erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum

Agaricales of Indonesia. 2. A preliminary monograph of Marasmius from Java and Bali

Dennis E. Desjardin¹, Atik Retnowati² & Egon Horak³

¹ Dept. of Biology, San Francisco State University, 1600 Holloway Ave., San Francisco, CA 94132

² Herbarium Bogoriense, Research and Development for Biology, The Indonesian Institute of Sciences, Bogor, Indonesia

³ Geobotanical Institute ETH, Herbarium, Zollikerstrasse 107, CH-8008 Zürich, Switzerland

Desjardin, D. E., A. Retnowati & E. Horak (2000). Agaricales of Indonesia. 2. A preliminary monograph of *Marasmius* from Java and Bali. – Sydowia 52 (2): 92–193.

Thirty-seven species of Marasmius are reported from Java and Bali. Comprehensive descriptions, illustrations, and comparisons with phenetically similar taxa are provided, as is a dichotomous key to aid in their identification. Twelve taxa are described as new: Marasmius araucariae var. siccipes, M. berambutanus, M. cladophyllus var. tjibodensis, M. cohaerens var. orientalis, M. coklatus, M. dicandinus, M. halimunensis, M. kembangus, M. luteomarginatus, M. perplexus, M. persicinus, and M. schizochaetus.

Keywords: agarics, biotic survey, fungal systematics.

Members of the genus Marasmius are some of the more frequently encountered agarics in southeast Asian forests and throughout other tropical regions of the world. Over 1,600 epithets have been published in the genus, although many of these are now considered synonyms of other taxa, invalid names, nomina dubia, or have been transferred to other genera. As part of our on-going biotic survey of the Agaricales of Indonesia, we have encountered numerous marasmioid fungi during four collecting expeditions to the islands of Java and Bali, viz., March 1977, January 1998, 1999 and 2000. We present here a preliminary monograph of Marasmius from Java and Bali, based primarily on recently collected specimens, supplemented and supported by analyses of extant type specimens of taxa described or reported from the region. In this treatment we accept the generic circumscription of Marasmius as delimited by Singer (1976, 1986) and Desjardin (1989). We do not follow the more inclusive Friesian concepts promoted by Corner (1996) wherein he accepted within *Marasmius* many species that are better placed in the genera Collybia, Cyptotrama, Flammulina, Gymnopus, Marasmiellus, Micromphale, Strobilurus and others.

Prior to this treatment, 28 species of *Marasmius* had been reported from Java by Léveillé (1844; 1846), Moritzi (1845-1846), Zollinger (1844; 1854), Hennings (1900), Overeem & Overeem-de Haas (1922), and Boedijn (1940). Of these 28 epithets, only 10 can be placed in *Marasmius* with assurance; the remaining 18 are considered by us to belong to other genera or represent *nomina dubia*. Of the 10 previously reported taxa that we accept in *Marasmius*, several represent misapplied epithets, while several others are synonyms. We have recollected only three species reported from the region prior to this research, but we have added to the list an additional 34 *Marasmius* taxa, 12 of which are new to science. Provided below are descriptions and illustrations of 37 taxa of *Marasmius*, plus a dichotomous key to aid in their identification, and an itemization of excluded and insufficiently known taxa.

Color terms and notations in parentheses are those of Kornerup & Wanscher (1978), while color terms in guotation marks are from Ridgway (1912). All measurements and colors reported for microscopic features were made from dried material rehydrated in 100% ethanol followed by distilled water, 3% KOH or Melzer's reagent. The terms used to describe lamellae spacing refer to the number of lamellae that reach from the pileus margin to the stipe, and do not include the lamellulae whose spacing is indicated by the number of series present. Spore statistics include: \bar{x} , the arithmetic mean of the spore length by spore width (± standard deviation) for n spores measured in a single specimen; $\bar{\mathbf{x}}_r$ the range of spore means and $\bar{\mathbf{x}}_m$, the mean of spore means $(\pm SD)$ where more than one specimen is available; Q, the quotient of spore length and spore width in any one spore, indicated as a range of variation in n spores measured; \bar{q} the mean of Q-values in a single sample; \bar{q}_r , the range of \bar{q} -values and \bar{q}_m , the mean of \bar{q} -values where more than one specimen is available. Unless stated otherwise, in the figures the basidiomes are natural size. Basidiospores 2000x (scale bar = 5um); basidia, cystidia, setae, pileipellis and stipitipellis 1000x (scale bar = 10 µm). Specimens are deposited in BO, SFSU or ZT as indicated.

Key to Marasmius of Java and Bali

1. Pileus composed of a non-hymeniform layer of repent, interwoven, diverticulate hyphae with broom cell-like terminal cells; stipe institutious; rhizomorphs well-developedsect. Androsacei (2)

1*.	Pileus composed of a hymeniform layer of smooth cells or setu- lose cells; stipe institutious or non-institutious; rhizomorphs pre- sent or absent
2.	Stipe orangish yellow to golden; caulocystidia absent
2^{*} .	Stipe brown to dark brown; caulocystidia present
3. 3*.	Cheilocystidia and clamp connections absent2. <i>M. perplexus</i> Cheilocystidia and clamp connections present
4. 4*.	Pileus white to cream colored; pileipellis hyphae non-incrusted; caulocystidia cylindrical, non-setulose 3. <i>M. aff. chiapasensis</i> Pileus chocolate brown; pileipellis hyphae with dark brown in- crustations; caulocystidia often forked, with apical setulae
5. 5*.	(from 1) Collarium present; stipe institutious sect. <i>Marasmius</i> (6) Collarium absent; stipe institutous or non-institutious
6.	Pileipellis composed of <i>Rotalis</i> -type broom cells
6*.	Pileipellis composed of <i>Siccus</i> -type broom cells
7. 7*.	Pileus light brown; lamellae distant to remote (7–8); basidio- spores 9–11 μ m long 5. <i>M. plicatus</i> Pileus white to off-white; lamellae distant to subdistant (9–18); basidiospores 7–9 μ m long
8.	Lamellae distant (9–13); pileus with a prominent dark papilla . 6 M laworotalis
8*.	Lamellae subdistant (15–18); pileus often lacking a dark papilla
9.	(from 6) Pileus hirsute or hispidulous from presence of pilosetae
9*.	Pileus glabrous to minutely granulose, pileosetae and long se- tulae absent
10.	Pileosetae common, $50-182 \mu m$ long; pileipellis broom cells and cheilocystidia with 2–4 apical setulae; stipe not arising directly from rhizomorphs

$10^{*}.$	Pilee	osetae	uncomn	10n,	36 - 64	μm	long;	pileipell	is broom	n cells
	and	cheilo	cystidia	with	n nume	erous	s (5–20)) apical	setulae;	many
	stipe	es arisi	ing direc	tly fi	rom rh	izom	orphs	9. M.	berambı	ıtanus

11. Basidiospore mean length $>\!12~\mu m,$ length range 11–17 μm 12 11*. Basidiospore mean length $<\!10.7~\mu m,$ length range 6–12 μm 13
 Pileus deep reddish brown to purplish brown; 10–14 lamellae with reddish brown edges; basidiospores 12.5–17 μm long
 12*. Pileus reddish orange to deep brownish orange or ferruginous; 7–10 lamellae with non-pigmented edges; basidiospores 11– 13.5 μm long
 13. Pileus white to cream with a reddish brown to dark brown or black papilla
 Stipe arising directly from rhizomorphs, nodes often present on stipe and rhizomorphs; basidiospore mean length 8.8 μm
 14*. Stipe not arising directly from rhizomorphs, nodes absent from stipe and rhizomorphs; basidiospores mean length 10.2 μm 13. M. conicopapillatus
 Stipe arising directly from rhizomorphs; pileus 1–3 mm diam, brownish orange to brown
16. Stipe and rhizomorphs yellow to golden 15. M. acicularis16*. Stipe and rhizomorphs dark brown to black. 16. M. ruforotula
 17. (from 5) Pileipellis composed of non-setulose elementssect. Globulares (18) 17*. Pileipellis composed of <i>Rotalis</i>-type or <i>Siccus</i>-type broom cells 20
 Pileus reddish orange to brownish orange, 50–200 mm diam; basidiospores 6–7 μm long

18*. Pileus white to cream or light brown, typically <50 mm diam;

95

19.	Pleurocystidia absent; pileus white to cream; caulocystidia pre- sent; basidiomes associated with bamboo
19*.	Pleurocystidia present; pileus light brown; caulocystidia absent; basidiomes associated with dicotyledonous leaves
20. 20*.	(from 17) Stipe institutious; pileipellis of <i>Rotalis</i> -type broom cells
	sect. Sicci (22)
21.	Pileus white with a dark central spot; cheilocystidia absent 20. M. dicandinus
21*.	Pileus orangish brown lacking a dark central spot; cheilocysti- dia of <i>Rotalis</i> -type broom cells 21. <i>M. micraster</i>
22.	Setae present on pileus, lamellae, and/or stipe
22*.	Setae absent
23.	Basidiospores 12–15 µm long; pleurosetae absent
23*.	Basidiospores 8–12 μm long; pleurosetae present24
24.	Pileus 15–38 (–60) mm diam, dark chocolate brown, even, not plicate; lamellae greyish brown, non-marginate; cheilocystidia
24*.	of <i>Siccus</i> -type broom cells plus cheilosetae 23. <i>M. coklatus</i> Pileus 50–75 mm diam, pale chestnut brown to reddish brown, strongly plicate; lamellae cream, reddish brown-marginate; cheilosetae only present
25. 25*.	(from 22) Pleurocystidia absent ser. <i>Leonini</i> (26) Pleurocystidia present ser. <i>Haematocephali</i> (35)
26.	Pileipellis composed of 2-types of cells, poorly developed <i>Siccus</i> -type broom cells with few setulae, and smooth, non-setu-
26*.	Pileipellis composed entirely of well-developed Siccus-type broom cells
$27. 27^*.$	Pileus 30–75 mm diam 28 Pileus < 30 mm diam
06	

28. 28*.	Basidiospores 9–11 μm long; pileus brown to dark brown, dis- tinctly canescent
29. 29*.	Basidio spores $<8~\mu m$ long 28. M. subconiatus Basidio spores $>11~\mu m$ long 30
30. 30*.	Pileus deep purplish red; basidiospore mean length 20 μ m 29. <i>M. tageticolor</i> Pileus ferrugineus, brownish orange, orange, peach-colored or orangish white; basidiospore mean length <17.7 μ m
31. 31*.	Pileus bright orange to orangish white or peach-colored 32 Pileus ferrugineus to brownish orange
32.	Stipe 6–9 mm long, central; cheilocystidia of Siccus-type broom cells; lamellae non-marginate; basidiospore mean length 17.7 μ m; pileus peach-colored
32*.	Stipe <3 mm long, eccentric; cheilocystidia cylindrical, non- setulose; lamellae bright yellow-marginate; basidiospore mean length 16.6 μ m; pileus bright orange to orangish white
33. 33*.	Stipe lacking caulocystidia; basidiospore mean length 14.6 μ m; pileus 2–11 mm diam
34. 34 *	Lamellae poorly developed, reticulate-venose; cheilocystidia irregularly cylindrical, non-setulose; caulocystidia cylindrical, non-setulose
35. 35*.	(from 25) Pileus deep reddish brown to greyish red or reddish purple; basidiospores 18.5–22.5 μm long (mean length 20.5 μm).
36.	$\label{eq:eq:energy} \begin{array}{c} \mbox{length} < 17 \ \mbox{\mu m} \end{array} \begin{array}{c} \mbox{length} < 17 \ \mbox{\mu m} \end{array} \begin{array}{c} \mbox{length} < 17 \ \mbox{m} \end{array} \begin{array}{c} \mbox{length} < 17 \ \mbox{length} \end{array} \end{array} \begin{array}{c} \mbox{length} < 17 \ \mbox{length} \end{array} \begin{array}{c} \mbox{length} < 17 \ \mbox{length} \end{array} \end{array} \end{array} \begin{array}{c} \mbox{length} < 17 \ \mbox{length} \end{array} \end{array} \begin{array}{c} \mbox{length} < 17 \ \mbox{length} \end{array} \end{array} $
	orange-marginate

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum/

Enumeration of taxa

Marasmius Fries, Fl. Scan.: 339. 1835 (nom. cons.) sect. Androsacei Kühner, Botaniste 25: 91. 1933 (ut Androsaceae) Type species: Agaricus androsaceus L. [Marasmius androsaceus (L.:Fr.) Fr.]

≡ Setulipes Antonín, Ces. Mykol. 41: 85. 1987.

 Marasmius aurantiobasalis Desjardin & E. Horak, Bibl. Mycol. 168: 132–133. 1997. – Fig. 1: 1–5.

Type: New Zealand: South Island, Prov. Westland, Ahaura, Kopara, Nelson Creek, 17 Jan. 1968, Horak 68–33 (Holotype: PDD; Isotype: SFSU, ZT).

Pileus 2.5–7 mm diam, convex when young, expanding to plano-convex in age; disc distinctly wrinkled, plicate; surface dull, dry, glabrous to pruinose; light brown to pale reddish brown with a darker disc. – Context thin, concolorous. – Lamellae adnate, distant (10–12 reaching stipe) with 1 series of lamellulae, narrow, pale concolorous with the pileus, non-marginate. – Stipe $12–23 \times 0.5$ mm, central, terete, equal, pliant, glabrous, instituous, golden yellow; rhizomorphs orangish yellow. – O d or and taste not distinctive.

Basidiospores (6-)7-9×3-4(-4.6) μ m [$\bar{x}_r = 7.5-8.5 \times 3.0-$ 3.8 μ m, $\bar{x}_m = 8.0 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.3 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.5 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.5 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.5 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \times 3.5 \pm 0.5 \mu$ m, Q = 2-2.8, $\bar{q}_r = 2.3-2.6$, $\bar{q}_m = 2.4 \pm 0.5 \mu$, $\bar{q}_m = 2.4 \mu$ 0.2, n = 25 spores per 4 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. - Basidia 20-25.5×6-7 µm, clavate, 4spored. - Basidioles clavate to fusoid. - Cheilocystidia abundant, similar to *Siccus*-type broom cells; main body $12-32.5 \times 5-9 \mu m$, cylindrical to broadly clavate or irregular in outline, seldom branched, hyaline, thin-walled, with numerous apical setulae $1-5 \times 1-$ 2 µm, cylindrical to conical, often apically branched, hyaline, thinwalled. - Pleurocystidia absent. - Pileipellis non-hymeniform, not mottled, composed of a *Rameales*-structure, with repent broom cell-like terminal cells; main body of terminal cells $13-22 \times 8-12 \mu m$, clavate to broadly clavate, seldom lobed, thin-walled, inamyloid; hyphae 6-7 µm diam, diverticulate, non-incrusted to weakly incrusted; diverticula $2-5 \times 1.5-3$ µm, cylindrical to conical, seldom branched, thin-walled, inamyloid. - Pileus trama interwoven; hyphae smooth to weakly incrusted, weakly dextrinoid. - Lamellar trama regular; hyphae 5-6 µm diam, cylindrical, smooth, hyaline, inamyloid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-5 µm diam, cylindrical, parallel, hyaline to yellowish brown, weakly dextrinoid, thick-walled; medullary erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum



Fig. 1. Marasmius aurantiobasalis Desjardin & E. Horak (A. Retnowati 115). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidiole. – 4. Cheilocystidia. – 5. Pileipellis.

hyphae $3-6\ \mu m$ diam, hyaline, thin- to thick-walled. – Stipe vesture absent. – Clamp connections uncommon, sometimes present only at base of basidia.

Habit, habitat, distribution. – Gregarious on dicotyledonous leaves in montane rainforest. Java.

Material examined. - Indonesia: Java, West Java, Cibodas Botanical Garden, trail to Mt. Gede, 8 Jan. 1998, D. E. Desjardin 6725 (BO, SFSU); same location, 22 Jan. 1999, A. Retnowati 155 (BO, SFSU); Java, Mt. Halimun National Park, loop trail from Cikaniki, 9 Jan. 1999, A. Retnowati 094 (BO, SFSU); same location, 9 Jan. 1999, A. Retnowati 115 (BO, SFSU).

Marasmius aurantiobasalis is one of the more commonly collected members of Marasmius section Androsacei in Java. The species is characterized by the following combination of features: a) a convex, light brown to pale reddish brown pileus with rugulose disc; b) distant, non-marginate lamellae; c) a golden yellow stipe associated with orangish yellow rhizomorphs; and d) the presence of clamp connections but not in all tissues. The golden yellow stipes accompanied by golden yellow rhizomorphs are useful field characters to distinguish this species from most others. Marasmius acicularis Berk. also shares these features, but differs in forming brownish orange to ferruginous pilei composed of Siccus-type broom cells. Marasmius straminipes Peck from Eastern North America is similar but differs in forming a paler pileus (often cream to pale grevish brown) and grows on either conifer debris (Pinus, Picea) or on leaves of Quercus (Holotype: NYS!; see Desjardin & Petersen 1989).

Marasmius perplexus Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 2: 1–5.

Pileus 2-7 mm latus, primo obtuse conicus vel hemisphaericus dein convexus vel planoconvexus, sulcatus, rugulosus, pallide brunneus. Lamellae adnatae, subdistantes vel distantes, haud collariatae marginataeque, pallide brunneae. Stipes $8-18 \times 0.1-0.4$ mm, filiformis, glabrus, institutis, fuscus vel fuligineus, rhizomorpha nigra nulla vel praesentia. Odor saporque nulli. Basidiosporae $(5-)6-9 \times (2-)3-4 \mu m$, ellipsoideae, hyalinae, inamyloideae, leves, tenuitunicatae. Basidia $18-36 \times 5-$ 8.5 µm, 4-spora. Basidiola clavata vel fusoidea. Cheilocystidia et pleurocystidia nulla. Pileipellis typi Rameales, haud hymeniformis, hyphis cylindraceis (3-9 µm latis), pallide luteobrunneis, dense diverticulatis compositus, diverticula $1-7 \times 1-$ 2 μ m, cylindrica vel conica; cellulae terminales clavatae 14–20 × 7–10 μ m, setulosae, membrana tenuitunicata, glabra vel incrustata et inamyloidea instructae. Trama pilei irregulare, hyphis conspicue dextrinoideis instructum. Caulocystidia 15- $51 \times 8-11$ µm, clavata, cylindrica vel fusoidea, rare bifurcata, membrana tenuitunicata, hyalina vel straminea, inamyloidea instructa. Fibulae nullae. Ad folia putrida Castanopsidis et ad detritum plantarum dicotyledonearum. Holotypus: Indonesia, Java, West Java, Cibodas Botanical Garden, trail to Mt. Gede, 22 Jan. 1999, A. Retnowati 146 (BO).

Pileus 2–7 mm diam, obtusely conical to hemispherical and shallowly depressed when young, becoming convex to plano-convex in age, translucent striate to sulcate, undulating; margin straight, crenate to wavy; surface dry, dull, rugulose, glabrous; pale brown overall. – Context thin, white to pale brown. – Lamellae adnate, subdistant to distant (8–14 reaching stipe) with 2–3 series of laerlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum/



Fig. 2. Marasmius perplexus Desjardin, Retnowati & E. Horak (A. Retnowati 146, Holotype). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Pileipellis. – 5. Caulocystidia.

mellulae, narrow (0.5–1 mm), serrulate, non-collariate, pale brown, non-marginate. – Stipe $8-18 \times 0.1-0.4$ mm, central, cylindrical, wiry, pliant, hollow, glabrous, institutious, dark brown to black; black rhizomorphs present or absent. – Odor and taste not distinctive.

Basidiospores (5–)6–9×(2–)3–4 μ m [$\bar{x}_r = 6.9-8.3 \times 2.9-3.6 \mu$ m, \bar{x}_{m} = 7.7 ± 0.6 × 3.3 ± 0.3 µm, Q = 1.4–4, \bar{q}_{r} = 2–2.7, \bar{q}_{m} = 2.4 ± 0.4, n = 25 spores per 5 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. - Basidia 18-36×5-8.5 µm, clavate, 4-spored. - Basidioles clavate to fusoid. - Cheilocystidia and pleurocystidia absent. - Pileipellis not hymeniform, not mottled, composed of a Rameales-structure, with clavate to broadly clavate or irregular broom cell-like terminal cells, $14-20 \times 7-10 \mu m$, yellowish brown, thin-walled; hyphae 3-9 µm diam, densely diverticulate, smooth to weakly incrusted, pale yellowish brown, inamyloid, nongelatinous, thin-walled; diverticula $1-7 \times 1-2 \mu m$, cylindrical to conical, hyaline to yellowish brown, inamyloid, thin-walled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 5-6 µm diam, cylindrical, not-inflated, smooth to weakly incrusted, hyaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 2-5 µm diam, parallel, cylindrical, smooth or incrusted, hyaline to yellowish brown, strongly dextrinoid, thick-walled; medullary hyphae 4-6 µm diam, parallel, cylindrical, non-incrusted, hyaline to pale brown, inamyloid to dextrinoid, thick-walled (up to 1 μ m). – Stipe vesture of scattered caulocystidia 15–51×8–11 μ m, clavate to broadly clavate, cylindrical or fusoid, seldom forked apically, hyaline to yellowish brown, inamyloid, with walls up to 1 μ m thick. – Clamp connections absent in all tissues.

Habit, habitat, and distribution. – Gregarious on dead *Castanopsis* leaves and on debris of other dicotyledonous plants in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 13 Jan. 1998, A.Retnowati 020 (BO, SFSU); same location, 9 Jan. 1999, A. Retnowati 112 (BO, SFSU); Java, West Java, Cibodas Botanical Garden, trail to Mt. Gede, 22 Jan. 1999, A. Retnowati 146 (Holotype: BO; Isotype: SFSU); same location, 23 Jan. 1999, A. Retnowati 158 (BO, SFSU); Java, West Bogor, Dungus Iwul Nature Reserve, 26 Dec. 1998, A. Retnowati 051 (SFSU).

Etymology. – perplexus (L): perplexing, referring to the unusual combination of microanatomy that makes understanding taxonomic relationships difficult.

Marasmius perplexus has the unusual combination of a lack of both clamp connections and cheilocystidia. These features, in combination with a pale brown, rugulose-sulcate pileus, noncollariate and non-marginate lamellae, a seemingly glabrous, dark brown to black, institutious stipe bearing numerous short caulocystidia, a welldeveloped Rameales-type pileipellis and growth on dicot leaves, are unique. This unusual suite of features makes it difficult and confusing to determine to which species this taxon is most closely allied. There are many Marasmius species in section Androsacei that lack clamp connections, fewer that lack cheilocystidia, and even fewer that lack both of these features.

Other species lacking clamp connections that are similar to *M. perplexus* include *M. atlanticus* Singer from Florida, *M. atroincrustatus* Singer from Mexico, *M. pallidocephalus* Gilliam from North America, and *M. aporpus* Singer from Chile. *Marasmius atlanticus* (Type: F!) and *M. atroincrustatus* (Type: F!) both differ in forming numerous cheilocystidia and have densely white-hispid stipes bearing much longer caulocystidia. *Marasmius pallidocephalus* differs in lacking caulocystidia and in growing on conifer needles in temperate regions (Type: MICH!). *Marasmius aporpus* differs in forming a flesh- to cinnamon-colored pileus, forms cheilocystidia, lacks caulocystidia and is lignicolous (*fide* Singer, 1969). A similar species that lacks cheilocystidia is *M. liquidambari* Singer recently reported from Papua New Guinea by Desjardin & Horak (1997). The

latter species differs, however, in possessing clamp connections, forming a fuscous to reddish brown pileus, and has closer lamellae (15–19) and longer caulocystidia (Type: F!).

 Marasmius aff. chiapasensis Singer, Fl. Neotrop. Monogr. 17: 73. 1976. – Fig. 3: 1–6.

Type: Mexico, Chiapas, between Finca Sospiro and El Pozo, 4 Aug. 1969, Singer M $8969\;({\rm F!}).$

Pileus 2–5 mm diam, convex when young, soon becoming plano-convex, disc even or slightly depressed; margin striate to rugulo-striate, inflexed; surface dull, dry, glabrous to pruinose; pure white to off-white when young, disc becoming light brown in age. – Context thin, white. – Lamellae adnate, subdistant to distant (11–15 reaching stipe) with 0–2 series of lamellulae, noncollariate, moderately broad to broad, off-white, non-marginate. – Stipe 7– 14×0.2 mm, central, cylindrical, wiry, pliant, hollow, minutely pruinose to hispidulous, instituous, cream at the apex grading to brown at the base; rhizomorphs absent. – Odor and taste not distinctive.

Basidiospores $(6-)7-9 \times (2.5-)3-4$ µm [$\bar{x}_r = 7.0-8.0 \times 3.0-$ 3.3 μ m, $\bar{x}_{m} = 7.7 \pm 0.7 \times 3.3 \pm 0.2 \mu$ m, Q = 2-3, $\bar{q}_{r} = 2-2.5$, $\bar{q}_{m} = 2.4 \pm 0.2$, n = 25 spores per 2 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia 20–27×5–6 μm, clavate, 4-spored. – Basidioles clavate to fusoid. - Cheilocystidia similar to Siccus-type broom cells; main body $9-20.5 \times 7-9$ µm, clavate to broadly clavate, turbinate or subvesiculose, rarely lobed, sometimes irregular in outline, hyaline, inamyloid, apically thin- to thick-walled; apical setulae $1-6 \times 1-1.5$ µm, cylindrical to conical, sometimes irregular in outline, ranging from hyaline to yellowish brown, obtuse to subacute, rarely wavy in outline, thick-walled. - Pleurocystidia absent. - Pileipellis not hymeniform, not mottled, composed of a Rameales-structure with clavate to broadly clavate or irregular broom cell-like terminal cells, $5-20.5 \times 7-20$ µm, diverticulate, yellowish brown, thin-walled; hyphae densely diverticulate, non-incrusted, pale vellowish brown, inamyloid, thin-walled; diverticula 3- $6(-15) \times 1-2.5$ µm, cylindrical to conical, seldom apically forked, hyaline to yellowish brown, inamyloid, thin-walled. - Pileus trama interwoven. – Lamellar trama regular; hyphae 4–6 (-10) µm diam, cylindrical to inflated, hyaline, inamyloid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-6 µm diam, parallel, cylindrical, hyaline (apex) to brown (base), weakly dextrinoid, thick-walled; medullary hyphae 3-5 µm diam, hyaline, thin-walled. - Stipe vesture of numerous caulocystidia $15-55 \times 3-7$ µm, cylindrical to clavate, hyaline, inamyloid, thickwalled. - Clamp connections present.

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrun



Fig. 3. Marasmius aff. chiapasensis Singer (A. Retnowati 098). – 1. Basidiomes (x2).
 – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.
 – 6. Caulocystidia.

Habit, habitat, and distribution. – Scattered to gregarious on undetermined dicotyledonous leaves. Bali, Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, 7 Jan. 1999, A. Retnowati 098 (BO, SFSU); Bali, East of Lake Bratan, South Ridge of Mt. Catur, 17 Jan. 1999, A. Retnowati 141 (BO, SFSU).

The Indonesian specimens are very similar to M. chiapasensis, and differ micromorphologically only in forming longer basidiospores (7–9 µm long versus 6–7.2 µm long in the holotype: F!). In addition, *M. chiapasensis* was described from material collected in Mexico that had a pileus colored ochraceous brown on the disc with a paler margin, i.e. not white to off-white as in the Indonesian specimens. We hesitate to describe the Malesian material as a new species until further material is found from which the range in variation in pileus coloration and basidiospore size can be evaluated.

Marasmius schizochaetus Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 4: 1–6.

