Dictyochaeta and *Dictyochaetopsis* species from the *Pandanaceae*

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The genera *Dictyochaeta* and *Dictyochaetopsis* are discussed with records from the *Pandanaceae*. Five new species of *Dictyochaeta* are described. Twenty six species are transferred from *Codinaea* to *Dictyochaeta*, and four species are transferred to *Dictyochaetopsis*. Keys are provided to those species of *Dictyochaeta* described since 1991, and to all species of *Dictyochaetopsis*.

Key words: anamorphic fungi, *Freycinetia*, keys, microfungi, mitosporic fungi, *Pandanus*, taxonomy.

Introduction

Arambarri and Cabello (1989) used cluster analysis to determine the similarities of 114 species of phialidic dematiaceous hyphomycetes, based on their morphological similarity (using 28 characters). They found that most species in *Dictyochaeta* were closely related, and thus concluded the genus *Dictyochaeta* (syn. *Codinaea*) to be well defined. Due to the presence of lateral phialides, produced from the setae or conidiophores, *Codinaea apicalis* (Berk. and M.A. Curtis) S. Hughes and W.B. Kendr., *Codinaea* state of *Chaetosphaeria dingleyae* S. Hughes and W.B. Kendr., *Codinaea elegantissima* Lunghini, *C. filamentosa* Onofri, *C. glauco-nigra* (Cooke and M.B. Ellis) S. Hughes and W.B. Kendr., *C. intermedia* Rambelli, *C. maharashtrensis* Piroz. and S.D. Patil, and *Dictyochaeta menisporoides* Hol.-Jech. were deemed unrelated to *Dictyochaeta*. Arambarri and Cabello (1990) later introduced *Dictyochaetopsis* to accommodate species that produce lateral phialides.

Arambarri and Cabello (1989) attempted to transfer 21 species of *Codinaea* to *Dictyochaeta*. However, they failed to provide a reference to the basionyms, thus contravening Article 33.2 of the *International Code of*

Botanical Nomenclature. Two of these 21 species, *D. heteroderae* (Morgan-Jones) Carris and Glawe and *D. parva* (S. Hughes and W.B. Kendr.) Hol.-Jech. had been validly transferred by earlier authors (Carris and Glawe, 1988; Holubová-Jechová, 1988). The other 19 species of *Codinaea* are transferred to *Dictyochaeta* in this paper, along with a few other remaining species within *Codinaea* which are transferred to *Dictyochaeta* or *Dictyochaetopsis*. Collections in these genera from the *Pandanaceae* are reported. A key is provided to those species of *Dictyochaeta* which were not included by Kuthubutheen and Nawawi (1991e), and a second key is provided to all species of *Dictyochaetopsis*.

Taxonomy

Dictyochaeta Speg., Physis 7: 18 (1923).

= *Codinaea* Maire, Publication of the Institute of Botany Barcelona 3: 15 (1937).

= *Menisporella* Agnihothr., Proceedings of the Indian Academy of Science 56: 98 (1962).

Type species: *Dictyochaeta fuegiana* Speg., Physis 7: 18 (1923).

Dictyochaeta is characterised by macronematous, mononematous (rarely synnematous), septate, pale brown to dark brown conidiophores that produce mono- or polyphialidic, sympodially proliferating conidiogenous cells that often have conspicuous and flared collarettes. Frequently, sterile or fertile setae are associated with the conidiophores and together these can form small clusters originating from a knot of superficial hyphae. The conidia are hyaline, smooth, typically falcate but can be ellipsoid, clavate, fusoid, or cylindrical, 0-1(-3)-septate, and with or without setulae (Gamundi *et al*., 1977; Kuthubutheen and Nawawi, 1991b-e).

Many species of mitosporic fungi now referred to *Dictyochaeta* have been previously treated under the generic name *Codinaea*. Hughes and Kendrick (1968) discussed the possibility of using the name *Dictyochaeta* instead of *Codinaea*, based on the rule of priority. However, they concluded it best to continue using the name *Codinaea* as the type material for *Dictyochaeta* (*D. fuegiana*) was scant and lacked the necessary diagnostic characters required for a thorough description. Inadequate original drawings and descriptions, and the lack of additional collections were also contributing factors. Even though the type material for *Codinaea* (*C. aristata* Maire) was lost, Hughes and Kendrick (1968) were able to confirm that it agreed with the present generic concept of this group based on the description and drawings by Maire (1937). Gamundi *et al*. (1977) redescribed *D. fuegiana* from fresh material opening the way for the name *Dictyochaeta* to be used. Since this work, most authors have used the name *Dictyochaeta* in preference to *Codinaea*, and many species previously referred to *Codinaea* have been transferred to the genus *Dictyochaeta* (e.g.,

Holubová-Jechová, 1984; Arambarri *et al.*, 1987; Arambarri and Cabello, 1990; Kuthubutheen and Nawawi, 1990).

In their key to *Dictyochaeta* and *Codinaea*, Kuthubutheen and Nawawi (1991e) accepted 59 species in *Dictyochaeta*, and 10 in *Codinaea*. Species treated as *Codinaea* were mainly those that Arambarri and Cabello (1989) had left in the genus for further treatment. The only exceptions were *C. pakhalensis* S.M. Reddy and S.S. Reddy, *C. britannica* M.B. Ellis and *C. australensis* B. Sutton, all of which were members of *Codinaea* unstudied by Arambarri and Cabello (1989). Kuthubutheen and Nawawi (1991e) chose to leave them in *Codinaea* because, in their opinion, a mass transfer of *Codinaea* species to *Dictyochaeta* could result in further taxonomic complications, especially if these transfers did not coincide with a complete re-evaluation of *Dictyochaeta*, *Codinaea* related genera, and their teleomorphs.

Prior to this work no species of *Dictyochaeta* or *Codinaea* had been described or recorded from any member of the *Pandanaceae* (McKenzie and Hyde, 1996).

Most species of *Codinaea* have been transferred to *Dictyochaeta* or *Dictyochaetopsis* and the majority of authors view *Codinaea* as a synonym of *Dictyochaeta*. The remaining species of *Codinaea* appear also to belong in *Dictyochaeta*, and it is deemed justified to transfer them, along with the species transferred invalidly by Arambarri and Cabello (1989).

1. ***Dictyochaeta*** state of ***Chaetosphaeria dingleyae*** S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 343 (1968).

Setae 120-265 µm long, 4.5-5 µm wide at the widest point, 8-12 septate. *Conidiophores* 33-67 µm long, 2.5-3.5 µm wide at the widest point, 3-7 septate. *Conidia* 10.5-16 × 2-2.5 µm, 1 septate. *Setulae* at both ends of conidium, 6-10 µm long.

Habitat: Known to inhabit decaying leaves of *Beilschmiedia tarairi*, *Freycinetia excelsa*, *Laurelia novae-zealandiae*, and rotten wood.

Known distribution: Australia (this paper), New Zealand (Hughes and Kendrick, 1968).

Material examined: AUSTRALIA, northern Queensland, Lacey Creek State Forest Park, on decaying stem of *Freycinetia excelsa*, 17 Jun. 1996, S.R. Whitton [HKU(M) 4924].

Notes: This specimen resembles three other species of *Dictyochaeta* in having 1-septate conidia, setulae at both ends of the conidia, and setae. *Dictyochaeta malaysiana* Kuthub. has significantly larger conidia (24-32 × 3-4 µm), *D. tortuosa* B. Sutton has loosely coiled setae which are tortuous towards the apices, and *D. novae-guineesis* Matsush. has conidia which are much broader (9-16 µm wide) than in this specimen (Matsushima, 1971; Sutton, 1980; Kuthubutheen, 1987). General characteristics and dimensions agree with the *Dictyochaeta* anamorph of *Chaetosphaeria dingleyae*.

A species of *Chaetosphaeria* was found to be closely associated with the *Dictyochaeta* on our material, and microscopic examination revealed this to be *Chaetosphaeria dingleyae*.

2. ***Dictyochaeta*** state of ***Chaetosphaeria pulchriseta*** S. Hughes, W.B. Kendr. and Shoemaker in Hughes and Kendrick, New Zealand Journal of Botany 6: 356 (1968).

Setae 180-378 µm long, 7-10.5 µm wide at basal septa, 2.5-4.1 µm wide at apical septa, penultimate cell 30-72 µm long. *Conidiophores* 28-130 µm long. *Collarettes* distinct, flared, 1-3 per conidiophore. *Conidia* 27-33 × 2.2-3 µm. *Setulae* 1.5-3 µm long.

Habitat: Known to inhabit decaying leaves of *Pandanus* sp., *P. furcatus*, rotten wood of *Leptospermum scoparium* and decaying bark of *Acer* sp., *Fagus sylvatica*, and decaying submerged twigs.

Known distribution: Brunei (this paper), Czechoslovakia (Holubová-Jechová, 1984), Hong Kong (this paper), Malaysia (Kuthubutheen and Nawawi, 1991d), New Zealand (Hughes and Kendrick, 1968), U.S.A. (Hughes and Kendrick, 1968).

Material examined: BRUNEI DARUSSALAM, Temburong, Batu Apoi Forest Reserve, Kuala Belalong Field Studies Centre, Ashton Track, on decaying leaves of *Pandanus* sp., 24 Oct. 1995, S.R. Whitton [HKU(M) 4915]. HONG KONG, Hong Kong Island, Mt Austin, on decaying leaves of *P. furcatus*, 7 Jun. 1995, E.H.C. McKenzie [HKU(M) 4933]; Hong Kong Island, Mt Austin, on decaying leaves of *P. furcatus*, 7 Jun. 1995, S.R. Whitton [HKU(M) 4931].

Notes: The *Dictyochaeta* state of *Chaetosphaeria pulchriseta* is characterised by sterile setae that have an acute apex and a darkly pigmented penultimate cell, and conidia that are falcate, aseptate and have short setulae at each end (Hughes and Kendrick, 1968). Specimens examined agree fully with the description by Hughes and Kendrick (1968).

