Cercospora and allied genera from Laos – 1: Notes on Zasmidium (Stenella s. lat.)

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Abstract – Leaf spots or lesions on living plants were collected from the Vientiane area and Bolikhamxay Province of Laos. Any cercosporoid taxa present were recorded, their macroscopic characters observed, cultures were isolated from single spores, and microscopic characters were observed under the microscope. Five Zasmidium species have presently been identified and five of these are new species. In this paper we introduce the taxonomic novelties Zasmidium aporosae, Z. jasminicola, Z. pavettae and Z. suregadae. Furthermore, Stenella manihotis, S. meynae-laxiflorae and S. pseudoramularia are assigned to Zasmidium.

anamorphic fungi / cercosporoid hyphomycetes / South East Asia / taxonomy / new species

INTRODUCTION

Studies on the biodiversity of the previously poorly studied fungi from various habitats in northern Thailand and Laos have been carried out (e.g. insects: Aung et al., 2008; leaf litter: Duong et al., 2008; wood: Kodoseb et al., 2008a, b; monocotyledons; Pinruana et al., 2007; Thongkanthab et al., 2008). There is considerable interest in the cercosporoid fungi and recently there have been several publications from Australasia and Asia (Braun & Crous, 2007; Kirschner & Chen, 2007; Nakashima et al., 2007). Cercosporoids have been shown to be a polyphyletic group (Crous et al., 2007a) comprising numerous genera with partly unsettled phylogeny and taxonomy (Crous et al. 2007b). In this paper we deal with Stenella-like hyphomycetes from the Lao PDR (Lao People Democratic Republic). The genus Stenella was described by Sydow (1930) and recognized by Ellis (1971, 1976), who reduced Biharia Thirum. & Mishra (Thirumalachar &

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Mishra, 1953) to synonymy with this genus. Deighton (1979) followed this concept of *Stenella* and differentiated it from *Mycovellosiella* based on the formation of verruculose superficial hyphae and usually rough-walled, catenate conidia. Up to the present time about 150 species have been assigned to *Stenella*. The main characters of this genus are: formation of verruculose superficial secondary mycelium; conidia formed singly or catenate, amero- to sclecosporous, mostly verruculose. However, in phylogenetic examinations on *Ramichloridium* and allied genera Arzanlou et al. (2007) demonstrated that *Zasmidium cellare* (Pers.: Fr.) Fr., the type species of the older genus *Zasmidium*, clustered within the *Mycosphaerellaceae* together with former *Stenella* species. With regard to morphology and conidiogenesis, *Zasmidium* agrees well with *Stenella* species by forming verrucose, pigmented aerial hyphae, giving rise to solitary conidiophores and thickened, darkened conidiogenous loci. Most former *Stenella* species belong to the *Mycosphaerellaceae* as well, but *Stenella arguata* Syd., the type species, clusters within the *Teratosphaeriaceae*, i.e. this species is phylogenetically distinct. Furthermore, *Stenella* anamorphs of the *Mycosphaerellaceae* have conidiogenous loci and hila that are planate as in other cercosporid genera, whereas the loci and hila in *S. arguata*, *Teratosphaeriaceae*, are pileate (see David 1993). There are several possible solutions of this generic issue, viz. the recognition of a single polyphyletic genus for *Stenella*-like hyphomycetes (either, following the rules of priority, under the oldest name *Zasmidium* or under *Stenella*, provided that the latte name would be conserved over *Zasmidium*) or two monophyletic genera, i.e. *Zasmidium* (*Mycosphaerellaceae*) and *Stenella s. str.* (*Teratosphaeriaceae*). In any case, the oldest name *Zasmidium* is available for the whole complex. Furthermore, there is a strong tendency to end up with monophyletic genera when possible. Therefore, *Stenella s. str.* should be confined to anamorphs of the *Teratosphaeriaceae*. All *Stenella* species have to be proven and reassessed, either by molecular methods or by detailed examinations of the scar structure. In this paper we introduce four new species of *Zasmidium* from Laos.

