
Three new species of *Massarina* associated with terrestrial, non-marine parts of mangroves

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Three species of *Massarina* were collected during investigations into the saprobic fungi occurring on the terrestrial, non-marine parts of mangrove trees in Mauritius. The new species, *M. beaurivagea*, *M. mauritiana* and *M. rhizophorae* are described, illustrated and compared to similar species.

Key words: *Lophiostomataceae*, manglicolous fungi, *Massarina*, terrestrial fungi

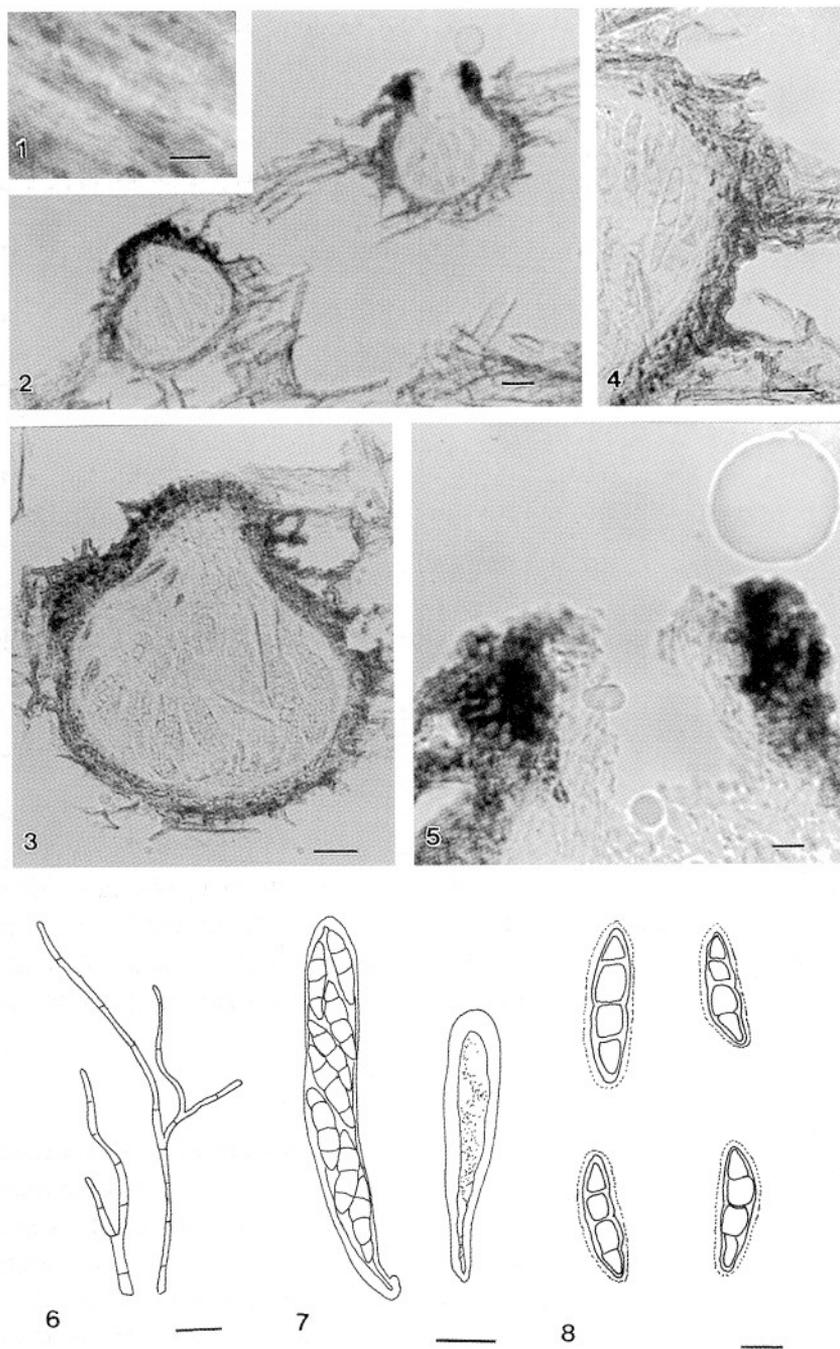
Introduction

Most studies on manglicolous fungi have concentrated on the marine component of the ecosystem. An important part of mangrove ecosystems is the terrestrial, non-marine habitat, and this habitat has been neglected as far as saprobic fungi are concerned (Kohlmeyer, 1969). No species of *Massarina* were reported from terrestrial parts of mangrove plants, in the review of Kohlmeyer (1969).

