944 from Abisko, Torne Lappmark (material in UPS). The species has small, lecideine, convex apothecia with pruinose discs.

Specimen examined: Pältsan, on siliceous boulder on SE-facing slope of southern peak, alt. 900 m, 68.99189°N, 20.26539°E. 4 Aug. 2011, *Arup L11056* (LD).

Lecanora leptacinella Nyl.
Described from Finland, this species was previously known from three sites in Sweden (all in Torne Lappmark) as well as the Alps of Central Europe (Obermayer & Poelt 1994). At Pältsan, as in most cases, it overgrows dead mosses of the genus *Polytrichum* (Fig. 3). The thallus reacts K+ yellow, the spores are 8–10 × 4–5 µm, the epithecium is K+ greenish with granules that dissolve in K, and the paraphyses are strongly branched.

Specimen examined: Pältsan, c. 1.5 km N of the middle peak, alt. 900 m., 69.02139°N, 20.23260°E. 7 Aug. 2011, *Westberg P124* (S).

Lecidea commaculans Nyl.
The minute, black and convex apothecia of *L. commaculans* are usually found on rocks where there is little competition from other species, typically on flat acidic rocks in wind-swept, alpine situations. In Scandinavia, it was previously known from Nord-Trøndelag in Norway (Nordin et al. 2015) and in Sweden from Härjedalen and Torne Lappmark (Svensson & Palice 2009). It may prove to be a common species in the Scandinavian mountains, but easily escapes detection because of its inconspicuousness.

Specimen examined: Pältsan, c. 450 m N of the N peak, alt. 1090 m, 69.20110ºN, 20.19770ºE. 6 Aug. 2011, *Svensson 2292* (herb. M. Svensson).

Pachyascus lapponicus Poelt & Hertel

This is a rarely reported and collected species with a poorly known distribution, known only from a few localities in northern Sweden (Grube 2002a, Poelt & Hertel 1968, Westberg et al. 2005) and one in Norway (Grube 2002b). It always grows on *Andreaea* and it is mainly characterized by its thallus composed of greyish goniocysts with scattered apothecia placed in the axils of old leaves of the *Andreaea* (for a more detailed description see Grube 2002a and Poelt & Hertel 1968). The species was found in an open heath on the northern slope of the mountain where it was growing on a north-facing, mainly vertical surface of schistose rocks influenced by seepage water.

Specimen examined: Pältsan, on N-facing slope c. 1.7 km NW of the middle peak (1444 m), alt. 1110 m, 69.01953°N, 20.19675°E. 6 Aug. 2011, *Berglund* (herb. Berglund).



Figure 3. *Lecanora leptacinella*, *Westberg P124* (S). Scale bar = 1 mm.

Phacographa protoparmeliae Hafellner

New to Sweden. This species was reported from the Murmansk region in arctic Russia by Fryday (2011) and the first two Norwegian finds were recently reported by Westberg et al. (2015); it is also known from Austria and Spain. The species is parasitic on *Protoparmelia badia* and was found on a vertical rock surface in the northern slope. The host had lost its usual brown colour and was in a rather poor condition, but still possible to identify. *Phacographa protoparmeliae* has black, up to 1.2 mm wide apothecia growing in small groups of 2–10 on its host. It has 3-septate

spores, 22–25 × 6–7(–8) µm that are colourless, but with a perispore sheath that becomes brown with age. See Hafellner (2009) and Fryday (2011) for a more detailed description.

Specimen examined: Pältsan, on N-facing slope c. 1.7 km NW of the middle peak (1444 m), alt. 1110 m, 69.01946°N, 20.19632°E. 6 Aug. 2011, *Westberg* (S).

