

Three new *Ophioceras* species (Ascomycetes) from the tropics

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Ophioceras guttulatum sp. nov., *O. hongkongense* sp. nov. and *O. palmae* sp. nov. are described and illustrated from decaying terrestrial palms and woody substrates in freshwater habitats. They all have black perithecia with long necks, cylindrical asci with refractive apical rings and filiform ascospores.

Key Words—aquatic fungi; palmicolous ascomycete; streams; systematics.

Ophioceras Sacc. is lectotypified by *O. dolichostomum* (Berk. & M. A. Curtis) Sacc. and is characterized by black perithecia with long cylindrical necks, unitunicate, cylindrical asci with a cylindrical refractive apical ring, and long filiform, hyaline ascospores (Walker, 1980). Conway and Barr (1978) considered all *Ophioceras* species to be distinguished from *Gaeumannomyces* Arx & D. L. Olivier since they are saprotrophic on wood whereas species of *Gaeumannomyces* are usually parasites on roots, crowns, stems and leaves of Gramineae (Walker, 1980). Recent molecular studies have, however, showed that *Ophioceras* and *Gaeumannomyces* may be closely related, and the genus is provisionally placed in the Magnaporthaceae (Chen et al., 1999). The taxonomic position of the genus was discussed in detail in Chen et al. (1999) and Shearer et al. (1999). For the time being we prefer to maintain no graminicolous species in *Ophioceras*.

Ophioceras species are commonly found on decaying woody substrates in freshwater habitats (Hyde, 1992; Hyde and Goh, 1998; Shearer et al., 1999; Tsui et al., 2001) all over the world, and currently seven species are accepted: *O. leptosporum* (S. H. Iqbal) J. Walker, *O. dolichostomum*, *O. arcuatissporum* Shearer, J. L. Crane & W. Chen, *O. commune* Shearer, J. L. Crane & W. Chen, *O. fusiforme* Shearer, J. L. Crane & W. Chen, *O. tenuisporum* Shearer, J. L. Crane & W. Chen and *O. venezuelense* Shearer, J. L. Crane & W. Chen (Shearer et al., 1999). During our extensive investigation of fungi on terrestrial decaying palms and submerged wood in the tropics (Goh and Hyde, 1999; Tsui et al., 2001), we collected three new *Ophioceras* species. They are described and compared with accepted species (Table 1).

Materials and Methods

Submerged woody substrata were collected from streams in Hong Kong, and taken to the laboratory in

plastic bags. The samples were processed and examined following the method described in Tsui et al. (2001). Rainforest habitat in Philippines was also visited and decaying fronds of palms were collected. These were taken to the laboratory in plastic bags and examined after 3-d incubation. Fungi were isolated using the single-spore isolation techniques and where successful, cultures are deposited in HKUCC.

Taxonomy

Ophioceras guttulatum K. M. Tsui, Y. M. Leung, K. D. Hyde & Hodgkiss, sp. nov. Figs. 1–10

Ascomata 400–600 μm alta, 1200–1800 μm diam, subglobosa, superficialia vel immersa, rostrata, gregaria vel solitaria, nigra, paraphysata. Rostrum cylindraceum, 500–1500 μm longum, periphysatum. Peridium 20–40 μm crassum, pseudoparenchymaticum, *textura angularis*, ex cellulis 3–4-stratis brunneis, compressis compositum. Asci 130–160 \times 14–17 μm , octospori, cylindrici, breviter pedicellati, apparatu apicali reflectivo ca. 1–1.5 μm alto 1.5–2 μm diam praediti. Ascosporeae 100–128 \times 4–5 μm , cylindricae, falcatae, guttulateae, 3–5-septatae, pallide luteae vel hyalinae, in massa aurantiacae.

Holotypus: HONG KONG: Tai Po, Lam Tsuen River, on submerged wood, Dec 1998, coll. K. M. Tsui, KM 306 (HKU(M) 12171). Culture of holotype: HKUCC 3622.

Etymology: From the Latin *guttulatum*, referring to the heavily guttulate ascospores.

