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Research

Synonymizations and lectotypifications of some lecideoid lichens (Ascomycota, Lecanoromycetes) described from Finland or Sweden

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Between 1850 and 1950, hundreds of lecideoid lichen-forming fungi were described from Fennoscandia, mainly in the genus *Lecidea*. The status of many of these species is still uncertain and some have not been revised since their description. We examined types and nomenclature of nine such lecideoid taxa, and found that they represent synonyms of earlier described species: *Bacidia dolera* (= *Lecidea albofuscescens*), *Lecidea aviaria* (= *Rhizocarpon richardii*), *L. cavernarum* (= *Porpidia soledizodes*), *L. cuculi* (= *Schaereria fuscocinerea*), *L. frustulenta* (= *Micarea subnigrata*), *L. ivalensis* (= *Carbonea vorticosa*), *L. melaphanoides* (= *Scoliciosporum intrusum*), *L. mustialensis* (= *L. albofuscescens*) and *L. submilvina* (= *Miriacidia leucophaea*). In addition, we examined types and nomenclature of three synonyms of *Lecanora cadubriae*: *Biatora admixta*, *B. pinicola* and *Lecidea subinsequens*. Lectotypes are designated for the basionyms *Biatora admixta* Th.Fr., *Biatora pinicola* Th.Fr. ex Hellb., *Lecidea cuculi* Vain., *Lecidea fuscocinerea* Nyl., *Lecidea ivalensis* Vain., *Lecidea melaphanoides* Nyl. and *Lecidea subinsequens* Nyl.

Keywords: Fennoscandia, fungi, lichens, nomenclature, taxonomy



Introduction

The lichen genus *Lecidea* was introduced by Acharius (1803) for crustose lichen-forming fungi with lecideoid apothecia, i.e. fruiting bodies without symbiotic algae in the margin surrounding the hymenial tissue. This is a wide generic circumscription, and Acharius included species in the genus which today are understood to belong to different orders. Still, Acharius' generic divisions represented a step forward at the time of their publication, although with time their impracticability became increasingly obvious. With the advent of microscopical techniques in lichenology during the latter part of the 19th century, most workers consequently accepted a more restricted generic circumscription of *Lecidea*, including only lecideoid species with unicellular ascospores in the genus.

An exception was the prolific Finnish lichenologist William Nylander (1822–1899), who, especially in the beginning of his career, did not accept ascospore morphology as a useful character for generic delimitation, and consequently used almost as wide a



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circumscription of the genus *Lecidea* as Acharius had done. In contrast to his wide generic circumscriptions, his concept of species was decidedly narrow. Consequently, Nylander's enormous taxonomic output, produced during the span of a 50-year career, includes several hundred new species of *Lecidea*. Many of these were described on material collected in Fennoscandia, particularly Finland (including some areas that now belong to Russia).

After Nylander, the most productive Fennoscandian lichenologists in terms of number of newly described species were Edvard Vainio (1853–1929) and Hugo Magnusson (1885–1964). Like Nylander, they combined broad generic circumscriptions with a rather narrow species concept and a habit of describing new species based on just a single collection. The result was an intimidatingly large number of lecideoid lichens described from Fennoscandia, a number that was further increased as there were other lichenologists who also described lecideoid lichens at the same time, including Theodor Magnus Fries (1832–1913), Teodor Hedlund (1861–1953) and Veli Räsänen (1888–1953). From the 1960s and onwards, much work has been done to improve both generic circumscriptions and the circumscriptions of individual lecideoid lichen species, a process that has been complemented and accelerated in the last few decades by the introduction of phylogenetic analysis of nucleotide sequences. In spite of this, however, much work remains to be done and many old names of unclear status, described during the heyday of lecideoid lichen description, are still awaiting revision.

Our aim with this study is to revise and, when appropriate, designate lectotypes for nine of these unclear taxa that are still accepted in the current Fennoscandian checklist: *Bacidia dolera* (Nyl.) Forssell & Blomb., *Lecidea aviaria* Vain., *L. cavernarum* (Räsänen) H.Magn., *L. cuculi* Vain., *L. frustulenta* H. Magn., *L. ivalensis* Vain., *L. melaphanoides* Nyl., *L. subinsequens* Nyl. and *L. submilvina* Vain. During our work with these revisions, we became aware of three additional, validly published names (*Biatora admixta* Th.Fr., *B. pinicola* Th.Fr. ex Hellb. and *Lecidea mustialensis* (Vain.) Zahlbr.) which apparently have not been revised since their description and they are also revised here.

