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ORIGINAL RESEARCH PAPER

Aphyllophoroid funga (Basidiomycota) of Finland: range extensions and records of nationally new and rare species

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Abstract
Knowledge of the Finnish aphyllophoroid funga has increased substantially in recent years. In this article, we present two species new to Finland: *Spiculogloea subminuta* Hauerslev and *Typhula suecica* I. Olariaga, G. Corriol, I. Salcedo & K. Hansen, and document *Sistotrema luteoviride* Kotir. & K.-H. Larss. for the third time globally. We also contribute 50 new records of 33 nationally rare species (with a maximum of ten previous records in Finland) and list 52 regionally new species, found for the first time in a certain subzone of the boreal vegetation zone in Finland. Each record is enclosed and contains notes on the substrate. Furthermore, the ecology of the nationally new species and the distribution of rare species are discussed.

Keywords
aphyllophorales; biogeography; clavarioids; corticioids; polypores; wood-inhabiting fungi

Introduction

Aphyllophoroid fungi are an ecological and morphological form group of the Basidiomycota, which consists of morphologically varied fungal subgroups, such as corticioids, polypores, clavarioids, and tremelloids. These groups are highly taxonomically diverse and polyphyletic [1]. Aphyllophoroid fungi consist of wood decay fungi, litter decay fungi, ectomycorrhizal species, parasitic fungi, and mycoparasites [2].

The Finnish aphyllophoroid funga comprises 1,043 species [2,3] (also H. Kotiranta, unpubl.), the majority of which are corticioids and polypores [2,4,5]. A large body of knowledge on the occurrence and distribution of aphyllophoroid species has been accumulated after the first Finnish checklist [2], especially on polypores and corticioids, but also on clavarioids (e.g., [3–11]).

However, the occurrence and distribution of many aphyllophoroid species in Finland are still not adequately known; therefore, there are large gaps in the knowledge of their ecology, biogeography, substrata, and habitat requirements and their conservation status and accurate threat levels are difficult to evaluate. The main reasons for this

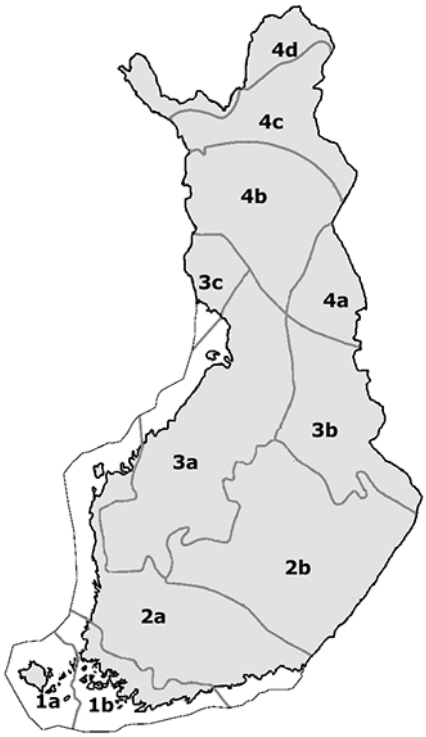

Fig. 1 Boreal forest vegetation zones (1–4) and their subzones in Finland. 1a – Hemiboreal, Åland; 1b – Hemiboreal, Oak Zone; 2a – Southern Boreal, Southwestern Finland, and Southern Ostrobothnia; 2b – Southern Boreal, Lake District; 3a – Middle Boreal, Ostrobothnia; 3b – Middle Boreal, Northern Carelia – Kainuu; 3c – Middle Boreal, Southwestern Lapland; 4a – Northern Boreal, Kuusamo District; 4b – Northern Boreal, North Ostrobothnia; 4c – Northern Boreal, Forest Lapland; 4d – Northern Boreal, Fjeld Lapland.

gap are time-consuming sampling, inconspicuous basidiomata that are difficult to find, narrow ecological niches (substratum), and challenges in species identification.

In this article, we present new records of aphyllophoroid fungi in Finland, considering three types of records: species new to Finland; rare or seldom collected species with a maximum of 10 previous records in Finland; and species that are new to a certain subzone (section) of the boreal vegetation zone in Finland.

Material and methods

The records in this article were mainly obtained during 2017 and 2018 but also include some older records. The majority of the records were derived from species inventories conducted in different parts of Finland, but sporadic records were also included. Some records were obtained during inventories as a result of random species sampling, such as inventories for the Finnish Atlas of Fungi (http://www.sieniatlas.fi/) or the BioBlitz species inventory event in the Koli National Park. Inventory methods varied to some extent, but opportunistic species sampling was often carried out [12].

In these records, we generally used two levels to name the sites: a municipality and a topographical site; however, in some cases the name of a village or large nature conservation area were also used. The Finnish National Uniform Coordinate System (UCS, 27° E) [13] was used to obtain coordinates. Biogeographical provinces (at the beginning of each record) were determined according to Knudsen and Vesterholt [14], and Latin province names are presented on the website of the Finnish Biodiversity Information Facility [15] alongside the division of provinces [16]. The map showing the forest vegetation zones and their subzones (Fig. 1) was modified based on Rassi et al. [17]. In accordance with the above-mentioned sources, the names of the subzones are presented in English (e.g., Ostrobothnia), unlike the Latin names of the biogeographical provinces (e.g., Ostrobottnia).

Taxonomy and nomenclature mainly followed those by Hjortstam and Ryvarden [18], Kotiranta et al. [2], and Niemelä [5]; however, Bernicchia and Gorjón [19] were used for some species. The Finnish national red-list evaluation of the IUCN standard corresponds to Kotiranta et al. [20] and if the species status was of least concern, it was not mentioned. The decay stage classification (1–5) of dead wood was carried out according to Renvall [21], with Stage 1 referring to hard dead wood and Stage 5 referring to completely decayed wood. The diameter of dead wood was measured at breast height if the trunk was complete and from the middle if the trunk was broken. We use the term "kelo" to refer to dead and old-growth trunks of Scots pine (*Pinus sylvestris* L.) with a grey and decorticated surface. Scots pine mainly become kelo trees in dry and barren forest habitats [22,23].

Material was collected, identified, and confirmed by several researchers as described in the record details using the following abbreviations: TH = Teppo Helo, JJ = Jari Julkunen, HK = Heikki Kotiranta, MK = Matti Kulju, HL = Hannu Lehtonen, JP = Jorma Pennanen, and AS = Anton Shiryaev. The collector was also the identifier, unless otherwise stated. The code after the collector's name or abbreviation represents the personal sampling number of the specimen. Voucher specimens were deposited in the herbaria of the universities of Helsinki (H), Oulu (OULU), Turku (TUR), and Institute of Plant and Animal Ecology, the Urals Branch of the Russian Academy of Sciences (SVER), and/or in the private reference herbaria of Teppo Helo (TH), Heikki Kotiranta (HK), or Jorma Pennanen (JP).

Tab. 1 Rare species and the ordinal number of the new record in Finland.

Species	Ordinal number of the new record
Antrodia tanakai	6th–7th
Athelia sibirica	4th–5th
Athelia singularis	4th
Athelicium hallenbergii	5th
Basidiodendron rimosum	5th–6th
Botryobasidium aureum	6th
Botryobasidium ellipsosporum	3rd
Candelabrochaete septocystidia	3rd–4th
Cerinomyces crustulinus	4th
Conferticium ravum	7th
Coronicium alboglaucum	5th–6th
Fuscoporia contigua	2nd–4th
Hyphoderma incrustatum	5th
Kneiffiella curvispora	8th–9th
Oliveonia fibrillosa	7th–8th
Oxyporus obducens	8th
Peniophorella guttulifera	8th
Piloderma lanatum	4th
Pseudotomentella humicola	3rd–4th
Repetobasidium vile	4th
Rhizochaete sulphurina	4th
Scytinostromella nannfeldtii	5th
Sistotrema luteoviride	3rd
Tretomyces microsporus	5th–6th
Tubulicrinis globisporus	3rd
Tulasnella allantospora	6th
Tulasnella brinkmannii s. l.	3rd–4th
Tulasnella calospora	2nd–3rd
Tulasnella deliquescens	4th–5th
Tulasnella fuscoviolacea	3rd
Tulasnella permacra	4th
Tulasnella thelephorea	6th
Xenasma rimicola	3rd–4th

Results: list of species

Two of the presented species are new to Finland: *Spiculogloea subminuta* Hauerslev and *Typhula suecica* I. Olariaga, G. Corriol, I. Salcedo & K. Hansen. The discovery of *Sistotrema luteoviride* is the third recorded globally, with all records being from Finland. We present 50 new records (localities) of the following 33 rare or infrequently collected species (a maximum of ten previous records in Finland) and the ordinal number of these records in Finland is provided in Tab. 1.

