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## Microfungi on the Pandanaceae, a new species of *Stictis* (Ostropales)

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During investigations into the microfungi which inhabit decaying parts of the monocotyledonous family Pandanaceae, 16 specimens attributable to the genus *Stictis* were collected. *Stictis subiculata* was collected from New Zealand and Australia, while *S. carnea* was collected from New Zealand and Hong Kong, increasing the known range of both species. *Stictis pandani* sp. nov. has short ascospores and narrowly clavate asci, and is described and illustrated, based on a collection from Australia and the Philippines.

**Key words:** mitosporic fungi, systematics, taxonomy.

### Introduction

*Stictis* Pers. was introduced for immersed discomycetes in the order Ostropales (Sherwood, 1977; Johnston, 1983). Sherwood (1977) reviewed the genera within the Ostropales, placing particular emphasis on the structure of the ascomata and their marginal tissues. *Stictis* contains around 68 accepted species, is cosmopolitan and found on decaying leaves, wood, bark, herbaceous stems, grass culms and fern rachises from many hosts (Sherwood, 1977; Johnston, 1983; Hawksworth *et al.*, 1995). *Stictis* is characterised by apothecia which originate as immersed structures in the host tissues, but open by a pore, or are erumpent as a result of irregular splitting of the host tissue. The hymenium typically remains immersed or deeply immersed in the host, and is often light in colour and can split away from the apothecial margin when dry. The margin typically consists of three layers, the inner layer is composed of filamentous, branched or simple, periphysoids. Outside of this, is a layer of extruded crystalline material, which is in turn coated by a hyaline, interwoven, sometimes gelatinous hyphal wall. In some species the hyphal wall is surrounded by a thin layer of brown stromatic tissue. The subhymenium

consists of small celled, amyloid or non-amyloid tissue, which rests directly on host cells or on an extension of the apothecial marginal wall. Asci are cylindrical, typically contain 8, or sometimes 4 cylindrical to filiform, septate, ascospores, and have a thickened apical cap which is pierced by a J- apical pore. The paraphyses are filiform, hyaline, sometimes brown towards the apex, simple or branched, and are sometimes apically enlarged. The ascospores sometimes have gelatinous sheaths, and in some species coil when released from the ascus (Sherwood, 1977; Johnston, 1983). Johnston (1983) gave the anamorphs of 21 species known from New Zealand, and three of these anamorphs were also found in nature. Three mycelial states were found, those that produced *Coleophoma*-like pycnidia, *Ebollia* Minter and Caine (1980) pycnidia and sterile mycelia. The three mycelial states correlated with morphological differences in the telomorph.

Few species of *Stictis* are known to inhabit the Pandanaceae. *Stictis subiculata* P.R. Johnst. was described from *Freycinetia banksii*, and *S. lata* P.R. Johnst. is known to occur on *Freycinetia banksi*, but was described from *Codyline australis*, both from New Zealand (Johnston, 1983). In the present study three species of *Stictis* were collected including *S. carnea* Seaver and Waterston, *S. subiculata* P.R. Johnst. and *S. pandani* sp. nov.

