A taxonomic revision of *Ustilago*, *Sporisorium* and *Macalpinomyces*

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Abstract Morphological characters within the *Ustilago-Sporisorium-Macalpinomyces* complex are defined explicitly. The genera *Sporisorium* and *Anthracocystis* are emended to reflect morphological synapomorphies. Three new genera, *Langdonia*, *Stollia* and *Triodiomyces* are described based on soral synapomorphies and host classification. The new classification of the *Ustilago-Sporisorium-Macalpinomyces* complex incorporates 142 new taxonomic combinations.

Key words smut fungi, systematics, taxonomy, *Ustilaginaceae*, *Ustilaginomycotina*

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INTRODUCTION

The three genera of smut fungi, *Ustilago*, *Sporisorium* and *Macalpinomyces*, form a complex that has eluded resolution by morphology (Langdon & Fullerton 1975, Vánky 1991, Piepenbring et al. 1998) and molecular phylogenetic analysis (Stoll et al. 2003, 2005). Two suggestions to reconcile the taxonomy of the complex have been proposed. The first was to break up the current taxa into several smaller genera and subgenera, and the second to unify the three genera into a single genus, *Ustilago* (Vánky 2002, Piepenbring 2004). The former solution is dependent on finding morphological synapomorphies that can delimit the genera, and the latter solution dismisses the wide morphological diversity within the group (McTaggart et al. 2012a).

Synapomorphic morphological characters and host plant classification delimited clades in the *Ustilago-Sporisorium-Macalpinomyces* complex (McTaggart et al. 2012b). The current study defines these synapomorphic characters and proposes a new classification for many species currently placed in *Ustilago*, *Sporisorium* and *Macalpinomyces*. This approach preserves the well-known genera *Ustilago*, *Sporisorium* and *Macalpinomyces*, and enables the classification to reflect morphological diversity in the complex.

PHYLOGENY

Phylogenetic analyses resolved eight clades within the *Ustilago-Sporisorium-Macalpinomyces* complex (McTaggart et al. 2012b). Six of the clades had unique
morphology or host characters. *Sporisorium* and *Anomalomyces* were accepted genera. Here *Anthracocystis* is reinstated, and three new genera, *Langdonia*, *Stollia* and *Triodiomyces* are proposed to accommodate newly resolved clades (Fig. 1).

Definitions of soral characters in the *Ustilago-Sporisorium-Macalpinomyces* complex

The interpretation of soral morphology is inconsistent for many descriptions of smut species. For example, *Sporisorium consanguineum*, *Macalpinomyces spermophorus* and *M. viridans* were described with columellae, but these structures are not homologous with columellae in *Sporisorium sensu stricto* (McTaggart et al. 2012b). Soral characters need accurate definition to prevent misinterpretation.

Columellae

A columella is defined as a structure formed by both fungal and host material, which proliferates after hyphal-induced growth of the host meristem, and connects the sorus to the host. The columella is invariably the same length or slightly shorter than the length of the sorus. There are two types of true columellae within the complex. Stout columellae are a synapomorphy for *Sporisorium* sensu stricto (Clade 1), and filiform, flexuous columellae are a synapomorphy for *Anthracocystis* (Clade 4) (McTaggart et al. 2012b). The non-homologous columella-like structures found in other clades have different origins and do not satisfy the definition of columellae. In particular, care should be taken not to confuse the columella with remnants of the inflorescence, such as in *Ustilago drakensbergiana*.

Sterile cells

Sterile cells are defined as the cells formed from partitioning non-sporogenous hyphae within the sorus. Sterile cells are an apomorphic character of the complex and were present in *Macalpinomyces eriaches*, *Anomalomyces panici*, and Clades 1, 2, 3, 7 and 8 (McTaggart et al. 2012b). Sterile cells also occur in other groups of smut fungi, including *Tilletia* in the *Exobasidiomycetes*, and are not a valuable character for higher levels of classification. Cells found in the peridium are not formed from partitioning hyphae and are referred to as peridial cells. Peridial cells are generally irregular and in chains, and are only found in taxa with a fungal derived peridium.

Sterile cells formed from non-sporogenous hyphae within the sorus are a useful character for delimitation of genera within the *Ustilago-Sporisorium-Macalpinomyces* complex. Taxa that lack sterile cells occur in two monophyletic groups, namely *Anthracocystis* and the subgroup, *Ustilago s. str.* (McTaggart et al. 2012b). Absence of sterile cells is an apomorphy for these groups.

Spore balls

Spore balls were considered to be a convergent character within the *Ustilaginomycotina* (Vánky 2001). However, spore balls produced by coiled sporogenous hyphae are an apomorphic character within *Anthracocystis*, *Anomalomyces panici* and *Langdonia* (McTaggart et al. 2012b). Although spore balls are homoplasious within the *Ustilaginomycotina*, they can be used for generic delimitation within the complex.
TAXONOMY

**Sporisorium sensu stricto (Clade 1)**

*Sporisorium* was originally described as having columellae and sterile cells (Link 1825; Langdon & Fullerton 1978). Many species were described in *Sporisorium* even though they lacked sterile cells, for example *Sporisorium absconditum*, *S. cenchri* and *S. glutinosum*. Spore balls became a *de facto* character that defined *Sporisorium* (Vánky 2002), although spore balls were not mentioned in the type description. McTaggart et al. (2012b) resolved the synapomorphies of *Sporisorium sensu stricto*, which were the presence of a woody columella and sterile cells, and absence of spore balls. It is now possible to define *Sporisorium* in a strict sense, according to the descriptions by Link (1825) and Langdon & Fullerton (1978). Emended or additional characters have been placed in bold font.

*Sporisorium* Ehrenb. ex Link, in Link, Linné’s Species Plantarum, Ed. 4, 6(2): 86. 1825 *emend.* McTaggart & R.G. Shivas

*Sori* replacing inflorescences or florets. *Peridium* of interwoven hyphae overlain by several layers of host tissue. *Columella* composed of host tissues permeated by inter- and intra-cellular hyphae, **cylindrical, stout or woody, branched or unbranched, peripheral cells thick-walled and vacuolated.** *Hyphae* growing from columella of young sori differentiating as pockets of sporogenous hyphae enclosed by non-sporogenous partitioning hyphae. **Sporogenous hyphae uncoiled.** *Spores* at first somewhat agglutinated, later pulverulent, dark, single, globose to subglobose. **Sterile cells** hyaline, subglobose to globose, in groups or chains, intermixed with the spores, **formed from non-sporogenous partitioning hyphae.** Germination of *Ustilago* type.

*Type species. Sporisorium sorghi* Ehrenb. ex Link, in Willdenow, Willd., Sp. pl., Edn 4 6(2): 86. 1825.

*Neotype* (design. by Vánky 1990: 275). **EGYPT**, Cairo, *Sorghum bicolor*, June 1876, G. Schweinfurth, HUV 1672; isoneotypes in Thümen, Mycoth. univ. no. 725 (as *'Ustilago reiliana f. Sorghi cernui on Sorghum cernuum'). **Paranetype. ROMANIA, Transylvania, near Odorhei [Székelyudvarhely], alt. c. 480 m, Sorghum bicolor, 5 Sep. 1963, K. Vánky, HUV 2027**; isoparaneotypes in Vánky, Ust. exs. no. 50 (as *Sphacelotheca sorghi on Sorghum vulgare*). For comments on neotypification see Vánky 1990: 275.

*New combination for Sporisorium s. str.*

*Sporisorium porosum* (Langdon) McTaggart & R.G. Shivas, *comb. nov.* — **MycoBank** MB801582

*Basionym. Ustilago porosa* Langdon, Proc. Linn. Soc. New South Wales 87: 48. 1962.

*Specimens examined. AUSTRALIA, Western Australia, Kununurra, Sewerage treatment plant, Sorghum timorense, 07 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51811; Western Australia, Kununurra, Mulligan Lagoon Road, Sorghum timorense, 09 Apr. 2008, A.R. McTaggart, V.L.
Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51842a; Northern Territory, NE of Anthony Lagoon, Sorghum timorense, 15 Apr. 1947, S.T. Blake, BRIP 7803, holotype.

Sporisorium porosum does not have sterile cells, which are usually present in other species of Sporisorium.

**Anthracocystis (Clade 4)**

Many taxa recovered in Clade 4 of the molecular phylogenetic analysis by McTaggart et al. (2012b) were previously classified as Sporosporium. Langdon & Fullerton (1975) described soral differences between Sporosporium on hosts in Caryophyllaceae and on hosts in Poaceae. The name Sporosporium was considered a synonym of Thecaphora (Vánky 2002) and is not suitable for species in Clade 4 as it applies to smuts on Caryophyllaceae. Brefeld (1912) described Anthracocystis to accommodate Caeoma destruens, which was recovered in Clade 4. Brefeld (1912) diagnosed Anthracocystis as a distinct genus based on presence of smut galls, and the peculiar formation of its peridium that developed from floral envelopes.

A third name applied to species in Clade 4 was Lundquistia, which Vánky (2001a) established for taxa possessing spore balls embedded in the host tissue, and sori that lacked sterile cells, peridia and columellae. Vánky (2001a) initially described Lundquistia for one species, *L. fascicularis*, on Digitaria brownii in Australia. This species is now synonymous with Sporisorium panici-leucophaei. Three years later, Vánky (2004b) emended Lundquistia to include species that had either permanent or ephemeral spore balls, with or without sterile cells between the spore balls. He included three South American taxa, *L. mexicana* (syn. *Sporisorium mexicanum*), *L. duranii* (syn. *S. duranii*), and *L. deiteliana* (syn. *S. dietelianum*), which possessed combinations of soral characters that were not typical of Sporisorium. Vánky (2004b) stated that the characters he used to establish Lundquistia were “not strong enough to differentiate two genera”, but retained Lundquistia as a genus.

The first two descriptions of Lundquistia by Vánky (2001a, 2004b) made some mistaken conclusions about the soral morphology of species included in this genus (McTaggart et al. 2012a). Lundquistia was originally described as lacking columellae (Vánky 2001a). However, the combination of fungal and host material in the shredded fascicles of vascular bands described in Sporisorium panici-leucophaei are columellae under the definition proposed here. The presence of filiform columellae is a synapomorphy for taxa in Clade 4 (McTaggart et al. 2012b). Vánky (2001a) reported that the spore balls in Lundquistia were not formed from coiled sporogenous hyphae, which is a synapomorphic character for taxa in Clade 4. The method of spore ball formation in Sporisorium panici-leucophaei is not known. For other taxa in Clade 4, spore balls form from coiled sporogenous hyphae, as outlined by Langdon & Fullerton (1975).

Cunnington et al. (2005) demonstrated that the emended Lundquistia (Vánky 2004b) was polyphyletic. Stoll et al. (2005) first synonymized Lundquistia with Sporisorium and later Cunnington et al. (2005) confirmed the synonymy. They were unable to find any morphological characters that could separate the two monophyletic groups within Sporisorium.
Sporisorium panici-leucophaei and S. mexicanum, which were both placed in Lundquistia (Vánky 2001a, 2004b), belong to Clade 4. Taxa included in Clade 4 represent a genus separate from Sporisorium. Lundquistia and Anthracocystis are both valid names for these species. Anthracocystis was described in 1912 and takes priority over Lundquistia.

Characters that separate Anthracocystis from Sporisorium are the presence of filiform columellae and spore balls, and the absence of sterile cells (rarely a few cells are observed). The presence of a white, fungal peridium is a useful diagnostic character. Anthracocystis is emended to accommodate taxa with these characters. Emended or additional characters have been placed in bold font.

**Anthracocystis** Bref., Unters. Gesammtgeb. Mykol. 15: 53. 1912. **emend.** McTaggart & R.G. Shivas

= **Lundquistia** Vánky, Mycotaxon 77: 371. 2001, emend. Vánky, Fungal Diversity, 17: 160. Type: **Lundquistia fascicularis** Vánky on Digitaria brownii.

Sori replacing inflorescences, **all of the racemes or localised in spikelets of an inflorescence. Peridium of vacuolated fungal cells surrounded by a single layer of host cells. Columella composed of vascular bundles surrounded by host parenchyma permeated by inter- and intracellular hyphae, often separated into several columellae each around a vascular bundle surrounded by parenchyma, filiform, flexuous, flattened. Sporogenous hyphae coiled. Spores compacted in spore balls, globose to subglobose, often outer spores darker than inner spores. Sterile cells few or absent.**

*Type species.* **Anthracocystis destruens** (Schltdl.) Bref., Unters. Gesammtgeb. Mykol. (Liepzig) 15: 53. 1912.

*Neotype* (design. by Vánky, Symb. Bot. Upsal., 24(2):115. 1985). GERMANY, Bunzlau [Poland, Bolesławiec], *Panicum miliaceum*, J. Kühn, HUV 1895; isoneotypes in Rbh., Herb. viv. myc., ed. 2, no. 400 (as 'Ustilago destruens').

**New combinations for Anthracocystis**

**Anthracocystis abramoviana** (Lavrov) McTaggart & R.G. Shivas, **comb. nov.** — MycoBank MB519129

*Basionym.* **Sorosporium abramovianum** Lavrov, Trudy Tomsk. Gosud. Univ. 86: 85. 1934.

