

## New species of *Lachnum* and *Perrotia* from Hong Kong, China

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**Abstract:** Three new species, *Lachnum cylindricum*, *L. granulatum*, and *Perrotia hongkongensis*, are described from Hong Kong. *Lachnum carneolum* is recorded for the first time from China. A key to the long-spored species of *Lachnum* related to the new taxa is provided.

**Key Words:** Hyaloscyphaceae, *Lachnum cylindricum*, *Lachnum granulatum*, *Perrotia hongkongensis*

Hong Kong is located in the tropical region of China, south of Guangdong Province, and comprises Hong Kong Island, The New Territories, Lantau Island, and numerous small islands. The discomycetes of Hong Kong are poorly known. *Helotium hongkongense* (Berk. & M. A. Curtis) Sacc. was probably the earliest discomycete record from Hong Kong (Saccardo 1889). In the book *Hong Kong Mushrooms*, three large cup-fungi, *Galiella javanica* (Rehm) Nannf. & Korf, *Peziza ampelioa* Quél., and *Sarcoscypha coccinea* (Scop.: Fr.) Lambotte, were recorded (Chang and Mao 1995). A recent text on biodiversity of micro-fungi on palms added six more discomycetes from Hong Kong, *Lachnum palmae* (Kanouse) Spooner, *Mollisia* sp. #1, *Mollisia* sp. #2, *Orbilina auricolor* (Bloxam) Sacc., *Strossmayeria bakeriana* (Henn.) Iturriaga, and *Terriera* cf. *breve* (Berk.) P. R. Johnst. (Fröhlich 1997). In order to investigate the species diversity of discomycetes in Hong Kong, field expeditions were organized from the mid-Jul to early Aug, 1998. Collections were made in the New Territories and Hong Kong Island at altitudes of 100–800 m. Unfortunately, the weather was dry and rainfall was much less than the average for the season and therefore only

about 50 discomycete specimens were collected and examined. Four species of *Lachnum* and one of *Perrotia* were identified and three of them are new.

This study is based on collections made in the above field expeditions and a few dried specimens deposited in the Mycological Herbarium of the University of Hong Kong [HKU(M)]. Descriptions and measurements are from fresh material except if otherwise mentioned. Terms for the anatomic structures followed definitions by Korf (1973). Measurements were obtained in cotton blue lacto-phenol mounts and ascus pore iodine reactions was determined in Melzer's reagent. Illustrations were made with the aid of a drawing tube. Detailed methods given by Zhuang (1988, 1998) were generally followed. Specimens studied are deposited in HKU(M) and some in the Herbarium Mycologicum Institute Microbiologici Academiae Sinicae (HMAS).

