

**SQUAMANITA CITRICOLOR, A NEW SPECIES
FROM CENTRAL AFRICA**

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The new *Squamanita citricolor* is described from Zaire (Democratic Republic of Congo). It has a medium-sized basidiocarp characterized by a glabrous yellow pileus, a whitish to yellowish stipe rising from an ochraceous yellow, obconical, deeply rooting basal bulb, and very thick-walled fusiform pleuro- and cheilocystidia. Because it has to be assumed now that all *Squamanita* species are mycoparasites and that the basal body formerly called protocarpic tuber is in fact a deformed basidiocarp of another species infected by *Squamanita* mycelium it is proposed that the term 'protocarpic tuber' is replaced by the new term 'cecidocarp'.

In 1971 the second author collected in Zaire a remarkable agaric with a smooth yellow pileus, whitish lamellae, and a whitish to yellowish stipe with remnants of a cortina and rising from a prominent radicating ochraceous-yellow bulb. This collection turned out to represent an undescribed species of *Squamanita*, actually the first species of this genus recorded from Africa.

On account of its large fusiform cystidia this new species, named here *S. citricolor*, seems to be closely related to the widespread *S. umbonata*, known now from North America, Europe and Asia. However, it differs from the latter in its smooth pileus and the very thick wall of the cystidia.

In a very interesting paper Redhead et al. (1994) described the case of basidiocarps of a species of *Squamanita*, named *S. contortipes*, found to be growing on deformed but still recognizable basidiocarps of *Galerina* spp. Although several authors had earlier suggested that members of *Squamanita* are parasites on other agarics (for a survey see Redhead et al., 1994: 1815) this was the first solid proof of the parasitic nature of species of *Squamanita* and persuasive evidence that all *Squamanitas* are mycoparasites.

When it is accepted that the more or less tuber-like basal bodies in *Squamanita* are deformed basidiocarps of other agarics, two major problems concerning the morphology of *Squamanita* are resolved.

The first of these problems was the fact that in the group of species with orange to yellow or yellow-brown pilei these tuber-like bodies have the acrophysalidic tissue typical for *Amanita* and *Limacella* species, whereas in the species with blue-grey pilei acrophysalides are completely lacking. This looked like such a fundamental difference that generic separation of the two groups would be unavoidable. However, when we assume that the acrophysalidic nature of some tubers is a character of the host parasitized by a species of *Squamanita*, it has no bearing on the taxonomy of the genus *Squamanita*.

The second problem was the curious fact that some species of *Squamanita* seem to have two universal veils, viz. one forming a volval limb on the basal tuber and another forming scales at the base of the stipe proper and on the pileus (see Bas, 1965: 353–354).

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This is most apparent in *S. squarrolosa*, described by Ridley (1988) from New Zealand, and would be a unique construction in the agarics. But if the outer volval limb (very evident in some species, hardly visible or absent in others) is interpreted as a remnant of the outer layer of the parasitized basidiocarp of the host and caused by the primordium of the *Squamanita* breaking out of the tissues of the host, then this problem also no longer exists.

Bas (1965: 356) introduced the term protocarpic tuber for the fleshy, short-lived, basal, more or less tuber-like body of *Squamantas* from which one or more basidiocarps may arise, and the term was adopted by Singer (1975: 22; 1986: 17). Redhead et al. (1994: 1816) rejected this designation, when it became clear that these protocarpic tubers do not belong to the *Squamanita* basidiocarps but are galls provoked by infection of basidiocarps of other species of agarics with *Squamanita* mycelium. We concur but propose a new term for these galls for two reasons. Firstly, these galls have a very special nature as it is likely that they always produce chlamydospores. In *S. odorata*, they often fail to produce *Squamanita* basidiocarps, but always produce large amounts of chlamydospores, and therefore represent a biologically very important part of the life cycle of *S. odorata*. Secondly, it is useful to have a term available that can be used unaltered in all languages. Therefore we propose replacing the term 'protocarpic tuber' with 'cecidocarp'.