≡ **Sporisorium abramovianum** (Lavrov) I.V. Karatygin, in Karatygin & Azbukina, Definitorum fungorum URSS, etc.: 72. 1989.

**Anthracocystis abscondita** (Vánky) McTaggart & R.G. Shivas, **comb. nov.** — MycoBank MB801583

*Basionym.* **Sporisorium absconditum** Vánky, Mycotaxon 85: 36. 2003.

*Specimens examined.* AUSTRALIA, Queensland, Mount Garnet, Forty Mile Scrub National Park, *Schizachyrium fragile*, 06 Apr. 1998, *C. & K. Vánky*, BRIP 43880,
isotype; Northern Territory, 26 km S of Tennant Creek, *Schizachyrium fragile*, 26 Apr. 2007, A.R. McTaggart, J.R. Liberato, R.G. Shivas, BRIP 49648.

**Anthracocystis anadelphiae** (G. Viennot-Bourgin) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801584

*Basionym. Sorosporium anadelphiae* Viennot-Bourgin, Bull. Soc. Bot. France 104: 266. 1957 (as *'ananelphiae'*).

≡ *Sporisorium anadelphiae* (Viennot-Bourgin) Vánky, Mycotaxon 85: 58. 2003.

**Anthracocystis andropogonis-aciculati** (Petch) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801585

*Basionym. Ustilago andropogonis-aciculati* Petch, Ann. Roy. Bot. Gard. (Peradeniya) 4: 303. 1909.

≡ *Sorosporium andropogonis-aciculati* (Petch) Petch, Ann. Roy. Bot. Gard. (Peradeniya) 5: 227. 1912.

≡ *Sporisorium andropogonis-aciculati* (Petch) Vánky, Mycotaxon 18: 328. 1983.

Specimen examined. CHINA, Yunnan, Jinghong, *Chrysopogon aciculatus*, 24 Sep. 1985, T. & K. Vánky, Vánky, Ust. exs. no. 522.

**Anthracocystis andropogonis-chinensis** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801586

*Basionym. Sorosporium andropogonis-chinensis* Vánky, Mycotaxon 95: 5. 2006.

**Anthracocystis andropogonis-eucomi** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801587

*Basionym. Sorosporium andropogonis-eucomi* Vánky, Mycotaxon 95: 5. 2006.

Specimen examined. SOUTH AFRICA, Mpumalanga Prov., 9 km NE of Grascop, 1 km along road R534, *Andropogon eucomus*, 22 Jan. 1997, C. & K. Vánky, BRIP 47128, isotype.

**Anthracocystis andropogonis-finitimi** (Maubl.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801588

*Basionym. Ustilago andropogonis-finitimi* Maubl., Bull. Soc. Mycol. France 22: 74. 1906.

≡ *Sporisorium andropogonis-finitimi* (Maubl.) Vánky & Mouch., Mycol. Res. 104: 382. 2000.

Specimens examined. ZAMBIA, Southern Province, 22 km NE of Pemba, *Hyparrhenia filipendula*, 12 Apr. 2001, C., T. & K. Vánky, BRIP 39626; Southern Province, 10 km NW of Monze, *Hyparrhenia filipendula*, 15 Apr. 2001, C., T. & K. Vánky, BRIP 39634.

**Anthracocystis andropogonis-gabonensis** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801749

*Basionym. Sorosporium andropogonis-gabonensis* Vánky, Mycotaxon 95: 7. 2006, nom. nov. for *Sorosporium congoense* L. Ling, Lloydia 16: 186. 1953, (not *Sporisorium congoense* (Syd. & P. Syd.) Vánky).
**Anthracocystis andropogonis-pumili** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801589
   Basionym. *Sporisorium andropogonis-pumili* Vánky, Mycotaxon 95: 7. 2006.

**Anthracocystis anthistiriae** (Cobb) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801590
   Basionym. *Tolyposporium anthistiriae* Cobb, Agric. Gaz. New South Wales 3: 1006. 1892.
   ≡ *Sorosporium anthistiriae* (Cobb) L. Ling, Mycol. Pap. 11: 9. 1945.
   ≡ *Sporisorium anthistiriae* (Cobb) Vánky, in Vánky & Guo, Acta Mycol. Sinica, Suppl. I: 230. 1987.

Specimen examined. CHINA, Beijing, Botanical Garden, *Themeda triandra*, 08 Oct. 1985, L. Guo & K. Vánky, Vánky, Ust. exs. no. 579; AUSTRALIA, Western Australia, between Wyndham and Kununurra, *Themeda triandra*, 13 Apr. 2007, A.R. McTaggart, M.J. Ryley & R.G. Shivas, BRIP 49775.

**Anthracocystis anthracoidespora** (Vánky & R.G. Shivas) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801591
   Basionym. *Sporisorium anthracoidesporum* Vánky & R.G. Shivas, in Vánky, Mycotaxon 68: 335. 1998.

Specimen examined. PAPUA NEW GUINEA, Western Province, Bensbach River, *Pseudoraphis spinescens*, 13 Apr. 1997, A.A. Mitchell & R.G. Shivas, BRIP 39176, isotype.

**Anthracocystis apludae** (Mishra) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801592
   Basionym. *Sorosporium apludae* Mishra, Mycologia 48: 875. 1956 (not *Sporisorium apludae* (Syd. & P. Syd.) L. Guo, Mycosystema 3: 76. 1990).
   ≡ *Sporisorium mishrae* Vánky, Mycotaxon 65: 135. 1997 (nom. nov.).

Specimen examined. INDIA, Karnataka, Belgaum, *Apluda mutica*, 16 Jun 1995, Sharma, K. Vánky, Vánky, Ust. exs. no. 967.

**Anthracocystis apludae-aristatae** (B.V. Patil & Thirum.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801593
   Basionym. *Sorosporium apludae-aristatae* B.V. Patil & Thirum., Sydowia 20: 48. 1968.
   ≡ *Sporisorium apludae-aristatae* (B.V. Patil & Thirum.) Vánky, Mycotaxon 65: 135. 1997.

Specimen examined. INDIA, Uttar Pradesh, Varanasi, *Apluda mutica*, 07 Oct. 1992, K. Vánky, Vánky, Ust. exs. no. 916.

**Anthracocystis apludae-muticae** (A.R. Patil, T.M. Patil & M.S. Patil) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801594
   Basionym. *Sorosporium apludae-muticae* A.R. Patil, T.M. Patil & M.S. Patil, J. Mycol. Pl. Pathol. 34: 839. 2004 (not *Sporisorium apludae-muticae* L. Guo, Mycotaxon 72: 390. 1999).
Sporisorium muticae Vánky & A.R. Patil, in Vánky, Mycotaxon 99: 47. 2007 (nom. nov.).

**Anthracocystis azmatii** (Mundk.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801595

*Basionym. Sorosporium azmatii* Mundk., Trans. Brit. Mycol. Soc. 23: 115. 1939.
≡ *Sporisorium azmatii* (Mundk.) Vánky, Fungal Diversity 18: 180. 2005.

*Specimen examined. INDIA, Karnataka, Mysore, Bilikere, Chrysopogon caeruleus, 19 Sept. 1903, C.A. Barber, BRIP 8052, isotype.*

**Anthracocystis berndtii** (Vánky) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801596

*Basionym. Sorosporium berndtii* Vánky, Mycotaxon 85: 37. 2003.

*Specimen examined. THAILAND, Chiang Mai, Mae Taeng District, Mae Ngad Dam, Schizachyrium sanguineum, 19 Dec. 2007, P. Athipunyakom, S. Likhitekaraj, V.L. Challinor, A.R. McTaggart, T.S. Marney, M.D.E. & R.G. Shivas, BRIP 51559.*

**Anthracocystis blakeana** (Vánky) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801597

*Basionym. Sorosporium blakeanum* Vánky, Mycotaxon 89: 74. 2004.

*Specimen examined. AUSTRALIA, Queensland, N of Hughenden, Poison Creek, Schizachyrium fragile, 10 Apr. 1935, S.T. Blake, BRIP 7804, holotype.*

**Anthracocystis bothriochloae** (L. Ling) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801598

*Basionym. Sorosporium bothriochloae* L. Ling, Lloydia 16: 186. 1953.
≡ *Sporisorium bothriochloae* (L. Ling) Vánky, Fungal Diversity 15: 229. 2004.

*Specimens examined. AUSTRALIA, Northern Territory, on Stuart Highway, 209 km SE of Katherine, Dichanthium fecundum, 14 Mar. 2000, R.G. Shivas, I.T. Riley, C. & K. Vánky, Vánky, Ust. exs. no. 1196; Western Australia, between Wyndham and Kununurra, Dichanthium sericeum, 08 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51819.*

**Anthracocystis caledonica** (Pat.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801599

*Basionym. Sorosporium caledonicum* Pat., Bull. Soc. Mycol. France 3: 173. 1887.
≡ *Sporisorium caledonicum* (Pat.) Vánky, Mycotaxon 40: 165. 1991.
≡ *Sorosporium heteropogonis-contorti* Bacc., Ann. Bot. (Rome) 14: 132. 1917.

*Specimens examined. INDIA, Utter Pradesh, Tehri, Garwal Himalaya Mt., Heteropogon contortus, 17 Sept. 1992, T. & K. Vánky, Vánky, Ust. exs. no. 1053; AUSTRALIA, Northern Territory, Timber Creek, Policeman’s Lookout, Heteropogon contortus, 10 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51854.*
Anthracocystis cenchri (Lagerh.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801600

*Basionym.* Ustilago cenchri Lagerh., in Patouillard & Lagerheim, Bull. Herb. Boissier 3: 62. 1895.

≡ Sporisorium cenchri (Lagerh.) Vánky, Symb. Bot. Upsal. 24: 114. 1985.
≡ Tolyposporium cenchri Bref., Unters. Gesammtgeb. Mykol. 12: 156. 1895.
≡ Sporisorium cenchri (Berf.) Zundel, Bothalia 3: 303, 1938.
≡ Sporisorium chardonianum Zundel, Mycologia 34: 125. 1942.
≡ Sporisorium texanum Zundel, Mycologia 36: 409. 1944.
≡ Sporisorium cenchri Henn. var. *levis* Vörös & Ubrizsy, Acta Phytopathol. Acad. Sci. Hung. 3: 269. 1968.

Specimen examined. MEXICO, 56 km NE of Durango, *Cenchrus pauciflorus*, 18 Nov. 2003, T. & K. Vánky, BRIP 45311: Vánky Ust. exs. no. 1214.

Anthracocystis cenchri-elymoidis (Vánky & R.G. Shivas) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801601

*Basionym.* Sporisorium cenchri-elymoidis Vánky & R.G. Shivas, in Vánky, Mycotaxon 81: 392. 2002.

Specimens examined. AUSTRALIA, Western Australia, Corneille Island, Cenchrus elymoides var. brevisetosus, 18 May 1998, A.A. Mitchell, BRIP 26491, holotype; Western Australia, Mitchell Plateau, Surveyor’s Pool, Cenchrus elymoides var. brevisetosus, 12 May 2009, A.R. McTaggart, V.L. Challinor, M.J. Ryley, C.F. Gambley, T. Scharaschkin, M.D.E. & R.G. Shivas, BRIP 52532.

Anthracocystis chrysopogonicola (A.R. Patil, T.M. Patil & M.S. Patil) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801602

*Basionym.* Sporisorium chrysopogonicola A.R. Patil, T.M. Patil & M.S. Patil J., Mycol. Pl. Pathol. 34: 779. 2004.

Anthracocystis chrysopogonis (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801603

*Basionym.* Sporisorium chrysopogonis Vánky, Mycotaxon 18: 327. 1983.

Anthracocystis chrysopogonis-fulvi (A.R. Patil, T.M. Patil & M.S. Patil) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801606

*Basionym.* Sorosporium chrysopogonis-fulvi A.R. Patil, T.M. Patil & M.S. Patil, J. Mycol. Pl. Pathol. 34: 839. 2004 (as ‘chrysopogonis-fulvis’).
≡ Sporisorium chrysopogonis-fulvi (A.R. Patil, T.M. Patil & M.S. Patil) Vánky & A.R. Patil, in Vánky, Mycotaxon 99: 50. 2007.

Anthracocystis compacta (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801607

*Basionym.* Sporisorium compactum Vánky, Mycotaxon 85: 23. 2003.

Anthracocystis confusa (Massee) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801608

*Basionym.* Ustilago confusa Massee, in Cooke, Grevillea 20: 65. 1892.
Sporisorium shivasii Vánky, Mycotaxon 89: 104. 2004, nom. nov.

Sporisorium chamaeraphis Syd., in Sydow & Petrak, Ann. Mycol. 26: 431. 1928.

Sporisorium chamaeraphis (H. Syd.) Vánky, Mycotaxon 68: 330. 1998.

Specimen examined. AUSTRALIA, Northern Territory, Daly River, Fish Lagoon, Pseudoraphis spinescens, 12 Sept. 1996, I.G. Pascoe, BRIP 26795.

Anthracocystis congensis (Syd. & P. Syd.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801609

Basionym. Ustilago congensis Syd. & P. Syd., in Wildeman, Études sur la flore du Bas- et Moyen-Congo 3: 9. 1909.