**MATERIALS AND METHODS**

**Sample collection**

Leaves of plants with leaf-spots or other lesions were collected during numerous field trips. Photos of the symptoms, including the fungal colonies or fruit bodies were taken. The specimens were collected in the Vientiane Capital and Bolikhamsay Province areas of Central Laos.

**General information**

- **Vientiane** is the capital city of Laos, situated in the Mekong Valley and it is located at 17°58' North, 102°36' East (17.9667, 102.6). Vientiane consists of an area 3,920 km².
- **Bolikhamsay** (or Bolikhamsay) Province is located in central Laos in the narrow “neck”, with moderately high mountains sloping Southwest into the Mekong River valley. Bolikhamsay can be reached by bus, 150 km or about 3 hours leaving from the Morning Market bus station. Bolikhamsay consists of an area 14,863 km².
Examination of fungal structures

Macroscopic characters were observed using a stereoscope to check (1) lesions/leaf spots (shape, size, colour, margin), and (2) colonies/caespituli (with details, e.g., amphigenous/epiphyllous, punctiform/pustulate/inconspicuous, effuse, loose, dense, brown/blackish, etc.).

Measurements

Where sufficient material was available, 30 measurements of mycelia (internal, external), hyphae (branched or not, width, septation, colour, wall thin/thick, smooth/verruculose), stromata (location, e.g., substomatal, intraepidermal; shape, size, colour; cells, angular or rounded in outline, size, wall thick/thin), conidiophores (formation, solitary/fasciculate/sporodochial, arising from internal/external hyphae/stromata, erumpent/through stomata; shape; size; septation; colour; wall, thin/thick, smooth/verruculose), conidigenous cells (integrated, terminal/intercalary; length, shape, e.g., cylindrical/geniculate/sinuous), conidiogenous loci [scars] (shape, size, thickened, darkened/pigmented or unthickened or inconspicuous, etc.), and conidia (formation, solitary/catenate; shape; size; septation; colour; wall, thin/thick, smooth/verruculose, apex; base; hila, size, thickened/unthickened, pigmented or not) have been carried out and the standard variation has been estimated by using the formula:

\[ \bar{x} = \frac{\sum x}{n} \]

Notes: \(x\) = is an average of the size of each component
\(y\) = is a number of components

Herbarium specimens

Dried specimens were prepared and stored at the MFLU and the Biology Department, Faculty of Sciences, National University of Laos. Duplicates of collections and syntypes are preserved at the herbarium of the Institute of Biology, Geobotany and Botanical Garden, Halle (Saale), Germany (HAL) and MFLU.

RESULTS

Five new Zasidium species were identified:

Table 1. Zasidium species recorded from Laos.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Fungi species</th>
<th>Vientiane Capital</th>
<th>Bolikhamxay Province</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MD</td>
<td>DD</td>
</tr>
<tr>
<td>1</td>
<td>Zasidium aporosae sp. nov.</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>2</td>
<td>Zasidium jasminicola sp. nov.</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td>Zasidium pavettae sp. nov.</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Zasidium meynae-laxiflorae comb. nov.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Zasidium suregadae sp. nov.</td>
<td>x</td>
<td></td>
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</table>

Note: MD = Mixed deciduous forest, DD = Dry dipterocarp forest, UT= Unstock forest.
Taxonomy

1. *Zasmidium aporosae* P. Phensintham, K.D. Hyde & U. Braun, sp. nov. (Figs 1-2)

   Mycobank, MB 513397
   Stenellae bischofiae-javanicae similis, sed conidiis in vivo angustioribus, 2-3 µm latis, levibus vel subtiliter verruculosis.