Altogether, 62 records of 52 species are reported as new to a certain subzone (section) of the boreal forest vegetation zone in Finland. The number of records new to the different subzones are: Southern Boreal, Southwestern Finland, and Southern Ostrobothnia (2a), 4; Southern Boreal, Lake District (2b), 4; Middle Boreal, Ostrobothnia (3a), 10; Middle Boreal, Northern Carelia – Kainuu (3b), 27; Middle Boreal, Southwestern Lapland (3c), 2; Northern Boreal, North Ostrobothnia (4b), 1; and Northern Boreal, Forest Lapland (4c), 5.

Species are listed in alphabetical order.

Amaurodon mustialaënsis (P. Karst.) Kõljalg & K. H. Larsson (Fig. 2)

[*Hypochnopsis mustialensis* (P. Karst.) P. Karst.]

Specimen examined. *Ostrobottnia kajanensis*, Sotkamo, Naulavaara, Korkeakoskenpuro, UCS 7089:3558, on a fallen deciduous tree trunk (diam. 12 cm, Decay Stage 3) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Sep 24, 2018, leg. & det. TH 2018111 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Amylocorticium subincarnatum (Peck) Pouzar

Specimen examined. Karelia australis, Lappeenranta, Martti Peräkasarin korpi, UCS 6742119:3541284, on a fallen *Picea abies* trunk (diam. 30 cm, Decay Stage 4) in a middle-aged, spruce-dominated, mesic heath forest, Oct 26, 2018, leg. & det. JP 4061 (JP).

New to Southern Boreal, Lake District (2b). Vulnerable.

Antrodia tanakai (Murrill) Spirin & Miettinen (Fig. 3)

Specimens examined. Savonia Borealis, Savonranta, Kakonsalo, Aluslamminmäki, UCS 6907779:3600742, on a fallen *Populus tremula* branch (diam. 10 cm, Decay Stage 3) in an old, mixed, mesic heath forest, Sep 13, 2018, leg. & det. JP 3811 (JP); Savonia Borealis, Savonranta, Kakonsalo, Aluslamminmäki, UCS 6908181:3600826, on a fallen *Populus tremula* trunk (diam. 30 cm, Decay Stage 3) in an old, mixed, mesic heath forest, Sep 13, 2018, leg. & det. JP 3815 (JP).

These are the sixth and seventh records of the species in Finland; previous records were all from the Southern Boreal, Lake District (2b): Heinävesi, Joroinen, Joensuu, and Lieksa [24,25]. Not evaluated.

Fig. 2 *Amaurodon mustialaënsis* with *Piloderma fallax* in Sotkamo (TH 2018111). Photo: Teppo Helo.

Fig. 3 *Antrodia tanakai* in Savonranta (JP 3815). Photo: Jorma Pennanen.

Athelia bombacina (Pers.) Jülich

Specimen examined. Ostrobottnia ouluensis, Oulu, Kaijonharju, UCS 7219388:3428534, on a fallen *Pinus sylvestris* trunk in a mesic heath forest, Nov 14, 2018, leg. Saara Salmela (OULU), det. MK.

New to Middle Boreal, Ostrobothnia (3a).

Athelia sibirica (Jülich) J. Erikss. & Ryvarden (Fig. 4)

Specimens examined. Ostrobottnia ouluensis, Oulu, Kaijonharju, UCS 7219495:3428470, on a fallen *Betula* sp. trunk in a mesic heath forest, Nov 14, 2018, leg. Saara Salmela (OULU), det. MK; Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 12 cm, Decay Stage 3) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Oct 9, 2018, leg. TH 2018114 (OULU), det. MK, and in the same location on a fallen *Populus tremula* trunk (diam. 13 cm, Decay Stage 2), Oct 10, 2018, leg. & det. TH 2018167 (OULU), conf. MK; Sotkamo, Talvivaara, UCS 7091:3558, on a fallen *Betula* sp. trunk (diam. 25 cm, Decay Stage 3) in an old-growth, spruce-dominated forest with a large amount of dead wood, Oct 3, 2018, leg. & det. TH 2018139 (OULU), conf. MK & HK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). These are the fourth and fifth records of the species in Finland; previous records were from Lammi (2a), Oulu (3a), and Kittilä (4b) [2,3].

Athelia singularis Parmasto (Fig. 5)

Specimen examined. Karelia Borealis, Lieksa, Patvinsuo National Park, Hietavaara, UCS 7010437:3686196, on a fallen *Pinus sylvestris* trunk (diam. 25 cm, Decay Stage 3) in a very old, pine-dominated, subxeric heath forest, Sep 25, 2018, leg. & det. JP 3896 (JP), conf. HK.

This is the fourth record of the species in Finland; previous records were from Rovaniemi (3c), Suomussalmi (4a), and Kajaani (3b) [3,26].

Athelia subovata Jülich & Hjortstam

Specimen examined. Ostrobottnia ouluensis, Oulu, Kaijonharju, UCS 7219504:3428533, on a fallen *Betula* sp. trunk in a mesic heath forest, Nov 11, 2018, leg. Saara Salmela (OULU), det. MK.

New to Middle Boreal, Ostrobothnia (3a).

Athelicium hallenbergii Yurchenko & Kotiranta (Fig. 6)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7091:3557, on a fallen *Populus tremula* twig (diam. 2 cm, Decay Stage 3) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Sep 28, 2018, leg. TH 2018090 (OULU), det. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the fifth record of the species in Finland; previous records were from Lammi (2a), Petäjävesi (2b), Viitasaari (2b), and Oulu (3a) [3,7].

Fig. 4 *Athelia sibirica* in Sotkamo (TH 2018139). Photo: Teppo Helo.

Fig. 5 *Athelia singularis* in Lieksa (JP 3896). Photo: Jorma Pennanen.

Fig. 6 *Athelicium hallenbergii* in Sotkamo (TH 2018090). Photo: Teppo Helo.

Basidiodendron eyrei (Wakef.) Luck-Allen

Specimen examined. Ostrobottnia ultima, Rovaniemi, Pisavaara Strict Nature Reserve, Isolomanoja, UCS 7356399:3415530, on a fallen *Betula* sp. trunk (diam. 23 cm, Decay Stage 2) in a herb-rich mesic forest, Sep 9, 2018, leg & det. MK 45/18 & Tapio Kekki (OULU).

New to Middle Boreal, Southwestern Lapland (3c).

Basidiodendron rimosum (H. S. Jacks & G. W. Martin) Luck-Allen (Fig. 7)

Specimens examined. Ostrobottnia kajanensis, Puolanka, Paljakka, Mustakumpu, UCS 7173:3549, on a fallen *Picea abies* trunk (diam. 15 cm, Decay Stage 4) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Sep 23, 2018, leg. & det. TH 2018138 (OULU), conf. MK; Sotkamo, Losonvaara, UCS 7107:3545, on a fallen *Picea abies* trunk (diam. 10 cm, Decay Stage 2), in a moist, old-growth, spruce-dominated forest, Sep 21 2018, leg. TH 2018106 (OULU), det. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). These are the fifth and sixth records of the species in Finland; previous records were from Finnström (1a), Geta (1a), Kirkkonummi (1b), and Toivakka (2b) [2,3].

Botryobasidium aureum Parmasto (Fig. 8)

Specimen examined. Karelia Borealis, Lieksa, Koli National Park, UCS 7003:3641, on a fallen *Alnus incana* trunk (diam. 20, Decay Stage 3) and on a fallen deciduous tree trunk (diam. 8 cm, Decay Stage 4) in an old-growth, spruce-dominated, herb-rich forest with a large amount of dead deciduous wood, Aug 17, 2018, leg. & det. TH 2018135, 2018136 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the 6th record of the species in Finland. All Finnish collections are anamorphs [*Haplotrichum aureum* (Pers.) Hol.-Jech.] and the previous records were from Jomala (1a), Tenhola (1b), Kemiönsaari (1b), Pieksämäki (2b), and Oulu (3a) [2,7].

Fig. 7 *Basidiodendron rimosum* in Puolanka (TH 2018138). Photo: Teppo Helo.

Fig. 8 *Botryobasidium aureum* in Lieksa (TH 2018135). Photo: Teppo Helo.

Botryobasidium ellipsosporum Holubová-Jechová

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 30 cm, Decay Stage 4) with *Tulasnella subglobispora*, *Tylospra fibrillosa*, and *Hypochnicium albostramineum* in an old-growth, spruce-dominated forest with a large amount of dead wood, Oct 7, 2018, leg. & det. TH 2018121 (OULU), conf. MK.