3. ***Dictyochaeta apiculata*** (Matsush.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea apiculata* Matsush., Icones Microfungorum a Matsushima Lectorum (Kobe): 36 (1975).

4. ***Dictyochaeta aristata*** (Maire) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea aristata* Maire, Publication of the Institute of Botany Barcelona 3: 15 (1937).

5. ***Dictyochaeta assamica*** (Agnihothr.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Menisporella assamica* Agnihothr., Darwiniana 28: 297 (1988).

≡ *Codinaea assamica* (Agnihothr.) S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 334 (1968).

6. ***Dictyochaeta australensis*** (B. Sutton) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea australensis* B. Sutton, Proceedings of the Royal Society of Queensland 91: 14 (1980).

7. ***Dictyochaeta botulispora*** (S. Hughes and W.B. Kendr.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea botulispora* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 335 (1968).

8. ***Dictyochaeta brevisetula*** (S. Hughes and W.B. Kendr.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea brevisetula* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 338 (1968).

9. ***Dictyochaeta britannica*** (M.B. Ellis) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea britannica* M.B. Ellis, More Dematiaceous Hyphomycetes: 472 (1976).

10. ***Dictyochaeta coffeae*** (Maggi and Persiani) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea coffeae* Maggi and Persiani, Mycotaxon 20: 251 (1984).

11. ***Dictyochaeta cylindrospora*** (Morgan-Jones and E.G. Ingram) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea cylindrospora* Morgan-Jones and E.G. Ingram, Mycotaxon 4: 504 (1976).

12. ***Dictyochaeta dimorpha*** (Toyaz. and Udagawa) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea dimorpha* Toyaz. and Udagawa, Mycotaxon 13: 451 (1981).

13. ***Dictyochaeta eucalypti*** (B. Sutton and Hodges) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea eucalypti* B. Sutton and Hodges, Nova Hedwigia 26: 517 (1975).

14. ***Dictyochaeta falcatispora*** (M.S. Patil, Yadav and S.D. Patil) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea falcatispora* M.S. Patil, Yadav and S.D. Patil, Indian Phytopathology 44: 308 (1991).

15. ***Dictyochaeta fertilis*** (S. Hughes and W.B. Kendr.) Hol.-Jech., Folia Geobotanica et Phytotaxonomica 19: 387 (1984).

≡ *Codinaea fertilis* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 347 (1968).

Setae 155-385 µm long, 4.5-7.2 µm wide towards the base, 3.5-5 µm wide at the apex, 10-20 septate, up to 15 successive sympodial proliferations. *Conidiophores* 54-170 µm long, 3-5 µm wide towards the base, 6-11 septate. *Conidia* 9-15 × 2.2-3 µm. *Setulae* up to 9 µm long.

Habitat: Known to inhabit decaying leaves of *Fagus sylvatica*, *Pandanus* sp., *P. tectorius*, *Rhopalostylis sapida*, wood and bark of *Fagus sylvatica*, *Filipendula ulmaria*, *Fraxinus excelsior*, *Quercus robur* and *Rubus fruticosus*.

Known distribution: Brunei (this paper), Canada (Holubová-Jechová, 1984), Czechoslovakia (Holubová-Jechová, 1984), Hong Kong (this paper), Malaysia (Kuthubutheen and Nawawi, 1991d), New Zealand (Hughes and Kendrick, 1968), Philippines (this paper), U.K. (Ellis, 1971).

Material examined: BRUNEI DARUSSALAM, Temburong, Batu Apoi Forest Reserve, Kuala Belalong Field Studies Centre, track to Wak Wak, on decaying leaves of *Freycinetia* sp., 25 Oct. 1995, S.R. Whitton [HKU(M) 4936]; Temburong, Batu Apoi Forest Reserve, Kuala Belalong Field Studies Centre, Aston Track, on decaying leaves of *Freycinetia* sp., 24 Oct. 1995, S.R. Whitton [HKU(M) 4937]. HONG KONG, Lamma Island, Kit Tsai Wan Beach, on decaying leaves of *Pandanus tectorius*, 25 Jul. 1997, S.R. Whitton [HKU(M) 12805]. PHILIPPINES, Luzon Island, Quezon Region, Sinoloan, Baranggay Magsaysay U.P. Site, on decaying leaves of *Pandanus* sp., 21 Oct. 1996, S.R. Whitton [HKU(M) 4911]; *ibid.* [HKU(M) 4912]; Luzon Island, Quezon Region, Laguna, Los Baños, Mt Makiling, Baranggay Bagon Silang, on decaying leaves of *Pandanus* sp., 22 Oct. 1996, S.R. Whitton [HKU(M) 4909].

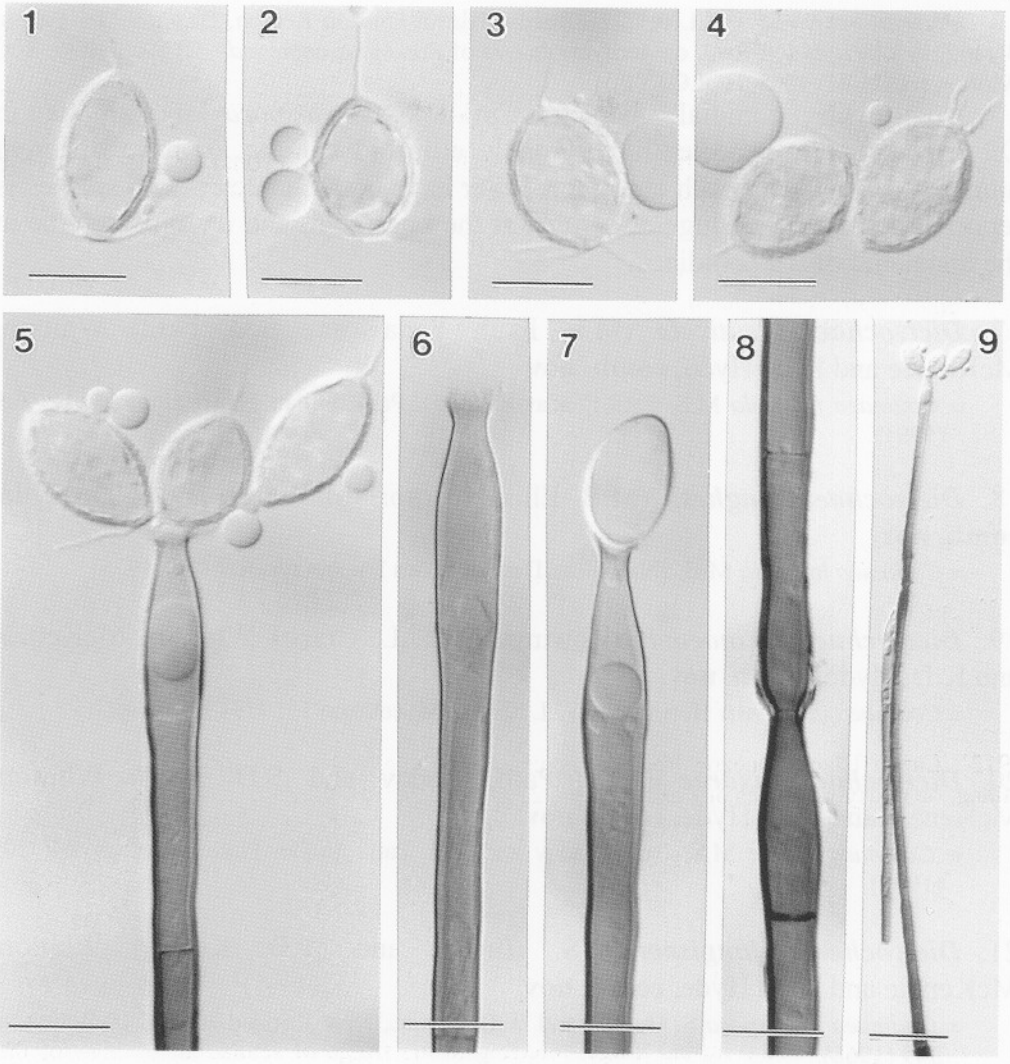
Notes: In all respects our specimens agree with the description by Hughes and Kendrick (1968) for *D. fertilis*. No taxonomically significant differences were observed.

16. ***Dictyochaeta fimbriaspora*** Whitton, McKenzie and K.D. Hyde, **sp. nov.** (Figs. 1-9)

Etymology: *fimbriae* means fringe, referring to the fringe of setulae at the base of the conidia.

Conidiophora solitaria, 310-550 µm longa, 6-8 µm lata, macronematosa, mononematosa, recta, erecta, cylindrica, brunnea, ad apicem pallidiora, laevia, 7-15 septata, crassitunicata, percurrente. *Cellulae conidiogenae* monophialidicae, in conidiophoris incorporatae, pallide brunneae, ampulliforme; collarulo expanso. *Conidia* in capitulum mucosum aggregata, 14-19.5 × 8-11.5 µm, late ellipsoidea, eseptata, hyalina, laevia, apice rotundata, basi truncata; una setula apicalis, 1-8 µm longa, recta, erecta; fimbria setulae basalis, 5-10 µm longa, curvata.

Colonies consisting of solitary conidiophores scattered over the substrate surface. *Setae* none. *Conidiophores* 310-550 µm long, 6-8 µm wide at the widest point, macronematous, mononematous, straight, erect, cylindrical, brown, fading only slightly from base to apex, smooth, 7-15 septate, walls and septa thickened, percurrent. *Conidiogenous cells* enteroblastic, monophialidic, integrated into the apex of the conidiophores, pale brown, ampulliform.



