

Three new species of *Sporidesmiella* from southern China

Jian Ma · Yi-Dong Zhang · Li-Guo Ma ·
Rafael F. Castañeda-Ruíz · Xiu-Guo Zhang

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Abstract *Sporidesmiella rosae* sp. nov., *S. machili* sp. nov., and *S. archidendri* sp. nov., occurring, respectively, on dead branches of *Rosa chinensis*, *Machilus grijsii*, and *Archidendron clypearia*, were collected from subtropical forests in southern China. They are described, illustrated, and compared with similar taxa. A dichotomous key to *Sporidesmiella* species is provided.

Keywords Anamorphic fungi · Hyphomycetes · Taxonomy

Introduction

Sporidesmiella was originally established by Kirk (1982) with *Sporidesmiella claviformis* as the type species, and was characterized by acrogenous, solitary, distoseptate conidia seceding schizolytically from monoblastic, integrated, terminal, annellidic, or rarely sympodially proliferating conidiogenous cells. The conidia are cylindrical, clavate, obovoid to cuneiform, rounded or coronate at the apex, and truncate at the base. Kirk (1983) expanded the generic concept to include the presence or absence of thick-walled subulate setae. Up to now, 27 taxa have been published under *Sporidesmiella* (Kirk 1982; Zhang et al. 1983; Matsushima 1985; Holubová-Jechová 1987;

Castañeda Ruíz 1988; Castañeda Ruíz and Kendrick 1990, 1991; Subramanian 1992; Kuthubutheen and Nawawi 1993; McKemy and Wang 1996; Castañeda Ruíz et al. 1998; Yanna et al. 2001; Wu and Zhuang 2005; Braun and Heuchert 2010). One of these, *S. vignalensis* (Castañeda Ruíz and Kendrick 1990) exhibits a similar conidial ontogeny of *Repetophragma* (Subramanian 1992). This species should be excluded from *Sporidesmiella*, and the evidence is described below. *Sporidesmiella* currently contains 26 valid taxa, and the criteria used for species delimitation are primarily based on proliferations of conidiogenous cells and conidial shape, size range, and septation (Kirk 1982; Kuthubutheen and Nawawi 1993; Castañeda Ruíz et al. 1998; Yanna et al. 2001; Wu and Zhuang 2005).

China is considered an important Asian reservoir of biodiversity. However, its mycobiota, especially of mitospore fungi, is poorly known. During our ongoing surveys of microfungi associated with woody debris in subtropical forests of southern China, three interesting hyphomycetes were collected on dead branches. The characters of their conidia and conidiogenous cells indicated they were appropriately placed in the genus *Sporidesmiella*, but are not conspecific with any of the currently accepted species.

Materials and methods

Partially decomposed woody debris was collected from subtropical forests of southern China and returned to the laboratory in Ziploc plastic bags. Samples were incubated at 25°C in an RXZ-260A Artificial Climate Box in 9-cm-diameter plastic Petri dishes with moistened filter paper and examined under a stereo microscope over a 3-week period.

J. Ma · Y.-D. Zhang · L.-G. Ma · X.-G. Zhang (✉)
Department of Plant Pathology,
Shandong Agricultural University, Tai'an 271018, China
e-mail: zhxg@sdau.edu.cn; sdau613@163.com

R. F. Castañeda-Ruíz
Instituto de Investigaciones Fundamentales en Agricultura
Tropical “Alejandro de Humboldt” (INIFAT), calle 1, esq. 2,
Santiago de Las Vegas, C. P. 17200 Havana, Cuba

Conidia and conidiophores were removed from the wood with a needle and transferred to a drop of lactophenol on a microscope slide; the coverslip was sealed in place with neutral balsam, and excess lactophenol was evaporated in a drying oven (55°C). For each collection, 50 mature conidia and 20 conidiophores were measured and photographed using an Olympus microscope (model BX 51), with 100× (oil immersion) objectives. The type specimens are deposited in the Herbarium of the Department of Plant Pathology, Shandong Agricultural University (HSAUP), with isotypes in Mycological Herbarium, Institute of Microbiology, Chinese Academy of Sciences (HMAS) (<http://hmas.im.ac.cn>).

Taxonomy

Sporidesmiella rosae Jian Ma & X.G. Zhang, sp. nov.

