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SHORT COMMUNICATION

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New species of *Clohiesia* and *Paraniesslia* collected from freshwater habitats in China

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Abstract Two fungi collected from submerged woody debris were found to represent hitherto undescribed species of the ascomycete genera *Clohiesia* and *Paraniesslia*. They are described as *Clohiesia curvispora* sp. nov. and *Paraniesslia aquatica* sp. nov. based on morphological characters. *Clohiesia curvispora* is characterized by immersed ascomata under a clypeus, and unitunicate, cylindrical asci containing one-celled, curved, elongate-fusiform ascospores. *Paraniesslia aquatica* is characterized by small, superficial, setose ascomata, and unitunicate, clavate asci containing verrucose, brown ascospores. Each species is illustrated with light micrographs and compared with similar taxa in this article.

Key words Ascomycetes · Freshwater fungi · Lignicolous fungi · Taxonomy

Submerged woody substrata are essential components of freshwater ecosystems (Jacobson et al. 1999). Diverse taxonomic groups of fungi colonize and grow on submerged wood (Tsui and Hyde 2003). Wood-inhabiting fungi in the freshwater environment have received less attention in mainland China, as compared to those in terrestrial environment. Our study of fungal biodiversity in streams in Yunnan of mainland China (Cai et al. 2005, 2006; Zhu et al. 2005) yielded two interesting teleomorphic ascomycetes. Examination of their morphological characteristics showed that they are new species of *Clohiesia* K.D. Hyde and *Paraniesslia* K.M. Tsui, K.D. Hyde & Hodgkiss. They are therefore, described, illustrated, and compared to similar taxa.

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In this study, samples were processed and examined following the methods described in Cai et al. (2006). Single spore isolations were made on cornmeal agar (CMA) (Choi et al. 1999). Cultures are deposited in HKUCC. Type specimens are deposited in HKU (M). Observations and photographs were made from materials mounted in water. The range between minimum and maximum values for microscopic measurements is given. Mean values are in brackets, with "*n*" being the number of items measured.

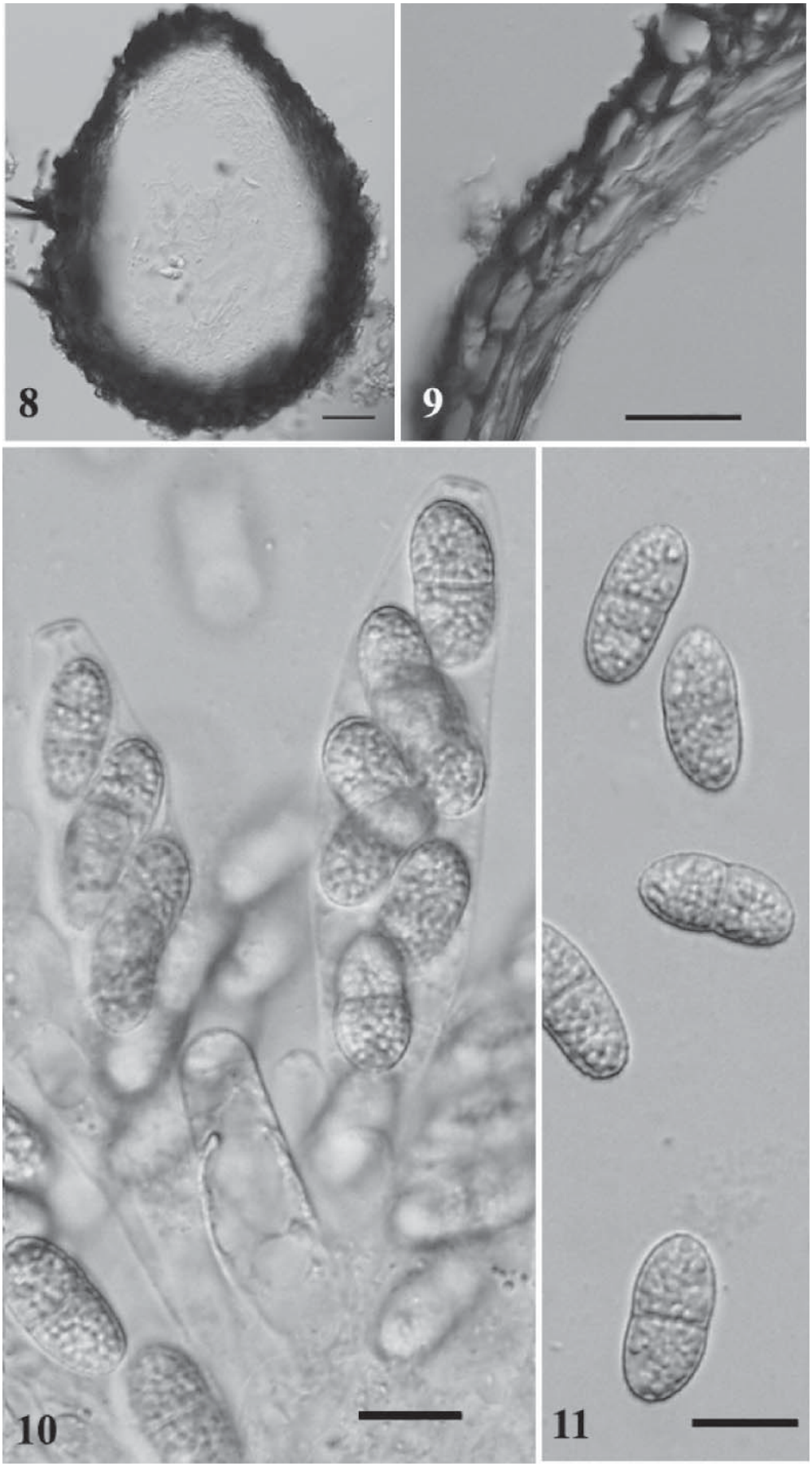
Clohiesia curvispora L. Cai & K.D. Hyde sp. nov.
Figs. 1–7

