Thirty pyrenomycetoid Ascomycota species new to Norway from a workshop in Horten, May 2-5, 2023

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Norsk tittel: Tretti nye norske pyrenomycetoide sekksporesopp-arter fra workshop i Horten 2.-5. mai 2023.

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NØKKELORD
Sekksporesopper, barklevende, vedlevende, plantelevende, pyrenomyceter, pyrenomycetoide sopp

SAMMENDRAG
Under en workshop med inviterte internasjonale eksperter fant vi 30 pyrenomycetoide sekksporesopp-arter nye for Norge, hvorav 16 nye for Skandinavia og en ny for Europa. Disse presenteres her med korte notater om deres mikromorfologi, økologi og forekomst i Fennoskandia, noen også med bilder.

ABSTRACT
During a workshop with invited international experts, we found 30 pyrenomycetoid ascomycete species new to Norway, whereof 16 new to Scandinavia and one new to Europe. These are presented here with short notes on their micromorphology, ecology, and occurrence in Fennoscandia, some also with photos.

INTRODUCTION

How many species of pyrenomycetoid Ascomycota new to Norway can ten experts find in three days? Previous projects ("Artsprosjekt") in South Norway have recovered at least 215 non-lichenized or weakly lichenized pyrenomycetoid species new to the country (Jordal et al.2014; Nordén 2014; Nordén & Jordal 2014; Nordén et al. 2014; Lechat et al. 2015; Nordén et al. 2015a; Nordén et al. 2015b; Nordén 2016; Jordal et al. 2017; Nordén et al. 2017; Nordén et al. 2017; Nordén & Aptroot 2018; Nordén et al. 2019; Olsen et al. 2019; Nordén & Andreasen 2020; Nordén & Andreasen 2022; Jordal et al. 2022), mainly in temp-

Figure 1. Group photo from the workshop with the participants in front of an apple tree *Malus domestica* infested with mistletoe *Viscum album*. Three species new to Norway growing on mistletoe were found during the workshop. From the left: Mathias Andreasen, Patrik Mlčoch, Karl Soler Kinnerbäck, Gernot Friebes, Edvin Johannesen, Hermann Voglmayr, Roger Andersson, Bjørn Wergen, Katrin Gilbert and Björn Nordén. Photo Mathias Andreasen.

erate broadleaf forest. Due to the many findings, one could imagine that it would become more and more difficult to find newspecies for the country in this environment. To test this, a workshop was arranged in Horten, S Norway, May 2-5, 2023, inviting international experts to collecting trips during three days and microscopy lab in the evenings. Collection permits were obtained for collection in Nature Reserves.

Pyrenomycetoid Ascomycota is an artificial assemblage of Dothideomycetes, Eurotiomycetes (Chaetothyriomycetidae) and Sordariomycetes, collectively defined by having globose to flask-shaped ascomata with an apical opening. Many are saprotrophs on organic substrates such as wood and other plant material. Many are also lichen-forming, but the workshop concentrated on non-lichenized species, which are considerably less well known than their lichenized counterparts (the number of newly discovered species per biodiversity mapping project tends to be considerably lower in lichenized fungi, Table 2).

MATERIALS AND METHODS

The presented species were encountered in temperate deciduous forests, wetlands and meadows on short excursions from Horten, Vestfold and Telemark county (Figure 1 & 2). The collection sites are situated below 75 m.a.s.l. and have a cool temperate climate, with the yearly average temperature of 7.5°C (warmest month July average maximum temperature of 23°C, coldest month February average maximum temperature of 2°C), and an average annual precipitation amounting to 952 mm. The bedrock in the area is rich in calcium and sport a high vascular plant diversity in herb-rich deciduous forests and wet-

Figure 2. Pyrenomycetoid Ascomycota collectors in action – experts from Europe gathered in Falkensten naturreservat in Horten, Vestfold og Telemark, May 2023. At this site fungi on twigs and branches appear to have been especially popular objects for study, but also fungi on herbs were studied during the workshop.

lands. Each forenoon and early afternoon were spent on the collection trips, and the rest of the time was spent in the lab. Seven of the reported findings were however collected at other sites in the days following the workshop by two of the participants.

The species were determined by studying the morphology of the sexual morph (teleomorph) or/and asexual morph (anamorph) under the microscope. Species distributions in Scandinavia were checked using the following sources: for Norway Artskart (2023), The Norwegian Mycological Database (Norsk Soppdatabase) NMD (2023), and Aarnæs (2002); for Sweden Eriksson (2014), Westberg et al. (2021) and Artportalen (2023), and for Denmark Atlas of Danish Fungi (2023), along with the international GBIF database (GBIF 2023).

Collectors, identifiers and photographers are designated by: BN: Björn Nordén, BW: Bjørn Wergen, EJ: Edvin Johannesen, HV: Hermann Voglmayr, KG: Katrin Gilbert, KSK: Karl Soler Kinnerbäck, MA: Mathias Andreasen, PM: Patrik Mlčoch, RA: Roger Andersson. The reported material will be deposited in Herb. O. Taxonomical nomenclature and systematic classification follows Mycobank.org unless otherwise stated, and should be treated as preliminary in several cases.

RESULTS

Thirty species are reported as new to Norway (Table 1) and are presented below.

Table 1. Species new to Norway collected during or in immediate connection with the workshop. Known occurrences in neighboring Scandinavian countries are marked with (×) in respective column.