≡ Sphacelotheca congensis (Syd. & P. Syd.) Wakef., in Zundel, Mycologia 22: 140. 1930.

≡ Sporisorium congensense (Syd. & P. Syd.) Vánky, Fungal Diversity 12: 186. 2003.

Specimen examined. UGANDA, Wakiso, Entebbe, Zizka Forest, Hyparrhenia diplandra, 15 Feb. 2002, M. Namaganda, T., C., & K. Vánky, Vánky, Ust. exs. no. 1179.

Anthracocystis contorta (Griffiths) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801610

Basionym. Sorosporium contortum Griffiths, Bull. Torrey Bot. Club 31: 83. 1904.

≡ Sporisorium contortum (Griffiths) Vánky, Mycotaxon 40: 165. 1991.

Anthracocystis cryptica (Cooke & Massee) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801611

Basionym. Cintractia cryptica Cooke & Massee, in Cooke, Grevillea 18: 34. 1889.

≡ Sorosporium crypticum (Cooke & Massee) Ling, Sydowia 3: 131. 1949.

≡ Sporisorium crypticum (Cooke & Massee) Vánky & M.S. Patil, in Vánky, Mycotaxon 74: 183. 2000.

Anthracocystis cymbopogonis (Mundk.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801613

Specimens examined. AUSTRALIA, Queensland, ca. 100 km SW of Mareeba, Brachiaria holosericea, 03 Mar. 2000, C. & K. Vánky, Vánky, Ust. exs. no. 1185; Western Australia, Drysdale River, Kalumburu Rd., Yakirra sp., 12 May 2009, A.R. McTaggart, V.L. Challinor, M.J. Ryley, C.F. Gambley, T. Scharaschkin, M.D.E. & R.G. Shivas, BRIP 52536.
**Basionym.** Tolyposporium cymbopogonis Mundk., Indian J. Agric. Sci. 14: 51. 1944.
≡ Sorosporium cymbopogonis (Mundk.) Thirum. & Neerg., Friesia 11: 183. 1978.
≡ Sporisorium cymbopogonis (Mundk.) Vánky, Mycotaxon 85: 25. 2003.
≡ Tolyposporium christensenii Raghunath, Mycopathol. Mycol. Appl. 34: 120. 1968.

Specimen examined. INDONESIA, Bali, Lake Batur, ca. 2 km SW of Hot Springs, Cymbopogon flexuosus, 04 Apr. 1992, C. & K. Vánky, BRIP 39635.

**Anthracocystis cymbopogonis-bombycini** (R.G. Shivas & Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801614

**Basionym.** Sporisorium cymbopogonis-bombycini R.G. Shivas & Vánky, Mycol. Balcan. 1: 163. 2004.

Specimens examined. AUSTRALIA, Western Australia, Wyndham, Cymbopogon bombycinus, 03 Mar. 1989, R.G. Shivas, BRIP 26809, holotype; Western Australia, Mt. Hart Wilderness Lodge, Cymbopogon bombycinus, 14 May 2009, A.R. McTaggart, V.L. Challinor, M.J. Ryley, C.F. Gambley, T. Scharaschkin, M.D.E. & R.G. Shivas, BRIP 52511.

**Anthracocystis cymbopogonis-distantis** (L. Ling) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801615

**Basionym.** Sorosporium cymbopogonis-distantis L. Ling, Farlowia 4: 341. 1953.
≡ Sporisorium cymbopogonis-distantis (L. Ling) L. Guo, Mycosystema 17: 1. 1998.

**Anthracocystis cynodontis** (L. Ling) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801616

**Basionym.** Sorosporium cynodontis L. Ling, Sydowia 3: 131. 1949.
≡ Sporisorium cynodontis (L. Ling) R.G. Shivas & Vánky, Fungal Diversity 8: 150. 2001.

**Anthracocystis cynodontis** is one of five known Anthracocystis species that has a chloridoid grass host. The majority of Anthracocystis taxa infect andropogonoid grasses.

**Anthracocystis decorsei** (Har. & Pat.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801617

**Basionym.** Tolyposporium decorsei Har. & Pat., Bull. Mus. Hist. Nat. (Paris) 15: 197. 1909.
≡ Sorosporium decorsei (Har. & Pat.) L. Ling, Lloydia 16: 187. 1953.
≡ Sporisorium decorsei (Har. & Pat.) Vánky, Mycotaxon 65: 160. 1997.

**Anthracocystis dembianensis** (Baccarini) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801618

**Basionym.** Sorosporium dembianense Baccarini, Ann. Bot. (Rome) 14: 132. 1917.
≡ Sporisorium dembianense (Baccarini) Vánky
**Specimens examined.** ZIMBABWE, North Province, Matabeland, Victoria Falls, *Hyparrhenia tamba*, 02 Dec. 1999, C. & K. Vánky, BRIP 39649; Zambia, Eastern Province, 230 km NE of Lusaka, *Hyparrhenia filipendula*, 18 Apr. 2001, T., C. & K. Vánky, BRIP 39689; SOUTH AFRICA, Mpumalanga, 2 km E of Waterfall-Bowen, *Hyparrhenia filipendula*, 20 Dec. 2002, A. Witt, R.G. Shivas & K. Vánky, BRIP 39657; ETHIOPIA, Gojam Region, 24 km NE of Bahar Dahr, *Hyparrhenia hirta*, 23 Oct. 2004, T. & K. Vánky, BRIP 47130.

*Anthracocystis dembianensis* possesses several synapomorphic characters of *Anthracocystis*, namely permanent spore balls, dimorphic spores and absence of sterile cells. The columella is described by Vánky (2003a) as flagelliform, often with a shortly bi- or trifurcate apex. Examination of four specimens of *A. dembianensis* confirmed that the columella is flagelliform. It is woody at the base of the sorus and tapers into a flattened, filiform apex.

*Anthracocystis densiflora* (L. Ling) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB519163

Basionym. *Sorosporium densiflorum* L. Ling, *Lloydia* 16: 188. 1953.

≡ *Sporisorium densiflorum* (L. Ling) Vánky, *Mycotaxon* 85: 27. 2003.

*Anthracocystis destruens* (Schltdl.) Bref. — MycoBank MB431380

Basionym. *Caeoma destruens* Schltdl., *Fl. Berol., Pars 2. Cryptogamia*: 130. 1824.

≡ *Uredo destruens* (Schltdl.) Duby, *Botanicon Gallicum*, Ed. 2, Pars 2:901, 1830.

≡ *Tilletia destruens* (Schltdl.) Lév., *Ann. Sci. Nat. Bot., Sér. 3*, 8:372, 1847.

≡ *Ustilago destruens* (Schltdl.) Rabenh., *Herb. viv. myc.*, ed. 2, no. 400, 1857.

≡ *Sphacelotheca destruens* (Schltdl.) J.A. Stev. & Aar.G. Johnson, *Phytopathology* 34: 613. 1944.

≡ *Sporisorium destruens* (Schltdl.) Vánky, *Symb. Bot. Upsal.* 24(2): 115. 1985.

≡ *Uredo segetum* Pers. δ *Uredo Panici-miliacei* Pers., Syn. meth. fung. 1: 224. 1801.

≡ *Uredo carbo* δ *panici-miliacei* (Pers.) De Candolle, *Fl. franç.*, ed. 3, 6: 76. 1815.

≡ *Erysibe panicorum* β *panici-miliacei* (Pers.) Wallroth, *Flora Cryptogamica Germaniae* 2: 216. 1833.

≡ *Ustilago panici-miliacei* (Pers.) G. Winter, Rabenh. *Krypt.-Fl.*, 2 Aufl., 1: 89. 1881.

≡ *Sorosporium panici-miliacei* (Pers.) Takahashi, *Bot. Mag. (Tokyo)* 16: 184 & 247. 1902.

≡ *Sphacelotheca panici-miliacei* (Pers.) Bubák, *Houby Ceské* 2: 27. 1912.

≡ *Sorosporium manchuricum* S. Ito, *Trans. Sapporo Nat. Hist. Soc.* 14: 93. 1935.

≡ *Sphacelotheca panici-miliacei* (Pers.) Bubák var. *manchurica* (S. Ito) Lavrov, *Trdy Tomsk. Gosud. Univ., Ser. Biol.* 104:32, 1948.

≡ *Sphacelotheca manchurica* (S. Ito) Y.C. Wang, *Acta Bot. Sinica* 10: 134. 1962.

≡ *Sphacelotheca lioui* W.Y. Yen, *Contr. Inst. Bot. Natl. Acad. Peiping* 4: 193. 1937.

Specimens examined. ROMANIA, Dobrogea, delta Danubii, pr. brachium Sf. Gheorghe, *Panicum miliaceum*, 19 Sep. 1982, G.A., Negrean, Vánky, Ust. exs. no. 472; AUSTRALIA, Queensland, Dalby, *Panicum miliaceum*, 08 Apr. 1958, T. McKnight, BRIP 8221.
There are a few sterile cells reported in *Anthracocystis destruens* (Vánky 1994a). These are most likely remnants of non-sporogenous hyphae.

**Anthracocystis duranii** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801619

*Basionym. Ustilago duranii* Vánky, *Mycotaxon* 89: 77. 2004.
≡ *Sporisorium duranii* (Vánky) Vánky & Cunnington, in Cunnington, Vánky & Shivas, *Myc. Balcan.* 2: 96. 2005.
≡ *Lundquistia duranii* (Vánky) Vánky, *Fungal Diversity* 17: 165. 2004.

**Anthracocystis dichanthii** (Vánky & N.D. Sharma) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801620

*Basionym. Sporisorium dichanthii* Vánky & N.D. Sharma, in Vánky, *Fungal Diversity* 15: 230. 2004.

*Specimen examined.* INDIA, Madhya Pradesh, Jabalpur, 200 km SW of Pachmarhi, *Dichanthium aristatum*, 30 Oct. 1992, R. Sharma, S. Raich, BRIP 51777, HUV 20263, isotype.

**Anthracocystis ehrenbergii** (J.G. Kühn) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801621

*Basionym. Sorosporium ehrenbergii* J.G. Kühn, *Mitth. Vereins. Erdk. Halle* 1877: 87.
≡ *Tolyposporium ehrenbergii* (J.G. Kühn) Pat., *Bull. Soc. Mycol. France* 19: 254. 1903.
≡ *Sporisorium ehrenbergii* (J.G. Kühn) Vánky, *Mycotaxon* 38: 270. 1990.
≡ *Tolyposporium filiferum* Busse, *Arbeiten Biol. Abt. Landw.-Forstw. Kaiserl. Gesundheit.* 4: 383. 1905.
≡ *Sporisorium filiferum* (Busse) Zundel, *Mycologia* 22: 148. 1930.
≡ *Sporisorium andropogonis-sorghii* S. Ito, *Trans. Sapporo Nat. Hist. Soc.* 14: 93. 1935.

**Anthracocystis elionuri** (Henn. & Pole-Evans) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801622

*Basionym. Ustilago elionuri* Henn. & Pole-Evans, in *Hennings, Bot. Jahresb. Syst.* 41: 270. 1908.
≡ *Sphacelotheca elionuri* (Henn. & Pole-Evans) Viennot-Bourgin (nom. herb.?).
≡ *Sporisorium elionuri* (Henn. & Pole-Evans) Vánky, *Mycotaxon* 73: 155. 1999.
≡ *Ustilago elionuri* Sppeg., *Anales Mus. Nac. Buenos Aires*, Ser. 3, 12: 288. 1909. (not *Ustilago elionuri* Henn. & Pole-Evans, in *Hennings, Bot. Jb.* 41: 270. 1908).
≡ *Ustilago elionuri-candidi* Sppeg., in *Saccardo & Trotter, in Saccardo, Syll. fung.* 21: 501. 1912. (nom. nov. pro *U. elionuri* Sppeg.).
≡ *Sphacelotheca elionuri-candidi* (Sppeg.) Hirschh., *Ustil. Fl. Argent.*: 119. 1986.

*Specimen examined.* SOUTH AFRICA, Eastern Cape, Lady Grey, *Elionurus muticus*, 21 July 1996, C. & K. Vánky, Vánky, Ust. exs. no. 1019.

**Anthracocystis enteromorpha** (McAlpine) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801623
**Basionym. Ustilago enteromorpha** McAlpine, Agric. Gaz. New South Wales 7: 154. 1896.
≡ **Sorosporium enteromorphum** (McAlpine) McAlpine, The smuts of Australia: 177. 1910.
≡ **Sporisorium enteromorphum** (McAlpine) Vánky, Mycotaxon 51: 161. 1994.

Specimens examined. SOUTH AFRICA, KwaZulu-Natal, Drakensberg Mountains, *Themeda triandra*, 03 Jan. 1997, K. Vánky, Vánky, Ust. exs. no. 1020; AUSTRALIA, Queensland, Carnarvon National Park, Carnarvon Gorge, *Themeda triandra*, 28 Jun. 2010, R.G. Shivas, BRIP 53624.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis enteromorpha* (Vánky 1994b), which are most likely remnants of the non-sporogenous hyphae. McAlpine (1910) did not record sterile cells in the type description.

**Anthracocystis eriochloae** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801624  
Basionym. **Sporisorium eriochloae** Vánky, Mycotaxon 74: 174. 2000.

