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Two new combinations and a new record of *Zasmidium* from China

Fengyan Zhai[1], W.H. Hsieh[2], Yingjie Liu[1], & Yinglan Guo[3*]

[1] *Henan Institute of Science and Technology, Xinxiang 453003, China*

[2] *Department of Plant Pathology, National Chung Hsing University, Taichung, Taiwan, Republic of China*

[3] *Institute of Microbiology, Chinese Academy of Science, Beijing 100101, China*

* Correspondence to: *guoyl@im.ac.cn*

Abstract — *Stenella gynurae* is recombined as *Zasmidium gynurae*, and *S. bougainvilleae* as *Z. bougainvilleae*; these species are described, illustrated and discussed. *Zasmidium salicis* is also reported as new to China.

Key words —morphology, *Mycosphaerellaceae*, reallocation, taxonomy

Introduction

The type species of *Stenella* Syd., *S. araguata* Syd., which is characterized by pileate condiogenous loci and hila, is placed by molecular sequence analyses in *Teratosphaeriaceae*. In contrast, most other previous *Stenella* species have planate *Cercospora*-like scars and hila and belong in *Mycosphaerellaceae*, where they agree morphologically and cluster phylogenetically with the type of *Zasmidium* Fr.; they have therefore been transferred to *Zasmidium* (Braun et al. 2010a,b). Here we transfer two additional *Stenella* species, *S. gynurae* and *S. bougainvilleae,* which coincide morphologically with the current concept of *Zasmidium*. Another *Zasmidium* species, *Z. salicis*, is reported as new to China.

Taxonomy

Zasmidium gynurae (Sawada & Katsuki) W.H. Hsieh, Y.L. Guo & F.Y. Zhai, **comb. nov.** Fig. 1

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≡ *Cercospora gynurae* Sawada & Katsuki, Spec. Publ. Coll. Agric., Nat. Taiwan Univ. 8: 218, 1959.

≡ *Stenella gynurae* (Sawada & Katsuki) Goh & W.H. Hsieh, *Cercospora* Similar Fungi Taiwan: 88, 1990.

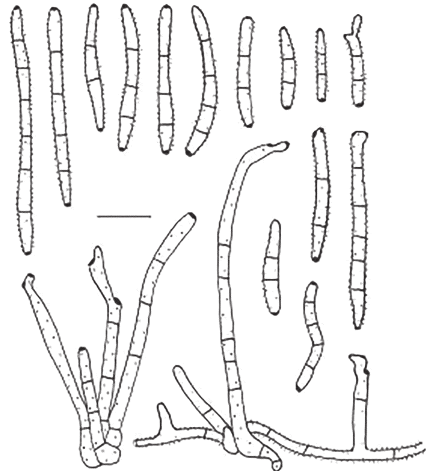

Fig. 1. *Zasmidium gynurae* (NYU-PPE, holotype). Conidiophores and conidia. Scale bar = 10 μm.

Leaf spots circular, greyish, without distinct margin, 3.0–5.0 mm diam. Fruiting hypophyllous. Primary mycelium immersed. Secondary mycelium superficial; hyphae subhyaline to pale olivaceous, septate, branched, finely verruculose, 1.0–2.0 μm diam. Secondary conidiophores arising as lateral branches from external hyphae. Stromata none. Primary conidiophores emerging through stomata, 1–6-fasciculate, or arising as solitary branches from superficial hyphae, pale olivaceous to pale brown, paler towards the apex, irregular in width, straight to 1–2-geniculate, rarely branched, round to conical at the apex, 1–6-septate, 20.0–70.0(–230.0) × 2.5–3.5 μm. Conidial scars conspicuously thickened, 0.5–1.0 μm wide. Conidia cylindrical, catenate, later verruculose, subhyaline to pale olivaceous, straight to slightly curved, round to conical at the apex, obconical to obconically truncate at the base, 2–6-septate, 18.0–60.0 × 2.5–3.5 μm; hila small but conspicuously thickened.

Collection examined: **China**. **Taiwan Province**, Changhua County, on leaves of *Gynura bicolor* (Willd.) DC. (*Compositae*), 14 XII 1909, coll. K. Sawada (NYU-PPE, holotype).

Distribution: China.

Zasmidium bougainvilleae (J.M. Yen & Lim) Y.L. Guo, W.H. Hsieh & F.Y. Zhai, **comb. nov.** Fig. 2

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≡ *Stenella bougainvilleae* J.M. Yen & Lim, Mycotaxon 16: 96, 1982.

Leaf spots amphigenous, circular to subcircular, 1.0–4.0 mm diam., sometimes confluent, olivaceous-brown to pale brown, surrounded by a pale

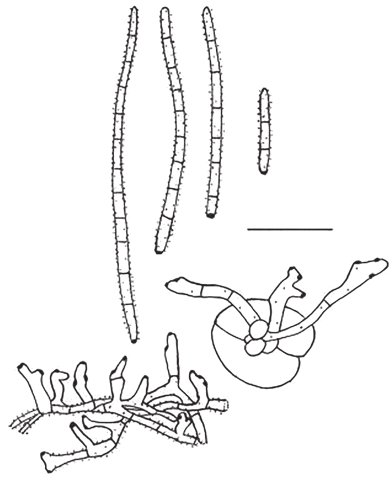

Fig. 2. *Zasmidium bougainvilleae* (HMAS 242906).
Conidiophores and conidia. Scale bar = 20 μm.