Placidiopsis pseudocinerea Breuss

This species is very similar to *Catapyrenium cinereum* from which it differs in having one-septate, regularly ellipsoid spores 15–19 × 7.5–9 µm (Breuss 1996), whereas *C. cinereum* has simple spores. It can be distinguished from other *Placidiopsis* species by its brown rhizohyphae and the squamules that are scattered or aggregated in small groups. It grows mainly on soil and, in contrast to *Catapyrenium cinereum*, prefers acidic substrates. It also has a more northern distribution and occurs at higher altitudes than *C. cinereum*. On Pältsan, it was found in three localities on the NW slopes of the mountain. In Sweden, it was previously collected on Mt Mittåkläppen by S. Almqvist in 1866 and P. J. Hellbom in 1867, and was recently discovered in Jämtland (material in UPS). In Norway, it is known from Oppland to Troms (Nordin et al. 2015).

Specimens examined: Pältsan, on N-facing slope of the middle peak (1444 m), alt. 1240 m, 69.01063°N, 20.23663°E. 3 Aug. 2011, *Prieto* (S); c. 1.2 km NW of Mellantoppen (1444 m), alt. 1187 m, 69.01690°N, 20.20372°E. 3 Aug. 2011, *Prieto* (S); on NW slope below the highest ridge, 69.01552°N, 20.21869°E. On terricolous bryophytes. 6 Aug. 2011, *Nordin 7333* (UPS L-552604).

Placynthium pulvinatum Øvstedal

New to Sweden. A rather recently described species (Øvstedal et al. 2009), known only from a few collections from Svalbard, northern Norway, Iceland and Russia (Jørgensen 2007, Urbanavichus 2015). It is a characteristic species growing on soil, forming thick and rather large cushion-formed thalli (Fig. 4). The species was found in rock crevices on the north slope of Pältsan at 1110 m alt., and also on the S-facing side of the mountain. We also found one specimen in Hasselrot's unidentified collections. The latter specimen, although not well developed, is fertile. The 4–5-septate, fusiform spores separate the species from *P. nigrum*, which may also occasionally be found on soil. ITS sequences from one specimen from Pältsan was obtained and included in a phylogenetic analysis (Kosuthová et al. 2016). It was found to be closely related to a group of *Placynthium* characterized by lacking an amyloid tube structure in the ascus (i.e. *P. asperellum* and *P. flabellosum*) whereas *P. nigrum* belonged to another clade characterized by having such a structure.

Specimens examined: Pältsan, on N-facing slope c. 1.7 km NW of the middle peak (1444 m), alt. 1110 m, 69.01946°N, 20.19632°E. On soil in a rock crevice. 6 Aug. 2011, *Westberg P113* (S F263268); S–SE slope of the southern peak, c. 800 m SE of the peak, alt. c. 940 m, 68.99205°N, 20.25593°E. 4 Aug. 2011, *Berglund* (herb. Berglund); N-facing slope, 69.0231°N, 20.2227°E. 7 Aug. 2011, *Berglund* (herb. Berglund).

Schadonia fecunda (Th. Fr.) Vězda & Poelt

Schadonia fecunda seems to be a rare lichen, with only a few Swedish records from Härjedalen, Jämtland and Torne Lappmark from the 19th and early 20th century. At Pältsan it was found at two different localities in *Dryas* heaths on calcareous ground. Other species collected on these sites were *Biatora subduplex*, *Blastenia ammiospila*, *Gyalecta foveolaris*, *Rinodina mniarea*, *Rostania ceranisca* and *Thamnolia vermicularis* var. *subuliformis*. The species is characterized by its rather

thin green-grey to grey-brown, scurfy, verrucose to granular thallus and black apothecia, to 1.5 mm diam., with a dark brown rim. Microscopic investigation reveals the distinctive characters: hyaline, muriform spores and anastomosing paraphyses. Unlike *Lopadium*, the asci of *Schadonia* contain more than one hyaline spore (2–8 /ascus) and have an I+ blue tholus. The fact that this is the first Swedish report since 1927 is possibly due to the scarcity of the species rather than a population decline, but it may also have been mistaken for the common *Lopadium pezizoideum* and left uncollected.

Specimens examined: Pältsan, on NW slope below the highest ridge. 69.01138°N, 20.23852°E. 3 Aug. 2011, *Nordin 7215* (UPS L-548927); 800 m ENE of the middle peak (1444 m.) alt. 1110 m, 69.01167°N, 20.24187°E. 3 Aug. 2011, *Svensson 2219* (herb. Svensson).