**Anthracocystis eulaliae** (L. Ling) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801625  
Basionym. **Sorosporium eulaliae** L. Ling, Sydowia 7: 155. 1953.  
≡ **Sporisorium eulaliae** (L. Ling) Vánky, Mycotaxon 62: 137. 1997.

Specimen examined. AUSTRALIA, Queensland, Pindi Pindi, *Eulalia trispicata*, 21 Aug. 1941, R.F.N. Langdon, BRIP 7929, isotype.

**Anthracocystis everhartii** (Ellis & Galloway) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801626  
Basionym. **Sorosporium everhartii** Ellis & Galloway, J. Mycol. 6: 32. 1890.  
≡ **Tolyposporium everhartii** (Ellis & Galloway) Dietel, in Engler & Prantl, Die Natürl. Pflanzenfam. I, 1: 14. 1897.  
≡ **Sporisorium everhartii** (Ellis & Galloway) M. Piepenbr., Mycol. Res. 103: 462. 1999.

**Anthracocystis fallax** (R.G. Shivas & Cunningt.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801627  
Basionym. **Sporisorium fallax** R.G. Shivas & Cunningt., in Shivas, Cunnington & Vánky, Fungal Diversity 16: 149. 2004.

Specimen examined. AUSTRALIA, Northern Territory, 268 km SE of Katherine, *Chrysopogon fallax*, 15 Mar. 2000, R.G. Shivas, I.T. Riley, C. & K. Vánky, BRIP 27687, holotype.

**Anthracocystis filiformis** (Henn.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801628  
Basionym. **Ustilago filiformis** Henn., Bot. Jahrb. Syst. 30: 254. 1901 (not **Ustilago filiformis** (Schrank) Rostrup. Festskr. Bot. Foren. 54: 136. 1890).  
≡ **Sorosporium filiforme** (Henn.) Zundel (as *'filiformis'*), Mycologia 22: 153. 1930.
= Sporisorium filiforme (Henn.) Vánky, Mycotaxon 74: 180. 2000.

**Anthracocystis formosana** (Sawada) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801629

*Basionym.* *Ustilago formosana* Sawada, J. Formosan Nat. Hist. Soc. 34: 6. 1918 (in Japanese, n.v.); in Tanaka, Mycologia 14: 89. 1922.

≡ *Sporisorium formosanum* (Sawada) Sawada, Descriptive catalogue of the Formosan fungi. 4: 29. 1928.

≡ *Sporisorium formosanum* (Sawada) Vánky, Publ. Herb. Univ. Uppsala 11: 12. 1983.

≡ *Ustilago digitariae* Rabenh. f. *panici-repentis* Kühn, Hedwigia 15: 5. 1876 (nom. conf., comp. Vánky 1990:274).

≡ *Sporisorium panici* Beeli, Bull. Jard. Bot. État 8: 7. 1922 (not *Sporisorium panici* MacKinnon, J. Proc. R. Soc. N.S.W. 45: 201. 1912).

≡ *Sporisorium beelii* Zundel, Bothalia 3: 307. 1938.

≡ *Sporisorium panici* Beeli var. *kinshasaensis* Beeli, Bull. Jard. Bot. État 8: 8. 1922.

≡ *Sporisorium kinshasaensis* (Beeli) Zundel, Mycologia 29: 590. 1937.

≡ *Sporisorium beelii* Zundel var. *kinshasaensis* (Beeli) Hendrix, Publ. Inst. Nat. Etude Agron. Congo Belge, Ser. Sci. 35: 8. 1948.

≡ *Ustilago amadelpha* Syd. & P. Syd. & Butler var. *glabriuscula* Cif., Nuovo Giorn. Bot. Ital. 40: 255. 1933.

≡ *Ustilago overeemii* Cif. (as *overeeimi*), Nuovo Giorn. Bot. Ital. 40: 254. 1933.

≡ *Sporisorium overeemii* (Cif.) Malençon, Rev. Mycol. (Paris), N.S., 10: 121. 1945.

≡ *Sporisorium overeemii* (Cif.) Rifai, Reinwardtia 9: 400. 1980.

≡ *Sporisorium punctatum* Malençon & W.Y. Yen, Rev. Mycol. (Paris), N.S. 2: 130. 1937.

≡ *Sporisorium trichophorum* (Tul. & C. Tul.) Zundel, Mycologia 31: 583. 1939

*Specimen examined.* TAIWAN, Taichung, University campus, *Panicum repens*, 12 July 1988, F. Oberwinkler, Vánky, Ust. exs. no. 688.

**Anthracocystis gayana** (Vánky & C. Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801630

*Basionym.* *Sporisorium gayanum* Vánky & C. Vánky , in Vánky, Mycotaxon 74: 205. 2000.

*Specimen examined.* ZIMBABWE, North Province, Matabeleland, 12 km north of Lusulu, *Andropogon gayanus*, 16 Mar. 1999, C. & K. Vánky, BRIP 27435, Vánky, Ust. exs. no. 1064, isotype.

Sterile cells formed from non-sporogenous hyphae are absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis gayana* (Vánky 2000), which are most likely remnants of the non-sporogenous hyphae.

**Anthracocystis glutinosa** (Zundel) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801631

*Basionym.* *Sporisorium glutinosum* Zundel, Mycologia 36: 407. 1944.

≡ *Sporisorium glutinosum* (Zundel) Vánky, Mycotaxon 74: 180. 2000.
= Tolyposporium andropogonis Patel & N.B. Kulk., in Patel, Gokhale & Kulkarni, Indian Phytopathol. 4: 65. 1951.
≡ Sorosporium andropogonis (Patel & N.B. Kulk.) Thirum. & Neerg., Friesia 11: 182. 1978.

Specimen examined. AUSTRALIA, Queensland, Lakeland, 16 km from Lakeland to Cooktown Road, Heteropogon triticeus, 24 Mar. 2005, T.S. Marney & R.G. Shivas, BRIP 46153.

*Anthracocystis guaranitica* (Speg.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801632

  Basionym. *Ustilago guaranitica* Speg., Anales Soc. Ci. Argent. 17: 87. 1884.
  ≡ Sphacelotheca guaranitica (Speg.) Zundel, Mycologia 22: 135. 1930.
  ≡ Sorosporium guaraniticum (Speg.) L. Ling, Lloydia 16: 190. 1953.
  ≡ Sporisorium guaraniticum (Speg.) Vánky, Mycotaxon 35: 155. 1989.

Specimen examined. ECUADOR, Pichincha, Quito, 30km E of inter pagg. Pifo et Yaruqui, Schizachyrium condensatum, 21 Mar. 1993, H. Bauch, C. & K. Vánky, Vánky, Ust. exs. no. 1168.

*Anthracocystis heteropogonicola* (Mundk. & Thirum.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801633

  Basionym. *Sorosporium heteropogonicola* Mundk. & Thirum., in Thirumalachar & Mundkur, Mycol. Pap. 40: 5. 1951.
  ≡ Sporisorium heteropogonicola (Mundk. & Thirum.) Vánky, in Shivas & Vánky, Mycol. Res. 101: 839. 1997.

Specimens examined. INDIA, Nainital, Utter Pradesh, *Heteropogon contortus*, 07 Sep. 1992, K. Vánky, Vánky, Ust. exs. no. 919; AUSTRALIA, Western Australia, between Wyndham and Kununurra, *Heteropogon contortus*, 08 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51822.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis heteropogonicola* (Shivas and Vánky 1997), which were most likely remnants of the non-sporogenous hyphae.

*Anthracocystis hodsonii* (Zundel) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801634

  Basionym. *Sorosporium hodsonii* Zundel, Mycologia 22: 152. 1930.
  ≡ Sporisorium hodsonii (Zundel) Vánky, Mycotaxon 91: 225. 2005.
  = Sorosporium harrismithense Zundel, Mycologia 22: 154. 1930.
  = Sorosporium flanaganianum Zundel, Mycologia 22: 155, 1930.
  = Ustilago versatilis Syd., Ann. Mycol. 33: 231. 1935.
  = Sorosporium versatile (Syd.) Zundel, Bothalia 3: 308, 1938.
  = Sorosporium afrum Syd., Ann. Mycol. 33: 232. 1935.

Specimen examined. SOUTH AFRICA, Limpopo, Naboomspruit, 20km S of Nylvsley Nature Reserve, *Panicum schinzii*, 15 Mar. 1998, C. & K. Vánky, Vánky, Ust. exs. no. 1236.
Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. Vánky (2005) included sterile cells as sparse or absent in his description of *Anthracocystis hodsonii*.

**Anthracocystis holstii** (Henn.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801635

*Basionym. Sorosporium holstii* Henn., in Engler, Pflanzenwelt Ost-Afrikas, etc., C., 49. 1895.

≡ *Sporisorium holstii* (Henn.) Vánky, Mycotaxon 51: 162. 1994.

*Specimen examined. THAILAND, Themeda triandra, 20 Dec. 2005, R.G. Shivas, P. Athipunyakom, BRIP 47758.*

**Anthracocystis horsfallii** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801636

*Basionym. Sorosporium horsfallii* Vánky, Mycotaxon 78: 297. 2001.

**Anthracocystis hwangensis** (Vánky & C. Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801637

*Basionym. Sorosporium hwangense* Vánky & C. Vánky in Vánky, Mycotaxon 74: 194. 2000.

*Specimen examined. ZIMBABWE, Matabeleland North, Hwange National Park, Main Camp, Sedina Waterhole, Sporobolus panicoides, 06 Mar. 1999, C. & K. Vánky, Vánky, Ust. exs. no. 1059, isotype.*

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *A. hwangensis* (Vánky 2000), which are most likely remnants of the non-sporogenous hyphae. *Anthracocystis hwangensis* on *Sporobolus* is one of five known *Anthracocystis* species that have a chloridoid grass as host. The majority of *Anthracocystis* taxa infect andropogonoid grasses.

**Anthracocystis ischaemiana** (A.R. Patil, T.M. Patil & M.S. Patil) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801638

*Basionym. Sorosporium ischaemianum* A.R. Patil, T.M. Patil & M.S. Patil, J. Mycol. Pl. Pathol. 34: 783. 2004.

**Anthracocystis ischaemoides** (Henn.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801639

*Basionym. Ustilago ischaemoides* Henn., in Wildeman, Ann. Mus. Congo Bot., Sér. 5, Bot. 2: 86. 1907.

≡ *Sorosporium ischaemoides* (Henn.) Zundel, Mycologia 29: 587. 1937.

≡ *Sporisorium ischaemoides* (Henn.) Vánky, Fungal Diversity 12: 188. 2003.

≡ *Sorosporium wildemanianum* Henn., in Wildeman, Ann. Mus. Congo, Sér. 5, Bot. 2: 87. 1907.

≡ *Sorosporium austroafricanum* Zundel (as 'austro-africanum'), Mycologia 22: 147. 1930.

≡ *Sorosporium hansfordii* Ainsw., Proc. Linn. Soc. London 153: 93. 1941.
Specimen examined. SOUTH AFRICA, Western Cape, Gordon Bay, 10km S of Somerset West, Hyparrhenia anamesa, 03 Dec. 1996, C. & K. Vánky, Vánky, Ust. exs. no. 1162.

*Anthracocystis langdonii* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801640  
*Basionym. Sporisorium langdonii* Vánky, Mycotaxon 51: 156. 1994.

Specimen examined. AUSTRALIA, Queensland, Dalby, Themeda avenacea, 27 May 1941, R.F.N. Langdon, BRIP 7865, holotype.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis langdonii* (Vánky 1994b), which are most likely remnants of the non-sporogenous hyphae.

*Anthracocystis leersiae* (Mishra) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801641  
*Basionym. Sorosporium leersiae* Mishra, Mycologia 48: 876. 1956 (not *Sporisorium leersiae* Bag & D.K. Agarwal, Indian Phytopathol. 54: 221. 2001).  
≡ *Sporisorium leersiae-hexandrae* Vánky, Mycotaxon 89: 103. 2004 (nom. nov.).  
≡ *Sporisorium leersiae* Bag & D.K. Agarwal, Indian Phytopathol. 54: 221. 2001.

*Leersia* is a member of the grass tribe *Oryzeae* in the sub-family *Ehrhartoideae* (Stevens 2001). *Anthracocystis leersiae* is the only known species to occur on a grass in this sub-family.

*Anthracocystis leucostachys* (Henn.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801642  
*Basionym. Ustilago leucostachys* Henn., in Pazschke, Hedwigia 35: 50. 1896.  
≡ *Sphacelotheca leucostachys* (Henn.) Zundel, Mycologia 22: 144. 1930.  
≡ *Sporisorium leucostachys* (Henn.) M. Piepenbr., Flora Neotropica Monograph 86: 110. 2003.

*Anthracocystis likhitekarajae* (R.G. Shivas, Athipunyakom & McTaggart) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801643  
*Basionym. Sporisorium likhitekarajae* R.G. Shivas, Athipunyakom & McTaggart, in Shivas, Athipunyakom & McTaggart, Mycol. Balcan. 5: 103. 2008.