Material and methods

Light microscopy measurements were made on material mounted in water using an oil-immersion lens, with a precision of 1 µm. To examine colour reactions of pigments and solubility of crystals, we used a 10% solution of KOH (abbreviated K), a 4–5% solution of NaClO (abbreviated C) and two different concentrations (10% and 50%) of HNO₃ (abbreviated N). Apical structures of asci were examined in Lugol's solution (0.3–0.4% iodine, abbreviated I) after pretreatment with K. Thallus reactions were checked with K, C, and in addition an ethanolic solution of paraphenylenediamine (abbreviated Pd). HPTLC was performed following the method described by Arup et al. (1993) and Orange et al. (2010).

We have not attempted to make a complete list of synonyms for the treated species, but cite heterotypic synonyms for which we have seen the types.

Taxonomic treatment

Carbonea vorticosa (Flörke) Hertel (1983, p. 442)

Basionym: *Lecidea sabuletorum* δ *vorticosa* Flörke (1808, p. 311).

Based on the same type: *Lecidea vorticosa* (Flörke) Körber (1855, p. 251). *Lecidea contigua* var. *vorticosa* (Flörke) Boistel (1903, p. 214).

Type: 'Auf etwas glatten Steinen auf dem Harze, im Thüringenschen, Salzburgischen, bey Berlin u.s.w.' Cited from the protologue (Flörke 1808, p. 311), original material not located.

Taxonomic synonym: *Lecidea ivalensis* Vainio (1883, p. 65), **syn. nov.**

Based on the same type: *Lecidea vorticosa* var. *ivalensis* (Vain.) Lyngé (1928, p. 82).

Type: Finland, Lapponia inarenensis, Inari, Hammastunturi, ad rupem granuliticam, 1878, E. Vainio (lectotype, TUR-V 25080!, designated here, MBT 10001187 [TLC: nil]; isotype, H9511553!).

Remarks

Lecidea vorticosa was described as a form or variety of *L. sabuletorum* by Flörke (1808). His short description could fit many crustose lichens, and the fact that both montane and lowland localities were listed also suggests that the original material may have been heterogeneous. A more precise application of the name was provided by Körber (1855), who raised the epithet *vorticosa* to species level, provided a description and cited several collections, including n:o 167B in Flotow's exsiccate. Since then, the name *Lecidea vorticosa* has been used more or less in the sense of Körber (Körber 1855, Fries 1874, Knoph et al. 2004).

Flörke's herbarium was destroyed in World War 2 and no original material of *Lecidea sabuletorum* δ *vorticosa* has ever been located by subsequent workers (Hertel 1970, 1977, 1983, Rambold 1989). In the absence of a lectotype or neotype, the operational concept of *Carbonea vorticosa* has been that of a variable species (Hertel 1975, Rambold 1989) with a wide distribution (see world distribution map in Hertel 1985), with several taxa currently included in its synonymy, including but possibly not limited to *Lecidea latypea* Nyl., *L. sublatypea* Leight. (Fries 1874), *L. andina* Zahlbr., *L. kuendigiana* Müll. Arg., *L. orvinii* Lyngé, *L. pullulans* Th.Fr. and *L. subdeclinata* Nyl. (Hertel 1975). In our view, many of these taxa are likely to actually represent synonyms, but ultimately,

their status will only be possible to evaluate after a revision and typification of *C. vorticosa*. The exsiccate collection cited by Körber (1855) is a possible candidate for a neotype, but this is not the only option.

When describing *Lecidea ivalensis*, Vainio (1883) compared it to *L. vorticosa*, but pointed out differences in apothecial pigmentation between the two taxa. We found that the type material fits well into the current, broad circumscription of *Carbonea vorticosa*, and any purported differences between the taxa are of course dependent on the typification of *C. vorticosa*. The type material of *L. ivalensis* lacks secondary compounds detectable by TLC. The secondary chemistry of *C. vorticosa* has been variously reported as pannarin, argopsin or no secondary compounds (Rambold 1989, Knoph et al. 2004, Chambers et al. 2009). It is unknown whether these reported differences in secondary chemistry have any taxonomic significance. We suggest that *L. ivalensis* is treated as a synonym of *C. vorticosa*, pending a revision of the taxon and typification of the name.

***Lecanora cadubriae* (A. Massal.) Hedlund (1892, p. 48)**

Basionym: *Biatora cadubriae* A. Massalongo (1856, p. 176).

Based on the same type: *Lecidea cadubriae* (A. Massal.) Th. Fries (1874, p. 468).

Type: Massalongo, Lich. Ital. Exs. No 332 [Ad truncus pinorum in albis Cadubriae; Massalongo 1856] (syntypes, S L4130! [TLC: norstictic acid]; UPS! [TLC: norstictic acid]).

