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Submersisphaeria palmae sp. nov. with a key to species, and notes on *Helicoubisia*

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Submersisphaeria palmae sp. nov. is described and illustrated from petioles, rachides and trunks of palms at Sirindhorn Peat Swamp Forest, Narathiwat, in southern Thailand. This species has much smaller ascospores than most previously described species. A key to the five accepted species is given and *S. palmae* is compared with the most similar taxa. *Helicoubisia coronata* was collected from the palm, *Eleiodoxa conferta*, also in the Peat Swamp Forest. *Helicoubisia* is characterised by erect conidiophores bearing discrete, polyblastic conidiogenous cells at the apex and coiled, pale brown conidia. *Helicoubisia* and *Moorella* are discussed and *M. monocephala* is relegated to synonymy of *H. coronata*.

Keywords: Fungal diversity, *Moorella*, palm fungi, synonymy.

We are studying the fungi on submerged and terrestrial decaying parts of palms that grow in the acidic waters of Sirindhorn Peat Swamp Forest, in southern Thailand (Hyde & al., 2002; McKenzie & al., 2002). In this paper we describe a new species of *Submersisphaeria* collected on the submerged petioles, rachides and trunks of the palms *Eleiodoxa conferta* Griff., *Nenga pumila* H. Wendl. and *Licuala longecalycata* Furt. *Helicoubisia coronata* Lunghini & Rambelli was collected on a terrestrial sample of *Eleiodoxa conferta* and recorded for the first time in Thailand. The taxonomy and nomenclature of this species is clarified.

Materials and methods

Collected palm material was returned to the laboratory and incubated in plastic boxes on damp tissue paper. Samples were observed by stereomicroscopy and fungi were mounted in water for measurement and photography. Attempts were made to isolate both fungi from single spores and then grow them on potato dextrose agar

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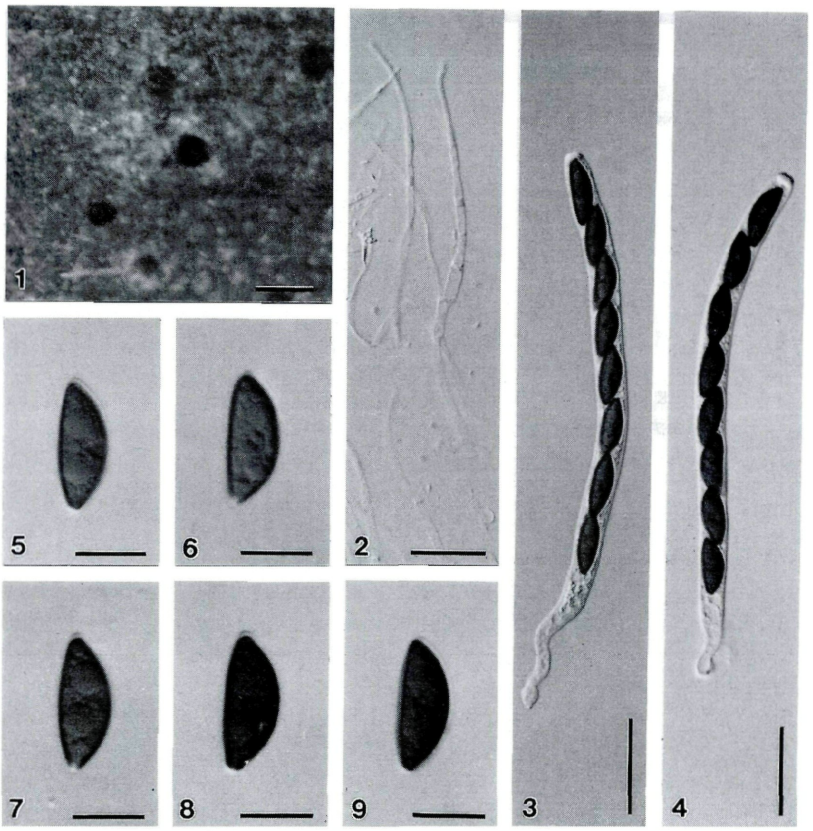
(PDA) (Choi & al., 1999). Type material is deposited in the BIOTEC Bangkok Herbarium (BBH) and axenic cultures are stored in the BIOTEC Culture Collection (BCC).

Taxonomy

Submersisphaeria palmae A. Pinnoi **sp. nov.** – Figs. 1–9.

Ascomata in substrato immersa, 200–300 µm diam, globosa vel subglobosa, solitaria. Asci 100–127.5 × 6.25–8.75 µm, octospori, cylindrici, leptodermi, longe pedicellati, apparato apicali praediti. Ascosporae 17.5–22.5 × 5–7.5 µm, uniseriatae, unicellulares, brunneae, ellipsoideae, appendiculatae.