   Description: Leaf spots variable, typically deep brown to black, more or less irregularly orbicular, 1-15 mm in diam. Caespituli/colonies amphigenous, but chiefly hypophyllous. Mycelium: internal hyphae not observed; external hyphae often constricted at the septa, pale olivaceous-brown, almost smooth to verruculose, 1-7 µm wide ($\bar{x} = 2.57$ µm, n = 30), distances between septa 5-29 µm ($\bar{x} = 11.67$ µm, n = 30), thick-walled approximately 0.30-1 µm ($\bar{x} = 0.61$ µm, n = 30). Stromata absent. Conidiophores borne on external mycelial hyphae, unbranched, septate, mid pale golden brown, smooth, 2-5-septate, thin-walled, 0.50-1 µm ($\bar{x} = 0.80$ µm, n = 30), (6-)29-76(-83) × 3-4 µm ($\bar{x} = 43.1 \times 3.2$ µm, n = 30); conidiogenous cells intergrated, terminal or rarely intercalary, 7-15 × 1-3 µm ($\bar{x} = 10.3 \times 2.8$ µm, n = 30), conidiogenous loci forming minute, dark or refractive scars on lateral and terminal denticles, 1-2 µm wide ($\bar{x} = 1.72$ µm, n = 30), planate, giving rise to branched conidial chains, occasionally terminally swollen. Conidia solitary or catenulate, pale olivaceous, small conidia ellipsoid-ovoid to subcylindrical, but most conidia longer and slightly obclavate to obclavate-subcylindrical, straight or slightly curved or sinuous, smooth or finely verruculose, thin-walled, rounded or subtruncate at the ends with thickened, planate hila, short obconically truncate at the base, variable in length and shape, occasionally with lateral branchlets (germ tubes), 0-3-septate, (5-)6-38(-39) × 2-3 µm ($\bar{x} = 17.47 \times 2.3$ µm, n = 30).

   Known hosts: *Aporosa villosa* (Lindl.) H. Baill.
   Known distribution: Laos.


   Cultural characteristics: Colonies on PDA after three weeks at 25°C with spreading mycelium, surface ridged, black and wavy in the centre and grey margin, reaching 10-27 mm diam. Hyphae often constricted at the septa, distances between septa 4-20 µm ($\bar{x} = 10.97$ µm, n = 30), thin-walled approximately 0.5-1 µm ($\bar{x} = 0.68$ µm, n = 30), hyaline, smooth or verruculose, forming lateral and terminal minute, dark or refractive denticle-like scars, 1-2 µm diam., giving rise to branched conidial chains, width of mycelial hyphae gradually decreasing from primary to secondary and any later colonies. Conidia solitary or catenulate, greenish, verruculose, more variable in length and shape than those from leaves, 17-66 × 3-4 µm ($\bar{x} = 41.94 \times 3.3$ µm, n = 18).

   Remarks: The young conidia of *Z. aporosae* can be minutely verruculose, more evident than in adult conidia. Several species of the genus *Stenella* are known from hosts belonging to the Euphorbiaceae, but all of them are distinct from the new species *Z. aporosae*. *Stenella bischofiae-javanicae* R.K. Chaudhary, Tripathi, P.N. Singh & S. Chaudhary (Chaudhary et al. 2001), described from India on *Bischofia javanica*, differs in having usually solitary conidia, up to 5 µm wide, with 2-6 septa and a surface with loosely scattered coarse warts. *S. bridellicola* K. Srivast., A.K. Srivast. & Kamal on *Bridelia stipularis* in India (Srivastava et al. 1994) has much longer conidiophores, up to 310 × 5-7 µm, and broader conidia 4-7 µm, formed singly. *Zasmidium manihotis* (U. Braun &
Fig. 1. 1-11. *Zasidium aporosae* sp. nov. on *Aporosa villosa*: 1-3. External hyphae with attached conidiophores. 4-11. Conidia. Bar: 1-11 = 10 μm.
F.O. Freire) U. Braun **comb. nov.** (Bas.: Stenella manihotis U. Braun & F.O. Freire, Cryptog. Mycol. 25: 240, 2004), MycoBank, MB 513397, known on Manihot sp. in Brazil, is characterized by having solitary as well as fasciculate conidiophores and much longer conidia, 25-160 × 3-4 µm, 2-16-septate, usually formed singly. *S. gorakhpurensis* (Kamal & P. Kumar) de Hoog (de Hoog et al. 1983) on Glochidion multiloculare in India is characterized by having colorless hyphae and smooth, very small, 1-3-septate conidia.

