



## *Neosporidesmium subramanianii* sp. nov. from Vietnam

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### Abstract

The new species *Neosporidesmium subramanianii*, based on material collected in Vietnam on dead leaves of *Saccharum spontaneum*, is described, illustrated, compared with morphologically similar species, and an updated key to the species of *Neosporidesmium* is also provided.

**Key words** – ascomycetes – asexual morph – South East Asia – synnematous hyphomycetes – taxonomic novelty

### Introduction

Vietnam is a tropical country with high but little explored fungal diversity. Within the scope of a research program of the Vietnamese-Russian Tropical Research and Technological Centre, in recent years numerous fungi of different taxonomic groups have been collected and published in a series of papers (Mel'nik 2011, 2012a, b, Mel'nik & Braun 2013, Mel'nik et al. 2012, 2013, 2014, 2015). Recently a synnematous hyphomycete was collected on dead leaves of *Saccharum spontaneum*, critical morphological examination revealed it to be an undescribed species of *Neosporidesmium* Mercado & J. Mena (Mercado & Mena 1988). Attempts to cultivate this fungus *in vitro*, in order to be able to carry out molecular analyses, failed, but due to striking morphological characters and clear differences to all similar and comparable species it is justified to introduce a new species of *Neosporidesmium*.

### Materials & Methods

Fresh samples collected in the course of field trips in Vietnam were dried at room temperature. The collections were later examined in distilled water and photographed using a Zeiss microscope, Stemi 2000CS, and Axio Imager A1 equipped with Nomarski differential interference contrast optics. Measurements of 30 conidia and other structures have been made whenever possible at a magnification of  $\times 1000$ , and the 95 % confidential intervals were determined and extreme values were given in parentheses. The identification of the new species was accomplished through comparison with descriptions of other species hitherto assigned to *Neosporidesmium*. Type material is deposited at LE.

## Results

*Neosporidesmium subramanianii* Melnik, E.S. Popov & U. Braun, **sp. nov.**  
Mycobank, MB816352

Fig. 1

Etymology – named in memoriam of an outstanding Indian mycologist, C.V. Subramanian (1924–2016).

Diagnosis – Morphologically similar to *N. macrosporum* which, however, differs from *N. subramanianii* in having broader conidiophores, 4.5–8 µm wide, much larger conidiogenous cells, 23.5–34.5 × 7–9.5(–12.5) µm, and longer obclavate conidia, 108–250 µm, gradually attenuated towards the tip, with long attenuated terminal portion.