This is the third record of the species in Finland. The specimen was an anamorph like the two previous Finnish collections from Lammi (2a) and Puolanka (3b) [2,3].

Botryobasidium laeve (J. Erikss.) Parmasto

Specimen examined. Ostrobottnia ouluensis, Muhos, Laitasaari, Rova, UCS 7197547:3446426, on a *Prunus maackii* twig (diam. 2 cm, Decay Stage 1) in a mesic heath forest, Oct 8, 2018, leg. & det. MK 67/18 (OULU), conf. HK.

New to Middle Boreal, Ostrobothnia (3a).

Candelabrochaete septocystidia (Burt) Burds. (Fig. 9)

[*Odonticium septocystidia* (Burt) Zmitr. & Spirin]

Specimens examined. Karelia australis, Lappeenranta, Martti Peräkasarin korpi, UCS 6742129:3541379, on a fallen *Picea abies* trunk (diam. 30 cm, Decay Stage 30) in a middle-aged, spruce-dominated, mesic heath forest, Oct 26, 2018, leg. & det. JP 4064 (JP); Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 35 cm, Decay Stage 2) in an old-growth, spruce-dominated forest with a large amount of dead wood, Oct 10, 2018, leg. & det. TH 2018079 (OULU), conf. MK.

New to Southern Boreal, Lake District (2b), and Middle Boreal, Northern Carelia – Kainuu (3b). These are the third and fourth records of the species in Finland; previous records were from Salo (1b) and Lammi (2a) [2,8]. Endangered.

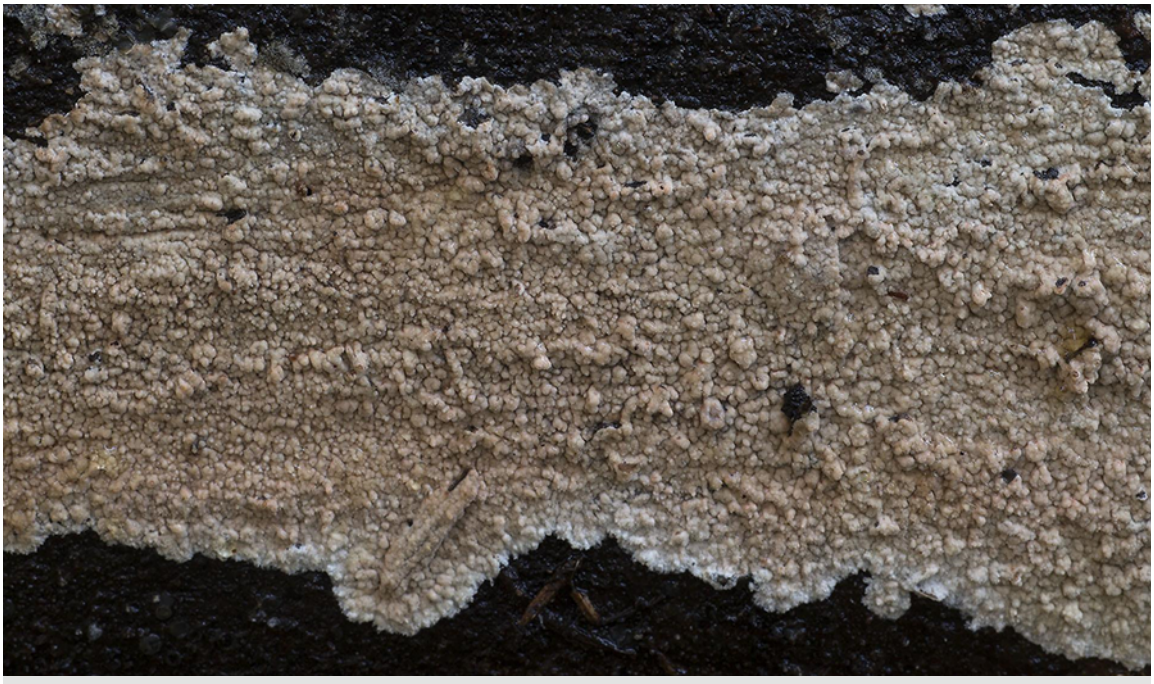

Fig. 9 *Candelabrochaete septocystidia* in Sotkamo (TH 2018079). Photo: Teppo Helo.

Cerinomyces crustulinus (Bourdot & Galzin) G. W. Martin (Fig. 10)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7091:3557, on a fallen *Picea abies* trunk (diam. 35 cm, Decay Stage 4) in an old-growth, spruce-dominated forest, Oct 3, 2018, leg. & det. TH 2018085 (OULU), conf. MK.

This is the fourth record of the species in Finland; previous records were from Padasjoki (2a), Lammi (2a), and Kuhmo (3b) [2].

Clavulina rugosa (Bull. : Fr.) J. Schröt. (Fig. 11)

Specimens examined. Ostrobottnia kajanensis, Hyrynsalmi, Paljakka, Mustakumpu, UCS 71739:35522, on mosses and wet ground on the edge of a brook in a spruce-dominated, herb-rich forest, Aug 28, 2018. leg. & det. Tapio Kekki & TH 2018182 (OULU); Puolanka, Latvavaara, UCS 71779:35460, on mosses and wet ground on the edge of a brook in a spruce-dominated, herb-rich forest, Sep 17, 2018. leg. & det. TH 2018183 (OULU).

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Conferticium ravum (Burt) Ginns & Freeman

Specimen examined. Tavastia Borealis, Konnevesi, Etelä-Konnevesi National Park, Kitulampi W, UCS 6942826:3483886, on a fallen and broken *Populus tremula* trunk (diam. 12 cm, Decay Stage 3) in a middle-aged, mixed mesic heath forest and moist hillside, Oct 23, 2018, leg. & det. JP 4057 (JP), conf. HK.

This is the seventh record of the species in Finland; previous records were from Korpilahti (2b), Sulkava (2b), Suonenjoki (2b), Äänekoski (2b), Viitasaari (2b), and Rovaniemi (3c) (Kotiranta unpubl.). Vulnerable.

Coronicium alboglaucum (Bourdot & Galzin) Jülich (Fig. 12)

Specimens examined. Ostrobottnia kajanensis, Kajaani, Teppana, UCS 71260:35361, on a fallen deciduous tree trunk (diam. 3 cm, Decay Stage 3) in a small, spruce-dominated forest area in the middle of a suburb, Sep 12, 2017, leg. TH 20170041 (OULU), det. HK; Paltamo, Melalahti, UCS 71443:35331, on three fallen *Picea abies* branches (diam. 2–3 cm, Decay Stage 3) in a spruce-dominated, mesic heath forest, Aug 19, 2018, leg. & det. TH 2018152, 2018154, 2018159 (OULU), conf. MK. The spore shape was different in the Kajaani specimen, but otherwise the sample is similar to previous collections.

New to Middle Boreal, Northern Carelia – Kainuu (3b). These are the fifth and sixth records of the species in Finland; previous records were from Lammi (2a), Äänekoski (2b), Luhanka (2b), and Muurame (2b) [2,3].

Corticium boreoroseum Boidin & Lanquetin

(*Laeticorticium lundellii* J. Erikss.)

Specimen examined. Ostrobottnia ouluensis, Oulu, Kaijonharju, UCS 7219503:3428494, on a fallen *Betula* trunk in a mesic heath forest, Nov 12, 2018, leg. Saara Salmela (OULU), det. MK.

New to Middle Boreal, Ostrobothnia (3a).

Fig. 10 *Cerinomyces crustulinus* with *Athelia acrospora* in Sotkamo (TH 2018085). Photo: Teppo Helo.

Fig. 11 *Clavulina rugosa* in Puolanka (TH 2018183). Photo: Teppo Helo.

Fig. 12 *Coronicium alboglaucum* in Kajaani (TH 20170041). Photo: Teppo Helo.

Cristinia helvetica (Pers.) Parmasto

Specimen examined. Ostrobottnia ouluensis, Muhos, Laitasaari, Rova, UCS 7197547:3446431, on a fallen deciduous tree trunk (diam. 5.5 cm) in a mesic heath forest, Oct 8, 2018, leg. & det. MK 66/18 (OULU).

New to Middle Boreal, Ostrobothnia (3a).

Dacrymyces stillatus Nees : Fr (Fig. 13)

Specimens examined. Ostrobottnia kajanensis, Sotkamo, Rikkola, UCS 71057:35470, on a fallen *Picea abies* trunk (diam. 10 cm, Decay Stage 3) in a spruce-dominated forest, Sep 29, 2017, TH 20170045 (TH); Sotkamo, Rikkola, UCS 71063:35473, on a coniferous board in rotten barn ruins on the edge of an abandoned farmhouse yard, Sep 29, 2017, leg. & det. TH 20170043 (OULU).

