

More cercosporoid hyphomycetes from some South Pacific island countries

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Abstract. Two new cercosporoid hyphomycetes from Vanuatu, *Cercospora spathulata* and *Pseudocercospora pomeliae*, are described and illustrated. Six new records of cercosporoid hyphomycetes that cause plant diseases from New Caledonia, Samoa and Vanuatu are given. Four new hosts of *Cercospora apii* s. lat. from the region are reported.

Additional keywords: *Cercospora*-like anamorphs, fungal diversity, new taxa.

Introduction

Records of cercosporoid fungi collected from some South Pacific islands appear in checklists of plant pathogens compiled for several countries such as New Caledonia (Bugnicourt and Marty 1961; Huguenin 1966, 1967; Kohler 1987) and Vanuatu (Huguenin 1964; McKenzie 1989). Braun *et al.* (1999) provided a comprehensive list of cercosporoid hyphomycetes from several South Pacific island countries including the descriptions of 14 new species and one new genus. This paper complements that of Braun *et al.* (1999), contributing two new species of cercosporoid hyphomycetes from Vanuatu as well as new disease and host records from Vanuatu, New Caledonia and Samoa that are held in the herbarium BRIP (Queensland Department of Primary Industries and Fisheries).

Specimens of cercosporoid fungi collected in New Caledonia, Vanuatu and Samoa and held in the herbarium BRIP were re-examined on microscopic mounts in lactic acid. Biometric data was obtained from the examination of turgid structures and only mature conidia (those unattached to conidiophores) were measured. Nomenclatural novelties were deposited in MycoBank (www.mycobank.org, verified 13 March 2008).

Taxonomy

Cercospora spathulata Liberato & McTaggart, **sp. nov.** (Fig. 1)

MYCOBANK: 511300.

Differt a *Cercospora apii* Fresen. emend. Crous & U. Braun (s. lat.) et *C. lactucae-sativae* conidiis cum apicibus spatulatis et septis interdum contractis.

Holotype on leaves of *Lactuca sativa* L. (Asteraceae), Snake Hill, Efate, Vanuatu, 30 May 2003, J.G. Wright; holo: BRIP 44736.

Etymology: referring to the spatulate apices of the conidia.

Fungi imperfecti, Hyphomycetes. Leaf lesions chlorotic, 1–2 mm wide, subcircular, surrounded by irregular, water-soaked halos that coalesce to cover larger portions of the leaf limited by the major veins. *Mycelium* internal. *Caespituli* amphigenous, mainly hypophyllous. *Stromata* absent. *Conidiophores* mainly solitary, sometimes in loose fascicles, pale olivaceous-brown, concolourous, 1–4-septate, cylindrical, unbranched, basal part straight, upper fertile part with up to two sympodial shoulders, 70–148 × 3.5–4.0 μm, smooth, cell wall somewhat thickened. *Conidiogenous cells* integrated, terminal, 25–45 μm long, with sympodial proliferation, polyblastic; conidiogenous loci conspicuous, situated at the tip and small shoulders of the conidiogenous cells, thickened, darkened, 3 μm diam. *Conidia* hyaline, solitary, scolesporous, cylindrical, with a spatulate apex, pluriseptate (up to 17 septa), 54–180 × 4.5–5.5(–6) μm, sometimes constricted at the septa, smooth, thin-walled, base obtuse, attenuated and truncated; hilum thickened, darkened and refractive, 2–3.5 μm wide.

More than 3000 names were published in *Cercospora* under a very broad concept for the genus (Pollack 1987). Crous and Braun (2003) reviewed the cercosporoid hyphomycetes and emended *Cercospora*, highlighting its important diagnostic features, namely the pigmented conidiophores; conspicuous, thickened and darkened, planate conidiogenous loci (scars); scolesporous and hyaline conidia. Crous and Braun (2003) recognised 659 species as belonging to *Cercospora* s. str.

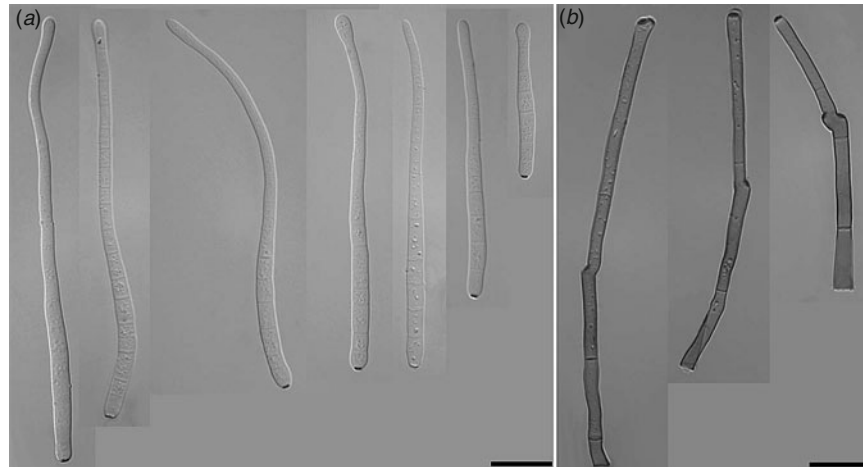


Fig. 1. *Cercospora spathulata* (BRIP 44736): (a) conidia; (b) conidiophores. Bars = 20 µm.

