

# *Macalpinomyces arundinellae-setosae* sp. nov. (Ustilaginomycetes) from Australia

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**Abstract.** A new smut fungus, *Macalpinomyces arundinellae-setosae*, is described on the grass *Arundinella setosa* from Queensland, Australia. It is compared with the eight known smut fungi on *Arundinella* and a key for identifying these species is given.

**Key words:** *Macalpinomyces arundinellae-setosae*, new species, smut fungi, taxonomy, Ustilaginomycetes

## Introduction

*Arundinella* Raddi, in the subfam. Panicoideae, is a homogeneous genus of c. 55 species from warm regions with four species in Australia (Sharp & Simon 2002). The smut fungi on *Arundinella* were revised by Vánky (2004: 88–94) who recognised eight species in four genera, namely one species in *Macalpinomyces*, two in “*Melanotaenium*”, two in *Tilletia*, and three in *Sporisorium*. An additional species of *Macalpinomyces* was recently collected in some ovaries of *Arundinella setosa* Trin. in northern Queensland, Australia. It differs from *Macalpinomyces effusus* (Syd. & P. Syd.) Vánky, on *Arundinella bengalensis* (Spreng.) Druce, which has sori that form long tubes on the top of sterile shoots.

## Taxonomy

*Macalpinomyces arundinellae-setosae* R.G. Shivas & Vánky, sp. nov.

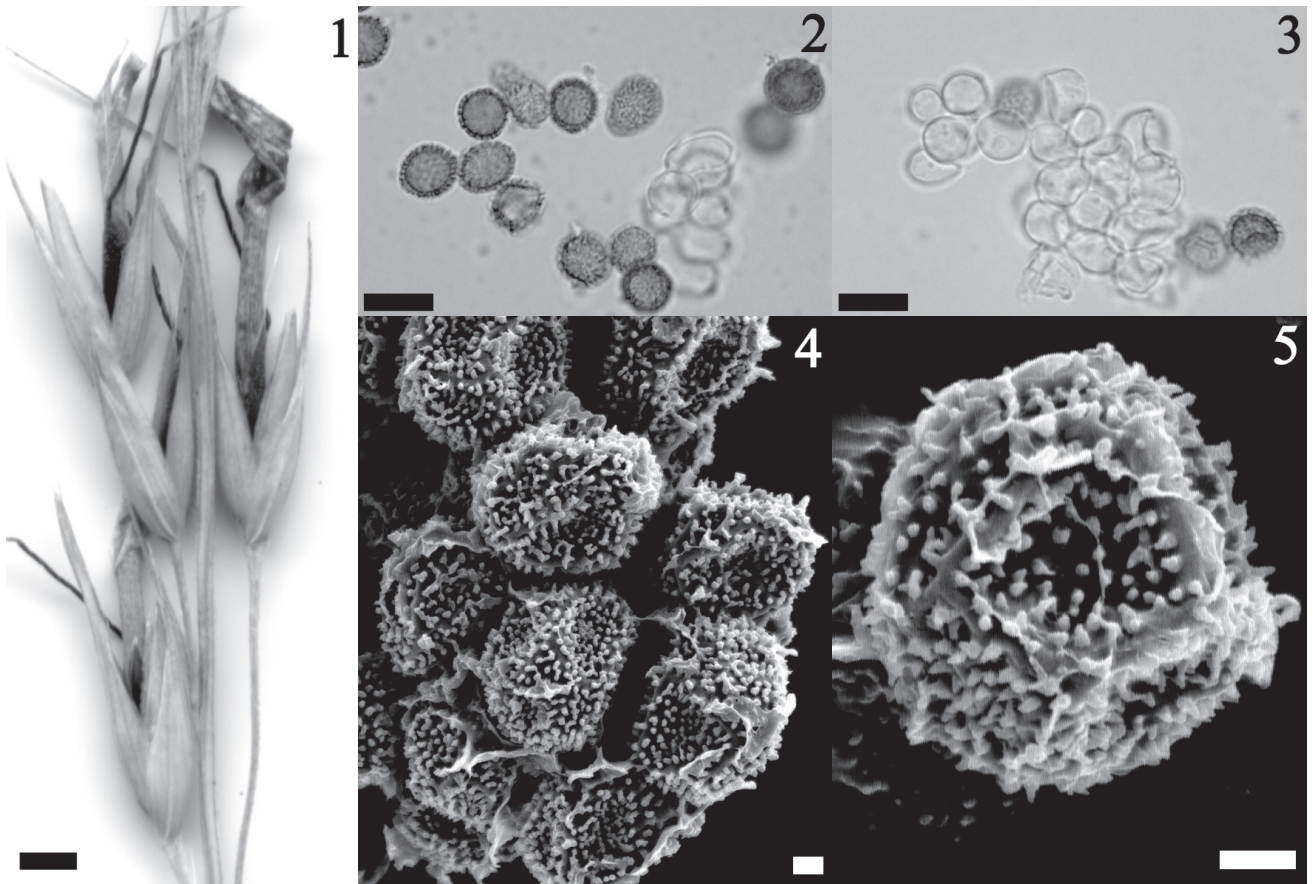
*Holotypus* in matrice *Arundinella setosa* Trin., Australia, Queensland, 8 km S oppid. Lakeland, 4.V.2004, 15°56'16"S, 144°50'17"E, alt. cca. 460 m.s.m., leg. T.S. Marney & R.G.