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Ditangium cerasi (Schumach.) Costantin & L. M. Dufour (Fig. 14)

[*Craterocolla cerasi* (Schumach.) Bref.]

Specimen examined. Ostrobottnia kajanensis, Puolanka, Latvavaara, UCS 7177:3546, on a fallen *Picea abies* trunk (diam. 35 cm, Decay Stage 3) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Sep 17, 2018, leg & det. TH 2018189 (TH).

New to Middle Boreal, Northern Carelia – Kainuu (3b).

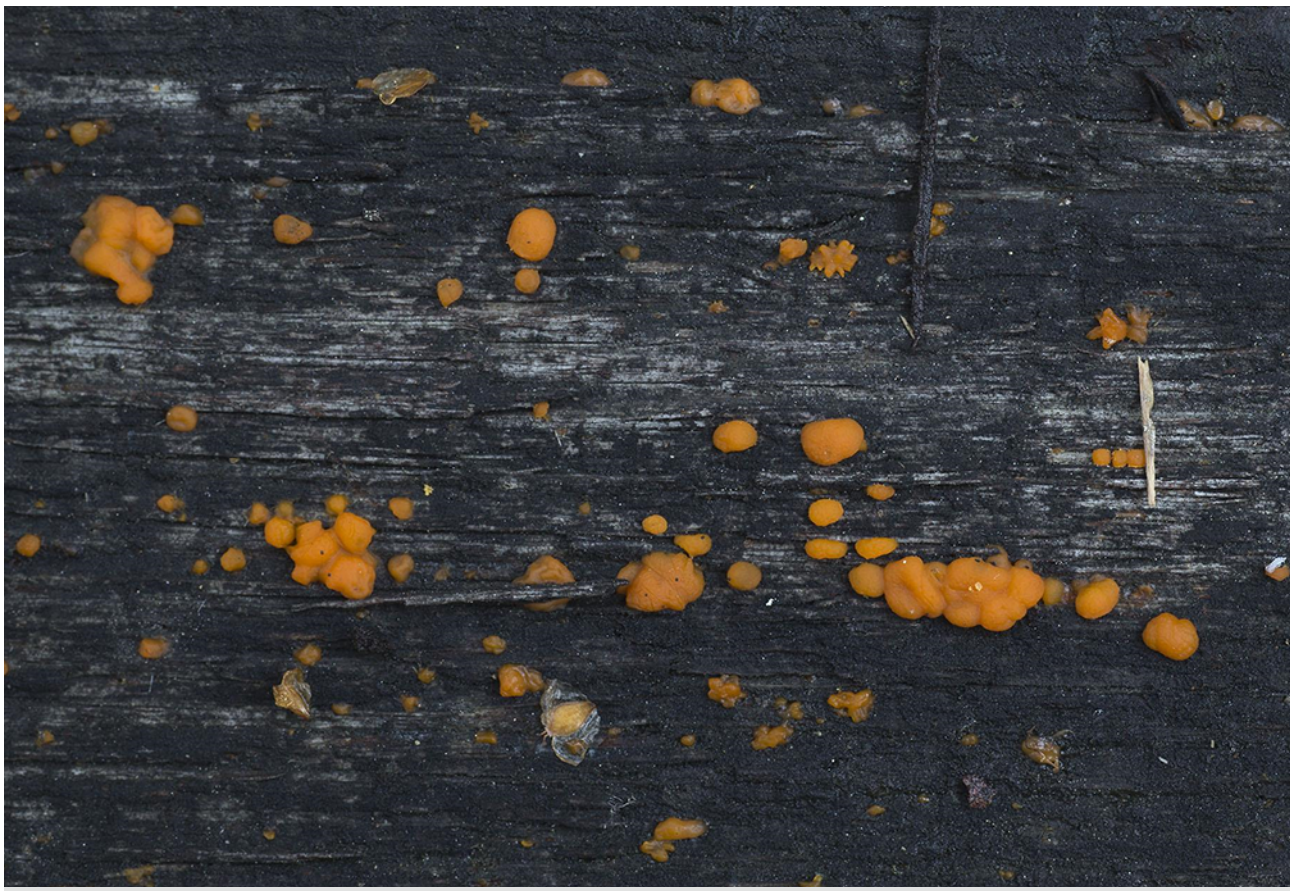

Fig. 13 *Dacrymyces stillatus* in Sotkamo (TH 20170045). Photo: Teppo Helo.

Fig. 14 *Ditangium cerasi* in Puolanka (TH 2018189). Photo: Teppo Helo.

Fig. 15 *Exidia repanda* in Puolanka (TH 20170042). Photo: Teppo Helo.

Exidia repanda Fr. (Fig. 15)

Specimen examined. Ostrobottnia kajanensis, Puolanka, Latvavaara, UCS 7178:3546, on a fallen *Betula* sp. branch (diam. 2 cm, Decay Stage 2) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Oct 15, 2017, leg & det. TH 20170042 (OULU).

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Fuscoporia contigua (Pers.) G. Cunn. (Fig. 16)

Specimens examined. Satakunta, Pori, Mäntykallo/Kallo UCS 6843903:3206324 and 684390:320632, on five dead trunks and the base of two old, living shrubs of *Hippophaë rhamnoides*, Mar 12, 2018 and Jun 10, 2018, leg. HL 30.10.18/3; Pori, Herrainpäivät UCS 6841273:3207146, on the base of two old, living *H. rhamnoides* shrubs, Apr 21 2018, HL 21.4.18/50; Pori, Reposaari UCS 6845656:3205880, on dead *H. rhamnoides* branches (diam. 1 cm and 4 cm), Nov 18, 2018, leg. & det. HL 18.11.18/50 (H, OULU, TUR), conf. MK & Tuomo Niemelä. In these locations *P. contiguus* was found on a total of ca. 30 old shrubs, trunks, or branches of *H. rhamnoides*. On the living shrubs, basidiomata grew to a height of 5–60 cm and the diameter of the trunks was 5–12 cm. The trunks were mainly dead, and the fallen branches were 1–5 cm in diameter where the basidiomata were found. All shrubs grew on a stony sea shore, with two findings made in a shore meadow ca. 50 meters away from the *H. rhamnoides* stands and substrata with broken pieces of trunk (diam. 7 and 10 cm, Decay Stage 4).

New to Southern Boreal, Southwestern Finland and Southern Ostrobothnia (2a). There is only one record of this species before in Finland, from Eckerö (1a) [2]. Not Evaluated.

Fig. 16 *Fuscoporia contigua* in Pori (HL 18.11.18/50). Photo: Hannu Lehtonen.

Fig. 17 *Heterotextus alpinus* in Puolanka, ex situ (TH 20170044). Photo: Teppo Helo.

Heterotextus alpinus (Tracy & Earle) G. W. Martin (Fig. 17)

Specimen examined. Ostrobottnia kajanensis, Puolanka, Kettukallio, UCS 7186:3525, on a fallen *Pinus sylvestris* branch (diam. 2.5 cm, Decay Stage 3) in an old-growth, pine-dominated forest, Oct 14, 2017, leg. & det. TH 20170044 (OULU).

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Hymenochaete cinnamomea (Fr.) Bres. (Fig. 18)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 70 cm, Decay Stage 4) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Oct 9, 2018, leg. & det. TH 2018112 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Fig. 18 *Hymenochaete cinnamomea* in Sotkamo (TH 2018112). Photo: Teppo Helo.

Hyphoderma crassescens Laurila ex. K. H. Larss.

Specimens examined. Satakunta, Ikaalinen, Seitseminen National Park, Multiharju, UCS 6872396: 3311431, on a fallen *Pinus sylvestris* trunk (diam. 35 cm, Decay Stage 3) in an old, pine-dominated, mesic heath forest, Oct 9, 2018, leg. & det. JP 3984 (JP); Lapponia kittilensis, Pallas-Ounastunturi National Park, UCS 7509382:3383475, on a fallen *Pinus sylvestris* trunk (diam. 35 cm, Decay Stage 3) in an old-growth, spruce-dominated mesic heath forest, Aug 9, 2013, leg. JP 2413 (JP) det. HK.

New to Middle Boreal, Ostrobothnia (3a) and Northern Boreal, North Ostrobothnia (4b).

Hyphoderma incrustatum K. H. Larss. (Fig. 19)

Specimen examined. Savonia Borealis, Savonranta, Kakonsalo, Haukiniemi, UCS 6910207:3605347, on a fallen and broken *Populus tremula* trunk (diam. 12 cm, Decay Stage 3) in a middle-aged, mixed mesic heath forest and moist hillside, Sep 11, 2018, leg. & det. JP 3788 (JP), conf. HK.