Colonies on potato dextrose agar slow growing, 3 cm diam after one mo at room temperature (25°C), mycelium white, cottony, low convex with crenate edges, with concentric rings, reverse yellow. No fructifications produced. Ascomata 400–600 μm high, 1200–1800 μm in diam, subglobose, superficial to immersed, with a long beak, gregarious to scattered, black (Fig. 1). Beak cylindrical, 500–1500 μm long, periphy-

Table 1. A synopsis of *Ophioceras* species collected in freshwater habitats.

Species	Ascomata (μm)	Asci (μm)	Ascospores (μm) (Septation)	References
<i>O. arcuatisporum</i>	313–324 × 252–340	276–307 × 15–20	170–239 × 4–7 (5–12)	Shearer et al. (1999)
<i>O. commune</i>	150–350 × 260–400	64–118 × 4–12	50–110 × 2 (3–7)	Shearer et al. (1999)
<i>O. dolichostomum</i>	500 diam	100–130 × 8–12	94–110 × 2–3 (3–7)	Conway and Barr (1978)
<i>O. fusiforme</i>	360–500 × 330–450	70–112 × 6–12	64–104 × 1.5–3 (3–5)	Shearer et al. (1999)
<i>O. guttulatatum</i>	400–600 × 1200–1800	130–160 × 14–17	100–128 × 4–5 (3–5)	This paper
<i>O. hongkongense</i>	500–600 × 700–800	100–125 × 12–14	72–101 × 3.5–4.5 (3–6)	This paper
<i>O. leptosporum</i>	250–300 diam	70–95 × 5–6	70–80 × 1–1.5 (3–7)	Shearer et al. (1999)
<i>O. tenuisporum</i>	240–625 × 260–115	82–114 × 4–6	66–94 × 11–15 (3)	Shearer et al. (1999)
<i>O. venezuelense</i>	730–890 × 745–868	148–180 × 11–18	130–158 × 2–4 (5)	Shearer et al. (1999)

sate, wall layers melanized (Fig. 2). Peridium in longitudinal section *textura angularis*, 20–40 μm wide, comprising 3–4 layers of brown, compressed pseudoparenchyma cells (Fig. 3). Paraphyses 5 μm wide at base, longer than asci, numerous, septate, hyaline, tapering distally (Fig. 8). Asci 130–160 × 14–17 μm (\bar{x} = 147 × 15 μm , n = 25), 8-spored, broadly cylindrical, short pedicellate, thin-walled, with a small refractive apical apparatus, J-, 1–1.5 μm high, 1.5–2 μm in diam (Figs. 4–7). Ascospores 100–128 × 4–5 μm (\bar{x} = 117 × 4.5 μm , n = 45), cylindrical, falcate, heavily guttulate, 3–5-septate, pale yellow to hyaline, orange in mass (Figs. 9–10).

Other examined material: HONG KONG. Tai Po, Lam Tsuen River, on submerged wood, Dec 1998, coll. K. M. Tsui, KM 306 (HKU(M) 12194).

Notes: *Ophioceras guttulatatum* is similar to *O. arcuatisporum* in ascospore width, but the ascospores in *O. guttulatatum* are heavily guttulate, much shorter in length, and have fewer septation. The asci are also broadly cylindrical instead of narrowly cylindrical as in *O. arcuatisporum*.

Ophioceras hongkongense K. M. Tsui, Y. M. Leung, K. D. Hyde & Hodgkiss, sp. nov. Figs. 11–21

Ascomata 500–640 μm alta, 700–800 μm diam, superficialia vel immersa, globosa vel subglobosa, rostrata, gregaria, nigra. Rostrum cylindricum, ca. 600 × 200 μm , periphysatum. Paries ascomatis pseudoparenchymaticus, bistratus, 20–40 μm crassus; stratum exterius *textura angularis*, materia nigra amorphica completum; stratum interius ex cellulis pallide brunneis compositum. Asci 100–125 × 12–14 μm , octospori, late cylindrici, breviter pedicellati, apparatu apicali refractivo ca. 1.5 μm alto 2 μm diam praediti. Ascosporae 72–101 × 3.5–4.5 μm , cylindricae, falcatae, guttulate, 3–5-septatae, hyalinae.

Holotypus: HONG KONG: Tai Po. Lam Tsuen River, on submerged wood, Dec 1998, K. M. Tsui, KM 315 (HKU(M) 12226). Culture of holotype: HKUCC 3624.

Etymology: From the Latin *hongkongense*, referring to the place where the fungus was collected.

