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RESEARCH ARTICLE

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Key words

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Abstract Novel species of fungi described in this study include those from various countries as follows: **Algeria**, *Phaeoacremonium adelophialidum* from *Vitis vinifera.* **Antarctica**, *Comoclathris antarctica* from soil. **Australia**, *Coniochaeta salicifolia* as endophyte from healthy leaves of *Geijera salicifolia*, *Eremothecium peggii* in fruit of *Citrus australis*, *Microdochium ratticaudae* from stem of *Sporobolus natalensis*, *Neocelosporium corymbiae* on stems of *Corymbia variegata*, *Phytophthora kelmanii* from rhizosphere soil of *Ptilotus pyramidatus*, *Pseudosydowia backhousiae* on living leaves of *Backhousia citriodora*, *Pseudosydowia indooroopillyensis*, *Pseudosydowia louisecottisiae* and *Pseudosydowia queenslandica* on living leaves of *Eucalyptus* sp. **Brazil**, *Absidia montepascoalis* from soil. **Chile**, *Ilyonectria zarorii* from soil under *Maytenus boaria*. **Costa Rica**, *Colletotrichum filicis* from an unidentified fern. **Croatia**, *Mollisia endogranulata* on deteriorated hardwood. **Czech Republic**, *Arcopilus navicularis* from tea bag with fruit tea, *Neosetophoma buxi* as endophyte from *Buxus sempervirens*, *Xerochrysium bohemicum* on surface of biscuits with chocolate glaze and filled with jam. **France**, *Entoloma cyaneobasale* on basic to calcareous soil, *Fusarium aconidiale* from *Triticum aestivum*, *Fusarium juglandicola* from buds of *Juglans regia.* **Germany**, *Tetraploa endophytica* as endophyte from *Microthlaspi perfoliatum* roots. **India**, *Castanediella ambae* on leaves of *Mangifera indica*, *Lactifluus kanadii* on soil under *Castanopsis* sp., *Penicillium uttarakhandense* from soil. **Italy**, *Penicillium ferraniaense* from compost. **Namibia**, *Bezerromyces gobabebensis* on leaves of unidentified succulent, *Cladosporium stipagrostidicola* on leaves of *Stipagrostis* sp., *Cymostachys euphorbiae* on leaves of *Euphorbia* sp., *Deniquelata hypolithi* from hypolith under a rock, *Hysterobrevium walvisbayicola* on leaves of unidentified tree, *Knufia hypolithi* and *Knufia walvisbayicola* from hypolith under a rock, *Lapidomyces stipagrostidicola* on leaves of *Stipagrostis* sp., *Nothophaeotheca mirabibensis* (incl. *Nothophaeotheca* gen. nov.) on persistent inflorescence remains of *Blepharis obmitrata*, *Paramyrothecium salvadorae* on twigs of *Salvadora persica*, *Preussia procaviicola* on dung of *Procavia* sp., *Sordaria equicola* on zebra dung, *Volutella salvadorae* on stems of *Salvadora persica*. **Netherlands**, *Entoloma ammophilum* on sandy soil, *Entoloma pseudocruentatum* on nutrient poor (acid) soil, *Entoloma pudens* on plant debris, amongst grasses. **New Zealand**, *Amorocoelophoma neoregeliae* from leaf spots of *Neoregelia* sp., *Aquilomyces metrosideri* and *Septoriella callistemonis* from stem discolouration and leaf spots of *Metrosideros* sp., *Cadophora neoregeliae* from leaf spots of *Neoregelia* sp., *Flexuomyces asteliae* (incl. *Flexuomyces* gen. nov.) and *Mollisia asteliae* from leaf spots of *Astelia chathamica*, *Ophioceras freycinetiae* from leaf spots of *Freycinetia*

Abstract (cont.)

banksii, *Phaeosphaeria caricis-sectae* from leaf spots of *Carex secta.* **Norway**, *Cuphophyllus flavipesoides* on soil in semi-natural grassland, *Entoloma coracis* on soil in calcareous *Pinus* and *Tilia* forests, *Entoloma cyaneolilacinum* on soil semi-natural grasslands, *Inocybe norvegica* on gravelly soil. **Pakistan**, *Butyriboletus parachinarensis* on soil in association with *Quercus baloot.* **Poland**, *Hyalodendriella bialowiezensis* on debris beneath fallen bark of Norway spruce *Picea abies.* **Russia**, *Bolbitius sibiricus* on a moss covered rotting trunk of *Populus tremula*, *Crepidotus wasseri* on debris of *Populus tremula*, *Entoloma isborscanum* on soil on calcareous grasslands, *Entoloma subcoracis* on soil in subalpine grasslands, *Hydropus lecythiocystis* on rotted wood of *Betula pendula*, *Meruliopsis faginea* on fallen dead branches of *Fagus orientalis*, *Metschnikowia taurica* from fruits of *Ziziphus jujube*, *Suillus praetermissus* on soil, *Teunia lichenophila* as endophyte from *Cladonia rangiferina.* **Slovakia**, *Hygrocybe fulgens* on mowed grassland, *Pleuroflammula pannonica* from corticated branches of *Quercus* sp. **South Africa**, *Acrodontium burrowsianum* on leaves of unidentified *Poaceae*, *Castanediella senegaliae* on dead pods of *Senegalia ataxacantha*, *Cladophialophora behniae* on leaves of *Behnia* sp., *Colletotrichum cliviigenum* on leaves of *Clivia* sp., *Diatrype dalbergiae* on bark of *Dalbergia armata*, *Falcocladium heteropyxidicola* on leaves of *Heteropyxis canescens*, *Lapidomyces aloidendricola* as epiphyte on brown stem of *Aloidendron dichotomum*, *Lasionectria sansevieriae* and *Phaeosphaeriopsis sansevieriae* on leaves of *Sansevieria hyacinthoides*, *Lylea dalbergiae* on *Diatrype dalbergiae* on bark of *Dalbergia armata*, *Neochaetothyrina syzygii* (incl. *Neochaetothyrina* gen. nov.) on leaves of *Syzygium chordatum*, *Nothophaeomoniella ekebergiae* (incl. *Nothophaeomoniella* gen. nov.) on leaves of *Ekebergia pterophylla*, *Paracymostachys euphorbiae* (incl. *Paracymostachys* gen. nov.) on leaf litter of *Euphorbia ingens*, *Paramycosphaerella pterocarpi* on leaves of *Pterocarpus angolensis*, *Paramycosphaerella syzygii* on leaf litter of *Syzygium chordatum*, *Parateichospora phoenicicola* (incl. *Parateichospora* gen. nov.) on leaves of *Phoenix reclinata*, *Seiridium syzygii* on twigs of *Syzygium chordatum*, *Setophoma syzygii* on leaves of *Syzygium* sp., *Starmerella xylocopis* from larval feed of an Afrotropical bee *Xylocopa caffra*, *Teratosphaeria combreti* on leaf litter of *Combretum kraussii*, *Teratosphaericola leucadendri* on leaves of *Leucadendron* sp., *Toxicocladosporium pterocarpi* on pods of *Pterocarpus angolensis.* **Spain**, *Cortinarius bonachei* with *Quercus ilex* in calcareus soils, *Cortinarius brunneovolvatus* under *Quercus ilex* subsp. *ballota* in calcareous soil, *Extremopsis radicicola* (incl. *Extremopsis* gen. nov.) from root-associated soil in a wet heathland, *Russula quintanensis* on acidic soils, *Tubaria vulcanica* on volcanic lapilii material, *Tuber zambonelliae* in calcareus soil. **Sweden**, *Elaphomyces borealis* on soil under *Pinus sylvestris* and *Betula pubescens.* **Tanzania**, *Curvularia tanzanica* on inflorescence of *Cyperus aromaticus.* **Thailand**, *Simplicillium niveum* on *Ophiocordyceps camponoti-leonardi* on underside of unidentified dicotyledonous leaf. **USA**, *Calonectria californiensis* on leaves of *Umbellularia californica*, *Exophiala spartinae* from surface sterilised roots of *Spartina alterniflora*, *Neophaeococcomyces oklahomaensis* from outside wall of alcohol distillery. **Vietnam**, *Fistulinella aurantioflava* on soil. Morphological and culture characteristics are supported by DNA barcodes.