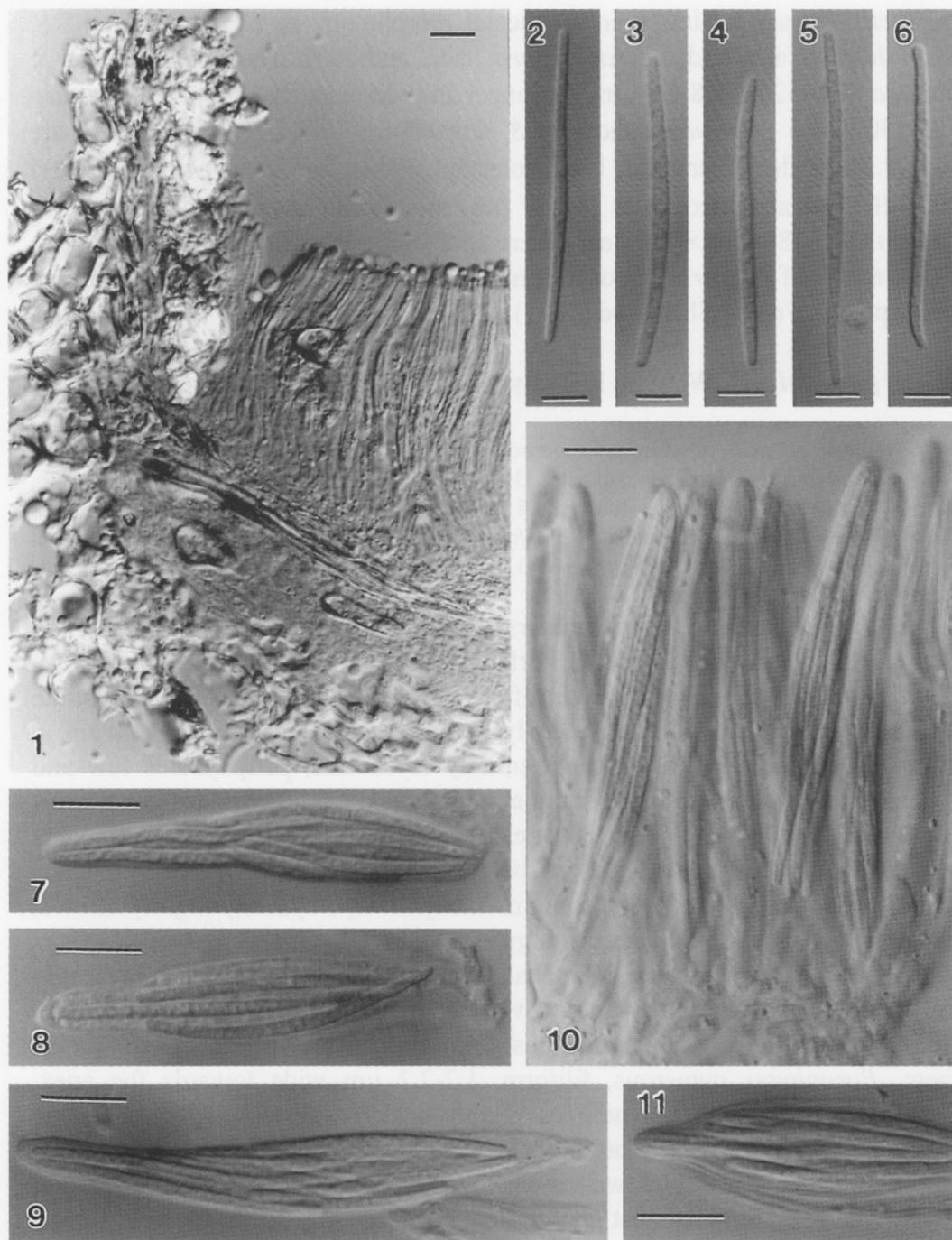
## Taxonomy

### *Stictis carnea* Seaver and Waterston, Mycologia 33: 311 (1941)

*Materials examined:* HONG KONG, New Territories, Kadoorie Farm and Garden, on decaying leaves of *Pandanus furcatus*, 13 June 1995, S.R. Whitton (HKU(M) 12718); *ibid.*, New Territories, Sai Kung, on decaying leaves of *P. tectorius*, 27 Feb. 1997, S.R. Whitton, (HKU(M) 12719); *ibid.*, New Territories, Sai Kung, Mangrove Swamp, on decaying leaves of *P. tectorius*, 26 Feb. 1997, S.R. Whitton (HKU(M) 12720); NEW ZEALAND, North Island, Auckland district, Hunua Ranges, Workman track, on decaying leaves of *Freycinetia banksii*, 9 May 1996, S.R. Whitton (HKU(M) 12721); *ibid.*, North Island, Auckland district, Hunua Ranges, Wairoa-Cosseys track, on decaying leaves of *F. banksii*, 9 May 1996, S.R. Whitton (HKU(M) 12722); *ibid.*, Waitakere Ranges, Fairy Falls track, on decaying leaves of *F. banksii*, 23 May 1996, S.R. Whitton (HKU(M) 12723); *ibid.*, Rotorua district, Lake Okatina, on decaying leaves of *F. banksii*, 25 May 1996, S.R. Whitton (HKU(M) 12724); *ibid.*, North Island, Manawatu, Manawatu Gorge Scenic Reserve, on decaying leaves of *F. banksii*, 30 Apr. 1997, S.R. Whitton (HKU(M) 12725).

