

New African woodland taxa for *Russula* subsection *Mamillatinae*

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Abstract – Descriptions and illustrations are provided for all taxa in *Russula* subsection *Mamillatinae*, including some new taxa from the zambezian woodlands in Africa: *R. immaculata* var. *julbernardiae* var. nov., *R. rubrorobusta* sp. nov., *R. rubrorobusta* var. *repleta* var. nov., *R. nkayambae* sp. nov. A key to the taxa is provided and the definition of the subsection emended.

Résumé – Descriptions et illustrations sont fournies pour tous les taxons de *Russula* sous-section *Mamillatinae*, y compris quelques nouveaux taxons décrits des forêts claires zambéziennes en Afrique: *R. immaculata* var. *julbernardiae* var. nov., *R. rubrorobusta* sp. nov., *R. rubrorobusta* var. *repleta* var. nov., *R. nkayambae* sp. nov. Une clé des taxons est donnée et la définition de la sous-section est émendée.

INTRODUCTION

Russula subsection *Mamillatinae* Buyck (1990) was described for *R. immaculata* (Beeli) Dennis from the *Gilbertiodendron dewevrei* dominated rain forest in Zaire. *R. immaculata* forms very firm and robust basidiomata with a white (var. *immaculata*) to yellow (var. *mamillata*), mamillate cap and a strongly greying context. It is microscopically well characterized by the densely agglutinated, hardly dissociating extremities of the pileipellis and the reticulate spores showing obtuse, interconnected warts and a distinctly amyloid plage. The type specimen of *R. immaculata* var. *immaculata* is a single, heavily infested basidiome, but the type of the var. *mamillata* consists of several well-preserved basidiomata (part of the type of this variety is represented on the 1992 stamps of 100 Burundian francs). Both taxa were collected between 1924 and 1942 by Miss Goossens-Fontana, the wife of a Belgian botanist and resident in Zaire. Another rain forest species collected by Miss Goossens-Fontana, *Russula viridirobusta* Buyck, has the same habit and pileipellis structure but the colour of the cap is green and the spores are not reticulate and lack an amyloid plage. Notwithstanding these important differences for the spores, *Mamillatinae* seems provisionally the best place for *R. viridirobusta* because of the very similar pileipellis structure, at least until new collections allow a re-appreciation of this taxon.

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In this contribution, I describe some new African taxa in *Mamillatinae* from the neighbouring Zambezi woodlands while providing also English descriptions for the already described rain forest taxa (with the exception of *R. viridirobusta*) for a better understanding of the subsection. The definition of the subsection is emended.

MATERIAL AND METHODS

All specimens were collected and described by the author. Specimens for the new taxa are deposited at PC. Microscopic observations and measurements were made in ammoniacal Congo red, after a short aqueous KOH pretreatment to improve tissue dissociation and matrix dissolution. Original drawings for all elements of the hymenium or pellis were made at a 2600 × magnification. Original drawings of spores were made at a magnification of 6700 × using a monotubus with mirror. All drawings are represented to the 10 μm bar. Observation of ortho- and metachromatic structures in cresyl blue were made as explained in Buyck (1989). Measurements of spores were performed in Melzer's reagent and are based on 20 spores per specimen; they give mean length and width (in case more than one collection is measured, the highest and lowest measured mean values are given for length and width and "n" = total number of spores measured for the taxon), mean values are preceded by their subtracted doubled standard deviation, and followed by their added doubled standard deviation, these preceded, resp. followed, between brackets, by eventually exceeding minimum or maximum values. Similarly, the mean length/width ratio (Q) gives minimum, mean and maximum values (in case more than one specimen is measured, the highest and lowest measured mean values are given and "n" = total number of spores measured for the taxon). We refer the reader to Buyck (1991) for explanation of cystidial terminology.

SUBSECTION MAMILLATINAE

Russula subsection *Mamillatinae* Buyck, Bull. Jard. Bot. Nat. Belg. 60: 209 (1991), emend.

Basidiomata fleshy, often very large. **Cap** white, yellow, brownish orange to pinkish orange or pinkish to dark red or vinaceous, sometimes mamillate or irregularly lobed, firm and robust with a smooth or indistinctly striate margin. **Stipe** central to subcentral, generally long and stout, whitish to subconcolorous above, in its lower part often developing brownish tints and becoming coarsely scurfy-scaly with brown, more or less horizontally oriented scales, often forming almost a continuous tomentum at the base. **Context** whitish, often strongly greying at an early age, intensely brownish orange towards the stipe base and in injuries. **Taste** mild, also very acrid and bitter according to Miss Goossens-Fontana. **Smell** usually insignificant. **Spore print** pale cream-coloured: Romagnesi Ib(-IIa?), darker when dry. **Exsiccatum** retaining most of the original pigmentation, if present, in pileus and stipe, otherwise turning brownish; lamellae greyish brown.

