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## A redescription of *Marasmius pellucidus*, a species widespread in South Asia

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*Marasmius pellucidus* is redescribed from analyses of type specimens and recently collected material from South Asia. It is illustrated and compared with numerous allied taxa from Africa and South America. *Marasmius papyraceus* and *Cantharellus elegans* are accepted as synonyms.

**Key words:** Basidiomycetes, fungi, taxonomy.

### Introduction

*Marasmius pellucidus* forms relatively large basidiomes with white, paper-thin, translucent-striate pilei, close to distant, very narrow and intervenose lamellae, and cespitose stipes that are white at the apex and reddish brown to brown at the base. This striking species is widespread throughout South Asia, from Sri Lanka eastward to New Caledonia, and from Java northward to Thailand. It has been given several names during its taxonomic history, and this paper presents our interpretation of the oldest, valid name for the taxon, based on analyses of type specimens and abundant recently collected

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material. An accounting of the convoluted taxonomic history of the species is provided, and it is compared with allied species from Africa and South America.

Colour terms and notations in parentheses are those of Kornerup and Wanscher (1978). All measurements and colours 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 stipe to the pileus margin 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 ( $\pm$  standard deviation) for  $n$  spores measured in a single specimen;  $x_{mr}$ , the range of spore means, and  $x_{mm}$ , 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;  $Q_m$ , the mean of  $Q$ -values in a single specimen;  $Q_{mr}$ , the range of  $Q_m$  values and  $Q_{mm}$ , the mean of  $Q_m$  values where more than one specimen is available. Specimens are deposited in SFSU, BO, and at the Mushroom Research Centre, Chiang Mai, Thailand (herein designated MRCTH).

## Taxonomy

*Marasmius pellucidus* Berk. & Broome, J. Linn. Soc., Bot. 14: 35, 1875.

(Figs. 1-18)

Synonyms:

*Cantharellus elegans* Berk. & Broome, J. Linn. Soc., Bot. 14: 33, 1875.

*Marasmius papyraceus* Masee, Bull. Misc. Inform. 10: 358, 1914.

Misapplied Names:

*Marasmius congregatus sensu* Petch, Trans. British Mycol. Soc. 31: 22, 1948 [non *Marasmius congregatus* Mont., Ann. Sci. Nat. Bot. 4: 113, 1854].

Possible Synonyms:

*Marasmius zandbaiensis* Henn. & E. Nyman, Monunia 1: 150, 1900.

*Marasmius papyraceus* var. *limonicolor* Corner, Beih. Nova Hedwigia 111: 85, 1996.

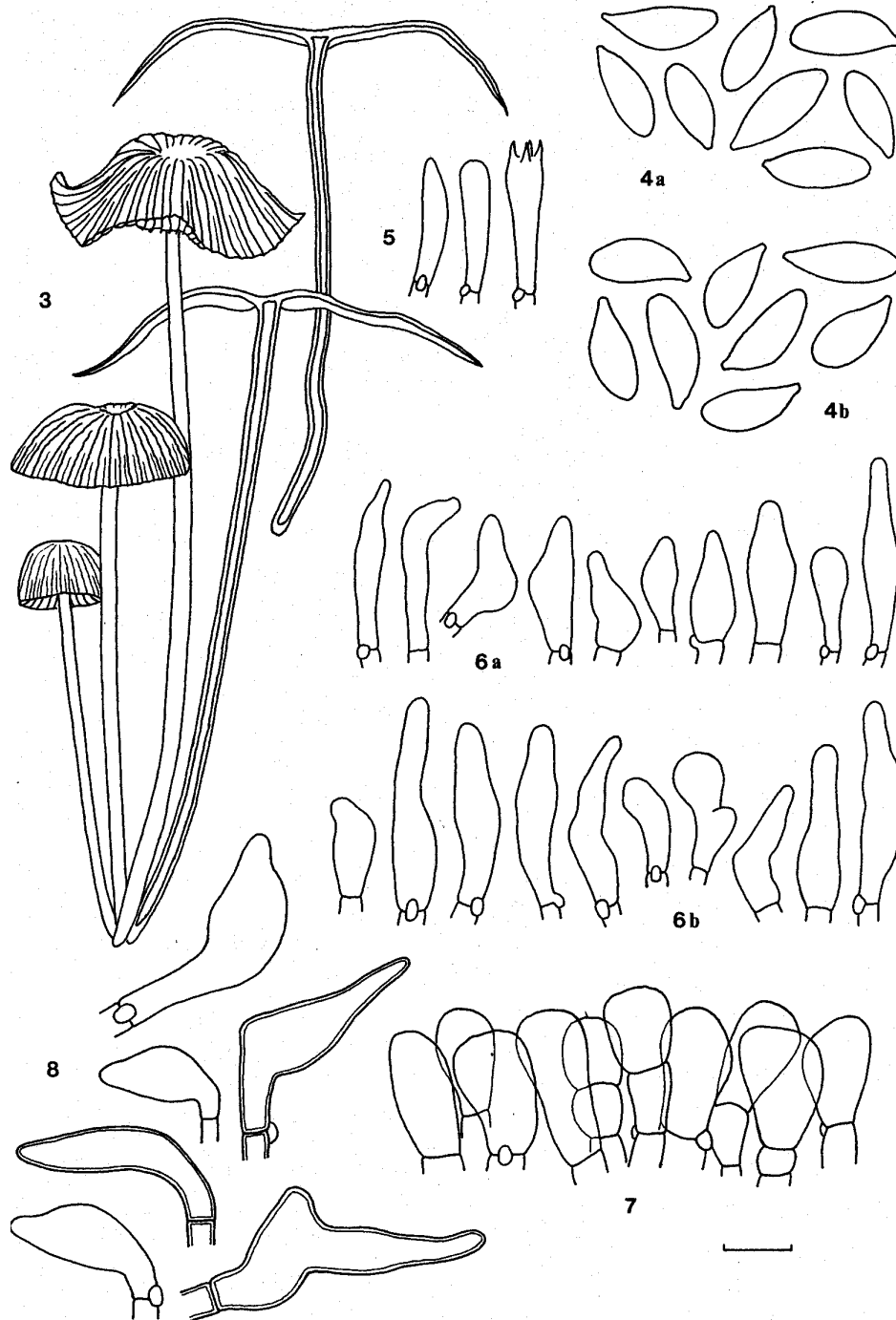
*Pileus* (Figs. 1-3, 9) 15-50(-70) mm diam., obtusely conical to convex or campanulate when young, expanding to broadly convex, broadly campanulate, plano-campanulate or nearly plane in age, often with a shallow central depression; disc smooth to rugulose or reticulate; margin striate to rugulose-striate or rugulose-sulcate, pellucid, initially decurved, in age decurved to upturned, wavy or undulate; surface hygrophanous, glabrous, moist to dry, dull; disc ivory, cream (4A3), pale orange white (5A2-3), or pale brownish grey (6C3); margin white, ivory, buff, pale yellowish white (4A2) or cream (4A3), in age entire pileus often dingy white and pellucid. *Context* thin (0.5-1