Figs. 1-9. *Dictyochaeta fimbriaspora* (from holotype). **1-4.** Conidia. Note the fringe of setulae at the base of each conidium. **5-7.** Conidiogenous cells. Note the torn collarette in Fig. 6. **8, 9.** Conidiophores. Note the percurrent proliferation in Fig. 8. Bars: 1-8 = 10 µm; 9 = 50 µm.

Collarettes distinctive and flared. *Conidia* aggregated into slimy masses at the apex of the conidiophores, 14-19.5 × 8-11.5 µm, broadly ellipsoid, aseptate, hyaline, smooth, distal end rounded, basal end truncate. *Setulae* straight or curved, apical setulae generally straight, erect, simple, solitary, 1-8 µm long, basal end of conidia with a fringe of setulae, often curved upwards, simple, 5-10 µm long.

Habitat: Known to inhabit decaying leaves of *Pandanus copelandii*.

Known distribution: Philippines.

Material examined: PHILIPPINES, Luzon Island, Quezon Region, Laguna, Los Baños, Baranggay Maragondon Real, on decaying leaves of *Pandanus copelandii*, 21 Oct. 1996, S.R. Whitton [HKU(M) 4908, HOLOTYPE].

Notes: The conidial characters in D. *fimbriaspora* are unique in *Dictyochaeta*. Few species have broadly ellipsoid conidia, or have different numbers of setulae at each end, even fewer have both characters. No species is reported as having a fringe of setulae at the basal end, and a single setulae at the distal end of the conidia.

17. ***Dictyochaeta fruticola*** (M.S. Patil, Yadav and S.D. Patil) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea fruticola* M.S. Patil, Yadav and S.D. Patil, Indian Phytopathology 44: 309 (1991).

18. ***Dictyochaeta hughesii*** (M.B. Ellis) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea hughesii* M.B. Ellis, More Dematiaceous Hyphomycetes: 473 (1976).

19. ***Dictyochaeta illinoensis*** (Hewings and J.L. Crane) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea illinoensis* Hewings and J.L. Crane, Mycotaxon 13: 419 (1981).

20. ***Dictyochaeta ixorae*** (M.S. Patil, Yadav and S.D. Patil) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea ixorae* M.S. Patil, Yadav and S.D. Patil, Indian Phytopathology 44: 309 (1991).

21. ***Dictyochaeta longispora*** (S. Hughes and W.B. Kendr.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea longispora* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 349 (1968).

22. ***Dictyochaeta lunata*** (Matsush.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

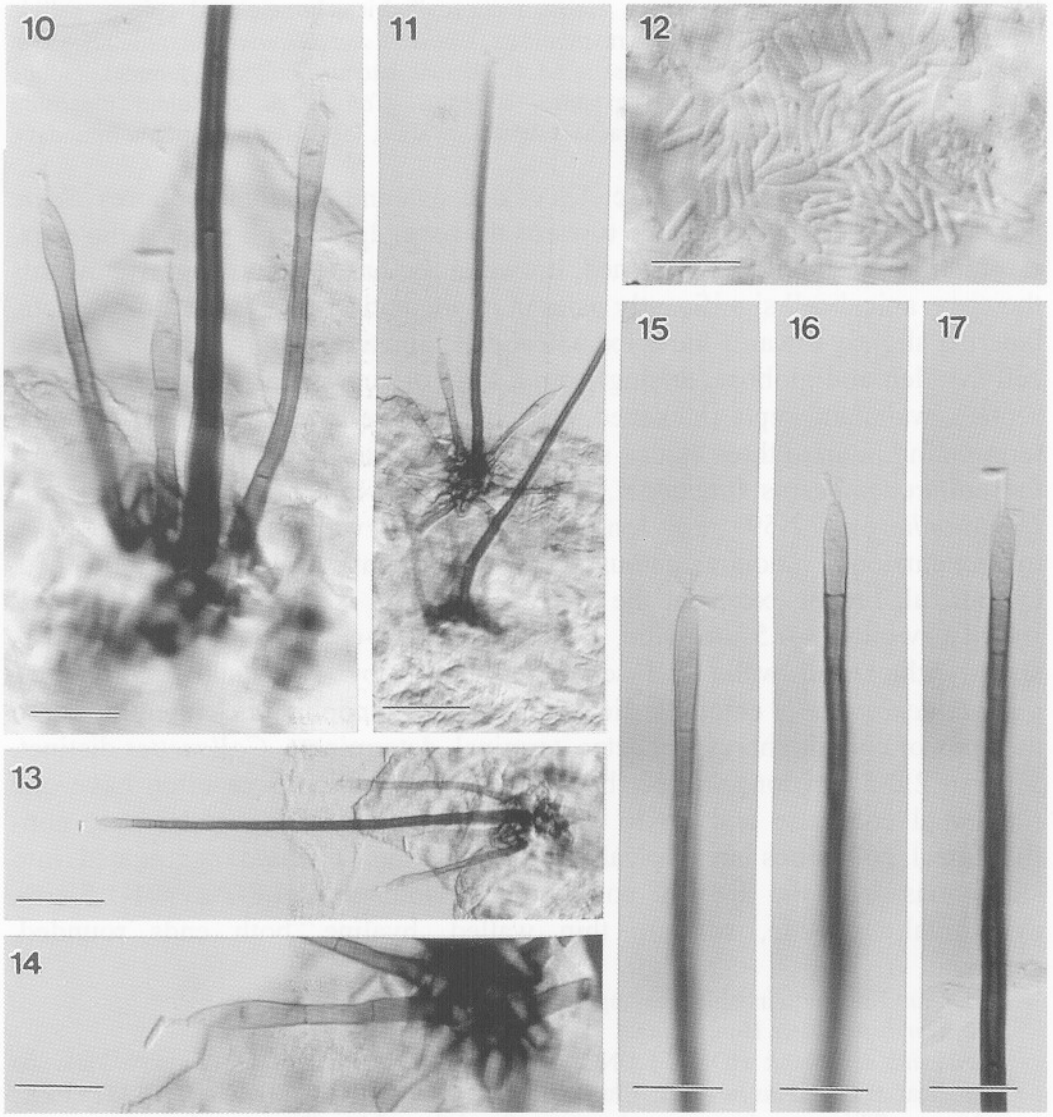
≡ *Codinaea lunata* Matsush., Icones Microfungorum a Matsushima Lectorum (Kobe): 37 (1975).

23. ***Dictyochaeta lunulospora*** (Hewings and J.L. Crane) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea lunulospora* Hewings and J.L. Crane, Mycotaxon 13: 421 (1981).

24. ***Dictyochaeta matsushimae*** (Hewings and J.L. Crane) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea matsushimae* Hewings and J.L. Crane, Mycotaxon 13: 423 (1981).



Figs. 10-17. *Dictyochaeta microcylindrospora* (from holotype). **10, 14.** Conidiophores. **11, 13.** Conidiophores and setae. Note that both have fertile apices. **12.** Conidia. **15-17.** Conidiogenous cells showing elongate collarettes. Bars: 10, 12, 14-17 = 10 µm; 11, 13 = 20 µm.

25. ***Dictyochaeta microcylindrospora*** Whitton, McKenzie and K.D. Hyde, **sp. nov.** (Figs. 10-17)

Etymology: *microcylindrospora*, refers to the similarity of this specimen to *D. cylindrospora* Morgan-Jones and E.G. Ingram, and its small conidial size.

Setae 90-144 µm longae, ad basim 2.5-4 µm latae, ad apicem 2.5-3.8 µm latae, erectae, rectae, laevea, brunneae, apicem versus pallidiora, 4-7 septatae, crassitunicatae, in phialide terminantes. *Conidiophora* 3-7 fasciculata cum 1 seta consociata, 32-59 µm longa, 1.5-2.6 µm

lata, macronematosa, mononematosa, erecta, recta, cylindrica, brunnea, ad apicem pallide brunnea, laevia, 1-3 septata, leviter crassitunicata. *Cellulae conidiogenae* polyphialidicae, in conidiophoris et setis incorporatae, usque ad 4 reliquias laterales collorum ferentes, pallide brunneae, ampulliforme; collarulo expanso, stipitatus. *Conidia* in capitulum mucosum aggregata, 4.8-7.2 × 1-1.5 µm, cylindracea, eseptata, hyalina, laevia, ambo extrema rotundata; 0-setulae.

