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# An emendation of the genus Hyaloscypha to include Fuscoscypha (Hyaloscyphaceae, Helotiales, Ascomycotina)

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The monotypic genus *Fuscoscypha* possesses hairs similar as in the genus *Hyaloscypha* but differs by grey-olivaceous-brown apothecia with short dark stipes. Molecular data proves that the pigmentation does not permit delimitation of a separate genus, as white and brown taxa do not form separate clades. Followingly, *Fuscoscypha* is here considered to be a synonym of *Hyaloscypha*. Three of the here treated four species have an olivaceous-brown excipulum. Two are saprophytes on decaying leaves and fruits of angiosperms: *F. acicularum*, the type species of *Fuscoscypha*, and *Hyaloscypha fuscostipitata* comb. nov. (formerly placed in *Betulina*). Two are biotrophic parasites on Bryophyta: *Hyaloscypha hepaticola* comb. nov. (formerly placed in *Trichopeziza*) and the hyaline-excipled *Hyaloscypha albocarpa* spec. nov. which is otherwise very similar to *H. hepaticola*. The type species of the genus *Betulina*, *B. hirta*, is found to be an earlier synonym of *Urceolella salicicola (= U. graddonii)*. The new combination *Urceolella hirta* is therefore proposed, hence *Betulina* is considered a synonym of *Urceolella*.

Key words: Hyaloscyphaceae, Hyaloscypha, Fuscoscypha, Betulina, Urceolella, bryophilous ascomycetes

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## Introduction

The genus *Betulina* was created by Velenovský (1947: 138) for a single taxon, *B. hirta* Velen., having rather large (1–1.5 mm), pure white, long-haired apothecia thriving on wet decaying birch leaves in Bohemia. Velenovský compared it with the genus *Hyaloscypha* Boud., from which he separated it by stipitate apothecia and extraordinarily long (1 mm) and narrow (hardly 2 µm), cylindrical, flexuous hairs without lumen. Graddon (1974: 477) linked with Velenovský's genus *Betulina* a species he discovered in Britain, likewise on birch leaves, *B. fuscostipitata* Graddon. The assignment of this species to *Betulina* sounds rather inappropriate, considering the quite differently shaped hairs being short,

straight, gradually narrowed towards apex, thin-walled, and bearing lumps of resinous exudate. The hairs of *B. fuscostipitata* closely resemble those of *Hyaloscypha* in the modern circumscription (Velenovský 1934 included also species with cylindrical hairs in *Hyaloscypha*). Graddon refrained from placing his species in *Hyaloscypha* because of the stipitate apothecia, the stipe being distinctly higher than wide.

In his monograph of *Hyaloscypha* and allied genera, Huhtinen (1990) reported that no type material of *Betulina hirta* exists. From the protologue he suggested a possible identity with *Hyalopeziza ciliata* although the solid hairs were described much longer and narrower than known for *H. ciliata*. Furthermore, Huhtinen explicitly suggested that Graddon's *B. fuscostipitata* and a similar unnamed Japanese collection might deserve a new genus, which he saw to be morphologically related to both *Hyaloscypha* and *Dematioscypha* Svrček. The latter genus resembles *B. fuscostipitata* in its dark brown color of the excipular cells, but the cells are shorter and wider (brick-shaped to almost globose from base to margin), a distinct stipe is lacking, the asci are IKI–, and a conspicuous mononematous anamorph (*Haplographium*) with long black-brown setae is regularly associated. Similarly, the genus *Phaeoscypha* Spooner (in Kirk & Spooner 1984: 574) resembles *B. fuscostipitata* in the brown excipulum and even hair shape, but differs by short-celled excipular cells, a very short stipe, rather large asci and spores, and a conspicuous mononematous anamorph (*Chalara*). So Huhtinen's conclusion was to wait new material before establishing a new genus for Graddon's taxon.

In spring 1999, a tiny stipitate dark brown Hyaloscyphaceae was found by one of us (JDS) in the High Ardennes (Belgium) in an open *Vaccinium* bog: it was thriving as a biotrophic parasite on a leafy liverwort (*Cephaloziella divaricata*), a genus belonging to the smallest liverworts known in Central Europe. Later three further collection sites in western Germany came to our notice: the bryologist and ecologist Peter Wolff had noted the very same species since 1988, exclusively on *Cephaloziella rubella*. As he kindly sent us fresh collections, we (HOB & JDS) could verify full agreement with the find from Belgium. Based on our illustrations, the expert for bryophilous ascomycetes Dr. Peter Döbbeler identified the species as *Trichopeziza hepaticola* Grelet & Croz. which he knew only from the literature. Although the type material was not reexamined by us, the protologue and the identical host genus leaves little doubt about the identity of our specimens.

For most of its characters, this discomycete appears closely related to Graddon's *Betulina fuscostipitata*. So we decided to reconsider the genus *Betulina* by studying the type species, *B. hirta*. In the meantime the holotype was located at PRM (Praha) and on request sent to one of us (JDS), intending to redefine a genus that apparently could now encompass three species. It appeared at once, however, that neither Graddon's species nor our own taxon had anything to do with *Betulina hirta*: this one looked as a tiny short-stipitate pure white Hyaloscyphaceae, the excipulum of which was clothed with very long, flexuous, glassy hairs with a narrow lumen to the apex. From the type convolute it was evident that as early as in 1980 Svrček had revised the holotype and with good reason transferred *B. hirta* to *Urceolella* Boud. as *U. hirta* (Velen.) Svrček ined. Furthermore, he had established that *U. salicicola* Raschle is a synonym (in the "revidit" label). Though not often reported, this foliicolous species seems to be widely distributed and to grow on a range of hosts, viz. *Betula*, *Populus*, *Quercus* and *Salix* (Baral & Krieglsteiner, 1985; Raitviir & Galán, 1993, as *Urceolella graddonii* nom. nov.). The following new combination is therefore proposed:

***Urceolella hirta*** (Velen.) Svrček, De Sloover & Baral **comb. nov.**
Basionym: *Betulina hirta* Velen., Opera Bot. Cechica 4: 138 (1947).
≡ *Urceolella salicicola* Raschle, Sydowia 39: 215 (1977, 1976–1977) ≡ *Hyalotricha salicicola* Graddon, Trans. Br. mycol. Soc. 69: 262 (Oct. 1977) ≡ *Urceolella graddonii* Raitv. & R. Galán nom. nov., Sydowia 45: 49 (1993).
MycoBank no.: MB513058

Among the known genera of Hyaloscyphaceae, the morphology of *Betulina fuscostipitata* seems to resemble most closely the description of the monotypic genus *Fuscoscypha* Svrček (1987). This genus was established for *Lachnum aciculare* Velen. (on leaves of *Pinus*), which is so far known with certainty only from the sparse type collection. Though having hyaline, gradually tapered hairs much resembling those of

*Hyaloscypha*, Svrček separated *Fuscoscypha* at the generic level because of an ectal excipulum of a grey-brown textura oblita, while species of *Hyaloscypha* have completely hyaline apothecia and a non-gelatinized t. prismatica-angularis. *F. acicularum* and *B. fuscostipitata* are also similar in their ecology (saprobes on leaves of coniferous vs. broad-leaved trees). The main difference seems to lie in the ectal excipulum, being t. oblita in *H. acicularum* but a rather thin-walled t. prismatica-angularis in *B. fuscostipitata*. *Trichopeziza hepaticola* differs from these two species in larger asci and spores, simple-septate ascogenous hyphae, and in being parasitic on liverworts, while the excipulum concurs quite well with that of *B. fuscostipitata*. Moreover, resinous exudates have never been observed in *T. hepaticola* while present in the two saprophytic species.

Despite such divergences it seems reasonable, in our opinion, to consider the three taxa congeneric. Re-examination of the holotype of *Lachnum acicularum* by one of us (HB) revealed so little differences to *Betulina fuscostipitata*, examined from two personal collections, that even the species limits become questionable. The ectal excipulum of the former was found to be of a t. prismatica with thick brown walls, the thin septa of the comparatively short cells being only visible in CR (possibly Svrček overlooked some of the septa), and the wall thickness appears to represent only a gradual difference to the much more thin-walled excipulum of *B. fuscostipitata*. Contrary to Svrček's report of inamyloid asci, *Fuscoscypha acicularum* possesses a minute hemiamyloid ring that becomes evident only when KOH-pretreated, while the ring in *B. fuscostipitata* reacts blue in IKI without such a treatment (euamyloid). When Huhtinen (1990: 53) reexamined the holotype of *L. acicularum* he did not mention any similarities with *B. fuscostipitata* but instead compared it with *Hamatocanthoscypha* Svrček, in which genus brown species were already placed. The observed differences between *Fuscoscypha* (ectal excipulum of t. oblita and narrowly conical, non-uncinate hairs) and *Hamatocanthoscypha* convinced Huhtinen to accept *Fuscoscypha* as a separate genus.

