New cercosporoid fungi from southern Africa

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Seven cercosporoid fungi are newly described from leaf spots on various plants in South Africa. An eighth species, Stigmella diematae Crous & B. Sutton is described from leaf spots on a Dierama K. Koch species collected in Lesotho. Cercospora ekebergiae Crous & B. Sutton is newly described from Ekebergia Sparmm., while a new coelomycete genus, Phaeoaphelosporella Crous & B. Sutton, is described as the pigmented analogue of Phloeosporella Höhn. to accommodate Cercospora ekebergiae Syd. Additional species treated are Cercosporella lotononis Crous & B. Sutton on Lotononis bainesii Bak., Passalora tecomariae Crous & B. Sutton on a Tecomaria Spach species, Phaeoramularia digitariae Crous & B. Sutton on Digitaria digitalis (Nees) Stapf, Pseudocercosporella capensis Crous & B. Sutton on Cunnia capensis L. and Pseudocercosporella eucalyti Crous & B. Sutton on Eucalyptus undulata Thunb.

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Introduction

The South African flora is known to be extremely rich in endemic genera and species (Arnold & De Wet 1993). As is true in other temperate regions of the world, leaf spot symptoms on diverse plant species are also a common phenomenon in South Africa. Earlier studies have shown that most of these can be attributed to cercosporoid fungi (Doidge 1950). Several of these were recorded and described by Chupp and Doidge (1948). In subsequent studies (Crous & Braun 1994; Crous & Morris 1994; Crous & Braun 1995, 1996a, 1996b; Crous & Wingfield, 1996; Sutton & Crous 1997), all records lodged at the National Collection of Fungi (PREM) were reassessed, and several new species described. In the present study, an examination was made of all the unidentified cercosporoid collections lodged at PREM. Several new species are recognised and these are described in this paper.

Description of Species

Several species were found to occur on hosts from which no cercosporoid fungi have previously been described. These include a species of Cercospora Fr. on Lotononis bainesii Bak., and a Passalora Fr. species on Tecomaria Spach. These two species are, therefore, described as new.

Cercospora lotononis Crous & B. Sutton sp. nov. (Figure 1). Caespituli epiphyllii, sparsi, discreti, brunnei. Conidiophora per stoma in fasciculis 2–6 emergentia, brunnea, laevia, cylindracea, non ramosa, recta ad geniculato-sinuosa, 3–11-septata, 75–250 × 5–7 μm. Cellulae conidigenous terminales, pallide brunneae, laevae, cylindraceae, mono- ad polyblasticae, cicatricibus conidialibus conspicuis, atris, crassissis, refractivis, 30–45 × 5–7 μm. Conidia solitaria, hyalina, laevia, 2–23-septata, recta ad parum curvata, obclavata ad filiformia, 50–240 × 2–5 μm; hilar crassum, refractivum, atrum, concisum.

Lesions amphiogenous, brown, circular, slightly raised, up to 3 mm diam. Mycelium immersed, consisting of smooth, hyaline, branched, septate hyphae, 2–3 μm wide. Caespituli epigemius, sparse, separate, brown, formed on a weakly-developed stroma. Conidiophores emerging in fascicles of 2–6 through stoma, brown, smooth, cylindrical, unbranched, straight to geniculate-sinuose, 3–11-septate, 75–250 × 5–7 μm. Conidiogenous cells terminal, light brown, smooth, cylindrical, with bluntly rounded to clavate apex, mono- to polyblastic, conidial scars conspicuous, darkened, thickened, refractive, 30–45 × 5–7 μm. Conidia solitary, hyaline, smooth, 2–23-septate, straight to slightly curved, obclavate to filiform with a truncate base and obtuse apex, 2–23-septate, 50–240 × 2–5 μm; hilar thickened, refractive, darkened, conspicuous.


Passalora tecomariae Crous & B. Sutton sp. nov. (Figure 2). Caespituli hypogeni, numerosi, pallide brunnei. Conidiophora fasciculata, olivacea ad pallide brunneae, verruculose, cylindraceae, erecta, recta ad geniculato-sinuosa, 1–3-septata, 30–50 × 5–7 μm. Cellulae conidigenous terminales in conidiophoros incorporatae, verruculoseae, olivaceae ad pallide brunneae, cylindraceae, rectae ad geniculato-sinuosae, 14–23 × 5–6 μm; cicatricibus minute crassis, atribus, refractivis. Conidia olivacea ad pallide brunnea, verruculosa, guttulata, obclavata, 1–6-septata, 35–90 × 5–6 μm; hilar minute crassum, atrum, refractivum.