Pileus 2-4 mm latus, convexus apice depresso, plicatus, rugulosus, glabrus, umbrinus. Lamellae adnatae, distantes, haud collariatae vel marginatae, pallide brunneae. Stipes $14-17 \times 0.2$ mm, filiformis, flexilis, hispidus, institution, pallide brunneus, rhizomorpha nulla. Odor saporque nulli. Basidiosporae $6-8 \times 3-4$ µm, ellipsoideae, leves, hvalinae, inamyloideae, tenui-tunicatae. Basidia $22-26 \times 5-7 \mu m$, 4-spora. Basidiola clavata vel fusoidea. Cheilocystidia $15-24.5 \times 6-13$ µm, conspicue setulosa, clavata vel irregularia, hyalina vel straminea, tenui-tunicata, diverticula $2-6 \times 1$ µm, cylindrica vel conica, tenui- vel crassetunicata. Pleurocystidia nulla. Pileipellis typi Rameales, haud hymeniformis, hyphae 3-6 µm latae, fusco-incrustatae, crassetunicatae, cellulae terminales $14-18 \times 7-10 \mu m$, setulosae, clavatae vel iregulares, luteobrunneae, tenuitunicatae, diverticula $3-6 \times 1 \mu m$, hyalina vel luteobrunnea, crassetunicata. Trama pilei irregularis, hyphae trama lamellarum haud gelatinosa, paulo dextrinoideae. Caulocystidia $12-64 \times 4-10 \ \mu m$, irregulariter cylindrica, apicaliter saepe furcata vel diverticulata, brunnea, dextrinoidea, membrana usque ad 2 μ m crassa, diverticula 2 $30 \times 1-3$ μ m, cylindrica vel conica, brunnea, crassetunicata. Fibulae presentes. Gregarius ad folia putrida plantarum dicotyledonearum. Holotypus: Indonesia, Java, West Java, Mt. Halimun National Park, 9 Jan. 1999, A. Retnowati 113 (SFSU).

Pileus 2–4 mm diam, convex with a shallow central depression, strongly plicate, non-papillate, rugulose; surface dull, dry, glabrous; evenly chocolate brown overall. – Context thin, brown. – Lamellae adnate, distant (8 reaching stipe) with 2 series of lamellulae, non-collariate, broad, margin serrate, light brown, non-marginate. – Stipe 14–17 \times 0.2 mm, central, cylindrical, wiry, pliant, hispid, institutious, light brown; rhizomorphs absent. – Odor and taste not distinctive.

Basidiospores $6-8\times 3-4$ µm [$\bar{x} = 7.0 \pm 0.4 \times 3.4 \pm 0.4$ µm, Q = 1.7–2.6, $\bar{q} = 2 \pm 0.2$, n = 25 spores per 1 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia $22-26 \times 5-7$ µm, clavate, 4-spored. – Basidioles clavate to fusoid. – Cheilocystidia abundant, broom cell-like, $15-24.5 \times 6-13$ µm, clavate to broadly clavate or irregular in outline, hyaline to yellowish brown, thin-walled; diverticula $2-6\times 1$ µm, dense over the upper half of cell, cylindrical to conical, obtuse to subacute, hyaline, inamyloid, thin-to thick-walled. – Pleurocystidia absent. – Pileipellis not hymeniform, not mottled, composed of a *Rameales*-structure with clavate

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum



Fig. 4. Marasmius schizochaetus Desjardin, Retnowati & E. Horak (A. Retnowati 113, Holotype). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis. – 6. Caulocystidia.

to broadly clavate or irregular broom cell-like terminal cells, 14–18×7–10 μ m, yellowish brown, thin-walled; hyphae 3–6 μ m diam, with dark brown incrustations, thick-walled; diverticula 3–6×1 μ m, cylindrical to conical, hyaline to yellowish brown, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 3–5 μ m diam, cylindrical, incrusted to non-incrusted, hyaline, inamyloid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical and medullary hyphae undifferentiated, 2–7 μ m diam, parallel, cylindrical, thick-walled (up to 1 μ m), strongly dextrinoid. – Stipe vesture composed of scattered but abundant caulocysti-

dia 12–64×4–10 µm, irregularly cylindrical, often apically split or diverticulate, caramel brown, dextrinoid, with walls up to 2 µm thick; diverticula $2-30\times1-3$ µm, cylindrical to conical, obtuse to subacute, caramel brown, thick-walled. – Clamp connections present.

Habit, habitat, and distribution. – Gregarious on undetermined dicotyledonous leaves in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 9 Jan. 1999, A. Retnowati 113 (Holotype: SFSU).

Etymology. – schizo (Gr.): split; chaetus (Gr.): hairs, referring to the unusual caulocystidia.

Marasmius schizochaetus is distinguished by a small, dark chocolate brown pileus, light brown, non-collariate lamellae, a hispid, light brown, insititious stipe not associated with rhizomorphs, relatively small basidiospores, and thick-walled, brown, apically forked and diverticulate caulocystidia. The last feature is remarkable and not shared by any known members of section *Androsacei*. Numerous taxa with thick-walled pigmented caulocystidia have been described in the section, but all such cells lack outgrowths. Moreover, few species in the section have been described with an evenly dark chocolate brown pileus. In combination, these two features make *M. schizochaetus* unique.

Sect. Marasmius, subsect. Marasmius

- = sect. Pararotulae Singer, Sydowia 18: 339. 1965. [Type species: Marasmius pararotula Singer].
- = subsect. Pararotulae (Singer) Singer, Fl. Neotrop. Monogr. 17: 92. 1976.
- Marasmius plicatus Wakker, De Ziektan van het Suikerriet op Java, Leiden, 1898. – Fig. 5: 1–5. Type: Java. Not extant.

Pileus 3–7 mm diam, convex, plicate; disc rugulose, shallowly umbilicate, lacking a papilla; surface dull, dry, glabrous; light brown overall with an off white umbilicus when fresh, becoming brown with cream umbilicus when dried. – Context thin, white. – Lamellae adnate with a small collarium, distant to remote (7–8 reaching stipe) with no lamellulae, narrow, non-intervenose, light brown, non-marginate. – Stipe $17-32 \times 0.3$ mm, central, terete, wiry, pliant, solid, glabrous, shiny, institutious, dark brown overall; rhizomorphs absent. – Odor and taste not distinctive. erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrun



Fig. 5. Marasmius plicatus Wakker (A. Retnowati 116). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

Basidiospores $9-11 \times 4-6 \ \mu m$ [x = $10.6 \pm 0.4 \times 5.4 \pm 0.6 \ \mu m$; Q = 1.5-2.5; $\bar{q} = 2 \pm 0.3$, n = 25 spores per 1 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. - Basidia not observed. - Basidioles clavate to fusoid. - Cheilocystidia common, of Rotalistype broom cells; main body $15-20.5 \times 10-15$ µm, clavate to broadly clavate, turbinate or subglobose, hyaline, typically thin-walled, few apically thick-walled; divergent setulae $3-4 \times 1 \mu m$, conical to narrowly cylindrical, obtuse, crowded over upper half of cell, hyaline, thick-walled. - Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of Rotalis-type broom cells; main body 15- $24.5 \times 11-12$ µm, clavate to broadly clavate, turbinate or subglobose, sometimes irregular in outline, hyaline, inamyloid, thin-walled; divergent setulae $1.5-2 \times 1 \mu m$, narrowly cylindrical to conical, obtuse, crowded over upper half of cell. - Pileus trama interwoven. -Lamellar trama regular; hyphae 3-8 µm diam, cylindrical, smooth, hyaline, inamyloid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-5 µm diam, parallel, cylindrical, smooth, yellowish brown, dextrinoid, thick-walled, non-gelatinous; medullary hyphae 2–4 µm diam, parallel, cylindrical, hyaline to yellowish brown, dextrinoid. - Stipe vesture absent. - Clamp connections present.

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum

Habit, habitat, and distribution. – Gregarious on undetermined dicotyledonous leaves in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 9 Jan. 1999, A. Retnowati 116 (Neotype: BO; Isoneotype: SFSU).

Marasmius plicatus is distinguished by a light brown, plicateumbilicate pileus lacking a papilla, by distant (7–8), collariate, nonmarginate lamellae, by a dark brown, institutious stipe that arises directly from the substrate, and by relatively larger basidiospores (9– $11 \times 4-6 \mu m$). Our material, collected at Mt. Halimun on Java, differs from the minimal protologue only in forming longer basidiospores (9–11 μm versus 6–8 μm), and growth on dicot leaves (described from sugar cane and bamboo). Although these are significant differences, the overall similarities, especially in other taxonomically important features, suggest that we have recollected this long forgotten Javanese species. The evenly brown, umbilicate pileus lacking a central papilla and distant lamellae are distinctive.

Marasmius plicatus is similar to M. griseofuscescens Singer from Ecuador and M. arimanus Singer from Trinidad. Marasmius griseofuscescens differs in forming much smaller (1.5–2.2 mm diam), grey pilei and more numerous lamellae (10–11; fide Singer, 1976). Marasmius arimanus differs in forming a smaller pileus (2–3 mm diam), sepia-marginate lamellae, a shorter stipe (7–15 mm long), and growth on logs (fide Dennis, 1951; Singer, 1976; Pegler, 1983).

 Marasmius leucorotalis Singer, Sydowia 18: 337. 1965. – Fig. 6: 1–5. Type: Bolivia, La Paz; Nor-Yungas, Rio Yariza, 23 Feb. 1956, Singer B 1414 (LIL).

Pileus 1.5–7 mm diam, hemispherical to convex when young with a deep central depression, becoming plano-convex and umbilicate at maturity, with a small greyish brown to black conic papilla in umbilicus; margin slightly incurved to straight, sometimes upturned in age, crenate, plicate; surface dull, dry, glabrous to granulose; off-white to white, drying tan to pale brown. – Context very thin, concolorous. – Lamellae adnate to a collarium, distant (9–13 reaching stipe) with no lamellulae, white, non-marginate. – Stipe 6– 32×0.2 –0.3 mm, central, terete, wiry, pliant, glabrous, institious, dark reddish brown to black; with or without black rhizomorphs. Odor and taste not distinctive.

Basidiospores 7-9(-10)×(2.6-)3-4 μ m [$\bar{x}_r = 7.8-9.0 \times 3.0-4.0 \mu$ m, $\bar{x}_m = 8.4 \pm 0.6 \times 3.7 \pm 0.3 \mu$ m, Q = 1.6-3, $\bar{q}_r = 2-2.5$, $\bar{q}_m = 2.3 \pm 0.2$, n = 25 spores per 5 specimens], ellipsoid, smooth, hyaline, in-



Fig. 6. Marasmius leucorotalis Singer (A. Retnowati 083). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

amyloid, thin-walled. - Basidia 13-30.5×5-7 µm, clavate, 4spored. - Basidioles 19-24.5×4-7 μm, clavate to fusoid. - Cheilocystidia common, of Rotalis-type broom cells; main body 10- $30 \times 7-17$ µm, clavate to broadly clavate or subglobose, sometimes irregular in outline, hyaline, inamyloid, thin- to thick-walled (up to 1 μ m); divergent setulae 2–5 × 1 μ m, narrowly cylindrical to conical, crowded over upper half of cell, thin-walled, hyaline, inamyloid. -Pleurocystidia absent. - Pileipellis hymeniform, not mottled to weakly mottled, composed of *Rotalis*-type broom cells; main body $10-34 \times 5-17$ µm, broadly clavate to subglobose, hyaline, thin-walled; divergent setulae $2-3 \times 1$ µm, cylindrical to conical, crowded over upper half of cell, hyaline to yellowish brown, inamyloid, thin- to thick-walled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 3.5-7 µm diam, cylindrical, smooth, hyaline, inamyloid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 2–7 µm diam, parallel, cylindrical, smooth, hyaline to vellowish brown, dextrinoid, thick-walled, non-gelatinous; medullary hyphae 3-8 µm diam, parallel, hyaline, inamyloid, thin-walled. -Stipe vesture absent. - Clamp connections present.

Habit, habitat, and distribution. – Gregarious on undetermined dicotyledonous leaves in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Cibodas Botanical Garden, 9 Jan. 1998, K. P. Collins 98–19 (BO, SFSU); Mt. Halimun National Park,

loop trail from Cikaniki, 6 Jan. 1999, A. Retnowati 083 (BO, SFSU); same location, 8 Jan. 1999, A. Retnowati 105 (BO, SFSU); same location, 9 Jan. 1999, A. Retnowati 114 (SFSU); same location, 9 Jan. 1999, A. Retnowati 118 (BO, SFSU).

Marasmius leucorotalis, known previously only from the New World tropics, is characterized by a small, white, plicate pileus with a dark central papilla, by non-marginate, collariate, distant lamellae, by a dark brown to black, institutious stipe that arises directly from the substrate, and by growth on dicotyledonous leaves. The Indonesian specimens match closely the descriptions provided by Singer (1965b, 1976) of material from southern South America, but differ slightly from the description provided by Pegler (1983) for specimens from the Lesser Antilles.

Marasmius leucorotalis is similar to M. tubulatus Petch from Sri Lanka, M. apatelius Singer and M. baumannii Hennings from Africa, and M. ubiquipallens Desjardin & Horak from Papua New Guinea. Marasmius tubulatus differs in forming a greyish brown pileus, marginate lamellae, and broader basidiospores (4–5 µm diameter; fide Petch, 1948; Pegler, 1986). Marasmius apatelius differs in forming a light brown pileus lacking dark central spot (fide Singer 1965a; Pegler 1977). Marasmius baumannii differs in forming a cream to yellow pileus instead of white, but otherwise is indistinguishable (fide Singer 1965a; Pegler, 1977). Marasmius ubiquipallens differs in forming a tan colored pileus without a dark central spot, marginate lamellae and a stramineous to pale brown (not black) stipe (Desjardin & Horak, 1997).

 Marasmius rotalis Berk. & Broome, J. Linn. Soc., Bot. 14: 40. 1873. – Fig. 7: 1–5.

Type: Sri Lanka, Peradeniya, Thwaites 810 (K!).

Pileus 2.5–7.5 mm diam, at first hemispherical, becoming convex in age, with a small rounded papilla that ranges from pallid to brown, with a deep depression around papilla; margin strongly plicate, crenate; surface dull, dry, glabrous; off-white to white overall. – Context thin, concolorous. – Lamellae adnate to a collarium, subdistant to close (15–18 reaching stipe) with no lamellulae, horizontal, not-intervenose, narrow (up to 0.75 mm), white, non-marginate. – Stipe $20-25 \times 0.1$ mm, central, cylindrical, wiry, pliant, glabrous, institutious; dark brown to black overall; black rhizomorphs present. – Od or and taste not distinctive.

Basidiospores 7–9×3–4 µm [$\bar{x} = 8.0 \pm 0.5 \times 3.7 \pm 0.3$ µm; Q = 1.7–2.6; $\bar{q} = 2 \pm 0.2$, n = 25 spores per 1 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia not observed. – Basi-



Fig. 7. Marasmius rotalis Berk. & Broome (A. Retnowati 058). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

dioles clavate to fusoid. - Cheilocystidia common, of Rotalistype broom cells; main body $12-19.5 \times 8-13$ µm, cylindrical to clavate, broadly clavate, turbinate or subglobose, hyaline, typically thin-walled, inamyloid; divergent setulae $2-4 \times 1 \mu m$, knob-like to conical, obtuse, dense over upper half of cell, hyaline to yellow, thinwalled. - Pleurocystidia absent. - Pileipellis hymeniform, not mottled, composed of Rotalis-type broom cells; main body 12- $24.5 \times 8-13 \mu m$, cylindrical to clavate, broadly clavate or subglobose, hvaline, thin-walled; divergent setulae $2-4 \times 1 \mu m$, knob-like to conical, obtuse, dense over upper half of cell, hyaline, thin- to thickwalled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 5-9 µm diam, cylindrical, smooth, inamyloid to weakly dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 4-5 µm diam, parallel, cylindrical, smooth, brown, dextrinoid, thick-walled, non-gelatinous; medullary hyphae 4-7 µm diam, parallel, hyaline to pale brown, weakly dextrinoid, thin-walled. - Stipe vesture absent. - Clamp connections present.

Habit, habitat, and distribution. – Gregarious on undetermined dicotyledonous leaves in alien forest.

Material examined. – Indonesia: Java, West Java, West Bogor, Dungus Iwul Nature Reserve, 26 Dec. 1998, A. Retnowati 058 (SFSU).

Marasmius rotalis is characterized by a relatively small, plicate pileus colored white to off-white with a dark central papilla, close (15–18), collariate lamellae, a dark brown to black, institutious stipe that arises directly from the substrate, basidiospores $7-9 \times 3-4$ µm, and by growth on dicotyledonous leaves. In addition to the type locality in Sri Lanka, this pantropical species has been reported from Colombia (Singer, 1976), Zaire (Singer, 1976), Malaysia (Corner, 1996) and Papua New Guinea (Desjardin & Horak, 1997). It differs from *M. leucorotalis* mainly in forming more numerous lamellae, 15–18 versus 9–13, respectively, and in sometimes lacking a dark central spot on the pileus.

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

Type species: Marasmius curreyi Berk. & Broome.

- = subsect. Penicillati Singer sensu Singer, Fl. Neotrop. Monogr. 17: 121. 1976. [Type species: Marasmius graminum (Lib.) Berk. sensu Singer].
- Marasmius purpureosetosus Corner, Nova Hedwigia 111: 90. 1996.
 Fig. 8: 1–6.

[ut Marasmius purpureisetosus]

Type: Malaysia, Johore, Malayan Peninsula, Corner s.n., 1 Sept. 1940 (E).

Pileus 0.5–3 mm diam, flattened convex to conical, with a shallow central umbilicus and a small, dark brown, rounded papilla in the pale yellowish buff umbilicus, striatulate to sulcate; surface dull, dry, hispid overall with long reddish brown to black setae, hence appearing dark brown to black; ground color cream (4A2–3) to brownish orange (5C4–5; "clay") under setae. – La mella e adnate to a collarium, subdistant to close (10–16 reaching stipe), rather thick, broad, collarium flared and well developed, sometimes inner surface spotted brown; white to cream (4A2), non-marginate. – Stipe 7–70 × 0.05–0.1 mm, central, wiry, sometimes forked, rarely with a few nodes that are sometimes flared, glabrous, shiny, institious, black to dark brown; black rhizomorphs present. – O d or and taste not distinctive.

Basidiospores (6–)7–9×3–4.5 μ m [$\bar{x}_r = 7.7-8.0 \times 3.6-3.9 \mu$ m, $\bar{x}_m = 7.9 \pm 0.1 \times 3.7 \pm 0.2 \mu$ m, Q = 1.7–2.8, $\bar{q}_r = 2-2.2$, $\bar{q}_m = 2 \pm 0.2$, n = 25 spores per 3 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia 17–23×6–7 μ m, clavate to broadly clavate, 4-spored. – Basidioles obtusely fusoid to clavate, hyaline, thinwalled. – Cheilocystidia abundant, composed of 2 types of cells: a) *Siccus*-type broom cells; main body 18–24.5×5–11 μ m, clavate to cylindrical or turbinate, hyaline to pale brown, thick-walled; apical erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrun



Fig. 8. Marasmius purpureosetosus Corner (D. E. Desjardin 6765). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis broom cells. – 6. Pileosetae.

setulae 2–8×1.7–3 μ m, cylindrical to conical, sometimes irregular in outline, ranging from 2–3 per cell, subacute to acute, hyaline to pale brown, inamyloid, thick-walled; b) non-setulose cells, 10– 23×5–7 μ m, fusoid, hyaline, weakly dextrinoid, thick-walled, interspersed with *Siccus*-type broom cells. – Pleurocystidia absent. – Pileipellis hymeniform, not mottled, composed of 3 types

of cells: a) Siccus-type broom cells, with main body $10-22.5 \times 6-$ 9 µm, cylindrical to clavate or irregular in outline, hyaline to pale brown, with walls up to 1 μ m thick; apical setulae 8-30.5 \times 1.5-4.5 µm, conical, subacute to acute, ranging from 2-3 per cell, brown, thick-walled or solid; b) transitional cells $20-40 \times 7-9$ µm, with main body clavate to broadly clavate, similar to Siccus-type broom cells but with only 2-3 large apical setulae, subacute to sharply acute; c) pileosetae $50-182 \times 5-14$ µm, common, lanceolate to fusoid-ventricose, subacute to acute, brown, dextrinoid, thickwalled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 3-6 µm diam, cylindrical, smooth, hyaline, dextrinoid, thinwalled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 2-4 µm diam, parallel, cylindrical, smooth, yellowish brown, dextrinoid, walls up to 1 µm thick, non-gelatinous; medullary hyphae 3-6 µm diam, hyaline to pale yellowish brown, walls up to 0.5 µm thick. - Stipe vesture of uncommon caulocystidia 14- $41 \times 3-5$ µm, cylindrical, hyaline, inamyloid, thin-walled. – Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious on undetermined dicotyledonous leaves in montane rainforest with *Castanopsis*. Java.

Material examin ed. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, ca 1900 m, 13 Jan. 1998, D.E. Desjardin 6765 (BO, SFSU); same location, 14 Jan. 1998, D.E. Desjardin 6774 (BO, SFSU); same location, 6 Jan. 1999, D.E. Desjardin 6867 (BO, SFSU).

Diagnostic features of *Marasmius purpureosetosus* include: a) a small, hispid, cream to brownish orange pileus with reddish brown to black pileosetae; b) subdistant (10-16) lamellae attached to a collarium; and c) a glabrous stipe that sometimes has flared nodes. *Marasmius purpureosetosus* and the following species, *M. berambutanus*, are the only known members of section *Marasmius* with pileosetae. The two species differ by the features presented in the key. Although we have not observed the stipes on basidiomes of *M. purpureosetosus* arising directly from rhizomorphs, they sometimes do have nodes and are associated with branched rhizomorphs, two features common to species that form basidiomes directly on rhizomorphs.

The Indonesian specimens match quite closely the protologue based on a Malaysian specimen (Corner, 1996) except that we did not observe purple tones on the pilei although the brown pileosetae give the pileus a dark appearance.

Marasmius berambutanus Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 9: 1–5.

Pileus 0.5-3 mm latus, convexo-umbilicatus, plicatus, papilla brunnea conica instructus, hispidulus, primo albus vel cremeus, dein pallide albo-brunneus. Lamellae adnatae, collariatae, distantes, albae, haud marginatae. Stipes $4-25 \times 0.05$ -0.1 mm, filiformis, flexilis, rariter ramosus ad nodos, glabrus, fuscus vel fuliginosus, insititius vel rhizomorphis nigris affixus. Odor saporque nulli. Basidiosporae $(7-)8-11 \times 3-5 \mu m$, ellipsoideae, leves, hyalinae, inamyloideae, tenui-tunicatae. Basidia $20-30.5 \times 6-8$ µm, 4-spora. Basidioles clavata. Cheilocystidia $9-17.5 \times 6-$ 10 μm, typi Sicci, abundantia, setulosa, clavata vel irregularia, hyalina; setulae ad apicem $3-10 \times 1-1.5$ µm, cylindricae vel conicae, hyalinae vel pallide luteo-brunneae, crasse-tunicatae. Pleurocystidia nulla. Pileipellis hymeniformis, typi Sicci: a) cellulae setulosae $9-20.5 \times 5-10 \mu m$, clavatae, hyalinae vel pallide luteo-brunneae, crasse-tunicatae, setulae ad apicem $5-30.5 \times 1-2 \ \mu m$, numerosae, cylindricae vel conicae, saepe noduloso-ramosae, hvalinae vel pallide luteo-brunneae, crassetunicatae; b) Pileosetae $15-20.5 \times 5-6 \ \mu m$, cylindricae vel irregulares, subacutae vel acutae, saepe ramosae, hyalinae vel pallide luteo-brunneae, inamyloideae. Trama pilei irregulare; trama lamellarum regulare, hyphis inamyloideis vel paulo dextrinoideis instructum. Caulocystidia 3-15 µm lata, clavata, tenui-tunicata, inamyloidea. Fibulae presentes. Gregarius ad folia putrida plantarum dicotyledonearum vel monocotyledonearum. Holotypus: Indonesia, Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 6 Jan. 1999, A. Retnowati 081 (BO).

Pileus 0.5–3 mm diam, convex–umbilicate, with a small conic to convex, reddish brown to dark brown papilla, plicate to the umbilicus; surface dull, dry, hispidulous; white to cream when young, remaining so or darkening to dingy buff or whitish brown in age. – Context thin, white. – Lamellae adnate or adnexed to a collarium, distant (7–10 reaching stipe) with no lamellulae, broad, not-intervenose, white, non-marginate. – Stipe $4-25 \times 0.05-0.1$ mm, central, cylindrical, wiry, pliant, sometimes branched and with scattered nodes, glabrous, shiny, insititious, dark brown to black, arising directly from black rhizomorphs. – Odor and taste not distinctive.

Basidiospores (7–)8–11×3–5 μ m [$\bar{x}_r = 8.4-10.6 \times 3.5-4 \mu$ m; $\bar{x}_m = 9.4 \pm 0.8 \times 4.0 \pm 0.2 \mu$ m; Q = 1.7–3.3; $\bar{q}_r = 2.3-2.5$; $\bar{q}_m = 2.4 \pm 0.1$, n = 25 spores per 3 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia 20–30.5×6–8 μ m, clavate, 4-spored. – Basidioles clavate. – Cheilocystidia abundant, of *Siccus*-type broom cells; main body 9–17.5×6–10 μ m, clavate to broadly clavate, turbinate, subvesiculose or irregular in outline, rarely lobed, hyaline, inamyloid, thin- to thick-walled; apical setulae 3–10(–12)×1–1.5 μ m, cylindrical to conical or irregular in outline, obtuse to subacute, hyaline to yellowish brown, inamyloid, thick-walled. – Pleuro-cystidia absent. – Pileipellis hymeniform, not mottled to weakly mottled, composed of *Siccus*-type broom cells plus pileosetae: a) *Siccus*-type broom cells with main body 9–20.5×5–10 μ m, clavate to



Fig. 9. Marasmius berambutanus Desjardin, Retnowati & E. Horak (A. Retnowati 081, Holotype). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidiole. – 4. Cheilocystidia. – 5. Pileipellis.

broadly clavate, vesiculose, turbinate or irregular in outline, hyaline to brownish yellow, thick-walled overall; apical setulae $5-30.5 \times 1-2$ µm, crowded, cylindrical to conical, subacute to obtuse, often branched and with a few nodules, hyaline to brownish yellow, thickwalled; most cells with long setulae; b) pileosetae $36-75 \times 2.5-5$ µm with a swollen base 5-10 µm diam, cylindrical to lanceolate or irregular in outline, subacute to acute, sometimes branched, brownish yellow, inamyloid; numerous cells transitional between broom cells and setae, with 3-4 apical setulae 10-42 µm long. – Pileus trama interwoven. – Lamellar trama regular; hyphae 3-5 µm diam, cylindrical, smooth, hyaline, inamyloid to weakly dextrinoid, thinwalled. – Stipe tissue monomitic; cortical hyphae $3-4 \mu m$ diam, cylindrical, reddish brown to dark brown, dextrinoid, thick-walled; medullary hyphae $3-7 \mu m$ diam, hyaline, weakly dextrinoid, thinwalled. – Stipe vesture composed of scattered caulocystidia $3-15 \mu m$ diam, clavate, hyaline to pale brown, inamyloid, thin-walled. – Clamp connections present.

Habit, habitat, and distribution. – Gregarious on dicotyledonous or monocotyledonous leaves in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 14 Jan. 1998, D.E. Desjardin 6776 (BO, SFSU); same location, 6 Jan. 1999, A. Retnowati 081 (Holotype: BO; Isotype: SFSU); same location, 8 Jan. 1999, A. Retnowati 101 (BO, SFSU).

Etymology. – be (Indonesian): with; rambut (Indonesian): hairs, referring to the pileus with hair-like setae.