Taxonomic synonym: *Biatora admixta* Th. Fries (1863, p. 9).

Based on the same type: *Lecidea cadubriae* f. *admixta* (Th. Fr.) Zahlbruckner (1925, p. 743).

Type: [Sweden, Nerike [= Närke], Almy par., St. Åskog [= St. Ässkog?], på gran [= on *Picea abies*], [no date], P.J. Hellbom (lectotype, UPS L-766719!), designated here, MBT 10001186 [TLC: virensic acid]).

Taxonomic synonym: *Biatora pinicola* Th. Fr. ex Hellblom (1867, p. 272).

Type: [Sweden, Östergötland, Östra Eneby par.] Ad corticem Pini sylvestris in Ostrogothia media et meridionali passim (...), in paroecia Eneby orientali lectam, Stenhammar, Lich. Suec. Exs. No 166 (lectotype, UPS L-995773!), designated here, MBT 10001194, [TLC: virensic acid]; isolectotype, H!).

Taxonomic synonym: *Lecidea subinsequens* Nylander in Norrlin (1873, p. 335).

Based on the same type: *Lecanora cadubriae* var. *subinsequens* (Nyl.) Hedlund (1892, p. 48). *Lecidea cadubriae* var. *subinsequens* (Nyl.) Lettau (1918, p. 122).

Type: [Finland, Lapponia kittilensis,] Par. Muonioniska, Muonio, ad lignum Pini, 1867, J.P. Norrlin (lectotype, H9511300! [TLC: norstictic acid], designated here, MBT 10001196; isolectotype, H9511299! [TLC: norstictic acid]).

Taxonomic synonym: *Lecidea subinsequens* f. *ecrustacea* Norrlin (1873, p. 335) nom. inval. [ICN Art. 38.1 (a)].

Remarks

The year of publication for *Biatora cadubriae* is usually given as 1854 (e.g. Nimis 2016). However, in the absence of a description, the *B. cadubriae* of Massalongo (1854, p. 20) is not a validly published name. This name was validly published two years later, as Massalongo (1856) provided a description and cited his earlier work of 1854.

Fries described *Biatora admixta* in 1863, but later apparently realised that it was not possible to reliably distinguish it from the earlier published *Biatora cadubriae* (Fries 1874). It was also included in the synonymy of *Lecanora cadubriae* by Hedlund (1892). There are two collections in UPS marked with '*Biatora admixta* n. sp.' in Fries' handwriting; however, only one of them (UPS L-766719) matches the protologue as it was collected on *Picea abies*. We designate this collection as the lectotype and confirm that it fits the current circumscription of *Lecanora cadubriae* (for further discussion on chemotypes, below). An additional specimen in S (S F73070) that could possibly also be part of the original material was not available for study.

Hellbom (1867) included *Biatora pinicola* in a list of species found in the Swedish province of Närke. He attributed the name to Fries ('Th. Fr. in Sched. (*Biatora phaeostigma* Stenh. Exsicc. N:o 166)') but Fries never published a species of this name. As Hellbom (1867) gave a short description and cited at least one collection, the name is validly published however. Apart from a later publication by Hellbom (1871), the name does not appear to have been used anywhere else, except for a mention as a synonym of *Lecanora cadubriae* by Fries (1874).

In addition to the collection in Stenhammar's exsiccate, Hellbom (1867) listed the species as occurring in the parishes Almy, St. Mellösa and Viby, but without giving further locality data. We found one collection in UPS (L-766720) that was collected by Hellbom in St. Mellösa and which could represent original material of *B. pinicola*. However, the only collection cited in the protologue that can be identified with certainty is No. 166 of Stenhammar's exsiccate, and the specimen of this exsiccate kept in UPS is likely the one seen by Fries. We hence designate this collection as the lectotype of *B. pinicola*. Both the collection L-766720 and the exsiccate collection represent typical specimens of *Lecanora cadubriae*, and both belong to the chemotype with virensic acid.

Lecidea subinsequens was considered a synonym of *Lecanora cadubriae* rather soon after its description (Nylander 1881, Hedlund 1892). However, the possibly heterogeneous nature of the type material was pointed out by Printzen (1995) and, pending further studies, the species has been retained as an accepted species in subsequent Fennoscandian checklists.

Two publications are candidates as the place of the first valid description of *L. subinsequens*: Norrlin (1873) (quoting a letter from Nylander) and Nylander (1873a). Norrlin's work was published between 1 April and 26 November 1873 (Stafleu and Cowan 1981) and Nylander's on 1 July 1873, according to the first page of the journal issue in which the work was published.