Specimen examined. THAILAND, Nakhon Phanom, 31 km west of Sri Songkram, Ischaemum sp., 12 Dec. 2007, P. Athipunyakom, S. Likhitekaraj, V.L. Challinor, T.S. Marney, A.R. McTaggart, M.D.E. & R.G. Shivas, BRIP 51521, holotype.

*Anthracocystis livingstoneana* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801644  
*Basionym. Sporisorium livingstoneanum* Vánky, Mycotaxon 95: 17. 2006.

Specimen examined. ZAMBIA, Southern Province, 10 km N of Livingstone, Andropogon gayanus, 14 Apr. 2001, T., C. & K. Vánky, BRIP 47134, isotype.
Anthracocystis lophopogonis (Thirum. & Pavgi) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801645

Basionym. *Sorosporium lophopogonis* Thirum. & Pavgi, *Sydowia* 20: 23. 1968.
≡ *Sporisorium lophopogonis* (Thirum. & Pavgi) Vánky, *Mycotaxon* 48: 40. 1993.

Specimen examined. INDIA, Maharashtra, Pune, *Lophopogon tridentatus*, 18 Oct. 1992, K. Vánky, Vánky, Ust. exs. no. 921.

**Anthracocystis loudetiae-pedicellatae** (Vánky & C. Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801646

Basionym. *Sorosporium loudetiae-pedicellatae* Vánky & C. Vánky, in Vánky, *Mycotaxon* 65: 165. 1997.

**Anthracocystis loudetia-superbae** (L. Ling) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801647

Basionym. *Sorosporium loudetia-superbae* L. Ling, *Lloydia* 16: 190. 1953.
≡ *Sporisorium loudetia-superbae* (L. Ling) Vánky *Mycotaxon* 65: 162. 1997.

**Anthracocystis maranguensis** (Henn.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801648

Basionym. *Sorosporium maranguense* Henn. (as 'maranguensis'), in Engler, *Pflanzenwelt Ost-Afrikas*, etc., C, p. 49, 1895.
≡ *Sporisorium maranguense* (Henn.) Vánky, *Fungal Diversity* 12: 193. 2003.

**Anthracocystis masseeana** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801649

Basionym. *Sorosporium masseeanum* Vánky, *Australas. Pl. Pathol.* 29: 160. 2000.

**Anthracocystis megaloprotachnes** (Vánky & T. Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801650

Basionym. *Sorosporium megaloprotachnes* Vánky & T. Vánky, in Vánky, *Mycotaxon* 81: 389. 2002.

**Anthracocystis mexicana** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801651

Basionym. *Lundquistia mexicana* Vánky, *Fungal Diversity* 17: 161. 2004.
≡ *Sporisorium mexicanum* (Vánky) Vánky & Cunnington, in Cunnington, Vánky & Shivas, *Mycol. Balcan.* 2: 98. 2005.

Vánky (2004) described *Anthracocystis mexicana* with sterile cells mixed within the sorus. Sterile cells derived from partitioning hyphae are an apomorphic character of *Sporisorium*. *Anthracocystis mexicana* was sister to all other taxa in *Anthracocystis*. Whether these are true sterile cells that were lost subsequently in *Anthracocystis* or sterile cells present in spore balls is unknown.

**Anthracocystis mixta** (Massee) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801652

Basionym. *Tilletia mixta* Massee, *Bull. Misc. Inform.* 1899: 145. 1899.
≡ *Sorosporium mixtum* (Massee) McAlpine, *The Smuts of Australia*: 178. 1910.
≡ *Sporisorium mixtum* (Massee) Vánky, *Mycotaxon* 56: 214. 1995.
= *Sorosporium eriochloae* Griffiths, Bull. Torrey Bot. Club 31: 84. 1904.

**Anthracocystis mutabilis** (Syd.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801653

*Basionym. Sphacelotheca mutabilis* Syd., Ann. Mycol. 35: 24. 1937.
≡ *Sorosporium mutabile* (Syd.) L. Ling, Lloydia 14: 107. 1951.
≡ *Sporisorium mutabile* (Syd.) Vánky, Mycotaxon 85: 29. 2003.
≡ *Sorosporium cantonense* Zundel, Mycologia 31: 584, 1939.
≡ *Sporisorium cantonense* (Zundel) L. Guo, Mycosystema 17: 1, 1998.
≡ *Sorosporium terrareginalense* Zundel, Mycologia 36: 409, 1944.

*Specimens examined.* AUSTRALIA, Western Australia, Morowa, *Cymbopogon bombycinus*, 26 Sep. 1993, R.J. Cranfield, BRIP 28994; New South Wales, 11 km N of Coonabarabran, *Cymbopogon refractus*, 16 Apr. 2004, M.D.E. & R.G. Shivas, BRIP 44111.

**Anthracocystis myosuroidis** (Hirschh.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801654

*Basionym. Sorosporium myosuroidis* Hirschh., Revista Mus. La Plata, N.S., Bot. 3: 343. 1941.
≡ *Sporisorium myosuroidis* (Hirschh.) Vánky, Mycotaxon 81: 396. 2002.

**Anthracocystis nardi** (Syd. & P. Syd) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801655

*Basionym. Ustilago nardi* Syd. & P. Syd., in H. & P. Sydow & Butler, Ann. Mycol. 4: 425. 1906.
≡ *Sphacelotheca nardi* (Syd. & P. Syd.) Zundel, Mycologia 22: 137. 1930.
≡ *Sorosporium nardi* (Syd. & P. Syd.) L. Ling, Sydowia 5: 47. 1951.
≡ *Sporisorium nardi* (Syd. & P. Syd.) Vánky, Mycotaxon 85: 30. 2003.

**Anthracocystis normanensis** (R.G. Shivas & Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801656

*Basionym. Sporisorium normanense* R.G. Shivas & Vánky (as 'normanensis'), Fungal Diversity 8: 150. 2001.

*Specimen examined.* AUSTRALIA, Queensland, Normanton, 18 km SSE of Norman River Bridge, *Cynodon dactylon*, 10 Jul. 1999, R.G. Shivas, M. Gunther, BRIP 25751, holotype.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis normanensis* (Shivas and Vánky 2001), which are most likely remnants of the non-sporogenous hyphae. *Anthracocystis normanensis* on *Cynodon* is one of five known *Anthracocystis* species that has a chloridoid grass species as host. The majority of *Anthracocystis* taxa infect andropogonoid grasses.

**Anthracocystis nyasalandica** (L. Ling) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801657

*Basionym. Sorosporium nyasalandicum* L. Ling, Sydowia 7: 156. 1953.
≡ *Sporisorium nyasalandicum* (L. Ling) Vánky, Mycotaxon 91: 226. 2005.
**Anthracocystis operculata** (Vánky, C. Vánky & R.G. Shivas) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801658

*Basionym.* *Sporisorium operculatum* Vánky, C. Vánky & R.G. Shivas, in Vánky & Shivas, Fungal Diversity 7: 154. 2001.

*Specimen examined.* AUSTRALIA, Queensland, Chillagoe, *Mnesithea formosa*, 04 Mar. 2000, *K.* & *C.* Vánky, BRIP 27015, holotype.

**Anthracocystis ovaria** (Griffiths) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801659

*Basionym.* *Sorosporium ovarium* Griffiths, Bull. Torrey Bot. Club 34: 209. 1907.

≡ *Sporisorium ovarium* (Griffiths) Vánky, Mycotaxon 65: 138. 1997.

≡ *Sphacelotheca diplospora* (Ellis & Everh.) Clinton var. *verruculosa* Clinton, North American Flora 7: 27. 1906.

≡ *Ustilago verecunda* Syd., Ann. Mycol. 33: 231. 1935.

≡ *Sorosporium verecundum* (Syd.) Zundel, Bothalia 3: 304. 1938.

≡ *Sorosporium brachiariae* J.C.F. Hopkins, Trans. Rhodesia Sci. Assoc. 35: 126. 1938.

≡ *Ustilago urochloana* Zundel, Mycologia 35: 166. 1943.

≡ *Sorosporium brachiariae-ramosae* T.S. Ramakr., Proc. Indian Acad. Sci. 35: 113. 1952.

*Specimen examined.* AUSTRALIA, Northern Territory, Alice Springs, 393km N of Devils Marbles, *Brachiaria piligera*, 15 Mar. 2000, *R.G.* Shivas, *I.T.* Riley, *C.* & *K.* Vánky, Vánky, Ust. exs. no. 1184.

**Anthracocystis panicicola** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801660

*Basionym.* *Sporisorium panicicola* Vánky, Mycotaxon 91: 229. 2005.

*Specimen examined.* REUNION, St Benoit, 14km SW of Lacus Le Grand Etang, *Panicum coloratum*, 02 Dec. 1994, *C.* & *K.* Vánky, Vánky, Ust. exs. no. 1238, isotype.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *A. panicicola* (Vánky 2005), which are most likely remnants of the non-sporogenous hyphae.

**Anthracocystis panici-fasciculati** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801661

*Basionym.* *Sporisorium panici-fasciculati* Vánky, Mycotaxon 91: 229. 2005.

**Anthracocystis panici-leucophaei** (Bref.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801662

*Basionym.* *Ustilago panici-leucophaei* Bref., Unters. Gesammtgeb. Mykol. 12: 114. 1895.

≡ *Sphacelotheca panici-leucophaei* (Bref.) Clinton, North American Flora 7: 28. 1906.
Sporisorium panici-leucophaei (Bref.) M. Piepenbr., Mycol. Res. 103: 465. 1999.
≡ Lundquistia panici-leucophaei (Bref.) Vánky, Fungal Diversity 17: 167. 2004.
= Ustilago insularis Henn., in Paszchke, Hedwigia 35: 51. 1896.
= Ustilago bonariensis Speg., Anales Mus. Nac. Buenos Aires, Ser. 3, 12: 287. 1909.
≡ Sphacelotheca bonariensis (Speg.) Ciferri, Ann. Mycol. 29: 56. 1931.
≡ Sorosporium bonariense (Speg.) Zundel, Ustil. World: 54. 1953 (as 'bonariensis').
≡ Sporisorium bonariense (Speg.) Vánky, nom. herb.
≡ Sphacelotheca viegasiana Zundel, Mycologia 31: 588. 1939.
≡ Sorosporium lindmanii Zundel, Mycologia 35: 173. 1943.
≡ Ustilago garcesii Zundel (as 'Garcesi'), Mycologia 37: 372. 1945.
≡ Lundquistia fascicularis Vánky, Mycotaxon 77: 373. 2001.
≡ Sporisorium fasciculare (Vánky) M. Stoll, Begerow & Oberw. (as 'fascicularis'), Mycol. Res. 109: 354. 2005.

Specimens examined. AUSTRALIA, New South Wales, 11km N of Coonabarabran, Digitaria breviglumis, 16 Apr. 2004, M.D.E. & R.G. Shivas, BRIP 44110; ARGENTINA, Buenos Aires, 115 km NNW of Buenos Aires, Panicum elephantipes, 29 Nov. 1999, K. & C. Vánky, Vánky, Ust. exs. no.1117 (BRIP 28944).

Anthracocystis panici-petrosi (Syd. & P. Syd) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801663
Basionym. Ustilago panici-petrosi Syd. & P. Syd., Ann. Mycol. 14: 73. 1916.
≡ Sporisorium panici-petrosi (Syd. & P. Syd.) M. Piepenbr., Flora Neotropica Monograph 86: 122. 2003.

Anthracocystis paraneurachnis (R.G. Shivas & Vánky) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801664
Basionym. Sporisorium paraneurachnis R.G. Shivas & Vánky (as 'paraneurachnes'), Mycol. Res. 101: 836. 1997.

Specimen examined. AUSTRALIA, Western Australia, Paraneurachne muelleri, 27 Jun. 1996, A.A. Mitchell, BRIP 26804.

Anthracocystis parodii (Hirschh.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801665
Basionym. Ustilago parodii Hirschh., Darwinia 3: 404. 1939.
≡ Sporisorium parodii (Hirschh.) Vánky, Mycotaxon 85: 59. 2003.

Anthracocystis parodii on Muhlenbergia is one of five known Anthracocystis species that infect a chloridoid grass. The majority of Anthracocystis taxa infect andropogonoid grasses.

Anthracocystis paspali-thunbergii (Henn.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801666
Basionym. Ustilago paspali-thunbergii Henn., Hedwigia 43: 140. 1904.
≡ Sorosporium paspali-thunbergii (Henn.) S. Ito, Trans. Sapporo Nat. Hist. Soc. 14: 94. 1935.
≡ *Sporisorium paspali-thunbergii* (Henn.) Vánky, Publ. Herb. Ustilag. Vánky (HUV) 3: 9. 1986.
≡ *Sorosporium paspali* McAlpine, The smuts of Australia: 180. 1910.
≡ *Sorosporium paspali* McAlpine var. *verrucosum* Thirum. & M.S. Pavgi, Mycopathol. Mycol. Appl. 7: 283. 1956.

*Specimen examined.* CHINA, Yunnan, Mamushu, *Paspalum scrobiculatum*, 22 Sep. 1985, L. Guo & K. Vánky, Vánky, Ust. exs. no. 526.

