

Psathyrella jacobssonii Örstadius (Basidiomycetes, Agaricales) – new to Norway

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KEY WORDS

Agaricales, distribution, Norway, *Psathyrella jacobssonii*, sequencing

NØKKLORD

Agaricales, Norge, *Psathyrella jacobssonii*, sekvensering, utbredelse

SAMMENDRAG

Psathyrella jacobssonii ble først publisert fra Sverige i 2001. I Norge ble arten funnet første gang i 2014 og den er så langt ikke kjent utenfor Fennoscandia. Den er her dokumentert fra fire lokaliteter i Norge. Artikkelen gir en beskrivelse av et funn fra Holmvassdalen i Nordland. En oversikt over andre funn i Fennoscandia er inkludert.

ABSTRACT

Psathyrella jacobssonii was first published from Sweden in 2001. In Norway the species was found for the first time in 2014, and it is so far not known outside Fennoscandia. We here record it from four localities in Norway. This paper provides a description of the material from Holmvassdalen in Nordland county, North Norway. A compilation of other finds in Fennoscandia is included.

INTRODUCTION

Very little is known about *Psathyrella* species in Norway; the main information is found in *Funga Nordica* (Knudsen and Vesterholt 2012), in an article by Leif Örstadius (Örstadius 2007) and a recent publication of new species by Örstadius et. al. (2015). In addition one of us (Ø. Weholt) has collected and studied *Psathyrella* species 30 years ago when he had close contact with the Dutch *Psathyrella* expert Kits van Waveren. Unfortunately, the results of the work were not published. However, this has also been a source of inspiration to resume the *Psathyrella* studies, initiated by the later works of Ellen Larsson and Leif Örstadius.

Siw Elin Eidissen and Jostein Lorås have for some years mapped fungi in selected areas in Holmvassdalen nature reserve in Grane municipality in Nordland county, North Norway. The area consists partly of old spruce forest on calcareous soils, with moist shady grooves, springs and rich fens and was protected as a Nature Reserve in 2008. During one of our visits, a species of *Psathyrella* was collected, which after morphological and genetic examinations was identified as *P. jacobssonii*. This species was first described from Sweden in 2001 (Örstadius 2001).

Psathyrella jacobssonii has previously been recorded several times from Finland and Sweden, but not from Norway. In addition to the collection in Holmvassdalen, Weholt has examined collections from four other locations in Norway. The first material was found in Fredrikstad municipality in Østfold county in South Norway in 2014.

In the present work we report *P. jacobssonii* as new to Norway mainly based on examined and sequenced material from Holmvassdalen. A brief overview of its Fennoscandian distribution follows.

MATERIALS AND METHODS

Dried material from Holmvassdalen was observed in 10% NH₄OH using an Olympus CX31 light microscope with phase contrast equipment. The line drawings were made by hand. The material is deposited in the Natural History Museum in Oslo (O).

DNA extraction, PCR amplification and sequencing was performed at Alvalab in Spain. Details about the procedures employed are given in Weholt et al. (2015).

Description

Original description: Örstadius, 2001, Windahlia 24: 15-18:

”*Cap 15-30 mm broad, conico-convex or campanulate, then expanded convex with umbo, at first dark reddish brown, then fading to brown, faintly striate on the marginal area, hygrophorous, drying to pale brown without pink; veil flocculose almost to centre, evanescent. Gills adnate, medium spaced, pale brown in young specimens, dark brown at maturity with white edge. Stem 50-100 x 1-3 mm, with an up to 10 mm long pseudorrhiza, stiff, pale brown, pulverulent at apex, flocculose-fibrillose downwards. Smell indistinctive to unpleasant. Taste mild.*”

”*Spores 10.5-13 x 6-7 μm, av. 11.1-12.4 x 6.1-6.6 μm, Qav. = 1.8-1.9, oblong, narrowly ovoid, subcylindrical, in profile flattened on adaxial side, sometimes narrowly amygdaliform, in water dark red (Mu. 10R 3/6, 2.5YR 4/8); germ pore distinct. Basidia 4-spored, 18-38 x 10-11 μm. Pleurocystidia 35-70 x 11-22 μm, rather numerous, lageniform, fusiform, upper part sometimes rostrate or*

forked; walls pale or sometimes yellow. Cheilocystidia of two types: A: 25-70 x 7-17 μm, lageniform, fusiform, rarely capitate, abundant, B: clavate, not dominating; gill edge and cystidia in fresh specimens covered with drops staining green in a solution of ammonia. Caulocystidia seen at upper part of stem. Pileipellis a hymeniderm of 20-50 μm wide cells, pale; pileitrama of coarsely incrustated hyphae. Veil cells 20-130 x 4-20 μm, cylindrical-inflated, hyaline to yellow. Clamps present.”

