

Report of 27 lichenicolous fungi species and three genera new to Finland

Arto Puolasmaa¹ and Inka Kuusisto²

¹ Herbarium (TUR), Biodiversity Unit,
University of Turku, Finland.

² Herbarium (TUR) and Kevo Subarctic
Research Station, Biodiversity Unit,
University of Turku, Finland.

* Corresponding author: ihmkuu@utu.fi

Keywords: *lichenicolous fungi, new records,
herbarium specimens*

Article info:

Received: 19 April 2023

Accepted: 10 December 2023

Published online: 23 April 2024

Corresponding Editor: Riikka Linnakoski

Abstract

We studied systematically herbaria lichen specimens collected from Finland and from former Finnish parts of Russia to detect lichenicolous fungi. In total, 3355 lichen specimens were found with lichenicolous fungi from 160 taxa. We report here 27 species and three genera that are new to Finland. Three of these, *Cercidospora epithamnolia*, *Cyclothorium* sp. and *Roselliniella stereocaulorum*, are reported as also new to Scandinavia. Three taxa are reported from a new host.

Introduction

Lichenicolous fungi are a diverse group of lichen-colonizing fungi that live exclusively on lichens (Lawrey & Diederich, 2003). Lichenicolous fungi have been studied for more than 200 years, but especially outside Europe they are still poorly studied (Lawrey

& Diederich 2003). The world list of lichenicolous fungi comprises approximately 1800 species of which 302 are present in Finland (Lawrey & Diederich 2018; Pykälä et al. 2023). However, collecting lichenicolous fungi has been occasional in Finland and only relatively few taxa have been studied more thoroughly, see for example Alstrup and Ahti (2007), Puolasmaa et al. (2012), Myllys and Launis (2018), Suija and Jüriado (2020). In this study we systematically studied herbaria lichen specimens. Here we report 28 lichenicolous fungi taxa new to Finland of which three are new to Scandinavia. We also provide a list of all observed taxa (Table 1).

Materials and methods

Specimens were primarily separated from lichen specimens of collections of the Turku University Herbarium (TUR and TUR-V) by systematically scanning herbarium specimens for lichenicolous fungi. Studied lichen taxa were chosen based on the potentially high lichenicolous fungi diversity of the lichen taxa on the grounds of previous records in the literature. However, not all the interesting genera were checked, for example, only a small proportion of specimens from the genus *Cladonia* were screened. Specimens from the lichen genus *Peltigera* were studied also from collections of the Botanical Museum, University of Helsinki (H) and the results of these examinations have been mostly published in Puolasmaa et al. (2012). In addition, in a couple of cases, lichenicolous fungi were observed in the field and deposited to herbaria after an examination. The studied specimens were collected from Finland, former Finnish parts of Russia, and, in a couple of cases, from other parts of Russia from the vicinity of Finland. Species identifications were made mainly by Arto Puolasmaa between the years 2002–2018. The identifications were made using a dissection microscope and a compound microscope. After the examination, specimens were returned to their original herbaria. Taxa new to Finland deposited in the TUR or TUR-V were digitalized into the Collection Management System Kotka of Finnish herbaria, and through that to the Finnish Biodiversity Infor-

mation Facility (FinBIF) in 2023. The nomenclature of lichenicolous fungi follows Santesson's checklist (Westberg et al. 2021).

Results

A total of 160 lichenicolous fungi taxa from 71 genera were detected (Table 1). 28 of these taxa – *Abrothallus lobariae* (Diederich & Etayo) Diederich & Ertz, *Abrothallus nephromatis* Suija & Pérez-Ortega (Figure 1c), *Arthonia caerulescens* (Almq.) R. Sant., *Arthonia destruens* Rehm, *Arthonia lecanorina* (Almq.) R. Sant., *Arthonia stereocaulina* (Ohlert) R. Sant., *Cercidospora epithamnolia* Zhurb., *Cercidospora punctillata* (Nyl.) R. Sant. (Figure 1b), *Cercidospora stereocaulorum* (Arnold) Hafellner, *Cercidospora thamnoliae* Zhurb., *Cyclothyrium*, *Dacampia engeliana* (Saut.) A. Massal., *Endococcus nanellus* Ohlert (Figure 1c), *Epicladonia lapponica* Ihlen, *Lasiosphaeriopsis stereocaulicola* Th. Fr. ex Linds.) O.E. Erikss. & R. Sant., *Lichenochora obscuroides* (Linds.) Triebel & Rambold, *Lichenopeltella stereocaulorum* Zhurb., *Nesolechia fusca* (Triebel & Rambold) Pérez-Ortega, *Opegrapha stereocaulicola* Alstrup & D. Hawksw., *Paranectria oropensis* (Ces.) D. Hawksw. & Piroz., *Polycoccum arnoldii* (Hepp) D. Hawksw., *Polycoccum vermicularium* (Linds.) D. Hawksw., *Pronectria xanthoriae* Lowen & Diederich, *Reconditella physconiarum* Hafellner & Matzer, *Roselliniella stereocaulorum* Zhurb., Kukwa & Oset, *Sclerococcum australe* (Triebel & Hertel) Ertz & Diederich, *Stigidium hageniae* (Rehm) Hafellner, *Taeniolella christianseanii* Alstrup & D. Hawksw., *Thamnogalla crombiei* (Mudd) D. Hawksw (Figure 1a) and *Unguiculariopsis cribriformis* (Norman) Alstrup & D. Hawksw. – are new to Finland of which three, *Cyclothyrium* sp., *Reconditella physconiarum*, *Thamnogalla crombiei*, belong to genera new to Finland (Table 1). Three of the taxa, *Cercidospora epithamnolia*, *Cyclothyrium* sp. and *Roselliniella stereocaulorum* are also new to Scandinavia.