Among these, only two species, *C. apii* s. lat. and *C. lactucaesativae* Sawada, were associated with *Lactuca*, which includes the cultivated vegetable *L. sativa* L. (lettuce). *C. spathulata* differs from *C. apii* s. lat. and *C. lactucaesativae* by having cylindrical conidia with spatulate apices that are sometimes constricted at the septa. *Cercospora longissima* var. *indica* Munjal, Lall & Chona is one further fungus described on *Lactuca* (Munjal *et al.* 1962), but according to Crous and Braun (2003) the status of this fungus is unclear and it may not belong to *Cercospora* s. str. at all. It differs from *C. spathulata* by having much shorter (19–77 × 5–8 µm), obclavate-cylindrical conidia. *C. agavicola* Ayala-Escobar (Ayala-Escobar *et al.* 2005), recently described from Mexico on *Agave tequilana* F.A.C.Weber (Agavaceae), is a morphologically comparable species characterised by having similar conidia with spatulate apices. This species is easily distinguishable from *C. spathulata* by its well developed, large stromata and conidia with (0–)3–8 septa. Furthermore, the host species of the two taxa are quite unrelated.

Pseudocercospora pometiae U. Braun & R.G. Shivas, sp. nov. (Fig. 2)

MYCOBANK: 511301.

Differt a *Pseudocercospora talisiae* lesionibus distinctis, conidiis semper solitariis et a *Pseudocercospora cupaniae* stromatibus minoribus.

Holotype on leaves of *Pometia pinnata* J.R. Forst. & G. Forst. (Sapindaceae), Lovunmataibo, Ambae, Vanuatu, 2 June 2003, J.G. Wright; holo: BRIP 44766.

Etymology: from the host genus *Pometia*.

Fungi imperfecti, Hyphomycetes. Leaf lesions amphigenous, subcircular to angular-irregular, 1–15 µm wide, brown, greyish brown to medium dark brown, margin indefinite, occasionally vein-limited or with a slightly raised marginal line and narrow to wide yellowish halo. *Caespituli* amphigenous, mainly hypophyllous, punctiform, dark brown to black. *Mycelium* internal. *Stromata* at first substomatal, but later widening and rupturing the stomata, 10–50 µm diam., brown. *Conidiophores* in

small to moderately large fascicles, loose to moderately dense, arising from stromata, emerging through stomata, erect, straight, subcylindrical to geniculate-sinuous, unbranched, occasionally with short branchlets, 10–50 × 2–6 µm, 0–2-septate, subhyaline to pale olivaceous or olivaceous-brown, thin-walled, smooth. *Conidiogenous cells* integrated, terminal or conidiophores reduced to conidiogenous cells, 10–25 µm long; conidiogenous loci inconspicuous to subdenticulate, but wall of the loci consistently unthickened and not darkened. *Conidia* solitary, obclavate-cylindrical, 15–70 × 3–5 µm, 1–6-septate, pale olivaceous, thin-walled, smooth, apex subacute to obtuse, base obconically truncate, 1.5–2.0 µm wide, hila unthickened, not darkened.

Pseudocercospora pometiae belongs to a group of species on hosts in the *Sapindaceae* that are characterised by having relatively short, fasciculate conidiophores arising from well developed stromata. *Pseudocercospora talisiae* U. Braun & F. Freire, described from Brazil on *Talisia esculenta*, and *P. cupaniae* (Syd.) U. Braun & F. Freire (Braun and Freire 2002) on *Cupania guatemalensis* in Costa Rica are morphologically close to *P. pometiae*. However, the latter species possesses much larger, often intraepidermal stromata, up to 100 µm diam., and *P. talisiae* is characterised by its quite distinct lesions (small, 1–3 mm wide, angular, often with a reddish tinge) and conidia occasionally formed in chains. Other species on hosts belonging to the *Sapindaceae* differ in having much narrower conidia [*Pseudocercospora mitteriana* Goh & W.H. Hsieh, on *Dodonaea viscosa*, conidia 2–3.5 µm wide (Hsieh and Goh 1990)], much wider conidia, 5–8 µm wide [*P. thoninae* (F. Stevens) U. Braun & Crous, on *Thoninia* spp. (Chupp 1954; Crous and Braun 2003)] or very long conidiophores [*P. allophylicola* Deighton, on *Allophylus africanus*, conidiophores up to 150 µm long; *P. allophyli* (Hansf.) Deighton, on *Allophylus* spp., conidiophores up to 180 µm long (Deighton 1987); *P. allophylina* Goh & W.H. Hsieh, on *Allophylus timorensis*, conidiophores up to 500 µm long (Hsieh and Goh 1990)]. *Pseudocercospora dodoneae* Boesewinkel (Boesewinkel 1981) on *Dodonaea viscosa* is distinguished by its effuse fruiting, lacking stromata and branched conidiophores.