”*Habitat and distribution: Solitary to caespitose in moist herb-rich forest, on soil, in leaves, in Sphagnum or among other mosses, “margin of eutrophic fen and forest near Picea abies, Betula and Salix” (Jukka Vauras pers. comm.). August – September*”

Norwegian material examined

Specimens examined: Norway, Østfold: Fredrikstad, Zinkvalseverket, among grass in old orchard, 21. Sept. 2014, leg. M. Pettersen, (O); Torp bruk, boggy, with *Salix, Alnus*, 30. Sept. 2014, leg. M. Pettersen (O); Oppland: Lunner, Myrabakken NE, north of Brovollveien, boggy, not in *Sphagnum*, 15. Aug. 2015, leg. Ø. Weholt 20 -15 (O); Sør-Fron, Gålå, Håkåsæterdalen, in *Sphagnum* in eutrophic fen, 16. Aug. 2015, leg. Ø. Weholt 21-15 (O). Nordland: Grane, Holmvassdalen Nature Reserve, in moss near a small pond in a moist shady groove, surrounded by old spruce-dominated, calcareous forests 19. Sept. 2015, leg. J. Lorås and S. E. Eidissen JL4-15 (O).

The following information is based on the specimens from Holmvassdalen – Figs. 1-4. The material from Holmvassdalen was found in moss near a small pond in a moist shady groove, surrounded by old spruce-dominated, calcareous forests. Several specimens (about 12-15) grew close together (caespitose) in a

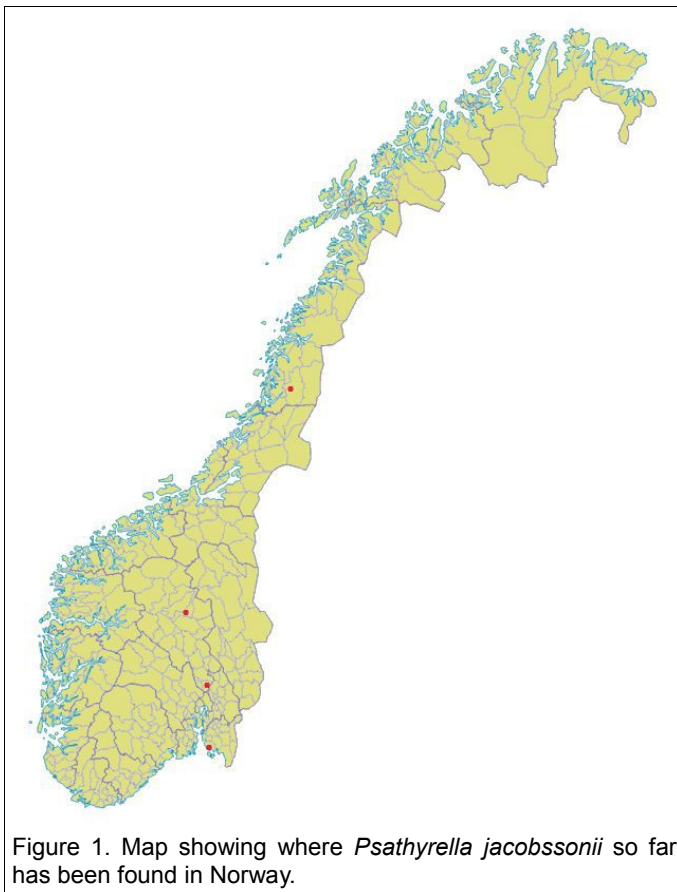


Figure 1. Map showing where *Psathyrella jacobssonii* so far has been found in Norway.

tussock. A stream has gradually dug out the groove and produces a relatively constant humid microclimate. In September 2015 the pH value obtained from a soil sample taken beneath the moss layer was around 7. A few meters away, the very rare species *Entoloma graphitipes*, was found as new to northern Europe (Weholt et al. 2015).

