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Microfungi on the Pandanaceae: *Polytretophora macrospora* sp. nov.

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Polytretophora macrospora **is introduced based on specimens from two species of *Pandanus* in Seychelles. The new species is compared with currently accepted species. A key and a comparative synopsis to *Polytretophora* species are provided. Numerous specimens of *P. calcarata*, collected on members of the Pandanaceae from Australia, Fiji, Hong Kong, Malaysia, New Caledonia, Palau, Philippines, Seychelles and Solomon Islands are also reported, along with *P. dendroidea* on *Pandanus* sp. from Malaysia.**

Key Words——*Freycinetia*; hyphomycetes; key; *Pandanus*; *Sararanga*.

Polytretophora Mercado was introduced with the single species, *P. calcarata* Mercado. It is characterised by dark conidiophores that are either simple or dichotomously branched. The conidiogenous cells are polytretic, while the conidia are typically slightly curved, consisting of a brown, swollen basal cell and a pale, conical apical cell. The base of the basal cell is distinctly truncate and strongly thickened. Conidiophore and conidiogenesis characteristics strongly resemble those found in the genera *Spadicoides* S. Hughes, *Diplococcium* Grove and *Helminthosporium* Link, although all four genera can be distinguished relatively easily by conidium morphology. Subramanian and Bhat (1987) introduced the genus *Parahelminthosporium* Subram. & Bhat with *P. malabaricum* Subram. & Bhat on *Calamus rachides* from India. As *P. malabaricum* was considered identical to *Polytretophora calcarata*, the former becomes a nomenclatural synonym (Kuthubutheen and Nawawi, 1991). Since *Polytretophora* was introduced, only *P. dendroidea* Kuthub. & Nawawi has been added to the genus.

The current work originates from an ongoing study of the saprophytic microfungi that inhabit members of the monocotyledonous family Pandanaceae (e.g. Hyde, 1997; McKenzie, 1995; McKenzie and Hyde, 1996; Whitton et al., 1999, 2000a, 2000b). No species of *Polytretophora* have been described or reported from the Pandanaceae prior to this research. A new species of *Polytretophora* found on *Pandanus* sp. and *Pan. seychellarum* is described and compared with the currently accepted species. *Polytretophora calcarata* is reported on Pandanaceae from Australia, Fiji, Hong Kong, Malaysia, New Caledonia, Palau, Philippines and Seychelles, and *P. dendroidea* is reported on *Pandanus* sp. from Malaysia. Due to difficulties with quarantine requirements, no living cultures were prepared, and all descriptions are from dried herbarium specimens. A dichotomous key and a comparative synopsis (Table 1) to *Polytretophora* species are provided. The key and table incorporate measurements taken from both current specimens and from the literature.

Taxonomy

Polytretophora Mercado, Acta Botanica Cubana **16**: 1. 1983.
=*Parahelminthosporium* Subram. & Bhat, Kavaka **15**: 61. 1989.
Type species: *Polytretophora calcarata* Mercado.

Polytretophora calcarata Mercado, Acta Botanica Cubana **16**: 3. 1983.
=*Parahelminthosporium malabaricum* Subram. & Bhat, Kavaka 15: 63. 1989.

Conidiophores 255–980 μm long, 8–22.5 μm wide near the base, 14–43 septate. Conidia 19–29 μm long, 8–11 μm wide at widest point, basal cell 12.5–21 μm long, apical cell 6.5–9.5 μm long.

Habitat: Known to inhabit decaying plant parts of *Calamus* sp., *Freycinetia* sp., *F. graminifolia*, *Korthalsia rigida*, *Pandanus* sp., *Pan. copelandii*, *Pan. hornei*, *Pan. monticola*, *Pan. seychellarum*, *Pan. tectorius*, *Pinanga scotechinii*, *Pinanga* sp., *Plectomiopsis geminiflora*, *Sararanga philippinensis*.

Distribution: Australia (current specimen), China (Kuthubutheen and Nawawi, 1991), Cuba (Mercado, 1983), Fiji (current specimen), Hong Kong (current speci-

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men), India (Subramanian and Bhat, 1989), Malaysia (Kuthubutheen and Nawawi, 1991, current specimen), New Caledonia (current specimen), Palau (current specimen), Philippines (current specimen), Seychelles (current specimen), Solomon Islands (current specimen).