Species new to Norway	Sweden	Denmark	Species new to Norway	Sweden	Denmark
Albicollum longisporum			*Nemania chestersii*	×	×
Anisogramma vepris	×	×	*Neocucurbitaria populi*		
Cucurbitaria chevalieri			*Nitschkia confertula*	×	×
Cucurbitaria salicina			*Parafenestella pseudosalicis*		
Delitschia intonsa	×		*Parafenestella salicum*		
Diatrypella angulata			*Plagiostoma geranii*	×	×
Digitodochium amoenum	×	×	*Plenodomus visci*		×
Hypoxylon julianii	×	×	*Pseudohalonectria lignicola*		
Lecythothecium duriligni			*Saccardoella separans*		
Lentithecium aquaticum			*Septoriella elongata*	×	
Leptosphaeria barriae			*Setoseptoria arundinacea*	×	×
Leptosphaeria clavispora			*Sphaeropsis visci*	×	×
Lophidium thyridioides			*Splanchnonema loricatum*	×	×
Lophodermium herbarum	×	×	*Stylonectria wegeliniana*	×	×
Massaria conspurcata	×	×	*Synfenestella sorbi*		
Melanconiella flavovirens	×				

Albicollum longisporum Voglmayr, J. Fourn., Tello & Jaklitsch (Sordariomycetes, Xylariales, Xylariaceae), Fig. 3

This species has immersed ascomata and a collar of white pseudostromatic tissue around the ostioles, which is characteristic for the genus *Albicollum* (Voglmayr et al. 2022). The most characteristic microscopic feature of this species is its helicoid germ slit that is less than 1 µm wide and coiling usually more than two times around the ascospore. Ascospore size of the Norwegian collection (43-51 × 10.5-13 µm) fits the range reported for the species (21.5-67.5 × 8.5-19 µm; Voglmayr et al. 2022). The Norwegian collection deviates from other collections of *A. longisporum* by the (almost) inamyloid (vs. hemiamyloid) apical ascus ring; however, sequence data confirm the species identification (Voglmayr, unpublished). It occurs on dead branches of various deciduous shrubs and trees and has so far only been recorded from higher altitudes in the Mediterranean region (Greece, Morocco, Spain), which makes the Norwegian record a remarkable distribution range extension to the north.

Material: Vestfold og Telemark, Tinn, Gjøystdalvegen; EU89 UTM32V: 485108 6650156 (Lat/Long 8.73310 59.98846); on attached twigs of *Populus tremula*; May 9, 2023; leg. BW, KG; det. BW.

Anisogramma vepris (Lacroix) Merezhko (Sordariomycetes, Diaporthales, Valsaceae) Syn. *Apioporthe vepris* (Lacroix) Wehm.

This species forms small immersed or erumpent stromata and has 1-septate ascospores measuring 6-9(10) × 2-2.5 µm, often constricted at the septum, and with a short bristle-like mucous appendage to ca 5 µm. It grows on dead *Rubus* stems.

Figure 3. *Albicollum longisporum.* Upper photos ascomata. Middle photos of ascospores. Lower photos asci and ascospores in asci, lower far right in lugol. Photos BW.

Material: Vestfold og Telemark, Horten, Falkensten naturreservat; EU89 UTM32V 578950 6589288 (Long/Lat 10.39183 59.43474); on *Rubus idaeus*, May 4 2023, Leg. MA, Det. KSK, MA.

Vestfold og Telemark, Horten, Borrevannet; EU89 UTM32V: 582023 6585510 (Lat/Long 10.44454 59,40024); on *Rubus idaeus*; May 3, 2023; leg. MA; det. KSK, MA.

Cucurbitaria chevalieri P.Karst. (Dothideomycetes, Pleosporales, Cucurbitariaceae)

Cucurbitaria chevalieri P.Karst., Fungi Fenn. Exs., Cent. 9: no. 892, 1869. ≡ *Teichospora chevalieri* (P.Karst.) P.Karst. (as Chevalierii), Bidrag till Kännedom Finlands Natur Folk 23: 66, 1873. [Full synonymy, see https://www.mycobank.org/MB/847906] This species name was validly published on the label of Karsten, Fungi Fenn. Exs. 892, fig. 189 (FH 00785884). The species is characterized by single or clustered erumpent 400-500 µm broad black ascomata with indistinct papillae. The ascospores are light brown, with 3 to 5 transverse septa and one longitudinal septum except in the end cells, 18-28 × 8-10 µm. On old dead wood. This is very likely no true *Cucurbitaria* (which has been restricted to only two species, only occurring on *Berberis*; see Jaklitsch et al. 2018). However, in lack of sequence data, the generic classification of the species cannot be evaluated.

Material: Vestfold og Telemark, Horten, Fjugstad naturreservat; EU89 UTM32V 582931 6581330 (Lat/Long 10.45892 59.36253); on *Ulmus glabra* (dead trunk); May 3, 2023; leg. MA; det. PM.

Cucurbitaria salicina Fuckel (Dothideomycetes, Pleosporales, Cucurbitariaceae), Fig. 4

Cucurbitaria salicina was described from *Salix fragilis* and *S. triandra*. It may not belong to *Cucurbitaria* s str. The material fits well with the original description. It forms gregarious ascomata on dead, often decorticated *Salix* twigs. The ascomata are partly embedded into the substrate, globose to somewhat flattened, black. Ascospores (18)18.6-20.7(21.3) × (7.9)8.5-9.4 µm, light brown to brown, with 5 irregular transverse septations and mostly only one longitudinal septation. Asci 105-125 × 12-13 µm, with 8 uniseriate spores.

See original description in Fuckel (1870).
Material: Vestfold og Telemark, Tinn, Skinnarbu; EU89 UTM32V: 461354 6630988 (Lat/Long 8.31098 - 59.81481); on *Salix sp.;* May 7, 2023; leg. BW, KG; det. BW, HV.

