

Tsuyoshi Hosoya · Seppo Huhtinen

**Hyaloscyphaceae in Japan (7): *Hyaloscypha albohyalina* var. *monodictys* var. nov.**

Received: June 26, 2002 / Accepted: July 27, 2002

**Abstract** *Hyaloscypha albohyalina* var. *monodictys*, a new variety in the family Hyaloscyphaceae, Helotiales with *Monodictys* anamorph is described and illustrated.

**Key words** *Hyaloscypha albohyalina* var. *monodictys* · Hyaloscyphaceae · Japan · *Monodictys* · New variety

**Introduction**

Members of the genus *Hyaloscypha* Boud., Hyaloscyphaceae produce minute, sessile to subsessile apothecia with aseptate, hyaline hairs tapered toward the apex. Of the 27 taxa described, 5 taxa have been found in Japan (Huhtinen 1989): *Hyaloscypha albohyalina* (P. Karst.) Boud. var. *albohyalina*, *H. albohyalina* var. *spiralis* (Velen.) Huhtinen, *H. aureliella* (Nyl.) Huhtinen, *H. fuckelii* Nannf. var. *fuckelii*, and *H. nipponica* Huhtinen. Otani (1966) documented *H. leuconica* (Cooke) Nannf. from Hokkaido.

In the first author's survey of the family Hyaloscyphaceae in Japan, *Hyaloscypha albohyalina* var. *albohyalina*, *H. albohyalina* var. *spiralis*, *H. aureliella*, and *H. nipponica* were collected. Besides these, two specimens of *Hyaloscypha* morphologically similar to *H. albohyalina* were found. These specimens revealed a *Monodictys* S. Hughes anamorph under pure culture. Here, we describe

this fungus as a new variety under *Hyaloscypha albohyalina*.

**Materials and methods**

Methods for collection, isolation, and microscopic observation followed Hosoya and Otani (1997). Isolates were kept on potato dextrose agar (PDA; Nissui) slants as stock cultures. To observe the anamorph, PDA and modified Weitzman–Silva–Hutner agar medium (WSH; 10 g oatmeal, 1 g  $\text{KH}_2\text{PO}_4$ , 1 g  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , 1 g  $\text{NaNO}_3$ , 20 g agar, 1000 ml distilled water) plates were inoculated at the center. The plates were observed after 1–3 weeks incubation at 23°C. Color indications follow Kornerup and Wanscher (1978).

**Descriptions**

***Hyaloscypha albohyalina*** (P. Karst.) Boud. var. ***monodictys*** Hosoya & Huhtinen, var. nov. Figs. 1–3

Apothecia sparsa, cum anamorphose, sessilia vel brevis-tipitata, turbinata, cupulata vel spherica, griseo-aurantia cum margine albo pruinoso incurvato, 300 µm in diametro. Excipulum ectale “textura prismatica,” ex cellulis 6–10 × 2.5–3 µm MLZ–aliquantum crassitunicatis compositum. Pili recti vel undulati, cylindranei vel conici, ad apicem obtusum gradatim angustati, aseptati vel septati, basi 2–4 µm crassi, 30–50 µm longi, hyalini, tenuitunicati. Asci 31–40 × 6–7 µm, cylindraneo-clavati, ex hamulis surgentes; apice rotundati, poro iodo obscure coerulescenti. Ascosporeae 6–8 × 2.0–2.8 µm, hyalinae, aseptatae, ellipsoideae, saepe biguttulatae. Paraphyses cylindricae, flexuosae, septatae, aliquando e basi ramosae, 0.8–1 µm crassae.

Holotypus. Honshu: TUR 157227, Fukuroda waterfall, Daigo-machi, Kuji-gun, Ibaraki Prefecture, on coniferous wood, 29-X-94, TRL-1106 (culture SANK 13597).