**Figs. 1-2.** *Marasmius pellucidus*. **1.** D.E. Desjardin #7081 from Bogor, Java. **2.** D.E. Desjardin #7611 from Chiang Mai, Thailand. Scale bar for both photos as in Fig. 1, in mm.

mm), pliant, white. *Odor* mild, somewhat sweet, like *Marasmius oreades*. *Taste* not distinctive. *Lamellae* adnate to shallowly adnexed, non-collariate, close to subdistant or distant (12-20) with 3-5 series of lamellulae, narrow (0.5-2 mm, rarely up to 3 mm broad), sometimes not reaching pileus margin, often anastomosing and intervenose, white to ivory, pale yellowish white (4A2) or cream (4A3); edges even, non-marginate. *Stipe* (20-)40-150 × (1-)2-3 mm, central, terete or sometimes once-cleft, ±equal, sometimes wavy, cartilaginous or pliant, tough, fistulose, sometimes twisted-fibrous, dull, dry; apex minutely pruinose, white to pale yellowish white (4A2); centrally pruinose, greyish orange (5B4), brownish yellow (5C5-6) or brownish orange (6C5-7); base pruinose or furfuraceous to appressed-fibrillose, brown (7D-E5-8), reddish brown (8D-E4-8), or dark brown (7-8F5-8), non-insititious, arising from dense creamy white mycelium.

*Basidiospores* (Figs. 4a-b, 10, 16) (6-)6.5-8(-8.5) × (2.5-)3-4 μm [ $x_{mr} = 6.8-7.5 \times 2.9-3.6 \mu\text{m}$ ,  $x_{mm} = 7.2 \pm 0.2 \times 3.3 \pm 0.2 \mu\text{m}$ ,  $Q = 1.4-2.7$ ,  $Q_{mr} = 2.0-2.5$ ,  $Q_{mm} = 2.2 \pm 0.1$ ,  $n = 20-25$  spores per 11 specimens], subfusoid to ellipsoid or amygdaliform, with a prominent hilar appendix, smooth, hyaline, inamyloid, thin-walled. *Basidia* (Fig. 5) 16-30 × 4.5-7 μm, clavate, 4-spored. *Basidioles* (Figs. 5, 11) clavate to subfusoid. *Pleurocystidia* absent. *Cheilocystidia* (Figs. 6a-b, 12) abundant, lamellar edge sterile, 12-30(-40) × 4.5-8 μm, versiform, ranging from irregularly cylindrical to fusoid, ventricose, clavate or boot-shaped, hyaline, inamyloid, thin-walled. *Pileipellis* (Figs. 7, 14, 17) a hymeniform layer of *Globulares*-type cells: cells 10-25(-32) × (6-)8-18(-25) μm, subglobose to pyriform, clavate or broadly clavate, sometimes in short chains, hyaline, inamyloid, thin-walled; arising from a subcutis up to 30 μm thick formed of irregularly isodiametric or puzzle-shaped cells 5-12 μm diam. that are tightly packed, dextrinoid, thin-walled. *Pileus trama* of loosely interwoven hyphae 2.5-8(-12) μm diam., cylindrical to irregularly cylindrical, thin-walled or thick-walled (up to 0.5 μm), hyaline, dextrinoid, non-gelatinous. *Lamellar trama* regular; hyphae 2.5-10 μm diam., cylindrical, hyaline, dextrinoid, thin-walled, non-gelatinous. *Stipe tissue* monomitic; cortical hyphae 5-10 μm diam., parallel, cylindrical, thick-walled (up to 0.5 μm), smooth, non-incrusted, non-gelatinous, yellow to tawny in H<sub>2</sub>O, pale yellowish green in 3%KOH, strongly dextrinoid; medullary hyphae 5-16(-20) μm diam., subparallel, cylindrical, thin-walled, hyaline, dextrinoid. *Stipe vesture* of scattered to dense, repent to erect caulocystidia. *Caulocystidia* (Figs. 8, 13, 15, 18) 15-60(-85) × (4-)6-14 μm, versiform, ranging from irregularly cylindrical to fusoid, ventricose, clavate or irregular in outline, sometimes geniculate, thin-walled to thick-walled (0.5-1.5 μm), hyaline, inamyloid to dextrinoid. *Clamp connections* present in all tissues.