Specimens examined: Australia, north Queensland, along side the road between Branston Beach and Cairns, on decaying leaves of *Pandanus tectorius*, 16 June 1996, S. R. Whitton (HKU(M) 14017); ibid., 17 June 1996 (HKU(M) 14013) and (HKU(M) 14022); north Queensland, Lacey Creek State Forest Park, on decaying leaves of *Pan. monticola*, 17 June 1996, S. R. Whitton (HKU(M) 14014) and (HKU(M) 14023); north Queensland, along side the road between Baybinda and Cairns, on decaying leaves of *Pan. monticola*, 17 June 1996, S. R. Whitton (HKU(M) 14018); north Queensland, in forest surrounding Lake Barrine, on decaying leaves of *Pan. monticola*, 18 June 1996, S. R. Whitton (HKU(M) 14016). Fiji, Viti Levu, Colo-i-Suva, on decaying leaves of *Freycinetia* sp., 27 February 1992, E. H. C. McKenzie (PDD 64970). Hong Kong, New Territories, Sai Kung Peninsula, on decaying leaves of *Pan. tectorius*, 1 April 1994, E. H. C. McKenzie (PDD 64972). Malaysia, Kuala Lumpur, University of Malaya, Botanical Garden, on decaying leaves of *Pandanus* sp., 12 August 1992, E. H. C. McKenzie (PDD 60531). New Caledonia, Mt. Panié, alt. 1500 m, on decaying leaves of *Freycinetia* sp., 15 December 1990, J. S. Dugdale (PDD 64974); ibid., alt. 1300 m (PDD 64971); Mt. Painé, alt. 1300 m, on decaying leaves of *F. graminifolia*, 15 December 1990, J. S. Dugdale (PDD 64973); Mt. des Koghis, on decaying leaves of *Freycinetia* sp., 25 February 1994, E. H. C. McKenzie & T. K. Crosby (PDD 64975). Palau, Babeldaob, on decaying leaves of *Freycinetia* sp., 10 August 1991, E. H. C. McKenzie (PDD 64976). Philippines, Luzon Island, Quezon Region, Sinoloan, Baranggay Magsaysay U. P. Site, on decaying leaves of *Pandanus* sp., 21 October 1996, S. R. Whitton (HKU(M) 14021); Luzon Island, Quezon Region, Los Banos, Laguna, Baranggay Maragondon Real, on decaying leaves of *Pan. copelandii*, 21 October 1996, S. R. Whitton (HKU(M) 14015); ibid., on decaying leaves of *Sararanga philippinensis*, 22 October 1996, S. R. Whitton (HKU(M) 14020); ibid., 24 October 1996 (HKU(M) 14027). Seychelles, Praslin Island, Vallee de Mai, on decaying leaves of *Pan. hornei*, 2 August 1996, K. D. Hyde (HKU(M) 14019); Mahe, Congo Rouge, on decaying leaves of *Pan. seychellarum*, 2 August 1996, K. D. Hyde (HKU(M) 14026). Solomon Islands, New Georgia, Goldie College, on decaying leaves of *Pandanus* sp., 11 May 1999, E. H. C. McKenzie (PDD 73001).

Notes: The only noticeable difference between the specimens of *P. calcarata* found on Pandanaceae and those reported previously (Kuthubutheen and Nawawi, 1991; Mercado, 1983; Subramanian and Bhat, 1989) is a slightly (although distinct) darker band of pigmentation around the middle of the basal cell of the conidia. This character was seen in many specimens (at least in some conidia), but it is obviously variable and not interpreted as being of high taxonomic value.

Polytretophora dendroidea Kuthub. & Nawawi, Mycological Research **95**: 627. 1991.

Conidiophores 325–400 μm long, 9.5–10.5 μm wide towards the base, 2–3-times dichotomously branched, 8–16 septate. Conidia 15–27.5 × 5–9 μm; basal cell 7.5–14.5 μm long; apical cell 8–13 μm long.

Habitat: Known to inhabit decaying leaves of *Licuala* sp., *Pandanus* sp. and *Plectonia grandis*.