Spores subglobose to elongate, with a reticulate ornamentation up to 0.6 μm high, composed of warts or spines fused in ridges or connected by fine lines; **plage** distinctly amyloid. Basidia four-spored, sterigmata not particularly large. **Cystidia** with abundant contents, thin- to thick-walled. **Pileipellis** entirely orthochromatic in cresyl blue, a typical hymeniderm or dens trichoderm of irregularly inflated, small extremities; dermatocystidia also continuing in the underlying trama. **Clamps** absent in all parts.

Type-species: *Russula immaculata* (Beeli) Dennis in Singer

Key to the species

1. Cap and also stipe with pinkish red to vinaceous pigments; in woodland (2)
1. Cap and stipe without red or vinaceous colours, or pileus at most with some faint pinkish tints near the margin (3)
2. Stipe very robust, but with large superimposed cavities in the stipe, outer surface mostly smooth, no brown pigments, spores elongate . . . *R. rubrorubusta*
2. Stipe more slender but compact, without such large cavities, outer surface strongly scurfy-scaly. Spores subglobose to shortly ellipsoid, with brown pigmented cells in cap surface *R. rubrorubusta* var. *repleta*
3. Cap and stipe whitish, in rain forest.
Taste very acrid *R. immaculata* var. *immaculata*
3. Cap and stipe yellowish to pale orange-brown or with weak pinkish tints near the cap margin. Acrid or mild (4)
4. Cap yellow (5)
4. Cap brownish or with faint pinkish tinges at the margin, with stipe distinctly shorter than cap diam., in woodland. Mild *R. nkayambae*
5. Cap basically yellow but often developing a strongly areolate-fissurate surface and turning brown, in woodland. Spores almost globose, terminal cells in cap sometimes thick-walled. Mild *R. immaculata* var. *julbernardia*
5. Cap evenly yellow or somewhat paler towards the margin, without thick-called cells. In rain forest. Acrid *R. immaculata* var. *mamillata*

Russula immaculata (Beeli) Dennis in Singer, Sydowia 9: 425 (1955)

= *Tricholoma immaculata* Beeli, Bull. Soc. Roy. Bot. Belg. 60: 76 (1928)

– var. *immaculata*

Pileus fleshy, large, 120 mm in diam., convex, more or less flattened at the disc, white. **Gills** free, emarginated, 10-12 mm large, pale cream-coloured; lamellulae present; edge concolorous, even. **Stipe** slender, 116 \times 15-17 mm, cylindrical, slightly inflated at the base, probably concolorous, solid. **Context** white, unchanging. **Taste** unknown. **Smell** unknown. **Spore print** pale. **Exsiccatum** with brown-orange pileus (6CD5-7, 5B4-5 or more ochraceous), stipe concolorous or slightly darker (6BCDE4-6), gills pale greyish brown (5CD2-3), rather spaced.

Spores ellipsoid or larmiformous, (7.1)7.3-7.92-8.5 \times 6.7-7.06-7.5 μm ($Q = 1.06-1.12-1.20$, $n = 20$); ornamentation distinctly amyloid, relatively low (less than 0.5 μm), consisting of hemispherical to convex elements aligned in short chains or connected by fine lines and thin ridges, rarely isolated, forming a nearly complete reticulum; plage a broad amyloid patch, more or less depressed and not decurrent on the apiculus, radiating outward. **Basidia** 33-45 \times 11-13 μm , subclavate,