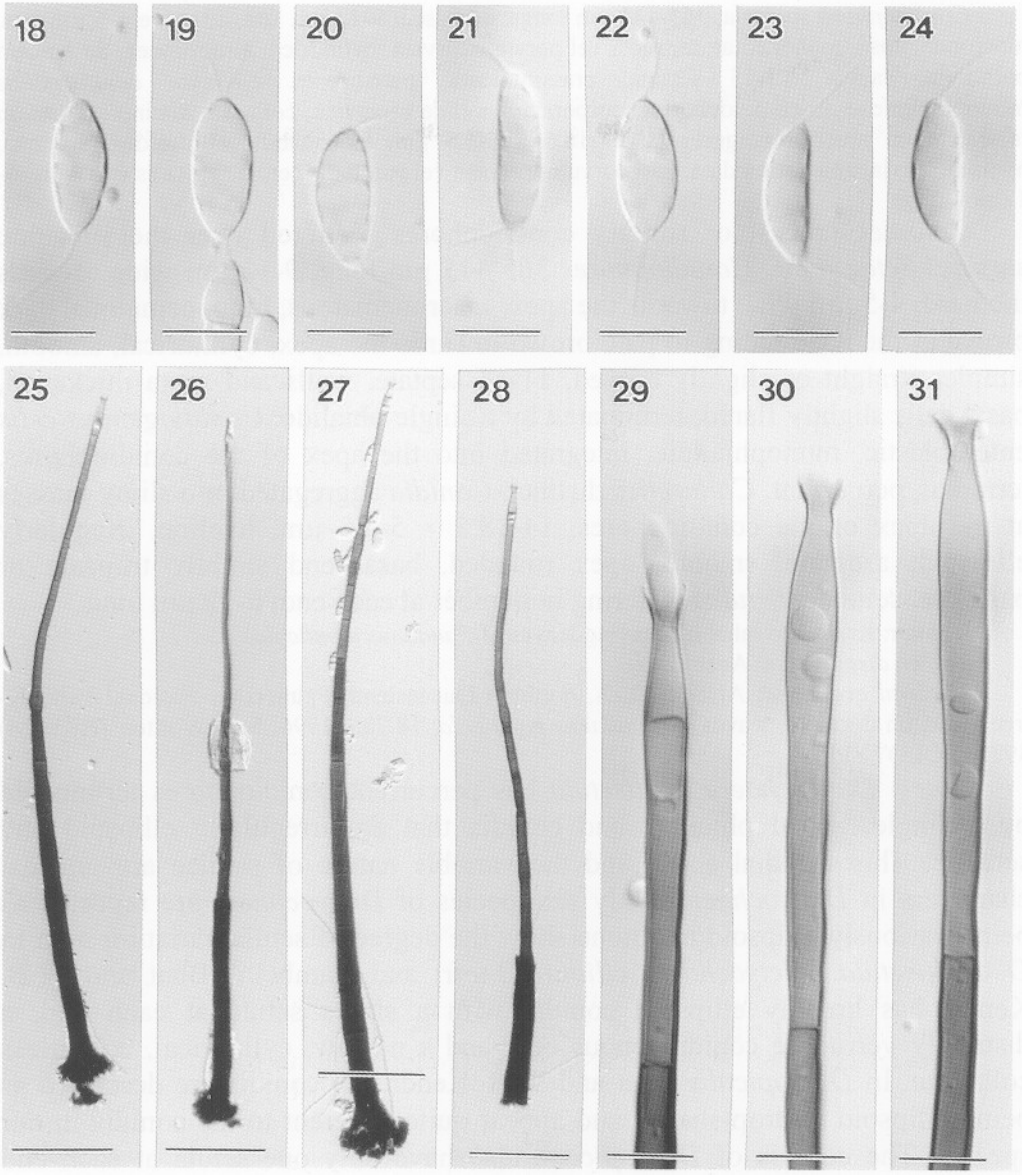
Colonies form scattered fascicles of one seta and 3-7 conidiophores. *Setae* 90-144 µm long, 2.5-4 µm wide towards the base, 2.5-3.8 µm wide at the apex, erect, straight, smooth, unbranched, brown at the base, fading slightly towards the apex, apical cell significantly paler in pigmentation than the rest of the seta, tapering slightly towards the apex, apical cell sometimes slightly swollen, basal cell swollen and globose, arising from a knot of superficial globose cells, 4-7 septate, walls and septa thickened, especially in the lower portion of the seta, terminating in up to three apical, stalked, distinct, flared collarettes, only one of the collarettes seems functional, others are spent and often bent sidewards. *Conidiophores* 32-59 µm long, 1.5-2.6 µm wide towards the base, macronematous, mononematous, erect, straight, smooth, unbranched, cylindrical, brown except at the apical cell which is pale brown, apical cell slightly swollen 3-4.5 µm wide, 1-3 septate, basal cells swollen and globose, slightly thickened walls and septa, terminated by 1-4 stalked collarettes. *Conidiogenous cells* enteroblastic, functionally monophialidic, integrated into the apex of conidiophores and setae, terminal, determinate. *Collarettes* distinct, stalked, 2.8-5 µm long, flared, both setae and conidiophores often have one functional collarette and up to three old, non-functioning collarettes, non-functional collarettes are typically bent sideways. *Conidia* aggregated into slimy masses at the apex of conidiophores and setae, 4.8-7.2 × 1-1.5 µm, cylindrical, aseptate, smooth, thin walled, hyaline, both ends rounded, asetulate.

Habitat: Known to inhabit decaying leaves of *Pandanus furcatus*.

Known distribution: Hong Kong.

Material examined: HONG KONG, New Territories, Shing Mun Country Park, on decaying leaf of *Pandanus furcatus*, 4 Jul. 1995, S.R. Whitton [HKU(M) 4932, HOLOTYPE].

Notes: This specimen produces a fascicle of one seta and up to seven conidiophores, each of which is terminated by a single cylindrical collarette, and conidia that are aseptate, asetulate, and cylindrical. *Dictyochaeta cylindrospora* has this set of characters. There are two differences between our specimen and that reported by Morgan-Jones and Ingram (1976). In *D. cylindrospora* conidia are 8-11 × 2-2.5 µm, whilst in our specimen they are 4.8-7.2 × 1-1.5 µm. The other difference is the non-functional collarettes, which is not thought to be taxonomically significant. The difference in conidial dimensions, especially that of conidial width, is seen as enough to warrant specific recognition.



Figs. 18-31. *Dictyochaeta multisetula* (from holotype). **18-24.** Conidia. Note the variations in setulae number. **25-28.** Conidiophores. **29-31.** Conidiogenous cells. Bars: 18-24; 29-31 = 10 µm; 25-28 = 50 µm.

26. ***Dictyochaeta multisetula*** Whitton, McKenzie and K.D. Hyde, **sp. nov.** (Figs. 18-31)

Etymology: *multisetula*, from the Latin word *multi* = many, referring to the number and variation of setulae.

Conidiophora solitaria, 365-445 µm longa, ad basem 9-12 µm lata, ad apice 4-5 µm lata, macronematosa, mononematosa, recta vel parvum curvata, cylindrica, atrobrunnea, ad apicem pallidiora, laevia, 11-15 septata, crassitunicata, percurrente. *Cellulae conidiogenae* monophialidicae, in conidiophoris incorporatae, pallide brunneae; collarulo distincte. *Conidia* in capitulum mucosum aggregata, 14-18.5 × 5-6.5 µm, inaequabilis ellipsoidea, eseptata, hyalina, laevia, apice rotundata, basi parvum truncata vel papillate; setulae apicalis et basilis, 6-12 µm longa.

Colonies consist of solitary conidiophores scattered over the substrate surface. *Setae* none. *Conidiophores* 365-445 µm long, 9-12 µm wide towards the base, 4-5 µm wide towards the apex, macronematous, mononematous, dark brown at the base fading to pale brown towards the apex, cylindrical, smooth, simple, straight or slightly curved, 11-15 septate, walls and septa thickened, basal cells slightly flared, terminated by a single phialide. *Conidiogenous cells* enteroblastic, monophialidic, integrated into the apex of the conidiophores, terminal, percurrent. *Collarettes* distinct. *Conidia* aggregated into slimy masses at the apex of the conidiophores, 14-18.5 × 5-6.5 µm, hyaline, irregularly ellipsoid, aseptate, smooth, apex rounded, basal end slightly truncate or papillate, setulate. *Setulae* differing in number at each end, 6-12 µm long.

Habitat: Known to inhabit decaying leaves of *Pandanus monticola.*

Known distribution: Australia.

Material examined: AUSTRALIA, northern Queensland, Palmerston National Park, K-tree walk, on decaying leaves of *Pandanus monticola*, 18 Jun. 1996, S.R. Whitton [HKU(M) 4922, HOLOTYPE].

Notes: *Dictyochaeta multisetula* has percurrent conidiophores terminated by a single, apical phialide, and conidia that are irregularly ellipsoid and setulate. This conidial shape and the variable nature of setulae are unusual characters in *Dictyochaeta*. Only six species of *Dictyochaeta* are reported as being variously ellipsoid and none show the degree of setula variation seen in *D. multisetula*. *Dictyochaeta ciliata* (Onofri and Rambelli) Bhat and W.B. Kendr. has broadly ellipsoid conidia with a single setula at each end, a distinctly verrucose conidiogenous cell, and a narrow, cylindrical, colourless collarette. In *D. tropicalis* Bhat and W.B. Kendr. the conidia are described as being ellipsoid to drop-shaped and appear quite different to the conidia in our species. The conidia of *D. tropicalis* also have only one setula at each end (Bhat and Kendrick, 1993). *Dictyochaeta gyrosetula* Kuthub. and Nawawi forms small fascicles consisting of one seta and a few conidiophores, and has irregularly ellipsoid conidia with a truncate scar at the base. However, this species has a single spirally twisted setula at the apex of the conidia (Kuthubutheen and Nawawi, 1991c). In *D. aliformis* Kuthub. and Nawawi the conidia are described as being ellipsoid and papillate, but papillae occur at both ends of the conidia with a single setula at each end (Kuthubutheen and Nawawi, 1991a). The conidia of *D. tumidospora* Kuthub. and Nawawi are

Table 1. Variations in the number of setulae on conidia of *Dictyochaeta multisetula* (265 conidia examined).

Setulae number		No. of conidia	Percentage
apical	basal		
1	1	99	37
1	2	129	49
1	3	5	2
2	1	13	5
2	2	18	7
2	3	1	<1

ellipsoidal and papillate, with a single setula at each end. The conidia of *D. tumidospora* are also larger (20-28 × 7-9.5 µm) than those in this specimen, and the conidiophores are polyphialidic (Kuthubutheen and Nawawi, 1991a). *Dictyochaeta daphnioides* Kuthub. and Nawawi is similar to *D. multisetula* as the conidia are ellipsoid, papillate at the basal end, and possess a single, simple setula at each end. However, *D. daphnioides* has polyphialidic conidiophores and the number of setulae is not variable (Kuthubutheen and Nawawi, 1991a).

The configuration of setulae were observed for 265 conidia, and indicate two typical configurations. One apical setula and either one or two basal setulae, together comprise 86% of total conidia (Table 1).

27. ***Dictyochaeta obesispora*** (S. Hughes and W.B. Kendr.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea obesispora* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 351 (1968).

28. ***Dictyochaeta pakhalensis*** (S.M. Reddy and S.S. Reddy) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea pakhalensis* S.M. Reddy and S.S. Reddy, Sydowia 30: 186 (1978).