Delitschia intonsa Luck-Allen (Dothideomycetes, Pleosporales, Sporormiaceae)

This species is fimicolous and appears on dung of various larger animals. Pseudothecia 700-950 × 450-500 um, pyriform, membranous, thoroughly hairy, quite dark brown. Neck up to 200 x 150 µm, semi-coriaceous, black, tuberculate, with white hair. The ascospores are 1-septate, brown, and measure 46-54 × 14-18 µm. For a full description of the species, see Doveri (2004).

Material: Vestfold og Telemark, Horten, Falkensten naturreservat; EU89 UTM32V 578950 6589288 (Lat/Long 10.39183 59.43474); on deer dung; May 4, 2023; leg. BW, KG; det. BW.

Diatrypella angulata (Fr.) Ces. & De Not.
Syn. *Diatrypella nigroannulata* (Grev.) Nitschke

This species grows on *Fagus* twigs and has furrowed perithecial necks, protruding from the initially light-colored cushion-shaped stromata. The most characteristic feature is a ring-shaped, dark zone sometimes visible through the bark around each stroma. It also differs from *D. favacea* with which it is synonymized by some authors in the more protruding and furrowed ostiolar necks. The spore-bearing part of the ascus is over 60 µm long and the ascospores are 5-7(8) µm long. For a

Figure 4. *Cucurbitaria salicina*. Upper photo: ascospores and asci. Lower left photo: cross section of peridium and ascomata. Lower right photos: ascomata on substrate and cross section of ascomata. Photos BW.

full description, se Vasilyeva & Scheuer (1996).

Material: Vestfold og Telemark, Horten, Karljohansvern plante- og dyrefredningsområde, EU89 UTM32V: 584822 6587947 (Lat/Long 10.49478 59.42156); on twig of *Fagus sylvatica*; May 4, 2023; leg. BN; det. HV.

Digitodochium amoenum (Nitschke ex Sacc.) Voglmayr, J.Fourn. & Jaklitsch (Sordariomycetes, Xylariales, Xylariaceae)
Syn. *Anthostoma amoenum* Nitschke ex Sacc.

Digitodochium can be diagnosed by *Lopadostoma*-like pseudostromata overlain by a white disc and ascospores with a lateral germination pore, 3-4 µm diam, conspicuous, usually central. Ascospores (20)21-29.6(33.5) × (8.5)9.2-13(14) µm, aseptate, ellipsoid to narrowly ellipsoid or subcitriform, equilateral, dark brown, with narrowly rounded, frequently slightly pinched ends. The anamorph is highly diagnostic by subhyaline staurosporous conidia consisting of a cylindrical main axis with whorls of lateral branches arising at wide angles from the basal cells of the main axis; conidial masses are produced in yellow-orange acervular conidiomata. The anamorph has been previously recorded from Europe as *Digitodochium rhodoleucum*, which, however, is a distinct species only known from Japan. This is the first time a holomorphic collection is recorded from Norway; an anamorphic Norwegian collection has already been recorded in Voglmayr et al. (2022) and the species is therefore not included in the sum of species new to Norway. For a full description of the species, see Voglmayr et al. (2022). This species seems to be confined to corticated dead twigs of *Fagus sylvatica*, and the anamorph-

telomorph connection has only recently been clarified (Voglmayr et al. 2022).

Material: Vestfold og Telemark, Horten, Karljohansvern plante- og dyrefredningsområde, EU89 UTM32V: 584822 6587947 (Lat/Long 10.49478 59.42156); on *Fagus sylvatica*; May 4, 2023; leg. HV; det. HV.

Hypoxylon julianii L.E. Petrini (Sordariomycetes, Xylariales, Hypoxylaceae)

This seldom collected species is quite similar to the common *H. rubiginosum* but has smaller perithecia and significantly larger ascospores. The perithecia are spherical, (200-)250-320 µm in diameter and the ascospores measure 15-20.4 × 6.2-8.4 µm.

Detailed description, see Pyrenomycetes from southwestern France (2004).

Material: Viken, Asker, Vettre; EU89 UTM32V: 582744 6633639 (Lat/Long 10.47607 59.83214); on *Ulmus glabra* (branch on the ground); May 2, 2023; leg. RA; det. RA, conf. BN.

Lecythothecium duriligni Réblová & Winka (Sordariomycetes, Chaetosphaeriales, Chaetosphaeriaceae), Fig. 5

This species has embedded single perithecia which grow on wood of various deciduous and very rarely also on coniferous trees. It has unitunicate asci with an inamyloid apical ring, and characteristic spores that are fusiform, up to around 40 µm long, 7-septate at maturity, with brown central cells and hyaline end cells, measuring in the studied material (34)35.5-40(41) × (8)8.7-9(9.3) µm.

For a full description of the species, see Reblova & Winka (2001).

Material: Viken, Asker, Spireodden naturreservat; EU89 UTM32V: 583872 6633541 (Lat/Long 10.49615 59.83104); on *Malus domestica*; May 2, 2023; leg. RA; det. RA, BN.

Lentithecium aquaticum Ying Zhang, J. Fourn. & K.D. Hyde (Dothideomycetes, Pleosporales, Lentitheciaceae)

This species has scattered, immersed ascomata that are lenticular with a flattened base. The rounded papilla protrudes slightly above the wood surface which is stained dark grey. The ascospores measure 25-30 × 8-12 µm and are broadly fusiform with broadly rounded ends, inequilateral in side view, hyaline, two-celled, turning four-celled with age, and are encompassed by a conspicuous sheath, 1.5-3 µm thick. For a full description of the species, see Zhang et al. (2008).

Material: Vestfold og Telemark, Horten, Fjugstad naturreservat; EU89 UTM32V 582931 6581330 (Lat/Long 10.45892 59.36253); on *Phragmites australis*; May 3 2023; leg. BW, KG; det. BW.