Macroscopy

Two specimens were collected and examined. Pileus is 25-30 mm broad, with conical shape and umbo, reddish brown, striate margin, veil white flocculose. Lamellae rather crowded, adnate, dark brown with white edge. Stipe up to 110 x 3 mm, white, flocculose, with pseudorrhiza.

Microscopy (dried material)

Spores 9.8-12.2 x 5.5-7.1 μm , average 11.0 x 6.2 μm (n = 50), germ pore central, distinct, Qav = 1.75, basidia 17-25 x 10-14 μm , pleurocystidia numerous, with acute apex, some few rostrate-forked, 40-60 x 12-15 μm , cheilocystidia 38-55 x 11-17 μm , gill edge homogenous, with acute apex, with pale green deposits in ammonia, clavate cheilocystidia scarce, clamps present.

Molecular identification

Results showed a 99% similarity in the ITS region with the holotype of *P. jacobssonii* (GenBank accession no. KC992855).

DISCUSSION

The species can be recognized by the copious veil, stem with more or less pronounced pseudorrhiza, green staining gill edge, abundant cheilocystidia, large spores, and moist habitat. Morphologically, it comes close to *P. microrrhiza* from which it differs in the green staining gill edge and the more copious veil covering almost the whole cap when young. Moreover, the cheilocystidia are slightly longer. In the system of Kits van Waveren (1985) the species is placed in subgenus *Psathyrella* section *Psathyrella*. Phylogenetically *P. jacobssonii* is closely related to *P. sublatispora* that differs in having smaller spores, a scanty veil, and a dry habitat.

In the Nordic countries the five species *P. jacobssonii*, *P. lutensis*, *P. multipedata*, *P. supernula*, and *P. silvestris* (now *Cystoagaricus silvestris* (Gillet) Örstadius & E. Larss.) have gill edge and cystidia staining green drops in a 10 % solution of ammonia. The reaction



Figure 2. Habitat of *Psathyrella jacobssonii* in Holmvassdalen. Photo: J. Lorås.

varies from distinct to faint. The drops and reaction disappear gradually when the basidiomata are dried and fail to come by old herbarium material. The newly described *Psathyrella conferta* Eyssart. & Chiaffi from France also belongs to the group (Eyssartier 2004) and from America and Japan further six species are known (Hoashi 2008). The gill edge of *P. fusca* is covered with drops, but these drops are remaining colourless in a solution of ammonia.

The *Psathyrella* material from Holmvassdalen, as well as that of the two collections from Lunner and Sør-Fron, turned out to be *P. jacobssonii*, confirmed from genetic analyses in the ITS region. The material of the two collections from Fredrikstad was originally identified as *P. corrugis*/*P. microrrhiza*, but since, on re-examination, we found that the

cheilocystidia exhibited distinct greenish mucoid deposits in NH_4OH and all other characters agreed well with the newly described *P. jacobssonii*, we are convinced they represent this species.

Macroscopically all the Norwegian collections agree well with the original description of *P. jacobssonii*: pileus with dark red brown colour, the copious pileus velum, especially by young basidiomata, and the stem with pseudorrhiza. Microscopically, the cystidia with green deposits were evident in the material from Holmvassdalen and one of the collections from Sør-Fron (ØW 21-15). A positive reaction was not observed in the collection from Lunner (ØW 20-15), despite that this time fresh material was studied. Except from this, they were not possible to distinguish from each other. The genetic analy-



Figure 3. Two specimens of *Psathyrella jacobssonii* from Holmvassdalen. Photo: J. Lorås.

sis, however, demonstrated they had identical sequences in the ITS region. This shows that it sometimes can be difficult with certainty to identify *P. jacobssonii* morphologically, and that molecular assistance is necessary for a safe identification.

The compiled spore measurements of the Norwegian finds were in the range 9.8-13.0 x 5.5-7.2 μm , average (n = 50) 11.0-12.0 x 6.0-

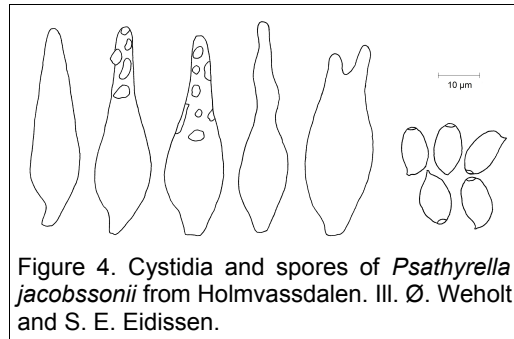


Figure 4. Cystidia and spores of *Psathyrella jacobssonii* from Holmvassdalen. Ill. Ø. Weholt and S. E. Eidissen.

