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Calcarisporium phaeopodium sp. nov., a new hyphomycete from Thailand

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Somrithipol, S. & Jones E.B.G. (200*). *Calcarisporium phaeopodium* sp. nov., a new hyphomycete from Thailand. – Sydowia 58 (1): 133 – 140.

The genus *Calcarisporium* is briefly reviewed. *Calcarisporium phaeopodium,* collected on a dead leaf in a tropical forest in Thailand is illustrated, described as a new species and compared with related taxa. The fungus differs from other *Calcarisporium* species in having a dark, proliferating basal part to the conidiophore. A key to *Calcarisporium* species is provided.

Key words: anamorphic fungi, new species, taxonomy.

Preuss (1851) proposed the genus *Calcarisporium* with *C. arbuscula* Preuss as the type species. The genus is characterized by hyaline, erect, verticillate conidiophores and sympodial conidium formation (Hughes 1951, de Hoog 1974). A further nine species were then added to the genus: *C. griseum* Speg. (Spegazzini 1902), *C. pallidum* Tubaki (Tubaki 1955), *C. parasiticum* H.L. Barnett (Barnett 1958), *C. indicum* D. Rao & R. Rao (Rao & Rao 1964), *C. antibioticum* Haller & Loeffler (Haller & Loeffler 1969), *C. thermophilum* H.C. Evans (Evans 1970), *C. echinosporum* Deighton & Piroz., *C. setiphilum* Deighton & Piroz. (Deighton & Pirozynski 1972) and *C. abietis* B. Sutton (Sutton 1973).

de Hoog (1974) revised the genus and accepted only *C. arbuscula,* the type species, with *C. antibioticum* as its synonymy. *Calcarisporium abietis, C. parasiticum, C. setiphilum,* and *C. thermophilum* were transferred to the genera *Acrodontium, Hansfordia, Sporothrix,* and *Calcarisporiella,* respectively. *Calcarisporium echinosporum, C. griseum, C. indicum,* and *C. pallidum* were treated as doubtful species that belonged to other genera. Soon afterwards, Matsushima (1975) described *C. acerosum* Matsush. as a new species and transferred *C. pallidum* to the genus *Sporothrix.* de Hoog (1978) subsequently made a new combination, *Calcarisporium ovalisporum* (Petch) de Hoog, resulting in three accepted *Calcarisporium* species.

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During our continuing investigation on saprobic microfungi in Thailand (Somrithipol & Jones 2003), a fungus referable to the genus *Calcarisporium* was collected on a decaying leaf. The morphological characteristics of this fungus differ from any known taxon and it is, therefore, described here as a new species.

Materials and Methods

Decaying plant materials on the forest floor were collected and incubated in moist chambers and periodically observed for fungi. The methods of examination and isolation follow Somrithipol & Jones (2003). Morphological measurements include minimum and maximum ranges. Conidial measurements are given as follows: (minimum) arithmetic mean ($\bar{x}$) ± standard deviation (maximum), (*n* measured units). All materials examined were dried and deposited in BIOTEC Bangkok Herbarium (BBH). Cultures are deposited in BIOTEC Culture Collection (BCC), Thailand.

Taxonomy

Calcarisporium phaeopodium Somrithipol & E.B.G. Jones **sp. nov.** – Figs. 1 – 10

Ad fungos anamorphicos hyphomycetes pertinens. Coloniae effusae, albidae. Mycelium immersum. Stromata, hyphopodia et setae absentia. Conidiophora macronematosa, mononematosa, solitaria, non ramosa, recta vel flexuosa, usque ad 200 µm longa, prope basim 4 – 6 µm lata, prope apicem 2 – 4 µm lata; parte basim laevia, crassitunicata, brunnea vel atro-brunnea; cum cellulae basales inflatae vel lobulata, cum 16 – 25 µm distantia supra basin percurrenter proliferantia; supra proliferationes positi laevia, tenuitunicata, subhyalina et apicem pallidiora, cum cellulae conidiogenae in verticillis 20 – 35 µm distantibus disposita, 4 – 5 verticillis et 4 – 10 cellulae conidiogenae in quoque verticillo. Cellulae conidiogenae discretae, subulatae, hyalinae, cum inflatus, sympodialis et denticulatus apices, 6 – 14.5 µm longa, 2 – 3 µm lata, prope apicem 1 – 2 µm gradatim angustata, ad inflata et denticulata apicem 2 – 3 µm lata. Conidia holoblasica, unicellularia, acerosa vel anguste obclavata, curva, parte basilari truncata, hyalinae, laevia, tenuitunicata, 7.5 – 12.5 µm longa, 0.7 – 1 µm lata, conidiorum secessio schizolytica. Teleomorphis ignota.