Colonies on potato dextrose agar slow growing, 3 cm diam after one mo at room temperature (25°C), mycelium olive, effuse, with entire edge, reverse creamy to greenish grey. No fructifications produced. Ascomata

500–640 μm high, 700–800 μm in diam, superficial to immersed, globose to elongate globose, with a long beak, gregarious or scattered, black (Fig. 11). Beak more than 600 μm long, ca. 200 μm wide, cylindrical, periphysate. Peridium 20–40 μm wide, *textura angularis*, two layered: inner layer comprised pale brown, pseudoparenchyma cells, outer layer comprised of small angular cells with dark brown amorphous material (Figs. 12–13). Paraphyses 4–5 μm wide, more than 100 μm long, numerous, septate, hyaline, tapering distally (Fig. 17). Asci 100–125 × 12–14 μm (\bar{x} = 113 × 13 μm , n = 20), elongated fusoid to broadly cylindrical, with acute apex, 8-spored, short pedicellate, thin-walled, with a small refractive apical apparatus, J-, ca. 1.5 μm high, 2 μm in diam (Figs. 14–16). Ascospores 72–101 × 3.5–4.5 μm (\bar{x} = 88 × 4 μm , n = 40), cylindrical, falcate, tapered at both ends, 3–5-septate, hyaline (Figs. 18–21).

Notes: The ascospores in *O. hongkongense* are similar to those of *O. commune* and *O. fusiformis* in length and number of septa, but are falcate, non-sigmoid and greater in width. The apex of asci in *Ophioceras hongkongense* is also acute in comparison to *O. fusiformis*.

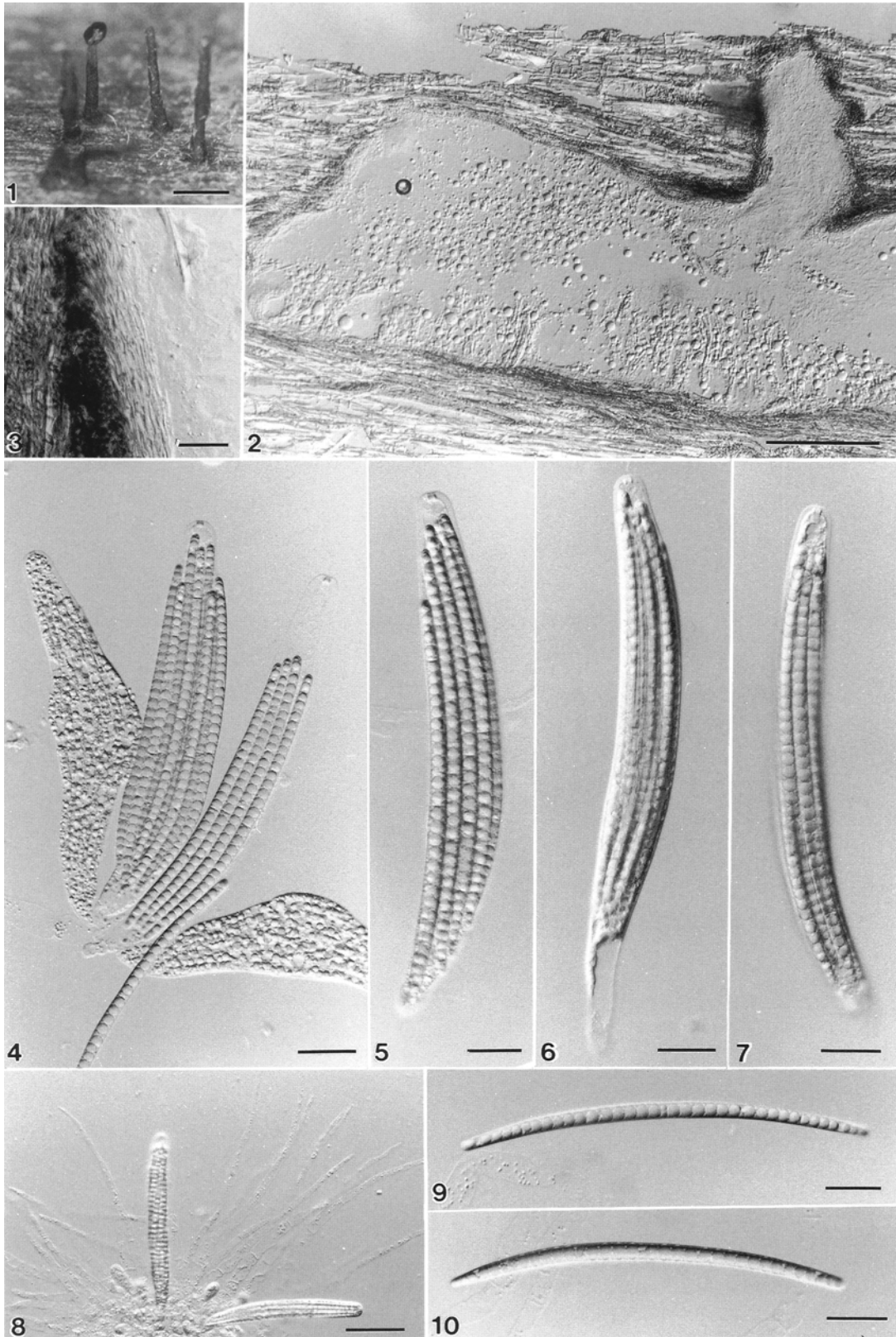
Ophioceras palmae K. M. Tsui, Y. M. Leung, K. D. Hyde & Hodgkiss, sp. nov. Figs. 22–31