Distribution: Brunei Darussalam (current specimens), Malaysia (Kuthubutheen and Nawawi, 1991; current specimen)

Specimens examined: Brunei Darussalam, Temburong, Batu Apoi Forest Reserve, Sungai Belalong, Kuala Belalong Field Studies Centre (KBFSC), Ashton's Trail, on dead frond blade of *Licuala* sp., 1 December 1994, J. Fröhlich (HKU(M) JF LI 51) and (HKU(M) JF LIII 55); ibid., on dead petiole of *Licuala* sp., 1 January 1995, J. Fröhlich (HKU(M) JF LI 83); ibid., on dead frond blade of *Licuala* sp., 5 June 1995, J. Fröhlich (HKU(M) 7607; JF LIII 105); KBFSC, on small track leading to Ruth Levy's plot, on dead petiole of *Licuala* sp., 15 June 1995, J. Fröhlich (HKU(M) 7691; JF LII 75); KBFSC, Anak Esu Tributary, on dead rachis of *Licuala* sp., 15 January 1994, J. Fröhlich (HKU(M) 7696; JF 247). Malaysia, Kuala Lumpur, University of Malaya, Botanical Garden, on decaying leaves of *Pandanus* sp., 12 Aug. 1992, E. H. C. McKenzie (PDD 61220).

Notes: *Polytretophora dendroidea* is characterised by conidiophores up to 6-times dichotomously branched and conidia of a smaller size (basal cell 7.5–16 × 8–10 μm, apical cell 8–14 × 2–3.5 μm) than either *P. calcarata* (basal cell 12.5–29 × 8–11 μm, apical cell 6–14 × 1.5–3.5 μm) or *P. macrospora* (basal cell 19–25 × 12.5–19 μm, apical cell 10–17 × 4.5–7 μm) (Kuthubutheen and Nawawi, 1991). In the Malaysian specimen, conidiophore and conidial dimensions are at the smaller end of known ranges and the conidiophores are only 2–3-times dichotomously branched. These differences are interpreted as due to natural variation. In the Brunei specimens, conidiophore size and branching and conidial dimensions are similar to those reported by Kuthubutheen and Nawawi (1991).