Fig. 2. 1-11. Zasmidium aporosae sp. nov. on Aporosa villosa from leaf spots/lesions: 1-2. Lesions on host leaves (1. Upper surface, 2. Lower surface). 3. Caespituli. 4-5. Conidiophores. 6-7. External hyphae. 8-10. Conidia. 11. Culture. Bar: 1-2 = 10 mm. 4-10 = 10 µm. 11 = 10 mm.

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Differt a *Zasmidio pseudoramulario* conidiophoris in vivo semper ex hyphis superficialibus oriundis et conidiis latioribus, (4-)5-42(-47) × (2-)3-5(-6) μm, 0-6-septatis.

Fig. 3. 1-11. *Zasmidium jasminicola* sp. nov. on *Jasminum undulatum*: 1-4. Conidiophores. 5-11. Conidia. Bar: 1-11 = 10 μm.
Description: **Leaf spots** variable, typically deep brown, more or less irregularly orbicular, up to 10 mm. diam. **Caespituli/colonies** amphigenous. **Mycelium: internal hyphae** not observed; **external hyphae** verruculose, often constricted at the septa, pale olivaceous-brown, 1-2 µm wide, distances between septa 7-15 µm, thin-walled, approximately 0.50-0.80 µm. **Stromata** well-developed, brown, 6-40 µm diam. **Conidiophores** borne on external mycelial hyphae, unbranched, septate, mid pale golden brown, smooth, thin-walled, approximately 0.50-0.80 µm, up to 3-septate, 10-46 × 2-4 µm (\(\bar{x} = 21.54 \times 2.31 \mu m, n = 13\)); **conidiogenous cells** intergrated, terminal or rarely intercalary, 7-15 × 2-3 µm, **conidiogenous loci** forming minute, dark or refractive scars on lateral and terminal denticles, 2-3 µm diam., planate, giving rise to branched conidial chains, occasionally terminally swollen. **Conidia** solitary or catenulate, pale olivaceous, ellipsoid-ovoid or subcylindrical but mostly slightly obclavate, straight or slightly curved or sinuous, smooth or finely verruculose, thin-walled, rounded or subtruncate at the ends, with thickened hila, 1-2 µm wide, planate, short obconically truncate at the base, about 0.5-1.5 µm wide, variable in length and shape, some conidia occasionally with a lateral branchlet (germ tube), 0-6-septate, (4-)5-42(-47) × (2-)3-5(-6) µm (\(\bar{x} = 13.98 \times 2.09 \mu m, n = 30\)).

**Known hosts:** *Jasminum undulatum* Ker-Gawl. (this paper).
**Known distribution:** Laos (this paper).

Material examined: Laos, Vientiane Capital, Xaythany District, Xay Village, on leaf of *Jasminum undulatum* (Oleaceae), P. Phengsintham, 19 April 2006, (NOUL P 10, holotype).

Cultural characteristics: **Colonies** on PDA after three weeks at 25 °C with spreading mycelium, surface ridged, black and wavy in the centre and grey margin, reaching 10-27 mm diam. **Hyphae** often constricted at the septa, distances between septa (2-)6-27 µm (\(\bar{x} = 14.93 \mu m, n = 30\)), thin-walled, approximately 0.5 µm, hyaline, smooth or verruculose, forming minute, dark or refractive scars on lateral and terminal denticles, 1.5-2 µm diam., giving rise to branched conidial chains, width of mycelial hyphae gradually decreasing from primary to secondary and any later colonies, 1-5 µm wide (\(\bar{x} = 2.8 \mu m, n = 30\)). **Conidia** solitary or catenulate, greenish, verruculose, more variable in length and shape than those from leaves, 5-29 × 1.5-2.5 µm (\(\bar{x} = 10.5 \times 2.08 \mu m, n = 30\)).

