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## NEWLY RECORDED SPECIES OF *MARASMIUS* (AGARICALES, MARASMIACEAE) TO THE MYCOTA OF INDONESIA

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### ABSTRAK

Atik Retnowati & Dennis E. Desjardin. 2022. Rekaman baru jenis *Marasmius* (Agaricales, Marasmiaceae) untuk jamur Indonesia. *Floribunda* 7(1): 1–12 — Enam jenis *Marasmius* sebagai rekaman baru jamur di Indonesia dilaporkan dari Jawa; *M. tubulatus*, *M. aff. subruforotula*, *M. nigrobrunneus* f. *cinnamomeus*, *M. xestocephalus*, *M. grandisetulosus*, dan *M. olaecephalus*. Jenis-jenis tersebut merupakan anggota seksi *Sicci* dan *Marasmius*. Deskripsi karakter morfologi yang lengkap, foto, ilustrasi garis untuk karakter mikroskopis pada setiap jenis, dan kunci determinasi jenis disajikan dengan catatan singkat terkait taksonomi masing-masing jenis.

Kata kunci: informasi distribusi, jamur marasmioid, taksonomi.

Atik Retnowati & Dennis E. Desjardin. 2022. Newly recorded species of *Marasmius* (Agaricales, Marasmiaceae) to the mycota of Indonesia. *Floribunda* 7(1): 1–12 — Six species of *Marasmius* newly documented in the mycota of Indonesia are reported from Java; *M. tubulatus*, *M. aff. subruforotula*, *M. nigrobrunneus* f. *cinnamomeus*, *M. xestocephalus*, *M. grandisetulosus*, and *M. olaecephalus*. Those species belong to sections *Sicci* and *Marasmius*. Detailed morphological descriptions, photos, line drawings of micro-morphological features of each species and keys to species are provided with a brief discussion on their taxonomy.

Keywords: Distribution records, marasmioid fungi, taxonomy.

The genus *Marasmius*, one of the mushroom genera in the family Marasmiaceae, consists of approximately 500 species (Kirk *et al.*, 2008). It is distributed worldwide with high diversity in tropical and subtropical areas. They are commonly encountered and form relatively small marcescent basidiomata with convex to campanulate pileus, adnate to adnexed lamellae that may be collariate, an insititious or non-insititious cartilaginous stipe, white basidiospores, and a hymeniform pileipellis. Most are saprophytic, and some are parasitic and have no mycorrhizal association.

Preliminary research on *Marasmius* from Indonesia was published by Leveille (1844, 1846), Moritzi (1845–1846), Zollinger (1844), Hennings (1900), Overeem & Overeem-de Haas (1922) and Boedijn (1940). The species were mostly reported

from Java, and it has become a very important place for the development of mycological research of Indonesia with some type localities of the described species; Cibodas and Bogor Botanical Gardens, Mount Gede Pangrango. The island represents the lowland forest, which includes extensive evergreen rain forest, semi-evergreen rain forest, moist deciduous forest along the northern coast, and a dry deciduous forest.

This study was carried out as part of the Agaricales of Java and Bali Project (1999–2001), and it was expected to provide an overview of the diversity of *Marasmius* in Indonesia. Desjardin *et al.* (2000) provided the most comprehensive recent treatment of the genus in Indonesia, reporting 37 species from Java and Bali, including 12 new species from both islands. Fieldwork conducted since

this publication has yielded six additional species of *Marasmius* from Java and reported in this paper as new additional records for Indonesia.

## MATERIALS AND METHODS

Specimens of *Marasmius* were collected from the Indonesian province of West Java: Bogor Botanical Gardens, Mount Salak, and Mount Halimun. The collections were carried out during the rainy season in January 2000-2001. The specimens of *Marasmius* were collected by Purposive Random Sampling. Notes on important macromorphological features were made in the field soon after collecting. Microscopic observation was made in material mounted in 3% of KOH. Color notation was determined using Kornerup and Wanscher (1978). Examined specimens are deposited in Herbarium Bogoriense (BO), Indonesia and Harry D. Thiers Herbarium (SFSU) at San Francisco State University, USA.

Line drawings of the micro-characters were made with the aid of a camera lucida attached to a compound microscope using 40× or 100× (oil immersion) objectives. Spore range was obtained by

measuring 25 mature basidiospores. Basidiospore statistics include: the arithmetic mean of the spore length by spore width ( $\pm$  standard deviation) for  $n$  spores measured in a single specimen ( $x_m$ ); the range of spore means ( $x_{mr}$ ), and the variation in relation to the mean of spore means ( $\pm$  SD) when more than one specimen is available ( $x_{mm}$ ); the quotient of basidiospore length and basidiospore width in any basidiospore, indicated as a range of variation in  $n$  basidiospores measured ( $Q$ ); the mean of  $Q$ -values in a single specimen ( $Q_m$ ); the range of  $Q_m$ -values where more than one specimen is available ( $Q_{mr}$ ); and the mean of  $Q_m$ -values where more than one specimen is available ( $Q_{mm}$ ) (Retnowati, 2018).

## RESULTS AND DISCUSSION

During the identification process of the *Marasmius* collections made in 2000-2001, six species with newly distribution records for Indonesia were encountered. Key to sections and complete descriptions of morphological characters of each species are provided.

### Key to sections, subsections and species of *Marasmius* from Java

- 1a. Collarium present; stipe insititious ..... **sect. *Marasmius* 2**  
 1b. Collarium absent; stipe insititious or non-insititious ..... **sect. *Sicci* 4**  
 2a. Pileipellis composed of *Rotalis*-type broom cells, Pileus greyish orange to brownish orange lacking a papilla; lamellae subdistant; stipe 30 mm long <, lacking rhizomorph ..... **subject. *Marasmius* 1. *M. tubulatus***  
 2b. Pileipellis composed of *Siccus*-type broom cells, Pileus reddish brown, lamellae distant, stipe up to 60 mm, rhizomorph present or absent ..... **subject. *Sicciformis* 3**  
 3a. Pileus with or without a central black spot, stipe length up to 25 mm, stipe width up to 0.01 mm ..... **2. *M. aff. subruforotula***  
 3b. Pileus with a central dark spot, stipe length up to 60 mm ..... **3. *M. nigrobrunneous* f. *cinnamomeus***  
 4a. Pleurocystidia absent, caulocystidia present ..... **ser. *Atrorubentes* 4. *M. xestocephalus***  
 4b. Pleurocystidia present, caulocystidia absent to uncommon ..... **ser. *Haematocephalus* 5**  
 5a. Pileus reddish brown when dried; lamellae adnexed, distant to remote, marginate; basidiospores 22.4-25 mm long ..... **5. *M. grandisetulosus***  
 5b. Pileus with distinctive colour change from olivaceous to brown; lamellae narrowly adnate to adnate, close to crowded, non-marginate; basidiospores (11.2)12-15.2(16) mm long ..... **6. *M. olaeocephalus***

### *Marasmius* Fries, Fl. Scan.: 339. 1835 (nom.cons.)

#### Sect. *Marasmius*, subject. *Marasmius*

= sect. *Pararotulae* Singer, Sydowia 18: 339. 1965. [Type species: *Marasmius pararotula* Singer].