Shivas, BRIP 46 034, isotypus in H.U.V. 20 963. Paratypus in matrice *A. setosa*, Australia, Queensland, Mt. Garnet, 5.V.2004, 17°36'59"S, 145°28'39"E, alt. cca. 670 m.s.m., leg. T.S. Marney & R.G. Shivas, BRIP 46 051.

*Sori* in nonnullis ovarii eiusdem inflorescentiae, cylindrici, cca. 0,5 × 5–13 mm, e glumis prominentes, primum peridio pallide flavidobrunneo cooperti, quo ab apice dehiscenti massam atrobrunneam, semiagglutinatam usque pulveream sporarum cum catervis cellularum sterilium intermixtam ostendentes. Columella nulla. Sporae subglobosae, ellipsoidales usque plerumque subpolyedrice rotundate irregulares, 6,5–8,5 × 6,5–9 µm, flavidobrunneae; pariete aequali, cca. 0,5 µm crasso, dense, humiliter echinulato, imago obliqua sporarum undulata usque leniter serrulata. Cellulae steriles in catervis magnis, solutis, irregularibus, cellulae singulae globoideae, elongatae usque parum irregulares, 4–7 × 5–9,5 µm, hyalinae, cum guttula 1 (–2) olei(?); pariete tenui (cca. 0,5 µm), levi.

*Sori* (Figs 1, 6) in some ovaries of an inflorescence, cylindrical, ca 0.5 × 5–13 mm, protruding beyond the glumes, first covered by a pale yellowish brown peridium that dehisces from its apex exposing the dark brown, semiagglutinated to powdery mass of spores intermixed with groups of sterile cells.

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Figs 1-5. *Macalpinomyces arundinellae-setosae* (from holotype). 1. Sori in the ovaries of *Arundinella setosa*. Bar = 1 mm. 2. Spores and sterile cells. Bar = 10  $\mu$ m. 3. Sterile cells, some with oil? droplets visible. Bar = 10  $\mu$ m. 4-5. Surface ornamentation of spores in SEM. Bar = 1  $\mu$ m



Fig. 6. Sori of *Macalpinomyces arundinellae-setosae* on *Arundinella setosa* (from type). Habit (left) and three sori and a healthy spikelet (right). Bars = 1 cm (left) and 3 mm (right)

Columella lacking. **Spores** (Figs 2, 4, 5) subglobose, ellipsoidal to usually rounded subpolyhedrally irregular, 6.5-8.5 × 6.5-9 µm, yellowish brown; wall even, ca 0.5 µm thick, densely low echinulate, spore profile wavy to finely serrulate. **Sterile cells** (Fig. 3) in large, loose, irregular groups, single cells globoid, elongated to slightly irregular, 4-7 × 5-9.5 µm, hyaline, with 1 (-2) oil? droplets; wall thin, ca 0.5 µm, smooth.

On Poaceae: *Arundinella setosa*; known only from the type locations in Australia.

The absence of columellae in the sori, the lack of spore balls, and the presence of sterile cells indicate that *Macalpinomyces* is the best genus for this species. Vánky (2004) recently provided a key to the known species of smut fungi on *Arundinella*. Only two of these species, *Sporisorium arundinellae* (Bref.) Vánky and *Sporisorium arundinellae-nepalensis* Vánky, infect the ovaries and have small spores (less than 10 µm diam). However the sori of *S. arundinellae* and *S. arundinellae-nepalensis* are much shorter (2-3 mm) than those of *Macalpinomyces arundinellae-setosae*.

#### Key to the smut fungi on *Arundinella*

- |    |   |  |
|----|---|--|
| 1  | Sori in the leaves as lead-coloured spots or stripes                                    | 2  |
| 1* | Sori elsewhere  | 3  |
| 2  | Sori long linear. Spores 7-11 µm long, regular, wall 0.8-1.5 µm thick                   | " <i>Melanotaenium</i> " <i>arundinellae</i> |
| 2* | Sori as wide spots. Spores 9-16 µm long, irregular, wall 1-5 µm thick                   | " <i>Melanotaenium</i> " <i>tuberculatae</i> |
| 3  | Spores large, over 20 µm long   | 4  |
| 3* | Spores smaller  | 5  |
| 4  | Spores 22-37 µm long. In SEM warts often confluent in rows. Sterile cells 13-20 µm long | <i>Tilletia arundinellae</i>                 |
| 4* | Spores 20-30 µm long. In SEM warts not confluent in rows. Sterile cells 20-40 µm long   | <i>Tilletia lineata</i>                      |
| 5  | Sori on the stems   | 6  |
| 5* | Sori in the ovaries   | 7  |
| 6  | Spores external around a long, flagelliform columella                                   | <i>Sporisorium kusanoi</i> (?)               |
| 6* | Spores hidden within a tubular sorus  | <i>Macalpinomyces effusus</i>                |
| 7  | Sori 0.6-1.2 mm long. Spores 9.5-14.5 µm long   | <i>Sporisorium arundinellae-pumilae</i>      |
| 7* | Sori longer, spores smaller, ca 6.5-10.5 µm long  | 8  |
| 8  | Sori 5-13 mm long, in some spikelets of an inflorescence. Sterile cells present         | <i>Macalpinomyces arundinellae-setosae</i>   |
| 8* | Sori 2-3 mm long, in all spikelets of a panicle. Sterile cells absent                   | 9  |
| 9  | Spore balls permanent. Spores dimorphic   | <i>Sporisorium arundinellae-nepalensis</i>   |
| 9* | Spore balls ephemeral or absent. Spores not dimorphic                                   | <i>Sporisorium arundinellae</i>              |

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