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One new species, *Guedea lantania*, and two new record of hyphomycetes from Taiwan

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ABSTRACT: Three new hyphomycetes in Taiwan are proposed, including one new species, *Guedea lantania*, and two new records, *Isthmotricladia gombakiensis* and *Wiesneriomyces laurinus*. They were isolated from decaying leaves or rotten twigs individually. Morphological characteristics of *G. lantania* was described, illustrated and compared with the other species in the *Guedea* genus and a key to the members of this genus was provided. The unique characters of the two newly recorded fungi were also diagnosed and illustrated, and compared with the allied taxa to highlight their distinct characters.

KEY WORDS: Biodiversity, hyphomycetes, mitosporic fungi, Taiwan, taxonomy.

INTRODUCTION

During studies of hyphomycetes from rotten vegetation in Taiwan, a species, *Guedea lantania* was established, and two newly recorded species: *Isthmotricladia gombakiensis* Nawawi, and *Wiesneriomyces laurinus* (Tassi) P. M. Kirk were described and illustrated. *G. lantania* was recovered from rotten twigs, whereas *I. gombakiensis* and *W. laurinus* were isolated from decaying leaves. The differences between *G. lantania* and its allied species are discussed and a key for all the four described species in the *Guedea* genus is proposed. *I. gombakiensis* and *W. laurinus* are first recorded in Taiwan. Detailed descriptions and illustrations of morphological characteristics are provided. In addition, these species are compared with the allied taxa to highlight their unique features for rapid recognition.

MATERIALS and METHODS

Materials representing different substrate types from several locations in Taiwan were collected and incubated in moist chambers (plastic boxes, 30 × 20 × 12 cm, with three layers of moistened papers) to induce the sporulation of the fungi. The axenic cultures were obtained by single spore or mass spore isolation technique. The isolation was performed under a stereomicroscope using a sterile micro-glass needle to sweep spores on the agar surface to an adequate distance eliminating the possible contaminants. Blocks of agar bearing single or mass spores were excised and then transferred to oat meal agar (OMA) or corn meal agar (CMA) slants or plates depending on their nutrient preference for sporulation. Details of morphological characteristics were illustrated and photographed with an Olympus light microscope (BX-50) built with a drawing tube. Dried voucher specimens were deposited in the Department of Plant Pathology and Microbiology, National Taiwan University (NTU), Taipei, Taiwan, R.O.C., for further comparative study.

TAXONOMIC TREATMENT

Guedea lantania S.S. Tzean & J.L. Chen***, sp. nov.*** MycoBank No.: MB812605. Figs. 1 & 2A-C

Colonies on the substrate effuse, dark brown to deep dark brown, hairy. Mycelium partly superficial, partly immersed, composed of branched, septate, smooth, pale reddish brown to reddish brown, 2.8–6.7 µm wide hyphae. Conidiophores macronematous, mononematous, scattered, crowded or simple, erect to flexuous, septate, reddish brown, paler towards the apex, smooth to roughened near the apex, 236.0–420.0 ×3.4–5.6 µm. Conidiogenous cells holoblastic, monoblastic, integrated, terminal or intercalary, determinate, short- or elongated-cylindrical. Conidia solitary, acropleurogenous, ovoid, 1-2-septate, slightly constricted at the septa, with conspicuous brown to dark brown bands masking the septa, smooth, basal cell often grayish olivaceous brown to moderate olivaceous brown, the upper cells pale brown, usually with small or inconspicuous, black hilum at the base, 7.6–15.2× 5.2–7.8 µm. Teleomorph absent.

Etymology: The specific epithet, lantania, refers to the location where the specimen collected.

Specimen examined: **TAIWAN**: On a rotten twig, Lantan, Chiayi city, leg. J.L. Chen, Oct. 25 1996, CTN-45. (**Holotype**: TNTU 1150). No culture obtained despite several attempts.

Distributions: Taiwan.

Note: The genus was established in 1978, with *G. sacra* as the type species. The additional species have

Table 1 Comparison of *Guedea* species in features of conidia.

