Diversity and distribution of Finnish aphyllophoroid and heterobasidioid fungi (*Basidiomycota*): An update

Panu Kunttu1*, Teppo Helo2, Matti Kulju3, Pyry Veteli4, Jari Julkunen5, Otto Miettinen6, Jorma Pennanen7, Aki Moilanen8 & Heikki Kotiranta 9

**Abstract.** Biogeographical and ecological knowledge of aphyllophoroid fungi has increased substantially after the publication of the Finnish aphyllophoroid checklist. In this paper, we describe the occurrence and distributions of both aphyllophoroid and heterobasidioid fungi in Finland. We introduce 13 species new to Finland: *Hyphoderma lapponicum*, *Mycostilla vermiformis*, *Proterochaete adusta*, *Pseudotomentella alobata*, *Pseudoxenasma verrucisporum*, *Sistotrema subtrigonospermum*, *Spiculogloea minuta*, *Tomentella botryoides*, *Tomentella neobourdotti*, *Tomentella subtestacea*, *Tomentella subpilosa*, *Tulasnella anguifera*, and *Tulasnella interrogans*. *Proterochaete* and *Pseudoxenasma* are new genera to Finland. We also present the record of *Caudicicola gracilis* for only the second time globally. Furthermore, we present 115 new records (locations) of 53 rare or seldom collected species. In addition, we report 96 species considered new to a specific subzone of the boreal forest vegetation zone in Finland. The records contain notes on the substrata, and the ecology and distribution of nationally new species and are briefly discussed.

**Key words:** *Aphyllophorales*, biogeography, corticioids, polypores, wood-associated fungi

**Introduction**

The checklist of Finnish aphyllophoroid fungi was published in 2009 (Kotiranta et al. 2009). Since that time, substantial new information on both aphyllophoroid and heterobasidioid species has accumulated, which includes a total of 102 species new to Finland (H. Kotiranta, unpublished), 406 records of rare species, and 525 species new to some region (e.g., Kunttu et al. 2016, 2018, 2019). The species that are new to Finland can be either factually new finds or results of better understanding of species identity due to taxonomic revisions. This accumulated knowledge is mainly explained by recent extensive field inventories and studies, while areas (e.g., Kainuu province, Oulu region) and substrata (e.g., fine woody debris) that had previously received little attention have also been newly surveyed (e.g., Juutilainen 2016).

In the current paper, we present new records of aphyllophoroid and heterobasidioid fungi in Finland, where we consider three types of records: 1) species new to Finland, 2) rare or seldom collected species with a maximum of 10 previous records in Finland, and 3) species that are new to a specific subzone (section) of the boreal forest vegetation zone in Finland. The records contain notes on the substrata, and the ecology and distribution of nationally new species and are briefly discussed.

**Material and methods**

Most of the records in this paper were derived by mycologists from field trips and species inventories (e.g., Finnish Atlas of Fungi), but some old herbarium specimens were also studied. A common inventory method was an opportunistic search/sampling for species, which entailed a careful walk through a study site to collect visible sporocarps,
and emphasis was placed on sampling multiple habitats and substrate qualities to collect a large number of species and to obtain a representative picture of the species composition of the study site (Stokland & Sippola 2004). Field work by the author PV during 2020 in Lapland was conducted in the form of systematic inventory of sample plots. The work was part of a Natural Resources Institute Finland LUKE led project. The majority of the records date from 2019 and 2020, but some older records were also included.

At the beginning of each fungal record, we provide the biogeographical provinces according to Knudsen and Vesterholt (2008), and Latin province names are presented on the website of FinBIF (2021a) alongside this provincial division. For each record, we named the sites at two or three levels: a municipality and a village, or a topographical site or nature conservation area. If the biogeographical province was the same as in the previous record for the same fungal species, it was not repeated. The Finnish National Uniform Coordinate System (UCS, 27°E; Heikinheimo & Raatikainen 1981) was used to present the coordinates. The forest vegetation subzones (Fig. 1) follow Ahti et al. (1968), and are also available on the online FinBIF map (FinBIF 2021b). Following the abovementioned sources, the names of the subzones were presented in English (e.g., Ostrobothnia), in contrast to the Latin names that were used for the biogeographical provinces (e.g., Ostrobottnia).

Taxonomy and nomenclature mainly follow Kotiranta et al. (2009) and Hjortstam and Ryvarden (2009), but Bernicchia and Gorjón (2010) was also used for some species, as was Spirin et al. (2019a) for genus Protomeruliaceae, and Svantesson et al. (2019) for the Pseudotomentella tristis group. The Finnish Red List assessment of species according to the IUCN-standard corresponds to Kotiranta et al. (2019). If a species status was determined to be of least concern, it was not mentioned.

The decay stage classification (1–5) of dead wood was carried out according to Renvall (1995), with stage 1 referring to hard dead wood and stage 5 referring to completely decayed wood. This is widely used method for all tree species in the boreal forests (e.g., Korhonen 2009; Siitonen et al. 2009). The diameter of dead wood was measured at chest height if the trunk was complete and from the middle if it was broken. Here, we use the Finnish term ‘kelo’ to refer to dead and old-growth trunks of Scots pine (Pinus sylvestris) with a silvery-grey, decorticated appearance. Kelo trees are special substrata for fungi due to their extremely slow decay rate (even hundreds of years), long-lasting hard surface and chemical compounds (Leikola 1969; Niemelä et al. 2002; Venugopal et al. 2016). Classification of habitat types follows, to a large extent, the Red List assessment of habitat types in Finland (Kontula & Raunio 2018).

The material were collected, identified, and confirmed by several mycologists as described in the record details, using the following abbreviations: TH = Teppo Helo, JJ = Jari Julkunen, HK = Heikki Kotiranta, MK = Matti Kulju, OM = Otto Miettinen, AM = Aki Moilanen, JP = Jorma Pennanen, and PV = Pyry Veteli. Unless otherwise stated, the collector was also the identifier. The code after the name of the collector 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), Jyväskylä (JYV) and Kuopio Natural History Museum (KUO).

**Results**

We discovered 13 fungal species new to Finland: *Hyphoderma lapponicum*, *Mycostilla vermiformis*, *Protrochaeote adusta*, *Pseudotomentella alabata*, *Pseudoxenasma verrucisporum*, *Sistotrema subtrigonospermum*, *Spiculogloea minuta*, *Tomentella botryoides*, *Tomentella neobourdotii*, *Tomentella testacea*, *Tomentella subpilosa*, *Tulasnella anguifera*, and *Tulasnella interrogans*. We also present the record of *Caudicicola gracilis* for only the second time globally. Furthermore, 115 new records (locations) of 53 rare or seldom collected species (with a maximum...
of ten previous records in Finland) are presented. Altogether, 96 species are reported as new to a specific subzone (section) of the boreal forest vegetation zone in Finland (Table 1).

The species are listed below in alphabetical order.

*Amaurodon cyaneus* (Wakef.) Kõljalg & K.H. Larsson (Fig. 2)

**Distribution.** New to 3b (Fig. 1).

**Notes.** 3rd record in Finland; previous records: Helsinki (1b) (Kotiranta et al. 2009). Vulnerable.

**Specimen examined.** Ostrobotnian kajangensis, Sotkamo, Losonvaara, UCS 7107057:3546404, on a fallen trunk of *Populus tremula* (diam. 8 cm, decay stage 2) in an old spruce-dominated herb-rich heath forest, 6 Oct. 2018, leg. & det. TH 20180214 (OULU), conf. MK.

*Amylocorticium pedunculatum* Hjortstam (Fig. 3)

**Distribution.** New to 3b (Fig. 1).

**Notes.** 5th–7th records; previous records: Helsinki (1b), Lammi (2a), Luhanka (2b), and Äänekoski (2b) (Kotiranta et al. 2009; H. Kotiranta, unpublished).

**Specimens examined.** Ostrobotnia kajangensis, Kuhmo, Jämäsvaara SE, UCS 7099282:3624258, on a fallen small trunk of *Populus tremula* (diam. 12 cm, decay stage 4) in a mixed mesic heath forest, 8 Sept. 2016, leg. & det. JP3182 (H); Sotkamo, Naulavaara, UCS 7087212:3559108, on fallen trunk of *Picea abies* (diam. 5 cm, decay stage 3), in a middle-aged mixed herb-rich heath forests, 11 Sept. 2012, leg. P. Helo 2343 (OULU), det. TH; Sotkamo, Losonvaara, UCS 7106778:3545296, on a fallen trunk of *Picea abies* (diam. 10 cm, decay stage 3), in an old spruce-dominated mesic heath forest, 30 Sept. 2020, leg. & det. TH 20200015 (H).

*Amyloxenasma allantosporum* (Oberw.) Hjortstam & Ryvarden

**Distribution.** New to 3a (Fig. 1).

**Specimen examined.** Ostrobotnia ouluensis, Oulu, Karjasilta, UCS 7212887:3429705, on a stump of *Larix sibirica* (decay stage 2), in a small mesic heath forest with larch-trees planted next to the road, 26 Oct. 2019, leg. & det. AM 244 (OULU), conf. MK.

| Subzone of boreal forest vegetation zone | Number of new species |
|-----------------------------------------|-----------------------|
| Hemiboreal, Oak zone (1b)               | 5                     |
| Southern boreal, Southwestern Finland and Southern Ostrobothnia (2a) | 3                     |
| Southern boreal, Lake district (2b)     | 7                     |
| Middle boreal, Ostrobothnia (3a)        | 19                    |
| Middle boreal, Northern Carelia – Kainuu (3b) | 42                   |
| Middle boreal, Southwestern Lapland (3c) | 11                   |
| Northern boreal, Kuusamo District (4a)  | 2                     |
| Northern boreal, North Ostrobothnia (4b) | 4                     |
| Northern boreal, Fjeld Lapland (4d)     | 4                     |

**Figure 2. Amaurodon cyaneus in Sotkamo (TH 20180214). Photo: Teppo Helo.**

**Figure 3. Amylocorticium pedunculatum in Kuhmo, ex situ (JP3182). Photo: Jorma Pennanen.**

**Figure 4. Antrodia leucaena in Helsinki (PV 2570). Photo: Pyry Veteli.**
Antrodiella parasitica Vampola  
(Fig. 5)

**Distribution.** New to 2b (Fig. 1).

**Notes.** 8th and 9th records in Finland; previous records: Karjalohja (1b), Lammi (2a), Padasjoki (2a), Sipoo (2a; two sites), Vantaa (2a), and Puolanka (3b) (Kotiranta et al. 2009; Kunttu et al. 2014). Vulnerable.

**Specimens examined.** Nylandia, Helsinki, Kustaanharri, UCS 6681:3386, on fallen Picea abies (diam. 35 cm, decay stage 2) in association with dead and live Trichaptum abietinum basidiomata, in Picea abies dominated old stand with high amount of coarse dead wood, 11 Oct. 2020, leg. & det. PV 2557 (H), conf. OM; Savonia borealis, Iisalmi, Poskimäki, UCS 7053991:3511039, on a fallen trunk of Picea abies (diam. 10 cm, decay stage 2) in a pine-dominated rocky forest, 9 Sept. 2020, leg. O. Ryhänen 1/9920 (OULU), det. MK, conf. HK.

Aphanobasidium subnitens (Bourd. & Galz.) Jülich  
(Fig. 6)

**Distribution.** New to 3b (Fig. 1).

**Notes.** 3rd record in Finland; previous records: Luhanka (2a) and Porvoo (2a). (Kotiranta et al. 2009; Kunttu et al. 2018).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7102091:3663174, on a fallen trunk of Picea abies (diam. 35 cm, decay stage 4), in a very old dwarf shrub spruce mire, 5 Oct. 2020, leg. & det. TH 20200029 (OULU, H), conf. MK, HK & V. Spirin.

Athelia acrospora Jülich  
(Fig. 7)

**Distribution.** New to 3c (Fig. 1).

**Specimens examined.** Ostrobotnia ultima, Tervola, Pisavaara Strict Nature Reserve, Vähäloma, UCS 7353720:3412120, on a kelo branch of Pinus sylvestris on the ground (diam. 5 cm, decay stage 1) in an old stony mesic heath forest, 4 Oct. 2020, leg. & det. MK 67/20 (OULU).

Athelia bombacina (Pers.) Jülich  
(Fig. 8)

**Distribution.** New to 3c (Fig. 1).

**Specimens examined.** Ostrobotnia ultima, Tervola, Pisavaara Strict Nature Reserve, Vähäloma, UCS 7352735:3413712, on a decorticated fallen trunk of Pinus sylvestris (diam. 25 cm, decay stage 3) in an old pine-dominated mesic heath forest, 4 Oct. 2020, leg. & det. MK 58/20 (OULU); Ostrobotnia ultima, Tervola, Pisavaara Strict Nature Reserve, UCS 7353868:3411948, on a partly decorticated fallen trunk of Picea abies (diam. 23 cm, decay stage 4) in an old spruce-dominated mesic heath forest, 4 Oct. 2020, leg. & det. MK 68/20 (OULU).

Athelopsis glaucina (Bourdot & Galzin) Parmasto  
(Fig. 7)

**Notes.** 9th record in Finland; previous records: Geta (1a), Finström (1a), Helsinki (1b), Tavastia australis (2a/2b), two records in 3a, and records in 3c and 4c (FinBIF 2021c, H. Kotiranta, unpublished).

**Specimen examined.** Nylandia, Karjaa, Lepinjärvi, UCS 6664384:3313649, on a fallen branch of Corylus avellana (diam. 4 cm, decay stage 4) in a Corylus avellana dominated herb-rich forest, 31 Dec. 2020, leg. & det. JP4241 (H), conf. HK.