Lesions amphiogenous, light to medium brown, circular, up to 6 mm diam. Mycelium immersed, consisting of smooth, hyaline, branched, septate hyphae, 1.5–2 μm wide. Caespituli hypogeni abundant, light brown, arising from an inconspicuous substomal stroma. Conidiophores arising from stromata in fascicles of up to 20, olivaceae to light brown, verruculose, cylindraceae, erect, straight to geniculate-sinuose, divergent, simple or branched at base, regenerating enteroblastically near apex, 1–3-septate, 30–50 × 5–7 μm. Conidigenous cells terminal, integrated, verruculose, olivaceae to light brown, cylindrical, straight to geniculate-sinuose, tapering to a sub-truncate apex, 14–23 × 5–6 μm; scars minutely thickened, darkened, refractive. Conidia holoblastic, olivaceae to light brown, verruculose, guttulata, obclavata, with an obconically subtruncate base, tapering toward an obtuse apex, 1–6-septata, 35–90 × 5–6 μm; hilar minutely thickened, darkened, refractive.


An examination of the holotype of Cercospora ekebergiae Syd. lodged at S by Braun (1991), led to the conclusion that this
species belongs either in Phloeospora Wallr. or Phloeospora Höhn. In an examination of specimens lodged as unidentified species of Cercospora at PREM, a duplicate of the original collection, PREM 6799 (presumably isotype), was found. Sections of the conidiomata showed them to be predominantly acervular, thereby confirming the observations made by Braun (1991). Furthermore, conidia were formed holoblastically via sympodial proliferation and had unthickened hila, suggesting that the fungus should reside in Phloeospora rather than Quasiphloeospora. However, both the conidiophores and the conidia were pale olivaceous, making Phloeospora (subepidermal conidiomata) and Pseudophloeospora U. Braun (subcuticular conidiomata) unsuitable for this taxon, as the latter two genera currently accommodate species with hyaline structures (Sutton 1980; Braun 1993). The generic name Phaeophloeospora Rangel is an earlier name for Kirramyces J. Walker et al. (Crous et al. 1997), and is reserved for pycnidal fungi with verruculose, pigmented conidigenous cells that proliferate enteroblastically and percurrently. The fungus occurring on Ekebergia is thus the pigmented analogue of Phloeospora, for which the name Phaeophloeospora is introduced.

Phaeophloeospora Crous & B. Sutton gen. nov.

Maculis foliorum consociata. Mycelium immersum, ex hyphis laevibus olivaceis ad hyalinis, ramulosis, septatis constans. Conidiomata ampligena discreta, pallide brunnea ad pallide


Associated with leaf spots. Mycelium immersed, consisting of smooth, hyaline to olivaceous, branched, septate hyphae. Conidiomata amphiogenous, separate, pale yellow to light brown, acervular, subepidermal, base consisting of olivaceous cells of textura angularis. Conidiophores pale olivaceous, smooth, simple or branched at the base, septate, cylindrical, erect, formed from the upper cells of the conidioma. Conidiogenous cells integrated, terminal, smooth, pale olivaceous, cylindrical, straight to geniculate-sinuous with a subtruncate apex, proliferating sympodially and holoblastically. Conidia holoblastic, pale olivaceous, smooth, subcylindrical, straight to gently curved, obtuse at apex, and subtruncate at base, gutulate, euseptate, with inconspicuous hila.

Type species: Phaeophloeospora ekebergiae (Syd.) B. Sutton & Crous

Phaeophloeospora ekebergiae (Syd.) B. Sutton & Crous comb. nov. (Figure 3).

Cercospora ekebergiae Syd., Ann. Mycol. 12: 267 (1914). Lesions amphiogenous, medium brown, circular with a raised white margin, up to 4 mm diam. Mycelium immersed, consisting of smooth, hyaline to olivaceous, branched, septate hyphae, 1.5–2.5 μm wide. Conidiomata amphiogenous, abundant, separate, pale yellow to light brown, acervular, subepidermal, base consisting of olivaceous cells of textura angularis, 60–180 μm diam., 40–90 μm high (including conidiophores). Conidiophores pale olivaceous, smooth, simple or branched at the base, 1–3-septate, cylindrical, erect, formed from the upper cells of the conidioma, 30–80 × 2.5–4 μm.