Hairs of the *Hyaloscypha*-type are also known in a number of species which Baral (1989) included in the genus *Calycellina* Höhn. whilst Huhtinen (1990) separated them in *Phialina* Höhn. by restricting *Calycellina* to taxa with cylindrical hairs. *Calycellina* s.l. is characterized by refractive vacuoles in the living paraphyses and hair bases and herein sharply differs from both *Betulina fuscostipitata* and *Trichopeziza hepaticola* which are devoid of such vacuoles (future fresh finds of *H. acicularum* should be tested for this vital character). Svrček stressed the basal dark brown ring of the apothecia as characteristic of *Fuscoscypha*, a feature also very typical of *Calycellina*. While the main characteristics of the genus *Fuscoscypha* appear to be the dark brown pigment and a distinct stipe, three deviating collections of a bryophilous fungus came to our notice having completely white, usually sessile apothecia. The hosts were *Calypogeia*, *Cephalozia* and *Tetraphis* growing over tree bases in acidic coniferous forests. Considering the almost identical morphology of the hymenial elements and hairs, this colourless taxon is undoubtedly congeneric with *T. hepaticola*, hence the taxonomic value of both the brown pigment and stipe in *Fuscoscypha* and the limits against *Hyaloscypha* become questionable. Because of the deviating hosts and a few differing microscopic characteristics of more or less ambiguous taxonomic value, we here tentatively describe the white taxon as a new species. The present molecular results on *T. hepaticola* confirm that the brown pigment has little taxonomical value, at least at the generic level. Hence, we here consider all four investigated species as members of *Hyaloscypha*.

## Materials and methods

### *Morphological study*

The material was studied with an Olympus BX40 research microscope and a Zeiss Standard 20 using bright field optics. Media and staining procedures used were those given in Baral (1992) and Huhtinen (1990), and their abbreviations are: MLZ (Melzer's reagent), IKI (1% Lugol's solution), CB = Cotton blue in lactophenol, CR (ammoniacal Congo red), CRB = Cresyl blue (aqueous), KOH (5% aqueous solution). † sign refers to observations from dead cells, * sign to observations from living cells. Categories of relative lipid (oil) content: 0 = no oil content, 5 = maximum oil content. The number of collections (= populations) from which the data derive are given in {}. H.B. = herbarium H.-O. Baral. Colour coding follows Cailleux (1981).

***Molecular study***

*Taxon sampling:* To test the placement of *Hyaloscypha hepaticola*, representatives of *Hyaloscypha* and two other genera (*Lachnum* and *Arachnopeziza*) from the traditional family Hyaloscyphaceae (including Lachnaceae) were included as ingroup taxa. *Hymenoscyphus fructigenus* and *Cyathicula microspora* (traditional family Helotiaceae) were selected as outgroup taxa. 15 specimens of 11 species were used in this study (Table 1). All herbarium specimens used in DNA extraction are deposited in TUR.

Table 1. Taxa used in this study.

| | | | GenBank accession number | | | | |
|---|---|---|---|---|---|---|---|
| **Taxon** | **ID** | **Origin & collector** | **LSU** | **betatubulin** | **RPB2** | **ITS** | **mtSSU** |
| Arachnopeziza variepilosa (R. Galán & Raitv.) Huhtinen | M337 | Canada, Yukon, Huhtinen 87/131 | EU940086 | FJ477045 | – | EU940163 | – |
| Cyathicula microspora Velen. | M267 | Sweden, Frøslev 2006-B1 | EU940088 | FJ477046 | EU940304 | EU940165 | EU940240 |
| Hyaloscypha hepaticola | M171 | Finland, Nieminen 10 | EU940118 | FJ477047 | EU940330 | EU940194 | EU940266 |
| Hyaloscypha hepaticola | M339 | Finland, Kukkonen 37 | EU940150 | FJ477048 | EU940359 | EU940226 | EU940290 |
| Hyaloscypha albohyalina var. spiralis (Velen.) Huhtinen | M259 | Finland, Nieminen 28 | EU940151 | FJ477049 | EU940360 | EU940227 | EU940291 |
| Hyaloscypha aureliella (Nyl.) Huhtinen | M234 | UK, Scotland, Huhtinen 05/56 | EU940152 | FJ477050 | EU940361 | EU940228 | EU940292 |
| Hyaloscypha aureliella | M235 | Finland, Söderholm, 6 Sept. 2005 | EU940153 | FJ477051 | EU940362 | EU940229 | EU940293 |
| Hyaloscypha daedaleae Velen. | | GenBank | AY789415 | – | – | AY789416 | – |
| Hyaloscypha fuckelii Nannf. | M233 | UK, Scotland, Leonard, 25 Aug. 2005 | EU940154 | FJ477052 | EU940363 | EU940230 | EU940294 |
| Hyaloscypha vitreola (P. Karst.) Boud. | M39 | Finland, Söderholm 3400 | EU940155 | FJ477053 | EU940364 | EU940231 | EU940295 |
| Hyaloscypha vitreola | M220[a] | Finland, Huhtinen 05/71 | FJ477058 | FJ477054 | FJ477057 | FJ477059 | – |
| Hyaloscypha vitreola | M236 | Finland, Laukka 229 | EU940156 | FJ477055 | – | EU940232 | EU940296 |
| Hymenoscyphus fructigenus (Bull.) Fr. | M159[a] | Finland, Heinonen & Heinonen 708 | EU940157 | FJ477056 | EU940365 | EU940233 | EU940297 |
| Lachnum cf. bicolor (Bull.) P. Karst. | | GenBank | AY544674 | – | – | AJ430394 | AY544744 |
| Lachnum virgineum (Batsch) P. Karst. | | GenBank | AY544646 | – | DQ470877 | DQ491485 | AY544745 |

[a] DNA extracted from apothecia; all others were extracted from cultures

*Fungal cultures and DNA extraction:* Ascospores or apothecia (M39) were cultured on 2% malt extract agar (MEA) containing chloramphenicol. Mycelia were allowed to grow for approximately two months in room temperature. For observations on cultural morphology the strains were grown at +15°C with a combination of 12/12 h of light and darkness. The diameter was measured at two week intervals. DNA was extracted from cultures or directly from ascomata, the number of apothecia picked depending on their size. Extractions were performed with QIAamp® DNA Mini Kit (Qiagen) according to the manufacturer's protocol.

*Amplification and purification:* Five different gene loci were amplified: partial rDNA LSU (ca. 1300 bp), partial betatubulin (ca. 700 bp), partial RPB2 (ca. 900 bp), partial mitochondrial rDNA SSU (ca. 1100 bp) and rDNA ITS (including ITS1, 5.8S and ITS2; ca. 500 bp; for primers, see Table 2). illustra™ puReTaq Ready-To-Go PCR Beads (GE Healthcare) were used in the amplification and the reactions were performed with GeneAmp® PCR System 9700 (PE Applied Biosystems).

The PCR profile was 60 s at 95°C (denaturation), 60 s at 52°C (LSU), 56 °C (betatubulin), 55°C (RPB2) or 60°C (ITS; annealing), and 60 s at 72°C (extension). 30 cycles were used, preceded by 5 min at 95°C (initial denaturation) and followed by 7 min at 72°C (final extension). For mtSSU rDNA, 35 cycles were used. Denaturation and annealing times were 30 s, and annealing temperatures were 52°C for cycles 1–5 and 50°C for cycles 6–35. Two different primer sets were used to amplify and sequence ITS. At first, ITS1-F and ITS4 were used as PCR primers and ITS5 and ITS2-KL as sequencing primers. However, PCR with ITS1-F and ITS4 occasionally

yielded double bands on gel, as an intron position at the end of SSU is located in the amplified area. To dispose of this problem ITS1-LM and ITS2-KL were used as both PCR and sequencing primers. The obtained PCR products were purified with illustra™ GFX PCR DNA and Gel Band Purification Kit (GE Healthcare) according to the manufacturer's protocol.

*Sequencing:* BigDye Terminator Cycle Sequencing Ready Reaction Kit version 1.1 (Applied Biosystems) was used for the sequencing reactions. Sequencing reactions were run using the same equipment as for the PCR. A 25-cycle sequencing schedule with a denaturation temperature of 96˚C for 30 s, an annealing temperature of 50˚C for 15 s, and an extension temperature of 60˚C for 4 m was performed. The post-reaction purification of the samples was done using Montage SEQ96 Sequencing Reaction Cleanup Kit (Millipore) according to manufacturer's protocol. Sequencing was carried out with MegaBACE 1000 DNA Analysis System (GE Healthcare). Part of the sequence data was acquired as outsourcing service from Macrogen Inc. in Seoul, South Korea. According to their web page, sequencing is conducted under BigDye Terminator cycling conditions. Products are purified using ethanol precipitation and sequenced with 3730xl DNA Analyzer (Applied Biosystems). Primers used in sequencing are listed in Table 2.

