

Lasiosphaeria and a similar new genus from palms

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Received 4 September 2000

Accepted for publication 11 June 2001

Lasiosphaeriaceous ascomycetes from palms are discussed in this paper and three new species, *L. alexandricola*, *L. alexandrae* and *L. chapmanii*, are described. Three species are excluded from *Lasiosphaeria*, *L. nematospora*, *L. rufula* and *L. tephrocoma*, and the transfer of *L. subambigua* to *Cercophora* is noted. A new genus, *Arecacicola*, is introduced to accommodate a distinctive taxon from palms. *Arecacicola* is characterized by ascomata immersed in a sparse stroma consisting of host cells filled with fungal hyphae. The ascomata do not ultimately become erumpent. The ascospores lack apical spines, and the asci do not possess an apical ring. A key to lasiosphaeriaceous taxa from palms is provided.

Key Words—Ascomycetes; Lasiosphaeriaceae; palms; taxonomy; tropics.

The ascomycetes on palms are a diverse assemblage (Hyde et al., 1997, 2000) and several genera have been treated in a series of papers by Hyde and co-workers (e.g. Hyde, 1994, 1996a, 1996b). The genus most commonly found on palms is *Oxydothis* Penz. & Sacc., while genera such as *Anthostomella* Sacc., *Astrosphaeriella* Syd. & P. Syd., *Capsulospora* K. D. Hyde and *Linocarpon* Syd. & P. Syd., are also frequently recorded (Hyde et al., 1997).

Members of the Lasiosphaeriaceae are found less frequently associated with palms (Hyde and Taylor, 1998). Lasiosphaeriaceous taxa which have been found on this substrate include the occasional species of *Caudatispora* J. Fröhl. & K. D. Hyde (Fröhlich and Hyde, 1995; Huhndorf and Fernández, 1999) and *Cercophora* Fuckel (Hanlin and Tortolero, 1987).

Other similar genera found on palms include *Chaetosphaeria* Tul. & C. Tul. (Hyde et al., 1999a) and *Melanochaeta* E. Müll., Harr & Sulm. (Fröhlich and Hyde, 2000) both of which are now placed in the Chaetosphaeriaceae (Réblová et al., 1999); *Iodosphaeria* Samuels, E. Müll. & Petrini (Taylor and Hyde, 1999), which has recently been moved to the Trichosphaeriaceae (Réblová, 1999); and also *Ophioceras* Sacc. (Fröhlich and Hyde, 2000) and *Pseudohalonectria* Minoura & T. Muroi (Hyde et al., 1999b), taxa with uncertain family affinities (Chen et al., 1995, 1999; Shearer et al., 1999).

In this paper the species of *Lasiosphaeria* Ces. & De Not. described from palms are re-evaluated. Four species, *Lasiosphaeria nematospora* Linder, *L. subambigua* Höhn., *L. rufula* (Penz. & Sacc.) Rossman, and *L. tephrocoma* (Berk. & Broome) Sacc., have been described from palms, and none are retained in *Lasiosphaeria* in this paper. Three new species of *Lasiosphaeria* from collec-

tions made on palms are described. In addition a new genus, *Arecacicola*, is introduced to accommodate a species that cannot be accommodated in existing lasiosphaeriaceous genera. A key to lasiosphaeriaceous and related genera is presented.

Key to lasiosphaeriaceous taxa from palms

1. Ascomata deeply immersed, ascospores cylindrical, multiseptate *Arecacicola*
1. Ascomata superficial or immersed under a few layers of host cells, asci and ascospores variously shaped 2
2. Ascospores filiform, asci apedicellate, ascomata with distinct papilla or with long necks 3
2. Ascospores fusiform to cylindrical, often with blunt spine-like projections at their apices, asci pedicellate 4
3. Ascomata black, ascospores remaining within asci when discharged from the ascomata *Ophioceras*
3. Ascomata pigmented yellow to brown (less obvious when the material has dried), ascospores discharged freely or quickly released from asci *Pseudohalonectria*
4. Ascospores ellipsoidal to fusiform without blunt apical spines 5
4. Ascospores mainly cylindrical with or without blunt apical spines 7
5. Ascospores unicellular, asci with or without an apical ring *Iodosphaeria*
5. Ascospores bi- to multicellular 6
6. Ascospores hyaline *Chaetosphaeria*
6. Ascospores with dark brown central cells and paler end cells *Melanochaeta*
7. Ascospores with a swollen upper part that becomes

- brown *Cercophora*
7. Ascospores not becoming swollen, but may become brown at maturity 8
8. Ascospores with caudate (tail-like) extensions and with mucilaginous tips, ascomata clustered on a basal stroma *Caudatispora*
8. Ascospores with or without blunt apical spines, ascomata not clustered on a basal stroma *Lasiosphaeria*

Taxonomy

Arecacicola Joa. E. Taylor, J. Fröhl. & K. D. Hyde, gen. nov.

Ascomata in stromate immersa, subglobosa, brunnea, ostiolata, paraphysata. Asci 8-sporei, cylindrici, pedicellati, unitunicati. Ascosporeae 2–4-seriatae, cylindricae vel filiformes, multiseptatae, hyalinae.

Ascomata visible as black ostiolar dots on the host surface; in vertical section immersed, sub-globose, brown, with a central umbilicate ostiole, embedded in a stroma consisting of host cells and brown, thin-walled fungal hyphae. Peridium brown, comprising several layers of dark-brown walled compressed cells. Paraphyses hypha-like, septate, numerous, embedded in a gelatinous matrix. Asci 8-spored, cylindrical, pedicellate, unitunicate, apically rounded, lacking an apical ring. Ascospores 2–4-seriate, cylindrical to filiform, multiseptate, hyaline, straight or curved (particularly at the apices), without appendages or a sheath, end cells guttulate.

Type species: *Arecacicola calami* Joa. E. Taylor, J. Fröhl. & K. D. Hyde, sp. nov.

Etymology: In reference to the substrate, palm (*Arecaceae*), on which the type species was recorded.