T. Hosoya (✉)<sup>1</sup>  
Sankyo Co., Ltd., Lead Discovery Research Laboratories, Ibaraki,  
Japan

S. Huhtinen  
Herbarium, Center for Biodiversity, University of Turku, Turku,  
Finland

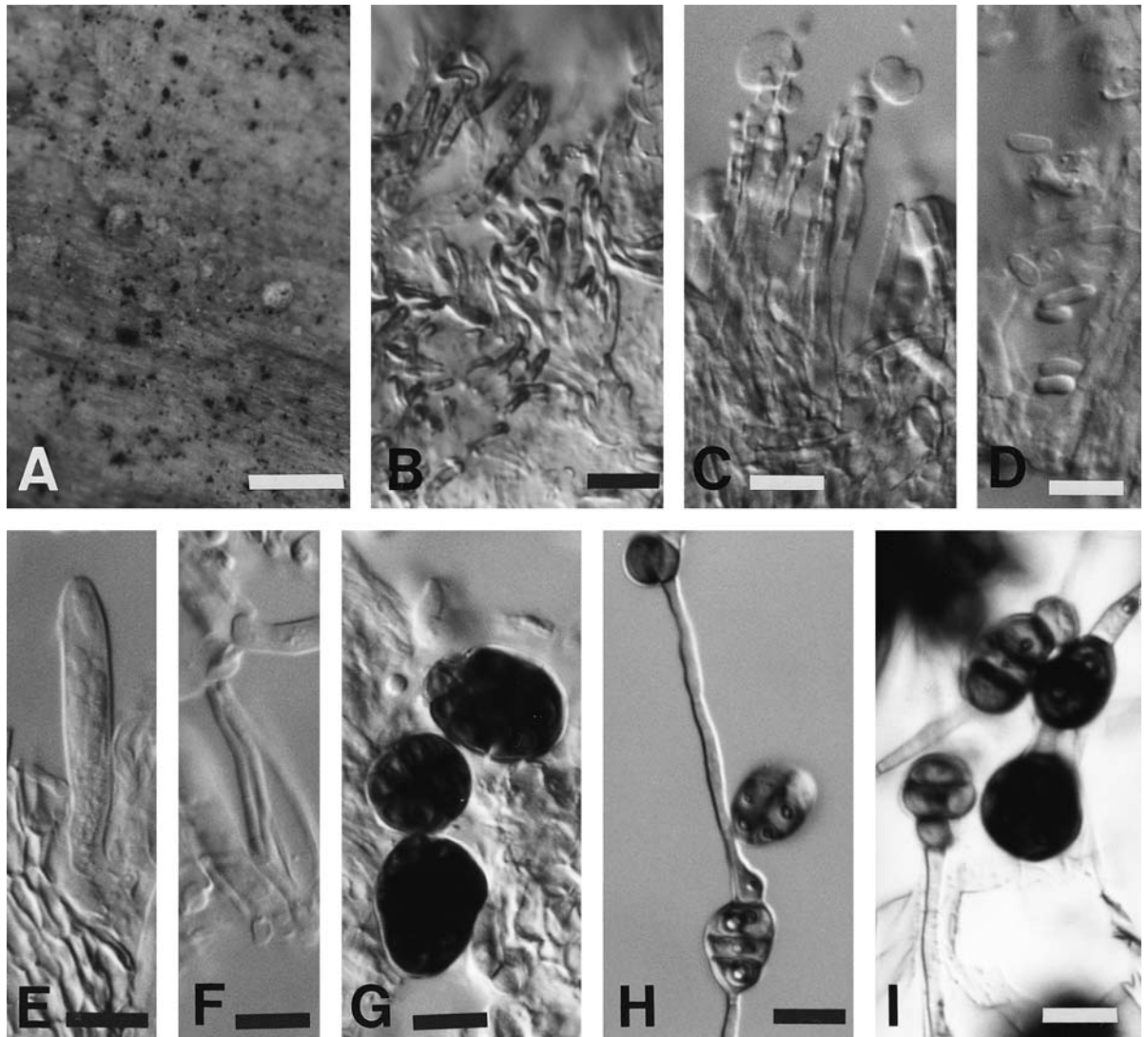
<sup>1</sup> Present address:  
Strategic Product Portfolio Department, Sankyo Co., Ltd., 3-5-1  
Nihonbashi-Honcho, Chuo-ku, Tokyo 103-8426, Japan  
Tel. +81-3-5255-7040 (Ext. 2528); Fax +81-3-5255-7086  
e-mail: hosoya@hq.sankyo.co.jp

Status anamorphus: *Monodictys* sp.

Etymology. Latin, “*Monodictys*,” refers to its anamorph associated on the substrate.