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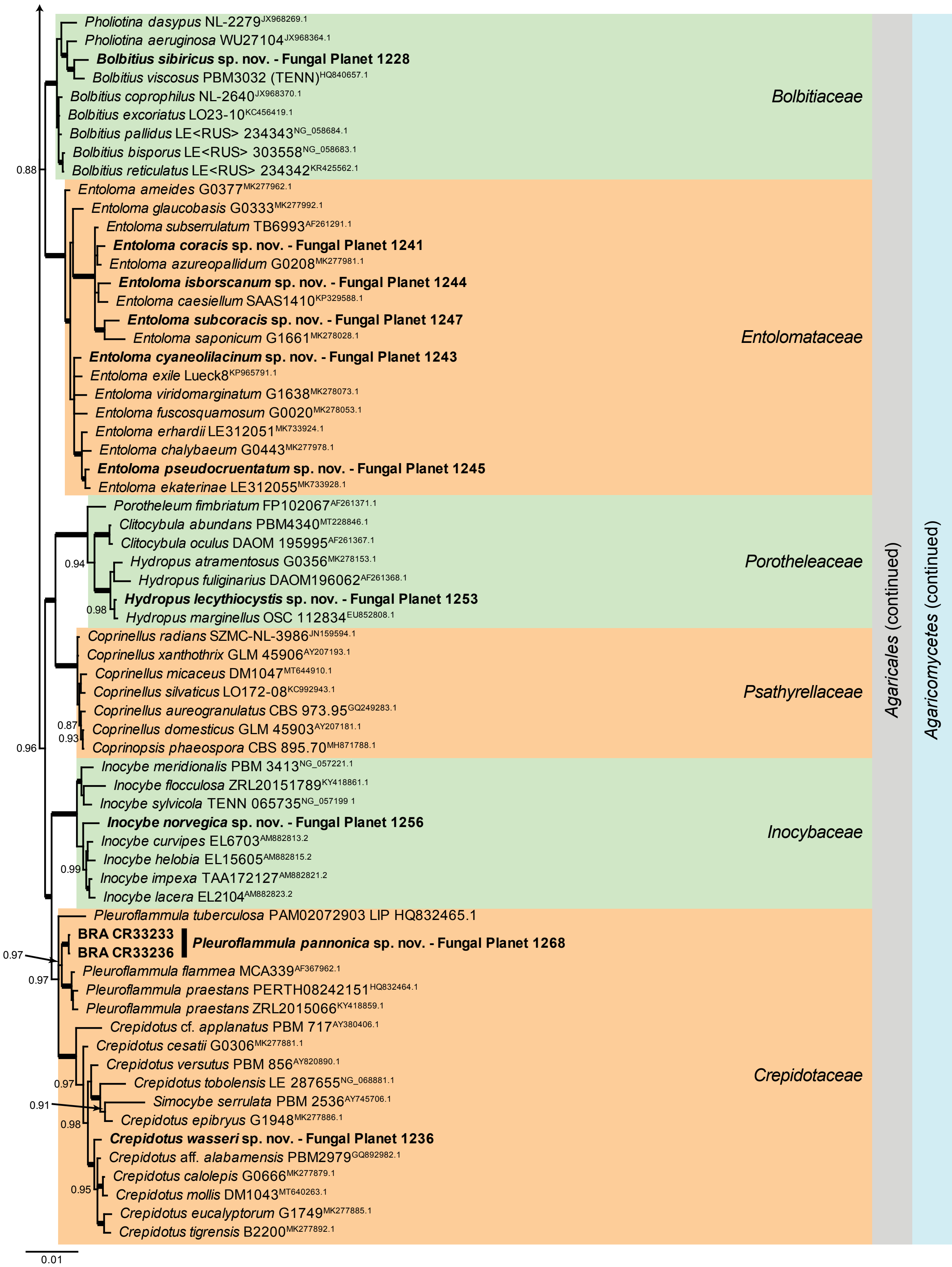

Overview *Agaricomycetes* phylogeny (cont.) – part 3


Entoloma ammophilum

Fungal Planet 1240 – 13 July 2021

Entoloma ammophilum G.M. Jansen, Dima, Noordel. & Vila, *sp. nov.*

Etymology. Referring to the habitat on sandy soil (from άμμος, Greek, – sand, and φιλέω, Greek, – to like).

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata medium-sized, collybioid. *Pileus* 10–20(–35) mm diam, convex to convex flattened, umbilicate, not distinctly hygrophanous, dark brown or grey brown with blackish brown centre, deeply translucently striate up to centre, minutely squamulose at centre, more or less glabrous towards margin. *Lamellae*, L = about 30, l = 3–5, deeply emarginate, ventricose, pink with eroded, concolorous edge. *Stipe* 30–50 × 1–2 mm, cylindrical, bicolored, steel-blue in lower part, brown above, polished. *Smell* and *taste* not noted. *Spores* heterodiametrical, 9.5–11.5 × 7–8.5 µm, av. 10.4 × 7.8 µm, Q = 1.1–1.55, Qav = 1.25, regularly 5–7-angled. *Basidia* 4-spored, clavate, up to 45 × 15 µm, clampless. *Lamella edge* fertile, cystidia absent. *Pileipellis* a cutis at margin, trichoderm-like at centre, made up of clavate terminal elements, up to 20 µm wide. *Pigment* intracellular-granular, brown. *Clamp connections* absent in all tissues.

Habitat & Distribution — Terrestrial on sandy soil, in small groups in moist dune valley with *Salix repens* on calcareous sandy-clayey soil, or in sandy soil of riverbanks, under *Populus nigra* and *Alnus glutinosa*. Known from the Netherlands and Spain.

Typus. The Netherlands, Prov. Zeeland, Dreischor, 22 Oct. 2016, *G.M. Jansen* C160-4418 (holotype L0608224, ITS sequence GenBank MW934591, MycoBank MB 839221).

Additional material examined. Spain, Barcelona, Vallès Oriental, Can Romegosa, Sant Fost de Campsentelles, alt. 140 m, 24 Oct. 2010, under *Populus nigra* and *Alnus glutinosa*, on sandy soil, *F. Caballero* & *J. Vila*, SFC 101024-05 (L0607606, ITS sequence GenBank MW934592).

Notes — *Entoloma ammophilum* has a characteristic dark brown or brown grey pileus and a polished, bicoloured stipe. It differs from *E. glaucobasis*, which frequently occurs in the same habitat, by the polished nature of the stipe, and fertile lamellae edge. Furthermore, *E. glaucobasis* is phylogenetically rather distant in the /Griseocyaneum clade. Within the /Sarcitulum clade, this species resembles *E. montanum*, which may superficially look similar, but differs clearly in having a sterile, often brown coloured lamella edge, and alpine or boreal distribution.

Colour illustrations. The Netherlands, Prov. Zeeland, Dreischor (type locality). Spores and pileipellis (from holotype); basidiomata *in situ* (holotype). Scale bars = 1 cm (basidiomata), 10 µm (spores and microstructures).

Supplementary material

FP1240 Phylogenetic tree derived from Maximum Likelihood analysis based on nrITS1-5.8S-ITS2 data. Analysis was performed in PhyML v. 3.0 (Guindon et al. 2010) using the non-parametric Shimodaira-Hasegawa version of the approximate likelihood-ratio test (SH-aLRT) and the GTR+I+Γ model of evolution. ML bootstrap support values are shown at the nodes (BS > 50 %).

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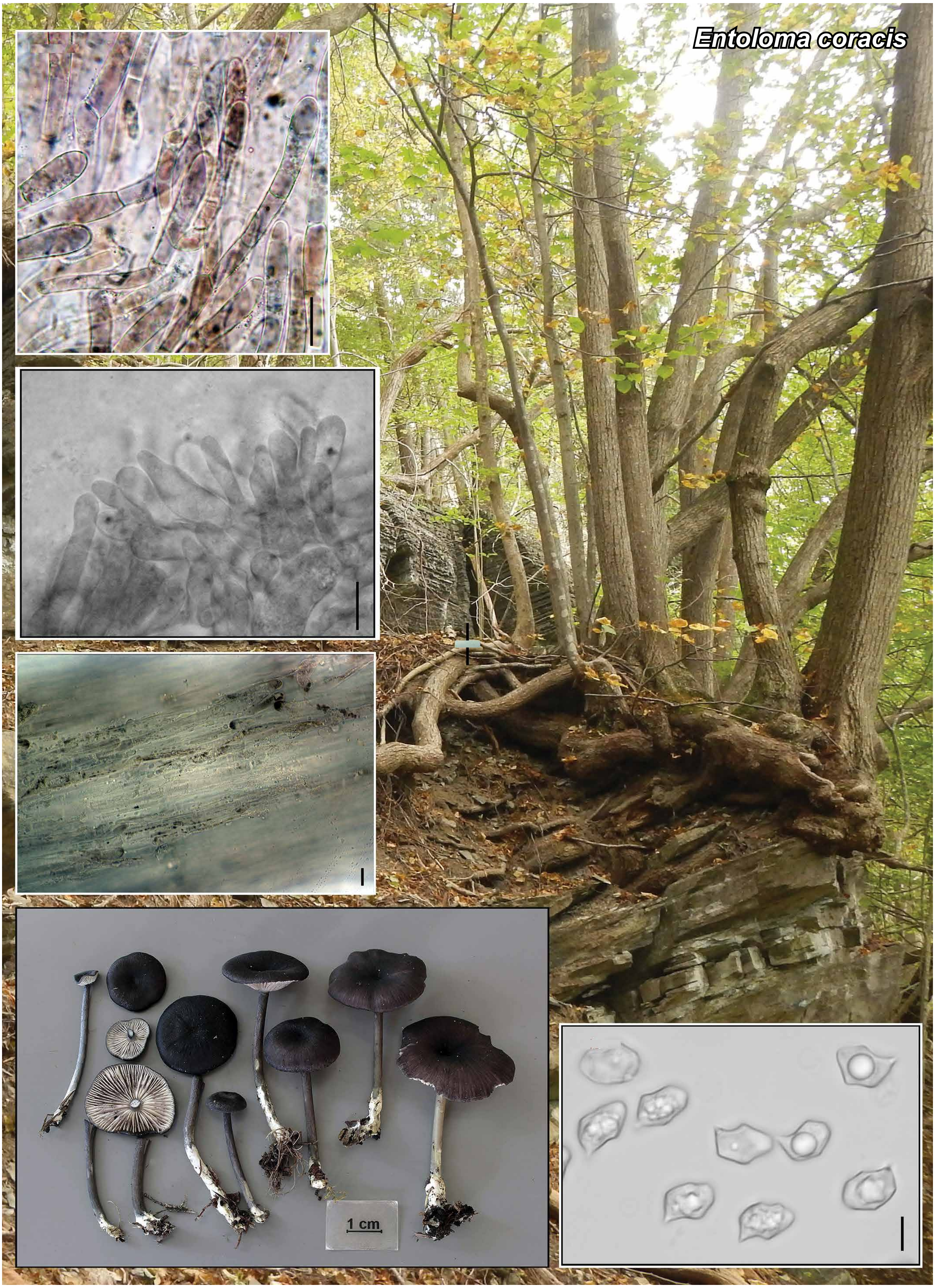
Entoloma coracis
1 cm

