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Two new *Lactarius* species from Cameroon

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Abstract – *Lactarius desideratus* Verbeken & Stubbe nov. sp. and *L. uapacae* Verbeken & Stubbe nov. sp. are described from primary rainforest in Cameroon. Both species are characterized by very small and yellowish basidiocarps, but their microscopical features are very different, placing one of them in *L.* section *Plinthogali* and one in *L.* sect. *Chamaeleontini.*

***Lactarius* / taxonomy / tropical Africa / ectomycorrhizal fungi / primary rainforest**

Résumé – *Lactarius desideratus* Verbeken & Stubbe nov. sp. et *L. uapacae* Verbeken & Stubbe nov. sp. sont décrits de la forêt tropicale du Cameroun. Les deux espèces ne se ressemblent que par leurs carpophores petits et jaunes, car leurs caractères microscopiques très différents placent *L. desideratus* dans la section *Plinthogali* et *L. uapacae* dans *L.* sect. *Chamaeleontini.*

INTRODUCTION

The diversity of the ectomycorrhizal genus *Lactarius* Pers. in tropical Africa is high. A forthcoming monograph treats 96 species (Verbeken, 2008 - including the species described in this paper) but the real number of species is estimated to attain at least 125 (Verbeken & Buyck, 2001). Records from Cameroon are still rather scarce. Only two species were originally described from Cameroon, *Lactarius undulatus* Verbeken (Verbeken, 2001) and *L. zenkeri* (Henn.) Singer (Hennings, 1902), whereas eight other species have been reported from the country, mainly from Korup National Park: viz. *Lactarius acutus* R. Heim, *L. annulatoangustifolius* (Beeli) Buyck, *L. gymnocarpus* R. Heim ex Singer, *L. inversus* Gooss.-Font. & R. Heim, *L. melanodermus* R. Heim & Gooss.-Font., *L. melanogalus* R. Heim ex R. Heim, *L. phlebonemus* R. Heim & Gooss.-Font., and *L. rubroviolascens* R. Heim (Berthet & Boidin, 1966; Heim, 1955; Verbeken, 1995, 1996a, 1996b, 2001, 2008; Verbeken & Walleyn, 2000; Verbeken *et al.*, 2000). Identifications of some other species cited in Onguene (2000) need to be confirmed.

During a short expedition in the Dja Biosphere Reserve in April 2007, when rains arrived later then usual, only 2 *Lactarius* species with small basidiocarps were collected among roots of *Uapaca guineensis* Müll. Arg. in a wet part of the rainforest. Micromorphological and molecular data show that notwithstanding their macromorphological resemblance, they belong to two completely different groups:

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Lactarius sect. *Plinthogali* and *L.* sect. *Chamaeleontini*. A recently published phylogeny (Buyck *et al.*, 2008) has demonstrated that these 2 sections actually belong to 2 different lactarioid genera but as the nomenclatural implications of this study are still pending (Buyck *et al.*, 2008 submitted), the genus *Lactarius* is treated here in the traditional concept.

MATERIAL AND METHODS

Macroscopic characters are all based on fresh material. Microscopic features were studied from dried material mainly in Congo-red in L4. Spore ornamentation is described and illustrated as observed in Melzer's reagent. For details on terminology we refer to Verbeken (1998, 2008). Line-drawings were made by A. Verbeken with the aid of a drawing tube at original magnifications 6000 × for spores, 1000 × for individual elements and sections. Basidia length excludes sterigmata length. Spores were measured in side view in Melzer's reagent, excluding the ornamentation, and measurements are given as (MINa) [AVa-2*SD] - *AVa* - *AVb* - [AVb + 2*SD] (MAXb) in which AVa = lowest mean value for the measured collections, AVb = greatest mean value and SD = standard deviation calculated for the measurements of one collection. Q stands for "quotient length/width" and is given as (MINQa) *Qa* - *Qb* (MAXQb) in which Qa, respectively Qb, stands for the lowest, respectively the highest, mean quotient for the measured specimens. Colour codes refer to Kornerup & Wanscher (1978).