Biatoropsis usnearum Räsänen  
(Fig. 8)

**Distribution.** New to 3b (Fig. 1).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Riihi, UCS 7127522:3654462, on Usnea glabrescens growing on a living Salix caprea (diam. 35 cm) in a very old Picea abies dominated paludified herb-rich heath forest, 26 Aug. 2017, leg. & det JJ 1101 (OULU). We are aware that there is also an older unpublished museum specimen (KUO) which was collected on the border of zones 3a and 3b. Because that specimen lacks...
exact coordinates, we decided to publish our more accurate JJ 1101 record.

**Botryobasidium ellipsosporum** Holubová-Jechová

**Notes.** 4th record in Finland; previous records: Lammi (2a), Puolanka (3b) and Sotkamo (3b) (Kotiranta et al. 2009; Kunttu et al. 2018, 2019). The specimen was an anamorph as were the three previous Finnish collections.

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Elimys-salo, UCS 7129643:3664595, on a fallen trunk of *Pinus sylvestris* (diam. 25, decay stage 2, kelo tree) with *Tulasnella deliquesces* and *Tylospora fibrillosa* in an old pine-dominated sub-xeric heath forest, 9 Oct. 2020, leg. & det. TH 20200039 (OULU).

**Botryobasidium intertextum** (Schwein.) Jülich & Stalpers

**Distribution.** New to 3a (Fig. 1).

**Specimen examined.** Ostrobotnia ouluensis, Utajärvi, Hangan-vaaara, Hanganhete, UCS 7220917:3490636, on a fallen trunk of *Alnus incana*, in a spruce-dominated herb-rich forest next to a stream running from a spring, 14 July 2018, leg. & det. AM 74b-18 (OULU), conf. MK.

**Brevicelllicium olivascens** (Bres.) K.H. Larss. & Hjortstam

**Distribution.** New to 3a (Fig. 1).

**Specimen examined.** Ostrobotnia ouluensis, Oulu, Kontinkan-gas, UCS 7212832:3429839, on a fallen trunk of *Populus trem-ula*, in an aspen-dominated herb-rich heath forest adjacent to a road, 12 Oct. 2019, leg. & det. AM 140 (OULU), conf. MK.

**Byssocorticium efibulatum** Hjortstam & Ryvarden

**Notes.** 2nd record in Finland; previous record: Raasepori (1b) (Kunttu et al. 2012). Not Evaluated.

**Specimen examined.** Nylandia, Helsinki, Annala, UCS 6679:3387, on pieces of oak branches that were half-buried in the mulch of a mesic herb-rich forest with *Quercus robur*, *Acer platanoides* and *Pinus sylvestris*, 1 May 2020 and 10 Oct. 2020, leg. & det. PV 1814 (H) and PV 2554.

**Caudicicola gracilis** Kotir., Kulju & Miettinen

**Notes.** This is the second global record; the first record was reported in Finland, Pyhäjärvi (3a), where basidiomata were discovered growing on six *Picea abies* or coniferous stumps quite close to each other in a spruce-dominated swamp forest (Kotiranta et al. 2017). Data Deficient.

**Specimen examined.** Ostrobotnia ouluensis, Oulu, Holtinkylä, Samakkokan, UCS 7213406:3440431, on a decorticated fallen trunk of *Pinus sylvestris* (diam. 15 cm, decay stage 2) in an old stony mesic heath forest, 28 Sept. 2020, leg. & det. P. Jokikokko (OULU, H), conf. MK. This finding is described in more detail in Jokikokko (2020).

**Byssocorticium efibulatum** Hjortstam & Ryvarden

**Notes.** 2nd record in Finland; previous record: Raasepori (1b) (Kunttu et al. 2012). Not Evaluated.

**Specimen examined.** Nylandia, Helsinki, Annala, UCS 6679:3387, on pieces of oak branches that were half-buried in the mulch of a mesic herb-rich forest with *Quercus robur*, *Acer platanoides* and *Pinus sylvestris*, 1 May 2020 and 10 Oct. 2020, leg. & det. PV 1814 (H) and PV 2554.

**Ceraceomyces borealis** (Romell) J. Erikss. & Ryvarden

**Distribution.** New to 2b (Fig. 1).

**Specimen examined.** Savonia borealis, Lapinlahti, Koirniemi, 7033:3548, on a log of *Alnus incana* (diam. 10 cm, decay stage 2), in a log pile, 12 Aug. 2020, leg. & det. PV 2091 (H).
Specimen examined. Nylandia, Helsinki, Kumpula, Kymintien metsä, UCS 6679:3387, on trunk of dead standing Pinus sylvestris (diam. 28 cm, decay stage 2), rocky forest dominated by Pinus sylvestris, 14.11.2020, leg. & det. PV 2630 (H).

Clavaria greletii Boud.

Notes. 9th record in Finland; previous records: Ikaalinen (2a), Päijäne (2a), Lappeenranta (2b), Pieksämäki (2b), Kajaani (3b; two sites), Sotkamo (3b), and Keminmaa (3c) (Kotiranta et al. 2009; Kunttu et al. 2016).

Specimen examined. Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103310:3665104, on fallen trunk of Pinus sylvestris (diam. 20, decay stage 4, kelo tree) with Paullicorticium sp. in a very old pine-dominated sub-xeric heath forest, 3 Oct. 2020, leg. TH 20200022 (OULU), det. MK.

Dendrothele amygdalispora Hjortstam

Distribution. New to 3b (Fig. 1).

Specimen examined. Ostrobotnia kajanensis, Kajaani, Old cemetery, UCS 71262:35347, on trunk and branch of Salix frigida 'Bullata' in a park-like cemetery, 29 Oct. 2020, leg. & det. TH 20200044 (OULU).
Specimen examined. Ostrobotnia ultima, Tervola, Pisavaara Strict Nature Reserve, Vähäloma, UCS 7352766:3413304, on a corticated fallen trunk of Betula sp. (diam. 10 cm, decay stage 1) in an old spruce-dominated mesic heath forest, 4 Oct. 2020, leg. & det. MK 50/20 (OULU).

Gloiothele lactescens (Berk.) Hjortstam

Notes. 2nd–3rd records in Finland; previous record: a park in Helsinki (Kotiranta et al. 2009). Near Threatened.

Specimen examined. Nylandia, Helsinki, Sibelius Park, UCS 667611:3844, on a decorticated trunk and a stump of Tilia sp. (diam. 35 cm, decay stage 4) plus on a board, 23 Sept. 2010 and yearly till 30 Oct. 2014, but not anymore on the stump 2016 when the trunk had been removed, leg. & det. HK 22720, 25409, 26213, 26214, 26215, 26501 (H); Helsinki, Kustaankartano, UCS 6681:3386, on fallen Salix sp stem (diam. 10 cm, decay stage 3), former agricultural land, now herb-rich forest with high amounts of coarse dead wood, stand dominated by Salix caprea and Ulmus glabra, 3.10.2019, leg. & det. PV 1364 (H), conf. HK.

Hapalopilus ribicola (P. Karst.) Spirin & Miettinen

Distribution. New to 3a (Fig. 1).

Specimen examined. Ostrobotnia ouluensis, Oulu, Metsokangas, UCS 7207308:3432036, on a partly decorticated fallen trunk of Pinus sylvestris (diam. 15 cm, decay stage 1) in a wet forested old field, 6 Nov. 2020, leg. & det. MK 92/20 (OULU, H), conf. V. Spirin; Ostrobotnia kajanensis, Sotkamo, Losonvaara, UCS 7106773:3545205, on a fallen trunk of Picea abies (diam. 30 cm, decay stage 3), in an old spruce-dominated mesic heath forest, 30 Sept. 2020, leg. & det. TH 20200045 (OULU); Sotkamo, Talvivaara, UCS 7093231:3557660, on a fallen trunk of Picea abies (diam. 15 cm, decay stage 3), in an old spruce-dominated mesic heath forest, 24 Sept. 2020, leg. & det. TH 20200010 (OULU), conf. V. Spirin; Kuhmo, Elimyssalo, UCS 71265:36593, on a fallen trunk of Picea abies (diam. 10 cm, decay stage 3), in an old spruce-dominated mesic heath forest, 4 Oct. 2020, leg. & det. TH 20200046 (OULU).

Hyalodon piceicola (Kühner ex Bourdot) Malysheva & Spirin (Fig. 16)

Distribution. New to 1b (Fig. 1).

Specimen examined. Nylandia, Raasepori, Fiskars, Risslaån, UCS 6672561:308094, on a piece of wood of Picea abies (diam. 10 cm, decay stage 4) in a brookside herb-rich forest, 21 Jan. 2020, leg. & det. JP 4264 (H).
**Hyphoderma lapponicum** (Litsch.) Ryvarden

**Distribution.** New to Finland and hence new to 4d (Fig. 1).

**Specimen examined.** Lapponica enontekiensis, Enontekiö, Jogasjävri N, Doskaljohka W, UCS 768596:328070, on dead trunk or branch of *Betula pubescens* subsp. czerepanovi, in a moist to dry mountain birch forest, 27 Jul. 2020, leg. H. Väre 25318 (H), det. MK, conf. HK.

**Hypnochicium subrigescens** Boidin (Fig. 17)

**Distribution.** New to 3b (Fig. 1).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Elimys-salo, UCS 7126464:3660017, on a fallen branch of *Populus tremula* (diam. 30 cm, decay stage 2), in an old dwarf shrub spruce mire, 6 Oct. 2020, leg. TH 20200049 (OULU), det. MK; Kuhmo, Ulvinsalo, UCS 7103767:3665034, on a fallen trunk of *Populus tremula* (diam. 30 cm, decay stage 4), in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. & det. TH 20200048 (OULU).

**Jaapia argillacea** Bres. (Fig. 18)

**Distribution.** New to 3b (Fig. 1).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103386:3664703, on a fallen trunk of *Picea abies* (diam. 40 cm, decay stage 4) with *Jaapia ochroleuca* and *Dichostereum boreale* in a very old dwarf shrub spruce mire, 4 Oct. 2020, leg. & det. TH 20200050 (OULU), conf. MK.

**Leptosporomyces fuscostratus** (Burt) Hjortstam

**Distribution.** New to 3a (Fig. 1).

**Specimen examined.** Ostrobotnia ouluensis, Oulu, Metsokangas, UCS 7207125:3432114, on a decorticated stump of *Picea abies* (diam. 23 cm, decay stage 4) in a mesic heath forest, 4 Nov. 2020, leg. & det. MK 89/20 (OULU), conf. HK.

**Lindneria panphyliensis** Bernicchia (Fig. 19)

**Notes.** 5th–7th records in Finland; previous records: four sites in Helsinki (Miettinen 2012).

**Specimens examined.** Nylandia, Helsinki, Kustaan kartano, UCS 6681:3386, on a thin stem of a fallen dead *Acer platanoides* (diam. 8 cm, decay stage 2), pressed to the organic/clay soil, herb-rich site, mixed stand of old conifers with *Acer, Betula, Sorbus, Salix* and *Alnus* middle- and understory, 23 Oct. 2019, leg. PV 1524 (H); Helsinki, Patomäenpuisto, UCS 6682:3387, far decayed piece of deciduous wood, pressed to organic/clay soil, herb-rich site dominated by *Picea abies, Betula pendula* and *Acer platanoides* (diam. 8 cm, decay stage 2), pressed to the organic/clay soil, 07 Nov. 2020, leg. S. Pousi, P. Tolvanen, PV 2607 (H), det. PV; Helsinki, Taivaskallio, UCS 6680:3386, on trunk of fallen *Sorbus aucuparia*, pressed to rich organic soil, nearby *Acer platanoides, Sorbus aucuparia* and *Pinus sylvestris*, 30 Oct. 2020, leg. PV 2589 (H).

**Litschauerella clematitis** (Bourdou & Galzin) J. Erikss. & Ryvarden (Fig. 20)

**Distribution.** New to 3b (Fig. 1).

**Notes.** 5th record in Finland; previous records: Tammisaari (1b), Helsinki (1b), Jyväskylä (2b), and Utsjoki (4d) (Kotiranta et al. 2009; Kotiranta & Shiryaev 2013; Kunttu et al. 2018).

**Specimen examined.** Ostrobotnia kajanensis, Sotkamo, Losonvaara, UCS 7103386:3664703, on a fallen trunk of *Juniperus communis* (diam. 6 cm, decay stage 3), in a middle-aged spruce-dominated mesic heath forest, 28 Sept. 2020, leg. & det. TH 20200051 (OULU).

**Luellia recondita** (H.S. Jacks.) K.H. Larsson & Hjortstam (Fig. 21)

**Distribution.** New to 3b (Fig. 1).

**Notes.** 8th record in Finland; previous records: Eckerö (1a), Helsinki (1b), Tammisaari (1b), Kemiösaaari (1b),
Hamina (2a), Jyväskylä (2b), and Rovaniemi (3c) (Kotiranta et al. 2009; Kunttu et al. 2012, 2015, 2016, 2018).

Specimen examined. Ostrobotnia kajanensis, Kuhmo, Elimyslaks, UCS 71285:36651, on a fallen trunk of *Picea abies* (diam. 10 cm, decay stage 1) with *Tulasnella pallida* and *Sistotrema autumnale* in an old spruce-dominated mesic heath forest, 10 Oct. 2020, leg. & det. TH 20200056 (OULU), conf. MK.

Figure 23. *Paullicorticium ansatum* in Kuhmo (TH 20200053). Photo: Teppo Helo.

**Distribution.** New to 3b (Fig. 1).

**Notes.** 3rd record in Finland; previous records: Lammi (2a) and Padasjoki (2a) (Kotiranta et al. 2009). Near Threatened.

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Elimyslaks, UCS 7130655:3662462, on a log of *Picea abies* (diam. 30 cm, decay stage 3, kelo tree), in an old pine-dominated sub-xeric heath forest, 12 Oct. 2020, leg. & det. TH 20200053 (OULU), conf. MK.