Holotypus. – Thailandia, Nakhon Rashasimae Provincia, in folio putrescentem dicotyledoneae, a S. Somrithipol lectus, 15 IX 2005 (SFC 1682 in BBH).

Figs. 1 – 8. Light micrographs of *Calcarisporium phaeopodium* (from holotype): **1.** Colony on a dead leaf. **2, 3.** Conidia. **4.** Conidiophore and conidiogenous cells in whorls. **5, 6.** Dark basal part of conidiophores with proliferations. **7, 8.** Conidiogenous cells with swollen, denticulate apex. Bars: Fig. 1 = 250 µm, Figs. 2, 3, 6 – 8 = 10 µm, Figs. 4, 5 = 25 µm.

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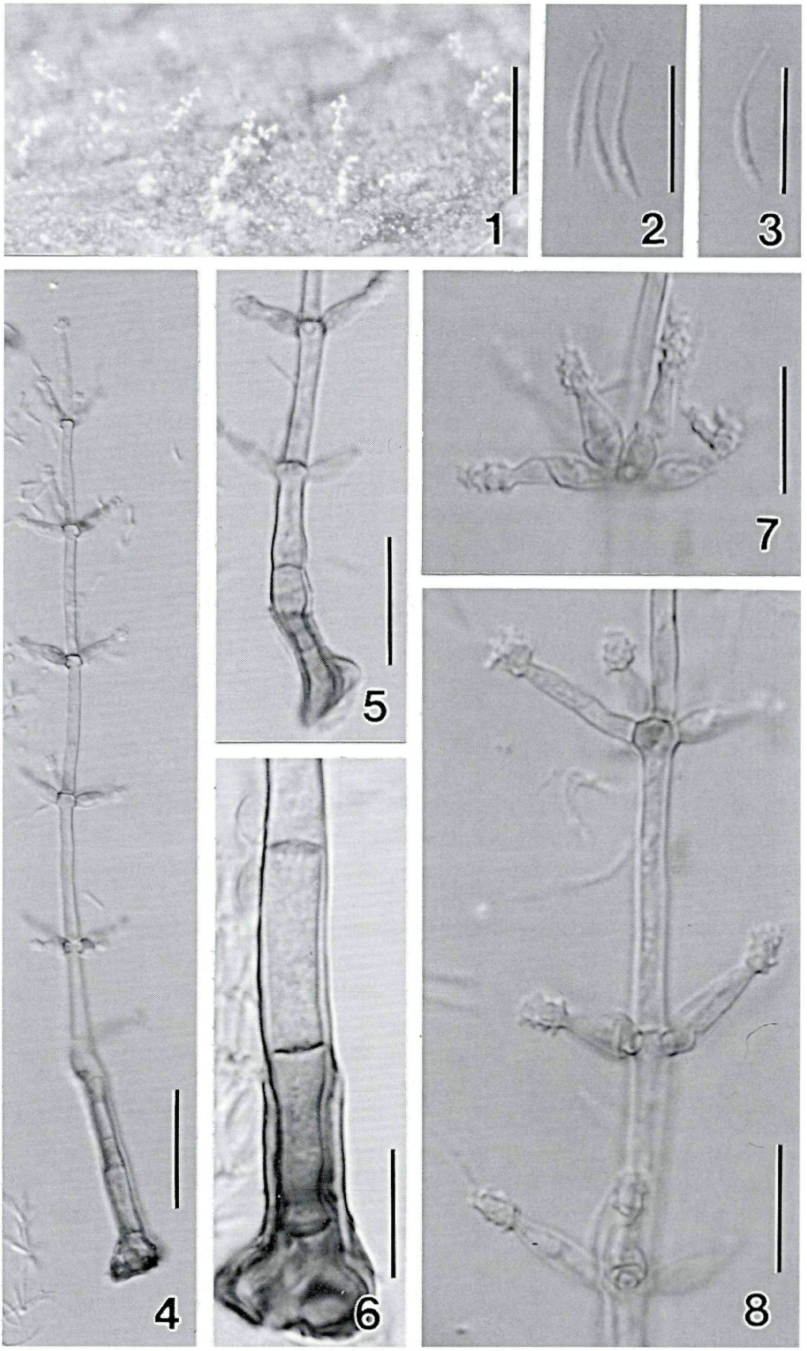