**Remarks:** *Zasmidium pseudoramularia* (U. Braun) U. Braun **comb. nov.** (Bas.: *Stenella pseudoramularia* U. Braun, Nova Hedwigia 73: 431, 2001); MycoBank, MB 513398, the second species of *Stenella* on a host belonging to the Oleaceae, described from Indonesia on *Nyctanthus arbor-tristis* (Braun 2001), is distinguished from *S. jasminicola* by forming solitary or loosely aggregated (subfasciculate) conidiophores arising from immersed hyphae and much narrower (6-35 × 1-3 µm *in vivo*), 0-1(-2)-septate conidia The young conidia of *S. jasminicola* can be minutely verruculose, more evident than in adult conidia.

3. **Zasmidium pavetata** P. Phengsintham, K.D. Hyde & U. Braun, **sp. nov.**

(Figs 5-6)

MycoBank, MB 513399

Stenellae canthii similis, sed stromatibus formatibus, conidiophoris fasciculatis et solitariis, conidiis solitariis et catenatis, leniter breviornibus et angustioribus, (5-)6-59(-65) × 2-4 µm. Differt a *S. meynea-laxiflorae conidiophorisc in fasciculis parvioribus, brevioribus, ad 34 µm longis, conidiis brevioribus, (5-)6-59(-65) µm longis.
Fig. 5. 1-9. *Zasmidium pavetteae* sp. nov. on *Pavetta indica*: 1-3. Conidiophores. 4. External mycelium with attached conidiophores. 6-9. Conidia. Bar: 1-9 = 10 μm.
Description: **Leaf spots/lesions** circular to irregular, 3-8 mm in diam., grey-brown in the centre, and with greyish margin. **Caespituli/colonies** amphigenous, inconspicuous. **Mycelium** internal and external: **internal hyphae** inconspicuous; **external hyphae** branched, 2-3 µm wide (\( \bar{x} = 2.8 \) µm, \( n = 17 \)),

septate, constricted at the septa, distances between septa 9-24 µm (\(\bar{x} = 15.5\) µm, n = 17), pale olivaceous-brown, wall approximately 0.25-0.50 µm wide (\(\bar{x} = 0.44\) µm, n = 17), verruculose. **Stromata** not well-developed, subglobose, approximately 23 µm in diam., brown, stromatal cells oval, ellipsoidal to angular in outline, 3-5 µm wide (\(\bar{x} = 3.75\) µm, n = 8), brown to dark brown, wall approximately 0.50-0.80 µm wide (\(\bar{x} = 0.54\) µm, n = 8), smooth. **Conidiophores** fasciculate or solitary, arising from stromata and borne on external mycelial hyphae, unbranched, cylindrical, 12-34 × 3-4 µm (\(\bar{x} = 16.8 \times 3.5\) µm, n = 5), 1-septate, brown, wall approximately 0.80 µm, smooth; **conidiogenous cells** integrated, terminal or intercalary, 19-20 × 3-4 µm, cylindrical, paler at the apex; **conidiogenous loci** forming minute, dark or refractive scars on lateral and terminal denticle-like protuberances, giving rise to branched conidial chains, 1-2 µm wide, planate, wall approximately 0.8-1 µm wide, thickened, darkened. **Conidia** solitary or catenulate, sometimes subcylindrical but mostly slightly obclavate, straight or slightly curved or sinuous, (5)-6-59(-65) × 2-4 µm (\(\bar{x} = 20 \times 2.75\) µm, n = 20), 0-5-septate, pale olivaceous, wall approximately 0.25-0.50 µm wide (\(\bar{x} = 0.36\) µm, n = 20), smooth or finely verruculose, apex rounded or subtruncate, with a conspicuous hilum, base short obconically truncate, hila approximately 1 µm wide, wall approximately 0.6-0.8 µm thick.

**Known host:** *Pavetta indica* L.

**Known distribution:** Laos (this paper).

Material examined: Laos, Vientiane Capital, Xaythany District, Houay Den Meuang and Dong Mak Khai villages, on leaf of genus *Pavetta indica* (Rubiacaeae), 26 April 2006, P. Phengsintham (NOUL P 24, holotype); ibid. 10 March 2007 (NUOL P 261, paratype).

