

**Aquatic fungi from peat swamp palms:
Jahnula appendiculata sp. nov.**

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A new species of *Jahnula* is described based on a specimen from a submerged palm trunk in a peat swamp forest in Thailand. *Jahnula appendiculata* sp. nov. is unique in the genus in having ascospores that are surrounded by a sheath and in having bipolar cellular appendages. The taxon is illustrated with light micrographs and a brief discussion of appendages in freshwater ascomycetes is provided.

Keywords: freshwater ascomycete, palm, peat swamp, taxonomy.

We are investigating the fungi occurring on palms in Sirindhorn Peat Swamp Forest, Narathiwat, in southern Thailand. Fronds from the palms may fall into the acidic waters of the peat swamp (pH 5.8–6.2), while others may remain attached to the trees or become lodged in plants and litter above the water. This latter can be regarded as terrestrial. The fungi that colonise the palm fronds in the terrestrial milieu are typical palm fungi (e.g. Fröhlich & Hyde, 1999; Yanna & al., 2001), while those colonizing submerged fronds can be regarded as aquatic species (e.g. Goh & Hyde, 1999). The latter habitat (submerged palm material) has not been studied previously and is an interesting source of novel fungi. In this paper we report on a new species of *Jahnula* Kirschst. with fascinating appendages.

Jahnula has been reviewed by Hyde & Wong (1999) and includes eight species. It is an aquatic genus and is unusual in having large cells in the peridium and ascomata that are attached to the substratum by often quite long stalks, e.g. up to 300 µm length, 40–55 µm width in *Jahnula siamensiae* S. Sivichai & E. B. G. Jones (Pang & al., 2002). Based on these characters and supportive molecular data, the order Jahnulales has been erected for *Jahnula* and related genera (Pang & al., 2002). Hyde & Wong (1999) originally thought that the thick stalks might be algal associations, but this is unlikely. Ascospores

pores are brown and often surrounded by a sheath or have mucilaginous pad-like appendages. We collected a unique species of *Jahnula* in which the ascospores are surrounded by a sheath and also have bipolar cellular appendages. It is therefore described as a new species.

Material and methods

Submerged palm material was collected from Sirindhorn Peat Swamp Forest, Narathiwat, southern Thailand during May 2001. The material was returned to the laboratory, incubated in plastic boxes on damp tissue paper and examined within 4 weeks. Type material has been deposited in the BIOTEC Herbarium (BBH) and a culture in the BIOTEC Culture Collection (BCC). Single spore isolations were made on corn meal agar with added antibiotics to suppress bacterial growth. All observations, including photographic documentation, were of material mounted in water, using differential interference microscope. The range between minimum and maximum values for microscopic measurements is given, mean values are in brackets, n being the number of items measured.