Ascomata 400–600 μm diametro, 400–500 μm alta, globosa vel subglobosa, superficialia vel subimmersa, carbonacea, atro-brunnea vel nigra, papillata, ostiolata, clypeata, gregaria. Peridium 30–50 μm crassum, brunneum vel nigrum. Paraphyses 3–4 μm crassae, filamentosae, numerosae, septatae, ramosae, hyalinae. Asci 125–175 × 8.5–10.5 μm, octospori, unitunicati, cylindrici, pedicellati, tenuitunicati, apice rotundati, apparatu apicali praediti. Ascosporae 32.5–39 × 3.2–5 μm, 1- vel 2-seriatae, unicellulares, hyalinae, guttulatae, curvatim fusiformes, tunico gelatinoso praeditae.

Etymology: Referring to the curved ascospores.

Ascomata 400–600 μm in diameter, 400–500 μm high, perithecioid, globose to subglobose, superficial to partly immersed, carbonaceous, dark brown to black, papillate, ostiolate, clypeate, gregarious. Clypeus light-colored, disc-like, thin, surrounding the ostiole, comprising host cells filled with irregular brown hyphae. Ostiole central, short, brown, composed of dark brown pseudoparenchyma of textura angularis, periphysate. Peridium 30–50 μm thick, brown-black, composed of light brown oblong cells. Paraphyses 3–4 μm wide at base, longer than asci, hypha-like, filamentous, numerous, septate, branched, hyaline, tapering distally, embedded in a gelatinous matrix. Asci 125–175 × 8.5–10.5 μm ($\bar{x}$ = 152 × 9.6 μm, n = 10), 8-spored, unitunicate, cylindrical, pedicellate, thin-walled, apically rounded, with a nonamyloid, refractive, apical apparatus (ca. 1.5 μm long, 2.5–3 μm in diameter). Ascospores 32.5–39 × 3.2–5 μm ($\bar{x}$ = 35.5 × 4 μm, n = 25), overlapping uniseriate to biseriate,

Figs. 1–7. *Clohiesia curvispora*, from holotype. **1** Section of ascoma. **2** Section of the peridium. **3** Paraphyses. **4**, **5** Asci. Note the apical ring. **6**, **7** Ascospores. *Bars* **1** 30 µm; **2** 15 µm; **3–7** 10 µm



Figs. 8–11. *Paraniesslia aquatica*, from holotype. **8** Section of ascoma. **9** Section of peridium. **10** Asci. **11** Ascospores. *Bars* **8** 30 µm; **9** 25 µm; **10**, **11** 10 µm

one-celled, hyaline, guttulate, curved elongate-fusiform, with a thin mucilaginous sheath.

Colonies on CMA slow growing, up to 2 cm diameter after 2 months at room temperature (22°–25°C), superficial, woolly, with a few aerial hyphae, pale brown from above, reverse dark brown in the center, white toward the margin, growing in concentric rings (cultures studied in HKUCC 9182).

Habitat: Saprobic on submerged decaying wood.

Anamorph: Unknown.

Material examined: China, Yunnan, Jinghong, on submerged wood in a small forest stream, Sept. 15, 2002, L. Cai, CAI-9BNA38 (holotype: HKU(M) 10854).

Notes: *Clohiesia* K.D. Hyde was established to accommodate the freshwater taxon *C. corticola* from tropical Australia (Hyde 1995). *Clohiesia* had been placed in Annulatascaceae (Sordariales) owing to its relatively massive J-apical ring (Wong et al. 1998). Recent molecular studies, however, have revealed that the family Annulatascaceae is polyphyletic (Campbell and Shearer 2004; Huhndorf et al. 2004; Vijaykrishna et al. 2005). In addition, *Clohiesia* was shown to have phylogenetic affinity with Lasiosphaeriaceae and Sordariaceae instead of other annulatascaceous species (Raja et al. 2003; Duong et al. 2004). Currently, *Clohiesia* is placed in Sordariales incertae sedis (Kirk et al. 2001).

