

Notes on the synonyms of *Lecanora filamentosa*

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Relevant authentic specimens of *Lecidea hercynica* M. Hauck & Schmall, and *L. dalecarlica* Hedl. were found to be conspecific with *Lecanora filamentosa* (Stirt.) Elix & Palice (syn. *Lecanora ramulicola* (H. Magn.) Printzen & P.F. May). Besides nomenclature, notes on chemistry, morphology and distribution of this species are provided. The taxon is reported here for the first time from Finland and Norway.

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Lecanora filamentosa (as *Lecanora ramulicola*) was recently reported as a widespread but mostly overlooked lichen species that bears superficial similarity to *L. symmicta* (Printzen & May 2002, Pérez-Ortega & Printzen 2007). This species was initially described in the 19th century as *Lecanora symmicta* f. *rufescens* Arnold and more recently (1936) as *Lecidea saepincola* var. *ramulicola* H. Magn., but both names remained almost entirely unnoticed. Because of their morphological and anatomical similarity, Printzen & May (2002) regarded the species as a close relative of *L. symmicta*, but molecular phylogenetic analyses showed that they were not closely related (Pérez-Ortega et al. 2010). *Lecanora filamentosa* is very variable in thalline and apothecial morphology, as well as in microscopic features such as ascus apical structure and ascospore size. Its most

obvious difference from *L. symmicta* is the production of atranorin as major secondary metabolite and usnic acid only as an accessory compound. Recent studies of “lecideoid” species of *Lecanora* revealed that this species has been described independently several times. Below, we discuss the nomenclature, variability and known distribution of this species. It was previously known from Central Europe, Spain, European Russia and eastern North America. Here we also report it from northern Europe.

Nomenclature and discussion

Lecidea filamentosa Stirt. was described from Scotland by Stirton (1880). However, this species was not accepted in the most recent checklist of British lichens (Coppins 2002) nor in 2nd edition of the Lichen Flora of Great Britain (Edwards et al. 2009). In the Synonym

List of British lichens it is treated under *Lecanora symmicta* s. lat. (<http://www.thebls.org.uk/content/synlist.html>). Stirton's description is relatively short and he did not mention any related taxa. Two original specimens, one in GLAM and one (apparently a duplicate) in BM represent forms of *Lecanora filamentosa* with dark, non-pruinose apothecia and a moderately developed rimose thallus.

Lecidea dalecarlica Hedl. was described from Sweden (Hedlund 1892). Although this species was accepted by Santesson et al. (2004), there are no reports of it in recent literature. It was originally described from a single locality in central Sweden and subsequently recorded from two locations in SW Sweden (Dalsland) by Hulting (1900). Outside of Sweden it was only reported from the eastern Pyrenees and the southern Massif Central in France (Bouly de Lesdain 1905). These French records were not studied by us but the determinations are likely to be correct since Bouly de Lesdain compared his collections to Hedlund's original material. Hedlund (1892) provided a relatively detailed description, in which he compared the new species to *Lecanora symmicta* and *Lecidea turgidula*. Although his conclusions were based on a rather limited amount of material from a single locality, he described the variability of the species quite adequately. The original material consists of six specimens deposited in S and UPS. Hedlund (1892) described two different forms (one with pale and one with dark apothecia) as "1. f." and "2. f." to which he assigned no taxonomic status. The name is lectotypified on a fairly rich collection labelled "1.f." from S (L-1863) which contains both weakly or non-pigmented as well as strongly pigmented apothecia and displays typical variability of the species. In general Hedlund's material of the "dark form" differs from most central and northern European collections of this species in that the apothecia are distinctly pruinose, and contain higher concentrations of

the pigment *cinereorufa*-green (Meyer & Printzen 2000). They also have a partly endoxylic, less strongly developed thallus, while in most Central and Northern European specimens the thallus is well-developed and continuous to rimose. There are almost no anatomical or chemical differences between Hedlund's material and the type of *Lecanora filamentosa*.

Schmull & Hauck (2005) described *Lecidea hercynica* M.Hauck & Schmull from the Harz Mountains of central Europe, not far from the type locality of *Lecanora ramulicola*, which is just south of Berlin. The ascus type of this species was assigned to the "Micarea-type" but in fact their illustrations fall within the variability of ascus types described in Printzen & May (2002) for *Lecanora ramulicola*. The species was also said to contain protocetraric acid in addition to atranorin, but TLC and HPLC failed to detect this substance in the studied type material. Instead, a trace of usnic acid and paraensic acids C, D and G were detected. It has previously been suggested that *Lecidea hercynica* was closely related or perhaps conspecific with *L. ramulicola* (Pérez-Ortega & Printzen 2007).