The locality data for the material on which *L. subinsequens* was based is given as 'on old pine wood by Muonio' [= 'på äldre tallved vid Muonio'] by Norrlin (1873) and as 'lignicola in Lapponia' by Nylander (1873a). We located two specimens (H9511299, H9511300) that fit the more specific locality in Norrlin's publication, as both mention Muonio on the label. There is an additional specimen collected by Norrlin and labelled as *Lecidea subinsequens* in H-NYL, with the locality given as 'Lapponia, Turtola'. This specimen (H-NYL 21464) can only be part of the original material if Nylander's publication was first, as Turtola is not situated by the river Muonio, but further south by the river Tornio (Torneå). In other words, if Norrlin (1873) was first and Muonio consequently the locality of the protologue, there are two specimens from which a lectotype can be chosen, whereas if Nylander (1873a) was first, there are three specimens of the original material, as both Muonio and Turtola are within the area that Nylander would have meant with 'Lapponia'. All three collections contain norstictic acid and represent typical specimens of *Lecanora cadubriæ*. Since it is unclear which of the two publications that has priority, we have chosen to designate as lectotype one of the two collections that is eligible in either case. This particular collection (H9511300) is not included in Nylander's own herbarium, but was clearly seen by him, as indicated by a small envelope within the collection with the text '*Lecidea subinsequens* Muonio' in Nylander's handwriting.

The typification of *Lecidea subinsequens* was discussed by Printzen (1995), who examined two collections in H-NYL, one of the syntypes mentioned above (H-NYL 21464) and an additional collection (H-NYL 21465 = H9511331), which he also considered a syntype of *L. subinsequens*. He suggested that H-NYL 21464 could be identical to *Lecanora cadubriæ*, but noted that H-NYL 21465 differed, as this specimen had an endoxylic thallus. We, however, do not consider this latter specimen a syntype of *L. subinsequens*. On this specimen, Nylander has written '*Lecidea subinsequens ecrustacea*', a name at the forma level which he apparently never published. Norrlin (1873) likewise mentions f. *ecrustacea*, but as he included no description of any specimen, *L. subinsequens* f. *ecrustacea* was never validly published. It can be argued however, that Nylander had demonstrated that he did not include these specimens in *L. subinsequens*, and thus we consider it inappropriate to view them as syntypes of the primary taxon. In our view, both specimens of *L. subinsequens* f. *ecrustacea* represent specimens of *L. cadubriæ* with a poorly developed thallus.

Although *Lecanora cadubriæ* is usually described as having norstictic acid (sometimes with traces of stictic and salazinic

acid, Edwards et al. 2009), Holien and Hilmo (1991) reported the existence of two chemotypes in the species: one with norstictic acid and one with virensic acid. They found that specimens of the two chemotypes display no obvious morphological, ecological or distributional differences and that they may grow together on the same tree (Holien and Hilmo 1991). Should future studies involving molecular data conclude that the two chemotypes do represent two different taxa, then the oldest name for the chemotype with norstictic acid is probably *Biatora cadubriæ*, given that the exsiccate material is homogeneous and/or that the name is lectotypified on a specimen with this secondary chemistry. The oldest name for the chemotype with virensic acid appears to be *Biatora admixta*.

Additional specimens examined: [Sweden], Nerike [= Närke], Stora Mellösa, [no date], P.J. Hellbom (UPS L-766720 [TLC: virensic acid]). [Finland,] Lapponia [= Ostrobothnia ultima, Pello,] Turtola, 1867, J.P. Norrlin (H-NYL 21464 = H9511330 [TLC: norstictic acid]). [Finland,] Lapponia tornensis [= Lapponia enontekiensis], par. Enontekis, ad lignum Pini, 1867, [J.P.] Norrlin (H-NYL 21465 = H9511331, H9511303 [both specimens labelled '*Lecidea subinsequens ecrustacea*', TLC: norstictic acid]).

***Lecidea albofuscescens* Nylander (1867, p. 370)**

Based on the same type: *Biatora albofuscescens* (Nyl.) Arnold (1871, p. 476).

Type: Finland, [Tavastia australis, Hämeenlinna, Evo] Evois, ad cort. abietis [= on bark of *Picea abies*], 1866, J.P. Norrlin (lectotype, H-NYL 20725 = H9510050!, designated by Printzen (1995, p. 156) [ICN Art. 9.10]; isolectotype, H9511557!).

Taxonomic synonym: *Lecidea dolera* Nylander (1873b, p. 20), **syn. nov.**

Based on the same type: *Bacidia dolera* (Nyl.) Forssell and Blomberg (1880, p. 81).

Type: [Finland, Tavastia borealis, Keuruu,] Pihlajavesi, 1871, [J.P.] Norrlin (Syntype or holotype, H-NYL 17948 = H9510149!).

