



PERSOONIAL Reflections

Editors choice: Best Student Biodiversity paper of 2009

The following paper was selected by the editorial board as best student paper for the year 2009 (volumes 22, 23). The decision was chiefly based on the holistic approach used in the paper to delineate fungal biodiversity, and the integration of molecular and morphological techniques to achieve this goal.

Co-David D, Langeveld D, Noordeloos ME. 2009. Molecular phylogeny and spore evolution of *Entolomataceae*. *Persoonia* 23: 147–176.

Profile – Delia Co-David

I fell in love with systematics while obtaining my B.S. in Biology from the Institute of Biology, University of the Philippines, Diliman. My thesis, co-written with Mae Rose Sumugat, involved the identification of the flora of two swamps in the Philippines. This involved identifying piles and piles of herbarium plants specimens. Whenever I needed a break from my thesis-work, I took walks in the forests and identified plants growing in the vicinity. I found taxonomy and systematics fascinating!

Because of my botanical knowledge, the world seemed much more rich and interesting, enabling me to look at the plants I walked by – or ate –, and I could imagine lines of evolution going back in time, linking different plants to their most recent common ancestors.

Upon graduating in 2000, I volunteered to help in Conservation International's 3-week exploratory expedition to northern Palawan. Leonard Co (no relation) headed the team. Here I got a real taste for botanical field work in a tropical rainforest. The importance of organised notes and keeping one's feet dry is still with me today! In 2001, I was awarded a University Fellowship by Nuffic to pursue an M.Sc. in Biology, specialising in biodiversity and systematics at the 'Nationaal Herbarium Nederland, Universiteit Leiden' (now Netherlands Centre for Biodiversity Naturalis (NCBN), Leiden). I learned more about the practice of traditional plant taxonomy, and became attracted to molecular phylogenetic techniques, which I did not expect, since it was so far removed from the field work that I loved so much. In hindsight, it was the natural step, as molecular phylogenetics is a very powerful tool, enabling us to draw imaginary lines back in time, reconstructing the tree of life.

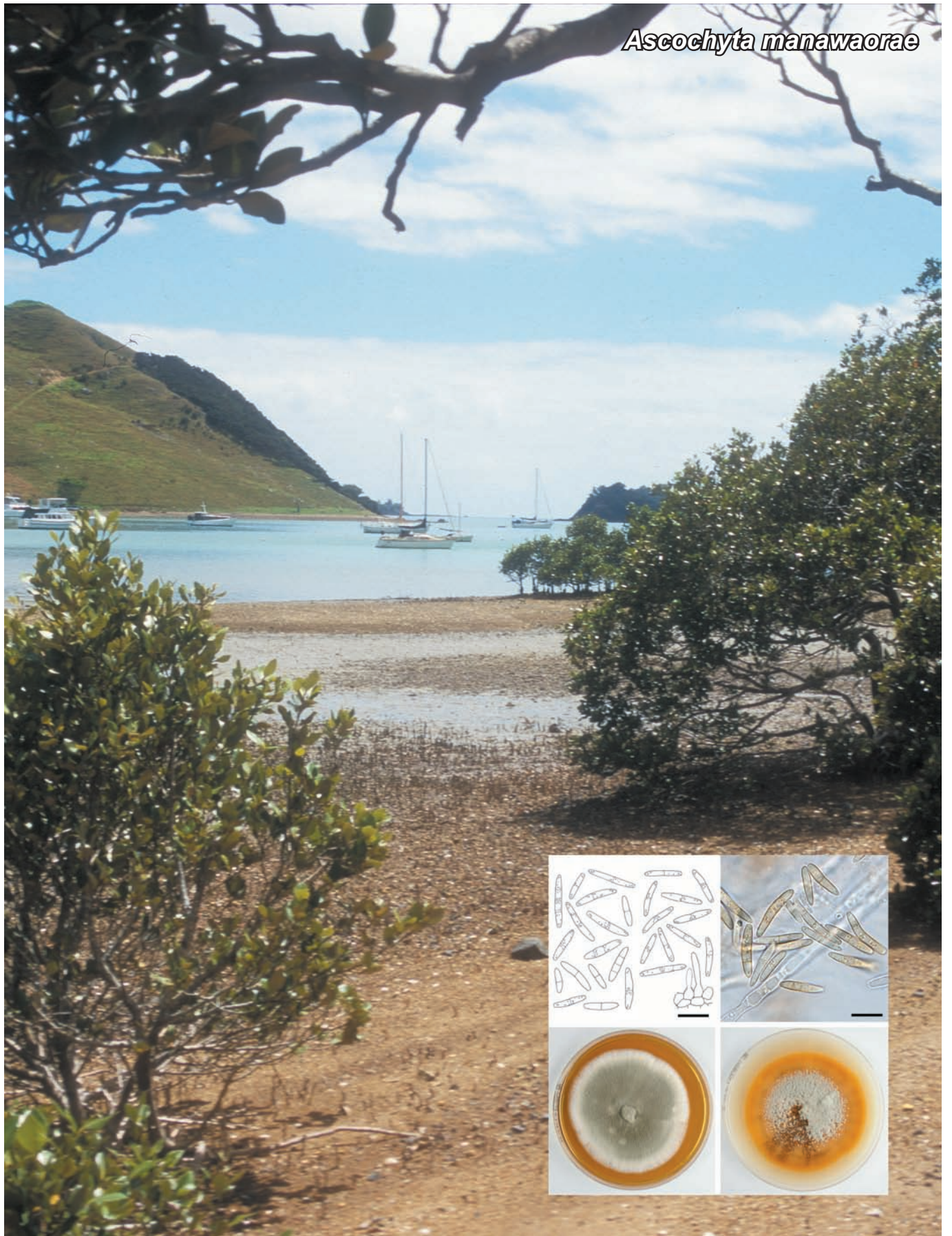
In 2003, I was invited to apply for, and was accepted as a Ph.D. student to work on the molecular phylogeny of presumably closely related subgenera of *Entoloma* with Dr Machiel Noordeloos at the NCBN in Leiden. Although the project focused



Ms Delia Co-David.

on mushrooms instead of the more familiar plants I knew, the project attracted me since it would allow me to study my subjects all the way from seeing them fruiting in their natural habitats during field work, all the way to reconstructing their phylogeny and evolutionary history. The thesis topic eventually incorporated the phylogeny of the family *Entolomataceae*, as well as studying the genus *Entoloma* at subgeneric and species level. The article 'Molecular phylogeny and spore evolution of *Entolomataceae*' is the first of a series of articles resulting from this work.

Ascochyta manawaorae



Fungal Planet 45 – 18 June 2010

***Ascochyta manawaorae* Verkley, Woudenberg & De Gruyter, sp. nov.**

Teleomorph. Unknown (anamorphic *Phaeosphaeriaceae*, based on molecular analysis).