**Peniophora cinerea** (Pers.: Fr.) W.B Cooke

**Distribution.** New to 3b (Fig. 1).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Elimyslaks, UCS 71285:36651, on a fallen trunk of *Picea abies* (diam. 10 cm, decay stage 3) with *Tulasnella pallida* and *Sistotrema autumnale* in an old spruce-dominated mesic heath forest, 12 Oct. 2020, leg. & det. TH 20200056 (OULU), conf. MK.

**Peniophora nuda** (Fr.) Bres.

**Distribution.** New to 3b (Fig. 1).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Elimyslaks, UCS 71295:36645, on a fallen trunk of *Betula* sp. (diam. 30 cm, decay stage 2), in an old dwarf shrub spruce mire, 9 Oct. 2020, leg. & det. TH 20200057 (OULU), conf. MK.
**Peniophora pini** (Schlecht.: Fr.) Boidin (Fig. 25)

**Distribution.** New to 3b (Fig. 1).

**Specimen examined.** Ostrobotnia kajanensis, Sotkamo, Losonvaara, UCS 71072:35460, on a fallen branch of *Pinus sylvestris* (diam. 7 cm, decay stage 1), in a middle-aged spruce-dominated mesic heath forest, 28 Sept. 2020, leg. & det. TH 20200058 (OULU), conf. MK.

**Peniophora quercina** (Pers.: Fr.) W. B. Cooke (Fig. 26)

**Notes.** 2nd–5th records in Finland; the previous: Karjaa (1b) (Kotiranta et al. 2009). Endangered.

**Specimen examined.** Regio aboënsis, Perniö, Arpalahdi, Kaapinmäki, UCS 6692:3285, on a fallen branch of *Quercus robur* in an herb-rich forest dominated by old oak trees, 8 Nov. 2004, leg. P. Heinonen & M.-L. Heinonen (TUR, H); Nylandia, Helsinki, Veräjälaakso, on a recently fallen branch of a large living *Quercus robur*, 20 Sept. 2014, leg. A. Käppi, det. V. Spirin (H); Helsinki, Koskela, UCS 6680:3387, on a corticated branch of *Quercus robur* (diam. 0.6/1.3 cm, decay stage 2) in a cultivated oak park, with *Peniophora incarnata* and *P. nuda*, 30 Nov. 2014, leg. & det. HK (H); Nylandia, Helsinki, Maunulanpuisto, UCS 6681:3384, on *Quercus robur*, colonized branches (diam. 4 cm, decay 2–3) that had fallen from standing living trees on an oak plantation in agricultural field, 20 Mar. 2020, leg. & det. PV 1722 (H).

**Phellodon secretus** Niemelä & Kinnunen

**Distribution.** New to 3c (Fig. 1).

**Specimen examined.** Ostrobotnia ultima, Rovaniemi, Hirvas, UCS 7374:3427, under a burnt *Pinus sylvestris* stump (diam. 17 cm, decay stage 2) together with *Hydnellum gracilipes*, in a managed mesic heath forest dominated by *Pinus sylvestris*, very small amount of coarse woody debris, with indication of past fires in the soil, 20 Sept. 2020, leg. & det. PV 2445. Vulnerable.

**Phlebia subcretacea** (Litsch.) M.B. Christ.

**Distribution.** New to 3c, 4b (Fig. 1).

**Specimens examined.** Ostrobotnia ultima, Rovaniemi, Hirvas, UCS 7374:3427, fallen *Pinus sylvestris* trunk (diam. 37 cm, decay stage 4), in a managed mesic heath forest, open stand with small amount of coarse dead wood 21 Sept. 2020, leg. & det. PV 2449 (H); Rovaniemi, Vanttauskoski, UCS 7371:3488, on a fallen trunk of *Pinus sylvestris* (diam. 30 cm, decay stage 5b), with *Odonticium romellii*, mesic and partly paludified heath forest with thick moss cover. Dense stand dominated by *Pinus sylvestris* mixed with *Picea abies* and *Betula* spp., with moderately large amounts of coarse dead wood including kelo pines, 25 Sept. 2020, leg. & det. PV 2494 (H).

**Postia persicina** Niemelä & Y.C. Dai (Fig. 27)

**Notes.** 5th in Finland; previous records: Kuusamo (4a), Saarijärvi (3a), Hyrynsalmi (3b), and Kolari (4b) (Kotiranta et al. 2009; Niemelä 2016; Kunttu et al. 2018; FinBIF 2021a). Critically Endangered.
Specimen examined. Ostrobotinia kajanensis, Kuhmo, Ulvinsalo Strict Nature Reserve, UCS 7100248:3665269, on a fallen trunk of *Pinus sylvestris* (diam. 23 cm, decay stage 3) in an old *Vaccinium-Myrtilus* type pine-dominated mesic heath forest, 12 Sept. 2016, leg. JP 3198 (H), det. OM (specimen sequenced).

‘Postia rufescens’ Spirin & Miettinen’ ined.

Distribution. New to 3a (Fig. 1).

Specimen examined. Satakunta, Ikaalinen, Seitsemän National Park UCS 6876613:3309436, on a fallen trunk of *Pinus sylvestris* (diam. 20 cm, decay stage 3) in a mixed mesic heath forest, 24 Sept. 2019, leg. & det. JP 4073 (H).

*Proterochaete adusta* (Burt) Spirin & V. Malysheva

[Syn. *Sebacina adusta* Burt, *Protodontia oligacantha* G.W. Martin, *Exidiopsis pallida* K. Wells & Raitv.]

Distribution. New genus and species to Finland and hence new to 2a, 3b (Fig. 1).

Specimens examined. Ostrobotinia kajanensis, Kuhmo, Riikivara, UCS 7127339:3654469, on a bark of a fallen and hollow Populus tremula trunk (diam. 40 cm, decay stage 2) in a very old *Picea abies* dominated thin-peated *Vaccinium myrtillus* – *Vaccinium vitis-idaea* spruce mire, 26 Aug. 2017, leg. JJ 1062 (OULU, H), det. V. Spirin; Tavastia australis, Hämeenlinna, Härkämäki UCS 6792834:3394898 (probably inaccurate), 23 Sept. 1964, leg V. Hintikka, L. Laine, V. Kujala, L. K. Weresub (H), det. V. Spirin.

*Protomerulius brachysporus* (Luck-Allen) Spirin & V. Malysheva

Distribution. New to 3b (Fig. 1).

Notes. 4th record in Finland; previous records: Espoo (1b), Lohja (1b), and Vehmaa (1b) (Spirin et al. 2019a).

Specimen examined. Ostrobotinia kajanensis, Kuhmo, Elimyssalo, UCS 7128815:3665112, on a fallen trunk of *Picea abies* (diam. 25 cm, decay stage 2), in an old spruce-dominated mesic heath forest, 10 Oct. 2020, leg. & det. TH 20200036 (OULU, H), conf. MK & V. Spirin.

*Pseudotomentella alobata* Svantesson

Distribution. New to Finland and hence new to 3b (Fig. 1).

Notes. 7th – 8th records in Finland; previous records: Helsinki (1b; two sites) Tammela (2a), Kangasala (2a), Petäjävesi (2b), Luhanka (2b), and Oulu (3a). (Kotiranta et al. 2009; Kunttu et al. 2012, 2018; Miettinen 2012).

Specimens examined. Savonia borealis, Sonkajärvi, Sonkalahiti, UCS 7063:3525, on fallen trunk of *Betula pubescens* (diam. 25 cm, decay stage 4), on dead *Inonotus obliquus* basidiom, leg. PV 2108 (H), det.V. Spirin; locus as above, on fallen trunk of *Betula pubescens* (diam. 15 cm, decay stage 3), with *Treichispora cohaerens*, leg. PV 2105, det. V. Spirin; Lapponica enontekiensis, Enontekiö, Jogasjärví, Doskaljohka W, UCS 768596:328070, on a dead trunk or branch of *Betula nana*, in a moist to dry mountain birch forest, 27 Jul. 2020 H. Väre 25321 (H), det. MK, conf. HK.

*Pseudotomentella nigra* (Höhn. & Litsch.) Svitécek

Distribution. New to 2b, 3b (Fig. 1).
Specimens examined. Savonia australis, Punkaharju, Kokonharju Nature Reserve UCS 6857539:3621745, on a fallen branch of *Pinus sylvestris* (diam. 7 cm, decay stage 3) in a pine-dominated mesic heath forest, 21 Sept. 2009, leg. & det. JP 1019 (H); Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103764:3665002, on a fallen trunk of *Populus tremula* (diam. 15 cm, decay stage 3), in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. TH 20200060 (OULU), det. MK; Sotkamo, Saukkoperä, UCS 7086573:3584216, on charred fallen trunk of coniferous tree (diam. 45 cm, decay stage 4), on the border between an old spruce-dominated mesic heath forest and a clear-cut area, 1 Sept. 2008, leg. P. Helo 1712 (OULU), det. TH & MK; Sotkamo, Talvivaara UCS 7093224:3557672, on a fallen trunk of *Picea abies* (diam. 20 cm, decay stage 3), in an old spruce-dominated mesic heath forest, 24 Sept. 2020, leg. TH 20200059 (OULU), det. MK.

**Pseudotomentella alobata** Sauv. & Å. Kärnefelt Distribution. New to 3a–c (Fig. 1).

Notes. 5th–12th records in Finland; previous records: Lammi (1b), Lammi (2a), Ikaanen (2a), and Ruovesi (2b) (Svantesson et al. 2019). Note: The species was separated from the *Pseudotomentella tristis* group. The most common species in this group.

**Pseudotomentella scianstra** M. Pers. & Hjortstam Distribution. New to Finland, and hence new to 1b (Fig. 1).

Notes. 5th–12th records in Finland; previous records: Lammi (1b), Lammi (2a), Ikaanen (2a), and Ruovesi (2b) (Svantesson et al. 2019). Note: The species is described from the *Pseudotomentella tristis* group. Most of the *P. tristis* specimens in the collections are determined incorrectly, so the distribution of the species is not reliably known. Probably quite rare.

Specimens examined. Ostrobotnia ouluensis, Oulu, Karjasilta, UCS 72128:3621745, on a fallen branch of *Pinus sylvestris* (diam. 7 cm, decay stage 3) in a pine-dominated mesic heath forest, 21 Sept. 2009, leg. & det. JP 1019 (H); Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103764:3665002, on a fallen trunk of *Populus tremula* (diam. 15 cm, decay stage 3), in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. TH 20200060 (OULU), det. MK; Sotkamo, Saukkoperä, UCS 7086573:3584216, on charred fallen trunk of coniferous tree (diam. 45 cm, decay stage 4), on the border between an old spruce-dominated mesic heath forest and a clear-cut area, 1 Sept. 2008, leg. P. Helo 1712 (OULU), det. TH & MK; Sotkamo, Talvivaara UCS 7093224:3557672, on a fallen trunk of *Picea abies* (diam. 20 cm, decay stage 3), in an old spruce-dominated mesic heath forest, 24 Sept. 2020, leg. TH 20200059 (OULU), det. MK.

**Pseudotomentella umbrina** (Fr.) M.J.Larsen (Fig. 33)

Notes. 5th–12th records in Finland; previous records: Lammi (1b), Lammi (2a), Ikaanen (2a), and Ruovesi (2b) (Svantesson et al. 2019). Note: The species was separated from the *Pseudotomentella tristis* group. The most common species in this group.

Specimens examined. Savonia australis, Punkaharju, Kokonharju Nature Reserve UCS 6857539:3621745, on a fallen trunk of *Betula* sp. trunk (diam. 30 cm, decay stage 3) in a middle-aged – old *Picea abies* dominated herb-rich heath forest – mesic heath forest, 13 Sept. 2016, leg. JH 840 (OULU), det. MK; Ostrobotnia ouluensis, Oulu, Hietasaari, UCS 7213936:34262670, on a partly decorticated fallen trunk of *Salix* sp. (diam. 2 cm, decay stage 2) in a larch deciduous-dominated coastal mixed forest, 12 Sept. 2011, leg. MK 40/11 & P. & M. Helo (OULU), det. MK; Ostrobotnia ouluensis, Oulu, Hietasaari, UCS 7213902:3426075, on a partly decorticated fallen trunk of *Picea abies* (diam. 12 cm, decay stage 3) in an old coniferous-dominated mesic heath forest, 3 Oct. 2013, leg. & det. MK 56/13 (OULU); Ostrobotnia ultima, Rovaniemi, Pisavaara Strict Nature Reserve, Sorvantulkki, UCS 7358625:3416764, on a partly decorticated fallen trunk of *Picea abies* (diam. 35 cm, decay stage 4) in an old coniferous-dominated mesic heath forest, 3 Oct. 2013, leg. & det. MK 56/13 (OULU); Ostrobotnia ultima, Rovaniemi, Pisavaara Strict Nature Reserve, Pitkäjänkä, UCS 7359110:3415712, on a partly decorticated stump of *Picea abies* (diam. 12 cm, decay stage 3) in an old coniferous-dominated mesic heath forest, 19 Aug. 2016, leg. MK 56/13 & A. Ruotsalainen (OULU), det. MK; Ostrobotnia kajanensis, Sotkamo, Karjasilta, UCS 7017123:3544783, on a fallen trunk of *Sorbus aucuparia* (diam. 5 cm, decay stage 2), in an old spruce-dominated mesic heath forest, 15 Sept. 2020, leg. TH 20200063 (OULU), det. MK; Sotkamo, Talvivaara UCS 7092990:3557856, on a fallen trunk of *Pinus sylvestris* (diam. 12 cm, decay stage 2), in an old spruce-dominated mesic heath forest, 22 Sept. 2020, leg. TH 20200064 (OULU), det. MK; Sotkamo, Korkeakoskenpuro UCS 7089332:3558290, on a fallen trunk of *Populus tremula* (diam. 10 cm, decay stage 3), in an old spruce-dominated herb-rich heath forests, 24 Sept. 2018, leg. TH 20200223 (OULU), det. MK.

