

*Macalpinomyces mackinlayi*



Fungal Planet 37 – 23 December 2009

***Macalpinomyces mackinlayi* McTaggart & R.G. Shivas, sp. nov.**

Sori in nonnullis ovarii inflorescentiae, longe cylindrici, 10–35 × 1.0–1.5 µm, primo virides tum cinerei. Sporae globosae, subglobosae vel late ellipsoideae, 9–13 × 8–12 µm, luteobrunneae; paries aequalis, dense opertus conicis spinis 1–2 µm altis. Cellulae steriles in catervis irregularibus, cellulae singulae globosae, subglobosae, ellipsoideae, 5.5–10.0 × 4.5–8.0 µm, hyalinae; paries aequalis, ca. 0.3 µm, levis.

*Etymology.* Derived from the host epithet.

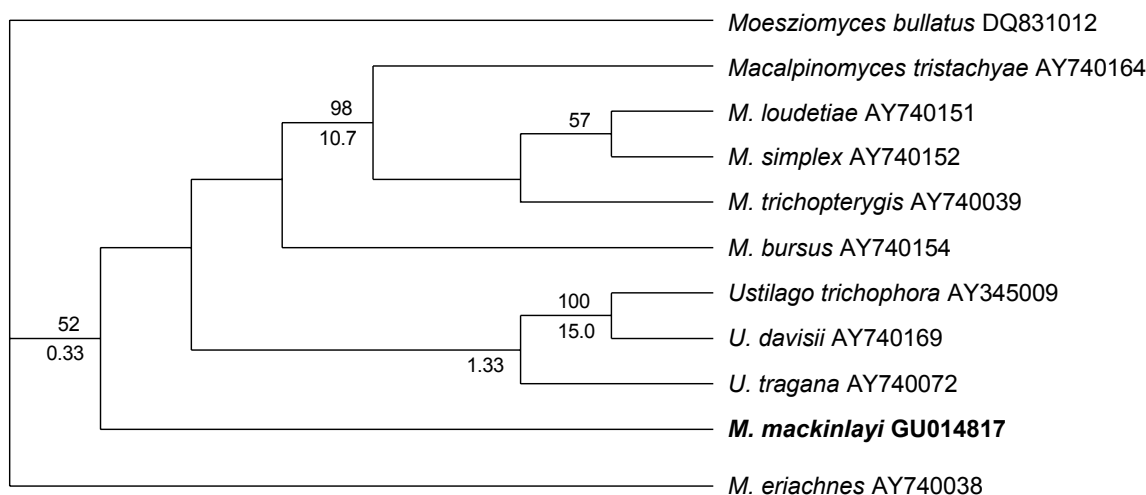
*Sori* in some ovaries of an inflorescence, hypertrophied, long-cylindrical, sometimes twisted, 10–35 × 1.0–1.5 mm wide, initially green becoming grey from the apex downwards, with reddish brown remnants about 2 mm long of the host pericarp at the apex, rupture longitudinally exposing the powdery spore mass mixed with sterile cells. *Sporae* globose, subglobose or broadly ellipsoidal, 9–13 × 8–12 µm, yellowish brown; wall even, densely covered in conical spines 1–2 µm high. *Sterile cells* in large, loose, irregular groups; individual cells globose, subglobose, ellipsoidal or slightly irregular, 5.5–10.0 × 4.5–8.0 µm, hyaline; wall even, c. 0.3 µm thick, smooth.

*Typus.* AUSTRALIA, Western Australia, c. 35 km north of Drysdale River, alt. c. 380 m, 15° 23' 13" S, 126° 16' 58" E, *Eulalia mackinlayi*, 10 May 2009, A.R. McTaggart, V.L. Challinor, M.J. Ryley, C.E. Gambley, T. Scharaschkin, M.D.E & R.G. Shivas, BRIP 52549, holotype; ITS sequence GenBank GU014817, MycoBank MB515252. *Paratypus*, Western Australia, between King Edward River crossing and Mitchell Falls, 10 May 2009, A.R. McTaggart, V.L. Challinor, M.J. Ryley, C.E. Gambley, T. Scharaschkin, M.D.E & R.G. Shivas, BRIP 52546.