Figure 4. *Placynthium pulvinatum*, *Westberg P113* (S F263268). Scale bar = 5 mm.

Scytinium aquale (Arnold) Otálora et al.
New to Torne Lappmark. There are only three earlier finds of this species in the Nordic countries, all from Sweden. In the early 1960s, Du Rietz collected it at two localities in Lycksele Lappmark along the banks of the river Umeälven. A third specimen from Lule Lappmark collected by Gunnar Gilenstam in 1965 was recently found in UPS. *Scytinium aquale* is a very small, crustose species (Fig. 5) that grows on calcareous rocks in humid situations. On Pältsan, it was growing on moist calcareous, schistose rocks together with *Gyalidea lecideopsis*, *Placynthium nigrum* and *Staurothele succedens*.

Specimen examined: Pältsan, on N-facing slope c. 1.7 km NW of the middle peak (1444 m), alt. 1110 m, 69.01946°N, 20.19632°E. 6 Aug. 2011, *Westberg P123* (S F273321).

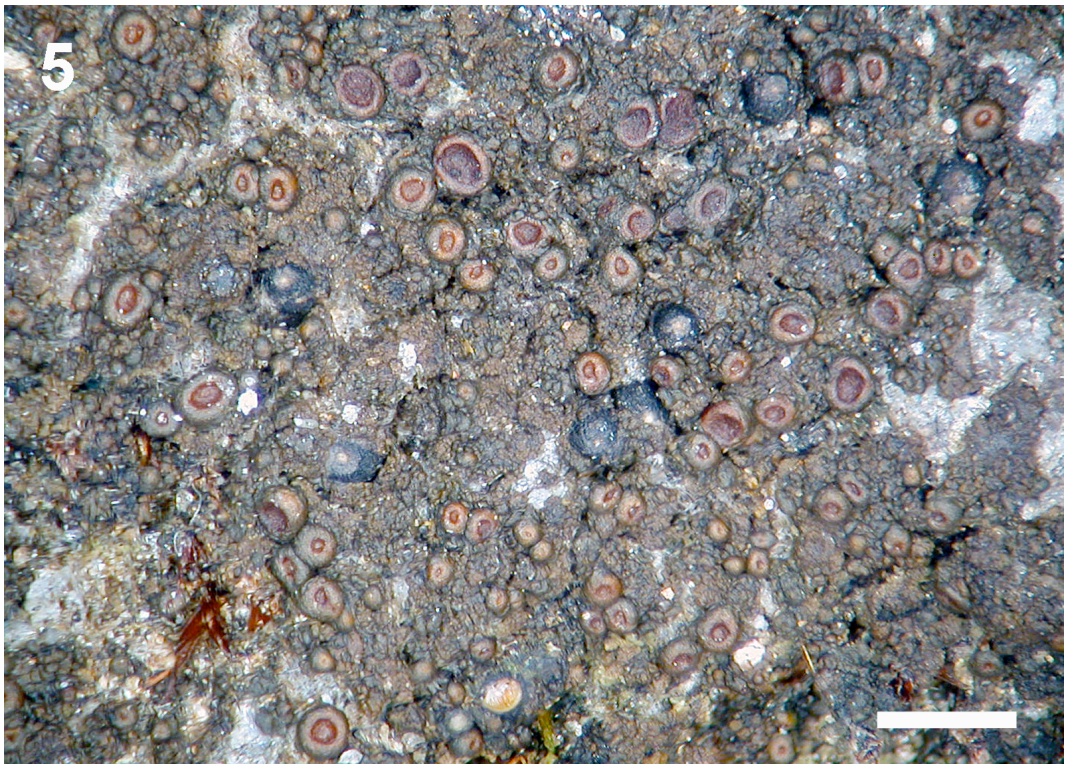


Figure 5. *Scytinium aquale* (with scattered perithecia of *Staurothele succedens*), *Westberg P123* (S F273321). Scale bar = 1 mm.

