Fungi from palms. VI.[1] Reflections on *Oxydothis* and related genera

K. D. Hyde

Department of Botany, University of Hong Kong, Pokfulam Road, Hong Kong

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Ceriospora, *Ceriosporella*, *Frondispora* gen. nov., *Leiosphaerella*, *Oxydothis* and related genera from palms are examined and their differences highlighted. The type species of each genus is diagnosed and species included in *Leiosphaerella*, *Ceriospora* and *Ceriosporella* from palms are discussed.

Keywords: *Ceriospora*, *Ceriosporella*, *Frondispora*, *Lasiobertia*, *Leiosphaerella*, *Linocarpon*, *Oxydothis*, *Pemphidium*, palm fungi.

Fallen palm rachides and leaves are invariably colonised by fungi of the genera *Astrosphaeriella* Syd. & P. Syd., *Linocarpon* Syd. & P. Syd., *Oxydothis* Penz. & Sacc. and *Phomatospora* Sacc. (Hyde, 1988, 1992, 1993; Hyde & Nakagiri, 1989; Hyde, personal observation). The genus *Oxydothis* is closely related to *Leiosphaerella* Höhnel and *Ceriospora* Niessl and there is considerable confusion about the differences between these genera (Samuels & Rossman, 1987; Müller & von Arx, 1962). The purpose of this paper is to examine the type species of each of these genera and to clarify their differences. The common palm genera *Linocarpon* and *Pemphidium* and the generic synonyms of *Oxydothis* are included, and species of *Leiosphaerella*, *Ceriospora* and *Ceriosporella* from palms are also examined for completeness. Melzer's reagent is used for the blue staining reaction of the ascus apex.

Taxonomy

Ceriospora Niessl, Verh. Naturf. Ver. Brünn 14: 169. 1876.

Type species. – *Ceriospora dubyi* Niessl.

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[1] V in Sydowia 45: 199–203.

Ascomata immersed, globose, subglobose or conical, some with flattened bases, ostiolate, appearing on the host surface as a blackened papilla, or sometimes superficial, mostly single or occasionally in small linear groups. – Peridium comprising 3–5 layers of light–brown brick–shaped cells. – Paraphyses hypha–like, filamentous, septate and hyaline. – Asci 8–spored, cylindric–clavate, thin–walled, unitunicate, short pedunculate, apically rounded, with a J+, apical, plug–like ring. – Ascospores 2–3–seriate, fusiform, hyaline, with a central septum, tapering towards both ends, with spine–like appendages.

Ceriospora is distinct from the palm inhabiting genus *Oxydothis*. Asci in the former are cylindric–clavate compared with long–cylindrical in *Oxydothis*. Furthermore in *Oxydothis* the ascus apex is often truncate, while the blue–staining apical apparatus is distinctly subapical (Figs. 48, 49). In *Ceriospora* the ascus apex is broadly rounded and the blue–staining apical apparatus is distinctly apical and plug–like (Figs. 4, 6). In *Oxydothis* the ascomata usually occur under a darkened clypeus and are often, but not always, horizontal to the host surface. In *Ceriospora* the ascomata are vertical to the host surface and lack a clypeus.

Ceriospora has greater affinity with *Leiosphaerella*, the type of which has a minute clypeus, cylindric–clavate asci and ascomata whose axis is vertical to the host surface. However, the type of *Leiosphaerella, L. praeclara* (Rehm) Höhnel differs from *Ceriospora dubyi* as the ring in *Leiosphaerella* is subapical and ascospores lack appendages. At this stage I feel these differences are great enough to warrant two separate genera.

Ceriospora dubyi Niessl, Verh. Naturf. Ver. Brünn. 14: 169. 1876. – Figs. 1–6.

≡ *Sphaeria ceriospora* Duby ap. Klotzsch–Rbh, Herb Mycol. 1937. 1850.
≡ *Sphaerella ceriospora* (Duby) Cesati et De Not, Schema Sfer. Ital. 63. 1863.
≡ *Hendersonia ceriospora* Schröt. ap. Cohn, Krypt. Fl. Schlesiens 3: 393. 1897.

Ascomata 105–195 µm high, 165–285 µm diam, immersed or superficial (perhaps by shedding of the epidermis), globose, subglobose or conical, some with flattened bases (Fig. 1), appearing on the host surface as a raised blackened papilla, or superficial, mostly single, occasionally in small linear groups. – Peridium ca 20 µm thick comprising 3–5 layers of light–brown brick–shaped cells (Fig. 2). – Paraphyses up to 6 µm diam, hypha–like, filamentous, septate, hyaline, hard to locate in dried specimens. – Asci 90–120 x 18–20 µm, 8–spored, cylindric–clavate, thin–walled, unitunicate, short pedunculate,

apically rounded, with a J+, apical, plug-like ring, 4–5 µm diam, 1.2–1.6 µm high (Figs. 4–6). – Ascospores 30–38 x 7.5–10 µm excluding appendages (length 42–59 x 7.5–10 µm including appendages), 2–3-seriate, fusiform, with a central septum, slightly constricted at the septum, hyaline, straight or some curved, tapering towards both ends, with spine-like appendages (Fig. 3).

Material examined. – Switzerland, near Geneva, in stems of *Humulus lupulus* L., Duby, 1850 (STR, Holotype).

Ceriospora arecae Menon, Arecanut Journal 10: 3. 1960.

Ceriospora arecae Menon was described from India by Menon (1960) associated with yellow leaf disease of *Areca catechu* L. However, no holotype was designated nor was any location of type material indicated. The name has thus not been validly published under article 37 of the International Code of Botanical Nomenclature. From illustrations provided by Menon (1960), the fungus is almost certainly an *Oxydothis* species.

Ceriospora bicalcarata (Cesati) Sacc., Sylloge Fungorum 2: 186. 1883.

See under *Ceriosporella* Berlese and *Frondispora* Hyde.