**Figs. 3-8.** *Marasmius pellucidus*. **3.** Basidiomes. **4a-b.** Basidiospores. **5.** Basidium and basidioles. **6a-b.** Cheilocystidia. **7.** Pileipellis. **8.** Caulocystidia. Bars: 3 = 10 mm; 4 = 5  $\mu$ m, 5-8 = 10  $\mu$ m. Figs. 3, 4a, 5, 6a, 7, 8 = D.E. Desjardin #7081 (Java). Figs. 4b, 6b = D.E. Desjardin #7396 (Thailand).

*Habit, habitat and distribution.* Gregarious to densely gregarious, typically in cespitose clusters on leaf mulch or on woody debris or rotten logs of various dicotyledonous plants, sometimes amongst bamboo leaves. Borneo, Java, Malaysia, New Caledonia, Singapore, Sri Lanka, Thailand.

*Specimens examined:* INDONESIA, East Kalimantan. Kayan Mentarang National Park, Pa'raye Mt., trail to sub-camp 1 via 'jalan salah', 3 Apr. 2003, A. Retnowati #371 (SFSU, BO); same location, 8 Apr. 2003, A. Retnowati #434 (SFSU, BO); Kayan Mentarang National Park, Pa'raye Mt., forest along Parinibung River, 10 Apr. 2003, A. Retnowati #470 (SFSU, BO). Java, Bogor, Bogor Botanical Garden, July 1923, C. van Overeem #122 (ut *Papyromarasmium gracilis*, BO); same location, 9 Jan. 2000, D.E. Desjardin #7081 (SFSU, BO); same location, 12 Jan. 2000, D.E. Desjardin #7108 (SFSU, BO). NEW CALEDONIA. east of Nouméa, Mts. Koghi, 25 Feb. 1994, Horak #5153 (SFSU, ZT). SINGAPORE. Singapore Botanic Gardens, E.H. Burkill #121, 16 Sep. 1913 (Holotype of *Marasmius papyraceus*: K). SRI LANKA. Peradeniya, Thwaites #38, Nov. 1867 (Isotype of *Marasmius pellucidus*: K); Peradeniya, Sept. 1868 (Isotype of *Cantharellus elegans*: K). THAILAND. Chiang Mai Province, Mok Fa Waterfall on Hwy 1095, elev. 1014 m, 28 June 2003, D.E. Desjardin #7584 (SFSU); Chiang Mai Province, Pathummikaram temple on Hwy 1095, 13 Jul. 2003, N. Wannathes #022 (MRCTH); Chiang Mai Province, 27 km marker on Hwy 1095, 2 Jul. 2003, N. Wannathes #016 (MRCTH); Chiang Mai Province, New Waterfall at 36 km marker on Hwy 1095, 6 Jul. 2003, D.E. Desjardin #'s 7611 & 7615 (SFSU); same location, Y.S. Tan #022 (MRCTH); Chiang Mai Province, Doi Suthep National Park, Sangra Sabhasri Lane to Huai Kok Ma Village, elev. 1145 m, N18°48.402', E98°54.617', 14 Aug. 2003, N. Wannathes #109 (MRCTH); same location, 22 June 2003, D.E. Desjardin #7559 (SFSU); Doi Inthanon National Park, Mae Chem jct., elev. 1600 m, N18°31.420', E98°29.216', 26 June 2002, D.E. Desjardin #7396 (SFSU); same location, 26 June 2003, N. Wannathes #007 (MRCTH).

*Notes.* *Marasmius pellucidus* is recognized easily in the field because of its relatively large, paper-thin, white, pellucid-striate pileus, very narrow and intervenose or forked lamellae, and cespitose, reddish-brown to brown stipes. It forms large, dense clusters on leaf mulch, woody debris or on rotten logs. Microscopically, diagnostic features include: a hymeniform pileipellis of subglobose to broadly clavate, non-setulose cells; versiform, non-setulose cheilocystidia and caulocystidia; a lack of pleurocystidia; relatively small, subfusoid basidiospores; and dextrinoid tissues. Collectively, these characters indicate that *M. pellucidus* belongs in sect. *Globulares*, where it is allied with a number of species from Africa and South America.

Berkeley and Broome (1875) described the species twice in the same paper, first as *Cantharellus elegans* (pg. 33) and then again as *Marasmius pellucidus* (pg. 35). Placement by them in *Cantharellus* was based on the presence of poorly-developed, anastomosing and intervenose lamellae as exhibited by the young basidiomes that constitute the type collection (K!). The basidiomes in the type collection of *M. pellucidus* (K!) are more mature and show lamellae that are better developed and less intervenose. Both type collections contain cespitose clusters of 3-9 basidiomes with indistinguishable micromorphology (see type studies below). In the protologue of *C. elegans*,

Berkeley and Broome (1875) end their Latin diagnosis with ‘– *Marasmius congregatus* Mont.’ without an explanation, but implicitly acknowledging that *C. elegans* is similar to *M. congregatus*. Petch (1948) reported the species from Sri Lanka as *Marasmius congregatus* and he listed *C. elegans* and *M. pellucidus* as synonyms. Petch also provided a beautiful watercolour painting of a single basidiome (1948: Plate III, Fig. 1). *Marasmius congregatus* was described from French Guyana (Montagne, 1854) and indeed, the protologue reports a taxon with macromorphology nearly identical to that of *M. pellucidus* and *C. elegans*. As was typical for the time, no micromorphological data were reported in the protologue of *M. congregatus*. Unfortunately, the epithet *M. congregatus* was apparently overlooked by Dennis (1951a,b) and Singer (1965a, 1976) in their studies of South America *Marasmius*, and until now has remained a *nomen dubium*. Pegler (1986) reported *M. pellucidus* as the correct name for the Sri Lanka species, and noted that *M. congregatus* was a misapplied name. Our type study of *M. congregatus* Mont. (see below) indicates that the species has a pileipellis formed from *Siccus*-type broom cells and belongs in sect. *Sicci*, where it may represent an older name for *M. bellus* Berk. Pegler (1986) reported the basidiospores of *M. pellucidus* as 8-10.5 µm long, whereas Petch (1948) reported them as 6-8 µm long. Our analysis of the type specimen agrees with Petch, and this difference is taxonomically significant.