Lecanora ramulicola, based on a type from Germany, was recently reduced to synonymy with *L. filamentosa* by Elix and Palice in Pérez-Ortega et al. (2010), the epithet *filamentosa* being the oldest known for this species. We adopt the combination made by Elix and Palice, and summarize the synonymy of *Lecanora filamentosa* as follows:

***Lecanora filamentosa* (Stirt.) Elix & Palice**

in Pérez-Ortega et al., *Mycological Progress* 9: 531 (2010). – *Lecidea filamentosa* Stirt. – Type: Scotland, Glen Lochay, Killin, 21 July 1879, Stirton (GLAM–NHB.1927.8.01010! – lectotype [HPLC: atranorin, usnic acid, paraensic acids C and D]; BM 731241! –

isolectotype [HPLC: atranorin, usnic acid, paraensic acid D]).

Lecanora ramulicola (H.Magn.) Printzen & P.F.May, Bryologist 105: 63 (2002). See Printzen & May (2002) for a detailed taxonomic treatment.

Lecidea dalecarlica ('*Dalekarlica*') Hedl., Bihang till Kungliga Svenska Vetenskaps-Akademiens Handlingar, ser. 3, 18/3: 57–58 (1892). – Type: [Sweden, Dalarna, par. Elfdal,] Hållstugan, Dalekarlia, VI.1891, T. Hedlund (S-1863 – lectotype selected here [HPLC: atranorin, usnic acid, paraensic acids C and D]; S-1860-2, UPS-L-04476-7 [5 specimens] – isolectotypes!).

Lecidea hercynica M. Hauck & Schmull in Schmull & Hauck, Lichenologist 37: 485 (2005). – Type: Germany, Sachsen-Anhalt, Harz Mountains, Hochharz National Park, Mt. Brocken, 53°6'N, 9°3'E, alt. 1000 m, on mostly decorticated branches of *Picea abies*, 29.VI.2004, M. Hauck (GOET – holotype! [HPLC: atranorin, usnic acid, paraensic acids C, D and G]; HBG – isotype!).

?*Lecanora symmicta* var. *trabalis* f. *biatorina* Eitner, Jahresber. Schles. Ges. Vaterl. Cult., Abt. Z 88: 27 (1911) [type not seen].

As previously pointed out by Hedlund (1892) and more recently by Printzen & May (2002) and Pérez-Ortega & Printzen (2007), *Lecanora filamentosa* is an extremely variable species. The main difference between the two forms of *Lecidea dalecarlica* outlined by Hedlund – dark versus pale apothecia – corresponds to the variability of apothecial pigmentation described in detail by Printzen & May (2002). Differences in pigmentation also result in the apices of the paraphyses appearing more or less thickened (due to different amounts of pigment deposited) and the dark-pigmented apothecia appearing more or less pruinose. Intermediates between dark and pale, and heavily pruinose and epruinose morphs occur frequently and dark pigmented apothecia may contain

paraphyses with both pigmented as well as non-pigmented apical and subapical cells. The same holds true for the apical cells of the excipular hyphae, which are usually more regularly pigmented in dark-rimmed apothecia, and the pigment *cinereorufa*-green seems to be concentrated here. In *Lecanora symmicta* as well as in *L. filamentosa* the degree of pruinosity seems to depend on environmental factors and the age of apothecia. Central European material is frequently non-pruinose, but often a slight pruina is evident after wetting the apothecia. Nevertheless, distinctly pruinose specimens occur in northern and central Europe, particularly in sites protected from direct rainfall, e. g. depressions of the substrate, while epruinose apothecia are found in exposed sites. Usually pruinose apothecia are only developed intermittently in parts of specimens (e.g. Czarnota 618, Malíček 1399, Palice 5942). Pruinose and non-pruinose apothecia were observed side by side in specimens growing on substrates with irregular surfaces (e.g. Türk 5261 & Wittmann).