Fungal Planet 1241 – 13 July 2021

Entoloma coracis Brandrud, Dima, Noordel., G.M. Jansen & Vila, *sp. nov.*

Etymology. The epithet refers to the dark blackish to violaceous black colour of the basidiomata, like plumage of a raven (*Corvus corax*).

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata medium-sized, collybioid. *Pileus* 10–35 mm, hemispherical to convex expanding plano-convex with involute then deflexed margin, with depressed, rarely umbilicate centre, not hygrophanous, not translucently striate, initially very dark blackish to violaceous black, with age the bluish tinges fade away, leaving the pileus very dark brownish black, violaceous black or porphyry brown, uniformly coloured, not or slightly pallescent on maturing, entirely tomentose and staying so during development or breaking up in small squamules. *Lamellae*, L = 20–30, l = 1–3, moderately distant, adnate-emarginate or with decurrent tooth, segmentiform to subventricose, white, then with pale pink tinge, with irregular, usually with concolorous edge; rarely spotted black from the start, or becoming spotted blackish with age. *Stipe* 20–80 × 3–7 mm, relatively long and stout, initially violaceous grey, fading to pale bluish grey, sometimes developing a lilac-pink tinge, much paler than the pileus, not polished, but covered with blue to violaceous longitudinal fibrils, sometimes scaly-flocculose at apex, especially in rainy conditions, fibrils with same colour or contrastingly darker than background, with abundant white basal mycelium. *Context* white. *Smell* insignificant, *taste* not recorded. *Spores* 8.5–12.5 × 5.5–7.5 µm, av. 9.5–11 × 6–6.5 µm, Q = 1.3–1.7, Qav = 1.3–1.4, heterodiametrical, with 5–7 rather pronounced and sharp angles. *Basidia* 4-spored, claviform, 28.5–41 × 8–13.5 µm, clampless. *Lamella edge* sterile, consisting of a strand of hyphae with clustered cheilocystidia (serrulatum-type) with rather pronounced often somewhat tapering cheilocystidia, 5–15 µm wide, usually not pigmented, but occasionally becoming bluish black with age. *Hymenophoral trama* regular, made up of cylindrical to inflated hyphae, 11–25 µm wide. *Pileipellis* a cutis with transitions to a trichoderm, of clavate, septate, terminal elements, 50–110 × 8–19 µm. *Pigment* intracellular, brown. *Brilliant granules* sparse to abundant. *Clamp connections* absent.

Habitat & Distribution — Saprotrophic, calciphilous or acidophilous. In Norway mainly in open, calcareous *Pinus* and *Tilia* forests, but also in naturally open, steppe-like, thermophilous grassland/shrubland on shallow-soil limestone rocks, and once also recorded in grassland and shrub vegetation on limestone. In South Europe in Mediterranean thermophilous areas, under *Quercus ilex*, *Cistus monspeliensis* or *Pinus halepensis*, also known in the Canary Islands, on woods with *Laurus novocanariensis*, *Pinus radiata* and *Cistus symphytifolius*. Known from Norway, France, Spain and Austria, but certainly more widespread in Europe.

Colour illustrations. Norway, Telemark, Porsgrunn, Frierflogene NR, calcareous dry grassland/margin of calcareous pine forest (type locality). Spores, cheilocystidia, pileipellis, stipitipellis (all from holotype); basidiomata *in situ* (holotype). Scale bars = 1 cm (basidiomata), 10 µm (spores and microstructures).

Typus. Norway, Telemark, Porsgrunn, Frierflogene NR, near bridge, calcareous, dry grassland/margin of calcareous pine forest, 14 Sept. 2019, *T.E. Brandrud*, *B. Dima & R. Solvang*, TEB 381-19 (holotype O-F-256850, ITS and LSU sequences GenBank MW934571 and MW934251, MycoBank MB 839222).

Additional materials examined. Austria, Tirol, Ehrwald, 28 Aug. 2018, *Rainer Wald* (L0608002, ITS sequence GenBank MW934578). – France, Dordogne, Sanilhac, route de Lafaye, on soil with *Mycenella bryophila*, 241 m a.s.l., 6 Nov. 2019, *G. Eyssartier* (GE 19027, ITS sequence GenBank MW934581). – Norway, Nordland, Alstahaug, Altra, 10 m a.s.l., calcareous pasture, 18 Sept. 2004, *D. Pettersen*, *A.B. Stærnes*, *J.B. Jordal*, *A. Knutsen* & *P. Fadnes* (O-F-67255, ITS sequence GenBank MW934572); Trøndelag, Snåsa, Bergsåsen Nature Reserve, calcareous pine forest, 2 Sept. 2009, *E. Bendiksen* & *K. Bendiksen* KB&EB51/09 (O-F-252053, ITS sequence GenBank MW934574); Steinkjer, Kvam, Aunvolltangen, 60 m a.s.l., old calcareous *Picea* forest, 3 Sept. 2010, *H. Holien* & *T.E. Brandrud*, *U.-B. Bøe*, *A. Molia* HH 57/10 (O-F-293335, ITS sequence GenBank MW934575); Telemark, Bamble, Baneåsen Nature Reserve, calcareous *Tilia* forest, 7 Sept. 2015, *B. Dima* & *T.E. Brandrud* TEB 244-15 (O-F-251952, ITS sequence GenBank MW934573); Bamble, Røsskleiva Nature Reserve SE, in calcareous *Fraxinus-Corylus* forest, 8 Sept. 2015, *T.E. Brandrud* & *B. Dima* TEB 279-15 (O-F-254580, ITS sequence GenBank MW934576); Porsgrunn, Blekebakken Nature Reserve, calcareous *Pinus* forest, 25 Sept. 2015, *T.E. Brandrud* & *B. Dima* TEB 557-15 (O-F-254614, ITS sequence GenBank MW934577); Vestfold, Larvik, Løvallåsen, calcareous grassland, 9 Oct. 2013, *T. Læssøe* & *A. Molia* AM-245ø-2013 (O-F-21892, ITS sequence GenBank MW934579). – Spain, Girona, Can Cofi, 1 June 2013, *P. Carbo* 20130601 (L0608020, ITS sequence GenBank MW934580).

Notes — *Entoloma coracis* is one of the *E. corvinum* lookalikes, with its very dark, opaque, tomentose pileus, white lamellae, and fibrous stipe. *Entoloma aranense* is a sister species of *E. coracis*, less robust, paler, with a lilac-bluish tinged pileus when young, later brown and fibrillose, and a typical subalpine-alpine habitat. Microscopically the differences are minimal. *Entoloma porphyrogriseum* is also closely related, but differs, e.g., in smaller spores, and not so persistently dark pileus. Phylogenetically (see the phylogenetic tree for *E. ammophilum* in Supplementary material FP1240), these three species are rather distant from *E. corvinum* s.str., as we now interpret it, and they differ from *E. coracis*, morphologically by the narrower, more sharply angled spores, the serrulatum-type lamella edge, and the habitat. *Entoloma corvinum* is an alpine species, like the similar *E. erhardii*, which differs by having smaller spores, and a polished stipe.