= subject. *Pararotulae* (Singer) Singer, Fl. Neotropica Monogr. 17: 92. 1976.

#### 1. *Marasmius tubulatus* Petch (1948: 42).

Fig. 1-2.

Type: SRILANKA, Peradeniya, on dead leaves and twigs, 1 November 1914, Petch 4243 (K).

Pileus 2.5–7 mm diam, flattened-conical to subcylindrical with an umbilicate disc, striate to sulcate, dull, dry, glabrous; umbilicus pallid cream to cream-brown, with a darker central spot (no pa-

pilla); most of pileus greyish orange (5B4–5) to brownish orange (6C4–6). Lamellae adnate to a collarium, subdistant, broad, off-white to pale yellowish white, non-marginate. Stipe 30–90 × 0.1 mm, central, wiry, tough, insititious, glabrous, black; typically lacking rhizomorphs, rarely branched.

Basidiospores  $9-11(-12) \times 4-5(-6) \mu\text{m}$  [ $x_m = 9.86 \pm 0.86 \times 4.54 \pm 0.45 \mu\text{m}$ ,  $Q = 1.83-2.50$ ,  $Q_m = 2.18 \pm 0.2$ ,  $n = 25$  spores per one specimen), ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia  $20-24 \times 7-9 \mu\text{m}$ , clavate, 4-spored. Basidioles clavate to fusoid. Cheilocystidia abundant, composed of *Rotalis*-type broom cells; main body  $8-21 \times 8-14 \mu\text{m}$ , clavate to broadly clavate, turbinate, subglobose or irregular in outline, hyaline, thin-walled; divergent setulae  $0.8 \times 0.8 \mu\text{m}$ , conical to narrowly cylindrical, obtuse, crowded, thin-walled. Pleurocystidia absent. Pileipellis hymeniform, mottled, composed of *Rotalis*-type broom cells; main body  $12-24 \times 10-12 \mu\text{m}$ , clavate to broadly clavate, subglobose or irregular in outline, hyaline, thin- to thick-walled; divergent setulae  $1.6-2 \times 0.8 \mu\text{m}$ , narrowly cylindrical to conical, ob-

tuse, crowded. Stipe tissue monomitic; cortical hyphae  $3-6 \mu\text{m}$  diam, parallel, cylindrical, yellowish brown, smooth, thin-walled, dextrinoid; medullary hyphae  $3-4 \mu\text{m}$  diam, parallel, cylindrical, hyaline, thin-walled, dextrinoid. Stipe vestiture absent. Clamp connections present.

Habitat: on undetermined leaves in primary forest, elevation ca. 1000 m.

Known distribution: Indonesia, Sri Lanka (type) (Petch, 1948; Pegler, 1986) and Malaysia (Tan *et al.*, 2009).

Material examined: INDONESIA. West Java, Mt. Halimun National Park, trail from Cikaniki, elevation ca. 1000 m, solitary to scattered on undetermined leaves in primary forest 9 January 2001, leg. A. Retnowati (D.E.D 7208, BO!, SFSU).

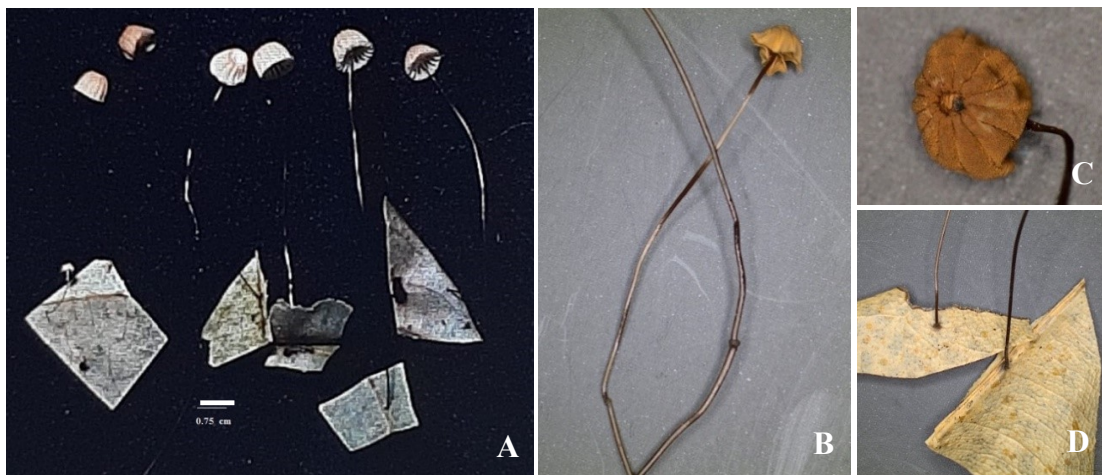


Figure 1. *Marasmius tubulatus* Petch. A. Fruiting bodies; B. Branched stipe; C. Dark central spot at pileus; and D. Insititious stipe. From D.E. Desjardin 7208. (Photo A: D.E.Desjardin; B-D: A. Retnowati). Scale bars: A= 0.75 cm.

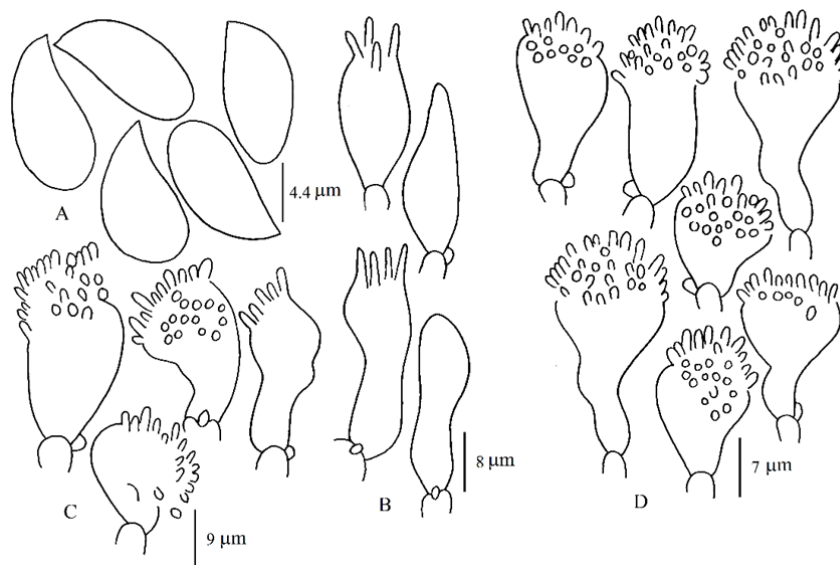


Figure 2. Micro-morphological features of *Marasmius tubulatus* Petch.: A. Basidiospores; B. Basidia-basidioles; C. Cheilocystidia; and D. Pileipellis (Drawn by A. Retnowati from D.E. Desjardin 7208).