6.6 μm , $Q_{av} = 1.75-1.9$. The collection from Holmvassdalen was in the lower range, with spores somewhat shorter than in the other collections and the type material.

All collections were found in distinctly moist sites, except one of the Fredrikstad collections that was found among grass in an orchard.

DISTRIBUTION

Until 2014, *P. jacobssonii* was only reported from Finland and Sweden. One of us (L. Örstadius) who has studied more than 100 *Psathyrella* collections from Iceland recalls that material of some of the collections reminded of *P. jacobssonii*. However, a safe reference of these collections to *P. jacobssonii* is not possible without sequencing. Hence, for the present the known distribution of *P. jacobssonii* is restricted to Fennoscandia.

More than 100 psathyrelloid species occur in Europe, some of them with a restricted distribution. *Psathyrella jacobssonii*, *P. borei-fasciculata*, and *P. squamosa* are so far only known from the Nordic countries.

Collections examined by Leif Örstadius: Finland: Keski-Pohjanmaa. Raahe, Saloinen, SE. of Ryttilampi, 30.VIII.1995, S. Jakobsson (herb. Jakobsson 1321), 4.IX.1995, Jakobsson & Särkkä (herb. Jakobsson 1406), 20.IX.1996, Jakobsson & Risunen (herb. Jakobsson 2114); Koillismaa. Kuusamo, Juuma, Jäkälävuoma, 25.VIII.1978, Sjöblom & Albrecht (TURA); Mountain ridge Valtavaara, 26.VIII.1978, G.

Gulden 174/78 (O, as *Psathyrella* sp.); Perä-Pohjanmaa. Rovaniemi, Meltaus, "Kenkäkorpi", 23.VIII.1999, J. Vauras 15337F (TURA 8634); Pohjois-Savo. Kuopio, Pitkälähti, E. side of Matkusjärvi, 3.IX.1989, J. Vauras 3772 (TURA); Varsinais-Suomi. Karkkila, Haavisto, 7.IX.1995, J. Vauras 10700F (TURA). Sweden: Medelpad. Borgsjö, Julåsen, 31.VIII.1989, C. Eriksson (herb. LÖ 256-89); Uppland. Vänge, Fiby urskog, 8.IX.1994, I. Kytövuori (herb. LÖ 45-94); Västergötland. Timmele, Blankered, 15.IX.1992, Toresson & Örstadius (GB holotype; S isotype); Västmanland. Ramnäs, Kolfallsudden, 5.IX.2013, L. Bsenko (dubl. in herb. LÖ-233-13).

REFERENCES

- Eyssartier G, 2004. Notes sur cortinaires et psathyrelles rares ou nouvelles. *Fungi non delineati* 28: 1–55.
- Hoashi Y, 2008. *Psathyrella turcosomarginata*, a new species with cheilocystidia possessing mucoid deposits staining bluish green in ammonia solution. *Mycoscience* 49: 385–387.
- Kits van Waveren E, 1985. The Dutch, French and British species of *Psathyrella*. *Persoonia Suppl. 2*: 1–300.
- Knudsen H, Vesterholt J, 2012. *Funga Nordica*. Agaricoid, boletoid and cyphelloid genera. Nordsvamp, Copenhagen.
- Örstadius L, 2001. *Psathyrella jacobssonii* (Agaricales), a new species with green staining gill edge in solution of ammonia. *Windahlia* 24: 15-18.
- Örstadius L, 2007. Studies on *Psathyrella* within the project *Funga Nordica*. *Agarica* 27: 64-90.
- Örstadius L, Ryberg M, Larsson E, 2015. Molecular phylogenetics and taxonomy in Psathyrellaceae (Agaricales) with focus on psathyrelloid species: introduction of three new genera and 18 new species. *Mycological Progress* 14: 25: 1-42.
- Weholt Ø, Eidissen SE, Lorås J, Alvarado P, 2015. *Entoloma graphitipes* – a species new to Northern Europe. *Karstenia* 55: 19-24.