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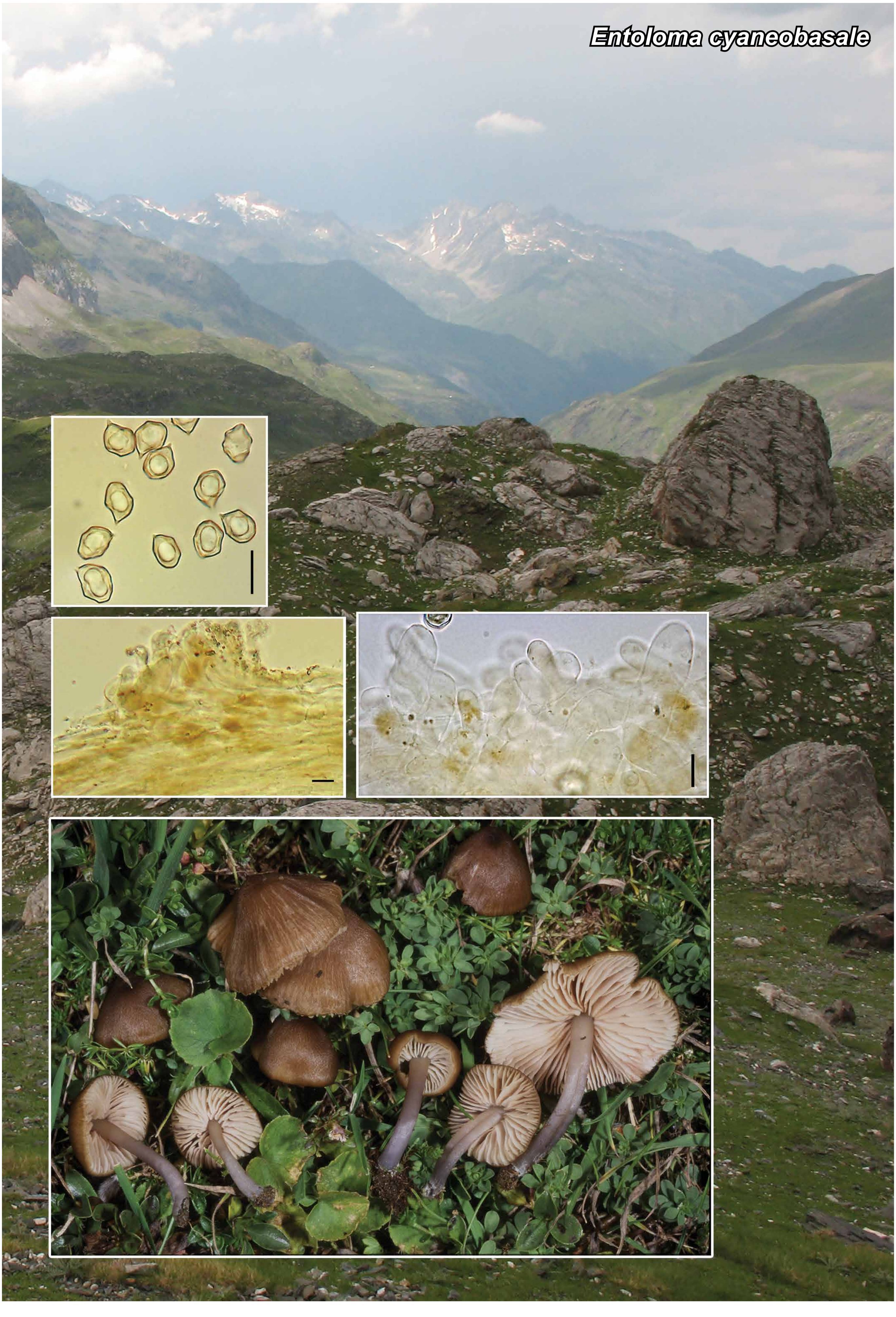
Entoloma cyaneobasale

Fungal Planet 1242 – 13 July 2021

Entoloma cyaneobasale Corriol, Dima & Noordel., *sp. nov.*

Etymology. The epithet refers to the blue colour in the base of the stipe (from '*cyaneus'*, Greek – dark blue, and '*basis'*, Greek – base).

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata medium-sized, collybioid. *Pileus* 20–40 mm diam, campanulate to convex with incurved margin, then bluntly conico-convex to convex with more or less lobed margin, brown (near 7.5YR3/4) then brown-yellow (10 YR 5.4; Munsell 1954), darker at centre, distinctly hygrophanous (drying to 10 YR 7/3), nearly opaque with only slight striation at margin, entirely fibrillose to sub-squamulose. *Lamellae* rather distant, deeply emarginate, straight to ventricose, whitish, then pink, with slightly eroded, brown edge. *Stipe* up to 45 × 4.5 mm, cylindrical, or quite often compressed with groove, initially blue-grey at base (2.5 / PB), and pale greyish at apex (10 YR 7–6/2), typically bicoloured, quickly fading, nearly polished, but with fine fibrillose striation over whole length, with white mycelial base. *Context* whitish. *Smell* and *taste* not noted. *Spores* (9–)9.5–11(–11.5) × (7–)7.5–8.5(–9) µm, av. 10 × 8 µm, Q = (1.1–)1.15–1.4, Qav = 1.3, shortly heterodiametrical, with 6–8 weak angles, thick-walled, with granular content. *Basidia* 22–30 × 10–12 µm, 4-spored, shortly cylindrico-clavate to ventricose, with 3–4 µm long sterigmata, clampless. *Lamellae edge* sterile, of serrulatum-type, made up of septate cheilocystidia, with terminal elements 35–55 × 9–13 µm, with brown, intracellular pigment. *Pleurocystidia* not observed. *Subhymenium* branched. *Pileipellis* a trichoderm, with clavate terminal elements, often in clusters, with brown, diffuse, intracellular pigment. *Subpellis* with concentrated brown intracellular pigment, with abundant brilliant granules and mixed with refringent lactiferous hyphae. *Clamp connections* absent.

Habitat & Distribution — Terrestrial in alpine snowbed on basic to calcareous soil, together with *Dryas* and *Salix* species. Known from France and Italy.

Typus. France, Pyrenées-Atlantiques, Eaux-Bonnes, cirque du Plaa Ségouné, Gourette, 2 400 m a.s.l., 30 Aug. 2002, *G. Corriol* (holotype GC02083008 in BBF, ITS sequence GenBank MW934560, MycoBank MB 839223).

Additional materials examined. Italy, Trentino-Alto Adige, Passo dello Stelvio/Stilfser Joch, near Berghotel Franzenshöhe, alpine grassland with *Dryas* and *Salix* spp., 2 200 m a.s.l., 30 July 2018, *B. Dima*, DB-2018-07-30-1 (ITS sequence GenBank MW934561).

Colour illustrations. France, Pyrenee-Atlantiques, Eaux-Bonns, cirque du Plaa Ségouné à Gourette, 2 400 m a.s.l., calcareous alpine snowbeds on the northern slope of Pyrenees. Spores; cheilocystidia; pileipellis; stipitipellis (all from holotype); basidiomata *in situ* (holotype). Scale bars = 1 cm (basidiomata), 10 µm (spores and microstructures).

Notes — *Entoloma cyaneobasale* falls within the /Mediterraneense clade (see the phylogenetic tree for *E. ammophilum* in Supplementary material FP1240). In the field, these collections were readily identified as *E. glaucobasis* on account of the bicoloured stipe. However, the spores are smaller, the stipe is more polished, and it has a lamella edge of the serrulatum-type with brown pigment. *Entoloma glaucobasis* is also phylogenetically distant, and belongs to the /Griseocyaneum clade.