The type species of this new ascomycete genus was collected on *Calamus* sp. in Java, Indonesia, and was believed to be lasiosphaeriaceous (Sordariales) *sensu* Barr (1990). It does not, however, correspond to any previously described member of that family. This taxon is atypical of *Lasiosphaeria sensu stricto*, as the ascomata are immersed in a sparse stroma, consisting of host cells filled with fungal hyphae, and do not ultimately become erumpent. In addition the ascospores lack apical spines, and the asci do not possess an apical ring. A new genus, *Arecacicola*, is therefore introduced to accommodate this collection.

Arecacicola should be compared with other lasiosphaeriaceous genera possessing cylindrical to filiform ascospores, including *Ophioceras*, which possesses ascomata with an elongate beak, and *Plagiosphaera* Petr., which has a shorter, thicker beak (Barr, 1990). Both *Ophioceras* and *Plagiosphaera* have some similarities with *Arecacicola* as they are both immersed in the host substrate. They differ in that their ascospores are truly filiform (scoleospores) and their papilla or beaks are well developed. The asci in *Ophioceras* are apedicellate, and the inclusion of this genus in the Lasiosphaeriaceae was therefore questioned (Chen et al., 1995, 1999; Shearer et al., 1999).

Other genera with filiform ascospores, such as

Mycomedusiospora G. C. Carroll & Munk, possess superficial ascomata with a pale yellowish peridium and ascospores that disarticulate into part-spores. *Acrospermoides* J. H. Mill. & G. E. Thomps. possesses ascospores that do not disarticulate (Miller and Thompson, 1940; Barr, 1990) and can also be compared to *Arecacicola*, but it differs in having superficial blackish ascomata. For the present, *Arecacicola* is best included in the Lasiosphaeriaceae (incertae sedis).

Arecacicola calami Joa. E. Taylor, J. Fröhl. & K. D. Hyde, sp. nov. Figs. 1–7

Ascomata in stromate immersa, 200–310 alta × 240–320 µm diam, subglobosa, brunnea, ostiolata, paraphysata. Asci 170–200 × 11–14 µm, 8-sporei, cylindrici, pedicellati. Ascosporeae 54–72 × 4–6 µm, 2–4-seriatae, cylindrici vel filiformes, 12–17-septatae, hyalinae.

Ascomata visible on host substrate as black ostiolar dots; in vertical section 200–310 high × 240–320 µm diam, immersed, subglobose, brown, with a central umbilicate ostiole (Fig. 1). Peridium up to 10–20 µm wide, comprising several layers of dark-brown walled compressed cells, embedded in a stroma comprising host cells filled with pale brown fungal hyphae (Fig. 2). Paraphyses up to 6 µm wide, hypha-like, septate, numerous, embedded in a gelatinous matrix (Fig. 3). Asci 170–200 × 11–14 µm, 8-spored, cylindrical, pedicellate, apically rounded, lacking an apical ring (Fig. 3). Ascospores 54–72 × 4–6 µm, 2–4-seriate, cylindrical to filiform, 12–17-septate, hyaline, straight or curved (particularly at the apices), without appendages or a sheath, end cells guttulate (Figs. 4–7).

Etymology: In reference to the host genus *Calamus* L.

Host substrate: *Calamus* sp.

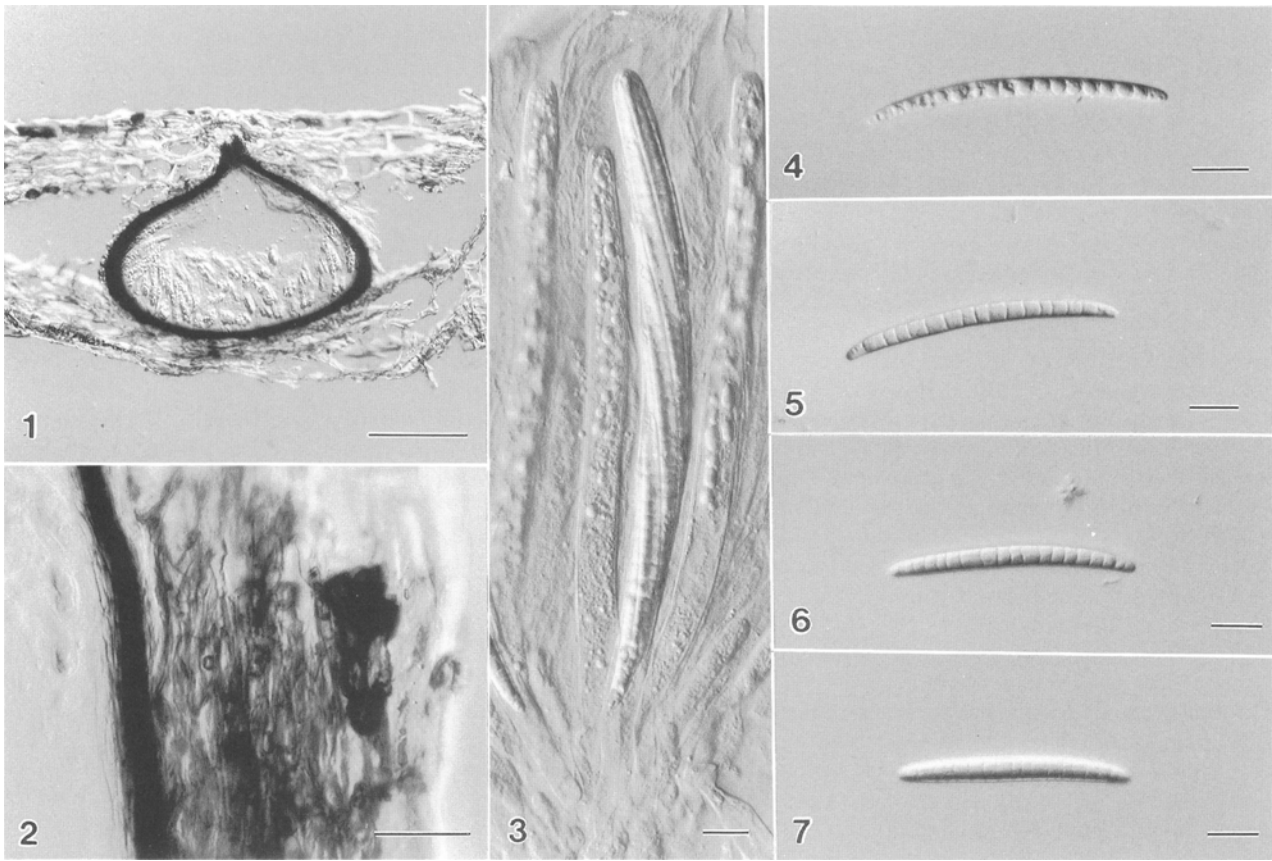
Known distribution: Indonesia.