**Pseudoxenasma verrucisporum** K.H. Larss. & Hjortstam (Fig. 34)

Distribution. New to Finland, and hence new to 1b (Fig. 1).
Specimen examined. Uusimaa, Helsinki, Haltiala, UCS 668474:3385328, dead, attached branch (diam. 2 cm, decay stage 2) of a recently died, standing Picea abies (diam. 60 cm) with Globulicium hiemale in an old, dense spruce forest, 28 Feb. 2021 OM 24542 (H 6200144).

Punctularia strigosozonata (Schw.) Talbot (Fig. 35)

Notes. 7th–8th records in Finland; previous records: Vehkalahti (2a), Savonranta (2b; two sites), Hlomantsi (2b and 3b; two sites), and Lieksa (3b) (Kotiranta et al. 2009). Vulnerable.

Specimens examined. Nylandia, Porvoo, Humla, UCS 6696:3430, on crown branches of a fallen dead Populus tremula, 19 Feb. 2020, leg. P. von Bagh, det. PV (H6083193), for site details see von Bagh (2020); Tavastia australis, Kouvola, Raajärvi UCS 6777967:3468376, on a fallen trunk of Populus tremula (diam. 35 cm, decay stage 2) in a clearcut area, 13 May 2020, leg. & det. JP4274 (H).

Repetobasidium vile (Bourd. & Galz.) J. Erikss. (Fig. 36)

Notes. 5th record in Finland; previous records: Tammiisaari (1b), Parainen (1b), Jyväskylä (2b), and Sotkamo (3b) (Kotiranta et al. 2009; Kunttu et al. 2014, 2019).

Specimen examined. Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103332:3664690, on a fallen trunk of Picea abies (diam. 40 cm, decay stage 3), in a very old spruce-dominated mesic heath forest, 4 Oct. 2020, leg. & det. TH 20200065 (OULU).

Saccosoma farinacea (Höhn.) Spirin & K. Põldmaa [syn. Helicogloea farinacea (Höhn.) D. P. Rogers]

Distribution. New to 2b (Fig. 1).

Notes. 8th record in Finland; previous records: Karjalohja (1b), Helsinki (1b), Lempäälä (2a), Tampere (2a), Padasjoki (2a), Kajaani (3b), and Paltamo (3b) (Kotiranta et al. 2009; Kunttu et al. 2013; Kunttu et al. 2018; Kunttu et al. 2020).

Specimen examined. Savonia borealis, Lapinlahti, Koiminki, 7033:3548, in crown branches of a fallen old Populus tremula retention tree, in a young herb-rich heath forest dominated by Picea abies and Betula pendula, 16 Jun. 2020, leg. & det. PV 1935 (H) as Saccosoma cf farinaceum, conf. V. Spirin.

Sidera vulgaris (Fr.) Miettinen (Fig. 37)

Notes. 9th record in Finland; previous records: Nauvo (1b), Kemiönsaari (1b) Kirkkonummi (1b), Helsinki (1b & 2a; four sites), and Sipoo (2a) (Vauras 2000; Kunttu
et al. 2014, 2016; Savola 2015; Savola & Kolehmainen 2015). Near Threatened.

**Specimen examined.** Nylandia, Helsinki, Kustaan kartano, UCS 6681:3386, on Sorbus aucuparia (diam. 12 cm, decay stage 3), herb-rich site with mixed stand of old conifers and Salix caprea, Betula pendula, Sorbus aucuparia, Populus tremula, Alnus incana, Ulmus glabra and Acer platanoides etc. with high amounts of coarse woody debris, 17 Oct. 2020, leg. & det. PV 2572 (H).

**Sistotrema oblongisporum** M.P. Christ. & Hauersl.

**Distribution.** New to 3a (Fig. 1).

**Specimen examined.** Ostrobotinia ouluensis, Oulu, Kontinkangas, UCS 7212832:3429839, on a fallen trunk of Populus tremula, in an aspen-dominated herb-rich heath forest adjacent to a road, 12 Oct. 2019, leg. & det. AM 143 (OULU), conf. MK.

**Sistotrema subtrigonospermum** D. P. Rogers (Fig. 38)

**Distribution.** New to Finland, and hence new to 3b (Fig. 1).

**Specimen examined.** Ostrobotinia kajanensis, Sotkamo, Losonvaara, UCS 7107251:3544808, on a fallen branch of deciduous tree (diam. 1.5 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 15 Sept. 2020, leg. & det. TH 20200127 (OULU), conf. MK; at the same site UCS 7106777:3545232, on a fallen branch of Picea abies (diam. 1 cm, decay stage 4) with Botryobasidium laeve in an old spruce-dominated mesic heath forest, 30 Sept. 2020, leg. & det. TH 20200128 (OULU), conf. MK.

**Spiculogloea minuta** P. Roberts

**Distribution.** New to Finland, and hence new to 3b (Fig. 1).

**Specimen examined.** Ostrobottinia kajanensis, Sotkamo, Talvivaara, UCS 7093211:3557817, on a fallen trunk of Picea abies (diam. 15 cm, decay stage 3) with Tulasnella allantospora in an old spruce-dominated mesic heath forest, 23 Sept. 2020, leg. & det. TH 20200008 (H), det. MK & TH.

**Spiculogloea subminuta** Hauerslev

**Distribution.** New to 2b, 3a, c (Fig. 1).

**Notes.** 4th–10th records in Finland; previous records: Kuhmo (3b), Kajaani (3b), and Inari (4c) (Kunttu et al. 2019, 2020).

**Specimen examined.** Karelia borealis, Värtsilä, Petsola, Savikko, Rauhanmaja W, UCS 69077:36888, on a fallen trunk of Picea abies in a spruce-dominated brookside forest, 24 Jun. 1995, leg. H. Väre (OULU), det. MK; Ostrobotinia media, Pyhäjärvi, Mäikykylä, Iso Käräsmäenjärvi, Kokkopuro, UCS 70904:34616, on a decorticated fallen trunk of Pinus sylvestris (diam. 15 cm) with Botryobasidium subcoronatum (Höhn. & Litsch.) Donk, in an old spruce-dominated mesic heath forest, 23 Sept. 2020, leg. & det. MK 116/98 (OULU); Ostrobotinia media, Pyhäjärvi, Mäikykylä, Käräsmäenjärvi, Isolehto, UCS 70918:34616, on a fallen trunk of Picea abies (diam. 19 cm) with Botryobasidium subcoronatum (Höhn. & Litsch.) Donk, in an old spruce-dominated mesic heath forest, 26 Sept. 1999, leg. & det. MK 136/99 (OULU); Ostrobotinia ouluensis, Pudasjärvi, Sarvisuo, UCS 7223013:3493616, on a fallen trunk of Alnus incana with Botryobasidium subcoronatum (Höhn. & Litsch.) Donk, in an old spruce-dominated mesic heath forest, 26 Sept. 1999, leg. & det. MK 136/99 (OULU); Ostrobotinia ouluensis, Pudasjärvi, Sarvisuo, UCS 7223013:3493616, on a fallen trunk of Alnus incana with Botryobasidium subcoronatum (Höhn. & Litsch.) Donk, in an old spruce-dominated herb-rich forest next to a stream running from a spring, 10 July 2018, leg. AM 46-18 (OULU), det. MK; Ostrobotinia kajanensis, Puolanka, Paljakka Strict Nature Reserve, Kajansuo W, UCS 7183458:3550223, on a fallen trunk of Picea abies (diam. 50 cm, decay stage 3) with Botryobasidium subcoronatum (Höhn. & Litsch.) Donk, in an old spruce-dominated mesic heath forest, 26 Sept. 2003, leg. MK 56/03b & P. Halonen (OULU), det. MK; Ostrobotinia ultima, Rovaniemi, Pisavaara Strict Nature Reserve, UCS 7359420:3416576, on a decorticated fallen trunk of Picea abies (diam. 20 cm, decay stage 4) with Botryobasidium subcoronatum (Höhn. & Litsch.) Donk, in an old mesic heath forest, 17 Sept. 2015. leg. MK 66/15 & P. Helo (OULU), det. MK; Ostrobotinia ultima, Rovaniemi, Pisavaara Strict Nature Reserve, Alalaki E, UCS 7350666:3413522, on a decorticated partly charred fallen trunk of Pinus sylvestris (diam. 30 cm, decay stage 1) with Botryobasidium subcoronatum (Höhn. & Litsch.) Donk, in an old mesic heath forest, 11 Sept. 2020, leg. & det. MK 27/20 (OULU).

**Tomentella botryoides** (Schwein.) Bourd. & Galz. (Fig. 39)

**Distribution.** New to Finland and hence new to 1b (Fig. 1).

**Specimen examined.** Regio aboënsis, Turku, Ruissalo, Choræus Bridge, UCS approx. 6712:3234, on a fallen trunk of Quercus robur, 9 Sept. 1937, leg. Matti Laurila, (TUR), det. MK; UCS 6711:3233, on a fallen trunk of Quercus robur (diam. 30 cm, decay stage 1) in a small herb-rich forest with oak trees, 30 Sept. 2019, leg. & det. TH 2019023 (OULU), conf. MK & E. Martini.
**Tomentella ellisii** (Sacc.) Jülich & Stalpers (Fig. 40)

**Distribution.** New to 3b (Fig. 1).

**Note.** This is probably a group of species. Therefore, the distribution of the species is not reliable.

**Specimen examined.** Ostrobotnia kajanensis, Sotkamo, Penikkapuro UCS 7087271:3559145, on a fallen trunk of *Populus tremula* (diam. 7 cm, decay stage 3) in an old spruce-dominated mesic heath forest around a stream, 25 Sept. 2018, leg. & det. TH 20180220 (OULU), conf. MK & E. Martini.

**Figure 40.** *Tomentella ellisii* in Sotkamo (TH 20180220). Photo: Teppo Helo.

**Tomentella fuscocinerea** (Pers.: Fr.) Donk (Fig. 41)

**Distribution.** New to 3b (Fig. 1).

**Notes.** 2nd record in Finland; previous record: Kemioensaaari (1b) (Kunttu et al. 2015).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103751:3665047, on a fallen trunk of *Populus tremula* (diam. 5 cm, decay stage 2), in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. & det. TH 20200004 (OULU, H), conf. MK.

**Figure 41.** *Tomentella fuscocinerea* in Kuhmo (TH 20200004). Photo: Teppo Helo.

**Tomentella galzinii** Bourdot (Fig. 42)

**Distribution.** New to 3a–b (Fig. 1).

**Specimens examined.** Ostrobotnia ouluensis, Oulu, Kontinkangas, UCS 7212832:3429839, on a fallen trunk of *Populus tremula*, in an aspen-dominated herb-rich heath forest next to a road, 12 Oct. 2019, leg. & det. AM 130 (OULU), conf. E. Martini; Ostrobotnia kajanensis, Paltamo, Melalahti UCS 71471:35327, on a fallen trunk of *Salix caprea* (diam. 2 cm, decay stage 2) in a calcareous mesic eutrophic herb-rich forest, 24 Sept. 2019, leg. & det. TH 20190052 (OULU), conf. MK.

**Figure 42.** *Tomentella galzinii* in Paltamo (TH 20190052). Photo: Teppo Helo.

**Tomentella lapida** (Pers.) Stalpers (Fig. 43)

**Distribution.** New to 2b, 3b (Fig. 1).

**Notes.** 2nd–8th records in Finland; previous record: Noormarkku (2a) (Kotiranta et al. 2009). There are more than 40 collections from the Kainuu region recorded between 2018–2020 (T. Helo, unpublished). Note: *Tomentella* specimens are often incorrectly identified. There are probably more of this species in Finnish collections.

**Specimens examined.** Tavastia borealis, Toivakka, Vuorilampi Nature Reserve, UCS 68852:34558, on *Populus tremula*, leg.

**Figure 43.** *Tomentella lapida* in Sotkamo (TH 20200066). Photo: Teppo Helo.

& det. J. Purhonen (JYV); Ostrobotnia kajanensis, Hyrynsalmi, Karhisenvaara, UCS 7157343:3587655, on a fallen trunk of *Populus tremula* (diam. 35 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 28 Sept. 2018, leg. & det. TH 20180221 (OULU), conf. MK; Paltamo, Melalahti, UCS 71471:35327, on a fallen trunk of *Salix caprea* (diam. 3 cm, decay stage 4) in a calcareous mesic eutrophic herb-rich forest, 24 Sept. 2019, leg. & det. TH 20190052 (OULU), conf. MK; Paltamo, Melalahti, UCS 71471:35327, on a fallen trunk of *Salix caprea* (diam. 7 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 14 Aug. 2020, leg. & det. TH 20200066 (OULU, H), conf. MK & E. Martini; Puolanka, Taapuri, UCS 7106789:3545178, on a fallen trunk of *Populus tremula* (diam. 35 cm, decay stage 3) in
an old spruce-dominated mesic heath forest, 17 Aug. 2020, leg. & det. TH 20200067 (OULU), conf. MK; Sotkamo, Talvivaara, UCS 7092390:3558388, on a fallen trunk of *Populus tremula* (diam. 8 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 21 Aug. 2020, leg. & det. TH 20200122 (OULU), conf. MK; Kuhmo, Elimiysalo UCS 71265:36593, on a fallen trunk of *Picea abies* (diam. 6 cm, decay stage 3) with *Piloderma byssinum* in an old spruce-dominated mesic heath forest, 6 Oct. 2020, leg. TH 20200068 (OULU), det. MK.

*Tomentella lateritia* Pat. (Fig. 44)

**Distribution.** New to 3b (Fig. 1).

**Specimen examined.** Ostrobotnia kajanensis, Sotkamo, Losonvaara, UCS 7105320:3545502, on a fallen trunk of *Picea abies* (diam. 14 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 31 Aug. 2005, leg. P. Helo 1455 (OULU), det. E. Martini; Sotkamo, Losonvaara, UCS 7107300:3545992, on a fallen trunk of *Juniperus communis* (diam. 4 cm, decay stage 4) with *Piloderma sphaerosporum* in a middle-aged spruce-dominated mesic heath forest, 28 Sept. 2020, leg. & det. TH 20200005 (OULU, H), conf. MK.