Conidiomata pycnidialia, superficialia vel epidermide erumpentia, globosa, fusca vel atra, 100–200(–250) µm diam; ostiolum centrale, circulare, 10–15 µm diam. Cellulae conidiogenae discretae, determinatae, holoblasticae, interdum percurrentes et obscure annulatae, doliiformae vel breve ampulliformae, 3–5 × 4–7(–9) µm; conidia cylindrica, in medio septata, rare 2–3-septata, pallide lutescens vel olivacescens, 12–19 × 2–3 µm.

Etymology. Named after the village of Manawaora near the type locality, Bay of Islands, New Zealand.

Conidiomata (in vivo) pycnidial, superficial or erumpent from the epidermis, globose, dark brown to black, 100–200(–250) µm diam; ostiole central, circular, 10–15 µm diam, surrounded by dark brown, thick-walled cells; pycnidial wall composed of three cell layers of *textura angularis*, the outer layer with brown cells, with up to 1 µm thick walls, the inner cell layers with hyaline walls. **Conidiogenous cells** discrete, determinate, holoblastic, occasionally proliferating percurrently and indistinctly annellate, doliiform or short-ampulliform, 3–5 × 4–7(–9) µm. **Conidia** cylindrical, medianly 1-septate, rarely 2–3-septate, slightly constricted around the septa, widest near the middle of the basal cell, apical cell narrowing gradually towards the pointed tip, basal cell with a truncate base, the wall thin, smooth, becoming pale yellow to olivaceous, each cell containing a few small oil droplets, 12–19 × 2–3 µm.

Culture characteristics — (in diffuse daylight, 15 °C, nuv, 12 h rhythm, colours according to Rayner¹): Colonies on oatmeal agar reaching 26 mm diam in 7 d (85 mm in 21 d), spreading, with an even, glabrous, at first colourless, later orange margin; colony spreading, immersed mycelium ochreous to fulvous, the surface partly covered by a dense mat of woolly glaucous aerial mycelium; reverse first ochreous to fulvous around the centre, later umber, surrounded by sienna and orange concentric zones. Colonies on CMA as on OA, but reverse first honey to isabelline in the centre, later chestnut to bay, surrounded by umber and ochreous concentric zones. Colonies on MEA reaching 24 mm diam in 7 d (75 mm in 21 d), spreading, with an even, glabrous, first buff, then rosy buff margin; colony surface as on OA, but mouse grey to glaucous, reverse cinnamon to fawn, darkening in the centre to chestnut. **Conidia** as *in planta*, but more frequently 2–3-septate (about 50%), 10–23.5 × 2–3.5 µm (on malt extract agar, diffuse daylight, 18 °C).

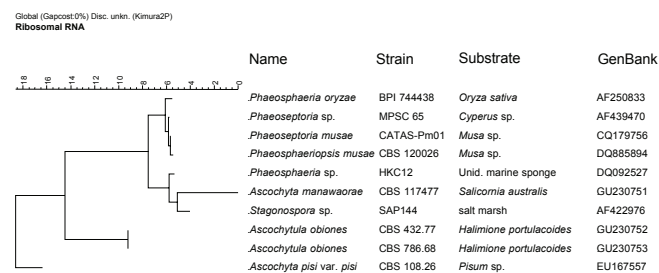
Typus. NEW ZEALAND, North Island, Northland, Bay of Islands area, Manawaora near Russell, on dead leaves and stems of *Salicornia australis*, on the border of a mangrove vegetation, 30 Jan. 2003, G. Verkley 2022b; PDD 98412 holotype, culture ex-type CBS 117477 = ICMP 18292, ITS sequence GenBank GU230751, MycoBank MB497140.

Notes — No teleomorph was observed that could be associated with *A. manawaorae*. Based on ITS rDNA analysis, the genetically closest teleomorphs are members of the genus *Phaeosphaeria* (*Phaeosphaeriaceae*, type species *P. oryzae*). Our fungus is morphologically close to species that have been described in the coelomycete genus *Ascochyta*. Although it is not closely related to *A. pisi*, the type species of the genus *Ascochyta*, it is described here in this genus pending further work to resolve the various lineages of *Ascochyta*-like anamorphs, for which new generic names need to ultimately be proposed. Several *Ascochyta* species have thus far been described from the host genus *Salicornia*. These include *A. salicorniae-patulae* and *A. salicorniae*. Different taxonomic opinions about the status and placement of these taxa have been formulated^{2,3}. The conidia of *A. salicorniae*, 1–3-septate, are much wider, 10–19(–20) × 4–7 µm, than those of *A. manawaorae*, and are surrounded by a mucilaginous sheath². *Ascochyta salicorniae* is a widespread species, but it is not known from Australia or New Zealand. The conidia of *A. salicorniae-patulae* are cylindrical, rounded at both ends, 1-septate, sometimes with a somewhat narrowed lower cell, not or slightly constricted at the septum, and smaller, 9–14 × 3.5–4 µm³. The conidia of *A. manawaorae* become considerably longer and are narrower than those of *A. salicorniae-patulae*, and rarely become 2–3-septate in planta. *Ascochyta* species found on other members of the plant family *Chenopodiaceae* also differ in conidial sizes from *A. manawaorae*^{3,4}. *Ascochyta obiones* (syn. *Ascochyta obiones*), which is found on *Halimione portulacoides* in saline habitats in Europe, is morphologically quite similar to *A. manawaorae* in conidial pigmentation and septation, and conidiogenesis⁵, but genetically it is rather distant. The conidia of *A. obiones* are, however, shorter and wider, (8–)9–12(–14) × (3–)3.5–4.5(–6) µm⁵, than those of *A. manawaorae*. Based on the aforementioned morphological differences with *A. salicorniae-patulae* and the genetic difference with *A. obiones*, *A. manawaorae* is described here as a new species.

Acknowledgements Dr Peter R. Johnston, Landcare Research, Auckland, is thanked for arranging collecting permits. The Johanna Westerdijkfonds is acknowledged for financially supporting the foray, and Dr Vadim Mel'nik is kindly acknowledged for critically reading of an earlier version of the manuscript.

Colour illustrations. Mangrove vegetation on the coast near Manawaora, where the fungus was collected from the host *Salicornia australis*; line drawing of conidia on MEA (CBS 117747; left) and holotype (right); conidia and conidiogenous cells on OA; 3 wk old colony on MEA and OA. Scale bars = 10 µm.

References. ¹Rayner RW. 1970. A mycological colour chart. Commonwealth Mycological Institute, Kew. ²Kohlmeyer J, Kohlmeyer E. 1979. Marine mycology. The higher fungi. Academic Press, New York. ³Mel'nik VA. 1977. Opredelitel' grubov roda *Ascochyta* Lib. Izdatel'stvo Nauka. Leningrad. ⁴Mel'nik VA. 2000. Key to the fungi of the genus *Ascochyta* Lib. (Coelomycetes). Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft Berlin-Dahlem 379: 1–192. ⁵Buchanan PK. 1987. A reappraisal of *Ascochyta* and *Ascochyta* (Coelomycetes). Mycological Papers 156: 1–83.