Cultural characteristics: **Mycelial colonies** on PDA after three weeks at 25°C spreading surface ridged, black and brown in the centre, grey margin, reaching 10 mm in diam., hyphae 1-4 µm wide (\(\bar{x} = 2.6\) µm, n = 30), septate, constricted at the septa, distances between septa 6-16 µm (\(\bar{x} = 11\) µm, n = 30), brownish to subhyaline, wall approximately 0.25-0.50 µm (\(\bar{x} = 0.44\) µm, n = 30), smooth or verruculose. **Conidiophores** and **conidia** not formed in the culture.

Remarks: Several *Stenella* species, all described from India, have been recorded on hosts belonging to the Rubiaceae. *Stenella canthii* J.M. Yen, A.K. Kar & B.K. Das (1982a), described from West Bengal on *Canthium dedymum*, is morphologically close to the fungus on *Pavetta indica*, but this species is distinguished by lacking stromata, consistently solitary conidiophores and somewhat longer, wider conidia, 18-112 × 3-4.5 µm. *S. meyniae-laxiflorae* K. Srivast., A.K. Srivast. & Kamal (Srivastava *et al.* 1995) is another similar species, but it is distinct by its much longer conidiophores, up to about 90 µm in length, often formed in well-developed fascicles of 9-20 stalks. Most of the other *Stenella* species on Rubiaceae are characterized by having much longer pluriseptate conidia, viz., *S. coffeae* J.M. Yen, A.K. Kar & B.K. Das (conidia 33-200 × 3-5(-6) µm, see Yen *et al.* 1982a), *S. hypianttherae* S.K. Singh, Archana Singh & Kamal (conidia 18-177 × 3-5 µm, see Singh *et al.* 1997), *S. plecnoniae* Ponnappa (conidia 40-210 × 2-3.5 µm, see Ellis 1976), *S. vangueriae* (Thirum. & Mishra) Deighton (conidia 30-258 × 3-4.5 µm, see Thirumalacher & Mishra 1953), and *S. xeromphigena* J.M. Yen, A.K. Kar & B.K. Das (conidia 20-156 × 3-4 µm, see Yen *et al.* 1982b). *Stenella naucleae* A.K. Das (Das 1990) differs in having larger, well-developed stromata with large fascicles composed of 7-55 conidiophores, and much longer, pluriseptate conidiophores, 33-115 × 3-5 µm.

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Description: **Leaf spots/lesions** circular to irregularly angular, 1-12 mm in diam., brown to dark brown in the centre and with yellowish margin. **Caespituli/colonies** amphigenous, small, scattered, brown. **Mycelium** internal and external: **internal hyphae** inconspicuous; **external hyphae** branched, 2-3 µm wide (µ = 2.5 µm, n = 12), septate, constricted at the septa, distances between septa 5-18 µm (µ = 11.92 µm, n = 12), pale olivaceous-brown, wall approximately 0.3-0.8 µm wide (µ = 0.52 µm, n = 12), verruculose. **Stromata** well-developed, subglobose, approximately 10-41 µm in diam., brown; stromatal cells oval, ellipsoidal to angular in outline, 3-9 µm wide (µ = 5.67 µm, n = 30), brown to dark brown, wall approximately 0.5-1 µm wide (µ = 0.74 µm, n = 30), smooth. **Conidiophores** fasciculate, arising from stromata (9-20 per fascicle) and solitary, borne on external mycelial hyphae, unbranched, cylindrical, (14-)15-93(-98) × 3-4 µm (µ = 51.8 × 3.37 µm, n = 30), 0-7-septate, distances between septa 4-23 µm (µ = 11 µm, n = 30), brown to dark brown, wall approximately 0.5-1 µm wide (µ = 0.63 µm, n = 30), smooth, 0-2-geniculate; **conidiogenous cells** polyblastic, integrated, terminal or intercalary, 9-23 × 3-4 µm, cylindrical, pale at the apex; **conidiogenous loci** forming minute, dark or refractive scars on lateral and terminal denticle-like protuberances giving rise to branched conidial chains, 1-1.5 µm wide (µ = 1.68 µm, n = 13), wall approximately 0.5-1 µm wide (µ = 0.81 µm, n = 13), thickened, darkened, with a minute central pore. **Conidia** solitary or catenate, sometimes subcylindrical but mostly slightly obclavate, straight or slightly curved or sinuous, (4-)16-87 × 2-4 µm (µ = 30.57 × 3.4 µm, n = 14), 0-6-septate, pale olivaceous, wall approximately 0.25-0.5 µm wide (µ = 0.3 µm, n = 14), smooth or finely verruculose, apex rounded or subtruncate with a thickened hilum, base short obconically truncate, with a basal hilum, approximately 1-1.5 µm wide (µ = 1.32 µm, n = 9), wall thickened, approximately 0.5-0.8 µm wide (µ = 0.54 µm, n = 9).