Fig. 1

MycoBank no.: MB 561154

Coloniae in substrato naturali effusae, pilosae, hypophyllae, brunneae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, pallide brunneis vel brunneis, laevibus, 1.5–3 µm crassis compositum. Conidiophora macronematosae, mononematosae, cylindrica, solitaria, non-ramosa, erecta, recta vel flexuosa,

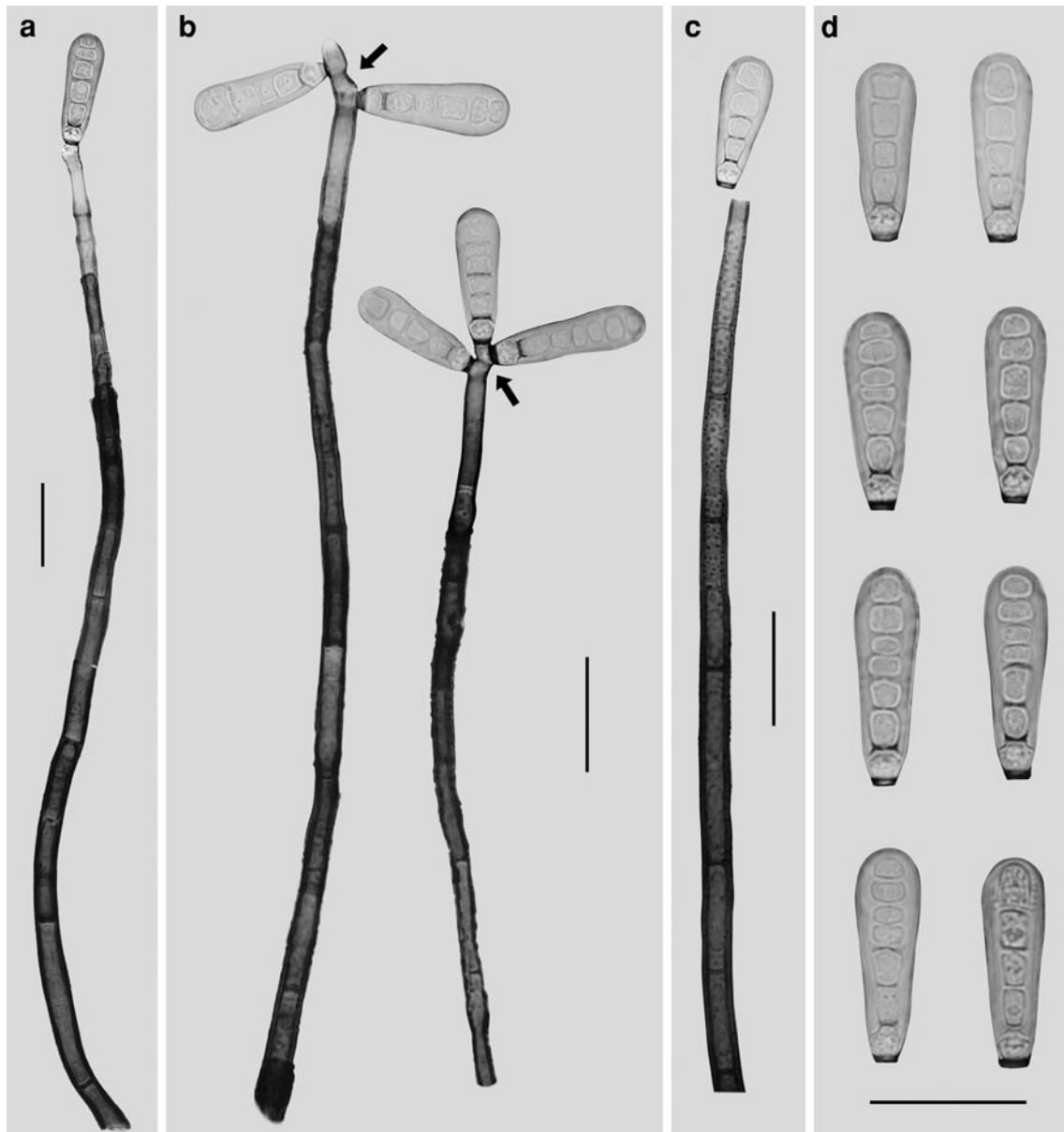


Fig. 1 *Sporidesmiella rosae* (HSAUP H5296). **a, b** Conidiophores and conidia. Conidiophore apices showing conidiogenous cells and percurrent extensions; occasional sympodial proliferations (arrows). **c** Conidiophore and conidium. **d** Conidia. Bars **a–d** 20 µm