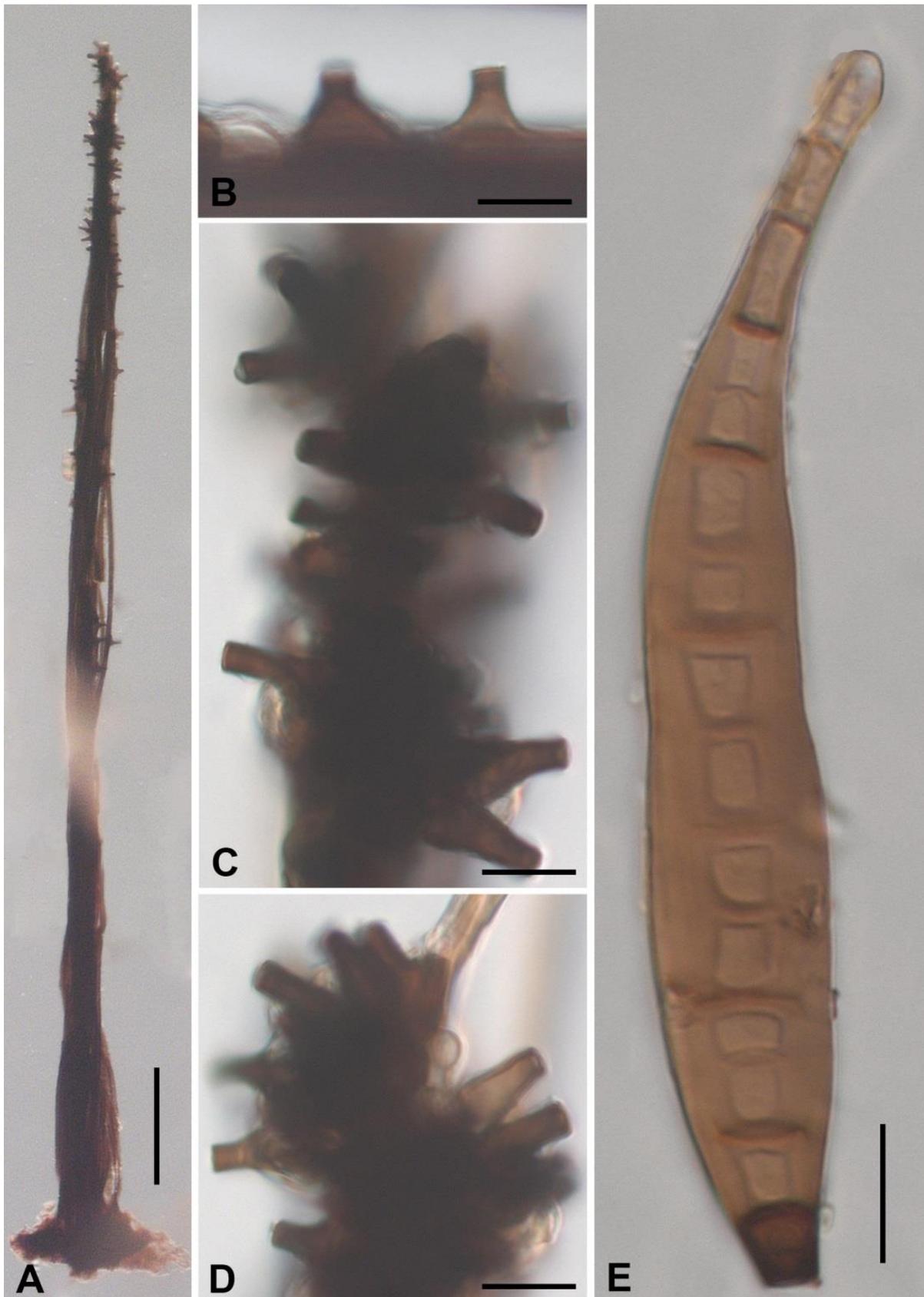
Typus – VIETNAM, Dong Nai Province, Tan Phu District, Cat Tien National Park (Nam Cat Tien Sector), right side of Dong Nai river close to the Park's Headquarter, 11°25'31.9"N, 107°25'45.9"E, on dead leaves of *Saccharum spontaneum*, 17 Dec. 2014, E.S. Popov (LE 264614 **holotype**).

**Colonies** on natural substrate effuse, dark brown and hairy. **Mycelium** superficial and partly immersed in the substratum; hyphae septate, brown, thin-walled, smooth. **Conidiomata** synnematos, solitary, erect, dark brown to black, main portion more or less cylindrical to gradually attenuated towards the apex, 600–1200 µm long, 45–80 µm wide below, i.e. just above the basal part immersed in the substrate, which is discoid or even rhizoid, up to 120 µm diam, 24–30 µm wide near the apex. **Conidiophores** macronematous, unbranched, septate, wall ≤ 1 µm thick, smooth, brown to dark brown, 600–1200 µm long and 4–5 µm wide. **Conidiogenous cells** spread along the upper half to two-third of the synnemata, sometimes up to 80 % of the upper part of the synnemata with laterally splaying out conidiogenous cells, integrated, terminal, monoblastic, determinate, short subcylindrical-conical, doliiform to lageniform 8–13 × 3–3.5 µm, brown to dark brown, thin-walled, smooth. **Conidia** holoblastic, solitary, dry, acrogenous, straight to somewhat curved, broadly obclavate, (80–)90–112(–120) × 10–13(–14) µm, (8–)9–15-distoseptate, smooth, brown, with thin outer and thick inner wall layer giving rise to reduced cell lumina, apex obtuse, broadly rounded, with obconically truncate base, 3–3.5 µm wide, a trapezoidal portion of the base usually strongly pigmented, dark brown. Conidial secession schizolytic.

