Mycoscience (2003) 44:245–248
DOI 10.1007/s10267-003-0097-0

SHORT COMMUNICATION

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Hadrospora fallax (Pleosporales) found in Japan

Received: December 13, 2002 / Accepted: January 27, 2003

Abstract *Hadrospora fallax* (Phaeosphaeriaceae, Pleosporales), collected from riverside environments, is described and illustrated for the first time in Japan.

Key words Freshwater · *Hadrospora* · Phaeosphaeriaceae · Pleosporales

Hadrospora fallax (Mouton) Boise, Mem. NY. Bot. Gard. 49: 310, 1989. Figs. 1–18

≡ *Trematosphaeria fallax* Mouton, Bull. Soc. R. Bot. Belg. 25: 155, 1886.

Anamorph: Form genus *Zalerion* R. T. Moore & Meyers.

Ascomata 300–365 μm high, 300–410 μm diameter, numerous, scattered to clustered, immersed to erumpent, globose, covered with sparse brown septate hyphae on lower part of ascoma (Figs. 5, 7, 14). Beak 65–100 μm long, 100–140 μm wide, central, short-papillate, composed of polygonal to subglobose brown cells, with hyaline sparse periphyses. Ascomal wall mainly of textura globosa and partly of textura intricata in surface view; in longitudinal section 30–45 μm thick at sides, composed of two wall zones, outer zone of compressed small dark brown pseudoparenchymatic cells, inner zone of 5–7 layers of polygonal hyaline to brown 7–25 × 3.5–10 μm cells; slightly thinner at the base, 22–30 μm thick. Pseudoparaphyses cellular, numerous, 2–4 μm thick, septate, branched. Asci (130–)140–212.5 × 45–77.5(–87.5) μm (mean = 174.0 × 59.4 μm, n = 28), bitunicate, not numerous, basal, ovoid to ellipsoid, rounded at the apex, apical chamber present, with a short stalk or somewhat sessile, with 8 overlapping triseriate to tetraseriate ascospores (Figs. 4, 13). Ascospores (63.5–)70–100(–104.5) × (17.5–)19–26(–29) μm (mean = 84.9 × 22.7 μm, n = 139), L/W 3.3–4.2 (mean = 3.8, n = 125), broadly fusiform with rounded ends, straight to slightly curved, moderately thick-walled, 8–10-septate (septa of upper hemisphere + the primary septum + septa of lower hemisphere = 3 + 1 + 4, 3 + 1 + 5, 4 + 1 + 4, 4 + 1 + 5), with the primary septum supramedian (0.41–0.47, mean = 0.44, n = 125), constricted at the primary septum, weak to no constriction at other septa, the fourth or fifth cell from the apex (above the primary septum) enlarged downward, brown to reddish-brown and end cells pale brown, with or without guttules, smooth (but echinulate in lactophenol), with a conspicuous sharply delimited sheath, up to 34 μm thick at sides, 10–15 μm thick at both ends, sometimes constricted at the primary septum, and bell-shaped at ends. Ascospores produce 4–6 germ tubes from each end cell (Figs. 1–3, 8–12, 15).

Cultural characteristics: Colonies on potato dextrose agar (PDA) 50 mm in diameter after 3 weeks at 20°C under 12 L:D cycle, pale olivaceous gray (Rayner 1970; R. 120) to olivaceous gray (R. 121), with white margin; a yellowish pigment is produced in some isolates. Colonies on v-8 juice agar (V8A) 55 mm in diameter, smoke gray (R. 105) to pale olivaceous (R. 120), with abundant aerial mycelium; no pigment is produced; reverse olivaceous buff (R. 89) to gray olivaceous (R. 107). Colonies on cornmeal agar CMA growing rapidly, 70 mm in diameter, thin, consisting of submerged mycelium, uncolored; no pigment is produced.

All single ascospore isolates produced numerous ascomata on agar media (particularly on V8A) and on sterilized rice straws half immersed in water agar within 2 months. The fungus morphology was similar to that found in nature, but the ascomata and asci were larger in size (ascomata 600–650 μm high, 490–680 μm diameter; asci 142.5–257.5 × 52.5–107.5 μm, mean = 187.9 × 73.9 μm, n = 51), whereas the ascospores resembled those on the host, measuring (71–)75–93(–102) × (18–)19.5–26(–28) μm (mean = 78.7 × 20.0 μm, n = 159).