Neighbour-joining tree constructed using Bionumerics v. 4.61 (Applied Maths, St-Marthens-Lathem, Belgium). Gaps are treated as missing data, and the Kimura 2-correction mode was selected. The tree was rooted with *Ascochyta pisi* (CBS 108.26).

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Rhizodermea veluwensis



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Rhizodermea Verkley & Zijlstra, *gen. nov.*

Mycelium radices vivas plantarum incolens, stromata e textura angulari-globulosa composita et chlamydosporas terminales vel intercalares, globosas ad ellipsoideas, 0–1-septatas producens in cultura axenica. Species ad *Dermateaceae*, *Helotiales*, *Leotiomycetes*, *Ascomycota* pertinentes.

Etymology. *Rhizo*, referring to the root of the host that the fungus colonises; *dermea* to the teleomorph genus *Dermea* to which the genus is related.

Mycelium colonising living roots of plants, producing stromata composed of *textura angularis-globosa*, and terminal or intercalary, globose to ellipsoid, 0–1-septate chlamydospores in axenic culture. Species belonging in *Dermateaceae*, *Helotiales*, *Leotiomycetes*, *Ascomycota*.

Type species. *Rhizodermea veluwensis*.
Mycobank MB518022.

Rhizodermea veluwensis Verkley & Zijlstra, *sp. nov.*

Mycelium ex hyphis hyalinis septatis, 1.5–2.5(–3) µm latis, deinde 5.5–8.5 µm latis compositum. Stromata in coloniis aetate 2–4 menses formata, 3 mm lata et 1 mm alta, e textura angulari-globulosa composita. Chlamydosporae terminales globosae ad limoniformes, continuae, raro in medio uniseptatae, 18–25 µm diam, vel cylindricae ad ellipsoideae et plerumque terminales, raro intercalares.

Etymology. Name refers to the Veluwe, an area rich in forest and heathland in the centre of the Netherlands where the type locality and other known localities of this species are situated.

Mycelium at first mainly composed of hyaline, septate, 1.5–2.5(–3) µm wide hyphae, later also 5.5–8.5 µm wide, first hyaline, then pale yellowish brown and septate. After 2–3 weeks hyphal masses appear at the colony surface consisting of entangled hyphal chains of isodiametric cells inflated to 10 µm diam, with a few large oil droplets. On the outer surface of hyphal walls pustules of non-translucent, dark orange-brown, amorphous material with a rough surface are deposited. Stromata developing in colonies after 2–4 months on oatmeal agar¹ (OA) and cornmeal agar¹ (CMA) becoming up to 3 mm wide and 1 mm high, with a dark brick to almost black surface covered with a dense mat of straw, sulphur-yellow to citrine hyphae, inside mainly composed of hyaline *textura angularis-globosa*. From these stromata clear, cinnamon droplets are released, but they remain sterile. *Chlamydospores* terminal and globose to limoniform, continuous, rarely medianly 1-septate, with a hyaline to yellowish wall up to 2 µm thick often ornamented with pale yellow warts, 18–25 µm diam; in addition, more elongated, cylindrical to ellipsoid, mostly terminal, rarely intercalary chlamydospores are also formed. Where chlamydospores are numerous the colony surface has a powdery aspect.

Culture characteristics — At 18 °C under nuv in a daily rhythm of 12 h nuv and 12 h darkness (colours according to Rayner²). — Colonies on malt extract agar¹ (MEA) 45–48(–68) mm in 24 d, with a crenulate, colourless to vinaceous-buff margin; colony surface radially creased or plane, mostly covered by

a dense, felty layer of primrose to pale honey aerial mycelium; immersed mycelium fawn to brown-vinaceous; reverse sepia to brown-vinaceous or cinnamon. Colonies on OA reaching 70–85 mm diam in 24 d, with an irregularly ruffled, colourless, glabrous margin; colony surface largely covered with a diffuse to dense, low, woolly to cottony, buff aerial mycelium with pale ochreous to pale apricot tinges developing in a submarginal zone; immersed mycelium mostly buff, but in sectors and near the margin often also fawn to olivaceous-buff to citrine-green; reverse concolorous. After 2–3 months the surface of the colony becomes predominantly cinnamon or rosy-buff, sometimes with patches of straw or citrine. Colonies on CMA reaching 75 mm diam in 24 d, with an irregularly ruffled, colourless, glabrous margin; colony surface largely covered with a diffuse to dense, low, woolly to cottony, buff aerial mycelium showing throughout a more or less distinct pale ochreous to pale apricot haze; immersed mycelium a mixture of olivaceous and amber tinges, towards the margin more bright yellowish, reverse predominantly amber, locally and in the centre hazel.

Typus. THE NETHERLANDS, National Park De Hoge Veluwe, Deelense Veld, isolated from surface-sterilised root of *Erica tetralix*, Nov. 2000, *J. Zijlstra*, CBS 110605 (JA 222; GenBank HM002555), holotype (metabolically inactive preservations), MycoBank MB518023.

Other strains from surface-sterilised roots by *J. Zijlstra*, Nov. 2000. THE NETHERLANDS, Dwingelderveld, *E. tetralix*, CBS 110608 (JA 329; GenBank HM002556), CBS 110610 (JA 340; GenBank HM002557); same loc., *Empetrum nigrum*, Nov. 2000, CBS 110611 (JA 373; HM002558); Hoog Buurlo, Hoog Buurlosche Heide, *Vaccinium myrtillus*, CBS 110618 (JA476; GenBank HM002563); same loc., *V. vitis-idaea*, CBS 110652 (JA 386; GenBank HM002559); same loc., in oakwood, *Vaccinium myrtillus*, CBS 110613 (JA 444; GenBank HM002560), CBS 110614 (JA 446; GenBank HM002561), CBS 110615 (JA 447; GenBank HM002562). — GERMANY, Niedersachsen, Landkreis Wolfenbüttel, Elm near Evessen, isolated from root of *Larix decidua*, May 1994, *V. Kehr & B. Schulz* (A.K. Römmert 4056), CBS 111537 (GenBank HM008380).

Notes — See MycoBank MB518023.

References. ¹Crous PW, Verkley GJM, Groenewald JZ, Samson RA (eds). 2010. CBS Laboratory Manual 1: Fungal Biodiversity. CBS, Utrecht. ²Rayner RW. 1970. A mycological colour chart. Commonwealth Mycological Institute, Kew.