*Notes.* *Marasmius tubulatus* is characterized by a greyish orange to brownish orange or light brown pileus with a darker central spot (no papilla), collariate lamellae with or without light brown edges, a dark brown to black, wiry insititious stipe, and broadly ellipsoid basidiospores. The Indonesian

specimen differs only subtly from material reported from Sri Lanka (Petch 1948; Pegler, 1986) and Malaysia (Tan *et al.*, 2009) in forming a longer stipe (up to 90 mm) and slightly larger basidiospores (mean  $9.8 \times 4.5 \mu\text{m}$  versus  $9.3 \times 4.0 \mu\text{m}$ ).

**Sect. *Marasmius* subs. *Sicciformis*** Antonín, Acta Mus. Moraviae, Sci. Nat. 76: 145. 1991.

Type species: *Marasmius curreyi* Berk. & Broome

= subsect. *Penicillati* Singer sensu Singer, Fl. Neotropica Monogr. 121. 1976

[Type species: *Marasmius graminum* (Lib.) Berk. Sensu Singer].

**2. *Marasmius* aff. *subruforotula*** Singer (1964: 339). Fig. 3-4.

Type: ZAIRE, Forestier Central, 20 km N. E. of Yambao, alt. 470 m, 19 June 1939, Louis 15235 (BR).

Pileus 2.5–5 mm diam, convex to plano-convex, umbilicate or plano-conical umbilicate, plicate, with or without papilla, with or without a central black spot, dull, dry, glabrous, minutely granulose, deep reddish brown (8C6–8) fading to brownish red (8C6–8) on margin in age with a slightly paler umbilicus. Lamellae adnate to a collarium, distant (8–13 reaching stipe) with no lamellulae, broad, concave, white to cream buff, non-marginate or edges spotted reddish brown. Stipe 7–25  $\times$  0.1 mm, central, wiry, glabrous, shiny, dry, insititious, black; attached to substrate, with or without wiry black rhizomorphs.

Basidiospores  $8\text{--}9.6\text{--}10.4 \times (3.2\text{--})4\text{--}4.8$  [ $x_{\text{mr}} = 8.5\text{--}8.9 \times 4.0\text{--}4.4 \mu\text{m}$ ,  $x_{\text{mm}} = 8.74 \pm 0.27 \times 4.19 \pm 0.27 \mu\text{m}$ ,  $Q = 1.7\text{--}2.5$ ,  $Q_{\text{mr}} = 2.05\text{--}2.15$ ,  $Q_{\text{mm}} = 2.10 \pm 0.07$ ,  $n = 25$  spores per 2 speci-

mens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia  $20\text{--}22 \times 5\text{--}6 \mu\text{m}$ , clavate, 4-spored. Basidioles clavate to fusoid. Cheilocystidia common, composed of *Siccus*-type broom cells; main body  $4\text{--}17 \times 3\text{--}10 \mu\text{m}$ , clavate to broadly clavate or irregular in outline, hyaline to yellowish brown, thin-walled; apical setulae  $3\text{--}8 \times 0.8\text{--}2 \mu\text{m}$ , cylindrical to conical in outline, hyaline to yellowish brown, thin-walled. Pleurocystidia absent. Pileipellis hymeniform, mottled to weakly mottled, composed of *Siccus*-type broom cells; main body  $8\text{--}25 \times 4\text{--}14 \mu\text{m}$ , clavate to broadly clavate or irregular in outline, yellowish brown to brown, thin- to thick-walled, often branched apically; apical setulae  $2\text{--}8 \times 0.8\text{--}2 \mu\text{m}$ , cylindrical to conical or irregular in outline, obtuse to subacute, thin-walled. Stipe tissue monomitic; cortical hyphae  $2\text{--}6 \mu\text{m}$  diam, parallel, cylindrical, brown, dextrinoid, thin to thick-walled; medullary hyphae  $2\text{--}7 \mu\text{m}$  diam, parallel, cylindrical, hyaline, weakly dextrinoid, thin-walled. Stipe vestiture absent. Clamp connections present.

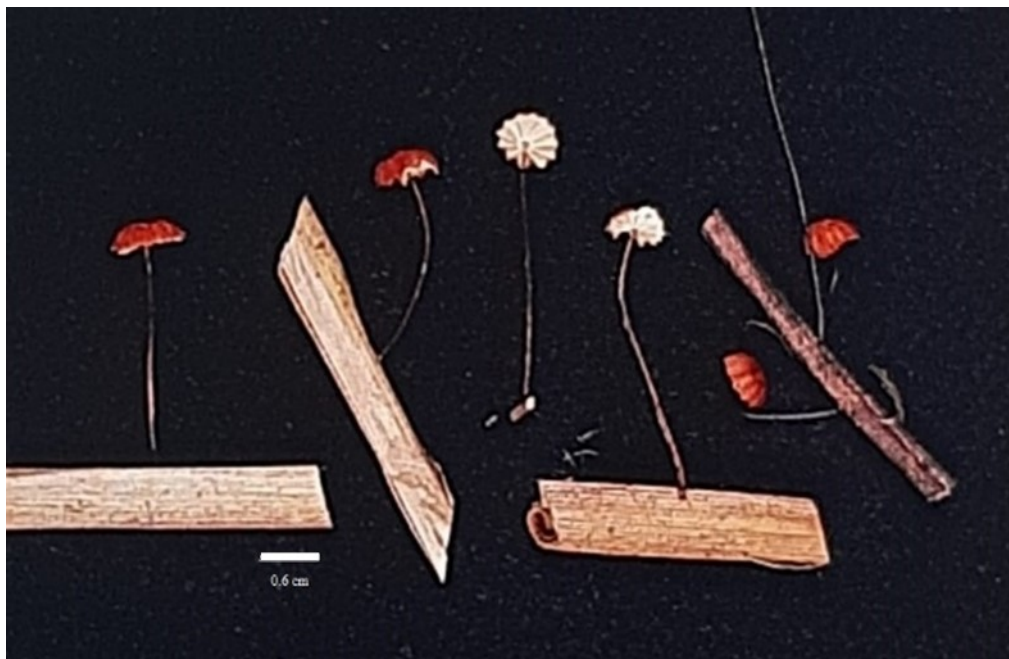


Figure 3. Fruiting bodies of *Marasmius* aff. *subruforotula* Singer. From D.E. Desjardin 7050. (Photo: D.E. Desjardin). Scale bar = 0.6 cm.

Habitat: On grass stems, fern rachis, rattan palm debris or rotten dicot leaves.

Known distribution: Indonesia, Thailand (Wannathes *et al.*, 2009) and Príncipe (Grace *et al.*, 2019).