Apothecia scattered, borne among the anamorph, sessile to very shortly stipitate; turbinate or cupulate to spherical, Greyish Orange (6B4) with white pruinose margin incurving to conceal at least part of the hymenium, 300µm in diameter when dry; rehydrating shallow saucer-shaped, hyaline. Ectal excipulum of textura prismatica, composed of cells of 6–10 × 2.5–3µm, first MLZ–, but after a prolonged stay in MLZ locally faintly dextrinoid, somewhat thick-

walled. Hairs often glued together or capped in fascicles by hyaline resinous matter, 30–50µm long, 2–4µm thick at the base, straight or undulating but never cinninate or circinate, cylindrical to conical, gradually narrowed toward the obtuse apex apically solidified or not, aseptate or septate in the protruding part, hyaline; wall thin, but seems to be thickened because of precipitation of resinous matter; resinous/solidifying matter hyaline, of two kinds: (1) heterogeneously attached inside of the hair, forming irregular, thin or clearly thickened, MLZ+ (dextrinoid) areas, at the apex but also on lower parts of the hair; (2) attached to the

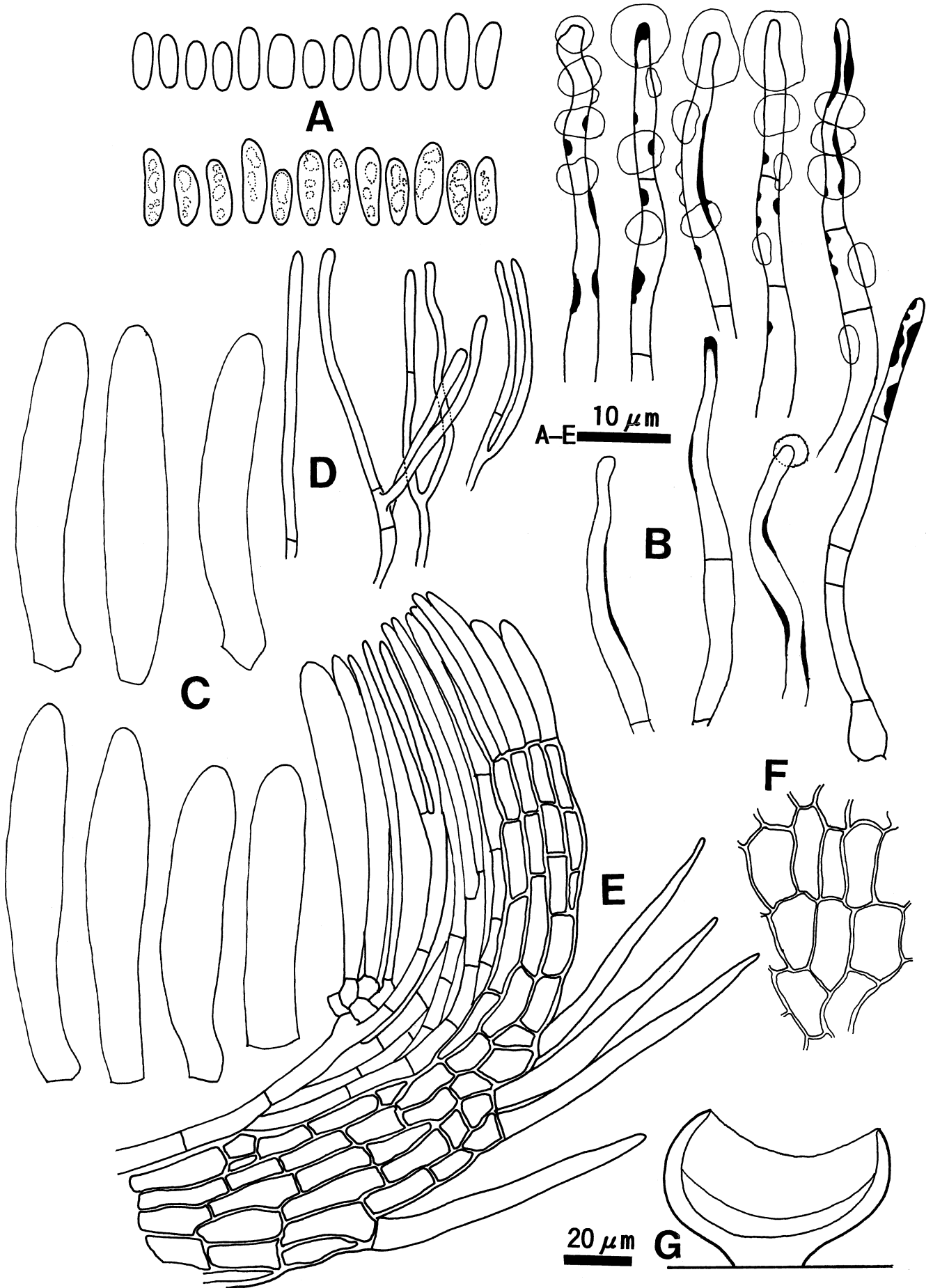


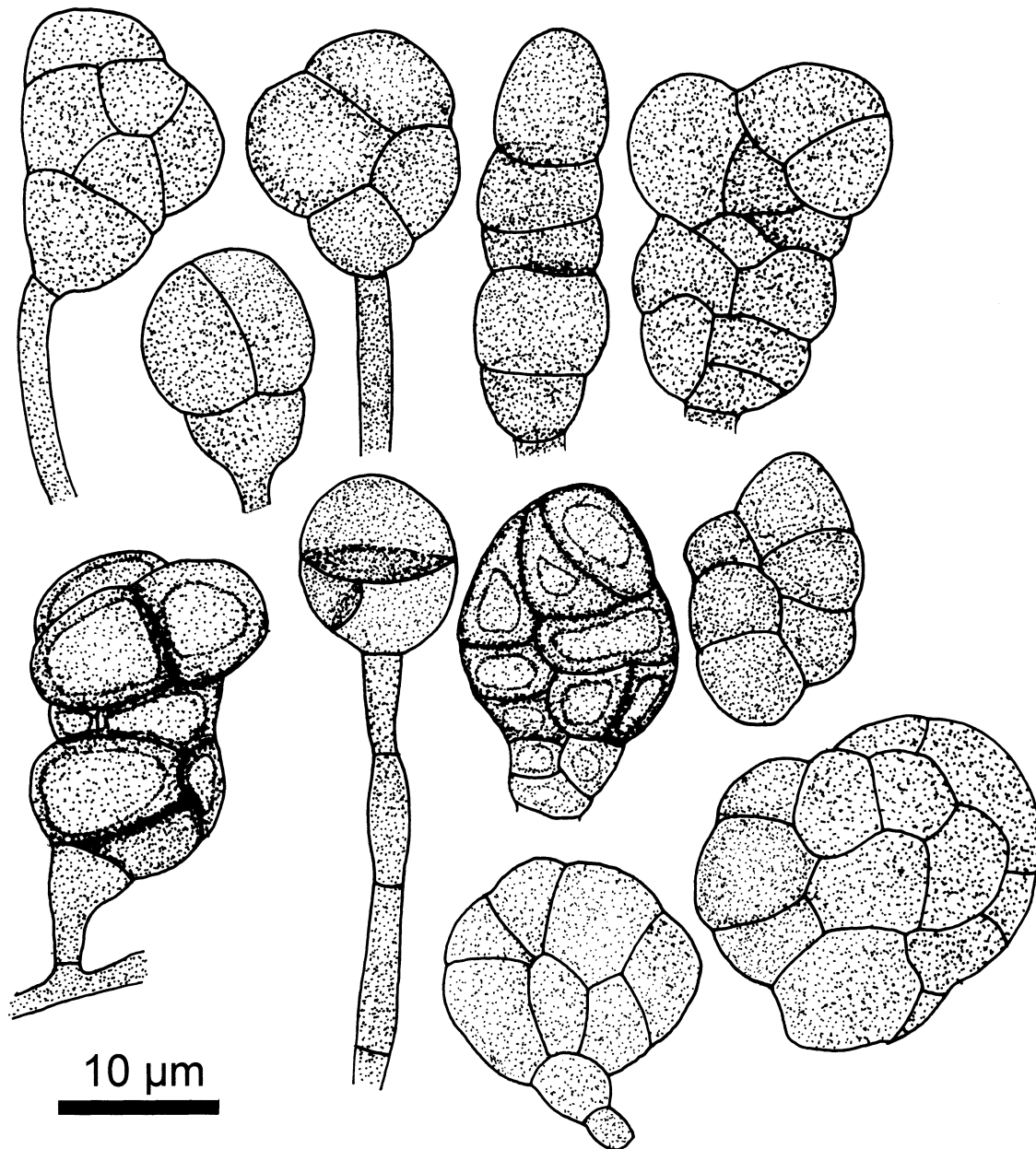
**Fig. 1.** *Hyaloscypha albohyalina* var. *monodictys* and *Monodictys* anamorph (A–G, TUR-157227; H, I, SANK 13597). **A** Dry apothecia. Note minute black dots are conidia of the anamorph. **B** Hairs in MLZ mount show partial MLZ+ reaction. **C** Hairs with massive lumps of resinous matter. **D** Ascospores. **E** Ascus. **F** Paraphyses. **G** *Monodictys*