156 of the observed taxa were detected from Finland and 80 from former Finnish parts of Russia. In other words: *Arthonia apotheciorum* (A. Massal.) Almq. was detected only from the Russian side

Table 1. List of observed taxa with the numbers of observations from Finland and from former Finnish parts of Russia and the number of noted host species. Here we report only those taxa we were able to identify to species level except for the genus new to Finland. Bolded taxa are new to Finland.

Taxa	Finland	Russia	Hosts				
<i>Abrothallus caerulescens</i>	28	1	2	<i>Cryptodiscus cladoniicola</i>	8	4	1
<i>Abrothallus cetrariae</i>	12	1	1	Cyclothyrium	5	0	3
Abrothallus lobariae	1	0	1	Dacampia engeliana	2	0	1
<i>Abrothallus nephromatis</i>	3	1	1	<i>Dacampia rufescentis</i>	2	0	1
<i>Abrothallus parmeliarum</i>	64	9	13	<i>Didymocyrtis epiphyscia</i>	2	0	2
<i>Abrothallus peyritschii</i>	13	4	2	Endococcus nanellus	32	3	2
<i>Abrothallus prodiens</i>	2	0	1	<i>Endococcus propinquus</i>	26	5	15
<i>Abrothallus suecicus</i>	111	1	6	Epicladonia laponica	1	0	1
<i>Arthonia apotheciorum</i>	0	1	1	<i>Epilichen glauconigellus</i>	3	0	2
Arthonia caerulescens	1	0	1	<i>Epilichen scabrosus</i>	18	1	3
Arthonia destruens	1	0	1	<i>Epinephroma kamchaticum</i>	16	3	3
<i>Arthonia digitatae</i>	1	0	1	<i>Everniicola flexispora</i>	10	2	1
<i>Arthonia epiphyscia</i>	19	0	5	<i>Graphium aphthosae</i>	13	0	4
<i>Arthonia farinacea</i>	13	0	2	<i>Hawksworthiana peltigericola</i>	12	1	7
<i>Arthonia fuscopurpurea</i>	1	0	1	<i>Heterocephalacria physciacearum</i>	29	0	5
Arthonia lecanorina	10	0	2	<i>Hobsoniopsis santessonii</i>	17	0	1
<i>Arthonia molendoi</i>	9	6	3	<i>Homostegia piggotii</i>	45	0	2
<i>Arthonia nephromiaria</i>	4	0	3	<i>Illosporopsis christiansenii</i>	1	0	1
<i>Arthonia peltigerea</i>	9	0	1	<i>Illosporium carneum</i>	71	3	8
<i>Arthonia peltigerina</i>	0	1	1	<i>Knufia peltigerae</i>	18	0	4
<i>Arthonia phaeophysciae</i>	17	1	5	<i>Lasiosphaeriopsis salisburyi</i>	3	2	1
Arthonia stereocaulina	24	1	12	Lasiosphaeriopsis stereocaulicola	10	0	6
<i>Arthonia subfuscicola</i>	11	1	2	<i>Libertiella fennica</i>	5	0	2
<i>Arthonia varians</i>	9	1	2	<i>Libertiella malmedyensis</i>	8	0	2
<i>Bacidina phacodes</i>	16	7	6	Lichenochora obscuroides	1	0	
<i>Candelariella superdistans</i>	10	0	2	<i>Lichenochora polycoccoides</i>	23	1	4
<i>Carbonea supersparsa</i>	7	1	2	<i>Lichenochora weillii</i>	47	2	4
<i>Carbonea vitellinaria</i>	26	0	5	<i>Lichenocodium lecanorae</i>	34	1	12
<i>Catillaria stereocaulorum</i>	36	1	14	<i>Lichenocodium lichenicola</i>	1	0	1
<i>Cecidonia umbonella</i>	2	2	2	<i>Lichenocodium usneae</i>	77	1	11
<i>Cercidospora epipolytropa</i>	27	3	4	<i>Lichenocodium xanthoriae</i>	35	0	4
Cercidospora epithamnia	1	0	1	<i>Lichenodiplis lecanorae</i>	11	0	5
<i>Cercidospora macrospora</i>	3	1	2	<i>Lichenopeltella cetrariicola</i>	32	7	5
Cercidospora punctillata	5	0	1	<i>Lichenopeltella peltigericola</i>	110	3	13
Cercidospora stereocaulorum	14	1	9	<i>Lichenopeltella santessonii</i>	47	3	7
Cercidospora thamnoliae	1	0	1	Lichenopeltella stereocaulorum	1	0	1
<i>Cortigifraga fuckelii</i>	45	3	10	<i>Lichenostigma alpinum</i>	1	0	1
<i>Cortigifraga peltigerae</i>	63	0	14	<i>Lichenostigma maureri</i>	9	0	2