Species	Conidial characters				
	Shape	Size (μm)	Septation	Pigmentation	Source
G. sacra	Oval	15.0–21.0×9.0–10.0	2	Brown to dark brown, with broad dark transverse banded septa	Rablelli & Bartoli (1978)
G. novae-zelandiae	Obovoid	13.5–16.2×7.2–9.0	2	Two lower cells brown, the upper distal cell paler, with broad dark banded septa	Hughes (1980)
G. ovata	Ovate	15.0–16.5×8.0–9.0	2	Two upper cells pale brown and the basal cell brown	Morgan-Jones & Eicker (1983)
G. lantania	Ovoid	7.6–15.2×5.2–7.8	1-2	Two upper cells pale brown, the basal cell dark brown, with dark transverse banded septa	Present study

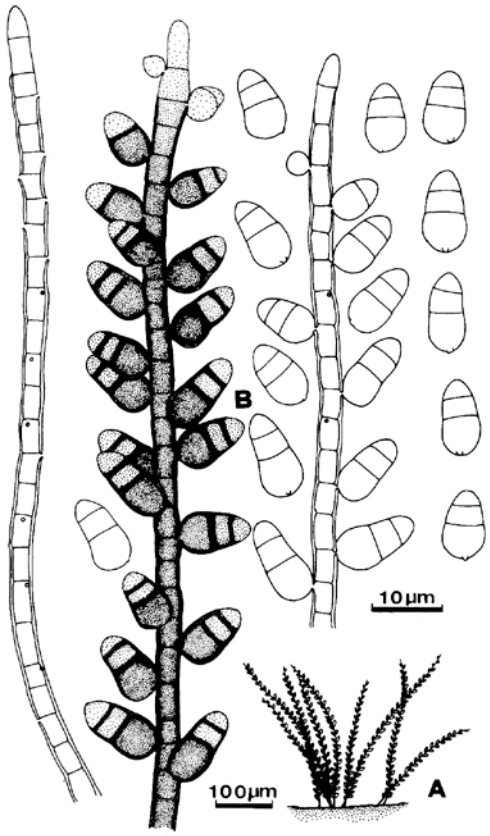

Fig. 1. *Guedea lantania*. A: habit on twig. B: conidiophores, conidia and conidiophores with developing conidia. Scale bar: A = 100 μm; B = 10 μm.

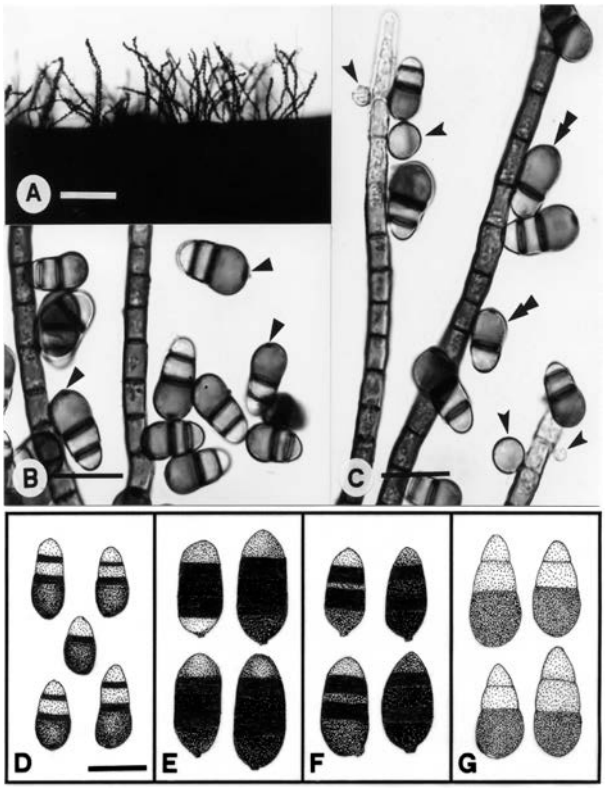

Fig. 2. A-C. *Guedea lantania*. A: habitat on twig. B: conidiophores and conidia with small black hilum at the base (arrowheads). C: conidiophores with developing conidia (arrowheads) and 1-sptate (double arrowheads) and 2-septate mature conidia. D-G. Conidia of different *Guedea* species. D: *Guedea lantania* (present study). E: *Guedea sacra* (courtesy of A. Rambelli & A. Bartoli, 1978). F: *Guedea novae-zelandiae* (courtesy of S. J. Hughes, 1980). G: *Guedea ovata* (courtesy of G. Morgan-Jones, R.C. Sinclair & A. Eicker, 1983). Scale bar: A = 200 μm; B-C = 5 μm; D-G = 10 μm.