29. ***Dictyochaeta parva*** (S. Hughes and W.B. Kendr.) Aramb. and Cabello, Mycotaxon 34: 682 (1989).

≡ *Codinaea parva* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 354 (1968).

Setae none. *Conidiophores* 5-17 septate, 95-250 µm long, width towards the apex 3-3.5 µm, and at the base 4-6 µm. *Conidia* 12.5-16 × 2.5-3.2 µm. *Setulae* 2.5-3.5 µm long.

Habitat: Known to inhabit decaying leaves of *Freycinetia banksii*, *Pandanus hornei*, *P. tectorius* and *Weinmannia racemosa*.

Known distribution: Australia (this paper), New Zealand (Hughes and Kendrick, 1968; this paper), Seychelles (this paper).

Material examined: AUSTRALIA, northern Queensland, beside the road to Branston Beach from Cairns, on decaying leaves of *Pandanus tectorius*, 17 Jun. 1996, S.R. Whitton [HKU(M) 4923]; *ibid.* [HKU(M) 4928]. NEW ZEALAND, Auckland, Waitakere Ranges, Fairy Falls Track, on decaying leaves of *Freycinetia banksii*, 23 May 1996, S.R. Whitton [HKU(M) 4916]. SEYCHELLES, Praslin Island, Valleé de Mai, on decaying leaves of *P. hornei*, 2 Aug. 1996, K.D. Hyde [HKU(M) 4921].

Notes: These specimens have no setae, the conidia are non-septate and the setulae at both ends of the conidia are short. These features characterise four species of *Dictyochaeta*: *D. apiculata* Matsush., *D. parva*, *D. vulgaris* S. Hughes and W.B. Kendr. and *D. tiklifrei* Bhat and B. Sutton. *Dictyochaeta apiculata* has only rudimentary setulae, the conidia of *D. tiklifrei* are larger (20-25 × 10-12.5 µm), whilst *D. vulgaris* also has larger conidia (17-23 × 2-2.7 µm) and polyphialidic conidiophores. Based on morphology and dimensions these specimens agree with the description for *D. parva* (Bhat and Sutton, 1985; Hughes and Kendrick, 1968; Matsushima, 1975).

30. ***Dictyochaeta renispora*** Whitton, McKenzie and K.D. Hyde, **sp. nov.**
(Figs. 32-41)

Etymology: *renispora*, from the descriptive term reniform, referring to the shape of the conidia.

Conidiophora 95-220 µm longa, 4-6 µm lata, macronematosa, mononematosa, recta, curvata vel flexuousa, cylindrica, brunnea, ad apicem pallide brunnea, laevia, 6-10 septata, crassitunicata, percurrente. *Cellulae conidiogenae* monophialidicae, in conidiophoris incorporatae, pallide brunneae; collarulo expanso. *Conidia* in capitulum mucosum aggregata, 6-8.5 × 3-4.5 µm, eseptata, hyalina, laevia, ambo extrema rotundata; visu frontali ellipsoidea, visu laterali reniformia; utrinque setula singula, simplicia, recta vel curvata, 6-12 µm longa praedita.

Colonies consisting of solitary conidiophores scattered over substrate surface. *Setae* none. *Conidiophores* 95-220 µm long, 4-6 µm wide at the base, macronematous, mononematous, simple, straight, curved or flexuous, brown fading to pale brown towards the apex, smooth, 6-10 septate, cylindrical or tapering slightly towards the apex, basal cells flared, walls and septa thickened, terminated by a single phialide. *Conidiogenous cells* enteroblastic, monophialidic, integrated into the apex of the conidiophores, terminal, percurrent. *Collarettes* distinct and flared. *Conidia* aggregated into slimy masses at the apex of conidiophores, 6-8.5 × 3-4.5 µm, hyaline, reniform from the side, ellipsoid from above, smooth, aseptate, rounded at both ends, setulate. *Setulae* single one at each end, simple, straight or curved, 6-12 µm long.

Habitat: Known to inhabit decaying leaves of *Freycinetia excelsa*, *F. multiploa* and *Pandanus* sp.

Known distribution: Australia, Brunei, Philippines.

Material examined: AUSTRALIA, northern Queensland, Lacey Creek State Forest Park, on decaying leaves of *Freycinetia excelsa*, 17 Jun. 1996, S.R. Whitton [HKU(M) 4927]. BRUNEI DARUSSALAM, Temburong, Batu Apoi Forest Reserve, Kuala Belalong Field

Figs. 32-41. *Dictyochaeta renispora* (from holotype). **32-36.** Conidia. **37-39.** Conidiophores. Note percurrent proliferation in Figs. 37 and 39. **40-41.** Conidiogenous cells. Bars: 32-36, 40-41 = 10 µm; 37-39 = 30 µm.

Studies Centre, Ashton Track, on decaying leaves of *Pandanus* sp., 24 Oct. 1995, S.R. Whitton [HKU(M) 4940]; Temburong, Batu Apoi Forest Reserve, Kuala Belalong Field Studies Centre, Ashton Track, on decaying leaves of *Freycinetia* sp., 24 Oct. 1995, S.R. Whitton [HKU(M) 4938]. PHILIPPINES, Los Baños, Mt. Makiling, Baranggay Bagong Silang, on decaying leaves of *F. multiploa*, 22 Oct. 1996, S.R. Whitton [HKU(M) 4913]; *ibid.* [HKU(M) 4914, HOLOTYPE]; *ibid.* [HKU(M) 4910].

Notes: *Dictyochaeta renispora* is characterised by monophialidic, percurrent conidiophores with distinct collarettes, and reniform, aseptate conidia with long (> 6 µm) setulae. *Dictyochaeta coffeae* Maggi and Persiani

and *D. simplex* (S. Hughes and W.B. Kendr.) Hol.-Jech. are both similar to this species in respect to conidiophore morphology and the absence of setae. However, these species have different conidial characteristics, especially in regard to shape and size. Both *D. simplex* (conidia 14-19 × 2.1-2.7 µm) and *D. coffeae* (conidia 10.8-18 × 3.4-5 µm) have falcate conidia, and sympodially proliferating polyphialides (Hughes and Kendrick, 1968; Maggi and Persiani, 1984). Based on conidial shape *D. renispora* resembles *D. tiklifrei* Bhat and Sutton, however, the latter is polyphialidic, the conidiophores are produced in small fascicles, and the conidia are larger (20-25 × 10-12.5 µm) (Bhat and Sutton, 1985).

31. ***Dictyochaeta septata*** (B. Sutton and Hodges) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea septata* B. Sutton and Hodges, Nova Hedwigia 26: 520 (1975).

32. ***Dictyochaeta setosa*** (S. Hughes and W.B. Kendr.) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea setosa* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 360 (1968).

33. ***Dictyochaeta seychellensa*** Whitton, McKenzie and K.D. Hyde, **sp. nov.**

(Figs. 42-53)

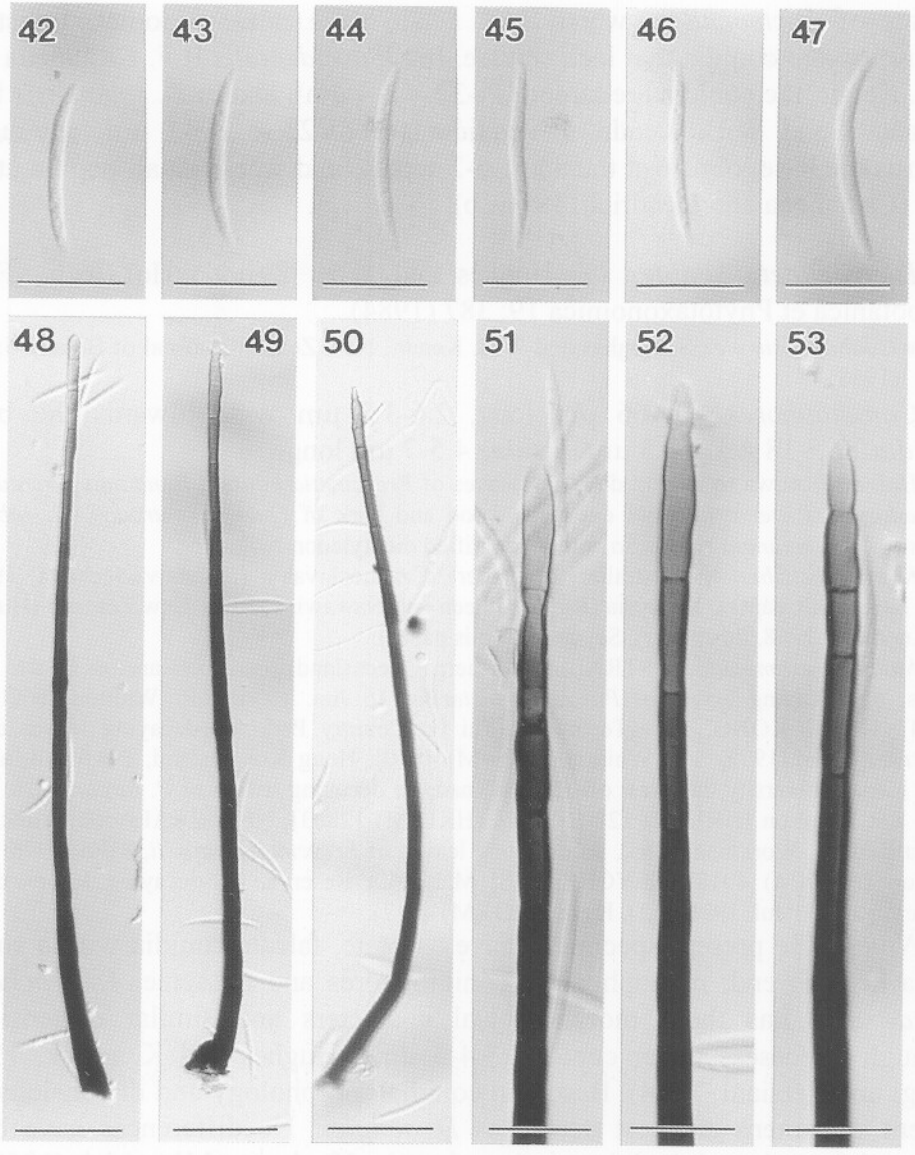
Conidiophora 155-310 µm longa, 3-6.5 µm lata, macronematosa, mononematosa, recta, curvata vel flexuousa, atrobrunnea, ad apicem pallidora, laevia, 5-15 septata, crassitunicata, determinate. *Cellulae conidiogenae* monophialidicae, in conidiophoris incorporatae, cylindricae; collarulo non distincte. *Conidia* in capitulum mucosum aggregata, 15-21.5 × 1.2-2 µm, eseptata, hyalina, falcata, laevia, ambo extrema extenuo et obtusa; 0-setulae.