A collection from Singapore was described by Masee (1914) as *Marasmius papyraceus* Masee, an appropriate name given the distinctive pileus morphology. This was the epithet used by Corner (1996) for material from the Singapore Botanic Gardens, which he reported occurs ‘every fungus season’. Corner was unable to find basidiospores in any of his collections or in the holotype. Our analysis of the holotype (K!) yielded basidiospores in the range 6.5-8.3 × 2.8-3.8 µm (see below). Corner (1996) described a new variety as *M. papyraceus* var. *limonicolor* Corner, based on a single collection from Singapore with pale lemon yellow basidiomes. He provided a beautiful watercolour painting of five basidiomes arising from a membranous subiculum (1996; Plate 3). We have not studied the holotype of the latter variety, but pale yellow colours fit within the pileus colour variation exhibited by *M. pellucidus* throughout its geographic range, although an entirely pale yellow stem as shown in Corner’s plate is unusual. Until the holotype or more fresh material from Singapore is studied, we consider *M. papyraceus* var. *limonicolor* as a possible synonym of *M. pellucidus*. Desjardin and Horak (1997) reported *M. pellucidus* from New Caledonia, and compared the species with African and South American taxa (elaborated further below).

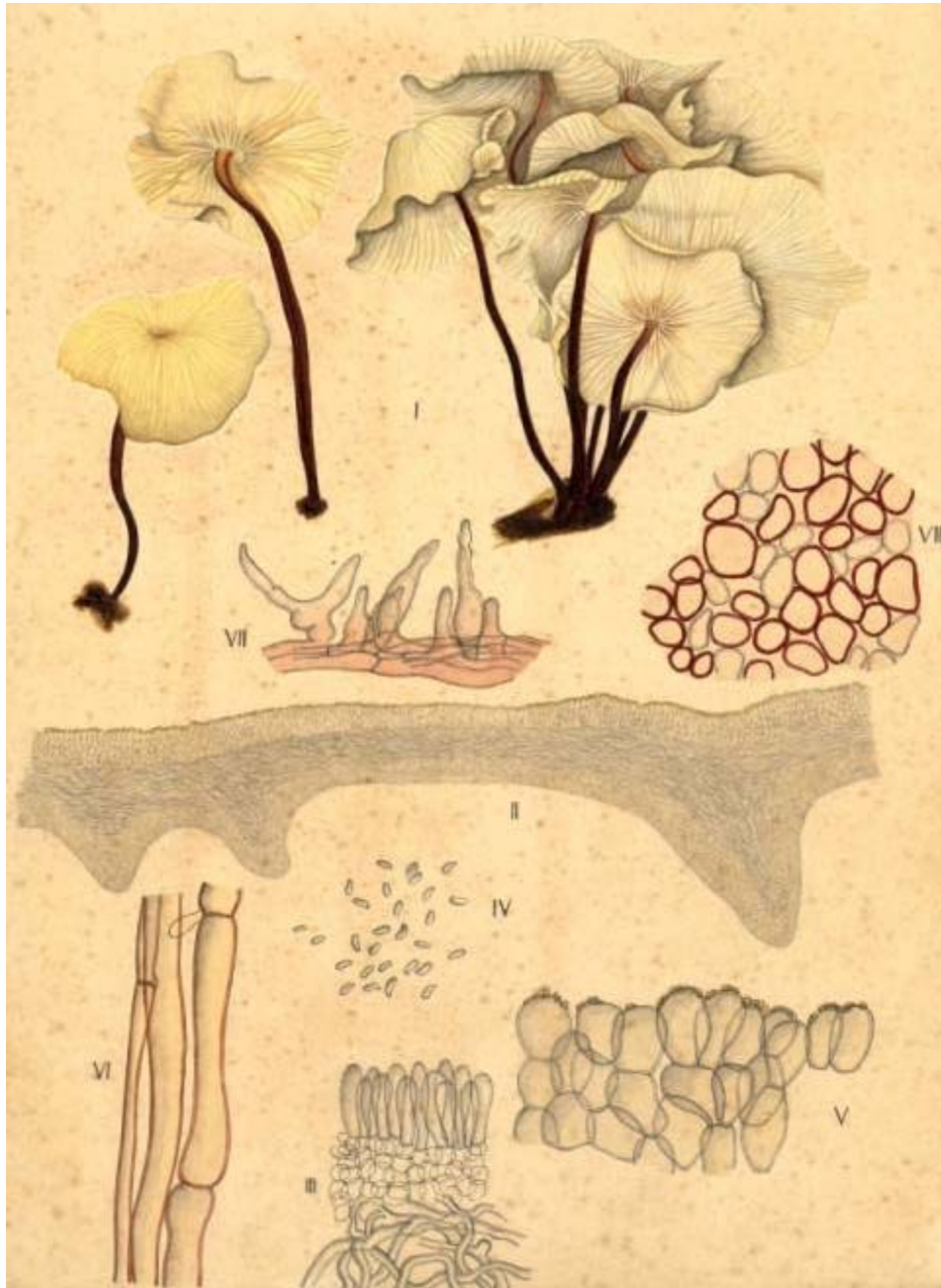
Hennings and Nyman (in Hennings, 1900) described *Marasmius zandbaiensis* Henn. & E. Nyman from a single specimen collected on a sandy beach in *Barringtonia* formation ('zandbai') in Java. Although the protologue reports a taxon morphologically similar to *M. pellucidus*, the type specimen no longer exists and we cannot confirm its taxonomic placement (Desjardin *et al.*, 2000). Van Overeem, a Dutch mycologist who worked out of Herbarium Bogoriense in Java in the early part of the last century, collected *M. pellucidus* and tentatively called it *Papyromarasmius gracilis*, a new genus and species he intended to publish but never did. A painting of basidiomes and a detailed illustration of micromorphology executed in July 1923 is housed at BO. A copy of Overeem's plate is provided here (Fig. 9).