Colour illustrations. Three weeks old cultures on MEA, OA (middle), and CMA (bottom); One-septate chlamydospore; smooth-walled, 0-septate chlamydospores; warted chlamydospores; hypha transformed to a chain of pigmented, isodiametric inflated cells; amorphous material deposited on the outer surface of hyphae; inner tissue of sterile stroma on OA. Scale bars = 10 µm.

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Zasmidium scaevolicola



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Zasmidium scaevolicola R.G. Shivas, McTaggart, A.J. Young & Crous, *sp. nov.*

Maculae foliorum amphigenae, circulares ad irregulares, usque ad 2 cm diametro, canae ad brunneolas, margine atrorubella-brunnea cinctae. *Conidiomata* sporodochialia, amphigena, abundissima in superiore pagina foliorum, pulvinata, atrorubella-brunnea. *Mycelium* internum. *Stromata* erumpentia, usque ad 75 µm diametro. *Conidiophora* numerosa, compacta, in fasciculis densis tegentibus stromatum paginam, erecta, subcylindracea ad geniculata-sinuosa, haud ramosa, 20–80 × 3–3.5 µm, usque ad 10 septata, rosea-brunnea, apices pallidiores, paries levis. *Cellulae conidiogenae* terminales, brunneolae, proliferatio sympodialis, cicatrices conspicuae, terminales, laterales, incrassatae, fuscatae, subdenticulatae. *Conidia* solitaria vel in catenis breviramosis, subcylindracea ad fusioidea, recta ad paulum curvata, pallidissima ad brunneola, 12–70 × 2.5–4 µm, 0–5-septata, verruculosa, fines rotundati, hila paulum incrassata et fuscata.

Etymology. Name derived from the host plant genus, *Scaevola* (Goodeiaceae).

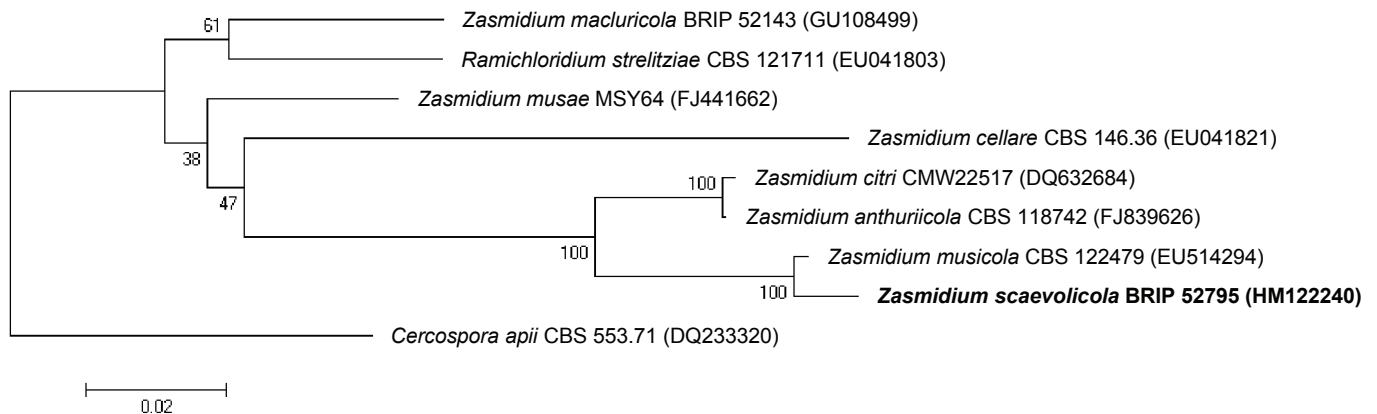
Leaf spots amphigenous, circular to irregular, up to 2 cm diam, grey to pale brown, surrounded by a dark reddish brown border. *Conidiomata* sporodochial, amphigenous, most abundant on upper leaf surface, pulvinate, dark reddish brown. *Mycelium* internal. *Stromata* erumpent, up to 75 µm diam. *Conidiophores* numerous, compact, in dense fascicles covering the surface of the stromata, erect, subcylindrical to geniculate-sinuuous, unbranched, 20–80 × 3–3.5 µm, up to 10-septate, pale reddish brown, tips paler, wall smooth. *Conidiogenous cells* terminal, pale brown, proliferation sympodial, scars conspicuous, terminal and lateral, thickened, darkened, subdenticulate. *Conidia* solitary or in short branched chains, subcylindrical to fusoid, straight to slightly curved, very pale to light brown, 12–70 × 2.5–4 µm, 0–5-septate, verruculose, ends rounded, hila slightly thickened and darkened.

Typus. AUSTRALIA, Queensland, Cape Tribulation, 16°04'02" S 145°27'50.9" E, *Scaevola taccada* (Gaertn.) Roxb., 8 Aug. 2009, R.G. Shivas & P.W. Crous, BRIP 52795, holotype, CBS H-20455, isotype; culture ex-type CPC 17344 = CBS 127009, ITS sequence GenBank HM122240, MycoBank MB518300.

Other specimens examined. Thornton's Beach, 2 Sept. 1977, J.H. Simmonds, BRIP 12368; same loc., 1 Oct. 1979, J.H. Simmonds, BRIP 13098; Cape Tribulation, 30 Sept. 1979, J.H. Simmonds, BRIP 13097; Potters Creek, Wongaling Beach, Sept. 1993, H.Y. Yip, BRIP 21434; same loc., 27 Nov. 1993, H.Y. Yip, BRIP 21479; same loc., 17 Apr. 1994, H.Y. Yip, BRIP 22037; Cape Tribulation, 18 Dec. 2009, R.G. Shivas & A.R. McTaggart, BRIP 50073.

Notes — *Zasmidium* is a paraphyletic genus within the *Mycosphaerellaceae*¹. *Zasmidium* s.str. has verruculose conidia that are formed singly or in chains, with planate, *Cercospora*-like scars. Morphological and DNA sequence data indicate that *Z. scaevolicola* belongs to the *Zasmidium* s.str. complex, which is currently unresolved¹. Only two cercosporoid hyphomycetes, *Pseudocercospora scaevolae* and *Cercospora scaevolae*, have been previously reported on *Scaevola*². *Zasmidium scaevolicola* differs from *P. scaevolae* and *C. scaevolae* (syn. *Ramularia scaevolae*), which both have smooth, solitary conidia^{2,3}.

BLASTn results of the ITS sequence of *Z. scaevolicola* (GenBank HM122240) had high identity to sequences of *Z. musicola* (as *Stenella musicola*) (EU514294, 99 % identical over 100 % query coverage), and *Zasmidium citri* (as *Mycosphaerella citri*) (DQ632684, 95 % identical over 100 % query coverage). Genomic DNA of *Z. scaevolicola* (holotype) is stored in the Australian Biosecurity Bank (www.padi.gov.au/pbt/).