Etymology. – palmae - in reference to the host family.



Figs. 1–9. *Submersisphaeria palmae* (from holotype). – 1. Ascomata on natural substratum. – 2. Paraphyses. – 3, 4. Cylindrical asci with refractive apical rings. – 5–9. Ascospores with paler area at end of spores. – Bars: 1 = 400 µm; 2 = 25 µm; 3–9 = 20 µm.

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Ascomata 200–300 µm diam, globose or subglobose, dark brown, coriaceous, solitary, immersed in substrata, visible as blackened dots on the host surface. Ostiole central. – Paraphyses 2.5–3.75 µm diam, hypha-like, filamentous, septate, tapering, numerous. – Asci 100–127.5 × 6.25–8.75 µm ($\bar{x}$ = 111 × 7.15 µm, n = 25), 8-spored, unitunicate, cylindrical, thin-walled, with a long pedicel, and a relatively large, refractive, non-amyloid apical ring, 4–5 µm diam, 1–2 µm high ($\bar{x}$ = 4.1 × 1.7 µm, n = 5). – Ascospores 17.5–22.5 µm × 5–7.5 µm ($\bar{x}$ = 18.2 × 5.9 µm, n = 25), uniseriate, unicellular, ellipsoidal, smooth, olivaceous-brown, with small mucilage pads at each end.

Holotype. – THAILAND: Narathiwat, Sirindhorn Peat Swamp Forest, on submerged rachis of *Eleiodoxa conferta*, 13 Feb. 2002, A. Pinnoi (Aom 152 in BBH).

Other material examined. – THAILAND: Narathiwat, Sirindhorn Peat Swamp Forest, on submerged petiole of *Eleiodoxa conferta*, 12 May 2001, A. Pinnoi (Aom 42 in BBH); *ibid.*, on submerged rachis of *Nenga pumila*, 12 Feb. 2002, A. Pinnoi (Nen 27 in BBH); *ibid.* (Nen 28 in BBH); *ibid.*, on submerged trunk of *Licuala longecalycata*, 22 Jun. 2001, U. Pinraun (Wah 71 in BBH); *ibid.*, on submerged petiole of *Licuala longecalycata*, 22 Jun. 2001, U. Pinraun (Wah 101 in BBH); *ibid.*, on submerged trunk of *Licuala longecalycata*, 26 Sep. 2001, U. Pinraun (Wah 125 in BBH).

The genus *Submersisphaeria* was introduced by Hyde (1996) to accommodate *S. aquatica* K. D. Hyde and is characterised by subglobose, immersed ascomata and unitunicate, cylindrical, pedicellate asci, with a relatively large, refractive, non-amyloid apical ring. Ascospores are brown, one-celled and reported to have hyaline germ pores at each end. Campbell & al. (2003) reported *S. aquatica* from submerged wood in the USA and illustrated ascospores with bipolar mucilaginous pads and no germ pores. Hyde (1996) and Zhou & Hyde (2000) described the ascospores of *S. aquatica* and *S. bambusicola* D. Q. Zhou & K. D. Hyde as having polar germ pores. *Submersisphaeria rattanicola* J. Fröhl. & K. D. Hyde which has fusiform ascospores with narrow ends was also reported to have germ pores by Fröhlich & Hyde (2000). Re-examination of the type material of *S. bambusicola* and *S. rattanicola*, and close examination of the specimens of *S. palmae* showed that the ends of the spores are hyaline, thus having only the appearance of germ pores. These lighter areas at the spore ends are, probably, an optical artifact. The generic description of *Submersisphaeria* should, therefore, be amended to include ascospores with polar pad-like appendages as well as unicellular ascospores, while the germ pore is absent.

Wang & al. (2004) introduced a fourth species to the genus in renaming *Amphisphaeria aquatica* (Ellis & Everh.) Berl. & Vogl. as *Submersisphaeria vasicola* Y. Z. Wang, Aptroot & K. D. Hyde. The ascospores of *S. palmae* are similar in size to those of *S. vasicola*

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(Wang & al., 2004). However, ascospores of *S. palmae* are unicellular, fusiform-ellipsoidal, olivaceous and flattened on one side, while those of *S. vasicola* are bicellular, ellipsoidal, brown and symmetrical. The only other species with unicellular ascospores is *S. bambusicola*, but this fungus has much larger ascospores.