*Notes* — *Macalpinomyces* is a polyphyletic genus with many species referable to either *Ustilago* or *Sporisorium*<sup>1</sup>. *Macal-*

*pinomyces* is represented in Australia by 12 taxa<sup>2</sup>. *Macalpinomyces mackinlayi* is best placed in *Macalpinomyces* until the *Ustilago-Sporisorium-Macalpinomyces* genus complex is resolved. It lacks columellae, typically present in *Sporisorium* and has sterile cells, which are not a character of *Ustilago*. It is morphologically similar to other *Macalpinomyces* species that have sterile cells, hypertrophied sori derived from host material, and densely echinulate spores, e.g. *M. arundinellasetosae*, *M. tubiformis* and *M. siamensis*. *Macalpinomyces mackinlayi* occurs on *Eulalia mackinlayi*, which is only known from the Mitchell Plateau region in north-western Australia. Eight *Sporisorium* species have been recorded on *Eulalia*, seven of which destroy the entire inflorescence or all the spikelets in an inflorescence. *Sporisorium tripsiccate* has localised sori and can be distinguished from *M. mackinlayi* by the white sorus derived from fungal cells, the presence of spore balls and the verrucose rather than echinulate spores.

BLASTn results of the ITS sequence of *Macalpinomyces mackinlayi* (GU014817) had high identity to sequences of *M. tristachyae* on *Loudetia chrysothrix* (GenBank: AY740164, 96 % identical over 90 % query coverage), *M. bursus* (as *Sporisorium bursum*) on *Themeda quadrivalvis* (GenBank: AY740154, 94 % identical over 90 % query coverage), *Ustilago trichophora* on *Echinochloa colona* (GenBank: AY345009, 94 % identical over 83 % query coverage) and *M. loudetiae* on *Loudetia flavida* (GenBank: AY740151, 91 % identical over 90 % query coverage). Genomic DNA of *M. mackinlayi* (holotype) is stored in the Australian Biosecurity Bank (<http://www.padii.gov.au/pbt/>).



Analysis of the ITS region of *Macalpinomyces mackinlayi* and some closely related taxa from GenBank in an exhaustive parsimony search using PAUP v4.0b4 yielded one tree (TL = 696; CI = 0.838; RI = 0.552; RC = 0.462). Bootstrap values from 1 000 replicates are shown above nodes and decay indices shown below nodes. The species described here is printed in **bold face**. The tree was rooted to *Moesziomyces bullatus* (Gen-

Bank DQ831012), a known outgroup of the *Ustilago-Sporisorium-Macalpinomyces* genus complex<sup>1</sup>. A maximum likelihood analysis resolved a similar tree topology, except *M. mackinlayi* was sister to the *M. tristachyae* clade. This tree highlights that *Macalpinomyces* is a non-monophyletic group.

**Acknowledgements** ARM would like to acknowledge the support of the Cooperative Research Centre for National Plant Biosecurity.

**References.** <sup>1</sup>Stoll M, Begerow D, Oberwinkler F. 2005. Molecular phylogeny of *Ustilago*, *Sporisorium*, and related taxa based on combined analyses of rDNA sequences. *Mycological Research* 109: 342–356. <sup>2</sup>Ványkó K, Shivas RG. 2008. *Fungi of Australia: The Smut Fungi*. ABRS, Canberra; CSIRO Publishing, Melbourne.

**Colour illustrations.** Drysdale River, Western Australia; sori in ovaries of *Eulalia mackinlayi*; spores and sterile cells; spore wall and sterile cells seen in SEM. Scale bars (from top to bottom) = 1 cm, 10 µm, 5 µm.

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