Etymology: *seychellensa*, refers to the type locality, Seychelles.

Colonies consisting of conidiophores either solitary or arranged in small groups and scattered on the substrate surface. *Setae* none. *Conidiophores* 155-310 µm long, 3-6.5 µm wide at the base, 2.5-3 µm wide towards the apex, macronematous, mononematous, very dark brown at the base, fading slightly towards the apex, smooth walled, 5-15-septate, walls and septa thickened, straight, curved or flexuous, simple, basal cell flared, the apex terminated by a single phialide. *Conidiogenous cells* enteroblastic, monophialidic, integrated into the apex of the conidiophore, terminal, determinate, cylindrical, tapered slightly at apex to the obtuse tip. *Collarettes* simple, not distinct. *Conidia* aggregated into slimy masses at the apex of conidiophores, 15-21.5 × 1.2-2 µm, hyaline, falcate, aseptate, smooth, both ends attenuated and obtuse. *Setulae* none.

Habitat: Known to inhabit decaying leaves of *Pandanus multispicatus*.

Known distribution: Seychelles.



Figs. 42-53. *Dictyochaeta seychellensa* (from holotype). **42-47.** Conidia. **48-50.** Conidiophores. **51-53.** Conidiogenous cells. Note the lack of distinct collarettes. Bars: 42-47, 51-53 = 10 µm; 48-50 = 40 µm.

Material examined: SEYCHELLES, Praslin Island, Vallee de Mai, on decaying leaves of *Pandanus multispicatus*, 7 Aug. 1996, K.D. Hyde [HKU(M) 4926, HOLOTYPE].

Notes: *Dictyochaeta seychellensa* is characterised by non-setulate conidia, long setiform, typically solitary conidiophores, no setae, and monophialidic conidiogenous cells without distinct collarettes. There are two other similar

species of *Dictyochaeta* which lack setae, have non-sympodial, indistinc collarettes and conidia that lack setulae. In *D. occidentalis* R.F. Castañeda an W.B. Kendr. the conidia are larger (24-32 × 3-4 µm), and in *D. zapatensis* R.F Castañeda and W.B. Kendr. the conidia are 17-23 × 2.5-3 µm, attenuate towards the base, obtuse at the apex, 0-2 septate and with a small papilla at th apex (Castañeda and Kendrick, 1990a,b).

34. ***Dictyochaeta simplex*** (S. Hughes and W.B. Kendr.) Hol.-Jech., Folia Geobotanica et Phytotaxonomica 19: 387 (1984).

≡ *Codinaea simplex* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 362 (1968).

Conidiophores 40-106 µm long, 2.6-3.5 µm wide towards the base. *Conidia* 12.5-18 × 1.5-2.3 µm. *Setulae* 4.5-7 µm long.

Habitat: Known to inhabit decaying leaves of *Freycinetia banksii*, *Pandanus furcatus*, *P. seychellarum*, *P. tectorius*, and decaying wood and bark of *Quercus petraeae*, *Q. roboris*, *Rubus* sp., *Weinmannia racemosa*, and unidentified dicotyledon twig.

Known distribution: Australia (this paper), Czechoslovakia (Holubová-Jechová, 1984), Hong Kong (this paper), Malaysia (Kuthubutheen and Nawawi, 1991d), New Zealand (Hughes and Kendrick, 1968, this paper), Seychelles (this paper).

Material examined: AUSTRALIA, northern Queensland, road to Branston Beach from Cairns, on decaying leaves of *Pandanus tectorius*, 16 Jun. 1996, S.R. Whitton [HKU(M) 12804]. HONG KONG, New Territories, Tai Po Country Park, on decaying leaves of *P. furcatus*, 13 Jun. 1995, S.R. Whitton [HKU(M) 4930]; Hong Kong Island, Pokfulam, above Hong Kong University, in forest off Hatton Road, on decaying leaves of *P. furcatus*, 28 Aug. 1997, S.R. Whitton [HKU(M) 12802]; *ibid.* [HKU(M) 12803]. NEW ZEALAND, Auckland, Hunua Ranges, Workman Track, on decaying leaves of *Freycinetia banksii*, 8 Jul. 1996, S.R. Whitton [HKU(M) 4918]. SEYCHELLES, Mahé, La Reserve, on decaying leaves of *P. seychellarum*, 31 Jul. 1996, K.D. Hyde [HKU(M) 4917].

Notes: The present specimens have aseptate, falcate conidia with a single setula at each end, monophialidic conidiophores and no setae. *Dictyochaeta coffeae* also has these morphological characters and similar dimensions, although it possess wider conidia (3.4-5 µm) (Hughes and Kendrick, 1968; Maggi and Persiani, 1984). Based on conidial morphology and dimensions the present specimens are best treated as *D. simplex*. No differences have been observed from the original description given by Hughes and Kendrick (1968).

35. ***Dictyochaeta tortuosa*** (B. Sutton) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea tortuosa* B. Sutton, Proceedings of the Royal Society of Queensland 91: 16 (1980).

36. ***Dictyochaeta unisetula*** (Morgan-Jones and E.G. Ingram) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea unisetula* Morgan-Jones and E.G. Ingram, Mycotaxon 4: 507 (1976).

7. ***Dictyochaeta vulgaris*** (S. Hughes and W.B. Kendr.) Whitton, McKenzie nd K.D. Hyde, **comb. nov.**

≡ *Codinaea vulgaris* S. Hughes and W.B. Kendr., New Zealand Journal of Botany 6: 367 (1968).

Conidiophores 143-397 µm long, 6-7 µm wide towards the base, 11-23 eptate. *Conidia* 13-22 × 3-5 µm. *Setulae*, often setulae at the broader end of he conidia are slightly longer than those at the narrower end, 2-5 µm and 1.5-!.5 µm long, respectively.

Habitat: Known to inhabit decaying leaves of *Nothofagus solandri* var. *cliffortioides*, *N. runcata*, *Pandanus seychellarum*, *Quintinia serrata*, *Rubus* sp., *Weinmannia racemosa* and otten wood.

Known distribution: New Zealand (Hughes and Kendrick, 1968), Seychelles (this paper).

Material examined: SEYCHELLES, Mahé, La Reserve, on decaying leaves of *Pandanus seychellarum*, 31 Jul. 1996, K.D. Hyde [HKU(M) 4920]; Mahé, Congo Rouge, on decaying leaves of *P. seychellarum*, 2 Aug. 1996, K.D. Hyde [HKU(M) 4919]; *ibid.* [HKU(M) 4925].

Notes: The present specimens are characterised by polyphialidic, percurrent conidiophores with distinct collarettes, no setae, and aseptate conidia with short (< 6 µm) setulae at both ends. The conidia of *D. appiculata* (Matsush.) Aramb. and Cabello have rudimentary setulae, and in *D. tikliferi* the conidia are broader (20-25 × 10-12.5 µm) (Bhat and Sutton, 1985; Matsushima, 1975). The current specimens also resemble *D. parva* (conidia 11-17 × 2.5-3.1 µm) and *D. vulgaris* (conidia 17-23 × 2-2.7 µm) which are morphologically similar, differing primarily in conidial dimensions. Based on morphology and conidial dimensions these specimens are best treated as *D. vulgaris*.

Fifteen species of *Dictyochaeta* (*D. ciliata*, *D. falcatispora*, *D. fimbriaspora*, *D. fruticola*, *D. ixorae*, *D. microcylindrospora*, *D. minutissima*, *D. multisetula*, *D. occidentalis*, *D. plovercovensis*, *D. renispora*, *D. seychellensa*, *D. tropicalis*, *D. uncinata*, *D. zapatensis*) were either not included in a previous key (Kuthubutheen and Nawawi, 1991e), or have been published since. A key to these species are provided.