brown to grayish brown margin, with 1–2 times zonate and pale yellow to pale grayish brown halo on the upper surface, paler on the lower surface. Fruiting hypophyllous. Primary mycelium immersed. Secondary mycelium superficial; hyphae emerging through stomata or from the base of primary conidiophores, or directly from the apex of conidiophores, pale olivaceous to olivaceous, branched, septate, verruculose, with lateral secondary conidiophores, 1.5–3.0 μm diam. Stromata none or small, formed only by several brown cells. Primary conidiophores emerging through stomata, 2–8-fasciculate, or up to 25-fasciculate on small stromata, moderately olivaceous-brown to pale brown, paler towards the apex, irregular in width, narrower towards the apex, branched, straight to strongly curved, 0–3-geniculate, conical at the apex, 1–6-septate, sometimes constricted at the septa, 25.0–68.0 × 3.0–4.0 μm. Secondary conidiophores olivaceous-brown to moderately olivaceous-brown, unbranched, erect or curved, 0–3-septate, 15.0–48.0 × 2.5–4.0 μm. Conidial scars small but conspicuously thickened, 0.8–1.3 μm wide. Conidia cylindrical to slightly obclavate-cylindrical, pale olivaceous, catenate, straight to slightly curved, finely verruculose, indistinctly 2–14-septate, obtuse to conical at the apex, obconical to subtruncate at the base, with small but conspicuously thickened hila, 15.0–68.0(–110.0) × 2.0–3.5 μm.

Collections examined: **China**. **Hainan Province**, Lingshui, on leaves of *Bougainvillea glabra* Choisy (*Nyctaginaceae*), 11 IV 2011, coll. Y.L. Guo, no. HN345 (HMAS 242906). **Taiwan Province**, Changhua County, on leaves of *Bougainvillea spectabilis* Willd., 23 X 1985, coll. T.K. Goh (NCHUPP-184).

Distribution: China, Singapore.

Notes: Hsieh & Goh (1990: 248) described *Z. bougainvilleae* on *Bougainvillea spectabilis* from Taiwan as leaf spots absent or merely indefinite yellowish discoloration, with shorter conidiophores (primary conidiophores 20.0–40.0 × 3.0–5.0 µm, secondary conidiophores 5.0–15.0 × 2.0–4.0 µm), and longer conidia (20.0–110.0 × 2.5–4.0 µm). The morphological characters of our collection on *B. glabra* from Hainan are fairly similar to those described by Yen & Lim (1982) on *B. spectabilis* from Singapore (primary conidiophores 30.0–90.0 × 3.0–4.0 µm, conidia 20.0–65.0 × 2.5–4.0 µm).

Zasmidium salicis (Chupp & H.C. Greene) Kamal & U. Braun, Cercosporoid Fungi of India: 248, 2010.

≡ *Cercospora salicis* Chupp & H.C. Greene, Am. Midland Naturalist 41: 757, 1949.

≡ *Stenella salicis* (Chupp & H.C. Greene) Crous & U. Braun, Mycotaxon 78: 342, 2001.

Leaf spots amphigenous, punctiform to irregular, 0.5–3.0 mm diam., often angular, limited by veins, brown to blackish brown on the upper surface, blackish brown on the lower surface. Fruiting amphigenous. Mycelium internal. Stromata substomatal, subglobose, brown, 10.0–26.0 µm diam. Conidiophores arising from the upper cells of stromata, emerging through stomata, 3–25 per fascicle, pale olivaceous-brown, uniform in color, irregular in width, verruculose, straight to geniculate-sinuous, 0–4-geniculate, mostly unbranched, 0–2-septate, 8.0–28.0 × 2.5–5.0 µm. Conidial scars darkened and thickened, 2.0–2.5 µm wide. Conidia cylindrical, cylindrical-obclavate, solidary, pale olivaceous to olivaceous-brown, finely verruculose with age, straight to moderate curved, obtuse at the apex, subtruncate at the base, 1–7-septate, 15.5–96.0 × 2.5–5.0 µm, hila thickened and darkened.

Collection examined: **China**. **Jilin Province**, Changchun, on leaves of *Salix matsudana* Koidz. (*Salicaceae*), 7 July 2006, coll. Y.J. Liu & F.Y.Zhai 6178 (HMJAU 30005).

Distribution: China, North America, Brazil.

Notes: This is the first report of *Zasmidium salicis* from China.

Chupp & Greene described *Cercospora salicis* from North America on *Salix alba* L. (Greene 1949; Chupp 1954). The holotype was re-examined by Crous & Braun (2001), who reallocated it to *Stenella* based on verruculose superficial hyphae and conidia. Kamal and Braun subsequently transferred the species to *Zasmidium* (Kamal 2010).

The conidiophores and conidia of our Chinese specimen are fairly similar to those of *Z. salicis* on *Salix* sp. in North America in shape and size but differ in lacking verruculose external mycelium, with the North American material having larger stromata (≤50 µm wide), 1–3-septate and somewhat

larger conidiophores (15–45 × 4–6 μm), and 1–6-septate and slightly smaller conidia (20–60 × 3–4.5 μm). The development of verruculose superficial hyphae is a basic feature of *Zasmidium* and well developed in most species, but may occasionally be absent (Crous & Braun 2003). A few species without any superficial mycelium have been assigned to this genus, e.g., *Zasmidium hymenocallidis* (U. Braun & Crous) U. Braun & Crous and *Z. macluricola* R.G. Shivas et al. (Shivas et al. 2009, Braun et al. 2010a).

Mycovellosiella salicis Deighton et al. (Deighton 1974) parasitic on *Salix tetrasperma* Roxb. is morphologically similar to *Zasmidium salicis* but differs in lacking obvious leaf spots and stromata and forming hypophyllous and diffusely fruiting, paler (pale olivaceous), and longer (≤80 μm) conidiophores, and paler (pale olivaceous) catenate conidia. *Mycovellosiella salicis* has been reallocated to *Passalora salicis* (Deighton et al.) U. Braun & Crous (Crous & Braun 2003).

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