**Anthracocystis pennisetis** (Rabenh.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801667

*Basionym. Ustilago pennisetis* Raben., Hedwigia 10: 18. 1871.
≡ *Sphacelotheca pennisetis* (Rabenh.) Reichert, Bot. Jahrb. Syst. 56: 679. 1921.
≡ *Sporisorium pennisetis* (Rabenh.) Ershad, Iranian J. Pl. Pathol. 30: 18, 1994.
≡ *Ustilago pappiana* Baccarini, Ann. Bot. (Rome) 4: 272. 1906.
≡ *Sorosporium pappianum* (Bacc.) L. Ling, Lloydia 16: 192. 1953.
≡ *Sorosporium catharticum* Maire, in Recueil de travaux cryptogamiques dédiés à Louis Margin: 359. 1931.
≡ *Sporisorium catharticum* (Maire) Vánky, Mycotaxon 35: 155. 1989.
≡ *Sphacelotheca panjabanensis* Syd., in Sydow & Ahmad, Ann. Mycol. 37: 442. 1939.
≡ *Ustilago panjabanensis* (Syd.) L. Ling, Sydowia 4: 76. 1950.
≡ *Sporisorium pennisetis* Mundk., Trans. Brit. Mycol. Soc. 23: 116. 1939.
≡ *Sphacelotheca stewartii* Mundk., Mycologia 36: 290. 1944.
≡ *Ustilago penniseti* Rabenh. var. *verruculosa* Massenot, in Guyot, Malençon & Massenot, Rev. Mycol. (Paris) 34: 217. 1969.

*Specimen examined.* INDIA, Tamil Nadu, Coimbatore, Institute of Forest Genetics & Tree Breeding, Guest House, *Cenchrus ciliaris*, 04 Jan 2010, R.G. & M.D.E. Shivas, BRIP 53217.

**Anthracocystis penniseticola** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801668

*Basionym. Sporisorium penniseticola* Vánky, Mycol. Balcan. 2: 92. 2005.

*Specimen examined.* ETHIOPIA, Arsi, 11 km south of Asela, *Pennisetum sphacelatum*, 04 Nov. 2004, T. & K. Vánky, BRIP 47137, paratype.

**Anthracocystis pennisetina** (S. Ahmad) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801669

*Basionym. Sphacelotheca pennisetina* S. Ahmad, Mycol. Pap. 64: 7. 1956.
≡ *Sporisorium pennisetinum* (S. Ahmad) Vánky, Mycotaxon 85: 13. 2003.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis pennisetina* (Vánky 2003b), which are most likely remnants of the non-sporogenous hyphae.

**Anthracocystis polliniae** (Magnus) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801670
**Basionym. Sorosporium polliniae** Magnus (as 'Sorisorium'), Verh. K. K. Zool.-Bot. Ges. Wien 50: 433. 1900.

≡ **Sorisorium polliniae** (Magnus) Vánky, Mycotaxon 18: 331. 1983.

**Specimen examined.** GREECE, Rhodos, *Andropogon distachyos* L., 14 Apr. 1988, *H.W. & I. Scholz*, Vánky, Ust. exs. no. 690.

**Anthracocystis polytriadis** (Massée) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801671

*Basionym. Ustilago polytriadis* Massée, Bull. Misc. Inform. 1911: 224. 1911.

≡ **Sphacelotheca polytriadis** (Massée) L. Ling, Sydowia 3: 127. 1949.

≡ **Sorisorium polytriadis** (Massée) M.A. Rifai, Bul. Kebun. Raya 7: 28, 1990.

≡ **Sorisorium polytriadis** (Massée) Vánky (comb. superfl.), Mycotaxon 62: 136. 1997

≡ **Sorisorium polytriadis** (Massée) Vánky, Mycotaxon 62: 136. 1997.

**Anthracocystis provincialis** (Ellis & Galloway) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801672

*Basionym. Sorosporium ellisii* G. Winter var. *provinciale* Ellis & Galloway, J. Mycol. 6: 31. 1890.

≡ **Sorisorium provinciale** (Ellis & Galloway) Clinton, J. Mycol. 8: 145. 1902.

≡ **Sorisorium provinciale** (Ellis & Galloway) Vánky & Snets., in Vánky, Mycotaxon 38: 271, 1990.

**Specimen examined.** UNITED STATES, Iowa, Ledges State Park, Boone Co., *Andropogon gerardi*, 23 Jun. 1989, *K.M. Snetselaar*, Vánky, Ust. exs. no. 759.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis provinciale* (Vánky 1990), which are most likely remnants of the non-sporogenous hyphae.

**Anthracocystis pseudanthistiriae** (Syd., P. Syd. & Butler) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank ******

*Basionym. Sorosporium pseudanthistiriae* Syd., P. Syd. & Butler, Ann. Mycol. 10: 254. 1912.

≡ **Sporisorium pseudanthistiriae** (Syd., P. Syd. & Butler) Vánky, Mycotaxon 62: 145. 1997.

≡ **Sorisorium pseudanthistiriae-umbellatae** A.R. Patil, T.M. Patil & M.S. Patil, J. Mycol. Pl. Pathol. 34: 841. 2004.

**Specimen examined.** INDIA, Maharashtra, Kolhapur, Shivaji University, *Pseudanthistiria hispida*, 16 Nov. 1995, *Sharma & K. Vánky*, Vánky, Ust. exs. no. 969.

**Anthracocystis pseudomaranguensis** (Zundel) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801673

*Basionym. Sorosporium pseudomaranguense* Zundel, Bothalia 3: 309. 1938.

≡ **Sporisorium pseudomaranguense** (Zundel) Vánky, Mycotaxon 91: 263. 2005.
Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis pseudomaranguensis* (Vánky 2005), which are most likely remnants of the non-sporogenous hyphae.

*Anthracocystis pseudoraphis* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801674  
*Basionym. Sporisorium pseudoraphis* Vánky, Mycotaxon 68: 331. 1998.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis pseudoraphis* (Vánky 1998), which are most likely remnants of the non-sporogenous hyphae.

*Anthracocystis rhytachnes* (Syd.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801675  
*Basionym. Sphacelotheca rhytachnes* Syd., Ann. Mycol. 37: 201. 1939.  
≡ *Sporisorium rhytachnes* (Syd.) Vánky, Mycotaxon 74: 171. 2000.

*Anthracocystis rubyanum* (Vánky & N.D. Sharma) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801676  
*Basionym. Sporisorium rubyanum* Vánky & N.D. Sharma, in Vánky, Fungal Diversity 15: 234. 2004.

*Specimen examined. INDIA, Madhya Pradesh, Jabalpur, 200 km SW of Pachmarhi, Capillipedium assimile, 31 Oct. 1992, R. Sharma & S. Raich, BRIP 51782, isoparatype.*

*Anthracocystis sahariana* on *Sporobolus* is one of five known *Anthracocystis* species that infect a chloridoid grass. The majority of *Anthracocystis* taxa infect andropogonoid grasses.

*Anthracocystis scheffleri* (Syd. & P. Syd) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801678  
*Basionym. Ustilago scheffleri* Syd. & P. Syd., Bot. Jahrb. Syst. 45: 262. 1911.  
≡ *Sporisorium scheffleri* (Syd. & P. Syd.) Vánky, Mycotaxon 91: 232. 2005.

*Anthracocystis schizachyrii* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801679  
*Basionym. Sporisorium schizachyrii* Vánky, Mycotaxon 81: 418. 2002.

*Specimen examined. ZAMBIA, Southern Province, Chirundu, 75 km ESE of Kafue, Schizachyrium exile, 28 Apr. 2001, K. & C. Vánky, Vánky, Ust. exs. no. 1128.*
**Anthracocystis scholzii** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801680  
*Basionym.* *Sporisorium scholzii* Vánky, Mycotaxon 95: 22. 2006.

**Anthracocystis sehimatis** (M.S. Patil) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801681  
*Basionym.* *Sorosporium sehimatis* M.S. Patil (as 'sehimae'), Indian Phytopathol. 45: 181. 1992.  
≡ *Sporisorium sehimatis* (M.S. Patil) Vánky, Mycotaxon 74: 188. 2000 (as 'sehimae').

**Anthracocystis setariae** (McAlpine) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801682  
*Basionym.* *Sorosporium setariae* McAlpine, The smuts of Australia: 183. 1910.  
≡ *Sporisorium setariae* (McAlpine) Vánky & R.G. Shivas, Fungal Diversity 14: 263. 2003.

**Anthracocystis shivasiora** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801683  
*Basionym.* *Sporisorium shivasiorum* Vánky, Mycotaxon 106: 145. 2008.  
 Specimen examined. THAILAND, Chiang Mai, Chiang Mai, near Mae Ngad Dam, *Eulalia trispicata*, 28 Dec. 2005, P. Athipunyakom, S. Likhitekaraj, W. Butranu, C. & K. Vánky, A.J., M.D.E. & R.G. Shivas, BRIP 51766, holotype.

**Anthracocystis spermoidea** (Berk. & Broome) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801684  
*Basionym.* *Ustilago spermoidea* Berkeley & Broome, J. Linn. Soc., Bot. 14: 94. 1875.  
≡ *Sphacelotheca spermoidea* (Berk. & Broome) Mundk., Trans. Brit. Mycol. Soc. 23: 96. 1939.  
≡ *Sorosporium spermoideum* (Berk. & Broome) L. Ling, Sydowia 5: 48. 1951.  
≡ *Sorosporium spermoideum* (Berk. & Broome) Zundel, Ustil. World: 74. 1953 (comb. superfl.).  
≡ *Sporisorium spermoideum* (Berk. & Broome) Vánky, Mycotaxon 85: 31. 2003.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis setariae* (Vánky & Shivas 2003), which are most likely remnants of the non-sporogenous hyphae.
Specimen examined. INDIA, Tamil Nadu, ca. 65km NW of Madurai, Cymbopogon martinii, 28 Jan. 1980, K. Vánky, Vánky, Ust. exs. no. 1245.

*Anthracocystis sphaelata* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801685

*Basionym.* *Sporisorium sphaelatum* Vánky, Mycotaxon 85: 13. 2003.

Specimen examined. SOUTH AFRICA, Lady Gray, Eastern Cape Province, Mt. Drakensberg, Pennisetum sphaelatum, 22 Dec. 1996, C. & K. Vánky, Vánky, Ust. exs. no. 1145.

*Anthracocystis stipara* (Speg.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801686

*Basionym.* *Ustilago stiparum* Speg., Anales Mus. Nac. Buenos Aires, Ser. 3, 12: 288. 1909.

≡ *Sorosporium stiparum* (Speg.) Zundel, Mycologia 43: 269. 1951.
≡ *Sporisorium stiparum* (Speg.) Vánky, Mycotaxon 106: 163. 2008.

*Anthracocystis sulcati* (M.S. Patil) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801687

*Basionym.* *Sorosporium sulcati* M.S. Patil, Indian Phytopathol. 45: 181. 1992.

≡ *Sporisorium sulcati* (M.S. Patil) Vánky, Mycotaxon 74: 188. 2000.

*Anthracocystis tanganyikeana* (Zundel) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801688

*Basionym.* *Sorosporium tanganyikeanum* Zundel, Mycologia 36: 408. 1944.

≡ *Sporisorium tanganyikeanum* (Zundel) Vánky, Mycotaxon 91: 235. 2005.

*Anthracocystis tembuti* (Henn. & Pole-Evans) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801689

*Basionym.* *Sorosporium tembuti* Henn. & Pole-Evans, in Hennings, Bot. Jahrb. Syst. 41: 270. 1908.

≡ *Sporisorium tembuti* (Henn. & Pole-Evans) Vánky, Mycotaxon 99: 63. 2007.
≡ *Ustilago tumefaciens* Henn., in Engler, Pflanzenwelt Ost-Afrikas, etc., C.: 48. 1895.

≡ *Sorosporium tumefaciens* (Henn.) Zundel, Mycologia 22: 149. 1930 (not *Sorosporium tumefaciens* McAlpine, The smuts of Australia: 184. 1910).

≡ *Sorosporium zundelianum* Cif., Nuovo Giorn. Bot. Ital., N.S., 40: 268. 1933, nom. nov.

≡ *Sporisorium healdii* Zundel, Mycologia 22: 147. 1930.
≡ *Sporisorium proliferatum* Zundel, Mycologia 22: 150. 1930.
≡ *Sporisorium clintonii* Zundel, Mycologia 22: 153. 1930.

Specimen examined. SOUTH AFRICA, KwaZulu-Natal, Mikes Pass, Cathedral Peak National Park, Hyparrhenia tamba, 30 Dec. 1996, K. & C. Vánky, Vánky, Ust. exs. no. 1153.

*Anthracocystis thelepogonis* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801690
Basionym. *Sporisorium thelepogonis* Vánky, Mycotaxon 62: 130. 1997.

**Specimen examined.** EAST TIMOR, Maahui, *Thelepodon elegans*, 06 May 2002, M.P. Weinert & A.A. Mitchell, BRIP 51275.

**Anthracocystis themedae-arguentis** (Vánky) McTaggart & R.G. Shivas, *comb. nov.*
— MycoBank MB801691
   Basionym. *Sporisorium themedae-arguentis* Vánky, Mycotaxon 51: 154. 1994.