Solorina octospora (Arnold) Arnold

New to Sweden. It is somewhat surprising that *S. octospora* (Fig. 6) has never been reported before from Sweden as it is known from both Norway and Finland. As the name implies, the asci are 8-spored which separates it from other species in the genus. Further identifying characters include the medulla, which reacts C+ red (metylgyrophorate) and the characteristically coarse surface of the thallus. The most similar species, *S. saccata*, has 4-spored asci, a C– medulla and a smooth upper surface. *S. octospora* was found at several localities at Pältsan growing on the ground in *Dryas* heaths. One specimen in Hasselrot's unidentified collections was also identified.

Specimens examined: Pältsan, on NE-facing slope of the middle peak (1444 m), c. 0.7 km ENE of the peak, alt. 1160–1210 m, 69.01115°N, 20.23948°E. 3 Aug. 2011, *Westberg P026* (S F214325); *Westberg P032* (S F214335); on E-facing slope of the SE peak, alt. 850–1000 m. 26 July 1948, *Hasselrot* (S F214705); on NE-facing slope of the middle peak (1444 m), 69.019°N, 20.228°E. 3 Aug. 2011, *Berglund* (herb. Berglund); on N-facing slope of the S peak (1404 m), 69.017°N, 20.239°E. 3 Aug. 2011, *Berglund* (herb. Berglund); 69.007°N, 20.257°E. 4 Aug. 2011, *Berglund* (herb. Berglund); 69.003°N, 20.265°E. 4 Aug. 2011, *Berglund* (herb. Berglund).

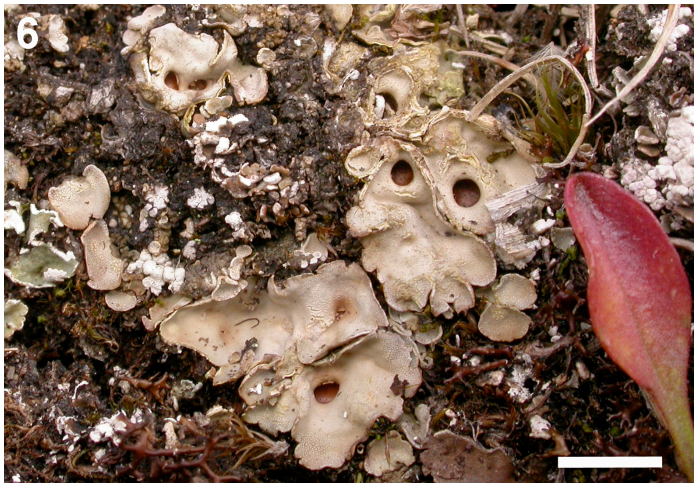


Figure 6. *Solorina octospora*, 4 Aug. 2011, *Berglund* (herb. Berglund). Scale bar = 5 mm.

Thelocarpon sphaerosporum H. Magn.
This is the fifth record of *T. sphaerosporum* in Sweden. It was first reported by Ahlner (1944) from Mt Grönfjället in Jämtland. It is not restricted to high elevations in montane areas and has also been found as far south in Sweden as Uppland (Nordin et al. 2015). In Norway it is known from the Varanger Peninsula (Magnusson 1936) and from one locality in Oppland (Timdal 2015). On Pältsan, it occurred on soil next to, for example, *Catapyrenium cinereum, Peltigera lepidophora* and *Solorina octospora* in an alpine *Dryas* heath on the NE slope of the mountain. The appearance of the genus *Thelocarpon* is macroscopically distinct: they all have small, perithecia-like apothecia with a yellow pruina and punctiform discs, 0.1–0.4 mm. *T. sphaerosporum* is characterized by its bottle-shaped asci, unbranched paraphyses and spherical spores. *T. depressulum* also has spherical spores, but in *T. sphaerosporum* they are larger, 4.5–5.5 µm *vs* 1.5–2 µm in *T. depressulum*, which also has smaller, clavate–cylindrical asci (Foucard 2001). *Thelocarpon laureri* has branched paraphyses and rounded, not spherical spores, 1.5–5 × 1–2 µm.

Specimen examined: Pältsan, on N-facing slope of the S peak, 69.007°N, 20.257°E. 4 Aug. 2011, *Berglund* (herb. T. Berglund).

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