In a recent world monograph on the genus *Massarina*, Aptroot (1998) retained 43 species amongst some 160 *Massarina* names (Hyde, 1995). Nine of the accepted species are from marine habitats and have been recorded on various intertidal mangrove substrates (Hyde, 1991; Kohlmeyer and Volkmann-Kohlmeyer, 1991a, b; Hyde *et al.*, 1992; Poon and Hyde, 1998). In the present study three species of *Massarina* are reported from the terrestrial, non-marine parts of various mangrove plants, including *Bruguiera gymnorrhiza*, *Rhizophora mucronata* and the mangrove associate, *Hibiscus tiliaceus*.

Taxonomy

1. *Massarina beaurivagea* Poonyth, K.D. Hyde, Aptroot and Peeraly, **sp. nov.** (Figs. 1-8)



Figs. 1-8. *Massarina beaurivagea* (from holotype). **1.** Appearance of ascomata on host surface. **2, 3.** Sections of ascomata. **4.** Peridium. **5.** Section of neck. **6.** Pseudoparaphyses. **7.** Asci. **8.** Ascospores. Bars: 1 = 200 μm , 2 = 50 μm , 3, 4 = 20 μm , 5-8 = 10 μm .

Etymology: From the site of collection, Beau Rivage.

Ascomata 165-185 μm alta, 150-170 μm diam., immersa, subglobosa ad pyriformia, ostiolata, solitaria vel gregaria. *Collum* 73-80 μm diam., periphysibus vestitum. Peridium 20-56 μm , textura intricata formans, brunneum. *Asci* 55-80 \times 13-17 μm , octospori, clavati, breviter pedicellati, fissitunicati, cum camera apicali et spissescens apicali. *Ascosporae* 18-21 \times 6-8 μm , fasciculatae, pallido fuscae, anguste fusiformes, cum apicibus rotundatus, uniseptatae, constrictis ad septum, tunica gelatinosa praeditae.

Holotype: MAURITIUS, Beau Rivage mangrove, on dead wood of *Hibiscus tiliaceus*, Dec. 1996, A.D. Poonyth (HKU(M)10262).

Ascomata 165-185 μm high, 150-170 μm diam., immersed, subglobose to pyriform, solitary or gregarious (Figs. 1, 2). *Neck* visible as a black cone or dome on the host surface, bleached around the neck, the bleached area being delimited by a black border, 73-80 μm diam., erumpent, periphysate, opening into a rounded ostiole (Figs. 2, 3). *Peridium* 20-56 μm wide, thickest around base of neck, comprising brown *textura intricata* (Figs. 4, 5). *Pseudoparaphyses* 1-2.5 μm diam., anastomosing above the asci, branched, embedded in a gelatinous matrix (Fig. 6). *Asci* 55-80 \times 13-17 μm , 8-spored, clavate, short-pedicellate, fissitunicate, apex rounded with an ocular chamber and apical thickening (Fig. 7). *Ascospores* 18-21 \times 6-8 μm , 2-3-seriate, fusiform with acute rounded ends, thick-walled, 1-septate, slightly constricted at septum, surrounded by a 1-2 μm thick gelatinous sheath (Fig. 8); mature ascospores pale brown; young ascospores hyaline and thinner (4-6 μm) and seemingly 3-septate.

Habitat: Saprobic on *Hibiscus tiliaceus*.

Known distribution: Mauritius.

