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<td>Citation</td>
<td>Mycologia, 2001, v. 93 n. 5, p. 1002-1009</td>
</tr>
<tr>
<td>Issued Date</td>
<td>2001</td>
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<td>URL</td>
<td><a href="http://hdl.handle.net/10722/53336">http://hdl.handle.net/10722/53336</a></td>
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Paraniesslia tuberculata gen. et sp. nov., and new records or species of Clypeosphaeria, Leptosphaeria and Astrosphaeriella in Hong Kong freshwater habitats

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Abstract: Paraniesslia tuberculata gen. et sp. nov., Clypeosphaeria uniseptata sp. nov. and Leptosphaeria giriimia sp. nov. are described and illustrated from wood submerged in freshwater habitats in Hong Kong, while Astrosphaeriella stellata is reported as a new record from a river in Hong Kong. Paraniesslia tuberculata has characteristic features of the Niesslia-aceae, but is unique in producing greenish-brown ascospores with tuberculate ornamentation.

Key Words: Aquatic fungi, ascomycetes, lignicolous, streams, systematics

INTRODUCTION

Submerged woody substrata are important in regulating stream hydraulics and habitats for stream organisms (Triska and Cromack 1980). The lignicolous fungal communities are diverse in taxonomic groups (Shearer 1993, Goh and Hyde 1996) and important in breaking down woody substrates in freshwater ecosystems because they produce wood-decaying enzymes (Wong et al 1998). Our study of fungal biodiversity on submerged wood in streams in Hong Kong (Goh and Hyde 1999, Tsui et al 2000) yielded four interesting ascomycetes, including three new species reported in this paper.

MATERIALS AND METHODS

Samples of submerged woody substrata were collected from different streams in Hong Kong, taken to the laboratory in plastic bags, and processed following the methods described in Tsui et al (2000). Fungi were isolated using single-spore isolation techniques (Choi et al 1999) and where successful, cultures have been deposited in Hong Kong University Culture Collection (HKUCC).

Accepted for publication March 5, 2001.
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TAXONOMY

Paraniesslia K. M. Tsui, K. D. Hyde et Hodgkiss, gen. nov.


Perithecia superficialis, pyriform to subglobose, papillate, with setae, ostiolar, periphysate, solitary to gregarious, brown. Peridium membranaceous, textura angularis in longitudinal section, textura epidermoidea in surface view. Setae acute, straight, unbranched, septate, brown or black. Interascal filaments septate. Asci unisericati, 8-spored, clavate, pedicellate, thinned, apex truncate, with a nonamyloid discoid refractive apical apparatus. Ascospores overlapping uniseriate to biseriate, ellipsoidal, 1-septate, verrucose, greenish brown to brown, with or without a mucilaginous sheath.

Etymology. From Latin, Paraniesslia, refers to the resemblance to Niesslia.

Species typica. Paraniesslia tuberculata K. M. Tsui, K. D. Hyde et Hodgkiss

Paraniesslia tuberculata K. M. Tsui, K. D. Hyde et Hodgkiss sp. nov. Figs. 1–12

Ascomata 100–130 μm alta, 100–120 μm diam, partim superficialia vel superficialis, pyriformia vel subglobosa, setosa, ostiolar, solitaria pallide brunnea vel brunnea. Peridium 14–20 μm crassum, pluribus stratis textura angularis compositum, extus visum textura epidermoidea, membranaceum. Setae acuta, non ramosae, brunnea. Filamenta interascula septata, tenuitunicata, deliquescent. Asci 50–60 μm, octospori, clavati, pedicellati, tenuitunicati, apice truncato, apparatu apicali ca 1 μm alto × 2.5 μm diam praediti. Ascoporae 11–14 × 4–6 μm, uniseriatae imbricatae, 1-septatae, obovate ellipsoideae, ad apices rotundatae, tuberculatae, viridifuscae, immaturas hyalinae.

Ascomata 100–130 μm high, 100–120 μm in diam, partly superficial to superficial, pyriform or globose to subglobose, short papillate with black setae, ostiolar, solitary, light brown to brown (Figs. 1–2). Peridium 14–20 μm wide, textura epidermoidea in sur-
Fig. 1-12. Light (1) and differential interference contrast (2-12) micrographs of Paraniesslia tuberculata (from holotype). 1. Appearance of ascomata on wood. 2. Section of the ascoma. 3. Section of the peridium. 4-7. Asci. Note the discoid apical refractive rings in 7. 8. Asci with paraphyses. 9-12. Ascospores with rough walls. Bars: 1 = 200 μm, 2 = 20 μm, 3 = 8 μm, 4-6 = 12 μm, 7 = 5 μm, 8 = 15, 9-12 = 6 μm.