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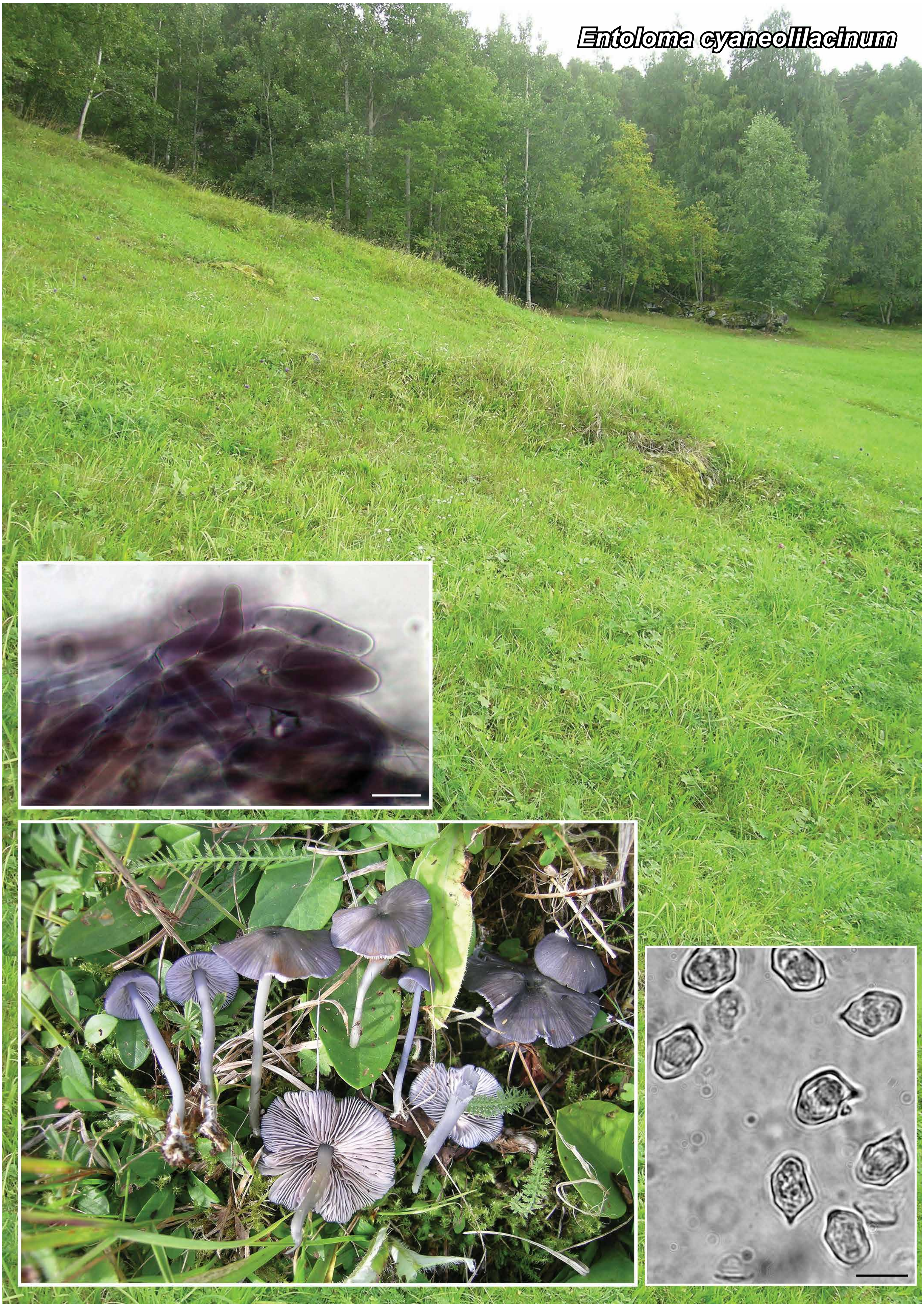
Entoloma cyaneolilacinum

Fungal Planet 1243 – 13 July 2021

Entoloma cyaneolilacinum Noordel., J.B. Jordal, Brandrud & Dima, *sp. nov*.

Etymology. The epithet refers to the colours of the basidiocarps, from '*cyaneus*', Greek, – blue, and '*lilacinus*' – lilac.

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata medium-sized, collybioid. *Pileus* 10–25 mm, conico-convex or campanulate-conical, slightly expanding, finally plano-convex, with deflexed then straight margin, not distinctly hygrophanous, deep blue then paler lilac-blue with a slightly darker spot at centre, deeply translucently striate, at first finely radially fibrillose to faintly tomentose, breaking up in small squamules in central part, radially fibrillose to almost smooth towards margin. *Lamellae* moderately distant, deeply emarginate, ventricose, white or with a faint bluish tinge, contrasting with blue pileus and stipe, with entire, concolorous edge. *Stipe* 30–50 × 2–3 mm, cylindrical, deep blue then lilac-blue, concolorous with margin of pileus or paler, glabrous, smooth, polished, with some white mycelium at base, once observed with yellow (discoloured?) mycelium. *Smell* and *taste* not indicated. *Spores* (7.5–)8.0–10.0(–11.0) × 6.0–8.5 µm, av. 8.5–9.5 × 6.5–8.0 µm, Q = 1.2–1.6, Qav = 1.4, heterodiametrical, 5–7-angled in side-view. *Basidia* 30–50 × 8–12 µm, 4-spored, clampless. *Lamella* edge fertile. *Cystidia* absent. *Hymenophoral trama* regular, made up of inflated elements, up to 20 µm wide. *Pileipellis* a transition between a cutis and a trichoderm, made up of clavate terminal elements, 22–75 × 10–25 µm with brownish intracellular pigment. *Brilliant granules* present, but not abundant. *Clamp connections* absent.

Habitat & Distribution — In semi-natural grasslands and in deciduous woodlands with *Betula*, *Corylus*, *Fraxinus* and *Quercus*. Verified with sequenced collections from Norway and The Netherlands, also reported from Germany.

Typus. Norway, Møre og Romsdal, Stranda, Liabygda, Ansok, N62.3137° E7.0236° (± 7 m), 310 m a.s.l., seminatural grassland (meadow), on the ground, 2 Sept. 2009, *J.B. Jordal*, JBJ09-E02 (holotype O-F-252009, ITS and LSU sequences GenBank MW934582 and MW934252, MycoBank MB 839224).

Colour illustrations. Norway, Møre og Romsdal, Stranda, Liabygda, Ansok, seminatural grassland, type locality. Spores, cheilocystidia, pileipellis, stipitipellis (all from holotype); Basidiomata *in situ* (holotype). Scale bars = 1 cm (basidiomata), 10 µm (spores and microstructures).

Additional materials examined. Norway, Møre og Romsdal, Sunndal, Jordalsgrenda, Kalvhusvøttu, 60 m a.s.l., seminatural grassland (meadow), 14 Sept. 2004, *J.B. Jordal*, *M.E. Noordeloos* & *G. Gulden* (O-F-177981, ITS sequence GenBank MW934584); ibid., 20 Sept. 2019, JBJ19-049 (O-F-256792, ITS sequence GenBank MW934586); Rogaland, Stavanger, Rennesøy, Askje, V-side, c. 60 m a.s.l., in semi-natural pasture, 3 Oct. 2006, *J.I. Johnsen* & *J.B. Jordal* (O-F-361225, ITS sequence GenBank MW934587); Vindafjord, Alnåsen west, 129 m a.s.l., west-faced deciduous forest, 5 Sept. 2008, *J.B. Jordal*, JBJ08-E02 (O-F-252007, ITS sequence GenBank MW934585). – The Netherlands, Prov. Utrecht, Soesterberg, former airfield, 30 Sept. 2019, *M.E. Noordeloos*, *P.J. Keizer* & *J. v. Dongen* (L0607898, ITS sequence GenBank MW934583).

Notes — The delicate lilac-blue colour of the basidiocarps as well as the small spores and fertile lamella edge are distinctive for *E. cyaneolilacinum*. It was treated as *E. lepiotosme* in Noordeloos (2004). However, there are considerable discrepancies with the protologue, describing a species with a blackish brown, virgate pileus, reminiscent of a species of *Inocybe*, a fibrillose stipe surface, a strong smell like that of *Lepiota cristata*, and larger spores. The lectotype of *Rhodophyllus lepiotosmus* failed for DNA sequencing. Considering the conflict with the protologue and the lack of molecular data, it was decided to describe the present taxon here as a species in its own right. Morphologically, *E. cyaneolilacinum* resembles *E. violaceoviride*, which has a sterile, brown pigmented lamella edge and often some greenish tinges in the basidiocarp, and has a distant phylogenetic position. *Entoloma cruentatum*, also phylogenetically distant (see the phylogenetic tree for *E. ammophilum* in Supplementary material FP1240), has similar spores and fertile lamella edge, but often turns orange-yellow when bruised at the base of the stipe.

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Entoloma isborscanum

Fungal Planet 1244 – 13 July 2021

Entoloma isborscanum O.V. Morozova, Noordel., Dima, G.M. Jansen & Reschke, *sp. nov.*

Etymology. Named after Izborsk (*Isborscum*, Lat.), a village in the Pskov Region of Russia, one of the oldest Russian towns, type locality and *Entoloma* hot spot.