An ITS neighbour-joining tree constructed using MEGA4. Distances were computed using Maximum Composite Likelihood from 453 positions in the dataset. Bootstrap values are from 1 000 replicates. Scale bar shows 0.02 changes per site. The tree was rooted to *Cercospora apii* (DQ233320).

Colour illustrations. *Scaevola taccada* at Cape Tribulation, northern Queensland; leaf with spots caused by *Z. scaevolicola*; leaf spots; conidia; conidiophores. Scale bars (from top to bottom) = 1 cm, 1 mm, 10 µm, 10 µm.

References. ¹Crous PW, Summerell BA, Carnegie AJ, Wingfield MJ, Hunter GC, Burgess TI, Andjic V, Barber PA, Groenewald JZ. 2009. Unravelling *Mycosphaerella*: do you believe in genera? *Persoonia* 23: 99–118. ²Braun U, Mouchacca J, McKenzie EHC. 1999. Cercosporoid hyphomycetes from New Caledonia and some other South Pacific islands. *New Zealand Journal of Botany* 37: 297–327. ³Braun U. 1992. Taxonomic notes on some species of the *Cercospora*-complex. *Nova Hedwigia* 55: 211–221.

Pseudocercospora adansoniae



Fungal Planet 48 – 18 June 2010

***Pseudocercospora adansoniae* McTaggart & R.G. Shivas, sp. nov.**

Maculae foliorum amphigenae, angulares ad irregulares, marginatae venis foliorum, confluentes, brunneae, 1–8 mm longae, fructus hypophyllus. *Mycelium* internum. *Conidiophora* erumpentia per stomata, in fasciculis triginta vel pluribus, interdum ramosa, 0–1-septa, plerumque aseptata, largeniformia ad ampulliformia ad interdum cylindracea, recta ad aliquando geniculata, 15–27 µm longa et 2–4 µm lata, basi usque ad 8 µm lata. *Cellulae conidiogenae* terminales, brunneolae, apice rotundato, percurrentes (usque ad tres annellations); cicatrices inconspicuae. *Conidia* solitaria, pallidissima ad brunneola, levia, recta ad interdum curvata, cylindracea ad obclavata, apice rotundato, basi attenuata ad obconice truncatam, 1–5-septata, 25–62 × 3–5 µm; hila inconspicua.

Etymology. Derived from the name of the host plant genus, *Adansonia*.

Leaf spots amphigenous, angular to irregular, bordered by leaf veins, confluent, brown, 1–8 mm long, fruiting hypophyllous. *Mycelium* internal. *Stromata* erumpent through stomata, up to 75 µm wide. *Conidiophores* in dense fascicles of 30 or more, sometimes branched, 0–1-septa, mostly aseptate, lageniform to ampulliform to sometimes cylindrical, straight to occasionally geniculate, 15–27 µm long and 2–4 µm wide, up to 8 µm wide at base. *Conidiogenous cells* terminal, pale brown, rounded at apex, percurrent (with up to 3 annellations), conidiogenous loci (scars) inconspicuous. *Conidia* solitary, very pale to light brown, smooth, straight to sometimes curved, cylindrical to obclavate, apex rounded, base attenuated to obconically truncate, 1–5-septate, 25–62 × 3–5 µm; hila neither thickened nor darkened.

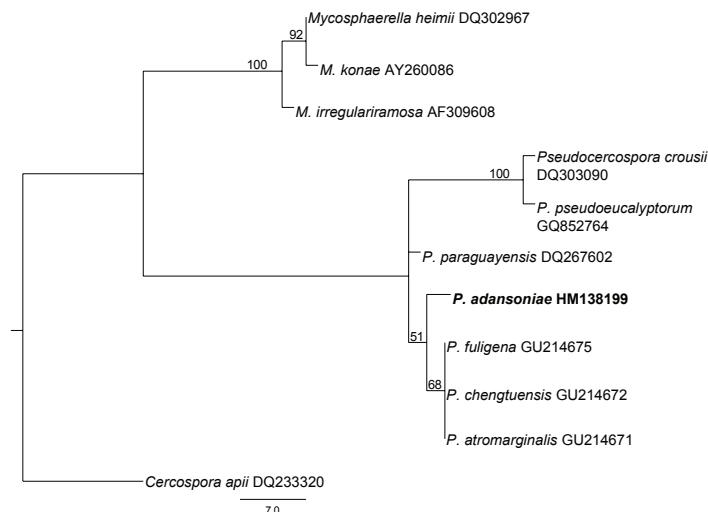
Culture characteristics — Colonies on potato-dextrose agar (Difco) circular, up to 14 mm diam after 21 d at 25 °C; greyish black to black; reverse black; velvety, flat with a raised central dome of dense aerial mycelium, margin entire, smooth.

Typus. AUSTRALIA, Western Australia, near Kununurra, 15°42'48" S, 128°45'21" E, *Adansonia gregorii*, 31 Aug. 2009, J.D. Ray 859, BRIP 53110, holotype; ITS sequence GenBank HM138199, MycoBank MB518299.

Notes — *Adansonia* is classified in the subfamily *Bombacoideae* in the *Malvaceae* family¹. Five cercosporoid fungi have been described from hosts in the *Bombacoideae*, viz. 1) *Cercospora ceibae*, which is morphologically similar to *C. apii* s.l.²; 2) *Pseudocercospora eriodendri* on *Eriodendron*, which differs from *P. adansoniae* in having longer (10–40 µm) cylindrical conidiophores^{2,3}; 3) *P. eriothecae* on *Eriotheca*, which has variable shaped conidiophores that proliferate sympodially rather than by annellides as in *P. adansoniae*⁴; 4) *P. pseudobombacis* on *Pseudobombax* sp., which has multiseptate and wider conidia than *P. adansoniae*⁴; and 5) *P. pachirae*, which is morphologically similar to *P. adansoniae*, except for conidiophores of uniform-width and much thinner conidia (1.5–3 µm)^{2,3}.

BLASTn results of the ITS sequence of *P. adansoniae* (GenBank HM138199) had high identity to sequences of *P. fuliginea* on *Lycopersicum* sp. (GU214675.1, 99 % identical over 100 % query coverage), *P. chengtuenensis* on *Lycium chinense* (GU214672.1, 99 % identical over 100 % query coverage) and *P. atromarginalis* on *Solanum nigrum* (GU214971.1, 99 % identical over 100 % query coverage). These taxa of high sequence identity were from Thailand and South Korea. Genomic DNA of *P. adansoniae* (holotype) is stored in the Australian Biosecurity Bank (www.padiil.gov.au/pbt/).

Acknowledgements JR acknowledges Peter Fox and Denise Hales (Boabs in the Kimberley) for their assistance and samples. We thank Andrew Geering for use of the background photograph.