Ascomata 164–320 × 244–288 μm , globosa vel subglobosa, partim immersa vel erumpentia, gregaria, fusca vel nigra, paraphysata. Rostrum cylindricum, 180–376 × 220–288 μm , periphysatum. Peridium 8–16 μm crassum, *textura angularis*, tristratum: stratum exterius pallide brunneum; stratum medius brunneum; stratum interius hyalinum. Asci 76–96 × 10–14 μm , octospori, late cylindrici, sigmoidei, breviter pedicellati, apice truncati, apparatu apicali 2 μm alto 2 μm diam praediti. Ascosporae 79–90 × 3–4 μm , sigmoideae, filiformes, 5-septatae, hyalinae.

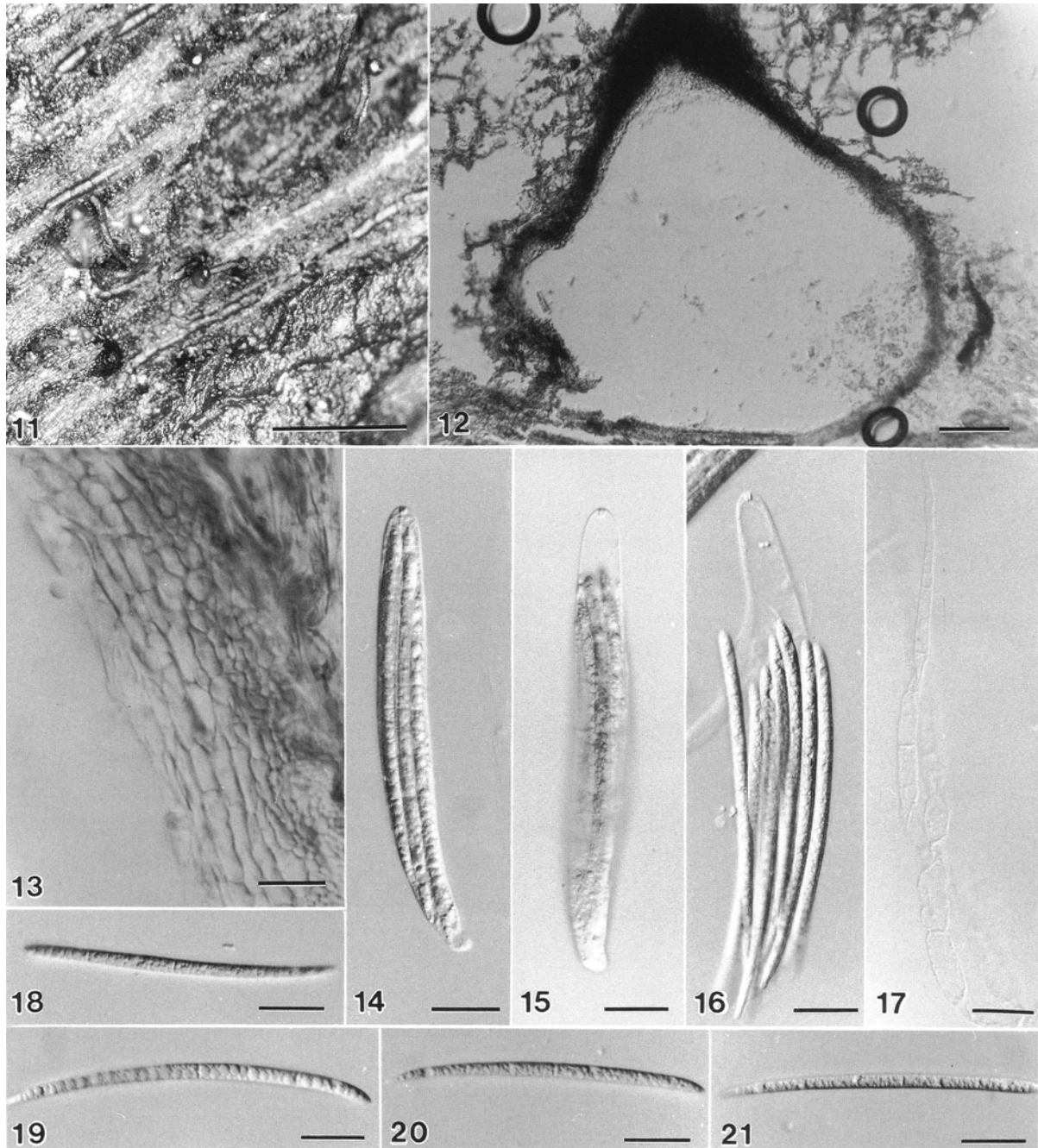
Holotypus: PHILIPPINES: Mt. Makiling, on *Calamus ornatus* Becc., coll. K. D. Hyde & T. Umali, Sep 1995 (HKU(M) 2441).