Marasmius berambutanus is distinguished by a very small, white to cream pileus that is covered with small setae and has a reddish brown central papilla, by collariate lamellae, and by forming stipes that arise directly from rhizomorphs. It is similar to another setose species, *M. purpureosetosus* Corner (1996), differing by the features presented in the key.

In the field, basidiomes of *M. berambutanus* look like those of *M. pallenticeps* Singer (1976), but careful observation with a hand lens will reveal the finely hispidulous pileus surface of *M. berambutanus* versus the glabrous pileus of *M. pallenticeps*. The presence of pileosetae and very long setulae in *M. berambutanus* clearly distinguishes it from *M. pallenticeps*.

- Marasmius purpureobrunneolus Henn., Monsunia 1: 151. 1900. Fig. 10: 1–5.
- Marasmius acierufus Corner, Beih. Nova Hedwigia 111: 25. 1996.
 Type: Java, Bogor Botanical Garden, 12 Feb. 1898, E. Nyman. Not extant.

Pileus 3–10 mm diam, henaispherical to convex with distinctly depressed to umbilicate disc, papilla absent; margin plicate, undulate; surface dull, dry, glabrous to pruinose; evenly reddish brown (liver brown) to dark brown or purplish brown. – Context thin; texture tough. – Lamellae broadly adnate to a small collarium, distant (9–14 reaching stipe) with no lamellulae; off-white with even to subfimbriate, reddish brown to purplish brown edges. – Stipe $18-35 \times 0.1-0.5$ mm, central, cylindrical, wiry, tough, solid,



Fig. 10. Marasmius purpureobrunneolus Henn. (E. Horak 77–179, Neotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Cheilocystidia. – 4. Pileipellis. – 5. Stipe tissue.

dry, glabrous, institutious, reddish brown to purplish brown or paler; dark brown rhizomorphs present. – Odor and taste not distinctive.

Basidiospores 12.5–15(–17.5)×2.5–4 μ m [\bar{x} = 14.8 ± 1.0×3.3 ± 0.4 μ m, Q = 3.5–4.9, \bar{q} = 4.5 ± 0.4, n = 25 spores per 1 specimen], slender-fusoid to suballantoid, gradually tapering towards a broad apiculus, smooth, hyaline, inamyloid, thin-walled. – Basidia not observed. – Basidioles fusoid. – Cheilocystidia of *Siccus*-type broom cells; main body 14–20×4–11 μ m, polymorphic, ranging from cylindrical to clavate or vesiculose, often irregularly forked or branched, brown, thick-walled in apical region; apical setulae 1–3×1 μ m, bluntly cylindrical or saddle-shaped, thick-walled, brown. – Pleurocystidia absent. – Pileipellis hymeniform,

119

mottled, composed of Siccus-type broom cells; main body 12– 20×8–16 μ m, clavate to broadly clavate or turbinate, hyaline to pale brown, apically thick-walled; apical setulae 1–3×0.5–1 μ m, cylindrical to conical, obtuse to subacute, usually wavy in outline, brown, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae inamyloid to dextrinoid. – Stipe tissue monomitic; cortical hyphae 4–5 μ m diam, parallel, cylindrical, smooth or pigment incrusted, hyaline to yellowish brown, dextrinoid, thick-walled (up to 1 μ m), non-gelatinous; medullary hyphae 4–6 μ m diam, cylindrical, hyaline to yellowish brown, smooth, thin-walled. – Stipe vesture absent. – Clamp connections present.

Habit, habitat and distribution. – Scattered on rotting stems and leaves of broad-leaves trees, mostly *Castanopsis*, *Lithocarpus* and dipterocarps in botanical garden area. Java.

Marasmius purpureobrunneolus was described by Hennings (1900) from material collected in the Bogor Botanical Garden. He described the pileus as "purpureo-brunnescente" and the lamellae as "collariato-affixis, pallide roseis vel albis." The pilei of the basidiomes collected by us at the type locality were reddish brown to dark brown or purplish brown, and the lamellar edges were reddish brown to purplish brown. The only other descrepancy between our material and the protologue is that the basidiospores were originally described as "subglobosis, 3–5 µm," whereas we measured the spores of the new material as $12.5-15 \times 2.5-4$ µm. We do not place much weight on the published spore measurements because they were often erroneous in these early publications and because no known members of Marasmius form subglobose basidiospore and none form such small basidiospores. Unfortunately, the type specimen of M. purpureobrunneolus was destroyed and consequently we are unable to confirm the published spore measurements. Until we discover a purplish brown *Marasmius* in section *Marasmius* from Bogor that has tiny subglobose basidiospores, we will accept M. purpureobrunneolus as a clavate-spored taxon. A beautiful painting of M. purpureobrunneolus labeled "Marasmius # 23" resides in Herbarium Bogoriense.

The species was recently described by Corner (1996) from Singapore as *M. acierufus* Corner.

Material examined. - Indonesia: Java, West Java, Bogor Botanical Garden, 11 Mar. 1977, E. Horak 77-179 (Neotype: SFSU; Isoneotype: ZT); same location, 6 Jan. 2000, D. E. Desjardin 7037 (SFSU).

Marasmius guyanensis Mont., Ann. Sci. Nat. Bot. 4(1): 114. 1854. Fig. 11: 1-5. Type: French Guyana, Leprieur. Authentic specimen, Herb. Berk. (K).

Pileus 1.5–5 mm diam, convex to campanulate, shallowly umbilicate, with or without a small black papilla; margin sulcate to plicate, decurved to slightly outcurved in age; surface dull, dry, glabrous to minutely pruinose; ranging from reddish orange (6A5–6) with slightly paler margin, to deep brownish orange (6–7C–D7–8) or bright ferruginous overall, umbilicus black or reddish orange, drying dark orangish brown overall. – Context thin, buff. – Lamella e adnate to a well-developed collarium, distant to remote (7–10 reaching stipe) with no lamellulae, not intervenose, broad, buff to pale cream (4A3), bright yellow (4A6–8) or yellow (4A4–5), nonmarginate. – Stipe $10-25 \times 0.1-0.2$ mm, central, terete, wiry, pliant, glabrous, shiny, institutious; dark brown to black overall; rhizomorphs present. – O d or and t as te not distinctive.

Basidiospores 11-13.5(-14.3) \times 3-4 μ m [$\bar{x}_r = 12.0-12.3 \times 3.3 3.7 \,\mu\text{m}, \, \bar{x}_{\text{m}} = 12.1 \pm 0.2 \times 3.6 \pm 0.2 \,\mu\text{m}, \, \text{Q} = 2.5 - 4.3, \, \bar{q}_{\text{r}} = 3 - 3.7, \, \bar{q}_{\text{m}} = 3.4 \pm 1.0 \,\mu\text{m}$ 0.3, n = 25 spores per 4 specimens], elongate- ellipsoid, smooth, hyaline, inamyloid. – Basidia $25.5-27.5 \times 5-6 \mu m$, clavate, 4-spored. - Basidioles 20-30×4.5-6 μm, clavate to fusoid. - Cheilocystidia common, of Siccus-type broom cells; main body $10-17.5 \times 7-$ 16 µm, cylindrical to clavate, broadly clavate, turbinate or subvesiculose, sometimes irregular in outline, hyaline to pale yellow, inamyloid, thick-walled at the apex; apical setulae $6-8 \times 1$ µm, crowded, cylindrical to conical or irregular in outline, subacute to obtuse, hyaline to yellow, thick-walled. - Pleurocytidia absent. -Pileipellis hymeniform, mottled, composed of Siccus-type broom cells, similar to cheilocystidia; main body $10-17.5 \times 7-10 \mu m$, clavate to broadly clavate, turbinate or vesiculose, hvaline to tawny, thickwalled; apical setulae $1-2 \times 0.5$ µm, cylindrical to conical, usually wavy in outline, obtuse to subacute, tawny to brown, thick-walled. -Pileus trama interwoven. - Lamellar trama regular; hyphae 5-7(-13.5) µm diam, cylindrical to inflated, smooth, hyaline, weakly dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 2-4 µm diam, parallel, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous; medullary hyphae 3-4 µm diam, cylindrical, thin-walled. - Stipe vesture absent. - Clamp connections present.

Habit, habitat, and distribution. – Scattered on leaves of undetermined dicotyledonous plants in botanical garden. Java.

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrun/



Fig. 11. Marasmius guyanensis Mont. (A. Retnowati 125). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

Material examined. – Indonesia: Java, Bogor Botanical Garden, 7 Jan. 1998, D. E. Desjardin 6713 (BO, SFSU); same location, 8 Jan. 1998, D.E. Desjardin 6719 (BO, SFSU); same location, 15 Jan. 1998, D.E. Desjardin 6797 (BO, SFSU); same location, 12 Jan. 1999, A. Retnowati 125 (BO, SFSU).

Distinctive features of *M. guyanensis* include: a) a small, plicate, reddish orange to brownish orange or yellowish orange pileus with a central black papilla; b) collariate lamellae; c) a dark stipe not arising from rhizomorphs; and d) relatively long and narrow basidiospores with mean of $12.1 \times 3.6 \ \mu$ m. Although known primarily from the New World tropics (cf. Singer, 1976; Pegler, 1983) it was recently reported from Singapore by Corner (1996). This species is very closely allied with *M. gordipes* Sacc. & Paol., described from Melaka State, Malaysia (subsequently reported from Sri Lanka by Petch [1948] and Pegler [1986]), but the latter is said to have a stipe that ranges from $60-130 \ mm$ long. The long stipe is about the only distinction between our Indonesian material and the protologue of *M. gordipes*. If it is found that Malesian specimens are capable of forming both very short and very long stipes, this observation may dictate our identifying Malesian material as *M. gordipes* instead of *M. guyanensis*.

Marasmius pallenticeps Singer, Fl. Neotrop. Monogr. 17: 127. 1976. – Fig. 12: 1–4.

Type: Argentina, Misiones, Frontera, General Manuel Belgrano near San Antonio, 19 Apr. 1957, Singer M 1123 (LIL).

Pileus 1–3 mm diam, convex, umbilicate, with a small conic dark brown to black papilla, plicate; surface dry, glabrous to minutely pruinose; pure white. – Context very thin, white. – Lamellae adnate to a collarium, distant (9–10 reaching stipe) with no lamellulae, broad, white, non-marginate. – Stipe $5-9\times0.1$ mm, central, terete, wiry, glabrous, pliant, institious; black; stipe arising from black, wiry rhizomorphs that are often branched. – Odor and taste not distinctive.

Basidiospores 8-10 × 4-5 μ m [\bar{x} = 8.8 ± 0.2 × 4.3 ± 0.3 μ m, Q = 1.6 - 2.4, $\bar{q} = 2 \pm 0.2$, n = 25 spores per 1 specimen], ellipsoid, smooth, hvaline, inamyloid, thin-walled. - Basidia $16-20.5 \times 5-7$ µm, clavate, 4-spored. - Basidioles clavate to fusoid. - Cheilocystidia common, of *Siccus*-type broom cells; main body $9-41 \times 6-12$ µm, clavate to broadly clavate, turbinate, or irregular in outline, rarely lobed, hyaline, thin-walled; apical setulae $2-3 \times 0.5-1$ µm, crowded, cylindrical to conical, seldom branched, subacute to obtuse, hyaline, inamyloid, thin-walled. - Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of Siccus-type broom cells; main body $8-28.5 \times 5-15.5$ µm, clavate to broadly clavate, turbinate or subvesiculose, hyaline, thick-walled apically, thin-walled elsewhere; apical setulae $3-4 \times 0.5-1$ µm, crowded, cylindrical to conical or irregular in outline, seldom branched, subacute to obtuse, hyaline (except on papilla where they are brown), inamyloid, thin- to thickwalled. - Pileus trama interwoven. - Lamellar trama regular; hyphae weakly dextrinoid. - Stipe tissue monomitic; cortical hyphae 4-6 µm diam, parallel, cylindrical, dark brown, dextrinoid, thick-walled; medullary hyphae 2-10 µm diam, hyaline, dextrinoid, thin-walled. - Stipe vesture of uncommon caulocystidia, clavate to cylindrical, thick-walled, inamyloid. - Clamp connections present.

Habit, habitat, and distribution. – Gregarious on *Castanopsis* leaves in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 9 Jan. 1999, A. Retnowati 111 (SFSU).

Marasmius pallenticeps is distinguished by a tiny, white pileus that bears a dark brown central papilla, by collariate lamellae, and by stipes that arise directly from branched rhizomorphs. Described erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrun



Fig. 12. Marasmius pallenticeps Singer (A. Retnowati 111). – 1. Basidiomes (a – x2; b – x3). – 2. Basidiospores. – 3. Cheilocystidia. – 4. Pileipellis.

originally from Argentina, this is the second report of the species from the Old World tropics. Desjardin and Horak (1997) recently reported the species from New Zealand. The species has pilei pigmented like those of *M. conicopapillatus*, but the latter species develops directly from leafy substrates, not from rhizomorphs, and forms larger pilei and slightly longer basidiospores on average. *Marasmius melaniformis* Berk. (*ut M. meloniformis* Berk. in Hooker, 1860), described from material collected in Tasmania, may represent the earliest name for the taxon. Until further material collected from *Eucalyptus* leaves and twigs in Tasmania is made available for study, however, we will accept Singer's epithet for the Indonesian taxon.

 Marasmius conicopapillatus Henn., Engler Bot. Jahrb. 22: 100. 1895. – Fig. 13: 1–5. Type: Cameroon, 20 May 1892, Dusén 41a. Not extant.

Pileus 1–7 mm diam, convex when young, expanding to flattened convex at maturity, shallowly umbilicate, with a conic, dark reddish brown to orangish brown papilla in umbilicus, striate to erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum/



Fig. 13. Marasmius conicopapillatus Henn. (A. Retnowati 144). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

plicate up to central depression; margin slightly outcurved, crenate; surface dull, dry, glabrous; pure white to off-white when young, becoming cream-buff (4A2-3) in age. – Context very thin, white. – Lamellae adnexed or adnate to a collarium, distant (8–11 reaching stipe) with 0 series lamellulae, non-intervenose, broad, white, nonmarginate. – Stipe $12-30 \times 0.05-0.2$ mm, central, wiry, pliant, glabrous, shiny, institutious; apex white, grading through brownish orange to black at the base; black rhizomorphs present. – Od or and taste not distinctive.

Basidiospores (8–)9–12×(3–)4–5 μ m [$\bar{x}_r = 10.0-10.7 \times 4.0-4.6 \mu$ m, $\bar{x}_m = 10.3 \pm 0.4 \times 4.3 \pm 0.3 \mu$ m, Q = 1.6–3.3, $\bar{q}_r = 2-2.7$, $\bar{q}_m = 2.4 \pm 0.2$, n = 25 spores per 4 specimens], ellipsoid, curved in profile, smooth, hyaline, inamyloid, thin-walled. – Basidia 19–30.5×6–9 μ m, clavate, 4-spored. – Basidioles clavate to fusoid. – Cheilocystidia common, of *Siccus*-type broom cells; main body 8–30.5×6–12 μ m, cylindrical to clavate, broadly clavate or irregular in outline, rarely lobed, hyaline to pale yellow, thick-walled (up to 1 μ m); apical setulae 2–5×0.5–1 μ m, crowded, cylindrical to conical

or irregular in outline, obtuse to subacute, hyaline to pale yellow, inamyloid, thin- to thick-walled. – Pleurocystidia absent. – Pi-leipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body 10–20.5 × 7–16 μ m, cylindrical to clavate, broadly clavate or sometimes irregular in outline, hyaline to pale yellow, apically thick-walled; apical setulae, 2–4 × 1 μ m, crowded, cylindrical to conical or irregular in outline, subacute to obtuse, hyaline to pale yellow, inamyloid, thin- to thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 5–7 μ m diam, cylindrical, smooth, hyaline, weakly dextrinoid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae 2–5 μ m diam, parallel, cylindrical, hyaline (apex) to brown (base), dextrinoid, with walls up to 1 μ m thick; medullary hyphae 2–8 μ m diam, cylindrical, thin-walled. – Stipe vesture absent. – Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious on leaves of various hardwoods in montane rainforest dominated by *Castanopsis javanica*. Java.

Material examined. – Indonesia: Java, Cibodas Botanical Garden, trail to Mt. Gede, 9 Jan. 1998, D.E. Desjardin 6741 (BO, SFSU); same location, 22 Jan. 1999, A. Retnowati 144 (SFSU); Mt. Halimun National Park, loop trail from Cikaniki, 14 Jan. 1998, D.E. Desjardin 6778 (BO, SFSU); same location, 6 Jan. 1999, A. Retnowati 084 (BO, SFSU).

Marasmius conicopapillatus has been reported from Cameroon and Uganda in the Old World tropics (Hennings, 1895; Pegler, 1977), and from Bolivia in the New World tropics (Singer, 1976). This report of specimens from several sites on Java indicates that the species is pantropical. As noted in the key, *M. conicopapillatus* is similar to *M. pallenticeps*, differing primarily in forming basidiomes directly from the substrate instead of from rhizomorphs.

Basidiomes begin development on dicot leaves as brownish orange to brown, conic papilla that are directly adnate to the substrate. As basidomes develop and the stipe elongates, the pileus margin and lamellae grow downward and outward from the margin of the papilla. Young basidiomes show an elongated stipe capped by a large papilla with a pallid skirt-like fringe that represents the developing pileus.

- Marasmius crinisequi F. Muell. ex Kalchbr., Grevillea 8: 153. 1880. – Fig. 14: 1–5.
 - = Marasmius equicrinis F. Muell. ex. Berk., J. Linn. Soc., Bot. 18: 383. 1881.
 - = Androsaceus crinisequi (F. Muell. ex Kalchbr.) Overeem, Hoofd van Het Mus. Econ. Bot. Buitenzorg 1: 69. 1927.
 - ≡ Marasmius graminum (Libert) Berk. & Broome var. equicrinis (F. Muell.) Dennis, Trans. Brit. Mycol. Soc. 34: 416. 1951.

= Marasmius repens Henn., Engl. Bot. Jahrb. 23: 548. 1897.

= Marasmius ramentaceus (Pat.) Sacc. & Trav., Syllog. Fung. 20: 21. 1911.

= Androsaceus ramentaceus Pat., Ann. Jard. Bot. Buitenzorg 1: 107. 1897.

Type: Australia, North Queensland, Rockingham Bay, F. von Mueller (K).

Pileus 1–3 mm diam, convex to hemispherical, umbilicate, with a tiny dark brown to black conic papilla; margin plicate, crenate, straight; surface dull, dry, glabrous or minutely pruinose; brownish orange, light brown or brown overall when young, remaining so in age or fading slightly, often dark reddish brown in depression surrounding dark papilla. – Context very thin, buff. – Lamellae adnate to a collarium, distant (8–9 reaching stipe) with no lamellulae, broad, white to buff, non-marginate. – Stipe $3-11 \times 0.1-0.3$ mm, central, wiry, sometimes with nodes, glabrous, dark reddish brown to black; arising directly from black rhizomorphs. – Odor and taste not distinctive.

Basidiospores $(7-)8-11(-12) \times 3-5 \ \mu m \ [\bar{x}_r = 8.0-10.7 \times 3.5-$ 4.5 μ m, $\bar{x}_m = 9.3 \pm 0.8 \times 3.9 \pm 0.5 \mu$ m, Q = 1.5–4, $\bar{q}_r = 2-3$, $\bar{q}_m = 2.5 \pm 0.3$, n = 25 spores per 6 specimens), ellipsoid, curved in profile, smooth, hyaline, inamyloid, thin-walled. - Basidia 18.5-26×5-7 µm, clavate, 4-spored. - Basidioles 16-30×5-7 μm, clavate to fusoid. -Cheilocystidia common, of Siccus-type broom cells; - main body $10-28.5 \times 3-8 \mu m$, cylindrical to clavate, broadly clavate, turbinate or irregular in outline, hyaline to yellow, thick-walled apically or overall, thin-walled elsewhere; apical setulae $1-3 \times 0.5-1.5$ µm, crowded, cylindrical to conical, sometimes wavy in outline, seldom branched, obtuse to subacute, hyaline to pale yellowish brown, inamyloid, thick-walled. - Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of Siccus-type broom cells; main body 9- $20.5 \times 6-12$ µm, cylindrical to clavate, broadly clavate, turbinate or irregular in outline, hyaline to yellowish brown; apical setulae 2- $10 \times 0.5-2$ µm, crowded, cylindrical to conical, seldom branched and nodulose, obtuse to subacute, yellowish brown to tawny, inamyloid, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 4-7 µm diam, cylindrical, smooth, hyaline, inamyloid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-5 µm diam, parallel, cylindrical, smooth, hyaline (apex) to brown (base), strongly dextrinoid, thick-walled; medullary hyphae 3-5 µm diam, cylindrical, parallel, hyaline, strongly dextrinoid, thin-walled. - Stipe vesture absent. - Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious on twigs and leaves of undetermined dicotyledonous plants under *Castanopsis* in montane rainforest. Java.


Fig. 14. Marasmius crinisequi F. Muell. ex Kalchbr. (A. Retnowati 102). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

Material examined. - Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 14 Jan. 1998, D. E. Desjardin 6777 (SFSU); same location, 14 Jan. 1998, K. P. Collins 98-27 (SFSU); same location, 8 Jan. 1999, A. Retnowati 102 (BO, SFSU); same location, 8 Jan. 1999, A. Retnowati 104 (BO, SFSU); same location, 9 Jan. 1999, A. Retnowati 117 (BO, SFSU).

Marasmius crinisequi, the causal agent of "Horse-hair Blight" is one of the more widely distributed species in the genus, reported throughout tropical areas of the world. The species grows on leaves and petioles of living or dead trees, and on monocotyledonous stems and culms. It is known to be pathogenic on tea, rubber, cocca, and nutmeg crops (Pegler, 1983), and its rhizomorphs are often found covering branches of living trees. The species was first described from material collected in Australia. Marasmius crinisequi is easily recognized by the following features: a) small (1–3 mm diameter), brown to brownish orange pileus, with a small dark conical papilla; b) distant, non-marginate lamellae; c) Siccus-type pileipellis elements and cheilocystidia; and d) stipes that arise directly from rhizomorphs.

 Marasmius acicularis Berk. & M.A. Curtis, Proc. Amer. Acad. Arts. 4: 120. 1860. – Fig. 15: 1–5. Type: Japan, Bonin Island, 31 Oct. 1854, C. Wright (K) [Isotype: FH!].

Pileus 2–6 mm diam, flattened-campanulate to hemispherical, umbilicate, plicate, papilla absent; surface dull, dry, glabrous; deep



Fig. 15. Marasmius acicularis Berk. & M. A. Curtis (D. E. Desjardin 6780). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

orangish brown (7D7–8) to ferruginous (7C7–8) overall when young, fading in age to brownish orange (6C6–7). – Lamellae adnate to a narrow collarium, remote (9–12 reaching stipe) with 0–1 series of lamellulae, convex, pale yellowish white (4A2), non-marginate. – Stipe $10-15 \times 0.1$ mm, central, terete, wiry, glabrous, shiny, insititious; yellow (4A5–6) to golden yellow (5–B6–8) overall; associated with yellow to golden rhizomorphs. – Odor and taste not distinctive.

Basidiospores $6-8 \times 3.5-5 \ \mu m$ [$\bar{x} = 7.3 \pm 0.6 \times 3.9 \pm 0.4 \ \mu m$, Q = 1.2–2.6, $\bar{q} = 1.9 \pm 0.3$, n = 25 spores per 2 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia $16.5-27.5 \times 5.5-8 \ \mu m$, clavate, 4-spored. – Basidioles $18.5-25 \times 4-7 \ \mu m$, clavate to fusoid. – Cheilocystidia common, composed of two types of cells: a) *Siccus*-type broom cells with main body $12-23.5 \times 5-12 \ \mu m$, cylindrical to clavate, broadly clavate, turbinate or irregular in outline, rarely lobed, hyaline, apically thick-walled; apical setulae $4-9 \times 0.5-1.5 \ \mu m$, narrowly cylindrical to conical or irregular in outline, obtuse

to subacute, hyaline, thin- to thick-walled; b) rare non-setulose cells with main body $12-18.5 \times 6-11 \mu m$, clavate to broadly clavate, hyaline, thin-walled. - Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of two type of cells: a) Siccus-type broom cells with main body $10-19 \times 6-11 \mu m$, cylindrical to clavate, broadly clavate, turbinate, or vesiculose, pale vellow, thin- to thick-walled; apical setulae $3-8 \times 1-2$ µm, crowded, cylindrical to irregular in outline, tawny, thick-walled; b) non-setulose cells with main body 11- $15.5 \times 5-10$ µm, subglobose to clavate, scattered, pale brownish orange, thick-walled. - Pileus trama interwoven. - Lamellar trama regular: hyphae 3–10 µm diam, cylindrical, smooth, hyaline, inamyloid to weakly dextrinoid, thin-walled, non-gelatinous. -Stipe tissue monomitic; cortical hyphae 3.9-5 µm diam, parallel, cylindrical, smooth, non-gelatinous, hyaline to pale yellow, dextrinoid, with walls up to 0.6 µm thick; medullary hyphae 5-6 µm diam, cylindrical, hyaline. - Stipe vesture of scattered caulocystidia, clavate to irregular in outline, uncommon. - Clamp connections present.

Habit, habitat, and distribution. – Gregarious on twigs and roots of undetermined plants under *Castanopsis javanica* in montane rainforest. Java.

Material examined. - Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 13 Jan. 1998, D.E. Desjardin 6759 (SFSU); same location, 14 Jan. 1998, D.E. Desjardin 6780 (BO, SFSU).

Marasmius acicularis is characterized by a small, plicate pileus colored brownish orange to ferruginous, pale yellowish white collariate lamellae, and by a yellow to golden stipe and rhizomorphs. Previously known only from the type specimen collected in 1854 on the Bonin Islands of Japan (FH!), our discovery of the taxon in Indonesia suggests that the species may occur throughout southeast Asia. Desjardin and Horak (1997) reported that the species belongs to sect. Sicci because of the Siccus-type pileipellis elements. A reexamination of the isotype specimen indicates a clearly insititious stipe (reported in the protologue), a feature exceedingly rare in sect. Sicci, but unfortunately the single basidiome is pressed flat and the presence or absence of a collarium is undeterminable. Although the protologue does not mention a collarium ("lamellis paucis, flavis, adnatis"), the unsual yellow stipe and rhizomorphs of the type specimen in combination with all micromorphological features are identical to our material from Java, and strongly suggest that all represent the same species. The two Javanese specimens collected from the same site differ in basidiospore size. Collection DED 6780 has basidiospores $6-8 \times 3-5$ µm, whereas collection DED 6759 has basidiospores $9-11.7 \times 3-4$ µm. The isotype specimen has basidiospores $9.3-10 \times 4-5$ µm (FH!). Further collections may necessitate the separation of the species into short-spored and long-spored varieties.

 Marasmius ruforotula Singer, Sydowia 2: 34. 1948. – Fig. 16: 1–5. Type: United States, Florida, Dade Co., Matheson Hammock, 3 Nov. 1942, Singer F 1456 (F!).

Pileus 2-5(-8) mm diam, at first hemispherical, becoming convex to campanulate in age, disc depressed, with a tiny dark reddish brown, central spot, sometimes forming a raised conical papilla, othertimes flattened, plicate; surface dull, dry, glabrous to subvelutinous; when young ranging from greyish orange (5B4-5) to brownish orange (5C4-5) or more commonly deep reddish brown (8D-E8), with or without a pale cream region surrounding central dot, or sometimes evenly colored brown (6E6-8) to dark brown (6F5-8), fading in age to ochraceous tawny (6C5) to greyish orange (6B3). -Context thin, white. - Lamellae adnexed or adnate to a collarium, distant to remote (7-12 reaching stipe) with no lamellulae, nonintervenose, broad, white to pale yellowish white (4A2), non-marginate or pale brownish-marginate. - Stipe $7-25 \times 0.1-0.3$ mm, central, wiry, equal, tough and pliant, not branched nor with nodes, glabrous, shiny, insititious, dark brown to black overall; arising from the substrate or rarely arising from black rhizomorphs. - Odor and taste not distinctive.