Taxonomic synonym: *Lecidea albofuscescens* subsp. *mustialensis* Vainio (1934, p. 357), **syn. nov.**

Based on the same type: *Lecidea mustialensis* (Vain.) Zahlbruckner (1939, p. 339).

Type: Finland, Tavastia australis, Tammela, Mustiala, ad corticem trunci Abietis excelsae [= on bark on trunk of *Picea abies*], 1868, A. Kullhem (Holotype, TUR-V 23223!).

Remarks

In his short protologue of *Lecidea dolera*, Nylander (1867) described the ascospores as acicular and $30\text{--}32 \times 2 \mu\text{m}$. The anatomy of the ascospores led Forssell and Blomberg (1880) to include the species in *Bacidia*, a placement which has been upheld ever since (Vainio 1922, Santesson et al. 2004). We found that the type material in H-NYL agrees well with the protologue, except for the ascospores, which are elongately lemon-shaped and ca $10 \times 4 \mu\text{m}$. In the absence of acicular ascospores, there appears to be no difference remaining between *B. dolera* and *L. albofuscescens*, and we therefore reduce the former to a synonym of the latter. Apart from the collection H-NYL 17948, we did not locate any other syntypes in herb. H. A collection of *Lecidea albofuscescens* in UPS (UPS L-648576!) has the same label data as H-NYL 17948 and may be part of the same gathering. As there is no mention of the name *Lecidea dolera* on the original label of the UPS collection however, it is unclear if it is part of the original material of *L. dolera*.

Lecidea mustialensis was described as a subspecies of *L. albofuscescens* by Vainio (1934), rendering Zahlbruckner's citation '*Lecidea mustialensis* Vain.' (Zahlbruckner 1938–1940) a valid combination at the species level. Vainio (1934) noted that the primary difference between *L. mustialensis* and *L. albofuscescens* was the pigmentation of the hypothecium. He also noted that *L. albofuscescens* and *L. mustialensis* occurred together in the same collection. Normal apothecia of *L. albofuscescens* are indeed present on one of the tiny pieces in the holotype of *L. albofuscescens* subsp. *mustialensis*. This likely represents the same individual that displays varying degrees of pigment concentration in its apothecia, and we thus regard *L. mustialensis* as a synonym of *L. albofuscescens*.

Micarea subnigrata (Nyl.) Coppins & Kilius, in Kilius (1981, p. 391)

Basionym: *Lecidea subnigrata* Nylander (1866, p. 370).

Based on the same type: *Biatorina subnigrata* (Nyl.) Arnold (1871, p. 474). *Catillaria subnigrata* (Nyl.) Herre (1910, p. 94).

Type: [United Kingdom,] Wales, Merioneth, Cader Idris, 1866, W.A. Leighton (lectotype, H-NYL 19136 = H9510510, designated by Kilius (1981, p. 391) [ICN Art. 9.10]; isolectotypes, BM, UPS!).

Taxonomic synonym: *Lecidea frustulenta* H. Magnusson (1955, p. 295), **syn. nov.**

Type: Sweden, Västergötland, Råda par., Mölnlycke, to the south, on steep rock near the road, 8 May 1927, A.H. Magnusson 10380 (holotype, UPS L-108146!).

Remarks

When describing *Lecidea frustulenta*, Magnusson (1955) suggested that his new species had affinities to species now

treated in *Fuscidea*. We, however, found that the holotype of *L. frustulenta* represents a typical specimen of *Micarea subnigrata*. Curiously, Magnusson correctly determined another collection of his (Magnusson 9790) as *Catillaria subnigrata*, which he reported as new to Scandinavia in the same publication as where he described *L. frustulenta* (Magnusson 1955). He did not compare the collections, nor did he mention that they are very similar to each other. Magnusson seems to only have observed unicellular ascospores in the holotype of *L. frustulenta* and probably failed to associate this specimen with species with 1-septate ascospores in *Catillaria*. Although the ascospores of *M. subnigrata* are usually 1-septate, unicellular ascospores also occur in this species (Coppins 1983), and we also observed 1-septate ascospores in the holotype of *L. frustulenta*.

Additional specimens examined: Sweden, Halland, Fjärås par., Bräcken, on stone fence, 29 June 1926, A.H. Magnusson 9790 (UPS L-774543 [conf. B. Coppins 1982]; L-056573).

Miriquidica leucophaea (Flörke ex Rabenh.) Hertel and Rambold (1987, p. 386)

Basionym: *Biatora leucophaea* Flörke ex Rabenhorst (1845, p. 91).