Table 2. Primers used in PCR and sequencing.

| Primer | Sequence | Type | Reference |
|---|---|---|---|
| LR0R | ACCCGCTGAACTTAAGC | PCR, sequencing | Cubeta et al. (1991) |
| LR7 | TACTACCACCAAGATCT | PCR, sequencing | Vilgalys & Hester (1990) |
| LR3R | GTCTTGAAACACGGACC | sequencing | Rehner & Samuels (1995) |
| LR5 | TCCTGAGGGAAACTTCG | sequencing[a] | Rehner & Samuels (1995) |
| LR3 | CCGTGTTTCAAGACGGG | sequencing[a] | Rehner & Samuels (1995) |
| BT3-LM | GAACGTCTACTTCAACGAG | PCR, sequencing | Myllys et al. (2001) |
| BT10-LM | TCGGAAGCAGCCATCATGTTCTT | PCR, sequencing | Myllys et al. (2001) |
| fRPB2-7cF | ATGGGYAARCAAGCYATGGG | PCR | Liu et al. (1999) |
| fRPB2-11aR | GCRTGGATCTTRTCRTCSACC | PCR | Liu et al. (1999) |
| RPB2-7F | ATGGGKAAGCARGCWATGGG | sequencing | Liu et al. (1999) |
| RPB2-3053R | TGRATYTTRTCRTCSACCATRTG | sequencing | Reeb et al. (2004) |
| ITS1-LM | GAACCTGCGGAAGGATCATT | PCR, sequencing | Myllys et al. (1999) |
| ITS2-KL | ATGCTTAAGTTCAGCGGGTA | PCR, sequencing | Lohtander et al. (1998) |
| ITS1-F | CTTGGTCATTTAGAGGAAGTAA | PCR | Gardes & Bruns (1993) |
| ITS4 | TCCTCCGCTTATTGATATGC | PCR | White et al. (1990) |
| ITS5 | GGAAGTAAAAGTCGTAACAAGG | sequencing | White et al. (1990) |
| mtSSU1-KL | AGTGGTGTACAGGTGAGTA | PCR, sequencing | Lohtander et al. (2002) |
| mtSSU2-KL | ATGTGGCACGTCTATAGCCCA | PCR, sequencing | Lohtander et al. (2002) |

[a] used as alternative sequencing primers

*Parsimony analyses:* The sequences were constructed with SeqMan 4.0 (DNASTAR), aligned with ClustalX 1.8 (Thompson et al. 1997) using default parameters and refined manually. Introns were removed. Analysis was carried out with PAUP 4.0 b 10 (Swofford 2002). Combined data matrix consisted of 15 taxa and 4650 characters, of which 3556 were constant, 324 variable but parsimony-uninformative and 770 parsimony-informative. Gaps were treated as fifth base. Branch-and-bound search was utilized with default parameters. Branch support was estimated by performing 1000 bootstrap replicates.

## Results and discussion

### *Phylogeny*

The cladistic analysis produced three equally parsimonious trees of length 2029 with consistency index (CI) of 0.740 and retention index (RI) of 0.707. A strict consensus tree was calculated (Fig. 1). Genus *Hyaloscypha* is monophyletic with 89% bootstrap support, and the dark-excipled *H. hepaticola* is nested inside hyaline species of *Hyaloscypha.*

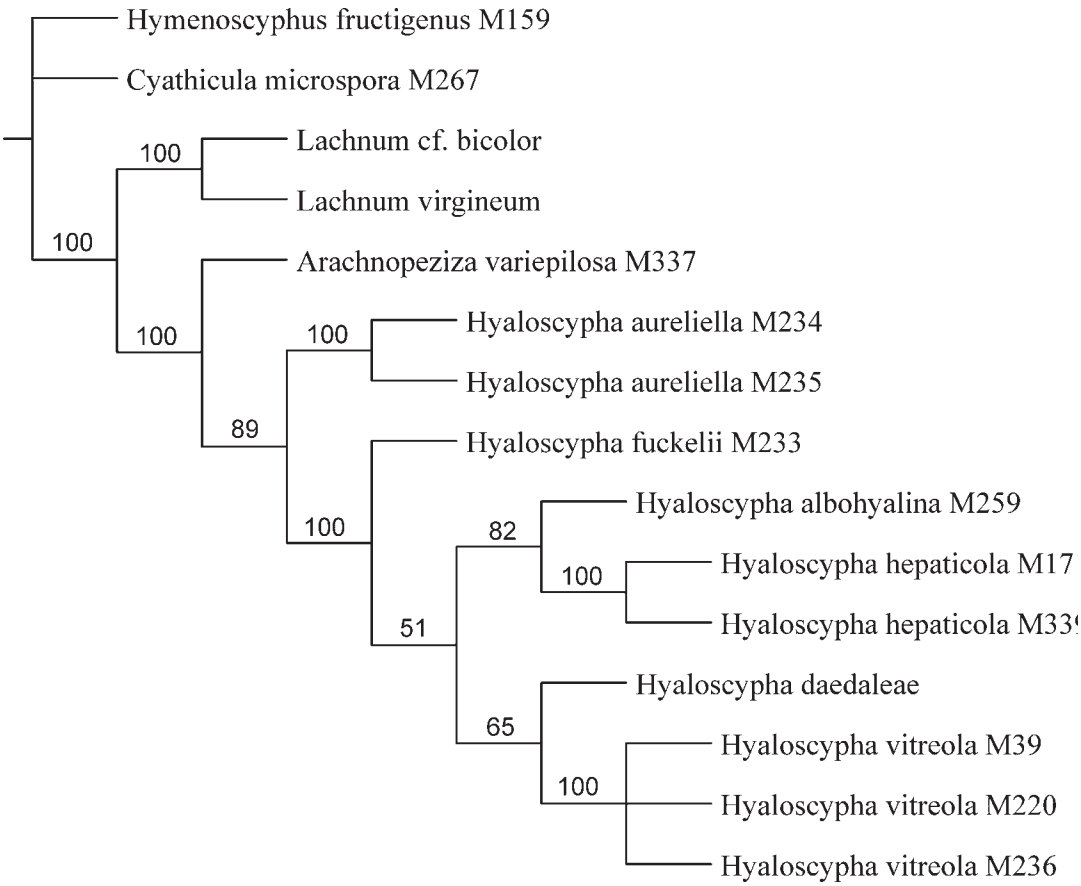



Fig. 1. Strict consensus tree obtained from the branch-and-bound analysis of a combined dataset consisting of LSU, betatubuline, RPB2, ITS and mtSSU. Bootstrap support values are shown at nodes.

## Morphotaxonomic treatment

### Key to the species of *Hyaloscypha* treated here

1. Biotrophic parasites on mosses, asci *43–108 × 6.5–11.3 µm (†47–86 × 5–8.8 µm), arising from simple septa, apical dome †0.9–2 µm thick, ascospores *5.5–12.5 × 2.8–4 µm, (†5.5–9 × 2.3–3.5 µm) with a low to high oil content, hairs in $H_2O$ smooth, without exudate, apices 1–1.5(–2.5) µm wide, apothecia entirely white, sessile or stipitate, or grey-brown with a dark brown stipe, pigment unchanged in KOH, ectal excipulum on flanks 30–80 µm thick ..... 2

– Saprophytes on decaying leaves and fruits, asci *28–50 × 5.5–6(–7?) µm (†28–42.5 × 5–6.3 µm), arising from croziers, apical dome †0.2–1 µm thick, ascospores *5–8 × 1.6–2.3 µm (†5–9 × 1.5–1.9 µm), with a very low oil content, hairs fresh in $H_2O$ smooth or finely rough, partly covered by hyaline to yellowish-brownish MLZ-soluble granules or lumps, apices 0.5–1.2 µm wide, apothecia grey-brown, with a dark brown stipe, pigment turning olivaceous in KOH, ectal excipulum on flanks 10–12 µm thick ..... 3

2. Apothecia grey-brown with dark stipe, excipular cells on lower flanks *4–19 × 3.5–9 µm, on *Cephaloziella, Lophozia* and *Ptilidium*, asci often with a basal protuberance ..... ***H. hepaticola***

– Apothecia entirely hyaline, often sessile, excipular cells on lower flanks *7–23 × 6–15 µm, on *Calypogeia*, *Cephalozia* and *Tetraphis*, asci never with a basal protuberance ..... ***H. albocarpa***

3. Ectal excipulum on flanks of t. prismatica with 1–1.5 µm thick common walls, ascus apical dome †0.2 µm thick, on needles of *Pinus* ..... ***H. acicularum***