RESULTS

Lactarius desideratus Verbeken and Stubbe **sp. nov.** **Fig. 1**

Pileus 9-20 mm diam., planoconvexus, applanatus vel leviter depressus, striatus-sulcatus, venosus, flavus ad pallide flavobrunneus ad aurantioflavus. Lamellae adnatae, distantes, flavidoalbae. Stipes 8-14 mm longus, 1-2 mm crassus, subcylindratus, griseoflavus vel pallide flavus. Latex aquosus ad albus, immutabilis, in papyro flavescens. Sporae late ellipsoideae, interdum subglobosae, 6.5-7.2-7.8 × 5.7-6.3-6.4 µm (Q = 1.07-1.15-1.23), zebroideae, cristis angustis usque ad 1.5(2) µm altis ornatae, macula suprahilaris distale amyloidea. Basidia 35-55 × 10-11 µm, (2)4-sporae, subclavata. Pleurocystidia absentia. Pleuropseudocystidia abundantia, leviter emergentia, 4-6 µm diam., cylindrata ad leviter tortuosa. Pileipellis bistrata, cellulae terminales subclavatae ad clavatae vel filiformes.

Holotypus: Cameroon, Eastern Prov., La réserve de faune du Dja, among roots of Uapaca guineensis in swampy place of primary rainforest, 10 April 2007, A. Verbeken 07-47 (GENT).

Pileus 9-20 mm diam., planoconvex, flattened or slightly depressed in the centre; surface striate-grooved, with soft pubescent reticulate veins in the centre, with some veins also present near the margin, soft velvety-pubescent, somewhat opaque, yellow to pale yellowish brown or orange yellow (3A4 to 4B6), darker in young specimens, up to 5D8 but more yellow. *Lamellae* broadly adnate with slightly decurrent tooth, distant (7+21 L+l/half a pileus), with 3 lamellulae between

