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Autor: Antonín, Vladimír / Desjardin, Dennis E. / Gsell, H.
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Studies in marasmioïd fungi - VII.
***Marasmius anisocystidiatus*, a new species in section Sicci**

Vladimír Antonín

Moravian Museum, Zelný trh 6, CS-659 37 Brno, Czechoslovakia

Dennis E. Desjardin

Dept. of Biology, San Francisco State University,
1600 Holloway Ave., San Francisco, CA, U.S.A. 9413

H. Gsell

Botanischer Garten und Institut für systematische Botanik
der Universität Zürich, Zollikerstr. 107, CH-8008 Zürich, Switzerland

Summary: *Marasmius anisocystidiatus* sp. nov. is described from material collected in a tropical greenhouse in the Botanical Garden in Zürich, Switzerland. The new species belongs in the sect. Sicci, subsect. Siccini, ser. Haematocephali, stirps Ferrugineus. A comparison is made with phenetically similar taxa.

Zusammenfassung: *Marasmius anisocystidiatus* Antonin sp. nov. ist aus dem tropischen Gewächshaus im botanischen Garten in Zürich beschrieben. Diese Art gehört in die Sekt. Sicci, Subsekt. Siccini, Ser. Haematocephali und Stirps Ferrugineus. Die Unterschiede zwischen den ähnlichen Arten werden diskutiert.

In recent years, several interesting species of *Marasmius* belonging to stirps Ferrugineus of section Sicci have been reported from material collected in greenhouses of European botanical gardens (Antonín 1988, 1990). One species, *Marasmius skalae* Antonín, was found in the Botanical Garden in Teplice, Bohemia, Czechoslovakia (Antonín 1988), and a second species found in the Botanical Garden at the Institute for Systematic Botany in Zürich is described as a new species in this paper. Both species are allied with a complex of taxa from South America and both are considered introduced into Europe along with plant brought from tropical South America.

Marasmius anisocystidiatus spec. nov.

Pileus 5-20 mm latus, campanulatus vel convexe planus, striatus, albidus vel pallide griseo-brunneus centro carne coloratus. Lamellae remotae (L = 12-13), intervenosae, albae, margine brunne pubescentes. Stipes 20-40 mm longus et 0.5-1 mm crassus, teres, aequalis, laevis, apice albus, ad basim nigro-fuscus. Odor non distinctus. Sapor mitis. Basidiosporae lacrymiformes jusque clavatae, hyalinae, non amyloidae, (14.5-)16.0-20.0(-22.0) × (4.0-)4.5-6.0(-6.4) µm

magnae. Basidia clavata, $23-32 \times 9-12 \mu\text{m}$. Cheilocystidia 1) elementorum pileipellis similia, $11-16 \times 4.5-9 \mu\text{m}$, 2) cylindrica vel clavata cum processu longo unico et nonnumquam cum processibus brevibus nonnullis, $15-45(-67) \times 3.5-10 \mu\text{m}$. Pleurocystidia clavata, fusiformia vel lageniformia, subcapitata vel cunate, ostrata, $30-50(-54.5) \times (3.5-)8-12 \mu\text{m}$. Hyphae dextrinoideae, fibulatae. Caulocystidia rara. Pileipellis hymeniformis, cellulae eius cellularum *Marasmii sicci* similes, ad basim hyaline, apice et diverticulis flavo-brunneis, $8-26 \times 5-16 \mu\text{m}$, diverticuli $1.5-8.0 \mu\text{m}$ longae. Ad terram huminosam.

Holotypus: Helvetia, Zürich, horto botanico, Mar. 1988, leg. H. Gsell, in herbario Z preservatur; isotypus in herbario BRNM et SFSU preservatur.