Our species should be classified in the genus *Clohiesia* because it has immersed ascomata under a clypeus, cylindrical-clavate asci with a refractive apical ring, and fusiform, hyaline, aseptate ascospores, characteristics of *Clohiesia* (Hyde 1995). There are currently two species in *Clohiesia*, *C. corticola* K.D. Hyde and *C. lignicola* K.M. Tsui, K.D. Hyde & Hodgkiss (Hyde 1995; Tsui et al. 1998). *Clohiesia curvispora* is different from *C. corticola*, the type species of the genus, in its larger ascospores (32.5–39 × 3.2–5 µm vs. 18.5–26.5 × 3.7–5 µm), which are distinctly curved. Moreover, *C. curvispora* differs from *C. corticola* in its larger ascomata and asci and the thicker peridium. *Clohiesia lignicola*, however, differs from *C. curvispora* in the smaller ascospores (14–28 × 4.5–6 µm), which are fusiform-ellipsoid rather than the curved elongate-fusiform ascospores in *C. curvispora* (Tsui et al. 1998).

Paraniesslia aquatica L. Cai & K.D. Hye, sp. nov.

Figs. 8–11

Ascomata 160–200 µm diametro, 190–240 µm alta, superficialia, pyriformia vel subglobosa, membranacea, brunnea vel nigra, papillata, ostiolata, setosa, solitaria vel gregaria. Setae acutae, rectae, non ramosae, septatae, nigrae. Peridium 15–30 µm, a externe visus *textura epidermoidea*, in sectione longitudinali cellulis 3–4-stratpsis *textura angularis* compositum. Paraphyses septatae, tenuitunicatae, deliquescentes. Asci 68–95 × 9–16 µm, octospori, clavati, pedicellati, unitunicati, tenuitunicati, apice truncati, apparatu apicali praediti. Ascosporae 15–19 × 6–7.5 µm, imbricato-uniseriatae vel biseriatae, ellipsoideae, 1-septatae, ad septum constrictae, verrucosae, subhyalinae, tunico gelatinoso praeditae.

Etymology: Referring to its aquatic habitat.

Ascomata 160–200 µm wide, 190–240 µm high, perithecioid, superficial, pyriform to subglobose, membranous, brown or black, papillate, ostiolate, solitary to gregarious, with setae. Setae acute, straight, unbranched, septate, black. Peridium 15–30 µm, textura epidermoidea in surface view, textura angularis in longitudinal section, composed of 3–4 layers of compressed polygonal cells. *Paraphyses* septate, thin-walled, deliquescent. Asci 68–95 × 9–16 µm ($\bar{x}$ = 78 × 12 µm, n = 15), 8-spored, clavate, pedicellate, unitunicate, thin-walled, apex truncate, with a nonamyloid discoid refractive apical ring. Ascospores 15–19 × 6–7.5 µm ($\bar{x}$ = 17.5 × 7 µm, n = 25), overlapping uniseriate to biseriate, ellipsoidal, 1-septate, slightly constricted at the septum, verrucose, subhyaline, with a thin mucilaginous sheath. No cultures obtained.

Habitat: Saprobic on wood submerged in freshwater.

Anamorph: Unknown.

Material examined: China, Yunnan, Kunming, Qinglongxia, submerged wood in a small stream, Nov. 10, 2002, L. Cai, CAI-11QL34 (holotype: HKU(M) 10856). Paratype, ibid, HKU(M) 10855.

Notes: *Paraniesslia* (Niessliaceae, Hypocreales) K.M. Tsui, K.D. Hyde & Hodgkiss was recently established to accommodate a fungus collected from Hong Kong freshwater habitats (Tsui et al. 2001). The genus is characterized by small, setose, perithecioid ascomata, unitunicate asci with nonamyloid, discoid, refractive apical ring, and uniseptate, verrucose, brown ascospores. *Paraniesslia* is also distinct in having deliquescing interascal filaments instead of true paraphyses, characteristics of Hypocreales. Our species is classified in *Paraniesslia* because it fits well with the generic concept of *Paraniesslia* (Tsui et al. 2001). There is currently only one species, *P. tuberculata* K.M. Tsui, K.D. Hyde & Hodgkiss, in this genus. *Paraniesslia aquatica* can be distinguished from the type species in having larger ascomata (160–200 × 190–240 µm vs. 100–120 × 100–130 µm), asci (68–95 × 9–16 µm vs. 50–75 × 7–14 µm), and ascospores (15–19 × 6–7.5 µm vs. 11–14 × 4–6.5 µm), and ascospores that are subhyaline at maturity rather than dark brown in *P. tuberculate* (Tsui et al. 2001).

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