

# New and noteworthy lichens and lichenicolous fungi from Norway

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Twelve species of lichens and lichenicolous fungi are reported as new to Fennoscandia. Additionally, we report 19 species as new to Norway. New localities are given for 47 rare or seldom collected species. The new combination *Reichlingia anomorphila* (Coppins & P. James) Frisch is proposed. Most collections were made in the boreo-nemoral and boreal rainforests during the NBIC funded project *Three storied diversity – mapping and barcoding crustose lichens and lichenicolous fungi in the Norwegian rainforests* and associated fieldwork in recent years. With the present contribution, we hope to raise awareness on previously neglected groups of lichenised and lichenicolous fungi and encourage further fieldwork in understudied habitats in Norway.

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## Introduction

The lichens of Norway are relatively well known by over two centuries of taxonomic research. A total of 2039 species are reported from the country (Ekman et al. 2019). In recent times, species mapping projects and efforts in biodiversity conservation have considerably increased our understanding of species' distribution and ecology. Nevertheless, new taxa, including species new to science, in the Norwegian lichen biota are discovered almost every year, mainly among crustose lichens and in key habitats such as the oceanic forests along the Norwegian coastline (e.g., Arup et al. 2014, Ertz et al. 2019, Haugan & Timdal 2019a,b, Haugan & Tønsberg 2018, Holien et al. 2016, Jordal et al. 2017, Jørgensen et al. 2013, Klepsland 2013, Nordén & Aptroot 2018, Nordén & Jordal 2016, Nordén et al. 2013, Palice & Tønsberg 2016, Tønsberg & Andersen 2019).

Lichenicolous fungi, on the other hand, are much less studied and remain poorly known. A total of 327 species are reported from Norway (Ekman et al. 2019), of which 58 are not found in other Fennoscandian countries (Nordin et al. 2019). However, many of the species reported for Norway are known from few localities only or have not been collected in the past decades. Hence,

we currently have rather sparse information on the distribution, ecology and conservation status of these species.

During extensive fieldwork in the boreo-nemoral and boreal rainforests, primarily in connection with the species project *Three storied diversity – mapping and barcoding crustose lichens and lichenicolous fungi in the Norwegian rainforests* (TSD), funded by the Norwegian Biodiversity Information Centre (NBIC), we have collected more than 4500 specimens. We are still studying this material and have additionally revised specimens of selected lichenicolous fungi in the collections of the Museum of Evolution in Uppsala (UPS). The specimens in UPS are relevant for the Norwegian distributions in Nordin et al. (2019) and are listed under *Additional specimen(s) examined*. Based on these data, we report 31 species of lichens and lichenicolous fungi as new to Norway or Fennoscandia, and provide new localities for 47 seldom collected species.

With the present contribution, we hope to raise awareness on previously neglected groups of lichenised and lichenicolous fungi and encourage further fieldwork in understudied habitats in Norway.

## Material and Methods

The material was mainly collected by the authors in the boreo-nemoral and boreal rainforests during the Norwegian Biodiversity Information Centre (NBIC) funded project *Three storied diversity – mapping and barcoding crustose lichens and lichenicolous fungi in the Norwegian rainforests*, and during associated field work of the authors in recent years. Collections in BG, O, TRH and UPS were used for reference, and material of selected species in UPS was revised and cited under *Additional specimen(s) examined*. The authors own material is deposited in BG, O, PRA and TRH. Geodetic datum is WGS84 if not otherwise stated.

Thin-layer chromatography (TLC) was performed in solvents A, B' and C on selected taxa following Orange et al. (2010). The nomenclature follows Artsnavnebase (2019) except for species that are not included in this database or otherwise stated below.

## Results

### Species new to Norway or Fennoscandia

#### *Absconditella pauxilla* Vězda & Vivant

The species was collected in Sør-Trøndelag, growing on dry twigs of young *Picea abies* in a steep, N-facing slope in boreal spruce forest. It was associated with *Micarea nitschkeana*. In Fennoscandia, it was previously known from Hälsingland and Dalarna in Sweden (Nordin et al. 2019). It is widespread in other parts of Europe (Aptroot et al. 2004, Coppins 2009a, Fałtynowicz & Kossowska 2016, Motiejūnaitė 2009, Nimis et al. 2018, Palice 1999, Roux et al. 2017, Vondrák & Liška 2013, Wirth et al. 2013) and is also known from Madeira (Pišút 2004). *Absconditella pauxilla* resembles the recently described *A. rubra* van den Boom, M. Brand & Suija (van den Boom et al. 2015), but differs by clearly longer ascospores and more distinct apothecia lacking an orange to reddish hue.

New to Norway.

*Specimen examined*: Sør-Trøndelag: Meldal, E–ESE of Svorkmo village, Sprangåsen, 63°09'28"N, 09°47'26"E, 260 m, 2006-09-14, Palice 15303 (PRA).

*Alyxoria culmigena* (Lib.) Ertz

The species was collected in coastal Norway from Rogaland to Nord-Trøndelag, growing on various trees including *Corylus avellana*, *Ilex aquifolium*, *Populus tremula* and *Sorbus aucuparia* in rain-sheltered situations. It was found in oceanic broad-leaved deciduous forests and coastal pine forests. In addition, one record was from a shady, calciferous, schistose rock below an overhang in boreal spruce forest. In Fennoscandia, *A. culmigena* was previously known from Finland and Sweden (Nordin et al. 2019). The species is further reported from other parts of Europe (Aptroot et al. 2004, Burgaz 2014, Diederich 1989, Himelbrant et al. 2017, Nimis 1993, Nimis et al. 2018, Randle & Saag 1999, Roux et al. 2017, Söchting & Alstrup 2008, Wirth et al. 2013), the Canary Islands (Gil González et al. 1990), North America (Esslinger 2018), Central America (Ertz 2009), Africa (Ertz 2009), Asia (Ertz 2009, Güvenç & Öztürk 2017, Joseph et al. 2016, Joshi et al. 2012, Seaward et al. 2008) and Australia (Kantvilas & Jarman 2012). Most reports have been made under the synonymous name *Opegrapha herbarum* Mont.

New to Norway.

*Note:* We follow Sérusiaux et al. (1999) and Diederich et al. (2012) in accepting *O. herbarum* Mont. as synonym of *Alyxoria culmigena*. The species is probably undercollected in Norway and should be searched for in suitable habitats.

*Specimens examined:* Rogaland: Rennesøy, Helleland, 59°06'03"N, 05°39'55"E, 5–20 m, 2017-07-13, Frisch TSD S6-2-Ca6-2 (TRH-L-37234). Hordaland: Tynes, Reksteren (Hope), 60°03'42"N, 05°25'25"E, 15 m, 2013-06-13, Klepsland JK13-L263 (O-L-206538). Sogn og Fjordane: Flora, Svanøya, Kvalstadfjellet N, 61°29'23"N, 05°04'54"E, 40 m, 2018-05-16, Klepsland JK18-195 (TRH-L-23802). Nord-Trøndelag: Leksvik, Vanvikan, 63°33'30"N, 10°14'40"E, 118 m, 2015-06-25, Frisch 15/No131 (TRH-L-652446); Stjørdal, Stormyra V, 63°26'38"N, 11°07'13"E, 290 m, 2015-09-17, Klepsland JK15-L958 (O-L-206747).

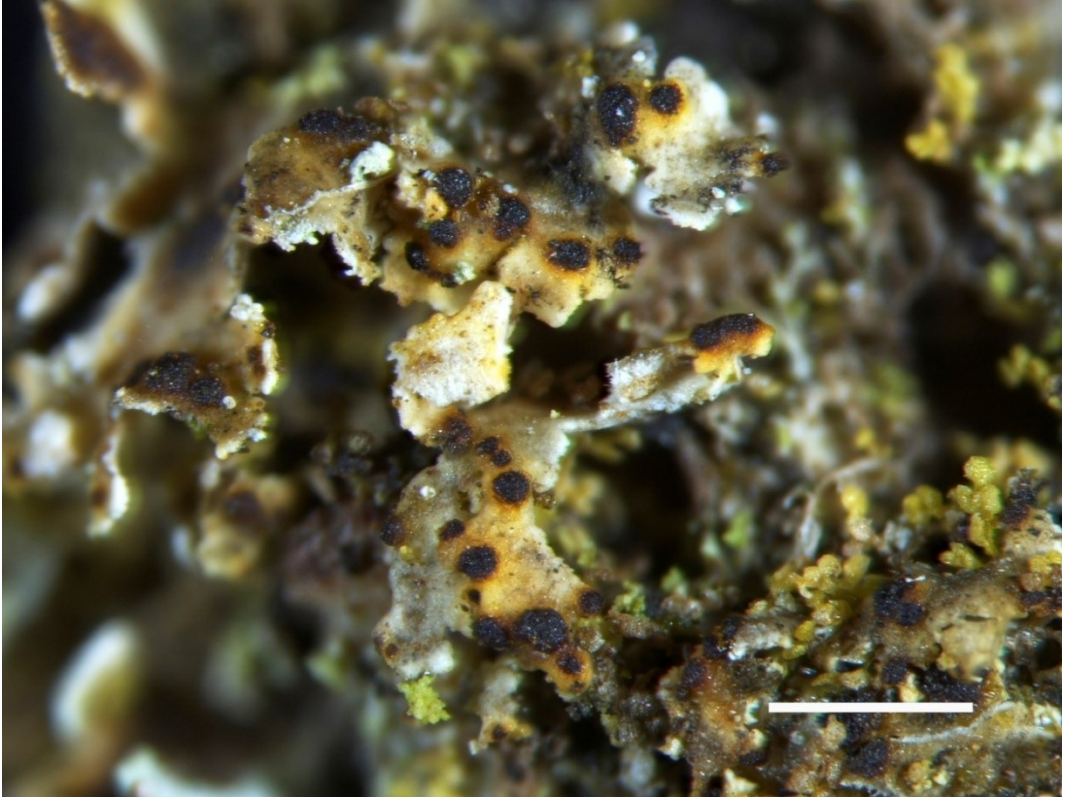
*Arthonia colombiana* Etayo

(Fig. 1)

The species was collected in Hordaland and Nordland, growing on basal squamules and podetia of *Cladonia coniocraea*, *C. macilenta*, *C. polydactyla* and *Cladonia* spp. on trunk bases of *Alnus glutinosa*, *A. incana*, *Betula pubescens*, *Pinus sylvestris* and *Salix aurita*. It was found in coastal pine forest and once in boreal deciduous forest. *Arthonia colombiana* was described from the Andes in Colombia (Etayo 2002) and has further been reported from the British Isles (Coppins & Aptroot 2009, Hitch 2007) and North America (Lendemer & Harris 2012). The type specimen was not available for study, but the Norwegian material agrees well with the protologue and the description in Coppins & Aptroot (2009).

New to Fennoscandia.

*Selected specimens examined:* Hordaland: Austevoll, Kvernvatnet Ø, 60°04'19"N, 05°17'40"E, 20 m, 2019-10-09, Klepsland JK19-527 (O-L-226229); Askøy, Kvernvatnet S, 60°28'07"N, 05°07'41"E, 50 m, 2018-05-13, Klepsland JK18-173 (TRH-L-23801); Askøy, Kvernvatnet S, 60°28'07"N, 05°07'41"E, 50 m, 2018-05-13, Frisch TSD S11-1-Ps3-1 (TRH-L-23857); Bømlo, Skogafjellet, 59°38'58"N, 05°12'26"E, 12 m, 2017-07-19, Frisch TSD S9-2-Ps1-1 & S9-2-Ps3-2 (TRH-L-23862 & 23864); Fitjar, Sandvika, 59°58'07"N, 05°20'16"E, 20 m, 2017-10-03, Frisch 17/No124 (TRH-L-23849); Fusa, Sundfjord Ø, 60°02'59"N, 05°48'28"E, 75 m, 2018-05-08, Klepsland JK18-110 (TRH-L-23797); Kvinnherad, Stussvik N, 60°02'06"N, 05°43'12"E, 220 m, 2019-10-08, Klepsland JK19-524 (O-L-226228); Stord, Øvrabø Ø, 59°46'01"N, 05°24'33"E, 50 m, 2017-04-28, Klepsland JK18-059 (TRH-L-23792); Stord, Øvrabø N, 59°46'09"N, 05°24'22"E, 12 m, 2018-05-07, Klepsland JK18-099 (TRH-L-23794). Nordland: Hemnes, Øverengmoen, 66°06'25"N, 13°49'21"E, 25–40 m, 2018-06-30, Frisch TSD N12-2-Pa7-2 (TRH-L-23853).



**Figure 1.** *Arthonia colombiana* (TRH-L-23857). Scale = 1 mm. Photo: A. Frisch.

*Arthonia digitatae* Hafellner

The species was collected in Aust-Agder, Hordaland, Sogn og Fjordane, Sør-Trøndelag and Troms, growing on basal squamules of *Cladonia* spp. in coastal pine forest and boreal rainforest. It has been found on trunk bases of *Betula pubescens* and *Pinus sylvestris* as well as on rotten wood of stumps and snags of *Picea abies* and *Pinus sylvestris*. In Fennoscandia, *A. digitatae* was previously reported from a single locality in Pite lappmark in Sweden (Ihlen & Wedin 2005). It is also reported from Svalbard (Zhurbenko & Pino-Bodas 2017), other parts of Europe (Alstrup 2014, Aptroot et al. 2005, Brackel 2014, 2016, Guttová et al. 2012, Zhurbenko 2017), Greenland (Alstrup et al. 2009), North America (Esslinger 2018), South America (Etayo & Sancho 2008) and Asia (Alstrup 2014, Zhurbenko & Pino-Bodas 2017, Zhurbenko et al. 2016).

New to Norway.

*Specimens examined:* *Aust-Agder:* Evje og Hornnes, Frubæråsen S, 58°36'22"N, 07°41'11"E, 510 m, 2017-09-21, Klepsland JK17-618 (O-L-221304); Evje og Hornnes, Kallhovd SV, 58°34'31"N, 07°43'13"E, 190 m, 2017-10-10, Klepsland JK17-685 (O-L-221305). *Hordaland:* Austevoll, Kvernavatnet SØ, 60°04'05"N, 05°17'39"E, 60 m, 2019-10-09, Klepsland JK19-526 (O-L-226239); Kvinnherad, Håvikvatnet, Futeneset, 60°02'00"N, 05°46'31"E, 90 m, 2017-07-20, Frisch TSD S7-1-Ps3-3 (TRH-L-23875). *Sogn og Fjordane:* Flora, Svanøya, Vågsfjellet nord, 61°29'23"N, 05°04'57"E, 25–50 m, 2018-05-16, Frisch TSD S14-1-Ps2-2 (TRH-L-23874); Gulen, Sygnefest nordøst, 61°04'17"N, 05°06'23"E, 20–50 m, 2018-05-15, Frisch 18/No99a, TSD S13-2-Bp2-

2 (TRH-L-23873). *Sør-Trøndelag*: Rissa, Nordelva naturreservat, 63°47'22"N, 10°10'27"E, 70 m, 2017-05-04, Frisch TSD N2-2-Extra-9 (TRH-L-23872). *Troms*: Bardu, Berglund, 68°48'58"N, 18°33'22"E, 200 m, 2019-07-18, Frisch TSD N15-1-Sxc1-1 (TRH-L-23871).

### ***Arthonia ligniariella* Coppins**

The species was collected in Buskerud, Oppland, Sogn og Fjordane, Nord-Trøndelag and Nordland. It was found on a thin-stemmed, dead *Salix caprea* in swampy spruce forest, on the rotten wood of *Pinus sylvestris* in an open boggy site, and on rain-sheltered branches of old *Picea abies*. In Fennoscandia, it was previously known from Sweden (Nordin et al. 2019). *Arthonia ligniariella* is further reported from other parts of Europe (Alstrup 2001, Aptroot et al. 2004, Coppins & Aptroot 2009, Nimis et al. 2018) and North America (Esslinger 2018).

New to Norway.

*Specimens examined*: *Buskerud*: Flå, Jeppe N, 60°25'59"N, 09°15'56"E, 860 m, 2019-09-16, Klepsland JK19-429 (O-L-226231). *Oppland*: Nordre Land, Lundbekken Ø, 60°59'05"N, 09°57'19"E, 600 m, 2017-05-19, Klepsland JK17-290 (TRH-L-23778); Nordre Land, Krokvasstjøfjellet V, 61°01'54"N, 10°06'47"E, 900 m, 2019-09-25, Klepsland JK19-475 (O-L-226232). *Sogn og Fjordane*: Vågsøy, N of Maurstad along the road 61, just SE of Trovatnet, 61°58'01"N, 05°30'28"E, 130 m, 2015-09-12, Palice 20307 & Tønsberg (PRA). *Nord-Trøndelag*: Lierne, Båsdalen, 64°29'56"N, 13°12'43"E, 355 m, 2008-06-11, Hofton THH08108 (O-L-186535); Snåsa, Gressåmoen, Barkbekken-Luru, 64°17'47"N, 13°02'38"E, 350 m, 2013-09-28, Hofton THH13323 (O-L-205767); Snåsa, Gressåmoen, Barkbekken-Luru, 64°17'48"N, 13°03'29"E, 365 m, 2013-09-28, Hofton THH13325 (O-L-205771). *Nordland*: Bindal, Fiskaroselva, 65°10'40"N, 12°13'18"E, 15–30 m, 2019-05-15, Frisch TSD N8-1-Pa4-3 (TRH-L-23903).

### ***Arthonia punctella* Nyl.**

The species was collected in Oppland, growing on thallus of *Diplotomma albostratum* in a steep schistose, calcareous rock wall in alpine heath. In Fennoscandia, it was previously known from Torne lappmark in Sweden (Nordin et al. 2019). *Arthonia punctella* is further reported from the British Isles (Coppins & Aptroot 2009), France (Roux et al. 2017), Turkey (Yazıcı et al. 2007) and Ukraine (Khodosovtsev et al. 2007).

New to Norway.

*Specimen examined*: *Oppland*: Dovre, Grimsdalen, Verkensåe N of Verkjessætre, 62°03'59"N, 09° 31'41"E, 1095 m, 2018-07-28, Frisch 18/No189 (TRH-L-23926).

### ***Arthothelium dictyosporum* (Coppins & P. James) Coppins**

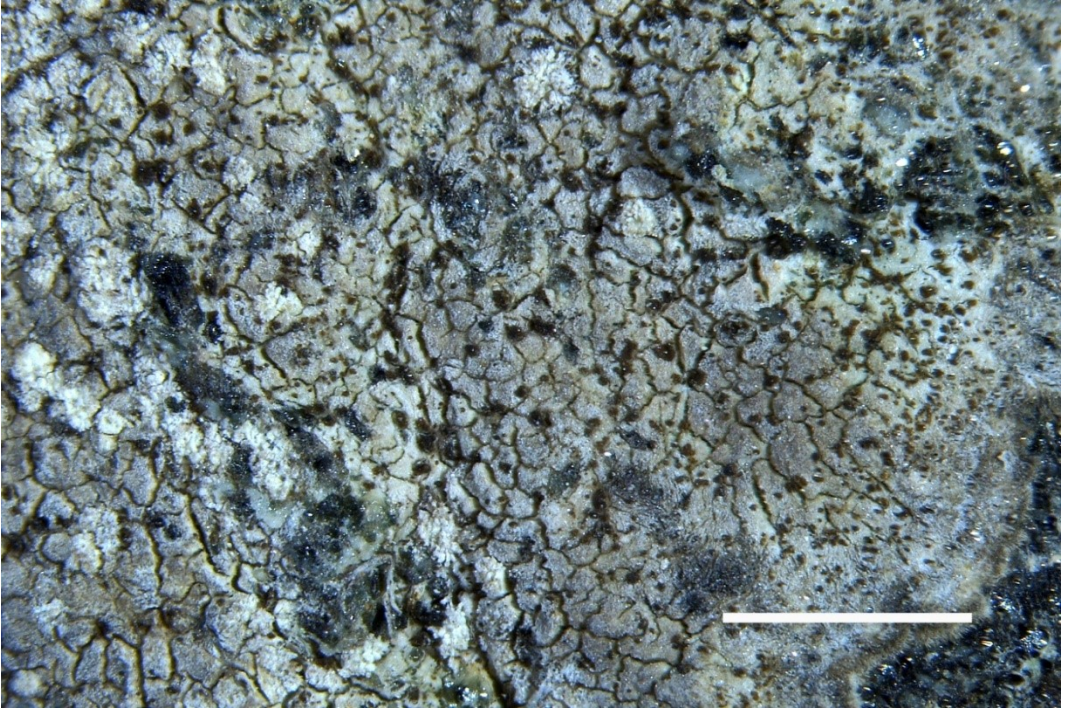
The species was collected in Hordaland, growing on trunk of *Fraxinus excelsior* in an E-facing, wooded scree slope. The species was previously known from the British Isles (Coppins 2009b) and the Canary Islands (Ertz & Diederich 2008).