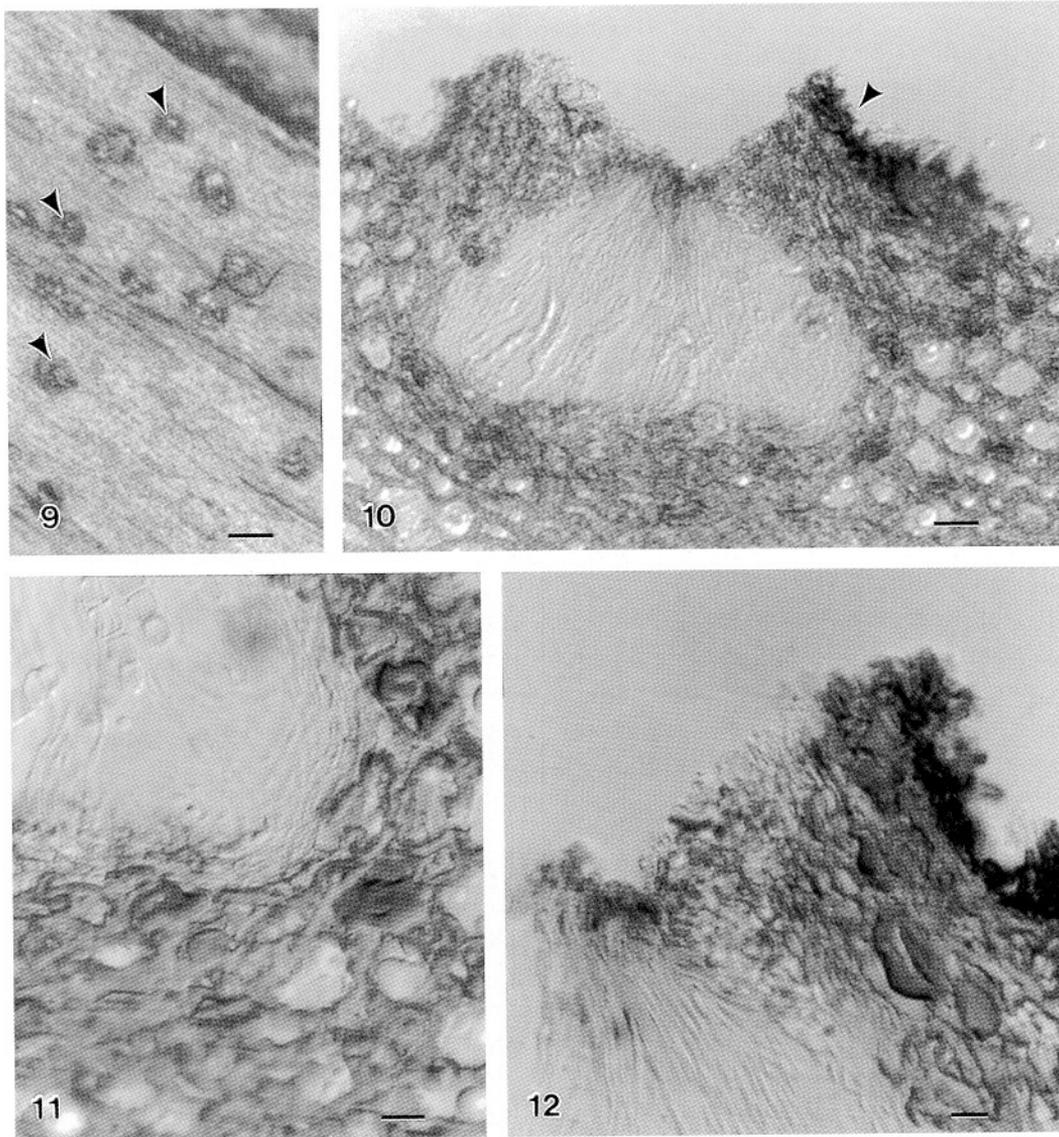
Other material examined: Same locality (HKU(M) 10261, 10263, 10264, 10265, 10267, 10268, 10273).