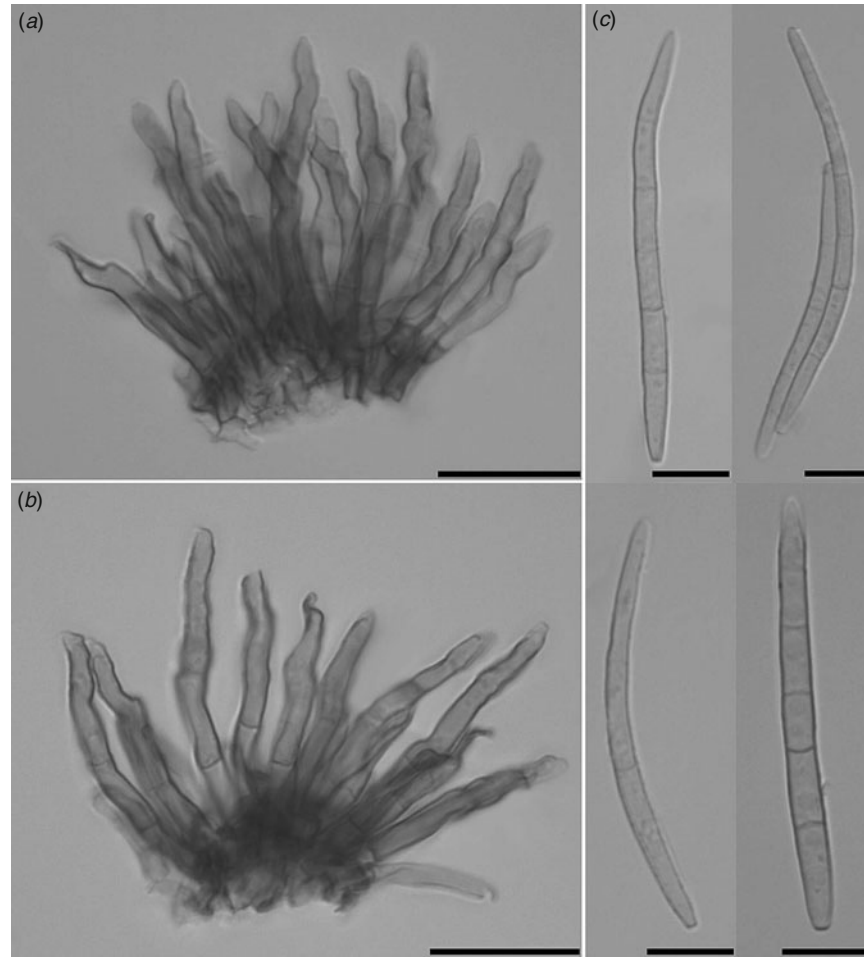


Fig. 2. *Pseudocercospora pometiae* (BRIP 44766): (a, b) conidiophores; (c) conidia. Bar = 20 μm (a, b), 10 μm (c).

New disease records

Six species of *Passalora* and *Pseudocercospora* are newly reported in the region as well as four new hosts for *Cercospora apii* s. lat. They are cited below.

Passalora bougainvilleae (Munt.-Cvetk.) R.F. Castañeda & U. Braun

On *Bougainvillea spectabilis* Willd. (Nyctaginaceae), AC Station de Recherches Maraîchères et Horticoles, Mount Doré, Sud, New Caledonia, 26 Aug. 2003, J.G. Wright (BRIP 45201).

Passalora fusimaculans (G.F. Atk.) U. Braun & Crous

On *Pennisetum purpureum* Schumacher (Poaceae), Tamoá, Païta, Sud, New Caledonia, 25 Aug. 2003, J.G. Wright (BRIP 45197).

On *Megathyrsus maximus* (Jacq.) B.K. Simon & S.W.L. Jacobs (Poaceae), Natawa, Santo, Vanuatu, 5 June 2003, J.G. Wright (BRIP 44807).