New to Fennoscandia.

*Specimen examined*: *Hordaland*: Tysnes, Nedrevåg-Blåberget, 59°58'22"N, 05°39'01"E, 25 m, 2017-07-21, Klepsland JK17-412 (O-L-221300).

### ***Chaenothecopsis subparvoica* (Nyl.) Tibell**

The species was collected in Sør-Trøndelag, growing on thallus of *Haematomma ochroleucum* var. *porphyrium* beneath a large boulder in an E-facing boulder field. In Fennoscandia, it was previously known from Finland and Sweden (Nordin et al. 2019). It is further reported from other parts of



**Figure 2.** *Dirina fallax* (TRH-L-24108). Scale = 2 mm. Photo: A. Frisch.

Europe (Brackel 2016, Giavarini & Coppins 2009, Muñiz & Hladun 2011, Palice 1999, Randlane & Saag 1999, Roux et al. 2017, Stepanchikova et al. 2014), North America (Esslinger 2018) and Asia (Giavarini & Coppins 2009).

New to Norway.

*Specimen examined:* *Sør-Trøndelag:* Trondheim, Klæbu, Vassfjellet near Steinslættåsen, 63°16'48"N, 10°22'44"E, 480 m, 2015-05-28, Frisch 15/No23 (TRH-L-652367).

***Dirina fallax*** de Not.

(Fig. 2)

The species was collected in Rogaland, Hordaland and Møre og Romsdal. In Fennoscandia, it was previously reported from Östergötland in Sweden (Svensson et al. 2017) and is elsewhere known from western and central Europe (Tehler et al. 2013). It is probably widespread in coastal Norway. *Dirina fallax* is a species of rock overhangs, ledges in overhangs, and on rocks on the floor beneath rock overhangs. It always grows protected from direct rain. Contrary to the calcicolous *D. massiliensis*, *D. fallax* is confined to siliceous rock. Erythrin was the major chemical constituent in all specimens from herbarium BG.

New to Norway.

*Specimens examined:* *Rogaland:* Rennesøy, SV-siden av Knott ved Asmarvik, UTM<sub>ED50</sub>: 32V LL 071 574, c. 30 m, 2001-01-06, Johnsen (BG-L-66584); Tysvær, Kårstø, Dalen, 50 m, 1981-11-08, Skjolddal 129 (BG-L-35954); Utsira, Skarvaneset, 59°18'06"N, 04°54'34"E, 10 m, 2017-10-04, Frisch 17/No91, 92 (TRH-L-24108, 24109, 24110 & 24111); Skarvaneset N, near trailhead to Josef hule, 59.30181°N, 04.90945°E, 7 m, 2017-10-

05, Tønsberg 47601 (BG-L-104048). *Hordaland*: Austevoll, Litla Kalsøy, 0–30 m, 1984-07-10, Tønsberg 8869 & Øvstedal (BG-L-35953); Fjell, Sotra, Vindenes, 1979-06-20, Skjolddal (BG-L-13344 & 13345); Fjell, Turøyna, NE of Tuskeluren, 60.45585°N, 04.91440°E, 20–30 m, 2013-06-08, Tønsberg 42307 (BG-L-96302); Stord, Geitåsen N, 59°45'30"N, 05°24'54"E, 60 m, 2018-04-28, Klepsland JK18-047 (TRH-L-23789); Stord, Bjelland-Gullberg, 59°46'20"N, 05°30'45"E, 30 m, 2018-04-29, JK18-065 (TRH-L-23791). *Møre og Romsdal*: Tingvoll, Aspøya, Bogsaspa, 0–20 m, 1980-08-30, James & Tønsberg (BG-L-35950).

***Epicladonia lapponica*** Ihlen

(Fig. 3)

The species was collected in Oppland, growing on thallus of *Pleopsidium chlorophanum* on a rain-shaded vertical part of a schistose boulder in alpine heath. In Fennoscandia, it was previously known from Lycksele Lappmark to Torne Lappmark in Sweden (Ihlen & Wedin 2005).

New to Norway.

*Specimen examined*: Oppland: Dovre, E slope of Råtåsjøhøi, 62°16'12"N, 09°49'23"E, 1220 m, 2018-07-27, Frisch 18/No152 (TRH-L-24114).

***Feltgeniomyces luxemburgensis*** Diederich

The species was collected in Nordland, growing on *Lecidella elaeochroma* in oceanic boreal deciduous forest with *Betula pubescens*, *Salix caprea* and *Sorbus aucuparia*. The species was previously known from Luxembourg (Diederich & Sérusiaux 2000) and Poland (Kukwa & Czarnota 2006).

New to Fennoscandia.

*Specimen examined*: Nordland: Meløy, Holandsfjorden, Fonndalen, Fonndal V, 66°41'54"N, 13°40'36"E, 10–25 m, 2018-07-01, Frisch TSD N13-1-Sa2-7 (TRH-L-24120).

***Gyalideopsis helvetica*** van den Boom & Vězda

The species was collected in Sør-Trøndelag, growing on young *Picea abies* in old growth boreal spruce forest. It was associated with *Pertusaria pupillaris* and *Biatora toensbergii*. In Fennoscandia, it was previously reported from Dalarna in Sweden (Nordin et al. 2019). *Gyalideopsis helvetica* is further reported from central and eastern Europe (van den Boom & Vězda 2000, van den Boom & Palice 2006, Guttová et al. 2012, Muchnik & Konoreva 2017, Nimis et al. 2018, Palice et al. 2018), North America (Esslinger 2018) and Asia (Guttová et al. 2012, Urbanavichene 2015).

New to Norway.

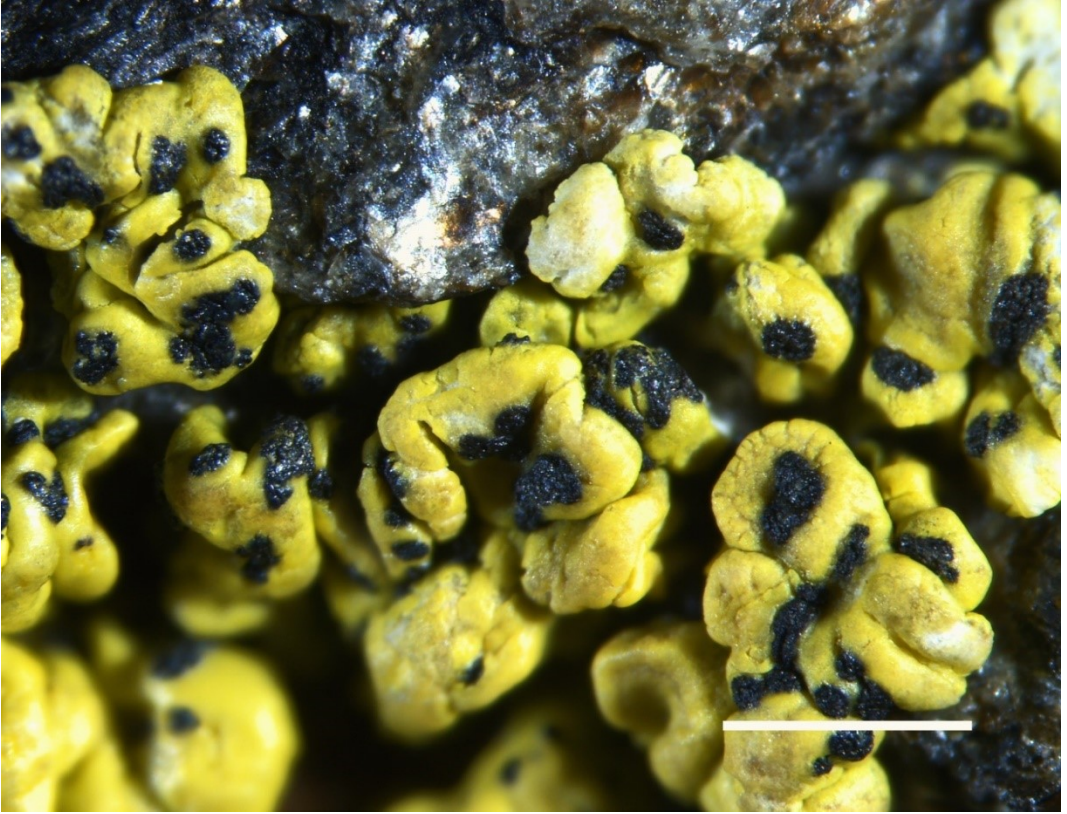
*Note*: Our specimen is sterile, but the characteristic urceolate soralia/gonicostangia on a glossy thallus agree well with richly fruiting, well developed material from Central Europe and Turkey (PRA herbarium; cf. van den Boom & Palice 2006, Guttová et al. 2012).

*Specimen examined*: Sør-Trøndelag: Meldal, SE of Svorkmo village, Urvatnet Forest Reserve, 63°07'19"N, 09°48'08"E, 305 m, 2006-09-15, Palice 11567 (PRA).

***Heterocephalacria bachmannii*** (Diederich & M.S. Christ.) Millanes & Wedin

(Syn. *Syzygospora bachmannii* Diederich & M.S. Christ.)

The species was collected in Møre og Romsdal, growing on thallus of *Cladonia uncialis* in coastal heath vegetation. In Fennoscandia, it was previously reported from Finland and Sweden (Diederich 1996, Millanes et al. 2014). *Heterocephalacria bachmannii* is further known from other parts of



**Figure 3.** *Epicladonia lapponica* (TRH-L-24114). Scale = 1 mm. Photo: A. Frisch.

Europe (Diederich 1996, Motiejūnaitė 1999), Greenland (Alstrup 2004), Madeira (Diederich 1996), North America (Diederich 1996), Central America (Diederich 2003) and Asia (Diederich 1996, Kocakaya et al. 2016).

New to Norway.

*Specimen examined:* Møre og Romsdal: Sykkylven, Nysætervatnet, 62.3466°N, 06.7811°E, 400 m, 2016-06-26, Olsen 16.03 (TRH-L-17119/2; det. A. Millanes).

***Lecania* aff. *croatica*** (Zahlbr.) Kotlov

The species was collected in Vestfold and Buskerud, growing on trunks of *Fraxinus excelsior* and *Fagus sylvatica* in humid broad-leaved forests. *Lecania croatica* is known elsewhere in Europe (e.g., Cezanne et al. 2008, Eichler et al. 2010, Malíček & Palice 2013, Guttová et al. 2018, Moisejevs et al. 2019), North America (Harris & Lendemer 2010) and Asia (Davydov & Printzen 2012).

New to Fennoscandia.

*Notes:* The specimens from Norway are sterile but recognizable by the characteristic thin, often immersed thallus, the small punctiform soralia and the lack of secondary metabolites detectable by TLC. An illustration of the species (from Luxembourg) is available, e.g., in Eichler et al. (2010), which closely resembles the Norwegian specimens. Barcode data generated for the four specimens



cited below and compared with nrITS sequences available from GenBank, indicate a closer phylogenetic relationship with samples from western North America (Ontario; Telfer et al. 2015) than with those from Europe and western Asia (Printzen 2014). The collected material might not belong to *L. croatica* s.str., but this requires further study.

*Specimens examined: Vestfold:* Larvik, Brekkesæter SØ, 59°03'31"N, 9°57'04"E, 110 m 2017-06-06, Klepsland JK17-L147 (O-L-221307); Sandefjord, Brekke, 59°10'13"N, 10°14'05"E, 95 m, 2017-06-20, Klepsland JK17-L169 (O-L-221309); Sandefjord, Kullerød, 59°10'20"N, 10°13'22"E, 95 m, 2017-06-20, Klepsland JK17-L168 (O-L-221308). *Buskerud:* Lier, Holtsmark S, 59°52'03"N, 10°15'17"E, 65 m, 2017-05-17, Klepsland JK17-L270 (O-L-221306).

### ***Micarea lapillicola* (Vain.) Coppins & Muhr**

The species was collected in Buskerud, Hordaland, Sogn og Fjordane and Troms, growing on recently exposed, partly rust-coloured, siliceous pebbles in road-cuts and on an exposed rock face. In Fennoscandia, it was previously reported from Finland and Sweden (Coppins & Muhr 1997). *Micarea lapillicola* is further known from the British Isles (Coppins & Muhr 1997), Czech Republic (Palice 1999) and possibly Tasmania (Kantvilas & Coppins 2019).

New to Norway.

*Specimens examined: Buskerud:* Nes, Mjellhovda V, 60°37'40"N, 09°10'38"E, 780 m, Klepsland JK19-443 (O-L-226768). *Hordaland:* Os, peninsula Bjørnen, road side near the serpentinic-rock outcrops S of Vargavågen bay, 60°08'57"N, 05°26'33"E, 20 m, 2016-09-17, Palice 24741 (PRA). *Sogn og Fjordane:* Vågsøy, N of Maurstad along the road 61, just SE of the lake Trovatnet, 61°58'01"N, 05°30'28"E, 130 m, 2015-09-12, Palice 27902 & Tønsberg (PRA). *Troms:* Balsfjord, Langvatnet NØ, 69°09'59"N, 19°02'05"E, 180 m, 2012-08-16, Klepsland JK12-L178 (O-L-186173).

### ***Milospium lacoizquetae* Etayo & Diederich**

The species was collected in Sogn og Fjordane, growing on basal squamules of *Cladonia* sp. on soft wood of a *Pinus sylvestris* snag in coastal pine forest. It is widespread in Europe (Brackel 2014, 2016, Brackel & Kocourková 2006, Schiefelbein et al. 2012, Šoun et al. 2006).

New to Fennoscandia.

*Specimen examined: Sogn og Fjordane:* Gulen, Sygnefest northeast, 61°04'17"N, 05°06'23"E, 35 m, 2018-05-15, Frisch 18/No99b (TRH-L-18898).

### ***Opegrapha paraxanthodes* Nyl.**

The species was collected in Buskerud, growing on calcareous, shaded, vertical rock wall in a steep W-facing slope with pine forest. It was previously known from the British Isles (Pentecost & Coppins 2009) and the Czech Republic (Vondrák et al. 2007).

New to Fennoscandia.

*Specimen examined: Buskerud:* Hole, Storøya SV, 60°02'46"N, 10°14'19"E, 100 m, 2014-08-02, Klepsland JK14-L482 (O-L-206737).

### ***Opegrapha pertusariicola* Coppins & P. James**

The species was collected in Hordaland and Møre og Romsdal, growing on thallus of *Pertusaria leioplaca* on trunks of *Corylus avellana*. It was previously known from the British Isles (Pentecost & Coppins 2009), Italy (Brackel 2016) and the Canary Islands (Hafellner 1995a).

New to Fennoscandia.

*Specimens examined: Hordaland:* Kvinnherad, Djupevika, Varaldsøy nature reserve, 60°07'15"N, 06°02'28"E, 160 m, 2015-09-12, Klepsland JK15-L909 (TRH-L-23775). *Møre og Romsdal:* Fræna, Lunheim NØ, 62°55'23"N, 07°06'57"E, 60 m, 2016-04-15, Klepsland JK16-153 (O-L-206450); Fræna, S of Hustad, 62.92390°N, 07.11698°E, 2016-04-15, Holien 15166 (TRH-L-17096); Tingvoll, Nastad sør, 63°01'49"N, 07°57'28"E, 2016-04-16, Jordal s.n. (TRH-L-17627).

***Opegrapha rupestris* Pers.**

The species was collected in Hordaland, growing on thallus of *Verrucaria* sp. at the top of a limestone rock wall enclosure. In Fennoscandia, it was previously reported from Finland and Sweden (Nordin et al. 2019). *Opegrapha rupestris* is further reported from other parts of Europe (Arup et al. 2001, Brackel 2014, Randlane & Saag 1999, Urbanavichus & Ismailov 2013, Zhurbenko 2017), the Azores (Hafellner 1995a), Madeira (Carvalho et al. 2008), Asia (Brackel 2014, John 1996), North America (Esslinger 2018) and New Zealand (Galloway 2007).

New to Norway.

*Note:* The name *O. rupestris* Pers. has been applied to various saxicolous *Opegrapha* species in the past. The species is listed for Norway (Ro Ho No Tr) in Nordin et al. (2019), but the Norwegian collections in BG, O, TRH and UPS all belong to different species including *Alyxoria varia* s.l. and *Opegrapha dolomitica*. Previous literature reports for the species should be considered with care.

*Specimen examined: Hordaland:* Bømlo, Moster, Austra Mosterhamn, 59°42'06"N, 05°23'03"E, on limestone enclosure, 2 m, 2018-04-29, Frisch 18/No121 (TRH-L-28748).

***Opegrapha sphaerophorica* Isbrand & Alstrup** (Fig. 4)

The species was collected in Sogn og Fjordane, growing on thallus of *Sphaerophorus globosus* on *Betula pubescens* in a steep, NW-facing slope in coastal pine forest. It is further known from central Europe (Hafellner 1994, Hawksworth 2003, Martínez 2002), the Canary Islands (Hafellner 1995a) and North America (Esslinger 2018).

New to Fennoscandia.

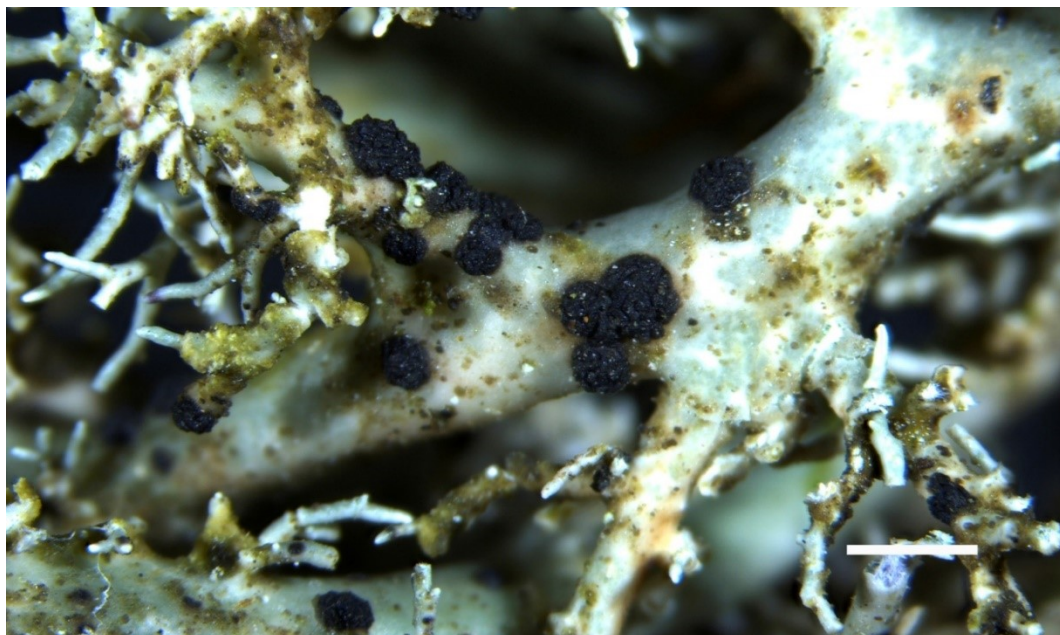
*Note:* The specimen from Norway agrees well with the holotype (C-L-73643!). Contrary to information given in the protologue, which states that all tissues react I– (Melzer without and with pretreatment with 10% K), the hymenial tissues of the type and the specimen from Norway react sky blue in 0.2% Lugols iodine solution without and with pretreatment in K.