been described since. It amounted to three species listed in CABI Bioscience Databases (2015) and International Mycological Association (2015). The genus *Guedea* has a uniquely mode of conidiogenesis characterized by the production of monoblastic conidia at special loci under septa along with the conidiophores. The Taiwan isolate conforms to the circumscription of *Guedea* genus by Rambelli and Bartoli (1978), which was defined by having macronematous, mononematous, reddish brown conidiophores with monoblastic conidiogenous cells and ovoid, 1-2-septate conidia with black-banded septa. The new species, *Guedea lantania*, differs from other members of the genus in having smaller conidia. Based on its conidial shape and pigmentation, *G. lantania* is most closely related to *G. ovate* Morgan-Jone & Eicker. However, the conidia wall of the latter species were paler color, with lager size and just only with 2- thin speta, and without distinct dark thick banded septa. Although *Guedea sacra* Rambelli & Bartoli and *Guedea nova-zelandiae*

Hughes resembles *G. lantania* in having two dark transverse banded septated conidia, but condial shape, size and pigmentation are notably different (Fig. 2B-G). A comparison of *G. lantania* with the other three species of the genus *Guedea* in features of conidia mentioned above was cited in Table 1. Furthermore, a key to all species of *Geudea* genus is provided.

Key to species of *Geudea* genus

1a.Conidia ovate or ovoid, 1-2-septate, two upper cells pale brown and the basal cell brown or dark brown……...2
1b.Conidia oval, obovoid, 2-septate, often middle cell dark borwn or black, diffused and merged with two thick dark transverse banded septa ...……..……..……...3
2a.Conidia 2-septate, with non-distinct thin transverse dark septa ….. ……..……....***G. ovata***
2b.Conidia 1-2-septate, with dark transverse thick banded septa……. ……..……....…***G. lantania***
3a.Conidia oval, up to 21 µm long, larger than 10 µm wide ……***G. sacra***
3b.Conidia obovoid, less than 17 µm long, 10 µm wide…….. ……..***G. novae-zelandiae***

Isthmotricladia gombakiensis Nawawi, Trans. Br. mycol. Soc. 64(2):243, 1975. Figs. 3 & 4

Colonies on Oat Meal Agar effuse, mucous, plane, pale orange to orange; reverse pale orange to orange. Mycelium mostly immersed, composed of branched, usually anastomosed, septate, smooth, hyaline, 1.0–4.6 µm wide hyphae. Conidiophores micronematous to semimacronematous, simple, erect or flexuous, geniculate, septate, smooth, hyaline, 7.7–68.0×2.0–3.3 µm. Conidiogenous cells terminal or intercalary, integrated, sympodial proliferation. Conidia holoblastic, hyaline, smooth, usually composed of (1)2–3 branches protruding from the apex of main axis; main axis clavate, truncate at the base, 1–4-septate, 13.6–25.2× 2.0–3.1 µm; branches cylindrical or longed-obclavate, tapering to the end, 5-11-septate, 58.4–97.6×3.2–4.4 µm.