Face view, and textura angularis in longitudinal section; composed of 3-4 layers of compressed polygonal cells, membranous (Fig. 3). Setae acute, septate, brown (Fig. 2). Interscal filaments septate, thin-walled, deliquescent. Asci 50-75 × 7-14 μm (\(\bar{x} = 60 \times 9 \mu m, n = 15\)), 8-spored, clavate, short pedicellate, thin-walled, apex truncate, with a discoid refractive apical apparatus, ca 1 μm high × 2.5 μm diam (Figs. 4-8). Ascospores 11-14 × 4-6.5 μm (\(\bar{x} = 13 \times 5 \mu m, n = 30\)), overlapping uniseriate, fusoid, ellipsoidal with rounded ends, 1-septate, slightly constricted at septum, ornamented, tuberculate, greenish-brown, hyaline when immature, without a mucilaginous sheath (Figs. 8-12). No cultures obtained.

Etymology. From tuberculata, in reference to its tuberculate ascospore ornamentation.


Notes. Paraniesslia is placed in the Niessliaceae,
which accommodates taxa having small, collabent, setose, perithecioid ascomata, unitunicate asci with a nonamyloid, discoid apical apparatus, and uniseptate ascospores (Samuels and Barr 1997). The genera in the Hypocreales have phialidic anamorphs and apical paraphyses, which may appear as deliquescing strands in mature ascomata when they develop from the upper meristematic tissues downwards to the base of the fruiting bodies (Rossman et al. 1999). Although the anamorphs and apical paraphyses were not clearly observed in *P. tuberculata*, the presence of deliquescing interascal filaments and the absence of true paraphyses warrant its disposition in the Hypocreales.

The identification of this taxon has been problematic. Using the key of Samuels and Barr (1997), this taxon should belong in either Cryptoniesslia Scheuer or Niesslia Auer. *Paraniesslia tuberculata* resembles *Cryptoniesslia setulosa* Scheuer, in the Niessliaceae, in having inconspicuous, deliquescing interascal filaments found in the centrum. *Cryptoniesslia setulosa* also differs in having immersed, black ascomata and hyaline, 1-septate, long fusiform ascospores (Scheuer 1993). *Niesslia* species are characterized by having hyaline, 1-septate ascospores (Barr 1990, 1993), while the ascospores in *Paraniesslia tuberculata* are verrucose and greenish brown. *Paraniesslia* is therefore different from the described genera of Niessliaceae (sensu Samuels and Barr 1997).

Another similar genus is *Phaeotrichosphaeria* Siv., which produces setose ascomata, unitunicate asci with refractive apical apparatus and brown, 1-septate ascospores (Sivanesan 1983). *Phaeotrichosphaeria* however is regarded as a relative of *Lasiosphaeria* Ces. & De Not. in the Lasiosphaeriaceae, and has thick-walled, noncollabent ascomata, narrow, true paraphyses, and *Endophragmiella* B. Sutton anamorphs (Sivanesan 1983, Barr 1990). The inclusion of *Paraniesslia tuberculata* in Savoryella R. A. Eaton & E. B. G. Jones may be considered. Their shared character is asci that are clavate and possess a discoid apical apparatus. *Paraniesslia tuberculata* is easily distinguished in having brown, setose ascomata without a neck. The ascospores are greenish brown and ellipsoidal, while *Savoryella* has black ascomata and brown, 4-septate ascospores with hyaline end cells. Also *Savoryella* is not closely related to the Niessliaceae and may belong in the Halosphaeriales (Ranghoo pers comm).

**Clypeosphaeria uniseptata** K. M. Tsui, K. D. Hyde et Hodgkiss, sp. nov. Figs. 13–21


Ascomata 150–200 high, 400–550 diam, subglobe or apllanate, erumpent to partly immersed beneath a clypeus, ostiolate, coriaceous, black (Figs. 13, 14). Papilla conical, periphysate (Fig. 14). Peridium ca 20 μm wide, *textura angularis*, composed of several layers of brown, compressed angular cells (Fig. 15). Paraphyses ca 5 μm wide, mostly longer than asci, filamentous, septate, hardly found. Asci 120–160 × 6–8 μm (x = 126 × 6.5 μm, n = 25), unitunicate, long cylindrical, pedicellate, with a J+, discoid, subapical ring (Figs. 16, 17). Ascospores 14–19 × 5–7 μm (x = 16 × 6 μm, n = 40), overlapping uniseriate, ellipsoidal, 1-septate, slightly constricted at septum, smooth, thick-walled, pale brown (Figs. 18–21).

Colonies on potato dextrose agar fast growing, with superficial white hyphae, cottony and flat with crenate edges, white reverse. No conidia or conidiophores produced.

**Etymology.** From uniseptata, in reference to the 1-septate ascospores.

**Specimens examined.** CHINA. HONG KONG: Tai Po, Lam Tsuen River, on submerged wood, Sep 1997, K. M. Tsui, KM 247 (HOLOTYPE, HKU(M) 8095), cultures from holotype (HKUCC 6579).