*Marasmius pellucidus* is similar to a number of species from Africa and South America, and as a group constitute a species complex. Species belonging to *Marasmius* sect. *Globulares* with pallid (white to cream-coloured), pellucid-striate, paper-thin pileus, no pleurocystidia, and basidiospores less than 12 µm long include: *M. pellucidus*, *M. arborescens* (Henn.) Belli (Hennings, 1895), *M. albertianus* Singer (1964), *M. kigwenensis* Antonín (2003), *M. lacteoides* Antonín (2003), *M. cohortalis* Berk. (1879) and its varieties, and *M. niveus* Montagne (1854). An accounting of comparative morphological data is provided in Table 1. Very few characters distinguish these taxa. The oldest epithet of the group is *M. niveus*, from South America. *Marasmius niveus* differs from *M. pellucidus* in forming longer basidiospores (mean length 7.7-8 µm), smaller and less conspicuous (sometimes absent), vesiculose cheilocystidia, non-intervenose lamellae, and basidiomes that form singly rather than in fasciculate clusters. *Marasmius cohortalis*, also from South America, differs in forming broader and more strongly intervenose lamellae, and in the shape of the cheilocystidia and caulocystidia which are consistently broadly clavate to subglobose or sphaeropedunculate. In *M. pellucidus* these cystidia are quite variable in shape, with numerous fusoid and cylindrical cells developed. *Marasmius arborescens* and *M. albertianus*, both from Africa, differ primarily in forming larger basidiospores (mean length in the range 8.5-9.3 µm), and close to crowded, non-intervenose lamellae. Two recently described African species, *M. kigwenensis* and *M. lacteoides* appear to differ from each other only in basidiospore and caulocystidia size, and differ from *M. pellucidus* only in forming crowded, non-intervenose lamellae on non-cespitose basidiomes.



**Table 1.** Comparative morphological data for species of *Marasmius* sect. *Globulares* with: pallid (white to cream), pellucid, paper-thin pileus; no pleurocystidia; and basidiospores <12  $\mu\text{m}$  long. Data compiled from Antonín (2003, 2004), Desjardin and Horak (1997), Desjardin *et al.* (2000), Pegler (1977, 1983, 1986), Singer (1965b, 1976), and unpublished type studies by Desjardin.

Species	Basidiospores	Cheilocystidia	Caulocystidia	Lamellae	Habit
<i>M. pellucidus</i> [South Asia]	6.5-8 $\times$ 3-4 $\mu\text{m}$ $x_{\text{mr}} = 6.8-7.5 \times 2.9-3.6 \mu\text{m}$ $x_{\text{nm}} = 7.2 \times 3.3 \mu\text{m}$ $Q_{\text{mr}} = 2-2.5$	Versiform: clavate, fusoid or cylindrical 12-30 $\times$ 4.5-8 $\mu\text{m}$	Versiform: clavate, fusoid or cylindrical 15-60 $\times$ 6-14 $\mu\text{m}$	Typically intervenose, rarely not intervenose close to distant (12-20) narrow (0.5-2 mm)	Cespitose
<i>M. arborescens</i> [Africa]	8-11.5 $\times$ 3-4 $\mu\text{m}$ $x_{\text{nm}} = 9.3 \times 3.5 \mu\text{m}$ $Q_{\text{mr}} = 2.4-3.2$	Clavate to vesiculose 13-31 $\times$ 6.6-15.5 $\mu\text{m}$	Versiform: clavate, lageniform or mucronate 15-77 $\times$ 4-12.5 $\mu\text{m}$	Not intervenose close (28-32) narrow	Cespitose
<i>M. albertianus</i> [Africa]	7.5-10.3 $\times$ 3-4.5 $\mu\text{m}$ $x_{\text{mr}} = 8.5-9 \times 3.5-4.2 \mu\text{m}$ $Q = 2-2.7$	Versiform: clavate, cylindrical or utriform 12-25 $\times$ 5-9 $\mu\text{m}$	Versiform: cylindrical, ventricose or irregular 20-47 $\times$ 7-14.5 $\mu\text{m}$	Not intervenose close to crowded narrow (1-2 mm)	Single to cespitose
<i>M. kigwenensis</i> [Africa]	5.8-6.6 $\times$ 3.1-3.7 $\mu\text{m}$ $x = ?$ $Q = 1.8$	Subcylindrical, lageniform or irregular 15.5-23 $\times$ 3.5-5.4 $\mu\text{m}$	Clavate, subcylindrical, or vesiculose 11.5-23 $\times$ 6.2-7.9 $\mu\text{m}$	Not intervenose crowded ( <i>ca.</i> 40) narrow (<1 mm)	Single or in small clusters
<i>M. lacteoides</i> [Africa]	6.2-8.5(-10) $\times$ 3.5-4.5 $\mu\text{m}$ $x = ?$ $Q = 1.8-2.2$	Clavate, subcylindrical or irregular 11.5-25 $\times$ 3.5-6.9 $\mu\text{m}$	Clavate, cylindrical, lageniform or irregular 19-44 $\times$ (3.8-)5.4-7.7 $\mu\text{m}$	Not intervenose crowded ( <i>ca.</i> 60) narrow	Single or in small clusters
<i>M. cohortalis</i> and varieties [South America]	6-8.3 $\times$ 3-4.5 $\mu\text{m}$ $x_{\text{mr}} = 6.7-7 \times 3.5-3.7 \mu\text{m}$ $Q = 1.8-2$	Broadly clavate, subglobose or pyriform 16-24(-32) $\times$ 7-13 $\mu\text{m}$	Broadly clavate or sphaeropedunculate 15-36 $\times$ 8-13 $\mu\text{m}$	Strongly intervenose subclose to distant broad (2-3.5 mm)	Single to cespitose
<i>M. niveus</i> [South America]	6-9.6 $\times$ 2.5-3.8 $\mu\text{m}$ $x_{\text{mr}} = 7.7-8 \times 3-3.4 \mu\text{m}$ $Q = 2.1-2.5 \mu\text{m}$	Absent or vesiculose 12.3-13.7 $\times$ 5.5-8.3 $\mu\text{m}$	No data	Not intervenose subclose to distant narrow (1-1.5 mm)	Single