*Specimen examined: Sogn og Fjordane:* Flora, Storefjellet nordvest, 61°40'01"N, 05°00'02"E, 35–70 m, 2018-05-17, Frisch 18/No236 (TRH-L-28749).

***Opegrapha thelotrematis* Coppins** (Fig. 5)

The species was collected in Hordaland and Møre og Romsdal. It was found lichenicolous on thallus of *Thelotrema lepadinum* growing on *Corylus avellana* and *Sorbus aucuparia* in coastal pine forest and other highly oceanic forest communities. *Opegrapha thelotrematis* is further known from the British Isles (Coppins 1987), Canary Islands (Hafellner 1995a) and North America (Tønsberg 1997).

New to Fennoscandia.



**Figure 4.** *Opegrapha sphaerophorica* (TRH-L-28749). Scale = 1 mm. Photo: A. Frisch.

*Specimens examined:* *Hordaland:* Stord, Åsen SW of Sagvåg, 59°46'03"N, 05°24'36"E, 50 m, 2018-04-28, Frisch 18/No120 (TRH-L-28750). *Møre og Romsdal:* Fræna, Stemshesten, 62°59'15"N, 07°11'57"E, 60 m, 2000-01-16, Gaarder 3678 (TRH-L-11195); Fræna, Raudtuva øst 1, 62°54'52"N, 07°10'44"E, 100 m, 2014-03-02, Gaarder 6074 & Jordal (TRH-L-15399); Fræna, Jendemsfjellet vest, 62°47'58"N, 07°01'00"E, 80 m, 2016-01-09, Gaarder 6851 & Larsen (TRH-L-17596); Skodje, Solnør, 62°29'13"N, 06°44'18"E, 50 m, 1997-01-18, Gaarder 2022 (TRH-L-11194); Tingvoll, Øygarden øst, 63°00'29"N, 08°01'33"E, 120 m, 2014-11-15, Gaarder 6447 (TRH-L-16222); Tingvoll, Fløyestad SØ, 63°00'53"N, 08°11'05"E, 50 m, 2016-04-16, Klepsland JK16-170 (O-L-206768).

***Pachnolepia pruinata* A. Massal.**

The species was collected in Sogn og Fjordane, growing on near horizontal trunk of old *Quercus robur* rain-sheltered by an overhanging rock wall. In Fennoscandia, it was previously reported from Sweden (Nordin et al. 2019). *Pachnolepia pruinata* is further reported from elsewhere in Europe (Alstrup 2001, Burgaz 2014, Coppins & Aptroot 2009, Maliček et al. 2014, Nimis 1993, Nimis et al. 2018, Paz-Bermúdez 2003, Roux et al. 2017, Søchting & Alstrup 2008, Wirth et al. 2013), northern Africa (Thor & Nascimbene 2010) and North America (Esslinger 2018).

New to Norway.

*Note:* The specimen from Norway lacks arthoniaic acid (Brian Coppins, pers. comm.), but otherwise agrees well with the species.

*Specimen examined:* *Sogn og Fjordane:* Gulen, Brossvikvatnet V, 61°03'19"N, 05°08'04"E, 140 m, 2015-07-16, Klepsland JK15-L527, det. B. Coppins (TRH-L-23774).



**Figure 5.** *Opegrapha thelotrematis* (TRH-L-28750). Scale = 1 mm. Photo: A. Frisch.

***Phacographa zwackhii*** (A. Massal. ex Zwackh) Hafellner

(Fig. 6)

The species was collected in Oslo, Sør-Trøndelag and Nord-Trøndelag, growing on thallus of *Phlyctis argena* on trunks of *Populus tremula* and *Ulmus glabra*. In Fennoscandia, it was previously reported from Sweden (Nordin et al. 2019). *Phacographa zwackhii* is known from across Europe (Brackel 2014, Khodosovtsev et al. 2013, Suija 2005).

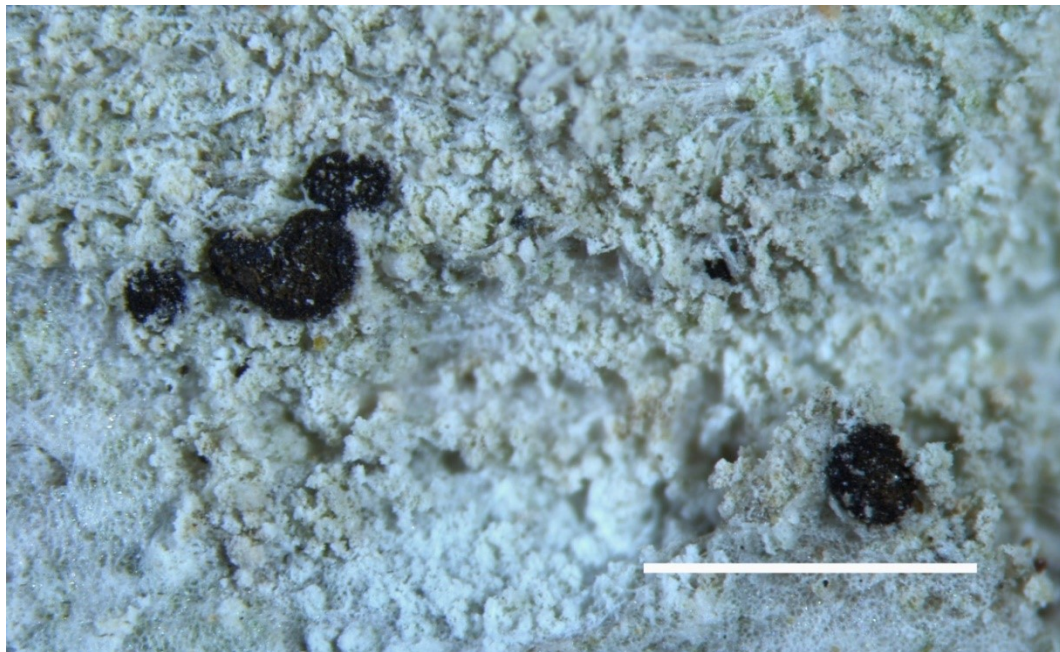
New to Norway.

*Specimens examined:* Oslo: Lutvannet SV, 59°54'24"N, 10°52'04"E, 260 m, 2011-04-16, Klepsland JK11-L003 (TRH-L-23770). Sør-Trøndelag: Rissa, Hassel N, 63°31'42"N, 10°09'46"E, 250 m, 2011-06-22, Klepsland JK11-L197 (TRH-L-23771). Nord-Trøndelag: Steinkjer, Byahalla, 64°03'07"N, 11°34'23"E, 225 m, 2018-08-09, Frisch 18/No233 (TRH-L-28790 & 28791).

***Pseudosagedia borrieri*** (Trevis.) Hafellner & Kalb

The species was collected in Rogaland and Hordaland, growing on trunks of *Fraxinus excelsior* and *Ulmus glabra* in coastal broad-leaved deciduous forest. In Fennoscandia, it was previously known from Skåne in Sweden (Nordin et al. 2019). It is further reported from Europe (McCarthy 2003), the Canary Islands (McCarthy 2003) and Madeira (Carvalho et al. 2008, McCarthy 2003).

New to Norway.



**Figure 6.** *Phacographa zwackhii* (TRH-L-28790). Scale = 1 mm. Photo: A. Frisch.

*Note:* The report in Nordin et al. (2019) from Telemark, Nome refers to *Strigula stigmatella* (O-L-28645). The latter can be separated from *P. borrieri* among other characters by the thick double-walled ascus apex, less pronounced perithecia partly covered by a thin thalline layer, and in usually being muscicolous as opposed to the corticolous *P. borrieri*.

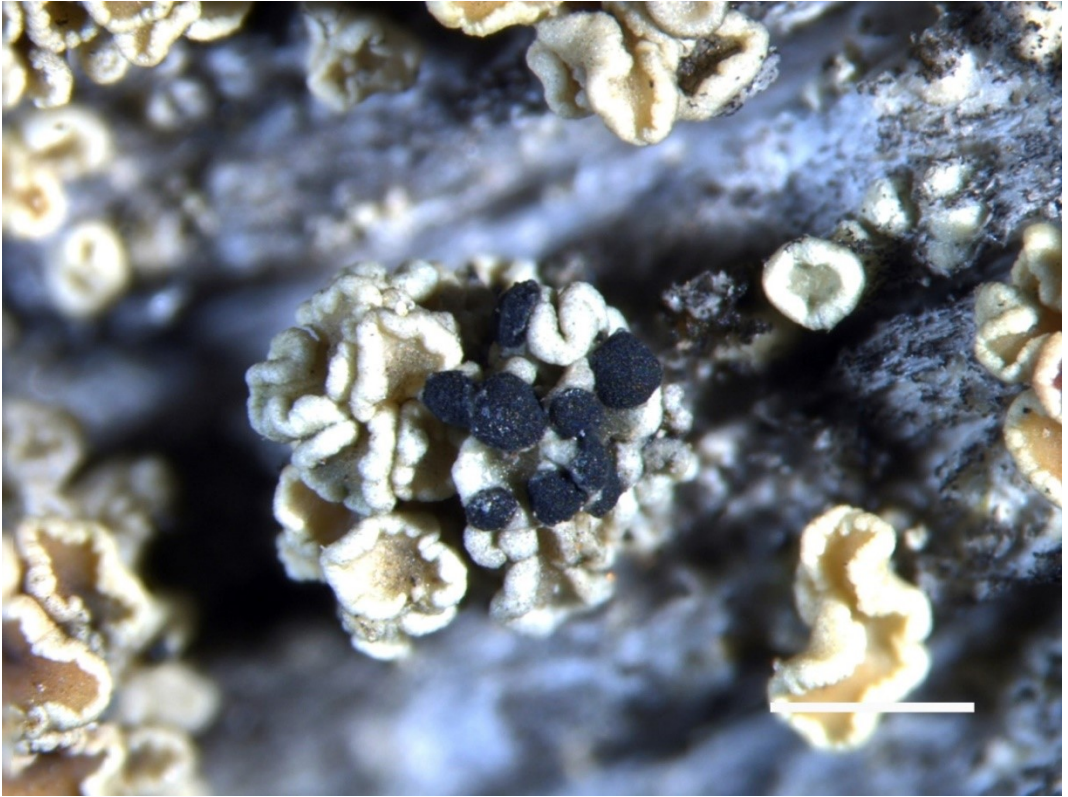
*Specimens examined:* Rogaland: Rennesøy, Helland V, 59°06'08"N, 05°39'43"E, 15 m, 2014-08-15, Klepsland JK14-L552 (O-L-200647); Rennesøy, Helland-Litladalen, 59°06'05"N, 05°39'49"E, 7 m, 2016-06-06, Klepsland JK16-275 (O-L-206764); Rennesøy, Helland-Litladalen, 59°06'08"N, 05°39'44"E, 10 m, 2016-06-06, Klepsland JK16-284a (TRH-L-23776). Hordaland: Bømlo, Spysøyhamn SV, 59°43'33"N, 05°22'08"E, 5 m, 2018-04-29, Klepsland JK18-069 (TRH-L-23793).

### ***Pseudosagedia byssophila* (Körb. ex Hepp) Hafellner & Kalb**

The species was collected in Rogaland and Hordaland, growing on trunks of *Corylus avellana*, *Fraxinus excelsior* and *Sorbus aucuparia* in oceanic broad-leaved deciduous forest. It has also been found on a root of *Fraxinus excelsior* underneath a large boulder in a wooded E-facing boulder field. In Fennoscandia, *P. byssophila* was previously reported from Öland in Sweden (Nordin et al. 2019). It is further reported from other parts of Europe (McCarthy 2003) and from northern Africa (McCarthy 2003). Corticolous specimens in the British Isles have previously been identified as *Pseudosagedia aenea* (Powell 2013).

New to Norway.

*Specimens examined:* Rogaland: Rennesøy, Kastdal, Dale SØ, 59°04'25"N, 05°44'10"E, 30 m, 2017-07-13, Klepsland JK17-324, JK17-326 (TRH-L-23779 & 23780). Hordaland: Bømlo, Skogafjellet N, 59°38'58"N, 05°12'26"E, 12 m, 2017-07-19, Klepsland JK17-381 (TRH-L-23782); Tysnes, Nedrevåg-Blåberget,



**Figure 7.** *Ramboldia insidiosa* (O-L-221295). Scale = 1 mm. Photo: A. Frisch.

59°58'22"N, 05°39'01"E, 25 m, 2017-07-21, Klepsland JK17-413c [sub *Bacidia viridifarinos*] (TRH-L-23785/3); Fusa, Bergsvågen, 60°02'51"N, 05°42'38"E, 30 m, 2018-05-08, Klepsland JK18-125 (TRH-L-23799).

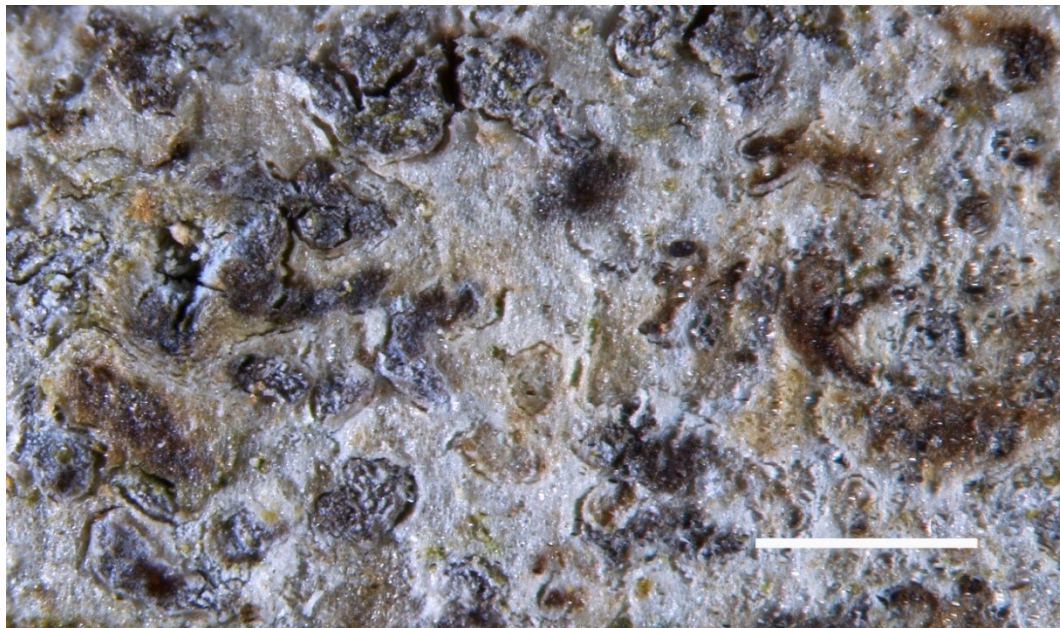
***Ramboldia insidiosa*** (Th. Fr.) Hafellner

(Fig. 7)

The species was collected in Hordaland, growing on apothecia of *Lecanora varia* on wood of a boatshed. In Fennoscandia, it was previously reported from Finland and Sweden (Nordin et al. 2019). *Ramboldia insidiosa* is further reported from other parts of Europe (Burgaz 2014, Dobson 2009, Nimis 1993, Nimis et al. 2018, Randlane & Saag 1999, Roux et al. 2017, Søchting & Alstrup 2008), the Canary Islands (Hafellner 1995b) and North America (Esslinger 2018).

New to Norway.

*Specimen examined:* Hordaland: Bømlo, Tjong, 59°38'45"N, 05°11'58"E, 2 m, 2017-07-19, Klepsland JK17-377 (O-L-221295 & TRH-L-18899).



**Figure 8.** *Reichlingia anombrophila* (TRH-L-23833). Scale = 1 mm. Photo: A. Frisch.

***Reichlingia anombrophila*** (Coppins & P. James) Frisch, **comb. nov.**

(Fig. 8)

MycoBank: MB 834441

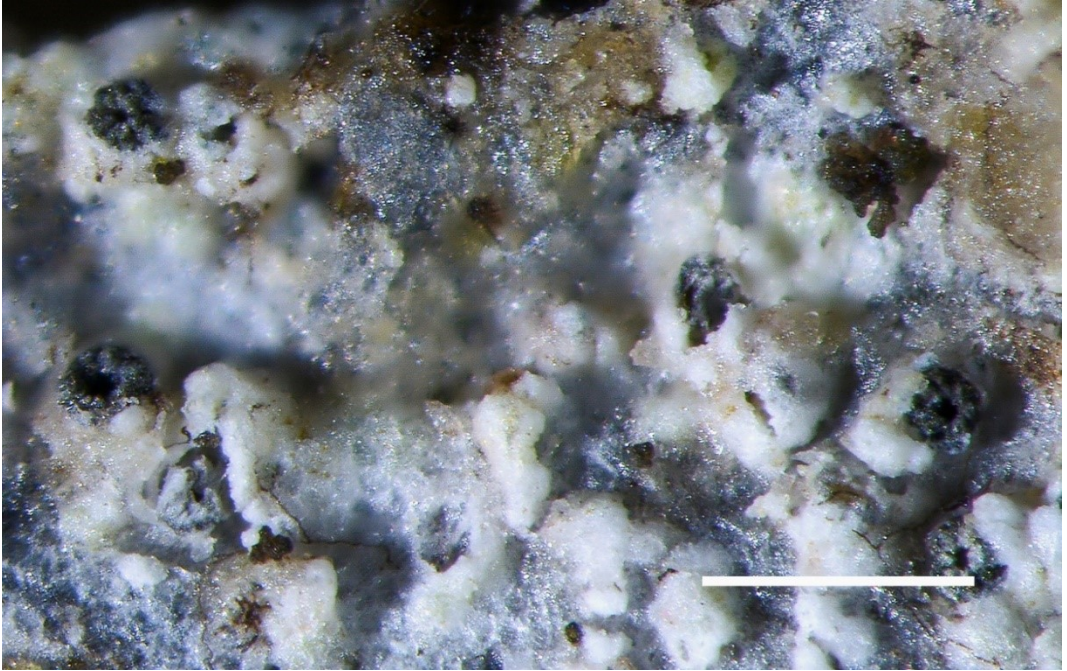
*Basionym:* *Arthonia anombrophila* Coppins & P. James, in Coppins B.J., *Lichenologist* 21: 196 (1989) – Type: [Wales]. Cambria: V.C.49, Caernarvonshire, Aber, Aber Valley, 23/663.713, ad paginam inferiorum trunci *Fraxini* veteris, 1970-10-01, B.J. Coppins & F. Rose (E holotype, BM isotype – both not seen).

The species was collected in Rogaland and Sogn og Fjordane, growing on trunk of *Quercus robur* in coastal oak forest, and on thin stems of *Ilex aquifolium* below a small boulder in coastal pine forest. In Fennoscandia, it was previously known from Öland in Sweden (Nordin et al. 2019). It has also been reported from the British Isles (Coppins & Aptroot 2009), Denmark (Søchting & Alstrup 2008), Italy (Nimis & Tretiach 1999) and Madeira (Carvalho et al. 2008).

New to Norway.

*Notes:* *Reichlingia anombrophila* is morphologically close to *R. zwackhii*, but differs in the smaller, 2–3-septate ascospores measured to 12–15 × 4–5 μm in Norwegian material. Both species produce 2'-*O*-methylperlatolic acid, confirmed for *R. anombrophila* in Frisch 18/No63 & Klepsland. Coppins (1989) and Coppins & Aptroot (2009) report an unidentified substance possibly related to confluent acid for this species. Unpublished DNA sequence data (mtSSU, nrLSU, *RPB2*) generated for Frisch 18/No63 & Klepsland support the inclusion of *Arthonia anombrophila* in *Reichlingia*.

*Specimens examined:* Rogaland: Hjelmeland, Sigmundstad N, 59°09'38"N, 06°02'20"E, 15 m, 2012-06-26, Klepsland JK12-L101 (O-L-206736). Sogn og Fjordane: Florø, Svanøya, Vågsfjellet nord, 61°29'23"N, 05°04'57"E, 25–50 m, 2018-05-16, Frisch 18/No63 & Klepsland (TRH-L-23833).



**Figure 9.** *Skyttea caesii* (TRH-L-28890). Scale = 0.5 mm. Photo: A. Frisch.

***Roccellographa sorediata*** (Sparrius, P. James & M.A. Allen) Coppins & Fryday

(Syn. *Peterjamesia sorediata* (Sparrius, P. James & M.A. Allen) D. Hawksw.)