Basidiospores (6-)7-10(-10.5) \times 3-5(-5.5) µm [$\bar{x}_r = 8.0-9.8 \times$ $3.5-5.0 \ \mu m$, $\bar{x}_m = 8.9 \pm 0.6 \times 4.3 \pm 0.3 \ \mu m$, Q = 1.7-2.8, $\bar{q}_r = 1.9-2.3$, $\bar{q}_m = 1.9-2.3$ 2 ± 0.2 , n = 25 spores per 5 specimens], ellipsoid, smooth, hyaline, inamyloid, thin-walled. - Basidia 17-25.5×4-7 µm, clavate, 4spored. - Basidioles clavate to fusoid. - Cheilocystidia common, of Siccus-type broom cells; main body $9-20.5 \times 5-12$ µm, cylindrical to clavate, broadly clavate or irregular in outline, rarely lobed, hyaline to pale yellow, apically thick-walled; apical setulae 3- 6×1 µm, crowded, cylindrical to conical, sometimes wavy in outline, obtuse to subacute, hyaline to pale brown, thin- to thick-walled. -Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of Siccus-type broom cells; main body $7-22.5 \times 5.5-$ 14.5 µm, cylindrical to clavate, broadly clavate, turbinate or sometimes irregular in outline, hyaline to pale yellow, apically thickwalled; apical setulae $2-7 \times 0.5-2 \mu m$, crowded, cylindrical to conical, usually wavy in outline, obtuse to subacute, hyaline to brownish orange, tawny or pale brown, thin- to thick-walled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 5-7 µm diam, cylindrical, smooth, hyaline, weakly dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 2-4 µm diam,



Fig. 16. – Marasmius ruforotula Singer (A. Retnowati 127). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

parallel, cylindrical, hyaline to brown, strongly dextrinoid, thin- to thick-walled; medullary hyphae 4–6 μ m diam, parallel, hyaline, thin-walled. – Stipe vesture absent or of uncommon caulocystidia, 12–17×2–5 μ m, clavate, inamyloid, thin-walled. – Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious on undetermined dicotyledonous leaves or twigs under *Castanopsis* (Fagaceae), or on bamboo. Bali, Java.

Material examined. – Indonesia: Java, Mt. Halimun National Park, loop trail from Cikaniki, 13 Jan. 1998, D. E. Desjardin 6758 (BO, SFSU); same location, 14 Jan. 1998, D. E. Desjardin 6775 (BO, SFSU); same location, 8 Jan. 1999, A. Retnowati 103 (BO, SFSU); same location, 14 Jan. 1998, D.E. Desjardin 6794 (BO, SFSU); Bogor Botanical Garden, 15 Jan. 1998, D. E. Desjardin 6798 (BO, SFSU); same location, 12 Jan. 1999, A. Retnowati 127 (BO, SFSU); Bali, Desa Belimbing, temple south of Sanda, 16 Jan. 1999, A. Retnowati 136 (BO, SFSU).

Marasmius ruforotula was described from material collected in Florida (FH!). It has been reported subsequently from Guadeloupe (Pegler, 1983), Mexico and Ecuador (Singer, 1976), and Papua New Guinea (Desjardin & Horak, 1997). Distinctive features include: a) a plicate, umbilicate pileus with a dark central spot or papilla and colors ranging from brownish orange, greyish orange or reddish brown to amber brown, greyish brown or brown; b) non-marginate to pale brownish-marginate, collariate lamellae; c) a dark, insititious stipe that typically arises directly from the substrate; and d) growth on both monocotyledonous and dicotyledonous debris. Collection AR 103 from Mt. Halimun, Java, differs from the other specimens only in forming a paler greyish brown pileus lacking reddish or orangish tones. Some populations, however, form basidiomes that are reddish brown to orangish brown and also some basidiomes that are pure brown to light brown. Hence, we include in the circumscription of *M. ruforotula* pilei that are greyish brown to brown.

Sect. Globulares Kühner, Botaniste 25: 100. 1933 (ut Globularineae).

Type species: Marasmius globularis Fr. (= M. wynnei Berk. & Broome).

 Marasmius silvicola Singer in Singer & Digilio, Lilloa 25: 199. 1952. – Fig. 17: 1–7.

Type: Argentina, Tucumán, Sierra de San Javier, 14 Apr. 1951, Singer T 1479 (LIL).

Pileus 50-90(-200) mm diam, at first conical to campanulate with a shallow broad umbo, soon expanding to plane-undulate, often with a broad flattened umbo and a slightly depressed zone surrounding the umbo in age; disc rugulose; margin striate to rugulostriate, wavy and folded; surface dull, dry to moist, glabrous, hygrophanous; when young and moist dark reddish orangish brown (7C7-8; "ferruginous") overall, soon fading with moisture loss from margin inward to brownish orange (6C6-8) or brownish yellow (5C6-8), disc remaining dark reddish orangish brown. - Context thick, buff to cream. - Lamellae adnexed, close to subdistant with 4-5 series of lamellulae, straight to convex, pruinose, broad (6-9 mm), light orange (5A4) to dark grevish orange (5B5), non-marginate. -Stipe $80-140 \times 5-10$ mm, central, terete or compressed, equal above and obclavate at base, hollow, tough, twisted-fibrous, pubescent to furfuraceous overall, base with downy white tomentum; pale vellowish white (4A2) to pale orangish white (5A2) overall when young, becoming greyish orange (5B4-5) in age, discoloring brown; arising from a thick, extensive membranous mat of white to cream, subiculum-like mycelium. - Odor like Marasmius oreades; taste strongly fungal.

Basidiospores (5–)6–7×2–3.5 μ m [$\bar{x} = 6.3 \pm 0.3 \times 2.8 \pm 0.4 \mu$ m; Q = 1.7–3; $\bar{q} = 2.3 \pm 0.4$, n = 25 spores per 1 specimen], ellipsoid,

133



Fig. 17. Marasmius silvicola Singer (D. E. Desjardin 6728). - 1. Basidiomes. (x0.5) 2. Basidiospores. - 3. Basidium and basidioles. - 4. Cheilocystidia. - 5. Pleurocystidia. - 6. Pileipellis. - 7. Caulocystidia.

134

smooth, hyaline, inamyloid, thin-walled. - Basidia 22.5-32.5 × 4.5-5 µm, clavate, 4-spored. - Basidioles clavate to fusoid. - Cheilocystidia abundant, 14-45×5-13 μm, obclavate to subulate, irregularly cylindrical or sphaeropedunculate, rarely capitate, sometimes in chains, some with broad apical knobs, hyaline, thin-walled. - Pleurocystidia abundant, $50-90(-100) \times 9-16(-20)$ µm, subulate to fusoid-ventricose, obtuse, arising from the lamellar trama and projecting well beyond the basidia, hyaline, inamyloid, thin-walled. - Pileipellis hymeniform, not-mottled, composed of clavate to broadly clavate or sphaeropedunculate, non-diverticulate cells, 20- $40(-50) \times 6.5-12 \mu m$, hyaline, inamyloid, thin-walled, non-gelatinous. - Pileus trama interwoven; hyphae 4-13 µm diam, cylindrical to inflated, smooth, non-gelatinous, hyaline, strongly dextrinoid. -Lamellar trama regular; hyphae 3-9 µm diam, cylindrical, hyaline, dextrinoid, thin-walled. - Stipe tissue monomitic; cortical hyphae 6-12 µm diam, parallel, cylindrical, hyaline, smooth or with annular to helical, hvaline incrustations, strongly dextrinoid, thinwalled; medullary hyphae 4-8 µm diam, subparallel, hyaline, dextrinoid, thin-walled. - Stipe vesture a tangled trichodermium composed of cylindrical to narrowly clavate or irregular cells or chains of cells 4-10 µm diam, hyaline, inamyloid, thin-walled. -Clamp connections present.

Habit, habitat, and distribution. – Scattered in leaf mulch under *Castanopsis javanica* in montane rainforest. Java.

Material examined. - Indonesia: Java, Cibodas Botanical Garden, trail to Mt. Gede, 9 Jan. 1998, D. E. Desjardin 6728 (BO, SFSU).

Marasmius silvicola is characterized by forming large, rugulose, brownish orange (deep cinnamon) to brownish yellow pilei, close to subdistant lamellae, a large, pallid, pubescent stipe, relatively small basidiospores, abundant fusoid pleurocystidia, versiform cheilocystidia, and cylindrical caulocystidia. When describing M. phlebodiscus Desjardin & Horak (1997) from material collected in Papua New Guinea, we distinguished it from *M. silvicola* based primarily on its much paler pileus (pale beige to tan), closer lamellae, and different cheilocystidia. The Indonesian material matches the pileus coloration and lamellar spacing of M. silvicola, and the cheilocystidia morphology of *M. phlebodiscus*. With further collecting throughout Malesia, it may turn out that M. phlebodiscus represents only a pale form of M. silvicola. Recently, Corner (1996) described M. trogioides Corner from material collected in Malesia. His color plate (Pl. 21) shows a fungus quite reminiscent of M. silvicola. The former species differs, however, in forming larger basidiospores (9 $11.5 \times 4.7-5.5 \ \mu$ m), less irregular and more evenly broadly clavate pileipellis cells, lacks clamp connections, and grows on wood. A beautiful watercolor illustration of *M. silvicola* labeled "*Striapus tjibodensis* van Overeem" resides in Herbarium Bogoriense. As far as we can tell, van Overeem never published the latter binomial.

 Marasmius aff. albertianus Singer, Bull. Bot. Jard. Brux. 34: 351. 1964. – Fig. 18: 1–6.

Type: Zaire, Lake Edward and Kivu District, Albert National Park, Kalonge s. Butahu, 8 May 1953, Fredericq in de Witte 8969 (BR).

Pileus 35 mm diam, convex with wavy margin at first, becoming broadly convex with a small umbo in age, striate; disc wrinkled; surface dull, dry, hygrophanous, glabrous; off white to cream with a slightly darker disc. -Context thin, white. -Lamellae subfree to adnexed, distant (16 reaching stipe) with 2 series of lamellulae, not forked nor intervenose, broad, white to cream, non-marginate. -Stipe 80×3 mm, slightly eccentric, terete, cylindrical, fibrillose, hollow, non-institious, pale brown to brownish white. -Odor and taste not distinctive.

Basidiospores $8-10 \times (3-)4-4.5(-5) \ \mu m \ [\bar{x} = 9.0 \pm 0.6 \times 4.2 \pm$ $0.4 \mu m$; Q = 2–2.7; $\bar{q} = 2 \pm 0.2$, n = 25 spores per 1 specimen], narrowly ellipsoid to broadly ellipsoid, smooth, hyaline, inamyloid, thin-walled. - Basidia 25-30×5-6 µm, clavate, 4-spored. - Basidioles narrowly cylindrical to subclavate. - Cheilocystidia common, 12- $23.5 \times 5-9$ µm, cylindrical to clavate, broadly clavate or pyriform, rarely lobed, hyaline, inamyloid, thin-walled. - Pleurocystidia absent. - Pileipellis hymeniform, not mottled, composed of clavate to broadly clavate, pyriform or subglobose cells, a few irregular in outline, $15-24.5 \times 10-16.5$ µm, non-diverticulate, hyaline, inamyloid, thin-walled. - Pileus trama interwoven; lamellar trama regular; hyphae 4-6(-16.4) µm diam, cylindrical to inflated, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical and medullary hyphae undifferentiated, 3-7 µm diam, parallel, cylindrical, hyaline, strongly dextrinoid, thin-walled. - Stipe vesture of scattered, abundant caulocystidia, 35.5- $47 \times 10-14.5$ µm, polymorphic, cylindrical to ventricose, vesiculose, narrowly clavate, or irregular in outline, hyaline, weakly dextrinoid, thin-walled. - Clamp connections present.

Habit, habitat, and distribution. – Solitary on bamboo in botanical garden. Java.

Material examined. – Indonesia: Java, West Java, Bogor Botanical Garden, 12 Jan. 1999, A. Retnowati 126 (BO, SFSU).



Fig. 18. Marasmius aff. albertianus Singer (A. Retnowati 126). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis. – 6. Caulocystidia.

The Indonesian specimen, which consists of a single basidiome collected on bamboo leaves, is similar to M. *albertianus* Singer in all taxonomically significant details except for having more distant and broader lamellae. Basidiospores, cheilocystidia, and caulocystidia size and shape, lack of pleurocystidia, pileus and stipe size and col-

oration, plus an association with bamboo debris are shared by the Indonesian specimen and *M. albertianus* (fide Singer, 1965a; Pegler, 1977). Because the Indonesian specimen was collected in the Bogor Botanical Garden associated with introduced bamboo, it is quite possible that is represents the African *M. albertianus*, but until further material is collected our identification must remain tentative. *Marasmius albertianus* is similar to *M. niveus* Mont., from the New World tropics, but the latter differs in forming a much darker stipe (fulvous, chestnut brown or purplish brown) that lacks caulocystidia and is apparently not associated with bamboo (fide Singer, 1976; Pegler, 1983).

 Marasmius calvus Berk. & Broome, J. Linn. Soc., Bot. 14: 34. 1873. – Fig. 19: 1–5.

Type: Sri Lanka, Kandy District, Peradeniya, Thwaites, 766 cum icone (K).

Pileus 37–52 mm diam, convex, expanding to broadly convex or plano-convex in age, with a flat or subdepressed disc, papilla absent; margin translucent-striate to sulcate, slightly incurved to straight; surface dull, dry, glabrous; light brown overall. – Lamellae adnexed, subdistant (12–14 reaching stipe) with 2–3 series of lamellulae, not intervenose, moderately broad, pale brownish white, non-marginate. – Stipe 70–80 × 3.5–4 mm, central, equal or sometimes with a slightly enlarged base, hollow, glabrous, non-insititious, base covered with white basal tomentum; light brown overall. – O d or not distinctive; taste slightly bitter.

Basidiospores $8-10 \times 2.5-3 \ \mu m$ [$\bar{x} = 9.0 \pm 0.7 \times 3.0 \pm 0.1 \ \mu m$; Q = 2.7–3.6; $\bar{q} = 3 \pm 0.3$, n = 25 spores per 1 specimen], narrowly ellipsoid, slightly curved in profile, smooth, hvaline, inamyloid, thin-walled. -Basidia not observed. - Basidioles cylindrical to subclavate. -Hymenial cystidia (pleuro- and cheilocystidia undifferentiated) common on sides and edges of lamellae, $36-46 \times 7-10 \mu m$, clavate to fusoid or submucronate, hvaline, refractive, thin-walled, -Pileipellis hymeniform, not mottled, composed of subglobose to clavate, pyriform or broadly clavate cells $12-16.5 \times 7-13.5$ µm, nondiverticulate, hyaline, inamyloid, thin- to thick-walled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 4-6 (-16) µm diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical and medullary hyphae undifferentiated, parallel, cylindrical, hyaline to pale vellowish brown, strongly dextrinoid, thin-walled or a few thick-walled. - Stipe vesture absent. - Clamp connections present.



Fig. 19. Marasmius calvus Berk. & Broome (A. Retnowati 145). – 1. Basidiomes (x0.5). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Hymenial cystidia. – 5. Pileipellis.

Habit, habitat, and distribution. – Gregarious on undetermined dicotyledonous leaves in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Cibodas Botanical Garden, trail to Mt. Gede, 22 Jan. 1999, A. Retnowati 145 (BO, SFSU).

Marasmius calvus is characterized by a light brown, striate to sulcate pileus, subdistant, broad lamellae, a glabrous, pallid stipe, relatively short basidiospores, numerous refractive hymenial cystidia, an absence of caulocystidia, and association with dicotyledonous debris. The species has been reported previously only from Sri Lanka (Petch, 1948; Pegler, 1986).

Sect. Hygrometrici Kühner, Botaniste 25: 95. 1933.

Type species: Marasmius hygrometricus (F. Brig.) Sacc. [= Marasmius corbariensis (Roum.) Singer].

Marasmius dicandinus Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 20: 1–4.

Pileus 2.5–3 mm latus, convexus, subdepressus ad centrum obscuriorem, plicatus, glabrus, albus, siccitate pallide stramineus. Lamellae adnatae, haud collariatae, distantes, albae, haud marginatae. Stipes 7–24 × 0.1 mm, filiformis, haud ramosus, teres, glabrus, insititius, fuscus vel fuligineus, rhizomorpha nulla. Odor saporque nulli. Basidiosporae 8–10 × 4–5 µm, ellipsoideae, leves, hyalinae, inamyloideae, tenui-tunicatae. Basidiola clavata vel fusoidea. Cheilocystidia pleurocystidia nulla. Pileipellis hymeniformis, typi Rotalis, cellulae setulosae, 22.5–34 × 8–12 µm, polymorphicae (clavatae, subglobosae vel turbinatae), hyalinae, inamyloideae, tenui-tunicatae; setulae divergentes $1–2 \times 0.5$ µm, ad apicem numerosae, conicae vel anguste cylindriceae, obtusae, hyalinae vel pallide luteo-brunneae. Trama pilei irregulare; trama lamellarum regulare, hyphis inamyloideis vel paulo dextrinoideis instructum. Caulocystidia nulla. Fibulae presentes. Gregarius ad folia putrida plantarum dicotyledonearum vel monocotyledonearum. Holotypus: Indonesia, Bali, Desa Belimbing, temple south of Sanda, 16 Jan. 1999, A. Retnowati, 135 (SFSU).

Pileus 2.5–3 mm diam, convex, shallowly depressed with a flattened dark central spot, plicate; surface dull, dry, glabrous; pure white overall, drying light yellow to cream. – Context thin, white. – Lamellae adnate, non-collariate, distant (10–11 reaching stipe) with no lamellulae, non-intervenose, broad, white, non-marginate. – Stipe $7-24 \times 0.1$ mm, central, cylindrical, wiry, not branched, lacking nodes, tough, pliant, solid, glabrous, institious; dark brown to black overall; rhizomorphs absent. – Odor and taste not distinctive.

Basidiospores 8–10×4–5 μ m [$\bar{x} = 9.0 \pm 0.6 \times 4.5 \pm 0.4 \mu$ m; Q = 1.6–2.5; – $\bar{q} = 2 \pm 0.2$, n = 16 spores per 1 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia not observed. – Basidioles clavate to fusoid. – Cheilocystidia absent. – Pleurocystidia absent. – Pleurocystidia absent. – Pleurocystidia absent. – Pleurocystidia absent. – Pileipellis hymeniform, mottled, composed of *Rotalis*-type broom cells; main body 22.5–34×8–12 μ m, clavate to broadly clavate, subglobose or turbinate, hyaline, inamyloid, typically thin-walled; divergent setulae 1–2×0.5 μ m, conical to narrowly cylindrical, obtuse, crowded over upper half of cell, hyaline to yellowish brown, inamyloid, thin- to thick-walled. – Pileus trama



Fig. 20. Marasmius dicandinus Desjardin, Retnowati & E. Horak (A. Retnowati 135, Holotype). – 1. Basidiomes (x2). – 2. Basidiospres. – 3. Basidioles. – 4. Pileipellis.

interwoven. – Lamellar trama regular; hyphae 3–8 µm diam, cylindrical, smooth, hyaline, inamyloid to weakly dextrinoid, thinwalled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae 2–4 µm diam, parallel, cylindrical, brown, slightly dextrinoid, thickwalled; medullary hyphae 3–6 µm diam, parallel, hyaline, thin- to thick-walled. – Stipe vesture absent. – Clamp connections present.

Habit, habitat, and distribution. – Scattered on undetermined dicotyledonous leaves. Bali.

Material examined. – Indonesia: Bali, Desa Belimbing, temple south of Sanda, 16 Jan. 1999, A. Retnowati 135 (Holotype: SFSU).

E tymology. - di (Indonesian) - by or near; candi (Indonesian) - temple, referring to the site where the holotype specimen was collected.

Marasmius dicandinus is distinct from all other described species in sect. *Hygrometrici* because of the lack of cheilocystidia. In addition, the lack of pigment on the pileus, except for the central dark spot, and absence of pileocystidia is unusual. The small, white pileus, non-collariate lamellae, wiry, institutious stipe, and absence of both cheilocystidia and caulocystidia are diagnostic features. Marasmius micraster Petch, Trans. Brit. Mycol. Soc. 31: 42. 1948.
Fig. 21: 1–5.

Type: Sri Lanka, Kandy District, Peradeniya, 21 Oct. 1914, Petch 4195 (K!).

Pileus 2.5–5 mm diam, convex with a shallow umbilicus, plicate; surface dull, dry, glabrous; orangish brown to rusty brown with a paler central depression. – Context thin, pallid. – Lamellae adnate to shallowly adnexed, non-collariate, distant (10 reaching stipe) with no lamellulae, non-intervenose, broad, white, non-marginate. – Stipe $45-52 \times 0.3$ mm, central, wiry, pliant, tough, unbranched, lacking nodes, glabrous, instituous, black; rhizomorphs absent. – Odor and taste not distinctive.

Basidiospores $8-10 \times 4-5 \ \mu m$ [$\bar{x} = 9.0 \pm 0.6 \times 4.5 \pm 0.4 \ \mu m$; Q = 1.8–2.5; $\bar{q} = 2 \pm 0.2$, n = 25 spores per 1 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia $18-25 \times 7-9 \mu m$, clavate, 4-spored. - Basidioles clavate to fusoid. - Cheilocystidia common, composed of Rotalis-type broom cells; main body 12- $26 \times 10-11$ µm, clavate to broadly clavate, subglobose, vesiculose or turbinate, sometimes irregular in outline, hyaline, apically thickwalled; divergent setulae $2-3 \times 0.5-1$ µm, cylindrical to conical, obtuse, crowded over upper half of cell, hyaline, thick-walled. -Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of *Rotalis*-type broom cells; main body 15-25 X 10-13 µm, clavate to broadly clavate, vesiculose or subglobose, hyaline, inamyloid, apically thick-walled, thin-walled elsewhere; divergent setulae $2-4 \times 1 \mu m$, conical to cylindrical, obtuse, crowded over upper half of cell, hyaline, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 3-10 µm diam, cylindrical to inflated, inamyloid to weakly dextrinoid, smooth, thin-walled, nongelatinous. - Stipe tissue monomitic; cortical hyphae 2-5 µm diam, parallel, cylindrical, ranging from pale brown (apex) to dark brown (base), dextrinoid, smooth, non-gelatinous, thick-walled; medullary hyphae 3-7 µm diam, parallel, cylindrical, hyaline, inamyloid, thin-walled. - Stipe vesture absent. - Clamp connections present.

Habit, habitat, and distribution. – Scattered on undetermined dicotyledonous leaves in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 9 Jan. 1999, A. Retnowati 119 (SFSU).

The Java specimen consists of only two basidiomes in rather poor condition. We tentatively identify this species as *Marasmius micraster* based on the available data. The species, originally de-



Fig. 21. Marasmius micraster Petch (A. Retnowati 119). – 1. Basidiomes (x1.5). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

scribed from Sri Lanka (Petch, 1948), has been reported from New Zealand by Desjardin and Horak (1997). It is distinguished by a plicate, orangish brown to soot brown pileus, distant, non-collariate lamellae, a glabrous, long, institutious stipe, basidiospores in the range $8-11 \times 4-5 \mu m$, and the absence of both pileocystidia and caulocystidia. Corner (1996) recently described *M. micraster* var. *brevipes* Corner from Singapore, differing only in forming a short stipe (6–10 mm) and fewer lamellae (4–7).

Sect. Sicci Singer, Mycologia 50: 106. 1958.

subsect. Siccini Singer, ser. Spinulosi (Clémençon) Desjardin in Antonín & Noordeloos, Lib. Bot. 8: 179. 1993.

Type species: Marasmius cohaerens (Pers.: Fr.) Cooke & Quél. [Bas. Agaricus cohaerens Pers.: Fr.].

= series Actinopus Singer, pro parte, Fl. Neotrop. Monogr. 17: 236. 1976.

 Marasmius nummularius Berk. & Broome, J. Linn. Soc., Bot. 14:33. 1873. – Fig. 22: 1–6.

Type: Sri Lanka, Kandy District, Peradeniya, Thwaites 102 cum icone (K!).

Pileus 6–12(–20) mm diam, obtusely conical to convex when young, soon expanding to plane, usually with a small rugulose umbo,

sometimes lacking umbo, sometimes depressed; disc wrinkled, margin decurved, faintly rugulose-striate; surface dull, dry, subvelutinous to velutinous; dark reddish brown (8E-F7-8) or deep brown with a tawny component (6–7E 7–8) overall when young, soon fading to light brown with orange tones (6D7-8) or dark brownish orange (6C7-8) with a reddish brown disc, finally brownish vellow (5C6-7) with a brownish orange disc. - Context thin, white. - Lamellae ascending-adnexed to adnate, crowded to subdistant (16 reaching stipe) with 3-5 series of lamellulae, narrow (1-2 mm), nonmarginate to pale reddish brown-marginate when dried; white to pale yellowish white (4A2) or buff, becoming pale orangish white (5A2) in age. - Stipe 25-60×1 mm, central, terete, equal, tough, hollow, pruinose to hispid overall, dull, dry, non-insititious, base covered with pale grevish orange (5B3-4) to ferruginous, strigose hairs; apex white to pale yellowish white (4A2) or cream (4A3), centrally brownish orange (6C6-8), grading to brown (7E7-8) towards the base; rhizomorphs absent. - Odor and taste not distinctive.

Basidiospores $(11-)12-15 \times (3-)3.5-5.0 \ \mu m \ [\bar{x}_r = 13.0-14.0 \times$ $3.8-4.5 \ \mu\text{m}; \ \bar{x}_{m} = 13.6 \pm 0.5 \times 4.0 \pm 0.3 \ \mu\text{m}; \ Q = 2.6-4; \ \bar{q}_{r} = 3-3.4; \ \bar{q}_{m} = 1.00 \ \bar{q}_{m}$ 3.2 ± 0.2 , n = 25 spores per 3 specimens], narrowly ellipsoid to fusoid, smooth, hyaline, inamyloid, thin-walled. – Basidia $20-26 \times 6-7 \mu m$, clavate, 4-spored. - Basidioles 20-26×5-7 µm, fusoid. - Cheilocystidia composed of two types of cells: a) Siccus-type broom cells with main body $10-26.5 \times 5-10$ µm, clavate to broadly clavate, hvaline, inamyloid, apically thick-walled; apical setulae $1.5-7 \times 0.5-$ 1.5 µm, numerous, narrowly conical, hyaline to tawny, inamyloid to dextrinoid, thin- to thick-walled; b) fusoid elements like the basidioles, $21-30.5 \times 6-9$ µm, hvaline, thin-walled, – Pleurocystidia absent or of scattered Siccus-type broom cells like the cheilocystidia. - Pileipellis hymeniform, mottled, composed of Siccus-type broom cells; main body $14-26 \times 5.5-8.5 \mu m$, subcylindrical to clavate, broadly clavate or irregular in outline, apically thick-walled or a few thick-walled overall, hyaline to yellow or brown, inamyloid; apical setulae $1.5-8 \times 0.5-1.5$ µm, irregularly cylindrical to conical, slightly wavy in outline, subacute to acute, hyaline to golden brown or tawny, dextrinoid, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 3-7 µm diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled; non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-6.5 µm diam, parallel, cylindrical, hyaline (apex) to pale tawny (base), strongly dextrinoid, thinwalled (up to $0.5 - \mu m$); medullary hyphae 2.5-9 μm diam, cylindrical, hyaline, dextrinoid, thin-walled. - Stipe vesture of numerous caulosetae, $20-150 \times 6-13(-17.5)$ µm, fusoid to subulate or lanceolate, acute, sometimes branched or setulose, hyaline to tawny, apically and centrally thick-walled (0.5-1.5 µm); rarely some cells



Fig. 22. Marasmius nummularius Berk. & Broome (E. Horak 77–178). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis. – 6. Caulosetae.

similar to *Siccus*-type broom cells but with very long setulae. - Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious on dicotyledonous or monocotyledonous (bamboo) leaves in botanical garden area. Java.