Based on the same type: *Psora leucophaea* (Flörke ex Rabenh.) Anzi (1860, p. 65). *Lecanora leucophaea* (Flörke ex Rabenh.) Nyl., in Crombie (1870, p. 51). *Lecidea parasema* var. *leucophaea* (Flörke ex Rabenh.) Boistel (1903, p. 220, 222).

Type: Hhst [= Poland, Silesia, Hochstein?], 24 Apr 1845 [leg. v. Flotow?] (lectotype: O-L-152197 [image!], designated by Hertel and Rambold (1987, p. 386)).

Taxonomic synonym: *Lecidea submilvina* Vainio (1883, p. 43), **syn. nov.**

Based on the same type: *Biatora submilvina* (Vain.) Räsänen (1939, p. 150).

Type: Finland, Lapponia Inarenensis, Inari, [Inarijärvi], rantakallio [= on shore rocks], 1878, E. Wainio (holotype, TUR-V 24084! [TLC: miriquidic acid]).

Remarks

Vainio (1883) described *Lecidea submilvina* based on a single collection, noting that it was close to *Lecidea* (= *Miriquidica*) *leucophaea*, but without explaining the differences between the two taxa. In Vainio's posthumous monograph on *Lecidea* (Vainio 1934), the description of *L. submilvina* was written by Lyngé, who prepared Vainio's unfinished manuscript for publication. Lyngé remarks that he found it hard to distinguish *L. submilvina* from *L. leucophaea*, and suggested that the former could be a form of the latter affected by frequent irrigation. Likewise, we have found that *L. submilvina* agrees well with *Miriquidica*

leucophaea and confirm that its secondary chemistry is also typical of this taxon. We therefore reduce *L. submilvina* to synonymy.

***Porpidia soledizodes* (Lamy ex Nyl.) J.R. Laundon (1989, p. 104)**

Basionym: *Lecidea crustulata* var. *soledizodes* Lamy ex Nylander (1883, p. 534).

Based on the same type: *Lecidea calcarea* var. *soledizodes* (Lamy ex Nyl.) Boistel (1903, p. 209). *Lecidea soledizodes* (Lamy ex Nyl.) Lindau (1913, p. 66). *Haplocarpon soledizodes* (Lamy ex Nyl.) Wirth (1972, p. 287). *Huilia soledizodes* (Lamy ex Nyl.) Hertel, in Hawksworth et al. (1980, p. 106).

Type: Gallia [= France, Hautes-Pyrénées], Cauterets, sapinère du Riou, 1883, E. Lamy (lectotype, PC, designated by Laundon (1989, p. 104) [ICN Art. 9.10]; isolectotype, H-NYL 16241 = H9501006!).

Taxonomic synonym: *Biatora cavernarum* Räsänen (1946, p. 5), **syn. nov.**

Based on the same type: *Lecidea cavernarum* (Räsänen) H.Magnusson (1952, p. 323).

Type: [Finland] Alandia [= Åland], Mariehamn, ad rupem graniticam in cavernam subumbrosam, 5 June 1924, E.A. Vainio (holotype, H9509437! [TLC: stictic acid, note in the envelope by Muhr, 1989]).

Remarks

Räsänen (1946) described *Biatora cavernarum* based on a single collection, but he did not compare his new species to any other species. It was transferred to *Lecidea* by Magnusson (1952), and has been included in the Fennoscandian checklists as *Lecidea cavernarum* during the last decades (Santesson et al. 2004, Nordin et al. 2021). We found that the type material represents a fertile and typical specimen of *Porpidia soledizodes*, and we thus reduce *Lecidea cavernarum* to synonymy.

***Rhizocarpon richardii* (Lamy ex Nyl.) Zahlbruckner (1926, p. 341)**

Basionym: *Lecidea richardii* [as 'richardi'] Lamy ex Nylander (1875a, p. 446).

Based on the same type: *Buellia richardii* (Lamy ex Nyl.) H. Olivier (1901, p. 162). *Buellia atroalba* var. *richardii* (Lamy ex Nyl.) Boistel (1903, p. 238). *Rhizocarpon constrictum* ssp. *richardii* (Lamy ex Nyl.) Clauzade & Cl. Roux (1985, p. 828).

Type: [France, Deux-Sèvres,] La Mothe – St Hèraye, 1876, [O.J.] Richard (neotype, H-NYL 10085 = H9508823!, designated by Laundon (1986, p. 173)).

Taxonomic synonym: *Lecidea aviaria* Vainio (1934, p. 84), **syn. nov.**

Type: Finland, Nylandia, Ingå, Blåskär, [illegible] litoral fågeltopp [= on coastal rocks manured by birds], 9 Aug 1920, W. Brenner (holotype, TUR-V 24151! [TLC: gyrophoric acid]).