<i>Muellerella erratica</i>	5	0	2	<i>Rhagadostoma brevisporum</i>	4	0	2
<i>Muellerella hospitans</i>	2	0	1	<i>Rhagadostoma lichenicola</i>	25	2	1
<i>Muellerella lichenicola</i>	22	0	4	<i>Roselliniella nephromatis</i>	23	3	4
<i>Muellerella pygmaea</i>	35	25	9	<i>Roselliniella stereocaulorum</i>	2	0	1
<i>Muellerella ventosicola</i>	69	8	2	<i>Sclerococcum attendendum</i>	1	0	1
<i>Nanostictis peltigerae</i>	84	2	9	<i>Sclerococcum australe</i>	1	0	1
<i>Nectriopsis lecanodes</i>	22	2	12	<i>Sclerococcum deminutum</i>	1	1	1
<i>Neocoleroa inundata</i>	1	0	1	<i>Sclerococcum homoclinellum</i>	2	0	2
<i>Nesolechia fusca</i>	2	0	1	<i>Sclerococcum lobiariellum</i>	2	0	2
<i>Nesolechia oxyspora</i>	44	2	9	<i>Sclerococcum sphaerale</i>	1	1	2
<i>Niesslia peltigericola</i>	119	11	5	<i>Scutula curvispora</i>	78	1	4
<i>Norrlinia peltigericola</i>	1	0	1	<i>Scutula dedicata</i>	22	3	5
<i>Opegrapha pulvinata</i>	6	1	1	<i>Scutula epiblastematica</i>	85	3	5
<i>Opegrapha stereocaulicola</i>	3	0	4	<i>Scutula heerii</i>	3	0	1
<i>Paranectria oropensis</i>	(1)	1	1	<i>Scutula miliaris</i>	146	16	4
<i>Pezizella epithallina</i>	2	0	1	<i>Sphaerellothecium minutum</i>	1	0	1
<i>Phacopsis cephalodioides</i>	5	0	1	<i>Stigmatidium congestum</i>	2	1	3
<i>Phoma epiparmelia</i>	3	1	2	<i>Stigmatidium fuscatae</i>	27	1	1
<i>Phoma peltigerae</i>	36	0	6	<i>Stigmatidium hageniae</i>	6	1	1
<i>Plectocarpon lichenum</i>	17	5	1	<i>Stigmatidium leucophlebiae</i>	5	0	2
<i>Plectocarpon linitae</i>	18	8	1	<i>Stigmatidium peltideae</i>	35	2	5
<i>Plectocarpon nephromeum</i>	3	2	1	<i>Stigmatidium pumilum</i>	18	3	5
<i>Plectocarpon peltigerae</i>	1	0	1	<i>Stigmatidium solorinarium</i>	18	10	1
<i>Polycoccum arnoldii</i>	6	2	4	<i>Stigmatidium squamariae</i>	22	1	5
<i>Polycoccum peltigerae</i>	30	0	4	<i>Stigmatidium stygnospilum</i>	19	3	3
<i>Polycoccum pulvinatum</i>	38	2	7	<i>Taeniolella christiansenii</i>	3	0	2
<i>Polycoccum superficiale</i>	2	0	1	<i>Taeniolella pertusariicola</i>	8	1	2
<i>Polycoccum trypetheliodes</i>	12	0	5	<i>Taeniolella rolfii</i>	10	0	1
<i>Polycoccum vermicularium</i>	1	1	1	<i>Telogalla olivieri</i>	25	2	1
<i>Polydesmia lichenis</i>	10	0	2	<i>Tetramelas pulverulentus</i>	3	3	1
<i>Pronectria erythrinella</i>	25	1	6	<i>Thamnogalla crombiei</i>	14	0	1
<i>Pronectria ornamentata</i>	4	0	3	<i>Thelocarpon epibolum</i>	74	6	7
<i>Pronectria robergei</i>	5	0	2	<i>Tremella cetrariicola</i>	55	2	3
<i>Pronectria santessonii</i>	3	0	1	<i>Tremella cladoniae</i>	1	0	1
<i>Pronectria tenuispora</i>	16	0	4	<i>Tremella coppinsii</i>	8	0	1
<i>Pronectria xanthoriae</i>	2	0	1	<i>Tremella hypogymniae</i>	47	5	1
<i>Protounguicularia nephromae</i>	10	7	4	<i>Unguiculariopsis cribriformis</i>	1	0	1
<i>Pyrenidium actinellum</i>	10	1	7	<i>Unguiculariopsis thallophila</i>	20	0	2
<i>Ramboldia insidiosa</i>	19	1	2	<i>Vouauxiella lichenicola</i>	12	0	4
<i>Reconditella physconiarum</i>	1	0	1	<i>Xanthoriicola physciae</i>	1	0	1
<i>Refractohilum galligenum</i>	32	11	2	<i>Xenonectriella lutescens</i>	5	0	2
<i>Refractohilum peltigerae</i>	1	0	1	<i>Zwackhiomyces coepulonus</i>	1	1	2



Figure 1. a) *Thamnogalla crombiei* on *Thamnolia vermicularis*, TFU.196940, b) *Cercidospora punctillata* on *Solorina crocea*, TFU.184091, c) *Endococcus nanellus* on *Stereocaulon tomentosum*, TLC.75094 and d) *Abrothallus nephromatis* on *Nephroma bellum*, TFU.181787.

of the Etelä-Karjala biogeographical province, *A. peltigerina* (Almq.) H. Olivier only from Petsamo province and *Paranectria oropensis* (Ces.) D. Hawksw. & Piroz. respectively only from the Russian side of Kuusamo biogeographical province (although we detected it also from one site from Finland, but this specimen is currently missing), whereas 79 of the taxa were found exclusively from Finland (Table 1). Overall, we found 3355 lichen specimens with lichenicolous fungi of which 3188 were identified to the species level, while the rest were identified to the genus level. 152 from the Finnish observations represented taxa new to Finland.