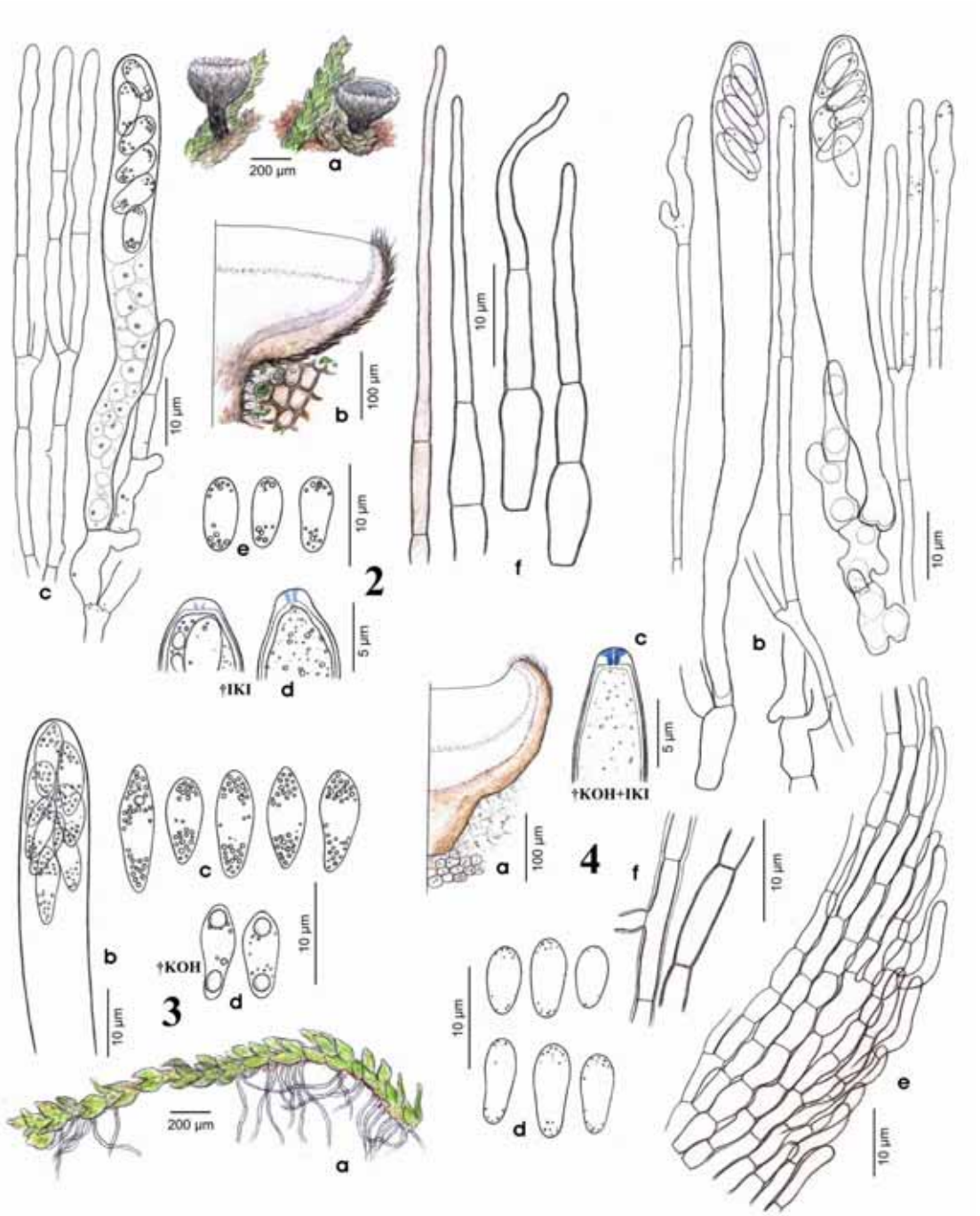
– Ectal excipulum on flanks of t. prismatica-angularis with 0.2–0.3 µm thick common walls, ascus apical dome †0.4–1 µm thick, on leaves and fruits of *Carpinus*, *Castanea*, *Rubus*....***H. fuscostipitata***

***Hyaloscypha hepaticola*** (Grelet & Croz.) Baral, Huhtinen & De Sloover **comb. nov.** – Figs. 2–4

Basionym: *Trichopeziza hepaticola* Grelet & Croz. in Grelet, Bull. trim. Soc. mycol. Fr. 41: 85 (1925).

MycoBank no.: MB513059

*Apothecia* scattered or gregarious in very small groups, fresh 0.2–0.7(–1) mm, dry 0.2–0.4 mm in diam, with cylindrical, ± hidden stipe 0.08–0.2 mm long, 0.08–0.12 mm thick, totally 0.3–0.4 mm high, receptacle 0.15–0.2 mm thick, soft-fleshed, disc slightly concave, finally flat, fresh deep ash-grey, margin finely whitish fimbriate, externally deep greyish-olivaceous to brownish-black, dry apothecia uniformly black, seemingly smooth but densely covered by short, appressed hairs, stipe dark brown to black. *Hairs* on mid flanks and margin 20–50 × (2–)2.3–3(–4) µm, straight to more or less flexuous, somewhat lageniform, with a shorter or longer, narrow-cylindrical apical part 1–1.5(–2) µm wide, apex rounded, pale to light greyish-brown throughout, more or less hyaline at margin, aseptate or sometimes with a septum near base, thin-walled, smooth, without exudate ($H_2O$), MLZ–, protruding near margin for 10–20 µm, at lower flanks shorter, cylindrical, light brown, appressed to receptacle, somewhat agglutinate, in surface view undulating by forming a regular network. *Ectal excipulum* pale to bright (ochraceous-)brown (inner parts paler), unchanged in KOH, thin-walled, cortical cells more firm-walled, non-gelatinized, 30–40 µm thick on lower flanks, of textura angularis-prismatica oriented at a 45–90° angle to the surface, cells *4–11(–19) × (3.5–)5–7(–9) µm {2}, on mid flanks of 25 µm thick t. prismatica oriented at 10–45°, cells *5–15 × 2.5–6.5 µm, at margin of hyaline or pale brown t. porrecta oriented at 10–20°. *Medullary excipulum* hyaline,




Figs. 2–4. *Hyaloscypha hepaticola*. Fig. 2. H.B. 6377. Fig. 3. H.B. 7120. Fig. 4. H.B. 7111. – 2a) Fresh apothecia on *Cephaloziella divaricata*. 2b) Median section of an apothecium. 2c) Ascus with simple-septate base, paraphyses. 2d) Ascus apices. 2e) Ascospores, 2f) Marginal hairs. – 3a) *Cephaloziella rubella* infected by *H. hepaticola*. 3b) Ascus top with spores tightly arranged at the apex. 3c–d) Mature ascospores. – 4a) Median section of an apothecium. 4b) Asci with simple-septate bases, paraphyses. 4c) Ascus apex. 4d) Ascospores. 4e) Ectal excipulum and appressed hairs on mid flanks. 4f) Detail of anchoring hyphae. – Del. H.-O. Baral.

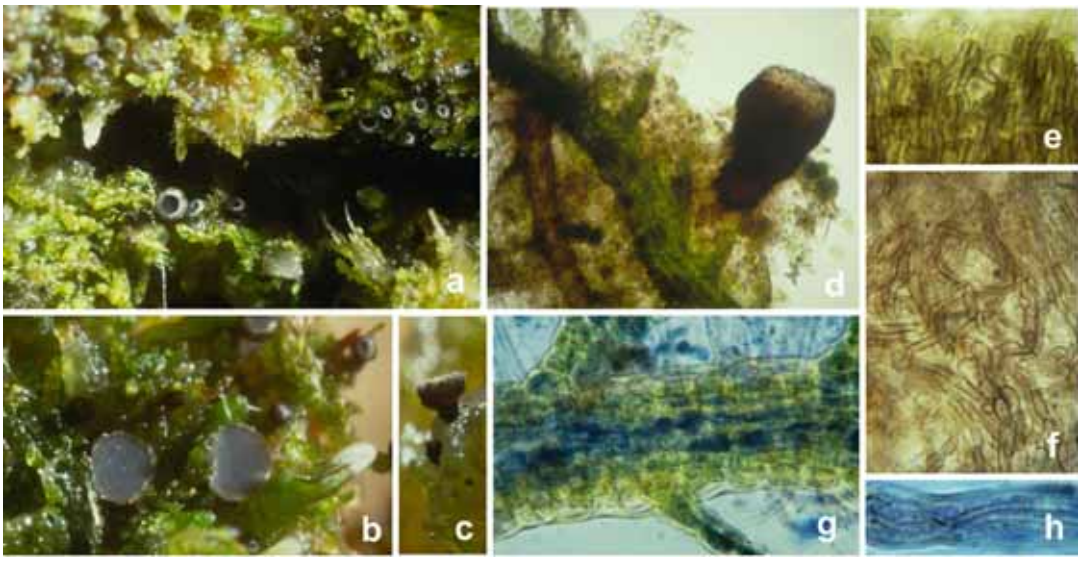



Fig. 5. *Hyaloscypha hepaticola*. HB 6377. – 5a–d) Fresh apothecia on *Cephaloziella divaricata* (a, c, d rather young, b mature). 5e–f) External view on apothecium showing hairs on margin (e) and flanks (f). 5g) Caulidia of *Cephaloziella* with internal hyphae of *H. hepaticola* among the cells of the axis (in CB). 5h) Rhizoid of *Cephaloziella* with hyphae in their lumen (in CB). – Photo J. De Sloover.

in centre of upwards oriented dense t. intricata, on flanks 10–15 µm thick, of t. porrecta. *Anchoring hyphae* abundant, forming a very loose t. intricata, hyaline or very pale brownish, very long, *1.8–2.6(–3) µm thick {2}, covered by a thin or thick hyaline gel sheath staining deep blue-violet in CRB, wall smooth, including gel 0.2–0.6 µm thick. *Asci* cylindric-clavate, *(52–)70–95(–108) × (6.7–)7.5–9.5(–11.3) µm {2}, †(47–)55–78(–86) × (5.4–)6–7(–7.8) µm in KOH {3}, †52–82 × 5.5–7.0(–8.8) µm in CR {2}, $\bar{x}$ = 65.6 × 6.2 µm (n= 16), protruding *5–10 µm beyond paraphyses when mature, 8-spored, pars sporifera *19–30 µm long (biseriate), †26–32 µm long (biseriate to subbiseriate), apex medium to strongly conical, apical ring pale to medium strongly blue in IKI (BB), blue in MLZ (euamyloid) {8}, *Calycina*-type, arising from simple septa {14}, typically with a basal aseptate protuberance. *Ascospores* ellipsoid to ellipsoid-clavate or fusoid to fusoid-clavate, aseptate, developing one septum with old age, *(6–)7–11(–12.5) × (2.8–)3–3.8(–4) µm {5}, †5.6–8(–9) × 2.3–3(–3.5) µm in CR {5}, ×= 7.2 × 2.8 µm (n= 67), with (2–)5–20 small (exceptionally medium-sized) LBs near each end or in each half (lipid content 1–2 or 3–4, varying among collections), LBs fusing in dead spores. *Paraphyses* filiform till apex, sometimes subapically slightly inflated, straight, rarely slightly flexuous, terminal cell *16–39 × 2–2.7(–3.5) µm {2}, lower cells *10–22 × 1.5–2.7 µm {2}, with very few minute LBs, without refractive vacuoles {4}.