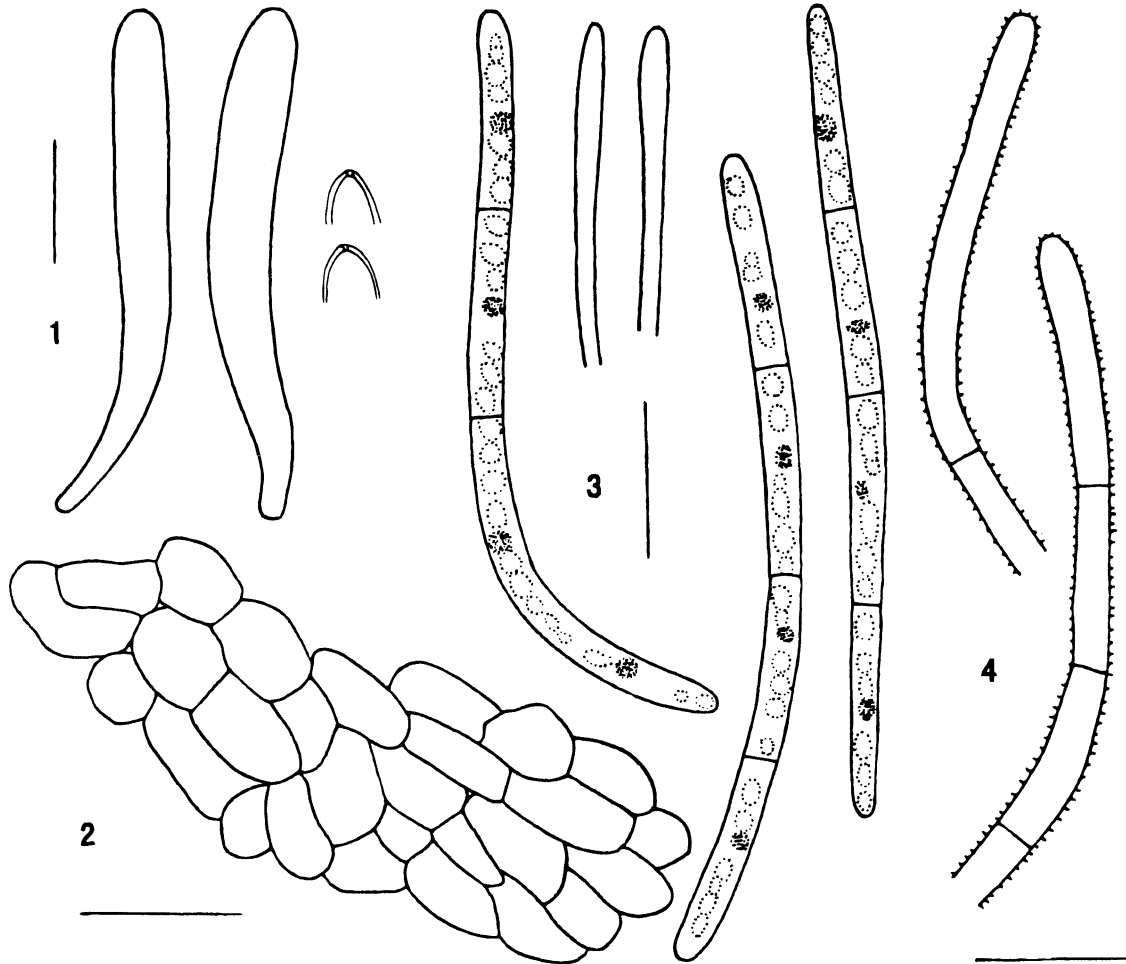
***Lachnum cylindricum*** W. Y. Zhuang et K. D. Hyde,  
sp. nov. FIGS. 1–4

Species haec ascosporis cylindricis, 0–3-septatis, 44–58 × 2–3 μm, ascis 70–93 × 7.5–10.5 μm, pilis hyalinis; similis *Lachno kumaonico* et *L. chusqueae* quae differunt illud ascosporis infra attenuatis, 7-septatis, 57–75 × 1.5–2.2(–3) μm, ascis 70–112 × 6–10 μm, pilis favido-brunneis, hoc ascosporis non septatis, fusoidis, pilis brunneis.

*Apothecia* discoid, short-stipitate, 0.4–0.7 mm in diam, hymenium cream, receptacle concolorous, surface hairy. *Hairs* subcylindrical with blunt apex, with coarse granules, hyaline, thin-walled, with 4–5 septa, up to 130 μm long and 2.2–3.5 μm wide. *Ectal excipulum* of textura prismatica to textura angularis, 18–26 μm thick, cells hyaline, thin-walled, walls somewhat glassy, 6–10 × 2.5–7 μm. *Medullary excipulum* of textura intricata, 20–75 μm thick, hyphae hyaline, 1–1.5 μm wide. *Hymenium* 90–100 μm thick. *Asci* 8-spored, clavate, pore walls faintly blue in Melzer's reagent, 70–93 × 7.5–10.5 μm. *Ascospores* cylindrical, with both ends rounded, some with lower end very slightly narrow, hyaline, 0–3-septate, hyaline, smooth-walled, multiguttulate, arranged in a fascicle, 4 nuclear stained areas shown in cotton blue solution which are evenly distributed along axis of a spore, 44–58 × 2–3 μm. *Paraphyses* subcylindrical to narrowly lanceolate, 2 μm wide, not obviously or slightly exceeding the asci.