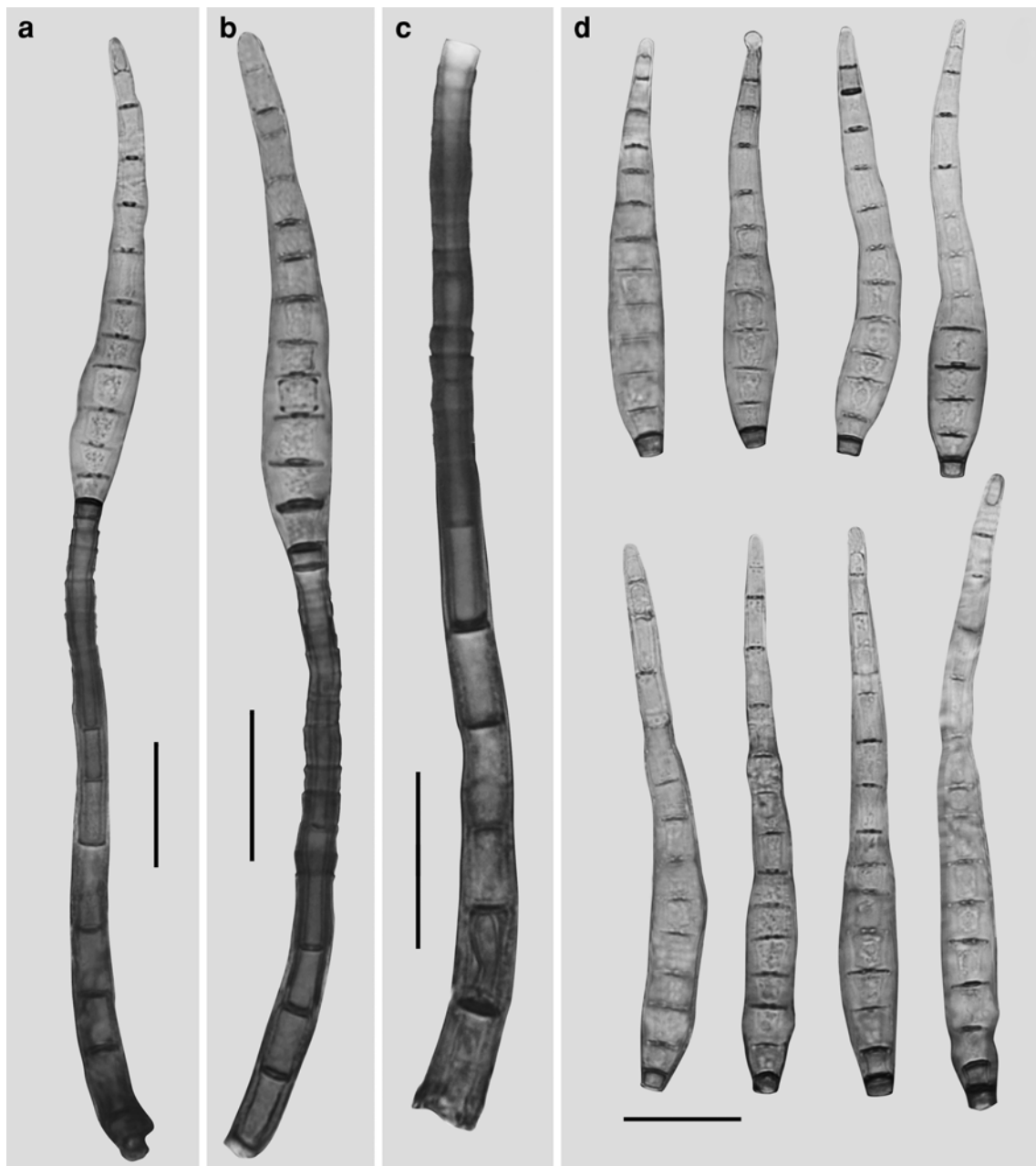


Fig. 2 *Sporidesmiella machili* (HSAUP H5006). **a, b** Conidiophores with terminal conidia. **c** Conidiophore apices showing conidiogenous cell and percurrent extensions. **d** Conidia. Bars **a–d** 20 µm

septata, verruculosae, atro-brunnea vel brunnea, usque ad 280 µm longa, 4–6.5 µm lata. Cellulae conidiogenae in conidiophoris incorporatae, terminales, cylindricae, brunneae vel pallide brunneae, cum usque ad 6 nonnumquam etiam pluribus percurrentibus cylindricis proliferationibus. Conidiorum secessio schizolytica. Conidia holoblastica, acrogena, solitaria, sicca, clavata, brunnea vel pallide brunnea, laevia, 4–7-distoseptata (plerumque 5–6), 23–28 µm longa, 7–10 µm crassa, ad basim truncata, 2.5–3.5 µm lata, ad apicem rotundata.