Materials examined: INDONESIA. West Java, Mt. Salak, Curug Nangka, N-slope, solitary on

grass stems and fern rachis, 7 January 2000, leg. D.E. Desjardin (DED 7050, BO!, SFSU); Bogor, Botanical Garden, scattered on rattan palm debris, 8 January 2000, leg. D.E. Desjardin (DED 7077, BO!, SFSU); *ibid.*, gregarious on rotten dried leaves, 9 January 2000, leg. D.E. Desjardin (DED 7087, BO!, SFSU).

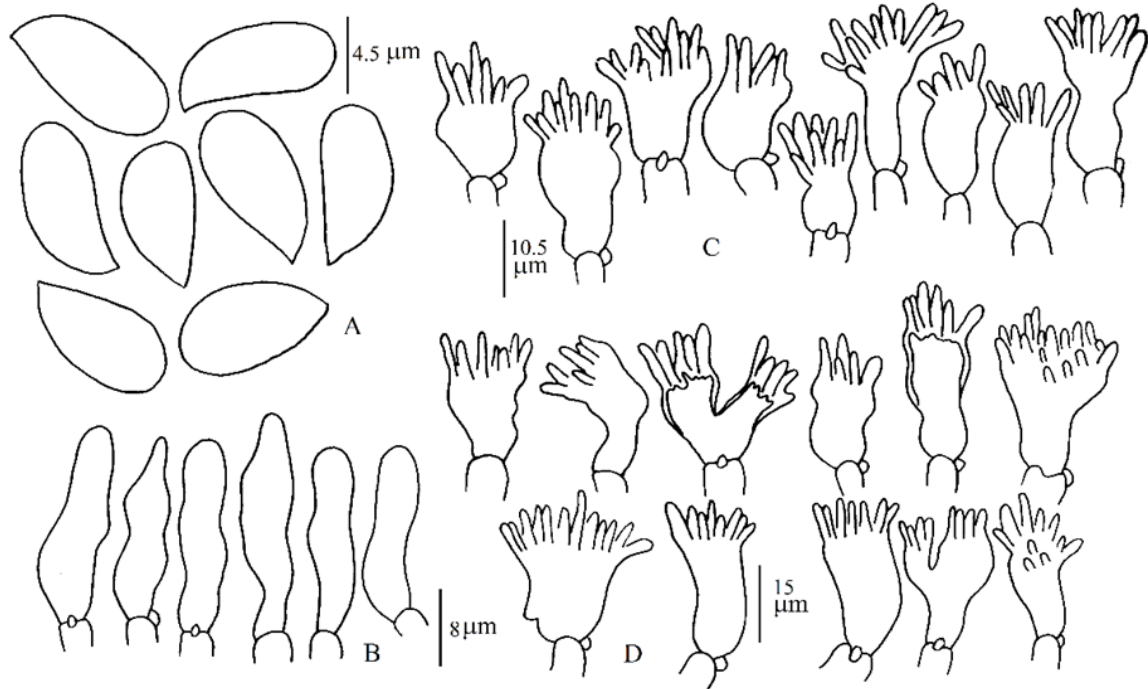


Figure 4. Micro-morphological features of *Marasmius* aff. *subruforotula* Singer.: A. Basidiospores; B. Basidioles; C. Cheilocystidia; and D. Pileipellis (Drawn by A. Retnowati from D.E. Desjardin 7077).

Notes. The distinctive characters of *M. subruforotula* are convex to plano-convex, umbilicate, papillate pileus that is deep reddish brown to brownish red; distant, white to cream buff collariate lamellae with or without reddish edges; a reddish brown to black insititious stipe with white apex; basidiospores in the range  $8\text{--}10 \times 4\text{--}5 \mu\text{m}$ ; *Siccus*-type broom cells; and no caulocystidia. This set of features probably represents a complex of

species. Material from Thailand (Wannathes *et al.*, 2009) and Príncipe (Grace *et al.*, 2019) are identical in morphology but have distinct ITS sequences and do not belong in a single monophyletic clade, indicating that they represent distinct species. Our material matches the morphology for *M. subruforotula* and is tentatively identified as such until molecular data are available.

### 3. *Marasmius nigrobrunneus* forma *cinnamomeus* Wannathes, Desjardin & Lumyong (2009: 233). Fig. 5-6.

Type: -

Pileus 2–8 mm diam, flattened-conical to convex or flattened-convex, umbilicate, plicate, with or without a small dark papilla or with a dark central spot, dull, dry, glabrous to minutely granulose, reddish brown (8D–E7–8) to reddish orange (7D–E7–8), margin fading to brownish orange (6C–D7–8), sometimes slightly paler in umbilicus, or dark grey to nearly black overall when young, fading to dark greyish brown to grey (7F3–4) to (7D–E2) in

age but drying darker, or dark reddish brown (8E6–8) to deep brownish orange (7C7–8; ferruginous), fading in age to greyish red (7B5–6). Lamellae adnate to a collarium, distant to subdistant (9–14) with 0 series of lamellulae, concave, broad, white to pale yellowish white (4A2) with white to greyish brown or reddish brown edges. Stipe 15–60  $\times$  0.1–0.3 mm, central, wiry, shiny, cylindrical, glabrous, insititious, dark brown to black, attached to substrate or directly arising from rhizomorphs.

Basidiospores  $(8\text{--})8.8\text{--}10.4\text{--}(11.2) \times (4\text{--})4.8\text{--}5.6$  [ $x_{mr} = 8.9\text{--}9.5 \times 4.9\text{--}5.0 \mu\text{m}$ ,  $x_{mm} = 9.30 \pm 0.4 \times 4.96 \pm 0.1 \mu\text{m}$ ,  $Q = 1.6\text{--}2.2$ ,  $Q_{mr} = 1.83\text{--}1.93$ ,

$Q_{mm} = 1.88 \pm 0.1$ ,  $n = 25$  spores per 3 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia  $19\text{--}32 \times 6$  mm, clavate, 4-spored. Basidiales clavate. Cheilocystidia common, composed of *Siccus*-type broom cells; main body  $10\text{--}26 \times 4\text{--}11$  mm, cylindrical to clavate, broadly clavate or irregular in outline, hyaline, thin-walled; apical setulae  $2\text{--}8 \times 0.8\text{--}2$  mm, cylindrical to conical or irregular in outline, yellowish brown, thin to thick-walled. Pleurocystidia absent. Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body  $10\text{--}27 \times 5\text{--}18$  mm, clavate to broadly clavate or irregular in outline, hyaline to weakly yellowish brown, thin- to thick-walled; apical setulae  $2\text{--}6 \times 0.8$  mm, cylindrical to conical or irregular in outline, brown, thick-walled (up to 0.8 mm). Stipe tissue monomitric; cortical hyphae  $3\text{--}7$  mm diam, parallel, cylindrical brown, dextrinoid, thin-

walled; medullary hyphae  $2\text{--}10$  mm diam, parallel, cylindrical, hyaline, weakly dextrinoid, thin- to thick-walled. Stipe vestiture absent. Clamp connections present.