These collections could not be identified using the key provided by Aptroot (1998). *Massarina* species with thick-walled ascospores include *M. eburnea* (Tul. and Tul.) Sacc., *M. cisti* Bose and *M. moeszii* Tóth. *Massarina eburnea* has 3-septate ascospores, but differs from *M. beaurivagea* in having larger ascospores (33-42 \times 9.5-12 μm) and a clypeus (Hyde, 1995; Aptroot, 1998). Ascospores of *M. cisti* are 1-3-septate, broadly fusiform with rounded ends and lack a gelatinous sheath, while those of *M. moeszii* are only 1-septate and lack a gelatinous sheath. Both *M. cisti* and *M. moeszii* have larger ascospores than those of the present collections (Aptroot, 1998).

2. *Massarina mauritiana* Poonyth, K.D. Hyde, Aptroot and Peerally, **sp. nov.**
(Figs. 9-21)

Etymology: In reference to Mauritius, where the fungus was first collected.

Ascomata 160-185 μm alta, 210-240 μm diam., immersa, clypeata, pyriformia, ostiolata, solitaria vel gregaria. Peridium 34-42 μm crassum. *Asci* 74-81 \times 23-36 μm , octospori, late clavati, breviter pedicellati, fissitunicati, cum apice rotundo et camera apicali. *Ascosporae* 26-34 \times 8-9.5