Lichenicolous fungi observations were made from more than 200 host species of which 43 hosted taxa new to Finland. Because some lichen genera

were studied more thoroughly than others we cannot conclude which lichen genera host the highest numbers of lichenicolous fungi. From the taxa new to Finland relatively many (eight) were found from *Stereocaulon* spp. which is probably because lichenicolous fungi from that genus were previously poorly investigated (for example genus *Peltigera* was studied in 2012 by Puolasmaa et al.). The host specificity of the detected lichenicolous fungi varied but the majority of the detected taxa seemed to be specialized to some lichen genus. We noted three new lichen – lichenicolous fungi interactions i.e. three lichenicolous fungi from three new hosts. However, these examinations were made only from specimens belonging to the taxa new to Finland and thus the overall number of new interactions in our data is probably higher.

The majority of the specimen data is available originally in Finnish. The original specimen data for the new taxa to Finland, as recorded in the Collection Management System Kotka, can be found following the link provided.

Specimens examined; taxa new to Finland

Specimens deposited to TUR or TUR-V

More information can be loaded from the IDs of the specimens. Alternatively, a list of all studied specimens deposited to TUR or TUR-V with detailed information can also be viewed at <https://laji.fi/en/observation/map?keyword=GX.18207>

Abrothallus lobariae (Diederich & Etayo) Diederich & Ertz

<http://mus.utu.fi/TFU.181782>, EP, Mustasaari, **HOST:** *Lobaria pulmonaria*, 1954

Abrothallus nephromatis Suija & Pérez-Ortega

<http://mus.utu.fi/TFU.181789>, InL, Utsjoki, **HOST:** *Nephroma bellum*, 1964; <http://mus.utu.fi/TFU.181788>, InL, Utsjoki, **HOST:** *Nephroma bellum*, 1964; <http://mus.utu.fi/TFU.181787>, InL, Utsjoki, **HOST:** *Nephroma bellum*, 1973

NOTE: This taxon was originally identified as *Abrothallus welwitschii* Mont. but since the taxonomic revision of the genus (Suija et al. 2015) we suppose that our specimens refer to *A. nephromatis*.

Arthonia caerulescens (Almq.) R. Sant.

<http://mus.utu.fi/TLC.75437>, PH, Petäjavesi, **HOST:** *Lecanora varia*, 1973

Arthonia destruens Rehm

<http://mus.utu.fi/TLC.74838>, A, Lemland, **HOST:** *Physcia aipolia*, 1923

Arthonia lecanorina (Almq.) R. Sant.

<http://mus.utu.fi/TVA.29056>, A, Föglö, **HOST:** *Lecanora carpinea*, 1923; <http://mus.utu.fi/TLC.75643>, V, Turku, **HOST:** *Lecanora carpinea*, 1923; <http://mus.utu.fi/TLC.23663>, U, Helsinki, **HOST:** *Lecanora* sp., 1880; <http://mus.utu.fi/TLC.23664>, EH, Hollola, **HOST:** *Lecanora* sp., 1872; <http://mus.utu.fi/TVA.05504>, EH, Hollola, **HOST:** *Lecanora carpinea*, 1872; <http://mus.utu.fi/TVA.29064>, EH, Jokioinen, **HOST:** *Lecanora albella*, 1872; <http://mus.utu.fi/TLC.75467>, EP, Alavus, **HOST:** *Lecanora carpinea*, 1948; <http://mus.utu.fi/TLC.75403>, PeP, Simo, **HOST:** *Lecanora carpinea*, 1920; <http://mus.utu.fi/TLC.75468>, PeP, Simo, **HOST:** *Lecanora carpinea*, 1952

NOTE: *Lecanora carpinea* is a new host species.

Arthonia stereocaulina (Ohlert) R. Sant.

<http://mus.utu.fi/TLC.74965>, V, Salo, **HOST:** *Stereocaulon nanodes*, 1988; <http://mus.utu.fi/TLC.74966>, U, Hanko, **HOST:** *Stereocaulon alpinum*, 1910; <http://mus.utu.fi/TVA.3741>, EH, Hollola, **HOST:** *Stereocaulon tomentosum*, 1869; <http://mus.utu.fi/TVA.3736>, EH, Jyväskylä, **HOST:** *Stereocaulon tomentosum*, 1873; <http://mus.utu.fi/TLC.74967>, PS, Kuopio, **HOST:** *Stereocaulon tomentosum*, 1907; <http://mus.utu.fi/TLC.74949>, PK, Kontiolahti, **HOST:** *Stereocaulon tomentosum*, 1948; <http://mus.utu.fi/TLC.74948>, PK, Kontiolahti, **HOST:** *Stereocaulon tomentosum*, 1948; <http://mus.utu.fi/TLC.74950>, Kn, Kuhmo, **HOST:** *Stereocaulon tomentosum*, 1956; <http://mus.utu.fi/TLC.74952>, Kn, Kuhmo, **HOST:** *Stereocaulon tomentosum*, 1956; <http://mus.utu.fi/TLC.74951>, Kn, Kuhmo, **HOST:** *Stereocaulon tomentosum*, 1956; <http://mus.utu.fi/TLC.74954>, PeP, Simo, **HOST:** *Stereocaulon paschale*, 1951; <http://mus.utu.fi/TLC.74953>, Kn, Suomussalmi, **HOST:** *Stereocaulon tomentosum*, 1936; <http://mus.utu.fi/TLC.75014>, KiL, Kittilä, **HOST:** *Stereocaulon saxatile*, 1969; <http://mus.utu.fi/TLC.74955>, EnL, Enontekiö, **HOST:** *Stereocaulon paschale*, 1958; <http://mus.utu.fi/TLC.75010>, EnL, Enontekiö, **HOST:** *Stereocaulon paschale*, 1958; <http://mus.utu.fi/TLC.74956>, EnL, Enontekiö, **HOST:** *Stereocaulon alpinum*, 1974; <http://mus.utu.fi/TLC.74968>, EnL, Enontekiö, **HOST:** *Stereocaulon botryosum*, 1977;