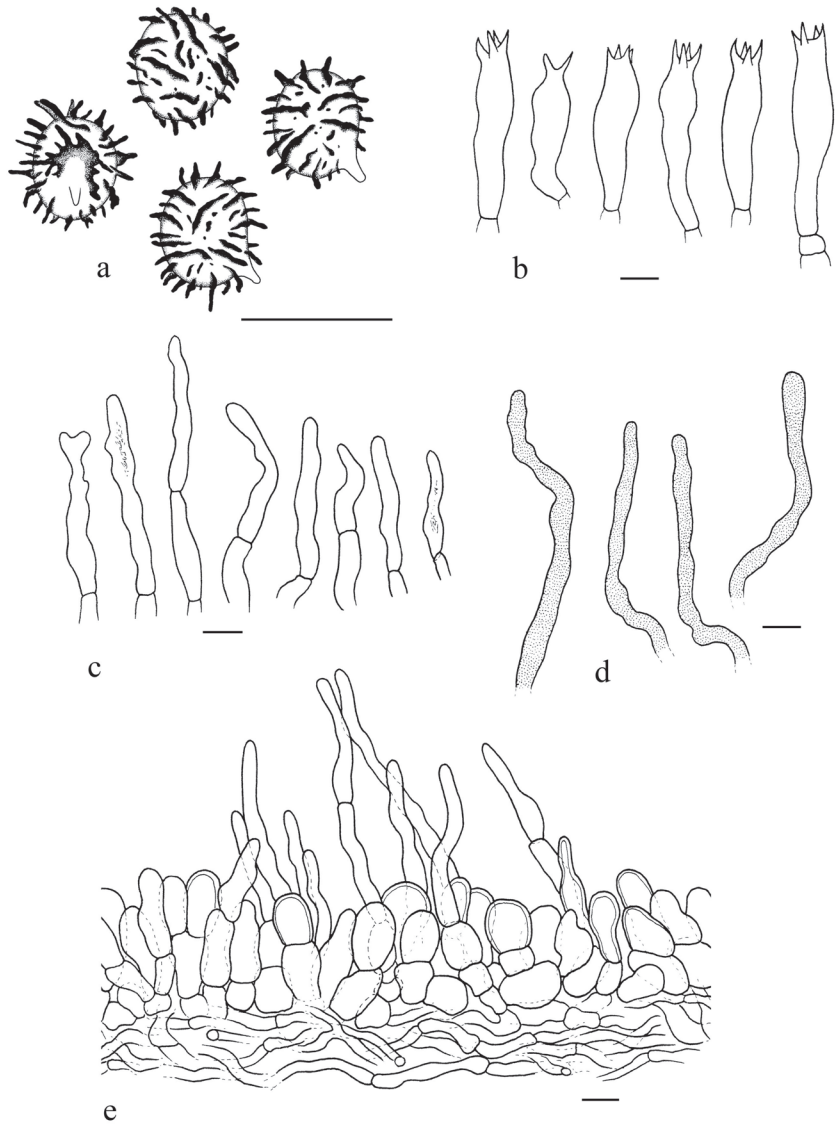

Fig. 1. Lactarius desideratus (holotypus): **a.** spores, **b.** basidia, **c.** marginal cells, **d.** pleuropseudocystidia, **e.** section through the pileipellis (scale bar = 10 μm).

2 lamellae, with a regular short-long-short-pattern, yellowish white, 4A2, rather thick, 1-3 mm broad; edge entire, concolorous. *Stipe* 8-14 mm × 1-2 mm, subcylindrical, tapering downwards, greyish yellow (4B5-4C6) or somewhat paler yellow, very slightly felty. *Context* very thin-fleshed, hollow in stipe, dirty pale yellow, unchanging, unchanging with $FeSO_4$; taste agreeable; smell not remarkable. *Latex* watery white, not abundant, unchanging, unchanging when isolated on glass, but changing to dirty yellow when isolated on white paper.

Spores mostly broadly ellipsoid, sometimes subglobose, 6.5-*7.2*-7.8 × 5.7-*6.3*-6.4 µm (Q = 1.07-*1.15*-1.23, n = 20); ornamentation strongly zebroid, composed of rather narrow ridges up to 1.5(2) µm high, arranged in a parallel pattern; abundant short ridges and warts present; plage distally amyloid. *Basidia* 35-55 × 10-11 µm, (2)4-spored, subclavate or somewhat irregular. *Pleurocystidia* absent. *Pleuropseudocystidia* rather abundant, slightly emergent, 4-6 µm diam., cylindrical to slightly tortuous, with slightly refringent walls. *Lamella edge* sterile; marginal cells 28-52 × 4-6 µm, subcylindrical or subfusiform, often irregular or with some bulges, very thin-walled, hyaline to slightly granular. *Lamellar trama* mixed, with hyaline hyphae, small sphaerocytes and lactifers. *Pileipellis* a palisade; subpellis thin, 1 or 2 cell-layers thick; terminal elements of two types; first type subclavate or clavate, sometimes almost spherical, 15-25 × 5-15 µm, thin-walled or distinctly thick-walled; second type long cylindrical and slender, 30-50 × 4-6 µm, always thin-walled. *Stipitipellis* similar, a thin palisade with two types of elements.

Collections examined: Cameroon, Eastern Prov., La réserve de faune du Dja, campement dans la brousse, alt. 610 m., N 03°19.50' E 12°42.87', among roots of *Uapaca guineensis* in periodically inundated, swampy primary rainforest, 10/04/2007, *A. Verbeken* 07-47 (Holotypus, GENT); ibid., 11/04/2007, *A. Verbeken* 07-63 (GENT).

Our molecular data (unpubl.) show that this species belongs to *Lactarius* section *Plinthogali* (Burl.) Singer, which is also supported by the micromorphological features: strongly zebroid spores, absence of pleurocystidia and a palisade structure in pilei- and stipitipellis.

L. desideratus is most closely related to *L. adhaerens* R. Heim, described from Malagasy lowland rainforest and only known from the type locality (Heim, 1938). *L. adhaerens* differs macromorphologically by the darker and more ochraceous orange colours of the pileus and the large collar of orange hairs at the base of the stipe. The stipe is also brownish red, while our species in Cameroon has a pale yellow and smooth stipe. Microscopically, *L. adhaerens* differs by the larger spores (8.0-*8.8*-9.5(10.5) × 6.9-*7.5*-8.2 µm), also ornamented with narrow and high ridges but in a less zebroid and rather subreticulate pattern.