Holotype: INDONESIA: Java, Cibodas, on a *Calamus* sp. trunk (rattan), Apr 1992, K. D. Hyde 1126a (HKU(M) 1126a).

Lasiosphaeria Ces. & De Not., Comm. Soc. Critt. Ital. 1: 229, 1863.

Lasiosphaeria is a widespread genus comprising 40 species (Hawksworth et al., 1995) and was originally introduced to accommodate seven species (Lundqvist, 1972). Two species have been selected as lectotype at different times, *L. hirsuta* (Fr.) Ces. & De Not. (Clements and Shear, 1931) and *L. ovina* (Pers.) Ces. & De Not. (Höhnelt, 1918; Lundqvist, 1972). Lundqvist (1972) discussed the history of the genus and presents a convincing argument as to why *L. ovina* should be considered the type. The authors of *Names in Current Use for Extant Plant Genera* (Greuter et al., 1993) follow Lundqvist's system and list *L. ovina* as the type. Descriptions of *L. ovina* are provided by Saccardo (1883), Berlese (1894), Munk (1957) and Lundqvist (1972).

Members of *Lasiosphaeria* are characterized by ascomata that are superficial or seated in a subiculum, globose, ovoid or pyriform, brown to black, with young ascomata often covered with a white tomentum (Seaver,



Figs. 1–7. *Arecaicola calami*. 1. Ascoma in section, immersed with a central umbilicate ostiole. 2. Peridium and sparse stroma consisting of host cells filled with fungal hyphae. 3. Asci (lacking an apical apparatus) and paraphyses. 4–7. Ascospores. Scale bars: 1 = 100 μm ; 2–7 = 10 μm .

1912). The peridium comprises three layers of cells, and the outer surface may or may not be covered in hairs (Lundqvist, 1972). Paraphyses are abundant and taper distally. The asci are cylindrical, unitunicate, and apically truncate with a refractive apical ring and often possess a sub-apical globule (Huhndorf, 1998). Ascospores are hyaline to yellowish to brown (Réblóvá, 1999), cylindrical, oblong, allantoid, filiform or elongate fusoid, often with a pointed appendage at one or both ends, aseptate to multiseptate, guttulate, curved, sigmoid or geniculate below (Barr, 1990; Huhndorf, 1998). The anamorph of *Lasiosphaeria* is described as forming directly from the germinating ascospores by means of phialides (Huhndorf, 1998).

There are no recent treatments of the genus, although Huhndorf (1998) outlines a proposal to revise the genus using phylogenetic analysis, based on both molecular and morphological data. Descriptions of members of the genus and recent additions are scattered through the literature (Seaver, 1912; Rehm, 1916; Munk, 1957; Hilber and Hilber, 1983; Hilber et al., 1987a, 1987b; Barr, 1993a, 1993b; Réblóvá, 1997).

The genera to which *Lasiosphaeria* is most similar are discussed by Lundqvist (1972) and Barr (1990). *Bombardia* (Fr.) P. Karst. and *Cercophora* are similar in terms of the morphology of the ascomata, asci and asco-

spores, and in anamorph development (Huhndorf, 1998). *Bombardia* has cylindrical ascospores with appendages and differs from *Lasiosphaeria* in ascomata wall structure: *Lasiosphaeria* species have 3-layered, light-colored, membranous peridia comprising parenchymatous cells, while *Bombardia* species have darker, tougher, 2-layered peridia in which the innermost layers are thick, fibrous and contain ramifying hyphae (Lundqvist, 1972). Also, in *Bombardia* perithecia lack necks, and their ascospores are bi-celled, the upper cell usually becoming dark brown with age (Lundqvist, 1972). *Cercophora* also has similar ascospore morphology (when the ascospores are young), but different ascomata wall characters to *Lasiosphaeria*. The peridia of *Cercophora* species is 3–4-layered, and the outer and middle layers are usually separated by a “stratum of gelatinised, very thick walled cells” (Lundqvist, 1972, p. 81). The taxa also differ in that *Cercophora* ascospores often swell in the upper part, which eventually becomes brown (Lundqvist, 1972). Other similar genera include *Tripterosporella* Subram. & Lodha, which is also segregated from *Lasiosphaeria* because it has ascospores which become enlarged and pigmented in part, and it has a cleistothecial ascomata (Barr, 1990). In addition, like many *Cercophora* species, *Tripterosporella* is known only from dung (Huhndorf, 1998). *Campptosphaeria* Fuckel has similarities with *Lasiosphaeria*,

and with the aforementioned taxa, but possess ascospores that become enlarged, but do not become brown (Lundqvist, 1972).

A recently introduced genus in the Lasiosphaeria-ceae, which has so far only been recorded on palms, is *Caudatispora* J. Fröhl. and K. D. Hyde (Fröhlich and Hyde, 1995; Huhndorf and Fernández, 1999). *Caudatispora* is similar to *Lasio-sphaeria*, especially in the morphology of the ascospores and paraphyses. The hyaline ascospores are provided with unusual caudate extensions, similar to those of ascospores of *Lasio-sphaeria*. Ascospores of *Caudatispora* can also become pale brown, and occasionally septate, with maturity (Huhndorf and Fernández, 1999). However, *Caudatispora* differs by producing clusters of superficial, reddish brown ascomata, which form on a common basal stroma. This feature is not recorded in *Lasio-sphaeria* (Fröhlich and Hyde, 1995; Huhndorf and Fernández, 1999).