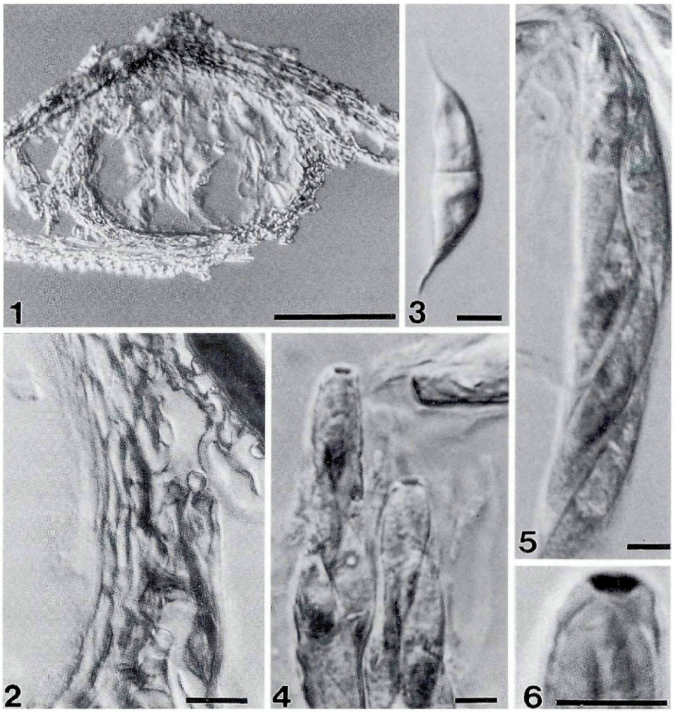
Ceriospora palmicola (Bat. & Maia) Müller, Beiträge zur Kryptogamenflora der Schweiz 11: 677. 1962.

= *Microcyclephaeria palmicola* Batista & Maia, Revista de Biologia 1:301. 1958.

Despite lengthy efforts it has not been possible to obtain the holotype of *Microcyclephaeria palmicola*. This species is involved in a nomenclature tangle and the name is illegitimate (Ponnappa & Shaw, 1978). Although this species was considered to be a *Ceriospora* by Müller & von Arx (1962), it is more likely that it belongs in *Oxydothis*. See section on *Microcyclephaeria*.

Ceriosporella Berlese, Icones Fungorum 1:121. 1894.

Ceriosporella Berlese (1894) was established for two species, *C. patouillardii* (Let.) Berlese (formerly *Ceriospora patouillardii* Let. ap. Pat., Tab. Anal. Fung. 5, 492. 1886) and *C. bicalcarata* (Cesati) Berlese. Characteristics included fusiform, septate ascospores with polar se-



Figs. 1–6. – Interference contrast micrographs of *Ceriospora dubyi*. – 1. Vertical section of ascoma. – 2. Peridium comprising 3–5 layers of light-brown brick-shaped cells. – 3. Ascospore. – 4–6. Asci with J+, apical, plug-like ring. – Bars: 1 = 100 µm; 2 – 6 =10 µm.

tae, clavate 8-spored asci and papillate ascomata immersed under the host epidermis (Berlese, 1894), both species having uniseptate ascospores. Although Berlese (1894) lists *C. patouillardii* first, he did not designate a holotype. Saccardo (1905) in excepting *Ceriosporella*, also did not designate a lectotype, while Clements & Shear (1931) designated *C. patouillardii* as the lectotype of *Ceriosporella*. Müller & von Arx (1962) synonymised *Ceriosporella patouillardii* with *Lophiosphaera ulicis* (Pat.) Müller and *Ceriosporella* with *Lophiosphaera* Trev. *Ceriosporella bicalcarata* was also retained as *Ceriospora bicalcarata* (Cesati) Sacc. by these authors. Later von Arx & Müller (1975) placed

Lophiosphaera in *Lophiostoma*, Cesati & De Not., so *Ceriosporella* was also synonymised here. These changes were apparently accepted as *Ceriosporella* Berlese is listed as a synonym of *Lophiostoma* in Hawksworth & al. (1983) and Eriksson & Hawksworth (1991).

Ceriosporella Cavalier (1966) was established to include two marine fungi, *C. calyptrata* (Kohlm.) Cavaliere and *C. longissima* (Kohlm.) Cavaliere. However, as this name is a later hononym of that used by Berlese (1894), it is invalid. Both species are united as *Cerios-poropsis calyptrata* Kohlm. (Kohlmeyer & Kohlmeyer, 1979).

Frondispora K. D. Hyde, gen. nov.

Type species. – *Frondispora bicalcarata* (Cesati) K. D. Hyde.

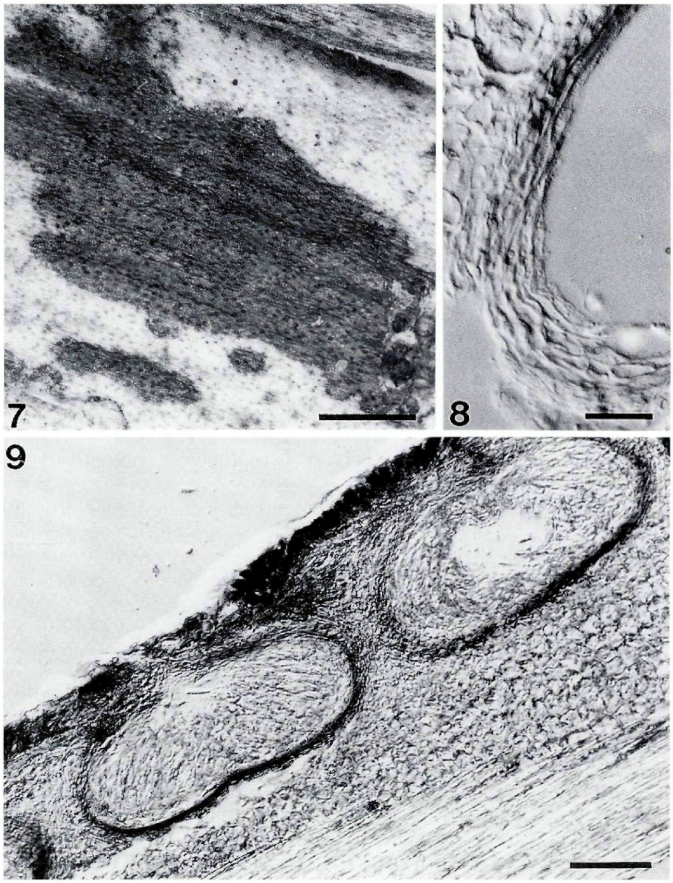
Ascomata immersa, stromata subglobosa, ostiolata, solitaria vel gregaria. Asci 8–spori, cylindracei vel clavati, unitunicati, ad apicem rotundati, apparato apicali praediti. Ascosporae 2–3–seriatae, fusiformes, hyalinae, 1–2–septatae, appendicibus spinosis apicalis praeditae.