Squamanita citricolor Thoen, *spec. nov.* — Fig. 1

Pileus 30–40 mm latus, convexus umbonatusque, flavus vel brunneo-flavus, glaber, laevis, siccus, margine appendiculatus. Lamellae subconfertae, adnatae, albidae. Stipes 80–100 × 15–20 mm, parte superiore cylindraceus, albidus vel flavus, cortinae fibrillis albidis ornatus, parte inferiore incrassatus, profunde radicans, ochraceo-flavus. Sporae 5.7–6.3 × 3.8–4.6 µm, ellipsoideae vel subreniformes vel ovoideae, hyaline, inamyloideae. Cheilocystidia pleurocystidiaque 35–73 × 7–17 mm, fusiformia, crasse-tunicata, abundantia. Pilei cutis hyphis intricatis vel subradiatis, 2.5–10 µm latis, pallide flavidis composita. Lamellarum trama regularis. Fibulae abundantes.

Holotypus: 'Zaire, Haut-Shaba, Luiswishi, 14 Dec. 1971, D. Thoen 5125' (BR; isotypi L, LFG).

Pileus 30–40 mm wide, first convex with fairly acute, conical umbo, expanding to plano-convex with umbo, uniformly bright yellow in the beginning, later becoming brown-yellow at centre and straw yellow at margin, smooth, glabrous, dry, at margin appendiculate with fibrillose remnants of partial veil. Lamellae moderately crowded, adnate, rather narrow (c. 3 mm wide), white at first, later becoming pale pinkish buff, with entire, concolorous edge. Stipe 80–100 × 15–20 mm (rooting base included); stem proper c. 30–35 × 5 mm, cylindrical, solid, at first whitish and covered with whitish fibrils of partial veil, later concolorous with cap; cecidiocarp c. 50–65 × 15–20 mm, elongate-napiform, tapering towards base, deeply rooting, solid, ochraceous-yellow, without volval scales at transitional zone between stipe and cecidiocarp. Flesh white in pileus and stipe, pinkish brown in cecidiocarp. Smell and taste not recorded. Colour of spore print unknown (probably white or very pale).

Spores [20/1] 5.7–6.7(–7.3) × (3.6–)3.8–4.6 µm, Q 1.35–1.75, average Q 1.55–1.6, ellipsoid to subreniform, sometimes subamygdaliform or ovoid, always with broadly rounded apex, with small abrupt apiculus, with very slightly thickened (c. 0.2–0.25 µm), in NH₄OH 10% pale yellowish, homogeneous wall, smooth, inamyloid, not or weakly metachromatic in cresyl blue, not accumulating Congo red, only a few weakly cyanophilous.