This is the fifth record of the species in Finland; previous records were from Inari (4c), Muurame (2b), Jyväskylä (2b), and Rautalampi (2b) [3]. Not Evaluated.

Fig. 19 *Hyphoderma incrustatum* in Savonranta (JP 3788). Photo: Jorma Pennanen.

Hyphoderma obtusiforme J. Erikss. & Å. Strid (Fig. 20)

Specimen examined. Lapponia inarensis, Inari, Haapaniemi, UCS 7645:3497, on a fallen *Populus tremula* trunk (diam. 30 cm, Decay Stage 3) in an aspen-dominated, herb-rich forest, Sep 2, 2018, leg. TH 2018097 (OULU), det. MK.

New to Northern Boreal, Forest Lapland (4c).

Hyphoderma roseocremeum (Bres.) Donk

Specimen examined. Ostrobottnia ouluensis, Oulu, Kaijonharju, UCS 7219462:3428427, on a fallen conifer trunk in a mesic heath forest, Nov 15, 2018, leg. Saara Salmela (OULU), det. MK.

New to Middle Boreal, Ostrobothnia (3a).

Hypochnicium geogenium (Bres.) J. Erikss.

Specimen examined. Ostrobottnia ouluensis, Oulu, Kaijonharju, UCS 7219451:3428503, on a fallen *Pinus sylvestris* trunk and stump in a mesic heath forest, Nov 12, 2018, leg. Saara Salmela (OULU), det. MK.

New to Middle Boreal, Ostrobothnia (3a).

Kneiffiella cineracea (Bourdot & Galzin) Jül. & Stalpers (Fig. 21)

[*Hyphodontia cineracea* (Bourdot & Galzin) J. Erikss. & Hjortstam]

Fig. 20 *Hyphoderma obtusiforme* in Inari (TH 2018097). Photo: Teppo Helo.

Fig. 21 *Kneiffiella cineracea* in Sotkamo (TH 2018096). Photo: Teppo Helo.

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Naulavaara, Penikkapuro, UCS 7087:3559, on a fallen deciduous tree trunk (diam. 20 cm, Decay Stage 3) in a moist, old-growth, spruce-dominated forest, Sep 25, 2018, leg. & det. TH 2018096 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Kneiffiella curvispora (J. Erikss. & Hjortstam) Jülich & Stalpers (Fig. 22)

[*Chaetoporellus curvisporus* (J. Erikss. & Hjortstam) J. Erikss. & Hjortstam, *Hyphodontia curvispora* J. Erikss. & Hjortstam)]

Specimens examined. Tavastia australis, Ruovesi, Nuijakorpi, UCS 6866962:3362273, on a fallen *Picea abies* trunk (diam. 30 cm, Decay Stage 4) in a spruce mire with a large amount of dead wood, Sep 11, 2018, leg. & det. JP 4040 (JP); Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3558, on a fallen *Populus tremula* trunk (diam. 30 cm, Decay Stage 3) in an old-growth, spruce-dominated forest, Jul 15, 2018, leg. & det. TH 2018149 (OULU).

These are the eighth and ninth records of the species in Finland; previous records were from Koski (2a), Lammi (2a), Padasjoki (2a), Muurame (2b), Pyhäjärvi (3a), Saarijärvi (3a), and Paltamo (3b) (on *Pinus, Picea*, and *Betula*). [2,9,27,28]. The substratum in Sotkamo (3b) was *Populus tremula* for the first time among Finnish collections.

Fig. 22 *Kneiffiella curvispora* in Ruovesi (JP 4040). Photo: Jorma Pennanen.

Laxitextum bicolor (Pers. : Fr.) Lentz

Specimen examined. Lapponia inarensis, Inari, Haapaniemi, UCS 7645292:3497395, on a fallen *Betula* sp. trunk (diam. 8 cm, Decay Stage 3) in a mesic herb-rich forest, Sep 2, 2018, leg. & det. MK 35/18 (OULU).

New to Northern Boreal, Forest Lapland (4c).

Leptosporomyces mutabilis (Bres.) G. J. Krieglsteiner coll. (Fig. 23)

Specimen examined. Savonia australis, Punkaharju, Laukansaari, UCS 6857984:3621788, on a fallen and broken *Larix* sp. trunk (diam. 30 cm, Decay Stage 4) in a research forest with a large amount of dead wood, Sep 30, 2018, leg. & det. JP 3962 (JP), conf. HK.

New to Southern Boreal, Lake District (2b). Not Evaluated.

Merulicium fusisporum (Romell) J. Erikss. & Ryvarden (Fig. 24)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3558, on a fallen *Populus tremula* trunk (diam. 18 cm, Decay Stage 3) and moss and spruce branches in a few square meters area around the trunk in an old-growth, spruce-dominated forest, Sep 25, 2018, leg. & det. TH 2018163 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Oliveonia fibrillosa (Burt) Donk (Fig. 25)

Specimens examined. Ostrobottnia kajanensis, Sotkamo, Naulavaara, Korkeakoskenpuro, UCS 7089:3558, on a fallen deciduous tree trunk (diam. 4 cm, Decay Stage 3) in a moist, old-growth, spruce-dominated forest, Sep 24, 2018, leg. & det. TH 2018091 (OULU), conf. MK; Hyrynsalmi, Karhisenvaara, UCS 7157:3587, on a fallen *Populus tremula* trunk (diam. 30 cm, Decay Stage 3) in old-growth, spruce-dominated forest, Sep 28, 2018, leg. & det. TH 2018074 (OULU), conf. MK.

These are the seventh and eighth records of the species in Finland; previous records were from Helsinki (1b), Kemiönsaari (1b), Karjalohja (1b), Äänekoski (2b), and Kajaani (3b) [2,3].

Oxyporus obducens (Pers.) Donk

[*Rigidoporus obducens* (Pers.) Pouzar]

Specimen examined. Nylandia, Espoo, Träskanda mansion, UCS 66827:33734, on a *Populus laurifolia* log cut 10 years ago in a park, Nov 17, 2018, leg. & det. Mikko Veräjänkorva (OULU), conf. MK.

This is the eighth record of the species in Finland; previous records were from Karjalohja (1b), Turku (1b), Helsinki (1b), and Hattula (2a) [28]. Not Evaluated.

Peniophorella guttulifera (P. Karst.) K. H. Larss. (Fig. 26)

[*Hyphoderma guttuliferum* (P. Karst.) Donk]

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 9 cm, Decay Stage 2) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Oct 9, 2018, leg. & det. TH 2018095 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the eighth record of the species in Finland; previous records were from Parainen (1b), Kemiönsaari (1b), Helsinki (1b), Vantaa (1b), Tammela (2a), Pieksämäki (2b), and Siikainen (3a) [2,7,8].

Fig. 23 *Leptosporomyces mutabilis* in Punkaharju (JP 3962). Photo: Jorma Pennanen.

Fig. 24 *Merulicium fusisporum* in Sotkamo (TH 2018163). Photo: Teppo Helo.

Fig. 25 *Oliveonia fibrillosa* in Hyrynsalmi (TH 2018074). Photo: Teppo Helo.

Fig. 26 *Peniophorella guttulifera* in Sotkamo (TH 2018095). Photo: Teppo Helo.

Phlebia nitidula (P. Karst.) Ryvarden (Fig. 27)

Specimen examined. Ostrobottnia kajanensis, Kajaani, Pyykönpuro, UCS 71250:35333, on a fallen *Salix caprea* trunk (diam. 3 cm, Decay Stage 3) in a deciduous thicket forest with a large amount of dead wood, Oct 1, 2017, leg. & det. TH 20170040 (OULU), conf. MK and HK.

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Fig. 27 *Phlebia nitidula* in Kajaani (TH 20170040). Photo: Teppo Helo.

Piloderma lanatum (Jülich) J. Erikss. & Hjortstam (Fig. 28)

Specimen examined. Ostrobottnia kajanensis, Kajaani, Pöllyvaara, UCS 7126:3535, on a fallen *Betula* sp. trunk (diam. 8 cm, Decay Stage 3) in a spruce-dominated, mesic heath forest, Sep 10, 2018, leg. & det. TH 2018146 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the fourth record of the species in Finland; previous records were from Helsinki (1b), Luhanka (2b), and Utsjoki (4d) [2,28].