anamorph associated with the teleomorph. **H** *Monodictys* anamorph produced on potato dextrose agar (PDA). Note conidia formed intercalary. **I** *Monodictys* anamorph produced on PDA. Note conidia formed terminally. Bars A 0.5 mm; B–I 10µm

**Fig. 2.** *Hyaloscypha albohyalina* var. *monodictys* (TUR-157227). **A** Ascospores. Cellular contents drawn for lower row. **B** Hairs. *Inked portion* shows MLZ+ reaction when in MLZ mount. *Hyaline circles* show platelike resin. The lower four hairs with resin largely omitted.

**C** Ascii. **D** Paraphyses. **E** Vertical section showing the margin. **F** Excipular cells. **G** Schematic drawing of the apothecium showing the outline of the structure. Hairs not drawn





**Fig. 3.** *Monodictys* anamorph of *H. albohyalina* var. *monodictys* (SANK 13597). Various aspects of conidial formation and released conidia under culture (PDA, 23°C, 3 weeks)

outside to form MLZ– lumps, many of which swell markedly to form globose or platelike bodies on the hair, intermixed with the nonswollen lumps. Asci 31–40 × 6–7 μm (in MLZ), cylindrical clavate, arising from croziers; apex rounded, pore MLZ– or indistinctly MLZ+ with or without KOH pretreatment. Ascospores 6–8 (–9.0) × 2.0–2.8 (–3.0) μm in MLZ ( $\bar{x} = 7.6 \times 2.4 \mu\text{m}$ ),  $Q = 2.5\text{--}4.0$ ,  $\bar{Q} = 3.2$  ( $n = 20$ , from the holotype), hyaline, aseptate, biseriolate near the apex, ellipsoid, often multiguttulate, occasionally constricted at the middle when mature. Paraphyses cylindrical to filiform, flexuous, septate, occasionally branched at the base, 0.8–1 μm wide.

Anamorph: *Monodictys* sp.

Colony of SANK 13597 on PDA 11 mm in diameter (23°C, 3 weeks), low and dense, slightly radially sulcate, convex, velvety, pruinose at the center, Olive Grey (2F2); concolorous, but slightly paler from the reverse, whitish sector appeared. Context tough and glutinous. Aerial mycelium little developed. Sectors absent. Pale-colored zonation present at the margin. Margin distinct, entire, superficial.

Conidia produced both on PDA and WSH. Conidiophores produced both on PDA and WSH, micronematous to semimacronematous, mononematous, unbranched, straight or flexuous, hyaline to brown, smooth. Conidiogenous cells monoblastic, integrated, terminal, determinate. Conidia 10–25 × 10–20 μm, solitary, acrogenous,

pyriform, ellipsoidal or subspherical, multicellular, sometimes slightly constricted at the septa, smooth, dark reddish-brown to almost black; each cell vacuolated.

Paratype: The Fukiage Gardens in the Imperial Palace, on unidentified wood (coniferous?), 3-X-97, TNSF-5013, *TRL-1516* (culture SANK 11498).

## Discussion

*Hyaloscypha albohyalina* var. *monodictys* belongs to a complex of variable populations grouped under *H. albohyalina*. This variability was discussed and depicted by Huhtinen (1989).

The main basis of separation between the type variety of *H. albohyalina* and *H. albohyalina* var. *spiralis* (Velen.) Huhtinen is the ascus basis. Other differences are less well defined and show considerable overlap. Cultural morphology was almost identical between the two. The type variety produced, however, no anamorph in culture, whereas var. *spiralis* frequently produced the *Pseudaegerita* anamorph. In both taxa, the wide morphological variability between the different populations was largely linked by cultural characters, thus making it virtually impossible to separate any other varieties at that stage (Huhtinen 1989).