Known distribution – hitherto only known from the type locality.

## Discussion

*Neosporidesmium subramanianii* is the third species of the genus reported from Vietnam. Mel'nik & Braun (2013) described *N. vietnamense* Melnik & U. Braun based on synnemata on twigs of an unidentified tree collected by Yu. Novozhilov in the Vietnamese Dong Nai province in 2011. A second record refers to *N. maestrense* Mercado & J. Mena on the rachis of *Calamus* sp. (*Arecaceae*) collected by A.V. Alexandrova in the Vietnamese Dak Lak province in 2013 (Mel'nik et al. 2014). Mel'nik & Braun (2013) provided a detailed discussion of the current wide generic concept of *Neosporidesmium*. This genus was introduced for synnematos hyphomycetes characterized by having percurrently proliferating conidiogenous cells forming distinctly swollen subsequent cells and scolecospores, distoseptate conidia (Mercado & Mena 1988). *Neosporidesmium antidesmatis* Jian Ma & X. G. Zhang (Ma et al. 2011) and *N. microsporum* W.P. Wu (Wu & Zhuang 2005) are two additional species forming comparable percurrent proliferations. Furthermore, several species with monoblastic, determinate, i.e. non-proliferating conidiogenous cells have been assigned to *Neosporidesmium* [*N. appendiculatum* I.B. Prasher & R.K. Verma (Prasher & Verma 2015b), *N. diaoluoshanense* Xiang Y. Li & X.G. Zhang (Li et al. 2015), *N. macrosporum* I.B. Prasher & R.K. Verma (Prasher & Verma 2015a), *N. malloti* Jian Ma & X.G. Zhang (Ma et al. 2011), *N. sinense* W.P. Wu (Wu & Zhuang 2005), and *N. xanthophylli* Jian Ma & X.G. Zhang (Ma et al. 2011)].



**Fig. 1** – *Neosporidesmium subramanianii* (holotype). A Synnema. B, C, D conidiogenous cells. E – conidium. – Scale bars: A = 100  $\mu$ m, B, C, D = 10  $\mu$ m.

However, the most drastic emendation to the genus *Neosporidesmium* goes back to the description of *N. micheliae* Y.D. Zhang & X.G. Zhang (Zhang et al. 2011), a species characterized by having euseptate conidia. The two species of *Neosporidesmium* with euseptate conidia, *N. micheliae* and *N. vietnamense*, are possibly not congeneric with the type species of the genus. Besides euseptate conidia, the two species differ from distoseptate species in having uniformly pigmented conidia, i.e. without dark brown conidial base. Shenoy et al. (2006) published results of comprehensive DNA sequence analyses of a wide range of taxa of the *Sporidesmium* Link complex suggesting that *Sporidesmium*, *Ellisembia* Subram. and other segregated genera are not monophyletic. Particular species of these genera are phylogenetically placed in two major classes of ascomycetes, i.e. *Dothideomycetes* and *Sordariomycetes*. A single sequence referred to as *Neosporidesmium* sp. clustered in the *Dothideomycetes* adjacent to *Sporidesmium australiense* M.B. Ellis. However, as long as molecular data for *N. maestrense*, the type species, and the other species concerned are not available, we prefer to refrain from any taxonomic conclusions and changes on generic level. Applying the currently accepted morphological concept of *Neosporidesmium*, the new species from Vietnam can be readily assigned to the genus *Neosporidesmium*. Basic characters like conidiomata, conidiogenous cells, and septation of conidia agree well with the concept of this genus. It pertains to a group of species characterized by having monoblastic, determinate (non-proliferating) conidiogenous cells combined with distoseptate conidia. *Neosporidesmium macrosporum* is the only comparable species, which however differs in having much wider conidiophores, much larger conidiogenous cells, and significantly longer conidia, gradually attenuated towards the tip, with long attenuated terminal portion (see diagnosis). Species currently allocated to *Neosporidesmium* are keyed out in the following updated key based on an older version published by Mel'nik & Braun (2013).