Typus: China, Sichuan Province, Mount Emei (29°21'N, 103°17'E), on dead branches of *Rosa chinensis* Jacq. (Rosaceae), 12 August 2005, leg. J. Ma (holotypus, HSAUP H5296; isotypus, HMAS 146138).

Etymology: *rosae*, in reference to the host genus *Rosa*.

Teleomorph: Unknown.

Colonies effuse on the natural substratum, hairy, hypophyllous, brown. Mycelium partly superficial, partly

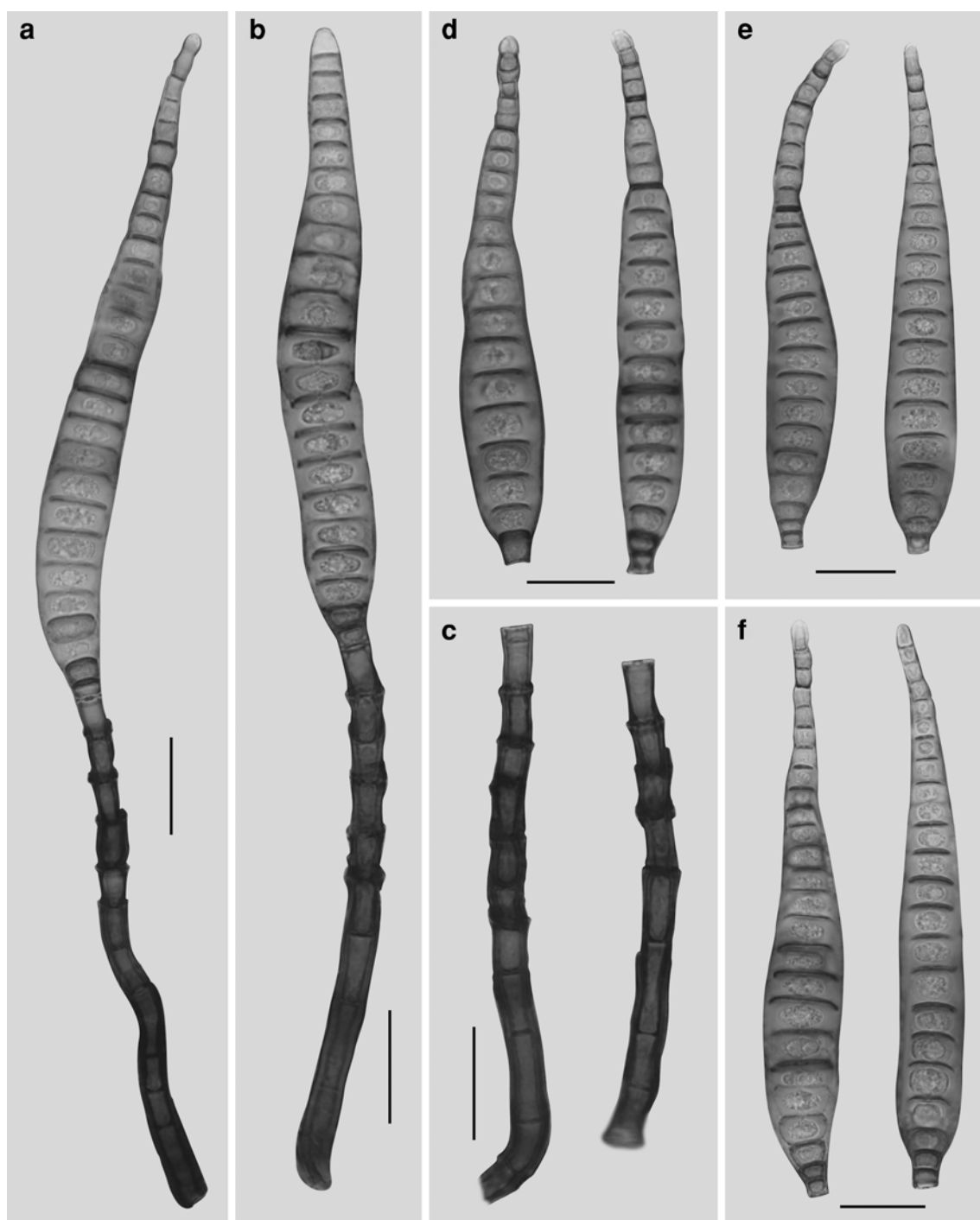


Fig. 3 *Sporidesmiella archidendri* (HSAUP H 5357). **a, b** Conidiophores with terminal conidia. **c** Conidiophore apices showing conidiogenous cells and percurrent extensions. **d–f** Conidia. Bars **a–f** 20 μ m

immersed in the substratum, composed of branched, septate, pale brown to brown, smooth-walled hyphae, 1.5–3 μ m thick. Conidiophores differentiated, cylindrical, solitary, unbranched, erect, straight or flexuous, septate, verruculose, dark brown to brown, up to 280 μ m long, 4–6.5 μ m wide. Conidiogenous cells integrated, terminal, cylindrical, brown to pale brown, mostly extending

percurrently; with up to 6 or more cylindrical extensions toward the apex; sometimes, after several percurrent extensions, the conidiogenous cell grows sympodially during the formation of several conidia, then reverts to percurrent extension. Conidial secession schizolytic. Conidia holoblastic, acrogenous, solitary, dry, clavate, brown to pale brown, smooth-walled, 4–7-distoseptate (usually

5–6), 23–28 µm long, 7–10 µm wide in the broadest part, base truncate and 2.5–3.5 µm wide, apex rounded.

Sporidesmiella machili Jian Ma & X.G. Zhang, sp. nov.
Fig. 2

MycoBank no.: MB 561155