Key to *Lasio-sphaeria* species on palms

1. Ascumata semi-immersed, ascospores $27.5\text{--}32.5 \times 2.5\text{--}3 \mu\text{m}$ *L. alexandricola*
1. Ascumata superficial with only the base immersed, ascospores more than $34 \mu\text{m}$ long 2
2. Ascospores with an acute apex and tapering abruptly to an extended spatulate tip
..... *L. alexandrae*
2. Ascospores with a rounded apex and tapering gradually to an extended spatulate tip
..... *L. chapmanii*

Lasio-sphaeria alexandrae J. E. Taylor, J. Fröhl. & K. D. Hyde, sp. nov. Figs. 8–21

Ascomata $200\text{--}315 \mu\text{m}$ alta, $200\text{--}300 \mu\text{m}$ diam, globosa vel obpyriformes, superficialia, atrorubra, rubra-brunnea vel nigra, coriacea, papillata, solitaria vel gregaria. Asci $90\text{--}126 \times 9\text{--}12 \mu\text{m}$, 8-sporei, cylindrici, pedicellati, uniloculati, truncati, apparatu apicale J-, $1\text{--}1.5 \times \mu\text{m}$ alta, $2.5\text{--}4 \mu\text{m}$ diam praediti. Ascosporeae $34\text{--}50 \times 3.7\text{--}5 \mu\text{m}$, fasciculatae, cylindricae, 0(–1)-septatae, hyalinae, appendiculata spathula praeditae.

Ascomata $200\text{--}315 \mu\text{m}$ high \times $200\text{--}300 \mu\text{m}$ diam, globose to obpyriform, superficial, dark red brown to black, coriaceous, with a central or eccentric papilla, solitary or aggregated, with orange-yellow contents (Figs. 8, 9). Peridium $14\text{--}24 \mu\text{m}$ wide, comprising 2 strata of dark brown, thick-walled compressed cells, becoming hyaline and thin-walled inwardly. Paraphyses $2.5\text{--}4 \mu\text{m}$ wide, hypha-like, septate, hyaline, tapering slightly distally (Fig. 10). Asci $90\text{--}126 \times 9\text{--}12 \mu\text{m}$, 8-spored, cylindrical, pedicellate, uniloculate, thin-walled, apically truncate, with a non-amyloid, non-refractive, apical ring, $1\text{--}1.5 \times \mu\text{m}$ high \times $2.5\text{--}4 \mu\text{m}$ diam, sub-apical globule not observed (Figs. 11–14). Ascospores $34\text{--}50 \times 3.7\text{--}5 \mu\text{m}$, fasciculate, cylindrical, 0(–1)-septate, hyaline, straight or slightly curved, apex distinctly acute, base narrowing abruptly to an extended spur with a spatulate mucilaginous tip (Figs. 15–21).

In culture: Colony circular, initially translucent becoming dark yellow-brown (5F3) (Kornerup and Wan-

sch, 1978), same in reverse. Mycelia immersed and superficial, flat with a crenated edge, slimy, becoming powdery and dense with age. Radial growth of 16 mm in 7 d. Ascumata develop in the centre of the colony after 3 mo.

Etymology: In reference to the palm host *Archontophoenix alexandrae* (F. Muell.) H. Wendl. & Drude.

Host substrate: *Archontophoenix alexandrae* (on submerged or terrestrial material).

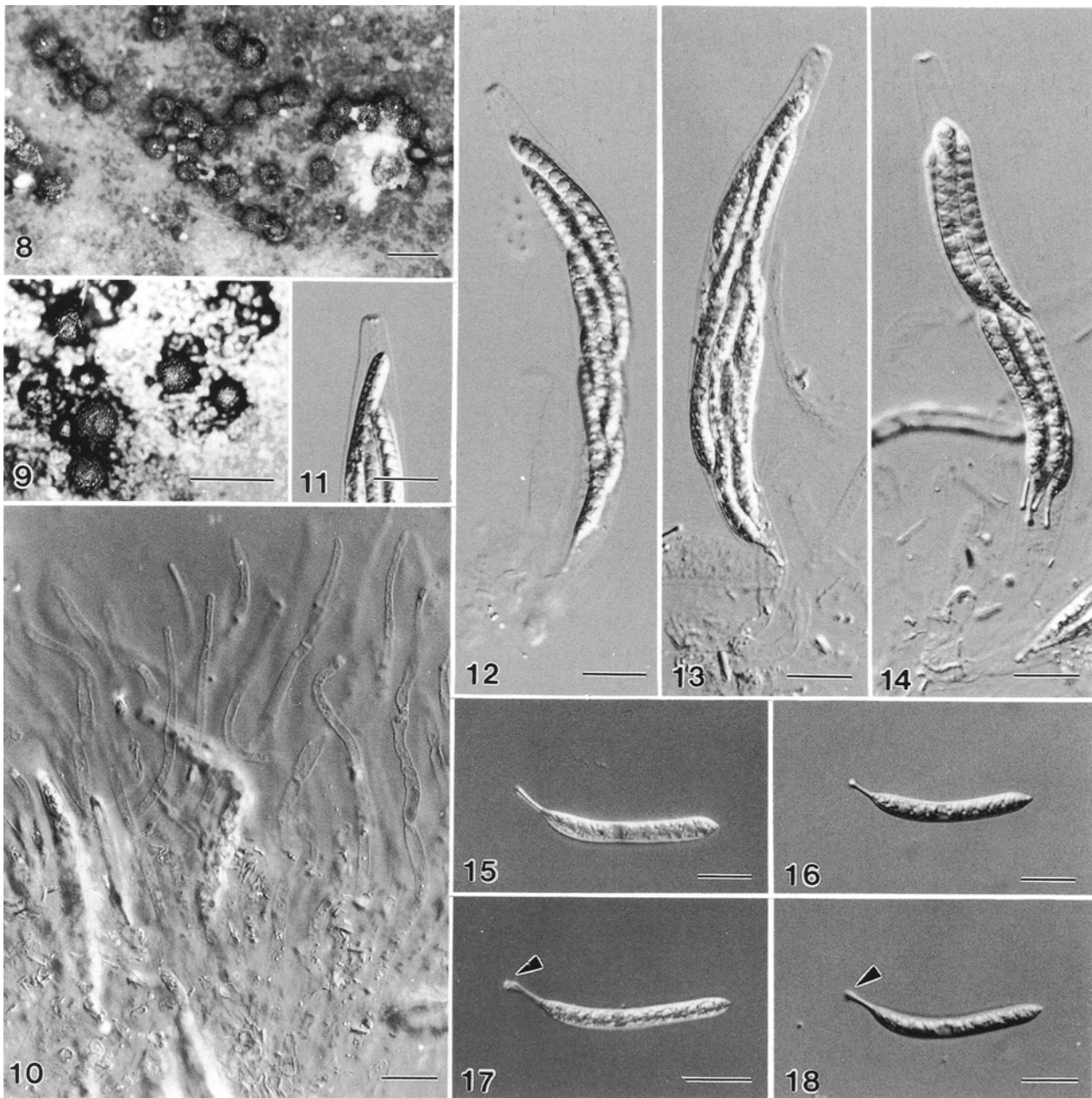
Known distribution: Australia.