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Anamorphic hyphomycete. – Colonies effuse, purely white (Fig. 1). Mycelium immersed. Stroma, hyphopodia, and setae absent. – Conidiophores macronematous, mononematous, solitary, unbranched, straight or flexuous, up to 200 µm high; 4 – 6 µm wide near the base, 2 – 4 µm wide near the apex (Figs. 4, 9); basal part smooth, thick-walled, brown to dark brown, with swollen or lobed basal cell; and with percurrent proliferation at 12 – 65 µm above the base (Figs. 5, 6, 9); above the proliferating position smooth, thin-walled, subhyaline and paler toward the apex, with conidiogenous cells arrange in whorls every 20 – 35 µm, 4 – 5 whorls and 4 – 10 conidiogenous cells in each whorls (Figs. 4, 8, 9). – Conidiogenous cells discrete, subulate, hyaline, with swollen, sympodial and denticulate apex, 6 – 14.5 µm long, 2 – 3 µm wide, gradually tapering to 1 – 2 µm wide near the apex, and 2 – 3 µm wide at the swollen and denticulate apex (Figs. 7, 8, 10). – Conidia holoblastic, unicellular, acerose to narrowly obclavate, curved, truncate at the base, hyaline, smooth, thin-walled, (7.5) 9.5 ± 1.2 (12.5) (n = 50) µm long, (0.7) 0.9 ± 0.1 (1.0) (n = 50) µm wide (Figs. 2, 3, 10), schizolytic secession. – Teleomorph unknown.

Etymology. – from Greek: φαιός (phaeos), dark; and πους (poús), foot; in reference to a dark, proliferating basal part of the conidiophore.

Habitat – Decaying leaf in an evergreen forest.

Distribution. – Thailand.

Holotype. – THAILAND, Nakhon Rashasima Province, on decaying dicotyledonous leaf, S. Somrithipol, 15 Sep 2005 (SFC 1682 in BBH).

Key to *Calcarisporium* species

1. Conidia oval to ellipsoidal (length/width ratio < 5/1) 2
1*. Conidia acereose to narrowly obclavate (length/width ratio > 8/1) 3
2. Conidiophores well differentiated, conidiogenous cells 12 – 26 × 2 – 3 µm; conidia 4 – 6 × 1.7 – 2.0 µm ..... *C. arbuscula*
2*. Conidiophores less differentiated, conidiogenous cells 5 – 12 × 1.4 – 1.8 µm; conidia 3 – 5 × 1.2 – 1.8 µm ..... *C. ovalisporum*
3. Basal part of conidiophores moderately brown, without proliferation; conidia 10.5 – 18 × 1 – 1.2 µm ..... *C. acerosum*
3*. Basal part of conidiophores dark brown, with proliferation; conidia 7.5 – 12.5 × 0.7 – 1 µm ..... *C. phaeopodium*

Fig. 9. Line drawing of *Calcarisporium phaeopodium* (from holotype): conidiophores and whorls of conidiogenous cells. Bar = 10 µm.