#### Updated key to *Neosporidesmium* species

1. Conidia euseptate, conidial base more or less concolorous with body, not darker brown ..... 2
- Conidia distoseptate, base of the conidia around the hila strongly pigmented, darker brown . 3
  
2. Synnemata (380–)500–1430  $\mu\text{m}$  long, 40–45  $\mu\text{m}$  wide below; conidiophores 2–2.5  $\mu\text{m}$  wide; conidia (75–)80–96(–110)  $\times$  11–13.5  $\mu\text{m}$ , wall smooth to somewhat rough, surface at least not quite even, rostrate apex subhyaline ..... *N. vietnamense*
- Synnemata up to 530  $\mu\text{m}$  long, 20–30  $\mu\text{m}$  wide below; conidiophores 4.5–6.5  $\mu\text{m}$ ; conidia 40–60  $\times$  8.5–11  $\mu\text{m}$ , wall smooth, apex not distinctly rostrate and pale brown .... *N. micheliae*
  
3. Conidiogenous cells percurrently proliferating, with distinct constriction (cells doliiform-lageniform) ..... 4
- Conidiogenous cells monoblastic, determinate, without any proliferations ..... 6
  
4. Conidia distinctly rostrate, rostrum hyaline or sub-hyaline ..... *N. antidesmatis*
- Conidia non-rostrate ..... 5
  
5. Conidia 45–67  $\times$  6–7  $\mu\text{m}$ , 6–7-distoseptate ..... *N. microsporum*
- Conidia 55–100  $\times$  15–19  $\mu\text{m}$ , 8–12-distoseptate ..... *N. maestrense*
  
6. Conidia short, length < 55  $\mu\text{m}$  ..... 7
- Conidia much longer, length > 50  $\mu\text{m}$  (about 50–250  $\mu\text{m}$ ) ..... 8
  
7. Conidia 22.5–33.5  $\times$  7–9  $\mu\text{m}$ , 6–7-distoseptate, apex pale brown and not distinctly rostrate ..... *N. malloti*
- Conidia 33.5–51.5  $\times$  12–14  $\mu\text{m}$ , 6–10-distoseptate, with distinct, hyaline or sub-hyaline rostrum, 11–19  $\mu\text{m}$  long ..... *N. xanthophylli*

8. Conidia distinctly rostrate, with long, filiform, hyaline to sub-hyaline beak ..... 9  
 - Beak lacking or conidia gradually attenuated towards the tip, but apex concolourous with the conidial body or somewhat paler, or apex of conidia distinctly swollen, with globose mucilaginous sheath or short branchlets ..... 10
9. Synnemata 80–110  $\mu\text{m}$  wide at the base; conidiogenous cells consistently monoblastic, determinate, without any proliferations; conidia 12–15  $\mu\text{m}$  wide, 10–11-distoseptate ..... *N. sinense*  
 - Synnemata 30–50  $\mu\text{m}$  wide at the base; conidiogenous cells without or with a single percurrent proliferation, but cells always lageniform-doliiform; conidia 7.5–9  $\mu\text{m}$  wide, 11–15-distoseptate ..... *N. antidesmatis*
10. Conidial apex with short branchlets (appendages) or with a globose mucilaginous sheath .. 11  
 - Apex simple, obtuse, at most slightly swollen, but without any appendages or mucilaginous sheaths ..... 12
11. Synnemata (615–)850–4700  $\mu\text{m}$  long, and 35–145  $\mu\text{m}$  wide, conidiogenous cells numerous, spread along almost the whole length of synnemata, from apex to base; conidial apex with short appendages, conidia 17–19  $\mu\text{m}$  wide, 9–15-distoseptate ..... *N. appendiculatum*  
 - Synnemata up to 605  $\mu\text{m}$  long, and 40–60  $\mu\text{m}$  wide; conidiogenous cells not numerous, confined to the apical part of the synnemata; conidial apex with globose, mucilaginous sheath, 10.5–13.5  $\mu\text{m}$  diam, conidia 10.5–13.5  $\mu\text{m}$  wide, 8–11-distoseptate ..... *N. diaoluoshanense*
12. Conidiophores 4.5–8  $\mu\text{m}$  wide; conidiogenous cells doliiform, 23.5–34.5  $\times$  7–9.5(–12.5)  $\mu\text{m}$ ; conidia 108–250  $\mu\text{m}$  long, obclavate, gradually attenuated towards the tip, attenuated terminal portion long ..... *N. macrosporum*  
 - Conidiophores 4–5  $\mu\text{m}$ ; conidiogenous cells subcylindrical-conical, doliiform to lageniform, 8–13  $\times$  3–3.5  $\mu\text{m}$ ; conidia (80–)90–112(–120)  $\mu\text{m}$  long, obclavate, but stout, attenuated terminal portion short ..... *N. subramanianii*