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FIGS. 1–4. *Lachnum cylindricum*. From HOLOTYPE. 1. Shape of asci and ascus apices. 2. Ectal excipulum at flank. 3. Ascospores with the nuclear-stained areas in cotton blue mount and paraphysis apices. 4. Hairs. Scale bars: 1 = 20  $\mu\text{m}$ , 2–4 = 10  $\mu\text{m}$ .

*Specimen examined.* CHINA. HONG KONG: New Territories, Wu Kao Tang, alt. 800 m, on rotten bamboo, 16-VII-1998, W. Y. Zhuang 2434 [HOLOTYPE: HKU(M) 10356, ISOTYPE: HMAS 74867].

*Etymology.* The specific epithet refers to the cylindrical ascospores.

*Notes.* *Lachnum cylindricum* is similar in spore size to *L. indicum* (Cash) J. H. Haines & Dumont from tree barks, *L. kumaonicum* (M. P. Sharma) M. P. Sharma, *L. chusqueae* (Pat.) J. H. Haines & Dumont from bamboo, and *L. pritzelianum* (Henn.) Spooner from a palm. The ascospores of *L. indicum* and *L. kumaonicum* have 7 septa and those in *L. chusqueae* and *L. pritzelianum* are nonseptate and multiguttulate instead of 0–3-septate in *L. cylindricum*. The ascospores of *L. chusqueae* are fusoid instead of cylindrical; and those of *L. indicum* and *L. pritzelianum* are cylindrical and taper slightly towards the distal end. The spores are wider in *L. indicum* and narrower in *L. pritzelianum* than those of the new species (Dennis

1954, Haines 1992, Haines and Dumont 1984, Spooner 1987). *Lachnum kumaonicum* from bamboo is the most similar species to *L. cylindricum*, particularly in spore shape, differing in spore septation (7-septate instead of 0–3) and spore dimension ( $57\text{--}75 \times 1.5\text{--}2.2\text{--}(3) \mu\text{m}$  vs  $44\text{--}58 \times 2\text{--}3 \mu\text{m}$ ). The hairs on the apothecia of the new species are buff to cinereous instead of hyaline. *Lachnum cylindricum* has four nuclear stained spots in cotton blue solution which are evenly distributed along the axis of spores.

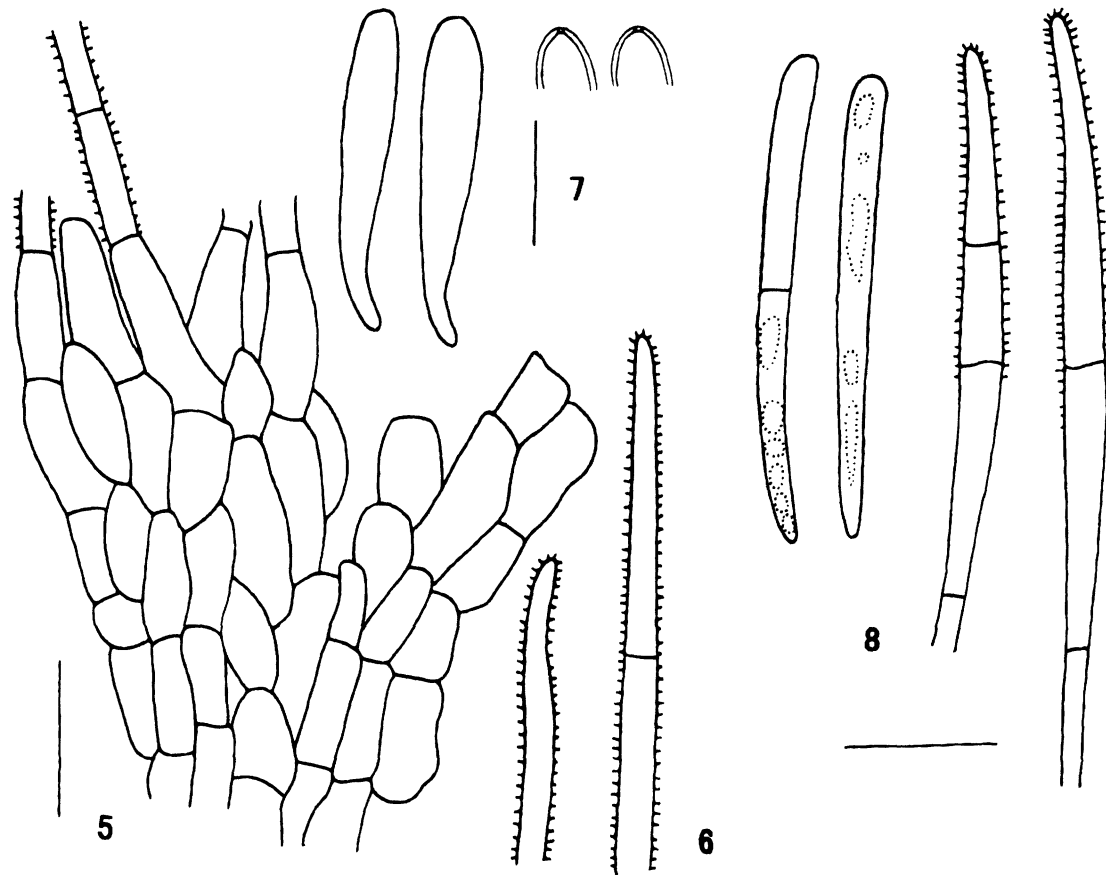
***Lachnum granulatum*** W. Y. Zhuang, Yanna et K. D.