Ascomata immersed under darkened blotches on the host surface; in section subglobose, stromatic, ostiolate and gregarious. – Stromata in epidermal layer, comprising host cells and brown fungal hyphae. – Peridium comprising hyaline or brown elongate cells. Palisade–like cells fill the area between ascomata. – Asci 8–spored, cylindric–clavate, unitunicate, apically rounded, with J– apical ring. – Ascospores 2–3–seriate, fusiform, hyaline, uniseptate, tapering at both ends to spine–like appendages (setae).

Frondispora bicalcarata (Cesati) Hyde, comb. nov. – Figs. 7–16.

≡ *Ceriosporella bicalcarata* (Cesati) Berlese, Icones Fungorum 1: 121. 1894.
≡ *Ceriospora bicalcarata* (Cesati) Sacc., Sylloge Fungorum 2: 186. 1883.
≡ *Sphaerella bicalcarata* Cesati, Hedwigia 11: 181. 1872.
≡ *Diaporthe bicalcarata* (Cesati) Niessl., Verh. Naturf. Ver. Brunn 14: 169. 1876.

Ascomata under weakly raised darkened blotches on the host surface (Fig. 7), in section to 390 µm diam, 200 µm high, subglobose, immersed, solitary or gregarious, stromatic, stromata covering 1–several ascomata (Fig. 9). – Ostiole central, in a minute crater–like area on host surface. – Stromata in epidermal cell layer only comprising host cells filled with brown interwoven hyphae (Fig. 9). – Peridium ca 15 µm wide, comprising several layers of hyaline or brown thin–walled elongate cells, dark–brown near the outside (Figs. 8, 10). Between ascomata are vertically orientated, hyaline, angular, elongate cells (Fig. 10). – Paraphyses embedded in a gel, hypha-like and filamentous. – Asci 85–140 x 14–16 µm, 8–spored, cylindric-



Figs. 7–9. – *Frondispora bicalcarata*. – 7. Dark stromata on host surface. – 8. Peridium comprising several layers of hyaline thin-walled elongate cells. – 9. Vertical section through ascomata. – Bars: 7 = 1 mm; 8 = 10 µm; 9 = 100 µm.

clavate, thin-walled, unitunicate, short pedunculate, apically rounded, with a J–, ring-like apical apparatus (Figs. 11, 12). – Ascospores 30–39 x 5–7 µm (length 48–65 µm inclusive of spines), 2–3–seriate, fusiform, hyaline, in mature specimens with a central septum, not constricted at the septum, tapering at both ends to spine-like appendages (Figs. 13–16).

Material examined. – Italy, Horto Botanico Neopolitani, in rachis of *Chamaerops humilis*, 1872, Rabenhorst, Fungi Europaei 1561 (K, holotype); Horto Botanico Pisae, on *Chamaerops humilis*, Oct 1881, Mori (RO).

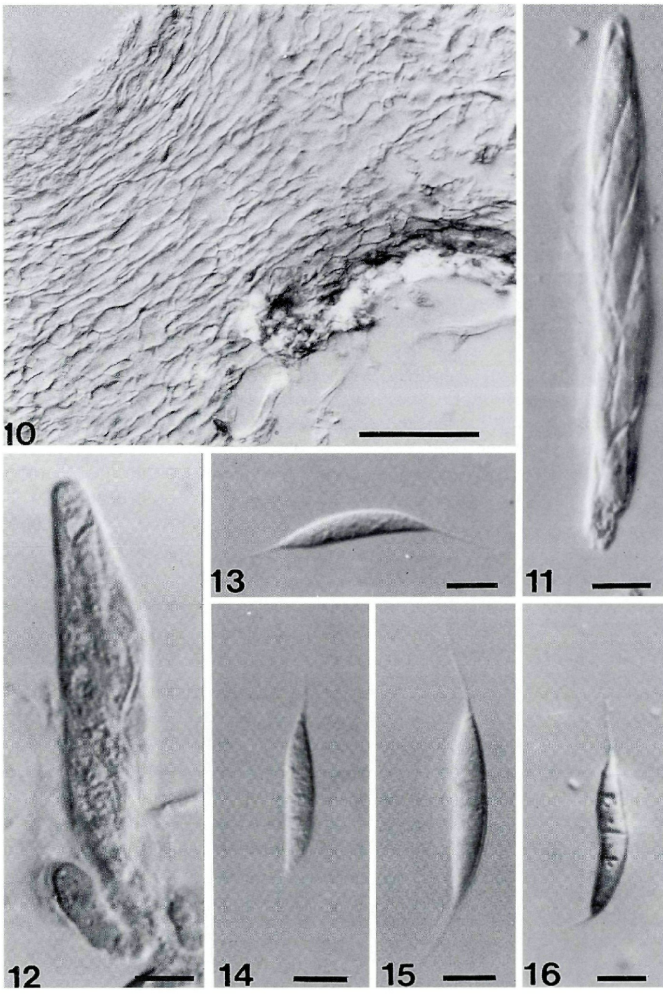
Ceriosporella bicalcarata cannot be used as the lectotype of *Ceriosporella*, since *C. patouillardii* was proposed as lectotype (Clements & Shear, 1937), and the genus subsequently synonymised with *Lophiostoma* (von Arx & Müller, 1975). Therefore, a new genus *Frondispora* is erected to accommodate *Ceriosporella bicalcarata*, which cannot be placed elsewhere.

Frondispora bicalcarata is similar to *Ceriospora dubyi* in ascospore form, ascus structure, and orientation of the ascomata. However, there are important differences which warrant separation at the generic level. Unlike ascomata of *Ceriospora dubyi*, those of *Frondispora bicalcarata* form under a dark–brown stroma and the peridium comprises several layers of thin–walled cells. Asci of *Frondispora* lack a blue staining apical apparatus and vertically oriented, elongate, angular cells fill the area between ascomata. In the description given above, ascus measurements are approximate since it was not possible to separate intact asci from the preserved material. Paraphyses were also poorly preserved. *Frondispora bicalcarata* cannot be included in *Oxydothis*. The asci are not long–cylindrical as in other *Oxydothis* species and the ring is non–amyloid.