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata medium-sized, collybioid. *Pileus* 15–35 mm diam, hemispherical, with slightly depressed centre, then expanding to convex or plano-convex with slightly umbilicate centre, with deflexed then straight margin, not hygrophanous or in the pileus margin only, not translucently striate or up to 1/3 of radius, radially fibrillose-squamulose all over, more densely in the centre, white background is visible between fibrils, brownish yellow, yellowish brown or light brown, darker in centre (5C5–8, 5D5–8; Kornerup & Wanscher 1978), in old and drying specimens radially cracking, showing white underground. *Lamellae* moderately distant, adnate-emarginate, decurrent with short tooth, whitish, pale or greyish, becoming pinkish grey, with irregular, concolorous, whitish or brownish edge. *Stipe* 20–70 × 2–3 mm, cylindrical or slightly broadened towards the base, minutely distinctly longitudinally striate, completely greyish blue (20B3–4, 20C3–4), greyish brown, bluish on the base only or completely yellow-brown, concolorous with the pileus (5C5–8, 5D5–8), white tomentose at the base. *Context* white, brownish under the surface. *Smell* pleasantly sweet or indistinct, *taste* unpleasant, nitrous. *Basidiospores* 8–12 × 6–7.5 µm, av. 9–10.5 × 6–7.5 µm, Q = (1.15–)1.3–1.7, Qav = 1.35–1.5, heterodiametrical, with 5–7 distinct angles in side-view, sometimes with some large spores up to 14 × 7 µm with indistinct angles from 1–2-spored basidia. *Basidia* 32–35.5 × 9.5–10.5 µm, 1–4-spored, narrowly clavate to clavate, sometimes with broadened walls, clampless. *Lamella edge* sterile of the ‘serrulatum’-type. *Cheilocystidia* 40–90 × 9–25 µm, as terminal elements of the hyphae arising from the subhymenium, clavate, broadly clavate or cylindrical, sometimes septate, sometimes with intracellular pigment, brownish in KOH. *Hymenophoral trama* regular, 4–20 µm wide, cylindrical hyphae. *Pileipellis* a cutis with transition to a trichoderm of cylindrical hyphae, 5–12 µm wide with cylindrical or inflated to ellipsoid or ovoid terminal elements, 48–105 × 12–32 µm, and intracellular, sometimes agglutinate pigment, brown in KOH. *Caulocystidia* as ascending bundled, cylindrical to slightly inflated terminal elements of the stipitipellis hyphae. *Clamp connections* absent.

Habit & Distribution — In small groups on soil on calcareous grasslands. Known from Denmark, Germany, the Netherlands, and Russia (European part).

Colour illustrations. Russia, Pskov region, Pechorsky district, Izborsk village, foot of the Truvor hillfort, calcareous grassland (type locality). Spores, cheilocystidia, pileipellis, caulocystidia (all from holotype); basidiomata *in situ* (holotype). Scale bars = 1 cm (basidiomata), 10 µm (spores and microstructures).

Typus. Russia, Pskov region, Pechorsky district, Izborsk village, foot of the Truvor hillfort, on calcareous grassland, N57.717702° E27.854764°, 24 Aug. 2011, *O. Morozova* (holotype LE 302088, ITS and LSU sequences GenBank MW934566 and MW934253, MycoBank MB 839225).

Additional materials examined. Denmark, Jylland, Begtrup Røn, 26 Aug. 2011, *R. Ejrnæs* (C, DMS167798, ITS sequence GenBank MW934570). – Germany, Baden-Württemberg, Heimberg, near Schloßböckelheim, 27 Oct. 2017, *W. Prüfert* (M-0141378, ITS sequence GenBank MW934565). – Russia, Pskov region, Pechorsky district, Izborsk village, foot of the Truvor hillfort, on calcareous grassland, 24 Aug. 2011, *O. Morozova*, LE 312486, ITS sequence GenBank MW934564; ibid., 12 Sept. 2020, *O. Morozova*, LE 312679, ITS sequence GenBank MW934569. – The Netherlands, Prov. Limburg, Nijswiller-Noord, 14 Aug. 2019, *F.* & *R. Salzmann*, L0607743, ITS sequence GenBank MW934568; ibid., 21 Aug. 2019, L0607927, ITS sequence GenBank MW934567; ibid., 2 Oct. 2019, L0607719, ITS sequence GenBank MW934563; ibid., 16 Oct. 2019, L0607718, ITS sequence GenBank MW934562.

Notes — *Entoloma isborscanum* is characterised by a squamulose yellowish brown pileus, a bluish or brownish blue, longitudinally striate stipe, rather small spores with distinct 5–7 angles, and a sterile lamella edge consisting of large clavate cheilocystidia arising from the subhymenium. Superficially it resembles *E. griseocyaneum*, which differs by the absence of cheilocystidia and smaller spores, or *E. glaucobasis*, which possesses larger, almost nodulose spores (Noordeloos 1992). The holotype specimen was published in Morozova et al. (2015) as *E. exile*, but this species is sufficiently more slender with distinct greenish glaucous tinges in the stipe. Also see the phylogenetic tree for *E. ammophilum* in Supplementary material FP1240.

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Entoloma pseudocruentatum
1 cm

Fungal Planet 1245 – 13 July 2021

Entoloma pseudocruentatum Noordel., Brandrud, G.M. Jansen, Dima & Læssøe, *sp. nov.*

Etymology. The epithet refers to the erroneously applied name *Entoloma cruentatum* for this species.

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata small to medium-sized, collybioid. *Pileus* 15–25 mm diam, convex to flattened-convex, later, when maturing, from flattened to somewhat depressed in the centre, never umbonate; slate blue grey with slight violaceous tinge, deeply translucently striate, innately radially fibrillose, not squamulose at centre, margin somewhat crenulate. *Lamellae* adnate, bluish grey when young. *Stipe* 30–40 × 2–4 mm, similar in colour to the pileus or paler, polished, with white to yellow or orange-yellow basal tomentum. *Context* thin, pale grey bluish. *Smell* indistinct. *Taste* not known. *Basidiospores* 8.5–10.0 × 6.0–7.5 µm, av. 9.1 × 6.8 µm, heterodiametrical, with 5–7 angles in side-view. *Basidia* 28–34 × 9.5–12.5 µm, clavate, 4-spored, clampless. *Lamella edge* fertile, cheilocystidia absent. *Pileipellis* a cutis of cylindrical hyphae, 3.5–9 µm wide, with a transition to a trichoderm at centre of clavate elements, 12–30 µm wide. *Pigment* blue to grey-blue, clotted granular and diffusely intracellular. Stipitipellis cylindrical hyphen 3.5–8.5 µm wide with grey blue clotted granular and diffuse intracellular pigment. *Clamp connections* absent in all tissues.

Habitat & Distribution — Saprotrophic, in groups on nutrient poor (acid) soil, in a regularly mown, species-rich grassland of an old airbase (holotype) and on rich grassland (Denmark), herb/grass-rich *Fraxinus*-*Quercus* forest (Norway).

Typus. The Netherlands, Prov. Utrecht, Soesterberg, former airfield, 30 Sept. 2019, *M.E. Noordeloos*, *P.J. Keizer* & *J.V. Dongen* (holotype L0607915, ITS and LSU sequences GenBank MW934588 and MW934254, MycoBank MB 839227).

Additional materials examined. Denmark, Favrholt, in semi-natural grassland, on shady slope with *Plantago lanceolata* and *Succisa pratensis*, 19 Aug. 2008, *T. Læssøe*, TL-13373 (C, DMS-730741; ITS sequence GenBank MW934590). – Norway, Telemark, Drangedal, Malfjell S, 31 Aug. 2015, in rich, somewhat calcareous grass-herb vegetation in open *Fraxinus*-*Quercus* forest, *T.E. Brandrud*, TEB 188-15 (O-F-251951; ITS sequence GenBank MW934589).

Colour illustrations. The Netherlands, Prov. Utrecht, Soesterberg, former airfield (type locality, photo credit P.J. Keizer). Basidiomata (left from holotype, right from TEB188-15); spores, cheilocystidia, pileipellis, stipitipellis (all from holotype). Scale bars = 1 cm (habit), 10 µm (spores), 5 µm (pileipellis and stipitipellis).

Notes — *Entoloma pseudocruentatum* was interpreted as *E. cruentatum* by Noordeloos (1987, 2004), as similar to *E. chalybaeum*, with a fertile lamella edge, a glaucous-blue stipe, with the base frequently discolouring yellowish or pale orange. However, there are now reasonable doubts as whether the original diagnosis of Quélet (1886) actually refers to the same species. *Entoloma cruentatum* is described as a species with a more or less conical to umbonate, lilac-blue pileus, and a stipe with glaucous bluish stipe with a strong reddening at base. Kühner & Romagnesi (1953) considered it a dubious species, probably in subg. *Nolanea*. Another option could be that *E. cruentatum* represents a form of *E. exile*, a species with rather variable pileus shape and colour, and often a reddening stipe base. The concept of Noordeloos (1984) was based on a collection from Scotland, which has many characters in common with the species described here. For this reason, we describe *Entoloma cruentatum* sensu Noordeloos (1984) as a new species. Also see the phylogenetic tree for *E. ammophilum* in Supplementary material FP1240.

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Entoloma pudens
10 mm

Fungal Planet 1246 – 13 July 2021

Entoloma pudens Noordel., G.M. Jansen, M.v.d. Vegte & Dima, *sp. nov.*

Etymology. The epithet refers to the modest size of the species.