utu.fi/TLC.74957, InL, Utsjoki, **HOST:** *Stereocaulon subcoralloides*, 1962; <http://mus.utu.fi/TLC.74961>, InL, Utsjoki, **HOST:** *Stereocaulon condensatum*, 1965; <http://mus.utu.fi/TLC.74959>, InL, Utsjoki, **HOST:** *Stereocaulon glareosum*, 1965; <http://mus.utu.fi/TLC.74958>, InL, Utsjoki, **HOST:** *Stereocaulon rivulorum*, 1974; <http://mus.utu.fi/TLC.74962>, InL, Utsjoki, **HOST:** *Stereocaulon alpinum*, 1974; <http://mus.utu.fi/TLC.74963>, InL, Utsjoki, **HOST:** *Stereocaulon alpinum*, 1974; <http://mus.utu.fi/TLC.74960>, InL, Utsjoki, **HOST:** *Stereocaulon depressum*, 1984

Cercidospora epithamnia Zhurb.

<http://mus.utu.fi/TFU.196946>, EnL, Enontekiö, **HOST:** *Thamnia vermicularis*, 1968

Cercidospora punctillata (Nyl.) R. Sant.

<http://mus.utu.fi/TFU.184092>, EnL, Enontekiö, **HOST:** *Solorina crocea*, 1958; <http://mus.utu.fi/TFU.184088>, EnL, Enontekiö, **HOST:** *Solorina crocea*, 1968; <http://mus.utu.fi/TFU.184091>, EnL, Enontekiö, **HOST:** *Solorina crocea*, 1968; <http://mus.utu.fi/TFU.184093>, InL, Utsjoki, **HOST:** *Solorina crocea*, 1960; <http://mus.utu.fi/TFU.184094>, InL, Utsjoki, **HOST:** *Solorina crocea*, 1963

Cercidospora stereocaulorum (Arnold)

Hafellner

<http://mus.utu.fi/TFU.196489>, A, Brändö, **HOST:** *Stereocaulon evolutum*, 1988; <http://mus.utu.fi/TFU.197483>, V, Salo, **HOST:** *Stereocaulon pileatum*, 1989; <http://mus.utu.fi/TFU.196486>, V, Salo, **HOST:** *Stereocaulon taeniarum*, 1989; <http://mus.utu.fi/TFU.196487>, V, Salo, **HOST:** *Stereocaulon dactylophyllum*, 1990; <http://mus.utu.fi/TFU.196488>, V, Salo, **HOST:** *Stereocaulon dactylophyllum*, 1990; <http://mus.utu.fi/TFU.196484>, Kn, Vaala, **HOST:** *Stereocaulon paschale*, 1981; <http://mus.utu.fi/TFU.196485>, PS, Sonkajärvi, **HOST:** *Stereocaulon tomentosum*, 1947; <http://mus.utu.fi/TFU.196483>, Ks, Kuusamo, **HOST:** *Stereocaulon paschale*, 1981; <http://mus.utu.fi/TFU.196478>, EnL, Enontekiö, **HOST:** *Stereocaulon vesuvianum*, 1977; <http://mus.utu.fi/TFU.196479>, EnL, Enontekiö, **HOST:** *Stereocaulon vesuvianum*, 1977; <http://mus.utu.fi/TFU.196481>, InL, Utsjoki,

HOST: *Stereocaulon subcoralloides*, 1965; <http://mus.utu.fi/TFU.196482>, InL, Utsjoki, **HOST:** *Stereocaulon tomentosum*, 1965; <http://mus.utu.fi/TFU.196480>, InL, Utsjoki, **HOST:** *Stereocaulon saxatile*, 1974; <http://mus.utu.fi/TFU.196833>, InL, Utsjoki, **HOST:** *Stereocaulon tomentosum*, 1974

Cercidospora thamniae Zhurb.

<http://mus.utu.fi/TFU.196948>, EnL, Enontekiö, **HOST:** *Thamnia vermicularis*, 1956

Cyclothyrium Petr.

<http://mus.utu.fi/TFU.184335>, V, Kemiönsaari, **HOST:** *Peltigera rufescens*, 1981; <http://mus.utu.fi/TFU.184334>, V, Parainen, **HOST:** *Peltigera rufescens*, 1958; <http://mus.utu.fi/TFU.184333>, V, Turku, **HOST:** *Peltigera praetextata*, 1923; <http://mus.utu.fi/TFU.184336>, V, Turku, **HOST:** *Peltigera praetextata*, 1934

Dacampia engeliana (Saut.) A. Massal.