*Tomentella neobourdotii* M.J. Larsen (Fig. 45)

**Distribution.** New to Finland and hence new to 3a–b (Fig. 1).

**Specimens examined.** Ostrobotnia ouluensis, Oulu, Nuottasaari, UCS 7212460:3426775, on a corticated fallen trunk of *Betula* sp. (diam. 13 cm, decay stage 4) in a lush deciduous-dominated mixed forest, 10 Sept. 2014 leg. MK 20/14 (OULU), det. E. Martini; Ostrobotnia kajanensis, Paltamo, Melalahti UCS 71471:35327, on a fallen trunk of *Betula* sp. (diam. 18 cm, decay stage 4) in a calcareous mesic eutrophic herb-rich forest, 24 Sept. 2019, leg. & det. TH 20190054 (OULU), conf. MK; Paltamo, Antinmäki UCS 71389:35486, on a fallen trunk of *Salix caprea* (diam. 15 cm, decay stage 2) in a mesic mesotrophic herb-rich forest, 20 Aug. 2019, leg. & det. TH 20190055 (OULU), conf. MK; Ristijärvi, Saukkovaara UCS 7151866:3559621, on a fallen trunk of *Populus tremula* (diam. 4 cm, decay stage 2) in a middle-aged deciduous-dominated herb-rich forest, 12 Oct. 2018, leg. & det. TH 20180222 (OULU), conf. MK.

*Tomentella subpilosa* Litsch. (Fig. 46)

**Distribution.** New to Finland, and hence new to 2a, 3b (Fig. 1).

**Specimens examined.** Satakunta, Pori, Metallinkylä, UCS 6827887:3225781, on a fallen trunk of *Salix caprea* (diam. 10 cm, decay stage 3) in a forested old field, 2 Oct. 2019, leg. H. Lehtonen 2.10.19/16 (OULU), det. TH & MK, conf. E. Martini. Ostrobotnia ouluensis, Oulu, Metallinkylä, UCS 7106805:3545188, on a fallen trunk of *Populus tremula* (diam. 35 cm, decay stage 4) with *Treichispora kavinioides* in an old spruce-dominated mesic heath forest, 14 Aug. 2020, leg. TH 20200069 (OULU, H), det. TH & MK, conf. E. Martini.

*Tomentella subtestacea* Bourdot & Galzin (Fig. 47)

**Distribution.** New to Finland and hence new to 3a–b (Fig. 1).

**Specimens examined.** Ostrobotnia ouluensis, Oulu, Hietasaari, UCS 7213925:3426179, on a partly decorticated piece of *Alnus incana* on the ground (diam. 12 cm, decay stage 3) in a dense and lush deciduous-dominated coastal mixed forest, 28 Sept. 2014, leg. MK 45/14 (OULU), det. E. Martini; Ostrobotnia kajanensis, Paltamo, Tololanmäki, UCS 7137:3551, on a fallen trunk of deciduous tree (diam. 6 cm, decay stage 3) in a spruce-dominated mesic mesotrophic herb-rich forest, 18 Aug. 2017, leg. TH 20170036 (OULU), det. MK.

*Tomentella terrestris* (Berk. & Broome) M.J. Larsen (Fig. 48)

**Distribution.** New to 3c (Fig. 1).

**Notes.** 4th–12th records in Finland; previous records: Kemiönsaari (1b), Vehkalahti (2b), and Kuhmo (3b) (Kotiranta et al. 2009; Kunttu et al. 2012). Altogether there are
approximately 20 collections from the Kainuu province, only a selection is presented here. Note: *Tomentella* specimens are often incorrectly identified. There are probably more of this species in Finnish collections.

**Specimens examined.** Tavastia borealis, Rautalampi, Iso Niinivuori, UCS 6934420:3487177, on a decorticated fallen trunk of *Juniperus communis* (diam. 6 cm, decay stage 1) in a mesic heath forest, 16 Sept. 2017, leg. MK 39/17 & et al., OULU, det. MK; Ostrobotnia kajanensis, Sotkamo, Losonvaara, UCS 7106795:3545403, on a fallen trunk of deciduous tree (diam. 4 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 14 Aug. 2020, leg. & det. TH 20200125 (OULU); and at the same site UCS 7107180:3544769, on a fallen trunk of *Picea abies* (diam. 17 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 17 Aug. 2020, leg. & det. TH 20200123 (OULU); Sotkamo, Talvivaara, UCS 7092452:3558387, on a fallen trunk of *Picea abies* (diam. 20 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 21 Aug. 2020, leg. & det. TH 20200124 (OULU); Sotkamo, Viltonvaara UCS 7084168:3561684, on a fallen trunk of *Betula* sp. (diam. 18 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 1 Oct. 2018, leg. & det. TH 20200223 (OULU); Hyrynsalmi, Karhisenvaara UCS 7157342:3587734, on a fallen trunk of *Populus tremula* (diam. 25 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 28 Sept. 2018, leg. & det. TH 20200224 (OULU): Ostrobotnia ultima, Tervola, Pisavaara Strict Nature Reserve, Alalaki, UCS 7350633:3431306, on a decorticated partly charred stump of *Pinus sylvestris* (decay stage 2) in an old dry heath forest, 2 Sept. 2020, leg. & det. MK 20/20 (OULU) and on the same site UCS 7350612:3413510, on a decorticated fallen trunk of *Pinus sylvestris* (diam. 10 cm, decay stage 3) in an old mesic heath forest, 11 Sept. 2020, leg. & det. MK 26/20 (OULU).

**Tomentellopsis echinospora** (Ellis) Hjortstam

**Distribution.** New to 4b (Fig. 1).

**Specimen examined.** Ostrobotnia ultima, Rovaniemi, Vanttauskoski, UCS 7371:3488, fallen trunk of *Pinus sylvestris* (diam. 26 cm, decay stage 2), 24 Sept. 2020, leg. & det. PV 2483 (H).

**Tomentellopsis submollis** (Svrček) Hjortstam

**Distribution.** New to 4b (Fig. 1).

**Specimen examined.** Ostrobotnia ultima, Rovaniemi, Rättiselkä, UCS 7402:3464, fallen trunk of *Pinus sylvestris* (diam. 50 cm, decay stage 5) in an *Empetrum-Myrtillus* heath forest with a high amount of dead wood, 17 Sept. 2020, leg. & det. PV 2397 (H).

**Tomentellopsis zygodesmoides** Ellis & Hjortstam

**Distribution.** New to 3b (Fig. 1).

**Notes.** 3rd record in Finland; previous records: Kemiönsaari (1b) and Tuusula (2a) (Kotiranta et al. 2009; Kunttu et al. 2012).

**Specimen examined.** Ostrobotnia kajanensis, Sotkamo, Losonvaara UCS 7106771:3545279, on a fallen trunk of *Populus tremula* (diam. 8 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 30 Sept. 2020, leg. TH 20200070 (OULU), det. MK.

**Trechispora incisa** K.H. Larsson

**Notes.** 2nd record in Finland; previous record: Lohja (1a) (Kotiranta et al. 2009).

**Specimen examined.** Nylandia, Raasepori, Karjaa, Lepinjärvi, UCS 6664277:3313401, on a broken trunk of *Betula pendula* (diam. 30 cm, decay stage 4) in a mixed herb-rich heath forest, 28 Oct. 2020, leg. & det. JP 4355 (H), conf. HK.
Trechispora laevis K.H. Larsson

**Distribution.** New to 3a (Fig. 1).

**Specimen examined.** Ostrobotnia ouluensis, Oulu, Knutillankangas, UCS 72111:34313, on a stump of *Populus tremula*, in a moist brookside forest, 12 Oct. 2019, leg. AM 164 (OULU), det. MK; Ostrobotnia ouluensis, Oulu, Inatii, UCS 7209158:3434103, on a branch of *Pinus sylvestris* (decay stage 3), in a small pine-dominated mesic heath forest, 6 May 2020, leg AM 284 (OULU), det. MK.

Trechispora microspora (P. Karst.) Liberta

**Distribution.** New to 3a–b (Fig. 1).

**Specimens examined.** Ostrobotnia ouluensis, Utajärvi, Hanganvaara, Hanganhete, UCS 7220912:3490586, on a fallen trunk of *Picea abies*, in a spruce-dominated herb-rich forest next to a stream running from a spring, 14 Jul. 2018, leg. & det. AM 79-18 (OULU), conf. MK; Ostrobotnia kajanensis, Sotkamo, Losonvaara UCS 7107109:3544787, on a fallen trunk of *Juniperus communis* (diam. 1.5 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 15 Sept. 2020, leg. & det. TH 20200071 (OULU), conf. MK.

Trechispora minuta K.H. Larss.

**Distribution.** New to 3a (Fig. 1).

**Specimen examined.** Ostrobotnia ouluensis, Oulu, Karjasilta, UCS 7212919:3429700, on a fallen trunk of *Larix sibirica*, in a small mesic heath forest with larch-trees planted next to the road, 26 Oct. 2019, leg. AM 274 (OULU), det. MK.

Trechispora stellulata (Bourdor & Galzin) Liberta

**Distribution.** New to 4d (Fig. 1).

**Specimens examined.** Lapponica enontekiensis, Enontekiö, Jogasjärvi N, Doskaljohka W, UCS 71056:354477, on a fallen branch of *Larix sibirica*, in a small mesic heath forest with larch-trees planted next to the road, 26 Oct. 2019, leg. AM 274 (OULU), det. MK.

Tremella polyporina D. A. Reid.

**Notes.** 6th record in Finland; previous records: Helsinki (1b), Lammi (2a), Tampere (2a), Hyrynsalmi (3b), and Inari (4c) (Pippola & Kotiranta 2008; Kotiranta et al. 2009; Miettinen 2012; Kunttu et al. 2016).

**Specimen examined.** Nylandia, Helsinki, Pirttipolunpuisto, UCS 6680:3385, fallen trunk of *Picea abies* (diam. 25 cm, decay stage 3), inside a *Postia* sp. basidioma, 8 Nov. 2020, leg. & det. PV 2616 (H).

Tretomyces microsporus Kotir., Saaren. & K.H. Larss.

**Notes.** 7th record in Finland; previous records: Paltamo (3a), Oulu (3a), Lieksa (3b; two sites), Suomussalmi (4a), and Inari (4c) (Kotiranta et al. 2009; Kunttu et al. 2015, 2018, 2019).

**Specimen examined.** Ostrobotnia kajanensis, Sotkamo, Katajavaara UCS 71056:35956, on a charred stump of *Pinus sylvestris* (diam. 35 cm, decay stage 4) in an old pine-dominated sub-xeric heath forest, 6 Nov. 2020, leg. & det. TH 20200072 (OULU).

Tubulicrinis angustus (D.P. Rogers & Weresub) Donk

**Distribution.** New to 3b (Fig. 1).

**Specimens examined.** Ostrobotnia kajanensis, Sotkamo, Losonvaara UCS 710718:354477, on a fallen branch of *Populus tremula* (diam. 2 cm, decay stage 3) in an old pine-dominated mesic heath forest, 15 Sept. 2020, leg. & det. TH 20200073 (OULU), conf. MK.
Tubulicrinis effugiens (Bourdot & Galzin) (Fig. 54)

**Distribution.** New to 3c (Fig. 1).

**Notes.** 7th–8th records in Finland; previous records: Pihtipudas (3a), Lieksa (3b), Kuusamo (4a), Muonio (4b), Salla (4c), Savukoski (4c) (Kotiranta et al. 2009; H. Kotiranta, unpublished).

**Specimens examined.** Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7102550:3662494, on a fallen trunk of Pinus sylvestris (diam. 5 cm, decay stage 3, kelo tree) in a middle-aged pine-dominated sub-xeric heath forest with a high amount of dead wood, 5 Oct. 2020, leg. & det. TH 20200024 (OULU, H), conf. MK; Ostrobotnia ultima, Tervola, Pisavaara Strict Nature Reserve, Alalaki E, UCS 7351155:3413354, on a decorticated piece of Pinus sylvestris on the ground (diam. 10 cm, decay stage 2), in a mountain boulder field, 11 Sept. 2020, leg. & det. MK 45/20 (OULU).

Tubulicrinis globisporus K.H. Larss. & Hjortstam (Fig. 55)

**Distribution.** New to 3b (Fig. 1).

**Notes.** 4th–6th records in Finland; previous records: Padasjoki (2a), Inari (4c; two sites) (Kotiranta et al. 2009; Kunttu et al. 2019).

**Specimens examined.** Ostrobotnia kajanensis, Puolanka, Murtiovaara, UCS 7182:3530, on a fallen trunk of Pinus sylvestris (decay stage 4), in a spruce-dominated mesic heath forest, 16 Aug. 2020, leg. & det. AM 289 (OULU), conf. MK; Kuhmo, Ulvinsalo, UCS 7102496:3662822, on a fallen trunk of Pinus sylvestris (diam. 40 cm, decay stage 4, kelo tree) in an old pine-dominated sub-xeric heath forest, 5 Oct. 2020, leg. & det. TH 20200025 (OULU, H); Kuhmo, Elimyssalo, UCS 7129656:3664650, on a fallen trunk of Pinus sylvestris (diam. 20 cm, decay stage 4, kelo tree) in an old pine-dominated sub-xeric heath forest, 9 Oct. 2020, leg. & det. TH 20200034 (H), and at the same site UCS 7129639:3664585, on a fallen trunk of Pinus sylvestris (diam. 40 cm, decay stage 4, kelo tree) in an old pine-dominated sub-xeric heath forest, 9 Oct. 2020, leg. & det. TH 20200075 (OULU).