Pileus 5-20 mm broad, campanulate at first, becoming convex to appanate at maturity, sometimes with a small, low, central papilla, margin deeply radially striate; disc tinged carneous, margin pale greyish brown to dirty white; when dried disc dark brown or dark reddish brown, margin greyish brown with pallid radial stripes; context thin, white. Lamellae adnexed to almost free, distant ($L = 12-13$), ventricose, thin, narrow, intervenose; white with brownish, slightly pruinose margins; lamellulae in 0-1 series. Stipe 20-40/0.5-1 mm, terete, equal, tough, glabrous, non-insititious, with white basal mycelium; apex white, base dark brown to brownish black. Odor not distinctive. Taste mild. Basidiospores $(14.5-)16.0-20.0(-22.0) \times (4.0-)4.5-6(-6.4) \mu\text{m}$ ($X=18 \pm 1.0 \times 5.1 \pm 0.4 \mu\text{m}$), $E=(2.4-)3.0-4.0 (-4.5)$, $Q = 3.5 \pm 0.2$, ($n = 30$), fusiform or clavate, inequilateral in profile, smooth, hyaline, inamyloid, thin-walled. Basidia $23-32 \times 9-12 \mu\text{m}$, clavate, 4-spored, clamped. Basidioles $22-33 \times 6-12 \mu\text{m}$, cylindric, clavate or fusoid, clamped. Cheilocystidia numerous, lamellar edge sterile, of two distinct types plus elements transitional between these: 1) Siccus-type broom cells; main body $11-16 \times 4.5-9.0 \mu\text{m}$, cylindric, clavate or irregular in outline, sometimes lobed, ranging from thin-walled and hyaline, to thick-walled and yellow or pale ferruginous; setulae $2.0-12.5 \times 1.0-3.0 \mu\text{m}$, 2-15 per cell, cylindric or irregular in outline, obtuse, sometimes lobed, ranging from thin-walled and hyaline to thick-walled and yellow or pale ferruginous; 2) clavate, spheropedunculate, cylindric-subcapitate, vesiculose-rostrate, clavate-capitate or flexuous-capitate cells $15-45(-67) \times 3.5-10.0 \mu\text{m}$, capitulum up to $8 \mu\text{m}$ diam., thin-walled overall, or more commonly with the central and basal portions thick-walled ($-0.6 \mu\text{m}$), hyaline overall, with or without basal clamp; 3) elements transitional in morphology between types 1 and 2; apex clavate, subcapitate or capitate, thin-walled and hyaline; central portion thick-walled ($-0.6 \mu\text{m}$), pale ferruginous, with or without several setulose outgrowths, basal portion thin- or thick-walled, ranging from yellow to pale ferruginous. Pleurocystidia $30-50 (-54.5) \times (3.5-)8-12 \mu\text{m}$, rare, versiform, cylindric, clavate or fusoid, some slightly lageniform or strangulate, often subcapitate or cuneate-rostrate, arising from the subhymenium and