Hyde, sp. nov.

FIGS. 5–8

Ab speciebus aliis *Lachni* differt paraphysibus lanceolatis, granulatis; ascosporis anguste, 0–3-septatis, scutuloideis,  $27\text{--}38 \times 2\text{--}2.2\text{--}(2.4) \mu\text{m}$ ; in *Calamo* sp. evolutis.

Dried apothecia discoid, short-stipitate to sessile, less than 0.2 mm in diam, hymenium light yellow, receptacle white, surface hairy. Hairs subcylindrical,



FIGS. 5–8. *Lachnum granulatum*. From HOLOTYPE. 5. Surface view of ectal excipulum. 6. Two fragments of hairs. 7. Shape of asci and ascus apices. 8. Ascospores and paraphysis apices. Scale bars: 5, 6, 8 = 10  $\mu\text{m}$ , 7 = 20  $\mu\text{m}$ .

slightly wider in the middle and slightly tapered towards the apex, granulate through the entire length, hyaline, (20–)32–48  $\times$  2.5–3.5  $\mu\text{m}$ . *Ectal excipulum* of textura prismatica, very thin, cells subhyaline, thin-walled, contents highly refractive, 4–7  $\times$  3–5  $\mu\text{m}$ . *Medullary excipulum* of textura intricata, very thin, hyphae hyaline, ca 1  $\mu\text{m}$  wide. *Hymenium* 65–70  $\mu\text{m}$  thick. *Asci* 8-spored, clavate, pore walls blue in Melzer's reagent, 52–60  $\times$  7.5–9(–9.5)  $\mu\text{m}$ . *Ascospores* subcylindrical with lower end slightly narrower, sometimes slightly bent at upper end and narrowly scutuloid, hyaline, smooth-walled, unicellular, a few becoming 1–3-septate, 27–38  $\times$  2–2.2(–2.4)  $\mu\text{m}$ . *Paraphyses* lanceolate, with blunt apex, upper cells with granulate wall, 2.5–3  $\mu\text{m}$  wide at the widest and 1.5–2  $\mu\text{m}$  wide below, exceeding the asci by 10–20  $\mu\text{m}$ .

*Specimen examined*. CHINA. HONG KONG: New Territories, Tai Po Kau, on *Calamus* sp., 17-VII-1997, Yanna [HOLOTYPE: HKU(M) 7177, ISOTYPE: HMAS 74864].

*Etymology*. The specific epithet refers to the granulate appearance of the apical cells of the paraphyses.

*Notes*. Combination of the small apothecia up to

0.2 mm in diam, granulate paraphysis apical cells, and narrowly scutuloid ascospores distinguishes *Lachnum granulatum* from any existing species of the genus. *Lachnum oncospermatis* (Berk. & Broome) M. L. Wu & J. H. Haines, which was originally reported occurring on palm from Ceylon, has similar apothecial gross morphology and spore shape (Berkeley and Broome 1873, Dennis 1954), but its ascospores are shorter and paraphyses have a different shape and lack granulate apical cells.