*Pure culture*: Radial growth 8.5 mm/month. Mats first with brown to light brown basic colour, in the inoculum N75, elsewhere blackish brown (T91) to black, at the margin whitish. Aerial mycelium scanty, beige (L91) to greyish (P92), lacking from the outermost half of the mat. Margin indistinct, fimbriate, submerged. Strong hyphal strands lacking. Zonation lacking, sector formation lacking. No colour change in surrounding agar, no yeast-like growth. No anamorph observed.

*Phenology*: In Central Europe found from December to June. In Finland first mature apothecia found early June and the last on mid-October.

*Xerotolerance*: Paraphyses and mature asci survive at least five days in the dry state.

*Ecology*: In Central Europe found on living but partly somewhat bleached leaves or stems of *Cephaloziella* spp., in a mosaic of dense populations of different small mosses (e.g. *Campylopus pyriformis*), crustose (e.g. ?*Trapelia*) and fruticose lichens (*Cladonia*), and jelly algae (*Gloeocapsa*?)

covering either raw humus over tree bases or rotten wood, mainly below *Pinus sylvestris*, at open places with medium insolation, at the border of very acid oligotrophic peatlands (open *Vaccinium* bogs, transition bogs with *Pinus*, *Molinia coerulea*, *Calluna vulgaris*). The basal hyphae grow very sparsely over the vital green stems and leaves of the liverwort but soon enter each rhizoid and grow extensively within its cells down to their basal ends. The intracellular hyphae have thereby the same diameter as the anchoring hyphae of the apothecium, but are always hyaline (Fig. 5h). Such infected individuals may occur several millimeters apart from the apothecia. The hyphae can also be traced inside the caulidia (Fig. 5g), and below the apothecia rarely some cells of the leaves contain hyphae. Finnish material has been collected on bleached or dead parts of *Ptilidium pulcherrimum* {8} and *Lophozia* sp. {3}. Most collections originate from hepatics on conifer trunks in old growth sites in protected areas and the material suggests that the species might prefer older and moister habitats. Of the eleven collections only three originated from ordinary, economically maintained sites. On one occasion the substrate (*Ptilidium*) grew on an acid stone. On *Ptilidium* the species co-occurred with, e.g., *Epibryon hepaticola* (Racov.) Döbbeler, *E. diaphanum* Döbbeler, *Leptomeliola ptilidii* Racov., and *Fellhanera margaritella* (Hulting) Hafellner.

*Hyaloscypha hepaticola* has repeatedly been observed by P. Wolff at the Miesau locality since 1988 (on *Cephaloziella rubella*, RP 669, 1214, 1215), but also from two further not very remote sites (Rheinland-Pfalz, NE of Landstuhl, NSG Geißweiher, MTB 6511/4, 236 m a.s.l., on *C. rubella*, RP 547; Saarland, NNE of Homburg, western part of Königsbruch, MTB 6610/1, 239 m a.s.l., on *C. divaricata,* SL 508, 509, 510). In the estern part of the Königsbruch a collection on *C. rubella* was noted (SL 305). All three former bogs lie in the "Westpfälzische Moorniederung" over Middle Buntsandstein, with a nordic-subatlantic local climate. The host moss always grows on very acid raw humus (about pH 3) with a potential *Pinus sylvestris* (& *Quercus robur*) forest but formerly more or less deforestated and used as pastures that are now mainly covered by *Molinia coerulea*, while they have formerly been moister and inhabited by plants characteristic of transition bogs.

The raw humus derives from rotten tussocks of *Molinia* but also from *Festuca filiformis*, *Calluna* and *Salix aurita*. The sites gain medium insolation. Extremely dry S-exposed sites without shade are avoided by the discomycete while permanently moist shaded places (e.g. the niches north of the tussocks) are occupied by *Campylopus pyriformis*. The latter moss as well as the lichens *Cladonia chlorophaea* and *C. coniocrea* were regularly found in close contact or in mosaic with the *Cephaloziella* stands which may cover relatively large areas. The close depressions are bogs in which trees were cut and peat has been harvested. The species was observed by P. Wolff during Dec.–June. A search in autumn, during October 2002, revealed that the host plant was only very reduced and difficult to detect, while *H. hepaticola* was completely absent. Instead, the white taxon was found at that time in one of these localities.

***Specimens studied*** *(Finnish grids refer to 27°E)*: **BELGIUM. Prov. Luxembourg**. High Ardennes, Vielsalm, Bihain, le Sacrawe, 50°15'N, 5°46'E, 585 m a.s.l., on *Cephaloziella divaricata*, 24.III.1999 *De Sloover 99C/9* (H.B. 6377). **FINLAND. Varsinais-Suomi.** Kaarina, Kuusisto, Kappelinmäki, grid 67080:32502, on *Ptilidium*, 3.VIII.2006 *Kukkonen 13* (TUR). Kemiö, Gästerby, Solbacka, grid 66862:32639, on *Ptilidium*, 4.VIII.2006 *Kukkonen 24* (TUR). Nousiainen, Saksala, Kurjenrahka National Park, Pukkipalo, grid 67455:32461, on *Ptilidium*, 6.X.2006 *Kukkonen 64* (TUR). Pukkipalo, grid 67455:32462, on *Ptilidium*, 6.X.2006 *Kukkonen 65* (TUR). **Etelä-Häme.** Tammela, Liesjärvi National Park, grid 6730:3329, on *Lophozia* and *Ptilidium*, 4.VII.2005 *Nieminen 10* (TUR). Juupajoki, Hyytiälä Forestry Field Station surroundings, grid 6863:3357, on *Lophozia*, 6.IX.2005 *Nieminen 23* (TUR). **Pohjois-Häme.** Kuru, Seitseminen National Park, Multiharju, grid 68719:33113, on *Ptilidium*, 14.X.2006 *Kukkonen 76* (TUR). Multiharju, grid 68719:33112, on *Ptilidium*, 14.X.2006 *Kukkonen 80, 81, 82* (TUR). **Kainuu.** Hyrynsalmi, Ukkohalla, Pieni Tuomivaara, grid 7180:3561, on *Lophozia*, 7.VI.2005 *Huhtinen & Nieminen 4* (TUR). **GERMANY. Rheinland-Pfalz**. Westpfälzische Moorniederung, NNE of Homburg, SW of Miesau, Neuwoogmoor, MTB 6610/1, 230 m a.s.l., peat over sandstone, on *Cephaloziella rubella*, 2.II.2002 *Wolff* (H.B. 7111, mis. J. Haedeke). Neuwoogmoor, same location, 20.III.2002 *Wolff* (H.B. 7119). Neuwoogmoor, same location, 1.IV.2002 *Wolff* (H.B. 7120).

Further specimens examined only by P. Wolff: on *C. divaricata*, SL 508, 509, 510; on *C. rubella*: SL 305, RP 669, 1214, 1215, 547.

**Type collection** (not studied): **FRANCE. Provence**. Dept. Var, Notre-Dame-des-Anges, near Pignans, on stems of living *Cephaloziella byssacea* (= *C. divaricata*), VI.1924 *de Crozals*.

Grelet (1925) described the apothecia as 0.3–0.4 mm in diam., blackish, with whitish pubescent margins, pale disc, and very short stipes. The narrow, flexuous, obtuse, more or less appressed, pale brownish (at the margin hyaline) hairs measured 30–50 × 2 µm, the asci 75–85 × 5–7 µm, and the ovoid-oblong to fusoid, sometimes one-septate ascospores 8–12 × 3–4 µm, the latter being without internal granulation. Most of these features fit quite well to our material, except that Grelet observed in sections under the microscope an apparently constant, rather intense blue-green colour of the apothecial base. The excipulum was described consisting of elongate, very narrow, parallel cells, the hairs on which being no more than elongated cortical cells. Possibly Grelet examined the excipulum in surface view where the prismatic shape of the inner cells is easily overlooked. The nearly negative ascus reaction reported by Grelet could be due to the minuteness of the apical ring. In his "Discomycetes de France" (Grelet 1953: 40) he merely repeated the original diagnosis and drawing.