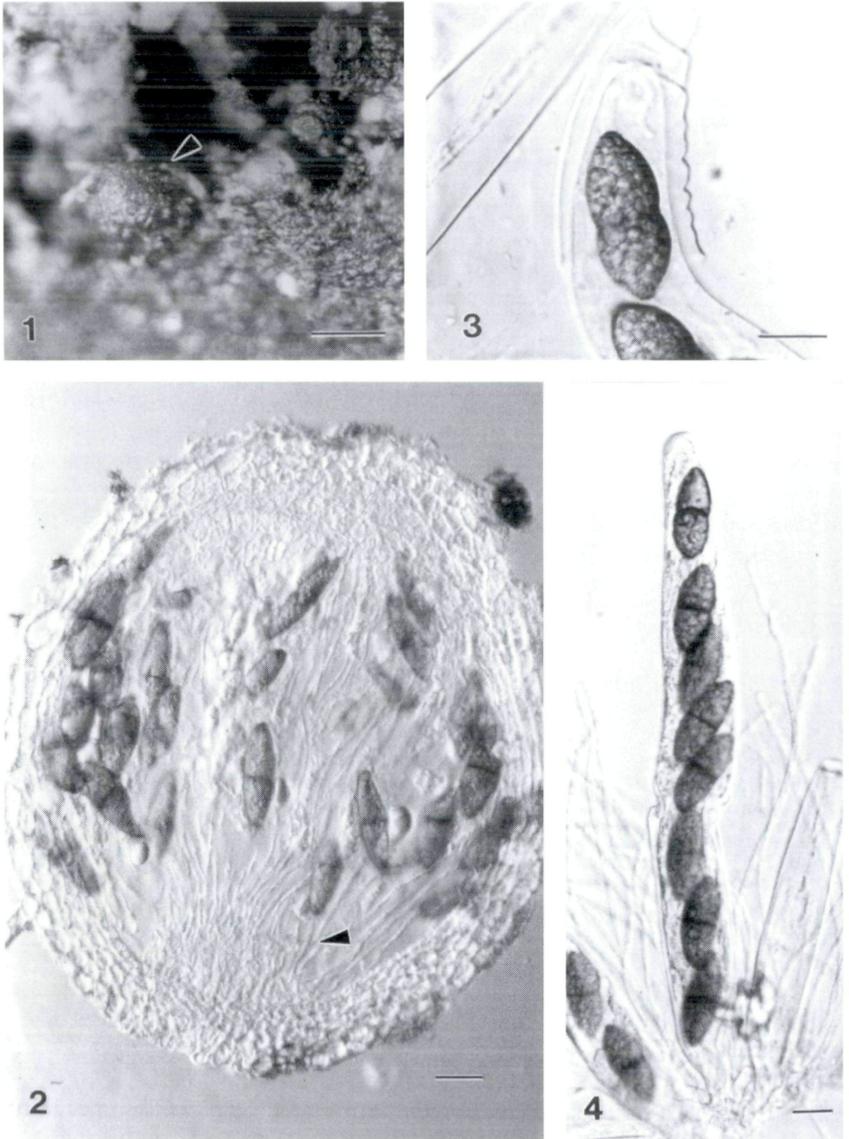
Taxonomy

Jahnula appendiculata Pinruan, K. D. Hyde & E. B. G. Jones, **sp. nov.** – Figs. 1–14.

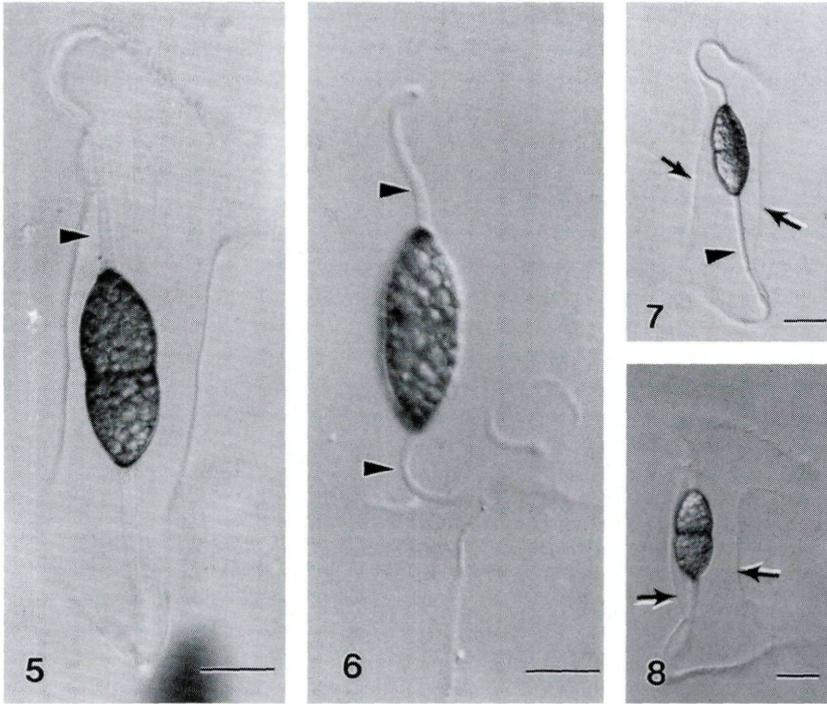
Ascomata 305–325 µm diametro, semi-immersa, erumpentia, globosa vel subglobosa, hyalina vel pallide straminea, membranacea, ostiolata, breviter papillata, solitaria, setis hyalinis usque ad 80 µm longis praedita, stipite hyalino. Filamenta interascalialia pseudoparaphyses. Asci 360–410 × 41–43 µm, octospori, cylindrici vel cylindrico-clavati, bitunicati, fissitunicati, camera oculari et annulo tenui instructi. Ascosporae 47.5–55 × 23.5–26.5 µm, 1–2-seriatae, ellipsoideo-fusifformes, brunneae, guttulateae, 1-septatae, ad septum constrictae, paries ornamento punctiformi, tunica gelatinosa circumdatae et duobus appendicibus cellularibus terminalibus longis hyalinis praeditae.