Lasiobertia Sivanesan, Trans. Br. Mycol. Soc. 70: 383. 1978.

Type species. – *Lasiobertia africana* Sivanesan.

Ascomata superficial, globose with a conical apex, uniloculate, tuberculate, dark–brown to black, single or aggregated. – Peridium comprising 4–5 layers of thick–walled, dark–brown globose large outer cells, and 3–4 layers of thinner, smaller and paler inner cells, at the base comprising thick–walled brown vertically orientated palisade–like cells. – Paraphyses hypha–like, filamentous, numerous, septate and hyaline. – Asci 8–spored, cylindrical, pedunculate, unitunicate, apically rounded with a J+ discoid subapical ring and faint canal leading to the tip. – Ascospores 1–2 seriate, fusiform,



Figs. 10–16. – Interference contrast micrographs (except 20) of *Frondispora bicalcarata*. – 10. Palisade-like cells between ascomata. – 11, 12. Asci. 13 – 16. Ascospoes with apical setae. – Bars = 10 µm.

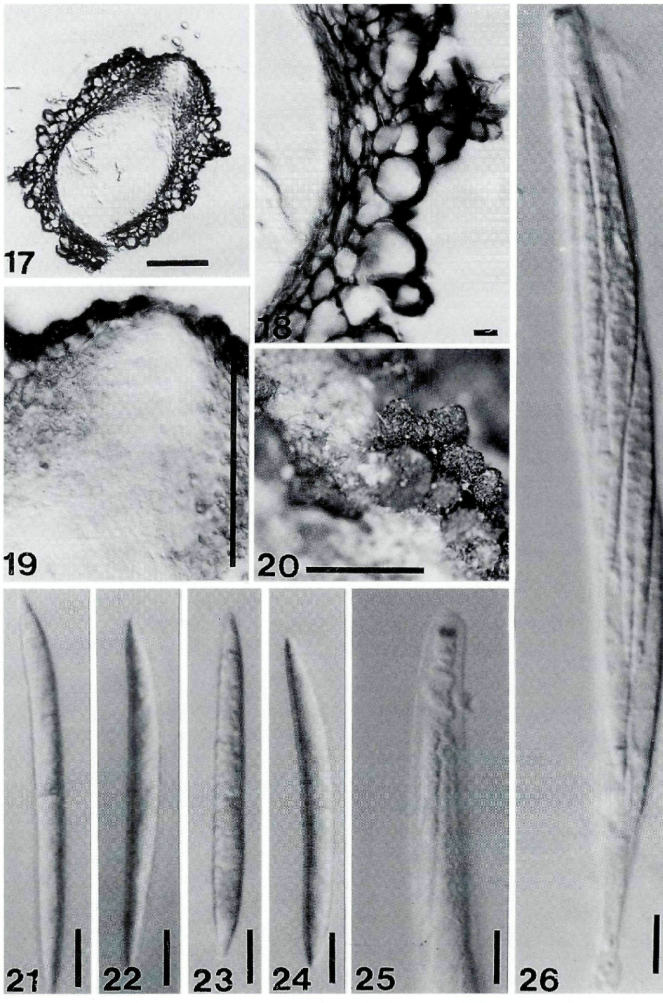
hyaline, straight or slightly curved, septate in the middle and gradually tapering to pointed processes.

Lasiobertia africana Sivanesan, Trans. Br. Mycol. Soc. 70: 383. 1978. – Figs. 17–26.

Ascomata 340–510 µm high, 250–370 µm diam, dark–brown to black, coarsely tuberculate, uniloculate, ostiolate, immersed, becoming erumpent by shedding of the host epidermis or some apparently always superficial, but with basal region of the sterile stalk partly embedded in a thin subiculum of richly branched, anastomosing, thick–walled, brown hyphae, solitary or clustered (Figs. 17, 20). The basal sterile stalk 100–140 µm high, 180–230 µm diam, composed of vertically arranged, thick–walled, brown angular palisade–like cells. – Peridium 45–48 µm thick, comprising 4–5 layers of thick–walled, dark–brown, globose, large, up to 21 µm wide, outer cells and 3–4 layers of thinner, smaller and paler inner cells (Fig. 18). – Paraphyses hypha–like, filamentous, numerous, septate and hyaline. – Asci 140–175 x 9–11 µm, 8–spored, cylindrical, unitunicate, apically rounded, with a J+, discoid, subapical ring, 3 µm diam, 2 µm high, with a faint canal leading to the tip (Figs. 25, 26). – Ascospores 55–74 x 4. 5–6 µm, 1–2 seriate, fusiform, hyaline, septate in the middle and tapering gradually to pointed processes (Figs. 21–24).

Holotype. – Ghana, Bunsu, in indet. palm stem, 7 June 1949, S. J. Hughes, (IMI 38816).

This taxon from palms has ascospores, asci and paraphyses characteristic of the genus *Oxydothis*, while ascomata form under the host which sloughs off, resulting in superficial ascomata. The taxon is obviously closely related to *Oxydothis*, but differs in 1) the basal stalk with vertical rows of cells, 2) lack of periphysate ostiole (Fig. 19) and 3) tuberculate covering of ascomata (Figs. 17, 18, 20). The nature of the ostiole is confusing as the ascomata are reported to be non–ostiolate by Sivanesan (1978). In the dried material the apex was clearly beaked, due to the inward collapse of the dried walls and in some specimens there was a clear ostiole. Sivanesan (1978) reports that in fresh material the apex is not visible externally due to the wall tuberculations, but in median vertical sections can be seen as a small region filled with thin–walled hyaline cells which presumably break open at the apex to discharge asci and ascospores (Fig. 19). *Lasiobertia* is retained as a monotypic genus closely related to *Oxydothis*. A hyphomycete similar to the genus *Melanographium* was found in association with the ascomycete (Sivanesan 1978). However, this did



Figs. 17–26. – Interference contrast micrographs (except 20) of *Lasiobertia africana*. – 17. Vertical sections of ascoma. – 18. Peridium. – 19. Ostiole. – 20. Superficial ascomata. – 21-24. Ascospores. – 25, 26. Asci with J+ subapical ring. – Bars: 17= 100 µm; 18, 19, 21–26 = 10 µm; 20 = 1 mm.

not form in culture and it is not known whether or not it is the anamorph of *Lasiobertia*.