The pruinose and epruinose, dark and pale specimens are all chemically identical. Atranorin is always present, usually as a major metabolite, but sometimes also as minor secondary substance (in one specimen chloratranorin was also detected in trace amounts by HPLC). Usnic acid seems to be constantly present but usually only in trace amounts, rarely as a minor metabolite and exceptionally as the major secondary substance. As previously noticed by Printzen & May (2002), usnic acid is often not evident on TLC plates. In addition to these two substances, an unknown substance was reported as an occasional accessory compound. On closer investigation one to three aliphatic substances ("fatty acids") were observed on TLC plates in trace to major amounts. According to their retention values on HPLC and their respective ultraviolet spectra they are referable to paraensic acids C (trace to major or absent), D

(trace to minor) and G (trace to minor or absent). On TLC plates spots were observed in Rf classes A: 1–2 & 3–4; B: 2, 4 & 4–5; C: 2–3, 4–5 & 5–6. Some of these spots may appear whitish/blue under 366 nm UV light. At present, these Rf values cannot be assigned to particular paraensic acids until the pure substances are isolated. The paraensic acids seem to be confined to the apothecia. In sections tiny globose, oily droplets are often visible in the exciple in addition to irregularly shaped ochre granules or their aggregates.

Lecanora filamentosa is a characteristic species of boreal coniferous forests. Under its various names it has previously been reported from the British Isles, Sweden, Germany, France (Bouly de Lesdain 1905), Denmark (Erichsen 1942) and Poland (Hillmann 1942). Recently it was recorded from the Czech Republic, Slovakia (Printzen & May 2002, Guttová & Lisická 2002), Austria (Berger & Priemetzhofer 2005), Spain (Pérez-Ortega & Printzen 2007), European Russia (Kuznetsova et al. 2007) and eastern North America (Printzen & May 2002). Czarnota et al. (2010) revised numerous herbarium specimens and produced a distribution map of *L. filamentosa* for Poland. It is reported here as new to Finland and Norway.

In central Europe, *L. filamentosa* is one of the locally dominant species in open montane-spruce, boggy and relic pine-/spruce forests. It is apparently fairly toxitolerant as it forms extensive patches on wood in die-back spruce forests and may have been spreading in such localities during recent decades often occupying upper surfaces of dead branches (see e.g. Schmull & Hauck 2005). Several old herbarium specimens, especially by C.F.E. Erichsen from northern Germany, were growing on worked wood. In contrast, there are only few recent samples from anthropogenic habitats, including a specimen collected by the first author (Palice 12273) and one from a wooden oak bridge from

the same area where Erichsen had been collecting (Dolnik & Neumann 2009).

Considering its high variability, it is not surprising that *L. filamentosa* was often misidentified or recorded under different names. The material we studied was filed under the following names or their synonyms: *Lecanora aitema*, *L. anopta*, *L. aff. cadubriae*, *L. hypoptoides*, *L. metaboloides*, *L. paroptoides*, *L. piniperda*, *L. ramulicola*, *L. saepincola*, *L. symmicta*, *L. symmictera*, *L. symmictera* f. *rufescens*, *L. trabalis*, and *Lecidea hypopta*. It is also evident that *L. filamentosa* is much more widespread than previously thought. Confusion with *Lecanora aitema*, *L. anopta* or other species of corticolous and lignicolous *Lecanora* and *Lecidea* sensu lato species are very likely. *Lecanora aitema* and *L. anopta* also produce the N⁺ reddish pigment, *cinereorufa*-green, in varying amounts. An additional common feature is the frequent absence of algae in the amphithecium. However, both species differ chemically (usnic acid and zeorin in *L. aitema*, isousnic acid in *L. anopta*; and both lack aliphatic lichen acids) and in the size of the pycnospores. *Lecanora anopta* can also be distinguished by its smaller and proportionally broader ascospores. In Europe, the presence of atranorin and the paraensic acids seems to be a good character for delimiting *L. filamentosa* from other members of the “*Lecanora symmicta* group”. When growing side by side, *L. filamentosa* and *L. symmicta* can be distinguished by the colour of the respective thalli. *Lecanora filamentosa* usually has a distinct greyish-white thallus while that of *L. symmicta* is more yellowish due to much higher concentrations of usnic acid. Specimens with heavily pruinose apothecia may also be mistaken for *Lecidea turgidula* or *Lecanora sarcopidoides* without detailed examination. These species contain placodiolic or pseudoplacodiolic acid as major constituents respectively (Tønberg 1992, van den Boom & Brand 2008).

