
Hyalodendriella bialowiezensis

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Hyalodendriella bialowiezensis Gorczak, *sp. nov.*

Etymology. Name refers to the Białowieża Primeval Forest where it was collected.

Classification — *Hamatocanthoscyphaceae*, *Helotiales*, *Leotiomycetes.*

On cornmeal agar (CMA): *Conidiophores* initially simple, later branching laterally, arborescent, usually with 2–4 branches, sometimes with secondary branches, 4–8 cells in main axis (av. = 5.5), conidiogenous cells mostly with single apical locus, infrequently 2–3 loci present. *Conidiophores* with distinctly wider and shorter cells than vegetative mycelium, with thicker cell walls, (30.5–)36–52.5(–57.5) (av. = 44) µm long × 2.5–3.5(–4) (av. = 3) µm wide. Rarely simple conidiophores forming as lateral branches on hyphae 1–2 cells, forming unbranched chain of conidia. *Conidia* formed in basipetal chains, infrequently 2–4 spores detach connected. *Conidia* hyaline, smooth or very finely verrucose, granular, aseptate, distinctly apiculate, limoniform, ellipsoidal or oval, (3.5–)5–7.5(–10) (av. = 6.2) µm long × (1.5–)2–2.5(–4) (av. = 2.3) µm wide. *Ramoconidia* derived from detached cells of branchlets of upper conidiophores present in older cultures, more irregular, angular and elongated, sometimes apiculate, (5.5–)7–11.5(–15) (av. = 9.1) µm long × (1.5–)2–3(–4) (av. = 2.6) µm wide. *Vegetative hyphae* smooth, hyaline, thin-walled, regularly septate, 1–2 (av. = 1.7) µm wide; rarely, larger, thin-walled, globose cells present.

Culture characteristics — (in darkness, 20 ± 2 °C). On oatmeal agar (OA) colonies dense, margin irregular, undulating, elevated in the centre, initially creamy, later beige, slightly orange in the centre in older colonies, with very sparse patches of white, low aerial mycelium, reaching 2(–2.5) cm in 2 mo. On potato dextrose agar (PDA) and malt extract agar (MEA) averse creamy, yellowish in older cultures, reverse yellowish, reaching 1.5(–2) cm in 2 mo. On cornmeal agar (CMA) cultures tiny, with white, snow-like, fluffy aerial mycelium, vegetative mycelium sparse and thin. On CMA radiating needle-like crystals were noted on the surface of the mycelium, 20–40 (av. = 31) µm diam.

Typus. Poland, Podlaskie Voivodeship, Białowieża Forest, forest division 366B, near Teremiski, on debris beneath fallen bark of Norway spruce *Picea abies* previously infected with European spruce bark beetle *Ips typographus*, 22 Nov. 2018, *M. Gorczak* (holotype WA0000074527, ex-type culture MGC 152A = CBS 148027,, ITS, SSU, LSU, *tef1-α*, *rpb1* and *rpb2* sequences GenBank MW004162, MW004159, MW009815, MW013798, MW811184 and MW013801, MycoBank MB 839246).

Notes — *Hyalodendriella bialowiezensis* is similar to subhyaline cladosporium-like fungi – *Hyalodendriella betulae*, *Rachicladosporium*, *Hormiactis*, and members of obsolete genus *Hyalodendron* (now in *Ramularia* and *Apiotrichum*). However, conidia of *H. bialowiezensis* do not have coronate scars (like *Ramularia* or true *Cladosporium*), and are always aseptate (unlike *Hormiactis*). Moreover, conidiophores and conidia of *H. bialowiezensis* are consistently hyaline, while abovementioned taxa are at least partially subhyaline or brownish. Young terminal limoniform conidia of *H. bialowiezensis* sometimes detach in chains still connected with thin thread of not fully divided cell wall in a manner similar to *Oidiodendron griseum*. Although *H. bialowiezensis* is related to apothecia-forming *Helotiales*, no associated sexual morph was recorded.

Hyalodendriella betulae and *H. bialowiezensis* have very similar limoniform conidia with distinctly apiculate ends, that in both cases are formed in chains. However, in case of *H. bialowiezensis* conidia are significantly larger (5–7 µm long, in *H. betulae* 0.5–1 µm) (Crous et al. 2007a). Conidiophores of *H. bialowiezensis* correspond with macroconidiophores (or type B conidiophores) of *H. betulae* in having, albeit rarely, conidiogenous cells with multiple loci (up to three in *H. bialowiezensis*). Interestingly in both species undetached conidia seem to elongate from the conidiophores in some cases. While they remain attached to microconidiophores of *H. betulae*, they infrequently break up as ramoconidia in *H. bialowiezensis*.

Hyalodendriella is placed either in *Pezizellaceae*, *Helotiales* (Johnston et al. 2019) or in *Hamatocanthoscyphaceae*, which in the classification of Ekanayaka et al. (2019) does not belong to *Helotiales* s.str.

Based on a megablast search of NCBIs GenBank nucleotide database the most similar, identified fungal sequences belong to *Hyalodendriella betulae* strain CBS 261.82 (LSU sequence, 96 % identity), *Chalara constricta* and *Chalara hughesii* (SSU sequences, 95 % identity). ITS sequences of *H. bialowiezensis* are distantly similar to other *Helotiales* (90 % identity to *Xenopolyscytalum* and various unidentified *Hyaloscyphaceae* sequences for ITS).

The maximum likelihood tree was constructed with RAxML-NG (Kozlov et al. 2019) on a partitioned alignment including SSU, 5.8S and LSU rDNA, mtSSU and protein coding *tef1-α*, *rpb1*, *rpb2*, *β-tub* and *mcm7* sequences, being an excerpt of the combined datasets of Han et al. (2014) and Johnston et al. (2019). The dataset contained 35 taxa and a total of 7 873 characters of which 1 919 were variable. Bootstrap support values at branches were obtained by generating 1 000 bootstrap replicates. The tree is rooted with *Leotia lubrica* belonging to *Leotiales*.

Colour illustrations. Białowieża Primeval Forest logging site, Poland (photo M. Klemens). Two-month-old colonies of *H. bialowiezensis* on PDA (left) and OA (right); conidiophores with visible young lateral branches and chains of limoniform conidia; various spores including irregular ramoconidia and undivided chains of limoniform spores. Scale bars = 20 µm.

Supplementary material

FP1252-1 Additional materials examined.

FP1252-2 The best scoring maximum likelihood tree calculated from 9 molecular markers shows *H. bialowiezensis* and closest related *Helotiales*. Only bootstrap support values ≥ 70 % are shown.

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