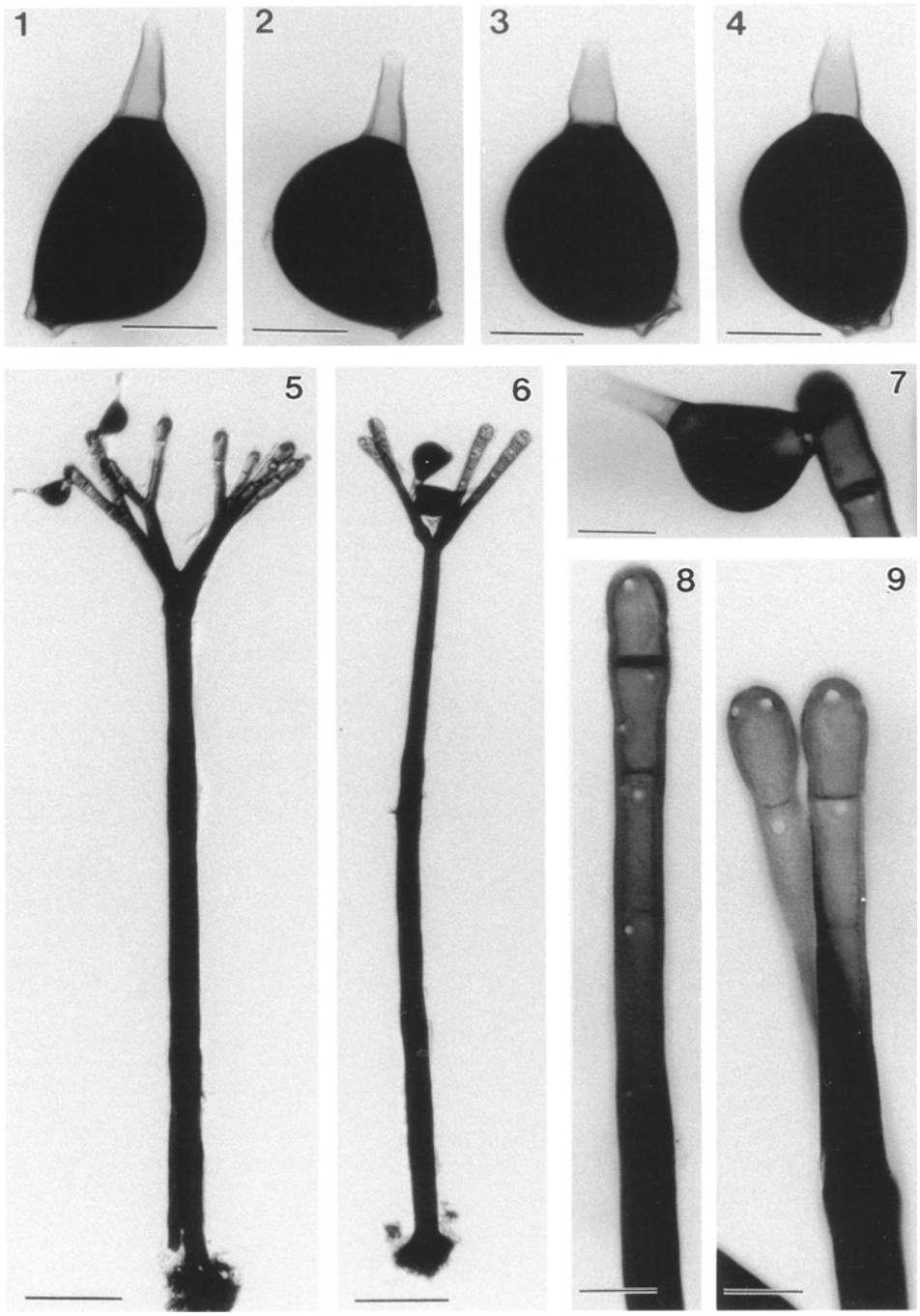
Polytretophora macrospora Whitton, McKenzie & K. D. Hyde, sp. nov. Figs. 1–9

Coloniae effusae, pilosae, fuscae brunneae. Mycelium immersum vel superficiale, septatum, brunneum, laeve. Conidiophora macronematosa, mononematosa, solitaria, erecta, recta vel leviter flexuosa, septata, laevia, plus minusve cylindrica, crassitunicata, 315–725 μm longa, basi 10–17.5 μm lata, ad apicem 1–3- (plerumque 2–) dichotomice ramosa, fusco-brunnea extra apicem-quem ramosa; rami fertiles, 25–110 μm longi, ad apicem 8–11 μm lati, cum 2–5 (plerumque 3) cellula, apice obtusi. Cellulae conidiogenae polytreticae, in conidiophoris incorporatae, terminales et intercalares, cum 1–6 (plerumque 2–4) poris 1.2–2 μm latis perforatae. Conidia 27–39 μm longa, acropleurogena, solitaria, sicca, laevia, curvata, 1-septata; cellulae basales fusco-brunneae, 19–25 μm longae, 12.5–19 μm latae, basi trunca-

tae et incrassatae, 4–6 (plerumque 5) μm latae; cellulae terminales subhyalinae vel pallide brunneae, conicae, apice obtusae vel truncatae, 10–17 μm longae, basi 4.5–7 μm latae.

Holotypus: in foliis emortuis *Pandani seychellarum*, Seychelles, Mahe, Congo Rouge, 2 August 1996, K. D. Hyde (HKU(M) 14024).

Colonies effuse, hairy, dark brown, consisting of conidiophores scattered singly over the substrate surface. Mycelium immersed and superficial; superficial hyphae thick walled, septate, brown, smooth, irregularly anastomosing, forming a tight knot of hyphal cells at the base of the conidiophores. Stroma absent. Hyphopodia absent. Setae absent. Conidiophores macronematous, mononematous, solitary, erect, straight or slightly curved, septate, smooth, cylindrical to slightly tapered from the base to the branching neck, with strongly thickened walls and septa, 315–725 μm long, 10–17.5 μm



Figs. 1–9. *Polytretophora macrospora* (holotype). 1–4. Conidia, note the thickened, truncate base. 5–6. Conidiophores. 7–9. Conidiogenous cells, note the tretic pores. Scale bars: 1–4, 7–9 = 10 μm; 5–6 = 50 μm.