The single tree (TL = 99; CI = 0.919; RI = 0.929; RC = 0.854) obtained using parsimony in an exhaustive search from an ITS sequence alignment using PAUP v4.0b10. The bootstrap support values from 1 000 replicates are shown at the nodes. The species described here is printed in **bold face**. The tree was rooted to *Cercospora apii* (GenBank DQ233320.1). A tree with the same topology was obtained from a maximum likelihood analysis in PAUP. *Pseudocercospora* was shown in a molecular phylogenetic analysis to be a polyphyletic genus with two distinct clades⁵. *Pseudocercospora adansoniae* occurs in the *seudocercospora* s.str. clade, having conidiophores in dense fascicles that proliferate percurrently with inconspicuous scars from conidial secession.

Colour illustrations. *Adansonia gregorii* (aka boabab), near Kununurra, Western Australia; leaves with lesions caused by *P. adansoniae*; caespituli on leaf spots; stroma with conidiophores; conidia. Scale bars (from left to right) = 1 cm, 25 mm, 10 µm, 10 µm.

References. ¹Stephens PF. 2001. Angiosperm Phylogeny Website. Version 9, June 2008. ²Crous PW, Braun U. 2003. Mycosphaerella and its anamorphs. CBS Biodiversity Series 1: 1–571. ³Chupp C. 1954. A monograph of the fungus genus *Cercospora*. Published by the author: Ithaca, New York. ⁴Hernandez-Gutierrez A, Dianese JC. 2008. New cercosporoid fungi from the Brazilian Cerrado 1. Species on hosts of the families Anacardiaceae, Araliaceae, Bombacaceae, Burseraceae and Celastraceae. Mycotaxon 106: 41–63. ⁵Crous PW, Summerell BA, Carnegie AJ, Wingfield MJ, Hunter GC, Burgess TI, Andjic V, Barber PA, Groenewald JZ. 2009. Unravelling Mycosphaerella: do you believe in genera? Persoonia 23: 99–118.

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Phytophthium sindhum



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***Phytophythium* Abad, de Cock, Bala, Robideau, Lodhi & Lévesque, gen. nov.**

Sporangia globosa ad ovoidea, cum papilla et tamen saepe interne proliferantia (phytophthoroida); emissioe zoosporarum pythioide. *Phytophythium* ex speciebus *Pythii* cladii K in Lévesque & de Cock (2004)¹ formatur.

Etymology. Phylogenetically between *Pythium* and *Phytophthora*.

Sporangia globose to ovoid, often with papilla and often proliferating internally (*Phytophthora*-like). Zoospore discharge is *Pythium*-like: the sporangium forms a discharge tube through which the contents moves out and forms a vesicle at the tip with an undifferentiated mass of protoplasm which then differentiates

into biflagellate zoospores. Most species have large, smooth oogonia, thick-walled oospores, and 1–2 elongate or lobate antheridia, laterally applied to the oogonium. *Phytophythium* comprises the *Pythium* species from clade K in Lévesque & de Cock¹, and is morphologically and phylogenetically between *Pythium* and *Phytophthora*.

Type species. *Phytophythium sindhum*.
Mycobank MB517068.

***Phytophythium sindhum* Lodhi, Shahzad & Lévesque, sp. nov.**

Sporangia subglobosa, terminalia, unilateraliter intercalaria vel intercalaria, proliferantia, 15 × 20–35 × 40 µm, saepe cum papilla. Tubi emittentes brevissimi, 5 × 8 µm diam. Zoosporae incystatae 10 µm diam. Oogonia globosa, laevia, terminalia et unilateraliter intercalaria, 30–39 (av. 34.5) µm diam. Oogonia plerumque monospora (99 %) raro bispora. Oosporae laeves, pleroticae vel apertoticae, 30–38 µm diam. Parietis oosporae 4–5 (av. 4.5) µm diam. Indice apertotico 91 %, indice parietis 59 %.

Etymology. Name refers to the province Sindh from where this species was frequently isolated.

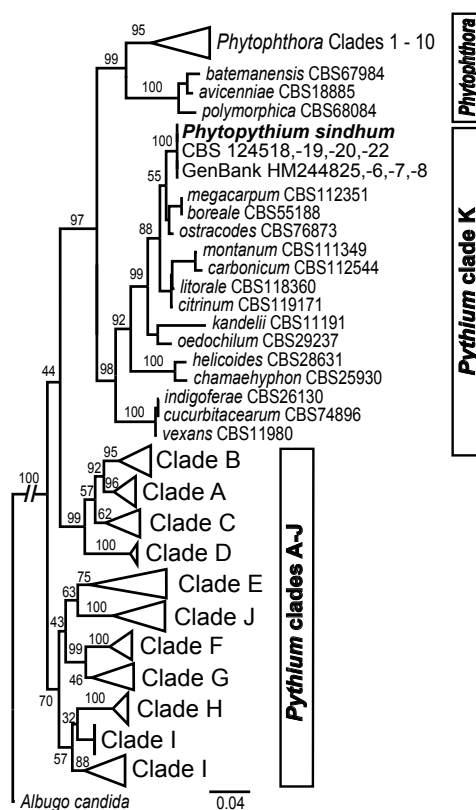
Sporangia subglobose, terminal, occasionally unilaterally intercalary or intercalary, proliferating and of variable size, ranging from 15 × 20–35 × 40 µm; under stress conditions they germinate directly via several germ tubes; a papilla is frequently associated with the sporangia; abundant zoospore discharge occurred at room temperature after washing, followed by half an hour cold shock; discharge tubes are very short, 5 × 8 µm; zoospores after encystment up to 10 µm diam. *Oogonia* globose, smooth, laterally on a short stalk, occasionally terminal and unilaterally intercalary; 30–39 (av. 34.5) µm diam; oogonia are mostly monosporous (> 99 %) but occasionally bisporous. *Antheridia* diclinous as well as monoclinal, elongate, more or less lengthwise applied but crook necked, making narrow apical contact with the oogonium. *Oospores* are smooth, mostly plerotic or nearly plerotic, occasionally apertotic, 30–38 (av. 34) µm. Oospore wall very thick, ranging from 4–5 (av. 4.5) µm.

Culture characteristics — *Phytophythium sindhum* produces thick, white, cottony growth on potato-dextrose agar (PDA), on potato-carrot agar (PCA) white aerial mycelium, on cornmeal agar (CMA) submerged mycelium and on cornmeal-dextrose agar (CMDA) a light rosette pattern. Colony diameter after one day at 25 °C on PDA 28.5 mm, PCA 28 mm, CMA 28.5 and CMDA 37.5 mm. The optimum growth temperature was 35 °C but it could not grow at 40 °C.

Holotypus. PAKISTAN, Sindh, District Sanghar, Shahpur Chakar, 25°55' N, 68°58' E, banana rhizosphere, 20 Nov. 2005, *M. Lodhi*, CBS 124518 (cryo-preserved). Ex-type culture also deposited as DAOM 238986 in the CCFC. GenBank HM244825 (ITS & LSU) and HM244822 (Cox1), MycoBank MB517069. Additional strains are listed in Table 1 (see MycoBank).