4-sterigmate; sterigmata slender but sometimes very long, 8-11(17) \times 1.5-2.5 μm . **Cystidia** dispersed, 80-110(160) \times 8-13 μm , arising from deep in the lamellar trama and subhymenium, cylindrical, fusiform-pedicellate, obtuse or sometimes abruptly narrowed and appendiculate-moniliformous, thin-walled; contents more or less abundant, crystalline-refrangent, inert to SV. **Marginal cells** not differentiated. **Pileipellis** entirely orthochromatic in cresyl blue, without oleiferous hyphae; subpellis formed of 4-7 μm large hyphae and numerous, equally large, cylindrical, very long and obtuse dermatocystidia; suprapellis a dense trichoderm formed of short, 1-2-celled extremities measuring 4-5(7) μm in diam.; terminal cell cylindrical, clavate or irregularly inflated, thin-walled, with some protruding, obtuse or subcapitate apices from the immersed dermatocystidia. **Stipitipellis** formed of similar, but more regular hyphal extremities often aggregated in fascicles with numerous interspersed dermatocystidia; extremities 4-6 μm diam., obtuse or broadly capitate, much longer and intricate towards the stipe base; caulocystidia cylindrical, 5-7(10) μm diam., relatively short (less than 100 μm) when originating near the surface, much longer if arising from the subpellis or the underlying trama. **Clamps** absent in all parts.

Habitat: terricolous in rain forest

Distribution: Zaire: Central Forest Distr.: Bangala, valley of the Motina, March 1924, Goossens-Fontana 401 (holotype, BR)

– var. *mamillata* Buyck, Bull. Jard. Bot. Nat. Belg. 59: 250 (1989)

Pileus fleshy, very large, up to 200 mm diam., first convex and typically with a narrow, well-differentiated, more or less acute than obtuse mamilla, becoming plano-depressed or finally saucer-shaped; margin smooth or shortly and indistinctly striate, incurved at young stages, often irregularly undulating; pellis smooth, dull, bright yellow, ochraceous or yellowish orange (3A3-5, 4A5-6) with greyish tones; pileal trama white, quickly greying. **Lamellae** shortly adnate to subfree, brittle, subacute in front, thick, close, with dispersed lamellulae (3 lamellulae for 5-7 lamellae/cm), whitish (2A2), developing ochraceous spots (4A3); edge even, concolorous. **Stipe** very stout and long, 140-200 \times 20-50 mm, cylindrical, generally narrowing towards the top or almost obclavate, sometimes curved in the lower part, smooth or longitudinally rugulose, towards the base often scurfy-scaly from horizontally oriented scales as if the stipe ruptures due to too strong inflation, whitish but sometimes developing greyish yellow stains, brownish to dark greyish at the base; stipe trama hard, soled then spongy. **Context** brittle, white, then greying and even locally yellowish or reddish towards the stipe base, immediately blue-green with gaiac, rapidly greyish pink with FeSO₄, dark brown with Phenol, insensitive to NH₄OH and aniline. **Taste** strongly acrid and bitter (fide Miss Goossens-Fontana). **Smell** acrid (fide Miss Goossens-Fontana). **Spore print** white, quickly cream. Exsiccatum retaining yellow pigments, later also developing brownish tints.

Spores 7.5-8.02-8.53-9.0 \times 6.9-7.13-7.25-7.6 μm ($Q = 1.07$ -1.13-1.18-1.22, $n = 40$). **Other microscopical features** as in the type variety.

Habitat: terricole in *Gilbertiodendron dewevrei* – dominated rain forest

Distribution: Zaire: central Forest Distr.: Binga, *Gilbertiodendron dewevrei*-dominated rain forest, June 1928, Goossens-Fontana 769 (BR), *ibid.*, oct. 1928, Goossens-Fontana 769b (BR); *ibid.*, dec. 1941 and March 1942, Goossens-Fontana 2073 (holotype, BR)

This variety differs essentially in the yellow colour of the pileus.

– var. **julbernardiae** var. nov.

Figs. 1-6

a var. *mamillata* immaculataque differt pileo concavo haud mamillato fissurato-squamoso squamis marginem versus brunnescentibus praedito sapore miti odore subnulla. Holotypus: Zambia, Luapula prov., prope Kawambwa Ntamubachushi falls versus, sub *Julbernardia globiflora* in silvis clarioribus, Jan. 6, 1991, Buyck 3422 (PC)

Basidiomata terricole. **Pileus** up to 112 mm diam., slightly depressed in the centre, brownish yellow but developing strongly and irregularly fissurate surface towards the margin (aspect of weathered specimens); margin sometimes weakly undulate, smooth. **Lamellae** subfree, dens, brittle, white, not frequently forked or anastomosed, rather thick; edge even, concolorous or sometimes staining brownish. **Stipe** 65 × 35 mm, firm and stout, subcylindrical to slightly ventricose, whitish but breaking up in brownish scales towards the base. Veil absent. **Context** whitish, developing brown colors when attacked by insects or other animals, orange with FeSO₄. **Taste** mild. **Smell** insignificant. **Spore print** not obtained, certainly pale. **Exsiccatum** cap strongly fissured, orange-brown (5C6-8) to pale brown (between series 4 & 5), stipe much paler, scaly-squamulose in lower half.