Leptosphaeria barriae Shoemaker (Dothideomycetes, Pleosporales, Leptosphaeriaceae)

This species has small, immersed black ascomata and 6-septate ascospores that measure about 45-55 × 5-6 µm, and grows on old stems of *Lupinus polyphyllus*. Shoemaker (1984) also described several similar species from this host substrate, e.g. *Leptosphaeria castrensis* and *Leptosphaeria wehmeyeri*, with different ascospore features. New phylogenetic analyses show that this species belongs to family Phaeosphaeriaceae (Mlčoch P., unpublished). For a full description, see Shoemaker (1984).

Material: Vestfold og Telemark, Horten, Fjugstad naturreservat; EU89 UTM32V 582931 6581330 (Lat/Long 10.45892 59.36253); on *Lupinus polyphyllus*; May 3, 2023; leg. PM; det. PM, conf. BN.

Leptosphaeria clavispora J.H. Mill. & Burton (Dothideomycetes, Pleosporales, Leptosphaeriaceae)

This species has subepidermal, globose pseudothecia with a short papilla. The asco-

Figure 5. *Lecythothecium duriligni*. Upper and lower right photos of ascospores. Middle and lower left photos of ascomata on substrate and cross section of ascomata. Photos BW.

spores are clavate to clavate-fusiform, yellowish-brown, 8- to 10-septate, with third and fourth cells from apex enlarged, constricted at first septum, 45-65 × 6.5-8 um. It grows on herbs of the family Asteraceae. According to new molecular analyses this species belongs to the genus *Ophiobolus* (Mlčoch P., unpublished). Se original description in Miller & Burton (1942)

Material: Viken, Asker, Spireodden naturreservat; EU89 UTM32V: 583872 6633541 (Lat/Long 10.49615 59.83104); on *Centaurea jacea*; May 2, 2023; leg. EJ; det. PM, conf. BN.

Leptosphaeria modesta Rabenh. (Dothideomycetes, Pleosporales, Leptosphaeriaceae)
Syn. *Nodulosphaeria modesta* (Rabenh.) Munk ex L. Holm

This species has small blacksubcuticular ascomata and can grow on herbaceous stems of various herbs and the species . It is further characterized by fusoid, hyaline to yellowish, 4- to 5-septate ascospores, 30-36 µm long with 2nd cell enlarged. Polar appendages are often present. For detailed description, see Italian microfungi (2021).

Material: Vestfold og Telemark, Horten, Borrevannet; EU89 UTM32V: 582023 6585510 (Lat/Long 10.44454 59.40024); on herbal stem; May 3, 2023; leg. PM; det. PM.

Lophidium thyridioides Sacc. & Speg. (Dothideomycetes, Pleosporales, Massariaceae), Fig. 6
Syn. *Decaisnella thyridioides* (Sacc. & Speg.) M.E.Barr

This species has embedded shiny black ascomata of about 0,7-1 mm in diam, which break through the substrate with an acute

perithecial opening. The muriform ascospores in the studied material measured (31.5)33.5-38.9(41.5) × (11.3)12-13.6(14.3) µm and had 10-12 transverse and 1-3(4) longitudinal septa. The similar *Decaisnella mesascium* has larger spores (>50 µm length). For a full description, see Barr (1990).

Material: Vestfold og Telemark, Tinn, Austbygda; EU89 UTM32V: 461354 6630988 (Lat/Long 8.31098 59.81481); on wood of *Salix* sp., May 7, 2023; leg. BW, KG; det. BW.

Lophodermium herbarum (Fr.) Fuckel (Leotiomycetes, Rhytismatales, Rhytismataceae)

This species occurs on dead leaves of *Convallaria majalis*. The ascomata are hysterothecial. The asci are cylindrical and 8-spored. Ascospores are hyaline, filiform, and measure ca 55 × 2 um. Se original description in Fuckel (1870).

Material: Vestfold og Telemark, Horten, Falkensten naturreservat; EU89 UTM32V 578950 6589288 (Lat/Long 10.39183 59.43474); on *Convallaria majalis*; May 4, 2023; leg. PM; det. PM.

Massaria conspurcata Sacc. (Dothideomycetes, Pleosporales, Massariaceae)

This species has immersed black depressed subglobose ascomata 0.6-1 mm diam forming under the bark surrounded by a black stromatic zone. It is well characterized by four-spored asci containing brown narrow ascospores (<16 µm wide) with usually paler brown central cells and an occurrence on dead corticated twigs of *Prunus padus* (Voglmayr & Jaklitsch 2011). It is probably not rare, but likely overlooked due to its highly seasonal occurrence in early spring; the material collected was already largely

Figure 6. *Lophidium thyridioides*. Upper left photo of spores. Upper right photo of ascomata on substrate and cross section of ascomata. Lower photos of ascospores in asci. Photos BW.

overmature. For a full description of the species, see Voglmayr & Jaklitsch (2011).

Material: Vestfold og Telemark, Horten, Karljohansvern plante- og dyrefredningsområde; EU89 UTM32V 578822 6587947 (Lat/Long 10.38908 59.42273); on *Prunus padus*; May 4, 2023; leg. HV; det. HV.

Melanconiella flavovirens (G.H.Otth) Voglmayr & Jaklitsch (Sordariomycetes, Diaporthales, Melanconiellaceae)

This species forms circular pseudostromata with 1-15(25) ostioles and an ectostroma which is often yellow-green to olive. The spore ends have up to 1.4 µm long, distinct, knob-like hyaline appendages (Voglmayr et al. 2012). The ascospores are hyaline, ellipsoid or fusoid, 1-septate with no or slight constriction, have one large and many small guttules in each cell and measure (17)20.5-24.5(30) × (7.0)7.5-8.8(9.8) µm. It occurs on dead corticated twigs and branches of *Corylus avellana*.