Both species stand out among the others of the same section because of their very small and yellow basidiocarps with distinct veins on the pileus. In *L. adhaerens* no colour change of the latex is observed. The Cameroon specimens showed a distinct yellowing of the latex only on white paper or on white tissue.

Lactarius uapacae Verbeken and Stubbe **sp. nov.** **Fig. 2**

Pileus 10-14 mm diam., planoconvexus, leviter depressus, striatus-sulcatus, minute velutinus, pallide flavus ad flavidoalbus. Lamellae adnatae, distantes, flavidoalbae. Stipes 7-10 mm longus, 1-3 mm crassus, subcylindratus, albidus. Sporae subglobosae ad late ellipsoideae, 8.5-9.9-11.4 × 7.8-8.9-9.9 µm (Q = 1.05-1.12-1.22), subreticulatae, cristis usque ad 1(1.5) µm altis ornatae, macula suprahilaris non amyloidea. Basidia 35-45 × 12-15 µm, (2)4-sporae, clavata. Pleurocystidia absentia. Pleuropseudocystidia abundantia, valde emergentia, usque ad 20 µm diam., fusiformia. Pileipellis bistrata, cellulae terminales subfusiformes vel subcylindricae, crassotunicatae.

Holotypus: Cameroon, Eastern Prov., La réserve de faune du Dja, growing on small branches under Uapaca in swampy place of primary rainforest, 10 April.2007, A. Verbeken 07-48 (GENT).

Pileus 10-14 mm diam., applanate with slight depression or slightly curved upwards in the centre, weakly umbonate; surface transparently striate-grooved, minutely