The *Zalerion* state was found when grown on PDA at room temperature over 4 months. Conidia holoblastic,

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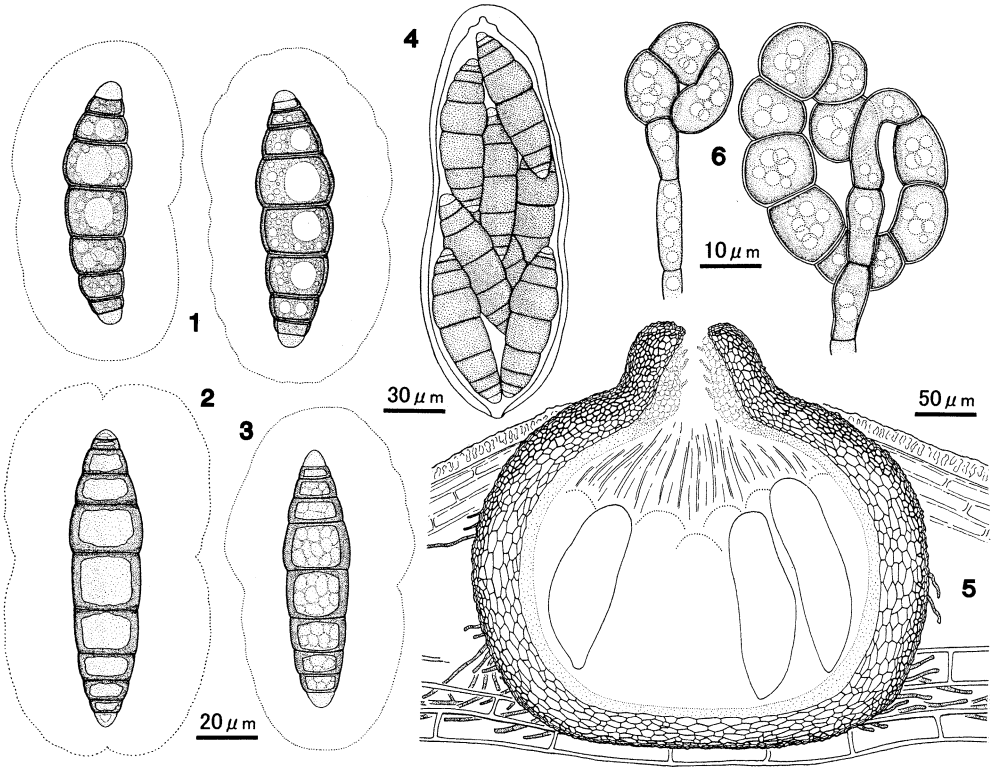


Figs. 1–6. Line drawings of *Hadrospora fallax*. **1–3** Ascospores; **4** Ascus; **5** Ascoma in longitudinal section; **6** Conidia. (**1**, **4**, HHUF 27428; **2**, **5**, HHUF 27429; **3**, culture 4288; **6**, culture 4292)