Colour illustrations. Collection site in Pakistan, banana field; Proliferating sporangium in water culture, swimming zoospores in a vesicle; Sporangium with 2 papilla; Oospore with monoclinal antheridium. Scale bars = 10 µm.

Notes — See MycoBank MB517069.



Maximum likelihood analysis using GTR model with PhyML² of the LSU (D1-D3, alignment length 1 384 bp) with close to 100 *Phytophthora* species, 150 *Pythium* species and *Phytophythium sindhum* showed a strong bootstrap support (1 000 replicates) for *Phytophythium sindhum* sp. nov. and for the *Pythium* clade structure proposed by Lévesque & de Cock¹ (for more detailed tree see MycoBank MB17069).

References. ¹Lévesque CA, Cock AWAM de. 2004. Molecular phylogeny and taxonomy of the genus *Pythium*. Mycological Research 108: 1363–1383. ²Guindon S, Gascuel O. 2003. A simple, fast, and accurate algorithm to estimate large phylogenies by maximum likelihood. Systematic Biology 52: 696–704.

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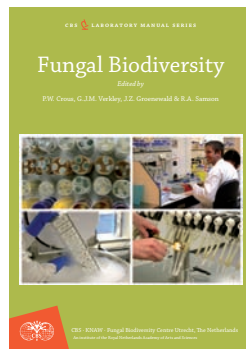
Book Review

Crous PW, Verkley GJM, Groenewald JZ, Samson RA (eds). 2009. *Fungal Biodiversity*. CBS Laboratory Manual Series 1. Pp. 269; hard cover, 59 colour and 3 black & white plates, 100 line drawings. Price 50 €. CBS-KNAW Fungal Biodiversity Centre, Utrecht, The Netherlands. ISBN 978-90-70351-77-9. www.cbs.knaw.nl

This is the first of a new series from CBS named the *CBS Laboratory Manual Series* which focuses on techniques involved in isolation, cultivation and morphological study of fungi. This first edition is based on the CBS annual mycological course and is the modern version of the CBS Laboratory Manual. This book however, is much more comprehensive than the predecessor, and is the perfect book for the teaching of the basic study of fungi.

The book has seven chapters starting with a brief introduction explaining what are fungi and how to study them. The second chapter, the fungal system, deals with important aspects for all mycologists: phenotypic, biological and phylogenetic species concepts – something every beginning mycologist should know. The next major section deals with divisions, orders and some families. Here I look more closely at the group close to my heart, the Ascomycetes, Division *Ascomycota* and particularly the coelomycetes as an example. This section begins with defining the main coelomycete characters and the important information behind this major group. It then goes on to illustrate some important coelomycete genera including *Colletotrichum*, *Phoma*, *Pestalotia* and *Pestalotiopsis*. The following entries are made under *Colletotrichum*; a brief review of the genus; characters of the genus; some important species, some great photographic plates; and a full page box detailing only *Colletotrichum gloeosporioides*. The data is up to date, thorough, and well illustrated.

Chapter III deals with general methods – the basic things you need to know when working with fungi. Aseptic work, safety,



single spore isolation, media preparation, microscopy, permanent mounts, drawing, stains, electron and fluorescence microscopy, growth studies, preservation of cultures, and herbarium techniques. Chapter IV deals with molecular and phylogenetics methods and is detailed enough to make a good introduction for beginners, and all potential molecular mycologists should be encouraged to read this. Chapter V deals with nomenclature and is fairly brief but covers the important points. Finally Chapter VI looks at studying ecological groups of fungi; symbionts and endophytes; soil fungi; water moulds; plant pathogens; seed fungi; saprobes on wood and dung; fungicolous fungi; entomogenous fungi; thermophiles and oligotrophs. These sections are brief and really provide an introduction. However, they refer you to other references and provide an idea for studying ecological groups of fungi. Chapter VII addresses applied mycology including fairly detailed methods to study important groups such as food-borne fungi, biodeterioration, mycotoxins, air and indoor fungi and medical fungi. Some are fairly detailed while others are briefly mentioned. Finally a detailed glossary (Chapter VIII), recipes for media (Chapter IX), references (Chapter X), major taxonomic arrangement (Chapter XI) and Index (Chapter XII) complete the book.

This is an excellent book and details the important items any beginner needs to know about the study of fungi. Although some sections are brief and refer one to other references the book is as complete as one could expect in a course book on mycology. Importantly the book brings mycology into the 21st century, using the techniques all modern publishers use to make the book look outstanding; highlighted sections; illustrations; boxes and well thought out headings. The illustrations and photomicrographs are outstanding, often breath taking but the important details (media recipes, stains) are also all there. The book is very well organised and easy to find ones way around and I highly recommend this book to anyone interested in mycology.

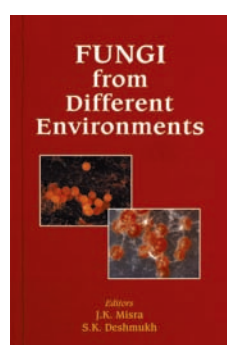
This hard back book is printed on excellent quality paper and the colour is fantastic. Every mycologist should have this in his laboratory and every teacher of mycology should have a few copies for teaching basic courses. All graduate students should read this at the start of their studies.

K.D. HYDE

New Title in Mycology

Misra JK, Deshmukh SK (eds). *Fungi from different environments*. Science Publisher, Enfield (USA). Pp. 405, hard cover. Price 109.00 US\$. ISBN 978-1-57808-578-1.

This book is the first in a series of four, dedicated to progress in mycological research. It presents, in 14 chapters, review papers on current progress in the field of fungi from different environments, written by specialists in the



respective fields. Subjects included are fungi from palao-environments, airborne fungi, marine filamentous fungi, a review on the genus *Achlya* in alkaline and sewage polluted aquatic systems, keratinic and keratinophilic fungi in sewage sludge, psychrophilic fungi, ammonia fungi, termite-associated fungi, hallucinogenic fungi, and thermophilic moulds in environmental management. A chapter is devoted to the environmental impacts on fatty acid composition of fungal membranes, and finally a review paper is presented on *Microsporium canis* and its control through environmental management.