*Lachnum carneolum* (Sacc.) Rehm, Rabenh. Krypt.-Fl. 1(3): 881, 1893.

*Specimen examined*. CHINA. HONG KONG: New Territories, Tai Mo Shan, alt. 700 m, on rotten leaves of *Miscanthus* sp., 23-VII-1998, P. R. Johnston (HKU(M) 10369, HMAS 74868).

*Notes*. The apothecia of HMAS 74868 are 0.2–0.35(–0.9) mm in diam and short-stipitate, with cream to pale yellow hymenia, and occur on rotten leaves of *Miscanthus* sp. This is a new record for China. Compared with the British material (Dennis

1949), ascospores of the Hong Kong collection are slightly wider ( $6\text{--}6.5 \times 1.2\text{--}1.5 \mu\text{m}$  vs  $5\text{--}6 \times 1 \mu\text{m}$ ), asci are shorter (ca  $35 \times 5 \mu\text{m}$  vs  $40 \times 5 \mu\text{m}$ ), and the paraphyses are narrower and  $4 \mu\text{m}$  wide. Since the Hong Kong collection and the British material are both on grass leaves and the major characteristics are very similar, we treat the above distinctions as infraspecific variations.

*Lachnum palmae* (Kanouse) Spooner, *Bibl. Mycol.* 116: 484, 1987.

*Specimens examined.* CHINA. HONG KONG: Hong Kong Island, campus of the University of Hong Kong, on leaf of *Livistona chinensis*, 20-VII-1996, Yanna [HKU(M) 7144, HMAS 74854]; Victoria Peak, alt. 300 m, on leaf of *Livistona chinensis*, 30-VII-1998, W. Y. Zhuang & D. Q. Zhou 2488 (HKU(M) 10373, HMAS 74866); on leaf of *Livistona chinensis*, 30-VII-1998, W. Y. Zhuang 2489 (HKU(M) 10374, HMAS 77307).

*Notes.* Compared with collections of *Lachnum palmae* from Central America and New Zealand, the asci of the Hong Kong material are shorter ( $84\text{--}103 \times 7\text{--}8 \mu\text{m}$  vs  $100\text{--}120 \times 7.5\text{--}8 \mu\text{m}$ ) and the ascospores are longer [ $70\text{--}87(\text{--}90) \times 1.5\text{--}2 \mu\text{m}$  vs  $(58\text{--})62\text{--}77 \times 1.5\text{--}1.8 \mu\text{m}$ ]. Spore-bearing area of Hong Kong collections usually occupies 90–100% of the entire ascus length, sporogenous portion in the New Zealand collection is mostly around 80% (Spooner, 1987).