*Habitat:* Known to inhabit decaying plant parts of *Actinidia deliciosa*, *Citrus* spp., *Cortaderia toetoe*, *Cyathea medullaris*, *Freycinetia banksii*, *Laurus* sp., *Pandanus furcatus*, *P. tectorius*, *Rhopalostylis sapida*, *Schefflera digitata*.

*Known distribution:* Bermuda, Colombia, Ecuador, Hong Kong, New Zealand, North Africa, Philippines, South Africa, Sri Lanka, Venezuela.



**Figs. 1-11.** Interference contrast micrographs of *Stictis pandani* (from holotype). **1.** Transverse section through an ascomata. **2-6.** Ascospores. **7-10.** Asci. **11.** Asci and paraphyses in hymenium. Bars: 1, 8-11= 10  $\mu$ m, 2-6 = 5  $\mu$ m.

*Stictis carnea* is similar in apothecial morphology to *S. radiata* Pers., *S. hawaiiensis* Cash, and *S. brachyspora* Sacc. and Berl. The ascospores of *S. radiata* (220-325 × 1.8-2.8 µm) are longer and narrower than those of *S. carnea* (95-180 × 3-4 µm), while those of *S. hawaiiensis* (160-220 × 4.2-5 µm) are longer and wider (Sherwood, 1977; Johnston, 1983). In *S. brachyspora* the asci (90-120 µm) and ascospores (65-90 µm) are shorter than those found in *S. carnea* (asci 180-220 × 5-6 µm) (Sherwood, 1977; Johnston, 1983). This is the first record of *S. carnea* from Hong Kong, all collections agree with the description given by Sherwood (1977).

***Stictis pandani*** S.R. Whitton, K.D. Hyde and E.H.C. McKenzie, sp. nov.

(Figs. 1-11)

*Etymology*: *pandani*, referring to Pandanaceae, the type substrate.

*Ascomata* immersa, profunde cupulata, 330-770 µm diam. *Margine* integro vel sublacerato, candens, pruinosa, in sectione transversali 30-40 µm crasso, fere ex toto crystallinum. *Periphysioidea* rarae et inconspicua. *Paraphyses* filiformes, simplices, 1.2-2.2 µm diam ad apice. *Asci* 8-spori, 52-74 × 5-9.5 µm, apice 1.8 µm crassi, anguste clavati. *Sporae* 25-45 × 1.8-2.1 µm, 3-septatae, cylindricae.

*Apothecia* scattered, at first immersed, opening by a pore but not becoming erumpent, splitting the substrate surface somewhat irregularly, 330-770 µm diam., margin white and pruinose, often with raised portions of the substrate attached, conspicuous, disc not deeply immersed, pale ochraceous. *Margin* in cross section is 30-40 µm, almost entirely crystalline, periphysoids few and inconspicuous, between the crystalline material and the host tissues is a narrow (5-12 µm wide) layer of hyaline, gelatinised, interwoven hyphal tissue, this hyphal tissue often tapers out towards the apothecial margin apex and extends downwards beneath the subhymenium. *Subhymenium* hyaline, slightly curved, consisting of small, isodiametric, angular cells, 10-25 µm wide, this layer sits directly on a distinct layer of hyphal tissue which is comprised of strongly gelatinised, hyaline, tightly interwoven, undifferentiated hyphae, 40-60 µm wide. Often these two layers have host tissues either between them or amongst them. *Paraphyses* numerous, filiform, 1.2-2.2 µm wide towards the apex, simple, apex obtuse and sometimes slightly enlarged, few septate, ± the same length as the asci. *Asci* 8-spored, 52-74 µm long, 5-9.5 µm wide at the widest part, narrowly clavate, thick walled when young, apical cap small (up to 1.8 µm thick) when immature, almost non-existent when mature, no visible apical pore. *Ascospores* 25-45 × 1.8-2.1 µm, irregularly arranged in a single overlapping fascicle, elongate-cylindric to filiform, hyaline, smooth, no gelatinous sheath observed, often slightly wider in the centre, both ends obtuse, 3-septate when

mature, although septa are often rather indistinct and thus difficult to see, straight or slightly curved when released from the ascus.

