

Memnoniella* and *Stachybotrys* species from *Musa acuminata

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Abstract – *Memnoniella subsimplex* and five species of *Stachybotrys* species are reported from *Musa acuminata* in Hong Kong and Thailand. *Stachybotrys suthepensis* sp. nov., found on decaying petioles, is described, illustrated and compared with similar species. It is characterized by conidia that are ellipsoid to cylindrical, rounded at both ends, olivaceous-brown to brown, verruculose and $7\text{-}9 \times 3\text{-}6 \mu\text{m}$.

***Musa* / banana fungi / new species / saprobes / *Stachybotrys suthepensis* sp. nov.**

INTRODUCTION

We are studying the endophytes, pathogens and saprobes of *Musa acuminata* in Hong Kong and Thailand (Photita *et al.* 2000, 2001a, b, 2002) and in this paper report on the genera *Memnoniella* and *Stachybotrys*. Distinguishing features of *Stachybotrys* include production of macronematous conidiophores with an apical cluster of several enteroblastic phialides, producing conidia in slime-covered aggregates (Ellis 1971; Campbell 1975). The closely related *Memnoniella* is similar, but produces phialoconidia in long persistent chains. Two species, *Stachybotrys ruwenzoriensis* and *S. subsimplex* (\equiv *Memnoniella subsimplex*) have been described from *Musa* spp. (Photita *et al.* 2002). Other species recorded on *Musa* include *S. globosa* (Misra & Srivastava 1982), *S. kampalensis* (Matsushima 1975), *S. cylindrospora* (this paper) and *S. theobromae* (this paper). The genera have also been collected on other monocotyledonous hosts (McKenzie, 1991; Whitton *et al.* 2001). In this paper we report on further collections of *Memnoniella subsimplex*

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and 5 species of *Stachybotrys*, including one new species from *Musa acuminata* in Thailand. The new species was previously referred to as *Stachybotrys* sp. by Photita *et al.* (2001a).

MATERIAL AND METHODS

Decaying petioles and leaves of *Musa acuminata* were collected from Hong Kong and northern Thailand. The samples were incubated at room temperature in plastic boxes containing moist paper and examined within two weeks for sporulating fungi. To obtain single spore cultures, a suspension of spores in sterile distilled water was pipetted on to water agar plates (Choi *et al.* 1999). Single spores were allowed to germinate and were then transferred to potato dextrose agar (PDA).

TAXONOMY

Memnoniella subsimplex (Cooke) Deighton, Mycological Papers 78: 5 (1960)

Conidiophores 100-140 μm long, 3-5 μm wide; phialides 8-13 \times 4-6 μm ; conidia globose, black, verrucose, 6-9 μm diam.

Specimens examined: HONG KONG, Lantau Island, Discovery Bay, Nim Shue Wan Village, on dead petioles of *Musa acuminata*, 5 Oct. 1999, W. Photita (HKU(M) 4931); New Territories, Tai Po, Fung Yuen Village, on dead petiole of *M. acuminata*, 4 Nov. 1999, W. Photita (HKU(M) 4915); THAILAND, Chiang Mai, Doi Suthep Pui National Park, on decaying leaf of *M. acuminata*, Dec. 1998, W. Photita (CMUBS 4, living culture), *ibid.*, 8 Jan 1999, W. Photita (CMUBS 15, 16, 17, 18, 19, 20), *ibid.*, 29 April 1999, W. Photita (CMUBS 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46), Chiang Mai, Queen Sirikit Botanic Garden, on *M. acuminata*, 28 July 2000, W. Photita (CMUBS 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64).

NOTES: This genus is distinguished from *Stachybotrys* by its globose, catenate conidia (Ellis 1971; Campbell 1975; Jong & Davis 1976).

Stachybotrys dichroa Grove, Journal of Botany, London 24: 201 (1889).

Conidiophores up to 120 μm long; phialides 8 \times 2 μm ; conidia cylindrical, black, verrucose, 10-12 \times 4-5 μm .

Specimen examined: THAILAND, Chiang Mai, Doi Suthep Pui National Park, on decaying leaves of *M. acuminata*, 11 Nov. 2000, W. Photita (CMUBS 9, living culture).

Stachybotrys nephrospora Hansf., Proceedings of the Linnean Society, London 155: 45 (1943).

Conidiophores branched, hyaline, smooth, often verrucose and dark near the apex, up to 90 μm long, 3-4 μm wide; phialides obvoid or ellipsoid, 10-12 \times 5-6 μm ; conidia reniform, black, verrucose, 8-12 \times 4-8 μm .

Specimens examined: THAILAND, Chiang Mai, Doi Suthep Pui National Park, on petiole of *M. acuminata*, 17 Aug, 1999, W. Photita (CMUBS 6), Queen Sirikit Botanic Garden, on pseudostem of *M. acuminata*, 29 April 2000, W. Photita (CMUBS 65).