<http://mus.utu.fi/TFU.202799>, SoL, Savukoski, **HOST:** *Solorina crocea*, 1878; <http://mus.utu.fi/TFU.193914>, InL, Utsjoki, **HOST:** *Solorina crocea*, 1969

Endococcus nanellus Ohlert

<http://mus.utu.fi/TLC.75061>, V, Parainen, **HOST:** *Stereocaulon tomentosum*, 1969; <http://mus.utu.fi/TLC.75063>, V, Uusikaupunki, **HOST:** *Stereocaulon tomentosum*, 1973; <http://mus.utu.fi/TLC.75094>, V, Uusikaupunki, **HOST:** *Stereocaulon tomentosum*, 1973; <http://mus.utu.fi/TLC.75095>, V, Uusikaupunki, **HOST:** *Stereocaulon tomentosum*, 1973; <http://mus.utu.fi/TLC.75096>, U, Espoo, **HOST:** *Stereocaulon tomentosum*, 1937; <http://mus.utu.fi/TVA.3735>, EH, Hollola, **HOST:** *Stereocaulon tomentosum*, 1872; <http://mus.utu.fi/TLC.75097>, EH, Hämeenlinna, **HOST:** *Stereocaulon grande*, 1907; <http://mus.utu.fi/TVA.3721>, EH, Jokioinen, **HOST:** *Stereocaulon tomentosum*, 1872; <http://mus.utu.fi/TVA.3733>, EH, Jokioinen, **HOST:** *Stereocaulon tomentosum*, 1872; <http://mus.utu.fi/TLC.75060>, EP, Isokyrö, **HOST:** *Stereocaulon tomentosum*, 1916; <http://mus.utu.fi/TFU.196482>, InL, Utsjoki, **HOST:** *Stereocaulon tomentosum*, 1965; <http://mus.utu.fi/TFU.196480>, InL, Utsjoki, **HOST:** *Stereocaulon saxatile*, 1974; <http://mus.utu.fi/TFU.196833>, InL, Utsjoki, **HOST:** *Stereocaulon tomentosum*, 1974

TLC.75089, EP, Isokyrö, **HOST: *Stereocaulon tomentosum***, 1916; <http://mus.utu.fi/TLC.75059>, EP, Kristiinankaupunki, **HOST: *Stereocaulon tomentosum***, 1953; <http://mus.utu.fi/TLC.75088>, PH, Jyväskylän, **HOST: *Stereocaulon tomentosum***, 1948; <http://mus.utu.fi/TLC.75087>, PH, Jyväskylän, **HOST: *Stereocaulon tomentosum***, 1949; <http://mus.utu.fi/TLC.75085>, PS, Pielavesi, **HOST: *Stereocaulon tomentosum***, 1897; <http://mus.utu.fi/TLC.75084>, PS, Leppävirta, **HOST: *Stereocaulon tomentosum***, 1957; <http://mus.utu.fi/TLC.75240>, PS, Kuopio, **HOST: *Stereocaulon grande***, 1942; <http://mus.utu.fi/TLC.75067>, KP, Pyhäjärvi, **HOST: *Stereocaulon tomentosum***, 1960; <http://mus.utu.fi/TLC.75068>, KP, Pyhäjärvi, **HOST: *Stereocaulon tomentosum***, 1960; <http://mus.utu.fi/TLC.75066>, Kn, Kuhmo, **HOST: *Stereocaulon tomentosum***, 1910; <http://mus.utu.fi/TLC.75102>, Kn, Kuhmo, **HOST: *Stereocaulon tomentosum***, 1956; <http://mus.utu.fi/TLC.75103>, Kn, Ristijärvi, **HOST: *Stereocaulon tomentosum***, 1956; <http://mus.utu.fi/TLC.75086>, Kn, Kajaani, **HOST: *Stereocaulon tomentosum***, 1951; <http://mus.utu.fi/TLC.75065>, Kn, Paltamo, **HOST: *Stereocaulon tomentosum***, 1970; <http://mus.utu.fi/TLC.75083>, Kn, Ristijärvi, **HOST: *Stereocaulon tomentosum***, 1956; <http://mus.utu.fi/TLC.75104>, Kn, Ristijärvi, **HOST: *Stereocaulon tomentosum***, 1956; <http://mus.utu.fi/TLC.75105>, Kn, Ristijärvi, **HOST: *Stereocaulon tomentosum***, 1956; <http://mus.utu.fi/TLC.75069>, Ks, Kuusamo, **HOST: *Stereocaulon tomentosum***, 1937; <http://mus.utu.fi/TLC.75062>, Ks, Kuusamo, **HOST: *Stereocaulon tomentosum***, 1969; <http://mus.utu.fi/TLC.75098>, Ks, Kuusamo, **HOST: *Stereocaulon grande***, 1981; <http://mus.utu.fi/TLC.75101>, InL, Inari, **HOST: *Stereocaulon tomentosum***, 1909; <http://mus.utu.fi/TLC.75099>, InL, Utsjoki, **HOST: *Stereocaulon tomentosum***, 1964

Epicladonia lapponica Ihlen

<http://mus.utu.fi/TLC.28367>, InL, Utsjoki, **HOST: *Pleopsidium chlorophanum***, 1963

Lasiosphaeriopsis stereocaulicola Th. Fr. ex Linds.) O.E. Erikss. & R. Sant.