Holotype: AUSTRALIA: Northern Queensland, Pine Creek, Yarrabara Road, on a submerged rachis of *Archontophoenix alexandrae*, Jul 1994, K. D. Hyde, JP 265 (HKU(M) 3521).

Specimens examined: AUSTRALIA: Northern Queensland, Cape Tribulation, Cow Bay, on dead sheath of *Archontophoenix alexandrae*, 16 Apr 1995, J. E. Taylor, JP 2124 (HKU(M)3625); *ibid.*, on dead petiole, (HKU(M)3628); *ibid.*, on dead rachis, (HKU(M)3631); *ibid.*, (HKU(M)3634); *ibid.*, (HKU(M)3635); Pine Creek, on dead rachis of *Archontophoenix alexandrae*, 17 Apr 1995, J. E. Taylor, JP 2124 (HKU(M)3648); *ibid.*, on dead inflorescence, (HKU(M)3652); *ibid.*, on dead rachis, (HKU(M)3653); *ibid.*, (HKU(M)3655); *ibid.*, (HKU(M)3763); Eubanegee Swamp, on dead petiole of *Archontophoenix alexandrae*, 17 Apr 1995, J. E. Taylor, JP 2124 (HKU(M)3784); Cairns Botanical Gardens, on dead rachis of *Archontophoenix alexandrae*, 17 Apr 1995, J. E. Taylor, JP 2124 (HKU(M)3792); *ibid.*, (HKU(M)3793); *ibid.*, (HKU(M)3834); *ibid.*, on dead petiole, 22 Mar 1994, J. Fröhlich (HKU(M)3808); *ibid.*, (HKU(M)3810); *ibid.*, (HKU(M)3820).

This distinctive species is most similar to *Lasio-sphaeria*, although it can also be compared to *Caudatispora*. The culture characteristics are very similar to those of *Caudatispora* (Huhndorf and Fernández, 1999), especially in the production of the teleomorph after three months. In addition, the shape and color of the ascumata are reminiscent of *Caudatispora*. This species must be recollected, and recultured so that molecular techniques can be used to confirm its true affinities. Presently, it is being retained in *Lasio-sphaeria*. It is most similar to, and can be compared with *L. alexandricola* and *L. chapmanii*, although the ascospores of these species differ in dimensions and morphology. Of the species from other plant substrates, it most closely resembles *L. breviseta* P. Karst. (Hilber and Hilber, 1983). This species produces thick-walled bristles on the peridium, and although the dimensions of the asci [(80–)110–130 \times (8–)10–12.5(–23) μm] and ascospores [(36–)40–46(–50) \times 3.2–4(–4.5) μm] of *L. breviseta* are similar, this species possesses ascospores that become brown and multiseptate (Hilber and Hilber, 1983).

Lasio-sphaeria alexandrae was found abundantly on very wet material in areas where collections were made, throughout the natural range of *Archontophoenix alexandrae*. It appears to be restricted to this host in Australia, as it was absent from collections of other palm material (e.g. *Licuala ramsayi* (F. Muell.) Domin) from the same damp habitats where *A. alexandrae* occurred.



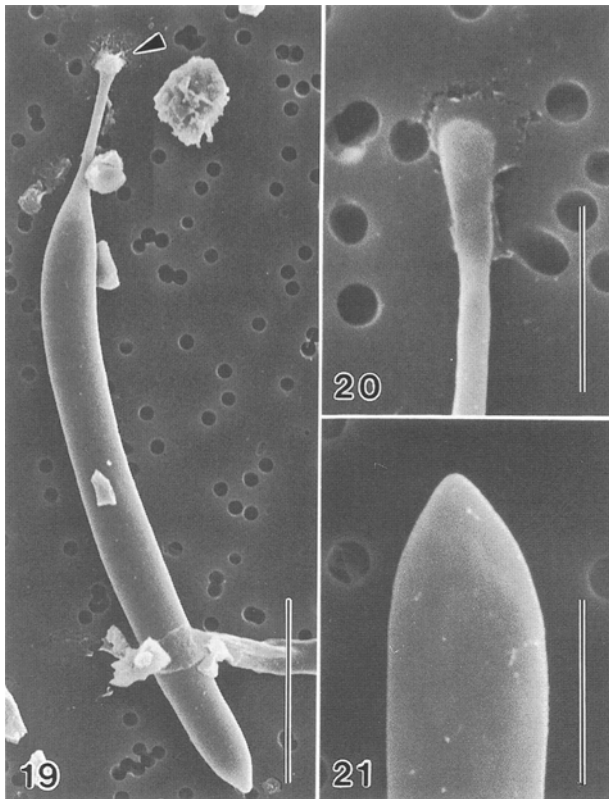
Figs. 8–18. *Laiosphaeria alexandrae*. 8, 9. Ascomata on host substrate. 10. Paraphyses. 11–14. Asci. 15–18. Ascospores showing the acute apex, narrowing abruptly to an extended spur with a blunt spathulate mucilaginous tip (arrowed). Scale bars: 8, 9 = 500 μm ; 10–18 = 10 μm .

Laiosphaeria alexandricola Joa. E. Taylor, J. Fröhl. & K. D. Hyde, sp. nov. Figs. 22–26

Laiosphaeria alexandrae Joa. E. Taylor, J. Fröhl. & K. D. Hyde similis sed ascomata semi-immersa et ascospores 27.5–32.5 \times 2.5–3 μm magnitudine differt.