Coloniae in substrato naturali effusae, pilosae, hypophyllae, brunneae vel atro-brunneae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, pallide brunneis vel brunneis, laevibus, 1.5–3.5 µm crassis compositum. Conidiophora macronematosae, mononematosae, cylindrica, solitaria, non-ramosa, erecta, recta vel flexuosa, septata, laevia, atro-brunnea vel brunnea, 77–135 µm longa, 3.5–6 µm lata. Cellulae conidiogenae monoblasticae, terminales, cylindricae, brunneae vel atro-brunneae, cum usque ad 16 nonnumquam etiam pluribus percurrentibus proliferationibus. Conidiorum secessio schizolytica. Conidia holoblastica, acrogena, solitaria, sicca, obclavata, brunnea vel pallide brunnea, laevia, 9–15-distoseptata, 57–110 µm longa, 7.5–10 µm crassa, ad basim truncata, 3–4.5 µm lata, ad apicem rotundata.

Typus: China, Fujian Province, Mount Wuyi (27°41'N, 117°42'E), on dead branches of *Machilus grijsii* Hance (Lauraceae), 12 August 2009, leg. J. Ma (holotypus, HSAUP H5006; isotypus, HMAS 146139).

Etymology: *machili*, in reference to the host genus *Machilus*.

Teleomorph: Unknown.

Colonies effuse on the natural substratum, hairy, hypophyllous, brown to dark brown. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, pale brown to brown, smooth-walled hyphae, 1.5–3.5 µm thick. Conidiophores differentiated, cylindrical, solitary, unbranched, erect, straight or flexuous, septate, smooth, dark brown to brown, 77–135 µm long, 3.5–6 µm wide. Conidiogenous cells monoblastic, terminal, cylindrical, brown to dark brown, with up to 16 (or sometimes more) percurrent extensions at the apex. Conidial secession schizolytic. Conidia holoblastic, acrogenous, solitary, dry, obclavate, brown to pale brown, smooth walled, 9–15-distoseptate, 57–110 µm long, 7.5–10 µm wide in the broadest part, base truncate and 3–4.5 µm wide, apex rounded.