Etymology: From the Latin *palmae*, referring to the type of plant substrates.

Ascomata 164–320 × 244–288 μm , globose to subglobose, erumpent to partly immersed, gregarious, dark brown to black. Neck cylindrical, *textura intricata*, 180–376 × 220–288 μm , pale brown at tips, periphy-



Figs. 1–10. *Ophioceras guttulatum* (from holotype). 1. Appearance of ascomata on wood. 2. Section of the ascoma. 3. Section of the peridium. 4–7. Asci. 8. Asci with paraphyses. 9–10. Ascospores. Bars: 1=500 μm ; 2=100 μm ; 3=25 μm ; 4=20 μm ; 5–7, 8=50 μm ; 9–10=15 μm .

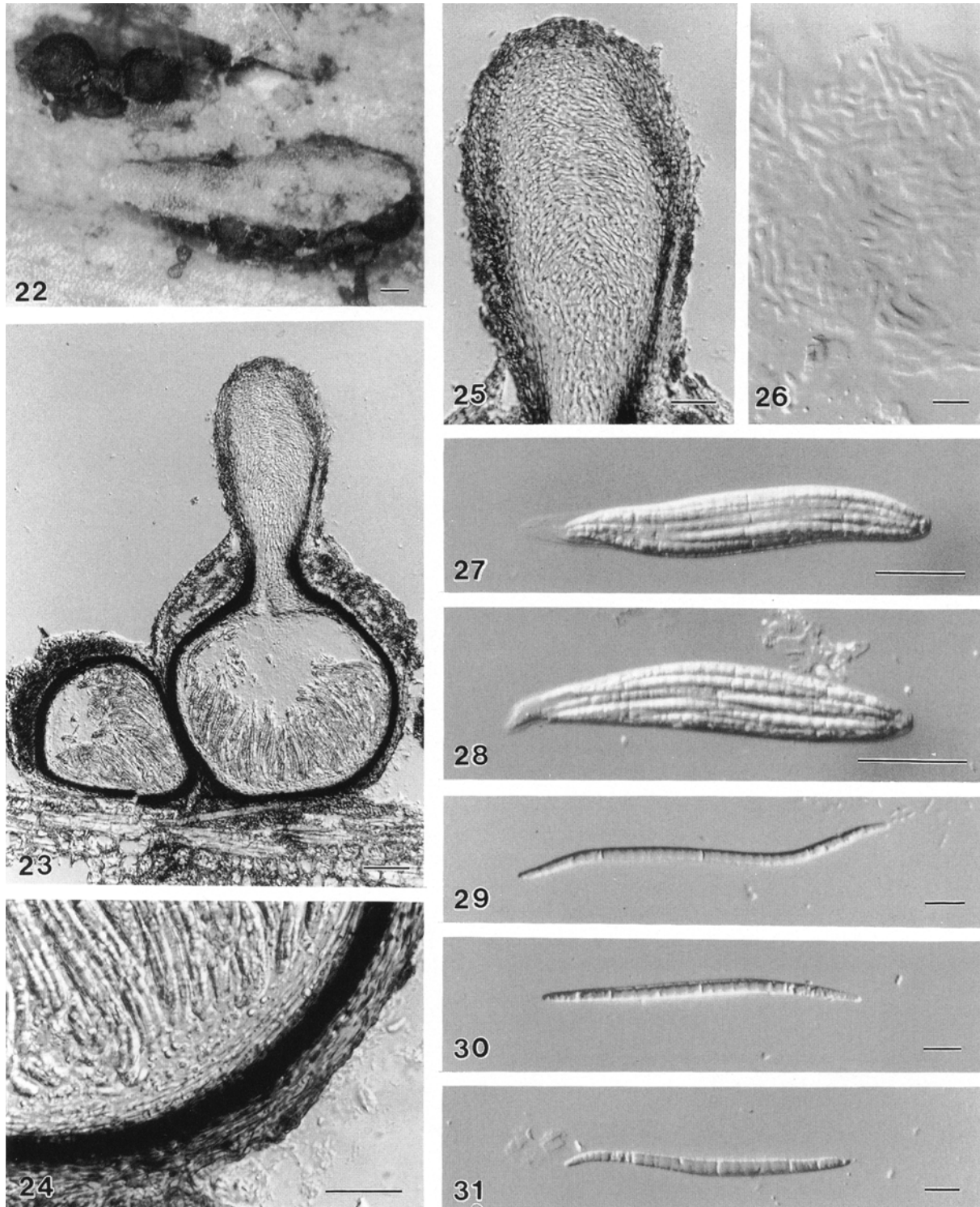


Figs. 11–21. *Ophioceras hongkongense* (from holotype). 11. Appearance of ascomata on wood. 12. Section of the ascoma. 13. Section of the peridium. 14–16. Asci. 17. Paraphyses. 18–21. Ascospores. Bars: 11=200 μm ; 12=100 μm ; 13=10 μm ; 14–16=15 μm ; 17–21=18 μm .

sate. Peridium 8–16 μm wide, *textura angularis*, 3-layered, outer layer pale brown, comprised of 6–7 layers of compressed cells; middle layer brown comprised of 5–6 layers of brown walled compressed cells, inner layer hyaline, comprised of 3–4 layers of compressed cells, peridium thicker at the upper portion