Remarks

In the protologue, Vainio (1934) compared his new species *Lecidea aviaria* to *Lecidea* (= *Schaereria*) *fuscocinerea*, from which *L. aviaria* was said to differ mainly by having larger ascospores. We found that the ascospores in the holotype were 1-septate and $22\text{--}30 \times 12\text{--}15 \mu\text{m}$. In this and also in other respects, the holotype of *L. aviaria* represents a typical specimen of *Rhizocarpon richardii*. Vainio possibly measured ascospores within asci; his figures for ascospore size in *L. aviaria* could indicate that he misinterpreted four 1-septate ascospores as eight unicellular ascospores.

***Schaereria fuscocinerea* (Nyl.) Clauzade & Cl. Roux (1985, p. 829)**

Basionym: *Lecidea fuscocinerea* Nylander (1852, p. 177).

Type: Sweden, [Södermanland or Uppland,] Holmiae [= Stockholm], [no date], W. Nylander (lectotype, H-NYL 15064 = H9509285!, designated here, MBT 10001197 [TLC: gyrophoric acid, note in the envelope by Schwarze & Hertel, 1980]).

Taxonomic synonym: *Lecidea rhizocarpooides* Malme (1932, p. 111).

Type: Sweden, Dalarna, Leksand, Lånäs, 14 July 1931, G.O. Malme (holotype, S L1760! [TLC: gyrophoric acid; Svensson and Owe-Larsson 2019]).

Taxonomic synonym: *Lecidea cuculi* Vainio (1934, p. 247), **syn. nov.**

Type: Finland, Nylandia, Sibbo [= Sipoo], Kuckubacka, ad saxa granitica, 1913, E. Wainio (lectotype, TUR-V 24149 B!, designated here, MBT 10001198 [TLC: gyrophoric acid]; isolectotypes, TUR-V 24149! [TLC: gyrophoric acid], O-L-914 [image!], O-L-152489 [image!]).

Remarks

In the protologue of *Lecidea fuscocinerea*, Nylander (1852) cited a collection made by himself (H-NYL 15064), but also made an unambiguous reference to a collection in Fries' and Stenhammar's exsiccate Lichenes Suecici ('*Lecidea atroalba* var. L. S. 406 C'). *Lecidea fuscocinerea* was transferred to *Schaereria* by Clauzade and Roux (1985), who did not cite any original material, but according to their notes in the envelope of H-NYL 15064, it is clear that they regarded this collection as the holotype of *L. fuscocinerea*. However,

as several collections were cited in the protologue, there is no holotype. The two exsiccate specimens from Lich. Suec. examined by us (H-NYL 13050!, UPS!) are both referable to *Lambiella gyrizans* (Nyl.) M. Westb. & Resl, the basionym of which was published nine years after the publication of *Lecidea fuscocinerea* (Nylander 1861, p. 231). British authors seem to have used the name *L. fuscocinerea* for specimens referable to *Lambiella gyrizans* (British Lichen Society 2021), but generally, the use of *L. fuscocinerea* has been based on the syntype H-NYL 15064 (Nylander 1861, Vainio 1934, Clauzade and Roux 1985). We view a lectotypification on a collection in Lichenes Suecici as likely to cause needless confusion and hence designate the collection H-NYL 15064 as the lectotype of *L. fuscocinerea*.

Lecidea cuculi was described by Vainio (1934) based on a single collection. He compared his new species to *L. atrocineria* (Schaer.) Vain., a taxon in which he included *L. fuscocinerea* (Vainio 1934). *Lecidea cuculi* was supposed to differ by having a different thallus reaction when C was applied (C+ light yellow to dull yellow instead of C+ red, Vainio 1934). We found that parts of the thallus of *L. cuculi* have a greenish tinge, and that the collection may represent a specimen in somewhat poor condition. The C-reaction reported by Vainio may be a result of the C+ red thallus reaction being obscured by the partly aberrant thallus colour. At any rate, the secondary chemistry with gyrophoric acid is typical of *Schaereria fuscocinerea*, and as we do not find any other difference, we reduce *L. cuculi* to synonymy.

We located four syntypes of *L. cuculi*, of which the two in O represent small pieces perhaps kept as reference specimens by Lynge, who edited Vainio's posthumous monograph on *Lecidea* (Vainio 1934). Of the two specimens in TUR-V, we designate the largest as the lectotype of *L. cuculi*.

***Scoliciosporum intrusum* (Th. Fr.) Hafellner (2004, p. 31)**

Basionym: *Lecidea intrusa* Th.Fries (1867, p. 152).