Material: Vestfold og Telemark, Horten, Falkensten naturreservat; EU89 UTM32V 578950 6589288 (Lat/Long 10.39183 59.43474); on *Corylus avellana*; May 4, 2023; leg. KSK; det. HV.

Nemania chestersii (J.D.Rogers & Whalley) Pouzar (Sordariomycetes, Xylariales, Xylariaceae)

This species has up to 6 cm long, effused, grey to brown stromata with abrupt margins on wood. Ascus annulus 3 × 2.5 µm, blue in Lugol's and Melzer's solutions. Ascospores (12)13-17 × 4.5-5.5(6) µm, ellipsoid to navicular or lunate, with narrowly rounded ends, guttulate, brown and without germ slit. The spore wall is characteristically ornamented with around 20 longitudinal ribs which separates this species from other species in the genus. It occurs on decorticated, decayed wood of *Fagus*, *Fraxinus* and *Quercus*. For a full description of the species, see Granmo et al. 1999.

Material: Vestfold og Telemark, Horten, Karljohansvern plante- og dyrefredningsområde; EU89 UTM32V 578822 6587947 (Lat/Long 10.38908 59.42273); on *Fagus sylvatica* ; May 4, 2023: leg. KSK: det. KSK.

Neocucurbitaria populi Jaklitsch & Voglmayr (Dothideomycetes, Pleosporales, Cucurbitariaceae), Fig. 7

This species grows on attached twigs of *Populus* sp., the black ascomata often somewhat embedded in remnants of bast tissues. Ascospores muriforme (21.9)22.3-25.8 × (9.7)9.9-11(11.4) µm, 7 somewhat irregular transverse septations and mostly 1-2 longitudinal septations, dark brown. For a full description, see Jacklitsch et al. (2017).

Material: Vestfold og Telemark, Rjukan, near Vemork, on attached twigs of *Populus* sp.; May 07, 2023; leg. BW, KG; det. BW.

Nitschkia confertula (Schwein.) Nannf. (Sordariomycetes, Sordariales, Nitschkiaceae)

The ascomata of this species are seated on a thin black subiculum, are turbinate to pulvinate, and become shallowly to deeply cupulate when dry. The spore-bearing part of the asci measure 25-35 × 9-15 µm and the asci taper into a long, thread-like stalk to ca 30 µm in length. The ascospores measure (7.5)8-10 × 3-4.5 µm and are ovoid to ellipsoidal, occasionally more narrowed toward one end, frequently flattened on one side or subreniform, frequently biguttulate and then sometimes appearing pseudoseptate, initially smoky-grey but becoming golden brown, in mass yellowish-brown, smooth. Original description in Nannfeldt (1975) and a detailed description in Fungi of Great Britain and Ireland (2023).

Material: Vestfold og Telemark, Horten, Fjugstad naturreservat; EU89 UTM32V 582931 6581330 (Lat/Long 10.45892 59.36253); on *Lupinus polyphyllus*; May 3,

Figure 7. *Neocucurbitaria populi*. Upper and lower left: ascospores in asci. Lower right: ascomata on substrate and cross section of ascomata. Photos BW.

2023; leg. EJ; det. BW.

Parafenestella pseudosalicis Jaklitsch & Voglmayr (Dothideomycetes, Pleosporales, Cucurbitariaceae), Fig. 8

There are a few closely related species of *Parafenestella* occurring on dead twigs of *Salix*, often on or near old fruitbodies of *Valsa* sp./*Cytospora* sp. They are difficult to separate without sequence data but we here tentatively report two species based on morphological analyses. *P. pseudosalicis* forms scattered ascomata mostly on twigs where the bark has partly degraded or on remnants of bast tissues, very probably on or at least near other pyrenomycetes, likely *Cytospora* sp.

Ascospores muriforme (25.5)26.2-29.5(31.1) × (12.1)12.5-13.5(13.8) µm, dark yellowish brown to dark brown, with 7-10 transverse and quite irregular three longitudinal septa. For a full description, see Jacklitsch & Voglmayr et al. (2019).

Material: Vestfold og Telemark, Tinn, Skinnarbu; EU89 UTM32V: 461354 6630988 (Lat/Long 8.31098 59.81481); on *Salix* sp.; May 7, 2023; leg. BW, KG; det. BW.

Parafenestella salicum Jaklitsch & Voglmayr (Dothideomycetes, Pleosporales, Cucurbitariaceae), Fig. 9

The small ascomata of this species (about 0.4-0.5 mm in diameter) are black, almost globose, and embedded into the substrate (bark and bast tissues). The muriforme ascospores measure (31)31.4-34.5(37) × 13.5-15 µm and are yellowish brown, with 10-15 transverse and 3-4 irregular longitudinal septations. For a full description, see Jacklitsch & Voglmayr et al. (2019).

Figure 8. *Parafenestella pseudosalicis*. Upper left photo of ascomata on substrate. Upper right photo of ascospores. Middle left and lower photos of asci with ascospores. Photos BW.

Material: Vestfold og Telemark, Tinn, Austbygda; EU89 UTM32V: 461354 6630988 (Lat/Long 8.31098 59.81481); on *Salix sp.* on dead *Leucostoma sp.*; May 7, 2023; leg. BW, KG; det. BW.

Plagiostoma geranii (Hollós) Sogonov (Sordariomycetes, Diaporthales, Gnomoniaceae)

This species grows on different species of *Geranium*. The perithecia are oblate, sometimes strongly flattened, immersed in the substrate and with a protruding neck which may be curved or bent. Asci ca 30-40 × 6-10 µm, with a refactive apical ring to ca 2 µm diam. Ascospores ca 13-18 × 1.5-2.5 µm, narrowly fusiform, straight or curved, hardly constricted at the ±central septum, hyaline, thin-walled, the cells containing numerous oil droplets, with a short filiform appendage at one or other, or both ends. For details, see Monod (1983).