   **Specimens examined.** AUSTRALIA, Northern Territory, Humpty Doo, *Themeda arguens*, 20 Mar. 1967, J.B. Heaton, BRIP 7883, paratype; INDONESIA, Bali, Denpasar, 20 km south of Mount Alas Kemayuna, *Themeda arguens*, 01 Apr. 1992, Menge, C. & K. Vánky, Vánky, Ust. exs. no. 855, isotype.

**Anthracocystis themedae-cymbariae** (Vánky) McTaggart & R.G. Shivas, *comb. nov.*
— MycoBank MB801692
   Basionym. *Sporisorium themedae-cymbariae* Vánky, Mycotaxon 62: 141. 1997.

   **Specimen examined.** INDIA, Karnataka, Mysore, Bandipur, *Themeda cymbaria*, 05 Jun 1995, Sharma & K. Vánky, Vánky, Ust. exs. no. 973.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis themedae-cymbariae* (Vánky 1997), which are most likely remnants of the non-sporogenous hyphae.

**Anthracocystis tothii** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801693
   Basionym. *Sporisorium tothii* Vánky, Mycotaxon 85: 14. 2003.

**Anthracocystis trispicatae** (R.G. Shivas, Vánky & Athipunyakom) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801694
   Basionym. *Sporisorium trispicatae* R.G. Shivas, Vánky & Athipunyakom, in Vánky, R.G. Shivas & Athipunyakom Mycol. Balcan. 3: 111. 2006.

   **Specimen examined.** THAILAND, Chiang Mai, Mae Ngad Dam, Mae Taeng District, *Eulalia trispicata*, 28 Dec. 2005, R.G. & M.D.E. Shivas, P. Athipunyakom, W. Butranu, S. Likhitekaraj, C. & K. Vánky, BRIP 47730, isotype.

**Anthracocystis tristachyae-hispidae** (L. Ling) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801695
   Basionym. *Sphacelotheca tristachyae-hispidae* L. Ling, Lloydia 16: 184. 1953.
   ≡ *Sporisorium tristachyae-hispidae* (L. Ling) Vánky, Mycotaxon 65: 162. 1997.

   **Specimen examined.** SOUTH AFRICA, KwaZulu-Natal, Giants Castle Reserve, Drakensberg Mountains, *Tristachya leucothrix*, 04 Jan. 1997, C. & K. Vánky, Vánky, Ust. exs. no. 1030.

**Anthracocystis tristachyae-nodiglumis** (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801696
Basionym. *Sporisorium tristachyae-nodiglumis* Vánky, Mycotaxon 85: 46. 2003.

Specimen examined. ZAMBIA, Central Province, 169 km ENE of Lusaka, *Tristachya* sp., 17 Apr. 2001, C., T. & K. Vánky, Vánky, Ust. exs. no. 1144, isotype.

*Anthracocystis tristachydis* (Syd. & P. Syd.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801697

Basionym. *Sorosporium tristachydis* Syd. & P. Syd., Bot. Jahrb. Syst. 45: 263. 1911.

≡ *Tolyposporium tristachydis* (Syd. & P. Syd.) Zundel, Bothalia 3: 310. 1938.

≡ *Sporisorium tristachydis* (Syd. & P. Syd.) Vánky, Mycotaxon 65: 161. 1997.

*Anthracocystis tumefaciens* (McAlpine) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801698

Basionym. *Sorosporium tumefaciens* McAlpine, The smuts of Australia: 184. 1910.

≡ *Sporisorium tumefaciens* (McAlpine) Vánky, Mycotaxon 18: 328. 1983.

≡ *Sphacelotheca rhaphidis* L. Ling, *Sydowia* 3: 128. 1949.

≡ *Sporisorium tumiforme* Vánky & R.G. Shivas, in Vánky, Fungal Diversity 18: 183. 2005.

Specimen examined. AUSTRALIA, Western Australia, Wyndham, 56 km SSE on Great Northern Highway, *Chrysopogon fallax*, 22 Feb. 1996, A.A. Mitchell, C. & K. Vánky, Vánky, Ust. exs. no. 1031.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells present *Anthracocystis tumefaciens*, which are remnants of the non-sporogenous hyphae.

*Anthracocystis ugandensis* (Henn.) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801699

Basionym. *Ustilago ugandensis* Henn., in Engler, Pflanzenwelt Ost-Afrikas, etc., C: 48. 1895.

≡ *Sporisorium ugandense* (Henn.) Vánky, Mycotaxon 91: 250. 2005.

≡ *Sphacelotheca dolichosora* Ainsw., Proc. Linn. Soc. London 153: 94. 1941.

≡ *Sporisorium dolichosorum* (Ainsw.) Vánky, Mycotaxon 73: 142. 1999.

Sterile cells formed from non-sporogenous hyphae are usually absent in *Anthracocystis*. There are a few sterile cells reported in *Anthracocystis ugandensis* (Vánky 2005), which are most likely remnants of the non-sporogenous hyphae.

*Anthracocystis walkeri* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801700

Basionym. *Sporisorium walkeri* Vánky, Mycotaxon 51: 158. 1994.

Specimen examined. AUSTRALIA, Queensland, Fernvale, *Themeda triandra*, 15 Nov. 1965, R.F.N. Langdon, BRIP 7876, paratype.

*Anthracocystis whiteochloae* (Vánky & McKenzie) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801701
Basionym. *Sporisorium whiteochloae* Vánky & McKenzie, in Vánky & Shivas, Fungal Diversity 7: 160. 2001.

Specimens examined. AUSTRALIA, Western Australia, Kununurra, Fish Farm Road, *Whiteochloa cymbiformis*, 26 Jun. 1998, R. Eichner, BRIP 26823, isotype; Northern Territory, Timber Creek, Policeman's Lookout, *Whiteochloa semitonsa*, 10 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51860b.

*Anthracocystis xerofasciculata* (R.G. Shivas, McTaggart & Vánky) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801702  
Basionym. *Sporisorium xerofasciculatum* R.G. Shivas, McTaggart & Vánky, Mycotaxon 101: 353. 2007.

Specimen examined. AUSTRALIA, Western Australia, Between Kununurra and Halls Creek, *Xerochloa laniflora*, 11 Apr. 2007, A.R. McTaggart, T.S. Marney, S.M. Thompson, M.J. Ryley, A.J., G.F., M.D.E. & R.G. Shivas, BRIP 49682, holotype.

*Anthracocystis zambiana* (Vánky) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801703  
Basionym. *Sporisorium zambianum* Vánky, Mycotaxon 85: 42. 2003.

**Stollia (Clade 3)**

The new genus *Stollia* is proposed to accommodate smut fungi that occur as localized galls in the ovaries on grasses in the tribe Andropogoneae. The sori are enclosed by a peridium of host tissue. The swollen ovaries consist of spores mixed with sterile cells. Columellae and spore balls are absent.

*Stollia* McTaggart & R.G. Shivas, gen. nov. — MycoBank MB801704; Fig. 23a-f.  
*Etymology:* Named after the German mycologist Matthias Stoll in recognition of his substantial contribution towards resolving the *Ustilago-Sporisorium-Macalpinomyces* complex.

Sori in swollen ovaries of Andropogoneae, localized in the inflorescence, globose to obovoid, covered by a thick peridium derived from host tissue, initially green, darker with age, which ruptures at maturity to expose the pulverulent spore mass mixed with sterile cells. Spores single, globose, subglobose to ellipsoidal, often echinulate. Sterile cells in loose irregular groups, globose, hyaline. Columellae and spore balls are lacking.

*Type species. Stollia ewartii* (McAlpine) McTaggart & R.G. Shivas

*Holotype.* AUSTRALIA, Western Australia, Napier, Broome Bay, *Sorghum stipoideum*, 22 May 1910, A.J. Ewart, MEL 1055129.

New combinations for Stollia

*Stollia bothriochloae* (L. Ling) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801705
Basionym. *Ustilago bothriochloae* L. Ling, Mycological Papers 11: 4. 1945.
≡ *Macalpinomyces bothriochloae* (L. Ling) Vánky, Fungal Diversity 15: 225. 2004.

*Specimens examined. BOLIVIA, La Paz, Sud Yungas, Between Chulumani and Inquisivi, *Bothriochloa bladhii*, 18 Apr. 2009, R.G. & M.D.E. Shivas, A.R. McTaggart, W.A. Arce, C. & K. Vánky, BRIP 52756; THAILAND, *Bothriochloa bladhii*, 27 Dec. 2005, R.G. Shivas & P. Athipunyaakom, BRIP 47762.*

*Stollia bursa* (Berk.) McTaggart & R.G. Shivas *comb. nov.* — MycoBank MB801706

Basionym. *Ustilago bursa* Berk., Hookers’s J. Bot. Kew Gard. Misc. 6: 206. 1854.
≡ *Tolyposporium bursum* (Berk.) McAlpine, The smuts of Australia: 186. 1910.
≡ *Sphacelotheca bursa* (Berk.) Mundk. & Thirum., Mycol. Pap. 16: 6. 1946.
≡ *Sporisorium bursum* (Berk.) Vánky, Mycotaxon 31: 403. 1988.
≡ *Macalpinomyces bursus* (Berk.) Vánky, Mycotaxon 81: 427. 2002.

*Specimen examined. THAILAND, Chiang Rai, 42 km east of Chiang Saen, Themeda villosa, 16 Dec. 2007, P. Athipunyaakom, S. Likhitekaraj, V.L. Challinor, T.S. Marney, A.R. McTaggart, M.D.E. & R.G. Shivas, BRIP 51544.*

*Stollia ewartii* (McAlpine) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801707

Basionym. *Ustilago ewartii* McAlpine (as 'ewarti'), Proc. Linn. Soc. New South Wales 36: 45. 1912 ['1911'].
≡ *Macalpinomyces ewartii* (McAlpine) Vánky & R.G. Shivas, Mycotaxon 80: 346. 2001.
= *Ustilago sorghi-stipoidei* L. Ling, Sydowia 7: 154. 1953.

*Specimens examined. AUSTRALIA, Western Australia, between Wyndham and Kununurra, *Sorghum timorense*, 04 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51814; Western Australia, between Wyndham and Kununurra, *Sorghum timorense*, 08 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51818; Northern Territory, Katherine, *Sorghum timorense*, 24 Apr. 1947, S.T. Blake, BRIP 7791, isotype.*

*Stollia ovariicolopsis* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801708

Basionym. *Sporisorium ovariicolopsis* Vánky, Mycotaxon 74: 203. 2000.
≡ *Macalpinomyces ovariicolopsis* (Vánky) Vánky, Mycotaxon 81: 427. 2002.

*Stollia pseudanthistiriae* (A.R. Patil, T.M. Patil & M.S. Patil) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801709

Basionym. *Macalpinomyces pseudanthistiriae* A.R. Patil, T.M. Patil & M.S. Patil, J. Mycol. Pl. Pathol. 34: 839. 2004.

*Langdonia (Clade 8)*

The new genus *Langdonia* is proposed to accommodate the monophyletic group of smut fungi that infect the ovaries of *Aristida*, have coiled sporogenous hyphae and lack columellae.
**Langdonia** McTaggart & R.G. Shivas, gen. nov. — MycoBank MB801710; Fig. 3a-c

**Etymology:** Named after the Australian mycologist Raymond F. N. Langdon who first described the mode of soral development in the *Ustilago-Sporisorium-Macalpinomyces* complex.

Infesting hosts of *Aristida*. Sori in some or all ovaries of a panicle. Columella absent. Spores usually compacted into spore balls. Sterile cells formed from non-sporogenous hyphae usually absent.

**Type species.** *Langdonia fraseriana* (Syd.) McTaggart & R.G. Shivas

**Holotype.** AUSTRALIA, New South Wales, Warialda, *Aristida leptopoda*, Jan. 1932, L.R. Fraser, IMI 44415, HUV 17480.

**New combinations for Langdonia**

**Langdonia aristidae** (Peck) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801711

*Basionym. Ustilago aristidae* Peck, Bull. Torrey Bot. Club 12: 35. 1885.

≡ *Sorosporium consanguineum* Ellis & Everhart, J. Mycol. 3:56, 1887.

≡ *Sporisorium consanguineum* (Ellis & Everhart) Vánky, Mycotaxon 31: 402. 1988, s. lat.

≡ *Sorosporium aristidae* Neger, Ann. Univ. Chile 95: 789. 1896 (as 'Sorisorium').

≡ *Sorosporium bornmuelleri* Magnus (as 'Sorisorium'), Verh. K. K. Zool.-Bot. Ges. Wien 50: 434. 1900.

≡ *Sorosporium concelatum* L. Ling, Lloydia 14: 106. 1951.

≡ *Sporisorium arundinellae-nepalensis* Vánky, Mycotaxon 89: 91. 2004 (not *Sporisorium concelatum* (Zundel) M. Piepenbr. Caldasia 24: 109. 2002).

**Specimens examined.** AUSTRALIA, Western Australia, Kununurra, Ivanhoe Crossing, *Aristida hygrometrica*, 09 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51839; Western Australia, Gingin, Cemetery, *Aristida* sp., 14 Sep. 1999, C. & K. Vánky, BRIP 27723.

**Langdonia aristidaria** (Durán) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801712

*Basionym. Ustilago aristidarius* Durán, Ustil. Mexico: 222. 1987.