Key to species of* Dictyochaeta *described since 1991, or not included in the key of Kuthubutheen and Nawawi (1991e)

1. Setae present 2
1. Setae absent 7

2. Conidia filiform, aseptate, curved, 20-25 × 1 µm; conidiophores 40-130 µm long; setae always sterile, 275-300 µm long ..... *D. uncinata*
2. Conidia not filiform 3

3. Conidia cylindrical 4
3. Conidia falcate 5

4. Conidia cylindrical, 1-septate, asetulate, 12-18 × 1.8 µm; setae 35-55 µm long; conidiophores 3.5-18 µm long ..... *D. fruticola*
4. Conidia cylindrical, aseptate, asetulate, 4.8-7.2 × 1.1-1.5 µm; setae 90-145 µm long; conidiophores 32-59 µm long ..... *D. microcylindrospora*

5. Conidia falcate, 1-septate, asetulate, 12-18 × 1.8 µm; setae up to 100 µm long; conidiophores up to 20 µm long ..... *D. ixorae*
5. Conidia falcate, aseptate 6

6. Conidia falcate, aseptate, asetulate, 6-9 × 1.8-2 µm; setae up to 120 µm long; conidiophores up to 30 µm long ..... *D. falcatispora*
6. Conidia falcate, aseptate, one setula at each end of conidium, 13-15 × 1.5-2 µm; setae up to 480 µm long; conidiophores up to 90 µm long; conidiogenous cells usually monophialidic ..... *D. plovercovensis*

7. Conidia asetulate, or with rudimentary setulae only 8
7. Conidia with setulae 11

8. Conidia falcate, (0-)1(-2) septate, one rudimentary setula at the apex, base acute, 17-23 × 2.5-3 µm; conidiophores 50-110 µm long ..... *D. zapatensis*
8. Conidia aseptate, no rudimentary setulae 9

9. Conidia fusoid, base acute, apex obtuse, 5.5-9 × 0.6-1 µm; conidiophores 15-75 µm long, sometimes branched ..... *D. minutissima*
9. Conidia falcate, both ends attenuated and obtuse 10

10. Conidia 15-21.5 × 1.2-2 µm; conidiophores 155-310 µm long ..... *D. seychellensa*
10. Conidia 24-32 × 3-4 µm; conidiophores 70-100 µm long ..... *D. occidentalis*

11. Conidiogenous cells with cylindrical collarette; conidia broadly ellipsoid, aseptate, 6.5-10.5 × 6-8 µm; conidiophores up to 160 µm long, apex coarsely verrucose ..... *D. ciliata*
11. Conidiogenous cells with funnel-shaped collarette; conidia otherwise 12

12. Number of setulae variable 13
12. One setula at each end of conidium 14

13. Conidia with one apical setula and a fringe of basal setulae, broadly ellipsoid, aseptate, 14-19.5 × 8-11 µm; conidiophores 310-550 µm long ..... *D. fimbriaspora*
13. Conidia with variable number of setulae at each end, irregularly ellipsoid, aseptate, 14-18.5 × 5-6.5 µm; conidiophores 365-445 µm long ..... *D. multisetula*

14. Conidia ellipsoid to obclavate, base obtuse to truncate, apex acute, aseptate, 7.5-9.5 × 3-5 µm; conidiophores 90-130 µm long ..... *D. tropicalis*
14. Conidia reniform, both ends rounded, aseptate, 6-8.5 × 3-4.5 µm; conidiophores 95-220 µm long ..... *D. renispora*

Dictyochaetopsis Aramb. and Cabello, Mycotaxon 38: 12 (1990).

Type species: *Dictyochaetopsis apicalis* (Berk. and M.A. Curtis) Aramb. and Cabello, Mycotaxon 38: 12 (1990).

Arambarri and Cabello (1990) introduced *Dictyochaetopsis* to accommodate species similar to *Dictyochaeta* which produce lateral phialides. *Codinaea apicalis* (Berk. and M.A. Curtis) S. Hughes and W.B. Kendr., *Codinaea* state of *Chaetosphaeria dingleyae*, *Codinaea elegantissima* Lunghini, *C. filamentosa* Onofri, *C. glauco-nigra* (Cooke and Ellis) S. Hughes and W.B. Kendr., *C. intermedia* Rambelli, *C. maharashtrensis* Piroz. and S.D. Patil and *Dictyochaeta menisporoides* Hol.-Jech. were transferred to *Dictyochaetopsis*. The members of *Dictyochaetopsis* are characterised by macronematous, setiform conidiophores that can have sterile or fertile apices. The conidiogenous cells are usually monophialidic (sometimes polyphialidic), discrete (rarely integrated), borne on the conidiophore or on lateral branches and with distinct, flared collarettes. Conidia are aggregated into slimy heads, fusoid to cylindrical, typically curved, hyaline, smooth, 0-multi-septate and with or without setulae (Arambarri and Cabello, 1990).

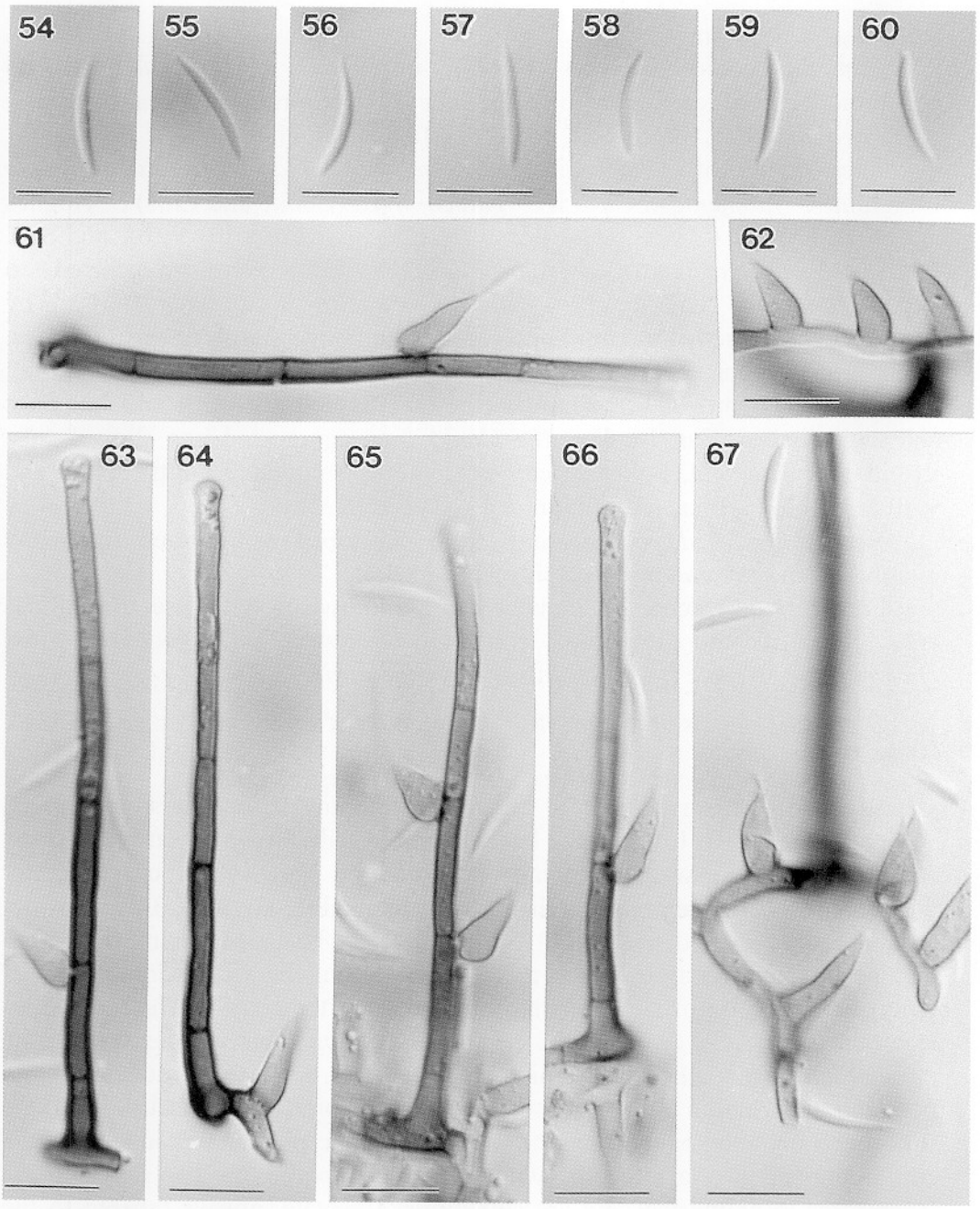
No species of *Dictyochaetopsis* was described or reported from any member of the *Pandanaceae* (McKenzie and Hyde, 1996).

Four further species of *Dictyochaeta* are known to have lateral phialides and, to prevent ongoing confusion between *Dictyochaeta* and *Dictyochaetopsis*, are transferred to *Dictyochaetopsis*.

1. ***Dictyochaetopsis antillana*** (R.F. Castañeda) Whitton, McKenzie and K.D. Hyde, **comb. nov.** (Figs. 54-67)

≡ *Dictyochaeta antillana* R.F. Castañeda, Fungi Cubenses 3: 7 (1988).

Setae 43-110 µm long, 2.5-4 µm wide at the lowest septum, simple, erect, straight, dark brown towards the base, fading to pale brown towards the apex, smooth, thickened walls especially towards the base, septa only slightly thickened, 2-4 septate, apical cell rounded and slightly swollen, 3-4 µm wide; basal cell thick walled, swollen (4.2-8 µm wide) or T-shaped, giving rise to 1-3 hyphae; discrete phialides often arise directly from the setae. *Conidiophores* reduced, consisting of short lateral branches from the setae or short phialides from the superficial hyphae, 0-1 septate. *Conidiogenous cells* enteroblastic, monophialidic (sometimes becoming polyphialidic), discrete, produced through pores in the middle section of the setae, also produced directly from the superficial mycelia, pale brown throughout, smooth; phialides produced on the conidiophores are lageniform, whilst phialides borne on the mycelia are lageniform to cylindrical and are sometimes 1-septate, always tapered to the apex, apex narrow with a very small, flared collarette, 9.5-15.5 µm long, 3-4.8 µm wide at the widest point. *Conidia* aggregated into a moist, slimy mass at the apex of the conidiogenous cells, 10.5-15.5 × 1.5-2 µm, hyaline, smooth,



Figs. 54-67. *Dictyochaetopsis antillana* [from HKU(M) 12937]. **54-60.** Conidia. **61, 63-66.** Conidiophores with discrete conidiogenous cells. **62, 67.** Superficial hyphae with discrete conidiogenous cells. Bars = 10 μm.