Pseudotomentella humicola M. J. Larsen (Fig. 29)

Specimens examined. Tavastia australis, Ylöjärvi, Pinsiönkangas UCS 68345:33122, on a big, fallen *Pinus sylvestris* trunk, Sep 27, 2004, leg. & det. Unto Söderholm 3578 (TUR), conf. MK; Ostrobottnia kajanensis, Puolanka, Paljakka, Mustakumpu, UCS 7172:3551, on a fallen *Picea abies* trunk (diam. 40 cm, Decay Stage 4) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Aug 26, 2018, leg. & det. JP & TH 2018156 (OULU), and in the same location on a fallen *Picea abies* trunk (diam. 50 cm, Decay Stage 4), Aug 26, 2018, leg. & det. TH 2018157 (OULU), conf. MK.

New to Southern Boreal, SW Finland, and Southern Ostrobothnia (2a). These are the third and fourth records of the species in Finland; previous records were from Lieksa (3b) and Kuusamo (4a) [2].

Fig. 28 *Piloderma lanatum* with *Scopuloides rimosa* (right up) and *Xylodon borealis* (right down) in Kajaani (TH 2018146). Photo: Teppo Helo.

Fig. 29 *Pseudotomentella humicola* with *Basidiodendron eyrei* in Puolanka (TH 2018156). Photo: Teppo Helo.

Repetobasidium vile (Bourd. & Galz.) J. Erikss. (Fig. 30)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Viltonvaara, UCS 7084:3561, on a fallen *Picea abies* trunk (diam. 25 cm, Decay Stage 4) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Oct 1, 2018, leg. & det. TH 2018105 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the fourth record of the species in Finland; previous records were from Tammisaari (1b), Parainen (1b), and Jyväskylä (2b) [2,8].

Fig. 30 *Repetobasidium vile* in Sotkamo (TH 2018105). Photo: Teppo Helo.

Rhizochaete sulphurina (P. Karst.) K. H. Larss. (Fig. 31)

[*Ceraceomyces sulphurinus* (P. Karst.) J. Erikss. & Ryvarden]

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 70 cm, Decay Stage 4) in a moist, old-growth, spruce-dominated forest with a large amount of dead wood, Oct 9, 2018, leg. & det. TH 2018081 (OULU), conf. MK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the fourth record of the species in Finland; previous records were from Savonlinna (2b), Punkaharju (2b), and Jalasjärvi (3a) [2,8].

Scytinostromella nannfeldtii (J. Erikss.) G. W. Freeman & R. H. Petersen (Fig. 32)

Specimens examined. Ostrobottnia kajanensis, Paltamo, Melalahti, UCS 71443:35331, on a fallen *Picea abies* branch (diam. 3 cm, Decay Stage 3) in a spruce-dominated, mesic heath forest, Aug 19, 2018, leg. TH 2018100 (OULU), det. HK, and in the same location on a fallen *Picea abies* branch (diam. 3 cm, Decay Stage 3), Aug 19, 2018, leg. & det. TH 2018188 (OULU).

This is the fifth record of the species in Finland; previous records were from Hyrynsalmi (3b), Rovaniemi (3c), Kuusamo (4a), and Savukoski (4c) [2,9].

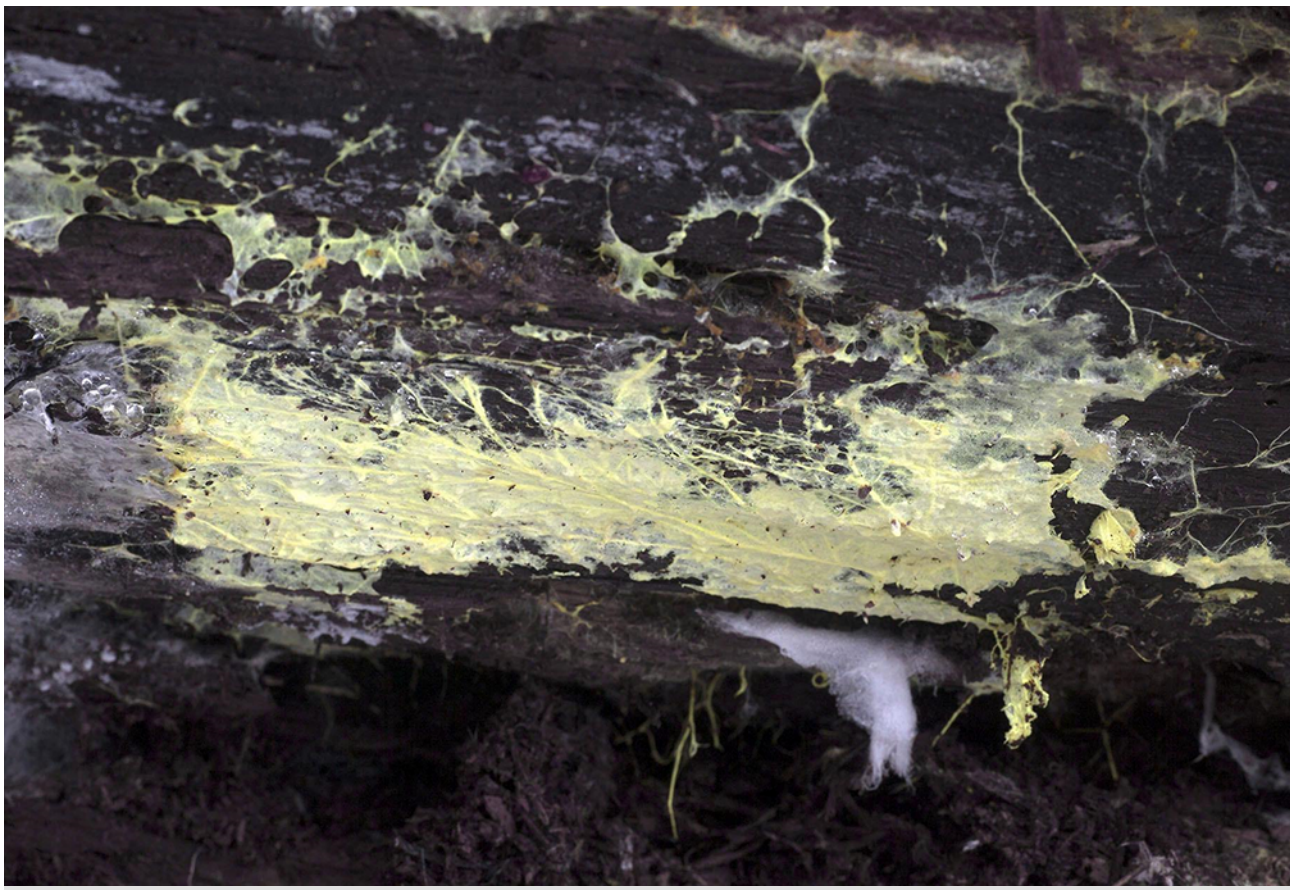

Fig. 31 *Rhizochaete sulphurina* in Sotkamo (TH 2018081). Photo: Teppo Helo.

Fig. 32 *Scytinostromella nannfeldtii* in Paltamo (TH 2018188). Photo: Teppo Helo.

Sistotrema luteoviride Kotir. & K.-H. Larss. (Fig. 33)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Naulavaara, Korkeakoskenpuro, UCS 7089:3558, on a fallen *Populus tremula* trunk (diam. 6 cm, Decay Stage 3) in a moist, old-growth, spruce-dominated forest with a large amount of dead deciduous wood, Sep 24, 2018, leg. & det. TH 2018080 (OULU), conf. MK & HK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the third record of the species in Finland. Both previous records were made nearby to one another in Utsjoki (4d) [29].

Sistotrema oblongisporum M. P. Christ. & Hauerslev (Fig. 34)

Specimen examined. Ostrobottnia kajanensis, Kajaani, Ensilä, UCS 71265:35345, on a fallen deciduous tree twig (diam. 3 cm) in a deciduous, riparian thicket forest with a large amount of dead wood, Oct 17, 2017, leg. TH 20170042 (OULU), det. HK.

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Sistotrema octosporum (J. Schröt. ex Höhn. & Litsch.) Hallenb.

Specimen examined. Ostrobottnia ouluensis, Muhos, Laitasaari, Rova, UCS 7197540:3446426, on a *Dasiphora fruticosa* twig (diam. 2 cm, Decay Stage 1) in a mesic heath forest, Oct 8, 2018, leg. & det. MK 71/18 (OULU), conf. HK.

New to Middle Boreal, Ostrobothnia (3a).

Sistotremastrum niveocremeum (Höhn. & Litsch.)

Specimen examined. Ostrobottnia ouluensis, Oulu, Kaijonharju, UCS 7219532:3428475, on a fallen *Betula* sp. trunk in a mesic heath forest, Nov 12, 2018, leg. Saara Salmela (OULU), det. MK.

New to Middle Boreal, Ostrobothnia (3a).