Sporidesmiella archidendri Jian Ma & X.G. Zhang, sp. nov.
Fig. 3

MycoBank no.: MB 561156

Coloniae in substrato naturali effusae, pilosae, hypophyllae, brunneae vel atro-brunneae. Mycelium partim superficiale, partim in substrato immersum, ex hyphis ramosis, septatis, pallide brunneis vel brunneis, laevibus, 2–4 µm crassis compositum. Conidiophora macronematosae, mononematosae,

cylindrica, solitaria, non-ramosa, erecta, recta vel flexuosa, septata, laevia, atro-brunnea vel brunnea, 66–116 µm longa, 5–6.5 µm lata. Cellulae conidiogenae monoblasticae, terminales, cylindricae, brunneae vel atro-brunneae, cum usque ad 5 nonnumquam etiam pluribus percurrentibus proliferationibus. Conidiorum secessio schizolytica. Conidia holoblastica, acrogena, solitaria, sicca, obclavata, brunnea, laevia, 19–29-distoseptata, 100–160 µm longa, 13–17 µm crassa, ad basim truncata, 4–5.5 µm lata, ad apicem rotundata.

Typus: China, Guangdong Province, Liuxihe National Forest Park (23°20'N, 113°20'E), on dead branches of *Archidendron clypearia* (Jack) I.C. Nielsen (Leguminosae), 22 October 2009, leg. J. Ma (holotypus, HSAUP H5357; isotypus, HMAS 146140).

Etymology: *archidendri*, in reference to the host genus *Archidendron*.

Teleomorph: Unknown.

Colonies effuse on the natural substratum, hairy, hypophyllous, brown to dark brown. Mycelium partly superficial, partly immersed in the substratum, composed of branched, septate, pale brown to brown, smooth-walled hyphae, 2–4 µm thick. Conidiophores differentiated, cylindrical, solitary, unbranched, erect, straight or flexuous, septate, smooth, dark brown to brown, 66–116 µm long, 5–6.5 µm wide. Conidiogenous cells monoblastic, terminal, cylindrical, brown to dark brown, with up to 5 or more percurrent extensions at the apex. Conidial secession schizolytic. Conidia holoblastic, acrogenous, solitary, dry, obclavate, brown, smooth-walled, 19–29-distoseptate, 100–160 µm long, 13–17 µm wide in the broadest part, base truncate and 4–5.5 µm wide, apex rounded.

Discussion

Kirk (1982) proposed the genus *Sporidesmiella* to accommodate those species previously described in *Sporidesmium* (Link 1809) or *Endophragma* (Duvernoy and Maire 1920) but with cylindrical to cuneiform or obovoid, distoseptate conidia. Previous studies have shown that *Sporidesmiella* is similar to several genera including *Sporidesmium*, *Repetophragma*, *Endophragmiella* (Sutton 1973), *Ellisembia* (Subramanian 1992), and *Brachysporiella* (Batista 1952) in conidial morphology. However, *Sporidesmiella* differs from *Sporidesmium* and *Ellisembia* in its annellidic or rarely sympodially extending conidiogenous cells, and from *Repetophragma* and *Brachysporiella* in its distoseptate conidia. The mode of conidial secession in *Sporidesmiella* is schizolytic whereas that of *Endophragmiella* is rhexolytic.

Sporidesmiella rosae superficially resembles *S. claviformis* (Kirk 1982), *S. setosa* (McKemy and Wang 1996), *S. sinensis* (Wu and Zhuang 2005), and *S. oraniopsis* (Yanna et al. 2001). *Sporidesmiella rosae* conidia (23–28 µm long) are longer than those of *S. claviformis* (14–20 µm long) and shorter than those of *S. oraniopsis* (28–40 µm long) and *S. setosa* (30–38 µm long), and have more distosepta (4–7-distoseptate) than those of *S. claviformis* (2-distoseptate), *S. oraniopsis* (3-distoseptate), and *S. sinensis* (3-distoseptate). The conidial scars in *S. rosae* (2.5–3.5 µm wide) are wider than those of *S. claviformis* (2–2.5 µm wide) and narrower than those of *S. sinensis* (4 µm wide) and *S. setosa* (3.5–5 µm wide). In addition, *S. rosae* conidia have a more obvious thickened and darkened hilum at the base than is seen in the other four species.

Among the known species of *Sporidesmiella*, *S. machili* resembles *S. pseudoseptata* (Subramanian 1992), *S. fusiformis*, and *S. verruculosa* (Wu and Zhuang 2005) in conidial shape. However, *S. machili* is distinguished from *S. fusiformis* (conidia 64–80 × 12–13 µm, 14–17-distoseptate) and *S. verruculosa* (conidia 85–95 × 15–21 µm, 17–18-distoseptate) by its longer and obviously narrower conidia with fewer septa (conidia 57–110 × 7.5–10 µm, 9–15-distoseptate). It further differs from *S. verruculosa* (conidial wall verruculose) in its smooth-walled conidia. It also differs from *S. pseudoseptata* (conidia 36–56 × 7–8 µm, 5–8-distoseptate) by its larger conidia with more septa. *Sporidesmiella machili* conidia are regularly obclavate whereas those of *S. pseudoseptata* are obclavate to subfusiform.