Key to *Submersisphaeria* species

1. Ascospores unicellular 2
1*. Ascospores bicellular 3
2. Ascospores 28–36 × 6–8 µm . . . . . *S. bambusicola*
2*. Ascospores 17.5–22.5 × 5–7.5 µm . . . . . *S. palmae*
3. Ascospores 23–27 × 7.5–10 µm, ellipsoidal with rounded ends . . . . . *S. aquatica*
3*. Ascospores less than 23 µm long 4
4. Ascospores 14.3–20.8 × 5–6.8 µm, fusiform with narrowing ends . . . . . *S. rattanicola*
4*. Ascospores 16–22 × 6–7 µm, ellipsoidal with rounded ends. . . . . *S. vasicola*

Helicoubisia coronata Lunghini & Rambelli, Mic. Ital. 1: 21 (1979). – Figs 10–19.

= *Moorella monocephala* Matsush., Matsushima Mycological Memoirs 7: 58. 1993.

Conidiophores on dead pinnae, brown, unbranched, straight, erect, smooth-walled, 4–7-septate, macronematous, mononematous, 73–98 × 5–7 µm. – Conidiogenous cells polyblastic, discrete, pale brown, 3–4 µm long, 4–6 µm wide, terminal. – Conidia helicoid, 1.5 times coiled, pale brown, smooth-walled, 10–12.5 µm diam., filament 8–10-septate, 3.5–4 µm diam. ($\bar{x}$ = 3.9 µm, n = 10), rounded at apical cell, truncate at base. – Colonies on PDA effuse, slow growing, reaching 1 cm diam. after 60 days at ~25°C, with superficial black mycelia, sterile.

Habitat. – Saprobic on dead pinnae of *Eleiodoxa conferta*, on decaying palm petioles (Matsushima, 1993) and unidentified dead leaves (Lunghini & Rambelli, 1979).

Known distribution. – Ecuador, Ivory Coast, Peru, Thailand.

Specimen examined. – THAILAND: Narathiwat, Sirindhorn Peat Swamp Forest, terrestrial pinnae of *Eleiodoxa conferta*, 12 May 2001, A. Pinnoi, Aom35 (living culture in BCC 9880).

Moorella was introduced by Rao & Rao (1964) to accommodate *M. speciosa* P. R. Rao & D. Rao, an anamorphic fungus with macronematous, mononematous, septate, dark brown conidiophores with

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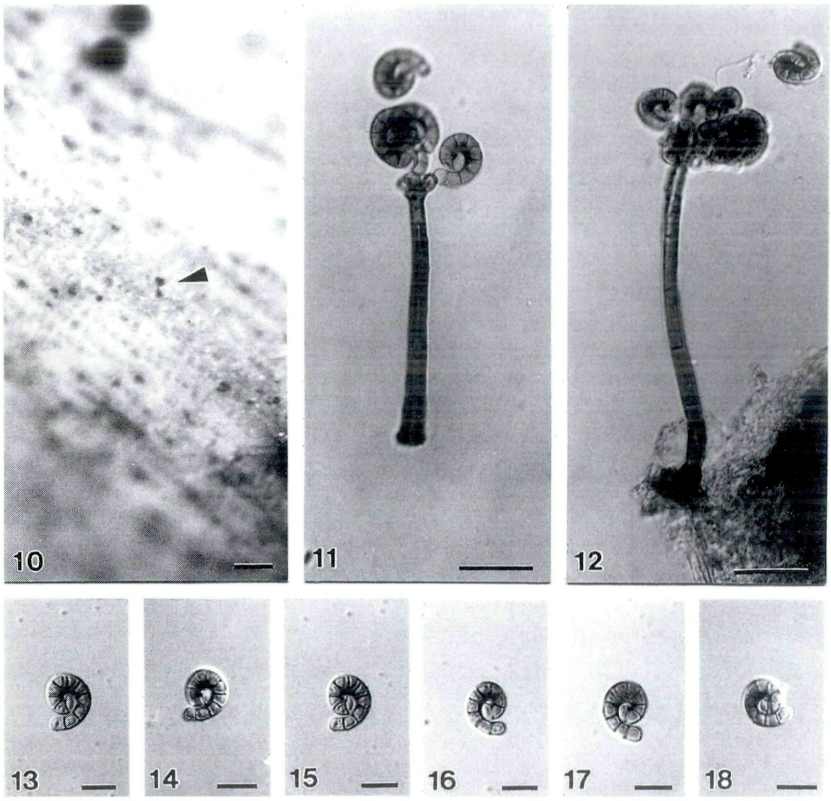