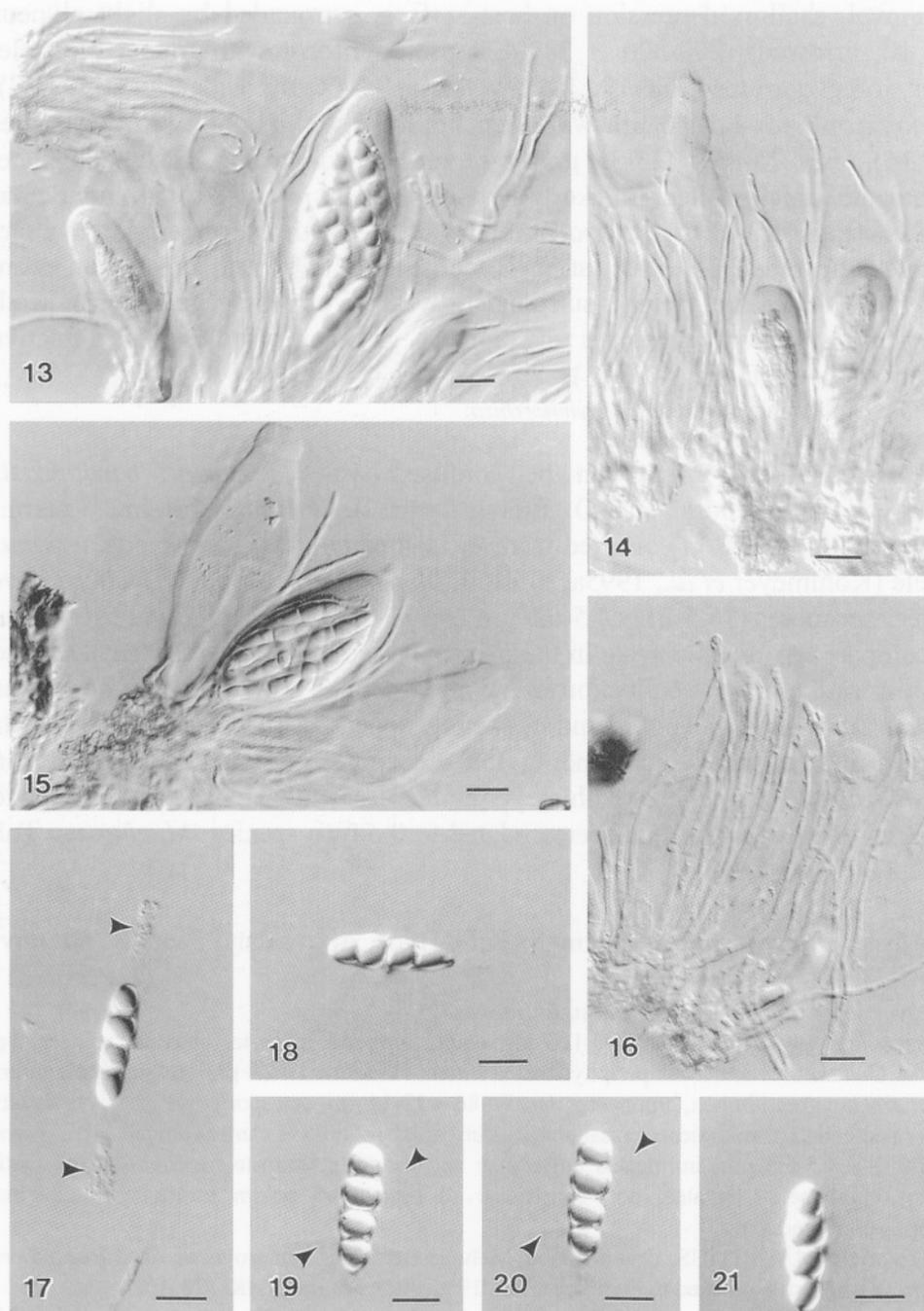


Figs. 9-12. *Massarina mauritiana* (from holotype). **9.** Appearance of ascomata on host surface. Note the rounded ostioles (arrowheads). **10.** Section through ascoma. Note the poorly developed clypeus (arrowhead). **11.** Peridium and host cells. **12.** Section through neck. Bars: 9 = 200 μm , 10 = 20 μm , 11, 12 = 10 μm .

μm , 3-4-seriatae, hyalinae, crassispiesscens, prolatus ellipsoideae, 3-septatae, constrictae ad septae, cum constrictio magis conspicuum ad septae primariae, tunica gelatinosa praeditae.

Holotype: MAURITIUS, Grand Gaube, Melville Barachois, in bark of *Bruguiera gymnorrhiza* twig still attached to living tree, 20 Aug. 1995, A.D. Poonyth (HKU(M)10239).

Ascomata 160-185 μm high, 210-240 μm diam., immersed, forming under



Figs. 13-21. *Massarina mauritiana* (from holotype). 13-16. Asci and pseudoparaphyses. 17-21. Ascospores. Note the granular texture of the sheath at the poles and the refractive structures adjacent to the septa (arrowheads). Bars = 10 μ m.

black, oval, shallow depression on host surface, surrounded by slight clypeus (Fig. 10, arrowed), 200-300 × 280-420 µm, pyriform with rounded ostiole, solitary or gregarious (Figs. 9, 10). *Peridium* 34-42 µm wide (Figs. 11, 12). *Pseudoparaphyses* 1.5-2.5 µm wide, septate, long, with slightly swollen apices (Fig. 16). *Asci* 74-81 × 23-36 µm, 8-spored, broad-clavate, short-pedicellate, fissitunicate, thick-walled, thickest at apices, apex rounded, with an ocular chamber (Figs. 13-15). *Ascospores* 26-34 × 8-9.5 µm, 3-4-seriate, hyaline, elongate ellipsoidal, 3-septate, strongly constricted at septa, constriction more pronounced at middle septum, surrounded by a 2-5 µm wide gelatinous sheath which swells strongly in water and appears granular at poles and refractive adjacent to the septa (Figs. 17-21).

Habitat: Saprobic on *Bruguiera gymnorrhiza*.

Known distribution: Mauritius.