Material examined. – Indonesia: Java, West Java, Bogor Botanical Garden, 8 Jan. 1998, collected by K. P. Collins, D. E. Desjardin 6720 (BO, SFSU); same location, 15 Jan. 1998, collected by K. P. Collins, D. E. Desjardin 6799 (BO, SFSU); same location, 11 Mar. 1977, E. Horak 77–178 (ZT); Bogor, Dungus Iwul Nature Reserve, 27 Dec. 1998, A. Retnowati 048 (SFSU).

Marasmius nummularius, originally described from material collected in Sri Lanka, is characterized by a dark reddish brown, rugulose-striate pileus, crowded to subdistant lamellae often with a reddish brown edge (at least when dried), and a non-insititious, pruinose to hispid stipe covered with lanceolate, yellowish brown caulosetae. It is a fairly common species amongst leaf litter of both dicotyledonous and monocotyledonous plants in the Bogor Botanical Garden. The Indonesian material differs only subtly from the holotype specimen (K!) in forming slightly longer basidiospores (10- $12 \times 3.5 - 4.0$ in the type) and more acute caulosetae. Another tropical species that shares many similarities with M. nummularius is M. ochroleucus Desjardin & Horak (1997), described recently from Papua New Guinea. The latter species differs in forming larger basidiomes (pilei 10-22 mm diam) with much paler pilei (pale ochre), more numerous lamellae (28-36), and thinner-walled, hvaline caulocystidia (Holotype, ZT!). A watercolor illustration of M. nummularius labelled "Marasmius #1241" resides in Herbarium Bogoriense.

Marasmius coklatus Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 23: 1–7.

Pileus 15–38 (–60) mm latus, convexus dein obtuse umbonatus, ad discum ruguloso-undulatus, velutinus, fuscus. Lamellae adnexae vel adnatae, remotae vel distantes, griseo-brunneae, haud marginatae. Stipes 33–63 × 3–5 mm, teres, aequalis, flexilis, minute pruinosus, haud insititius, ad basim tomento albo obtectus, pallide aurantio-brunneus vel brunneus. Odor saporque nulli. Basidiosporae 10–11 × 4.5–6 µm, ellipsoideae, leves, hyalinae, inamyloideae, tenui-tunicatae. Basidiola 22–52 × 3–7 µm, anguste clavata. Cheilocystidia et pleurocystidia: a) cellulae typi Sicci, 11–60 × 5–14.5 µm, setulosae, clavatae vel irregulares, hyalinae vel pallide brunneae; 2–5 setulae ad apicem 3–30 × 1.5–3 µm, cylindricae vel conicae, acutae, brunneae vel luteo-brunneae, crasse-tunicatae; b) Pileosetae 25–72 × 3–11 µm. Pileipellis hymeniformis, ex cellulis differentibus compositus: a) Cellulae typi Sicci 9–26.5 × 7–11 µm, cylindricae, clavatae vel fusoideae, stramineae vel pallide rubro-brunneae, inamyloideae, crasse-tunicatae, 2–4 setulae ad apicem 4–

 $25.5\times1.5-2.5~\mu m,$ cylindricae vel conicae, acutae, pallide luteo-brunneae vel brunneae, crasse-tunicatae; b) Pileosetae $42-67\times5-9~\mu m$, lanceolatae vel fusoideae, acutae, hyalinae vel pallide luteo-brunneae, crasse-tunicatae; c) Cellulae intermediatae setulosae. Trama pilei irregulare; trama lamellarum regulare, ex hyphis dextrinoideis compositum. Stipes cellulis typi Sicci et caulosetis obtectus. Fibulae presentes. Solitarius vel gregarius ad terram vel ad lignum in silva Castanopsidis javanicae. Holotypus: Indonesia, Java, West Java, Cibodas Botanical Garden, trail to Mt. Gede, 9 Jan. 1998, A. Retnowati 149 (BO).

Pileus 15–38 (-60) mm diam, convex when young, expanding to broadly convex with a broad umbo in age; disc distinctly rugulose-undulate; margin even, non-striate or weakly striatulate; surface dull, dry, velutinous; evenly dark brown (6F4–6; 9–10F5–8) overall when young or with slightly darker disc, the margin fading slightly to brown (7E6–8) in age. – Context thick, greyish brown (6D3). – Lamellae adnexed to adnate, remote to distant (10–15 reaching stipe) with 1–2 series of lamellulae, not intervenose, broad (4–12 mm), greyish brown (6D3) to greyish orange (6B2–3), non-marginate or seldom with a brown edge. – Stipe 33–63 (–95) × 3–5 mm, central, terete, equal, tough, hollow, minutely pruinose for most of its length, non-institious, base covered with white tomentum; apex greyish orange (6B3), centrally brownish orange (5C4) to light brown (7D4–7), base reddish brown (8E5–8) to dark reddish brown (8–9F5–8). – Od or and taste not distinctive.

Basidiospores $10-11 \times 4.5-6 \ \mu m \ [\bar{x} = 10.3 \pm 0.4 \times 5.3 \pm 0.5 \ \mu m]$ Q = 1.7-2.5; $\bar{q} = 1.9 \pm 0.2$, n = 25 spores per 3 specimen], ellipsoid, smooth, hyaline, inamyloid, thin-walled. - Basidia not observed. -Basidioles 22–52×3–7 μm, narrowly clavate. – Cheilocystidia abundant, of 2 types of cells: a) Siccus-type broom cells with main body $18-60 \times 5.5-14.5 \mu m$, subclavate to clavate, cylindrical or a few irregular in outline, apically thick-walled, hyaline to pale brown, inamyloid; apical setulae $7-28 \times 1.5-3$ µm, ranging from 2-5 setulae per cell, cylindrical to conical or slightly wavy in outline, subacute to acute, yellowish brown to brown, inamyloid, thick-walled; b) cheilosetae $27-72 \times 5-11$ µm numerous, similar to pileosetae, fusoid to lanceolate or fusoid-ventricose, acute, reddish brown to pale vellowish brown, inamyloid, thick-walled. - Pleurocystidia common, of 2 types of cells: a) Siccus-type broom cells, with main body $11-30 \times 5-7$ µm, clavate to cylindrical, yellowish brown, thick-walled; apical setulae $3-30 \times 1-2.5 \mu m$, ranging from 2-4 setulae per cell, cylindrical to conical, subacute to acute; b) pleurosetae $25-51 \times 3-$ 5 µm, common, fusoid to lanceolate or fusoid-ventricose, acute, yellowish brown, thick-walled. - Pileipellis hymeniform, not mottled, composed of three types of cells: a) Siccus-type broom cells with main body $9-26.5 \times 7-11 \mu m$, cylindrical to clavate or fusoid, pale vellow to reddish brown, inamyloid, ranging from thick-walled overall to only apically thick-walled; apical setulae $4-25.5 \times 1.5$ - $2.5 \mu m$, ranging from 2–4 setulae per cell (rarely up to 7 per cell), cylindrical to conical, seldom forked apically, subacute to acute, yellowish brown to brown, thick-walled; b) pileosetae, common. scattered, $42-67 \times 5-9$ µm, lanceolate to fusoid or fusoid-ventricose, sometimes irregular in outline, acute, hyaline to pale yellowish brown, thick-walled (up to 1 µm); c) cells transitional between broom cells and setae, $12-30 \times 7-8$ µm, with few apical setulae 16.5-26.5×1.5-2.5 µm, thick-walled. - Pileus trama interwoven. -Lamellar trama regular; hyphae 3-9 µm diam, cylindrical, smooth, hvaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical and medullary hyphae undifferentiated. 4-8 µm diam, parallel, cylindrical, smooth, hyaline to brown, dextrinoid, thin- to thick-walled (up to 1 um). - Stipe vesture of numerous Siccus-type broom cells and caulosetae; Siccus-type broom cells like the cheilocystidia; caulosetae common, $27-95 \times 5$ -8 μ m, lanceolate to fusoid-ventricose, acute, pale yellow, dextrinoid, thickwalled overall. - Clamp connections present.

Habit, habitat, and distribution. – Solitary to gregarious on soil or rotten buried wood in montane rainforest under *Castanopsis javanica*. Java.

Material examined. - Indonesia: Java, West Java, Cibodas Botanical Garden, trail to Mt. Gede, 9 Jan. 1998, D. E. Desjardin 6731 (SFSU); same location, 11 Jan. 1999, A. Retnowati 123 (BO, SFSU); same location, 22 Jan. 1999, A. Retnowati 149 (Holotype: BC; Isotype: SFSU); same location 10 Jan. 2000, coll. by A. Wilson, D. E. Desjardin 7090 (BO, SFSU).

Etymology. – coklat (Indonesian): dark chocolate brown.

This new species in sect. *Sicci* series *Spinulosi* has the following diagnostic features: a dark chocolate brown, velutinous pileus; remote to distant, broad, greyish brown lamellae; a brownish orange to brown, pruinose stipe; moderately long and broad basidiospores; *Siccus*-type cheilocystidia and pleurocystidia with few (2–5), long (-30μ m) apical setulae; and numerous pileo-, cheilo-, pleuro- and caulosetae that are often forked. In addition, it forms basidiomes on debris under *Castanopsis javanica* in primary forests.

Fig. 23. Marasmius coklatus Desjardin, Retnowati & E. Horak (A. Retnowati 149, Holotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidioles. – 4a. Siccus-type cheilocystidia. – 4b. Cheilosetae. – 5a. Siccus-type pleurocystidia. – 5b. Pleurosetae. – 6a–c. Pileipellis cells. – 7a. Siccus-type caulocystidia. – 7b. Caulosetae.



Marasmius coklatus is allied with M. spiculosus Singer from Bolivia, M. jalapensis Murrill from Mexico, and M. cohaerens (Alb. & Schwein.: Fr.) Cooke & Quél. from north temperate regions. Maras*mius spiculosus* differs in forming a ferruginous pileus with crowded to subdistant lamellae, much longer basidiospores (12-21 µm long), and lacks pleurosetae (fide Singer, 1965b, 1976). Marasmius jalapensis differs in forming a cream to pale cinnamon brown pileus with close lamellae, smaller basidiospores $(7-9 \times 2.5-3.5 \ \mu m)$, has unbranched pleurosetae, and lacks Siccus-type broom cells on the lamellar sides (fide Singer, 1976). Marasmius cohaerens differs in forming pilei that are more reddish brown to ferruginous, has smaller basidiospores $(7-10 \times 4-5 \mu m)$, forms unbranched pleurosetae, and lacks Siccus-type cheilocystidia. Another dark chocolate brown *Marasmius* from the southern hemisphere is *M. atrocastaneus* G. Stev., described from New Zealand and redescribed recently from holotype material (Desjardin & Horak, 1997). The latter species differs from M. coklatus in lacking pileosetae and pleurosetae, in forming yellowish white lamellae with reddish brown edges, and grows in association with Nothofagus (Holotype, K!).

Marasmius cohaerens var. orientalis Desjardin & E. Horak, var. nov. – Fig. 24: 1–6.

Differt a pileo plicato, usque ad 75 mm lato, lamellis paucis, basidiosporis longioribus (12 μ m), setis hymenialibus 35–50 μ m longis. Solitarius vel sparsus, ad lignum putridum vel folia putrida arborum latifoliorum. Holotypus: Indonesia, Java, West Java, Cibodas Botanical Garden, E. Horak 77–193 (SFSU).

Pileus 50–75 mm diam, at first hemispherical to convex, soon expanded to plano-convex with a low obtuse umbo, strongly plicate from near center to undulate-costate margin, with sharply defined smooth zone at very edge of margin; surface dull, dry, pruinose to velutinous; evenly pale chestnut brown to reddish brown. – Context thin, tough. – Lamellae adnexed, distant (16–20 reaching stipe) with 3 series of lamellulae, broad, off-white to cream, with reddish brown, fimbriate edges. – Stipe 50–100 × 2–3 mm, central, terete, equal, cartilaginous, hollow, dry, apex minutely pruinose, glabrous towards the base, non-instituous, base attached with stroma-like mycelium extending into coarse white rhizomorphs that penetrate the substrate; apex cream, base reddish brown. – Odor like cut grass, acidulous; taste mild, not distinctive.

Basidiospores 8–12×4–5(–5.5) μm [x̄ = 10.4 \pm 0.6×5.0 \pm 0.4 $\mu m;$ Q = 1.7–2.5; q̄ = 2 \pm 0.2, n = 25 spores per 1 specimen], broadly fusoid to almost club-shaped or comma-shaped, smooth, hyaline, inamyloid, thin-walled. – Basidia 28–36×5–7 μm , clavate, 4-spored. – Hymenial setae common on sides and edges of lamellae,



Fig. 24. Marasmius cohaerens var. orientalis Desjardin & E. Horak (E. Horak 77– 193, Holotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidia. – 4. Hymenial setae. – 5a. Siccus-type pileipellis cells. – 5b. Pileosetae. – 6. Caulosetae.

151

 $(30-)35-50 \times 4-7$ µm, polymorphic, mostly slender-fusoid, gradually tapering towards an acute apex, sometimes forked on lamellar edges, reddish-brown, dextrinoid, relatively thin to thick-walled (up to 1 µm). - Pileipellis hymeniform, not mottled, composed of two types of cells: a) predominantly Siccus-type broom cells with main body 16- $28 \times 5-8$ µm, clavate to narrowly lageniform or irregular in outline, hvaline or yellowish brown, apically thick-walled; apical setulae 5- $30 \times 1-3$ µm, ranging from 3–10 per cell, cylindrical to conical or irregular in outline, subacute to acute, tawny to reddish brown, inamyloid, thick-walled; b) pileosetae scattered, $50-60 \times 5-7 \mu m$, fusoid to fusoid-ventricose, rarely forked, sometimes irregular in outline, tawny, dextrinoid, thick-walled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 5–11 μm diam, cylindrical, smooth, hvaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-4 µm diam, parallel, cylindrical, smooth, yellowish brown, dextrinoid, thick-walled, non-gelatinous; medullary hyphae 5-8 µm diam, cylindrical, hyaline, dextrinoid, thin-walled. -Stipe vesture composed of numerous caulosetae like the hymenial setae, covering the entire stipe. - Clamp connections present.

Habit, habitat and distribution. – Solitary to scattered on rotting stems and leaves of broad-leaved trees (e.g. *Castanopsis*, *Lithocarpus*) in montane rainforest. Java.

Material examined. - Indonesia: Java, West Java, Cibodas Botanical Garden, 15 Mar. 1977, E. Horak, ZT 77-193 (Holotype: SFSU; Isotype: ZT).

Marasmius cohaerens var. orientalis differs from the typical north temperate M. cohaerens var. cohaerens and M. cohaerens var. lachnophyllus (Berk.) Gilliam in forming larger pilei (up to 75 mm diam) that are distinctly and deeply plicate, has fewer lamellae relative to the pileus diameter, has slightly longer basidiospores on average (12 µm long versus 8.3 µm long in var. cohaerens), and has much smaller hymenial setae (35–50 µm long versus 40–108 µm long). Like the north temperate varieties, var. orientalis is associated with fagaceous trees.

Sect. Sicci Singer

subsect. Siccini Singer, ser. Leonini Singer, Fl. Neotrop. Monogr. 17: 160. 1976.

Type species: Marasmius leoninus Berk.

 Marasmius halimunensis Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 25: 1–6.

Pileus $3-21~\mathrm{mm}$ latus, hemisphaericus dein plano-convexus, rugulosus, striatus, glabrus, primo albus vel pallide aurantio-brunneus. Lamellae adnatae, sub-

distantes, intervenosae, saepe reductae, albae, haud marginatae. Stipes $25-50 \times 1-$ 1.5 mm, centralis, teres, aequalis sed subbulbus ad basim, cartilagineus, minute pruinosus, haud insititius, albus at apicem, basi tomento cremeo vel pallide aurantio-brunneo obtectus. Odor saporque nulli. Basidiosporae 11-12×4 µm, ellipsoideae, leves, hyalinae, inamyloideae, tenui-tunicatae. Basidia $23-29 \times 6-$ 7 μm, 4-spora. Basidiola clavata vel fusoidea. Cheilocystidia $15-26 \times 7-10$ μm, cellulis pileipellidis similibus. Pleurocystidia nulla. Pileipellis hymeniformis: a) Cellulae typi Sicci 14–20×8–10 µm, setulosae, clavatae vel anguste lageniformes, hyalinae vel pallide luteo-brunneae, apicaliter crasse-tunicatae, 1-5 setulae ad apicem $4-16 \times 1-2 \mu m$, cylindricae vel conicae, acutae, crasse-tunicatae; b) Cellulae typi Globulares $14-30 \times 5-12$ µm, clavatae, cylindricae vel ventricosaeelongatae, hyalinae, inamyloideae, tenui-tunicatae, sed apicaliter crasse-tunicatae. Trama pilei irregulare; trama lamellarum regulare, hyphis dextrinoideis instructum. Caulocystidia $18-41 \times 6-8$ µm, cylindrica vel clavata, hyalina, inamyloidea, tenui-tunicata. Fibulae presentes. Sparsus, gregarius vel subcaespitosus. Ad folia deiecta et ad lignum dicotvledoneum. Holotypus: Indonesia, Java, West Java, Mt. Halimun National Park, 8 Jan. 1999, A. Retnowati 106 (BO).

Pileus 3–21 mm diam, hemispherical when young, expanding to plano-convex, with or without a low umbo in age, disc rugulose; margin even, straight, striate; surface dull, dry, glabrous; white to off-white or pale brownish orange overall when young, becoming white overall in age. – Context up to 2 mm thick, concolorous. – Lamellae adnate to subdecurrent, subdistant (15–18 reaching stipe) with 2 series of lamellulae, intervenose, narrow (up to 1 mm), often poorly developed, white to off-white, drying yellowish brown, non-marginate. – Stipe $25-50 \times 1-1.5$ mm, central, terete, equal above a subbulbous base, hollow, tough, glabrous to minutely pruinose, non-institious, base tomentose, covered by cream-colored to orange mycelium, without rhizomorphs; white on upper half, base ranging from white to pale brownish orange or pale reddish brown. – Od or and taste not distinctive.

Basidiospores $11-12 \times 4 \ \mu m$ (only 4 basidiospores observed), ellipsoid, smooth, hyaline, inamyloid, thin-walled. – Basidia 23– $29 \times 6-7 \ \mu m$, clavate, 4-spored. – Basidioles clavate to fusoid. – Cheilocystidia common, $15-26 \times 7-10 \ \mu m$, similar to pileipellis elements, clavate to cylindrical, non-setulose or with 1–3 setulae, hyaline, inamyloid, thin-walled or apically thick-walled; setulae 3– $12 \times 1-2 \ \mu m$, cylindrical to conical, hyaline, thick-walled. – Pleu – rocystidia absent. – Pileipellis hymeniform, not mottled, composed of two types of cells: a) predominantly *Siccus*-type broom cells with main body $14-20 \times 8-10 \ \mu m$, clavate to narrowly lageniform or irregular in outline, hyaline or yellowish brown, apically thick-walled; apical setulae $4-16 \times 1-2 \ \mu m$, ranging from 1–5 per cell, cylindrical to conical or irregular in outline, subacute to acute, hyaline to yellowish brown, inamyloid, thick-walled; b) *Globulares*-type cells, $14-30 \times 5-12 \ \mu m$, clavate to cylindrical or ventricose with long neck,



Fig. 25. Marasmius halimunensis Desjardin, Retnowati & E. Horak (A. Retnowati 106, Holotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis. – 6. Caulocystidia.

rarely lobed, a few irregular in outline, hyaline, inamyloid, thin-walled or apically thick-walled. – Pileus trama interwoven. – La-mellar trama regular; hyphae 3–7 µm diam, cylindrical, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical and medullary hyphae undifferentiated, 2–9 µm diameter, parallel, cylindrical, hyaline to pale tawny (at stipe base), dextrinoid, thick-walled (up to 1 µm). – Stipe vesture of scattered or clustered caulocystidia, $18-41 \times 6-8$ µm, cylindrical to clavate, hyaline, inamyloid, thin-walled. – Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious or subcaespitose on undetermined dicotyledonous leaves or wood in montane rainforest. Java. Material examined. – Indonesia: Java, West Java, Mount Halimun National Park, 6 Jan. 1999, A. Retnowati 086 (BO, SFSU); same location, 8 Jan. 1999, A. Retnowati 106 (Holotype: BO; Isotype: SFSU).

Etymology. – Halimun: referring to the type locality at Mt. Halimun National Park.

Marasmius halimunensis has an unusual combination of macroand micromorphogical features, and the species looks more like a Hydropus in the field. The pilei are off-white or with a pale brownish orange tinge, the lamellae become vellowish brown when dried, and the stipe is pruinose, white on the upper half and pale reddish brown on the lower half with orange mycelium. The unique microanatomy includes the following: a pileipellis composed of a mixture of poorly-developed Siccus-type broom cells with few setulae and non-setulose *Globulares*-type cells; cheilocystidia that are typically cylindrical and lacking setulae or with only 1-3 setulae; and the caulocystidia are cylindrical, thin-walled and hyaline. This new species shows some morphological similarities with *M. haediniformis* Singer and M. subarborescens Singer from the Republic of the Congo, and with M. pseudoniveus Singer from Bolivia. Marasmius haediniformis differs in forming a pileipellis composed entirely of well-developed Siccus-type broom cells, has Siccus-type cheilocystidia, and lacks caulocystidia (fide Singer, 1965a). Marasmius subarborescens shares the same features enumerated above for M. haediniformis and in addition differs from M. halimunensis in forming crowded lamellae and much smaller basidiospores (fide Singer. 1965a). Marasmius pseudoniveus forms a pileipellis composed of both broom cells and non-setulose cells as in M. halimunensis, but the broom cells have more setulae. In addition, M. pseudoniveus differs in forming larger pilei (22-45 mm broad), has smaller basidiospores (8–10.3 \times 2.7–4 µm), Siccus-type cheilocystidia, and thickwalled caulocystidia often with apical setulae (fide Singer, 1965b, 1976).

 Marasmius hypochroides Berk. & Broome, J. Linn. Soc., Bot. 14: 35. 1873. – Fig. 26: 1–5.

Type: Sri Lanka, Kandy District, Peradeniya, Thwaites 101 cum icone (K).

Pileus 30-70 mm diam, convex, becoming plano-convex in age, with a flat or depressed, rugulose disc; margin rugulose-sulcate; surface dull, dry, subvelutinous; disc dark brown (6F5-7), around disc brown to light brown (6D-E5-8), margin brownish grey (6C3), with a buff canescent bloom overall. – Lamellae ascending to horizontal, adnexed, distant (12–15 reaching stipe) with 3–4 series of lamellulae, convex, broad (3–6 mm), white to buff or pale yellowish white (4E2), non-marginate. – Stipe $50-90 \times 2-3$ mm, central, terete, equal, cartilaginous, glabrous, shiny, base with bulb of dense, strigose white mycelium; apex white to buff, grading downward through brownish orange (6C5–7) to brown (7E6–8) or dark brown (7F6–8). – Od or strongly fungal; taste not distinctive.

Basidiospores $9-11 \times 5-6 \ \mu m$ [$\bar{x} = 10.4 \pm 0.6 \times 5.6 \pm 0.4 \ \mu m$, Q = 1.5-2, $\bar{q} = 1.9 \pm 0.2$, n = 25 spores per 1 specimen], ellipsoid, smooth, hvaline, inamyloid, thin-walled. - Basidia 25.5-30.5×6-7 um, clavate, 4-spored. - Basidioles clavate to fusoid. - Cheilocystidia common, composed of Siccus-type broom cells; main body 12- $20.5 \times 5-7$ µm, clavate to broadly clavate, subcylindrical, cylindrical or irregular in outline, rarely lobed, hyaline, thick-walled; apical setulae $5-20 \times 1-1.5$ µm, crowded, narrowly cylindrical to conical or irregular in outline, subacute to acute, hyaline to pale yellow, thickwalled. - Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of Siccus-type broom cells similar to cheilocystidia; main body $12-27 \times 7-8 \mu m$, turbinate to clavate, broadly clavate or irregular in outline, hvaline to pale vellowish brown, predominantly apically thick-walled, a few thick-walled overall; apical setulae $4-16.5 \times 1-2.6$ µm, crowded, narrowly cylindrical to conical, obtuse to subacute, hvaline to pale vellowish brown, thick-walled. -Pileus trama interwoven. - Lamellar trama regular; hyphae 5-11 µm diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical and medullary hyphae undifferentiated, 5–10 µm diam, parallel, cylindrical, smooth, non-gelatinous, hyaline (apex) to yellowish brown (base), strongly dextrinoid, thin- to thick-walled. - Stipe vesture absent. -Clamp connections present.

Habit, habitat, and distribution. – Gregarious on very rotten log in botanical garden area. Java.

Material examined. – Indonesia: – Java, West Java, Bogor Botanical Garden, 12 Jan. 1999, D. E. Desjardin 6916 (BO, SFSU).

Marasmius hypochroides, described from Sri Lanka, was reported by Pegler (1986) to have olive tints on the pileus, and to have cheilocystidia and pileipellis cells with setulae in the range $3-9 \mu m$ long. Our material lacks olive tints on the pileus, where they are replaced by reddish tints, and has setulae up to 20 μm long. In addition, the Javanese specimen is unique in forming a distinctly canescent pileus, the result of such long setulae.



Fig. 26. Marasmius hypochroides Berk. & Broome (D. E. Desjardin 6916). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

Marasmius hypochroides is similar to M. napoensis Singer from Ecuador, and M. episemus Singer from the Democratic Republic of Congo (formerly Belgian Congo and Zaire). Marasmius napoensis differs in forming more distinctly intervenose lamellae, shorter setulae, and a pruinose stipe with Siccus-type caulocystidia (fide Singer, 1976). Marasmius episemus differs in lacking cheilocystidia and forming shorter setulae (fide Singer, 1965a). There is a possibility that M. episemus represents a synonym of M. hypochroides.

Marasmius kembangus Desjardin & E. Horak, sp. nov. - Fig. 27: 1-5.

Pileus 50-75 mm latus, hemisphaericus vel late convexus, umbonatus ad centrum depressum, plicatus, minute velutinus, argillaceus, aetate fuscus. Lamellae adnatae to adnexae, distantes, pileo concolores, obscuriore marginatae. Stipes $30-70 \times 1-2.5$ mm, teres, aequalis, glabrus, flexilis, apicaliter argillaceus, basim versus fuscus, tomento cremeo disciformique ad substratum affixus. Odor saporque nulli. Basidiosporae $22-30 \times (3-)3.5-5$ µm, anguste fusoideae vel suballantoideae, leves, hyalinae, inamyloideae, tenui-tunicatae. Basidia $45-52 \times 7-$ 9 µm, 4-spora. Basidiola clavata vel fusoidea. Cheilocystidia typi Sicci $20-45 \times 5-$ 10 µm, setulosa, fusoidea vel clavata, hyalinia vel pallide luteo-brunnea; setulae 2- $10 \times 0.5-2 \,\mu\text{m}$, cylindricae vel conicae, apicaliter furcatae, subacutae, pallide luteobrunneae, tenui- vel crasse-tunicatae. Pleurocystidia nulla. Pileipellis hymeniformis, cellulae typi Sicci $12-20 \times 7-10 \mu m$, clavatae vel irregulares, hyalinae; setulae ad apicem $7-10 \times 1-2$ µm, densae, anguste cylindricae vel conico-acutae, hyalinae vel pallide argillaceae, crasse-tunicatae. Trama pilei irregulare; trama lamellarum regulare, hyphis dextrinoideis praeditum. Caulocystidia nulla. Fibulae presentes. Sparsus, ad folia deiecta et ad frustula putrida palmarum. Holotypus: Indonesia, Java, Bogor Botanical Garden, E. Horak 77-87 (SFSU).