Leiosphaerella Höhnel, Sitzungsber. K. Ak. Wiss. Wien, math. –nat. Kl., 128: 579. 1919.

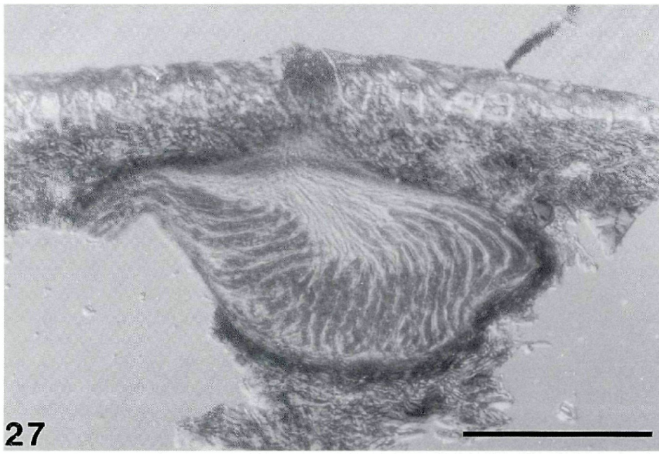
Type species. – *Leiosphaerella praeclara* (Rehm) Höhnel.

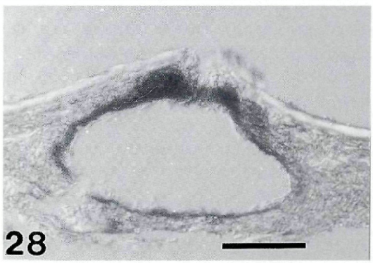
Ascomata immersed, becoming weakly erumpent, ostiolate, papillate, clypeate, lenticular or rounded, or some with flattened bases, appearing as a raised area on the host surface, mostly single or in groups of 2 or 3. – Peridium thin, comprising several layers of hyaline flattened cells. – Paraphyses embedded in a gel, numerous, hypha–like, filamentous, septate. – Asci 8–spored, cylindric–clavate, thin–walled, unitunicate, short pedunculate, apically rounded, with a J+, subapical, discoid ring. – Ascospores triseriate, fusiform, hyaline, with a central septum, weakly tapering to a rounded apex at both ends, without appendages.

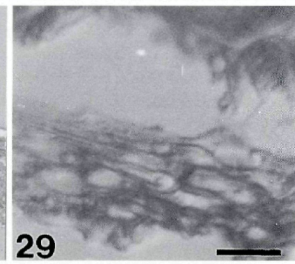
Leiosphaerella praeclara (Rehm) Höhnel, Sitzungsber. K. Ak. Wiss. Wien, Math–nat. Kl., 128: 579. 1919. – Figs. 27–38.

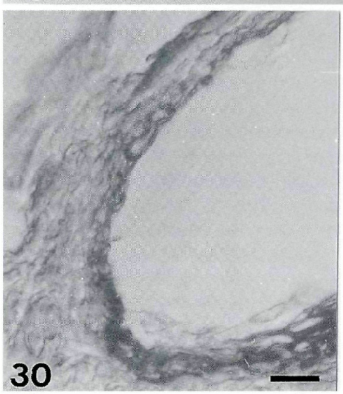
≡ *Didymella praeclara* Rehm – Ann. Mycol. 4: 39. 1906.

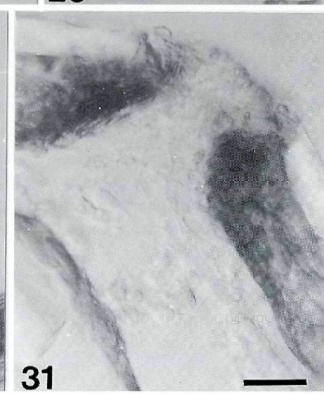
Ascomata 50–100 µm high, 195–240 µm diam, immersed, becoming weakly erumpent, ostiolate, papillate, clypeate, with papilla pushing through host surface, in section lenticular or rounded, or some with flattened bases, appearing as a raised area on the host surface, with a central blackened raised papilla, mostly single or occasionally in groups of 2 or 3 (Figs. 27, 28). – Peridium 10–20 µm thick, at the base and sides comprised of 4–6 layers of brown, thick–walled, weakly flattened (brick–shaped) cells (Figs. 29, 30), while above near the ostiole are several layers of hyaline flattened cells. – Neck ca 240 µm diam, central, short, brown or black, piercing host surface and surrounded by a small clypeus (Figs. 28, 31). – Paraphyses up to 5 µm diam, embedded in a gel, numerous, persistent, hypha–like, septate, amongst and fusing with periphyses in the neck. – Asci 80–100 x 10–14 µm (= 89.75 x 12.25 µm, n = 15), cylindric–clavate, thin–walled, unitunicate, short pedunculate, apically rounded, with a J+, subapical, discoid ring, 2.8 – 3.2 µm diam, 0.8 –1.2 µm high (Figs. 32–34). – Ascospores 34–40 x 4.5–6 µm (= 37.5 x 5.3 µm, n = 15), triseriate, fusiform, hyaline, with a central septum, not constricted at the septum, weakly tapering to a round apex at both ends, straight or some curved, some ends curved in opposite directions, without appendages (Figs. 35–38).











Figs. 27–31. – Interference contrast micrographs of *Leiosphaerella praeclara*. – 27, 28. Vertical sections of ascomata. – 29, 30. Peridium. – 31. Ostiole and clypeus. – Bars: 27, 28 = 100 µm; 29–31 = 10 µm.

Material examined. – Germany, Königstein, on twigs of *Vaccinium myrtillus* L., July 1902, W. Krieger, Rehm (S, Holotype).

Leiosphaerella praeclara occurs on *Vaccinium myrtillus* (Ericaceae) twigs in Europe where the host is common in hilly districts (Other members of *Vaccinium* are found in tropical forests). The ascomata develop in the cortex beneath the epidermis of twigs, but not in the xylem tissue.