The species was collected in Hordaland, growing on shaded overhanging rock walls. It is also reported from western Europe (Fletcher 2009, Roux et al. 2017, Sparrius et al. 2005, van den Boom & Giralt 2012) and Macaronesia (Fletcher 2009).

New to Fennoscandia.

*Specimen examined: Hordaland:* Austevoll, Litla Kalsøy, 60.0405°N, 05.0945°E (datum ED50), 0–30 m, 1984-07-10, Tønsberg 8868 & Øvstedal (TRH-L-40177); Os, Strøno, NE slope of Hjortåsen, 60°10'N, 05°22'E (datum ED50), 60–120 m, 1984-04-23, Jørgensen & Tønsberg s.n. (BG-L-80094).

***Skyttea caesii*** Diederich & Etayo

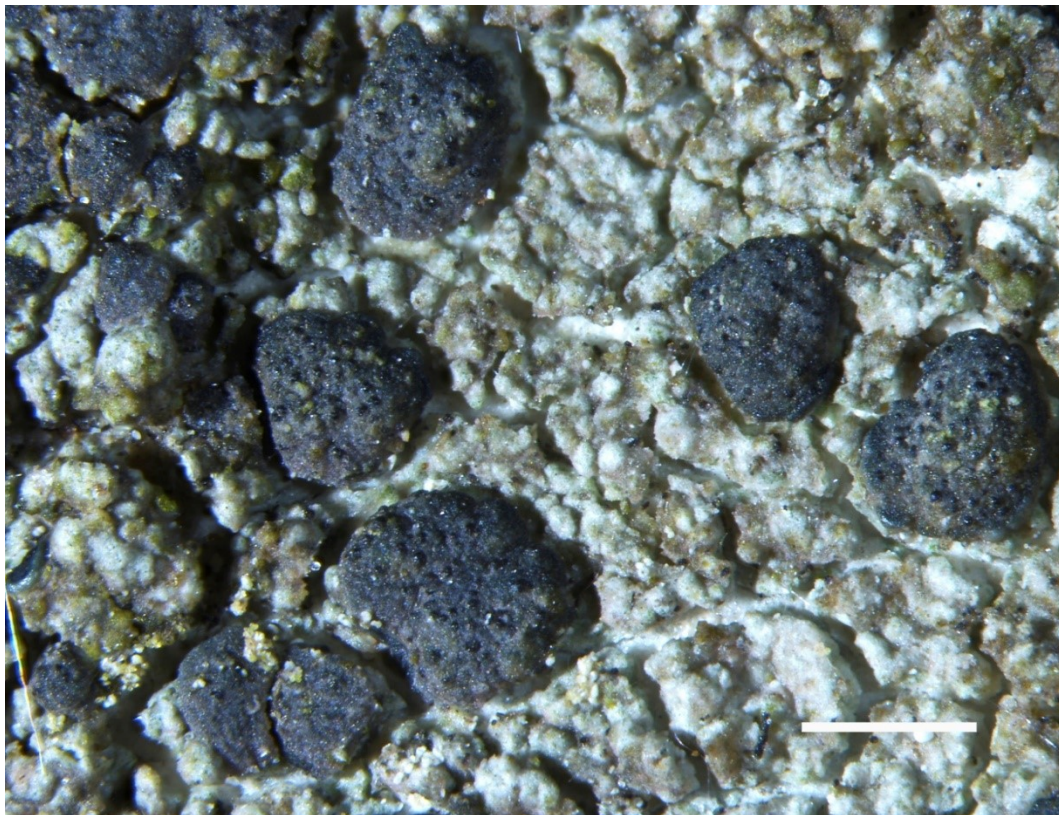
(Fig. 9)

The species was collected in Hordaland and Sogn og Fjordane, growing on thallus of *Mycoblastus caesius* on trunks of *Betula pubescens* and *Pinus sylvestris* in open coastal pine forests. It was previously known from western Europe (Diederich & Etayo 2000, Hawksworth 2003), the Canary Islands (Diederich & Etayo 2000), Africa (Diederich & Etayo 2000), North America (Diederich & Etayo 2000) and South America (Etayo 2002, Etayo & Sancho 2008).

New to Fennoscandia.

*Selected specimens examined: Hordaland:* Bømlo, Skogafjellet, 59°38'58"N, 05°12'26"E, 12 m, 2017-07-19, Frisch TSD S9-2-Ps3-3 (TRH-L-28900); Kvinnherad, Håvikvatnet, Futeneset, 60°02'00"N, 05°46'31"E, 90 m, 2017-07-20, Frisch TSD S7-1-Ps1-2 (TRH-L-28897); Os, Svensvikmyrane, 60°10'43"N, 05°20'52"E, 20–50 m, 2018-05-12, Frisch TSD S10-1-Ps3-2 & Frisch 18/No115 (TRH-L-28888 & 28890); Stord, Leirvik, Storavatnet





**Figure 10.** *Stigmidium lecidellae* (TRH-L-18612). Scale = 1 mm. Photo: A. Frisch.

øst, 59°46'50"N, 05°26'34"E, 30 m, 2017-07-16, Frisch TSD S8-1-Ps4-2 (TRH-L-28898); Stord, Halvgjengeåsen, 59°46'37"N, 05°26'27"E, 45 m, 2017-07-16, Frisch TSD S8-2-Bp2-1 (TRH-L-28899). *Sogn og Fjordane*: Flora, Svanøya, Vågsfjellet nord, 61°29'23"N, 05°04'57"E, 25–50 m, 2018-05-16, Frisch TSD S14-1-Ps3-12 (TRH-L-28893); Flora, Svanøya, Vågsfjellet nord, 61°29'27"N, 05°04'47"E, 25-50 m, 2018-05-16, Frisch TSD S14-2-Ps2-1 (TRH-L-28894); Flora, Svanøya, Storefjellet nordvest, 61°40'01"N, 05°00'02"E, 35–70 m, 2018-05-17, Frisch TSD S15-1-Ps2-1 (TRH-L-28896).

***Stigmidium arthoniae* (Arnold) Hafellner**

The species was collected in Rogaland and Hordaland, growing on thallus of *Arthonia radiata* on trunks of *Corylus avellana* and *Sorbus aucuparia* in coastal pine forest. It is elsewhere known from Austria (Hafellner 1994, Hofmann et al. 1995), the British Isles (Hawksworth 2003), Italy (Arnold 1872, 1874) and Switzerland (Keissler 1930).

New to Fennoscandia.

*Specimens examined*: *Rogaland*: Rennesøy, Kastdal, 59°04'26"N, 05°44'10"E, 50 m, 2017-07-13, Klepsland JK17-335 (TRH-L-23781). *Hordaland*: Tysnes, Beltestad, Beltestadknappen, 59°59'54"N, 05°27'33"E, 5 m, 2018-05-09, Frisch 18/No71 (TRH-L-28945).

***Stigmatidium lecidellae*** Triebel, Cl. Roux & Le Coeur

(Fig. 10)

The species was collected in Sør-Trøndelag, growing on apothecia of *Lecidella elaeochroma* on the trunk of an old *Alnus incana* in open deciduous forest bordering cultural landscape. In Fennoscandia, it was previously known from Gotland in Sweden (Nordin et al. 2019). *Stigmatidium lecidellae* is further reported from Europe (Hawksworth 2003, Suija et al. 2001, Roux et al. 1995).

New to Norway.

*Specimen examined: Sør-Trøndelag:* Malvik, Vulu, 63°25'23"N, 10°41'50"E, 120 m 2019-04-11, Vik-Mo 05/2019 b (TRH-L-18612).

**Notes on rare or otherwise interesting species*****Arthonia circinata*** Th. Fr.

This rare species is lichenicolous on species of *Umbilicaria* in alpine areas. The protologue cites two localities from Norway: *Bosekop i W. Finmarken* and *Leerdal i Bergens Stift (Sommerf:s herb.)* (Fries 1865a). A specimen in UPS labelled *Alten, Bosekop, på Kongshavnstjeldet, 3.7.1864, Th. M. Fries* (UPS-L-026325!) is the selected lectotype (Grube et al. 1995). The species was re-collected at the type locality in Alta by Norman in the second half of the 19<sup>th</sup> century (without exact date; TRH-L-20104, O-L-171815, O-L-171816, O-L-171818). It still occurred there on *Umbilicaria vellea* in 2015. The only other recent collections of the species in Fennoscandia are from Troms (Alstrup et al. 2008) and Oppland.

*Specimens examined: Oppland:* Lom, Bøverdalen, Galdbygdi, 61°43'12"N, 08°20'57"E, 600 m, 2019-07-31, Klepsland JK19-322 (O-L-226233). *Finnmark:* Alta, N slope of Komsa (Kongshavnstjeldet), 69°59'12"N, 23°16'46"E, 87 m, 2015-07-26, Frisch 15/No53, 54 (TRH-L-652391).

*Additional specimens examined: Oppland:* Dovre, Høgsnyta, on *Umbilicaria hirsuta*, 1863-08-17, Th.M. Fries (UPS F-519523); *Sogn og Fjordane:* Laerdal, in *Gyrophora spodochroa*. C. Sommerfelt (UPS F-519524, syntype); *Sør-Trøndelag:* Oppdal, Kongsvoll, in *Gyrophora vellea*, 1868-8-23, J.E. Zetterstedt (UPS F-519519 & 519523); Oppdal, Kongsvoll, 1863-08-04, Th.M. Fries (UPS F-519525); Oppdal, Kongsvoll, Knutshøa, Vårstigen, in *Gyrophora vellea*, 1868-08-24, J.E. Zetterstedt (UPS F-519520 & 519521).

***Arthonia epiphyscia*** Nyl.

The species was collected in Sør-Trøndelag, growing on thallus of *Physcia caesia* in a schistose rock outcrop in alpine heath. It is widespread in Norway (Nordin et al. 2019) but rarely collected. The only recent collection published from Norway is from the Skibotn area in Troms (Alstrup et al. 2008).

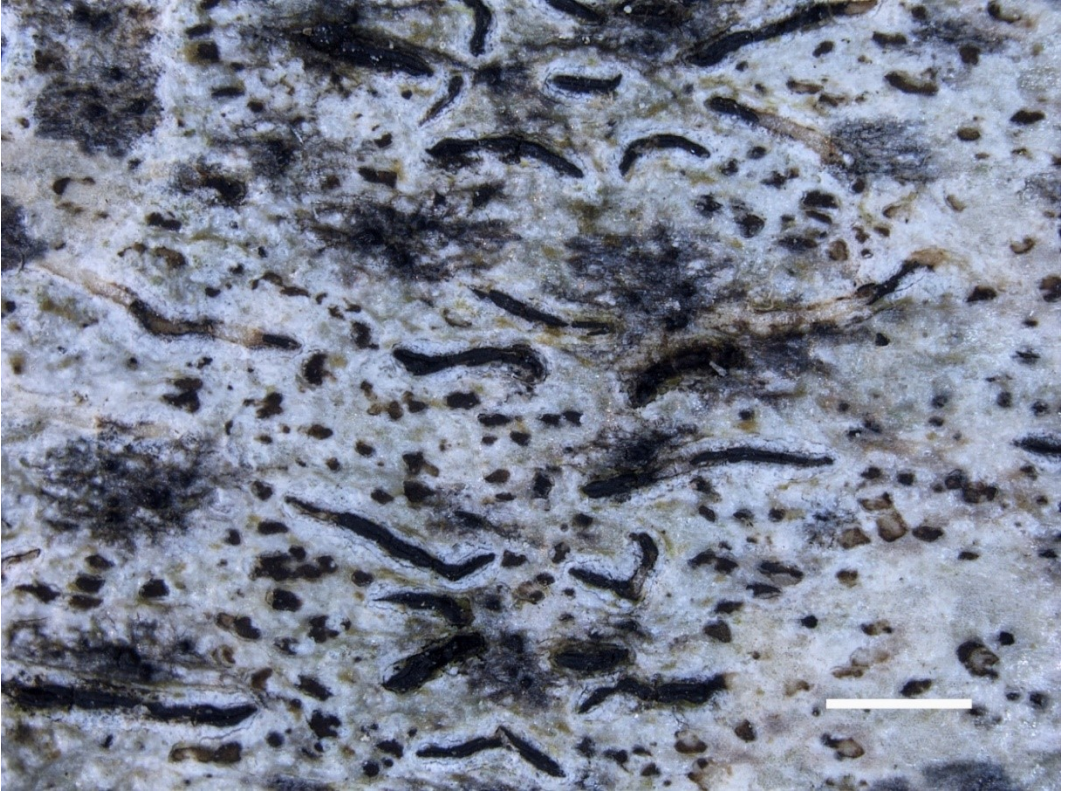
*Specimen examined: Sør-Trøndelag:* Midtre Gauldal, Litlfjellet, 62°47'41"N, 10°17'15"E, 890 m, 2017-07-25, Frisch 17/No5 (TRH-L-23876).

*Additional specimens examined: Finnmark:* Vadsø, Nordvaranger, Meskelva, på *Physcia dubia*, 700 m, 1917-07-28, B. Lyngé s.n. (UPS F-519572); Vadsø, Nordvaranger, Store Vadsøya, klapperstensfält uppe på oen, *Physcia*, 700 m, 1966-07-14, I. Nordin 3771d (UPS F-519571).

***Arthonia graphidicola*** Coppins

(Fig. 11)

The species was found on trunks of *Corylus avellana* and *Fraxinus excelsior*, growing on thallus of *Graphis scripta* in oceanic coastal pine forest and hazel groves from Hordaland to Møre og Romsdal. It was first reported for Norway by Blom et al. (2015) without citing specimens.



**Figure 11.** *Arthonia graphidicola* (TRH-L-23877). Scale = 1 mm. Photo: A. Frisch.

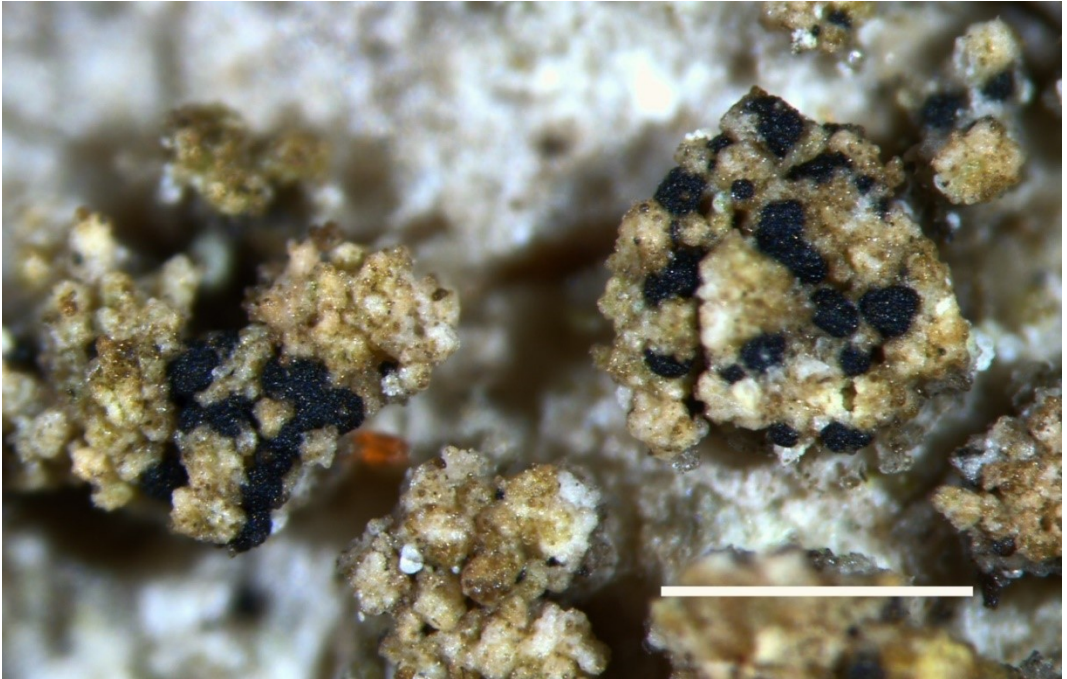
*Specimens examined:* Hordaland: Fusa, Bergsvågen, 60°02'53"N, 05°42'37"E, 30 m, 2017-07-20, Frisch 17/No19 (TRH-L-23877 & 23878); Tysnes, Beltestad, Beltestadknappen, 59°59'53"N, 05°27'33"E, 13 m, 2018-05-09, Frisch 18/No13 (TRH-L-23880); Tysnes, Austre Knappsvågen, 59°59'46"N, 05°27'31"E, 5 m, 2018-05-09, Frisch 18/No112 (TRH-L-23879). Møre og Romsdal: Fræna, Lunheim NØ, 62°55'23"N, 07°06'57"E, 60 m, 2016-04-15, Klepsland JK16-154 (O-L-206451).

***Arthonia japewiae*** Grube & Holien

(Fig. 12)

The species was collected in Sør-Trøndelag, Nord-Trøndelag and Nordland, growing on thallus of *Japewia subaurifera* on *Alnus incana* and *Picea abies* in boreal rainforest and in swampy forest close to a river. It was previously known in Norway from old spruce forests in Meldal (type locality) and Orkdal, Sør-Trøndelag (Grube & Matzer 1997), and in a boreal rainforest in Overhalla, Nord-Trøndelag (Prestø & Holien 2001).

*Specimens examined:* Sør-Trøndelag: Meldal, Urdvatnet forest reserve, 63.121°N, 09.8029°E, 320 m, 1991-08-13, Holien 4825 (TRH-L-15665) & 1993-07-19, Holien 5804 b (TRH-L-15504); Meldal, NE of Bustadvatnet, Vidmyråsen, 63.1393°N, 09.7439°E, 300 m, 1992-09-16, Holien 5474 (TRH-L-15510); Meldal, S of Sjursåstjønnan, 63.1301°N, 09.7833°E, 260 m, 1991-09-17, Holien 5470 (TRH-L-15667). Nord-Trøndelag: Overhalla, W of Foss, 64.4811°N, 11.9941°E, 80 m, 1997-03-13, Holien 7643 (TRH-L-15487). Nordland: Grane, Bjordalen, 65.60345°N, 13.29463°E, 100 m, 2017-05-22, Holien 15426 (TRH-L-17503); Grane, Stavvassdalen, 65.4857°N, 13.2680°E, 275 m, 2018-07-17, Vatne s.n. (TRH-L-18451).



**Figure 12.** *Arthonia japewiae* (TRH-L-18451). Scale = 1 mm. Photo: A. Frisch.

***Arthonia peltigerea* Th. Fr.**

(Fig. 13)

The species was collected in Hedmark and Troms, growing on thallus of *Peltigera rufescens*, *Solorina spongiosa* and *S. cf. bispora* on schistose rock outcrops in alpine heath. It was described from Tromsø (Fries 1866) and is known in Norway from scattered, mainly 19<sup>th</sup> century collections in Hordaland, Oppland, Nordland and Finnmark (Almquist 1880, Nordin et al. 2019).

*Specimens examined:* Hedmark: Folldal, Råtåsjøhei NØ, 62°16'36"N, 09°48'26"E, 1340 m, 2018-07-27, Klepsland JK18-405 (O-L-226236). Troms: Lyngsfjellan, Lyngen, Lyngseidet, SE slope of Kjostindane, 69°35'43"N, 20°10'30"E, 875 m, 2015-07-29, Frisch 15/No74 (TRH-L-18897); Nordreisa, W of Forsvatnet, 69°49'00"N, 21°14'29"E, 510 m, 2019-07-24, Frisch 19/No7 (TRH-L-23925).

*Additional specimens examined:* Nordland: Hattfjelldal, v. vägen utmed Valmåsen, 1951-06-14, Degelius s.n. (UPS F-519683, 106438); Rana, Dunderlandsdalen, Örtfjelmoen near Örtfjeld (c. 7 km NE of Naevernes), 1976-09-11, Santesson 27291 (UPS F-519682); Rana, Dalsklubben (V. ned-Dal), 1951-06-23, Degelius s.n. (UPS L-106437). Troms: Tromsø, s.d., Norman s.n. (UPS F-519686); Tromsø, Fløyfjellet, 1864-06-22, Fries s.n. (UPS F-519687); Tromsø, Tromsøysund, the S-slope of Bønntuva, 1968-08-16, Santesson 20134b (UPS F-519684). Finnmark: Berlevag, Varanger Peninsula, Vargviken (= 2 km ESE of Berlevåg), 1966-07-31, Santesson 18934 (UPS F-519689).

