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Cercospora species and similar fungi occurring in South Africa

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An examination of cercosporoid fungi lodged at the National Collection of Fungi revealed seven new species, one new variety, and four species that had to be allocated to other genera. Two species of *Stigmina*, *S. curvispora* and *S. rhois* are newly described from *Rhus pyrioides* and *Rhus discolor*, respectively, while *Stigmina protearum* var. *protearum* and var. *leucodendri* have been transferred to *Cercostigmina*, and an additional variety, var. *hakeae*, has been described from *Hakea saligna*. *Cercospora kiggelariae* and *Cercospora psychotriicola* are transferred to *Pseudocercospora*, and *Maytenus heterophylla* noted as a new host record for *Stigmina celastri*. *Mycosphaerella maesae* and its anamorph *Stenella maesae* are newly described from *Maesa lanceolata*, while other new species include *Distocercospora africana* on *Dioscorea sylvatica*, *Cercospora pseudokalanchoes* on *Kalanchoe rotundifolia*, *Mycovellosiella dombeyae* on *Dombeya burgessiae* and *Pseudocercospora cluytiicola* on *Cluytia* cf. *affinis*.

Keywords: *Cercospora*, *Distocercospora*, *Mycosphaerella*, *Mycovellosiella*, *Pseudocercospora*, *Stenella*, *Stigmina*, systematics, taxonomy.

Cercosporoid fungi are generally associated with leaf spot diseases of a wide range of host plants covering cereals, vegetables, grasses, ornamentals and trees (Hsieh & Goh, 1990). However, several species have also been found to be beneficial, acting as potential biocontrol agents of weeds (Conway, 1976; Morris, 1989). To date, South African records of these fungi have been poorly studied. Before 1948, seven species in this group were described by Kalchbrenner, Cooke & Winter, while H. & P. Sydow described an additional 10 species, and Verwoerd & Dippenaar one (Chupp & Doidge, 1948). The most significant local contribution at this stage was that of Chupp & Doidge (1948), who listed 75 species of which 21 were new records for the country and 10 were new to science. Since then, there have been several new descriptions or reallocations of species collected in South Africa (Braun & Crous, 1992; Crous & al., 1989; Crous & Wingfield,

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1991; Deighton, 1973, 1976, 1979; Dianese & al., 1993; Ellis, 1972; Marasas & Bredell, 1974).

Following the major contribution by Chupp & Doidge (1948) towards the systematics of South African cercosporoid fungi, there have been no further attempts to revise systematically other cercosporoid material filed at the National Collection of Fungi, Pretoria (PREM). Additional research by Deighton (1967, 1971, 1973, 1974, 1976, 1979, 1983, 1987), Pons & Sutton (1988) and Braun (1988a, 1988b, 1989, 1990, 1994) concluded that the generic concept of *Cercospora* adopted by Chupp (1954) was too wide, and that it could safely be redefined and the genus split into several additional genera to provide a better workable system. Generic separations were based upon several criteria including ontogeny, pigmentation, ornamentation and thickening of conidia, conidiophores and conidiomata. Since these changes, however, there has been no attempt to revise systematically local records. The present study, therefore, represents the first in a series aimed at revising and updating local records of these important plant pathogenic fungi.

Cercospora pseudokalanchoës P. W. Crous & U. Braun sp. nov.

Maculae amphigenae, suborbiculares, brunneae, 4–10 mm latae. Mycelium immersum; hyphae brunneae; stroma nullum vel parvum. Caespituli amphigeni, brunnei, 25–60 x 110–200 µm. Conidiophora fasciculata, brunnea, apicem versus olivacea, simplicia, recta, cylindrica vel leniter geniculata, apice rotundata, 1–9-septata, 48–180 x 4–6 µm. Cellulae conidiogenae brunneae, rectae, cylindricae vel geniculatae, 20–50 x 4–5 µm; cicatrices conidiales incrassatae, fuscae. Conidia solitaria, 55–140 x 4.5–6 µm, hyalina, laevia, acicularia, 5–15-septata, apice rotundata, obtusa, basi rotundata vel subtruncata, hila incrassata, fusca.

Leaf spots amphigenous, subcircular, brown, distinct, 4–10 mm diam. – Mycelium brown, internal, stroma absent or not well developed when present. – Caespituli amphigenous, brown, centered over stromata, 25–60 µm wide, 110–200 µm high. – Conidiophores fasciculate, brown, becoming olivaceous at apices, simple, straight cylindrical or slightly geniculate, with a rounded apex, 1–9-septate, 48–180 x 4–6 µm. – Conidiogenous cells brown, straight cylindrical or geniculate, with thickened scars, 20–50 x 4–5 µm. – Conidia solitary, hyaline, 55–140 x 4.5–6 µm, smooth, acicular, 5–15-septate, with obtusely rounded apices, and rounded or subtruncate bases with thickened and darkened hila (Fig. 1).

Material examined. – R.S.A.: Transvaal, Louis Trichardt, Hangklip Forestry Station, *Kalanchoë rotundifolia* (Crassulaceae), R.Y. Anelich, Apr. 1988, PREM 51121, holotype.

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Cercospora pseudokalanchoes can easily be distinguished from *C. kalanchoes* Boedijn, also occurring on this host, by its longer conidiophores and shorter, wider conidia.

Cercostigmina protearum (Cooke) U. Braun & P. W. Crous comb. nov.

= *Cercospora protearum* Cooke, Grevillea 12: 39 (1883).
= *Stigmina protearum* (Cooke) M.B. Ellis, Mycol. Pap. 131: 6-7 (1972).

Conidia 2–6-septate, 50–80 x 5–9 µm.

Material examined. – R.S.A.: *Leucospermum conocarpum*, St. James, 22 Dec. 1912, PREM 5570 (isotype?), Mac Owen 1456, Herb. K (holotype); on *Leucospermum* sp., PREM 3929.

Cercostigmina protearum var. ***leucadendri*** (Cooke) U. Braun & P. W. Crous comb. nov.

= *Cercospora protearum* var. *leucadendri* Cooke, Grevillea 12: 39 (1883).
= *Stigmina protearum* var. *leucadendri* (Cooke) M.B. Ellis, Mycol. Pap. 131: 7-8 (1972).

Conidia 1–3-septate, 25–50 x 5–7 µm.

Material examined. – R.S.A.: Cape Province, Kirstenbosch, *Leucadendron argenteum*, H.H.W. Pearson, 27 May 1914, PREM 8354 (isotype?), Mac Owen 1457 Herb. K (holotype).

Cercostigmina protearum var. ***hakeae*** U. Braun & P. W. Crous var. nov.

A varietate typica differt conidiis 2–9-septatis, 40–90 x 4–5 µm.