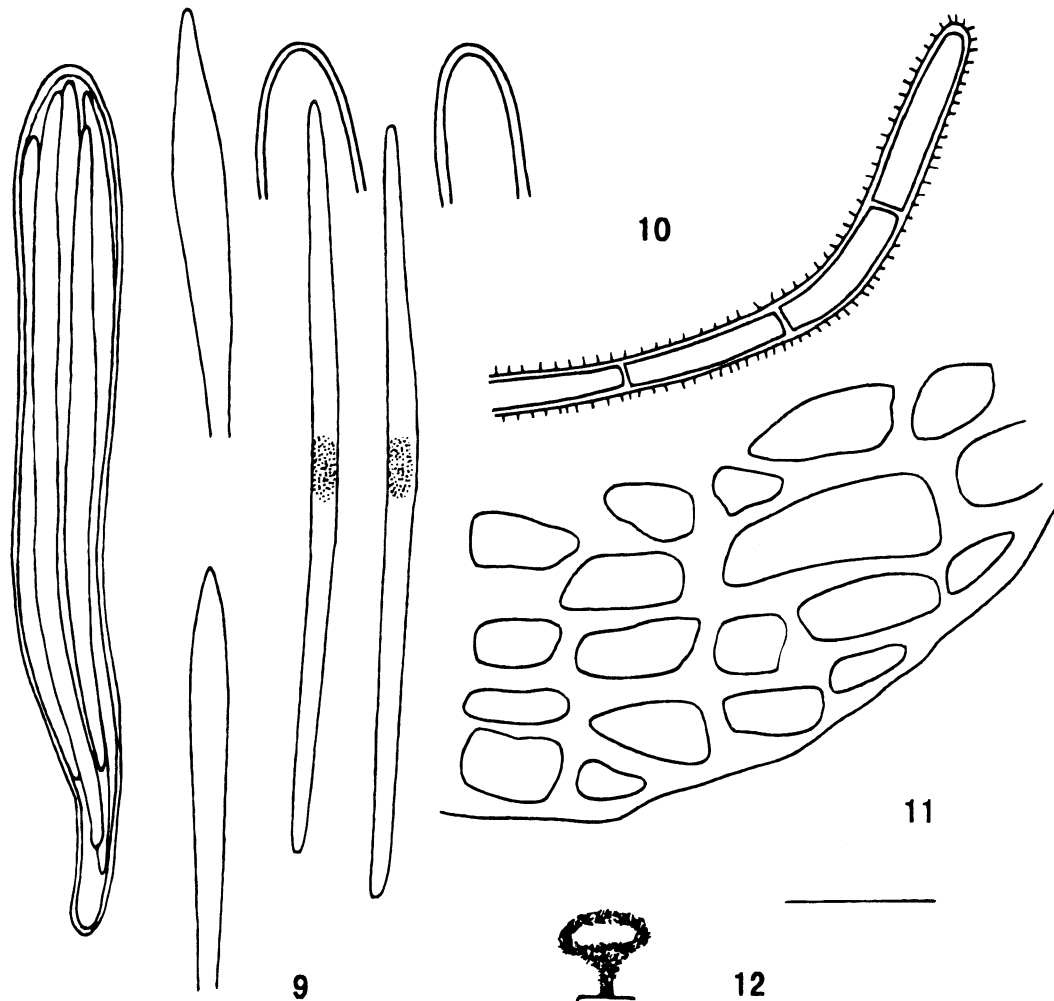
It has been shown in recent molecular and morphological data dealing with the phylogenetic relationships of the Hyaloscyphaceae (Cantrell and Hanlin 1997), that several septate, long-spored lignicolous species of *Lachnum*, such as *L. abnorme* (Mont.) J. H. Haines & Dumont, *L. brasiliense* (Mont.) J. H. Haines & Dumont, and *L. sclerotii* (S. L. Sm.) J. H. Haines & Dumont grouped together. It is quite possible that the long-spored palm-inhabiting species such as *L. palmae* and *L. pritzelianum* (Henn.) Spooner are also closely related.

A large number of *Lachnum* species have been reported from the tropical regions (Cantrell and Haines 1997, Dennis 1954, 1960a, b, 1970, Haines 1980, 1992, Haines and Dumont 1984, Haines et al 1980, Sharma 1986, Sharma and Rawla 1985, Spooner 1987, Wu and Haines 1999, Wu et al 1998, Zhuang and Wang 1998a, b). Among the four species found in Hong Kong, two are new. A key to eighteen species, including the few that occur in temperate regions (Singh 1975, Haines and Kaneko 1984), is provided. The key is based, in part, on published descriptions. *Dasyscyphus lasseri* Dennis is transferred to *Lachnum*:

***Lachnum lasseri* (Dennis) W. Y. Zhuang, comb. nov.**  
Basionym: *Dasyscyphus lasseri* Dennis, *Kew Bull.* 9: 309, 1954.