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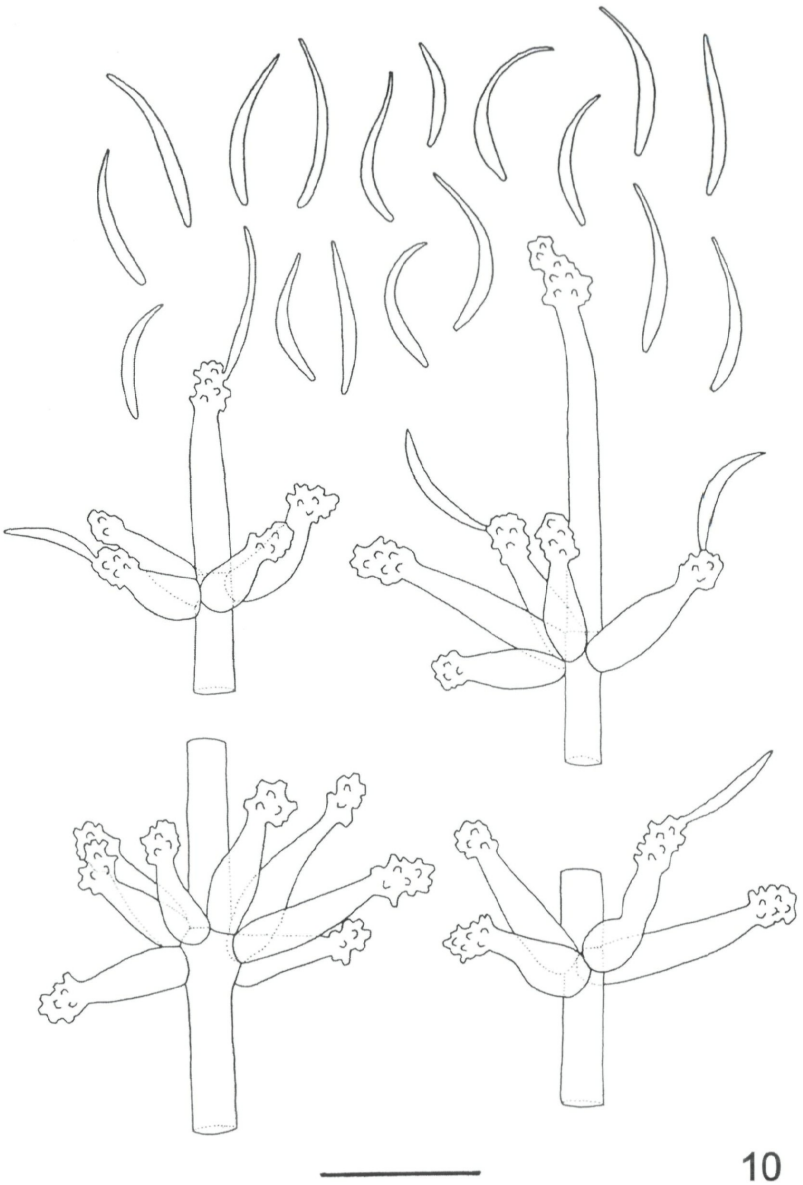

Fig. 10. Line drawing of *Calcarisporium phaeopodium* (from holotype): conidiogenous cells and conidia. Bar = 10 µm.

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Discussion

This fungus is best referred to the genus *Calcarisporium* as it posseses discrete, flask-shaped conidiogenous cells, with a sympodial and denticulate apex, in whorls on unbranched conidiophores. However, it markedly differs from other *Calcarisporium* species in having all conidiophores with a dark, proliferating basal part. Conidiophores with such characters are unusual in any *Calcarisporium* species and this fungus is, therefore, described as a new species.

Calcarisporium phaeopodium additionally differs from *C. acerosum* in having smaller conidia and differs from *C. arbuscula* and *C. ovalisporum* in conidial shape. This new fungus is also similar to *Selenodriella perramosa* R.F. Castañeda & W.B. Kendr. (Castañeda-Ruíz & Kendrick 1990) in sympodial conidiogenous cells and conidial shape. *Selenodriella perramosa,* however, has branching conidiophores and lacks proliferating conidiophores.

Species of *Calcarisporium* show different substratum preferences: fungicolous, caulicolous, and foliicolous. *Calcarisporium arbuscula* is common on higher basidiomycetes and ascomycetes, occurs occasionally on wood (de Hoog 1974) and is rarely isolated from soil (Barron 1968). It has been reported as an endophyte in sporophores of *Lactarius* and *Russula* (Watson 1955) and shows weak competition and poor survival in soil (Watson 1965). *Calcarisporium ovalisporum* was described on remains of dead insects associated with other hyphomycetes (de Hoog 1978) while *C. acerosum* was described on dead bark (Matsushima 1975). *Calcarisporium phaeopodium* was found on a dead leaf.

Acknowledgements

This study was supported by the Biodiversity Research and Training Program in Thailand grant BRT R_149001. We are grateful to Prof. Morakot Tanticharoen, BIOTEC, for her continued support.

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(Manuscript accepted 16 May 2006; Corresponding Editor: M. Kirchmair)

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Autor(en)/Author(s): Somrithipol Sayanh, Jones E. B. Gareth

Artikel/Article: Calcarisporium phaeopodium sp. nov., a new hyphomycete from Thailand. 133-140