Pileus 50–75 mm diam, hemispherical to broadly convex, always with a distinctive obtuse umbo in a depressed center, conspicuously plicate towards an incurved, undulate-costate margin; surface dull, dry, minutely velutinous; evenly buff to beige, drying dark brown (6F5–6). – Context tough, thin. – Lamellae adnate to adnexed, distant (14–20 reaching stipe) with no lamellulae, ventricose, broad (up to 8 mm), buff to beige or paler with a cream tinge, edges slightly darker. – Stipe $30-70 \times 1-2.5$ mm, central, terete, equal, dry, glabrous, tough, cartilaginous, hollow, base inserted into an off-white to cream-colored, disc-like mycelial pad; apex buff to beige, dark brown elsewhere. – Odor and taste not distinctive.

Basidiospores $22-30 \times (3-)3.5-5 \ \mu m$ [$\bar{x} = 26.5 \pm 0.6 \times 4.7 \pm 0.3 \ \mu m$; Q = 4.5-6.7; $\bar{q} = 5.7 \pm 0.6$, n = 25 spores per 1 specimen], narrowly fusoid to suballantoid, gradually tapering towards a broad apiculus, smooth, hyaline, inamyloid, thin-walled. – Basidia 45– $52 \times 7-9 \ \mu m$, clavate, 4-spored. – Basidioles clavate to fusoid. – Cheilocystidia common, of *Siccus*-type broom cells; main body



Fig. 27. Marasmius kembangus Desjardin & E. Horak (E. Horak 77–87, Holotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidia. – 4. Cheilocystidia. – 5. Pileipellis.

 $20-45 \times 5-10$ µm, fusoid to clavate, hyaline to pale yellowish brown, apically thick-walled; apical setulae $2-10 \times 0.5-2$ µm, cylindrical to conical, forked, subacute, pale yellowish brown, thin- to thick-wal-

led. – Pleurocystidia absent. – Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body $12-20 \times 7-10$ µm, clavate to broadly clavate, turbinate or irregular in outline, hyaline, thin- to apically thick-walled; apical setulae $7-10 \times 1-2$ µm, crowded, narrowly cylindrical to conical, subacute to acute, hyaline to pale yellowish brown, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 3–8 mm diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae 4–5 µm diam, parallel, cylindrical, smooth, yellowish brown, dextrinoid, thick-walled, non-gelatinous; medullary hyphae 5–8 µm diam, parallel, cylindrical, – hyaline, dextrinoid, thin-walled. – Caulocystidia absent. – Clamp connections present.

Habit, habitat, and distribution. – Scattered on rotting stems and leaves of undetermined palm in botanical garden area. Java.

Material examined. – Indonesia: Java, Bogor, Bogor Botanical Garden, 11 Mar. 1977, E. Horak 77-87 (Holotype: SFSU; Isotype: ZT).

Etymology. - kembang (Javanese): flower.

Marasmius kembangus is distinguished by a large, beige-colored, strongly plicate, conspicuously umbonate pileus, very long basidiospores, and absence of pleurocystidia and caulocystidia. It is similar to *M. megistus* Singer described from Zaire, another species with exceptionally long basidiospores and no pleurocystidia. *Marasmius megistus* differs, however, in forming a smaller, reddish brown to violet brown pileus, even longer basidiospores (23–48 µm long), and a pileipellis formed from smooth cells as well as broom cells (*fide* Singer, 1965a).

 Marasmius subconiatus Petch, Trans. Brit. Mycol. Soc. 31: 41. 1948. – Fig. 28: 1–5. Type: Sri Lanka, Kandy District, Peradeniya, on bamboo, Petch 4292 (K).

Pileus 4–7 mm diam, convex to plano-convex, sulcate; surface dull, dry, glabrous to minutely granulose; light orange (5A4–5) overall. – Lamellae horizontal, adnexed, distant with no lamellulae, non-collariate, convex, white with orange margin. – Stipe 7– 11×0.05 –0.1 mm, central, wiry, equal, glabrous, non-institious, dark brown to black overall. – Odor and taste not distinctive.



Fig. 28. Marasmius subconiatus Petch (D. E. Desjardin 6922). – 1. Basidiomes (x2). – 2. Basidiospore. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

Basidiospores $6.5 \times 2.5 \ \mu m$ (one basidiospore observed), narrowly ellipsoid, smooth, hyaline, inamyloid, thin-walled. - Basidia not observed. - Basidioles clavate to fusoid. - Cheilocystidia common, of *Siccus*-type broom cells; main body $12-15.5 \times 6-10 \mu m$, cylindrical to turbinate, clavate, broadly clavate or irregular in outline, rarely lobed, pale yellow, apically thick-walled; apical setulae $4-6 \times 0.5-1$ µm, crowded, cylindrical to conical, seldom forked apically, obtuse to subacute, hyaline to yellowish brown, thick-walled. -Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body $12-17.5 \times 6-9$ µm, cylindrical to clavate, broadly clavate, turbinate or irregular in outline, often lobed, hyaline to pale yellow, thin-to thick-walled; apical setulae $1.5-4 \times 0.5-1$ µm, crowded, cylindrical to conical, seldom branched, obtuse to subacute, hyaline to pale orange, thin- to thickwalled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 3-6 µm diam, cylindrical, smooth, hyaline, weakly dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-6 µm diam, parallel, cylindrical, smooth, yellowish brown, dextrinoid, thick-walled, non-gelatinous; medullary hyphae 4-8 μm diam, parallel, cylindrical, hyaline to pale yellow, dextrinoid, thin-walled. - Stipe vesture absent. - Clamp connections present.

Habit, habitat, and distribution. – Scattered on bamboo leaves in botanical garden area. Java.

Material examined. – Indonesia: Java, West Java, Bogor Botanical Garden, 12 Jan. 1999, D. E. Desjardin 6922 (BO, SFSU).

The Java specimen, collected on bamboo leaves in the Bogor Botanical Garden, is closest to M. subconiatus Petch, described from material collected on bamboo in Sri Lanka (Petch, 1948). Our material differs from the type only in pileus coloration, viz., light orange versus dull reddish brown, respectively. Because the Javanese collection consists of only 2 basidiomes both of which are apparently immature (only one basidiospore was observed), we hesitate to describe our material as new. Further collections from Java may indicate a range of pileus coloration from orange to reddish brown. A watercolor illustration commissioned by van Overeem of what may represent this tiny taxon and labelled "Marasmius # 1578" resides in Herbarium Bogoriense.

 Marasmius tageticolor Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 136. 1856. – Fig. 29: 1–5.

Type: Brazil, Amazonas, "Panure" (Ipanure = Sao Jeronimo), Spruce 37 (K!).

Pileus 5–12 mm diam, convex to broadly convex with a shallow central umbilicus, plicate; margin crenate; surface dull, dry, glabrous; disc dark purplish red (12 F7–8), elsewhere ruby (12 E 7–8) to violet brown ("garnet red", 11 E7–8). – Lamellae horizontal, adnexed, remote to distant (13–15) with 0–1 series of lamellulae, moderately broad, greyish red (11 C–D 5–6), non-marginate. – Stipe $10-20 \times 0.2-0.3$ mm, central, wiry, glabrous, non-insititious; dark brown to black overall. – O d or and taste not distinctive.

Basidiospores 19–21.5×3–4 µm [$\bar{x} = 20.0 \pm 0.8 \times 3.7 \pm 0.3$ µm, Q = 4.5–6.7, $\bar{q} = 5.5 \pm 0.7$, n = 25 spores per 1 specimen], cylindrical to fusoid, often curved in profile, smooth, hyaline, inamyloid, thinwalled. – Basidia not observed. – Basidioles clavate to fusoid. – Cheilocystidia common, composed of *Siccus*-type broom cells; main body 10–15×5–8 µm, clavate to cylindrical or irregular in outline, rarely lobed, hyaline, apically thick-walled; apical setulae 2– 10×0.5–1 µm, crowded, cylindrical to conical, seldom forked apically, obtuse to subacute, hyaline, dextrinoid, thick-walled. – Pleurocystidia absent. – Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body 14–21×5–7 µm, clavate to cylindrical ro irregular in outline, subhyaline to pale purple or reddish purple, dextrinoid, apically thick-walled; apical setu



Fig. 29. Marasmius tageticolor Berk. (D. E. Desjardin 6917). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

lae $3-11 \times 0.5-1.5$ µm, crowded, cylindrical to conical, usually wavy in outline, rarely branched, obtuse to subacute, hyaline to pale purple or reddish purple, dextrinoid, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 3–8 µm diam, cylindrical, smooth, hyaline, strongly dextrinoid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae 3–4 µm diam, parallel, cylindrical, hyaline (apex) to yellowish brown or brown (base), strongly dextrinoid, thick-walled; medullary hyphae 4–7 µm diam, parallel, cylindrical, hyaline to pale yellowish brown, dextrinoid, thin-walled. – Stipe vesture absent. – Clamp connections present.

Habit, habitat, and distribution. – Scattered on bamboo leaves and twigs in botanical garden area. Java.
Material examined. – Indonesia: Java, West Java, Bogor Botanical Garden, 12 Jan. 1999, D. E. Desjardin 6917 (BO, SFSU).

Basidiomes of *Marasmius tageticolor* are characterized by a deep purplish red to violet brown ("garnet red") pileus, remote to distant, greyish red, non-marginate lamellae, a non-insititious, glabrous stipe, and habit on bamboo leaves and stems. Diagnostic micromorphological features include the absence of pleurocystidia, and relatively long and narrow basidiospores. *Marasmius tageticolor* is a beautiful species that might be confused with *M. haematocephalus* (Mont.) Fr., and *M. phaeus* Berk. & M.A. Curtis. *Marasmius haematocephalus* (is e #35 below). *Marasmius phaeus* is distinct in forming white lamellae with reddish brown margins and a dark reddish brown pileus, lacking purple tints (*fide* Singer, 1976).

Although *M. tageticolor* is not a common tropical *Marasmius*, it is apparently widespread in the neotropics, viz., Mexico, Venezuela, and Brazil. This is the first report of the species from Malesia. A watercolor illustration of *M. tageticolor* commissioned by van Overeem and labeled "*Marasmius* # 1155" resides in Herbarium Bogoriense.

Marasmius persicinus Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 30: 1–5.

Pileus 3-5 mm latus, convexus dein campanulatus, sulcatus, subvelutinus, pallide aurantiacus vel persicinus. Lamellae adnexae vel subliberae, distantes, albae, haud marginatae. Stipes $6-9 \times 0.2$ mm, teres, filiformis, flexilis, glabrus, haud insititius, obscure rubro-brunneus, ad basim tomento argillaceo strigosoque affixus. Odor saporque nulli. Basidiosporae $(15.3-)16-18.5 \times 3-4 \mu m$, cylindricae vel fusoideae, leves, hyalinae, inamyloideae, tenui-tunicatae. Basidia $26.5-30.5 \times 7-$ 9 μm, 4-spora. Basidiola clavata vel fusoidea. Cheilocystidia typi Sicci, cellulae 10-20 × 5-7.5 um, setulosae, subcylindricae vel obtuse clavatae, hyalinae, tenui-tunicatae, setulae ad apicem $1.5\text{--}5.5\times0.5\text{--}1.5~\mu\text{m},$ densae, conicae vel cylindricae, saepe bifidae, obtusae vel subacutae, hyalinae, dextrinoideae. Pleurocystidia nulla. Pileipellis hymeniformis, cellulae typi Sicci $7-21 \times 5-12$ µm, setulosae, clavatae vel irregulares, hyalinae, tenui-tunicatae, setulae ad apicem $1.5-3(-7) \times 0.5-1 \ \mu m$, densae, subcylindricae vel irregulares, saepe furcatae, hyalinae vel pallide aurantiacae. Trama pilei irregulare; trama lamellarum regulare, hyphis dextrinoideis instructum. Caulocystidia nulla. Fibulae presentes. Sparsus, ad folia putrida plantarum Zingiberacearum. Holotypus: Indonesia, Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 14 Jan. 1998, D. E. Desjardin 6793 (BO).

Pileus 3–5 mm diam, convex to campanulate, expanding in age to broadly convex, striate to sulcate; surface dull, dry, subvelutinous, opaque; disc light orange (5A5), margin pale orangish white (5A3) to



Fig. 30. Marasmius persicinus Desjardin, Retnowati & E. Horak (D. E. Desjardin 6793, Holotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

peach colored. – Lamellae ascending, adnexed to subfree, distant (10-12 - reaching stipe) with 0–1 series of lamellulae, broad, convex, white, non-marginate. – Stipe 6–9×0.2 mm, central, terete, wiry, shiny, tough and pliant, glabrous, non-institutious, base covered with strigose, buff-colored tomentum; dark reddish brown overall or with white to pale tawny-white apex. – Odor and taste not distinctive.

Basidiospores (15.3-)16-18.5 \times 3-4 µm [\bar{x} = 17.7 \pm 0.8 \times 3.7 \pm $0.3 \mu m$, Q = 4.3-6.0, \bar{q} = 4.8 ± 0.5, n = 25 spores per 1 specimen], cylindrical to fusoid, often curved in profile, smooth, hyaline, inamyloid, thin-walled. - Basidia 26.5-30.5×7-9 µm, clavate, 4spored. - Basidioles 15-22×6-7 μm, clavate to fusoid. - Cheilocystidia common, of Siccus-type broom cells; main body $10-20 \times 5-$ 7.5 µm, subcylindrical to broadly clavate, hyaline, thin-walled; apical setulae $1.5-5.5 \times 0.5-1.5$ µm, crowded, conical to cylindrical or irregular in outline, often bifid, obtuse to subacute, hyaline, dextrinoid, thin- to thick-walled. - Pleurocystidia absent. - Pileipellis hymeniform, weakly mottled, composed of Siccus-type broom cells; main body $7-21 \times 5-12$ µm, clavate to broadly clavate, turbinate or irregular in outline, rarely lobed, hyaline, thin-walled; apical setulae $1.5-3(-7) \times 0.5-1$ µm, crowded, subcylindrical to irregular in outline, often forked, hyaline to pale orange, dextrinoid, thin- to thick-walled; some cells with fewer, larger and thicker-walled setulae causing the mottled appearance at 100x. - Pileus trama interwoven. – Lamellar trama regular; hyphae 1.5–5 μm

diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae 2–4 μ m diam, parallel, cylindrical, smooth, hyaline, dextrinoid, thick-walled (up to 1 μ m), non-gelatinous; medullary hyphae 5–6 μ m diam, cylindrical. hyaline, dextrinoid, thin-walled. – Stipe vesture absent. – Clamp connections present.

Habit, habitat, and distribution. – Scattered on senescent leaves of ginger in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt. Halimun National Park, loop trail from Cikaniki, 14 Jan. 1998, D. E. Desjardin 6793 (Holotype: BO; Isotype: SFSU).

Etymology. – persicinus (L): peach-colored, referring to the pileus coloration.

Marasmius persicinus is characterized by a pale orange to peach-colored pileus, distant and broad, non-marginate lamellae, a short (6-9 mm), glabrous stipe, and growth on ginger leaves. In addition, the species lacks pleurocystidia and caulocystidia, forms basidiospores with mean size of 17.7×3.7 µm, and forms crowded, very fine setulae on Siccus-type broom cells. The new species is similar to M. bambusiniformis Singer (1976) from South America and Papua New Guinea (Desjardin & Horak, 1997), and to M. coniatus Berk. & Broome, from Sri Lanka (Pegler, 1986). The type of Marasmius bambusiniformis (F!) differs in forming more deeply pigmented pilei (orange to reddish brown), more numerous (10–12) and narrower lamellae with orangish brown edges, a longer stipe (10-30 mm), pigmented cheilocystidia, and fewer and coarser setulae on Siccus-type broom cells. Marasmius coniatus is distinct in forming more deeply pigmented pilei (tawny brown with olivaceous brown disc), more numerous (12–14) and narrower lamellae, a longer stipe (10-40 mm), and fewer and coarser setulae on Siccus-type broom cells (fide Pegler, 1986).

Marasmius Iuteomarginatus Desjardin, Retnowati & E. Horak, sp. nov. – Fig. 31: 1–6.

Pileus 5–17 mm latus, convexus vel plano-convexus, ruguloso-striatus, pruinosus, primo aurantiacus, dein pallidior, aetate albescens. Lamellae adnatae, distantes, albae, luteomarginatae, fimbriatae. Stipes $1.5-3 \times 0.3-0.5$ mm, eccentricus, teres, aequalis, flexilis, pruinosus, haud institius, pallide aurantio-brunneus vel fuscus, ad basim tomento albo obtectus. Odor saporque nulli. Basidiosporae $15-18.5 \times (3-)3.5-5.0$ µm, cylindricae vel fusoideae, leves, hyalinae, inamyloideae, te-

nui-tunicatae. Basidia 26.5–30.5 × 8–9 µm, 4-spora. Basidiola clavata vel fusoidea. Cheilocystidia 9–18 × 3–5 µm, polymorphica, clavata vel cylindrica, ventricosa vel irregularia, rariter ad apicem ramosa, hyalina vel lutea, tenui-tunicata, cellulae typi Sicci nullae ad aciem lamellarum. Pleurocystidia nulla. Pileipellis hymeni-formis, cellulae typi Sicci 10–18 × 3–5 µm, cylindricae, late clavatae vel irregulares, hyalinae, tenui-tunicatae, setulae ad apicem $3–5 \times 0.5-1$ µm, cylindricae vel conicae, obtusae vel subacutae, hyalinae vel aureae, inamyloideae, tenui-tunicatae. Trama pilei iregulare; trama lamellarum regulare, hyphis inamyloideis vel vix dextrinoideis instructum. Caulocystidia: a) Cellulis typi Sicci in pileo similibus; b) Cheilocystidiis similibus. Fibulae presentes. Gregarius, ad folia et ad frustula putrida plantarum Zingiberacearum. Holotypus: Indonesia, Java, West Java, Mt. Ha-limun National Park, 9 Jan. 1999, A. Retnowati 110 (BO).

Pileus 5–17 mm diam, convex at first, expanding to planoconvex in age; disc distinctly rugulose; margin striate; surface dull, dry, pruinose; bright orange when young, becoming pale orangish white to white in age. – Context thin, white. – Lamellae horizontal, adnate, distant (7–9 reaching stipe) with 1 series of lamellulae, narrow, white; edges fimbriate, bright yellow. – Stipe 1.5– 3×0.3 –0.5 mm, eccentric, terete, equal, tough, pruinose, non-insititious, with white basal tomentum; orangish brown above to brown at the base. – Od or and taste not distinctive.

 $0.5 \ \mu m$, Q = 3.3–5, \bar{q} = 4 ± 0.4, n = 25 spores per 1 specimen], cylindrical to fusoid, often curved in profile, smooth, hvaline, inamyloid, thin-walled. - Basidia 26.5-30.5×8-9 μm, clavate, 4-spored. -Basidioles clavate to fusoid. - Cheilocystidia common, 9- $18 \times 3-5$ µm, polymorphic, clavate to cylindrical, ventricose or irregular in outline, rarely apically branched, hyaline to yellow, inamyloid, thin-walled, Siccus-type cells absent from lamellar edge. -Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body $10-18 \times 3-5$ µm, cylindrical to clavate, broadly clavate, subvesiculose, or irregular in outline, sometimes lobed, hyaline, inamyloid, thin-walled; apical setulae $3-5 \times 0.5-1$ µm, cylindrical to conical or wavy in outline, obtuse to subacute, hyaline to golden, inamyloid, thick-walled; some cells with fewer, coarser and thicker-walled setulae causing a mottled appearance at 100x. - Pileus trama interwoven. - Lamellar trama regular; hyphae 3-8 µm diam, cylindrical, hyaline, inamyloid to weakly dextrinoid, thin-walled. - Stipe tissue monomitic; cortical hyphae 2-6 µm diam, parallel, cylindrical, yellowish brown, dextrinoid, thick-walled; medullary hyphae 4-7 µm diam, parallel, cylindrical, hyaline, weakly dextrinoid, thin-walled. - Stipe vesture of two types of caulocystidia: a) Siccus-type broom cells; main body $7-10 \times 4-5$ µm, clavate to broadly clavate, cylindrical or irregular in outline, hvaline, inamyloid, thin-walled; apical setulae 2- 3×0.5 µm, not crowded, narrowly cylindrical to conical, obtuse to erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum



Fig. 31. Marasmius luteomarginatus Desjardin, Retnowati & E. Horak (A. Retnowati 110, Holotype). – 1. Basidiomes (x2). – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis. – 6. Caulocystidia.

subacute, hyaline, inamyloid, thin-walled; b) non-setulose cells with main body $6-15\times5-10$ µm, subcylindrical to clavate, hyaline, inamyloid, thin-walled. – Clamp connections present.

Habit, habitat, and distribution. – Gregarious on senescent ginger leaves and stems in montane rainforest. Java.

Material examined. – Indonesia: Java, West Java, Mt Halimun National Park, loop trail from Cikaniki, 9 Jan. 1999, A. Retnowati 110 (Holotype: BO; Isotype: SFSU).

Etymology. – luteo (L.): yellow; marginatus (L.): margin, referring to the bright yellow lamellar edges. Marasmius luteomarginatus is characterized by a small, orange to peach-colored pileus, white, distant lamellae with bright yellow edges, a very short (1–3 mm) eccentric, pruinose, non-institutious stipe, long basidiospores, no pleurocystidia, irregularly cylindrical cheilocystidia, two types of caulocystidia, and growth on ginger debris. This species is allied with *M. tenuissimus* (Jungh.) Singer which was described from material collected near Kebokoening, Java. The latter species, which we have not yet recollected in Java, differs according to Singer (1976) who studied the type specimen at L, in forming strongly intervenose, non-marginate lamellae, smaller basidiospores (8–10.5×3.8–4.8 µm), Siccus-type cheilocystidia (not cylindrical non-setulose cells), and grows on dicotyledonous debris.

 Marasmius berteroi (Lév.) Murrill, N. Amer. Fl. 9: 267. 1915. – Fig. 32: 1–5.

= Heliomyces berteroi Léveillé, Ann. Sci. Nat. Bot., ser. 3, 2: 177. 1844.

Type: Puerto Rico, Bertero (L).

Pileus 2–11 mm diam, hemispherical to convex when young, expanding to broadly conical or plano–convex with a broad umbo in age, plicate; margin crenate; surface dull, dry, glabrous to minutely velutinous; orangish brown to ferruginous with a slightly paler margin. – Context thin, white. – Lamellae subfree to adnexed, non-collariate, distant to subdistant (11–16 reaching stipe) with 0–1 series of lamellulae, narrow (up to 1.5 mm), white, non-marginate. – Stipe 12–22×0.2–0.5 mm, central, cylindrical, equal, pliant, glabrous, shiny, non-insititious, base with strigose, buff to pale orangish white mycelium; brown to dark brown overall. – Odor and taste not distinctive.

Basidiospores $12-16(-17.5) \times 3-4(-4.5) \ \mu m \ [\bar{x}_r = 14.0-14.9 \times 3.7-3.9 \ \mu m, \ \bar{x}_m = 14.5 \pm 0.5 \times 3.8 \pm 0.1 \ \mu m, \ Q = 3.0-4.7, \ \bar{q}_r = 3.8-3.9, \ \bar{q}_m = 3.8 \pm 0.1, \ n = 25 \ \text{spores per 2 specimens]}, subfusoid to fusoid, often curved in profile, smooth, hyaline, inamyloid, thin-walled. – Basidia not observed. – Basidioles clavate to fusoid. – Cheilocystidia common, of$ *Siccus* $-type broom cells; main body 10-17.5 × 6-7 \ \mu m, cylindrical to clavate, turbinate or irregular in outline, hyaline, inamyloid, thin-walled; apical setulae <math>1-5 \times 0.5-1 \ \mu m$, crowded, cylindrical to conical or wavy in outline, obtuse to subacute, hyaline to pale tawny, inamyloid, thin-walled. – Pleurocystidia absent. – Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body $11-2.5 \times 5-9 \ \mu m$, clavate to broadly clavate, turbinate or irregular in outline, hyaline directly in a setulae $2-6 \times 0.5-1 \ \mu m$, crowded, cylindrical to narrowly conical,

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum



Fig. 32. Marasmius berteroi (Lév.) Murrill (A. Retnowati 052). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis.

seldom forked apically, obtuse to subacute, hyaline to tawny or brownish orange, inamyloid, thin- to thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 4–7 μ m diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae 2–5 μ m diam, parallel, cylindrical, yellowish brown, dextrinoid, thick-walled; medullary hyphae 3–7 μ m diam, parallel, cylindrical, hyaline, dextrinoid, thin-walled. – Stipe vesture absent. – Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious on dicotyledonous leaves and twigs in lowland forest with alien plants. Java.

Material examined. - Indonesia: Java, West Java, West Bogor, Bogor, Dungus Iwul Nature Reserve, 26 Dec. 1998, A. Retnowati 050 (SFSU); same location, 26 Dec. 1998, A. Retnowati 052 (SFSU).

Diagnostic features of *M. berteroi* include a small, brownish orange to ferruginous, plicate pileus, non-marginate, distant lamellae, a glabrous stipe, and habit on dicotyledonous twigs and leaves. In addition, the moderately long basidiospores ($12-16 \mu m$) and absence of pleurocystidia and caulocystidia are distinctive. This

is a common species throughout South America and the Caribbean, but this is the first report from Malesia. Our material is very similar to *M. bambusiniformis* Singer (1976) described from South America (Ecuador and Brazil) and subsequently reported from Papua New Guinea (Desjardin & Horak, 1997), but the latter species differs subtly in forming ferruginous-marginate lamellar edges and longer basidiospores on average (15–18.5 μ m long; Type: F!).

Marasmius cladophyllus var. tjibodensis Desjardin, Retnowati & E. Horak, var. nov. - Fig. 33: 1–6.

Differt a varietate typi cheilocystidiis haud setulosis, a varietate glaberripedi caulocystidiis presentibus et basidiosporis majoribus, a varietate intermedio cheilocystidiis differentibus. Sparsus, ad frustula plantarum dicotyledonearum et folia putrida Bambusarum. Holotypus: Indonesia, Java, West Java, Cibodas Botanical Garden, 22 Jan. 1999, A. Retnowati 147 (BO).

Pileus 7–15 mm diam, convex to plano-convex with decurved margin, undulate to wavy, non-striate; surface dull, dry, subvelutinous; pale brownish orange (5C5; "clay") overall when young, fading to light orange or peach-colored in age. – Context thin, orangish white. – Lamellae poorly developed, adnate, subdistant (14– 15 reaching stipe) with 1 series of lamellulae, extremely narrow and vein like, reticulate-intervenose, forked, pale orangish white (5A2), non-marginate. – Stipe 15–55 × 1.5–2.5 mm, central, terete, equal, tough, pliant, hollow, pruinose to fibrillose overall, non-institious, with white, strigose basal hairs; orangish white on upper half grading into light orange to orangish brown below. – Odor and taste not distinctive.