KEY TO THE LONG-SPORED SPECIES OF *LACHNUM*

1. Paraphyses granulate at upper portion; ascospores subcylindrical with lower end slightly narrower, sometimes narrowly scutuloid, mostly unicellular,  $27\text{--}38 \times 2\text{--}2.2(\text{--}2.4) \mu\text{m}$  . . . . . *L. granulatum*
1. Paraphyses smooth-walled throughout; ascospores not narrowly scutuloid. . . . . 2
  2. Ascospores cylindrical to cylindrical-fusoid . . . . . 3
  2. Ascospores narrowly fusoid or aciculate . . . . . 7
3. Ascospores narrow at both ends, less than  $40 \mu\text{m}$  long; on trunk . . . . . *L. dalhousiense*
3. Ascospores with rounded ends, more than  $40 \mu\text{m}$  long; on bark of hardwood tree, palm or bamboo 4
  4. Ascospores non-septate, cylindrical slightly tapered towards the distal end,  $53\text{--}60 \times 1.5 \mu\text{m}$ ; on palm . . . . . *L. pritzelianum*
  4. Ascospores septate; not on palm . . . . . 5
5. On bark of tree; ascospores cylindrical with a hemispherical apex and tapered base, 0–7-septate,  $(35\text{--})40\text{--}55(\text{--}70) \times (1.8\text{--})2.1\text{--}2.5(\text{--}3) \mu\text{m}$  . . . . . *L. indicum*
5. On bamboo; ascospores cylindrical . . . . . 6
  6. Ascospores 3-septate at maturity,  $44\text{--}58 \times 2\text{--}3 \mu\text{m}$  . . . . . *L. cylindricum*
  6. Ascospores 7-septate at maturity,  $57\text{--}75 \times 1.5\text{--}2.2(\text{--}3) \mu\text{m}$  . . . . . *L. kumaonicum*
7. Ascospores non-septate . . . . . 8
7. Ascospores septate . . . . . 13
  8. Ascospores more than  $1.5 \mu\text{m}$  in width, on bamboo . . . . . 9
  8. Ascospores less than  $1.5 \mu\text{m}$  in width, not on bamboo . . . . . 10
9. Hairs brown,  $120\text{--}170 \times 3\text{--}4 \mu\text{m}$ ; asci  $90\text{--}105 \times 7\text{--}9 \mu\text{m}$ ; ascospores  $40\text{--}50 \times 2\text{--}3 \mu\text{m}$  . . . . . *L. chusqueae*
9. Hairs hyaline,  $30\text{--}80 \times 3\text{--}4 \mu\text{m}$ ; asci  $136\text{--}145 \times 9\text{--}10 \mu\text{m}$ ; ascospores  $(77\text{--})80\text{--}90 \times 2\text{--}2.5 \mu\text{m}$  . . . . . *L. novoguineense*
10. On leaves . . . . . 11
10. On other substrates . . . . . 12
11. Asci  $60 \times 4 \mu\text{m}$ ; ascospores  $53\text{--}60 \times 0.5 \mu\text{m}$  . . . . . *L. mapirianum*
11. Asci  $(42\text{--})48\text{--}53(\text{--}54) \times 2.9\text{--}3.9 \mu\text{m}$ ; ascospores  $(32\text{--})35\text{--}38(\text{--}41) \times 0.8\text{--}1.3 \mu\text{m}$  . . . . . *L. fushanense*
12. On grass culms; hairs  $70\text{--}110 \times 3.5\text{--}4 \mu\text{m}$ ; asci  $95\text{--}108 \times 8 \mu\text{m}$ ; ascospores  $65\text{--}80 \times 1\text{--}1.5 \mu\text{m}$  . . . . . *L. lasseri*
12. On wood; hairs wider at base,  $50 \times 3.5\text{--}4.5 \mu\text{m}$ ; asci  $60\text{--}75 \times 7 \mu\text{m}$ ; ascospores  $40\text{--}44 \times 1 \mu\text{m}$  . . . . . *L. cyphelloides*
13. Ascospores 0–3 septa . . . . . 14
13. Ascospores mostly with 7 or more septa . . . . . 17
  14. On tree fern; ascospores 0(–1)-septate,  $38\text{--}52 \times 2\text{--}3(\text{--}3.7) \mu\text{m}$  . . . . . *L. macrosporum*
  14. On other substrates; ascospores with up to 3 septa . . . . . 15
15. On bamboo . . . . . *L. nipponicum*



FIGS. 9-12. *Perrotia hongkongensis*. From HOLOTYPE. 9. Ascus with ascospores, ascus apices, paraphysis apex, and ascospores. 10. A fragment of hair. 11. Ectal excipulum at flank. 12. Shape of apothecium. Scale bars: 9-11 = 10  $\mu\text{m}$ .