Lesions amphigenous, grey-brown, causing tip die-back of leaves. – Mycelium internal, stroma present, large, consisting of 4–9 layers of brown pseudoparenchymatal cells, 50–200 µm wide, 20–40 µm high. – Conidiomata amphigenous, sporodochial, grey-brown, 70–260 µm wide, 25–35 µm high. – Conidiophores in dense fascicles, arising from stromata, olivaceous brown, smooth to finely roughened, simple or branched at base, 1–2-septate, straight, 15–35 x 5–7 µm. – Conidiogenous cells olivaceous brown, smooth to very finely roughened, straight or rarely once geniculate, cylindrical to ampulliform, tapering to a rounded or truncate apex; monoblastic to polyblastic, proliferation 1–3 times percurrent, rarely sympodial, 7–20 x 4–7 µm; conidial scars unthickened, inconspicuous. – Conidia solitary, olivaceous brown, smooth to very finely roughened, cylindrical, straight or gently curved, apex obtusely

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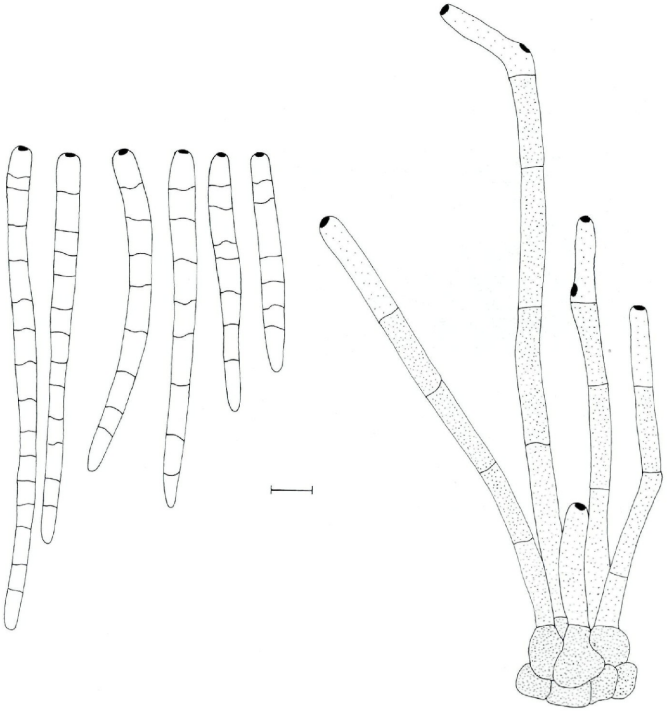

Fig. 1. – *Cercospora pseudokalanchoës*. Stroma giving rise to light brown, fasciculate conidiophores and conidiogenous cells with thickened scars, forming hyaline conidia with darkened hila (PREM 51121, holotype; bar = 10 μm).

rounded, base truncate, sometimes with minute marginal frill, 2–9-septate, 40–90 x 4–5 μm (Fig. 2).

Material examined. – R.S.A.: Transvaal, Louis Trichardt, Hangklip Forest Station, *Hakea saligna* (Proteaceae), C. Roux, Apr. 1988, PREM 51117, holotype.

The present species was treated by Chupp (1954) under *Cercospora*. Ellis (1976) placed it in *Stigmina*. Braun (1994) separated *Pseudocercospora*-like *Stigmina* species and referred them to the new genus *Cercostigmina*. *C. protearum* is a typical *Cercostigmina*.

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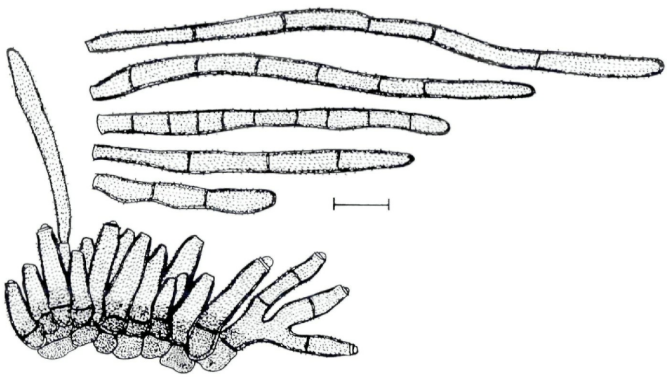

Fig. 2. – *Cercostigmina protearum* var. *hakea*. Stroma giving rise to fasciculate conidiophores with percurrent proliferations and olivaceous brown, finely roughened conidia (PREM 51117, holotype; bar = 10 µm).

Distocercospora africana P. W. Crous & U. Braun sp. nov.

Maculae amphigenae, suborbiculares vel angulares-irregulares, per venas limitatae, brunneae, ca. 8–20 mm latae. Mycelium immersum; hyphae subhyalinae vel olivaceae, septatae, ramosae, ca. 1–2.5 µm latae; stromata bene evoluta, pseudoparenchymatica, modice brunnea, ca. 15–50 x 10–40 µm, substomatalia vel leniter erumpentia, stoma rumpentia. Caespituli hypophylli, modice brunnei, 40–80 x 30–40 µm. Conidiophora pauca vel saepe dense fasciculata, 15–80 x 3–10 µm, recta, subcylindrica vel modice geniculata-sinuosa, simplicia, interdum ramosa, olivacea vel brunnea, laevia, continua vel 1–2(–3)-septata. Cellulae conidiogenae in conidiophoris incorporatae, terminaliae, sympodiales; cicatrices conidiales leniter incrassatae, fuscae. Conidia solitaria, acicularia vel anguste obclavata (-subcylindrica), 30–110 x 3–5 µm, recta vel curvata, laevia, subhyalina vel olivacea, 1–5(–6) distoseptata, apice obtusa vel subacuta, basi in hilum attenuata, truncata, leniter incrassata, fusca.

Leaf spots amphigenous, discrete, subcircular to angular-irregular, confined by veins, brown, ca. 8–20 mm diam. – Mycelium internal, hyphae subhyaline to olivaceous, septate, branched, ca. 1–2.5 µm diam., forming well developed stromata, consisting of medium brown, pseudoparenchymatal cells, ca. 15–50 µm wide and 10–40 µm high, origin substomatal, but often somewhat erumpent, large stromata widening and rupturing the stomata. – Caespituli hypophyllous, medium brown, 40–80 x 30–40 µm. – Conidiophores fasciculate, arising from stromata, through stomata, fascicles small and loose or dense, conidiophores 15–80 x 3–10 µm, straight and subcylindric to moderately geniculate-sinuous, simple,

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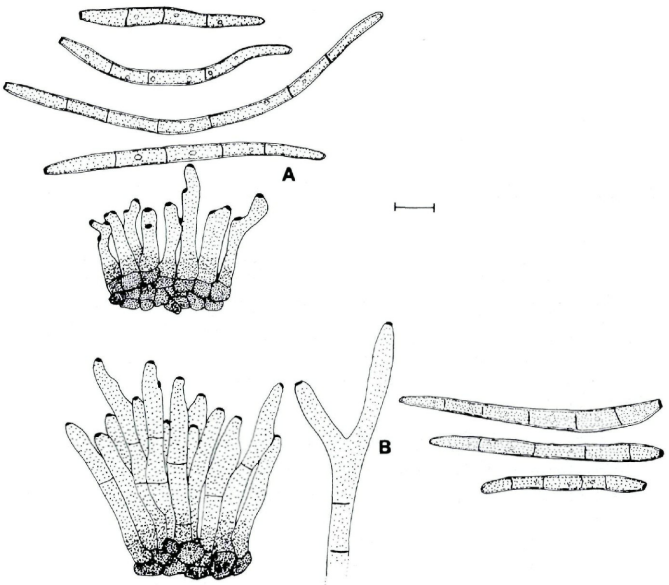