Tubulicrinis inornatus (H.S. Jacks. & D.P. Rogers) Donk (Fig. 56)

**Notes.** 7th record in Finland; previous records: Lammi (2a), Padasjoki (2a), Pieksämäki (2b), Saarijärvi (3a), Kuhmo (3b), and Rovaniemi (3c) (Kotiranta et al. 2009; FinBIF 2021c).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Elimyssalo, UCS 7129689:3664898, on a fallen trunk of Pinus sylvestris (diam. 40 cm, decay stage 3, kelo tree) in an old spruce-dominated mesic heath forest, 10 Oct. 2020, leg. & det. TH 20200076 (OULU), conf. MK.

Tubulicrinis propinquus (Bourdot & Galzin) Donk (Fig. 57)

**Distribution.** New to 3b (Fig. 1).

**Specimens examined.** Ostrobotnia kajanensis, Kuhmo,
Elimyssalo, UCS 71265:36593, on a fallen trunk of *Picea abies* (diam. 20 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 6 Oct. 2020, leg. TH 20200032 (OULU), det. MK, and at the same site UCS 7126433:3660163, on a fallen branch of *Picea abies* (diam. 5 cm, decay stage 3) in an old dwarf shrub spruce mire, 7 Oct. 2020, leg. TH 20200077 (OULU), det. MK.

**Tulasnella allantospora** Wakef. & A. Pearson (Fig. 58)

**Notes.** 7th–8th records in Finland; previous records: Lohja (1b), Kirkkonummi (1b), Porvoo (2a), Muurame (2b), Sotkamo (3b), and Suomussalmi (3b) (Kotiranta et al. 2009; Kunttu et al. 2018, 2019).

**Specimens examined.** *Ostrobottnia kajanensis*, Sotkamo, Talvivaara, UCS 7093211:3557817, on a fallen trunk of *Picea abies* (diam. 15 cm, decay stage 3) with *Spiculogloea minuta* in an old spruce-dominated mesic heath forest, 23 Sept. 2020, leg. & det. TH 20200008 (H), conf. MK; UCS 70934:35570, on a fallen trunk of *Picea abies* (diam. 40 cm, decay stage 4) with *Botryobasidium botryosum* in an old spruce-dominated mesic heath forest, 29 Sept. 2020, leg. & det. TH 20200078 (OULU); Kuhmo, Elimyssalo, UCS 7130599:3662312, on a fallen trunk of *Pinus sylvestris* (diam. 45 cm, decay stage 3, kelo tree) with *Athelia* sp. in an old pine-dominated sub-xeric heath forest, 12 Oct. 2020, leg. & det. TH 20200079 (OULU).

**Tulasnella anguifera** P. Roberts (Fig. 59)

**Distribution.** New to Finland, and hence new to 3b (Fig. 1).

**Specimens examined.** *Ostrobohtnia kajanensis*, Kuhmo, Ulvinsalo, UCS 7102660:366291, on a fallen trunk of *Pinus sylvestris* (diam. 25 cm, decay stage 4, kelo tree) with *Athelia bombacina* in a very old pine-dominated mesic heath forest, 8 Oct. 2020, leg. & det. TH 20200080 (OULU), conf. HK, and at the same site UCS 71026:36629, on a fallen trunk of *Pinus sylvestris* (diam. 25 cm, decay stage 4, kelo tree) with *Athelia bombacina*, *Sistotremastrum suecicum*, *Tulasnella permacra* and *Tulasnella albida* in an old pine-dominated mesic heath forest, 8 Oct. 2020, leg. & det. TH 20200081 (OULU).

**Tulasnella bourdotii** Jülich (Fig. 60)

**Notes.** 2nd–5th records in Finland; previous record: Lieksa (3b) (Kotiranta et al. 2009).

**Specimens examined.** *Ostrobohtnia kajanensis*, Sotkamo, Losonvaara UCS 7107282:3546032, on a fallen branch of *Pinus sylvestris* (diam. 5 cm, decay stage 4) in an old spruce-dominated mesic heath forest, 28 Sept. 2020, leg. & det. TH 20200082 (OULU), conf. MK; Sotkamo, Talvivaara UCS 70934:35570, on a fallen trunk of *Picea abies* (diam. 35 cm, decay stage 4) in an old spruce-dominated mesic heath forest, 29 Sept. 2020, leg. & det. TH 20200083 (OULU); UCS 7093442:3557179, on a fallen trunk of *Pinus sylvestris* (diam. 50 cm, decay stage 4, kelo tree) with *Tubulicrinis accedens* in a very old spruce-dominated mesic heath forest, 5 Oct. 2020, leg. & det. TH 20200085 (OULU), conf. MK; UCS
Tulasnella brinkmannii s.l. Bres. (Fig. 61)

Notes. 5th record in Finland; previous records: Suonenjoki (2b), Ristijärvi (3b), Sotkamo (3b), and Suomussalmi (3b) (Kunttu et al. 2018, 2019).

Specimen examined. Ostrobotnia kajanensis, Kuhmo, Elimys- salo, UCS 71265:36593, on a fallen trunk of Picea abies (diam. 12 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 6 Oct. 2020, leg. & det. TH 20200090 (OULU), det. MK.

Tulasnella cystidiophora Höhn. & Litsch. (Fig. 62)

Distribution. New to 2b, 3b (Fig. 1).

Notes. 2nd–3rd records in Finland; previous record: Tam- melia (2a) (Kotiranta et al. 2009).

Specimens examined. Tavastia borealis, Rautalampi, Etelä-Konnevesi National Park, UCS 6941550:3484986, on a fallen decorticated trunk of Betula sp. (diam. 18 cm, decay stage 2), in a mixed old-growth forest, 20 Sept. 2015 leg. & det. J. Purhonen 6603 (JYV), det. MK conf. HK; Ostrobotnia kajan- ensis, Kuhmo, Elimys-salo, UCS 71265:36593, on a fallen trunk of Populus tremula (diam. 27 cm, decay stage 2) in an old pine-dominated sub-xeric heath forest, 7 Oct. 2020, leg. TH 20200090 (OULU), det. MK.

Tulasnella deliquescens (Juel) Juel (Fig. 63)

Notes. 7th–10th records in Finland; previous records: Hel- sinki (1b), Jyväskylä (2b), Puolanka (3b), Hyrynsalmi (3b), Suomussalmi (3b), and Sodankylä (4c) (Kotiranta et al. 2009; Kunttu et al. 2018, 2019).

Specimens examined. Ostrobotnia kajanensis, Kuhmo, Tal- vivaara, UCS 7092997:3557674, on a fallen branch of Populus tremula (diam. 4 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 22 Sept. 2020, leg. TH 20200091 (OULU), det. MK; Sotkamo, Losonvaara, UCS 7107262:3545992, on a fallen trunk of Juniperus communis (diam. 2 cm, decay stage 3) in an old pine-dominated sub-xeric heath forest, 28 Sept. 2020, leg. & det. TH 20200099 (OULU); Kuhmo, Ulvinsalo, UCS 7103531:3664853, on a fallen branch of Pinus sylvestris (diam. 1 cm, decay stage 2, kelo tree) in a very old spruce-dominated mesic heath forest, 4 Oct. 2020, leg. & det. TH 20200093 (OULU); UCS 712673:3662961, on a fallen trunk of Pinus sylvestris (diam. 25 cm, decay stage 4, kelo tree) in an old pine-dominated mesic heath forest, 8 Oct. 2020, leg. & det. TH 20200095 (OULU); Kuhmo, Elimys-salo, UCS 7126326:3660131, on a fallen branch of Populus tremula (diam. 4 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 7 Oct. 2020, leg. TH 20200094 (OULU), det. MK; UCS 7129643:3664595, on a fallen trunk of Pinus sylvestris (diam. 25 cm, decay stage 2, kelo tree) in an old pine-dominated sub-xeric heath forest, 9 Oct. 2020, leg. & det. TH 20200039 (OULU); UCS 7129726:3664908, on a fallen trunk of Betula sp. (diam. 20 cm, decay stage 1) in an old pine-dominated sub-xeric heath forest, 10 Oct. 2020, leg. & det. TH 20200096 (OULU); UCS 7130472:3662572, on a fallen branch of Picea abies (diam. 1 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 12 Oct. 2020, leg. & det. TH 20200097 (OULU).

Tulasnella fuscosviolacea Bres. (Fig. 64)

Notes. 4th–5th records in Finland; previous records: Tam- melia (2a), Jyväskylä (2b), and Sotkamo (3b) (Kotiranta et al. 2009; Kunttu et al. 2018, 2019).

Specimens examined. Ostrobotnia kajanensis, Kuhmo, Tal- vivaara, UCS 71093368:3556912, on a fallen branch of Picea abies (diam. 1 cm, decay stage 3) in an old spruce-dominated mesic heath forest, 29 Sept. 2020, leg. & det. TH 20200098...
Tulasnella interrogans P. Roberts

Distribution. New to Finland, and hence new to 3b (Fig. 1).

Specimen examined. Ostrobottinia kajanensis, Kuhmo, Ulvinsalo, UCS 7103781:3665067, on a fallen trunk of Populus tremula (diam. 3 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. & det. TH 20200100 (OULU), conf. MK and at the same site UCS 7129534:3664519, on a fallen trunk of Populus tremula (diam. 25 cm, decay stage 2) in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. & det. TH 20200101 (OULU).

Tulasnella pallida Bres.

Distribution. New to 3a (Fig. 1).

Notes. 5th–7th records in Finland; previous records: Marttila (1b), Ylöjärvi (2b), Sotkamo (3b), and Puolanka (3b) (Kotiranta et al. 2009; Kunttu et al. 2018, 2019, 2020).

Specimen examined. Ostrobotnia ouluensis, Oulu, Iinatti, UCS 71093368:3556912, on a fallen branch of Picea abies (diam. 1.5 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 29 Sept. 2020, leg. & det. TH 20200099 (OULU); Kuhmo, Ulvinsalo, UCS 7103781:3665067, on a fallen branch of Populus tremula (diam. 35 cm, decay stage 2) in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. & det. TH 20200100 (OULU), and at the same site UCS 7103759:3665054, on a fallen trunk of Populus tremula (diam. 25 cm, decay stage 3) in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. & det. TH 20200101 (OULU).

Figure 64. Tulasnella fuscoviolacea in Kuhmo (TH 20200100). Photo: Teppo Helo.

Figure 66. Tulasnella pallida in Kuhmo (TH 20200105). Photo: Teppo Helo.

Figure 65. Tulasnella interrogans in Kuhmo (TH 20200102) with Athelia acrospora. Photo: Teppo Helo.
**Tulasnella thelephorea** (Juel) Juel

**Notes.** 7th record in Finland; previous records: Lohja (1b), Inkoo (1b), Kajaani (3b; two sites), Lieksa (3b), and Utsjoki (4d) (Kotiranta et al. 2009; Kunttu et al. 2018, 2019).

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103786:3665057, on a fallen trunk of *Betula* sp. (diam. 20 cm, decay stage 3) with *Athelia fibulata* in a very old spruce-dominated mesic heath forest, 2 Oct. 2020, leg. & det. TH 202000112 (OULU), conf. MK.

**Vararia racemosa** (Burt) Rog. & Jacks. ssp. *lapponica* Hallenberg

*Fig. 67*

**Distribution.** New to 3b (Fig. 1).

**Notes.** 2nd record in Finland; previous record: Salla (4c) (Kotiranta et al. 2009). Data Deficient.

**Specimen examined.** Ostrobotnia kajanensis, Kuhmo, Elimyssalo, UCS 71265:36593, on a fallen trunk of *Picea abies* (diam. 45 cm, decay stage 3) with *Tomentella stuposa*, *Xylodon brevisetus* s.str. and *Botryobasidium subcoronatum* in an old spruce-dominated mesic heath forest, 6 Oct. 2020, leg. TH 20200031 (OULU), det. MK.

**Xenasma pruinosum** (Pat.) Donk

*Fig. 68*

**Distribution.** New to 2a (Fig. 1).

**Notes.** 4th record in Finland; previous records: Luhanka (2b), Jyväskylä (2b), and Kajaani (3b) (Kotiranta et al. 2009; Kunttu et al. 2018).

**Specimen examined.** Tavastia australis, Kuhmoinen, Kissankulma, Vierula UCS 6823647:3405308, on a fallen branch of *Salix caprea* (diam. 10 cm, decay stage 2) in a summer house garden, 22 Sept. 2019, leg. & det. JP 4170 (H), conf. HK.

**Xenasmatella borealis** (K.H. Larss. & Hjortstam) Duhem

*Fig. 69*

**Notes.** 9th–10th records in Finland; previous records: Helsinki (1b), Kuhmoinen (2b), Petäjävesi (2b), Kajaani (3b), Lieksa (3b), Puolanka (3b), Sodankylä (4c), and Salla (4c) (Kotiranta et al. 2009; Kunttu et al. 2018, 2020).

**Specimens examined.** Ostrobotnia kajanensis, Kuhmo, Ulvinsalo, UCS 7103599:3665407, on a fallen trunk of *Pinus sylvestris* (diam. 4 cm, decay stage 3, kelo tree) in a very old spruce-dominated mesic heath forest, 13 Oct. 2020, leg. & det. TH 20200121 (OULU), and at the same site UCS 7102648:3662954, on a fallen trunk of *Pinus sylvestris* (diam. 6 cm, decay stage 3, kelo tree) in an old pine-dominated mesic heath forest, 8 Oct. 2020, leg. & det. TH 20200117 (OULU); Kuhmo, Elimyssalo, UCS 7130440:3662325, on a fallen branch of *Salix caprea* (diam. 10 cm, decay stage 2) in an old spruce-dominated mesic heath forest, 6 Oct. 2020, leg. TH 20200116 (OULU), det. MK.

**Xylodon borealis** (Kotir. & Saaren.) Hjortstam & Ryvarden

**Distribution.** New to 3a (Fig. 1).

**Notes.** X. borealis has been reported from Sweden, Norway, Spain, and one in unpublished (H. Kotiranta) record from Russian Far East (Eriksson & Ryvarden 1975; GBIF Secretariat 2019). The ecology of the species seems to be poorly known, and its delimitation against *H. obtusiforme* deserves further study.