Etymology of species epithet. – In reference to the appendaged ascospores.

Ascomata 305–325 µm diam, semi-immersed, becoming erumpent, but with the base remaining immersed, globose to subglobose, hyaline to pale straw-coloured, membranaceous, ostiolate, short papillate, easily detaching from wood, solitary, covered with short hyaline setae up to 80 µm long, with a hyaline stalk-like strand attached to the base, 37.5 µm length, 35 µm width. (Figs. 1, 2). – Peridium ca. 36 µm wide, comprising 4–6 rows of large angular cells with hyaline walls (Fig. 2). – Pseudoparaphyses up to



Figs. 1-4. Light micrographs of *Jahnula appendiculata* (from holotype, mounted in water). - 1. Erumpent ascomata (arrowhead; mature ascoma). - 2. Section of ascoma. Note the peridium and the cushion-like structure from which the asci arise (arrowhead). - 3. Apical region of a fissitunicate ascus. - 4. Asci and pseudoparaphyses. - Bars: 1 = 160 μ m, 2-4 = 20 μ m.



Figs. 5–8. Light micrographs of ascospores of *Jahnula appendiculata* (from holotype, mounted in water). – 5, 7, 8. Ascospores with sheath (small arrows) and appendages (arrowhead), the latter still within the sheath. – 6. Ascospore with polar appendages (arrowheads), the sheath having dissolved. – Bars = 20 μ m.

1.2 μ m wide, hypha-like, septate, unbranching between asci, branching and anastomosing above (Fig. 4). – Asci 360–410 \times 41–43 μ m (\bar{x} = 368.7 \times 42.5 μ m, n = 20), 8-spored, cylindrical to cylindrical-clavate, bitunicate, fissitunicate, with a shallow ocular chamber and faint ring (Figs. 3, 4). – Asci forming from a central cushion at the base of the ascoma (Fig. 2). – Ascospores 47.5–55 \times 23.5–26.5 μ m (\bar{x} = 51.3 \times 24.8 μ m, n = 25), 1–2-seriate, ellipsoid-fusiform, ends pointed, brown, guttulate, 1-septate, slightly constricted at the septum, wall ornamentation minutely verrucose, spore surrounded by a prominent mucilaginous sheath, ca 160 \times 40 μ m, which ends with a small subapical hood-like rim, and a long, cellular appendage arising from both poles, up to 120 μ m and 4 μ m diam. (Figs. 5–8).

Colonies on CMA effuse, reaching 2.5 cm in diam. in 11 days at room temperature (22–24°C), mycelium 12.5–17.5 μ m wide, brown, a small amount of aerial mycelium present, hyphae smooth-walled and loose, no anamorph observed.

Holotypus. – Thailand, Narathiwat, Sirindhorn Peat Swamp Forest, on submerged trunk of *Licuala longecalycata* Furt., 12 May 2001, U. Pinruan (Pinruan 96 in BBH).

Isotypus. – Thailand, Narathiwat, Sirindhorn Peat Swamp Forest, on submerged trunk of *Licuala longecalycata* Furt., 12 May 2001, U. Pinruan (Pinruan 96 in PDD).

Jahnula appendiculata is distinct from all other species in the genus by the ascospores that have both a sheath and bipolar appendages. The only other species with appendages is *Jahnula bipolaris* (K. D. Hyde) K. D. Hyde, however, the appendages in that species are cap-like (Hyde & Wong, 1999). When *J. appendiculata* ascospores are released from the asci they are surrounded by a mucilaginous sheath with an outer layer (membrane). Long cellular appendages are visible within the sheath at this stage. The appendages are attached to a hood-like rim at each end of the ascospores and are curled inside the ends of the sheath (Figs. 5, 7–8). In water, and with time, the ends of the sheath break or dissolve and release the curled appendages which then expand and become less defined (Figs. 5–8). The sheath eventually dissolves, or spreads, and only the appendages remain visible (Figs. 6). Other *Jahnula* species have spores with a mucilaginous sheath e.g. *J. granulosa* K. D. Hyde & S. W. Wong, *J. potamophila* K. D. Hyde & S. W. Wong, *J. seychellensis* K. D. Hyde & S. W. Wong, and *J. systyla* K. D. Hyde & S. W. Wong, the latter species being similar to the one in *J. appendiculata*.