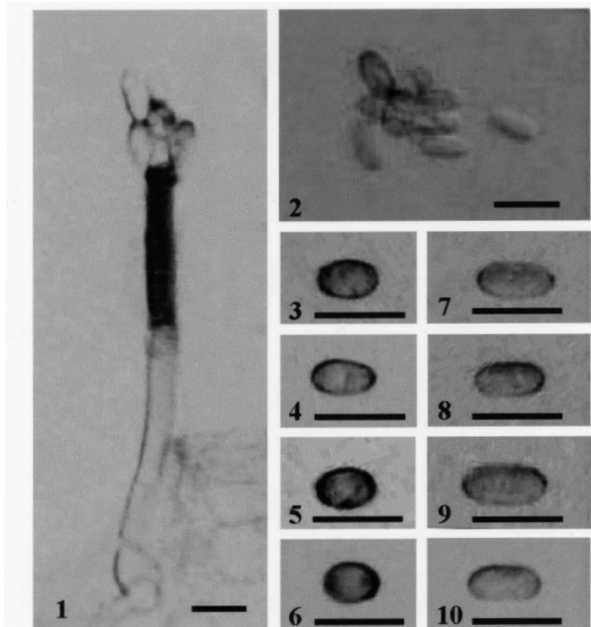
Stachybotrys ruwenzoriensis Matsush., Matsushima Mycological Memoirs 4: 17 (1985).

Conidiophores 70-90 μm long, 4-5 μm wide; phialides obovoid, 8-10 \times 5-6 μm ; conidia subglobose to globose, verrucose, 5-7 μm diam.

Specimen examined: THAILAND, Chiang Mai, Doi Suthep Pui National Park, on pseudostem of *M. acuminata*, 29 June 2000, W. Photita (CMUBS 7).

Stachybotrys suthepensis Photita, Lumyong, Hyde & McKenzie, sp. nov. Figs 1-11

Coloniae effusae. Mycelium superficiale et immersae. Conidiophora macronematosa, mononematosa, solitaria vel fasciculata, erecta, recta vel paulo flexuosa, laevia vel verrucosa, septata, pallide brunnea, saepe apicem versus obs-



Figs 1-10. *Stachybotrys suthepensis* (from holotype). 1. Conidiophore and phialides. 2-10. Conidia (Bars = 10 μm).

ellipsoidal in shape. *Stachybotrys suthepensis* also resembles *S. albipes*. The conidiophores of *S. suthepensis* are smooth or verrucose and pale brown, whereas those of *S. albipes* are usually smooth (Jong & Davis 1976). The phialides of *S. albipes* are subclavate and hyaline, while those of *S. suthepensis* are ellipsoidal and pale brown. The conidia of *S. suthepensis* are also longer than is normal for *S. albipes*. *Stachybotrys zaeae*, described from maize leave in North America, is very similar to *S. suthepensis*. In both species the conidiophores are relatively short and the conidia are verruculose and of a similar size. However, the conidia of *S. zaeae* are brown to dark brown and ellipsoid, while those of *S. suthepensis* are olivaceous brown to brown, and more cylindrical, with parallel sides. The conidiophores of *S. zaeae* are hyaline, whereas those of *S. suthepensis* are pale brown and markedly darker brown in the upper half. A synopsis of characters of *S. albipes*, *S. chartarum* and *S. suthepensis* is given in Table 1.

Stachybotrys theobromae Hansf., Proceedings of the Linnean Society, London 155: 45 (1943).

Conidiophores hyaline, smooth, up to 200 µm long, 4–6 µm wide; phialides 20–27 µm long, 6–8 µm wide at the broadest part; conidia ellipsoidal, with small projecting papilla at the base, smooth, black when mature, 11–22 × 14–16 µm.

Specimens examined: THAILAND, Chiang Mai, Doi Suthep Pui National Park, on pseudostem of *M. acuminata*, 27 Aug. 1999, W. Photita (CMUBS 78), *ibid.*, 8 Jan 2000, W. Photita (CMUBS 79), *ibid.*, on decaying leaves of *M. acuminata*, 17 April 2000, W. Photita (CMUBS 8), *ibid.*, 29 April 2000, W. Photita

Table 1. Comparison of *Stachybotrys suthepensis* with *S. albipes*, *S. chartarum* and *S. zaeae*.