**Fig. 9.** Painting of basidiomes, and line drawings of micromorphological features executed by C. van Overeem in July 1923, labeled '*Papyromarasmius gracilis*' (Overeem #122; unpublished epithet). I. Basidiomes. II. Tangential section through the pileus. III. Hymenium, subhymenium and lamellar trama. IV. Basidiospores. V. Pileipellis. VI. Hyphae of stipe (longitudinal view). VII. Caulocystidia. VIII. Hyphae of stipe (cross-section).

**Type studies***Marasmius pellucidus*

*Protologue*: Berkeley and Broome (1875; *ibid.*).

*Isotype specimen*: Sri Lanka, Peradeniya, Thwaites #38, Nov. 1867 (K).

The isotype specimen consists of two small clusters of cespitose basidiomes: one cluster with five intact basidiomes and a few broken stipes, and one cluster with four intact basidiomes – all are pressed flat and glued to a piece of paper. Pileus convex, striate, glabrous. Lamellae subdistant, narrow, reaching the pileus margin. Stipe glabrous above, pruinose below, arising from a pad of cream-coloured mycelium.

*Basidiospores* (Fig. 10)  $6.5\text{--}8 \times 2.8\text{--}3.8 \mu\text{m}$  [ $x = 7.4 \pm 0.6 \times 3.2 \pm 0.2 \mu\text{m}$ ,  $Q = 2\text{--}2.5$ ,  $Q_m = 2.3 \pm 0.1$ ,  $n = 13$  spores], subfusoid to fusoid, smooth, hyaline, inamyloid, thin-walled. *Basidia* not observed. *Basidioles* (Fig. 11)  $16\text{--}20 \times 3.2\text{--}4 \mu\text{m}$ , subfusoid. *Pleurocystidia* absent. *Cheilocystidia* (Fig. 12; few observed)  $28\text{--}32 \times 5.5\text{--}6.5 \mu\text{m}$ , irregularly clavate, hyaline, thin-walled. Pileipellis a hymeniform layer of globose to broadly clavate *Globulares*-type cells; cells  $8\text{--}16 \mu\text{m}$  diam., collapsed and reviving poorly, thin-walled, hyaline to pale yellow in KOH, inamyloid to weakly dextrinoid. Pileus tramal hyphae cylindrical, dextrinoid. *Stipe tissue* monomitic; hyphae  $4\text{--}8 \mu\text{m}$  diam., cylindrical, dextrinoid. *Caulocystidia* (Fig. 13)  $22\text{--}40 \times 8\text{--}14 \mu\text{m}$ , clavate to broadly clavate or subcylindrical, hyaline, thin-walled or thick-walled (up to  $0.5 \mu\text{m}$ ), scattered over all of stipe. *Clamp connections* present in all tissues.