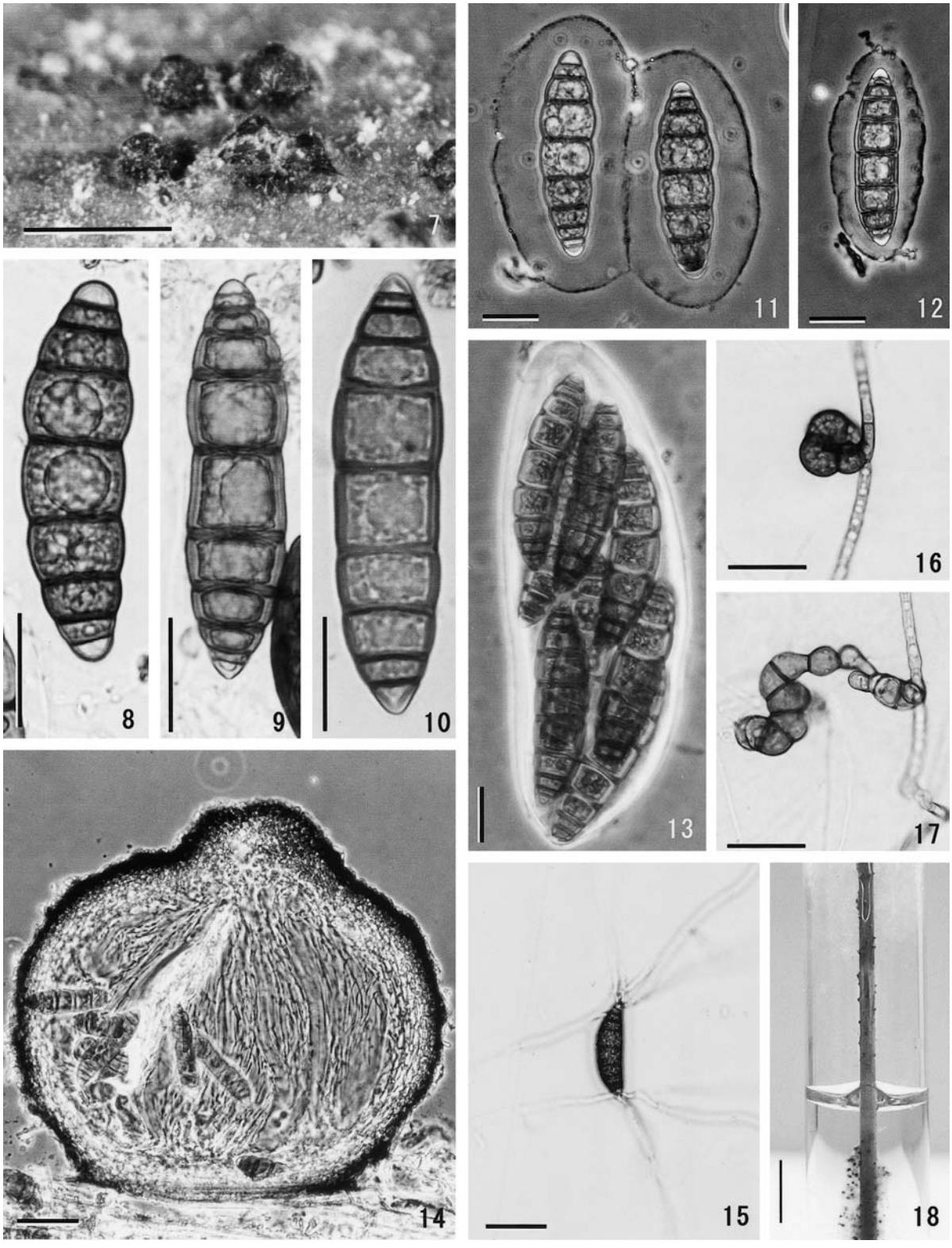
helicoid, multiseptate, constricted at septa, composed of several 8–13 μm diameter cells, brown to dark brown, smooth, with numerous guttules, coiled conidia ~22–50 μm in diameter (Figs. 6, 16, 17).

Materials examined: On stems of unknown plants: Oowasawa River, riverbank (Chitose bridge), Kadoke, Hirosaki, Aomori, 140°30.532′ E, 40°34.276′ N, July 29, 2001, KT.613 (HHUF 27426, culture 4288); Oowasawa River, riverbank (Horikoshi bridge), Kadoke, Hirosaki, Aomori, 140°31.181′ E, 40°34.304′ N, Aug. 14, 2001, KT.672 (HHUF 27428, culture 4290); Toyohira River, riverbank, Sapporo, Hokkaido, 141°21.489′ E, 43°02.229′ N, Sept. 2, 2001, KT.765 (HHUF 27429, culture 4291). On stems of unknown herbaceous plants: Oowasawa River, riverbank (Chitose bridge), Kadoke, Hirosaki, Aomori, Aug. 4, 2001, KT.630 (HHUF 27427, culture 4289); Oowasawa River, riverbank (Nakachitose bridge), Shimizumori, Hirosaki, Aomori, 140°30.163′ E, 40°34.181′ N, Oct. 28, 2001, KT.817 (HHUF 27430, culture 4292). On twigs of an unknown woody plant: Hirakawa, riverbank (Hirosakioohashi), Hiraka, Minamitsugaru, Aomori, 140°32.030′ E, 40°34.005′ N, Aug. 5, 2001, KT.855 (HHUF 27431). On culms of *Phragmites japonica* Steud.: Hirakawa, riverbank (Shintaihoubashi), Hiraka, Minamitsugaru, Aomori, 140°31′ E, 40°36′ N, Oct. 13, 2002, KT.912 (HHUF 27669); Magarikawa, riverbank, Sakekawa, Mogami, Yamagata, 140°11′ E, 38°48′ N, Oct. 13, 2002, Y. Ooki & YH (HHUF 27670). All specimens and isolates are maintained at Herbarium Hirosaki University, Fungi (HHUF).

Notes: During an investigation of Ascomycota from riverside environments in northern Japan (Hokkaido, Aomori, and Yamagata), we collected a *Trematosphaeria* Fuckel-like fungus on *Phragmites japonica* Steud. and unknown herbaceous or woody plants that have been submerged in the river or exposed on the riverbank.