**Figure 67.** *Vararia racemosa* in Kuhmo (TH 20200031). Photo: Teppo Helo.

**Figure 68.** *Xenasma pruinosum* in Kuhmoinen (JP 4170). Photo: Jorma Pennanen.

**Figure 69.** *Xenasmatella borealis* in Kuhmo (TH 20200119). Photo: Teppo Helo.

in a spruce-dominated herb-rich forest next to a stream running from a spring, 11 July 2018, leg. AM 66-18 (OULU), det. MK.

**Discussion**

Species new to Finland

*Hyphoderma lapponicum* has been reported from Sweden, Norway, and one in unpublished (H. Kotiranta) record from Russian Far East (Eriksson & Ryvarden 1975; GBIF Secretariat 2019). The ecology of the species seems to be poorly known, and its delimitation against *H. obtusiforme* deserves further study.
Mycostilla vermiformis is distributed in temperate and boreal forests of Europe, and it has been found in Sweden, Norway, Denmark, Russia, Poland, Czech Republic, United Kingdom, and France (see Spirin et al. 2019b). The hosts described by Spirin et al. (2019b) were Picea abies and Pinus sylvestris. In Finland, basidiomata grew on coarse trunks of moderately decayed Picea abies. The site in Helsinki is now partly destroyed. Previous reports of *Stypella vermiformis* in Finland represent another species. For the taxonomy of the complex see Spirin et al. (2019b).

*Proterochaete adusta* (Alvarenga et al. 2019) has been collected from USA (Idaho), Canada (Alberta, British Columbia), China (Jilin), Russia (Primorie, Khabarovsk), Norway (More and Romsdal) (Alvarenga et al. 2019), Germany (Thuringenia, Saxony, North Rhine-Westphalia) (Rödel et al. 2020) and now Finland (Kainuu, South Häme).

In the USA, *P. adusta* grew on a decorticated *Populus trichocarpa* trunk (Burt 1915), in Canada on *Populus trichocarpa* and *Acer negundo* (Martin 1953; Alvarenga et al. 2019), in Russia on an undescribed deciduous tree and a *Betula pseudosieboldiana* (Wells & Raatviir 1966; Alvarenga et al. 2019), in Norway on an undescribed hardwood (Alvarenga et al. 2019), in Germany on fallen *Populus* trunks (five records), inside a rotten *Populus* trunk (2017 record), and on a fallen and hollow stump (one record), and on a fallen and hollow *Populus tremula* trunk (2017 record). There is no description of the substrate in the 1964 Finnish record. In summary, *P. adusta* seems to demand, or at least to prefer, deciduous trees, especially *Populus* as its substrate (Rödel et al. 2020).

With the exception of substrate, the ecology of *P. adusta* remains unrecorded. Rödel et al. (2020) report that one of their specimens grew on an eastern bank of a river. The 2017 Finnish record grew on a very old *Picea abies* dominated thin-peated *Vaccinium myrtillus* – *Vaccinium vitis-idaea* spruce mire with a substantial amount of dead wood. *Populus tremula* and *Salix caprea* were secondary species in the forest. There is no description of the ecology in the 1964 Finnish record.

The fresh basidioma from the 2017 Finnish record was smooth – finely tuberculate, very thin and almost transparent. A cross section of the dry basidioma was a minimum of 20–40 µm compared to the cross sections 100–300 µm (Alvarenga et al. 2019) or 110–220 µm (Rödel et al. 2020). The dry basidioma of the 1964 Finnish record is rather finely granoid – finely tuberculate.

*Pseudotomentella alobata* has been reported in Sweden, Norway and Slovenia (Svantesson et al. 2019). To date, data on habitat are scarce, but recent Scandinavian collections have been made in old-growth coniferous or mixed forests on soil with high pH (Svantesson et al. 2019). The species is described from the *Pseudotomentella tristis* group. Most of the *P. tristis* specimens in the collections are incorrectly identified, so the distribution of the species is not reliably known. It is probably quite rare.

According to GBIF Secretariat (2019), *Pseudoxenonasma verrucisporum* is known in Sweden, Norway and Austria. Eriksson et al. (1981) report that this species typically inhabits conifer branches in closed, moist forests, often growing together with *Globulicium hiemale*, as in the case of the Finnish collection. In a Nordic context, the species appears to be southern (most finds are from the hemiboreal zone), although it may extend further north along the seacoast. The species has not been found in Russia, which would indicate that it may have an oceanic distribution (V. Spirin, pers. comm.). Most collections have been made close to the coast, where it can be locally common. Overall, the species appears to be rather rare. The collection from Helsinki fits well with this general pattern, as it was found in an old, closed spruce forest on the southern coast of Finland.

*Sistotrema subtrigonospermum* is a globally distributed species: records have been reported in several countries in Europe, Africa, North and South America, India, and Polynesia (see Martini 2021a). Typical substrata include advanced decayed lying trunks and fallen branches of deciduous trees (e.g., *Fagus, Quercus, Populus, Salix*), but there are collections from coniferous tree too (see Martini 2021a). The majority of substrata have been advanced or strongly decayed. The basidiomata in Finland inhabited fallen thin and decayed branches of deciduous trees and *Picea abies*.

*Spiculogloea minuta* has been reported in France, Germany, Norway, Russia, and United Kingdom (GBIF Secretariat 2019; Roberts 1997; Trichies 2002; Rödel 2014; Spiriin 2016; Spirin 2019b). The known substrata of this parasite species are *Helicogloea lagerheimii*, *Hyphoderma argillaceum*, *Mycostilla vermiformis*, *Phanerochaete sordida*, *Tubulicrinis accedens*, *Tulasnella allantospora*, *T. eichleriana*, *T. savelloides*, *T. tomaculum* and *T. violea* (Roberts 1997; Trichies 2002; Rödel 2014; Spiriin 2016; Spirin 2019b). The Finnish specimen was collected in association with *Tulasnella allantospora* on a decayed *Picea abies* trunk.

*Tomentella botryoides* is a widely distributed species that has been found in many countries in Europe, as well as in Morocco, Caucasus, Russian Far East, India and North America (see Martini 2021b). The collections have been made both from deciduous (e.g., genera *Quercus*, *Fagus*, *Betula*) and coniferous trees (e.g., genera *Thuja*, *Abies*, *Pinus*, *Pseudostuga*), where the substrate were mainly intermediately or strongly decayed lying trunks and branches (see Martini 2021b).

*Tomentella neobourdotii* has been reported in Sweden, Estonia, Denmark, Russian Federation, Belarus, Germany, Czech Republic, Austria, Switzerland, Liechtenstein, France, Italy, Spain, Portugal, Macedonia, Georgia, Iran and the USA (GBIF Secretariat 2019; Martini 2021c). It has been mainly collected from decayed trunks of deciduous trees (Martini 2021c).

*Tomentella subpilosa* has been reported in Denmark, Austria, France, Switzerland, Czech Republic and Slovakia (Svřeček 1960; GBIF Secretariat 2019; Martini 2019d). It has been mainly collected from decayed trunks or on branches of *Larix decidua*, *Abies alba*, *Pinus halepensis*, *P. sylvestris*, *Picea abies*, *Fagus sylvatica*, *Populus* sp, although basidiomata have also been
found growing on bark or hard surfaced wood (Svrček 1960; Martini 2019).

Tomentella subestistacea has a global distribution and GBIF Secretariat (2019) has listed it in Sweden, Norway, Denmark, Estonia, Russian Federation, Belarus, Ukraine, Germany, Poland, Belgium, France, Czech Republic, Hungary, United Kingdom, Spain, Azerbaijan, USA, Mexico and Laos. Ecological requirements are unknown or unreported. Previously Tomentella aff. subestistacea was reported in Finland in 1979 (Kotiranta et al. 2009), although the identity of the specimen remained unclear.

Tulasnella anguifera has previously been reported only in France and United Kingdom (Roberts 1992; GBIF Secretariat 2019; Trichies 2002) and was collected from decayed trunks or branches of Picea abies, Picea sp., and Prunus spinosa (Roberts 1992; Trichies 2002). Both Finnish specimens grew inside basidiomata of Athelia bombacina on decorticated Pinus sylvestris kelo branches. The second specimen occurred on the same trunk, in association with Sistotremastrum suecicum, Tulasnella permacra, and Tulasnella albida.

Tulasnella interrogans has been reported in Belgium, France, United Kingdom, and Spain (Roberts 1992; Dämön 2001; GBIF Secretariat 2019), where it was collected from decayed trunks or branches of Corylus sp., Picea sp., Salix sp. and inside a basidioma of Botryobasidium subcornatum (Roberts 1992; Trichies 2002). A Finnish specimen grew under and around basidioma of Athelia bombacina on a decorticated kelo branch of Pinus sylvestris. The habitat had been thinned at some point, but substantial amounts of decaying pine wood were still present onsite from the previous tree generations.

Tulasnella is a genus whose species’ ecology, biogeography, substrata and habitat requirements are poorly known. Notes on habitats in old collections are often incompletely described and hence do not allow conclusions to be drawn. Many of the Tulasnella species appear to favor herb-rich forests, but some occur in very diverse biotopes and can even be found in barren places. It is possible that some Tulasnella species even prefer old-growth forests. In fact, our specimens of these two Tulasnella species were found in one of the finest natural forests in Finland. Nonetheless, the number of collections is still insufficient to draw conclusions about the ecological requirements of these species.

The red-list status of the species new to Finland has not been assessed.

Species with only one previous global record

The second global record of Caudicicola gracilis was found in Oulu, Finland. The basidioma grew on a sawn block of Betula sp. that was leaning against a tree in a rather moist spruce-dominated drained and transformed mire. The first recording of C. gracilis was in 2014–2015 in Pyhäjärvi, central Finland and was described as a new species (Kotiranta et al. 2017). The habitat was a boreal wooded, drained minerotrophic mire. Spruce was the dominant tree species intermixed with pine, birch and some willow. All the basidiomata grew on the undersides of spruce or pine stumps (roots) and could only be seen after the stumps had been lifted from the ground (Kotiranta et al. 2017). However, if this is the typical growth habit of this species, then it will be a difficult species to detect. Caudicicola gracilis appears to be a wood- or litter-decomposer, since there are no mycorrhizal species in Stercherinaceae or in Polyporales (Hibbett et al. 2014).

Significant extensions of the known distribution range

Most of the new records were found in expected regions, relatively close to their previously known distribution. Nonetheless, the records of some species were located far from their earlier finds or were found in an unexpected location. This ‘expansion’ of the species’ distribution range can be largely explained by the increasing survey activity in different parts of Finland. The new record of Trechispora stellulata in Enontekiö is 570 km north from the nearest previous record in Puolanka. The new record of Ceriporia bresadolae in Helsinki extends its known range by 500 km to the south. However, it should be noted that collections identified as C. bresadolae in Estonia (Rummel et al. 2021), are actually closer than the previous collections in Finland (NATARC 2019). Similarly, the new records of Protodontia subgelatinosa in Enontekiö, Amnaurodon cyanneus, Protomerulius brachysporus and Tomentella fuscocinerea, all in Kuhmo, were found approximately 500 km further north compared to previous records. Tomentellopsis zygodesmoides was found in Sokkamo, which is situated 400 km north of the nearest previously known location in Tuusula.

Conclusions

The occurrence and distribution of many aphyllophoroid fungal species are still poorly known in Finland, as demonstrated by this article. Our new records indicate that many species most likely do not have such a scattered distribution as suggested by previous records. Thus, there are still large gaps in our knowledge of their ecology, biogeography, substrata and habitat requirements. The reasons behind this include time-consuming sampling, small basidiomata that are difficult to find, narrow ecological niches (substratum), changing taxonomy, and challenges in species identification. For example, the fungal communities that occupy the smallest fractions of woody debris seem to be poorly known, since this substrate has been commonly overlooked. However, new records are reported frequently and, therefore, knowledge accumulates all the time. New information on aphyllophoroid fungi will be gathered when performing field surveys in poorly studied areas and neglected habitats, or on species with tiny basidiomata. More effort should be allocated into field studies to establish which species are truly rare and to determine the actual distribution range. Naturally, a certain portion of aphyllophoroid fungal species are truly rare or geographically restricted, for example, due to habitat specialization. All such additional knowledge of species occurrence and habitats is important for a deeper understanding of diversity, ecology and conservation requirements of aphyllophoroid fungi.
Acknowledgments

We would like to thank the following people who made the collections, identified specimens, assisted with fieldwork or helped us otherwise: Peter von Bagh, Pekka Halonen, Maija-Liisa Heinonen, Pekka Heinonen, Maire Helo, Pekka Helo, Pauli Jokikokko, Sanna-Mari Kunttu, Anniina Kääpi, Tiina Laatinen, Hannu Lehtonen, Elia Martini, Suvii Pousi, Jenna Purhonen, Annu Ruotsalainen, Ossi Ryhänen, Peritti Salo, Viacheslav Spirin, Pekka Tolvanen, Laura Vuoksnemaa, and Henry Väre. Author PVW would like to thank Esa Huhta in Natural Resources Institute LUKE for leading the project ‘Demometä’ (A75831).

Dr. David Wilson revised the English language.

References

Ahti, T., Hämet-Ahti, L. & Jalas, J. 1968. Vegetation zones and their sections in northwestern Europe. Annales Botanici Fennici 5(3): 169–211.

Alvarenga, R. L. M., Spirin, V., Malysheva, V., Giberton, T. B. & Larsson, K.-H. 2019. Two new genera and six other novelties in Heterochaeta sensu lato (Auriculariales, Basidiomycota). Botany 97(3): 439–451. https://doi.org/10.1139/cjb-2019-0046

von Bagh, P. 2020. Karvaovakka Porvoossa. Sienilehti 72(2): 12.