Figure 1 Conidia and conidiophores of Cercospora laitononidis (Scale bar = 10 μm).

Figure 2 Conidiophores and conidia of Pseudala tecomariae (Scale bar = 10 μm).
terminal, olivaceous, smooth, cylindric, straight to once geniculate, tapering to a rounded apex, mono- to polyblastic, 15–35 × 4–5 μm; conidial scars conspicuous, darkened, thickened, refractive. Conidia in unbranched chains, pale olivaceous, smooth, 1–5-septate, straight to slightly curved, subcylindric to oblanceolate with an obtuse apex and obconically truncate base, 20–55 × 2.5–4 μm; hilum thickened, refractive, darkened.


In their treatment of cercosporoid fungi occurring in South Africa, Crous and Braun (1996a) omitted any reference to Cercospora capensis (Thüm.) Sacc. Chupp (1954) noted that C. capensis (collected from Cynonia capensis in Grahamstown by P. MacOwan in 1876 as No. 1262) was in all probability a species of Helminthosporium Link. Furthermore, he also referred to a letter by E.M. Doidge stating that an examination of the type specimen by Hansford supported this view. When Saccardo (1886) made a new combination of Helminthosporium capense Thüm. under Cercospora, he cited conidia as being 35–45 × 6–9 μm, and thus being much shorter and wider than those of Pseudocercospora capensis described in the present study.

**Pseudocercospora capensis** Crous & B. Sutton sp. nov. (Figure 5).

Caespituli hypogeni, discreti, medio- ad atrobrunnei, ex cellulis superioribus stromatum bene evolutarum formantes. Conidiophora ex cellulis superioribus stromatum exoriente, fasciculata, densa, multa, conidiogenus cellulis redacta. Cellulae conidigenae non ramosae, cylindraceae, recta vel geniculato-sinusae, laeves, olivaceae ad pallide brunnea, sympodioliter vel raro 1–4 enteroblastic et percurrente proliferantes, 8–17 × 3–5 μm; cica-tricibus conidiorum insconspicuis. Conidia solitaria, olivacea, laevia, gillula, recta vel curvata, cylindraceae apice obtuso, base truncata, 1–10-septata, 45–100 × 2.5–3 μm; hilum inconspicua.

**Phaeoramularia digitariae** Crous & B. Sutton sp. nov. (Figure 4).


Lesions amphigenous, light brown, narrowly elliptical, 0.5–2 mm wide, 3–8 mm in length. Mycelium immersed, consisting of smooth, hyaline to olivaceous, branched, septate hypheae, 2–4 μm wide. Cæspituli amphigenous, abundant, separate, dark brown, associated with a well-developed stroma, 20–60 μm wide, 40–110 μm high (including the conidiophores). Conidiophores emerging in fascicles of 13–25 through stomata, smooth, medium brown, becoming paler toward the apex, cylindrical, erect, divergent, unbranched, straight to slightly sinuous, 1–5-septate, 30–90 × 3–5 μm. Conidigenous cells...
Lesions amphigenous, grey to brown, subcircular, 2–7 mm diam., grey on upper surface, with a raised, dark brown border surrounded by a wide, diffuse, red-purple margin; grey to dark brown on lower surface with similar borders and margins to that on the upper surface. Mycelium immersed, consisting of branched, septate, pale olivaceous hyphae, 3–4 μm diam. Caespituli hypogenous, separate, medium to dark brown, formed from the upper cells of a well-developed stroma, 40–100 μm diam., 30–50 μm high (including the conidiophores). Conidiophores arising from the upper cells of the stroma, fasciculate, dense, numerous, reduced to conidiogenous cells. Conidiogenous cells unbranched, cylindrical, straight or geniculate-sinuous, smooth, olivaceous to light brown, tapering slightly toward a truncate apex, proliferating sympodially, or rarely 1–4 times enteroblastically and percurrently, 8–17 × 3–5 μm; conidial scars inconspicuous. Conidia solitary, olivaceous, smooth, guttulate, straight or curved, cylindrical with an obtuse apex and truncate base, 1–10-septate, 45–100 × 2.5–3 μm; hila inconspicuous.