Massarina mauritiana can be confused with *Massarina carolinensis* Kohlm., Volkm.-Kohlm. and O. Eriksson and *M. ricifera* Kohlm., Volkm.-Kohlm. and O. Eriksson collected from the saltmarsh grass *Juncus roemerianus* Scheele (Kohlmeyer *et al.*, 1995a, b). Both *M. carolinensis* and *M. ricifera* have smaller ascospores (16.5-21 × 4.5-6.5 µm and 19-25 × 5.5-7 µm), and cylindrical asci compared to broad clavate in the present collection. *Massarina ricifera* also differs from the present collection in having ascomata with a distinct neck. The granular texture at the poles and refractive appearance adjacent to the septa observed in the sheath surrounding the ascospores was not reported in *M. carolinensis* and *M. ricifera* (Kohlmeyer *et al.*, 1995a, b). The species belongs to the genus *Massarina s.s.* and seems related to the type species, *M. eburnea* Tul. and C. Tul.

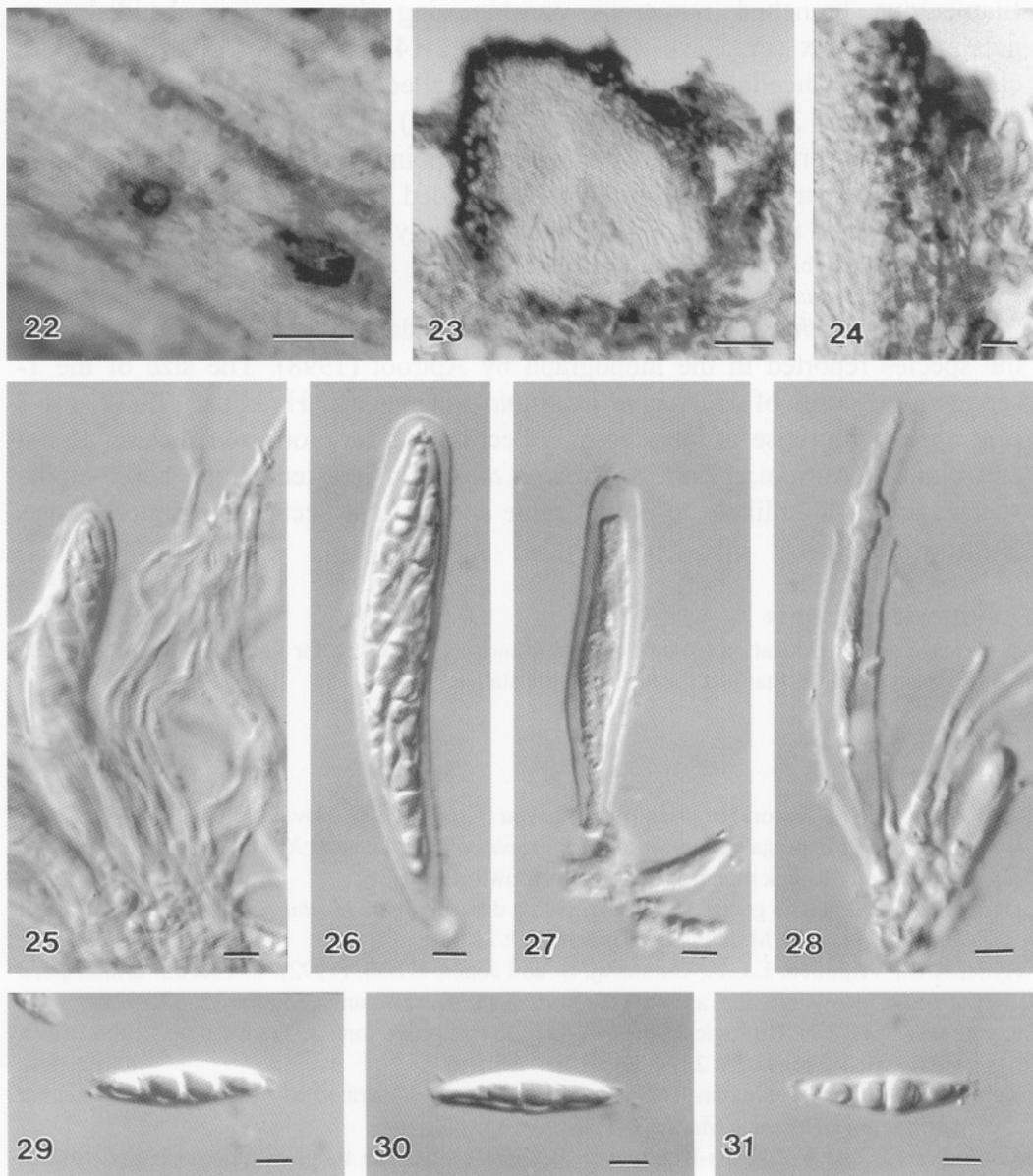
3. *Massarina rhizophorae* Poonyth, K.D. Hyde, Aptroot and Peeraly, **sp. nov.**
(Figs. 22-31)