Character	<i>Stachybotrys suthepensis</i>	<i>Stachybotrys albipes</i> *	<i>Stachybotrys chartarum</i> *	<i>Stachybotrys zaeae</i>
Conidiophores	Sometimes branched, pale brown at base, darker towards apex, 48–94 × 4–5 µm	Occasionally branched, hyaline, 60–200 × 3–7 µm	Simple or irregularly branched, hyaline at base, dark olivaceous towards apex, up to 1000 µm × 3–6 µm	Unbranched, hyaline, 48–85 × 3–5 µm
Conidia	Olivaceous-brown to brown, ellipsoid to cylindrical, rounded at both ends, 7–9 × 3–6 µm, smooth, verruculose when mature	Dark olive grey, ovate, size variable 4–12 × 3–6 µm, mostly 7–9 × 5–6 µm, smooth	Dark olive grey, ellipsoidal, 7–12 × 4–6 µm, smooth or with bands/ridges when mature	Brown to dark brown, ellipsoid, 7–9 × 3.5–4.5 µm, verruculose
Phialides	Ellipsoid, 7.5–11 × 3 µm thick in the broadest part, pale brown, inconspicuous collarettes	Subclavate, smooth-walled, hyaline, 9–16 × 3–5 µm, inconspicuous collarettes	Obovate or ellipsoid, 9–14 × 4–6 µm, hyaline becoming dark olivaceous, conspicuous collarettes	Obovate, pale salmon-coloured, 9–11 × 4–5 µm, inconspicuous collarettes

*Data from Jong and Davis (1976).

cura, 48-94 μm longa et 4-5 μm crassa. Cellulae conidiogenae monophialidicae, discretae, terminales, ellipsoideae, 7.5-11 \times 3 μm , pallide brunnea. Conidia in massis globosis aggregatai, acrogenai, ellipsoidea vel cylindricai, olivaceo-brunnea vel brunnea, laevia vel verruculosa, eseptatai, 7-9 \times 3-6 μm .

Etymology: the species epithet is derived from the collection site at Doi Suthep Pui National Park, Chiang Mai, Thailand.

Colonies effuse, usually black or blackish green. Mycelium superficial and immersed. Conidiophores macronematous, mononematous, single or in groups, sometimes branched, erect, straight or slightly flexuous, smooth or verrucose, septate, pale brown, darker towards apex, 48-94 μm long, 4-5 μm thick, bearing a whorl of 5-9 phialides. Conidiogenous cells monophialidic, discrete, terminal, ellipsoid, 7.5-11 \times 3 μm , pale brown. Conidia aggregated in slimy black heads, ellipsoid to cylindrical, rounded at both ends, olivaceous-brown to brown, smooth, verruculose when mature, non-septate, 7-9 \times 3-6 μm (= 8.5 \times 3.7 μm).

Colonies on PDA slow growing, attaining a diameter of 2 cm in one week, mycelium white in marginal colony areas, bearing abundant conidial structures in central areas, conidial areas blackish green, conidia produced abundantly a week following inoculation, at first in the center, then centrifugally toward the margin.

Holotype (designated here): THAILAND, Chiang Mai, Doi Suthep Pui National Park, on dead petioles of *Musa acuminata*, Dec. 1998, W. Photita (PDD 74595). Isotypes: BCC 9776; CMUBS66.

Additional specimens examined: THAILAND, Chiang Mai, Doi Suthep Pui National Park, on decaying pseudostem of *M. acuminata*, 1 Jan. 1999, W. Photita (CMUBS 10), *ibid.*, 9 July 1999, W. Photita (CMUBS 67), *ibid.*, 29 July 1999, W. Photita (CMUBS 68, 69), *ibid.*, 8 Jan 2000, W. Photita (CMUBS 70, 71, 72, 73), *ibid.*, 15 Jan 2000, W. Photita (CMUBS74, 75), Queen Sirikit Botanic Garden, on *M. acuminata*, 28 July 2000, W. Photita (CMUBS 76, 77).

NOTES: *Stachybotrys suthpensis* has olivaceous-brown to brown, ellipsoidal or cylindrical conidia, which are similar to *S. chartarum*. *Stachybotrys chartarum*, however, differs as the conidia are banded or ridged, shorter and more

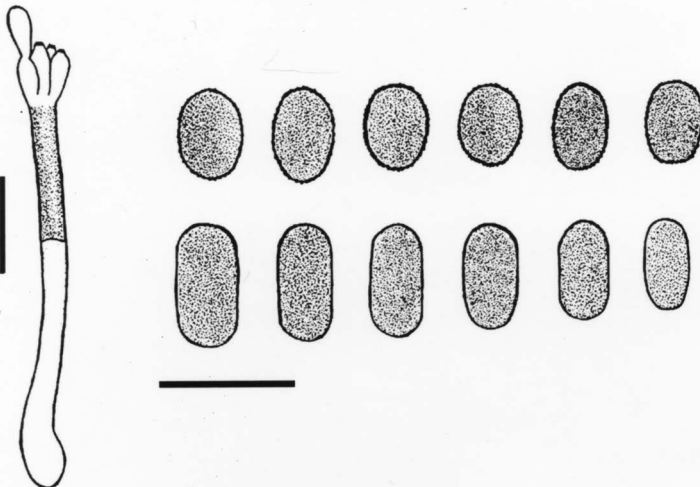


Fig. 11. Diagrammatic representation of *Stachybotrys suthpensis* (Bars = 10 μm).

(CMUBS 80), *ibid.*, 25 July 2000, W. Photita (CMUBS 81), *ibid.*, 4 Aug. 2000, W. Photita (CMUBS 82),

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