Basidiospores (10–)11–13.5 × 3–4(–4.5) μ m [\bar{x} = 11.6 ± 0.9 × 4.0 $\pm 0.3 \ \mu m; \ Q = 2.4 - 3.7; \ \bar{q} = 2.9 \pm 0.3, \ n = 25 \ spores \ per \ one \ specimen],$ elongate fusoid to subcylindrical, smooth, hyaline, inamyloid, thinwalled. - Basidia 25.5-33×6-7 µm, clavate, 4-spored. - Basidioles - 21-26×6-9 µm, clavate to subfusoid. - Cheilocystidia common, $22-46 \times 6-8 \mu m$, polymorphic, subcylindrical to cylindrical, ventricose, clavate, fusoid or irregular in outline, rarely forked apically, hvaline, inamyloid, thin-walled, rarely with walls up to 1 µm thick: Siccus-type broom cells absent from lamellar edge. - Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body $14-34 \times 5-13.5 \mu m$, cylindrical to clavate or irregular in outline, hyaline, weakly dextrinoid, thin- to thick-walled; apical setulae $3-9 \times 0.5-1$ µm, crowded, cylindrical to conical or irregular in outline, obtuse to subacute, pale tawny, weakly dextrinoid, thick-walled. - Pileus trama interwoven. -Lamellar trama regular; hyphae 3-8 µm diam, cylindrical,

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum



Fig. 33. Marasmius cladophyllus var. tjibodensis Desjardin, Retnowati & E. Horak (A. Retnowati 147, Holotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pileipellis. – 6. Caulocystidia.

smooth, hyaline, strongly dextrinoid, thin-walled to slightly thick-walled, non-gelatinous. – Stipe tissue monomitic; cortical and medullary hyphae undifferentiated, 3–8 μ m diam, parallel, cylindrical, smooth, hyaline to pale golden, strongly dextrinoid, thin- to thick-walled (up to 1 μ m), non-gelatinous. – Stipe vesture of numerous caulocystidia, 20–37 × 4–7 μ m, polymorphic, subcylindrical to clavate or irregular in outline, hyaline, inamyloid, thin-walled; *Siccus*-type broom cells absent from stipe surface. – Clamp connections present.

Habit, habitat, distribution. – Solitary to gregarious on debris under *Castanopsis javanica* or on undetermined dicotyledonous wood, in botanical garden area. Java.

Material examined. – Indonesia: Java, Cibodas Botanical Garden, trail to Mt. Gede, 8 Jan. 1998, D. E. Desjardin 6726 (SFSU); same location, 22 Jan. 1999, A. Retnowati 147 (Holotype: BO; Isotype: SFSU).

Etymology. – tjibodensis: from Tjibodas, the traditional spelling of Cibodas from where the type specimen was collected.

Marasmius cladophyllus var. tjibodensis is characterized by a brownish orange to peach-colored, non-striate pileus, poorly developed, reticulate-intervenose lamellae, and a pruinose stipe. Micromorphologically, it is distinct because of relatively long and broad basidiospores ($\bar{x} = 11.6 \times 4 \mu m$), a lamellar edge composed entirely of irregularly cylindrical to clavate cheilocystidia (lacking Siccus-type broom cells), and caulocystidia like the cheilocystidia. Marasmius *cladophyllus* is a commonly encountered species in the new world tropics. Of the described varieties of M. cladophyllus, var. cladophyllus Berk. differs in forming much larger pilei (10-60 mm diam), has Siccus-type broom cells on lamellar edges, and very thick-walled tramal hyphae (fide Singer, 1976). Marasmius cladophyllus var. glaberripes Singer differs in forming smaller basidiospores (8.5- 10×2.5 µm), and as its epithet indicates, lacks caulocystidia (fide Singer, 1976). The latter variety does share the same type of non-setulose cheilocystidia with M. cladophyllus var. tjibodensis. Marasmius cladophullus var. intermedius Singer differs in forming thickwalled tramal tissue, and has distinctly different cheilocystidia (fide Singer, 1976). This is the first report of M. cladophyllus from Malesia, and suggests that the species may be widely distributed in tropical regions of the world where it develops a wide range of micromorphological variation.

Marasmius araucariae var. siccipes Desjardin, Retnowati & E. Horak, var. nov. - Fig. 34: 1-6.

Differt a varietate typi lamellis ad aciem aurantio-brunneis, cellulis typi Sicci ad superficiem stipitis caulocystidis cylindricis mixtis. Sparsus, ad frustula plantarum dicotyledonearum et folia putrida Bambusarum. Holotypus: Indonesia, Java, West Java, Bogor Botanical Garden, 12 Jan. 1999, A. Retnowati 124 (BO).

Pileus 12–32 mm diam, convex to campanulate when young, expanding to plano-convex with upturned margin in age, striate to plicate; surface dull, dry, velutinous; orangish brown overall or with erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrun



Fig. 34. Marasmius araucariae var. siccipes Desjardin, Retnowati & E. Horak (A. Retnowati 124, Holotype). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidioles. – 4. Cheilocystidia. – 5. Pileipellis. – 6. Caulocystidia.

darker disc, drying reddish brown. – Context thin, white. – La-mellae adnexed to subfree, close (16 reaching stipe) with 3 series of lamellulae, not intervenose, narrow, white with orangish brown edges. – Stipe $30-50 \times 0.5-1$ mm, central, terete, equal, glabrous, non-institious with orangish white basal tomentum; yellowish white to white on upper half, grading into orangish brown to brown below. – Od or and taste not distinctive.

Basidiospores $11-12 \times 3-4 \ \mu m$ [$\bar{x} = 11.7 \pm 0.5 \times 3.8 \pm 0.4 \ \mu m$, Q = 2.7-4, $\bar{q} = 3 \pm 0.4$, n = 25 spores per 1 specimen], subfusoid, often curved in profile, smooth, hyaline, inamyloid, thin-walled. – Basidia not observed. – Basidioles clavate to fusoid. – Cheilocystidia common, of *Siccus*-type broom cells, similar to pileipellis elements; main body 9–18×4–9 μm , subcylindrical to clavate or irregular in outline, seldom lobed, hyaline to pale yellow, apically thickwalled; apical setulae $4-7 \times 0.5-1$ µm, crowded, cylindrical to conical. sometimes wavy in outline, obtuse to subacute, orangish brown, thick-walled. - Pleurocystidia absent. - Pileipellis hymeniform, mottled, composed of Siccus-type broom cells; main body 9- $23 \times 9-10$ µm, clavate to broadly clavate, cylindrical, turbinate or irregular in outline, seldom lobed, hyaline to pale tawny, thin- to thick-walled (up to 1 μ m); apical setulae 5-8 × 0.5-1 μ m, crowded, cylindrical to conical, obtuse to subacute, orangish brown to brown, dextrinoid, thick-walled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 5-8 µm diam, sometimes inflated up to 11 µm diam, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-6 µm diam. parallel, cylindrical, hyaline (apex) to brown (base), dextrinoid, thinto thick-walled; medullary hyphae 3-7 µm diameter, cylindrical, hyaline, dextrinoid, thin-walled. - Stipe vesture of two types of caulocystidia: a) Siccus-type broom cells with main body 10- $25.5 \times 5-10$ µm, scattered, uncommon, clavate to cylindrical or irregular in outline, hyaline; apical setulae $3-16 \times 0.5-1.5$ µm, cylindrical to conical or wavy, hyaline to pale tawny, thick-walled; b) non-setulose cells, $13-30 \times 5-7$ µm, common, clavate to cylindrical or ventricose, hyaline, inamyloid, thin-walled. - Clamp connections present.

Habit, habitat, and distribution. – Scattered on dicotyledonous debris or on bamboo leaves in botanical garden area. Java.

Material examined. - Indonesia: Java, West Java, Bogor Botanical Garden, 12 Jan. 1999, A. Retnowati 124 (Holotype: BO; Isotype: SFSU).

Etymology. – siccus (L): dry; pes (L): stipe; referring to the *Siccus*-type broom cells on the stipe surface.

Marasmius araucariae is distinguished by forming a striate, orangish brown to reddish brown pileus, close lamellae, a pruinose stipe, moderately long basidiospores and some cylindrical caulocystidia. The type variety, originally described from Argentina (Singer, 1965b) from material growing on *Araucaria* wood and leaves, was recently reported from Papua New Guinea by Desjardin & Horak (1997) from material growing on fagaceous leaves. The new variety described here as *M. araucariae* var. *siccipes* differs from the type variety in forming orangish brown-marginate lamellae, and in forming numerous *Siccus*-type broom cells on the stipe surface among the cylindrical caulocystidia.

sect. Sicci Singer

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

Type species: Marasmius haematocephalus (Mont.) Fr.

- Marasmius haematocephalus (Mont.) Fr., Epicr. Syst. Mycol.: 382. 1838. – Fig. 35: 1–6.
 - = Agaricus haematocephalus Mont., Ann. Sci. Nat. Bot., sér. 2, 7: 369. 1837.
 - = Androsaceus haematocephalus (Mont.) Pat., J. Bot. (Morot) 3: 336. 1889.
- = Marasmius rhodocephalus Fr., Nova Acta Regiae Soc. Sci. Upsal. ser. 3, 1: 31. 1851.
 - = Androsaceus rhodocephalus (Fr.) Pat., Bull. Soc. Mycol. France 4: 20. 1888.
- = Marasmius semipellucidus Berk. & Broome, J. Linn. Soc., Bot. 14: 36. 1875.
- Marasmius sanguineus Cooke & Massee, Grevillea 17: 59. 1889.
- = Marasmius atropurpureus Murrill, N. Amer. Fl. 9: 262. 1915.
- = Marasmius vinosus Beeli, Bull. Soc. Roy. Bot. Belgique 60: 158. 1928.

Type: Brazil, Rio de Janeiro, A. de Saint Hilaire. Not extant.

Pileus 3–15 mm diam, convex to obtusely conic when young, expanding to broadly convex or campanulate in age, lacking a papilla, plicate; surface dull, dry, glabrous to minutely velutinous; greyish red (5C4–5) to brownish red (8C6–8) or greyish reddish brown (9D4–5), sometimes with a hint of purple, fading on the margin in age. – Context thin, white. – Lamellae horizontal, subfree to adnexed, distant to remote (9–12 reaching stipe) with 0–1 series of lamellulae, broad (2–3 mm), non-collariate, pink to pale greyish red, wiry, tough, glabrous, non-insititious, base covered with white mycelium; brown to dark brown overall. – Odor and taste not distinctive.

Basidiospores $18-22.5 \times 3-5 \ \mu m \ [\bar{x}_r = 20.0-21.0 \times 3.9-4.1 \ \mu m,$ $\bar{x}_m = 20.5 \pm 0.5 \times 4.0 \pm 0.1 \ \mu m$, Q = 3.6-6.9, $\bar{q}_r = 5-5.4$, $\bar{q}_m = 5.2 \pm 0.2$, $n = 5.2 \pm 0.2$ 25 spores per 2 specimens], clavate to subfusoid, often curved in profile, smooth, hyaline, inamyloid, thin-walled. - Basidia 28- $32 \times 7-9$ µm, clavate, 4-spored. – Basidioles clavate to fusoid. – Cheilocystidia of two type of cells: a) Siccus-type broom cells with main body $10-16 \times 6-8 \mu m$, common, cylindrical to clavate, turbinate or irregular in outline, hyaline to pale yellowish brown, inamyloid, thin- to thick-walled apically; apical setulae $3-8 \times 0.5-1 \mu m$, cylindrical to conical, slightly wavy in outline, seldom branched, obtuse to subacute, hvaline to pale reddish brown, thick-walled; b) non-setulose cells like the pleurocystidia, $17-41 \times 6-8$ µm, common, clavate to fusoid, usually attenuated and strangulate at the apex, often with 2-4 successive apical constrictions, rarely lobed, weakly refractive, hyaline, inamyloid, thin-walled. - Pleurocystidia abundant, $33-72 \times 6-10 \mu m$, clavate to fusoid, wavy to constricted at

176

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum



Fig. 35. Marasmius haematocephalus (Mont.) Fr. (A. Retnowati 061). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pleurocystidia. – 6. Pileipellis.

the apex, refractive, hyaline, inamyloid, thin-walled. – Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body $8-18 \times 5-10 \ \mu\text{m}$, subcylindrical to clavate, broadly clavate, subglobose or irregular in outline, hyaline to pale tawny, thin- to thick-walled; apical setulae $3-9 \times 0.5-1 \ \mu\text{m}$, cylindrical to conical or wavy, obtuse to subacute, reddish brown, dextrinoid, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae $4-12 \ \mu\text{m}$ diam, cylindrical, smooth, hyaline, weakly dextrinoid, thinwalled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae $3-5 \ \mu\text{m}$ diam, parallel, cylindrical, yellowish brown, weakly dextrinoid, thick-walled (up to $1 \ \mu\text{m}$); medullary hyphae $4-7 \ \mu\text{m}$ diam, parallel, non-gelatinous. – Stipe to subactive, the monomitic is present.

Habit, habitat, and distribution. – Scattered on bamboo leaves or on undetermined dicotyledonous leaves in botanical garden area or in lowland forest with alien plants. Java.

Material examined. – Indonesia: Java, West Java, Bogor Botanical Garden, 12 Jan. 1999, D. E. Desjardin 6921 (BO, SFSU); Bogor, Dungus Iwul Nature Reserve, 26 Dec. 1998, A. Retnowati 061 (SFSU).

This beautiful red to brownish red species with refractive pleurocystidia has been reported on numerous occasions from the New World tropics (Dennis, 1970; Desjardin, 1989; Pegler, 1983; Singer, 1976), Africa (Pegler, 1977; Singer, 1965a), Sri Lanka (Petch, 1948; Pegler, 1986) and more recently from Papua New Guinea (Desjardin & Horak, 1997). Good comparative descriptions can be found in all of these references. The Javanese specimens are micromorphologically indistinguishable from New World material (type from Brazil) and differ only subtly in forming duller red pilei.

 Marasmius hypophaeus Berk. & M. A. Curtis, J. Linn. Soc., Bot. 10: 298. 1869. – Fig. 36: 1–6. Type: Cuba, Wright 129 (FH!).

Pileus 4-12 mm diam, campanulate to convex or obtusely conical when young, expanding to plano-conical or plano-convex in age, with a rugulose, non-papillate disc; margin plicate; surface dull, dry, glabrous to minutely velutinous; at first orange (6B5-8) to deep reddish orange (7B-C7-8; "ferrugineus") overall or with slightly darker disc, fading overall in age to pale orange or greyish orange (6B4), or remaining dark reddish orange, drying dark orangish brown to ferrugineus. - Context thin, white. - Lamellae adnexed to subfree, subdistant to distant (9-15 reaching stipe) with 0-1 series of lamellulae, convex, non-intervenose, non-collariate, moderately broad (1-2 mm), white to buff or pale cream, with pale orange to reddish orange edges. – Stipe $15-35 \times 0.2-1$ mm, central, terete, filiform, glabrous, shiny, sub-insititious, arising from a thin, white subiculum; apex white grading through orange, brownish orange to dark brown at the base, or dark brown to black overall; rhizomorphs absent. -Odor and taste not distinctive.

Basidiospores (12–)14–18.5×3–5 μ m [$\bar{x}_r = 14.0-17.0\times3.5-4.0 \mu$ m, $\bar{x}_m = 15.9 \pm 0.9 \times 3.7 \pm 0.3 \mu$ m, Q = 3.4–5.6, $\bar{q}_r = 4-4.6$, $\bar{q}_m = 4.3 \pm 0.3$, n = 25 spores per 3 specimens], narrowly clavate to fusoid, typically curved in profile, smooth, hyaline, inamyloid, thin-walled. – Basidia 24–29×5.5–7 μ m, clavate, 4-spored. – Basidioles clavate to fusoid. – Cheilocystidia common, of Siccus-type broom cells;



Fig. 36. Marasmius hypophaeus Berk. & M. A. Curtis (A. Retnowati 122). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidioles. – 4. Cheilocystidia. – 5. Pleurocystidia. – 6. Pileipellis.

main body $10-18 \times 4-7 \ \mu$ m, clavate to subclavate, cylindrical, turbinate or irregular in outline, rarely lobed, hyaline to pale tawny, inamyloid; apical setulae $2-8 \times 0.5-1 \ \mu$ m, crowded, cylindrical to conical or irregular in outline, obtuse to subacute, tawny to pale reddish orange, thick-walled. – Pleurocystidia common, $33-49 \times 7.5 10 \ \mu$ m, fusoid to clavate, usually attenuated and strangulate at the apex, rarely forked apically, refractive, hyaline, inamyloid, thinwalled, arising from deep in the subhymenium. – Pileipellis hymeniform, mottled, composed of *Siccus*-type broom cells; main body $7-23 \times 4-8 \ \mu$ m, clavate to subclavate, cylindrical, turbinate or irregular in outline, hyaline to pale yellow, inamyloid, apically thickwalled; apical setulae $4-8 \times 0.5-1 \ \mu$ m, crowded, cylindrical to conical or irregular in outline, seldom branched, obtuse to subacute, tawny to reddish brown, thick-walled. – Pileus trama interwoven. – Lamellar trama regular; hyphae 3–8 µm diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. – Stipe tissue monomitic; cortical hyphae 2–4 µm diam, parallel, cylindrical, hyaline or pale yellow (apex) to dark brown (base), strongly dextrinoid, thick-walled (up to 1 µm); medullary hyphae 4–6 µm diam, cylindrical, hyaline, weakly dextrinoid, thin-walled. – Stipe vesture absent. – Clamp connections present.

Habit, habitat, distribution. – Solitary to scattered or gregarious on monocotyledonous (bamboo) and dicotyledonous leaves or twigs in botanical garden areas. Java.

Material examined. – Indonesia: Java, West Java, Bogor Botanical Garden, 7 Jan. 1998, D. E. Desjardin 6714 (BO, SFSU); same location 12 Jan. 1999, D. E. Desjardin 6920 (BO, SFSU); Java, West Java, Cibodas Botanical Garden, 11 Jan. 1999, A. Retnowati 122 (BO, SFSU).

Marasmius hypophaeus is characterized by a small, plicate, ferrugineus pileus, subdistant lamellae with reddish orange edges, long and narrow basidiospores, hyaline-refractive pleurocystidia, a lack of caulocystidia, and habit on leaf mulch of monocotyledonous and dicotyledonous plants. The species was previously known only from the New World tropics. The Indonesian material differs from previously published descriptions only in forming slightly smaller pilei (4–12 mm diam versus 7–17 mm diam). Marasmius bingaensis Singer, described from Zaire, is very similar, differing in forming a larger (10–21 mm), more brownish pileus, non-marginate lamellae, and a paler stipe (fide Singer, 1965a). The latter species may represent a synonym of a pantropical M. hypophaeus. A watercolor illustration commissioned by van Overeem that possibly represents M. hypophaeus and is labeled "Marasmius # 41" resides in Herbarium Bogoriense.

 Marasmius ferrugineus (Berk.) Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10: 297. 1869. – Fig. 37: 1–6.

 \equiv Agaricus ferrugineus Berk., London J. Bot. 2: 630. 1843 (non Secr., 1833).

= Marasmius paucifolius Murrill, N. Amer. Fl. 9: 262. 1915.

= Marasmius gardneri Singer, Sydowia 12: 114. 1958.

Type: Brazil, Minas Gerais, Gardner (K!).

Pileus 4–10 mm diam, obtusely conical when young, expanding to broadly obtusely conical or convex in age, plicate with a rugose disc; margin crenate-scalloped, slightly upturned in age; surface erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum/



Fig. 37. – Marasmius ferrugineus (Berk.) Berk. & M. A. Curtis (A. Retnowati 130). – 1. Basidiomes. – 2. Basidiospores. – 3. Basidium and basidiole. – 4. Cheilocystidia. – 5. Pleurocystidia. – 6. Pileipellis.

dull, dry, subvelutinous; light orange (5A5) to greyish orange (5B5) overall when young, disc darkening somewhat in age to brownish orange (6C5–6). – Context very thin (<0.5 mm), white. – La-mellae ascending-adnexed to shallowly adnate or subfree, remote (8–10 reaching stipe) with 0–1 series of lamellulae, broad, pale pinkish white or orangish white (5A2), non-marginate. – Stipe 15– 40×0.3 –0.5 mm, central, terete, equal, wiry, glabrous, shiny, non-institutious, arising from a peachy-buff subiculum that covers the substrate; dark brown to black overall. – Odor and taste not distinctive.

Basidiospores $15-19.5 \times 3-5 \ \mu m \ [\bar{x}_r = 16.5-17.5 \times 3.4-4.5 \ \mu m, -\bar{x}_m = 17.0 \pm 0.5 \times 4.0 \pm 0.3 \ \mu m, Q = 3.2-5.6, \ \bar{q}_r = 4-5, \ \bar{q}_m = 4.4 \pm 0.5, n = 25 \ \text{spores per 2 specimensl}, \ fusoid to elongate-cylindrical, often curved in outline, smooth, hyaline, inamyloid, thin-walled. - Basidia 26.5-36 \times 6-9 \ \mu m, \ clavate, 4-spored. - Basidioles <math>17-30 \times 6-7 \ \mu m, \ clavate$ to fusoid. - Cheilocystidia common, of Siccus-type broom cells; main body $10-20 \times 5-9 \ \mu m, \ cylindrical to \ clavate, \ clava$

broadly clavate, turbinate or irregular in outline, hyaline, apically thick-walled; apical setulae $2-12 \times 0.5-1$ µm, crowded, cylindrical to conical or irregular in outline, obtuse to subacute, hyaline to pale yellowish brown, inamyloid, thin- to thick-walled. - Pleurocystidia uncommon, $27.5-76 \times 7-9$ µm, clavate to fusoid, usually attenuated and strangulate at the apex, refractive, hvaline, inamyloid, thin-walled, arising from deep in the subhymenium. - Pileipellis hymeniform, not mottled, composed of *Siccus*-type broom cells; main body $7-20 \times 5-11$ µm, clavate to broadly clavate, cylindrical, turbinate or irregular in outline, hvaline, apically thick-walled; apical setulae $2-7 \times 0.5-1$ µm, crowded, cylindrical to conical or irregular in outline, obtuse to subacute, hyaline to pale orange or tawny, thin- to thick-walled. - Pileus trama interwoven. - Lamellar trama regular; hyphae 3-7 µm diam, cylindrical, smooth, hyaline, dextrinoid, thin-walled, non-gelatinous. - Stipe tissue monomitic; cortical hyphae 3-8 diam, parallel, cylindrical, hyaline to brownish yellow, dextrinoid, thin- to thick-walled; medullary hyphae 4-7 µm diam, cylindrical, hyaline, weakly dextrinoid, thinwalled. - Stipe vesture absent. - Clamp connections present.

Habit, habitat, and distribution. – Scattered to gregarious on undetermined dicotyledonous leaves and twigs under *Ficus* in montane rainforest. Bali.

Material examined. – Indonesia: Bali, Bedugul Botanical Garden, trail to Mt. Pohen, 17 Jan. 1998, D. E. Desjardin 6805 (BO, SFSU); same location, 14 Jan. 1999, A. Retnowati 130 (SFSU).

Our Balinese material appears to represent a pallid form of *M. ferrugineus*. This species was described as having a bright ferrugineus-fulvous pileus (Singer, 1976; Pegler, 1977 [*ut M. gardneri* Singer], 1983), whereas the Bali specimens were greyish orange to pale brownish orange. In all taxonomically important micromorphological features, the Bali specimens are indistinguishable from South American material (Holotype, K!). The paler pileus and non-marginate lamellae distinguish Balinese *M. ferrugineus* from *M. hypophaeus*. *Marasmius bambusinus* (Fr.) Fr. appears nearly indistinguishable from *M. ferrugineus*, but differs in apparently being restricted to growth on bamboo debris (*fide* Singer, 1976).

Excluded and insufficiently known taxa

Macromorphological descriptions within quotation marks are direct translations from the Latin protologues, including additional data translated from the accompanying commentaries.

Marasmius acuminatus Henn., Monsunia I: 150. 1900.

"Pileus thin-membranous, tough, at first conic-acuminate, becoming broadly convex, center papillate-acuminate, radiate-striate, subsulcate, pale yellow, 5–9 mm diam; stipe fistulose, tough, terete, smooth, glabrous, base slightly thickened, subdisciform, ca. 1–1.5 cm long, 1 mm thick, yellow; lamellae adnate-decurrent, distant, of unequal length, narrow with attenuated margin, pale yellow; cystidia lageniform, $60-65 \times 18-20$ µm; basidia $30-35 \times 8-11$ µm, spores ovoid to ellipsoid, smooth, hyaline, $7-8 \times 4-5$ µm. Java, Cibodas, on wood, 24 Jun. 1898 (M. Fleischer)." Type not extant.

The following features suggest that M. acuminatus represents a species of Mycena: a) conic-acuminate, striate, yellow pileus; b) decurrent, pale yellow lamellae; and c) a glabrous, fistulose, yellow stipe with a slightly thickened base. We have collected a species of Mycena from Cibodas that matches the protologue, and the epithet will be neotypified with this material in a subsequent publication.

Marasmius bambusinus (Fr.) Fr., Epicr. Syst. Mycol.: 385. 1838.

= Agaricus bambusinus Fr., Linnaea 5: 507. 1830.

Type: Brazil, Beyrich. Type not extant.

Marasmius bambusinus (Fr.) Fr. was reported from Java by Moritzi (1845–1846) and Zollinger (1854). We have not yet found this member of sect. *Sicci* ser. *Haematocephali* in Java. It is possible that the material reported as *M. bambusinus* represents *M. hypophaeus* or *M. ferrugineus* described above.

Marasmius calopodioides Henn., Monsunia 1: 151. 1900.

"Pileus thin-membranous, campanulate, center depressed, dark brownish violaceous, margin striate, pale brown to sublilac, 1–1.5 cm diam; stipe stuffed, terete, equal, smooth, glabrous, pale brown, 1– 2 cm long, 1 mm thick; lamellae adnate, of unequal length, narrow, subdistant, pale; spores not at all conspicuous. Java, Cibodas, on branches, 5 Jul. 1898 (M. Fleischer)." Type not extant.

Marasmius calopodioides may represent a *Marasmius* or a *My-cena*. Features presented in the protologue, such as a dark brownish violaceous pileus and a stuffed stipe are suggestive of *Mycena*. We have not yet collected material matching the protologue.

Marasmius campanella Holterm., Mykol. Unters. Tropen: 105. 1898.

Marasmius campanella was reported by Hennings (1900) and van Overeem & van Overeem-de Haas (1922) from Java. There is a question concerning the type locality of *M. campanella* since Holterman (1898) did not cite a location. Petch (1948) noted that the type probably came from Peradeniya, Sri Lanka. It should be noted, however, that two Sri Lankan specimens identified by Petch as *M. campanella* (Petch 4171 [Peradeniya] and Petch 4122 [Hakgala], both FH!) represent *M. isabellinus* Pat. and a *Marasmiellus* sp., respectively (Desjardin, unpublished data). Pegler (1986) placed *M. campanella* in synonymy with *M. tenuissimus* (Jungh.) Singer, a species described from Java, although there is no indication that Pegler examined the type specimen of *M. campanella*. Apparently no authors since Holterman have studied the type specimen, possibly because it no longer exists. For the moment, *Marasmius campanella* must remain a *nomen dubium*.

Marasmius caryotae (Berk.) Petch, Ann. Roy. Bot. Gard. (Peradeniya) 4: 403. 1910.

= Heliomyces caryote Berk., Hooker's J. Bot. Kew Gard. Misc. 6: 491. 1847.

Type: Sri Lanka, Kandy District, Peradeniya, on fallen flowers of *Caryota urens*, Jun. 1844, Gardner 3 cum icone (K).

Marasmius caryotae, originally described from material growing in grasslands in Sri Lanka, was reported from the Krakatau island group near Java by Boedijn (1940). This species belongs in sect. *Globulares*. A painting labeled "Marasmius # 1556" that resides in Herbarium Bogoriense shows a yellow to greenish yellow taxon with long basidiospores and a *Globulares*-type pileipellis. This may represent *M. caryotae* as it occurs in Java, however, we have not collected this taxon nor seen herbarium specimens that match *M. caryotae*.