Etymology: In reference to the host, *Rhizophora*.

Ascomata 140-160 µm alta, 90-120 µm diam., immersa in parte, obovata, solitaria vel gregaria. *Collum* brevis, densus periphysibus vestitum. *Peridium* 10-28 µm crassum, cellularum angulatum cum grandilumen, brunneum. *Asci* 70-86 × 12-14 µm, octospori, cylindrici ad clavati, breviter pedicellati, fissiitunicati, crassitunicati, cum apice rotundo et camera apicali. *Ascospores* 22-28(-33) × 4.5-6.5 µm, imbricatus uniseriatae vel biseriatae, anguste fusiformes cum acutis extremis, hyalinae, 1-septatae, non constrictae ad septae, ad polum utrimque mucilagina, elongata, apice producta.

Holotype: MAURITIUS, Grand Gaube, Melville Barachois mangrove, on dead *Rhizophora mucronata* wood still attached to living tree, Jan. 1995, A.D. Poonyth (HKU(M)10208).

Ascomata 140-160 µm high, 90-120 µm diam., partially immersed, obovoid, necks appearing as black cones on substrate surface, solitary or gregarious (Figs. 22, 23). *Neck* short, with a rounded ostiole, ca. 20 µm diam., plugged by dense



Figs. 22-31. *Massarina rhizophorae* (from holotype). 22. Appearance of ascomata on host surface. 23. Section through ascoma. 24. Section through peridium. 25-27. Asci and pseudoparaphyses. 28. Dehiscent ascus. 29-31. Ascospores. Note the slightly protracted, bluntly ending sheaths at the ends. Bars: 22 = 100 μ m, 23, 24 = 20 μ m, 25-31 = 5 μ m.

tuft of paraphyses (Fig. 23). *Peridium* 10-28 μ m wide, composed of brown thick-walled angular cells with large lumina (Fig. 24). *Paraphyses* 1-2 μ m diam.,

filamentous, branched, numerous, anastomosing above asci, embedded in a gelatinous matrix (Fig. 25). *Asci* 70-86 × 12-14 µm, 8-spored, cylindrical to clavate, short pedicellate, fissitunicate, thick-walled; apex rounded with an ocular chamber (Figs. 25-28). *Ascospores* 22-28(-33) × 4.5-6.5 µm, overlapping uniseriate or biseriate, narrowly fusiform with pointed ends, hyaline, guttulate, 1-septate, not constricted at the septum; surrounded by a 1 µm thick mucilaginous sheath protracted to 2-6 µm at ends, ending bluntly (Figs. 29-31).

Habitat: Saprobic on *Rhizophora mucronata*.

Known distribution: Mauritius.

Massarina rhizophorae has a unique appendage type not shown by any of the species reported in the monograph by Aptroot (1998). The size of the 1-septate ascospores of *Massarina amphibia* Magnes and Hafellner (23-32 × 4-7 µm) agree with those of the present collection, but its protracted sheaths do not end bluntly (Aptroot, 1998). *Massarina amphibia* is a temperate, boreo-alpine species and it is unlikely to be the same species that occurs on tropical coasts (Aptroot, 1998).

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