**Notes.** Species in *Clypeosphaeria* Fuckel have clypeate, conspicuously papillate ascomata, long cylindrical asci with subapical, amylloid rings and uniseriate, ellipsoidal, brown ascospores. This genus was discussed by Barr (1989) and three species, *C. mamillana* (Fr.) Lamb., *C. perfidiosa* (De Not.) Barr and *C. americana* Barr & Samuels were included. The genus is now considered to be monotypic because *C. perfidiosa* and *C. americana* were transferred to *Steresphaeria* Kirsch. (Hyde et al 1998). *Clypeosphaeria mamillana* has a wedge-shaped subapical ring as compared to discoid in *C. uniseptata* and thin-walled ascospores that have one septum near the base (Barr 1989), or have 5 pseudosepta (Hyde et al 1998), as compared to 1 septum in *C. uniseptata*.

Species in *Amphisphaeria* Ces. & De Not. also have clypeate ascomata, long cylindrical asci with amylloid, subapical discoid rings, and ellipsoidal, 1-septate, brown ascospores (Barr 1990), and are characterized by having *Pestalotia*-like anamorphs (Kang et al 1999). We found no evidence of *Pestalotia*-like anamorphs in cultures of *C. uniseptata*, and its characteristic ascomatal morphology warrant the placement of this taxon in *Clypeosphaeria*. *Clypeosphaeria uniseptata* resembles *Amphisphaeria pakistane* E. Müll. &
Ahmad [ZT 9032, holotype] in producing ellipsoidal, brown, 1-septate ascospores, but is unique in having thick-walled ascospores.

**Leptosphaeria ginimia** K. M. Tsui, K. D. Hyde et Hodgkiss, sp. nov.  
Figs. 22–30

septa constrictae, guttulatae, fulvae vel bruneae, tunica gelatinosa praeditae.

Ascomata 240–300 μm high, 200–300 μm in diam, erumpent, superficial or partly immersed, subglobose to globose, gregarious, ostiolate, dark brown to black (Fig. 22). Peridium 20–30 μm wide, consisting of two layers: cells of outer layer interpersed with host cells, comprising 3–4 layers of brown polygonal 6–8 × 3–6 μm scleroparenchymatic cells; inner layer textura angularis (Figs. 23, 24). Pseudoparaphyses cellular, numerous, ca 2 μm wide, septate, filamentous, and embedded in a transparent gelatinous matrix (Fig. 27). Asci 95–140 × 9–13 μm (x = 121 × 11 μm, n = 25), 8-spored, cylindrical, short pedicellate, bitunicate, fissitunicate, ectoascus rupturing at the apex (Figs. 25–27). Ascospores 27.5–35 × 5.5–7 μm (x = 32 × 6 μm, n = 35), overlapping biseriate, 5-(6)-septate, fusiform, swollen at third cell, constricted at the septa, guttulate, yellow to pale brown, surrounded by a mucilaginous sheath (Figs. 28–30).

Colonies on potato dextrose agar slow growing, mostly immersed, brown to gray reverse, with super-
ficial hyphal growth, fluffy, effuse, with dentate edges, producing yellow pigments. No anamorphs produced.

Etymology. The Latin *ginimia*, derived from Ginimi Chan, for her appreciation and support of first author’s work in mycology.

Specimens examined. CHINA. HONG KONG: Tai Po, Lam Tsuen River, on submerged wood, 31 May 2000, K. M. Tsui, KM31 (HOLOTYPE, HKU(M) 16115), culture of holotype (HKCC 6465), Sep 1996, K. M. Tsui, KM31 (HKU(M) 4613), (HKU(M) 4627), (HKU(M) 5380), Sep 1997, K. M. Tsui, KM31 (HKU(M) 8056), Dec 1998, K. M. Tsui, KM31 (HKU(M) 12193).

Notes. *Leptosphaeria* Ces. & De Not. is a heterogeneous genus, and highly resembles *Phaeosphaeria* Miyake which also produces fusiform to cylindrical, bitunicate asci, and yellow, guttulate ascospores with more than 3 septa (Shoemaker and Babcock 1989). This taxon is better placed in *Leptosphaeria* (sensu Holm 1957, Shearer et al 1990, Ahn and Shearer 1997) because it possesses a thick ascomatal wall comprising scleroplectenchymatic cells and was collected from woody substrata.

*Phaeosphaeria* Ces. & De Not. is suitable because it has trabeculate pseudoparaphyses and hyaline, elongate fusiform ascospores with mucilaginous sheaths. The genus has also been expanded to include species with a slit-like ostiole (Hyde et al 2000) but this character has not been reported from collections of *A. stellata* on terrestrial bamboo (Hawksworth 1981) and palms (Hyde and Fröhlich 1997).

ACKNOWLEDGMENTS

We are grateful to Dr. C. Scheuer and the anonymous reviewer for the comments on the manuscript. Drs. C. Scheuer, G. Samuels, and Y. Z. Wang are thanked for the advice on the identification of ascomycetes. K. M. Tsui thanks The University of Hong Kong for the award of a Postgraduate Studentship. Helen Leung, Ken Wong and A. Y. P. Lee are thanked for their technical and photographic assistance.

LITERATURE CITED


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