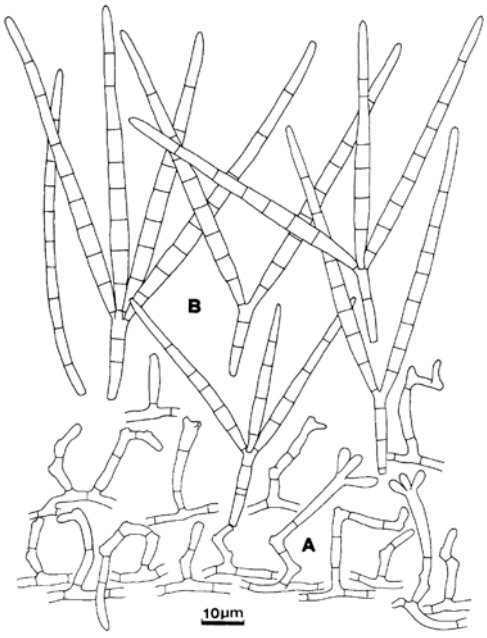

Fig. 3. *Isthmotricladia gombakiensis*. A: conidiophores bearing developing apical conidia. B: mature conidia. Scale bar: A-B = 10 µm.

Specimen examined: **TAIWAN**: On a rotten leaf, Tasheh township, Taichung city, Jul. 12 1997, leg. J.L. Chen. CTN-65 (dried culture).

Distributions: Taiwan, Malaysia, Cuba, Puerto Rico.

Note: Matsushima (1971) erected the genus *Isthmotricladia* with *I. laeensis* as the type species, which was isolated from a decayed coconut leaf in Papua-New Guinea. Subsequently two additional species have been described. Currently three species are listed in CABI Bioscience Databases (2015) and International Mycological Association (2015). The discovery of *Isthmotricladia gombakiensis* was in Malasia from river foam (Nawawi, 1975). The second record of this species was from a dead leaf of *Clusia minor* L. in Cuba (Matsushima, 1987), and the third record was from a stream foam in Puerto Rico (Carlos et al., 1995). The Taiwan isolate conforms to the description of *I. gombakiensis* by Nawawi (1975), but differed in having fewer branches (2–3 branched arm), shorter conidial axis (up to 25.2 µm long) and conidial branches (up to 97.6 µm long), and fewer septa in conidial branches. *Isthmotricladia gombakiensis* morphologically resembles *I. laeensis* in appearance of conidia but can be easily distinguished from the latter in having larger conidia with multi-septa.

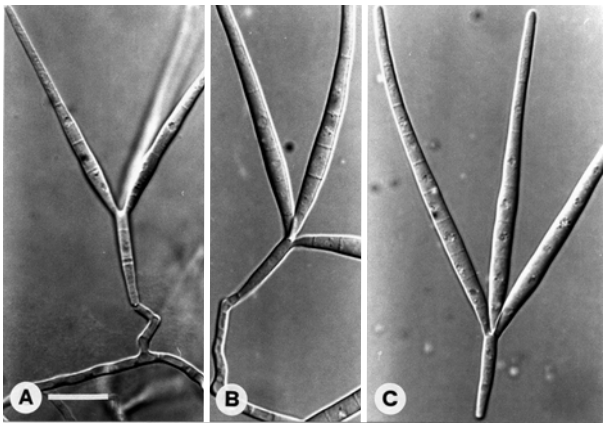

Fig. 4. *Isthmotricladia gombakiensis*. A-B: conidiophores with developing conidia. **C:** mature conidia with a clavate main axis and 3-cylindrical branched arms. Scale bar: A-C = 5 µm.

Wiesneriomyces laurina (Tassi) P.M. Kirk, Trans. Br. Mycol. Soc. 82(4):748, 1984. Figs. 5 & 6

Colonies on the substrate inconspicuous. Sporodochia present, with brown to dark brown, smooth to conspicuous verrucose, septate setae, 68–200 µm long, 4.0–8.0 µm wide at the base. Conidiophores branched, sepetae, smooth, hyaline to pale brown,