Traditionally, lignicolous fungi similar to *Leptosphaeria* Ces. & De Not. but with a paler end on the ascospores have been placed in *Trematosphaeria* (Luttrel 1973). However, Boise (1984) surveyed numerous species that had been placed in *Trematosphaeria* and accepted only five species in the genus, mainly based on the trabeculate hamathecium (Boise 1984, 1985). Many species excluded from *Trematosphaeria* were repositioned or synonymized in various genera including *Asteromassaria* Höhn., *Byssothecium* Fuckel, *Caryospora* De Not., *Hadrospora* Boise, *Leptosphaeria*, *Lophiostoma* Ces. & De Not., and *Massariosphaeria* (E. Müll.) Crivelli (Boise 1984, 1989).

In numerous *Trematosphaeria*-like fungi, our collections fit well within the generic concept of *Hadrospora*. Genus *Hadrospora*, which was erected by Boise (1989), is characterized by immersed to erumpent, subglobose ascomata with broadly papillate beak; pseudoparenchymatous ascomal wall; oblong to ovoid, 8-spored, fissitunicate asci; narrowly cellular pseudoparaphyses; ellipsoid to fusoid, pluriseptate, thick-walled, smooth, brown ascospores. The genus belongs in the Phaeosphaeriaceae, and presently contains two species. *Hadrospora fallax* (Mouton) Boise (basionym: *Trematosphaeria fallax* Mouton), the type species, has been reported previously from Belgium, Italy, Switzerland, and the United States (Boise 1989; Fisher and Webster 1992; Shearer and Crane 1971; Webster 1993). The second species, *H. clarkii* (Sivan.) Boise (basionym:



Figs. 7–18. Micrographs of *Hadrospora fallax*. **7** Ascomata on host surface. **8–10** Ascospores. **11**, **12** Ascospores with a mucilaginous sheath. **13** Ascus. **14** Ascoma in longitudinal section. **15** Germinated ascospore. **16**, **17** Conidia. **18** Ascomata in water culture. (**7–9**, **11**, **12** HHUF 27428; **10**, **13**, **15** HHUF 27426; **14** HHUF 27429; **16**, **17** culture 4292; **18** culture 4290). *Bars* **7** 500 μm; **8–13**, **16**, **17** 25 μm; **14**, **15** 50 μm; **18** 1 cm

Trematosphaeria clarkii Sivan.) was described from the leaf sheath of *Deschampsia caespitosa* (L.) P. Beauv. in Great Britain (Sivanesan 1976). In Japan, neither species has yet been recorded.

These two species can be distinguished mainly on the basis of differences in ascospore dimension and septation. The ascospores of *H. fallax* are smaller [(46–)60–72(–80) × 15–23 μm] and with 8(–9) transverse septa (Boise 1989); in *H. clarkii*, those are larger (90–132 × 20–35 μm), (6–)9–10 (–11)-septate and also rarely with vertical septa at the end cells of the spore (Sivanesan 1976). We identified our collected fungus as *H. fallax* although it differs in several ways from the description of *H. fallax* provided by Boise (1989), who examined the type material. For instance, the ascospores of our fungus are larger, 8–10-septate, and with a conspicuous sheath. We considered, however, these differences might be due to population diversity within the species. Fisher and Webster (1992) and Webster (1993) reported this species (at first as *H. clarkii*) from rice roots and noted that the ascospores are 7(–10)-septate, with a wide mucilaginous sheath. Lengths and widths of ascospores also may be varied among populations. In HHUF 27427, the ascospores are relatively smaller, 63.5–84 × 17.5–23.5 μm (mean = 74.7 × 20.6 μm, $n = 30$), whereas in HHUF 27429, those are larger, 77–104.5 × 21–27 μm (mean = 92.0 × 23.5 μm, $n = 41$).

Hadrospora fallax has been isolated from roots of wheat and rice and from cysts of a soybean nematode (Boise 1989; Webster 1993). It also has been recorded on balsa wood as a freshwater fungus (Shearer and Crane 1971), as in our collections. It is likely that this species has adapted morphologically to aquatic habitats because it has ascospores with a wide mucilaginous sheath and peculiar helicoid conidia of *Zalerion* form. It produced numerous ascomata on culms over water and in water, in water culture (method of Fallah and Shearer 2001) (Fig. 18). Thus, *H. fallax* could be an amphibious species defined by Shearer (1993).

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