*Cantharellus elegans*

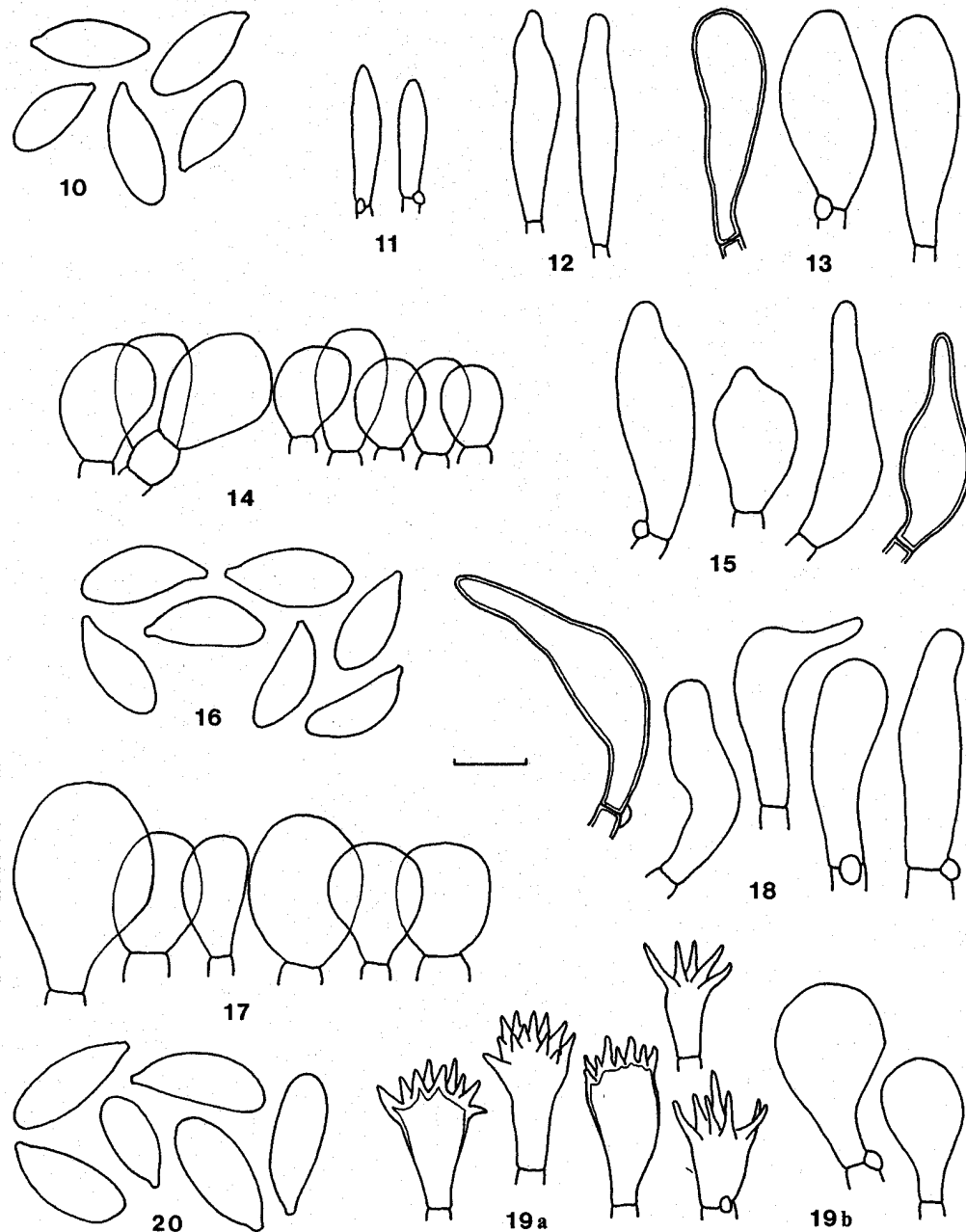
*Protologue*: Berkeley and Broome (1875; *ibid.*).

*Isotype specimen*: Sri Lanka, Peradeniya, Sept. 1868 (K).

The isotype specimen consists of five small clusters of cespitose basidiomes, ranging from 3-9 per cluster – all pressed flat and glued to a sheet of paper. Pileus small ( $5\text{--}9$  mm diam.), convex, pellucid-striate, glabrous. Lamellae distant, narrow, forked and anastomosing, poorly-developed. Stipe apex nearly glabrous, base pruinose. Material badly infected with a mold.

*Basidiospores* not observed; material presumably immature. *Basidia* not observed. *Basidioles* subfusoid. *Pleurocystidia* absent. *Cheilocystidia* not observed. *Pileipellis* (Fig. 14) a hymeniform layer of *Globulares*-type cells; cells  $12.5\text{--}20 \times 8\text{--}13 \mu\text{m}$ , subglobose to broadly clavate, hyaline, inamyloid, thin-walled. *Pileus trama* of interwoven, cylindrical, dextrinoid hyphae. *Stipe tissue* badly infected by a mold; hyphae  $2.5\text{--}6 \mu\text{m}$  diam., cylindrical, parallel, yellow in KOH, dextrinoid. *Caulocystidia* (Fig. 15) scattered,  $16\text{--}32 \times 6.5\text{--}11 \mu\text{m}$ , clavate to ventricose, hyaline, inamyloid, thin-walled to thick-walled (up to  $0.5 \mu\text{m}$ ). *Clamp connections* present.

Accepted here as a synonym of *M. pellucidus*.



**Figs. 10-20.** Micromorphological features of type specimens. **Figs. 10-13.** Isotype of *Marasmius pellucidus* (Thwaites #38). **10.** Basidiospores. **11.** Basidioles. **12.** Cheilocystidia. **13.** Caulocystidia. **Figs. 14-15.** Isotype of *Cantharellus elegans* (Sept. 1868). **14.** Pileipellis. **15.** Caulocystidia. **Figs. 16-18.** Holotype of *Marasmius papyraceus* (Burkill #121). **16.** Basidiospores. **17.** Pileipellis. **18.** Caulocystidia. **Fig. 19a-b.** Holotype of *Marasmius congregatus* (Leprieur #1081). **a.** *Siccus*-type broom cells from pileipellis. **b.** *Globulares*-type cells from pileipellis. **20.** Holotype of *Marasmius niveus* (Leprieur #1038). Basidiospores. Bars: 10, 16, 20 = 5  $\mu\text{m}$ ; 11-15, 17-19 = 10  $\mu\text{m}$ .

*Marasmius papyraceus*

*Protologue*: Masee (1914; *ibid.*).

*Holotype specimen*: Singapore, Singapore Botanic Gardens, E.H. Burkill #121, 16 Sep. 1913 (K).

The holotype specimen consists of four fragmented pilei and three intact stipes, all infected with a white mold – pressed flat and loose in the packet. Pileus convex, paper-thin, striate to rugulose-striate, creamy white. Lamellae distant, narrow, not reaching the pileus margin, creamy white. Stipe single, pruinose, twisted-fibrous, greyish brown. A watercolour painting accompanies the specimen showing 4 cespitose basidiomes with the following features: pileus disc pale yellow, margin white; stipe base reddish brown.