The genus *Trichopeziza* Fuckel in which Grelet placed the new species, is now restricted to a more natural group around species like *T. sulphurea* (Pers.) Fuckel, differing from *Hyaloscypha* in very long (ca 100–300 µm), rather thick-walled, multiseptate, projecting hairs which are covered by amorphous, hyaline, yellow or brown resinous exudates. Also the lanceolate paraphyses, ectal excipulum of *t. globulosa* and sessile apothecia are different.

***Hyaloscypha albocarpa*** Baral **spec. nov.** – Fig. 6

*Apothecia sessilia vel breviter stipitata, minuter pilosa; specimina vivide alba vel ochraceo-alba, usque ad 1.2 mm lata. Excipulum externum textura prismatica, ad marginem textura porrecta. Pili marginali 30–40 × 3 µm, lageniformi, anguste conici, , tenuiter tunicati, aseptati, exudato resinoso non habentes. Asci euamyloidei, in basi non uncinati. Sporae in statu vivo 6.5–9.5 × 3.2–*

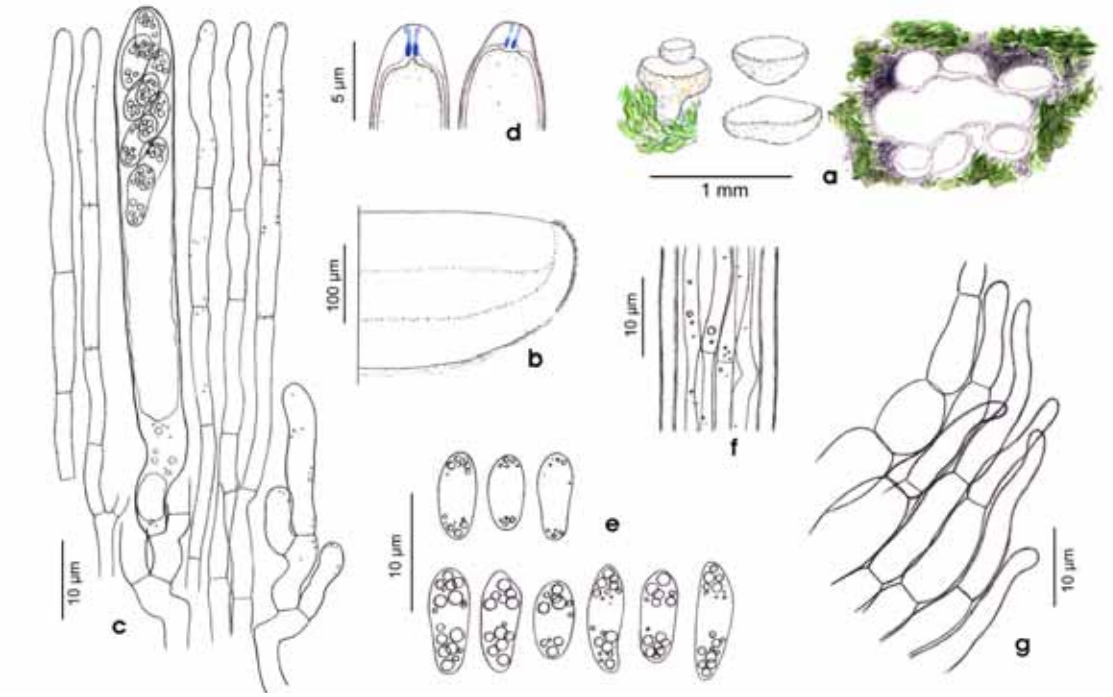



Fig. 6. *Hyaloscypha albocarpa*. Holotype. – 6a) Fresh apothecia on *Cephalozia bicuspidata*. 6b) Median section of an apothecium. 6c) Ascus with simple-septate base, paraphyses. 6d) Ascus apices. 6e) Mature ascospores (variation in lipid content noted between mature asci of an apothecium). 6f) Rhizoid of *Cephalozia* infected by hyphae of *H. albocarpa*. 6g) Ectal excipulum and appressed hairs on flanks. – Del. H.-O. Baral.

*3.5 µm, ellipsoideae vel oblonge-ellipsoideae, aseptatae. Paraphyses filiformes vel in apice minuter dilatatae, 2–3 µm latae, cellulis terminalibus 18–25 µm longis.*

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*Apothecia* scattered or gregarious in small groups, 0.25–0.7(–1.2) mm in diam. when fresh, (0.12–)0.16–0.2(–0.4) mm high, receptacle 0.12–0.2 mm thick, sessile on a broad or obconical base, or exceptionally with a cylindrical stipe measuring 0.2 × 0.17 µm; pure white, watery-white or pale yellowish-cream, very soft, disc slightly concave to flat, margin thin, not protruding, finely fimbriate (especially when young), externally seemingly smooth but densely covered by short, appressed hairs. *Hairs* on mid flanks *13–24 × 3–4 µm, more or less flexuous, somewhat lageniform, with a shorter or longer, cylindrical apical part 2–2.5 µm wide, apex rounded, hyaline, aseptate, thin-walled, smooth, without exudate ($H_2O$); at margin *30–40 × 3 µm, gradually tapering to a 1.5 µm wide tip, hairs protruding near margin for about 5–10 µm, at lower flanks shorter, light brown, appressed to receptacle. *Ectal excipulum* hyaline, thin-walled or slightly gelatinized, 40–80 µm thick near base, of vertically oriented textura prismatica, on lower flanks of t. prismatica(-angularis) 50 µm thick, oriented at a 10–45° or sometimes 45–70° angle to the surface, cells *(7–)10–20(–23) × 6–15 µm {2}, in some apothecia with pale yellowish LBs 1–3.3 µm in diam, on mid flanks and margin 20–30 µm thick, margin of t. porrecta oriented at 10–20°, cells 2.5–3 µm wide. *Medullary excipulum* hyaline, in centre of upwards oriented dense t. intricata, on flanks of ± distinct t. porrecta, individual cells *10–15 × 1.8–2.5(–4) µm. *Anchoring hyphae* sparse, hyaline, *1.5–2.5 µm thick {2}, wall smooth, walls firm, glassy, 0.3 µm thick, no gelatinous sheath seen. *Asci* cylindric-clavate, *43–57 × 7.8–8.2 {1} or *60–81 × 6.5–8 µm {2}, protruding 0–10 µm beyond paraphyses when mature, †50–70 × 5–6.5 µm {1}, 8-spored, pars sporifera *23–27(–33) µm long, spores */† obliquely biseriate, apex medium conical, apical ring faintly to strongly euamyloid (type BB, blue in IKI) {2} or slightly hemiamyloid (type rB blue in IKI, turning indistinctly reddish or negative at high concentration) {1}, upper part of ring distinctly less reactive, *Calycina*-type, dome (†) immature 1.6–2 µm thick, mature 0.7–1.6 µm, asci arising from simple septa {3}, never with a basal protuberance. *Ascospores* (cylindric-)ellipsoid to ellipsoid-clavate or fusoid-clavate, aseptate, *(5.5–)6.5–9.5(–10.3) × (2.8–)3.2–3.5(–3.8) µm {3}, with some small to medium-sized LBs near each end or in each half, lipid content usually 3–4 (LBs up to 1(–1.3) µm diam), apparently less mature spores only 1–2 (LBs up to 0.5 µm). *Paraphyses* filiform, sometimes subapically slightly inflated, straight to slightly flexuous, terminal cell *18–25 {1} × 2–2.8(–3.4) µm {2}, lower cells *9–22 × 2–3 µm {1}, with very few minute LBs, without refractive vacuoles {2}.

*Phenology*: The two specimens were collected in November and May.

*Xerotolerance*: Paraphyses and mature asci survive about 2 weeks in dry state.

*Ecology*: Thriving on living green leaves (near apex of plant) of *Calypogeia muelleriana* {1}, or at base of adult plants (partly on protonemata) of *Cephalozia bicuspidata* {1} and *Tetraphis pellucida* {1}, in pure stands {2} or mixed with sparse *Dicranella* sp. {1}, mosses growing over sandy soil, on tree bases of fallen *Picea* or standing *Pinus*, in rather acid conifer forests and bogs over sandstone; rhizoids below the apothecia were all found to contain abundant hyaline intracellular hyphae.

***Specimens studied*: GERMANY. Rheinland-Pfalz**. Westpfälzische Moorniederung, Miesau, Neuwoogmoor, MTB 6610/1, 230 m a.s.l., on sandstone, on *Cephalozia bicuspidata* below *Pinus*, 1.XI.2002 *Wolff* (ex H.B. 7240, holotype, M). **LUXEMBOURG**. Ettelbruck, Beaufort, Esselbur, Elteschmuer, 390 m a.s.l., on sandstone, on *Calypogeia muelleriana* below *Picea*, 13.V.2001 *Marson* (unpreserved). Esselbur, same locality, on *Tetraphis pellucida* below *Picea*, 13.V.2001 *Marson* (unpreserved).