Leiosphaerella was thought to be similar to *Oxydothis* by Samuels & Rossman (1987), who concluded that the only difference between the two genera was the orientation of the ascomata. They transferred *Metasphaeria cocoës* Petch to *Leiosphaerella*, which in most aspects was also similar to *Oxydothis*. In *L. cocoës* the axis of the ascomata is vertical to the host surface, but the asci differ quite markedly from those of *L. praeclara*. *Metasphaeria cocoës* is better placed in the genus *Oxydothis*. *Leiosphaerella livistonae* Hino & Katumoto in Katumoto (1966) described from *Livistona subglobosa* Mart. is also better placed in *Oxydothis*.

The main differences between *Leiosphaerella* and *Oxydothis* lie in the nature of the ascus. In *Leiosphaerella* this is cylindric–clavate (Figs. 32, 33) with a subapical discoid ring (Fig. 34). In *Oxydothis*, asci are long–cylindrical, while the ring is subapical, some distance from the ascus tip with a faint canal–like structure to the tip (Figs. 44, 48, 49). The ascospores in *Leiosphaerella* are ellipsoidal to fusiform (Figs. 35–38), while in *Oxydothis* they are cylindrical or filiform and mostly with pointed apical processes (Figs. 45–47). *Oxydothis* is found mostly on palms in the tropics. Differences between *Leiosphaerella* and *Ceriospora* are discussed under *Ceriospora*.

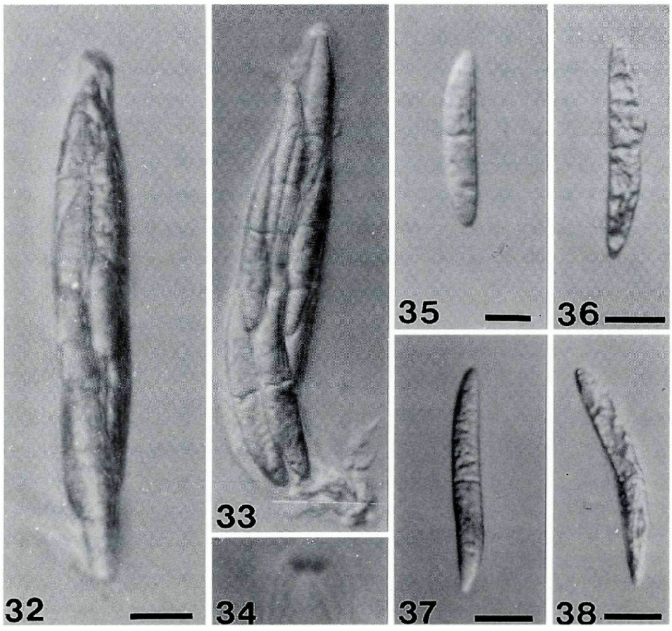
Linocarpon Syd. & P. Syd., Ann. Mycol. 15: 210. 1917.

Type species. – *L. pandani* (Syd. & P. Syd.) Syd. & P. Syd.

This genus is one of the most common colonisers of dead palm material and has recently been reviewed by Hyde (1992). The genus is superficially similar to *Pemphidium* and differences are discussed by Hyde (1993). *Linocarpon* is included in Tab. 1 for comparison with other palm inhabiting genera.

Merrilliopeltis Henn., Hedwigia 47: 261. 1908.

Merrilliopeltis Henn. was erected for *M. calami* Henn., a saprophyte on trunks of *Calamus* sp. in the Philippines (Hennings, 1908). The genus was synonymised with *Oxydothis* by Müller & von Arx



Figs. 32–38. – Interference contrast micrographs of *Leiosphaerella praeclara*. – 32, 33. Asci. – 34. Ascus tip with J+, subapical, discoid ring. – 35-38. Ascospores. – Bars = 10 µm.

(1962). I have examined type material of *M. calami* which contains a mixture of three fungal specimens on three separate palm samples. However, one specimen is an *Oxydothis* and agrees well with the description of *M. calami* of Hennings. *Merrilliopeltis* is therefore retained in *Oxydothis*.

Material examined. – Philippines, Mindoro, Mt Halcon, on trunk of *Calamus* sp., Nov. 1906, E. D. Merrill 6113(L, Holotype of *Merrilliopeltis calami*).

Microcyclephaeria Batista, Revista de Biologia, Lisboa. 1: 301. 1958.

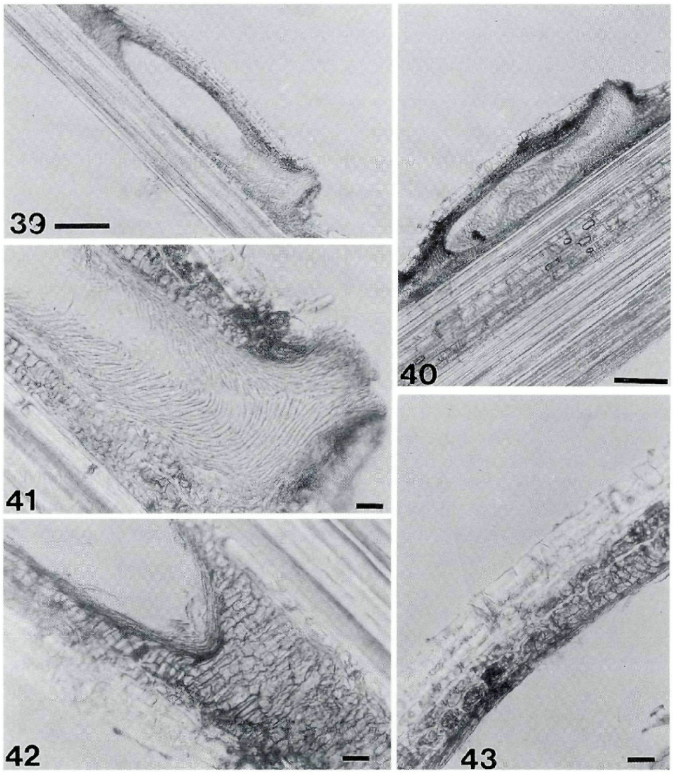
Microcyclephaeria Batista typified by *Microcyclephaeria palmicola* (Syd.) Batista & Maia is a nomenclatural tangle (Ponnappa & Shaw, 1978). Sydow (1937) discovered an ascomycete on a portion of a