In terms of conidial morphology, *S. archidendri* is similar to *S. machili*, *S. fusiformis*, *S. verruculosa*, and *S. pseudoseptata*. However, the conidia of *S. archidendri* (conidia 100–160 × 13–17 µm, 19–29-distoseptate) are larger than those of *S. machili* (conidia 23–28 × 7.5–10 µm, 4–7-distoseptate), *S. fusiformis* (conidia 64–80 × 12–13 µm, 14–17-distoseptate), and *S. pseudoseptata* (conidia 36–56 × 7–8 µm, 5–8-distoseptate), and have more septa. Moreover, *S. archidendri* differs from *S. verruculosa* (conidia 85–95 × 15–21 µm, 17–18-distoseptate) in having longer and slightly narrower conidia with more septa. In addition, the conidia of *S. archidendri* are smooth walled whereas those of *S. verruculosa* are verruculose.

We examined the description and illustration of *S. vignalensis* (Castañeda Ruíz and Kendrick 1990) and found it quite different from the generic concept of *Sporidesmiella* in its conidia without distoseptation. It exhibits the essential characteristics of *Repetophragma* in that solitary, euseptate conidia secede schizolytically from monoblastic, terminal annellate conidiogenous cells. Therefore, *S. vignalensis* should be transferred to the genus *Repetophragma*, although we propose no new combination here.

Key to species of *Sporidesmiella*

1. Conidiogenous cells with sympodial extension.....2
1. Conidiogenous cells without sympodial extension.....7
2. Conidia 1–2-distoseptate, not exceeding 6 µm wide....3
2. Conidia at least 3-distoseptate, 7.5 µm wide.....5
3. Conidia clavate, 10–14 × 3–4.5 µm.....*S. pachyanthicola*⁶
3. Conidia cylindrical or cuneiform.....4
4. Conidia 1-distoseptate, 17–22 × 4–6 µm.....*S. aspera*⁸
4. Conidia 1(–2)-distoseptate, 12–20 × 2.5–3.5 µm.....*S. parva* var. *palauensis*³
5. Conidia clavate, predominantly 5–6-distoseptate.....*S. rosae*¹⁴
5. Conidia obovoid, ellipsoid or broadly clavate, predominantly 3–4-distoseptate.....6
6. Conidia 3–4-distoseptate, (20–)22–27 × 10–14 µm.....*S. hyalosperma* var. *novae-zelandiae*¹
6. Conidia 3–4(–5)-distoseptate, 15–35 × 7.5–13 µm.....*S. brachysporioides*²
7. Setae present.....8
7. Setae absent.....10
8. Conidia predominantly 1-distoseptate, (12–)13–18(–20) × 2.5–4 µm.....*S. parva* var. *parva*¹
8. Conidia predominantly 4 or 4–5-distoseptate, at least 21 × 4 µm.....9
9. Conidia cylindrical to cuneiform, 21–40 × 4–8 µm...*S. garciniae*³
9. Conidia cuneiform, (30–)32–35(–38) × 7.5–9 µm.....*S. setosa*⁹
10. Conidia with apical projections or appendages...11
10. Conidia without apical projections or appendages....13
11. Conidia obclavate, 9–12-distoseptate, 45–55 × 8–9 µm...*S. ciliatospore*¹²
11. Conidia cuneiform, cylindrical or clavate, 2–3-distoseptate, <36 µm long.....12
12. Conidia 24–29 µm long (excluding projections), 4–5 µm wide at the base, 8–13 µm wide toward the apex, with 2–4 (mostly 3) projections.....*S. cornuta*⁸
12. Conidia 24–36 µm long (including projections), 2.5–3.5 µm wide at the base, 6–7.5 µm wide at the apex, with 4 projections.....*S. coronata*¹
13. Conidia verruculose.....14
13. Conidia smooth.....15
14. Conidia ellipsoid-ovoid to short subcylindrical, 0–1-distoseptate, 6–9 × 3–5 µm.....*S. lichenophila*¹³
14. Conidia fusiform to obclavate, 17–18-distoseptate, 85–95 × 15–21 µm.....*S. verruculosa*¹²
15. Conidia 2-euseptate below and (4–)5-distoseptate above, (17–)18–21(–23) × (6–)7–8.5(–9.5) µm.....*S. cuneiformis*¹
15. Conidia without eusepta.....16