Taxonomic novelties in this issue

Species	Gene loci sequenced
<i>Amniculicola immersa</i> Yin. Zhang, J. Fourn., Crous & K.D. Hyde, sp. nov. (p. 50)	LSU
<i>Ascochyta manawaorae</i> Verkley, Woudenberg & De Gruyter, sp. nov. (p. 129)	ITS
<i>Calonectria cerciana</i> L. Lombard, M.J. Wingf. & Crous, sp. nov. (p. 7)	ITS, TUB, H3
<i>Calonectria pseudoreteauidii</i> L. Lombard, M.J. Wingf. & Crous, sp. nov. (p. 8)	ITS, TUB, H3
<i>Calonectria queenslandica</i> L. Lombard, M.J. Wingf. & Crous, sp. nov. (p. 8)	ITS, TUB, H3
<i>Calonectria terrae-reginae</i> L. Lombard, M.J. Wingf. & Crous, sp. nov. (p. 9)	ITS, TUB, H3
<i>Collophora</i> Damm & Crous, gen. nov. (p. 64)	ITS, LSU, SSU, EF, GAPDH
<i>Collophora africana</i> Damm & Crous, sp. nov. (p. 65)	ITS, LSU, SSU, EF, GAPDH
<i>Collophora capensis</i> Damm & Crous, sp. nov. (p. 67)	ITS, LSU, SSU, EF, GAPDH
<i>Collophora paarla</i> Damm & Crous, sp. nov. (p. 67)	ITS, LSU, SSU, EF, GAPDH
<i>Collophora pallida</i> Damm & Crous, sp. nov. (p. 69)	ITS, LSU, SSU, EF, GAPDH
<i>Collophora rubra</i> Damm & Crous, sp. nov. (p. 69)	ITS, LSU, SSU, EF, GAPDH
<i>Coniochaeta africana</i> Damm & Crous, sp. nov. (p. 71)	ITS, LSU, SSU
<i>Coniochaeta prunicola</i> Damm & Crous, sp. nov. (p. 73)	ITS, LSU, SSU
<i>Cortinarius argyrius</i> Danks, T. Lebel & Vernes, sp. nov. (p. 113)	ITS
<i>Cortinarius basorapulus</i> Danks, T. Lebel & Vernes, sp. nov. (p. 115)	ITS
<i>Cortinarius caesibulga</i> Vernes, Danks & T. Lebel, sp. nov. (p. 116)	ITS
<i>Cortinarius cinereoroseolus</i> Danks, T. Lebel & Vernes, sp. nov. (p. 118)	ITS
<i>Cortinarius kaputarensis</i> Danks, T. Lebel & Vernes, sp. nov. (p. 120)	ITS
<i>Cortinarius maculobulga</i> Danks, T. Lebel & Vernes, sp. nov. (p. 121)	ITS
<i>Cortinarius nebulobrunneus</i> Danks, T. Lebel & Vernes, sp. nov. (p. 123)	ITS
<i>Cortinarius sinapivelus</i> Danks, T. Lebel & Vernes, sp. nov. (p. 124)	ITS
<i>Devriesia pseudoamericana</i> Jana Frank, B. Oertel, Schroers & Crous, sp. nov. (p. 97)	ITS, LSU, SSU, EF
<i>Houjia</i> G.Y. Sun & Crous, gen. nov. (p. 33)	ITS, LSU
<i>Houjia pomigena</i> Batzer & Crous, sp. nov. (p. 33)	ITS, LSU
<i>Houjia yanglingensis</i> G.Y. Sun & Crous sp. nov. (p. 34)	ITS, LSU
<i>Microcyclospora</i> Jana Frank, Schroers & Crous, gen. nov. (p. 99)	ITS, LSU, SSU, EF
<i>Microcyclospora malicola</i> Jana Frank, Schroers & Crous, sp. nov. (p. 99)	ITS, LSU, SSU, EF
<i>Microcyclospora pomicola</i> Jana Frank, B. Oertel, Schroers & Crous, sp. nov. (p. 100)	ITS, LSU, SSU, EF
<i>Microcyclospora tardicrescens</i> Jana Frank, Schroers & Crous, sp. nov. (p. 100)	ITS, LSU, SSU, EF
<i>Microcyclosporella</i> Jana Frank, Schroers & Crous, gen. nov. (p. 101)	ITS, LSU, SSU, EF
<i>Microcyclosporella mali</i> Jana Frank, Schroers & Crous, sp. nov. (p. 101)	ITS, LSU, SSU, EF
<i>Neoerysiphe hiratae</i> Heluta & S. Takam., sp. nov. (p. 87)	ITS, LSU
<i>Neoerysiphe joerstadii</i> Heluta & S. Takam., sp. nov. (p. 87)	ITS, LSU
<i>Neoerysiphe nevoi</i> Heluta & S. Takam., sp. nov. (p. 89)	ITS, LSU
<i>Neoerysiphe nevoi</i> var. <i>scolymi</i> Heluta & S. Takam., var. nov. (p. 90)	ITS, LSU
<i>Ophiostoma zambiensis</i> Roets, M.J. Wingf. & Z.W. de Beer, sp. nov. (p. 24)	ITS, TUB
<i>Ophiostoma protea-sedis</i> Roets, M.J. Wingf. & Z.W. de Beer, sp. nov. (p. 24)	ITS, TUB
<i>Phaeomoniella dura</i> Damm & Crous, sp. nov. (p. 73)	ITS, LSU, SSU
<i>Phaeomoniella effusa</i> Damm & Crous, sp. nov. (p. 75)	ITS, LSU, SSU
<i>Phaeomoniella prunicola</i> Damm & Crous, sp. nov. (p. 75)	ITS, LSU, SSU
<i>Phaeomoniella tardicola</i> Damm & Crous, sp. nov. (p. 77)	ITS, LSU, SSU
<i>Phaeothecoidiella</i> Batzer & Crous, gen. nov. (p. 30)	ITS, LSU
<i>Phaeothecoidiella illinoisensis</i> Batzer & Crous, sp. nov. (p. 32)	ITS, LSU
<i>Phaeothecoidiella missouriensis</i> Batzer & Crous, sp. nov. (p. 32)	ITS, LSU
<i>Phytopythium</i> Abad, de Cock, Bala, Robideau, Lodhi & Lévesque, gen. nov. (p. 137)	ITS, LSU
<i>Phytopythium sindhum</i> Lodhi, Shahzad & Lévesque, sp. nov. (p. 137)	ITS, LSU
<i>Pseudocercospora adansoniae</i> McTaggart & R.G. Shivas, sp. nov. (p. 135)	ITS
<i>Rhizodermea</i> Verkley & Zijlstra, gen. nov. (p. 131)	ITS
<i>Rhizodermea veluwensis</i> Verkley & Zijlstra, sp. nov. (p. 131)	ITS
<i>Roselliniella euparmeliicola</i> Millanes & D. Hawksw., sp. nov. (p. 13)	LSU
<i>Sporidesmajora</i> Batzer & Crous, gen. nov. (p. 35)	ITS, LSU
<i>Sporidesmajora pennsylvaniensis</i> Batzer & Crous, sp. nov. (p. 35)	ITS, LSU
<i>Zasmidium scaevolicola</i> R.G. Shivas, McTaggart, A.J. Young & Crous, sp. nov. (p. 133)	ITS