Figs. 10–18. *Helicoubisia coronata*. – 10. Colonies on natural substratum. – 11, 12. Conidiophores, conidiogenous cells, and conidia. – 13–18. Conidia. – Bars: 10 = 200 µm; 11–12 = 20 µm; 13–18 = 10 µm.

numerous short, septate, brown branches formed in verticils at intervals along the stipe. Conidiogenous cells were described as polyblastic, denticulate and terminal on the stipe and branches. Conidia were thin-walled, hyaline or subhyaline, 4–7-septate and 1–1.5 times coiled (Rao & Rao, 1964; Ellis, 1976). *Moorella* remained monotypic until Matsushima (1993) described *M. monocephala* Matsushima. *Moorella monocephala* was described with brown, unbranched, septate conidiophores, with an inflated apex bearing 2–6 discrete conidiogenous cells. Each conidiogenous cell was described as cuniform, pale brown and bearing 1–3 denticles. The conidia were described as solitary, helicoid, 1.5 times coiled, dry, smooth, 9–12 µm in diam., filaments 4–6 µm wide, 6–7-septate, and moderate to pale brown (Matsushima, 1993).

The monotypic genus *Helicoubisia* was introduced by Lunghini & Rambelli (1979) to accommodate *H. coronata*. *Helicoubisia cor-*

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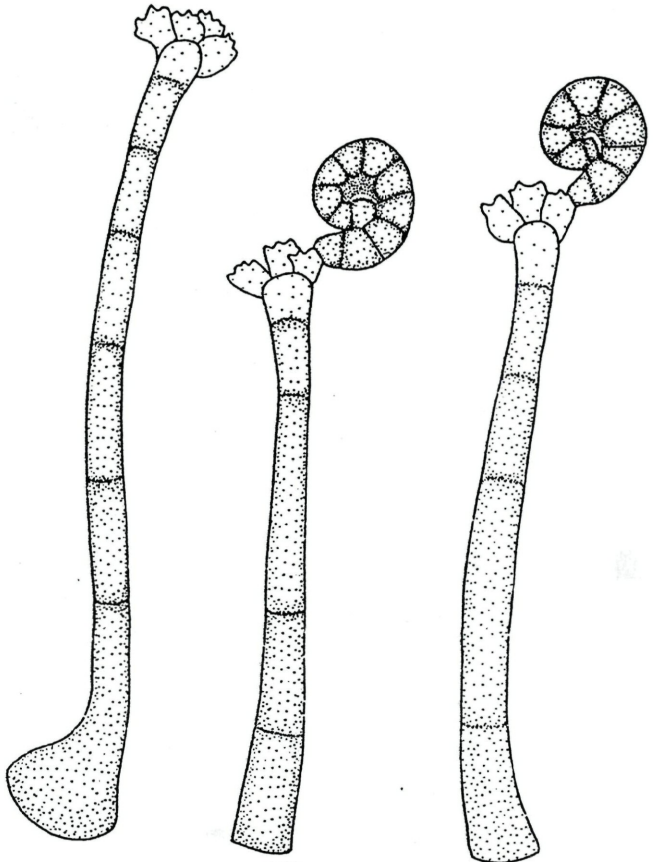

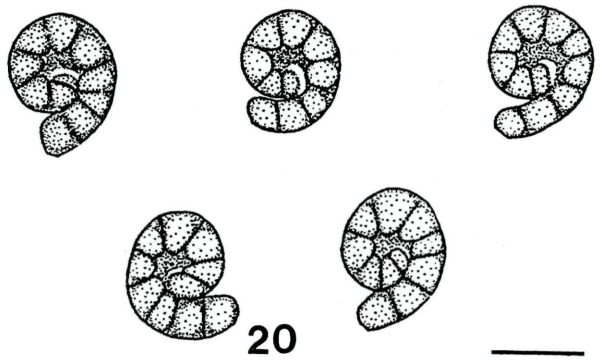

Figs. 19–20. *Helicoubisia coronata* (line drawing). – 19. Conidiophores and conidiogenous cells. 20. Conidia. – Bars: 19–20 = 10 µm.

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onata is identical to *Moorella monocephala* as described and illustrated by Matsushima (1993) and therefore, the first name has priority over the latter. The features of *H. coronata* are very similar to the fungus collected by us on *Eleiodoxa conferta*, and we consider the current specimen and *H. coronata* identical. The discrete conidiogenous cells of *H. coronata*, borne on the apex of the conidiophore, are sufficiently different to the integrated conidiogenous cells of *Moorella speciosa* that are formed on short verticillate branches, to have warranted the erection of a new genus by Lunghini & Rambelli (1979).

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