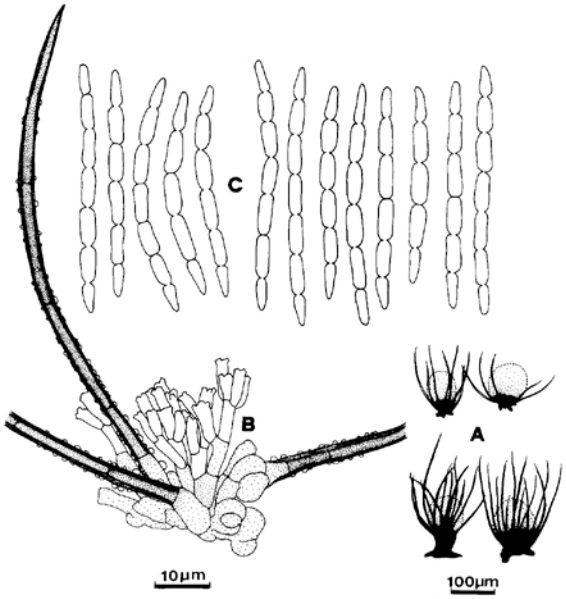

Fig. 5. *Wiesneriomyces laurinus*. A: sporodochia on rotten leaf. B: branched conidiophores. C: catenulate conidia. Scale bar: A = 100 μm; B-C = 10 μm.

24.0–36.0×2.4–5.8 μm. Conidiogenous cells clavate, polyblastic, 5.2–8.0×2.0–2.8 μm. Conidia in chains, (4)5–7 cells, smooth, hyaline to pale brown, 28.0–50.0× 2.4–3.6 μm.

Specimen examined: **TAIWAN**: On a rotten leaf, in the campus of National Cheng Kung University, Tainan city, Mar. 24, 2006, leg. J.L. Chen. CTN-66.

Ditibutions: Taiwan, India, Japan, Jawa, U.S.A., Cuba, Pakistan, New Caledonia, Australia, England, Thailand, New Zealand, Panama.

Note: The genus *Wiesneriomyces* was established by Koorders (1907) with *W. javanicus* as the type species. Two additional species have been described thereafter. Totally there are three species listed in CABI Bioscience Databases (2015). *W. laurinus* is distinct in its obvious conidiomata (sporodochia) with dark brawn setae, and branched conidiophores with polyblastic conidiogenous cells and catenulate conidia. The size of conidia in Taiwan specimens are shorter and narrower than those of *W. laurinus* described by Koorders (1907). *Wiesneriomyces conjunctosporus* is similar to *W. laurinus* but differs from the latter in having larger conidiomata with longer seta (up to 650 μm tall) and longer conidia (up to 360 μm long).

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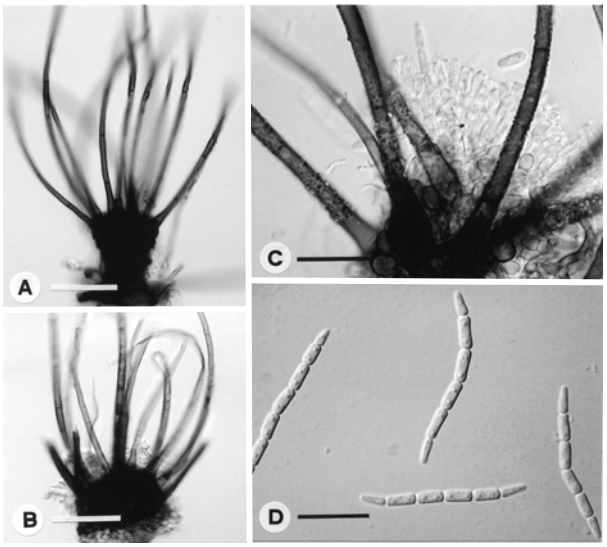

Fig. 6. *Wiesneriomyces laurinus*. A-B: sporodochium. C: branched conidiophores and verrucose, septate and dark brown setae. D: catenulate conidia. Scale bar: A-B = 50 μm; C-D = 20 μm.

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台灣產絲孢綱不完全菌一世界性新種及二新紀錄種之探討

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摘要：本文詳細繪圖及描述一種台灣產隸屬於不完全菌絲孢綱之世界性新種真菌(*Guedea lantania*)以及二種台灣產不完全菌絲孢綱之新紀錄種真菌(*Isthmotricladia gombakiensis* 及 *Wiesneriomyces laurinus*)，提供 *Guedea* 屬之檢索表，並比較討論此類真菌之形態鑑定特徵，以及其與模式種和相似種真菌間之異同。

關鍵詞：生物多樣性、絲孢綱、不完全菌、台灣、分類學。