Fig. 3. – *Distocercospora africana*. A, Stroma giving rise to conidiophores and conidiogenous cells with thickened, pigmented conidial scars and olivaceous conidia with thickened, darkened hila (PREM 51112, paratype); B, stroma giving rise to simple or branched conidiophores and conidia (PREM 10125, holotype; bar = 10 μm).

occasionally branched, olivaceous to brown, smooth, shorter ones continuous, longer ones 1–2(–3)-septate. – Conidiogenous cells integrated, terminal, proliferation sympodial, with somewhat thickened and darkened conidial scars. – Conidia solitary, acicular, narrowly obclavate (-subcylindric), 30–110 x 3–5 μm, straight to curved, smooth, subhyaline to olivaceous, 1–5(–6)-distoseptate, apex obtuse to subacute, base obconically truncate, with slightly thickened and darkened hila (Fig. 3).

Material examined. – R.S.A.: Cape Province, Kentani, *Dioscorea* sp. (Dioscoreaceae), A. Pegleu, 26 Apr. 1917, PREM 10125, holotype; Natal, Gorge Walk, Royal Natal National Park, *Dioscorea sylvatica*, A.P. Baxter, May 1988, PREM 51112, paratype.

This species is characterized by its distoseptate conidia. Therefore, it must be placed in the recently introduced genus

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Distocercospora N. Pons & B. Sutton (1988). It is close to *D. pachyderma* (Syd. & P. Syd). N. Pons & B. Sutton, the type species. This species is a common, widespread pathogen of various *Dioscorea* species, but differs from the present species by much longer, frequently branched conidiophores and verruculose conidia with thicker walls.

Mycosphaerella maesae P. W. Crous & U. Braun sp. nov.

Maculae plerumque hypophyllae, irregulares, diffusae, medio-brunneae, 6–15 mm diam. Ascocarpi amphigeni, plerumque hypophylli, nigri, aequaliter dispersi, immersi, 70–80 µm lati, 70–90 µm alti, ostiolis papillatis, 5–13 µm diam.; parietes medio-brunnei constiti sunt ex 3–4 stratis cellularum textura angulari. Asci aparaphysati, fasciculati, bitunicati, subsessiles, cylindrici, recti vel incurvi, 30–45 x 6–8 µm. Ascosporae bi vel irregulariter dispositae, obliquae, imbricatae, hyalinae, guttulatae, tenuitunicatae, latissimae in media parte cellularum apicalium, attenuatae prominentius ad extremum alterum, non colligatae ad septum medium, 7–9 x 2–3.5 µm.

Leaf spots predominantly hypophyllous, irregular, diffuse, medium brown, 6–15 mm diam. – Ascocarps amphigenous, predominantly hypophyllous, black, evenly dispersed, immersed, 70–80 µm wide, 70–90 µm high, ostiole papillate, 5–13 µm diam.; walls medium brown, consisting of 3–4 cell layers of textura angularis. – Asci aparaphysate, fasciculate, bitunicate, subsessile, cylindrical, straight or incurved, 8-spored, 30–45 x 6–8 µm. – Ascospores bi- to multiseriate, oblique, overlapping, hyaline, guttulate, thin-walled, widest in mid section of apical cells, tapering more prominently to one end than the other, not constricted at the median septum, 7–9 x 2–3.5 µm (Fig. 4).

Material examined. – R.S.A.: Transvaal, Louis Trichardt, Hangklip Forest Station, *Maesa lanceolata* (Myrsinaceae), R.Y. Anelich, Apr. 1988, PREM 51114a, holotype.

A species of *Stenella* was found to occur on lesions in association with ascomata of *Mycosphaerella maesae*, with conidiogenous cells frequently developing from hyphae originating from old pseudothecia.

Stenella maesae P. W. Crous & U. Braun sp. nov.

Maculae saepe hypophyllae, irregulares, diffusae, modice brunneae, 6–15 mm diam. Mycelium primarium immersum; hyphae olivaceae, ramosae, septatae, 1.5–2 µm latae: mycelium secundarium superficiale; hyphae olivaceae, ramosae, septatae, 1.5–3 µm latae, leniter verruculosae. Coloniae amphigenae, saepe hypophyllae. Conidiophora ex hyphis mycelialibus secundariis terminaliter et

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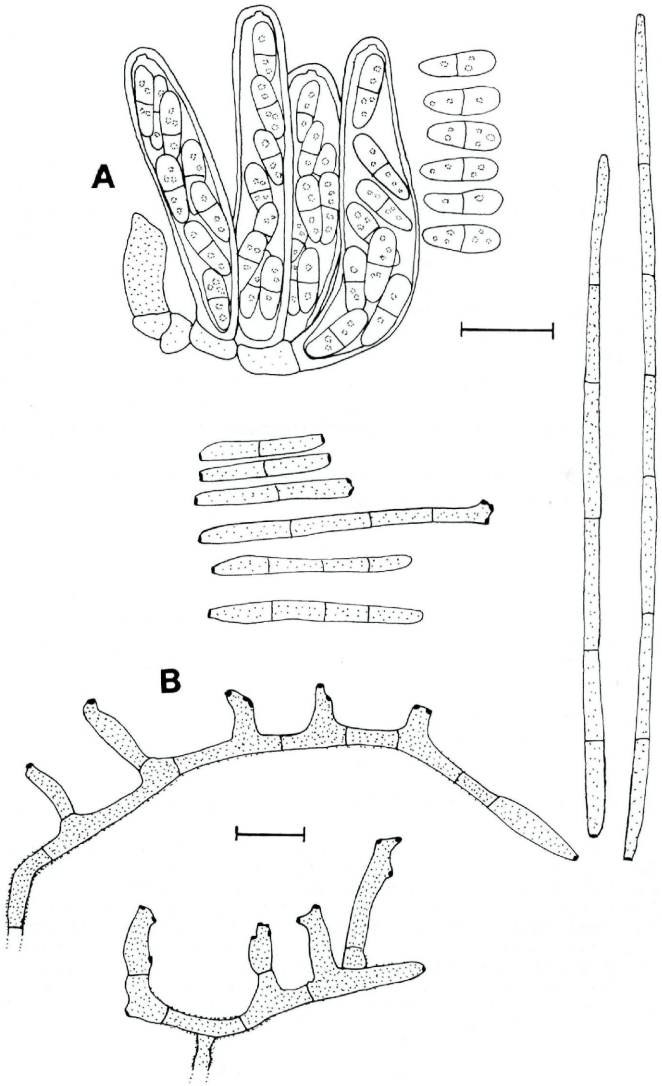

Fig. 4. – *Mycosphaerella maesae* and its anamorph, *Stenella maesae*. A, Asci and ascospores; B, conidiogenous cells with thickened, pigmented scars, arising from verruculose hyphae, giving rise to chains of conidia with thickened hila (PREM 51114b, holotype; bar = 10 μm).