A collection of Euclera undulata Thunb. (PREM 39020) was found to have leaf spots colonised by a species of Pseudocercospora Speg. Although several cercosporid fungi are known from Diospyros L. (Ebenaceae) (Pollack, 1987), none are known from Euclera, and this collection is therefore described below.

Pseudocercospora euclea Crous & B. Sutton sp. nov. (Figure 6).

Caespituli amphigeni sed in pagina adaxiali folii abundiores, discreti, grisei ad brunei, ex cellulis superioribus stromatum bene evolutumur formantes. Conidiophora ex cellulis superioribus stromatum exorientes, fasciculata, densa, multa, 1–3-septata, non ramosa, cylindracea, recta vel geniculato-sinuosa, laevia, olivaceo-brunnea, deinque pallidiora et apicum subtruncatum contracta, 15–45 × 3–6 μm. Cellulare conidiogenae terminales, laevae, olivaceae, cylindraceae ad apicem subtruncatum contractae, enteroblasticae et 1–4 percurrentes proliferantes, raro sympodiali; cicatricibus conidiorum inconspicuis. Conidia solitaria, olivacea, laevia, recta ad leniter curvata, cylindracea, apice obtusa et base truncata ad subtruncata, indistincte 1–6-septata, 35–90 × 3–4 μm; hila inconspicua.

Figure 6 Conidiophores and conidia of Pseudocercospora eucleae (Scale bar = 10 μm).

Lesions amphigenous, grey to brown, irregularly rounded with a raised, dark brown margin, up to 7 mm diam. Mycelium immersed, consisting of branched, septate, pale olivaceous hyphae, 3–4.5 μm diam. Caespituli amphigenous, but more abundant on adaxial leaf surface, separate, grey to brown, formed from the upper cells of a well developed stroma, 30–90 μm diam., 50–85 μm high (including the conidiophores). Conidiophores arising from the upper cells of the stroma, fasciculate, dense, numerous, 13-septate or reduced to conidiogenous cells, unbranched, cylindrical, straight or geniculate-sinuous, smooth, olivaceous-brown, becoming lighter, and tapering toward a subtruncate apex, 15–45 × 3–6 μm. Conidiogenous cells terminal, smooth, olivaceous, cylindrical, tapering toward a subtruncate apex, proliferating enteroblastically and 1–4 times percurrently, rarely sympodially, 15–20 × 3–6 μm; conidial scars inconspicuous. Conidia solitary, olivaceous, smooth, straight to gently curved, cylindrical with an obtuse apex and truncate to subtruncate base, indistinctly 1–6-septate, 35–90 × 3–4 μm; hila inconspicuous.


In an examination of a collection from Dierama K. Koch leaves, we found it to be colonised by a dematiaceous hyphomycete with
 verrucose, distoseptate conidia forming on verrucose, fasciculate conidiophores, arising through stomata, with irregular, percurrent anellations, suggesting that this fungus is best accommodated in the genus Stigmata Sacc. sensu stricto (Sutton & Pascoe 1989). No species of Stigmata or similar fungi are presently known from Dierama. Morphologically this collection resembles several other species such as S. pulviniformis (Syd.) Hughes, S. knoxdaviesii Crous & U. Braun, S. inconspicua B. Sutton & Pascoe and S. pallida (Ellis & Everhart) M.B. Ellis. It can, however, be distinguished from these species by its minute stromata, and predominantly cylindrical, 3-septate conidia that are smaller than those of S. pulviniformis, S. knoxdaviesii, and S. pallida, but larger than those of S. inconspicua

**Stigmata dieramae Crous & B. Sutton sp. nov.** (Figure 7)

Conidiomata amphigena, discreta, brunnea, fasciculata. Conidiophora in fasciculis 2–8 per stroma ex cellulis superibus stromatae submatalibus innumeribus emergentia, brunnea, verrucosa, simplicia ad basim ramosa, 1-septata vel cellulis conidiogenis redacta, cylindracea, recta vel 1 semel geniculata, 8–16 × 6–8 μm. Cellulæ conidiogenæ terminales, in conidiophoris incorporatae, brunneae, verrucosae, cylindraceae, rectae ad apicem obsum contractæ, conidia proliferatione enteroblasticae cum anellationibus 1–3 irregularibus producentia, 8–12 × 6–8 μm. Conidia holoblastica, solitaria, brunnea, verrucosa, strisi longitudinalibus, 1–3-distoseptata, recta ad parum curvata, subcylindracea, ad apicem obtusum contracta; base truncata ad subtruncata, fimbriae marginali, 18–25 × 7–8 μm.