***Arthonia stereocaulina* (Ohlert) R. Sant.**

The species was collected in Oppland, Sør-Trøndelag and Nordland, growing on thallus of *Stereocaulon condensatum* and *Stereocaulon* sp. in late snowbed communities, alpine heath and



**Figure 13.** *Arthonia peltigerea* (TRH-L-23925). Scale = 5 mm. Photo: A. Frisch.

soil-covered rocks. It is widespread in Norway, but was previously known only from four scattered localities in Oppland, Sør-Trøndelag and Troms (Alstrup et al. 2008, Nordin et al. 2019).

*Specimens examined:* *Oppland:* Dovre, Grimsdalen, Verkensåe N of Verkjessætre, 62°03'55"N, 09°31'48"E, 1085 m, 2018-07-27, Frisch 18/No149 (TRH-L-23951); Dovre, Grimsdalen, Verkensåe N of Verkjessætre, 62°03'59"N, 09°31'37"E, 1080 m, 2018-07-27, Frisch 18/No178 (TRH-L-23952). *Sør-Trøndelag:* Midtre Gauldal, Litfjellet, 62°47'46"N, 10°16'40"E, 830 m, 2017-07-25, Frisch 17/No18 (TRH-L-23950). *Nordland:* Rana, Saltfjellet-Svartisen National Park, Semskvatna, N top of Kjempåtinden, 66°41'25"N, 15°07'35"E, 1095 m, 2018-07-22, Frisch 18/No204 (TRH-L-23953).

*Additional specimens examined:* *Oppland:* Vågå, Åbakken (N of Lake Vågåvatn), 700 m, 1961-07-27, Santesson 14241 (UPS F-519772). *Sør-Trøndelag:* Røros, Brekken par., the southern side of Tamnes peninsula, c. 8 km W of Brekken, 700 m, 1987-08-03, Santesson 31881 (UPS F-519774). *Troms:* Tromsø, Tromsøysund, the S-slope of Bønntuva, 700 m, 1968-08-16, Santesson 20132 (UPS L-519773).

### *Arthonia toensbergii* Holien & Frisch

The species was recently described from boreal rainforests in Sør- and Nord-Trøndelag (Frisch & Holien 2018). More recent collections extend the known distribution of the species as far north as Bardu in Troms. *Mycoblastus alpinus*, on which *A. toensbergii* was growing in Bardu, is a new host species. All new specimens have been collected on *Picea abies*, except for the Bardu collection which was found on *Betula pubescens*.

*Selected specimens examined:* Nord-Trøndelag: Flatanger, Skjellådalen naturreservat, 64°21'16"N, 10°46'41"E, 85–110 m, 2018-08-07, Klepsland TSD N5-2-Pa2-4 (TRH-L-23960); Nærøy, Nærøy Prestegard, 64°55'57"N, 11°46'46"E, 60–70 m, 2019-08-15, Frisch TSD N7-1-Pa1-2 (TRH-L-23961); Nærøy, Nærøy Prestegard, 64°56'05"N, 11°47'25"E, 80–100 m, 2019-08-15, Frisch TSD N7-2-Pa4-3 (TRH-L-23962). Nordland: Bindal, Fiskaroselva, 65°10'40"N, 12°13'18"E, 15–30 m, 2019-05-15, Frisch TSD N8-1-Pa3-4 (TRH-L-23964); Bindal, Fiskaroselva, 65°10'43"N, 12°13'19"E, 15–30 m, 2019-05-15, Frisch TSD N8-2-Pa4-1 (TRH-L-23965); Brønnøy, Strengivatnet, 65°22'35"N, 12°38'09"E, 5–15 m, 2019-05-17, Frisch TSD N9-1-Pa6-1 (TRH-L-23967); Brønnøy, Strengivatnet, 65°22'34"N, 12°38'26"E, 0–20 m, 2019-05-17, Frisch TSD N9-2-Pa9-1 (TRH-L-23968); Grane, Øvergardselva ved Galnmoen, 65°31'06"N, 13°22'55"E, 65–75 m, 2019-05-18, Frisch TSD N10-1-Pa9-1 (TRH-L-23955); Grane, Øvergardselva ved Galnmoen, 65°31'04"N, 13°22'49"E, 70–90 m, 2019-05-18, Frisch TSD N10-2-Pa1-1 (TRH-L-23956); Hemnes, Øverengmoen naturreservat, 66°06'19"N, 13°49'11"E, 20–35 m, 2018-06-30, Frisch TSD N12-1-Pa2-3 pr.p. (TRH-L-18902); Vefsn, Langmoen, NW Fustvatnet, 65°54'39"N, 13°17'10"E, 55–65 m, 2018-06-29, Frisch TSD N11-2-Pa3-3 (TRH-L-23958). Troms: Bardu, Berglund, 68°49'06"N, 18°33'00"E, 160–175 m, 2019-07-18, Frisch TSD N15-2-Bp1-2 (TRH-L-23959).

***Arthopacopsis parmeliarum* Hafellner**

(Fig. 14)

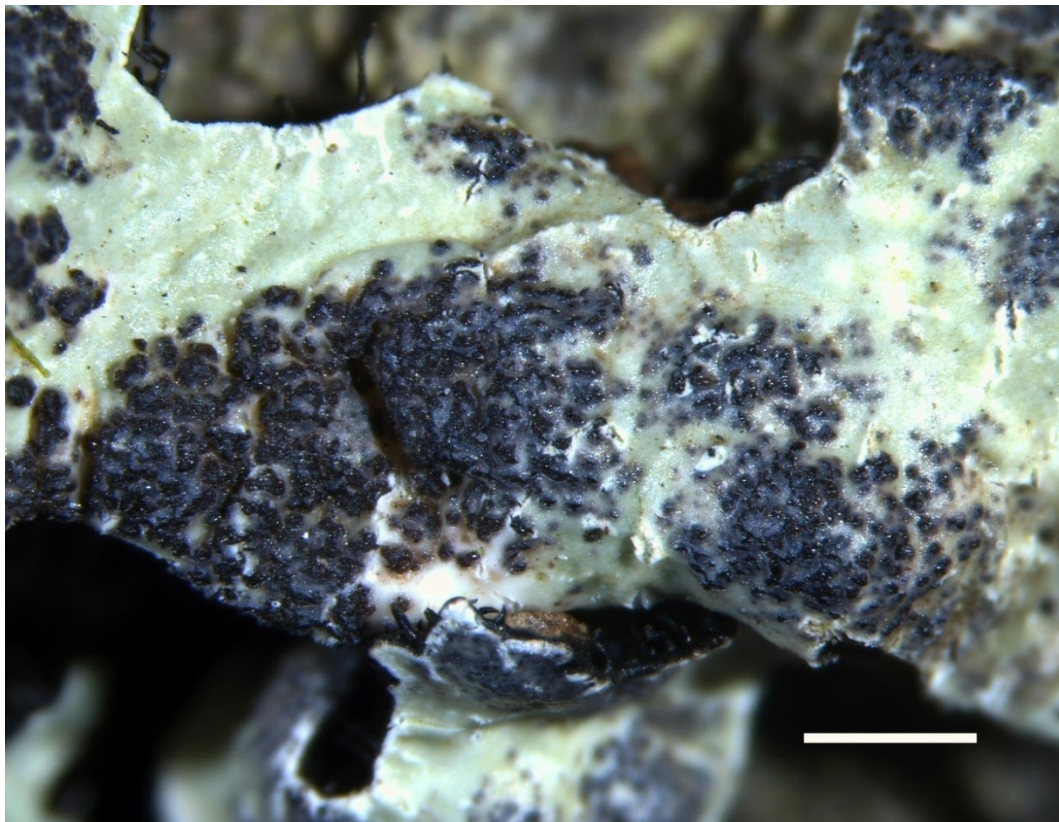
This is a common lichenicolous fungus on *Parmelia saxatilis* and *P. sulcata* in boreo-nemoral and boreal rainforests, and other oceanic forest communities from Sogn og Fjordane to Troms. The host species were growing on *Alnus incana*, *Betula pubescens*, *Picea abies*, *Salix caprea* and *Sorbus aucuparia*. *Arthopacopsis parmeliarum* was previously reported from scattered localities in Trøndelag (Nordin et al. 2019).

*Selected specimens examined:* Sør-Trøndelag: Åfjord, Høydalmoan naturreservat, 64°02'29"N, 10°26'13"E, 70–90 m, 2017-06-22, Frisch TSD N3-2-Pa2-5 (TRH-L-24000 & 24001); Osen, Seterelva naturreservat, 64°13'43"N, 10°40'26"E, 80–100 m, 2017-07-13, Frisch TSD N4-1-Pa1-1 pr.p. (TRH-L-24002 & 24003); Rissa, Nordelva naturreservat, 63°47'39"N, 10°11'35"E, 110–140 m, 2017-05-03, Frisch TSD N2-1-Bp3-2 (TRH-L-23997). Nord-Trøndelag: Flatanger, Skjellådalen naturreservat, 64°21'16"N, 10°46'41"E, 95 m, 2018-08-07, Klepsland TSD N5-2-Pa4-1 (TRH-24005); Flatanger, Jøssundfossen NW Liafjellet, 64°21'38"N, 10°49'14"E, 30–45 m, 2018-08-06, Frisch TSD N5-3-Bp1-1 (TRH-L-24006); Flatanger, Stordalen, 64°26'35"N, 10°58'21"E, 55 m, 2018-08-06, Frisch 18/No225 (TRH-L-23973). Nordland: Hemnes, Lamoen S of Sørbakken, S of Bjerka, 66°07'02.4"N, 13°48'41.8"E, 25–35 m, 2018-06-28, Frisch N12-3-Pa10-1 (TRH-L-23984); Hemnes, Øverengmoen naturreservat, 66°06'25"N, 13°49'21"E, 25–40 m, 2018-06-30, Frisch TSD N12-2-Ai3-8 & TSD N12-2-Pa3-3 (TRH-23981 & 23983); Meløy, Fonndalen, Fondal V, 66°41'54"N, 13°40'36"E, 10–25 m, 2018-07-01, Frisch TSD N13-1-Sa3-3 (TRH-L-23987); Meløy, Fonndalen, Fondal V, 66°41'46"N, 13°40'60"E, 30–45 m, 2018-07-01, Frisch TSD N13-2-Ai1-1 & TSD N13-2-Sxc1-1 (TRH-L-23989 & 23991); Vefsn, NW Fustvatnet, Langmoen, 65°54'43"N, 13°17'01"E, 60–70 m, 2018-06-29, Frisch TSD N11-1-Pa3-3 (TRH-L-23975); Vefsn, NW Fustvatnet, Langmoen, 65°54'39"N, 13°17'10"E, 55–65 m, 2018-06-29, Frisch TSD N11-2-Ai2-2 (TRH-L-23977). Troms: Narvik, Bjerkvik, Prestjordelva, 68°33'31"N, 17°33'02"E, 17 m, 2019-07-17, Frisch TSD N14-1-Ai1-1 (TRH-L-23992); Troms: Narvik, Bjerkvik, Prestjordelva, 68°33'45"N, 17°33'49"E, 23 m, 2019-07-17, Frisch N14-2-Ai3-2 (TRH-L-23994); Bardu, Berglund, 68°48'58"N, 18°33'22"E, 200 m, 2019-07-18, Frisch TSD N15-1-Bp1-2 (TRH-L-23995).

*Additional specimens examined:* Sogn og Fjordane: Lærdal, 2 km W of Husum, 300 m, 1985-08-08, Santesson 31303 (UPS F-519920). Nord-Trøndelag: Grong c. 1 km E of Grong centre, 64°28'N, 12°20'E, 1993-07-26, Wedin 4616 (UPS F-167230); Overhalla, c. 1 km W of Foss, 64°28'N, 12°00'E, 50–100 m, 1993-07-28, Wedin 4645, 4649 (UPS F-167245, 167246) and Santesson 33563 (UPS F-519921).

***Arthopyrenia carneobrunneola* Coppins**

The species was collected in Hordaland, growing on trunks of *Corylus avellana*, *Fraxinus excelsior* and *Tilia cordata* in coastal pine forest and mixed deciduous forest. It was first mentioned for Norway from Tysnes in Hordaland by Blom et al. (2015) without citing specimens.



**Figure 14.** *Arthophacopsis parmiliarum* (TRH-L-23984). Scale = 1 mm. Photo: A. Frisch.

*Specimens examined:* Hordaland: Bømlo, Skogafjellet N, 59°38'58"N, 05°12'26"E, 12 m, 2017-07-19, Klepsland JK17-383 (O-L-223361); Fusa, Hatledalsåsen, 60°02'40"N, 05°47'26"E, 100 m, 2018-05-08, Klepsland JK18-121 (TRH-L-23798); Kvinnherad, Varaldsøy, Sekken S, 60°07'50"N, 06°00'42"E, 280 m, 2016-06-11, Klepsland JK16-352 (O-L-206760); Stord, Øvrabø Ø, 59°45'57"N, 05°24'31"E, 55 m, 2018-04-28, Klepsland JK18-056 (TRH-L-23790).

***Arthopyrenia nitescens* (Salwey) Mudd**

The species was collected in Hordaland, growing on trunks of *Corylus avellana* and *Sorbus aucuparia* in coastal pine forest and hazel groves. It was first mentioned for Norway from Tysnes in Hordaland by Blom et al. (2015) without citing specimens.

*Selected specimens examined:* Hordaland: Bømlo, Tjong N, 59°38'49"N, 05°12'04"E, 15 m, 2017-07-19, Klepsland JK17-378 (O-L-223358); Bømlo, Skogafjellet N, 59°38'58"N, 05°12'26"E, 12 m, 2017-07-19, Klepsland JK17-382 (O-L-223360); Stord, Leirvik, Storavatnet Ø, 59°46'50"N, 05°26'34"E, 20–40 m, 2017-07-18, Klepsland TSD S8-1-Sa1-3 (TRH-L-37300); Stord, Leirvik, Storavatnet Ø, 59°46'52"N, 05°26'37"E, 15 m, 2016-06-07, Klepsland JK16-309 (O-L-222462); Stord, Øvrabø N, 59°46'10"N, 05°24'02"E, 20 m, 2018-05-07, Klepsland JK18-106 (TRH-L-23795).

*Arthopyrenia subcerasi* (Vain.) Zahlbr.

The species was collected in Aust-Agder and Nord-Trøndelag, growing on trunks of *Betula pubescens* in birch-aspen and birch-spruce forests. It was previously known in Norway from a single collection from Nordland, Bindal (Foucard 1992).

*Specimens examined:* *Aust-Agder:* Evje og Hornnes, Klepsland, Stemtjørna, 58°37'20"N, 07°56'51"E, 550 m, 2015-05-08, Klepsland JK15-L069 (TRH-L-23773). *Nord-Trøndelag:* Grong, Fjerdingselva, 64°38'22"N, 12°37'42"E, 115 m, 2014-06-22, Klepsland JK14-L147 (O-L-200277).

*Arthothelium macounii* (G. Merr.) W.J. Noble (Fig. 15)

This species was first reported from Norway by Blom et al. (2015) without citing specimens. Two new collections were made close to the original locality in Hordaland (Blom, pers. com.) from old *Corylus avellana* in coastal pine forest.

*Specimen examined:* *Hordaland:* Stord, Leirvik, Halvgjengeåsen, 59°46'37"N, 05°26'27"E, 45 m, 2017-07-21, Frisch 17/No20 (TRH-L-24010); Stord, Røyrtjørna nord, 32V KM 0021 3194, 50 m, 2014-05-27, Jordal & Gaarder s.n. (BG-L-96711).

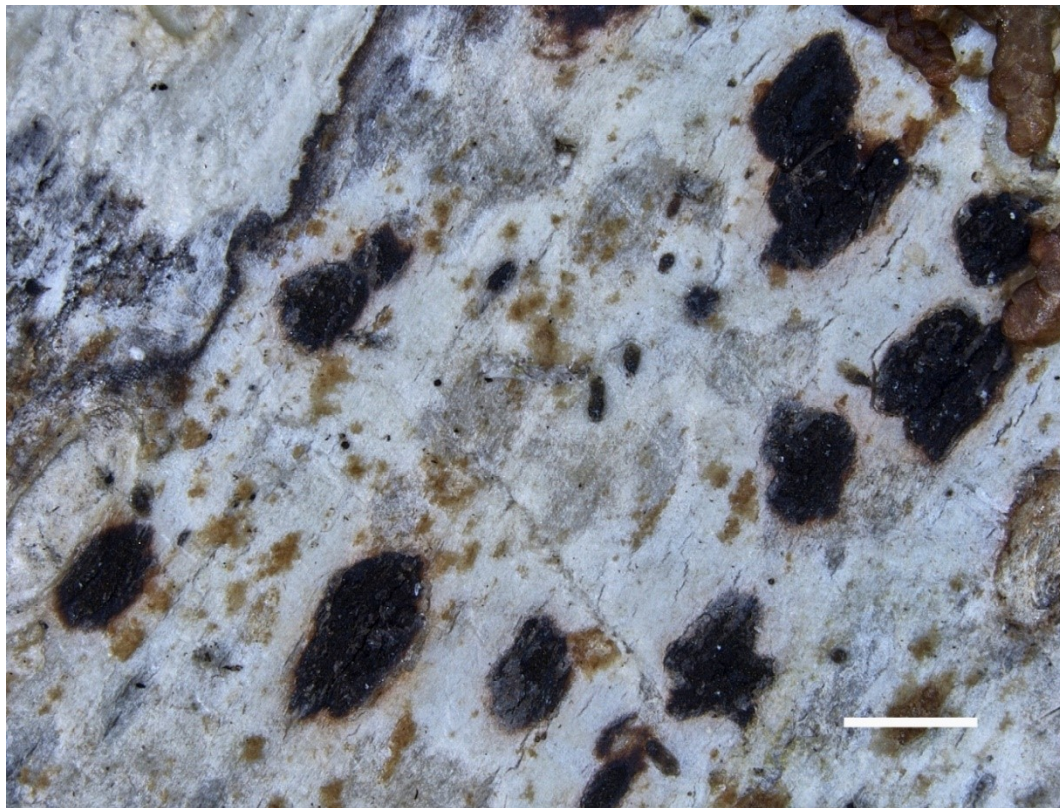
*Arthothelium scandinavicum* Th. Fr.

The species was described from Bogstadaasen (Holmenkollen) near Oslo (Fries 1865b) and was previously known in Norway from several 19<sup>th</sup> and one 20<sup>th</sup> century collection in Akershus. *Arthothelium scandinavicum* is rather common on bark and wood of *Picea abies* in humid spruce forests in southern and southeastern Norway but has rarely been collected. A wide gap in the recorded data exists from about 1949 to 2012. Recent collections have been made in Oppland, Buskerud, Telemark, Sør-Trøndelag and Nord-Trøndelag.