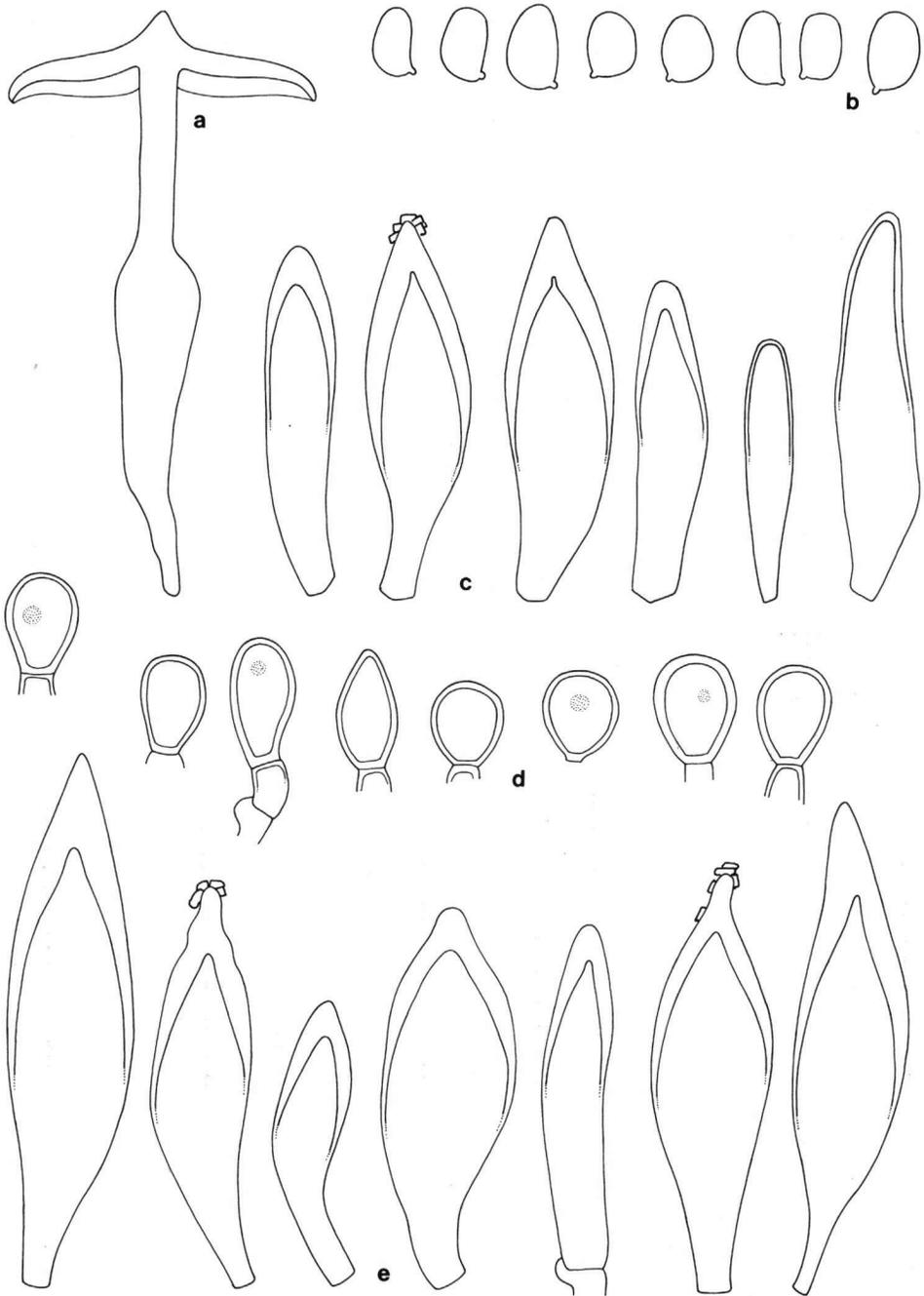


Fig. 1. *Squamanita citricolor* (holotype). a. Basidiocarp on cecidiocarp, $\times 1$; b. basidiospores, $\times 1500$; c. cheilocystidia, $\times 1000$; d. chlamydoconidia from cecidiocarp, $\times 1500$; e. pleurocystidia, $\times 1000$.