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lateraliter producta, olivacea, laevia vel leniter verruculosa, recta vel leniter geniculata, 7–15 x 2–4 µm; cicatrices conidiales conspicuae, incrassatae, fuscae. Conidia solitaria, catenata vel ramicatenata, pallide olivacea, laevia, acicularia vel cylindrica-obclavata, hila incrassata, fusca, 1–15-septata, recta vel curvata, apice obtusa, basi in hilum attenuata, truncata, 20–220 x 2–2.5 µm.

Leaf spots as for *M. maesae*. – Mycelium internal, secondary mycelium external, olivaceous, branched, septate, 1.5–3 µm wide, minutely verrucose. – Colonies amphigenous, predominantly hypophyllous, external hyphae associated with stomata. – Conidiophores reduced to conidiogenous cells. – Conidiogenous cells integrated, borne terminally or as mere short lateral projections on the external hyphae, or germinating mature conidia, olivaceous, smooth to finely roughened, straight or slightly geniculate, 7–15 x 2–4 µm; conidial scars conspicuous, thickened and darkened. – Conidia occurring singly or in simple or branched chains of up to three levels per chain, pale olivaceous, smooth, acicular to cylindrical at the upper, larger end of the range, obclavate at the lower end of the range, hila thickened and darkened, 1–15-septate, straight or curved, with obtuse apices and long obconically truncate bases, 20–220 x 2–2.5 µm (Fig. 4).

Material examined. – R.S.A.: Transvaal, Louis Trichardt, Hangklip Forest Station, *Maesa lanceolata*, R.Y. Anelich, Apr. 1988, PREM 51114b, holotype.

As far as we could establish no species of *Mycosphaerella* and only one species of *Stenella*, namely *S. embeliae* A. N. Rai & Kamal, is known from the Myrsinaceae (Rai & Kamal, 1989). The latter is easily distinguished from *S. maesae* by having unbranched chains of dark olivaceous, verruculose conidia, 14–145 x 3.5–7 µm, being much wider than those of *S. maesae*.

Mycovellosiella dombeyae P. W. Crous & U. Braun sp. nov.

Maculae amphigenae, suborbiculares vel leniter angulares-irregulares, 4–20 mm diam., brunneae. Mycelium primarium immersum; hyphae hyalinae, septatae, leniter ramosae, ca. 1–3 µm latae: mycelium secundarium superficiale, ex hyphis deorsum fere incoloribus, sursum pallide olivaceis, parce ramosis, septatis, 1–5 µm latis, laevis, assurgentibus, saepe funicularibus vel piloso foliorum scandentibus, compositum. Conidiophora (vel cellulae conidiogenae) lateralia vel terminalia, subcylindrica vel leniter geniculata-sinuosa, simplicia, 5–35 x 2–8 µm, subhyalina vel pallide olivacea, 0–2-septata, laevia; cicatrices conidiales incrassatae, fuscae. Conidia solitaria, acicularia, 30–180 x 4–6 µm, 1–10-septata, hyalina, leavia, apice obtusa vel subacuta, basi in hilum attenuata, truncata, incrassata, fusca.

Leaf spots amphigenous, subcircular to somewhat angular-irregular, 4–20 mm diam., brown, margin indefinite. – Primary

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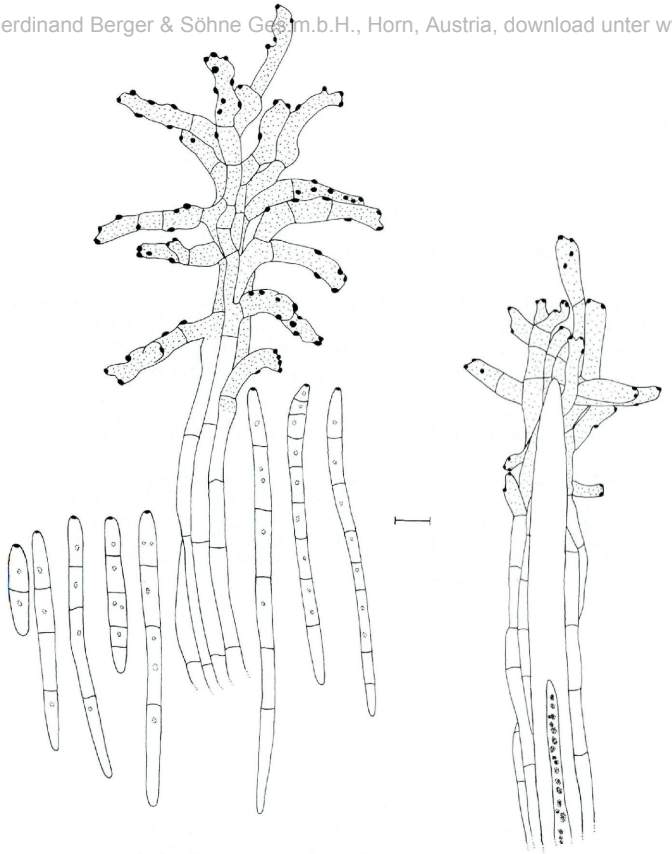

Fig. 5. – *Mycovellosiella dombeyae*. Assurgent conidiophores and conidiogenous cells with thickened scars climbing leaf hairs and forming hyaline conidia with thickened, darkened hila (PREM 51128, holotype; bar = 10 µm).

mycelium internal, hyaline, septate, sparsely branched, smooth, 1–3 µm wide; secondary mycelium external, creeping, assurgent, especially climbing leaf hairs, often closely appressed, forming ropes, hyaline or subhyaline, becoming pale olivaceous when they bear conidiophores, 1–5 µm wide, sparsely branched, smooth. – Conidiophores reduced to conidiogenous cells or one or two supporting cells. – Conidiogenous cells lateral and terminal, subcylindric to somewhat geniculate-sinuous, simple, 5–35 x 2–8 µm,

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subhyaline to pale olivaceous, 0–2-septate, smooth, conidial scars thickened and darkened. – Conidia solitary, acicular, 30–180 x 4–6 µm, 1–10-septate, hyaline, smooth, apex obtuse to subacute, base obconically truncate, hila thickened and darkened (Fig. 5).

Material examined. – R.S.A.: Transvaal, Louis Trichardt, Hangklip Forestry Station, *Dombeya burgessiae* (Sterculiaceae), R.Y. Anelich, Apr. 1988, PREM 51129, holotype; PREM 51128, paratype.