*Specimens examined:* *Oppland:* Lunner, Gjerdingseleva-Skillingen, 60°10'47"N, 10°40'09"E, 280 m, 2017-03-12, Klepsland JK17-001 (O-L-223106); Nordre Land, Lundbekken Ø, 60°59'07"N, 09°57'18"E, 590 m, 2017-05-19, Klepsland JK17-289 (O-L-223316). *Buskerud:* Flå, Gulsvikelvi, 60°21'56"N, 09°34'33"E, 240 m, 2016-08-24, Klepsland JK16-092 (O-L-206461); Krødsherad, Surtebergflaket Ø, 60°14'14"N, 09°35'53"E, 202 m, 2015-09-27, Klepsland JK15-L997 (O-L-222186); Krødsherad, Surtebergflaket Ø, 60°14'18"N, 09°35'38"E, 265 m, 2015-09-27, Klepsland JK15-L1001 (O-L-222191); Krødsherad, Surtebergflaket Ø, 60°14'21"N, 09°35'14"E, 455 m, 2015-09-27, Klepsland JK15-L1012 (O-L-222201); Sigdal, Hellerud Ø, 60°03'32"N, 09°31'44"E, 150 m, 2016-06-21, Klepsland JK16-091 (O-L-222317); Modum, Brennåsen SV, 59°57'46"N, 10°07'31"E, 640 m, 2018-02-04, Klepsland JK18-008 (TRH-L-23788). *Telemark:* Bø, Uvdal, Kvernabekken, 59°22'19"N, 08°57'05"E, 150 m, 2016-05-22, Klepsland JK16-237 (O-L-222414); Hjartdal, Dypemyrnatten Ø, 59°36'02"N, 08°58'49"E, 320 m, 2017-11-26, Klepsland JK17-809 (O-L-223597); Notodden, Liåsen, 59°42'27"N, 09°03'18"E, 470 m, 2017-12-09, Klepsland JK17-817 (O-L-223602). *Sør-Trøndelag:* Melhus, Svartdalsbrestan, 63.2190°N, 10.4797°E, 2015, Hanssen, Wangen & Gaarder (TRH-L-17435). *Nord-Trøndelag:* Lierne, Vangen Ø, 64°27'28"N, 13°51'00"E, 440 m, 2013-09-25, Klepsland JK13-L095a (O-L-223039).

*Additional specimens examined:* *Oslo:* [Christiania], Vettakollen, 1869-05-06, N.G. Moe 104 (UPS F-752797); Vettakollen, 1870-09-18, N.G. Moe 134 (UPS F-752799); Frognersætra, on *Picea*, 1947-07-20, A.H. Magnusson 20854 (UPS F-752798); Grefsenåsen, 1871-09-24, N.G. Moe 921 (UPS F-645830).





**Figure 15.** *Arthothelium macounii* (Jordal & Gaarder, BG-L-96711). Scale = 1 mm. Photo: A. Frisch.

***Byssoloma marginatum*** (Arnold) Sérus.

This species is rare in Norway, being reported only from thin twigs of *Picea abies* in boreal rainforests in Nord-Trøndelag and Nordland (Holien 2000, Nordin et al. 2019). Almdalen nature reserve in Namsos is a new locality for the species.

*Specimen examined:* Nord-Trøndelag: Namsos, Duna, Almdalen naturreservat, 64°35'30"N, 11°48'54"E, 25 m, 2017-07-14, Frisch & Holien TSD N6-2-Pa1-1 (TRH-L-24064).

***Catillaria lobariicola*** (Alstrup) Coppins & Aptroot

The species was collected in boreal rainforests in Sør-Trøndelag, Nord-Trøndelag and Nordland, growing on thallus of *Lobaria scrobiculata* on *Picea abies* and *Sorbus aucuparia*. The species was previously known only from the type locality in Overhalla (Alstrup 1997).

*Specimens examined:* Sør-Trøndelag: Osen, Seterelva naturreservat, 64°13'43"N, 10°40'26"E, 80–100 m, 2017-07-13, Frisch TSD N4-1-Sa1-5 (TRH-L-24075); Rissa, Nordelva naturreservat, 63°47'22"N, 10°10'27"E, 70 m, 2017-05-04, Frisch TSD N2-2-Pa5-5 (TRH-L-24074); Åfjord, S of Børmarka on E side of river Norddalselva, Stodalen, 64.0414°N, 10.4431°E, 110 m, 2005-09-09, Holien 10386 (TRH-L-11322). Nord-Trøndelag: Grong, N of Harran, NW of Øvermoen, Endesdalen, 645942°N, 12.5367°E, 100 m, 2006-05-29, Holien 10532 (TRH-L-11530); Overhalla, Grande S, 64°28'54"N, 12°00'05"E, 55 m, 2015-08-12, Klepsland JK15-1131 (O-L-

206528). *Nordland*: Brønnøy, Strengivatnet, 65°22'34"N, 12°38'26"E, 0–20 m, 2019-05-17, Frisch TSD N9-2-Pa5-2 (TRH-L-24076); Hemnes, Tørkbakken NØ, 66°07'11"N, 13°48'48"E, 40 m, 2018-09-02, Kleppland JK18-667 (TRH-L-23807).

***Cornutispora ciliata* Kalb**

The species was collected in a boreal rainforest in Sør-Trøndelag, growing on thallus of *Pertusaria amara*, the same host as reported for the species in Sweden (Theell et al. 2014). The only other Norwegian collection was growing on *Ochrolechia upsaliensis* (Alstrup et al. 2008). *Cornutispora ciliata* was described from *Dibaeis cretacea* in Tasmania (Gierl & Kalb 1993), but is reported from various host lichens including, e.g., *Cladonia* spp., *Evernia prunastri*, *Haematomma* spp., *Hypogymnia physodes*, *Ochrolechia* spp., *Pertusaria* spp. and *Xanthoria parietina* in Europe, Macaronesia, N., C. and S. America and Australasia (Brackel 2014). It is readily identified by its characteristic conidia (Gierl & Kalb 1993) but might be heterogeneous at world level.

*Specimen examined*: Sør-Trøndelag: Rissa, Storlidalen along river Nordelva, 63°40'02"N, 09°57'40"E, 135–170 m, 2018-06-20, TSD N1-1-Sa2-2 (TRH-L-24099).

***Epicladonia sandstedei* (Zopf) D. Hawksw.**

The species was collected in Nordland and Troms, growing on thallus of *Cladonia chlorophaea* and *C. coniocraea* in boreal rainforest, boreal deciduous forest and riverine alder forest on *Picea abies*, *Sorbus aucuparia* and the trunk of a dead *Alnus incana*. It was previously reported in Norway from two localities in Møre og Romsdal and Troms (Alstrup et al. 2008, Nordin et al. 2019).

*Specimens examined*: Nordland: Vefsn, Kanesbekken, 65°59'36"N, 13°16'57"E, 31 m, 2018-06-29, Frisch 18/No148 (TRH-L-24115); Vefsn, Langmoen, NW Fustvatnet, 65°54'39"N, 13°17'10"E, 55–65 m, 2018-06-29, Frisch TSD N11-2-Pa3-2 (TRH-L-24116). Troms: Bardu, Berglund, 68°48'58"N, 18°33'22"E, 200 m, 2019-07-18, Frisch TSD N15-1-Sa2-4 (TRH-L-24117).

*Additional specimen examined*: Møre og Romsdal: Nordal par., Gudbrandsjuvet, on *Cladonia squamosa*, *C. borealis* and *C. cf. chlorophaea*, 300 m, 1947-07-07, Magnusson 20684 (UPS F-485700).

***Gomphillus calycioides* (Delise ex Duby) Nyl.**

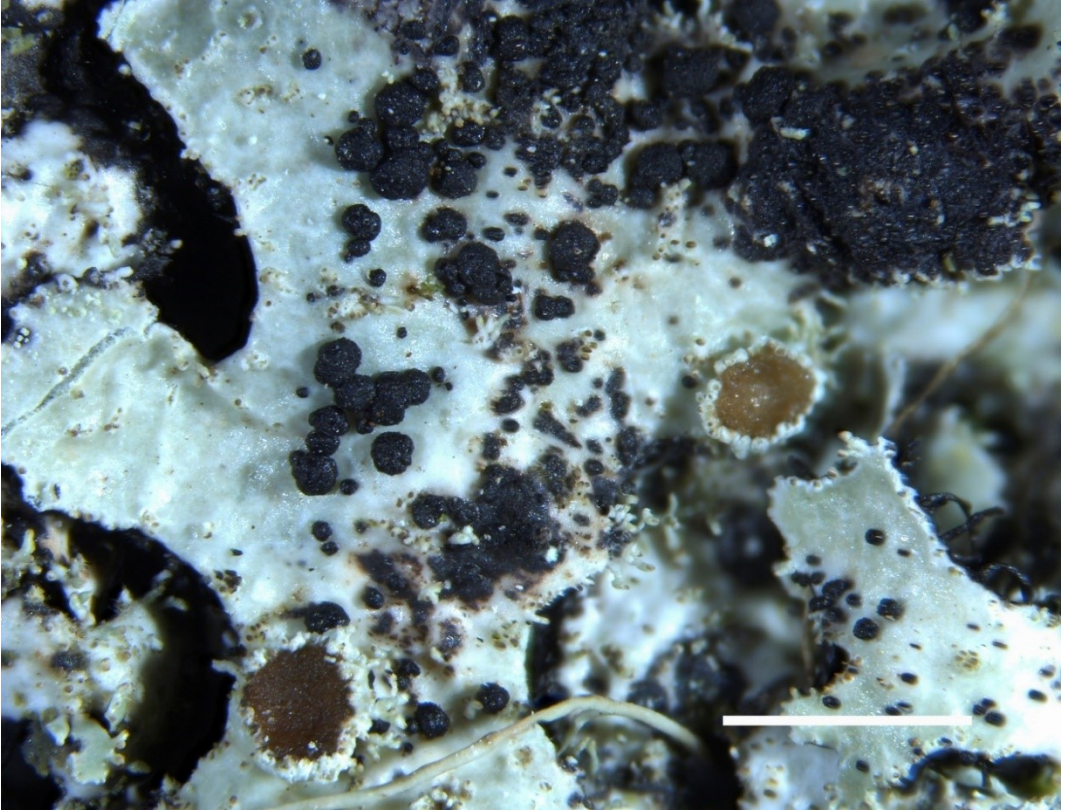
The species was collected on moss-covered base of *Fraxinus excelsior* in boreo-nemoral rainforest. *Gomphillus calycioides* is a rare species in Norway, being reported from a few boreo-nemoral rainforest localities in Hordaland (Nordén & Jordal 2016, Tønseberg 1994, Tønseberg & Øvstedal 1982).

*Specimen examined*: Rogaland: Jørpeland, Tysdalsvatnet: Strandabrynnane aust, 59°04'33"N, 06°05'35"E, 125 m, 2017-07-17, Frisch TSD S5-2-Fe1-4 (TRH-L-24122).

***Lasiosphaeriopsis stereocaulicola* (Linds.) O.E. Eriksson & R. Sant.**

The species was collected in Oppland, Sør-Trøndelag and Nordland, growing on thallus of *Stereocaulon rivulorum* and *Stereocaulon* sp. in alpine heath and late snowbed communities. The species was known in Norway from two nearby localities in Skibotn, Troms (Alstrup et al. 2008, Zhurbenko 2010).

*Specimens examined*: Oppland: Dovre, Grimsdalen, Verkenså N of Verkjessætre, 62°03'59"N, 09° 31'37"E, in alpine heath near stream, 1080 m, 2018-07-28, Frisch 18/No177 (TRH-L-24152). Sør-Trøndelag: Midtre Gauldal, Litlfjellet, 62°47'46"N, 10°16'40"E, 830 m, 2017-07-25, Frisch 17/No17 (TRH-L-24150 & 24151).



**Figure 16.** *Lichenopuccinia poeltii* (TRH-L-24004). Scale = 1 mm. Photo: A. Frisch.

*Nordland:* Rana, Saltfjellet-Svartisen N.P., Semskvatna, 66°41'34"N, 15°09'07"E, 1020 m, 2018-07-22, Frisch 18/No194 (TRH-L-24153).

***Lichenoconium lecanorae*** (Jaap) D. Hawksw.

The species was collected in Hordaland, growing on *Lecanora varia* on an old boatshed. It was known in Norway from few localities in Oppland and Sør-Trøndelag (Hafellner 1993, Nordin et al. 2019).

*Specimen examined:* *Hordaland:* Bømlo, Tjong, 59°38'45"N, 05°11'58"E, 2 m, 2017-07-19, Klepsland JK17-376 (O-L-223357).

*Additional specimens examined:* *Oppland:* Vågå, just N of Svee Hotel, 450 m, 1961-07-25, Santesson 14159c (UPS F-521318); Vågå, c. 1 km W of Fillinse [Fellese] on the northern shore of Vågåvatn, 1961-07-26, Santesson 14190b (UPS F-521319). *Sør-Trøndelag:* Røros, Glåmos parish, Olavsgruva, on the E slope of Mt. Kvintushøgda, 1973-08-03, R. Santesson 24557d (UPS F-521230).

***Lichenopuccinia poeltii*** D. Hawksw. & Hafellner

(Fig. 16)

This is a common species in the boreal rainforests of central Norway, growing on thallus of *Parmelia saxatilis* and *P. sulcata* on *Alnus incana*, *Betula pubescens*, *Picea abies* and *Sorbus*

*aucuparia*. It was previously reported for Norway from Flatanger (Holien & Tønsberg 1994, Holien et al. 2016).

*Selected specimens examined: Sør-Trøndelag:* Osen, Seterelva naturreservat, 64°13'43"N, 10°40'26"E, 90 m, 2017-07-13, Frisch TSD N4-1-Pa1-1 pr.p. (TRH-L-24003); Rissa, Storlidalen, 63°40'02"N, 09°57'40"E, 150 m, 2017-06-20, Frisch TSD N1-1-Pa6-1 (TRH-L-18901); Rissa, Nordelva naturreservat, 63°47'39"N, 10°11'35"E, 120 m, 2017-05-03, Frisch TSD N2-1-Pa7-1 (TRH-L-28666); Åfjord, Stodalen, Høydalmoan NR, 64°02'29"N, 10°26'38"E, 120 m, 2017-06-21, Frisch TSD N3-1-Bp2-3 & TSD N3-1-Pa3-1 (TRH-L-28669 & 28671). *Nord-Trøndelag:* Flatanger, Jøssund, Skjellådalen naturreservat, 64°21'16"N, 10°46'41"E, 85–110 m, 2018-08-07, Frisch TSD N5-2-Pa1-1 pr.p. (TRH-L-24004); Namsos, Duna, Almdalen naturreservat, 64°35'24"N, 11°48'47"E, 25–40 m, 2017-07-12, Frisch TSD N6-1-Pa8-3 (TRH-L-28677). *Nordland,* Meløy, Fonndalen, Fondal V, 66°41'54"N, 13°40'36"E, 10–25 m, 2018-07-01, Frisch TSD N13-1-Bp2-4 (TRH-L-28663).

***Lichenosticta alcicornaria* (Linds.) D. Hawksw.**

The species was collected in Nord-Trøndelag and Nordland, growing on basal squamules of *Cladonia* sp. on a large stump of *Picea abies* in a spruce plantation, and at the base of *Picea abies* in a boreal rainforest. It was previously known in Norway from two localities in Møre og Romsdal and Troms (Alstrup et al. 2008, Zhurbenko & Pino-Bodas 2017).

*Specimens examined: Nord-Trøndelag:* Steinkjer, Lustadvatnet N, Kleivberget, 64.01597°N, 12.11414°E, 400 m, 2019-10-17, Holien 15908 (TRH-L-18715). *Nordland:* Hemnes, Øverengmoen naturreservat, 66°06'19"N, 13°49'11"E, 20–35 m, 2018-06-30, Frisch TSD N12-1-Pa7-2 (TRH-L-28681).

***Micarea contexta* Hedl.**

The species was collected in Sør-Trøndelag, growing on wood of dead *Salix caprea* in boreal spruce forest, associated with *Micarea misella* and *Catinaria atropurpurea*. It was known in Norway from a single locality in Flatanger, Nord-Trøndelag (Holien et al. 2016).

*Specimen examined: Sør-Trøndelag:* Meldal, SE of Svorkmo village, forest reserve Urvatnet, boreal forest on the W shore of the lake, 63°07'22"N, 09°48'25"E, 300 m, 2006-09-15, Palice 10628 (PRA).

***Micarea lynceola* (Th. Fr.) Palice**

This species was known in Norway only from a few 19<sup>th</sup> century collections in Akershus (Fries 1874). A recent collection was made in Hordaland from wood of a power-transmission pole. It was also recently reported from a single Swedish collection (Svensson et al. 2017), while earlier Swedish records refer to *M. polycarpella* (Palice 1999). In order to update the current Fennoscandian distribution of this taxon, we include two collections from Finland, the northernmost outposts for this taxon reported so far, which were not specified in the checklist of Finnish lichens (Stenroos et al. 2016). These were collected on small siliceous pebbles, the usual habitat for the species.

*Specimens examined: Hordaland:* Vaksdal, E-facing hillside W of Bolstadfjorden, along the road from Dalseid to Stamnes, 60°38.57'N, 05°48.10'E, 120 m, 2006-09-07, Palice 10755 & Tønsberg (PRA, BG-L-94814).

*Additional specimens examined: Finland. South Häme:* Lammi, small gravel pit near Kellolähde spring, c. 61°00'30"N, 25°12'E, 100 m, 1997-08-18, Palice 633 (PRA); Lammi, Evo, Pirttikangas, W of Hokajärvi, 61°14'41"N, 25°05'33"E, 150 m, 2007-08-13, Palice 11660 (PRA).



**Figure 17.** *Micarea stipitata* (Frisch TRH-L-28710). Scale = 1 mm. Photo: A. Frisch.

***Micarea stipitata*** Coppins & P. James

(Fig. 17)

The species was collected in Sogn og Fjordane, growing on trunk bases of *Alnus glutinosa*, *Betula pubescens* and *Pinus sylvestris* in coastal pine forests. It was known in Norway from a few localities in Rogaland (Blom et al. 2015, Tønsberg & Johnsen 2009).

*Specimens examined:* Sogn og Fjordane: Flora, Svanøya, Vågsfjellet nord, 61°29'23"N, 05°04'57"E, 25–50 m, 2018-05-16, Frisch TSD S14-1-Sa2-2 (TRH-L-28709); Flora, Svanøya, Vågsfjellet nord, 61°29'27"N, 05°04'47"E, 25–50 m, 2018-05-16, Frisch TSD S14-2-Ps2-8 (TRH-L-28710); Flora, Storefjellet nordvest, 61°40'01"N, 05°00'02"E, 35–70 m, 2018-05-17, Frisch TSD S15-1-Bp2-2 & S15-1-Ps1-2 (TRH-L-28711 & 28712); Gulen, Sygnefest nordøst, 61°04'10"N, 05°06'07"E, 70–120 m, 2018-05-15, Frisch TSD S13-1-Bp2-1 (TRH-L-28708).

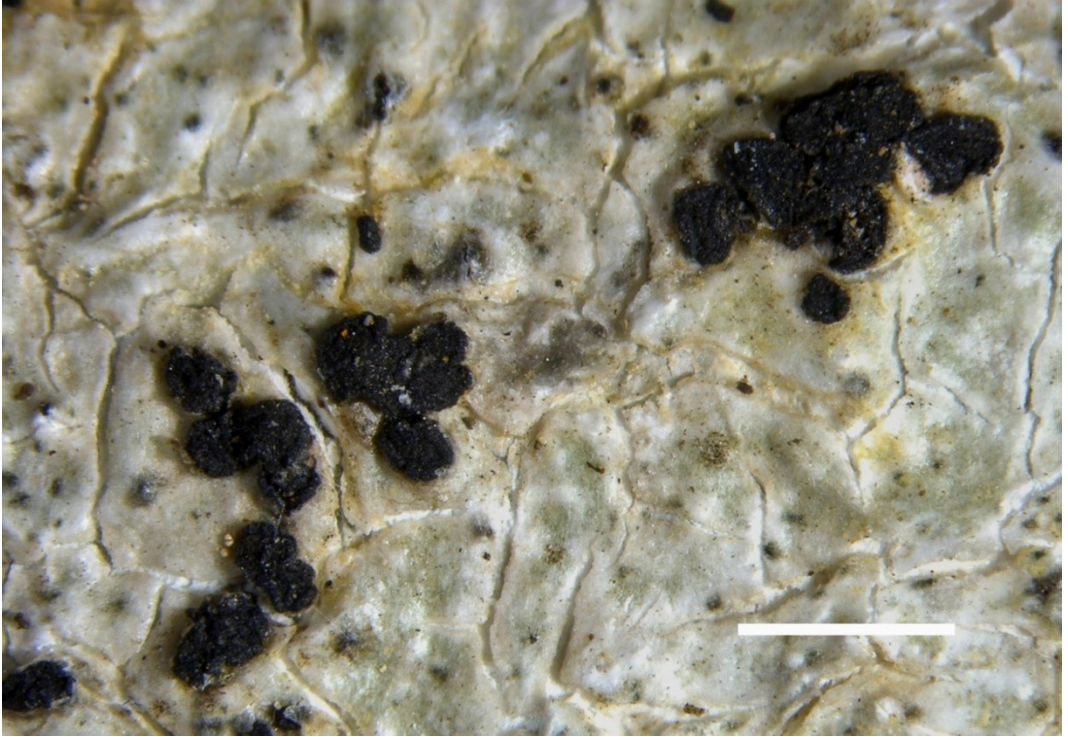
***Minutophoma chrysophthalmae*** D. Hawksw.