Material: Viken, Asker, Spireodden naturreservat; EU89 UTM32V: 583872 6633541 (Lat/Long 10.49615 59.83104); on *Geranium sanguineum*; May 2, 2023; leg. BN, Det. BN & Viken, Asker, Spireodden naturreservat; EU89 UTM32V: 583872 6633541 (Lat/Long 10.49615 59.83104); on *Geranium sanguineum*; May 2, 2023; leg. MA; det. MA.

Plenodomus visci (Sacc.) Gruyter, Aveskamp & Verkley (Dothideomycetes, Pleosporales, Leptosphaeriaceae)

Syn. *Gibberidea visci* Fuckel

This species grows on mistletoe, *Viscum album*. It has subepidermal, later erumpent and densely crowded, black pseudothecia with a shortly papillate ostiole. Asci bitunicate, apically with a small ocular chamber. Ascospores (5-)7-septate, cylindrical to slightly

Figure 9. *Parafenestella salicum*. Upper and lower left photos of ascospores in asci. Middle left photo of ascospores. Lower right photo of ascomata on substrate and cross section of ascomata. Photos BW.

clavate, constricted at the middle, ca 30-40 × 7-8 µm. For details, see Holm (1968) and Crous et al. (2020).

Material: Vestfold og Telemark, Horten, Borrevannet; EU89 UTM32V: 582023 6585510 (Lat/Long 10.44454 59.40024); on *Viscum album* on *Tilia cordata;* May 3, 2023; leg. BN; det. BN.

Pseudohalonectria lignicola Minoura & T.Muroi (Sordariomycetes, Pseudohalonectriaceae)

This species occurs in dead wood in freshwater. It is one of the species in the genus with a long perithecial neck. Ascospores up to ca 70 × 7 µm, weakly pigmented, yellow in mass, with 5-7(11) septa. For a detailed description, see Shearer (1989).

Material: Vestfold og Telemark, Horten, Falkensten naturreservat; EU89 UTM32V 578950 6589288 (Lat/Long 10.44454 59,40024); on deciduous wood in water (ditch); May 4, 2023; leg. RA; det. RA, BN.

Saccardoella separans M.E. Barr (Sordariomycetes incertae sedis), Fig. 10

This species has small, scattered ascomata fully embedded into the substrate, clypeate, in section often higher than broad. The ascospores measure (59.8)62.8-67.8(79) × (7.5)7.6-8.8(8.9) µm, hyaline, with 19-22 transverse distoseptata, one of the middle cells is remarkably larger than the others, all filled with at least one large oil drop. This species was previously reported only from North America. For a full description, see Barr (1994).

Material: Vestfold og Telemark, Tinn, Hovin Kirke; EU89 UTM32V: 500374 6634643 (Lat/Long 9.00667 59.84943); on branch of *Populus tremula*; May 9, 2023; leg. BW, KG; det. BW.

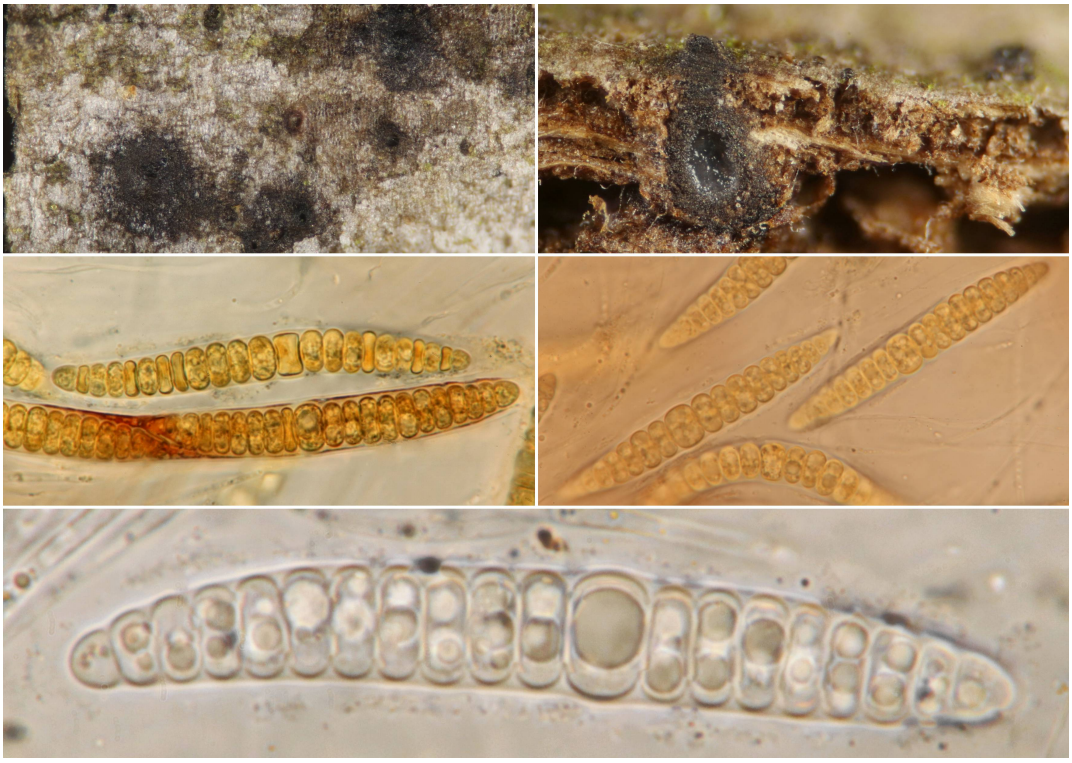

Figure 10. *Saccardoella separans*. Upper photos of ascomata on substrate and in cross section. Middle and lower photos of ascospores. Photos BW.