The morphology of *Hyaloscypha albocarpa* strikingly matches that of *H. hepaticola* in many respects, including spore size, shape and guttulation, amyloid ring, absence of croziers, hair shape, and structure of the marginal excipulum. For instance, the hairs in the unpreserved find on *Calypogeia* looked just as those in the Belgian find of *H. hepaticola*. Also the reported variation in size and abundance of LBs within the mature spores is noted in both taxa. *H. albocarpa* differs by apothecia which (1) completely lack

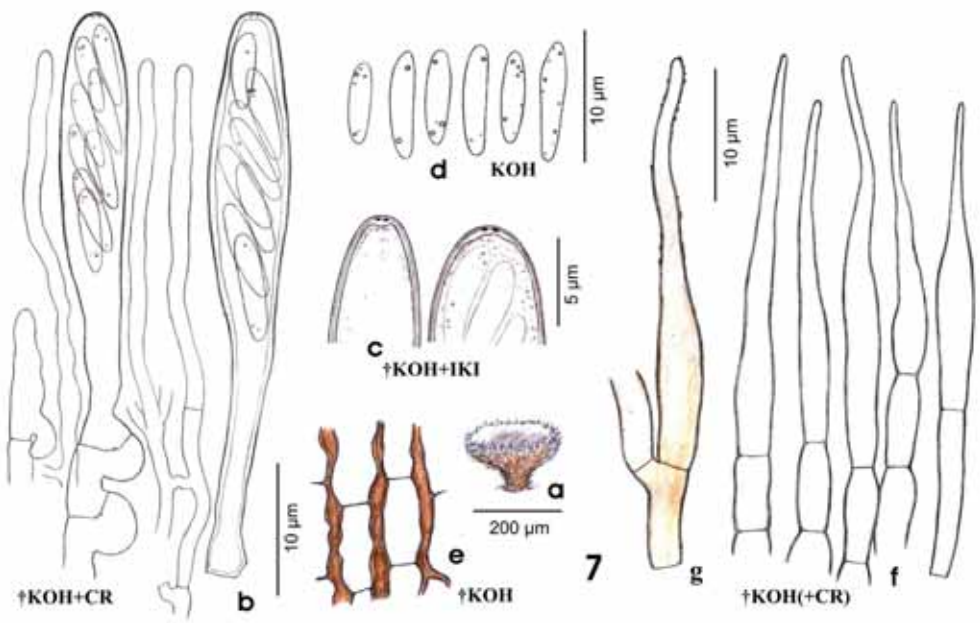



Fig. 7. *Hyaloscypha acicularum*. Holotype. – 7a) Rehydrated apothecium. 7b) Asci arising from croziers, paraphyses. 7c) Ascus apices. 7d) Ascospores. 7e) Ectal excipulum in surface view. 7f) Marginal hairs. 7g) Hair on stipe. – Del. H.-O. Baral.

any brown pigmentation and (2) usually also a stipe. Some further deviations can be noted, but their taxonomic value is not very clear and needs further research: (3) the asci are slightly smaller and (4) always without a basal protuberance, (5) the excipular cells on the flanks are distinctly larger, especially wider. Both species infect the rhizoids of the host plants, but the present collections of *H. albocarpa* suggest a rather wide range of different families of Bryophyta. Considering the combination of morphological and ecological differences, we believe that *H. albocarpa* is more than an albinotic form of *H. hepaticola* and deserves the rank of a species.

***Hyaloscypha acicularum*** (Velen.) Baral & Huhtinen **comb. nov.** – Fig. 7

Basionym: *Lachnum acicularum* Velen., Monogr. Discom. Bohemiae, p. 245, tab. 9, fig. 4 (1934). – *Fuscoscypha acicularum* (Velen.) Svrček, Sydowia 39: 222 (1987).

MycoBank no.: MB513061

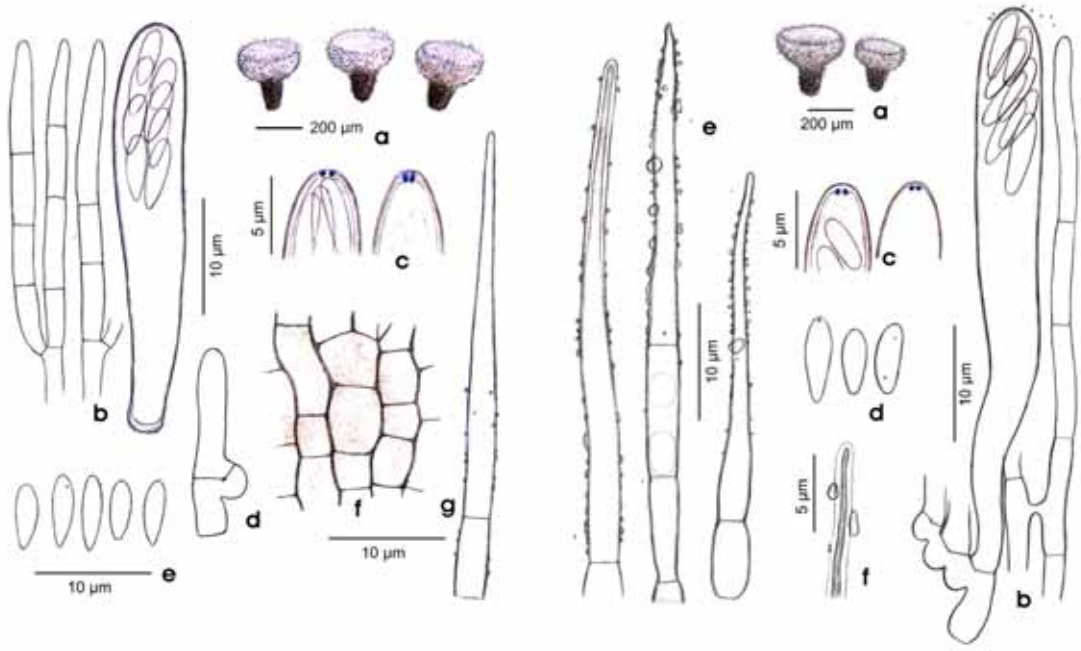
*Apothecia* scattered, 0.2 mm in diam. when rehydrated, with cylindrical stipe 0.05 × 0.04 mm, totally 0.15 mm high, receptacle ?0.08 mm thick, disc (whitish-)greyish, margin finely whitish fimbriate, externally medium brownish, densely covered by hairs, stipe bright to blackish brown, hairy. *Hairs* on flanks and margin 20–35[–50] × (2–)2.3–3(–4) µm, straight to slightly flexuous, somewhat lageniform, with a shorter or longer, narrow-cylindrical apical part 0.6–0.8 µm wide, apex rounded, hyaline, lower part brownish, aseptate, thin-walled, smooth in $H_2O$, occasionally with few large lumps of yellowish resinous exudates in unheated lactic acid totally smooth after heating, on stipe light brown with paler apex, lageniform, with ca. 1.2 µm wide apex with scattered minute warts. *Ectal excipulum* bright (ochraceous-)reddish-brown, turning grey-olivaceous to umber-brown in KOH, cortical cells with ca 1–1.5 µm thick common walls and very thin septa, on flanks of textura prismatica oriented at a low angle to the surface. *Medullary excipulum* not examined. *Anchoring hyphae* at very base of stipe light brown, undulating. *Asci* fusoid-clavate, †33–42.5 × 5–6.3 µm, 8-spored, spores obliquely biseriate, apex subhemispherical to medium conical, apical ring IKI–, pale blue when KOH-pretreated (hemiamyloid), dome †0.2 µm thick, ring 0.7–0.8 µm wide, arising

from croziers. *Ascospores* cylindric-ellipsoid to fusoid-clavate, aseptate, †(5.5–)6–8(–9) × (1.5–)1.6–1.7(–1.9) µm, with a few small LBs near each end (lipid content 1). *Paraphyses* filiform till apex, straight to slightly flexuous, †1–1.5 µm wide, septa not distinctly seen, near margin apparently lanceolate and intergrading with hairs.

***Specimen studied*: CZECH REPUBLIC. Central Bohemian Region.** Mnichovice, Hubáčkov, on rotten needles of *Pinus sylvestris*, associated with *Lophodermium pinastri*, VIII.1931 *Velenovský* (PRM 151974, holotype).

*Hyaloscypha acicularum* is only known from the holotype. Velenovský described and depicted the marginal hairs as 3-septate, 25–50 µm long, tipped with globose "corpuscules" (probably of resinous exudate). When Huhtinen (1990: 53 and in sched.) studied a juvenile apothecium, he saw that the hairs occasionally bear large lumps of yellowish exudate in unheated lactic acid. Such exudate was not observed, neither by Svrček (1987) nor in the present study. Apparently because of the difficulty to decide which of the cells at the hair base belong to the hair or the excipulum, both Svrček and we found the hairs to be shorter (17–35 µm, 20–35 µm in the present study) and aseptate. The ectal excipulum was named as t. oblita by Svrček, because of rather long and narrow cells with thick common walls. The present study suggests that the cells are shorter, i.e. of a thick-walled t. prismatica. Possibly Svrček overlooked some of the septa. Velenovský reported an apothecial diameter of 0.2–0.3 mm, and the black narrow stipe as long as the diameter, while Svrček found a diameter of 0.15–0.25 mm. Velenovský's spore length (3–5 µm) is much too short, which is often the case in his descriptions of relatively small spores, while Svrček's data (5–7 × 1.5–2 µm) are quite consistent with those here reported.