*H. albohyalina* var. *tigillaris* (P. Karst.) Huhtinen is the third entity separated and named. The main characteristics are the heavily resin-covered hairs, the total lack of dextrinoid reactions, the wide spores, and possibly also the coniferous substrate. The cultural characters remain unknown (Huhtinen 1989).

The present fungus embraces a character set in which none of the single morphological characteristics can solely be used in classification or recognition of the taxon. Colony morphology of the present fungus was also similar to that of *H. albohyalina* var. *albohyalina* and *H. albohyalina* var. *spiralis*. The overall combination, however, proved to be unique. The two specimens treated here are both identical and are linked and backed up by growing among and producing a *Monodictys* anamorph. None of the more than 200 studied populations of *H. albohyalina* showed the combination of abundantly resin-covered, indextrinoid hairs with strongly dextrinoid areas inside the hair. Only the extreme apex in some hairs occasionally contained dextrinoid material. Such abundant and scattered dextrinoid inclusions, as seen in the present taxon, were not seen. It should be remembered, however, that such reactions have proved out to be a variable character, as seen in the amyloid nodules of *H. aureliella* (Nyl.) Huhtinen (1989), for example.

Besides in *H. albohyalina* var. *tigillaris*, platelike resin remains abundantly on the hairs in MLZ also in *H. britannica* Huhtinen for which no anamorph is reported. In two populations, excipulum was reported to show dextrinoid areas, whereas the hairs were reported as indextrinoid or having occasional amyloid nodules, as in its

closest taxon *H. aureliella* (Huhtinen 1989). A restudy revealed this character to be restricted to a few, scattered areas of the excipulum only. All hairs were permanently MLZ-. Spores showed marked variability in length and were frequently one-septate. The resin was similar to that of *H. aureliella*. A dematiaceous hyphomycete was annoyingly found growing on the same chips as apothecia, being relatively similar to *Monodictys*. The character set, however, showed even this population was combined with *H. britannica*, and the occurrence of a hyphomycete was regarded to be merely coincidental.

Based on these data, we treat the present fungus as distinct from the known varieties of *H. albohyalina*. The overall variability, which may still remain partly unresolved, is the main reason for treating this new taxon at a varietal level only.

Among the species of *Monodictys* listed in Ellis (1971), the anamorph of *H. albohyalina* var. *monodictys* showed the closest morphological similarity to *Monodictys putredinis* (Wallr.) S. Hughes, but decisive evidence still is required for the identification of the specific rank.

Besides the present teleomorph-anamorph relationship, three holoblastic anamorphs have been reported in *Hyaloscypha*: *H. albohyalina* var. *spiralis*-*Pseudaegerita* J.L. Crane & Schokn. (Huhtinen 1989), *H. aureliella*-*Cheiromycella microscopica* (P. Karst.) S. Hughes (Huhtinen 1989), and *Hyaloscypha zalewskii*-*Clathrosphaerina zalewskii* Beverw. (Descals and Webster (1976), although the taxonomy of both teleomorph and anamorph is in doubt, as indicated by Huhtinen (1989)). Holoblastic anamorphs of *Hyaloscypha* have common features: conidia multicellular and complex in shape; conidiogenous cells integrated, and morphologically not well differentiated. These morphological features are often known in aero-aquatic hyphomycetes. As the teleomorphs of the foregoing examples are often found in wet environments, the shape of the conidia is regarded as a convergent adaptation to the habitat rather than a phylogenetic coincidence. The morphological difference of the holoblastic anamorph is suggested to be less phylogenetically significant in the genus *Hyaloscypha*.

## References

- Descals E, Webster J (1976) *Hyaloscypha*: perfect state of *Clathrosphaerina zalewskii*. *Trans Br Mycol Soc* 67:525–529
- Ellis MB (1971) Dematiaceous Hyphomycetes. Commonwealth Mycological Institute, Kew, England
- Hosoya T, Otani Y (1997) Hyaloscyphaceae in Japan (1): Non-glassy-haired members of the tribe Hyaloscypheae. *Mycoscience* 38:171–186
- Huhtinen S (1989) A monograph of *Hyaloscypha* and allied genera. *Karstenia* 29:45–252
- Kornerup A, Wanscher JH (1978) *Methuen handbook of colour*, 3rd edn. E Methuen, London
- Otani Y (1966) Miscellaneous notes on Helotiales in Hokkaido I. *Trans Mycol Soc Jpn* 7:174–180