<http://mus.utu.fi/TFU.196827>, PK, Lieksa, **HOST: *Stereocaulon condensatum***, 1936; <http://mus.utu.fi/TFU.197478>, Kn, Kuhmo, **HOST: *Stereocaulon***

paschale, 1956; <http://mus.utu.fi/TFU.196828>, EnL, Enontekiö, **HOST: *Stereocaulon condensatum***, 1974; <http://mus.utu.fi/TFU.200237>, InL, Inari, **HOST: *Stereocaulon tomentosum***, 1909; <http://mus.utu.fi/TFU.196831>, InL, Utsjoki, **HOST: *Stereocaulon condensatum***, 1956; <http://mus.utu.fi/TFU.196830>, InL, Utsjoki, **HOST: *Stereocaulon rivulorum***, 1959; <http://mus.utu.fi/TFU.197479>, InL, Utsjoki, **HOST: *Stereocaulon grande***, 1961; <http://mus.utu.fi/TFU.197480>, InL, Utsjoki, **HOST: *Stereocaulon grande***, 1961; <http://mus.utu.fi/TFU.197482>, InL, Utsjoki, **HOST: *Stereocaulon grande***, 1961; <http://mus.utu.fi/TFU.196829>, InL, Utsjoki, **HOST: *Stereocaulon alpinum***, 1974

Lichenochora obscuroides (Linds.) Triebel & Rambold

<http://mus.utu.fi/TFU.202401>, U, Raasepori, **HOST: *Physcia tenella***, 1907

Lichenopeltella stereocaulorum Zhurb.

<http://mus.utu.fi/TFU.197487>, EnL, Enontekiö, **HOST: *Stereocaulon alpinum***, 1958

Nesolechia fusca (Triebel & Rambold) Pérez-Ortega

<http://mus.utu.fi/TLC.75448>, V, Naantali, **HOST: *Xanthoparmelia conspersa***, 1971; <http://mus.utu.fi/TVA.2811>, U, Helsinki, **HOST: *Xanthoparmelia conspersa***, 1893

Opegrapha stereocaulicola Alstrup & D. Hawksw.

<http://mus.utu.fi/TLC.75008>, InL, Utsjoki, **HOST: *Stereocaulon subcoralloides***, 1964; <http://mus.utu.fi/TLC.75007>, InL, Utsjoki, **HOST: *Stereocaulon spathuliferum***, 1965; <http://mus.utu.fi/TLC.75006>, InL, Utsjoki, **HOST: *Stereocaulon botryosum***, 1965

Polycoccum arnoldii (Hepp) D. Hawksw.

<http://mus.utu.fi/TVA.22018>, EH, Hollola, **HOST: *Lecidea* cf. *caesiocinerascens***, 1874; <http://mus.utu.fi/TVA.22012>, PH, Juupajoki, **HOST: *Rhizocarpon***

colludens, 1874; <http://mus.utu.fi/TVA.21894>, PH, Jyväskylä, **HOST**: *Rhizocarpon obscuratum*, 1874; <http://mus.utu.fi/TVA.21900>, PK, Nurmes, **HOST**: *Rhizocarpon lavatum*, year unknown; <http://mus.utu.fi/TFU.201778>, PeP, Simo, **HOST**: *Rhizocarpon oederi*, 1946; <http://mus.utu.fi/TFU.201779>, PeP, Simo, **HOST**: *Rhizocarpon jemtlandicum*, 1951

NOTE: *Lecidea* is a new host genus.

Polycoccum vermicularium (Linds.) D. Hawksw.

<http://mus.utu.fi/TFU.196949>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1968

Pronectria xanthoriae Lowen & Diederich

<http://mus.utu.fi/TFU.194393>, EH, Hattula, **HOST**: *Xanthoria parietina*, 1970; <http://mus.utu.fi/TFU.194395>, EH, Hämeenlinna, **HOST**: *Xanthoria parietina*, 1964

Reconditella physconiarum Hafellner & Matzer

<http://mus.utu.fi/TFU.202395>, EH, Jokioinen, **HOST**: *Physconia enteroxantha*, 1985

NOTE: *Physconia enteroxantha* is a new host species.

Roselliniella stereocaulorum Zhurb., Kukwa & Oset

<http://mus.utu.fi/TFU.197485>, St, Loimaa, **HOST**: *Stereocaulon condensatum*, 1959; <http://mus.utu.fi/TVA.3776>, EH, Jyväskylä, **HOST**: *Stereocaulon condensatum*, 1873

Sclerococcum australe (Triebel & Hertel) Ertz & Diederich

<http://mus.utu.fi/TFU.201887>, InL, Utsjoki, **HOST**: *Porpidia flavicunda*, 1957

Stigmatidium hageniae (Rehm) Hafellner

<http://mus.utu.fi/TFU.180991>, A, Föglö, **HOST**: *Anaptychia ciliaris*, 1934; <http://mus.utu.fi/TFU.180992>, A, Jomala, **HOST**: *Anaptychia ciliaris*, 1941; <http://mus.utu.fi/TFU.180989>, V, Naantali, **HOST**: *Anaptychia ciliaris*, 1971; <http://mus.utu.fi/TFU.180990>, V, Parainen, **HOST**: *Anaptychia ciliaris*, 1973; <http://mus.utu.fi/TFU.180988>, U, Hanko, **HOST**: *Anaptychia ciliaris*, 1913; <http://mus.utu.fi/TFU.180987>, U, Hanko, **HOST**: *Anaptychia ciliaris*, 1946;

Taeniolella christiansenii Alstrup & D. Hawksw.

<http://mus.utu.fi/TFU.196824>, A, Sund, **HOST**: *Stereocaulon taeniarum*, 1973; <http://mus.utu.fi/TFU.196826>, V, Kemiönsaari, **HOST**: *Stereocaulon saxatile*, 1989; <http://mus.utu.fi/TFU.196825>, V, Lieto, **HOST**: *Stereocaulon saxatile*, 1976

Thamnogalla crombiei (Mudd) D. Hawksw.