15. On wood ..... 16  
 16. Ascospores 0-1(-3)-septate, 27-62  $\times$  1.9-4.8  $\mu\text{m}$  ..... *L. brasiliense*  
 16. Ascospores 3-septate, (15-)19-25(-28)  $\times$  1.8-2.8  $\mu\text{m}$  ..... *L. sclerotii*  
 17. Ascospores with 7 septa, 45-60  $\times$  1-2  $\mu\text{m}$  .....  
 ..... *L. avellaneo-melleum*  
 17. Ascospores with (0-)7(-13) septa, (50-)59-100 (-109)  $\times$  1.8-2.8  $\mu\text{m}$  ..... *L. patena*

***Perrotia hongkongensis* W. Y. Zhuang et K. D. Hyde, sp. nov.** FIGS. 9-12

Ab speciebus aliis *Perrotiae* differt ascis 60-70  $\times$  6.5-7.5  $\mu\text{m}$ ; ascosporis acicularibus, non septatis, 1.2-1.4  $\mu\text{m}$  in medio, 0.8-1  $\mu\text{m}$  ad polos, 50-55  $\times$  1.2-1.4  $\mu\text{m}$ ; apotheciis minutis, 0.2-0.3 mm diam, in foliis evolutis.

*Apothecia* discoid, distinctly stipitate, 0.2-0.3 mm in diam, stipes mostly 0.1-0.2 mm long, hymenium beige to light buff, receptacle light brown, surface hairy. *Hairs* subcylindrical, granulate, slightly thick-walled, pale brown, with 2-3 septa, 50-65  $\times$  4  $\mu\text{m}$ ;

granules 0.3-1  $\mu\text{m}$  diam and 0.3-0.8  $\mu\text{m}$  high. *Ectal excipulum* of textura prismatica to textura angularis, 14-18  $\mu\text{m}$  thick, cells subhyaline to pale yellow, cell walls obviously thickened and somewhat glassy, 7-13  $\times$  5-6  $\mu\text{m}$ . *Medullary excipulum* of textura intricata, 20-50  $\mu\text{m}$  thick, hyphae hyaline, 1.5-2.5  $\mu\text{m}$  wide. *Hymenium* ca 70  $\mu\text{m}$  thick. *Asci* 8-spored, clavate, somewhat conical apically, walls thinner at apex, pore walls not blue in Melzer's reagent, 60-70  $\times$  6.5-7.5  $\mu\text{m}$ . *Ascospores* aciculate, slightly wider in the middle and narrow at both ends, showing a dark stained area in the center when mounted in cotton blue lactophenol solution, hyaline, non-septate, with many small guttules, smooth-walled, 50-55  $\times$  1.2-1.4  $\mu\text{m}$ , 1.2-1.4  $\mu\text{m}$  in the middle and 0.8-1  $\mu\text{m}$  near ends. *Paraphyses* lanceolate, 2.5-3  $\mu\text{m}$  wide at the widest and 1-1.5  $\mu\text{m}$  wide below, exceeding the asci by 5-8(-10)  $\mu\text{m}$ .

*Specimen examined.* CHINA. HONG KONG: New Territories, Tai Po Kau, alt. 200 m, on a dead leaf of

a dicotyledon, 15-VII-1998, *W. Y. Zhuang* 2427 [HOLOTYPE: HKU(M) 10351, ISOTYPE: HMAS 74865].

*Etymology.* The specific epithet refers to locality of the fungus.

*Notes.* Compared with the eight existing species of *Perrotia* possessing nonseptate ascospores, *P. hongkongensis* is characterized by its minute apothecia, 0.2–0.3 mm in diam instead of (0.5–)1–2.5(–5) mm; aciculate ascospores instead of allantoid, fusoid, ellipsoid or broadly ellipsoid, up to 55 µm long instead of less than 24 µm; ascus apex not widely rounded but slightly conical, walls thinner at apical portion; and on a dead leaf of an unidentified dicotyledon instead of woody substrates (Dennis 1963, Raitviir 1970, Spooner 1987).

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