Spiculogloea subminuta Hauerslev (Fig. 35)

Specimens examined. Ostrobottnia kajanensis, Kuhmo, Rasinlampi, UCS 7103391:3665628, on a fallen *Picea abies* trunk (diam. 60 cm) inside *Botryobasidium subcoronatum* in a very old, mesic heath forest, Aug 25, 2017, leg. JJ 1077 (OULU), det. MK, conf. HK; Lapponia sompiensis, Inari, Tuuruharju, UCS 7674:3508, on a fallen *Pinus sylvestris* trunk with *Botryobasidium subcoronatum* (diam. 20 cm, Decay Stage 3) in a middle-aged, xeric heath forest, Aug 31, 2018, leg. TH 2018094 (OULU), det. MK.

New to Finland and hence to Middle Boreal, Northern Carelia – Kainuu (3b) and Northern Boreal, Forest Lapland (4c).

Steccherinum fimbriatellum (Peck) Miettinen

[*Junghuhnia fimbriatella* (Peck) Ryvarden]

Specimen examined: Karelia australis, Virolahti, Tinkanen, UCS 67104:35280, on dead Rubus idaeus and litter in an abandoned garden, Oct 13, 2018, leg. & det. AS & HK 28702 (H).

Fig. 33 *Sistotrema luteoviride* in Sotkamo (TH 2018080). Photo: Teppo Helo.

Fig. 34 *Sistotrema oblongisporum* in Kajaani (TH 20170042). Photo: Teppo Helo.

Fig. 35 *Spiculogloea subminuta* with *Botryobasidium subcoronatum* in Inari (TH 2018094). Photo: Teppo Helo.

New to Southern Boreal, Southeastern Finland and Southern (2a). Vulnerable.

Tretomyces microsporus Kotir. & Saaren. & K. H. Larss. (Fig. 36)

Specimens examined. Karelia Borealis, Lieksa, Säynäsemä, UCS 7038:3683, on a fallen *Pinus sylvestris* trunk (diam. 14 cm) in a dry heath forest, Aug 23, 1999, leg. Maarit Similä & Mari Niemi 521/1999 (TUR), det. MK; Lapponia inarensis, Inari, Sorasuvanto, UCS 76509:34805, on two fallen *Pinus sylvestris* trunks (diam. 7 cm, Decay Stage 3 and diam. 8 cm, Decay Stage 4) in an old-growth, xeric heath forest, Sep 2, 2018, leg. & det. HL & TH 2018101 (OULU) and TH 2018109 (OULU), conf. MK.

New to Northern Boreal, Forest Lapland (4c). These are the fifth and sixth records of the species in Finland; previous records were from Paltamo (3a), Oulu (3a), Lieksa (3b), and Suomussalmi (4a) [2,3,28].

Tubulicrinis globisporus (Bourdot & Galzin) Liberta (Fig. 37)

Specimen examined. Lapponia inarensis, Inari, Lauluvaara, UCS 7654:3493, on a fallen *Pinus sylvestris* trunk (diam. 20 cm, Decay Stage 3, kelo tree) in an old-growth, xeric heath forest, Sep 1, 2018, leg. & det. TH 2018083 (OULU), conf. MK.

This is the third record of the species in Finland; previous records were from Padasjoki (2a) and Inari (4c) [2].

Fig. 36 *Tretomyces microsporus* in Inari (TH 2018101). Photo: Teppo Helo.

Fig. 37 *Tubulicrinis globisporus* in Inari (TH 2018083). Photo: Teppo Helo.

Tulasnella albida Bourd. & Galz.

Specimen examined. Ostrobottnia ultima, Rovaniemi, Pisavaara Strict Nature Reserve, UCS 7356573:3415307, on a fallen *Picea abies* trunk (diam. 23 cm, Decay Stage 3), Sep 9, 2018, leg. & det. MK 38/18 & Tapio Kekki, (OULU).

New to Middle Boreal, Southwestern Lapland (3c).

Tulasnella allantospora Wakef. & A. Pearson (Fig. 38)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Naulavaara, Penikkapuro UCS 7087:3559, on a fallen *Picea abies* twig (diam. 2 cm, Decay Stage 2) in a moist, old-growth, spruce-dominated forest around a stream, Sep 25, 2018, leg. & det. TH 2018107, conf. MK.

This is the sixth record of the species in Finland; previous records were from Lohja (1b), Kirkkonummi (1b), Porvoo (2a), Muurame (2b), and Suomussalmi (3b) [2,3].

Tulasnella brinkmannii s. l. Bres. (Fig. 39)

Specimens examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 15 cm, Decay Stage 2) in an old-growth, spruce-dominated forest, Oct 10, 2018, leg. TH 2018087 (OULU), det. MK, conf. HK; Ristijärvi, Saukkovaara, UCS 7151:3559, on a fallen *Populus tremula* trunk (diam. 9 cm, Decay Stage 2), in a young, aspen-dominated forest, Oct 12, 2018, leg. TH 2018086 (OULU), det. MK, conf. HK.

These are the third and fourth records of the species in Finland; previous records were from Suonenjoki (2b) and Suomussalmi (3b) [3].

Tulasnella calospora (Boud.) Juel

Specimens examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7091:3558, on a fallen *Betula* sp. trunk (diam. 25 cm, Decay Stage 3) with *Athelia sibirica* in an old-growth, spruce-dominated forest with a large amount of dead wood, Oct 3, 2018, leg. TH 2018139 (OULU), det. MK; Kajaani, Aurala, UCS 7127:3532, on a fallen *Pinus sylvestris* branch (diam. 7 cm, Decay Stage 2) with *Botryobasidium laeve* in an old, wooded field near a river bank, Oct 8, 2018, leg. & det. TH 2018075 (OULU), conf. MK & HK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). These are the second and third records of the species in Finland; the first record was from Virolahti (2a) [7].

Tulasnella deliquescens (Juel) Juel (Fig. 40)

Specimens examined. Ostrobottnia kajanensis, Hyrynsalmi, Karhisenvaara, UCS 7157:3587, on a fallen *Populus tremula* trunk (diam. 23 cm, Decay Stage 3) in an old-growth, spruce-dominated forest with a large amount of dead wood, Sep 28, 2018, leg. & det. TH 2018082 (OULU), conf. MK; Lapponia inarensis, Sodankylä, Kakslauttanen, UCS 7583:3515, on two fallen *Pinus sylvestris* branches (diam. 4 cm, Decay Stage 3, kelo tree) in an old-growth, xeric heath forest with a large amount of dead wood, Sep 4, 2018, leg. & det. TH 2018102 (OULU), conf. MK.

New to Northern Boreal, Forest Lapland (4c). These are the fourth and fifth records of the species in Finland; previous records were from Helsinki (1b), Jyväskylä (2b), and Suomussalmi (3b) [2,3].

Fig. 38 *Tulasnella allantospora* in Sotkamo (TH 2018107). Photo: Teppo Helo.

Fig. 39 *Tulasnella brinkmannii* in Sotkamo (TH 2018087). Photo: Teppo Helo.

Fig. 40 *Tulasnella deliquescens* in Hyrynsalmi (TH 2018082). Photo: Teppo Helo.

Fig. 41 *Tulasnella fuscoviolacea* in Sotkamo (TH 2018104). Photo: Teppo Helo.

Tulasnella fuscoviolacea Bres. (Fig. 41)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Naulavaara, Korkeakoskenpuro, UCS 7089:3558, on a fallen *Populus tremula* trunk (diam. 5 cm, Decay Stage 2) in moist, old-growth, spruce-dominated forest, Sep 24, 2018, leg. & det. TH 2018104 (OULU), conf. MK & HK.

New to Middle Boreal, Northern Carelia – Kainuu (3b). This is the third record of the species in Finland; previous records were from Tammela (2a) and Jyväskylä (2b) [2,3].

Tulasnella permacra P. Roberts

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 70923:35583, on a fallen *Populus tremula* trunk (diam. 40 cm, Decay Stage 4) with Athelopsis *subinconspicua* and *Botryobasidium subcoronatum* in an old-growth, spruce-dominated, forest with a large amount of dead wood, Jul 15, 2018, leg. & det. TH 2018150 (OULU), conf. MK.

This is the fourth record of the species in Finland; previous records were from Helsinki (1b), Tammisaari (1b), and Puolanka (3b) [2,3].

Tulasnella pinicola Bres. (Fig. 42)

Specimen examined. Ostrobottnia kajanensis, Sotkamo, Talvivaara, UCS 7092:3557, on a fallen *Populus tremula* trunk (diam. 8 cm, Decay Stage 3) in an old-growth, spruce-dominated forest, Oct 10, 2018, leg. TH 2018084, det. MK, conf. HK.

New to Middle Boreal, Northern Carelia – Kainuu (3b).