According to Svrček (1987), Velenovský (in mscr.) found the species on a single needle of *Pinus sylvestris* lying on a very thermophilous slope with strong insolation in August after an extraordinarily strong drought. The species is thus undoubtedly xerotolerant. Velenovský noted a resemblance with *Antinoa* Velen., a small genus of similar acicolous discomycetes with dark stipes and small asci and spores, but lacking hairs on the receptacle.




Figs. 8–9. *Hyaloscypha fuscostipitata*. Fig. 8. H.B. 831. Fig. 9. H.B. 3283. – 8a) Fresh apothecia. 8b) Ascus and paraphyses. 8c) Ascus apices. 8d) Young ascus with crozier. 8e) Mature ascospores. 8f) Ectal excipulum in surface view. 8g) Hair. – 9a) Fresh apothecia. 9b) Ascus arising from croziers, paraphysis. 9c) Ascus apices. 9d) Mature ascospores. 9e) Hairs. 9f) Hair apex showing stained, detached plasma. – Del. H.-O. Baral.

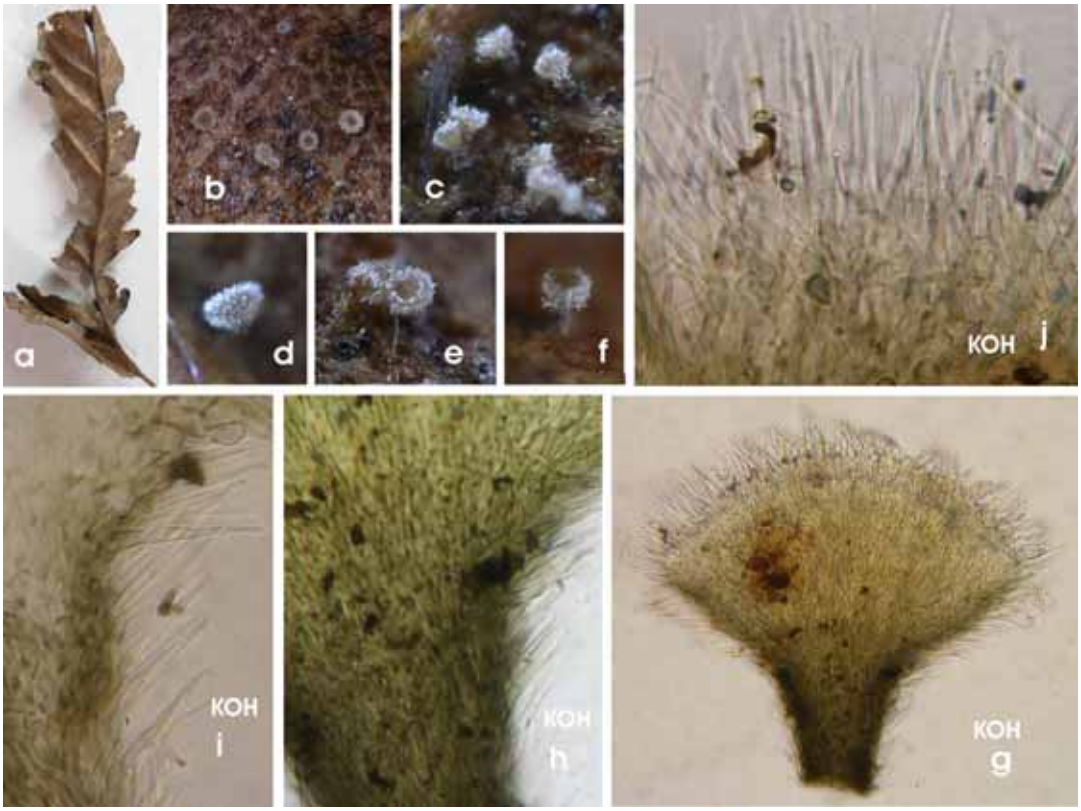



Fig. 10. *Hyaloscypha fuscostipitata*. H.B. 831. – 10a) Leaf of *Carpinus betulus* with apothecia on lower face. 10b–f) Rehydrated apothecia. 10g–h) Apothecium in squash mount. 10i) Apothecial stipe (median section) with projecting hairs. 10j) Hairs at margin (external view). – Photo H.-O. Baral (from over 31 years old herbarium material).

***Hyaloscypha fuscostipitata*** (Graddon) Baral & Huhtinen **comb. nov**. – Figs. 8–10

Basionym: *Betulina fuscostipitata* Graddon, Trans. Br. mycol. Soc. 63 (3): 477, fig. 3B (1974). – *Dematioscypha dematiicola* var. *fuscostipitata* (Graddon) Raitv., Česká Mykol. 52(4): 290 (2001).

MycoBank no.: MB513063

*Apothecia* gregarious, 0.2–0.3 mm diam. when dry, with cylindrical stipe 0.06–0.12 × 0.05–0.08(–0.1) mm, totally 0.2–0.3 mm high, receptacle 0.1 mm thick, disc whitish-grey to light olivaceous-brownish-grey, margin and exterior whitish-greyish fimbriate (± shining), externally medium greyish-brown, stipe bright to dark olivaveous-brown. *Hairs* on stipe, flanks and margin */†(22–)30–40(–48) × (2.2–)2.5–3(–3.5) µm {2}, projecting under a ca. 45° angle, straight to very slightly flexuous, gradually tapered to a 0.5–1 µm wide, rounded to acute apex, hyaline or very pale brownish at the base, aseptate or with 1(–2) septa near the base, thin-walled, with fine scattered warts in $H_2O$, MLZ and KOH, in fresh state partly agglutinated as teeth by large lumps of hyaline to yellowish-brown resinous exudate. *Ectal excipulum* ca 10–12 µm thick, pale to bright umber-brown (olivaceous in KOH), (†) thin-walled, with 0.2–0.3 µm thick common walls and thin septa, on lower flanks of textura prismatica-angularis-globulosa oriented at a low angle to the surface, cells †(3–)4–6(–9) × 3–6(–7) µm, on mid flanks and margin of t. prismatica-porrecta, cells †5–9 × 2.5–3 µm. *Medullary excipulum* hyaline, of dense, non-gelatinized t. intricata. *Anchoring hyphae* at very base of stipe abundant, hyaline to light grey-brown, †2–2.5(–3) µm, thin-walled. *Asci* cylindric-clavate, *(28–)35–45(–50) × (5.5–)6 µm {2}, †28–42 × 4–5.7 µm, 8-spored, spores (*) obliquely biseriate,

apex subhemispherical to medium conical, apical ring IKI medium to strongly blue {2}, rarely some mature asci IKI–, dome (†) immature 0.8–1 µm thick, mature 0.4–0.5 µm, ring 0.8–1 µm wide {2}, arising from croziers {2}. *Ascospores* cylindric-ellipsoid to fusoid-clavate, aseptate, *(5–)5.5–7(–8) × (1.6–)1.8–2.3 µm {2}, †5–6 × 1.5–1.8 µm, without or with very few minute LBs near each end (lipid content 0–0.5). *Paraphyses* filiform or often distinctly tapered near apex, straight to slightly flexuous, terminal cell †7–14 × 1.5–1.8 µm, lower cells 5–8 × 1.6–1.8 µm, without refractive vacuoles {1}.

*Phenology*: Occurring from September to October.

*Ecology*: On lower face of decayed, non-sceletonized leaves of *Carpinus betulus* {1}, involucres of *Castanea sativa* {1}, lying on the ground.

***Specimens studied*: GERMANY. Baden-Württemberg**. Stuttgart, Ditzingen, Nippenburger Wald, MTB 7120/1, 300 m a.s.l., on previous year's leaves of *Carpinus betulus*, 19.IX.1976 *Baral* (H.B. 831). Tübingen, Heuberg, MTB 7420/3, 495 m a.s.l. on previous year's involucres of *Castanea sativa* (on bases of spines), 17.X.1987 *Baral* (H.B. 3283). **UNITED KINGDOM. Warwickshire**. Coleshill, on *Betula* leaves, X.1972 *Clark* (K, ex Herb. Graddon *2245*, holotype).

This apparently rare species described from U.K. (Warwickshire) has also been found in Germany (Baral & Krieglsteiner 1985: 47). It thrives on dead fallen leaves of *Betula*, *Rubus* and *Carpinus* (Ellis & Ellis 1985, Baral & Krieglsteiner l.c.). *Castanea* involucres are reported as a new substrate in the present paper. The species is very closely related to *Hyaloscypha acicularum*, but appears to be separable at the species level by the thickness of the bright-coloured common walls between the cells of the ectal excipulum on the flanks, and the thickness of the apical ascus wall, in combination with the substrate (angiospermic vs. coniferous, see the above key).

*Hyaloscypha fuscostipitata* is easy to separate from *H. hepaticola* by its ecology (saprophytic vs. parasitic), by its shorter asci and smaller (especially narrower) spores with almost absent oil drops. Further differences are found in the hairs which project on stipe and flanks in *H. fuscostipitata* while being appressed and also less tapering in *H. hepaticola*, in the ascus base (croziers in *H. fuscostipitata* vs. simple septa in *H. hepaticola*), and in much shorter terminal cells of paraphyses. The distinct lumps of exudate on the hairs were only seen in the fresh state. They dissolve in MLZ, CR or KOH for which reason they are here termed resinous. However, very fine warts c. 0.5 µm high are inert to these reagents and are already visible in water mounts.

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