16. Conidia obclavate, fusiform or subfusiform.....17
16. Conidia clavata, cuneiform, cylindrical, ellipsoid or obovoid.....20
17. Conidia 19–29-distoseptate, $100\text{--}158 \times 13\text{--}17 \mu\text{m}$
.....*S. archidendri*¹⁴
17. Conidia <17-distoseptate, $110 \times 13 \mu\text{m}$18
18. Conidia 14–17-distoseptate, $64\text{--}80 \times 12\text{--}13 \mu\text{m}$
.....*S. fusiformis*¹²
18. Conidia less than $10 \mu\text{m}$ wide.....19
19. Conidia 9–15-distoseptate, $57\text{--}110 \times 7.5\text{--}10 \mu\text{m}$
.....*S. machili*¹⁴
19. Conidia 5–8-distoseptate, $35\text{--}56 \times 7\text{--}8 \mu\text{m}$
.....*S. pseudoseptata*⁷
20. Conidia up to 10- or 12-distoseptate.....21
20. Conidia less than 5-distoseptate.....22
21. Conidia cylindrical, up to slightly clavate or elongate ellipsoid, 3–10-distoseptate, $24\text{--}44 \times 6.5\text{--}10 \mu\text{m}$
.....*S. angustobasilaris*⁴
21. Conidia cylindrical, 2–12-distoseptate, $(22\text{--})46\text{--}100 \times (3.5\text{--})4\text{--}4.5 \mu\text{m}$*S. longissima*¹
22. Conidia 2-distoseptate.....23
22. Conidia predominantly 3 or 4-distoseptate.....24
23. Conidia ovoid to clavate, pale brown, upper cells with brown walls, basal cell colorless, $16\text{--}21 \times 8\text{--}13 \mu\text{m}$...
.....*S. caribensis*⁵
23. Conidia clavate, pale olivaceous to olivaceous brown or brown, $(14\text{--})16\text{--}20 \times (4.5\text{--})6.5\text{--}8.5\text{--}(9) \mu\text{m}$
.....*S. claviformis*¹
24. Conidia predominantly 3-distoseptate.....25
24. Conidia predominantly 4-distoseptate.....28
25. Conidia obovoid, broadly obovoid, sigmoid or curved.....26
25. Conidia clavate or cuneiform.....27
26. Conidia obovoid to broadly obovoid, (2–)3-distoseptate, $(30\text{--})34\text{--}38\text{--}(45) \times (13\text{--})16\text{--}18\text{--}(20) \mu\text{m}$
.....*S. incrassata*⁸
26. Conidia obovoid, rarely sigmoid or curved, (2–)3(–5)-distoseptate, $21\text{--}25 \times 8\text{--}10 \mu\text{m}$*S. intermedia*¹⁰
27. Conidia clavate, 3-distoseptate (rarely 4–5), $28\text{--}40 \times 8\text{--}10 \mu\text{m}$*S. oraniopsis*¹¹
27. Conidia clavate to cuneiform, 3-distoseptate, $24\text{--}26 \times 7.5\text{--}9 \mu\text{m}$*S. sinensis*¹²
28. Conidia 4-distoseptate, $25\text{--}30 \times 13\text{--}17 \mu\text{m}$
.....*S. latispora*¹²
28. Conidia (3–)4-distoseptate, $(17\text{--})22\text{--}25\text{--}(29) \times 9\text{--}12\text{--}(13) \mu\text{m}$*S. hyalosperma* var. *hyalosperma*¹

¹Kirk (1982), ²Zhang et al. (1983), ³Matsushima (1985), ⁴Holubová-Jechová (1987), ⁵Castañeda Ruíz (1988), ⁶Castañeda Ruíz and Kendrick (1991), ⁷Subramanian (1992), ⁸Kuthubutheen and Nawawi (1993), ⁹McKemy and Wang (1996), ¹⁰Castañeda Ruíz et al. (1998), ¹¹Yanna

et al. (2001), ¹²Wu and Zhuang (2005), ¹³Braun and Heuchert (2010), ¹⁴this study.

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