Known hosts: *Meyna laxiflora* Robyns., *M. pubescens* (Kurz.) Robyns.

Known distribution: India, Laos (this paper).

Materials examined: Laos, Vientiane Capital, Xaythany District, Houay Den Meuang and Dong Mak Khai villages, on leaf of *Meyna pubescens* (Rubiaceae), 26 April 2006, P. Phengsintham, (NOULP P 29); ibid. 10 March, 2007, (NUOLP P 295)

Cultural characteristics: **Mycelial colonies** on PDA after three weeks at 25°C spreading surface ridged, black and brown in the centre, grey margin, reaching 25 mm in diam. 1-8 µm wide (µ = 3.38 µm, n = 30), septate, constricted at the septa, distances between septa 4-20 µm (µ = 14.2 µm, n = 30), brownish to subhyaline, wall approximately 0.25-0.80 µm (µ = 0.45 µm, n = 30), smooth or verruculose. **Conidiophores** and **conidia** not formed in the culture.

Remarks: The collection from Laos is very similar to the type collection from India which is, according to the original description, characterized as follows: Conidiophores superficial, 16-52 × 3-5.5 µm. Conidia cylindrical, obclavate, 12-92 × 2.5-4 µm, olivaceous-brown, verruculose. *Meyna pubescens* is a new host species of this fungus. The relation of *Stenella meyae-laxiflorae* and *S. vangueriae* (Thirum. & Mishra) Deighton (1979), both species described from India on *Meyna laxiflora* (= *Vangueria spinosa*), is not quite clear. The two taxa are similar, but the latter species was described with much longer and somewhat wider conidia, 30-258 × 3-4.5 µm, formed singly, sometimes with lateral branchlets.
(Figs 9-10)

MycoBank, MB 513401

Stenellæ ateramnæ similis, sed maculis formantibus et conidiis pallide olivaceis, brevioribus, (16-)17-128(-153) × 2-4 µm, 1-10-septatis.