dead rachis of *Livistona australis* collected by L. Fraser (no. 62) in New South Wales and named the taxon *Diatrypella palmicola* Syd. Later, Batista (1958), while examining another portion of Fraser's collection of *L. australis*, found a separate ascomycete, which he assigned to the monotypic genus *Microcyclephaeria*, misnaming the taxon *M. palmicola* (Syd.) Batista & Maia. Müller (Müller & von Arx, 1962) also erred in naming *Ceriospora palmicola* (Batista & Maia) Müller, comb. nov. and citing *Microcyclephaeria palmicola* Batista & Maia as a synonym. The latter binomial is illegitimate as a later homonym of *M. palmicola* (Syd.) Batista & Maia, which, in turn is an obligate synonym of its basionym, *Diatrypella palmicola* Syd. and consequently, there is no name available for the fungus described by Batista & Maia (Ponnappa & Shaw, 1978). Although Batista & Maia (Batista, 1958) described the asci as "2–tunicados", Müller obviously considered the taxon to belong in *Ceriospora* (Müller & von Arx, 1962). Hawksworth *et al.* (1983) list *Microcyclephaeria* as a doubtful genus of the Dothideales, while Eriksson & Hawksworth (1991) include the genus as a unitunicate ascomycete of uncertain position. Despite considerable efforts, I have been unable to trace material of *Microcyclephaeria*. The illustrations of Batista & Maia (Batista, 1958) appear to illustrate an *Oxydothis* species, but without seeing original material it would be premature to make further judgement.

Oxydothis Penz. & Sacc., Malpighia 11: 505. 1987.

Type species. – *Oxydothis grisea* Penz. & Sacc.

Ascomata occur as weakly raised light or darkened discs, or form under raised blistered areas, singly or in groups (Figs. 39, 40), cylindrical in section, with long horizontal axis parallel, oblique or vertical to the host surface (Figs. 39, 40), with a periphysate ostiolar canal at one end curving upwards and piercing the host cuticle (Figs. 39–41), or vertical, occasionally beaked, often within dark stromatic tissue. – Peridium thin, of flattened brown thin–walled cells (Fig. 42). – Stromatal development variable. – Paraphyses hypha–like, branched, septate, persisting between asci, but often fragmenting in dried material. – Asci 8–spored, cylindrical, thin–walled, unitunicate, pedunculate, with a J+, subapical, ascal ring, which is wedge–shaped or discoid and a faint canal leading to the apex (Fig. 49). – Ascospores fusiform, 2–celled, septate centrally, smooth-walled, gradually tapering from the centre to pointed processes, which may be spine–like, or with rounded ends, often with small amounts of mucilage (Figs. 45–47).



Figs. 39–43. – Interference contrast micrographs of *Oxydothis grisea*. – 39, 40. Section through ascomata. – 41. Neck filled with periphyses. – 42. Palisade–like cells at sides of ascomata and peridium. – 43. Stroma. – Bars: 39, 40 = 100 µm; 41–43 = µm.

Oxydothis grisea Penz. & Sacc., Malpighia 11: 505. 1897. – Figs. 39–49.

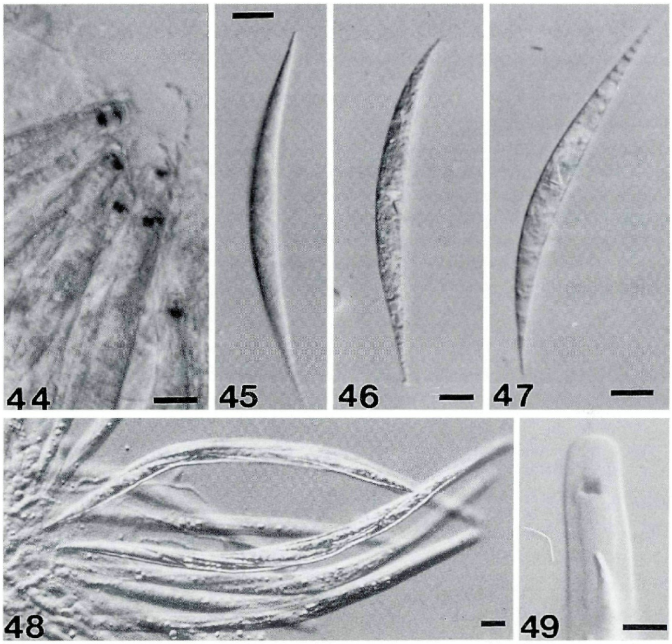
A s c o m a t a forming under the host surface, singly or in groups of 2 or 3, slightly darker at the rim, individually slightly raised, darkened, 0. 5–0. 75 mm long, with eccentric ostioles. Individual ascomata with axis horizontal to the host surface, ostiolar canal at one end

curving upwards and piercing host cuticle, ostiolar openings appearing as small blackened dots on the host surface, surrounded by variable amounts of stromatic tissue (Figs. 39,40). – Ostiolar canal periphysate (Fig. 41). – Peridium up to 10 µm wide, comprising 3 or 4 layers of thin-walled flattened brown cells (Fig. 42). – Paraphyses hypha-like, filamentous, septate, 2–3 µm wide, often fragmenting in dried material. – Asci 180 x 13–15 µm, long cylindrical, thin-walled, unitunicate, pedunculate, with a wedge-shaped, J+, subapical ring, 3.6–4.5 µm diam, 2. 7 µm high with a faint canal leading to the tip (Figs. 44, 48, 49). – Ascospores 84–99 x 6–7.5 µm, fusiform, hyaline, 2-celled, septate centrally, tapering from the centre to pointed processes (Figs. 45–47).

Holotype. – Indonesia: Cibodas, in long culm (midrib), 1897 (PAD).

Oxydothis grisea has been designated the type species of *Oxydothis* (Penzig & Saccardo, 1897; Müller & von Arx, 1962). The original identification of the host was not given although Müller & von Arx (1962) state the hosts to be Gramineae, Palmae and Musaceae. I have seen type material of *Oxydothis grisea* and the host appears to be *Calamus* sp. It was not possible to obtain measurements of the asci, as the material was in poor condition and clumped together. Those given are from Penzig & Saccardo (1897).