Marasmius cepaestipes Henn. & E. Nyman, Monsunia I: 151. 1900.

"Pileus membranous, campanulate, white, smooth, glabrous, subpapillate, ca. 3 cm diam; stipe subfistulose, terete, tough, pale yellow, smooth, 4 cm long, 1.5 mm thick, base bulbous, 7–8 mm thick; lamellae attached to a free collarium, subclose, broadly ventricose, white; spores ellipsoid to ovoid, hyaline, $7-9 \times 4-7$ µm. Java, Bogor Botanical Garden, on the ground (E. Nyman)." Type not extant.

The features presented in the protologue do not indicate that the taxon belongs in *Marasmius*. The combination of large (30 mm diam), campanulate-subpapillate, white pileus, close, broad, white lamellae, and pale yellow, glabrous, bulbous stipe growing caespitose on the ground suggests *Trogia*, *Hydropus*, or possibly even *Termito-myces* (if the pseudorhiza unobserved or broken off). We have not observed such a taxon growing in the Bogor Botanical Garden, and without material that matches the protologue, the epithet must remain a *nomen dubium*.

Marasmius cylindraceocampanulatus Henn., Monsunia I: 151. 1900.

"Pileus thin-membranous, cylindrical, campanulate, center umbilicate, furfuraceous-squamulose, margin striate to sulcate, pale yellowish brown, 3–4 mm broad; stipe fistulose, wiry, horny, brown, smooth, glabrous, 15–20 mm long, 0.5 mm thick; lamellae 2 mm broad, arcuate-decurrent, margin attenuated, yellowish brown; spores not observed. Java, Cibodas, on dead branches (M. Fleischer)." Type not extant.

All specimens that we have seen that match the protologue and have been determined by others as *M. cylindraceocampanulatus* represent a species of *Mycena*. In addition, we have collected material from the type locality at Cibodas that matches the protologue and belongs in *Mycena*. The material reported as *M. cylindraceocampanulatus* by Horak (1983) from Papua New Guinea belongs in *Mycena* (ZT!). We have not seen the Petch specimen from Sri Lanka reported by Pegler (1986) as *M. cylindraceocampanulatus* and placed by him in sect. *Sicci*. We feel confident, however, in accepting the Javanese *M. cylindraceocampanulatus* in the genus *Mycena*. A formal transfer will be made elsewhere.

Marasmius depressus (Lév.) Sacc., Syll. Fung. 5: 537. 1887.

 \equiv Agaricus (Mycena) depressus Lév., Ann. Sci. Nat. Bot., ser. 3, 5: 114. 1846. "Basidiomes small, pileus membranous, convex, depressed, sulcate, tomentose, dark brown (fuscus), 4–5 mm broad; lamellae broad, adnate, rounded, concolorous; stipe curved, cylindrical, glabrous, pale, base slightly thickened, white tomentose. Java, Tjikoya, on fallen branches (Zollinger)."

The combination of small, convex-depressed, sulcate dark brown pileus covered with brown tomentum, broad and dark, adnate lamellae, and a long ("la longueur de celui-ci est d'un décimetre"), glabrous, pallid stipe with white basal tomentum as described for *M. depressus* does not readily suggest placement in *Marasmius*. The pileus features suggest placement in *Crinipellis*, whereas the stipe features suggest *Mycena* as proposed by Léveillé. Until material from Tjikoya that matches the protologue is recollected, the epithet must remain a *nomen dubium*.

Marasmius fleischerianus Henn., Monsunia I: 150. 1900.

"Pileus thin-membranous, translucent, campanulate, center depressed to umbilicate, margin striate to subplicate, pale reddish brown, 2–3 cm diam; stipe subfistulose, tough, substriate, curved, reddish brown, 2.5–3 cm long, 1.5–2 mm thick, base thickened; lamellae adnate, scarcely decurrent, of unequal lengths, subdistant, both sides attenuated, narrow, pale yellow; spores ellipsoid, hyaline $4.5-5.5\times3-3.5$ µm. Java, Cibodas, on branches, 11 Jul. 1898 (M. Fleischer)." Type not extant.

Key features of M. fleischerianus include a broad (20–30 mm diam), striate, pellucid, reddish brown pileus, subdistant, adnate to subdecurrent, pale yellow lamellae, a relatively short (25–30 mm long), substriate, reddish brown stipe, and a growth on branches from Cibodas, Java. It is possible that this species represents one of the reddish brown members of sect. Sicci, but the limited details provided in the protologue (specifically an absence of micro-morphological data) are insufficient to determine the species with confidence. The epithet M. fleischerianus will remain a nomen dubium.

Marasmius fuscatus (Lév.) Sacc., Syll. Fung. 5: 526. 1887.

= Agaricus fuscatus Lév., Ann. Sci. Nat. Bot., ser. 3, 2: 169. 1844.

"Pileus dark brown (fuscus), fleshy, depressed, glabrous, striate, undulate; lamellae distant, acute, adnate; stipe stuffed, pruinose, attenuate from apex to the base. Pileus 6–8 mm diameter; *aff. Agaricus vaillantii.* Java, on tree trunks (Korthals)."

Details provided in the protologue of *M. fuscatus* suggest a number of possible genera, including *Marasmius*, *Marasmiellus*, and *Mycena*. No lamellae or stipe color was reported, nor were stipe size, characteristics of the attachment of the stipe to the substrate, or micromorphological data provided. With so many small, reddishbrown, lignicolous agarics with pruinose stipes in Java, it is impossible to determine with assurance which of these taxa represents *M. fuscatus*. The epithet will therefore remain a *nomen dubium*.

Marasmius helvelloides Henn. & E. Nyman, Monsunia I: 15. 1900.

"Pileus membranous-fleshy, campanulate, center obtusely rounded, smooth, glabrous, pale brown, shallowly radiate-plicate towards the margin, crispate, obscurely striate, undulate-lobed, 4–6 cm diam; stipe fistulose, cylindrical, apex sometimes clavate, brown, striate, 4–8 cm long, 4–8 mm thick; lamellae adnate to subdecurrent, pallid to yellowish white, broad, ventricose; basidia clavate; spores ellipsoid, $4-5 \times 3-4$ µm, hyaline. Java, Bogor Botanical Garden, on the ground, 15 Apr. 1898 (E. Nyman)." Type not extant.

Details provided in the protologue of *M. helvelloides* suggest that it may belong in the genera *Marasmius* or *Gymnopus*, although Hennings' (1900) comment that the shape of the fungus recalls *Helvella lacunosa* may suggest that the type material represented ab-

normally developed or parasitized basidiomes. Van Overeem (1927) believed the taxon was distinct from Marasmius and he erected the genus Protomarasmius Overeem based on the single species P. helvelloides (Henn. & E. Nyman) Overeem. A watercolor illustration and line drawings labeled "Protomarasmius # 1593" and commissioned by van Overeem resides at Herbarium Bogoriense. The basidiomes illustrated match the protologue quite nicely except for the pileus being yellowish brown to ochraceous (versus "pallide brunneo"). Line drawings at the periphery of the color illustration show small elongate-ellipsoid basidiospores, clavate to fusoid basidioles, a 4-spored basidium, and a hymeniform pileipellis composed of small, broadly clavate cells. The species illustrated is a *Marasmius* in sect. Globulares. If the specimen illustrated by van Overeem and labeled Protomarasmius is the same as Hennings' and Nyman's fungus, then M. helvelloides belongs in sect. Globulares. We have not vet seen fresh material of this interesting species.

Marasmius moritzianus (Lév.) Sacc., Syll. Fung. 5: 513. 1887.

= Agaricus moritzianus Lév., Ann. Sci. Nat. Bot., ser. 3, 5: 114. 1846.

"Pileus membranous, discoid, striate, glabrous, 2–3 cm diam, dark brown (fuscus); lamellae obscurely grey, distant, acutely adnate; stipe thin, glabrous, separating from pileus; *aff. Agaricus sumatrensis* Lév. Java (Zollinger #2072)." Type not extant.

The protologue does not provide enough taxonomically important data to determine taxonomic placement of *M. moritzianus*. The dark brown, glabrous, striate pileus, distant, acutely adnate, grey lamellae, and thin, glabrous stipe are suggestive of species belonging in the genera *Marasmius*, *Mycena*, *Trogia*, *Micropsalliota*, and possibly others. Without micromorphological data or a type specimen to analyze, the epithet must remain a *nomen dubium*.

Marasmius nymanianus Henn., Monsunia I: 150. 1900.

"Pileus thin-membranous, tough, sublateral to eccentric, convex-conchate, sometimes resupinate, 1–1.5 cm in diam, yellowish white, rugose-reticulate, crispate; stipe eccentric, curved, dark brown, cartilaginous, ca. 2 mm long, 1 mm thick; lamellae adnate, distant (6–10), broad, venose-anastomosing, white; spores subellipsoid, hyaline to pale yellow, $6-8\times4~\mu$ m. Java, Bogor Botanical Garden, on dead branches, 8 Mar. 1898 (E. Nyman)." Type not extant.

A white to yellow, rugulose-reticulate pileus, venose-anastomosing lamellae, and an eccentric to sublateral, dark brown, very short stipe suggest that *M. nymanianus* fits best in the genus *Marasmiellus* or possibly in *Campanella*.

Marasmius pangerangensis Henn., Monsunia I: 150. 1900.

"Pileus thin-membranous, tough, eccentric with a short stipe, flabelliform, undulate-crispate, rugulose-sulcate, flesh pallescent, 2– 3 cm broad, 1–2 cm long; stipe lateral, 2–3 mm long, thick, curved, pale, subvelutinous; lamellae sinuate-adnate, subdistant, broadly ventricose and crispate, venose-anastomosing, of unequal lengths, pallid; spores ovoid to subglobose, hyaline, $6-8 \times 4-5$ µm; basidia clavate $30 \times 4-6$ µm. Java, Pangerango forest, on dead branches, 18 Jul. 1898 (M. Fleischer)." Type not extant.

A whitish (pallescent), flabelliform, rugulose-sulcate pileus, venose-anastomosing lamellae, and a short, excentric, pale, subvelutinous stipe suggest that *M. pangerangensis* belongs in the genus *Marasmiellus*. We have collected a *Marasmiellus* from Cibodas Botanical Garden adjacent to Mt. Pangerango National Park that matches the protologue. Neotypification and a formal transfer to *Marasmiellus* will be published in a subsequent paper.

Marasmius papyraceus Massee, Kew Bull. 10: 358. 1914.

"Pileus membranous, dry, convex to hemispherical-depressed, umbilicate, sulcate, white, glabrous, 3–4 cm diam; lamellae crowded, narrow, emarginate-uncinate, white, edges even; stipe solid, equal, brown at the base, white at the apex; spores ellipsoid, hyaline, 8×4 – 5 µm. Singapore, growing on wood, E. M. Burkill 121. Growing in small clusters. Pileus very thin, dry, and papery, coarsely sulcate. Allied to *Marasmius hyperellus* Fr."

Boedijn (1940) reported *M. papyraceus* from Krakatau island with some uncertainty; no description was provided. The species was originally described from material collected in the Singapore Botanical Garden and was recently redescribed by Corner (1996) from topotypical material. Corner's description indicates that the species belongs in sect. *Globulares. Marasmius zandbaiensis* Henn. & E. Nyman, described from Java in 1900 (see below) is probably conspecific, but the oldest name for the taxon is most likely *M. pellucidus* Berk. & Broome (1875).

Marasmius parvulus (Lév.) Sacc., Syll. Fung. 5: 526. 1887 (nom. illeg.: non Marasmius parvulus Berk. & M. A. Curtis, Proc. Amer. Acad. Sci. 4: 120. 1860.)

= Agaricus parvulus Lév., Ann. Sci. Nat. Bot., sér. 3, 2: 168. 1844.

"Pileus membranous, glabrous, smooth, fuscescent, 4–6 mm diam; lamellae distant, few, rounded-adnate; stipe stuffed, fibrous, glabrous, fuscescent, black at the base. Java, on wood, *Agaricus* no. 2, Korthals." Type not extant. The small, smooth, fuscescent pileus, distant, adnate, and presumably non-collariate lamellae, and a glabrous, fuscescent, lignicolous stipe with black base are features more suggestive of several *Mycena* species that occur in Java than of a *Marasmius*. The species was undoubtedly described from a dried specimen, and whether the colors reported reflect those of fresh or dried specimens is unknown, although we suspect that the basidiome colors were determined from dried material. Not enough data were provided in the protologue to determine taxonomic placement with confidence, and hence, the epithet must remain a *nomen dubium*.

Marasmius parvulus (Lév.) Sacc. (1887) is a homonym of M. parvulus Berk. & M.A. Curtis. The transfer of Agaricus parvulus Lév. into Marasmius is therefore illegitimate. It should be noted also that M. parvulus Manimohan & Leelavathy [Trans. Brit. Mycol. Soc. 88 (3): 422.1987] represents another homonym.

Marasmius ramentaceus (Pat.) Sacc. & Trav., Syll. Fung. 20: 21. 1911.

= Androsaceus ramentaceus Pat. Ann. Jard. Bot. Buitenzorg 1: 107. 1897.

We accept Marasmius ramentaceus as described by Patouillard (ut Androsaceus, 1897) and based on specimen no. 276 collected at Depok, Java, as a synonym of *M. crinisequi* Mueller ex Kalchbr. (1880). Directly below the epithet "Androsaceus ramentaceus Pat." in the protologue, Patouillard (1897) cites: "Agaricus ramentaceus Berk. sec. Lév. ap. Zoll. 16; HZ no. 1144." Furthermore, Agaricus ramentaceus was reported from Java by Moritzi (1845–1846). We cannot find a citation for Agaricus ramentaceus Berk., but if one was published it would have been a homonym of Agaricus ramentaceus Bull. apud Ventenant [Hist. Champ.: 640. 1791, sanctioned by Fries, Syst. Mycol 1: 25. 1821].

Marasmius rufescens Berk. & Broome, J. Linn. Soc. Bot. 14: 41. 1873.

"Entirely rufescent; pileus suborbicular, glabrous, 0.75–1 inch broad; stipe short, 1–1.5 line high, cylindrical, glabrous; lamellae few, reticulate. Sri Lanka, Peradeniya, Jul. – Dec." (K).

Marasmius rufescens was reported from Krakatau island by Boedijn (1940). It is accepted by Pegler (1986) as a synonym of *M. tenuissimus* (Jungh.) Singer. See below for further commentary.

Marasmius sacchari Wakker, Centralb. Bakteriol., 2. Abth. 1: 44. 1896.

Description translated from Saccardo, Syll. Fung. 14: 115. 1899.

"Gregarious, with fasciculate base, variable, fleshy-membranous, persistent; pileus white, broadly campanulate, sordid white and plane to cupulate in age, 15 mm diam; lamellae white, simple or forked; stipe central, white, 15 mm long, apex tubiform, base villose; hyphae white, spores hyaline, smooth, irregularly oblong, attenuate on both side, rounded; $16-20 \times 4-5$ µm. Java, parasitic on stems of living sugar cane (*Saccharifera officinalis* Stokes)." Type not extant.

A white, broadly campanulate to plano-cupulate pileus, white and often forked lamellae, a short, white stipe with villose base, long basidiospores, and fasiculate growth on stems of sugar cane are features that suggest that *M. sacchari* is better placed in the genus *Marasmiellus*. It is apparently allied with other sugar cane parasites in sect. *Marasmiellus*, subsect. *Inodermini*, such as *M. troyanus* (Murrill) Dennis and *M. semiustus* (Berk. & M.A. Curtis) Singer. New material collected from Java on sugar cane must be examined before a definitive determination can be made.

Marasmius sclerophorus (Lév.) Sacc., Syll. Fung. 5: 547. 1887.

= Agaricus sclerophorus Lév., Ann. Sci. Nat. Bot., sér. 3, 2: 170. 1844.

"Pileus membranous, elastic, infundibuliform, substriate, fulvous; lamellae thick, bifid, ferrugineus, acutely adnate; stipe filiform, glabrous, becoming black; arising from a grey sclerotium. Java, *Agaricus sclerophorus*, Korthals mss."

This species is described as having a reddish cinnamon brown pileus, thick, ferrugineous lamellae, and a black stipe that rise from a grey sclerotium. In combination, these features suggests that *M. sclerophorus* belongs among the sclerotium-forming members of the genus *Hypholoma*.

Marasmius similis Berk. & M. A. Curtis, Hooker's J. Bot. Kew Gard. Misc. 1: 100. 1849.

Type: USA, South Carolina, Curtis 1319 (K!).

Marasmius similis was reported from Java by van Overeem & van Overeem-de Haas (1922). This species was originally described from material collected in South Carolina, USA, and it belongs in sect. *Sicci* ser. *Leonini* (Holotype: K!). We have been unable to locate van Overeem's specimen(s) annotated as *M. similis*, and we have not seen other Indonesian specimens that match *M. similis*.

Marasmius tenuissimus (Jungh.) Singer, Fl. Neotrop. Monogr. 17: 258. 1976.

- ≡ Agaricus tenuissimus Jungh., Verh. Batav. Genootsch. Kunsten 17: 84. 1838. (nom. illeg.: non Agaricus tenuissimus Schwein., Schriften Naturf. Ges. Leipzig 1: 64. 1822.)
- = Marasmius rufescens Berk. & Broome, J. Linn. Soc., Bot. 14: 41. 1873.
 - ≡ Marasmius campanella var. rufescens (Berk. & Br.) Petch apud Petch & Bisby, Peradeniya Monogr. 6: 59. 1950.
- = Xerotus tener Berk. & Broome, J. Linn. Soc., Bot. 14: 45. 1873.

Marasmius campanella Holterm., Mycol. Unters. Tropen: 105. 1898.
Type: Java, Kebo Koening (L).

Marasmius tenuissimus was described from Kebo Koening, Java. It has been placed in sect. Neosessiles by Singer (1976) and accepted there by Pegler (1986). We consider the section to be artificial and place the species in sect. Sicci ser. Leonini. We have not yet encountered material of M. tenuissimus in Java and will wait until fresh material is located before adding the species to the key.

Agaricus tenuissimus Jungh., published in 1838 is a homonym of *A. tenuissimus* Schwein. and is therefore illegitimate. Singer's (1976) transfer into *Marasmius*, based on Junghuhn's type specimen is invalid. A new name, or same name but based on a different Javanese specimen, is needed for this interesting, apparently widespread species.

Marasmius tenuissimus v. major

Zollinger (1844) and Overeem (1922) reported M. *tenuissimus* var. *major* Jungh. from Java. We have been unable to find a citation for such a taxon, and accordingly, we can make no taxonomic inferences.

Marasmius trichophorus (Zippel & Lév.) Sacc., Syll. Fung. 5: 558. 1887.

≡ Agaricus trichophorus Zippel & Lév., Ann. Sci. Nat. Bot., sér. 3, 2: 171. 1844.

"White, pileus membranous, pellucid, convex to plane, covered with long hairs; lamellae thin, acutely adnate; stipe filiform, glabrous, ca 20 mm tall; *aff. Marasmius hudsonii.* Java, on bark."

The white, pellucid, convex pileus with long hairs, acutely adnate, white lamellae, filiform, glabrous, white stipe and growth on wood suggest *M. trichophorus* belongs either in *Mycena* near *M. longiseta* Höhn., or in *Hemimycena* near *H. hirsuta* (Tode) Singer.

Marasmius venosus Henn. & E. Nyman, Monsunia I: 151. 1900.

"Pileus thin-membranous, pellucid, campanulate, umbilicate, venose-sulcate, reddish brown, ca. 2–3 cm diam; stipe fistulose, horny, setiform, dark brown, smooth, glabrous, drying contorted, 5–6 cm long, 1–1.5 mm thick; lamellae vein-like, collariate-adnate, narrow, anastomosing, yellowish brown; spores ellipsoid, hyaline, $4-5 \times 3-4 \mu$ m. Java, Bogor Botanical Garden, on dead branches, 3 Mar. 1898 (E. Nyman)." Type not extant.

Marasmius venosus probably belongs in sect. Sicci where it shows affinities to M. cladophyllus Berk. The latter species, including M. cladophyllus var. tjibodensis described herein, differs from M. venosus in forming smooth to weakly striate pilei, pruinose stipes, and much longer basidiospores. Van Overeem (1927) based the monotypic genus Hymenomarasmius on H. venosus (Henn. & E. Nyman) Overeem.

Marasmius zandbaiensis Henn. & E. Nyman, Monsunia I: 150. 1900.

"Pileus thin-membranous, pellucid, campanulate, moderately depressed, glabrous, margin plicate to sulcate, white, opaque, 2.5–3.5 cm diam; stipe fistulose, horny, smooth, glabrous, pale brown at the apex, chestnut colored at the base, silky, base with a white-to-mentose disc, 5–7 cm long, 1.5–2.5 mm thick; lamellae sinuate-ad-nexed, subdistant, white, narrow, of unequal lengths; spores not observed. Java, Zandbai, with *Baringtonia*, on the ground, 8 Dec. 1897 (E. Nyman)." Type not extant.

The large white, plicate pileus, narrow, white, subdistant lamellae, and tough, glabrous, pale brown to chesnut brown stipe with white basal tomentum suggest that *M. zandbaiensis* belongs in sect. *Globulares*. The protologue is suggestive of *M. papyraceus* and *M. pellucidus*. Until Javanese specimens become available for study, we cannot confirm the taxonomic placement of *M. zandbaiensis*.

Acknowledgments

We are most grateful to our Indonesian sponsor Dr. Mien Rifai, and to Lembaga Ilmu Pengetahuan Indonesia (LIPI – Indonesian Institute of Sciences) and Pusat Penelitian Dan Pengembangan Biologi (PPPB) for facilitating acquisition of research and collecting permits for Indonesia. This research was funded in part by NSF grant #DEB-9705083 to D.E. Desjardin and E. Horak, and by a scholarship from the Mycological Society of San Francisco to A. Retnowati. A. Retnowati was also funded in part by the GEF–Biodiversity Collections Project grant TF-028657 administered by LIPI, Bogor. The authors are grateful to Mrs A. Tanner (Herbaria Zurich, Switzerland) for editorial help and processing specimens of Marasmius.

References

Berkeley, M. J. (1860). Fungi. pp 241–282. – In : Hooker, J. D., Flora Tasmaniae 2: 1–422.

Berkeley, J. M & C. E. Broome. (1875). Enumeration of the fungi of Ceylon. Part 2. – J. Linn. Soc., Bot. 14: 29–140.

Boedijn, K. B. (1940). Mycetozoa, fungi, and lichenes of the Krakatau Group. – Bull. Jard. Bot. Buitenzorg, sér. 3, 16: 396–412.

Corner, E. J. H. (1996). The agaric genera Marasmius, Chaetocalathus, Crinipellis, Heimiomyces, Resupinatus, Xerula, and Xerulina in Malesia. – Beih. Nova Hedwigia 111: 1–175.

Dennis, R. W. G. (1951). Some Agaricaceae of Trinidad and Venezuela. Leucosporae: Part 1. – Trans. Brit. Mycol. Soc. 34: 411–482.

— (1970). Fungus flora of Venezuela and adjacent countries. – Kew Bull. Add. Ser. 3: 1–531. Desjardin, D. E. (1989). The Genus Marasmius from the Southern Appalachian Mountains. PhD. dissertation. – University of Tennessee, Knoxville. 880 p.

- & E. Horak (1997). Marasmius and Gloiocephala in South Pacific Region: Papua New Guinea, New Caledonia, and New Zealand Taxa. – Biblio. Mycol. 168: 1–152.
- & R. H. Petersen (1989). Studies on *Marasmius* from eastern North America. I. *Marasmius straminipes* and a new variety. – Mem. New York Bot. Gard. 49: 181–186.

Hennings, P. (1895). Fungi Camerunenses. I. - Bot. Jahrb. Syst. 22: 72-111.

(1900). Fungi monsunenses. – Monsunia 1: 15–16; 1: 150–151.

Holterman, C. (1898). Mykologische Untersuchungen aus den Tropen. – Berlin. 122 p.

Horak, E. (1983). Mycogeography in the South Pacific region: Agaricales, Boletales. In: Pirozynski (Ed.). Pacific mycogeography: a preliminary approach. – Austr. J. Bot., Suppl. Ser. 10: 1–41.

Kalchbrenner, K. (1880). Fungi of Australia. 1. Basidiomycetes. – Grevillea 8: 151–154.

Kornerup, A. & J. H. Wanscher (1978). Methuen handbook of colour. 3rd. Ed. – Eyre Methuen, London. 252 p.

- Léveillé, J. H. (1844). Champignons exotiques. Ann. Sci. Nat. Bot., sér. 3, 2: 167– 221.
- (1846). Description des Champignons de l'Herbier du Muséum de Paris. Ann. Sci. Nat. Bot., sér. 3, 5: 111–167.

Moritzi, A. (1845–1846). Verzeichnis der von H. Zollinger in den Jahren 1842–1844 auf Java gesammelten Pflanzen. – Solothurn. 144 p.

- Overeem, C. van (1927). Fungi. In: Heyne, K. (ed.). De Nuttige Planten van Nederlandsch Indië. Hoofd van Het Mus. Econ. – Bot. Buitenzorg 1: 1–732.
- & D. van Overeem-de Haas (1922). Verzeichnis der in Niederländisch Ost-Indien bis dem Jahre 1920 gefundenen Myxomycetes, Fungi, und Lichens. – Bull. Jard. Bot. Buitenzorg, sér. 3, 4: 1–146.
- Patouillard, N. (1897). Enumération des champignons récoltés à Java par M. Massart. – Ann. Jard. Bot. Buitenzorg, Suppl. 1: 107–126.
- Pegler, D. N. (1977). A preliminary agaric flora of East Africa. Kew Bull. Add. Ser. 6: 1–615.

— (1983). Agarics flora of the Lesser Antilles. – Kew Bull. Add. Ser. 9: 1–668.

— (1986). Agarics flora of Sri Lanka. – Kew Bull. Add. Ser. 12: 1–5(19.

Petch, T. (1948). A revision of Ceylon Marasmii. – Trans. Brit. Mycol. Soc. 31: 19– 44.

Ridgway, R. (1912). Color standards and color nomenclature. Publ. by the author. – Washington, D.C. 43 pp., 53 pl.

Saccardo, P. A. (1887). Sylloge Fungorum. V. Hymenomyceteae.

- Singer, R. (1965a). Marasmius. In: Flore Iconographique des Champignons du Congo, Fasc. 14: 253–278. Planches XLIV–XLVI. Jardin Botanique de l'Etat, Ministère de l'Agriculture, Bruxelles.
- (1965b). Monographic studies on South American Basidiomycetes, especially those of the east slope of the Andes and Brazil. 2. The genus *Marasmius* in South America. – Sydowia 18: 106–358.
- (1969). Mycoflora Australis. Beih. Nova Hedwigia 29: 1–405.
- (1976). Marasmieae (Basidiomycetes-Tricholomataceae). Fl. Neotrop. Monogr. 17: 1–347.
- (1986). The Agaricales in modern taxonomy. 4th. Ed. Koeltz Scientific Books, Federal Republic of Germany. 981 p.
- Zollinger, H. (1844). Observationes phytogeographicae praecipue genera et species nova nonnulla. Natuur Geneesk. – Arch. Ned. Indie, D 1. 1: 372–405.

erlag Ferdinand Berger & Söhne Ges.m.b.H., Horn, Austria, download unter www.biologiezentrum

— (1854). Systematisches Verzeichnis der im indischen Archipel in den Jahren 1842–1848 gesammelten sowie aus Japan empfangenen Pflanzen. – Zürich. 160 p.

(Manuscript accepted 3rd July 2000)