The ascospores of *J. appendiculata* are unique, with appendages at both poles and surrounded by a sheath, and differ from those of all other *Jahnula* species. In many other freshwater ascomycetes, ascospores are surrounded by various types of sheaths, e.g. *Annulataascus velatisporus* K. D. Hyde (Hyde, 1992). In *Pseudoproboscispora aquatica* S. W. Wong & K. D. Hyde appendages are cellular and appear to be similar once they are released from the ascus, but they are curled up in a proboscis-like manner within the ascus (Wong & Hyde, 1999). Several species (e.g. *Aniptodera* Shearer & M. A. Mill., *Diluviocola* K. D. Hyde, S. W. Wong & E. B. G. Jones, *Halosarpheia* Kohlm. & E. Kohlm., *Phaeonectriella* R. A. Eaton & E. B. G. Jones) have thread-like, bipolar, unfurling, filamentous appendages (Hyde & al., 1998, 1999). In *Fluminicola bipolaris* S. W. Wong, K. D. Hyde & E. B. G. Jones the appendages are bipolar, initially flattened and become cup-like when released in water (Wong & al., 1999). In all of the above species asci are unitunicate. It is rare to observe ascospore appendages in bitunicate ascomycetes, even amongst marine fungi (Hyde & al., 2000). Appendages, however, only occur in a small number of species e.g. *Massarina bipolaris* K. D. Hyde (Hyde, 1995).

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References

- Fröhlich, J. & K. D. Hyde (1999). Biodiversity of palm fungi on the tropics: Are global fungal diversity estimates realistic? – *Biodivers. Cons.* 8: 977–1004.
- Goh, T. K. & K. D. Hyde (1999). Fungi on submerged wood and bamboo in the Plover Cove Reservoir, Hong Kong. – *Fung. Divers.* 3: 57–85.
- Hyde, K. D. (1992). Tropical Australian freshwater fungi. II. *Annulatascus velatispora* gen. et sp. nov., *A. bipolaris* sp. nov. and *Nais aquatica* sp. nov. (Ascomycetes). – *Austral. Syst. Bot.* 5: 117–124.
- (1995). Tropical Australian freshwater fungi. VII. New genera and species of Ascomycetes. – *Nova Hedwigia* 61: 119–140.
- , S. W. Wong (1999). Tropical Australian freshwater fungi. XV. The ascomycete genus *Jahnula*, with five new species and one new combination. – *Nova Hedwigia* 68: 489–509.
- , S. W. Wong & E. B. G. Jones (1998). *Diluviocola capensis* gen. et sp. nov. a freshwater ascomycete with unique polar caps on the ascospores. – *Fung. Divers.* 1: 133–146.
- , V. V. Sarma & E. B. G. Jones (2000). Morphology and taxonomy of higher marine fungi. – In: Hyde, K. D. & S. B. Pointing (eds.). *Marine Mycology, a practical approach*, Fungal Diversity Research Series 1, Fungal Diversity Press, Hong Kong, pp.172–201.
- , W. H. Ho & C. K. M. Tsui (1999). The genera *Aniptodera*, *Halosarpheia*, *Nais* and *Phaeonectriella* from freshwater. – *Mycoscience* 40: 165–183.
- Pang, K. L., M. A. Abdel-Wahab, S. Sivichai, H. M. El-Sharouny & E. B. G. Jones (2002). *Jahnulales* (*Dothideomyces*, *Ascomycota*): a new order of lignicolous freshwater ascomycetes. – *Mycol. Res.* 106: 1031–1042.
- Wong, S. W. & K. D. Hyde (1999). *Proboscispora aquatica* gen. et sp. nov. from wood submerged in freshwater. – *Mycol. Res.* 103: 81–87.
- , K. D. Hyde & E. B. G. Jones (1999). Ultrastructural studies on freshwater ascomycetes. *Fluminicola bipolaris* gen. et sp. nov. – *Fung. Divers.* 3: 189–197.
- Yanna, W. H. Ho, K. D. Hyde & T. K. Goh (2001). Occurrence of fungi on tissues of *Livistona chinensis*. – *Fung. Divers.* 6: 167–179.

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