Pseudocercospora barringtoniigena U. Braun & Mouch.

On *Barringtonia edulis* Seem. (Lecythidaceae), Pang Pang, Efate, Vanuatu, 30 May 2003, J.G. Wright (BRIP 44 745). This is a new record for Vanuatu on a new host plant. This species was described by Braun and Mouchacca (2000) from Futuna on *Barringtonia asiatica*.

Pseudocercospora kleinhoviae (Höhn.) Deighton

On *Kleinhovia hospita* L. (Sterculiaceae), Rory, Malekula, Vanuatu, 13 June 2003, J.G. Wright (BRIP 44871).

Pseudocercospora mombin (Petr. & Cif.) Deighton

On *Spondias dulcis* Sol. ex G. Forst. (Anacardiaceae), Falealupo, Samoa, Feb. 2003, J.G. Wright, P. Matalauea, T. Mauga (BRIP 43668).

Pseudocercospora purpurea (Cooke) Deighton

On *Persea americana* Mill. (Lauraceae), Wahmet, Maré, Îles, New Caledonia, 4 Sept. 2003, J.G. Wright (BRIP 45292).

Cercospora apii Fresen. emend. P.W. Crous & U. Braun (*s. lat.*)

On *Abelmoschus esculentus* Moench, Efate, Vanuatu, 19 June 2003, J.G. Wright (BRIP 44913); on *Amaranthus viridis* L., Tanna, Vanuatu, 17 June 2003, J.G. Wright (BRIP 44902); on *Musa* sp., North Tanna, Vanuatu, 17 June 2003, J.G. Wright (BRIP 44895); on *Capsicum frutescens* L., Malekula, Vanuatu, 12 June 2003, J.G. Wright (BRIP 44857).

Species of *Cercospora* are generally considered to be host specific, which has led to the description of over 3000 species (Pollack 1987). Crous and Braun (2003) questioned this 'one host genus/family = one *Cercospora* species' approach on the basis of morphology and inoculation experiments, and subsequently placed 281 morphologically indistinguishable species in *C. apii s. lat.* This hypothesis was later revised by Groenewald *et al.* (2005) using molecular analysis and cultural characteristics to demonstrate that both *C. apii* Fresen. *s. str.* and *Cercospora beticola* Sacc. in the *C. apii* complex (Crous and Braun 2003) are distinct functional species, although able to cross infect each others' hosts (celery and sugar beet, respectively). Furthermore, Groenewald *et al.* (2005) provided evidence of a third species on celery, *C. apiicola* M. Groenewald, Crous & U. Braun, that was morphologically and pathologically similar to *C. apii*, yet was molecularly and culturally distinct. This indicates that similar species of *Cercospora* can be pathogenic to the same hosts. A further example of this was provided by Crous *et al.* (2006) who showed that grey leaf spot of maize was caused by two species, *Cercospora zae-maydis* Tehon & E.Y. Daniels and *C. zeina* Crous & Braun, which could only be separated reliably using molecular methods.

The presence of a *Cercospora* on a particular host is not always a useful taxonomic character. For example, Groenewald *et al.* (2006) showed that *C. apii s. str.* and *C. beticola* have much wider host ranges than first anticipated by Chupp (1954) and Ellis (1976) but narrower host ranges than proposed by Crous and Braun (2003). There are also situations where *Cercospora* species are isolated from atypical hosts. This phenomenon can be explained by the pogo stick hypothesis, which proposes that host-specific plant pathogens may colonise non-host tissue, especially necrotic lesions caused by other species, where they sporulate, enabling them to disperse further and reach their real hosts (Crous and Groenewald 2005). In such cases it is not known whether these *Cercospora* species cause disease or whether they are merely facultative saprobes. Evidence to date indicates that morphology, host specificity and geographic location are not suitable characters for the identification of species within the *C. apii* complex and that molecular data is essential (Groenewald *et al.* 2006).

Braun *et al.* (1999) listed several species of *Cercospora* that occurred in the South Pacific islands, now classified in the *C. apii s. lat.* complex, namely *C. canescens* Ellis & G. Martin, *C. citrullina* Cooke, *C. fukushiana* (Matsuura) W. Yamam., *C. ipomoeae* G. Winter, *C. kikuchii* T. Matsumoto & Tomoy., *C. malayensis* F. Stevens & Solheim, *C. physalidis* Ellis, *C. sonchi* Chupp, *C. triumfeticola* Munjal, Lall & Chona, *C. truncatella* G.F. Atk. and *C. zimmiae* Ellis & G. Martin. Further molecular study will elucidate whether these are true, pathogenic species.

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