Bernicchia, A. & Gorjón, S. P. 2010. Corticiaceae s.l. Fungi Europaei 12. Edizioni Candelusso, Alassio.

Burt, E. A. 1915. The Thelephoraceae of North America. V. Tremellosidendron, Eichleriella, and Sebacina. Annals of the Missouri Botanical Garden 2: 731–770.

Dämon, W. 2001. Die corticioiden Basidienpilze des Bundeslandes Salzburg (Österreich): Floristik, Lebensräume und Substratökologie. Bibliotheca Mycologica 189: 1–413.

Eriksson, J., Hjortstam, K. & Ryvarden, L. 1981. The Corticiaceae of North Europe. 6. Phlebia–Sarcodontia. Fungiflora, Oslo.

Eriksson, J. & Ryvarden, L. 1975. The Corticiaceae of North Europe vol. 3. Fungiflora, Oslo.

FinBIF 2021a. The list of biogeographical provinces. Finnish Biodiversity Information Facility. Available from: https://laji.fi/theme/emk [Cited 26 Feb. 2021].

FinBIF 2021b. Biogeographical provinces on a map. Finnish Biodiversity Information Facility. Available from https://laji.fi/map/overlayNames=geobiologicalProvinces [Cited 26 Feb. 2021].

FinBIF 2021c. Species search – Browse and discover species information, descriptions and pictures. Finnish Biodiversity Information Facility. Available from https://laji.fi/en/taxon [Cited 26 Feb. 2021].

GBIF Secretariat 2019. Global Biodiversity Information Facility – Backbone Taxonomy. Checklist dataset. https://doi.org/10.15468/39omei [Cited 13 Mar. 2021].

Hansen, L. & Knudsen, H. 1997. Nordsvamp, Copenhagen.

Heinikinemo, O. & Raatikainen, M. 1981. Grid references and names of localities in the recording of biological finds in Finland. Notulae Entomologicae 61: 133–154.

Hibbett, D. S., Bauer, R., Binder, M., Giachini, A. J., Hosaka, K., Justo, A., Larsson, E., Larsson, K.-H., Lawrey, J. D., Miettinen O., Nagy, L. G., Nilsson, R. H., Weiss, M. & Thorn, R. G. 2014. Agaricomycetes. In: McLaughlin, D. J. & Spatafora, J. W. (eds), Systematics and evolution: 373–429. Springer, Berlin & Heidelberg.

Hjortstam, K. & Ryvarden, L. 2009. A checklist of names in Heterochaeta sensu stricto – sensu lato and Schizopora with new combinations in Lagarospathidium, Lyomyces, Kneiffiella, Schizopora and Xylodon. Synopsis Fungorum 26: 33–55.

Jokikokko, P. 2020. Suomenia löytyi jo toinen loukkokäävän esiintymä. Sienilehti 72(4): 8–9.

Juutilainen, K. 2016. Ecology, environmental requirements and conservation of corticioid fungi occupying small diameter dead wood. Jyväskylä Studies in Biological and Environmental Science 313: 1–55.

Knudsen, H. & Vesterholt, J. (eds). 2008. Funga Nordica. Agaricoid, boletoid and cuphellloid genera. Nordsvamp, Copenhagen.

Kontula, T. & Raunio, A. (eds) 2018. Threatened habitat types in Finland 2018. Red List of habitats. Part II: Descriptions of habitat types. The Finnish Environment 5/2018. Finnish Environment Institute and Ministry of the Environment.

Korhonen Kari, T. (ed.) 2009. VM11 Maastotyöohje 2009. Koko Suomi. Metsätutkimuslaitos, Valtakunnan metsien inventointi VMI, Joensuu. http://urn:nbn:fi-fe201603085354 [Cited 1 Jul 2021].

Koitiara, H. & Shiryaev, A. 2013. Notes on Aphyllophoroid fungi (Basidiomycota) in Kevo, collected in 2009. Kevo Notes 14: 1–22.

Koitiara, H., Saarenkoska, R. & Kytövuori, I. 2009. Aphyllophoroid fungi of Finland. A check-list with ecology, distribution, and threat categories. Norrlinia 19: 1–223.

Koitiara, H., Kulju, M. & Miettinen, O. 2017. Caudicicola gracilis (Polyporales, Basidiomycota), a new polypore species and genus from Finland. Annales Botanici Fennici 54: 159–167.

Koitiara, H., Junninen, J., Halme, P., Kytövuori, I., von Bonndorf, T., Niskanen, T. & Limatainen, K. 2019. Aphyllophoroid fungi. In: Hyvärinen, E., Juslén, A., Kemppainen, E., Uddström, A. & Liukko, U.-M. (eds). The 2019 Red List of Finnish Species, pp. 234–247. Ministry of the Environment & Finnish Environment Institute, Helsinki.

Kunttu, P., Helo, T., Kulju, M., Julkunen, J. & Koitiara, H. 2020. Contributions to the knowledge of aphyllophoroid and heterobasidoid fungi (Basidiomycota) in Finland. Kartesinia 58(1): 118–143. https://doi.org/10.29205/ka.2020.490

Kunttu, P., Helo, T., Kulju, M., Julkunen, J., Pennanen, J., Shiryaev, A. G., Lehtonen, H. & Koitiara, H. 2019. Aphyllophoroid fungi (Basidiomycota) in Finland: range extensions and records of nationally new and rare species. Acta Mycologica 54(2): 1128. https://doi.org/10.5586/am.1128

Kunttu, P., Juutilainen, K., Helo, T., Kulju, M., Kekki, T. & Koitiara, H. 2018. Updates to Finnish aphyllophoroid funga (Basidiomycota): new species and range extensions. Myxosphere 9(3): 519–564. https://doi.org/10.5943/mycosystem/9/3/7

Kunttu, P., Kuokka, M., Kekki, T., Pennanen, J., Savola, K., Helo, T. & Koitiara, H. 2016. Extensions of known geographic distribution of aphyllophoroid funga (Basidiomycota) in Finland. Myxosphere 7: 333–357. https://doi.org/10.5943/mycosystem/7/3/7

Kunttu, P., Kulju, M. & Koitiara, H. 2012. New national and regional biological records for Finland 2. Contributions to the Finnish aphyllophoroid funga (Basidiomycota). Memoranda Societas pro Fauna et Flora Fennica 88: 61–66.

Kunttu, P., Pennanen, J., Helo, T., Kulju, M. & Söderholm, U. 2013. New national and regional biological records for Finland 4. Additions to the knowledge of Finnish aphyllophoroid funga (Basidiomycota). Memoranda Societas pro Fauna et Flora Fennica 89: 119–124.

Kunttu, P., Pennanen, J., Kulju, M., Kekki, T. & Suominen, M. 2014. Noteworthy records of aphyllophoroid funga in Finland (Basidiomycota). Acta Mycologica 49: 221–235. https://doi.org/10.5586/am.2014.017

Leikola, M. 1969. On the termination of diameter growth of Scots pine in old age in northernmost Finnish Lapland. Silva Fennica 3: 50–61.

Malysheva, V., Spirin, V., Schoutetten, N., De Lange, R., Pennanen, J. & Larsson, K.-H. 2020. New and Noteworthy Species of Helico gloea (Atractiellomycetes, Basidiomycota) from Europe. Annales Botanici Fennici 57: 1–7. https://doi.org/10.5735/085.057.0101

Martin, G. T. 1953. New species of Protodontia from British Columbia. Journal of the Washington Academy of Sciences 43(1): 16-18.

Martini, E. 2021a. Species with descriptions, images and drawings: Sistotrema subtrigonspermum D.P. Rogers (1935). https://www. aphyllo.net/spec.php?id=804300 [Cited 26 Mar. 2021].
Martini, E. 2021b: Species with descriptions, images and drawings: Tomentella botryoides (Schwein.) Bourdot & Galzin (1924). https://www.aphyllo.net/spec.php?id=1311400 [Cited 26 Mar. 2021]

Martini, E. 2021c. Species with descriptions, images and drawings: Tomentella neobordottii M.J. Larsen (1968). https://www.aphyllo.net/spec.php?id=246100 [Cited 27 Mar. 2021]

Martini, E. 2019d. Tomentella subpilosa Litsch. Excerpts from Crusts Tomentella subpilosa.pdf

Miettinen, O. 2012. The polypore survey of the forests in Helsinki – supplement 2014. Publications by City of Helsinki Environment Centre 6/2012: 1–24.

NATARC 2019. Database of Estonian fungi collections. Natural history archives and information network (NATARC). https://natarc.ut.ee/en/secenekogud.php [Cited 10 Apr. 2021]

Niemelä, T. 2016. The polypores of Finland. Norrlinia 31: 1–430.

Niemelä, T., Wallenius, T. & Kotiranta, H. 2002. The kelo tree, a vanishing substrate of specified wood-inhabiting fungi. Polish Botanical Journal 47: 91–101.

Pippola, E. & Kotiranta, H. 2008. The genus Tremella (Basidiomycota, Tremellales) in Finland. Annales Botanici Fennici 45: 401–434.

Pippola, E. & Kotiranta, H. 2008. The genus Tremella (Basidiomycota, Tremellales) in Finland. Annales Botanici Fennici 45: 401–434.

Renwall, P. 1995. Community structure and dynamics of wood-rotting Basidiomycetes on decomposing conifer trunks in northern Finland. Karstenia 35: 1–51. https://doi.org/10.29203/ka.1995.309

Roberts, P. 1992. Spiral-spored Tulasnella species from Devon and the New Forest. Mycological Research 96: 233–236. https://doi.org/10.1016/S0953-7562(09)80973-8

Roberts, P. 1997. New Heterobasidiomycetes from Great Britain. Mycotaxon 63: 195–216.

Rödel, T. 2014. Über aktuelle Funde von Spiculogloea occulta P. Roberts, Spiculogloea minuta P. Roberts und Spiculogloea subminuta Hauerslev. Ein Beitrag zur Kenntnis der Gattung Spiculogloea (Spiculogloeaes, Agaricostilbomycetes). Zeitschrift für Mykologie 80: 491–504.

Rödel, T., Dürrmich, F. & Kamke, M. 2020. Proterochaeta adusta – new to Germany. Boletus 41(1): 35–45

Runnel, K., Miettinen, O. & Lõhmus, A. 2021. Polypore fungi as a flagship group to indicate changes in biodiversity – a test case from Estonia. IMA Fungus 12(1). https://doi.org/10.1186/s43008-020-00050-y

Savola, K. 2015. The polypore survey of the forests in Helsinki – supplement 2014. Publications by City of Helsinki Environment Centre 1/2015.

Savola, K. & Kolehmainen, K. 2015 Pläkaapunkiseudun Viberkehän suojelelualueiden käävä. Metsähallituksen luonnonsuojelujulkaisuja A 220: 1–65.

Siitonen, J., Hottola, J. & Immonen, A. 2009. Differences in stand characteristics between brookside key habitats and managed forests in southern Finland. Silva Fennica 43: 21–37. https://doi.org/10.14214/sf.216

Spirin, V., Malysheva, V., Haelawaters, D., Larsson, K. H. 2019b. Studies in the Stypella vermiformis group. Antonie Van Leeuwenhoek 112: 753–764. https://doi.org/10.1007/s10482-018-01209-9

Spirin, V., Malysheva, V., Miettinen, O., Vlasak, J., Mendes Alvarenga, R. L., Gibertoni, T. B., Ryvarden, L. & Larsson, K-H 2019a. On Prostomcularia and Heterochaetella (Auriculariales, Basidiomycota). Mycological Progress 18: 1079–1099. https://doi.org/10.1007/s11557-019-01507-0

Spirin, V., Miettinen, O., Pennanen, J., Kotiranta, H. & Niemelä, T. 2013. Antrodia hyalina, a new polypore from Russia, and A. leucaena, new to Europe. Mycological Progress 12: 53–61. https://doi.org/10.1007/s11557-012-0815-0

Spirin, V., Nörden, J., Svantesson, S. & Larsson, K.-H. 2016. New records of intrahymenial heterobasidiomycetes (Basidiomycota) in north Europe. Nordic Journal of Botany 34: 475–477. https://doi.org/10.1111/njbo.01155

Stokland, J. & Sippola, A. L. 2004. Monitoring protocol for wood-inhabiting fungi in the Alberta Biodiversity Monitoring Program. Alberta Biodiversity Monitoring Program, Alberta.

Svantesson, S., Larsson, K.-H., Köljalg, U., May, T. W., Cangren, P., Nilsson, R. H. & Larsson, E. 2019. Solving the taxonomic identity of Pseudotomentella tristis s.l. (Thelephorales, Basidiomycota) – a multi-gene phylogeny and taxonomic review, integrating ecological and geographical data. MycoKeys 50: 1–77. https://doi.org/10.3897/mycokeys.50.32432

Svrček, M. 1960. ‘Tomentelloideae Czechoslovakiae. Genera resupinatae familia Thelephoraceae’, Sydowia 14(1–6): 170–245.

Trichies, G. 2002. Serendiptia lyrica sp. nov., Acreomyces lotharingus sp. nov. et quelques autres hétérobasidiés notables de Lorraine (France). Bulletin de la Société Mycologique de France 118(4): 351–379.

Vauras, J. 2000. Macrofungi of the Southwestern Archipelago National Park. Metsähallituksen luonnonsuojelujulkaisuja A 112: 1–91.

Venugopal, P., Julkunen-Tiitto, R., Junninen, K. & Kouki, J. 2016. Phenolic compounds in Scots pine heartwood: are kelo trees a unique woody substrate? Canadian Journal of Forest Research 46: 225–233. https://doi.org/10.1139/cjfr-2014-0498

Wells, K. & Raitviir, A. 1966. Two new species of Exidiopsis. Eesti NSV Teaduste Akadeemia Toimetised. Bioloogiline seeria 15(2): 206–208.