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### References

- Li XY, Liu SY, Zhang XG. 2015 – A new species of *Neosporidesmium* from Hainan, China. Mycotaxon 130, 307–310.
- Ma J, Wang Y, Ma LG, Zhang YD, Castañeda-Ruíz RF, Zhang XG. 2011 – Three new species of *Neosporidesmium* from Hainan. Mycological Progress 10, 157–162.
- Mel’nik VA. 2011 – Anamorphic fungi of Vietnam. I. Mikologiya i Fitopatologiya 45, 323–331. (In Russian)

- Mel'nik VA. 2012a – A new species of *Ardhachandra* (hyphomycetes) from Vietnam. *Mycosphere* 3, 922–924.
- Mel'nik VA. 2012b – *Phaeoisariopsis vietnamensis* sp. nov. and *P. clematidis* (hyphomycetes) from Vietnam. *Mycosphere* 3, 957–960.
- Mel'nik VA, Braun, U. 2013 – *Atractilina alinae* sp. nov. and *Neosporidesmium vietnamense* sp. nov. - two new synnematosous hyphomycetes from Vietnam. *Mycobiota* 3, 1–9.
- Mel'nik VA, Novozhilov YuK, Popov ES, Alexandrova AV. 2012 – Anamorphic fungi of Vietnam. II. *Mikologiya i Fitopatologiya* 46, 347–356.
- Mel'nik VA, Braun U, Alexandrova AV. 2013 – *Dactylaria mucoglobifera* sp. nov. – a new species from Vietnam. *Schlechtendalia* 25, 49–52.
- Mel'nik VA, Alexandrova AV, Braun U. 2014 – Two new species and new records of hyphomycetes from Vietnam. *Mycosphere* 5, 591–600.
- Mel'nik VA, Alexandrova AV, Zmitrovich IV, Braun U, Popov ES. 2015 – First record of *Hyphobasidiofera malaysiana* (*Basidiomycota*) from Vietnam. *Mycobiota* 5, 1–5.
- Mercado SA, Mena PJ. 1988 – Nuevos o raros hifomicetes de Cuba. *Acta Botanica Cubana* 59, 1–6.
- Prasher IB, Verma RK. 2015a – Some new and interesting hyphomycetes from North-Western Himalayas, India. *Nova Hedwigia* 100, 269–277.
- Prasher IB, Verma RK. 2015b – *Neosporidesmium appendiculatus* sp. nov. from North-Western India. *Mycological Progress* 14, Article 87, 1–6.
- Shenoy BD, Jeewon R, Wu WP, Bhat DJ, Hyde KD. 2006 – Ribosomal and RPB2 sequence analyses suggest that *Sporidesmium* and morphologically similar genera are polyphyletic. *Mycological Research* 110, 916–929.
- Wu WP, Zhuang WY. 2005 – *Sporidesmium*, *Endophragmiella* and related genera from China. *Fungal Diversity Research Series* 15, 1–351.
- Zhang YD, Ma J, Ma LG, Castañeda-Ruíz RF, Zhang XG. 2011 – New species of *Phaeodactylidium* and *Neosporidesmium* from China. *Sydowia* 63, 125–130.