This species is a typical *Mycovellosiella* with assurgent secondary hyphae, climbing leaf hairs and forming ropes. The acicular, hyaline *Cercospora*-like conidia are, however, unusual. In this respect, *M. dombeyae* is close to *M. abscondita* Deighton (1974).

Pseudocercospora clutiicola P. W. Crous & U. Braun sp. nov.

Maculae amphigenae, suborbiculares, brunneae, 1–3 mm latae. Mycelium immersum; stromata intraepidermalia, olivaceo-brunnea. Caespituli epiphylli, 40–65 x 15–20 µm, pallide olivacei. Conidiophora fasciculata, simplicia, 5–25 x 3–4.5 µm, 1–2-septata, pallide olivacea, recta, subcylindrica vel leniter geniculata-sinuosa, laevia. Cellulae conidiogenae integratae, 10–20 x 3–4 µm, dilute olivaceae, monoblasticae, polyblasticae vel interdum 1–2 percurrentes; cicatrices conidiales inconspicuae, non incrassatae. Conidia solitaria, cylindrica vel obclavata, saepe curvata, 65–110 x 3.5–4 µm, 8–15-septata, pallide olivacea, apice obtusa, basi truncata.

Leaf spots amphigenous, discrete, subcircular, brown, 1–3 mm diam. – Mycelium internal, forming intraepidermal stromata, olivaceous brown. – Caespituli epiphyllous, 40–65 µm wide and 15–20 µm high, pale olivaceous. – Conidiophores fasciculate, simple, 5–25 x 3–4.5 µm, 1–2-septate, pale olivaceous, paler towards the apex, straight, subcylindric to geniculate-sinuous, smooth. – Conidiogenous cells integrated, 10–20 x 3–4 µm, faintly olivaceous, monoblastic, polyblastic, occasionally with 1–2 percurrent proliferations; conidial scars inconspicuous, unthickened. – Conidia solitary, cylindric to obclavate, mildly to prominently curved, 65–110 x 3.5–4 µm, 8–15-septate, pale olivaceous, apex obtuse, base truncate (Fig. 6).

Material examined. – R.S.A.: Northern Transvaal, Zoutpansberg, Pisanghoek, *Clutia* cf. *affinis* (Euphorbiaceae), M. Bosman, 1929, PREM 32896, holotype.

Pseudocercospora clutiicola can be distinguished from *P. cluytiae* (Kalchbr. & Cooke) Deighton by its clearly defined dark brown lesions, epiphyllous conidiomata, as well as its longer, 8–15-septate, curved conidia, which are often aggregated in white cirri.

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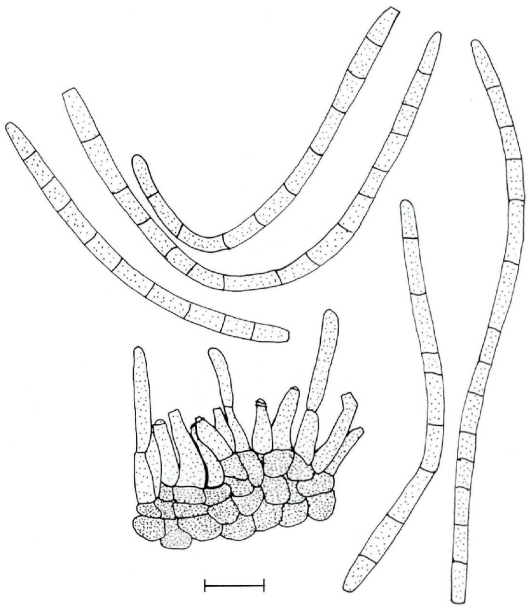

Fig. 6. – *Pseudocercospora clutiicola*. Stroma giving rise to fasciculate conidiophores and conidiogenous cells with 1-2 percurrent proliferations and olivaceous conidia (PREM 32896, holotype; bar = 10 µm).

Pseudocercospora kiggelariae (Syd.) P. W. Crous & U. Braun comb. nov.

= *Cercospora kiggelariae* Syd., Ann. Myc. 22: 434 (1924).

Leaf spots epiphyllous, discrete, subcircular to irregular, dark brown, becoming light brown to greyish white towards the centre, 2–10 mm diam., frequently becoming confluent and larger, with narrow, dark brown margins. – Mycelium internal, forming well developed intraepidermal stromata, ca. 25–50 µm diam., dark brown. – Caespituli epiphyllous, punctiform, dark brown, 50–115 µm wide and 60–80 µm high. – Conidiophores arising from stromata, in dense fascicles, subcylindric, ampulliform to slightly geniculate-sinuous, 5–35 x 2.5–6 µm, light brown to olivaceous brown, 0–1-septate. – Conidiogenous cells monoblastic to polyblastic, sympodial, rarely with 1–3 percurrent

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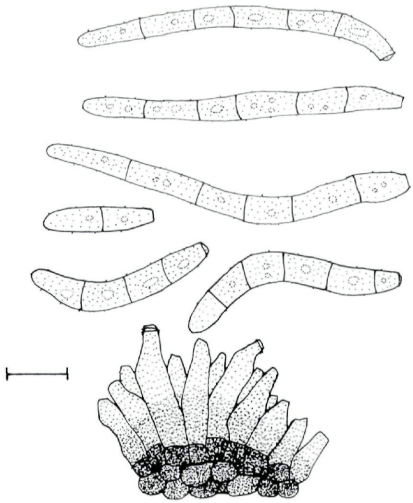

Fig. 7. – *Pseudocercospora kiggelariae*. Conidiophores arising from an intraepidermatal stroma, giving rise to faintly roughened, olivaceous conidia (PREM 51111; bar = 10 µm).

proliferations; conidial scars unthickened, inconspicuous. – Conidia solitary, obclavate-subcylindric, often curved, 15–75 x 3–6 µm, olivaceous to pale brownish, 1–7-septate, smooth to faintly rough, apex obtuse, base subtruncate, unthickened (Fig. 7).

Material examined. – R.S.A.: Western Cape Province, Stellenbosch, *Kiggelaria africana* (Flacourtiaceae), C.K. Brain, No. 1449, holotype (not examined); Stellenbosch, Coetzenburg, *K. africana*, P.S. Knox-Davies, Apr. 1988, PREM 51111.

Pseudocercospora kiggelariae occurs quite commonly on leaves of *Kiggelaria africana* which is indigenous to the Stellenbosch area. Because of its olivaceous conidiophores, conidia and inconspicuous, unthickened points of attachment to the conidiogenous cells, *Cercospora kiggelariae* is transferred to *Pseudocercospora*.

Pseudocercospora psychotriicola (Chupp & Doidge) P. W. Crous & U. Braun comb. nov.

= *Cercospora psychotriicola* Chupp & Doidge, Bothalia 4: 891 (1948) (as *psychotriaecola*).