Ascomata 110–240 μm high \times 240–440 μm diam, semi-immersed beneath 3–4 layers of host cells, erumpent, globose, black, coriaceous, with a central or eccentric papilla, solitary or aggregated (Fig. 22). Peridium 6–24 μm wide, thinner at the base, comprising several layers of dark brown thin-walled compressed cells; upper

peridium comprising thicker-walled cells, becoming melanised towards the periphery. Paraphyses 1.4–2 μm wide, hypha-like, septate, hyaline, tapering slightly distally (Fig. 24). Asci 58–74 \times 8–16 μm , 8-spored, clavate to fusiform, pedicellate, thin-walled, apically rounded, with a refractive apical ring, 2.5–3 μm high \times 1–1.5 μm diam, sub-apical globule not observed (Figs. 23, 24). Ascospores 27.5–32.5 \times 2.5–3 μm , fasciculate, cylindrical 0(–1)-septate, hyaline, straight or slightly curved, apex rounded, base narrowing to a short extended spur with a spathulate mucilaginous tip (Figs. 25, 26).



Figs. 19–21. Scanning electron micrographs of *Lasio-sphaeria alexandrae*. 19. Ascospore with a mucilaginous tip (arrowed). 20. Base of ascospores with a blunt spatulate mucilaginous tip. 21. Acute apex of ascospore. Scale bars: 19 = 10 μm ; 20, 21 = 5 μm .

Etymology: In reference to the palm host *Archontophoenix alexandrae*, on which the type of this species was recorded.

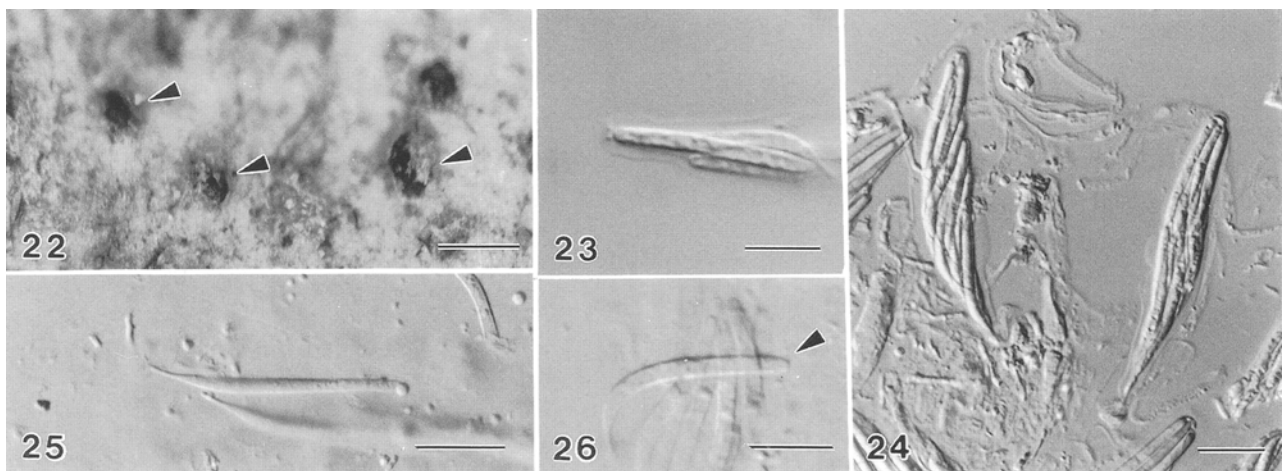
Host substrate: *Archontophoenix alexandrae*.

Known distribution: Hong Kong.

Holotype: HONG KONG: Hong Kong Peak, on dead sheath of *Archontophoenix alexandrae*, 4 Sep 1995, J. E. Taylor, JP 2157 (HKU(M) 3667).

This species of *Lasio-sphaeria* is unusual in that the ascomata are semi-immersed. This character distinguishes it from other species of *Lasio-sphaeria* found on palms. *Lasio-sphaeria chapmanii* possesses ascomata that can develop within old, empty locules of *Myelosperma* Syd. & P. Syd., but these ascomata are superficial within these locules. When considering species with semi-immersed ascomata recorded on other substrates, *L. alexandricola* can be compared to *L. munkii* R. Hilber & O. Hilber (Hilber et al., 1987a). The ascomata of *L. munkii* are similar in size (250–470 \times 350–420 μm), but ultimately become superficial and are characterized by a covering of hairs or bristles, which are lacking in *L. alexandricola*. The ascospores of *L. munkii* are of similar size [(18–)23–32 \times 3.5–4.5(–5.5) μm] and morphology, but the asci are larger (105–115(–125) \times 10–15 μm) (Hilber et al., 1987a). *Lasio-sphaeria immersa* P. Karst. (Hilber and Hilber, 1983) also has semi immersed ascomata. However, the dimensions of the asci [(115–)140–225 \times (12.5–)14–20 μm] and ascospores [(38–)43–51 \times (3.5–)4.2–4.6(–5.7) μm] of *L. immersa* are greater and the ascospores become brown and multiseptate (Hilber and Hilber, 1983).

Lasio-sphaeria alexandricola also resembles *L. alexandrae* in the overall shape of its ascospores and asci. However, the sizes of these structures are very different and the ascomata of *L. alexandrae* are superficial. *Lasio-sphaeria breviseta* has similar shaped ascospores to *L. alexandricola*, but they are generally larger and become brown and multiseptate (Hilber and Hilber, 1983). *Lasio-sphaeria breviseta* also differs in having superficial ascomata, or rarely with the base immersed, and bristles on the peridium (Hilber and Hilber, 1983).



Figs. 22–26. *Lasio-sphaeria alexandricola*. 22. Ascomata semi-immersed in host substrate (arrowed). 23, 24. Asci, with rounded apex and an apical apparatus, and remnants of paraphyses (in 24). 25, 26. Ascospores showing a distinctly rounded apex (arrowed), narrowing at the base to an extended spur with a blunt spatulate mucilaginous tip. Scale bars: 22 = 500 μm ; 23–26 = 10 μm .

Lasiosphaeria chapmanii Joa. E. Taylor, J. Fröhl. & K. D. Hyde, sp. nov. Figs. 27–32

Lasiosphaeria alexandrae Joa. E. Taylor, J. Fröhl. & K. D. Hyde similis sed ascomata immersa locula *Myelosperma* sp. vel superficialia, et ascosporae $45\text{--}57.5 \times 2.5\text{--}3.5 \mu\text{m}$ magnitudine differt.