Lesions amphigenous, black, diffuse, narrowly ellipsoid, 1 mm diam., 1–12 mm in length. Mycelium internal and superficial, consisting of hyaline to light brown, smooth to verruculose hyphae, branched, septate, 4–6 mm diam., forming minute stromata. Conidiomata amphigenous, separate, brown, fasciculate, 13–30 μm diam., 15–25 μm high (including conidiophores). Conidiophores arising in fascicles of 2–8 through stomata from the upper cells of a weakly-developed submatal struma, brown, verrucose, simple to branched at the base, 1-septate or reduced to conidiogenous cells, cylindrical, straight or once geniculate, 8–16 × 6–8 μm. Conidiog-}

**Figure 7** Conidiophores and conidia of *Stigmata dieramae* (Scale bar = 10 μm).

enous cells terminal, integrated, brown, verrucose, cylindrical, straight, tapering to a rounded apex, producing conidia by enteroblastic proliferation with 1–3-irregular anellations, 8–12 × 6–8 μm. Conidia holoblastic, solitary, brown verrucose with longitudinal striations, 1–3-distoseptate, straight to slightly curved, subcylindrical, tapering to an obtuse apex; base truncate to subtruncated with a marginal frill, 18–25 × 7–8 μm.

**Specimen examined:** Lesotho, Thaba Putsoa, Maseru district, *Dierama* sp., A.J. Guillarmod, 23 Feb. 1967, PREM 44333 (holotype).

A second collection from *Ekebergia capensis* Sparm. (PREM 51649) was found to be colonised by a cercosporid fungus distinct from *Phaeophloeospora ekebergiae*. It was characterised by pigmented, verruculose conidiophores that proliferated enteroblastically and percurrently. Sutton and Crous (1996) provisionally accepted the genus *Cercostigmina* U. Braun for species with brown, sporochoetal conidiomata, integrated conidiogenous cells that proliferate percurrently rather than sympodially, and euseptate, verruculose conidia. The species is thus best accommodated in *Cercostigmina*.

**Cercostigmina ekebergiae** Crous & B. Sutton sp. nov. (Figure 8).

Conidiomata hypogena, densa, sporochoelial, brunnea, in stroma supra stoma. Conidiophora in fasciculis densis, cellulis superioribus stromatae emergentia, medio brunnea, verruculosa, cylindracea ad ampulliformia, recta ad curvata, 0–2-septata, 15–25 × 4–6 μm. Cellulæ conidiogenæ terminales, in conidiophoris incorporatae, medio brunneae, verrucosae, cylindraceae ad ampulliformes, ad apicem subtruncatum contractæ, enteroblastice proliferantes proliferationibus ad 3 percurrentibus, 10–15 × 4,5–6 μm. Conidia solitaria, apicale, verruculosa, granulosa, 2–8-septata, 30–70 × 4–6 μm, subcylindracea ad obclavata, recta ad curvata, apice obtuso et base subtruncata; hilum non crassum, fimbriae marginali.

**Figure 8** Conidiophores and conidia of *Cercostigmina ekebergiae* (Scale bar = 10 μm).
Lesions angular to irregular, separate to confluent, amphigenous, dark brown on the upper surface, becoming light brown with age, light brown on the lower leaf surface, frequently vein-limited, 3–7
mm diam. Mycelium internal, composed of branched, septate, verruculose, pale brown hyphae, 2.5–4 μm wide. Conidiomata hypogeous, dense, sporodochial, brown, situated on a suprastomal stroma, 30–50 μm high (including conidiophores), 30–100 μm wide. Conidiophores in dense fascicles, arising from the upper cells of stromata, medium brown, verruculose, cylindrical to ampulliform, straight to curved, 0–2-septate, 15–25 × 4–6 μm. Conidigenous cells terminal, integrated, medium brown, verruculose, cylindrical to ampulliform, tapering to a subtruncate apex, proliferating enteroblastically to form up to 3 percurrent proliferations, 10–15 × 4.5–6 μm. Conidia solitary, apical, verruculose, granular, 2–8-septate, 30–70 × 4–6 μm, subcylindrical to obclavate, straight to curved, apex obtuse and base subtruncate; hilum unthickened with marginal frill.


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