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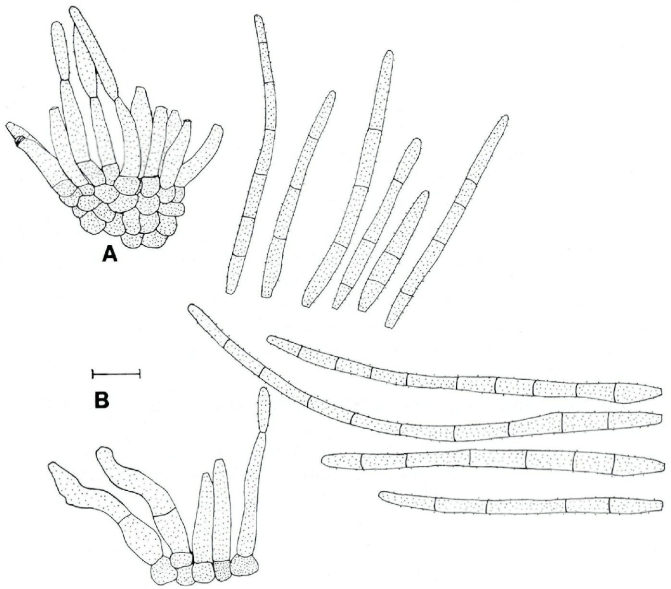

Fig. 8. – *Pseudocercospora psychotriicola*. A, Conidiophores with conidiogenous cells with 1-3 percurrent proliferations and olivaceous conidia (PREM 32773, holotype); B, conidiophores and conidia (PREM 51119; bar = 10 µm).

Leaf spots amphigenous, discrete, circular to irregular, dark brown, 5–30 mm diam. – Mycelium internal, stromata well developed. – Caespituli predominantly hypophyllous, dark brown, 30–80 µm wide, 40–70 µm high. – Conidiophores olivaceous-brown, smooth, straight to slightly geniculate-sinuous, 0–5-septate, 5–75 x 4–6 µm. – Conidiogenous cells olivaceous, integrated, polyblastic, sympodial, occasionally with 1–3 percurrent proliferations, 10–25 x 3–5 µm; conidial scars unthickened, inconspicuous. – Conidia solitary, olivaceous, smooth to finely roughened, cylindrical to narrowly obclavate, straight to curved, with an obtuse apex and obconically truncate unthickened base, indistinctly 2–10-septate, 35–110 x 3–4 µm (Fig. 8).

Material examined. – R.S.A.: Eastern Transvaal, Nelspruit, Mambatini Forest, *Psychotria capensis* (Rubiaceae), A.O.D. Mogg, 31 Mar. 1938, PREM 32773 (holotype); Northern Transvaal, Entabeni State Forest, Levubu, *P. capensis*, R.Y. Anelich, Apr. 1988, PREM 51119.

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Pseudocercospora psychotriicola has olivaceous conidiophores and conidia and unthickened scars on the conidiogenous cells, characteristics typical of species of *Pseudocercospora*. In the original description Chupp & Doidge (1948) state that conidia are indistinctly multiseptate, narrowly obclavate, and 40–120 x 2–4 µm. An examination of the type collection (PREM 32773) detected only smaller 2–6-septate conidia up to 75 µm in length. A more recent collection of the fungus (PREM 51119), however, contained indistinctly 2–10-septate conidia up to 115 µm in length.

Of the other cercosporoid fungi described from *Psychotria*, the name *Cercospora psychotriae* Chupp & Viégas (1945) is a later homonym of *Cercospora psychotriae* Sawada (1944). However, these two names represent two distinct fungi; that proposed by Viégas (1945) is a non-fasciculate species whereas the present species has well developed fascicles. *C. psychotriae* Chupp & Viégas will, therefore, be treated elsewhere.

An examination of Sawada's original collection of *Cercospora psychotriae* deposited at NTU-PPE found it to be devoid of fungal material (Hsieh & Goh, 1990). *P. psychotriicola* closely fits *C. psychotriae* Sawada in symptom expression (lesion colour and size), conidioma, conidiophore and conidium size, septation and pigmentation. In the original description of *C. psychotriae* (Sawada, 1944), conidiophores and conidia are described as being subhyaline to pale olivaceous, which corresponds with that of *P. psychotriicola*. However, the name *C. psychotriae* was never validly published because of the omission of a Latin diagnosis (Article 36.1 of the ICBN), and will, therefore, not be considered further.

Stigmina celastri (Kalchbr.) M.B. Ellis, Mycol. Pap. 72: 47 (1959).

Leaf spots amphigenous, discrete, circular to irregular, dark brown at margin, becoming lighter towards the centre, 2–15 mm diam. – Mycelium mostly internal, stroma consisting of 3–5 layers of dark brown pseudoparenchymatal cells, 30–70 µm wide, 30–50 µm high. – Conidiomata amphigenous, predominantly hypophyllous, fasciculate, situated over stomata, dark brown, 70–90 µm wide, 50–80 µm high. – Conidiophores brown, verruculose, straight or curved, 1–3-septate, 25–75 x 6–7 µm. – Conidiogenous cells light brown, verruculose, straight, curved or once geniculate, tapering to a bluntly rounded or subtruncate apex with 1–5 irregular, percurrent proliferations, seldomly sympodial, 8–35 x 6–6.5 µm. – Conidia medium brown, verruculose, cylindrical to acicular or obclavate at the extreme larger end of the range, 2–9-septate, with a rounded apex and subtruncate base at the smaller end of

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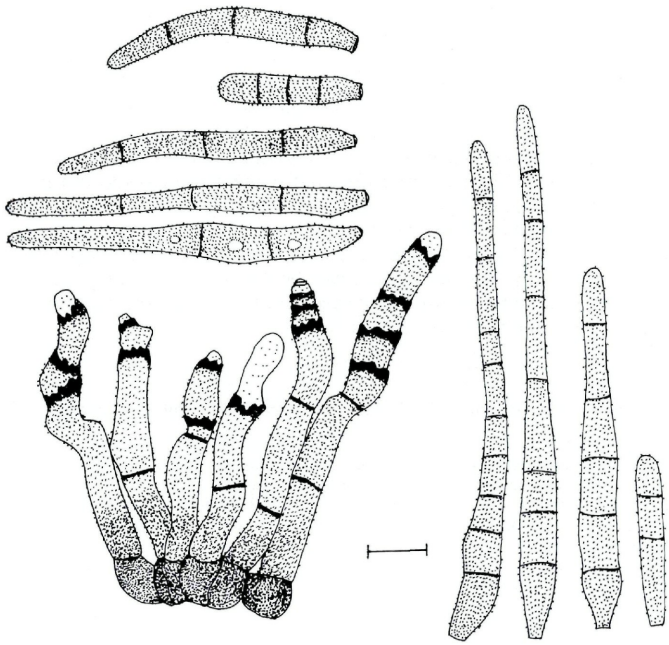

Fig. 9. – *Stigmina celastri*. A, Conidiophores and conidiogenous cells with enteroblastic proliferations and verruculose conidia (PREM 51110); B, verruculose, medium brown conidia (PREM 51125; bar = 10 μm).

the range, and a narrowly obtuse apex and long obconically truncate base at the larger end of the range, 25–110 x 5–6.5 μm, marginal basal frill present (Fig. 9).