Ascomata forming superficially on host substrate or beneath slightly raised areas of host epidermis in old, empty locules once filled by an unidentified *Myelosperma* species. Perithecia superficial (when forming within locules, occurring between, but not truly immersed within, layers of host tissue), globose, $100\text{--}150 \mu\text{m}$ high \times $90\text{--}130 \mu\text{m}$ diam, black, and with central, papillate ostioles. Peridium $30\text{--}40 \mu\text{m}$ wide, comprising 3 indistinct strata, an inner layer of thin-walled flattened, hyaline cells, a middle layer of angular brown walled cells and a thin outer layer of large brown thick-walled globose cells. Paraphyses $10\text{--}13 \mu\text{m}$ wide at the base, tapering to $2.5\text{--}3.5 \mu\text{m}$ at the apex, composed of almost globose cells at the base and sometimes with swollen apices, septate, flattened, hyaline, and filamentous, of similar length to

the asci (Fig. 27). Asci $102.5\text{--}132.5 \times 12.5\text{--}15 \mu\text{m}$, 8-spored, cylindrical, unitunicate, with a short pedicel, and a refractive subapical apparatus $0.5\text{--}1.5 \mu\text{m}$ high \times $3\text{--}4 \mu\text{m}$ diam, sub-apical globule not observed (Fig. 27). Ascospores $45\text{--}57.5 \times 2.5\text{--}3.5 \mu\text{m}$, 4–5-seriate, cylindrical, non-septate, hyaline, straight or slightly curved, apex rounded, base narrowing gradually to an extended spur with a spatulate mucilaginous tip (Fig. 28).

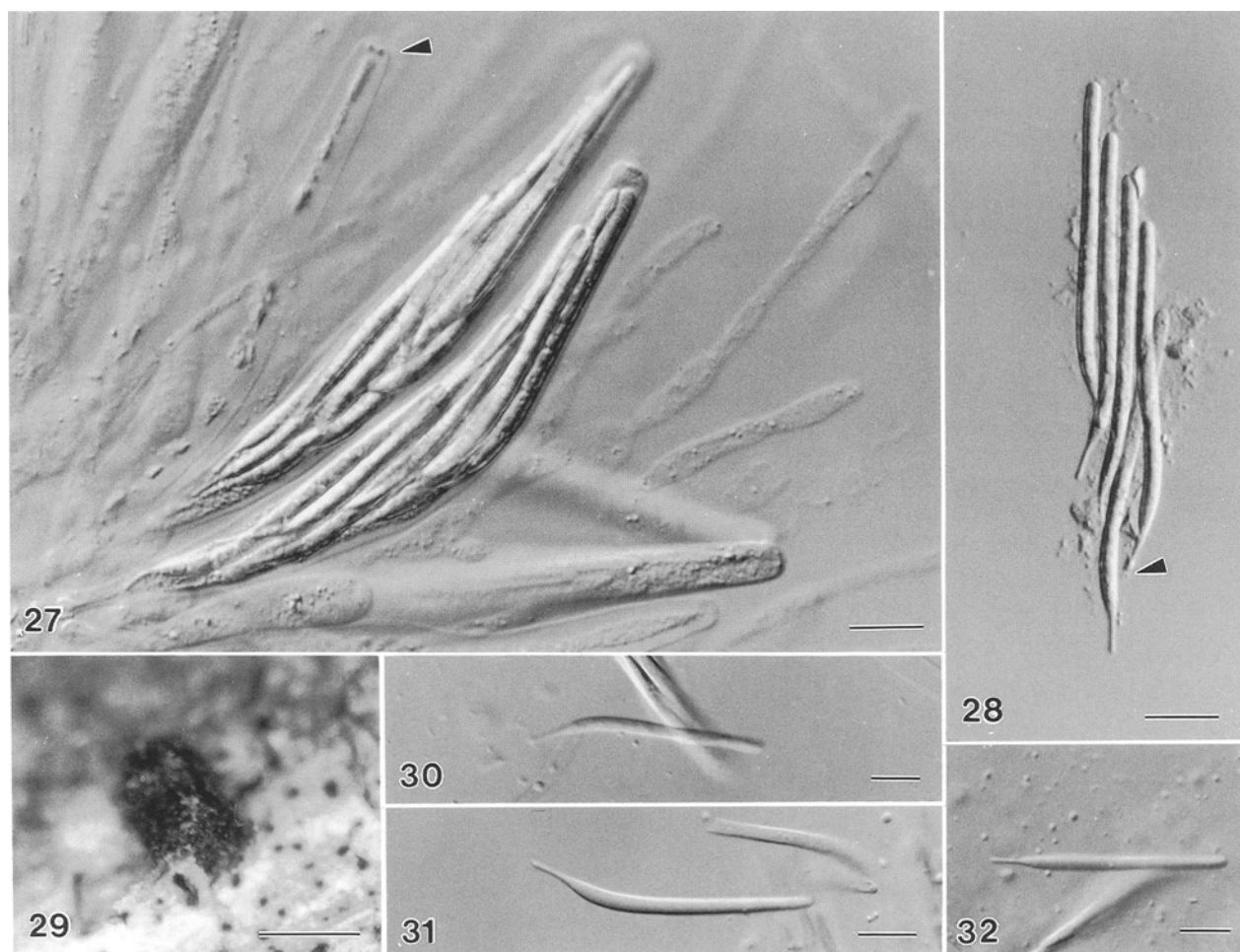
Etymology: In honor of the collector of the type material.

Host species: *Mauritia flexuosa* L. f., *Trachycarpus fortunei* (Hook.) H. Wendl.

Known distribution: Ecuador, China.

Holotype: ECUADOR: Oriente, *Reserva de Produccion Faunistica Cuyabeno* (Cuyabeno Reserve), Rio Grande, forest near the Laguna Grande, Canangucho, Path A, on dead petiole of *Mauritia flexuosa*, Aug 1993, J. A. I. Chapman JF 136 (HKU(M)7867).

Specimens examined: CHINA: Hubei Province, Xuanen County, on a dead petiole of *Trachycarpus fortunei*, 5 Jul 1995, J. E. Taylor, JP 5211 (HKU(M)4101).



Figs. 27–32. *Lasiosphaeria chapmanii*. 27, 28 (HKU(M) 7867) from Ecuador; 29–32 (HKU(M) 4101) from China. 27. Asci and paraphyses. Note the refractive subapical ascal ring (arrowed). 28. Ascospores. Note the basal spur with the spatulate mucilaginous tip (arrowed). 29. Ascomata on host substrate. 30–32. Ascospores showing a rounded apex and a basal spur with the spatulate mucilaginous tip. Scale bars: 29 = $100 \mu\text{m}$; 27, 28, 30–32 = $10 \mu\text{m}$.