*Basidiospores* (Fig. 16)  $6.5\text{-}8.3 \times 2.8\text{-}3.8 \mu\text{m}$  [ $7.5 \pm 0.5 \times 3.3 \pm 0.3 \mu\text{m}$ ,  $Q = 1.9\text{-}2.7$ ,  $Q_m = 2.2 \pm 0.1$ ,  $n = 20$  spores], fusoid to amygdaliform, smooth, hyaline, inamyloid, thin-walled. *Basidia* 4-spored. *Basidioles* subfusoid. *Pleurocystidia* absent. *Cheilocystidia* not observed; material too scanty and pressed flat. *Pileipellis* (Fig. 17) a hymeniform layer of *Globulares*-type cells; cells  $16\text{-}32 \times 8\text{-}18\text{-}(25) \mu\text{m}$ , subglobose to broadly clavate, smooth, hyaline, dextrinoid, thin-walled. *Pileus trama* of interwoven hyphae  $2.5\text{-}6.5 \mu\text{m}$  diam., cylindrical, hyaline, dextrinoid, non-gelatinous, thin-walled. *Lamellar trama* regular; hyphae similar to those in the pileus. *Stipe tissue* monomitic; cortical hyphae  $4.7 \mu\text{m}$  diam., cylindrical, pale brown, dextrinoid, thick-walled; medullary hyphae  $4\text{-}13 \mu\text{m}$  diam., cylindrical, hyaline, dextrinoid, thin-walled. *Caulocystidia* (Fig. 18)  $20\text{-}40 \times 8\text{-}13 \mu\text{m}$ , clavate to ventricose, sometimes mucronate, hyaline, inamyloid, thin-walled to thick-walled (up to  $0.5 \mu\text{m}$ ). *Clamp connections* present.

Accepted here as a synonym of *M. pellucidus*.

*Marasmius congregatus* Mont., Ann. Sci. Nat. Bot. 4: 113, 1854.

*Protologue*: Montagne (1854).

*Holotype specimen*: French Guyana, Leprieur #1081 (PC).

The holotype specimen consists of four basidiomes in good condition: three in a cespitose cluster, and one single basidiome – all pressed flat but loose in the packet. Pileus 10-20 mm diam., convex, striate, disc weakly venose, yellowish brown; context thin. Lamellae adnexed, distant (*ca.* 18) with 2 series of lamellulae, narrow (1-1.5 mm). Stipe  $35\text{-}54 \times 1.5\text{-}2$  mm, central, glabrous, non-insititious, brown to reddish brown, with fulvous, strigose basal mycelium.

*Basidiospores* none found on hymenium or stipe surface. *Basidia* not observed. *Basidioles* fusoid. *Pleurocystidia* absent. *Cheilocystidia* few observed; of scattered *Siccus*-type broom cells like those in the pileipellis. *Pileipellis* (Fig. 19) a hymeniform layer of *Siccus*-type broom cells

interspersed with *Globulares*-type cells, not mottled: (1) *Siccus*-type cells (Fig. 19a) with main body  $16-23 \times 6.5-13 \mu\text{m}$ , clavate, hyaline; apical setulae  $3-10 \times 0.5-1.5 \mu\text{m}$ , conical, acute, thick-walled to solid, hyaline, inamyloid to dextrinoid; (2) *Globulares*-type cells (Fig. 19b)  $19-26 \times 6.5-15 \mu\text{m}$ , clavate to broadly clavate, non-setulose, hyaline, inamyloid, thin-walled. *Pileus trama* of interwoven hyphae  $1.5-3.2 \mu\text{m}$  diam., cylindrical, hyaline, weakly dextrinoid, thin-walled. *Lamellar trama* regular; hyphae  $4-10 \mu\text{m}$  diam., cylindrical, hyaline, thin-walled. *Caulocystidia* absent. *Clamp connections* present in all tissues.

Accepted here as a distinct species in *Marasmius* sect. *Sicci*, ser. *Leonini*, where it may represent an older epithet for *Marasmius bellus* Berk.

*Marasmius niveus* Mont., Ann. Sci. Nat. Bot. 4: 117, 1854.

*Protologue*: Montagne (1854).

*Holotype specimen*: French Guyana, Leprieur #1038 (PC).

The holotype specimen consists of two basidiomes infected by a white mold – pressed flat and glued to a sheet of paper. Pileus 20-25 mm diam., plano-convex, striate, glabrous, yellowish brown. Lamellae adnexed, distant (17) with 2-3 series of lamellulae, narrow (1-1.5 mm), well-developed, not forked, not intervenose, all reach the pileus margin. Stipe  $37-40 \times 1 \text{ mm}$ , central, cylindrical, glabrous, non-insititious, with strigose basal mycelium.

*Basidiospores* (Fig. 20)  $6-9.6 \times 3.2-3.8 \mu\text{m}$  [ $x = 8 \pm 1.3 \times 3.4 \pm 0.2 \mu\text{m}$ ,  $Q = 1.8-2.7$ ,  $Q_m = 2.1 \pm 0.2$ ,  $n = 10$  spores], narrowly fusoid to ellipsoid, smooth, hyaline, inamyloid, thin-walled. *Basidia*  $19-22 \times 5.7-6.5 \mu\text{m}$ , clavate, 4-spored. *Pleurocystidia* absent. *Cheilocystidia* not distinguishable from other hymenial cells. *Pileipellis* a hymeniform layer of *Globulares*-type cells: mold-contaminated and difficult to evaluate – cells  $10-16 \mu\text{m}$  diam., clavate, non-setulose, hyaline, thin-walled. *Pileus trama* inamyloid. *Lamellar trama* dextrinoid. *Stipe* too mold-contaminated to provide meaningful data.

This species belongs in *Marasmius* sect. *Globulares*. It has been treated by Singer (1965a, 1976) based on more recently collected specimens from Brazil, Bolivia, Peru, and Venezuela, and his accounting is in agreement with our type analysis. Dennis (1951b: 434) transferred the epithet as *Collybia nivea* (Mont.) Dennis, and reported additional specimens from Trinidad.

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