The species was collected in Sogn og Fjordane, growing on apothecia of *Chrysothrix chrysophthalma* on *Pinus sylvestris* in coastal pine forest. It was previously known in Norway from a few scattered localities in Trøndelag (Holien 1994).

*Specimen examined:* Sogn og Fjordane: Gulen, Sygnefest nordøst, 61°04'17"N, 05°06'23"E, 20–50 m, 2018-05-15, Frisch TSD S13-2-Ps2-5 (TRH-L-28713).

***Muellerella polyspora*** Hepp ex Müll. Arg.

The species was collected in agricultural landscape in Åfjord, Sør-Trøndelag, growing on thallus of *Arthonia radiata* on *Sorbus aucuparia*. It was known in Norway from Nordland (Nordin et al. 2019).



**Figure 18.** *Opegrapha anomea* (TRH-L-16072). Scale = 1 mm. Photo: A. Frisch.

*Specimen examined:* Sør-Trøndelag: Åfjord, Lauvøya, Helleberget, 63°55'47"N, 09°56'55"E, 14 m, 2015-06-11, Frisch 15/No4 (TRH-L-652359).

***Opegrapha anomea* Nyl.**

(Fig. 18)

The species was collected in boreal rainforests in Sør- and Nord-Trøndelag, growing on thallus of *Pertusaria amara* on *Alnus incana*, *Betula pubescens*, *Picea abies* and *Sorbus aucuparia*. It was previously reported for Norway only from Overhalla in Nord-Trøndelag (Holien 2001).

*Specimens examined:* Sør-Trøndelag: Osen, Seterelva naturreservat, 64°13'43"N, 10°40'26"E, 90 m, 2017-07-13, Frisch TSD N4-1-Sa1-6 (TRH-L-28747). Nord-Trøndelag: Flatanger, Stordalen, 64°26'39"N, 10°58'12"E, 49 m, 2015-08-05, Frisch 15/No92 (TRH-L-16072); Flatanger, Dale naturreservat, 64°26'38"N, 10°58'07"E, 40–60 m, 2018-08-06, Klepsland JK18-516 (TRH-L-23805); Steinkjer, W of Strukstadmyra, 63°59'14"N, 11°34'50"E, 75 m, 2018-08-09, Frisch 18/No231 (TRH-L-28746).

***Phacographa protoparmeliae* Hafellner**

(Fig. 19)

The species was collected in Troms, growing on thallus of *Protoparmelia badia* in an exposed schistose rock outcrop. The species was first reported for Fennoscandia from Røros in Norway (Westberg et al. 2015).

*Specimen examined:* Troms: Lyngen, Lyngseidet, W of Rottenvikvatnet, 69°36'28"N, 20°10'37"E, 811 m, 2015-07-28, Frisch 15/No57 dpl. (TRH-L-28789).



**Figure 19.** *Phacographa protoparmeliae* (TRH-L-28789). Scale = 1 mm. Photo: A. Frisch.

***Phaeospora rimosicola*** (Leight. ex Mudd) Hepp ex Stein

(Fig. 20)

The species was collected in Oppland, growing on thallus of *Rhizocarpon umbilicatum* in a shady, schistose rock wall near a stream. It was previously known in Norway from few 19<sup>th</sup> century collections in Oslo and from Nordland (Nordin et al. 2019).

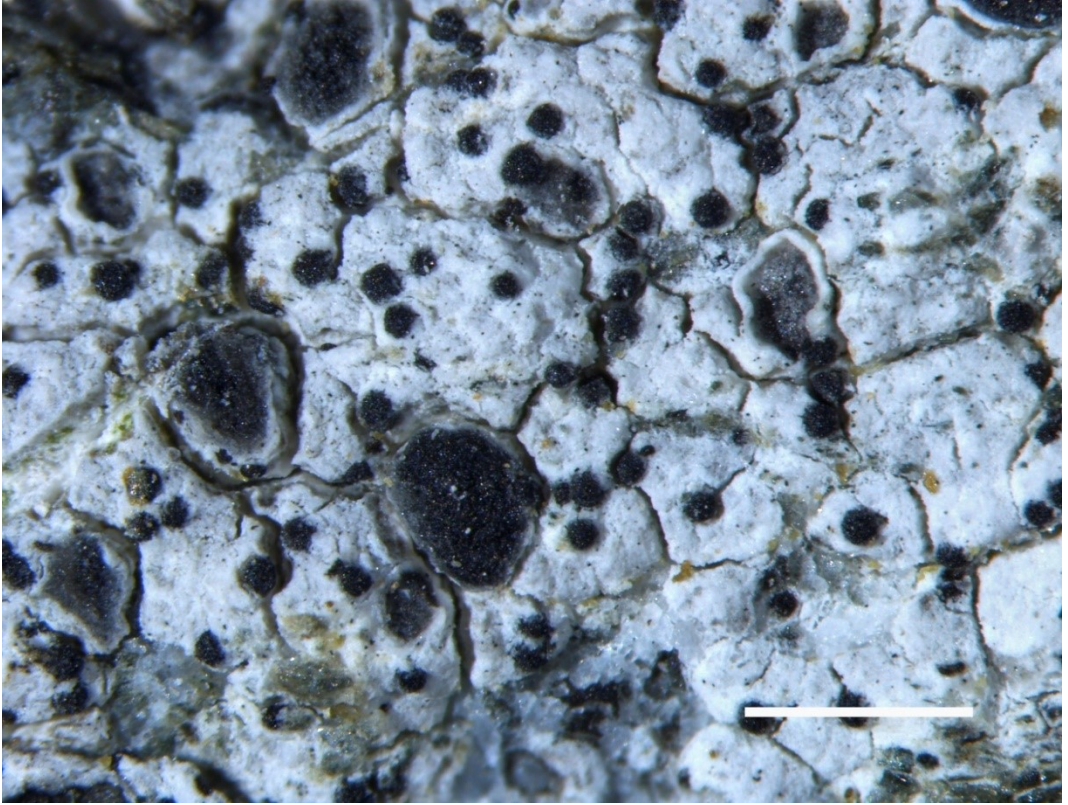
*Specimen examined:* Oppland: Dovre, Grimsdalen, Verkensåe N of Verkjessætre, 62°03'58"N, 09° 31'40"E, 1070 m, 2018-07-28, Frisch 18/No163 (TRH-L-28798).

*Additional specimens examined:* Oslo: [Christiania], Bryn, 1865-12-24, Moe 236 (UPS F-481860); Graevsenaasen. 1869-05-02, Moe 109 (UPS F-481859); Ryenberget, 1866-05-10, Moe 91 (UPS F-481862); Ekeberget, 1869-06-29, Moe 22 (UPS F-481861) & 1869-06-24, Moe s.n. (UPS F-481857). Nordland: Vega, Olderåsen, 1975-06-05, Degelius V-1037b (UPS F-91773).

***Polycoccum clauzadei*** Nav.-Ros. & Cl. Roux

(Fig. 21)

The species was collected in Oppland, growing on thallus and apothecia of *Rusavskia elegans* in a schistose rock outcrop in alpine heath. It was known in Fennoscandia from Troms in Norway and Torne lappmark in Sweden (Alstrup 2004).



**Figure 20.** *Phaeospora rimosicola* (TRH-L-28798). Scale = 1 mm. Photo: A. Frisch.

*Specimen examined:* Oppland: Dovre, Råtåsjøhei, 62°16'14"N, 09°49'28"E, 1195 m, 2018-07-27, Frisch 18/No175 (TRH-L-28810).

***Protounguicularia nephromatis*** (Zhurb. & Zavarzin) Huhtinen, D. Hawksw. & Ihlen

The species was collected in Nord-Trøndelag and Nordland, growing on thallus of *Nephroma bellum* in boreal rainforest and mixed deciduous forest. It was previously known in Norway from few localities in Hordaland and Trøndelag (Nordin et al. 2019).

*Specimens examined:* Nord-Trøndelag: Fosnes, Storengdalen, 64°38'56"N, 11°47'52"E, 110 m, 2015-10-05, Klepsland JK15-L1041 (O-L-222228); Grong, W of river Gartlandselva, 64.5444°N, 12.3796°E, 100 m, 1995-09-05, Holien 6863 (TRH-L-3362); Grong, Litlåa-Ekker, 64°28'54"N, 12°00'05"E, 90 m, 2015-05-26, Klepsland JK15-L343 (O-L-221687); Leksvik, Vollan, 63°42'16"N, 10°37'11"E, Olsen s.n. (TRH-L-17697); Mosvik, Skavdalen, 63°51'09"N, 11°02'16"E, 160 m, 2015-08-08, Klepsland JK15-L619 (O-L-221875); Namdalseid, Gårdsetervatnet S, 64°25'11"N, 11°01'47"E, 150 m, 2015-08-10, Klepsland JK15-L670 (O-L-221917). Nordland: Rana, Storforshei, Tiurhaugen N, 66°25'44"N, 14°26'15"E, 220 m, 2019-04-13, Olsen OOL-19.1a (TRH-L-18712); Vefsn, NW Fustvatnet, Langmoen, 65°54'43"N, 13°17'01"E, 60–70 m, 2018-06-29, Frisch TSD N11-1-Pa8-3 (TRD-L-28820); Vefsn, Kanesebikken, 65°59'36"N, 13°16'54"E, 32 m, 2018-06-29, Frisch 18/No143 (TRH-L-28817).





**Figure 21.** *Polycoccum clauzadei* (TRH-L-28810). Scale = 1 mm. Photo: A. Frisch.

***Ptychographa xylographoides* Nyl.**

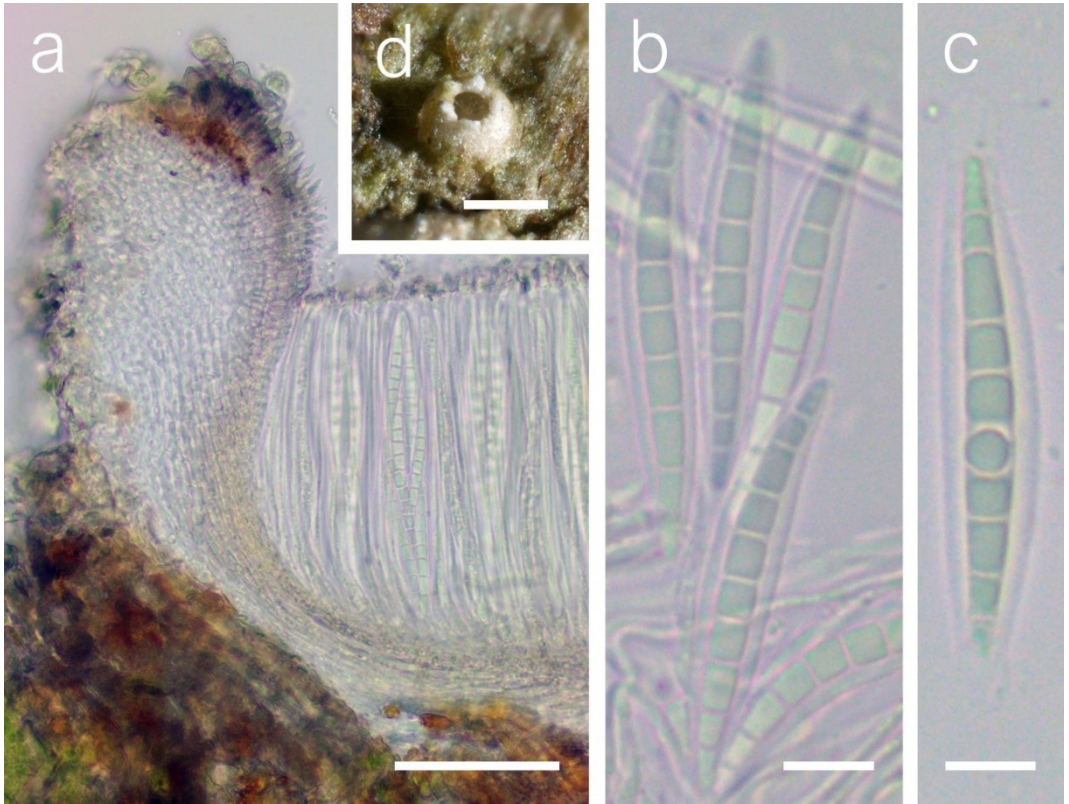
The species was collected in Nord-Trøndelag, growing on decorticated coniferous and deciduous logs in boreal rainforest. It was recently reported new to Norway from Hordaland by Nordén et al. (2019). It is further known from the British Isles and North America (Gilbert & Coppins 2009).

*Specimens examined:* Nord-Trøndelag: Namdalseid, S of lake Altvatnet, 64°22'10"N, 11°11'53"E, 100 m, 2016-09-19, Palice 26515 & Holien (PRA, TRH-L-18537); Nærøy, along stream Kobbholbekken, 64.8063°N, 11.7584°E, 10 m, 2014-09-18, Holien 14625, det. B. Nordén 2019 (TRH-L-18842).

*Additional specimens examined:* Hordaland: Kvam, Berge, 60°18'43.9"N, 06°09'59.8"E, 25 m, 2019-05-15, Nordén 19-038 (O-L-226834). **United Kingdom.** *Scotland:* Argyll, Appin, Glen Creran, 56°35'49"N, 05°11'23"W, 40–60 m, 2018-06-04, Palice 25205, Acton, Malíček, Powell & Vondrák (PRA, TRH-L-18538).

***Puttea duplex* (Coppins & Aptroot) M. Svensson**

The species was collected in Hordaland and Sogn og Fjordane. It was found in Stord growing on unidentified pleurocarpous mosses on *Sorbus aucuparia*. In Fjaler and Flora, it grew on *Hypnum cupressiforme* on trunks of *Alnus incana* and *Ilex aquifolium*. *Puttea duplex* was reported as new



**Figure 22.** *Ramonia subsphaeroides* (O-L-221293). **a.** Exciple, **b.** Ascospores in KOH, **c.** Ascospore in water, **d.** Apothecium (TRH-L-18900). Scales = a 50 µm, b 10 µm, c 7.5 µm, d 0.2 mm. Photos: J. Klepsland (a–c), A. Frisch (d).

to Fennoscandia from Bergen (Tønberg 2016) and was recently found in Sweden (Svensson et al. 2017).

*Specimens examined:* *Hordaland:* Fitjar, Stord, Sandvikvåg just E of the ferry quay, 59°58'05.5"N 05°20'17.9"E, 10 m, 2017-10-03, Palice 24641 (PRA). *Sogn og Fjordane:* Fjaler, Bortneim S, 61°20'58"N, 05°21'39"E, 140 m, 2015-07-14, Klepsland JK15-L486 (O-L-206738; Flora, Svanøya, Vågsfjellet nord, 61°29'23"N, 05°04'57"E, 25–50 m, 2018-05-16, Frisch TSD S14-1-Ia4-3 (TRH-L-28822).

***Pyrenula coryli* A. Massal.**

The species was collected in Hordaland growing on trunk of *Corylus avellana* in mixed birch-hazel forest. It was known in Norway from Møre og Romsdal (Nordin et al. 2019) and a 19<sup>th</sup> century collection from Svolvær, Nordland (BG, det. B. Coppins 1982).

*Specimen examined:* *Hordaland:* Tysnes, Hope Ø, 60°03'42"N, 05°25'27"E, 20 m, 2014-08-17, Klepsland JK14-L597 (O-L-206534).

***Ramonia subsphaeroides*** (Tav.) Vězda

(Fig. 22)

The species was collected in Strand, Rogaland, growing on trunk of *Sorbus aucuparia* in an old-growth broad-leaved deciduous forest. It was previously known in Norway from a single locality in Osterøy, Hordaland (Botnen 1993).

*Note:* Our collection is characterized by 0.25–0.35 mm wide apothecia with a 0.1–0.2 mm wide pore. The ascospores are spindle-shaped, (39–)45–55(–58) × 5–6 μm, 8–9-septate and have a c. 2 μm wide perispore. The collection agrees well with the specimen reported in Botnen (1993) and the available literature reports (e.g., Boqueras et al. 1993, Tavares 1950, Vězda 1966, 1967). *Ramonia chrysophaea*, the only other *Ramonia* species reported for Norway, differs by larger apothecia, 0.5–0.7 mm wide, with finally an up to 0.5 mm wide opening (Vězda 1967, 1973). In ascospore characters, however, the two species are rather concordant (40–66 × 3–4 μm, 9–10-septate in *R. chrysophaea* vs 50–60 × 4–5 μm, 8–10-septate in *R. subsphaeroides*) (Vězda 1966, 1967). It should be noted, that material of *R. chrysophaea* from the British Isles is reported to have needle-shaped ascospores 9–14-septate and up to 74 μm long (Sanderson & Purvis 2009) and may represent a different taxon.

*Specimens examined:* Rogaland: Strand, Tysdalsvatnet S, 59°04'35"N, 06°05'48"E, 160 m, 2017-07-17, Frisch TSD S5-1-Sa3-1 & Klepsland JK17-357 (TRH-L-18900, O-L-221293).

***Refractohilum galligenum*** D. Hawksw.

The species was collected in Nord-Trøndelag, Nordland and Troms, growing on thallus of *Nephroma bellum*, *N. laevigatum* and *N. resupinatum* in boreal rainforest and boreal deciduous forest. It was previously known in Norway from boreal rainforests in Overhalla and Snåsa, Nord-Trøndelag (Holien & Tønsberg 1994).

*Specimens examined:* Nord-Trøndelag: Flatanger, Jøssund, Skjellådalen naturreservat, 64°21'35"N, 10°47'45"E, 45 m, 2018-08-07, Frisch 18/No223 (TRH-L-28827). Nordland: Bindal, between Storhaugen and Hesttjønnå, 65°00'42"N, 12°44'51"E, 150 m, 2019-09-04, Hugdal EH 040 (TRH-L-18721); Meløy, Holandsfjorden, Fonndalen, 66°41'46"N, 13°40'60"E, 30–45 m, 2018-07-01, Frisch TSD N13-2-Sa3-3 (TRH-L-28828). Troms: Bardu, Berglund, 68°49'06"N, 18°33'00"E, 160–175 m, 2019-07-18, Frisch TSD N15-2-Sxc4-1 (TRH-L-28829).

*Additional specimens examined:* Nord-Trøndelag: Snåsa, c. 1 km N of Hammer, 60–140 m 1993-07-30, Santesson 33588 (UPS F-523063); Høylandet, Mørkved, 1938-08-17, Ahlner s.n. (UPS F-523057); Rissa, Sørrelv, c. 3 km E of Vollavatn, 1961-07-31, Santesson 14137 (UPS F-520064).