Septoriella elongata (Wehm.) Y. Marín & Crous (Dothideomycetes, Pleosporales, Phaeosphaeriaceae)

This species has immersed, globose ascomata. The ascospores are narrowly fusiform, straight or slightly curved, reddish-brown, 10-septate and measure 44-52 × 6-7(8) µm. The fourth cell from the top is enlarged (widened) and slightly longer than adjacent cells. The spores also have a conspicuous sheath which is 2-3 µm wide. It is recorded on a variety of grasses. For a full description, see Shoemaker & Babcock (1989) and Felix et al. 2019).

Material: Vestfold og Telemark, Horten, Fjugstad naturreservat; EU89 UTM32V 582931 6581330 (Lat/Long 10.45892 59.36253); on *Phragmites australis*; May 3, 2023; leg. KSK; det. KSK.

Setoseptoria arundinacea (Sowerby) Kaz. Tanaka & K. Hiray. (Dothideomycetes, Pleosporales Lentitheciaceae)

This species has immersed ascomata and occurs on culms of *Phragmites australis*. The ascospores measure 23-40.5 × 3.5-6 µm and are 1- to 2-septate, hyaline and have a uniform sheath. The material fits the description in Tanaka et al. (2015). *S. arundinacea* may consist of several cryptic species with close morphological resemblance. Another slightly differing collection of a similar species was collected by MA in 2021 and the entry needs to be changed into genus level.

Material: Vestfold og Telemark, Horten, Borrevannet; EU89 UTM32V: 582023 6585510 (Lat/Long 10.44454 59.40024); on *Phragmites australis*; May 3, 2023; leg. KSK; det. KSK.

Sphaeropsis visci (Alb. & Schwein.) Sacc. (Dothideomycetes, Botryosphaeriales, Botryosphaeriaceae)

This coelomycete seems to be relatively common on mistletoe *Viscum album*. The black pycnidia occur on leaves and stems and produce oval conidia 34-43 × 14−17 µm (x = 40.1 × 16.7 µm, n = 10) with obtuse to rounded apex, obtuse or truncate base. They are moderately thick-walled, initially hyaline, becoming brown, externally smooth-walled and internally finely verruculose. For a detailed description, see Phillips et al. 2013.

Material: Vestfold og Telemark, Horten, Borrevannet; EU89 UTM32V: 582023 6585510 (Lat/Long 10.44454 59.40024); on *Viscum album*; May 3, 2023; leg. BN, KG; det. BN.

Splanchnonema loricatum (Tul. & C.Tul.) M.E.Barr (Dothideomycetes, Pleosporales, Pleomassariaceae)

This species occurs on corticated twigs of *Fagus sylvatica* primarily in the winter season. It is characterised by pseudothecia embedded in bark and by octosporous cylindrical-clavate asci containing three-celled dark brown ascospores of size 30-50 × 11-18 µm that are asymmetric and surrounded by a thick swelling gelatinous sheath. For a full description, see Barr (1982).

Material: Vestfold og Telemark, Horten, Karljohansvern plante- og dyrefredningsområde; EU89 UTM32V 578822 6587947 (Lat/Long 10.38908 59.42273); on *Fagus sylvatica*; May 4, 2023; leg. HV; det. HV.

Stylonectria wegeliniana (Rehm) Gräfenhan, Voglmayr & Jaklitsch (Sordariomycetes, Hypocreales Nectriaceae)

This species has semi-immersed orange-red to red perithecia and is found on dead twigs of *Ulmus* spp., where it is associated with the pyrenomycete *Hapalocystis bicaudata*, a species that in Norway was first found in 2014 (Nordén et al. 2015). *S. wegeliniana* resembles *S. norvegica* but has larger, verruculose ascospores. For a full description, see Gräfenhan et al. (2011).

Material: Vestfold og Telemark, Horten, Falkensten naturreservat; EU89 UTM32V 578950 6589288 (Lat/Long 10.44454 59,40024); on *Hapalocystis bicaudata*/ *Ulmus glabra*; May 4, 2023: leg. RA; det. RA.

Synfenestella sorbi (P.Karst.) Jaklitsch & Voglmayr (Dothideomycetes, Pleosporales, Cucurbitariaceae), Fig. 11

This species occurs on dead twigs of *Sorbus aucuparia*, where it typically grows in old leucostoma-type fruitbodies of *Valsa* sp. (*Leucostoma* sp.). It has been recorded from Europe and North America so far, and probably the record from Norway is the most northern find in Europe.

Ascospores muriforme (26.6)-29.5(32.2) × (12.5)13.9-15.5(16.5) µm, yellowish brown, up to 7 transverse and 2-3 longitudinal septa; Asci 200-220 x 18-20 µm, 4-8 spored. For a full description of the species, see Jaklitsch & Voglmayr (2020).

Material: Vestfold og Telemark, Tinn, Austbygda; EU89 UTM32V: 461354 6630988 (Lat/Long 8.31098 59.81481); on *Sorbus aucuparia* on dead *Leucostoma* sp.; May 7, 2023; leg. BW, KG; det. BW.

DISCUSSION

Ascomycota is the most abundant and diverse fungal phylum, but its members are still poorly known in Norway. There are new country records of Ascomycota species, and even new species to science, waiting to be discovered in every vegetated habitat. The problem is to find and to identify them, something that requires training and experience.