The habit of *L. chapmanii* in the type specimen is unusual; the ascomata of *Lasiosphaeria* species usually form superficially on the host surface, not within old ascomata of other Ascomycetes. The locules occupied by the *Lasiosphaeria* were very old and no longer contained *Myelosperma* asci or ascospores. Consequently, it is unlikely that *L. chapmanii* is a mycoparasite.

In the collection on *Trachycarpus* from China (HKU(M) 4101), the asci were similar in size to the type specimen of *L. chapmanii* (84–120 × 10–17 µm), as were the apical apparatus (1.6–2 × 3–4 µm), but ascospores were generally larger (54–66 × 3–4 µm) (Figs. 30–32). The ascomata were 86–114 µm high × 86–109 µm diam (Fig. 29), with brown hairs on the outer peridium wall. It is noted that there was a great geographic distance between the areas where the two collections were made, and the hosts are distantly related (occurring in different subfamilies). However, until further collections can be made, we do not consider the variations in the two collections significant enough to warrant the erection of two new species.

Lasiosphaeria chapmanii superficially resembles the other two *Lasiosphaeria* species described from palms, *L. alexandrae* and *L. alexandricola*, but differ for the aforementioned reasons.

The most similar *Lasiosphaeria* species on other plant substrates are *L. breviseta*, *L. munkii* and *L. foliicola* R. Hilber & O. Hilber (Hilber et al., 1987a). *Lasiosphaeria breviseta* differs in the septation and coloration of mature ascospores, despite having similar-sized asci and ascospores (Hilber and Hilber, 1983), and also in the size of the ascomata (310–570 µm high × 230–420 µm diam). *Lasiosphaeria munkii* has morphologically similar, but smaller asci and ascospores (Hilber et al., 1987a). In *L. foliicola* the ascomata are considerably larger (600 µm high × 300–400 µm diam), but do possess a covering of brown hairs (Hilber et al., 1987a). The asci are larger (135–175 × 12.4–19.5 µm) and the ascospores overall smaller (40–45(–48) × 3.7–4.6 µm) and possess a long spiny basal tip (Hilber et al., 1987a).

Doubtful and excluded species

Lasiosphaeria nematospora Linder, Ann. Miss. Bot. Gard. 16: 290, 1929.

Holotype: BRITISH GUYANA: Demerara, Plantation Vryheid, on sheath of manicole palm, 2 Feb 1924, D. H. Linder #881 (FH).

In this species interascal tissue comprises sheet-like pseudoparaphyses in a gelatinous matrix, asci are bitunicate, and ascospores are long fusiform. The fungus is a *Tubeufia* Penz. & Sacc. (K. D. Hyde, pers. obs.).

Lasiosphaeria rufula (Penz. & Sacc.) Rossman, Mycologia 69: 375, 1977.

≡ *Ophionectria trichospora* (Berk. & Broome) Sacc., var. *rufula* Penz. & Sacc., Malpighia 11: 516, 1897.

Holotype: INDONESIA: Java, Bogor, Botanical Gardens, on rotting spathe of palm, Penzig 778 (PAD) —non vidi.

Lasiosphaeria rufula differs from all other species of *Lasiosphaeria*, including those recorded here from palms, due to the length of its ascospores (Rossman, 1977). Ascomata in this species are dark reddish-brown, asci are unitunicate and have a distinct apical ring, and ascospores are vermiform and hyaline (Rossman, 1977). Ascospores were reported as 130 × 6 µm (Penzig and Saccardo, 1897). Type material is presently not available from PAD for examination, but the length of the ascospores indicates that it should probably not be included in *Lasiosphaeria*.

Cercophora subambigua (Höhn.) Hanlin & Tortolero, Mycotaxon 30: 411, 1987.

≡ *Lasiosphaeria subambigua* Höhn., Denk. K. Ak. Wiss. Wien: 83, 1907.

Holotype: BRAZIL: Sao Paulo, "Alto da Serra prope Santos", on rotten palm stem together with *Lasiosphaeria ovina*, No. 3069 (FH).

Ascomata in this species are 420–560 µm high × 280–350 µm diam, superficial, black, pyreniform, papillate and covered in black setae. A small number of ascomata were dissected and only immature asci could be found. These were cylindrical, unitunicate and truncate with a refractive ring. Spores were immature and 2–3-seriate, and paraphyses were numerous, septate and tapering distally. In a diagram with the type material provided by Höhnelt, the mature ascospores were drawn with a large blackened cell and a cylindrical hyaline appendage typical of *Cercophora* species. Hanlin and Tortolero (1987) transferred this species to *Cercophora* and provide a description and illustrations of the species.

Lasiosphaeria tephrocoma (Berk. & Broome) Sacc., Sacc. Syll. 2: 198, 1883.

≡ *Sphaeria tephrocoma* Berk. & Broome, J. Linn. Soc. 14: 126, 1875.

Holotype: SRI LANKA: on palm petiole, Nov 1867, Herb Berk 1879, (K).

This is not a *Lasiosphaeria*. Several fungi occur on the single sample and one is somewhat characteristic of the taxon described by Saccardo (1883). This has small ascospores which are 12–16 × 5–6 µm, ellipsoidal, (1–)3 septate, yellow and lack a sheath. Asci are cylindrical with a refractive subapical ring and the taxon may be more closely allied with *Phomatospora* or *Iodosphaeria*.

Acknowledgements—This work is part of the theses submitted by J. E. Taylor and J. Fröhlich to The University of Hong Kong in partial fulfilment of the requirements for the degree of Doctor of Philosophy. The research was supported by a studentship provided by The University of Hong Kong. We would like to thank all those individuals or institutions which were involved with this paper, including Miss Huang Yungping at the Forestry Department, Hubei Institute for Nationalities, Enshi, Hubei, P. R. China; The Department of Primary Industries and Northern Australian Quarantine Inspection Service for funding part of this research; and to all those involved in the British Mycological Society expedition to Ecuador. The herbariums FH and K are thanked for the loans of material. Helen Leung is

gratefully acknowledged for her technical assistance, as is A. Y. P. Lee for his photographic assistance.

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