of perithecia than base. Paraphyses ca. 2–3 μm wide, hypha-like, septate, unbranched, hyaline. Asci 76–96 \times 10–14 μm (\bar{x} =86.5 \times 13 μm , n=30), 8-spored, broad cylindrical, sigmoid,

apex truncate, base round, short pedicellate, with disc-like, J-, refractive apical rings, ca. 2 μm high \times 2 μm diam. Ascospores 79–90 \times 1.2–2.0 μm (\bar{x} =84 \times 3 μm , n=30), sigmoid, filiform, tapering at both ends, 5-septate, hyaline.

Notes: This taxa has black perithecia with long necks, cylindrical asci with apical ring and filiform ascospores and is the first record of *Ophioceras* species from a palm. It is distinct in having asci with truncate apical



Figs. 22–31. *Ophioceras palmae* (from holotype). 22. Appearance of ascomata on palm. 23. Section of the ascoma. 24. Section of the peridium. 25. Section of the neck. 26. Paraphyses. 27–28. Asci. 29–31. Ascospores. Bars: 22=100 μm ; 23, 25=50 μm ; 24, 26–28=10 μm ; 29–31=5 μm .

tips and disc-like apical rings. It resembles *O. hongkongense* and *O. fusiforme* in ascospore size, but the ascospores in *O. palmae* are unique in being sigmoid.

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