Habitat: Scattered to gregarious on bamboo debris (*Schizostachyum* sp.) in botanical garden, or on stems of banana in montane rain forest.

Known distribution: Indonesia, Thailand (Wannathes *et al.*, 2009).

Material examined: INDONESIA. West Java, Bogor, Botanical Garden, scattered on debris of bamboo (*Schizostachyum* sp.), 8 January 2000, leg. D.E. Desjardin and E. Horak (DED 7059, BO!, SFSU); *ibid*, scattered on bamboo debris, 8 January 2000, leg. E. & A. Horak (DED 7076, BO!, SFSU); East slope of Mt. Salak, scattered to gregarious on stems of bamboo in montane rain forest, 11 January 2000, leg. (DED 7105, BO!, SFSU).



Figure 5. Fruiting bodies of *Marasmius nigrobrunneus* forma *cinnamomeus* Wannathes, Desjardin & Lumyong. From D.E. Desjardin 7076. (Photo: D.E.Desjardin). Scale bar= 0.75 cm.

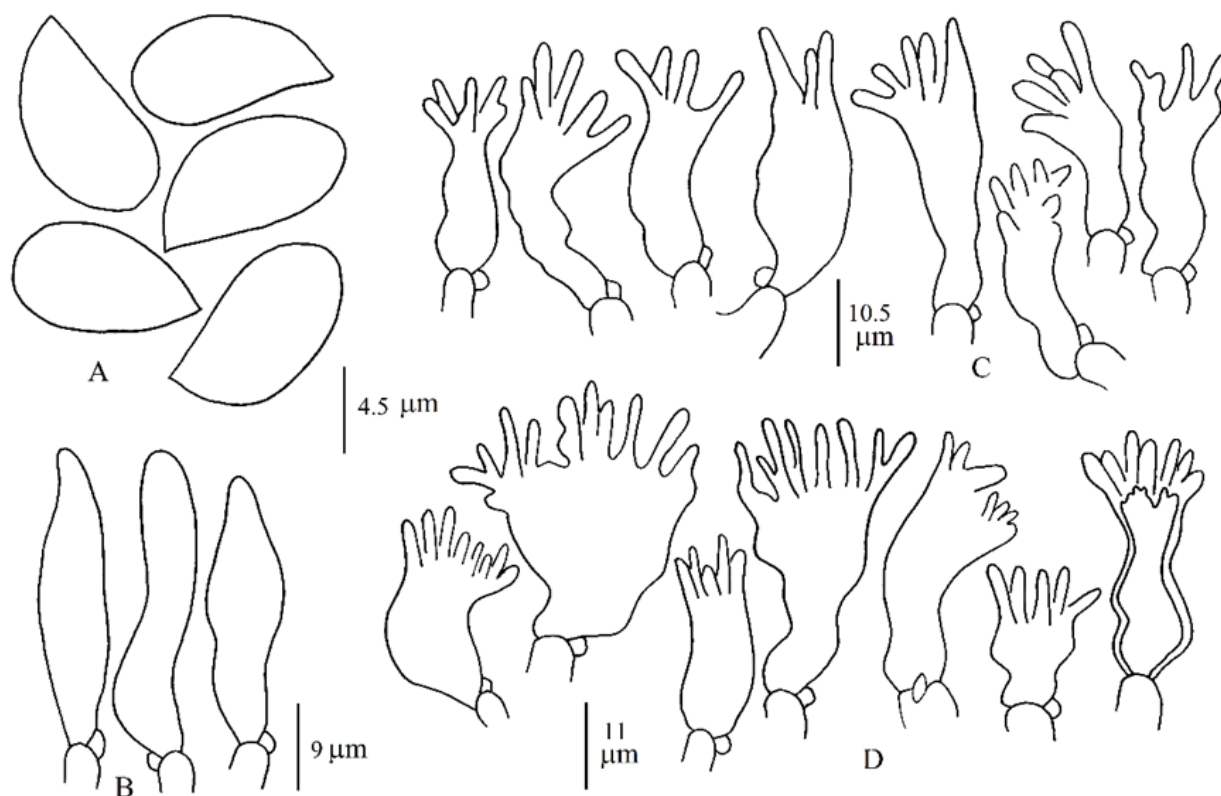


Figure 6. Micro-morphological features of *Marasmius nigrobrunneus* forma *cinnamomeus* Wannathes, Desjardin & Lumyong : A. Basidiospores; B. Basidioles; C. Cheilocystidia; and D. Pileipellis (Drawn by A. Retnowati from D.E. Desjardin 7059).

Notes. *Marasmius nigrobrunneus* forma *cinnamomeus* was described provisionally from material collected in Thailand (Wannathes *et al.*, 2009). The species is characterized by a rather broad range of pileus coloration, from dark grey to brownish grey (f. *nigrobrunneus*) to brownish or-

ange or reddish orange (f. *cinnamomeus*); white, collariate, distant to subdistant lamellae; a long (up to 60 mm), insititious, wiry stipe that usually arises directly from rhizomorphs; ellipsoid basidiospores in the range 8–11 × 4–6 µm; and growth on monocots.

#### Sect. *Sicci* Singer

subject. *Siccini* Singer, ser. *Atrorubentes* Desjardin & Horak, *Biblio. Mycol.* 168: 27.

4. *Marasmius xestocephalus* (Singer 1964: 367) sensu Wannathes, Desjardin, Hyde, Perry & Lumyong (2009: 268). Fig. 7-8.

Type: CONGO, Yangambi, Louis 14938 (BR, holotype).

Pileus 10–17 mm diam, convex to plano-convex, sometimes depressed, rugulose-striate to the wrinkled disc, dull, dry, hygrophanous, glabrous, cream (4A3) to whitish buff, or pale greyish orange (5B3) tones in age, often spotted brownish. Context very thin. Lamellae adnate, subdistant (12–14 reaching stipe) with 2–3 series of lamellulae, often forked or anastomosing, narrow (~2 mm), concave, cream buff. Stipe 20–35 × 0.5–1 mm, central to slightly eccentric, cylindrical, tough, pruinose, dry, non-insititious; apex buff to cream, base reddish brown (8D5–8).