Exsiccata examined: Arnold, Lich. Monac. Exs. 394 (FR, M, sub *Lecanora symmictera*; (iso)lectotype of *L. symmictera* f. *rufescens* Arnold, see Printzen & May 2002).

Des Abbayes, Lichenes Gallici et nonnulli alii Exs. 57 (BP!), sub *Lecidea saepincola* var. *ramulicola*; see Hillmann 1942: 3). [Poland,] Germania: inter Sternberg ac Koritten (Brandenburgia) ad ramulos Pinorum juniorum, Octobre 1934, leg. Hillmann.

Schade, Stolle & Riehmer, Lich. Sax. Exs. 70 (PRM!), sub *Lecanora trabalis*. [Germany,] Oberlausitz: An Kiefernstämmen bei Grüngräbchen, Okt. 1924, leg. E. Stolle; *ibid.* 403 (PRA!, HBG!, sub *Lecanora metaboloides*). [Czech Republic,] *Erzgeb.*: Auf der Rinde von *Pinus montana* auf der Glasbergheide bei Sebastiansberg i. Böhmen, Aug. 1928, leg. J. Dietrich & E. Stolle.

Additional specimens examined: **Austria.**

Oberösterreich: Mühlviertel, Thurytal (Feldaisttal) bei Freistadt, 6.XI. 2006, Priemetzhofer 5964 (hb. Priemetzhofer). *Salzburg*: Gosaukamm, Weg vom Ameisen-See zur Zwiesel-Alm, 23.VI.1983, Türk 5261 & Wittmann (GZU). *Steiermark*: Aflender Staritzen, in der Roßhöhle S der Dippelwand, W von Gollrad, 17.III.1984, Hafellner 11050 (GZU). **Czech Republic.** *W Bohemia*: Erzgebirge, Komotauer Bezirk, Sebastienberger Moor, VIII.1933, Watzel (PRC); Sudetengau, Komotau, an Kiefernzweigen im Moor "Sebastianberger Heide", 4.VIII.1940, Erichsen (HBG); Šumava Mts, Modrava, Roklanská slaf' peat-bog, ca 1km E-ESE of Mt Medvěd [1136.7], 27.VI.2006, Loskotová, Palice 10918, 10959 & Peksa (PRA); Šumava Mts, Kašperské hory, Buzošná reserved area, 4.IX. 2008, Bouda 510 (hb. Bouda); *ibid.*, Obří hrad reserved area, 21.VII.2008, Bouda 509 (hb. Bouda). *N Bohemia*: bei Aschendorf n. Leipa, 1919, Anders (PRC). *C Bohemia*: Brdy: Brdo, 25.IV.1925, Hilitzer (PRM 755049); distr. Příbram, Brdy Mts, Hutě pod Třemšínem

– Hřebeneč Natural Monument, 2.V.2008, Malíček 1399 (hb. Malíček). *S Bohemia*: Šumava Mts, Nová Pec, nature reserve Houska, 8.VIII.1998, Palice 829 (PRA); Šumava Mts, Nová Pec, nature reserve Jezerní luh, 18.X. 2009, Palice 12755 & Printzen (FR, PRA); Šumava Mts, peat bog Mrtvý luh 4 km E of Stožec, 5.VIII.1996, Palice & Printzen (FR); Novohradské hory Mts, Pohoří na Šumavě, Pohořské rašelinště peat-bog, 4.VI.2001, Palice 5942, 5988 (PRA); Novohradské hory – Myslivna, rezervace, 27.V.2004, Peksa 58, Svoboda & Zahradníková (PRC); Zvíkovská pahorkatina hilly area, Písek, Tuklety, NR Výří skály near Otava river, 6.X.2007, Bouda 129 (hb. Bouda). *E Bohemia*: Žďárské vrchy Mts, Radostín, Velké Dářko peat-bog, 4.X.2003, Palice 8116 (PRA); Králický Sněžník, smrkový les blízko Vlaštovčích skal, směrem na Schronisko, 3.X.2008, Peksa (hb. Peksa). *N Moravia*: E Sudetes, Jeseníky Mts, nature reserve Rejvíz, margin of pine-spruce forest, "Velká louka" E of Velké mechové jezírko, 16.X.2007, Palice 11729 (PRA). **Finland.** *Varsinais-Suomi*: V. Lohja, Nummenkylä, koulusta 500 m SW, 18.V.2003, Pykälä 22789 (H); V. Lohja, Isoteutari, Kohagen, W-osa, kallion lakimännikkö, katajan oksalla, niukka, 22.V.2003, Pykälä 22828 (H). **Germany.** *Hamburg*: Brückengeländer bei Mausoleum bei Wohldorf, 10.X.1905, Erichsen (HBG); *ibid.*, im Gehölz Klövenstein b. Altona, 19.III.1913, Erichsen (HBG). *Schleswig-Holstein*: Kreis Husum, Bredstedt, 17.VIII.1936, Erichsen (HBG); Kreis Steinburg, Inlanddünen der Kreuzerheide, 3.X.1927, Erichsen (HBG); *ibid.*, Kremperheide, beim Taterkrug, 3.X.1927, Erichsen (HBG); Kreis Segeberg, Kaltenkirchen, an einem Steg über die Ohlau, 7.X.1912, Erichsen (HBG); Kreis Pinneberg, bei Garstedterfeld, 22.II.1914, Erichsen (HBG); *ibid.*, am Waldrand zw. Rissen und Wedel, 11.X.1924, Erichsen (HBG); Friedrichsruh, (Wild)Gatter des Sauparks, 1.XI.1914, Erichsen (HBG); Sachsenwald, auf