Material examined. – R.S.A.: Transvaal, Louis Trichardt, Hangklip Forest Station, *Maytenus heterophylla* (Celastraceae), R.Y. Anelich, Apr. 1988, PREM 51110, 51125; Cape Province, *Celastrus buxifolius*, Mac Owen 1396, Herb. K (holotype, not examined).

The present collections do not fully agree with Ellis' (1976) description of *S. celastri*. The variability of these collections is, however, not known. Therefore, we prefer to refer the present specimens tentatively to *S. celastri*. This species is an intermediate between *Cercostigmina* U. Braun and *Stigmina*. The irregular

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annellations and verrucose conidiogenous cells suggest *Stigmina*. *S. celastri* is known from two new collections on *Maytenus heterophylla*, which is a new host record. The specimen collected from the Transvaal (PREM 51110), has, on average, shorter conidia with less septa than that of the second sample collected from the Natal Province (PREM 51125). However, the leaf symptoms, mode of conidiogenesis and other characters correspond well with these two collections. It is clearly noticeable that conidia are darker and more verrucose when they are small, and become hyaline and finely roughened, rather than verrucose, with an increase in length. Likewise, conidial septation was also observed to increase. This variation is very prominent, and had both types of conidia not been present in the same conidioma, a case could surely be argued that this was in fact more than one species.

Stigmina curvispora P. W. Crous & U. Braun sp. nov.

Maculae amphigenae, suborbiculares vel irregulares, atro-brunneae, 2–10 mm diam. Mycelium immersum; hyphae laeviae, atro-brunneae; stromata substomatalia, 60–80 x 10–20 µm, ex hyphis brunneis composita. Sporodochia epiphylla, brunnea, 70–90 x 30–50 µm. Conidiophora dense fasciculata, brunnea, verruculosa, 1–3-septata, 10–60 x 4–6 µm. Cellulae conidiogenae in conidiophoris incorporatae, brunneae, doliiformes vel cylindricae, rectae vel interdum geniculatae, lenissime verruculosae, enteropercurrentes, 20–50 x 6–10 µm. Conidia solitaria, pallide brunnea, 85–180 x 5.5–12 µm, verruculosa, (4–)7(–9) septata, obclavata, plerumque curvata, apice obtusa, basi truncata.

Leaf spots amphigenous, discrete, subcircular to irregular, dark brown, 2–10 mm diam. – Mycelium internal, composed of smooth, dark brown hyphae, forming brown substomatal stromata, 60–80 µm wide, 10–20 µm high, composed of brown aggregated pseudoparenchymatal cells. – Conidiomata epiphyllous, sporodochial, brown, 70–90 µm wide, 30–50 µm high. – Conidiophores in dense fascicles arising from stromata, brown, verruculose, either reduced to the occasional supporting cell at one extreme, or elongated, 1–3-septate in the other, 10–60 x 4–6 µm. – Conidiogenous cells integrated, brown, doliiform to cylindrical, straight, occasionally geniculate, verruculose, producing conidia by enteroblastic percurrent proliferation and resulting in the formation of up to 4 transverse, verruculose, irregular annellations, 20–50 x 6–10 µm. – Conidia solitary, apical, pale brown, 85–180 x 5.5–12 µm, verruculose, (4–)7(–9)-septate, obclavate, strongly curved with a long, thin, truncate basal cell, occasionally with a minute marginal frill terminating in an obtuse apex (Fig. 10).

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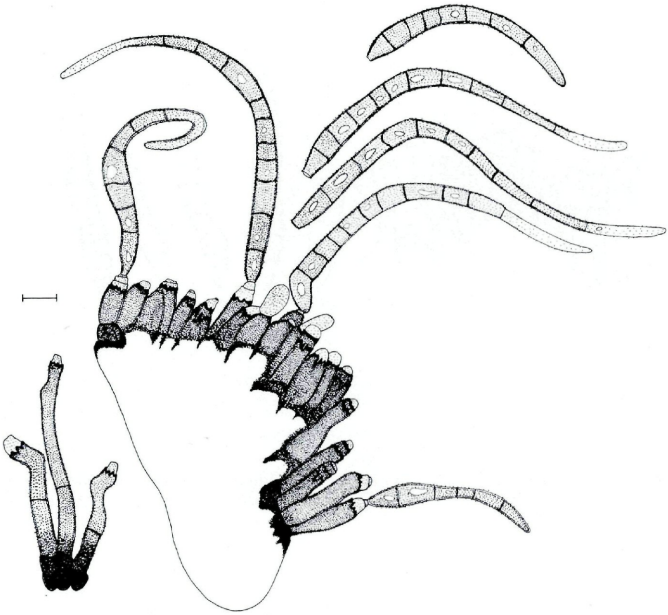

Fig. 10. – *Stigmina curvispora*. Conidioma with conidiophores and conidiogenous cells showing enteroblastic proliferation, giving rise to curved conidia (PREM 51105, holotype; bar = 10 μm).

Material examined. – R.S.A.: Eastern Transvaal, Roodeplaat, Vegetable & Ornamental Plant Research Institute, experimental farm, *Rhus pyroides* (Anacardiaceae), E. J. van der Linde, Mar. 1988, PREM 51105, holotype.

Because of its verrucose conidiophores and conidiogenous cells that proliferate enteropercurrently, this collection can be referred to *Stigmina* Sacc. It is distinct from all other species known to occur on this host (Ellis, 1976).

Stigmina rhois P. W. Crous & U. Braun sp. nov.

Maculae epiphyllae, orbiculares vel irregulares, atro-brunneae, 4–20 μm diam. Mycelium immersum; hyphae modice brunneae, ramosae, septatae; stromata bene evoluta, brunnea, substomatalia. Sporodochia epiphylla, atro-brunnea, 55–100 x 35–70 μm. Conidiophora dense fasciculata, 1–2-septata, brunnea, recta vel leniter

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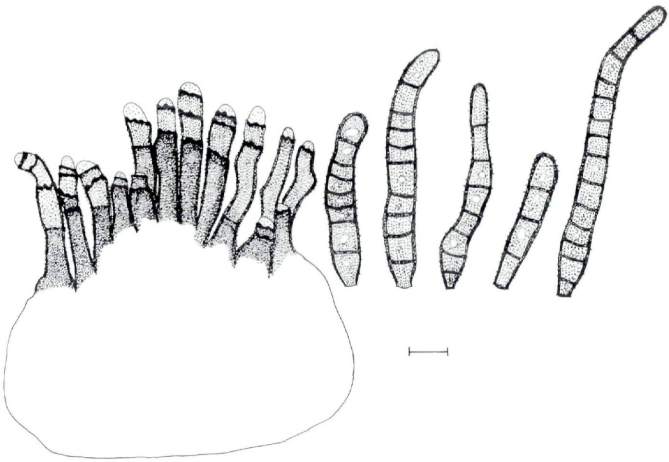

Fig. 11. – *Stigmina rhois*. Conidia and conidioma with conidiophores and conidiogenous cells showing enteroblastic proliferation (PREM 51132, holotype; bar = 10 µm).

geniculata-sinuosa, verruculosa, 30–50 x 5–8 µm. – Cellulae conidiogenae integratae, 20–30 x 5–7 µm, brunneae, ampulliformiae vel cylindricae, verruculosae, enteropercurrentes. Conidia solitaria, 45–130 x 6–8 µm, modice brunnea, verruculosa, (7–)9(–10) septata, obclavata, recta vel leniter curvata, apice rotundata, basi truncata.