Basidiospores (9–) 10–11 (–12) × 3–4 µm [ $x_m = 10.30 \pm 0.74 \times 3.62 \pm 0.41$  µm,  $Q = 2.40$ – $3.50$ ,  $Q_m = 2.88 \pm 0.31$ ,  $n = 25$  spores per 1 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia 22–24 × 6 µm, clavate, 4-spored. Basidioles clavate. Cheilocystidia composed of *Siccus*-type broom cells; main body 12–18 × 5–8 µm, cylindrical to clavate, broadly clavate or irregular in outline, rarely lobed, yellowish brown to hyaline, thin- to thick-walled; apical setulae 3–8 × 0.8–1.6 µm, cylindrical to conical, sometimes obtuse to subacute, hyaline to pale brown, thin- to thick-walled. Pleurocystidia absent. Pileipellis hymeniform, not-mottled, composed of *Siccus*-type broom cells; main body 10–18 × 4–9 µm, cylindrical to clavate, subglobose or irregular in outline, yellowish brown, thin- to thick-walled; apical setulae 6–12 × 0.8–1.6 µm, cylindrical to conical,

usually smooth or wavy in outline, thin- to thick-walled. Stipe tissue monomitic; cortical hyphae 4–6  $\mu\text{m}$  diam, parallel, cylindrical, hyaline, strongly dextrinoid, thick-walled (up to 0.8  $\mu\text{m}$ ); medullary hyphae 5–10  $\mu\text{m}$  diam, parallel, hyaline, dextrinoid. Stipe vestiture of numerous scattered or clustered caulocystidia 8–52  $\times$  4–6  $\mu\text{m}$ , polymorphic, subcylindrical to clavate or irregular in outline, obtuse, often forked, hyaline, weakly dextrinoid, thin-walled. Clamp connections present.

Habitat: on bamboo leaves in botanical garden.

Known distribution: Indonesia, Africa (Pegler, 1977; Antonín, 2007), Thailand (Wannathes *et al.*, 2009).

Material examined: INDONESIA: Java, West Java, Bogor, Botanical Garden, gregarious on bamboo leaves in botanical garden, 8 January 2000, leg. D.E. Desjardin (DED 7060, BO!, SFSU).



Figure 7. Fruiting bodies of *Marasmius xestocephalus* Singer. From D.E. Desjardin 7060. (Photo: D.E.Desjardin). Scale bar = 0.6 cm.

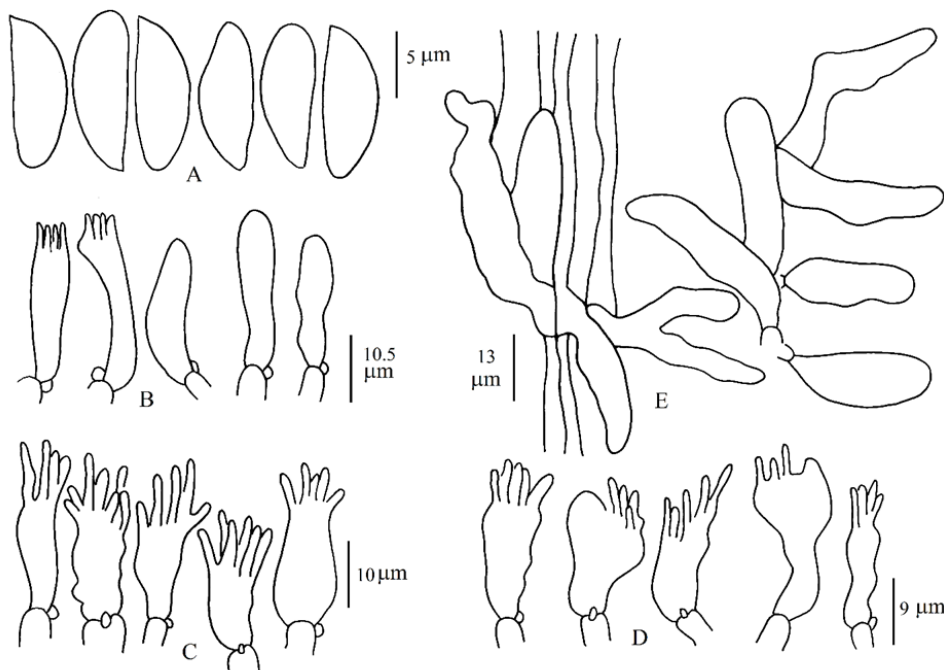


Figure 8. Micro-morphological features of *Marasmius xestocephalus* Singer. A. Basidiospores; B. Basidia and basidioles; C. Cheilocystidia; d. Pileipellis; e. Stipe vestiture. (Drawn by A. Retnowati from D.E. Desjardin 7060).



Notes. Material from Java, tentatively recognized here as *Marasmius xestocephalus* sensu Wannathes *et al.* (2009) is characterized by a relatively large, convex to plano-convex, rugulose-striate, whitish buff pileus with a wrinkled disc and pale greyish orange (5B3) tones in age; subdistant lamellae; and a pruinose stipe with numerous scattered or clustered caulocystidia. *Marasmius xestocephalus* was reported from Africa (Pegler, 1977; Antonín, 2007)

**Sect. *Sicci* Singer**

**subject. *Siccini* Singer, ser. *Haematocephali* Singer, Fl. Neotrop. Monogr. 17: 201. 1976.**

Type species: *Marasmius haematocephalus* (Mont.) Fr.

**5. *Marasmius grandisetulosus* Singer (1964: 379).**

Fig. 9-10.

Type: ZAIRE, Lake Edward, and Kivu District, Panzi, alt. 1650 m, November 1948, Goossens-Fontana 5076 (BR).

Pileus 7-22 mm diam, campanulate, sulcate to plicate, glabrous, dull, dry; dull greyish red (8-9C3-4) overall, darkening with moisture loss to brown (7E5), drying dark reddish brown (8F6-8). Lamellae adnexed, ascending, distant (11-13 reaching stipe) with 0-1 series of lamellulae, broad, off-white to dingy pinkish white with red to reddish brown edges. Stipe 20-50 × 0.5-1 mm, central, terete, wiry, tough, glabrous, non-insititious with white mycelium, dark reddish brown overall.

Basidiospores 22.4-25 × 4-5 mm [ $x_m = 23.55 \pm 0.87 \times 4.03 \pm 0.28$  mm,  $Q = 4.67 - 7.25$ ,  $Q_m = 5.87 \pm 0.45$ ,  $n = 25$  spores per one specimen], clavate to slender fusoid or subballontoid, smooth, hyaline, inamyloid, thin-walled. Basidia unobserved. Basidioles clavate. Cheilocystidia common, composed of *Siccus*-type broom cells; main body 10-21 × 7-8 mm, clavate to turbinate or irregular in outline, hyaline to yellowish brown, thin

and Thailand (Wannathes *et al.*, 2009). The Thai material differs from the African material reported by Antonín (2007) in having narrower basidiospores (3-4 μm versus 4.5-5.5 μm, respectively), and the Indonesian specimen differs from the Thai material (Wannathes *et al.*, 2009) in having fewer lamellae (12-14 versus 15-18) and shorter basidiospores (10-11 μm versus 11-14 μm).