dem Lattenzaun des Sauparks, 1.II.1914, [Erichsen] (HBG); Herzogtum Lauenburg – Sachsenwald, Revier Bausteller Eichholz, 1.XI.1931, Erichsen (HBG); Mölln, am Schwarzsee bei Lehmrade, 1.X.1933, Erichsen (HBG); Kreis Kiel, bei Schönbergstrand (Probstei), 7.X.1924, Erichsen (GZU, HBG); Kreis Lauenburg, in den Besenhorster Sandbergen, 10.X.1925, Erichsen (HBG). **Niedersachsen:** Osthannover, Kreis Dannenberg, 7.X.1937, Behr (HBG); **Sachsen:** Erzgebirge, Steinbach bei Johanngeorgenstadt, 8.VIII.1931, Riehmer (PRM 762272, BP). **Sachsen-Anhalt:** Bezirk Halle, Hohneklippen bei Drei-Annen-Hohne W Elbingerode, 8.IX.1979, Poelt (GZU). **Brandenburg:** Crinitz (Kreis Luckau), Weg nach Schrackau, 3.IV.1936, Hillmann (BC). **Great Britain.** **England:** [West Yorkshire,] Morton Moor, VIII.1934, Watson (BM 731182); **Scotland:** [Argyll,] Ben Doran, VIII.1929, Watson (BM 731185). **Norway.** **Aust-Agder:** Gjerstad. Solhomfjell, VII.1990, Hilmo (TRH); **Oppland:** Nord-Fron, Vinstra, pine forest above the right bank of the river Vinstra, 1.IX.2006, Palice 11454 (PRA). **Hordaland:** Vaksdal, the E-facing hillside W of fjord Bolstadfjorden, along the road from Dalseid to Stamnes, above the tunnel just N of Geitabottsberget, 7.IX.2006, Palice 10759 & Tønsberg (PRA, BG); Bømlo, island Bømlo S, Skogaberg Nature Reserve, 8.IX.2006, Knutsen, Palice 10681 & Tønsberg (PRA). **Poland.** **Woj. Lubuskie:** Brandenburg, Sternberg [Torzym] (Kreis Oststernberg), Weg nach Döbbernitz [Dębrznica], 5.X.1934, Hillmann (PRM 765484); zwischen Sternberg [Torzym] und Koritten [Koryta] (Kreis Oststernberg), 6.X.1934, Hillmann (GZU). **W Carpathians:** Western Beskidy Mts, Gorce Mts, Hala Turbacz (Filasowa glade), 16.V.1994, Czarnota 618 (GPN); Gorce National Park, W slope of Mostownica range, 23.VII.2007, Czarnota 5458 (GPN, PRA); **Slovakia.** **W Carpathians:** Orava, Trstená, Suchá Hora, managed pine boggy forest N of

the village, 21.V.2007, Guttová, Halda & Palice 11747 (PRA); Nizke Tatry Mts, Nižná Boca, Crchľa saddle, 29.VII.2008, Czarnota, Guttová, Halda & Palice 12273 (PRA). **Sweden.** **Bohuslän:** Ljung par., Ljung, near Skarsjön, 31.VII.1940, Magnusson 17861 (UPS – L-117637).

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