Description: Leaf spots/lesions circular to irregular, 1-3 mm diam., grey to grey-brown in the centre, and with yellow-green margin. Mycelium internal and external: internal hyphae branched, 2-4 µm wide (x̄ = 2.92 µm, n = 13), septate, constricted at the septa, distances between septa 4-19 µm (x̄ = 10.08 µm, n = 13), pale olivaceous-brown, wall approximately 0.3-0.5 µm wide (x̄ = 0.39 µm, n = 13), smooth; external hyphae superficial, branched, 1-4 µm wide (x̄ = 2.67 µm, n = 30), septate, constricted at the septa, distances between septa 6-22 µm (x̄ = 11.78 µm, n = 30), pale olivaceous-brown, wall approximately 0.3-0.5 µm wide (x̄ = 0.44 µm, n = 30), almost smooth to verruculose. Stromata well-developed, subglobose, approximately 35-70 µm diam., brown, stroma cells oval, ellipsoidal to angular in outline, 3-10 µm wide (x̄ = 6.37 µm, n = 30), brown to dark brown, wall approximately 0.5-1 µm wide (x̄ = 0.74 µm, n = 30), smooth. Conidiophores fasciculate, arising from stroma (9-34 per fascicle) and solitary, borne on external mycelial hyphae, unbranched, cylindrical, (34-)-40-86(-110) × 3-4 µm (x̄ = 65.8 × 3.3 µm, n = 30), 2-9-septate, distances between septa 7-20 µm (x̄ = 13.3 µm, n = 30), brown to dark brown, wall approximately 0.5-0.8 µm (x̄ = 0.58 µm, n = 30), smooth, 0-2 times geniculate; conidiogenous cells polyblastic, integrated, terminal or intercalary, 8-20 × 2-3 µm (x̄ = 15.8 × 3.14 µm, n = 30), cylindrical, pale at the apex; conidiogenous loci small, conspicuous, subplanate to planate, 1-1.5 µm wide (x̄ = 1.15 µm, n = 10), wall approximately 0.5-1 µm wide (x̄ = 0.76 µm, n = 10), thickened, darkened. Conidia solitary or catenulate, sometimes subcylindrical, but mostly slightly obclavate, occasionally with lateral branches, straight or slightly curved to sinuous, (16-)-17-128(-153) × 2-4 µm (x̄ = 74.13 × 2.8 µm, n = 30), 1-10-septate, pale olivaceous, wall approximately 0.3-0.5 µm wide (x̄ = 0.36 µm, n = 30), smooth or finely verruculose, apex rounded or subtruncate, at the end of some conidia with a thickened hilum, base truncate, hila slightly thickened and darkened, approximately 1-1.5 µm wide (x̄ = 1.04 µm, n = 13), wall approximately 0.5-0.8 µm wide (x̄ = 0.52 µm, n = 13).

Known hosts: *Suregada multiflora* (Juss.) H. Baill.  
Known distribution: Laos (this paper).


Cultural characteristics: Mycelial colonies on PDA after three weeks at 25 °C spreading surface ridged, grey-brown in the centre, margin greenish black, reaching 11 mm diam., hyphae 1-4 µm wide (x̄ = 2.8 µm, n = 30), septate, constricted at the septa, distances between septa 6-18 µm (x̄ = 11.9 µm, n = 30), greenish to brownish, wall approximately 0.25-0.50 µm (x̄ = 0.34 µm, n = 30), smooth or verruculose. Conidiophores and conidia not formed in the culture.

Remarks: Five Stenella spp. have been recorded on other hosts of the family Euphorbiaceae, but there is no record from Suregada spp. *Stenella bischofiae-javanicae* R.K. Chaudhary et al. (Chaudhary et al. 2001), *S. bridellicola* K. Srivast. et al. (Srivastava et al. 1994), *S. gorakhpurensis* (Kamal & P. Kumar) de Hoog (Kamal & Kumar 1980, de Hoog et al. 1983) as well as *Zasmidium aporosae*, described above, are distinct from the new species by having
Fig. 9. 1-8. Zasmidium suregadæ sp. nov on Suregada multifloræ: 1. Stroma with attached conidiophores. 2. External hypha with attached conidiophores. 3. Conidiophore. 4-8. Conidia. Bar: 1-8 = 10 μm.
conidiophores which are consistently formed singly, i.e. stromata and fasciculate conidiophores are lacking. *Zasmidium manihotis* (≡ *Stenella manihotis*, Braun & Freire 2004), described from Brazil on *Manihot* sp., is a similar species with solitary as well as fasciculate conidiophores, but the stromata are much smaller, 10-25 µm diam., or even lacking, the conidiophores are formed in small fascicles, they are wider, 3-7 µm, and the conidia are also wider, 3-6 µm. *S. atramnae* R.F. Castañeda & B. Kendr. (Castañeda & Kendrick 1991), described from Cuba on *Ateramus lucidus*, is close to the new species by having large stromata, 50-80 × 25-45 µm, with numerous conidiophores in fascicles, but the brown conidia are much longer, up to 280 µm, with up to 20 septa. Furthermore, the latter species has been described from fallen leaves (lesions lacking) with usually internal mycelium (verruculose external hyphae not described).

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**REFERENCES**