Basidia 4-spored, $27-36 \times 7-10 \mu\text{m}$, with clamp. Pleurocystidia ($39-73 \times 8.5-17 \mu\text{m}$) and cheilocystidia ($35-52 \times 7-14.5 \mu\text{m}$, intermixed with basidia), very abundant, usually fusiform to ventricose-fusiform, more rarely narrowly clavate, with obtuse to rather acute apex, sometimes mucronate, frequently with small, easily disappearing apical cluster of crystals or lumps of amorphous matter, thin-walled in lower half but very thick-walled in upper part; thickened wall vaguely layered, colourless to yellowish in NH_4OH , weakly metachromatic in cresyl blue, deeply colouring in Congo red, not cyanophilous. Pileipellis a cutis of (near centre) interwoven to (near margin) subradial, $2.5-10 \mu\text{m}$ wide, thin-walled to very slightly thick-walled, pale yellowish hyphae with clamps and a few usually narrow, refractive hyphae; cutis in radial section from c. $800 \mu\text{m}$ thick near centre to c. $400 \mu\text{m}$ thick near margin; hyphae densely packed and more or less agglutinate; pigment difficult to localize. Hymenophoral trama regular, but very slightly divergent in narrow, $10-15 \mu\text{m}$ thick outer layer, made up of $4-18 \mu\text{m}$ wide hyphae (narrow near subhymenium, broad and constricted at septa in central part), with scattered but rather abundant elongate packets, $2.5-10 \times 1-3 \mu\text{m}$, of intercellular crystals. Subhymenium very narrow, $10-15 \mu\text{m}$, ramose. Trama of stipe consisting of up to $25 \mu\text{m}$ wide, thin-walled, colourless hyphae with small clamps and scattered yellowish refractive hyphae. Trama of cecidiocarp abruptly different from that of stipe, composed, of (i) $4-25 \mu\text{m}$ wide, thin-walled, colourless, branching hyphae, varying from narrow and long-celled to broad and short-celled; (ii) fairly abundant, erect, clavate, thin-walled, terminal cells (acrophysalides), $130-310 \times 35-75 \mu\text{m}$, sometimes with yellowish contents; (iii) abundant brownish yellow, coiling and undulating, $5-20(-30) \mu\text{m}$ wide, refractive hyphae, and (iv) small, scattered, solitary, obovoid to clavate, rarely ventricose-fusiform, very thick-walled ($1.2-1.5 \mu\text{m}$), yellow-brown, terminal chlamydospores, $7.5-8.5(-10.5) \times 5.5-7(-8.5) \mu\text{m}$, inamyloid, not accumulating Congo red, with inner layer very slowly metachromatic in cresyl blue, not cyanophilous, rather abundant in cortical layer, rare elsewhere. Clamps abundant.

Habitat — Terrestrial in dense, dry forest; found in rainy season.

Distribution — Known only from type-locality in Zaire.

Collection examined. ZAIRE: distr. Haut-Shaba, Luiswishi 22 NNE of Lumbumbashi, 1,210 m alt., 14 Dec. 1971, *D. Thoen 5125* (holotype, BR; isotype, L and LFG).

Squamanita citricolor is very well characterized by the glabrous, bright yellow to yellow-brown cap, the glabrous base of the stem and upper part of the cecidiocarp, and the thick-walled pleuro- and cheilocystidia.

In view of the heavy fibrillose-squamose volval decoration of the pileus and the base of the stipe in the related species *S. umbonata* and *S. schreieri*, the total absence of volval remnants from the mature basidiocarp of *S. citricolor* is rather surprising. It looks as if the distribution of the vela in this species is a sixth to be added to the five types illustrated by Bas (1965: 353). The hyphae of the pileipellis being agglutinate, it is, however, possible that under very wet conditions the cap is viscid and that in the type-collection the volval remnants have been washed away. But in that case one would expect to find at least a few volval fragments at the base of the stipe and/or on the top of the cecidiocarp. The true nature of the volva in this species will be revealed only when some very young basidiocarps are collected.

RÉSUMÉ

Une nouvelle espèce, *Squamanita citricolor*, est décrite du Zaïre (actuellement 'République démocratique du Congo'). Il s'agit de la première espèce du genre en Afrique. Le basidiocarpe de dimension moyenne est caractérisé par un chapeau jaune, glabre, un stipe blanchâtre à jaunâtre émergeant d'un bulbe basal obconique, jaune ocre, profondément radicant, ainsi que par des pleuro- et des cheilocystides fusiformes, à parois très épaisses. Par ses larges cystides fusiformes, *S. citricolor* rappelle *S. umbonata*, une espèce à vaste aire de répartition, connue actuellement d'Amérique du Nord, d'Europe et d'Asie. *Squamanita citricolor* n'est connu que de la localité type où il croît au sol, dans une forêt dense sèche (appelée localement 'muhulu') de la province du Haut-Shaba (anciennement 'Haut-Katanga').

En raison du mycoparasitisme probable de toutes les espèces du genre *Squamanita*, la partie basale, qualifiée précédemment de 'tubercule protocarpique', est en fait un basidiocarpe déformé d'une autre espèce infectée par le mycélium du *Squamanita*. En conséquences, les auteurs proposent de remplacer le terme 'tubercule protocarpique' par le nouveau terme 'cécidiocarpe'.

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