-walled; apical setulae 4-6 × 0.8 mm, cylindrical to conical, slightly wavy in outline, obtuse to subacute, hyaline to pale reddish brown, thin-walled. Pleurocystidia abundant, 34-64 × 9-14 mm, clavate to fusoid, wavy to constricted at the apex, hyaline, inamyloid, thin-walled. Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body 10-18 × 4-11 mm, subcylindrical to clavate, broadly clavate, subglobose or irregular in outline, hyaline, thin-walled; apical setulae 2-10 × 0.8 mm, cylindrical to conical or wavy, obtuse to subacute, hyaline to yellowish brown, thin-walled. Stipe tissue monomitic; cortical and medullary hyphae indistinguishable, 4-8 mm diam, parallel, cylindrical, hyaline, dextrinoid, thin-walled. Stipe vestiture absent. Clamp connections present.

Habitat: On leaves of bamboo in garden area.

Known distribution: Indonesia, West Africa (Grace *et al.*, 2019).

Materials examined: INDONESIA. West Java, Bogor, Botanical Garden, scattered on leaves of bamboo in garden area, 13 January 2001, leg. R. Halling (DED 7243, BO!, SFSU).



Figure 9. Fruiting bodies of *Marasmius grandisetulosus* Singer. From D.E. Desjardin 7243. (Photo: D.E.Desjardin). Scale bar = 1 cm.

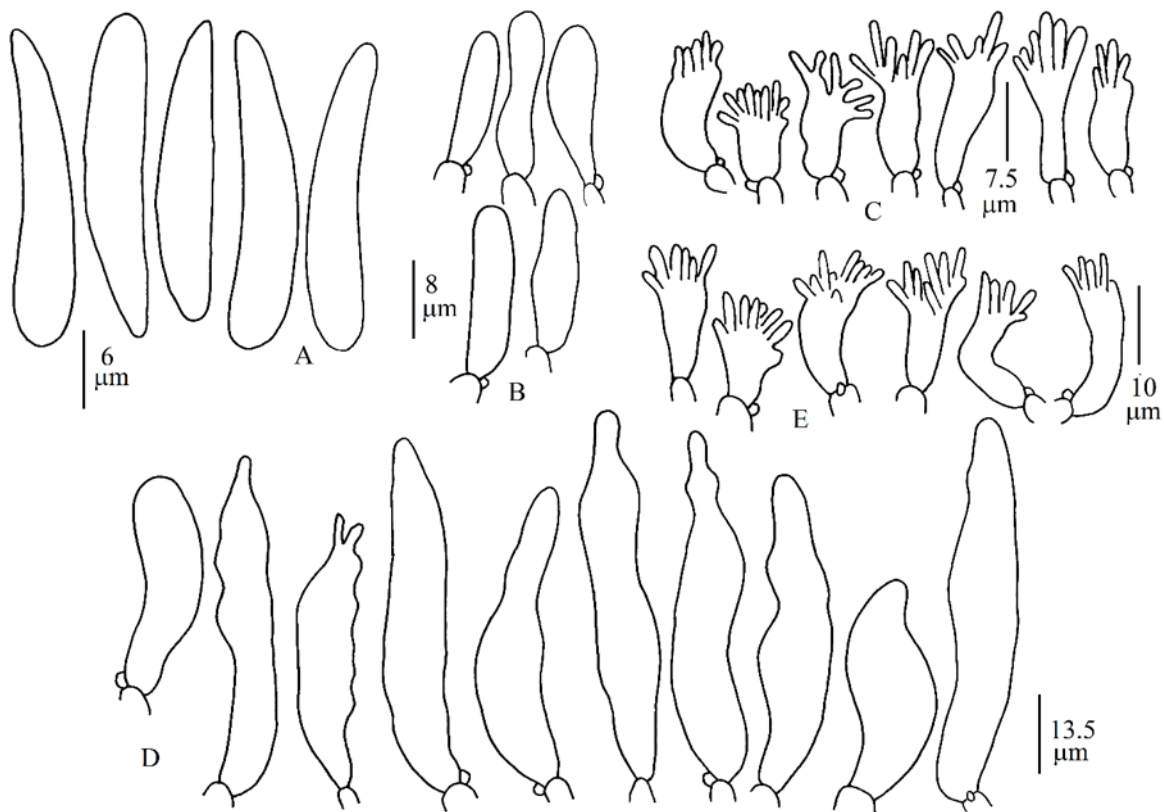


Figure 10. Micro-morphological features of *Marasmius grandisetulosus* Singer. A. Basidiospores; B. Basidioles; C. Cheilocystidia; D. Pleurocystidia; and E. Pileipellis. (Drawn by A. Retnowati from D.E. Desjardin 7243).

Notes. Indonesian material determined here as *Marasmius grandisetulosus* is characterized by a greyish red to brown pileus that dries dark reddish brown, distant lamellae with reddish brown edges, a glabrous, non-insititious stipe, conspicuous pleurocystidia, and clavate basidiospores in the range

22.4–25 × 4–5 mm. Material reported from São Tomé, West Africa, differs in forming shorter basidiospores ( $x_m = 20.9 \mu\text{m}$ ) and growing on dicot wood and leaves rather than bamboo (Grace *et al.*, 2019).

**6. *Marasmius elaeocephalus* Singer (1964: 384). Fig. 11–12.**

Type: ZAIRE, District Forestier Central, Yangambi, on leaf litter, alt. 470 m, 18 May 1939, Louis 14875 (BR, Holotype).

Pileus 6–16(–20) mm diam, convex to broadly convex or campanulate, expanding to plano-convex with or without small umbo, smooth, striate to even or faintly striatulate (not sulcate nor plicate) dull, dry, glabrous to subvelutinus, dark olivaceous brown (5-6E4-5) when young, losing olive tones and becoming yellow brown (5D5-6) to light brown (6D4-5; ‘hazel’) or brown orange (6C4-6) in age (colour change from olivaceous to brown orange distinctive). Lamellae narrowly adnate to adnate, close to crowded (17–22 reaching stipe) with 2–4 series of lamellulae, narrow to moderately broad, convex, white, off-white to cream or pale orangish white (4-5A2), non-marginate. Stipe 22–60 × 0.75–1 mm, central, cylindrical, terete, tough or pliant, glabrous, dry,

non-insititious, with orange to orangish brown or cream strigose mycelium; apex white to pale yellowish brown (4A2), base brownish orange to reddish brown.