Leaf spots epiphyllous, associated with discrete, circular to irregular, dark brown lesions, 4–20 mm diam. – Mycelium internal, composed of medium brown, branched, septate hyphae, forming well developed, brown, substomatal stromata. – Conidiomata centered over stomata, epiphyllous, sporodochial, dark brown, 55–100 µm wide, 35–70 µm high. – Conidiophores densely fasciculate, 1–2-septate, brown, straight or slightly geniculate-sinuous, verruculose, 30–50 x 5–8 µm. – Conidiogenous cells integrated, brown, ampulliform to cylindric, verruculose, producing conidia by enteroblastic percurrent proliferation to form up to 5 transverse, verruculose, irregular annellations, 20–30 x 5–7 µm. – Conidia solitary, 45–130 x 6–8 µm, apical, medium brown, verruculose, (7–)9(–19)-septate, obclavate, straight or curved, apex obtuse, base truncate, occasionally with a minute marginal frill (Fig. 11).

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Material examined. – R.S.A.: Natal, Mahai Gorge, Royal Natal National Park, *Rhus discolor* (Anacardiaceae), R.Y. Anelich, May 1988, PREM 51132, holotype.

Stigmina rhois differs from *Stigmina pulviniformis* (Syd.) S. Hughes, known from South Africa on *Rhus tomentosa*, by its much longer, multiseptate conidia (Ellis, 1976).

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References

Braun, U. (1988a). Studies on *Ramularia* and allied genera (1). – Int. J. Mycol. Lichenol. 3: 271–285.

— (1988b). Studies on *Ramularia* and allied genera (2). – Nova Hedwigia 47: 335–349.

— (1989). *Cercospora*–like fungi on *Cassia*. Int. – J. Mycol. Lichenol. 4: 191–204.

— (1990). Studies on *Ramularia* and allied genera (3). – Nova Hedwigia 50: 499–521.

— (1994). New genera of phytopathogenic Deuteromycetes. – Cryptogam. Bot., in press.

— & P.W. Crous (1992). *Dactylaria leptosphaeriicola* spec. nov. – Mycotaxon 45: 101–103.

Chupp, C. (1954). A Monograph of the Fungus Genus *Cercospora*. – Ithaca, New York. Published by the author.

— & E.M. Doidge (1948). *Cercospora* species recorded from South Africa. – Bothalia 4: 881–893.

Conway, K.E. (1976). *Cercospora rodmanii*, a new pathogen of water hyacinth with biological control potential. – Can. J. Bot. 54: 1079–1083.

Crous, P.W. & M.J. Wingfield (1991). *Mycosphaerella marasasii* sp. nov. and its *Pseudocercospora* anamorph on leaves of *Syzygium cordatum*. – Mycol. Res. 95: 1108–1112.

—, M.J. Wingfield, W.F.O. Marasas & B.C. Sutton (1989). *Pseudocercospora eucalyptorum* sp. nov. on *Eucalyptus* leaves. – Mycol. Res. 93: 394–498.

Deighton, F.C. (1967). New names in *Mycosphaerella* (*M. arachidis* and *M. pruni-persicae*) and validation of *M. rosicola*. – Trans. Br. mycol. Soc. 50: 328–329.

— (1971). Studies on *Cercospora* and allied genera. 3. *Centrospora*. – Mycol. Pap. 124: 1–13.

— (1973). Studies on *Cercospora* and allied genera. 4. *Cercosporella* Sacc., *Pseudocercosporella* gen. nov. and *Pseudocercosporidium* gen. nov. – Mycol. Pap. 133: 1–62.

— (1974). Studies on *Cercospora* and allied genera. 5. *Mycovellosiella* Rangel, and new species of *Ramulariopsis*. – Mycol. Pap. 137: 1–73.

— (1976). Studies on *Cercospora* and allied genera. 6. *Pseudocercospora* Speg., *Pantospora* Cif. and *Cercoseptoria* Petr. – Mycol. Pap. 140: 1–168.

— (1979). Studies on *Cercospora* and allied genera. 7. New species and dispositions. – Mycol. Pap. 144: 1–56.

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— (1983). Studies on *Cercospora* and allied genera. 8. Further notes on *Cercoseptoria* and some new species and redispositions. – Mycol. Pap. 151: 1–13.
— (1987). New species of *Pseudocercospora* and *Mycovellosiella*, and new combinations into *Pseudocercospora* and *Mycovellosiella*. – Trans. Br. mycol. Soc. 88: 365–391.
Dianese, J.C., B.C. Sutton & D.J. Tessmann (1993). Two deuteromycetes, *Phloeosporella flavio–moralis* sp. nov. and *Pseudocercospora punctata* comb. nov., causing leaf lesions on *Eugenia* spp. – Mycol. Res. 97: 123–126.
Ellis, M.B. (1972). Dematiaceous Hyphomycetes. 11. – Mycol. Pap. 131: 1–25.
— (1976). More Dematiaceous Hyphomycetes. – C.M.I., Kew, Surrey, England, 507 pp.
Hsieh, W.H. & T.K. Goh (1990). *Cercospora* and similar Fungi from Taiwan. – Maw Chang Book Company, Taipei, Taiwan, Republic of China.
Marasas, W.F.O. & I.H. Bredell (1974). A new species of *Phaeoramularia* (Fungi Imperfecti: Dematiaceae) from South Africa. – Bothalia 11: 217–219.
Morris, M.J. (1989). Host specificity studies of a leaf spot fungus, *Phaeoramularia* sp., for the biological control of crofton weed (*Ageratina adenophora*) in South Africa. – Phytophylactica 21: 281–283.
Pons, N. & B.C. Sutton (1988). *Cercospora* and similar fungi on yams (*Dioscorea* species). – Mycol. Pap. 160: 1–78.
Rai, A.N. & Kamal (1989). A new *Stenella* species from India. – Mycol. Pap. 93: 398–399.
Sawada, K. (1944). Descriptive catalogue of the Formosan fungi. 10. – Taiwan Agric. Res. Inst. Rep. 87: 79–90.
Viégas, A.P. (1945). Alguns fungos do Brasil – *Cercosporae*. – Bol. da Soc. Bras. de Agron. 8: 1–160.

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