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata small-sized, omphalioid. *Pileus* 12–18 mm diam, convex with straight or slightly crenulate margin, umbilicate, hygrophanous, deeply translucently striate up to centre, dark brown with obscure sepia-brown centre, finely scaly-virgate, particularly at central part. *Lamellae* distant, L = 12, l = 1–3, arcuate-deeply decurrent, pale brown with pinkish hue, with concolorous, entire edge. *Stipe* 35–30 × 1–1.5 mm, slightly broadened towards apex, pale horn brown, glabrous, polished. *Smell* and *taste* indistinct. Spores 9.5–13 × 6.5–8.5 μm, av. 11.3–11.5 × 7.6–8.2 μm, Q = 1.2–1.7, Qav 1.4–1.5, heterodiametrical, rather regularly 5–7-angled. *Basidia* 28–53 × 11–11.5 μm, 4-spored, clampless. *Lamella* edge fertile, *cystidia* absent. *Pileipellis* a cutis of broad hyphae with transitions to a trichoderm, made up of clavate elements, up to 25 μm wide, with both intracellular and incrusting pigment. *Clamp connections* absent.

Habitat & Distribution — Gregarious on plant debris, amongst grasses and *Sphagnum* in unfertilized hayfield. Known only from the type locality in The Netherlands.

Typus. The Netherlands, Prov. Gelderland, Groesbeek, de Bruuk, 17 Sept. 2018, *Marjon v.d. Vegte* & *G. Jansen* C173-6268 (holotype L0608054, ITS and LSU sequences GenBank MW934594, MycoBank MB 839226).

Additional material examined. The Netherlands, Prov. Gelderland, Groesbeek, de Bruuk, 2 Sept. 2018, *G. Jansen*, C173-6195 (L0607607, not sequenced).

Notes — This small omphalioid species was initially identified as *Entoloma nigellum* sensu Orton (1960), a concept accepted by Noordeloos (2004). The Dutch specimens are very likely the same as Orton's with their dark, translucently striate pileus, distant, decurrent lamellae, polished stipe, large spores and clampless hyphae. However, when comparing the original diagnosis of this poorly known species it became clear that Quélet's *Eccilia nigella* (Quélet 1886) strongly deviates in habit, in having a not translucent, almost black pileus, and a dark stipe, which sometimes has a bluish tinge. It is therefore rather questionable whether we can adopt the epithet '*nigellum'* for our taxon. Quélet's species could well stand for another, dark coloured species in the /Rusticoides clade and type material is not existent. For the time being, it therefore seems prudent to consider *Eccilia nigellum* as a *nomen dubium*. *Entoloma subpusillum* is similar, differing in having a non-translucent, not glabrous but uneven-rugulose pileal surface. Two other apparently similar species, viz., *E. pseudonigellum* and *E. rickenelliformis*, differ both in having a dark, not translucent pileus, differently sized and shaped spores, and abundant clamp-connections. The type sequence of *E. pseudonigellum* cluster distantly, in the /Undati clade, while DNA sequencing of the type of *E. rickenelliformis* proved unsuccessful. Several questions therefore remain unanswered in this group. *Entoloma pudens* is described as new, based on well-annotated material and molecular sequence data (see the phylogenetic tree for *E. ammophilum* in Supplementary material FP1240).

Colour illustrations. The Netherlands, Groesbeek, de Bruuk, unfertilised hayfield, type locality. Spores, cheilocystidia, pileipellis, stipitipellis (all from holotype); basidiomata *in situ* (holotype). Scale bars = 1 cm (basidiomata), 10 μm (spores and microstructures).

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Entoloma subcoracis

Fungal Planet 1247 – 13 July 2021

Entoloma subcoracis O.V. Morozova, Noordel. & Dima, *sp. nov*.

Etymology. The epithet refers to the resemblance of *Entoloma coracis* due to its black colour, like a raven (*Corvus corax*).

Classification — *Entolomataceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata medium-sized, collybioid. *Pileus* 10–35 mm diam, hemispherical or abruptly conical with central depression, hardly expanding, with deflexed margin, not hygrophanous, translucently striate almost up to the centre, initially uniformly blackish blue (21F5–8; Kornerup & Wanscher 1978), discolouring to bluish grey (21F3–4), minutely radially fibrillose-squamulose all over. *Lamellae* moderately distant, adnate-emarginate, segmentiform to narrowly ventricose, white, contrasting with the pileus surface, becoming pink, with irregular, serrulate concolorous edge. *Stipe* 30–70 × 1.5–3 mm, cylindrical, sometimes twisted, slightly longitudinally striate, minutely squamulose, especially in the upper part, concolorous with pileus or a little paler (up to 21F3–4), white tomentose at base. *Context* white, greyish under the surface. Smell indistinct, taste not reported. *Basidiospores* 9.5–11 × 6.5–8 µm, av. 10.0 × 7.0 µm, Q = 1.3–1.5, Qav = 1.4; heterodiametrical, with 5–7 angles in side-view, relatively simple. *Basidia* 32–38 × 10–12 µm, 4-spored, narrowly clavate to clavate, clampless. *Lamella edge* sterile. *Cheilocystidia* 37–80 × 8.5–13.5 µm, composed of 3–4 elements, terminal cells mostly lageniform or fusiform, sometimes cylindrical or narrowly clavate, colourless. *Pileipellis* cutis with transition to a trichoderm of cylindrical to slightly inflated hyphae 8–20 µm wide with inflated terminal elements and dark intracellular pigment, brownish in KOH. *Caulocystidia* 35–100 × 5.5–10 µm, as chains of cylindrical or inflated elements, usually with tapered terminal cells. Brilliant granules present. *Clamp connections* absent.

Habitat & Distribution — In small groups on soil in subalpine grasslands. Known from Russia (Caucasus).

Typus. Russia, Karachaevo-Cherkesia Republic, Teberda Nature Reserve, Arkhyz site, near the waterfall, N43.558889° E41.301389°, alt. 1 390 m a.s.l., 17 Aug. 2009, *O. Morozova* (holotype LE312483, ITS and LSU sequences GenBank MW934593 and MW934255, MycoBank MB 839228).

Colour illustrations. Russia, Karachaevo-Cherkesia Republic, Teberda Nature Reserve, Arkhyz site, near the waterfall, type locality (photo credit E. Malysheva). Spores, cheilocystidia, pileipellis, caulocystidia (all from holotype); basidiomata *in situ* (holotype). Scale bars = 1 cm (basidiomata), 10 µm (spores and microstructures).

Notes — *Entoloma subcoracis* belongs to the form-group of *E. corvinum* s. auct. including taxa such as *E. coracis* (also described in present paper) and *E. porphyrogriseum* characterised by blackish blue basidiocarps. *Entoloma subcoracis* is characterised by the voluminous cheilocystidia, and fusiform, septate caulocystidia. The characteristic large cystidia are shared with the North American *E. subcorvinum* (Hesler 1967, Noordeloos 1988). Both species seem, however, to be geographically separated. Unfortunately, no DNA sequence data are available for the holotype of *E. subcorvinum*. Also see the phylogenetic tree for *E. ammophilum* in Supplementary material FP1240.