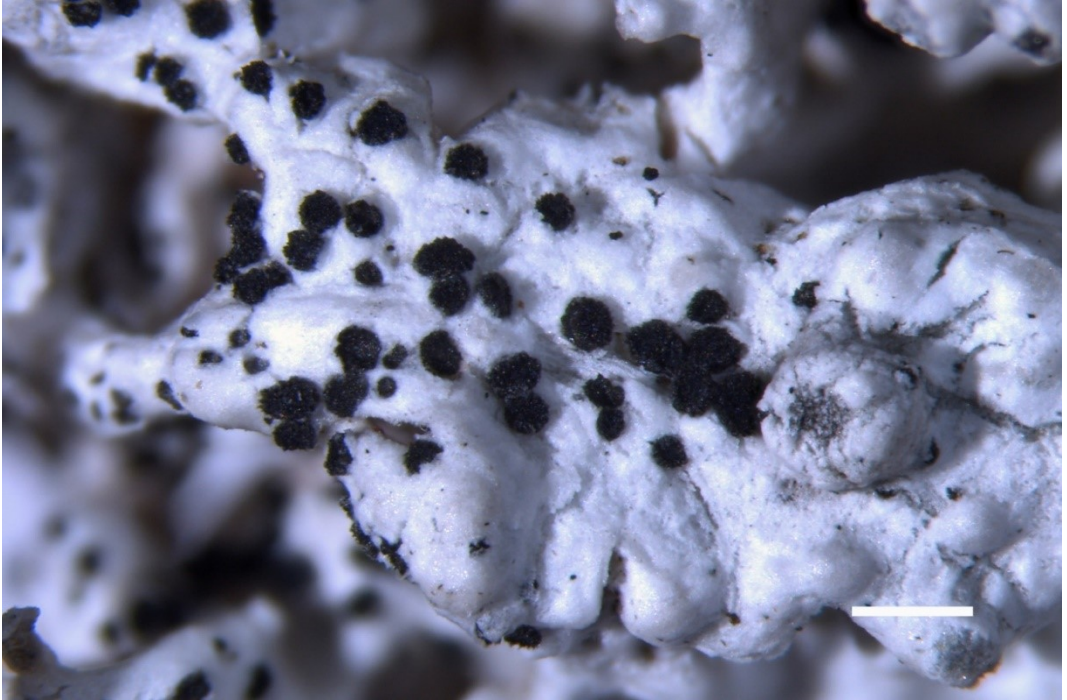
***Rhaphidicyrtis trichosporella*** (Nyl.) Vain.

The species was collected in Hordaland, growing on trunk base of *Betula pubescens* in an open coastal pine forest. It was first reported from Norway by Blom et al. (2015), but without citing specimens.

*Specimen examined:* Hordaland: Stord, Storavatnet øst, 59°46'50"N, 05°26'34"E, 20–40 m, 2017-07-16, Frisch TSD S8-1-Bp3-2 (TRH-L-37290).

***Rhymbocarpus neglectus*** (Vain.) Diederich & Etayo

The species was collected in Nord-Trøndelag in boreal rainforest, growing on thallus of *Lepraria* spp. on rain-shaded bases of *Picea abies* and *Sorbus aucuparia*, and on a steep, shady rock wall. It



**Figure 23.** *Rhymbocarpus pertusariae* (TRH-L-3720). Scale = 1 mm. Photo : A. Frisch.

is further known in Norway from Hordaland, Troms and Finnmark (Alstrup et al. 2008, Nordin et al. 2019).

*Specimens examined:* *Nord-Trøndelag:* Flatanger, Stordalen, 64°26'37"N, 10°58'18"E, 76 m, 2015-08-05, Frisch, 15/No93 (TRH-L-652420); Flatanger, Stordalen, 64°26'37"N, 10°58'15"E, 45 m, 2018-08-06, Frisch 18/No228 (TRH-L-28833).

*Additional specimens examined:* *Hordaland:* Ullensvang, Hardangervidda, Litlos Litloshangen, 1947-07-16, Degelius (UPS F-523136). *Troms:* Nordreisa, Vuodavarre, 300 m 1931-07-26, Degelius s.n. (UPS F-523133); Tromsø 1864-10-01, Fries s.n. (UPS F-523134); Tromsø, Fløjffjeldet, 1864-09-07, Fries s.n. (UPS F-523131). *Finnmark:* Berlevåg, Berlevaag, 1864-09-07, Fries s.n. (UPS F-523129).

***Rhymbocarpus pertusariae*** Diederich, Zhurb. & Etayo (Fig. 23)

The species was collected in Oppland, Sør-Trøndelag and Finnmark, growing on thallus of *Pertusaria panyrga* in alpine heath. It was known in Norway from a single locality in Troms (Alstrup et al. 2008).

*Specimens examined:* *Oppland:* Dovre, Grimsdalen, Verkensåe N of Verkjessætre, 62°04'00"N, 09° 31'35"E, 1085 m, 2018-07-28, Frisch 18/No171 (TRH-L-28834). *Sør-Trøndelag:* Midtre Gauldal, Litlfjellet, 62°47'43"N, 10°16'52"E, 850 m, 2017-07-25, Frisch 17/No13 (TRH-L-3720 & TRH-L-18905). *Finnmark:* Nesseby, Mortensnes, Geavrrit, 70.1299°N, 29.0306°E, 55 m, 2014-06-30, Holien 14375 b (TRH-L-15393).

*Additional specimen examined:* *Troms:* Storfjord, S of Skibotndalen, top of Luhčavárri, 69°15'06"N, 20°23'03"E, 900 m, 2003-08-09, Owe-Larsson 9023 (UPS F-349786).

***Sclerococcum lobariellum*** (Nyl.) Ertz & Diederich(Syn. *Dactylospora lobariella* (Nyl.) Hafellner)

The species was collected in Aust-Agder, Hordaland and Sør-Trøndelag, growing on thallus of *Lobaria pulmonaria* on *Fraxinus excelsior*, *Picea abies*, *Populus tremula* and *Sorbus aucuparia* in mixed deciduous forest and boreal rainforest, and on shaded sea-shore rocks. It was previously known in Norway only from Nordland (Nordin et al. 2019).

*Specimens examined:* Aust-Agder: Evje og Hornnes, Skarveheia SØ, 58°33'35"N, 07°57'52"E, 480 m, 2016-12-24, Klepsland JK16-918 (O-L-222950). Hordaland: Tysnes, Belttestadtjørna-Hovdanes N, 59°59'46"N, 05°27'34"E, 3 m, 2018-05-09, Klepsland JK18-134 (TRH-L-23800). Sør-Trøndelag: Rissa, Nordelva nature reserve, 63°47'22"N, 10°10'27"E, 70 m, 2017-05-04, Frisch TSD N2-2-Sa3-2 (TRH-L-28857).

*Additional specimen examined:* Nordland: Bodø, Kjerringøy, 1807-05-23, Wahlenberg s.n. (UPS F-520431).

***Sclerococcum microsporum*** (Etayo) Ertz & Diederich(Syn. *Dactylospora microspora* Etayo)

The species was collected in Sogn og Fjordane, Møre og Romsdal, Sør-Trøndelag and Nord-Trøndelag in coastal pine forest and boreal rainforest, growing on thallus of *Megalaria pulvereana* on *Betula pubescens*, *Ilex aquilinum*, *Picea abies*, *Populus tremula* and *Sorbus aucuparia*. It was previously known in Norway from two localities in Sør-Trøndelag growing on the same host (Holien 2001). *Sclerococcum microsporum* was described from Spain growing on *Catinaria atropurpurea* (Etayo 1991) and is further found on *Pachyphiale carneola* (Etayo 2010) and possibly *Parmeliella triptophylla* (Hawksworth 2003).

*Selected specimens examined:* Sogn og Fjordane: Bremanger, Skudalsvatnet, Skudalen, 61°44'58"N, 05°01'44"E, 60–80 m, 2018-05-17, Frisch TSD S15-2-Pt1-4 (TRH-L-28864); Flora, Svanøya, Vågsfjellet nord, 61°29'23"N, 05°04'57"E, 25–50 m 2018-05-16, Frisch 18/No6 (TRH-L-28858). Møre og Romsdal: Fræna, S of Hustad, Lunheim, 62.92332°N, 07.11519°E, 60 m, 2016-04-15, Holien 15162 (TRH-L-17341 & 17342). Sør-Trøndelag: Rissa, Nordelva naturreservat, 63°47'25"N, 10°10'39"E, 90 m, 2017-05-04, Klepsland JK17-259 (O-L-221286); Roan, NE of Hofstad, E of Haltlitjøna, 64.2103°N, 10.4665°E, 210 m, 2007-09-03, Holien 11403 (TRH-L-12142); Åfjord, Austdalselva south Mørrivatnet, 63°54'11"N, 10°13'48"E, 35–60 m, 2017-05-03, Frisch TSD N2-3-Ai2-7 (TRH-L-28859). Nord-Trøndelag: Flatanger, Innervika, Hylla sør, 64°33'14"N, 11°04'02"E, 25–50 m, 2018-08-08, Frisch TSD N5b-2-Bp3-2 (TRH-L-28860); Fosnes, between Saksa and Stormyra, Langdalen, 64.6878°N, 11.7889°E, 100 m, 2011-08-24, Holien 13401 (TRH-L-15856); Namdalseid, N-facing slope of Lakshølhaugen, 64.3845°N, 11.1705°E, 100 m, 2003-09-11, Holien 9774 b (TRH-L-9996).

***Skyttea gregaria*** Sherwood, D. Hawksw. & Coppins

The species was collected in coastal pine forest and boreal rainforest in Møre og Romsdal, Sør-Trøndelag and Nord-Trøndelag, and at the edge of a bog in a boreal forest in Nordland. It was growing on thallus of *Violella fucata* on *Betula pubescens* and *Pinus sylvestris*. *Skyttea gregaria* was first reported from Norway by Diederich & Etayo (2000). The species is widespread in coastal Norway but has been rarely collected.

*Selected specimens examined:* Møre og Romsdal: Fræna, Lunheim aust, 62°55'09"N, 07°07'14"E, 80–120 m, 2017-07-04, Frisch TSD S20-1-Ps1-4 (TRH-L-28911); Tingvoll, Aspøya, Seterdalen, 63°02'14"N, 07°55'46"E, 100 m, 2017-07-06, Frisch TSD S21-1-Bp3-5 & S21-1-Bp3-6 (TRH-L-28918 & 28919); Vanylven, E of Gudsalsvatnet lake and Sætrene farm, 62°00'48"N, 05°35'14"E, 195 m, 2015-09-11, Palice 22576 (PRA). Sør-Trøndelag: Rissa, Storlidalen, 63°40'02"N, 09°57'40"E, 150 m, 2017-06-20, Frisch TSD N1-1-Pa2-3 (TRH-L-



**Figure 24.** *Skyttea lecanorae* (TRH-L-28922). Scale = 0.5 mm. Photo : A. Frisch.

28905); Åfjord, Stodalen, Høydalmoan NR, 64°02'29"N, 10°26'38"E, 120 m, 2017-06-21, Frisch TSD N3-1-Bp2-1 (TRH-L-28907). *Nord-Trøndelag*: Flatanger, SSE of Vik, NE of lakelet Floavatnet, just downhill from gravel road Vedvikveien, 64°26'37"N, 10°47'03"E, 12 m, 2015-08-05, Tønsberg 45713 (BG-L-98717; sub *Violella fucata*). *Nordland*: Grane, Majavatnet, the peninsula [Sirupstangen] between Elvsundet and Sveumbukta, 65°10'09"N, 13°21'06"E, 321 m, 2017-08-06, Tønsberg 47386 (BG-103627; sub *Violella fucata*).

***Skyttea lecanorae*** Diederich & Etayo

(Fig. 24)

The species was collected from Rogaland to Nordland, growing on thallus and apothecia of *Lecanora chlarotera* and other species of the *Lecanora subfusca* group on *Corylus avellana*, *Fraxinus excelsior*, *Sorbus aucuparia* and *Tilia cordata* in coastal pine forest and boreal deciduous forest. *Skyttea lecanorae* was described from Troms (Diederich & Etayo 2000) and is additionally reported in Norway from Hordaland and Sør-Trøndelag (Nordin et al. 2019).

*Selected specimens examined*: *Rogaland*: Gjesdal, Dirdal, 58°49'49"N, 06°11'59"E, 160 m, 2017-07-13, Frisch TSD S4-2-Fe2-4 (TRH-L-28932); Rennesøy, Hodnafjellet, 59°04'26"N, 05°44'10"E, 40 m, 2017-07-13, Frisch TSD S6-1-Fe1-4 (TRH-L-28933). *Hordaland*: Bømlo, Skogafjellet, 59°38'49"N, 05°12'05"E, 10 m, 2017-07-19, Frisch TSD S9-1-Ca4-4 (TRH-L-28934). *Møre og Romsdal*: Fræna, Lunheim, 62°55'09"N, 07°07'14"E, 100 m, 2017-07-04, Frisch TSD S20-1-Sa2-4 (TRH-L-28930); Tingvoll, Aspøya, Seterdalen, 63°02'15"N, 07°55'56"E, 90 m, 2017-07-06, Frisch TSD S21-2-Sa1-6 (TRH-L-28931). *Nordland*: Meløy, Holandsfjorden, Fonndalen, Fondal V, 66°41'46"N, 13°40'60"E, 30–45 m, 2018-07-01, Frisch TSD N13-1-Sa3-1 & N13-1-Sa7-2 (TRH-L-28921, TRH-L-28922). *Troms*: Bardu, Berglund, 68°49'06"N, 18°32'60"E, 160–175 m, 2019-07-18, Frisch TSD N15-2-Bp4-1 (TRH-L-28929); Narvik, Bjerkvik, Prestjordelva, 68°33'31"N, 17°33'02"E, 17 m, 2019-07-17, Frisch TSD N14-1-Bp1-1 & N14-1-Bp3-1 (TRH-L-28924 & 28925).

***Skyttea nitschkei*** (Körb.) Sherwood, D. Hawksw. & Coppins

The species was collected from Rogaland to Sogn og Fjordane, growing on thallus of *Thelotrema lepadinum* in coastal pine forests and hazel groves. It was known in Norway from Hordaland (Nordén et al. 2019).

*Selected specimens examined:* Rogaland: Strand, Jørpeland, Tysdalsvatnet, 59°04'33"N, 06°05'37"E, 150 m, 2017-07-12, Frisch 17/No29 (TU). Hordaland: Fusa, Holmefjord, Eikhaugen, 60°17'58"N, 05°39'52"E, 30 m, 2018-05-08, Frisch 18/No25 (TRH-L-28935); Kvam, Gravdal sør, 60.1275°N, 05.8908°E, 80 m, 2018-06-10, Gaarder 7097 (TRH-L-18877); Kvinnherad, Håvikvatnet, Futeneset, 60°01'59"N, 05°46'25"E, 70 m, 2017-07-20, Frisch TSD S7-2-Ca2-1 (TRH-L-28941 & 28942); Lindås, Kvalvika-Røyldalane, 60°38'20"N, 05°26'16"E, 50 m, 2018-05-14, Frisch TSD S12-2-Ca1-1 (TRH-L-28937 & 28938); Stord, Leirvik, Halvgiengeåsen, 59°46'37"N, 05°26'27"E, 45 m, 2017-07-21, TSD S8-2-Sa2-1, Frisch 17/No51 (TU); Stord, Løning V, 59°47'23"N, 05°28'49"E, 20 m, 2016-6-7, Klepsland JK16-300 (O-L-222456). Sogn og Fjordane: Flora, Svanøya, Vågsfjellet nord, 61°29'27"N, 05°04'47"E, 25–50 m, 2018-05-16, Frisch TSD S14-2-Ia1-2 (TRH-L-28939).

***Strigula taylorii*** (Carroll ex Nyl.) R.C. Harris

The species was collected in Hordaland, growing on trunk of *Corylus avellana* close to a rock wall in a sun-exposed, W-facing scree slope. It was recently reported new to Norway from two separate localities in Hordaland by Nordén et al. (2019) growing on trunks of *Ulmus glabra* in temperate deciduous forest. It is further known from Europe (Coppins & Orange 2009, Nimis 1993, Nimis et al. 2018, Søchting & Alstrup 2008, Roux et al. 2017, Sparrius et al. 2002, van den Boom et al. 1996, Wirth et al. 2013), the Azores (Berger & Aptroot 2002) and Asia (Öztürk & Güvenc 2003).

*Specimen examined:* Hordaland: Fusa, Bergsvågen, 60°02'54"N, 05°42'37"E, 25 m, 2017-07-20, Klepsland JK17-401a [adest *Alyxoria ochrocheila*] (TRH-L-23784).

*Additional specimens examined:* Hordaland: Bømlo, Spysøy, Stølsvika sør, 59.72636°N, 05.36883°E, 5 m, 2013-05-11, Nordén & Jordal s.n. (O-L-226833); Kvam, Skeianeset, 60°23'59.6"N, 06°19'20.7"E, 160 m, 2019-05-13, Nordén 19-114 (O-L-226835).

***Wadeana minuta*** Coppins & P. James

The species was collected in Aust-Agder, Rogaland, Hordaland and Sør-Trøndelag in boreo-nemoral rainforest, boreal rainforest and oak forest on trunks of *Fraxinus excelsior*, *Quercus robur* and *Sorbus aucuparia*. It was previously known in Norway from four localities in Hordaland, growing on *Fraxinus excelsior* and *Ulmus glabra* (Coppins 1992, Nordén & Jordal 2016).

*Specimens examined:* Aust-Agder: Åmli, Hækjenkleivdalen, 58°44'59"N, 08°16'16"E, 440 m, 2016-08-11, Klepsland JK16-728 (O-L-222814); Åmli, Hækjenkleivfjella, 58°44'28"N, 08°16'55"E, 365 m, 2018-07-22, Klepsland JK18-381 (TRH-L-23803). Rogaland: Rennesøy, Hodnafjellet, 59°04'26"N, 05°44'10"E, 35 m, 2017-07-13, Frisch TSD S6-1-Fe1-12 pr.p. (TRH-L-28986); Suldal, Vikane, 59°35'44"N, 06°43'40"E, 166 m, 2017-09-16, Jordal s.n. (TRH-L-17776); Suldal, Mokleiv, 59°34'55"N, 06°41'01"E, 82 m, 2017-09-13, Jordal s.n. (TRH-L-17775). Hordaland: Fusa, Holmefjord, Eikhaugen, 60°17'55"N, 05°39'51"E, 37 m, 2018-05-08, Frisch 18/No59 (TRH-L-28984); Masfjorden, Nordgjelen, 60°54'22"N, 05°36'37"E, 196 m, 2014-05.30, Jordal s.n. (TRH-L-15195). Sør-Trøndelag: Rissa, Nordelva naturreservat, 63°47'39"N, 10°11'35"E, 120 m, 2017-05-03, Frisch TSD N2-1-Sa2-6 (TRH-L-28985).

*Additional specimen examined:* Hordaland: Bergen, Milde, Fana Folkehøgskule, 60°15'N, 05°16'E, on *Fraxinus*, 100 m, 1995-09-02, R. Moberg 11651 (UPS F-116055).

## Discussion

The large number of 78 species reported as new to Norway and Fennoscandia, or included with new distribution data, reflects the still incomplete picture that we have of the Norwegian biota of crustose lichens and lichenicolous fungi. Of the species treated, 47 are lichenicolous fungi (60%), and all 31 lichens are crustose. In many instances, the collected data are not sufficient to draw a clear picture on the distribution and ecology of these species in Norway, or to evaluate their occurrence frequency. However, some of the newly discovered species are expected to be rare or to have a restricted distribution in Norway. Examples include *Arthonia colombiana*, *A. graphidicola*, *Arthothelium dictyosporum*, *A. macounii*, *Opegrapha sphaerophoricola*, *O. thelotrematis*, *Pseudosagedia borrieri*, *P. byssophila*, *Reichlingia anombrophila*, *Skyttea nitschkei* and *S. caesii*, which all appear to be confined to the boreo-nemoral rainforests in western Norway. *Pachnolepia pruinata* represents another distinctly southern element that is expected to be rare and confined to rain-shaded sites under the highly oceanic climate of coastal Norway.

Further species like *Arthonia toensbergii*, *Arthophacopsis parmeliarum*, *Catillaria lobaricola*, *Lichenopuccinia poeltii* and *Opegrapha anomea* have a clearly northern distribution. These species were collected in boreal rainforests from Trøndelag to Troms, to which they might be confined. The term Trøndelag phytogeographical element has been adopted for species confined in Norway to the boreal rainforests, many of which also occur in the rainforests of western North America (Holien & Tønsberg 1996, Printzen & Tønsberg 1999).

On the other hand, several of the lichenicolous species from alpine habitats appear to be widely distributed in Norway and some of them might even be common. Species like *Arthonia apotheciorum*, *A. peltigerea*, *A. stereocaulina*, *Lasiosphaeriopsis stereocaulicola*, *Phaeospora rimosicola*, *Polycoccum clauzadei* and *Rhymbocarpus pertusariae* have clearly been undercollected in the past and are frequently found on their host lichens in suitable habitats over relatively rich and basic types of bedrock.

For all the reported species, intensified collection efforts are needed for a better evaluation of their conservation status in Norway. This applies particularly to the lichenicolous fungi.

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