However, this is not an insurmountable problem, and the question is why so few mycologists are interested in pyrenomycetoid Ascomycota. This group of fungi is very diverse

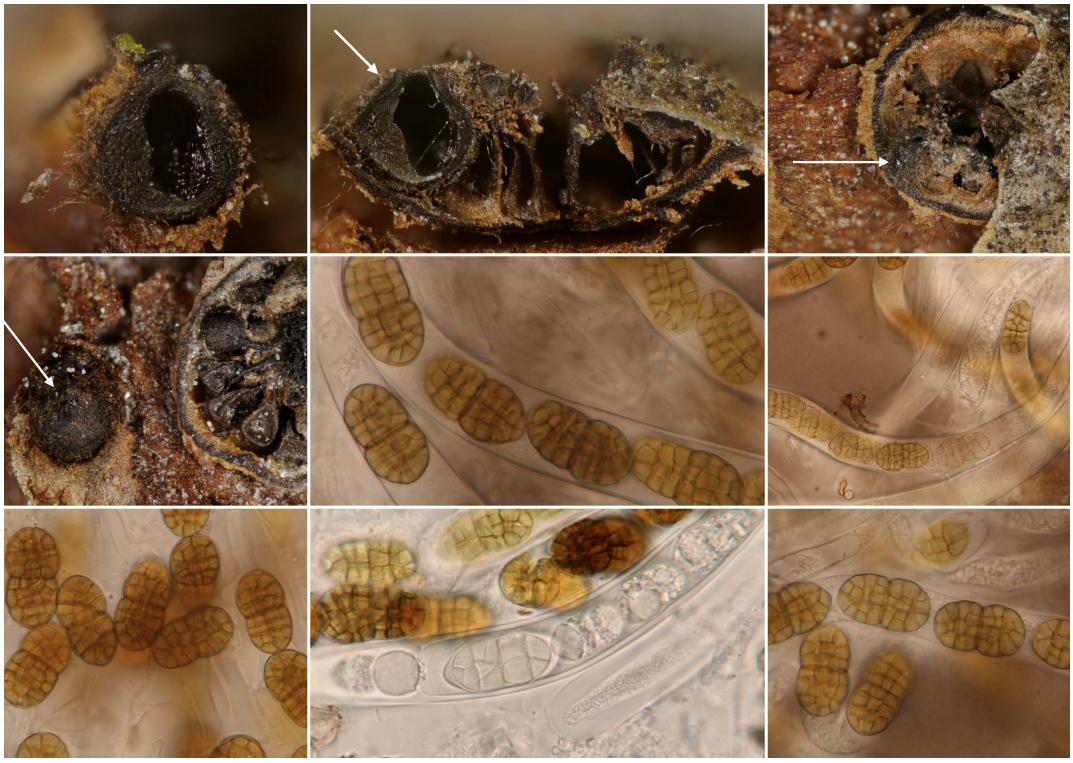

Figure 11. *Synfenestella sorbi*. Upper and middle left photos: ascomata on substrate and in cross section. Middle center, middle right and lower photos: ascospores and asci. Photos BW.

and present great morphological variation, and the species are easy to collect and store (you just dry them in room temperature, and this doesn't cause them to change).

Compared to other non-lichenized and non lichen associated taxa, the knowledge of pyrenomycetoid fungi is very poor and for instance lichenized Ascomycota are much better known. An illustration of this is that biodiversity mapping projects on lichenized Ascomycota found significantly fewer new species to Norway in comparison (Table 2). We therefore hope that more professional and amateur mycologists will take part in future surveys of poorly studied taxa of non-lichenized Ascomycota.

In addition to the species presented here, at least six species were found to be new to science and these will be taxonomically described by us or other mycologists.

It seems clear that not enough attention has been paid to pyrenomycetoid Ascomycota in Southern Norway despite several successful projects. The result from our workshop was similar to previous workshops supporting the need for additional mapping of these megadiverse and interesting fungi.

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Table 2. Number of species new to Norway identified by completed biodiversity mapping projects on fungi and bryophytes funded by the Norwegian Biodiversity Information Centre (Artsdatabanken). Information on the success of previous fungal and other cryptogam biodiversity mapping projects was gathered from https://www.artsdatabanken.no/Pages/199779/Sopp_og_lav) and https://www.artsdatabanken.no/Pages/199785/Moser_og_pseudosopper.

Taxon/guild	Proj. nb.	Years	Number of species new to Norway	Comment
Bitunicate Ascomycota on bark and wood	32-17	2018-2021	100	
Sordariomycetes in broadleaf forest	58-12	2013-2015	89	
Endophytic fungi in sapwood	23-19	2018-2021	62	
Cortinarius	63-10	2011-2013	60	
Jelly fungi	44-15	2016-2018	57	
Ascomycetes in Finnmark	56-09	2010-2013	57	Finnmark province
Bryophilous fungi	42-13	2014-2016	32	
Entoloma	50-14	2015-2017	30	
Hypogeous fungi	67-10	2011-2013	29	No exact figure given, but less than 30
Lichenized fungi and their parasites	34-16	2017-2020	29	Rain forest
Corticioid fungi on spruce logs	59-12	2013-2016	25	
Lecideoide skorpelav - Fase III	46-14	2015-2016	23	Of these 18 undescribed
Ramaria	59-09	2010-2012	22	
Helvella	45-15	2016-2018	20	
Ophiostoma	51-14	2015-2017	14	
Alpine bryophytes	22-19	2019-2022	12	
Bryophytes in poorly studied nature types	61-10	2011-2013	6	
Lecideoide lichenized fungi I-II	55-09, 57-12	2010-2013	5	
Cortinarius on Svalbard	18-18	2019-2020	4	Svalbard
Levermoser på Vestlandet	61-12	2013-2016	3	
Archeorhizo-mycetes	4-20	2020-2023	0	Genetic variants found, but no new species described.
Thelephorales	54-09	2010-2013	0	

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