Based on the same type: *Catillaria intrusa* (Th.Fr.) Th.Fries (1874, p. 574). *Lecideopsis intrusa* (Th.Fr.) Zopf (1896, p. 338). *Conida intrusa* (Th.Fr.) Sacc. & D.Sacc., in Saccardo (1906, p. 187). *Biatorina intrusa* (Th.Fr.) Dombrovskaya (1970, p. 50). *Micarea intrusa* (Th.Fr.) Coppins & Kilius in Coppins (1983, p. 138). *Carbonea intrusa* (Th.Fr.) Rambold & Triebel, in Aptroot et al. (1997, p. 47). *Lecidea contrusa* Vainio (1883, p. 29), *nom. illegit.* [ICN Art. 52.1].

Type: [Finland, Tavastia australis, Tammela,] Mustiala, 1867, A. Kullhem (holotype, UPS L-026155!).

Taxonomic synonym: *Lecidea aphanoides* Nylander (1868, p. 476).

Type: [United Kingdom,] Scotia [= Scotland], Braemar, 1868, [J.M.] Crombie (lectotype, H-NYL 20237 = H9509029!, designated by Coppins (1983, p. 138) [ICN Art. 9.10]).

Taxonomic synonym: *Lecidea melaphana* Nylander (1869, p. 83).

Type: [United Kingdom,] Scotia [= Scotland], Braemar, 1868, [J.M.] Crombie (syntypes, H-NYL 20189 = H9509021!, BM000975518).

Taxonomic synonym: *Lecidea melaphanoides* Nylander (1875b, p. 299), **syn. nov.**

Type: Finland, Nylandia, Helsinki, Thölö [= Töölö], kalliolla [= on rock], June 1874, E. Lang [= Vainio] (lectotype, TUR-V 25158!, designated here, MBT 10001199; isolectotypes, H-NYL 20194 = H9509020!, H-NYL 20194 = H9511554!).

Remarks

Nylander described *Lecidea aphanoides*, *L. melaphana* and *L. melaphanoides* as three different species although he was aware that they were very similar to each other. *Lecidea melaphana* was supposed to differ from *L. aphanoides* by having a black thallus and by having some brown pigmentation in the hypothecium (Nylander 1869), whereas *L. melaphanoides* was said to differ from *L. melaphana* by having an unpigmented lower part of the hypothecium and by showing different colour reactions when iodine was applied (Nylander 1875b). Coppins (1983) included both *L. aphanoides* and *L. melaphana* in the synonymy of *Micarea intrusa*, and they were also cited as synonyms when Hafellner transferred this species to *Scoliciosporum* (Hafellner 2004). These authors did not discuss *L. melaphanoides* however, and although only reported once since its description (Magnusson 1946), the species is still accepted in the current Fennoscandian checklist (Nordin et al. 2021).

In the protologue, Nylander (1875b) gives the locality as 'prope Helsingfors' and the collector as E. Lang (= E. Vainio). In H and TUR, there are in total five specimens of the original material of *L. melaphanoides* from two localities (Thölö and Meilans), both within the area of Helsinki (= Helsingfors) and collected by Lang. Specifically, there are three collections with matching label data from the Thölö locality in TUR (one specimen) and H (two specimens). Of the two specimens in H, both bear the same H-NYL-number (20194), although only one of the specimens were included in H-NYL. Possibly, the collection has been split earlier when sent on loan. We also located two specimens from the Meilans locality, one each in TUR-V and H-NYL. All five collections are homogeneous and are in our opinion referable to *Scoliciosporum intrusum*. The degree of pigmentation may vary also within the same specimen, and we regard these differences as of no taxonomic value. Nylander's use of iodine reactions was controversial already to his contemporaries (Vitikainen 2001). We could not reproduce these results and we regard these characters as of very limited taxonomic value in this case.

We have not been able to determine whether Nylander saw the whole specimens collected by Vainio or only the parts that are now kept in H. However, as the material is clearly

homogeneous and belong to the same gathering, we designate the Thölö specimen in TUR-V as the lectotype of *L. melaphanoides*, as this is the largest and most well-developed specimen.

Additional specimens examined: Finland, Helsinki, Meilans [= Meilahti], kivellä kalliolla [= on boulder on rock outcrop], 1874, E. Lang [= Vainio], (H-NYL 20193 = H9509019; TUR-V 25159).

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Author contributions

Måns Svensson: Conceptualization (lead); Data curation (equal); Funding acquisition (lead); Investigation (lead); Writing – original draft (lead); Writing – review and editing (lead). **Björn Owe-Larsson:** Conceptualization (supporting); Data curation (equal); Investigation (supporting); Writing – original draft (supporting); Writing – review and editing (supporting).

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