<http://mus.utu.fi/TFU.196940>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1948; <http://mus.utu.fi/TFU.196942>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1948; <http://mus.utu.fi/TFU.196941>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1951; <http://mus.utu.fi/TFU.196936>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1956; <http://mus.utu.fi/TFU.196934>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1959; <http://mus.utu.fi/TFU.196935>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1967; <http://mus.utu.fi/TFU.196947>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1968; <http://mus.utu.fi/TFU.196950>, EnL, Enontekiö, **HOST**: *Thamnozia vermicularis*, 1968; <http://mus.utu.fi/TFU.196938>, InL, Inari, **HOST**: *Thamnozia vermicularis*, 1968; <http://mus.utu.fi/TFU.196939>, InL, Utsjoki, **HOST**: *Thamnozia vermicularis*, 1956; <http://mus.utu.fi/TFU.196945>, InL, Utsjoki, **HOST**: *Thamnozia vermicularis*, 1959; <http://mus.utu.fi/TFU.196937>, InL, Utsjoki, **HOST**: *Thamnozia vermicularis*, 1961; <http://mus.utu.fi/TFU.196944>, InL, Utsjoki, **HOST**: *Thamnozia vermicularis*, 1974; <http://mus.utu.fi/TFU.196943>, InL, Utsjoki, **HOST**: *Thamnozia vermicularis*, 1996

Unguiculariopsis cribriformis (Norman) Alstrup & D. Hawksw.

<http://mus.utu.fi/TFU.205229>, EnL, Enontekiö, **HOST**: *Lepra dactylina*, 1956

Specimendeposited to H:

Cyclothyrium sp.

H6010955: Finland, EH, Iitti. Sääksjärvi, **HOST:** *Peltigera didactyla*, 60.840471°N, 26.238424°E, 3 December 2000, coll. Haikonen Veli, det. Puolasmaa Arto, 2007.

Currently missing specimens, not included in the results:

Echinodiscus sp. Etayo & Diederich

TUR 201283: Finland, EH, Hämeenlinna, Hattelmala, **HOST:** *Myriolecis populicola*, 67.132145°N, 27.495822°E, 27 August 1953, coll. Hakulinen Rainar, det. Puolasmaa Arto, 2013

Paranectria oropensis (Ces.) D. Hawksw. & Piroz.

H 9211350: Finland, SoL, Pelkosenniemi, Keminniemi, Sainvaara, **HOST:** *Lobaria scrobiculata*, 67.132145°N, 27.495822°E, 20 June 1965, coll. Rintanen Tapio, det. Puolasmaa Arto, 2017

Conclusions

Our study reveals the hidden diversity residing in the herbarium collections: most of the studied specimens were originally collected to study the host species and the lichenicolous fungi occurring in the specimens were seriously overlooked. Herbarium specimens can also give insight into the past: by studying herbarium specimens, we were able to identify lichenicolous fungi collected more than 150 years ago. In our investigations, we found 28 taxa new to Finland. This shows that lichenicolous fungi are poorly studied in Finland and systematic investigations are needed. Although we scanned lichenicolous fungi from various lichen genera some of the host genera are still poorly investigated. For example, only a small part of the specimens from the genus *Cladonia* in TUR were screened. We sus-

pect that *Cladonia* spp. might host many previously undetected lichenicolous fungi species from Finland. Hence future systematic investigations should be allocated especially to this lichen genus.

Acknowledgements

We are extremely grateful to Kati Pihlaja for reviewing and improving the manuscript. Dr. Juha Pykälä is acknowledged for providing information about specimens deposited to H. Annika Metso is thanked for returning the digitalized specimens to TUR collections. We also warmly thank Nelly Llerena Martinez for guidance in taking the dissection microscope photos (**Figure 1**).

References

- Alstrup, V. & Ahti, T. 2007: New reports of lichenicolous fungi, mainly from Finland and Russia. *Karstenia* 47: 1-4.
- Lawrey, J. D., & Diederich, P. 2003: Lichenicolous fungi: interactions, evolution, and biodiversity. *The Bryologist* 106: 80-120.
- Lawrey, J. D. & P. Diederich. 2018: Lichenicolous fungi – worldwide checklist, including isolated cultures and sequences available. URL: <http://www.lichenicolous.net> [accessed on 11 April 2023].
- Myllys, L. K. & Launis, M. A. 2018: Additions to the diversity of lichens and lichenicolous fungi living on decaying wood in Finland. *Graphis Scripta* 30:78-87
- Puolasmaa, A., Toivanen, A., Marsh, Huhtinen, S. & Stenroos, S. 2012: Peltigericolous fungi from Finland—three genera and six species new to Finland. *Karstenia* 52:1-50.
- Pykälä, J., Ahti, T., Kantelinen, A., Myllys, L., Puolasmaa, A., Rikkinen, J. & Velmala, S. 2023: Lichens and lichenicolous fungi. In Laiho, E., von Bonsdorff, T., Piirainen, E. (eds.). *FinBIF 2023. The FinBIF checklist of Finnish species 2022*. Finnish Biodiversity Information Facility, Finnish Museum of Natural History, University of Helsinki, Helsinki.
- Suija, A., De Los Rios, A. & Perez-Ortega, S. 2015: A molecular reappraisal of *Abrothallus* species growing on lichens of the order Peltigerales. *Phytotaxa* 195:201-226.

Suija, A. & Jüriado, I. 2020: Records of new and interesting lichenicolous fungi from Finland and Norway. *Graphis Scripta* 32:86-100.

Westberg, M., Moberg, R., Myrdal, M., Nordin, A. & Ekman, S. 2021: Santesson's Checklist of Fennoscandian Lichen-Forming and Lichenicolous Fungi. Museum of Evolution, Uppsala University, 938 pp.