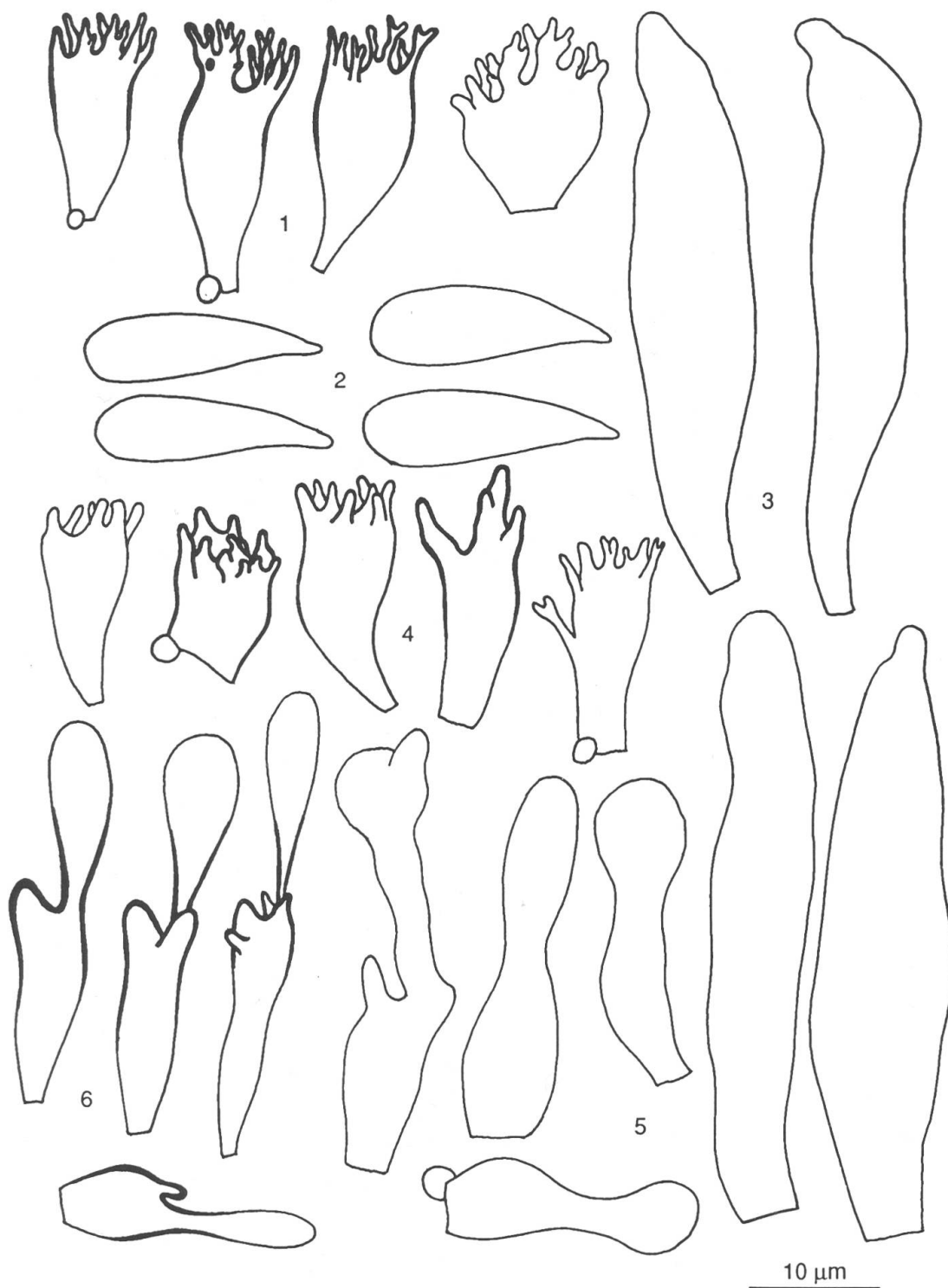


Figure 1: *Marasmius anisocystidiatus* (type). 1 broom cells of the pileipellis, 2 basidiospores, 3 pleurocystidia, 4-6 cheilocystidia.



Figure 2: *Marasmius anisocystidiatus* Photo: F. Waldvogel

projecting well beyond the basidia, refractive, hyaline, thin-walled. Pileipellis hymeniform, mottled, of Siccus-type broom cells; main body 8-26 x 5-16 (-21) μm , cylindric, clavate, vesiculose or irregular in outline, often lobed, ranging from hyaline and thin-walled, to ochraceous or yellowish brown and thick-walled (-0.6 μm), with or without basal clamp; setulae 1.5-8.0 x 0.5-3.5 μm , usually irregular in outline, seldom cylindric, obtuse, often lobed, thick-walled or solid, ranging from nearly hyaline to yellowish brown; some elements with thick-walled, darker pigmented and fewer setulae distributed throughout the pileipellis causing the mottled appearance at low magnification. Pileus trama interwoven; lamellar trama regular; hyphae 2-6(-8) μm diam., cylindric, branched, non-gelatinous, hyaline, dextrinoid, thin-walled. Stipe tissue monomitic; cortical hyphae 2.5-5.0 μm diam., parallel, cylindric, thick-walled (-0.6 μm), yellow (stipe apex) to brown (stipe base), dextrinoid; medullary hyphae 2.5-10.0 μm diam., cylindric, non-gelatinous, hyaline, dextrinoid, thin-walled. Stipe glabrous, or with rare, scattered Siccus-type broom cells similar to the

pileipellis elements, with thick, ochraceous walls; mycelial "hairs" at stipe base composed of cylindric hyphae up to 1000 and more $\times$ 1.5-3.0 μm , obtuse, hyaline or pale yellow, with walls up to 1.0 μm thick (lumen nearly occluded). Clamp connections common in all tissues.