**Langdonia aridicola** (Speg.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801713

*Basionym. Urocystis aridicola* Speg., Anales Mus. Nac. Buenos Aires, Ser. 3, 12: 294. 1909.

≡ *Tuburcinia aridicola* (Speg.) Liro, Ann. Univ. Fenn. Abo., Ser. A, 1: 26. 1922.

≡ *Sporisorium aridicola* (Speg.) Vánky, Mycotaxon 78: 305. 2001.

≡ *Sorosporium consanguineum* Ellis & Everh. var. *bullatum* Pavgi & Thirumalchar, Sydowia 5: 10. 1951.
Sorosporium bullatum (Pavgi & Thirum.) Pavgi & Thirum., in Thirumalachar & Pavgi, Mycopathol. Mycol. Appl. 7: 284. 1956 (not Sorosporium bullatum J. Schröter, Jber. schles. Ges. vaterl. Kultur 49: 6. 1869).

≡ Sorosporium penuriasorus Durán, Ustil. Mexico: 67. 1987.

Specimens examined. AUSTRALIA, Northern Territory, Victoria River, 15 km east of Victoria Highway, Aristida sp., 12 Apr. 2008, A.R. McTaggart, V.L. Challinor, A.D.W. Geering, M.D.E. & R.G. Shivas, BRIP 51871; Northern Territory, 72 km NNW of Alice Springs, Aristida jerichoensis, 26 Mar. 2000, C. & K. Vánky, Vánky, Ust. exs. no. 1119.

Langdonia clandestina (R.G. Shivas, Vánky & Athipunyakom) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801714

Basionym. Sporisorium clandestinum R.G. Shivas, Vánky & Athipunyakom, in Vánky, Shivas & Athipunyakom, Mycol. Balcan. 3: 108. 2006.

Specimens examined. THAILAND, Nakhon Phanom, 31 km west of Sri Songkram, Aristida balansae, 12 Dec. 2007, P. Athipunyakom, S. Likhitekaraj, V.L. Challinor, T.S. Marney, A.R. McTaggart, M.D.E. & R.G. Shivas, BRIP 51520; Kalasin Province, 10 km NW of Na Khu, Aristida setacea, 20 Dec. 2005, R.G. Shivas, P. Athipunyakom, BRIP 47754, isotype.

Langdonia confusa (H.S. Jackson) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801715

Basionym. Sorosporium confusum H.S. Jackson, Bull. Torrey Bot. Club 35: 148. 1908.

≡ Sporisorium confusum (H.S. Jackson) Vánky, Mycotaxon 78: 306. 2001.

Specimens examined. AUSTRALIA, Northern Territory, 63.4 km north of Alice Springs, Aristida inaequiglumis, 23 Apr. 2007, A.R. McTaggart, J.R. Liberato, R.G. Shivas, BRIP 49660; Queensland, 1 km south of Mount Morgan, Aristida queenslandica, 24 Mar. 2003, R.G. & M.D.E. Shivas, BRIP 42670; BOLIVIA, Potosi, Charcas, between Toro Toro and Punata, Aristida sp., 22 Apr. 2009, R.G. & M.D.E. Shivas, A.R. McTaggart, W.A. Arce, C. & K. Vánky, BRIP 52755.

Langdonia fraseriana (Syd.) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801716

Basionym. Sorosporium fraserianum Syd., Ann. Mycol. 35: 25. 1937.

≡ Sporisorium fraserianum (Syd.) Vánky, Mycotaxon 78: 308. 2001.

Specimen examined. AUSTRALIA, Northern Territory, Alice Springs, near Standley's Gap, Aristida nitidula, 22 Apr. 2007, A.R. McTaggart, J.R. Liberato & R.G. Shivas, BRIP 49668.

Langdonia goniospora (Massee) McTaggart & R.G. Shivas, comb. nov. — MycoBank MB801717

Basionym. Ustilago goniospora Massee, Bull. Misc. Inform. 1899: 183. 1899.

≡ Sorosporium goniosporum (Massee) L. Ling, Lloydia 16: 189. 1953.

≡ Sporisorium goniosporum (Massee) Vánky, Mycotaxon 78: 308. 2001.
**Langdonia inopinata** (Vánky) McTaggart & R.G. Shivas, _comb. nov._ — MycoBank MB801718

*Basionym. Sporisorium inopinatum* Vánky, Mycotaxon 81: 384. 2002.

*Specimen examined. THAILAND, Aristida sp., 20 Dec. 2005, R.G. Shivas & P. Athipunyakom, BRIP 47757; ZIMBABWE, Matabeleland North, 30 km SE of Bulawayo, _Aristida scabrivalvis_, 02 Mar. 1999, C. & K. Vánky, Vánky, Ust. exs. no. 1108, isotype.*

**Triodiomyces (Clade 5)**

The new genus *Triodiomyces* is proposed to accommodate the monophyletic group of smut fungi that occur on grasses in the genus *Triodia*.

*Triodiomyces* McTaggart & R.G. Shivas, _gen. nov._ — MycoBank MB801719

*Etymology:* Named after the host genus, *Triodia*.

*Infecting hosts of Triodia. Sori in culms or inflorescence. Columella, spore balls and sterile cells absent.*

*Type species. Triodiomyces altilis* (Syd.) McTaggart & R.G. Shivas

*Holotype. AUSTRALIA, Northern Territory, between Liddels Hill and Ayers Rock (Uluru), _Triodia sp_. June 1935, *J.B. Clealand*, BRIP 7884 (lectotype of *Ustilago altilis* design. by Vánky & Shivas, Smut Fungi of Australia: 233. 2008).*

*New combinations for Triodiomyces*

*Triodiomyces altilis* (Syd.) McTaggart & R.G. Shivas, _comb. nov._ — MycoBank MB801720

*Basionym. Ustilago altilis* Syd., _Ann. Mycol_. 35:23. 1937.

*Specimens examined. AUSTRALIA, Northern Territory, between Liddels Hill and Ayers Rock, _Triodia sp_. June 1935, *J.B. Clealand*, BRIP 7884, lectotype; Barkley Highway, 80 km East of Tennant Creek, _Triodia pungens_, 25 Apr. 2007, A.R. McTaggart, J.R. Liberato & R.G. Shivas, BRIP 49644; Tanami Desert, _Triodia pungens_, 01 July 1980, *P.K. Latz*, BRIP 14713; Western Australia, Mitchell Plateau, _Triodia sp_. 11 May 2009, A.R. McTaggart, *V.L. Challinor*, M.J. Ryley, *C.F. Gambley*, T. Scharaschkin, M.D.E. & R.G. Shivas, BRIP 52543.*

*Triodiomyces inaltilis* (Vánky & A.A. Mitch.) McTaggart & R.G. Shivas, _comb. nov._ — MycoBank MB801721

*Basionym. Ustilago inaltilis* Vánky & A.A. Mitch., in Vánky, Mycotaxon 68:328. 1998.

*Specimens examined. AUSTRALIA, Western Australia, Galvins Gorge, _Triodia longiloba_, 06 June 1996, *A.A. Mitchell*, BRIP 49123, holotype.*

*Triodiomyces lituanus* (R.G. Shivas, Vánky & Cunningt.) McTaggart & R.G. Shivas, _comb. nov._ — MycoBank MB801722
**Basionym.** *Ustilago lituana* R.G. Shivas, Vánky & Cunningt., Australas. Pl. Pathol. 35:363. 2006.

**Specimens examined.** AUSTRALIA, Western Australia, Cooke Point Port Headland, Foreshore off Dempster St., *Triodia epactia*, 12 Aug. 2005, M.J. Ryley, T.S. Marney & R.G. Shivas, BRIP 46795, holotype; Turnoff to Derby, *Triodia* sp., 09 Apr. 2007, A.R. McTaggart, T.S. Marney, S.M. Thompson, M.J. Ryley, A.J., G.F., M.D.E. & R.G. Shivas, BRIP 49124.

*Triodiomyces lunatus* (R.G. Shivas, McTaggart & Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801723

**Basionym.** *Ustilago lunata* R.G. Shivas, McTaggart & Vánky, Mycotaxon 101:358. 2007.

**Specimens examined.** AUSTRALIA, Western Australia, Kennedy Range, *Triodia longiceps*, 16 July 1991, E. Davison, BRIP 49114, isotype.

*Triodiomyces triodiae* (Vánky) McTaggart & R.G. Shivas, *comb. nov.* — MycoBank MB801724

**Basionym.** *Ustilago triodiae* Vánky, Mycotaxon 62:167. 1997.

**Specimens examined.** AUSTRALIA, Western Australia, turnoff to Derby, *Triodia* sp., 09 Apr. 2007, A.R. McTaggart, T.S. Marney, S.M. Thompson, M.J. Ryley, A.J., G.F., M.D.E. & R.G. Shivas, BRIP 49124; Mitchell Plateau, 11 May 2009, A.R. McTaggart, V.L. Challinor, M.J. Ryley, C.F. Gambley, T. Scharaschkin, M.D.E. & R.G. Shivas, BRIP 52542.

**Identification of genera**

A key to the genera of the *Ustilago-Sporisorium-Macalpinomyces* complex follows. The genera can be identified by soral characteristics and host plant.

| 1a | Columella, sterile cells or spore balls present | 4 |
| 1b | Columella, sterile cells and spore balls absent | 2 |
| 2b | On *Poaceae* | 3 |
| 2c | On *Polygonaceae* |  |
| 3a | On *Triodia* |  |
| 3b | On other genera of grasses |  |
| 4a | Columella present | 5 |
| 4b | Columella absent | 6 |
| 5a | Columella filiform, flattened or flexuous. Spore balls formed from coiled sporogenous hyphae. Sterile cells usually absent |  |
| 5b | Columella stout, cylindrical or woody. Spore balls usually absent. Sterile cells present |  |
| 6a | Sori cylindrical or tubular, derived from host tissue | 7 |
| 6b | Sori globose or ovoid in hypertrophied host ovaries |  |
| 7a | Spore balls present and formed from coiled sporogenous hyphae | 8 |
| 7b | Spore balls absent | 9 |
8a On *Aristida*  
\hspace{1em} b On *Panicum trachyrachis*, sterile cells present

9a On *Eriachne*  
\hspace{1em} b On grasses in the subfamilies *Paniceae* or *Chloridoideae*

10a On grasses in the tribe *Andropogoneae*  
\hspace{1em} b On grasses in the tribes *Panicoideae* or *Chloridoideae*

**DISCUSSION**

Six of the monophyletic groups within the *Ustilago-Sporisorium-Macalpinomyces* complex are well supported and can be defined by morphology or host classification. The soral synapomorphies present in *Sporisorium* provided a clear, morphological solution to what was the largest component of the *Ustilago-Sporisorium-Macalpinomyces* complex. Relationships among these groups are still ambiguous. Character evolution within the complex cannot be determined confidently while there is doubt about the evolutionary relationships among the clades. For example, because the relationship of *Sporisorium* to *Anthracocystis* is not fully resolved, it is unknown whether columellae arose once in a shared common ancestor, or whether columellae were derived in two separate clades. The results of our previous studies indicate that the two structural types of columellae arose separately in smut fungi that infect the *Andropogoneae*.

*Macalpinomyces* remains a polyphyletic group, with taxa distributed over three unrelated clades: (i) the monotypic type species *Macalpinomyces eriachnes*, (ii) Clade 2, which contains smuts with tubular sori that are either localized or entirely replace the host inflorescence, and (iii) Clade 7, which form galls on panicoid and chloridoid hosts and have sterile cells. The possible taxonomic outcomes of these clades were discussed by McTaggart et al. (2012b).

*Ustilago* is also polyphyletic, with taxa distributed in three clades: (i) Clade 6, which contains the type species and may be further subdivided into host delimited genera, (ii) Clade 2, which contains *Ustilago maydis* and taxa with tubular sori, and (iii) Clade 7 with species that do not possess sterile cells or peridia, for example, *U. drakensbergiana*. The resolution of *Ustilago* and *Macalpinomyces* are dependent on each other, and in future phylogenetic analyses, taxa should be chosen from *Stollia*, *Ustilago s. lat.* , and Clades 2, 6 and 7. It is not necessary to add *Sporisorium* or *Anthracocystis* as these clades are well represented. Data should be obtained from the nuclear rDNA loci ITS and LSU. The addition of more nuclear sequence data is another approach if nuclear rDNA loci do not resolve the relationships.

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Figures

Fig. 1. Phylogram obtained from a phylogenetic analysis by McTaggart et al. (2012). Maximum likelihood support values (> 70%) from RAxML 1000 bootstrap replicates and PhyML aRLT values shown above the nodes. Posterior probabilities (> 0.95) from Bayesian inference shown below the nodes. Resolved genera within the complex are listed on the right hand side. Unresolved clades are numbered according to McTaggart et al. (2012b). Type species of known genera are in bold.

Fig. 2. Stollia ewartii and S. bursa. a. S. ewartii sori. b. S. ewartii spores. c. S. ewartii spores under SEM. d. S. bursa sori. e. S. bursa spores. f. S. bursa spores under SEM. Scale a, d = 5 mm; b-c, e-f = 10 µm.

Fig. 3. Langdonia. a. L. aristidicola sori. b. L. aristidicola spores in spore ball. c. L. aristidicola spore ball under SEM. Scale b-c = 10 µm.