Oxydothis is a distinct genus occurring on rachides and leaves mostly in the Palmae and Pandanaceae, with one species on bamboo. The ascomata usually occur in darkened raised lesions on the host surface, each lesion comprising an individual ascoma or clusters of ascomata. Individual ascomata or the whole lesion may have a darkened margin. In some species the ascomata form under raised blistered areas with may or may not be darkened. In section the ascomata are usually cylindrical with their long axis horizontal to the host surface; each ascoma has an eccentric ostiole which may be beaked and that bends upwards to pierce the host surface (Figs. 39, 40). In some species especially those forming under raised blistered areas, the ascomal axis may be oblique or even vertical to that of the host surface. The necks are apical and often emerge through fissures at the sides of the blisters. The hypha-like, branched and septate paraphyses are persistent amongst the asci, although they can be difficult to locate in rehydrated specimens. Asci are long cylindrical with rounded or truncate ends and are provided with a wedge-shaped or discoid, J+, subapical apparatus and faint canal to the tip (Figs. 44, 48, 49). Ascospores are hyaline, fusiform, 2-celled, tapering gradually from the centre to form pointed processes (Figs. 45–47) which may be spine-like or with rounded ends often with mucilage.



Figs. 44–49. – Interference contrast micrographs of *Oxydothis* spp. – 44. Blue staining ascal subapical apparatus (from Holotype of *O.* grisea). – 45–47. Ascospores (from holotype of *O. grisea*). – 48–49. Asci which are long cylindrical, with a J+, subapical ring and faint canal to the tip (from *O. maculosa* Penz. & Sacc, Indonesia, Cibodas, on *Calamus rachis*, April 1992, K. D. Hyde). – Bars = 10 µm.

A review of the genus *Oxydothis* will be published separately in this series (Hyde, in prep.). Samuels & Rossman (1987) have suggested that there is little difference between *Leiosphaerella* and *Oxydothis*, but if the type species of each genus are compared, there can be little doubt that they should be retained as separate genera. The differences are discussed under *Leiosphaerella* and highlighted in Tab. 1.

Pemphidium Montagne, Ann. Sci nat. Ser. 2 (Bot), 14: 329. 1840.

Type species. – *P. nitidum* Montagne.

Pemphidium occurs on palms with records from South America (Hyde, 1993). The genus is superficially similar to *Linocarpon* and differences are discussed by Hyde (1993).

Plagiothecium Schrantz, Bull. Soc. Mycol. France 76: 335. 1960.

Plagiothecium was proposed by Schrantz (1960) to include *Metasphaeria sabalensis* Cooke. *M. sabalensis* is clearly an *Oxydothis* and therefore *Plagiothecium* Schrantz is synonymous with *Oxydothis* (Müller & von Arx, 1962; Barr, 1976).

Material examined. – USA: Georgia, Darien, on rachis of *Sabal*, 1878, Cooke, K.

Plagiolagynion Schrantz, Bull. Soc. Mycol. France 78: 218. 1962.

Schrantz (1962) erected the genus *Plagiolagynion* Schrantz (1960), a later homonym of the name *Plagiothecium* Bruch & Schimper (1851), a genus of mosses. The type is *Metasphaeria sabalensis* Cooke which is clearly an *Oxydothis*, *Plagiolagynion* is synonymous with this genus (Barr, 1976).

Schizochora Syd. & P. Syd. – Ann. Mycol. 11:265 (1913).

Schizochora was described from the Philippines from leaves of *Ficus guyeri* Elmer and is presently included in the Phyllachoraceae (Eriksson & Hawksworth, 1990). A second species, *S. pandani* Stevens (1925) was reduced to synonymy under *Oxydothis pandanicola* (Syd. & P. Syd.) Petrak by Petrak (1952). I have also examined type material of *S. pandani* from BISH! and agree that the taxa are synonymous.

Disposition of genera into families

The first placement of genera into families in Tab. 1 is based on Eriksson & Hawksworth (1991), with the exception of *Lasiobertia*. Barr (1990) prefers to arrange *Linocarpon* in the Hyponectriaceae. *Ceriospora, Lasiobertia, Leiosphaerella, Oxydothis* and *Pemphidium* may also be characteristic of the Hyponectriaceae in ascus, ascospore and peridium structure (Barr, personal communication), as Höhnel (1919) observed when he arranged them in the Physosporelleen, an invalid name for the Hyponectriaceae. Thus, an alternative and perhaps better scheme, would be to place all of the genera discussed in this paper in the Hyponectriaceae (second placement Tab. 1).

Tab. 1. – Differences between *Ceriospora*, *Frondispora*, *Lasiobertia*, *Linocarpon*, *Oxydothis*, *Pemphidium* and *Leiosphaerella*.

	Ceriospora	*Frondispora*	*Lasiobertia*	*Linocarpon*	*Oxydothis*	*Pemphidium*	*Leiosphaerella*
Ascomata	Immersed, no clypeus	Immersed under large stroma	Erumpent	Dome–shaped clypeus	Dome-shaped clypeus	Dome-shaped clypeus	Small clypeus
Peridium	3–5 layers of light-brown brick-shaped cells	Hyaline or brown elongate cells	Large dark-brown outer globose cells, smaller paler inner cells	Thin layer of brown thin-walled cells	Thin layer of hyaline thin-walled elongate cells	Thin layer of hyaline elongate cells	Comprising of inner thin-walled pallid cells and outer brown angular cells
Asci	J+, cylindric-clavate	J–, cylindric-clavate	J+, cylindrical	J–, cylindrical	J+(–), long cylindrical	J–, long cylindrical	J+, cylindric-clavate
Ascospores	Fusiform with spine-like appendages	Fusiform with apical setae	Fusiform tapering to pointed processes	Filiform, with septum-like refringent bands, some with appendages	Long fusiform or filiform with apiculate or spine-like poles, some with rounded ends with mucilage	Long-fusiform with tapering poles and polar appendages	Fusiform with rounded poles
	2-celled	2-celled	2-celled	1-celled	2-celled	1(–2) celled	2–celled
Family	Amphisphaeriaceae Hyponectriaceae	Amphisphaeriaceae Hyponectriaceae	Amphisphaeriaceae Hyponectriaceae	Valsaceae Hyponectriaceae	Amphisphaeriaceae Hyponectriaceae	Amphisphaeriaceae Hyponectriaceae	Amphisphaeriaceae Hyponectriaceae

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