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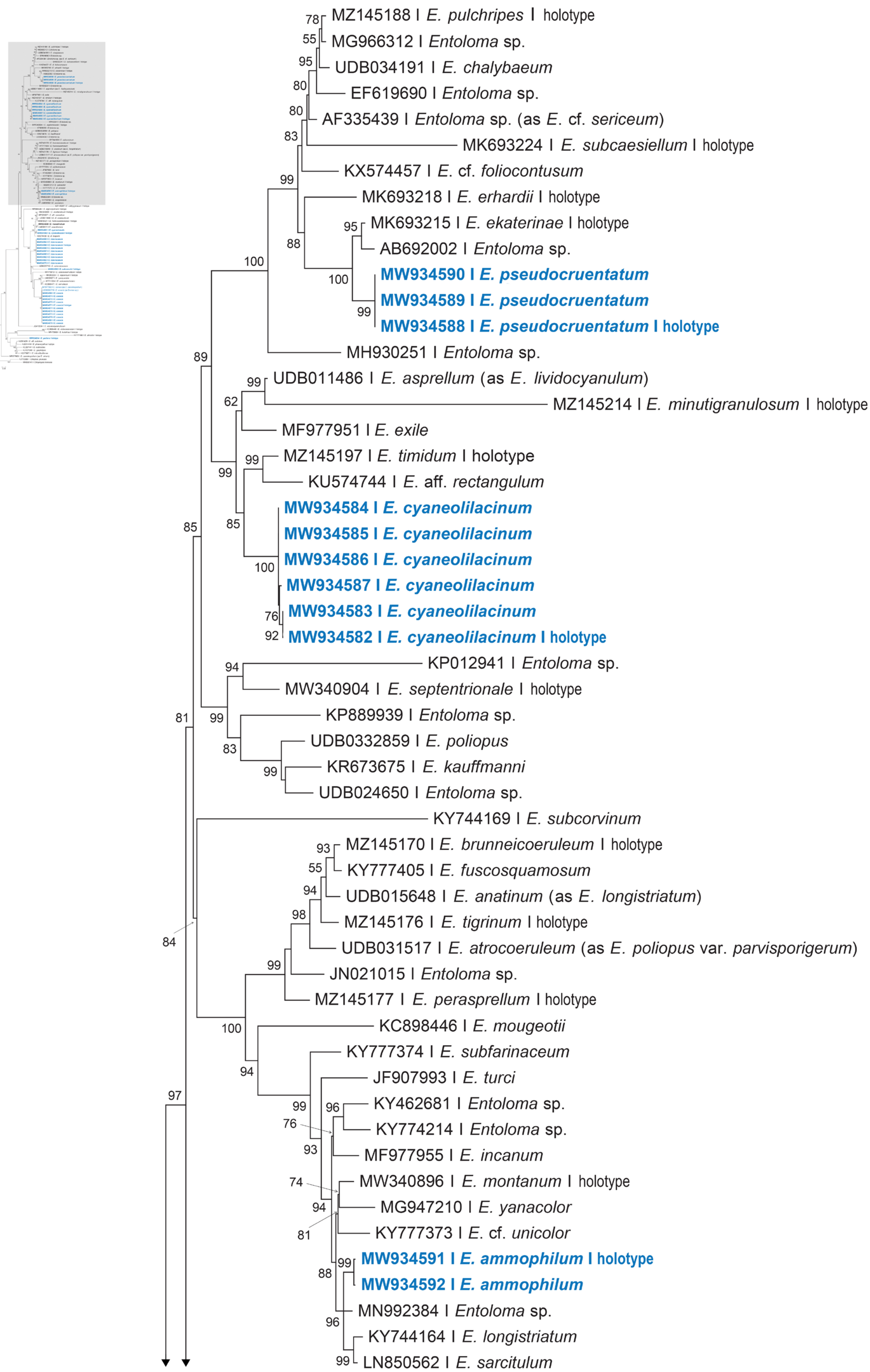
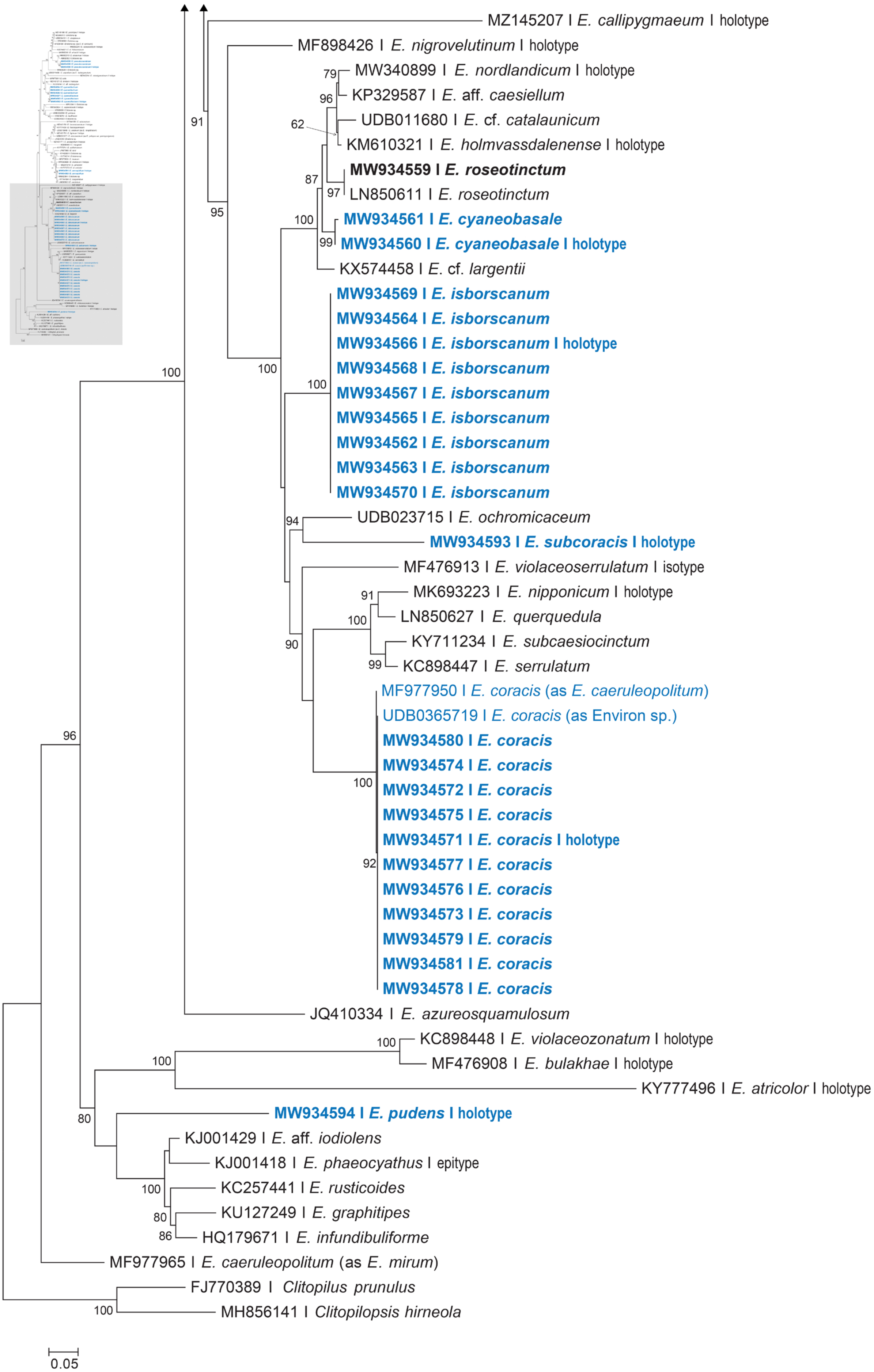
Fungal Planet 1240 – *Entoloma ammophilum*



FP1240 Phylogenetic tree derived from Maximum Likelihood analysis based on nrITS1-5.8S-ITS2 data. Analysis was performed in PhyML v. 3.0 (Guindon et al. 2010) using the non-parametric Shimodaira-Hasegawa version of the approximate likelihood-ratio test (SH-aLRT) and the GTR+I+Γ model of evolution. ML bootstrap support values are shown at the nodes (BS > 50 %).



MZ145207 I E. callipygmaeum I holotype
MF898426 I E. nigrovelutinum I holotype
MW340899 I E. nordlandicum I holotype
KP329587 I E. aff. caesiellum
UDB011680 I E. cf. catalaunicum
KM610321 I E. holmvassdalenense I holotype
MW934559 I E. roseotinctum
LN850611 I E. roseotinctum
MW934561 I E. cyaneobasale
MW934560 I E. cyaneobasale I holotype
KX574458 I E. cf. largentii
MW934569 I E. isborscanum
MW934564 I E. isborscanum
MW934566 I E. isborscanum I holotype
MW934568 I E. isborscanum
MW934567 I E. isborscanum
MW934565 I E. isborscanum
MW934562 I E. isborscanum
MW934563 I E. isborscanum
MW934570 I E. isborscanum
UDB023715 I E. ochromicaceum
MW934593 I E. subcoracis I holotype
MF476913 I E. violaceoserrulatum I isotype
MK693223 I E. nipponicum I holotype
LN850627 I E. querquedula
KY711234 I E. subcaesiocinctum
KC898447 I E. serrulatum
MF977950 I E. coracis (as E. caeruleopolitum)
UDB0365719 I E. coracis (as Environ sp.)
MW934580 I E. coracis
MW934574 I E. coracis
MW934572 I E. coracis
MW934575 I E. coracis
MW934571 I E. coracis I holotype
MW934577 I E. coracis
MW934576 I E. coracis
MW934573 I E. coracis
MW934579 I E. coracis
MW934581 I E. coracis
MW934578 I E. coracis
JQ410334 I E. azureosquamulosum
KC898448 I E. violaceozonatum I holotype
MF476908 I E. bulakhae I holotype
KY777496 I E. atricolor I holotype
MW934594 I E. pudens I holotype
KJ001429 I E. aff. iodiolens
KJ001418 I E. phaeocyathus I epitype
KC257441 I E. rusticoides
KU127249 I E. graphitipes
HQ179671 I E. infundibuliforme
MF977965 I E. caeruleopolitum (as E. mirum)
FJ770389 I Clitopilus prunulus
MH856141 I Clitopilopsis hirneola
0.05

FP1240 (cont.)