Table 1. Comparative synopsis of *Polytretophora* species.

	Conidiophore size (μm)	Conidiophore branching	Conidiogenesis cells	Basal cell size (μm)	Apical cell size (μm)
P. calcarata	245–1000 × 8–22.5	Unbranched	Integrated throughout most of the conidiophore cells	12.5–29 × 8–11	6–14 × 1.5–3.5
P. dendroidea	325–720 × 9.5–14	Up to 6-times dichotomously branched	Integrated into the top 2–3 conidiophore cells	7.5–16 × 8–10	8–14 × 2–3.5
P. macrospora	315–725 × 10–17.5	Up to 3-times dichotomously branched	Integrated into the top 2–3 conidiophore cells	19–25 × 12.5–19	10–17 × 4.5–7

wide towards the base, 9–13 μm wide at the branching neck, (1–)2(–3)-times dichotomously branching towards the apex, very dark brown to black along most of its length, typically only fading after branching, fading to brown at the apices, top 2–3 cells of the branches fertile, branches 25–110 μm long, apical cells of each branch slightly enlarged 8–11 μm wide, 2–5 (usually 3) cells per branch, apices rounded. Conidiogenous cells polytretic, integrated into the branches of the conidiophores, terminal and intercalary, borne in the top 2–3 cells of each branch, each fertile cell with 1–6 (typically 2–4) circular pores, pores 1.2–2 μm wide. Conidia 27–39 μm long, acropleurogenous, solitary, dry, smooth, 1 septate; basal cell dark to very dark brown, broadly ellipsoidal when viewed from above, when viewed from the side one side markedly curved whilst the other side only slightly so, 19–25 μm long, 12.5–19 μm wide at the widest part, strongly thickened and truncate at the basal zone of attachment, protuberant attachment zone 4.2–6 (usually 5) μm wide; apical cell pale in pigmentation fading to very pale at the apex, conical and tapering from base to apex, apex rounded or truncate, 10–17 μm long, 4.5–7 μm wide at the base.

Etymology: *macrospora*, refers to the large basal cell of the conidia.

Habitat: Known to inhabit decaying leaves of *Pandanus* sp., *Pan. seychellarum*.

Distribution: Seychelles.

Additional specimen examined: Seychelles, Mahe, La Reserve, on decaying leaves of *Pandanus* sp., 31 July 1996, K. D. Hyde (HKU(M) 14025).

Notes: *Polytretophora macrospora* is similar to *P. dendroidea* in general appearances and morphology. In both species the apical region of the conidiophore branches dichotomously; up to 6-times in *P. dendroidea* and up to 3-times in *P. macrospora*. The conidiophores are similar in size, and both have slightly swollen end cells on the branches (Kuthubutheen and Nawawi, 1991). The most significant difference between the two species is conidial size especially in regard to the basal cells; 7.5–16 × 8–10 μm in *P. dendroidea* and 19–25 × 12.5–19 μm in *P. macrospora*.

KEY TO SPECIES OF *POLYTRETOPHORA*

1. Conidiophores typically unbranched, up to 1000 μm long; conidiogenous cells integrated throughout most of the conidiophore length; conidia 2-celled, basal cell 12.5–29 × 8–11 μm, apical cell 6–14 × 1.5–3.5 μm ··· *P. calcarata*
1. Conidiophores apically branched ····· 2
2. Conidiophores 400–720 μm long, up to 6-times dichotomously branched; conidiogenous cells integrated into the last 2–3 cells of the conidiophores; conidia 2-celled, basal cell 7.5–16 × 8–10 μm, apical cell 8–14 × 2–3.5 μm ····· *P. dendroidea*
2. Conidiophores 315–725 μm long, 1–3 (typically 2)-times dichotomously branched; conidiogenous cells integrated into the last 2–3 cells of the conidiophores; conidia 2-celled, basal cell 19–25 × 12.5–19 μm, apical cell 10–17 × 4.5–7 μm ····· *P. macrospora*

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