Key to species of *Dictyochaetopsis*

1. Conidia with setulae 2
1. Conidia without setulae 8

2. Conidia with a single, bifid setula at each end, aseptate, falcate, 12.5-14.5 × 2.7-3.5 µm; conidiophores 250-340 µm long; conidiogenous cells monophialidic with funnel-shaped collarettes ..... *D. elegantissima*
2. Conidia with a single, simple setula at each end 3

3. Conidia 1-septate, falcate, 14-17 × 1.8-2.2 µm, setulae 11-13 µm long; conidiophores up to 130 µm long; conidiogenous cells polyphialidic, collarettes funnel-shaped. *D. dingleyae*
3. Conidia aseptate 4

4. Lateral phialides arising from distinct bulbous cells; conidia 18-23.5 × 2-3 µm, setulae 8.5-13 µm; conidiophores up to 200 µm long; conidiogenous cells mono- or polyphialidic, collarettes funnel-shaped ..... *D. pahangensis*
4. Lateral phialides not arising from bulbous cells 5

5. Lateral phialides forming clumps which encircle the conidiophore; conidia 12-16 × 1.5-2.5 µm, setulae 7-12 µm; conidiophores up to 300 µm long; conidiogenous cells polyphialidic, collarettes funnel-shaped ..... *D. gonytrichoides*
5. Lateral phialides not arising in clumps nor encircling the conidiophore 6

6. Setae, conidiophores and lateral branches polyphialidic; conidia falcate, 13-19 × 1.8-2.5 µm, setulae 4-9 µm; conidiophores up to 220 µm long; collarettes funnel-shaped ..... *D. menisporoides*
6. Setae, conidiophores and lateral branches monophialidic 7

7. Setiform conidiophores with long, sterile lateral branches; conidia falcate, 14.5-16.5 × 2-2.7 µm, setulae up to 11 µm; conidiophores 210-475 µm long; collarettes funnel-shaped... ..... *D. filamentosa*
7. Long, sterile, lateral branches lacking; conidia falcate, 16.5-18 × 3.5-4.5 µm, setulae up to 9 µm; conidiophores 50-250 µm long; collarettes funnel-shaped ..... *D. intermedia*

8. Conidia aseptate 9
8. Conidia septate 10

9. Setae up to 110 µm long, sterile, with swollen and rounded apices; collarettes funnel-shaped; conidia acerose, 10.5-15.5 × 1.5-2 µm ..... *D. antillana*
9. Setae up to 350 µm long, apices fertile; collarettes cylindrical; conidia cylindrical, 8-12 × 1.5-2.2 µm ..... *D. maharashtrensis*

10. Conidia 1-septate, 8.8-17.5 × 1.5-2 µm ..... *D. glauco-nigra*
10. Conidia more than 1-septate 11

11. Conidia 3-septate, 16.2 × 1.8-2.3 µm ..... *D. apicalis*
11. Conidia 2-3 septate, base obtuse, tapering to an acute and hooked apex, 30-45 × 1-1.5 µm; setae up to 220 µm long ..... *D. hamata*

septate, typically curved, acerose, both ends attenuated and rounded, sometime slightly tapering towards one end, setulae absent.

Habitat: Known to occur on decaying leaves of *Pandanus furcatus* and *Quercus oleoides* var. *sagraeana*.

Known distribution: Cuba (Castañeda, 1988), Hong Kong (this paper).

Material examined: HONG KONG, Hong Kong Island, The Peak, on decaying leaves of *Pandanus furcatus*, 8 Aug. 1995, S.R. Whitton [HKU(M) 12937].

Notes: *Dictyochaetopsis antillana* is characterised by the aseptate, lageniform lateral branches produced from the setae, the small, though distinct, sterile, swollen apices of the setae and the acerose, aseptate, non-setulate conidia (Castañeda, 1988). Of the five species of *Dictyochaetopsis* that lack setulae, only *D. antillana* and *D. maharashtrensis* have aseptate conidia. These two species are easily distinguished as *D. maharashtrensis* has long setae (up to 350 μm) which are blunt and often develop into a single phialide, and the conidia are more or less cylindrical and typically straight, the phialides are not flared (Pirozynski and Patil, 1970). Only *D. antillana* is reported to have setae with swollen apices.

2. ***Dictyochaetopsis gonytrichoides*** (Shearer and J.L. Crane) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Codinaea gonytrichoides* Shearer and J.L. Crane, Mycologia 63: 245 (1971).

≡ *Codinaeopsis gonytrichoides* (Shearer and J.L. Crane) Morgan-Jones, Mycotaxon 4: 167 (1976).

≡ *Dictyochaeta gonytrichoides* (Shearer and J.L. Crane) Kuthub. and Nawawi, Mycological Research 94: 845 (1990).

3. ***Dictyochaetopsis hamata*** (Kuthub. and Nawawi) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Dictyochaeta hamata* Kuthub. and Nawawi, Mycological Research 94: 840 (1990).

4. ***Dictyochaetopsis pahangensis*** (Kuthub. and Nawawi) Whitton, McKenzie and K.D. Hyde, **comb. nov.**

≡ *Dictyochaeta pahangensis* Kuthub. and Nawawi, Mycological Research 94: 841 (1990).

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References

Arambarri, M. and Cabello, M.N. (1989). A numerical taxonomic study of some phialidic genera of hyphomycetes: cluster analysis. Mycotaxon 34: 679-696.

Arambarri, M. and Cabello, M.N. (1990). Considerations about *Dictyochaeta*, *Codinaeopsis* and a new genus: *Dictyochaetopsis*. Mycotaxon 38: 11-14.

Arambarri, M., Cabello, M.N. and Mengascini, A. (1987). New hyphomycetes from Santiago River (Buenos Aires Province, Argentina). Mycotaxon 29: 29-35.

Bhat, D.J. and Kendrick, W.B. (1993). Twenty-five new conidial fungi from the Western Ghats and the Andaman Islands (India). Mycotaxon 49: 19-90.

Bhat, D.J. and Sutton, B.C. (1985). Some phialidic hyphomycetes from Ethiopia. Transactions of the British Mycological Society 84: 723-730.

Carris, L.M. and Glawe, D.A (1988). *Dictyochaeta heteroderae*, comb. nov. Mycotaxon 33: 23.

Castañeda Ruiz, R.F. (1988). Fungi Cubenses III. Instituto de Investigaciones Fundamentales en Agricultura Tropical Alejandro de Humboldt , Cuba.

Castañeda Ruiz, R.F. and Kendrick, W.B. (1990a). Conidial fungi from Cuba: I. University of Waterloo Biology Series 32: 1-53.

Castañeda Ruiz, R.F. and Kendrick, W.B. (1990b). Conidial fungi from Cuba: II. University of Waterloo Biology Series 33: 1-61.

Ellis, M.B. (1971). Dematiaceous Hyphomycetes, Commonwealth Mycological Institute, Kew, U.K.

Gamundi, I.J., Arambarri, A.M. and Giaiotti, A.L. (1977). Microflora de la Hojarasca de *Nothofagus dombeyi*. Darwiniana 21: 81-114.

Holubová-Jechová, V. (1984). Lignicolous hyphomycetes from Czechoslovakia 7. *Chalara*, *Exochalara*, *Fusichalara* and *Dictyochaeta*. Folia Geobotanica et Phytotaxonomica 19: 387-438.

Holubová-Jechová, V. (1988). Studies on hyphomycetes from Cuba VIII. A new genus *Piricaudilium* and some species new for the territory of Cuba. eská Mykologie 42: 200-204.

Hughes, S.J. and Kendrick, W.B. (1968). New Zealand fungi 12. *Menispora*, *Codinaea*, *Menisporopsis*. New Zealand Journal of Botany 6: 323-375.

Kuthubutheen, A.J. (1987). Two new species of *Dictyochaeta* from Malaysia. Transactions of the British Mycological Society 89: 353-358.

Kuthubutheen, A.J. and Nawawi, A. (1990). *Dictyochaeta hamata* and *D. pahangensis*, two new species with lateral phialides. Mycological Research 94: 840-846.

Kuthubutheen, A.J. and Nawawi, A. (1991a). Three new species of *Dictyochaeta* with non-setose conidiophores and non-septate setulate conidia from Malaysia. Mycological Research 95: 104-107.

Kuthubutheen, A.J. and Nawawi, A. (1991b). *Dictyochaeta macrospora* sp. nov.: a litter-inhabiting hyphomycete from Malaysia. Mycological Research 95: 248-250.

Kuthubutheen, A.J. and Nawawi, A. (1991c). Eight new species of *Dictyochaeta* (hyphomycetes) from Malaysia. Mycological Research 95: 1211-1219.

Kuthubutheen, A.J. and Nawawi, A. (1991d). *Dictyochaeta guadalcanalensis* comb. nov. and several new records of the genus in Malaysia. Mycological Research 95: 1220-1223.

Kuthubutheen, A.J. and Nawawi, A. (1991e). A key to *Dictyochaeta* and *Codinaea* species. Mycological Research 95: 1224-1229.

Maggi, O. and Persiani, A.M. (1984). *Codinaea coffeae* and *Phialocephala xalapensis*, two new hyphomycetes from Mexico. Mycotaxon 20: 251-258.

Maire, R. (1937). Fungi Catalaunici, Series altera. Contribution à l'étude de la Flore Mycologique de la Catalogne. Publicaciones del Instituto Botanico, Barcelona 3: 1-128.

Matsushima, T. (1971). Microfungi of the Solomon Islands and Papua-New-Guinea, Published by the author, Kobe, Japan.

Matsushima, T. (1975). Icones Microfungorum a Matsushima Lectorum, Nippon Printing Publishing Co., Osaka, Japan.

McKenzie, E.H.C. and Hyde, K.D. (1996). Index of fungi described from the Pandanaceae. Mycotaxon 57: 125-144.
Morgan-Jones, G. and Ingram, E.G. (1976). Notes on hyphomycetes. XV. Two new species of *Codinaea*. Mycotaxon 4: 504-509.
Pirozynski, K.A. and Patil, S.D. (1970). Some setose hyphomycetes of leaf litter in south India. Canadian Journal of Botany 48: 567-581.
Sutton, B.C. (1980). Microfungi from Australian leaf litter. Proceedings of the Royal Society of Queensland 91: 11-19.

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