Tulasnella thelephorea (Juel) Juel (Fig. 43)

Specimen examined: Ostrobottnia kajanensis, Kajaani, Karolineburg, UCS 71259:35356, on a fallen *Salix caprea* trunk (diam. 20 cm, Decay Stage 3) in an old, spruce-dominated, herb-rich heath forest, Sep 11, 2018, leg. & det. TH 2018165 (OULU), conf. MK.

This is the sixth record of the species in Finland; previous records were from Lohja (1b), Inkoo (1b), Kajaani (3b), Lieksa (3b), and Utsjoki (4d) [2,3].

Typhula suecica I. Olariaga, G. Corriol, I. Salcedo & K. Hansen

Specimens examined. Karelia australis, Virolahti, Tinkanen, UCS 67104:35280, on dead, fallen *Alnus glutinosa* leaves on damp ground in a moist forest, Oct 12, 2018, leg. & det. AS 26583 (SVER), and on fallen of tremula and *Alnus glutinosa* leaves in a *Phragmites australis* stand in a shore forest, Oct 12, 2018, leg. & det. AS 26609 (SVER).

New to Finland and hence Southern Boreal, Southeastern Finland, and Southern Ostrobothnia (2a). Not evaluated.

Xenasma rimicola (P. Karst.) Donk (Fig. 44)

Specimens examined. Tavastia australis, Ruovesi, Musturi nature reserve, UCS 6865699:3362335, on a fallen and broken *Populus tremula* trunk (diam. 30 cm, Decay Stage 3) in an old-growth, mixed, mesic heath forest, Oct 17, 2018, leg. & det. JP 4031 (JP); Ostrobottnia kajanensis, Sotkamo, Naulavaara, Korkeakoskenpuro, UCS 7089:3558, on a fallen *Salix caprea* trunk (diam. 8 cm, Decay Stage 2) in a moist, old-growth, spruce-dominated forest with a large amount of dead deciduous wood, Sep 24, 2018, leg. & det. TH 2018108 (OULU), conf. MK.

New to Southern Boreal, Lake District (2b). These are the third and fourth records of the species in Finland; previous records were from Tammela (2a) in 1889 and Ilomantsi (3b) [2]. Data deficient.

Fig. 42 *Tulasnella pinicola* with *Phanerochaete* sp. in Sotkamo (TH 2018084). Photo: Teppo Helo.

Fig. 43 *Tulasnella thelephorea* in Kajaani (TH 2018165). Photo: Teppo Helo.

Fig. 44 *Xenasma rimicola* in Ruovesi (JP 4031). Photo: Jorma Pennanen.

Discussion

Species new to Finland

Spiculogloea subminuta was described based on a single collection in Denmark [30], with *Botryobasidium subcoronatum* (Höhn. & Litsch.) Donk as the host species. Rödel [31] made several records of *S. subminuta* from Germany; in all the cases, the host species was *B. subcoronatum*. In Norway and Sweden, the host species was *Botryobasidium intertextum*, which grew on *Picea abies* [32]. The first Finnish record was from a very old, pristine or near-pristine, spruce-dominated mesic heath forest inside the Ulvilansalo strict nature reserve, on a fallen *Picea abies* trunk. The second Finnish record was found on a fallen *Pinus sylvestris* trunk in a pine-dominated, middle-aged, xeric heath forest with a forestry history and a low level of dead wood, even though there was some decaying kelo-wood at the landscape level. The basidiomata were found in *B. subcoronatum*. *Spiculogloea subminuta* is likely not as rare as the current records show; however, basidiomata are very small and grow inside other fungi, so are easily overlooked when the host species has already been identified. Both *B. intertextum* and *B. subcoronatum* are common species in Finland [2] and although *S. subminuta* is abundant and macroscopically quite conspicuous, it can be mistakenly identified as a conidial state of the host. This may help with identification since anamorphs of *B. subcoronatum* or *B. intertextum* have not yet been reported [19,33]. More records are required to further evaluate its distribution and ecological requirements.

Typhula suecica is widely distributed, but rare [34], and grows in damp forests on the dead, fallen leaves of *Acer*, *Alnus*, and *Populus*. Olariaga et al. [34] reported *T. suecica* in Southern France, Spain (Pyrenees), and central Sweden. Its Finnish localities (very close together) are in the southeastern corner of Finland on the shore of the Finnish Gulf in damp forests in which the fungus grew on the dead leaves of *Alnus* and *Populus*. The wide distribution area and "trivial" habitats connected with common substrata give the impression that *T. suecica* is not a threatened species in Europe, even if it is seldom collected.

Significant extensions of known distribution

Many of the new regional records occurred far away from their previously known localities, especially in eastern and northern Finland. This is mainly explained by the fact that areas, habitats, and substrata that had been little studied or overlooked are now being surveyed.

The habitats of *Fuscoporia contigua* (i.e., coastal scrub of common sea buckthorn, *Hippophaë rhamnoides*) have not been surveyed by mycologists, so it seems to appear that the lack of observations is mainly due to a lack of studies. The species has now been found 185 km northeast of Eckerö (1a), and it is likely that the species also occurs between these two locations, since suitable habitats exist widely. According to our understanding, *F. contigua* could occur if old shrubs and large stands of common sea buckthorn and their continuum are available. In this study, *F. contigua* was found in sites where coastal scrubs of common sea buckthorn are exposed to moving ice floes and the waves of ship traffic. This damages shrubs and creates suitable areas for growth on their trunks. Occurrences in Pori have now been found at three locations close to one other, within a distance of five kilometers. There are tens of records of *F. contigua* in Sweden (http://www.artportalen.se/), mainly on the eastern coast and approximately on the same latitude as the Finnish records have been made.

The following poorly known species were found 150–400 km north of their previous known localities: *Tulasnella fuscoviolacea* (150 km), *T. deliquescens* (400 km), *T. calospora* (400 km), and *Basidiodendron rimosum* (250 km), along with *Repetobasidium vile* (150 km) and *Coronicium alboglaucum* (200 km), which are species with a small or inconspicuous basidiome.

Tretomyces microsporus was found at Inari, 350 km north of previous records. The known occurrences of the species are concentrated in eastern Finland, with many findings from pine dominated, dry heath forests. It is possible that the species also occurs widely in northern Finland and elsewhere, since suitable habitats exist. *Hyphoderma obtusiforme* was also found at Inari, 400 km north of its previous known locations. We propose that the species occurs throughout Finland and in the area between this large gap. *Candelabrochaete septocystidia* and *Amaurodon mustialaënsis* were both found 300 km north of their earlier known occurrences. Both species are rare and probably have a southern distribution.

The new record of *Sistotrema luteoviride* from Sotkamo (3b) is ca. 600 km south of the previous records in Utsjoki (4d) [29]. Globally, *S. luteoviride* is extremely rare and these are the only three records in the world. The record in Sotkamo was derived from a thin *Populus tremula* trunk, whereas the substrata in Utsjoki – within approximately 2 km of each other – were thin corticated *Juniperus communis*. The habitats were also different; Sotkamo is an old, spruce-dominated, herb-rich heath forest with a large amount of young deciduous wood (mostly *Populus tremula* and *Salix caprea*, but also *Alnus incana*, *Betula* sp., and *Sorbus aucuparia*), whereas Utsjoki is a pine-dominated, dry heath forest and mixed river-side forest with birch, willow, and juniper. *S. luteoviride* is a mycorrhizal fungus for whom the substrate for the basidiocarp is not important, but the host tree is. Kotiranta and Larsson [29] reported two sequences from the root tips of *Salix reticulata* from an alpine ecosystem in northern Sweden and one from a cloud forest from *Quercus laurina* in Mexico. Why *S. luteoviride* makes so few basidiocarps remains a mystery.

Conclusions

A wealth of knowledge on the occurrence and distribution of aphyllophoroid species has been accumulated during the last ten years. A total of 65 nationally new species, 329 records of rare species, and 481 regionally new species have been reported from Finland after publishing the first Finnish checklist of aphyllophoroid fungi [2]. Nevertheless, the occurrence and distribution of aphyllophoroid fungi in Finland are still inadequately described and, in many cases, poorly understood, as demonstrated in this paper. It is obvious that tens of species can still be discovered if further field surveys are performed, particularly concentrating on remote areas, neglected and little studied habitats and

substrata, species with minuscule basidiomes, and taxonomically challenging groups. For many species, the few existing records are from distant geographic locations, yet it is doubtful that their distributions are so scattered in reality, with many of these species likely occurring at several sites between the scattered observations. To elucidate the prevalence, distributional areas, habitat requirements for conservation purposes and red-list assessment for these species, more effort should be applied to species inventories and studies of fungal ecology.

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