Growing on the peat-loam ground under imported *Cecropia concolor* and *Aristolochia tricandata* in a tropical greenhouse.

Species examined: Switzerland, Zürich, Institut für Systematische Botanik der Universität Zürich, Botanical Garden, 4. III. 1988, leg. H. Gsell, Exs. 1105-88 BA 4 (Holotype: Z, isotypes: BRNM, SFSU).

Commentary: *Marasmius anisocystidiatus* is characterized by the following combinations of features: 1) a striate pileus coloured dirty white or pale greyish brown with carneous disc; 2) distant and narrow, brown-marginate lamellae; 3) glabrous, non-insititious stipe usually lacking caulocystidia, or with rare scattered broom cells at the apex; 4) long and broad, clavate basidiospores; 5) distinctive, versiform cheilocystidia; 6) well-developed, refractive pleurocystidia; 7) dextrinoid, clamped hyphae, and 8) a mottled, hymeniform pileipellis of Siccus-type broom cells. This combination of characters indicates that *M. anisocystidiatus* belongs in series Haematocephali of section Sicci, where it is alleid with a complex of tropical taxa currently circumscribed as stirps Ferrugineus.

The most distinctive and unusual feature of *M. anisocystidiatus* is the cheilocystidia. Few species of *Marasmius* develop cheilocystidia morphologically as variable as those of *M. anisocystidiatus*, and no other known *Marasmius* species form capitate cheilocystidia of type-2 described above. Cheilocystidia superficially similar to those of type-2 were reported for *Marasmius ciliatomarginatus* Desjardin, a species described from the southern Appalachian Mountains of North America (Desjardin et Petersen 1989). *Marasmius ciliatomarginatus* differs, however, in reddish brown or deep orange brown pileus, closer lamellae (20-25), pubescent stipe with irregularly cylindric caulocystidia, shorter and narrower spores, and the lacks pleurocystidia (Desjardin et Petersen 1989; holotype, Tenn.).

A comparison with tropical South American taxa indicates that *M. anisocystidiatus* is allied with *M. montagneanus* Sing., *M. hypophaeus* Berk. et Curt., *M. ferrugineus* (Berk.) Berk. et Curt., *M. tenuisetulosus* (Sing.) Sing., and *M. skalae* Antonín. *Marasmius anisocystidiatus* is distinguished easily from all of these allied taxa by its unique cheilocystidia morphology. In addition, allied taxa differ from *M. anisocystidiatus* in the following ways. *Marasmius montagneanus* differs in forming darker pilei, copious well-developed basal mycelium, narrower spores (3.0-4.7 μm diam.), and by having shorter and more acute setulae on the pileipellis broom cells (Singer 1976; holotype, LIL!). *Marasmius hypophaeus* differs by darker, reddish orange pilei, non-intervenose

lamellae, narrower basidiospores on the average ($W = 4.4 \mu\text{m}$), longer and consistently conic setulae on pileipellis broom cells, and it often forms basidiomata on woody substrata (Singer 1976; lectotype, FH!). *Marasmius ferrugineus* differs in forming smaller (3-11 mm diam) and more brightly pigmented pilei (ferruginous-fulvous), non-marginate lamellae, narrower basidiospores on the average ($W = 4.4 \mu\text{m}$), broader pleurocystidia ($W = 11.5 \mu\text{m}$), and forms basidiomata on bark or woody substrata (Singer 1976; holotype, K!). *Marasmius tenuisetulosus* differs by more brightly pigmented pilei (rusty-tawny), closer (13-16) and non-marginate lamellae, narrower basidiospores ($3-4 \mu\text{m}$), acute setulae on pileipellis broom cells, and in forming basidiomata on woody substrata (fide Singer 1964, 1976). *Marasmius skaliae* differs by slightly larger pilei (11-30 mm diam.) ferruginous coloured with paler radial stripes, has closer lamellae (16-20), and longer pleurocystidia ($39-92 \mu\text{m}$) (Antonín 1988; holotype, BRNM!).

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