Basidiospores (11.2–)12–15.2(–16) × (3.2–)4–5.6, [ $x_{mr} = 12.8–14.5 \times 3.9–4.6 \mu\text{m}$ ,  $x_{mm} = 13.60 \pm 0.8 \times 4.27 \pm 0.4 \mu\text{m}$ ,  $Q = 2.6–4.0$ ,  $Q_{mr} = 3.16–3.29$ ,  $Q_{mm} = 3.22 \pm 0.1$ ,  $n = 25$  spores per 2 specimens and 17 spores per one specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. Basidia 20–24 × 6–8 mm, clavate, 4-spored. Basidioles clavate to fusoid. Cheilocystidia common, of *Siccus*-type broom cells; main body 7–21 × 5–10 mm, clavate to subclavate, cylindrical or irregular in outline, hyaline, thin- to thick-walled; apical setulae 2–8 × 0.8 mm, crowded, cylindrical to conical or irregular in outline, thin-walled. Pleurocystidia common, 27–44 × 5–10 mm, fusoid to clavate, usually attenuated and strangulate at the apex, hyaline, refractive, thin-walled. Pileipellis hymeniform, weakly mottled, composed of *Siccus*-type

broom cells; main body 8–18 × 3–8 mm, clavate to subclavate, cylindrical or irregular in outline, yellowish brown, thin-walled; apical setulae 2–8 × 0.8 mm, crowded, cylindrical to conical or irregular in outline, obtuse to subacute, thin-walled. Stipe tissue monomitic; cortical hyphae 2–7 mm diam, parallel, cylindrical, yellowish brown, dextrinoid, thin-walled; medullary hyphae 3–7 mm diam, parallel, cylindrical, hyaline, thin-walled. Caulocystidia rare on stipe apex, composed of 1) cylindrical to

subclavate cells 6–12 × 2–5 mm, hyaline, smooth, thin-walled; or 2) *Siccus*-type broom cells; main body 3–4 × 2–4 mm, cylindrical to conical, slightly wavy in outline, hyaline, thin-walled. Clamp connections present.

Habitat: On dicot leaf mulch or on *Dipterocarpaceae* leaves or other hardwood leaves in botanical garden. Known distribution: Indonesia, Africa (Singer 1964, Antonín 2007, Grace *et al.*, 2019).

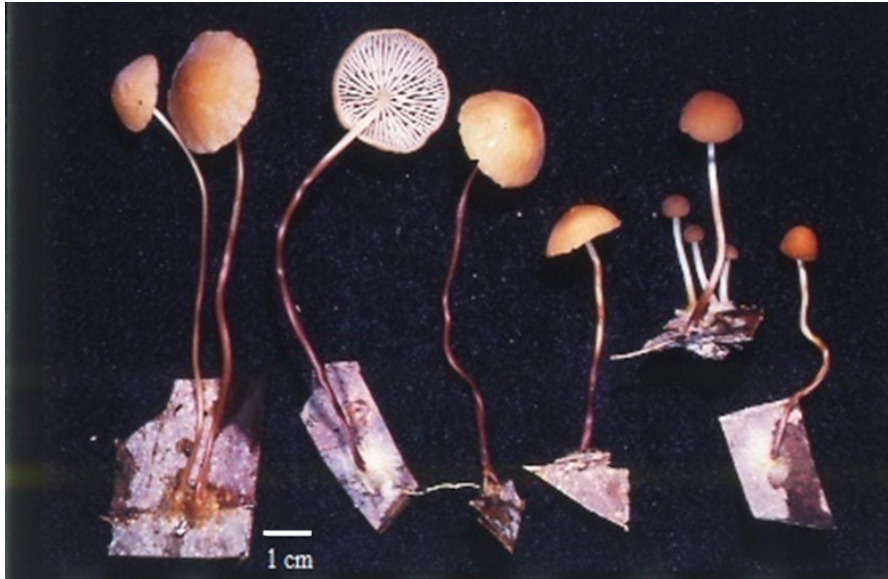


Figure 11. Fruiting bodies of *Marasmius elaeocephalus* Singer. From D.E. Desjardin 7072. (Photo: D.E.Desjardin). Scale bar = 1 cm.

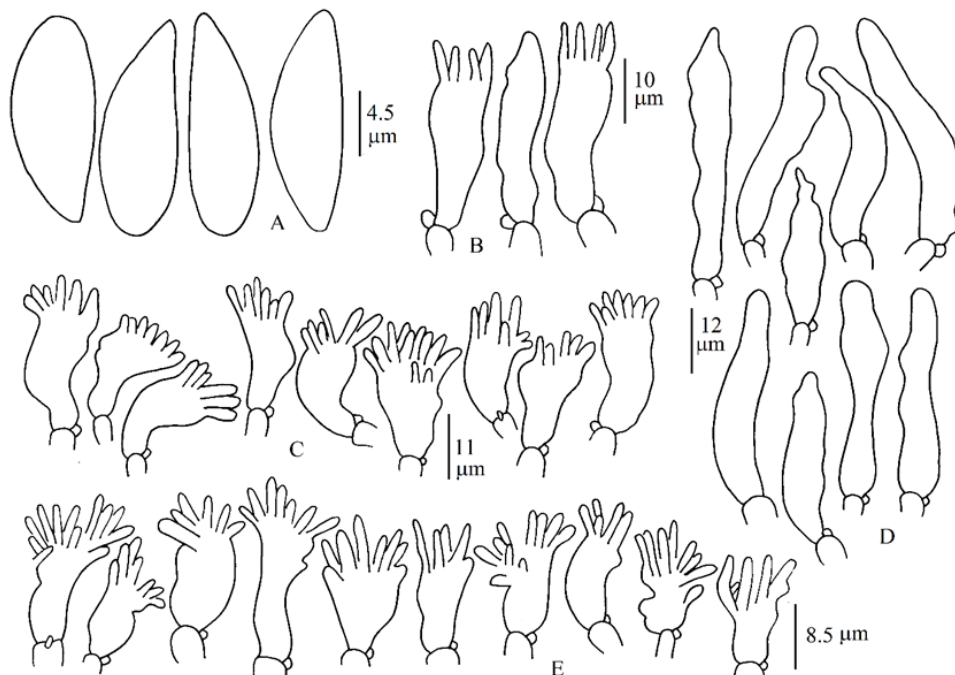


Figure 12. Micro-morphological features of *Marasmius elaeocephalus* Singer. A. Basidiospores; B. Basidia and basidioles; C. Cheilocystidia; D. Pleurocystidia; and E. Pileipellis. (Drawn by A. Retnowati from D.E. Desjardin 7083).

Materials examined: INDONESIA. West Bogor: Botanical Garden, scattered on *Dipterocarpus* leaves, 6 January 2000, leg. D.E. Desjardin (DED 7049, BO!, SFSU); *ibid*, scattered on hardwood leaves, 8 January 2000, leg. D.E. Desjardin (DED 7072, BO!, SFSU); *ibid*, scattered on dicot leaf mulch, 9 January 2000, leg. D. E. Desjardin (DED 7083, BO!, SFSU).

Notes. The dark olive-brown pileus, close to crowded lamellae, elongate-ellipsoid basidiospores, conspicuous pleurocystidia and growth on dicot debris is distinctive for *M. elaeocephalus*. The Indonesian material differs from that described from Africa (Singer, 1964; Antonín, 2007; Grace *et al.*, 2019) in forming slightly longer basidiospores with mean  $13.6 \times 4.3 \mu\text{m}$  versus  $11.1 \times 3.9 \mu\text{m}$ , respectively.

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