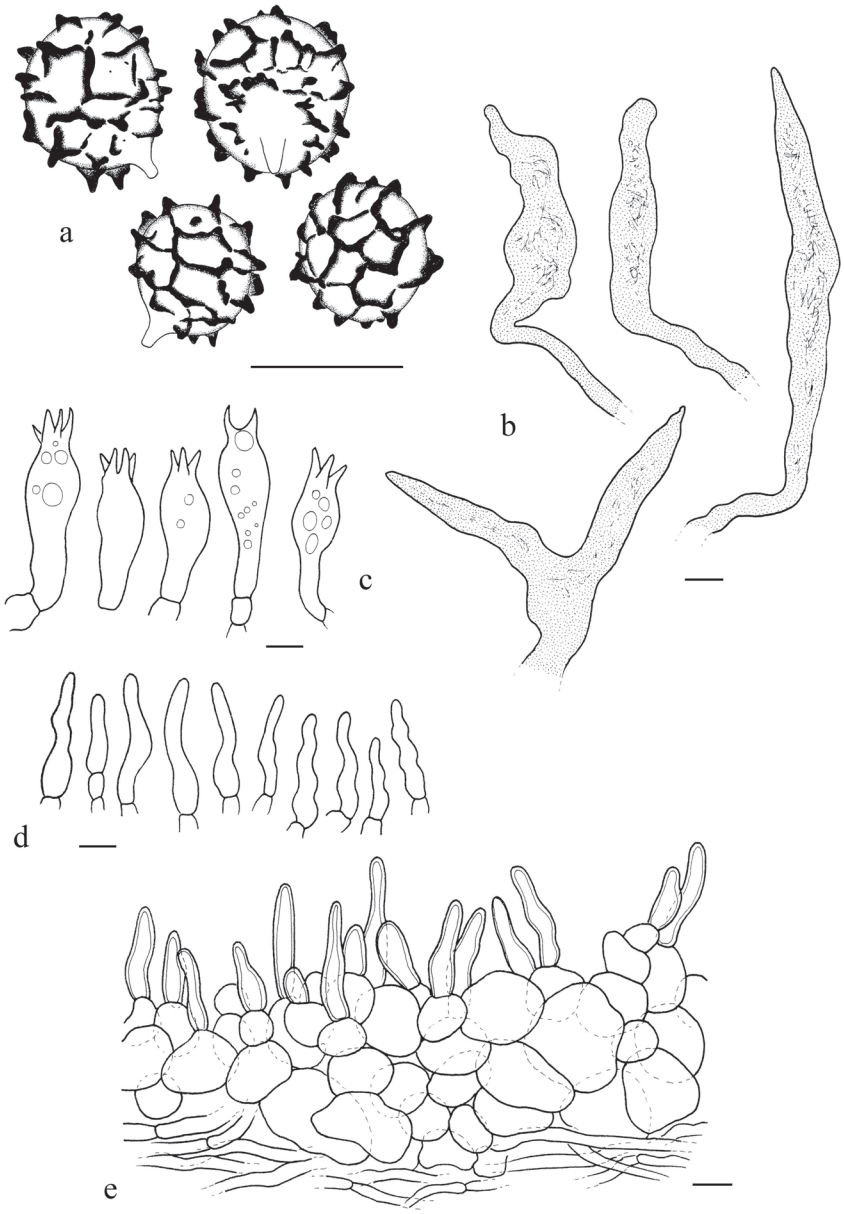

Fig. 2. Lactarius uapacae (holotypus): **a.** spores, **b.** pleuropseudocystidia, **c.** basidia, **d.** marginal cells, **e.** section through the pileipellis (scale bar = 10 µm).

felty, opaque, slightly greasy, without veins, very pale yellow to yellowish white (4A3) at the margin and when older, in centre and in young specimens slightly darker buff-yellowish to pinkish buff. *Lamellae* broadly adnate, distant, with 3 lamellulae between 2 lamellae, with regular short-long-short pattern, yellowish white; edge entire, concolorous. *Stipe* 7-10 mm × 1-3 mm, subcylindrical or strongly

curved, tapering downwards, sometimes irregular, pale buff to whitish. *Context* very thin-fleshed, hollow in stipe, dirty pale yellow, unchanging; smell not remarkable; taste unknown. *Latex* not observed.
Spores subglobose to broadly ellipsoid, 8.5-*9.9*-11.4 × 7.8-*8.9*-9.9 µm (Q = 1.05-*1.12*-1.22, n = 20); ornamentation amyloid, subreticulate, composed of wings up to 1(1.5) µm high; plage not amyloid. *Basidia* 35-45 × 12-15 µm, (2)4-spored, clavate. *Pleurocystidia* absent. *Pseudopleurocystidia* abundant, very emergent, locally up to 20 µm diam., fusiform or irregular, sometimes branching. *Lamella edge* sterile; marginal cells 20-37 × 4-6 µm, subfusiform to subcylindrical, thin-walled, hyaline. *Lamellar trama* cellular, composed of rather large sphaerocytes and lactifers. *Pileipellis* a lampropalissade, 60-80 µm thick; terminal elements subfusiform to subcylindrical, 15-35 × 6-9 µm, thick-walled; subpellis 40-50 µm thick. *Stipitipellis* a lamprotrichopalisade to lamprotrichoderm; terminal elements longer and more variable than in the pileus.

Striking characteristics for this species are the pale yellow and small basidiocarps, differing from *Lactarius desideratus* by the lack of veins and the paler colours. Microscopically the species is characterized by the large spores with subreticulate ornamentation. The broad and emergent pseudocystidia are typical for representatives of *L.* sect. *Chamaeleontini* Verbeken, as are the yellowish colours and the sulcate pileus. The pileipellis structure in this section shows quite some variation when it comes to the presence of thick-walled and usually hair-shaped elements: abundant to scattered, rarely absent. For this species, a pure lampropalisade is characteristic within the section. The species differs from all other members of this section by its small basidiocarps.
Collections examined: Cameroon, Eastern prov., La réserve de faune du Dja, campement dans la brousse, alt. 610 m., N 03°19.50' E 12°42.87', swampy primary rainforest with *Uapaca guineensis*, growing on small, decaying branches up to 10 cm above the ground, 10 April 2007, *A. Verbeken* 07-48 (GENT).

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