*Materials examined:* AUSTRALIA, North Queensland, Lacey Creek State Forest Park, on decaying leaves of *Pandanus monticola*, 17 June 1996, S.R. Whitton (HKU(M) 12726; holotype); *ibid.*, North Queensland, Licuala State Forest Park, on decaying leaves of *P. monticola*, 17 June 1997, S.R. Whitton (HKU(M) 12727); PHILIPPINES, Los Banos, Mount Makiling, Baranggay Bagang Silang, on decaying leaves of *Freycinetia* sp., 23 Oct. 1996, S.R. Whitton (HKU(M) 12728).

*Habitat:* From decaying leaves of *Freycinetia* sp. and *Pandanus monticola*. *Distribution:* Australia, Philippines.

The characteristic features of *Stictis pandani* are asci and ascospore size (especially length), the lack of a distinct layer of periphysoids and the marginal wall tissues which extend beneath the subhymenium. The shallow depth of the disc is also rather unusual in *Stictis*, but presumably is a result of the short asci length. *Stictis sagaretiae* Cash has an ascocarp margin which almost entirely consists of crystalline matter, asci of  $65\text{--}80 \times 7\text{--}11$   $\mu\text{m}$ , and ascospores of  $38\text{--}45(65) \times 3.5$   $\mu\text{m}$ . However, in *S. sagaretiae* there are no wall tissues either in the margin or below the subhymenium, the paraphyses are often apically branched, the apical caps in the asci are up to 3.5  $\mu\text{m}$  thick, and the ascospores are wider, covered in a thick gelatinous sheath and coil when released from the asci (Sherwood 1977). In *S. javanica* Sherwood (asci  $60\text{--}65 \times 10$   $\mu\text{m}$ , ascospores  $42\text{--}50 \times 2.5\text{--}3$   $\mu\text{m}$ ) and *S. helicospora* Sherwood (asci  $80\text{--}90 \times 3.5\text{--}4$   $\mu\text{m}$ , ascospores  $35\text{--}50 \times 1.5$   $\mu\text{m}$ ) also both have short asci and ascospores. However, the marginal wall of *S. javanica* has a distinct periphysoid layer, and the narrow wall layer is not continued under the subhymenium. The asci of *S. javanica* are typically broader ( $\pm 10$   $\mu\text{m}$ ) and have a very thick apical cap (5  $\mu\text{m}$ ), the paraphyses are apically branched and the ascospores are tapered, 7-septate and somewhat broader than those of *S. pandani* (Sherwood 1977). In *S. helicospora* the margin consists of a very thin layer of wall tissue, lined on the inside by unbranched periphysoids, the crystalline layer is very poorly developed and the subhymenium is not seated on an extension of the wall tissues. The asci are somewhat long, and the ascospores have a gelatinous sheath and coil when released from the ascus (Sherwood 1977).

*Stictis subiculata* P.R. Johnst., New Zealand Journal of Botany 21: 271 (1983).

*Materials examined:* AUSTRALIA, North Queensland, Road to Baybinda from Cairns, on decaying leaves of *Pandanus monticola*, 17 June 1996, S.R. Whitton (HKU(M) 12729); *ibid.*, North Queensland, Lacey Creek State Forest Park, on decaying leaves of *P. monticola*, 17 June 1996, S.R. Whitton (HKU(M) 12730); *ibid.*, North Queensland, Licuala State Forest Park, on decaying leaves of *P. monticola*, 17 June 1996, S.R. Whitton (HKU(M) 12731); *ibid.*, North Queensland, track beside Lake Barrine, on decaying leaves of *P. monticola*, 18 June 1996, S.R.

Whitton (HKU(M) 12732); NEW ZEALAND, North Island, Auckland district, Waitakere Ranges, Spraggs track, on decaying leaves of *Freycinetia banksii*, 23 May 1996, S.R. Whitton (HKU(M) 12733).

*Habitat:* From decaying leaves of *Cyathea medullaris*, *Dracophyllum latifolium*, *Freycinetia banksii*, *Pandanus monticola*.

*Known distribution:* Australia, New Zealand.

*Stictis subiculata* is a species in *Stictis* sect. *Cyclostroma* which is characterised by the presence of a pigmented stromatic layer surrounding the apothecial wall layer (Sherwood, 1977; Johnston, 1983). *Stictis subiculata* can be easily distinguished from other members of this section by the presence of a distinct hyphal subiculum surrounding the ascocarp on the surface of the substrate (Johnston, 1983).

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