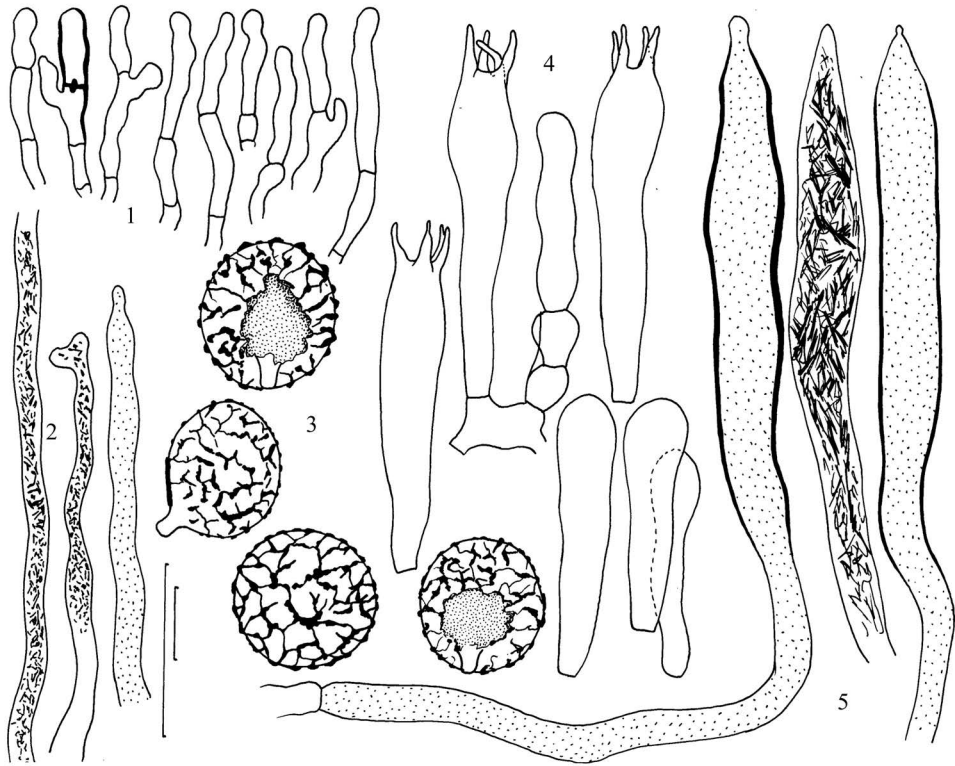
Microscopic features as in type.

Habitat: miombo forest, often near *Julbernardia*

Distribution: Burundi: Cankuzo prov., near the village of Cendajuru at the Tanzanian border, hill miombo with *Brachystegia longifolia* and *Julbernardia globiflora*, Dec. 1994, Buyck 5711 (PC). Zambia: Luapula prov., near Kawambwa, road to Ntamubachushi falls, under *Julbernardia globiflora*, Jan. 6, 1991, Buyck 3422 (holotype PC), Copperbelt Prov., Farm “Gibsons”, miombo woodland, leg. Buyck & Eyssartier, 16 Jan. 1996, Buyck 96.054 (PC). Tanzania: Southern Prov., Songea district, near Namtumbo, mixed miombo on brown soil, alt. 750 m, 26 Jan. 1993, Harkonen *et al.* 1402 (H, PC); *ibid.*, Njombe district, Masaulva village, N of Kidungala, alt. 1500, 2 Feb. 1993, Harkonen *et al.* 1542 (H, PC)

This may just be some kind of more robust woodland form of the rain forest taxon, as indicated by the shorter stipe, fissured cap and often more intense colours (typically rain forest species have long stipes, often bleach out and have thinner caps). On the other hand, the woodland collections have nearly globose spores and often thick-walled cells in the pileipellis. The only difference of importance resides in the mild taste and smell, a feature that Miss Goossens-Fontana noted as strongly acrid in her collections and which can be hardly ignored until new collections can be examined.

Confusion with other woodland taxa is easy since several yellow coloured look-alikes are present in the same habitat (Buyck, unpubl.) and share the grey-



Figs. 1-5. *R. immaculata* fo. *julbernardiae*. 1. Terminal elements of the pileipellis. 2. Parts of dermatocystidia in subpellis. 3. Spores. 4. Basidia and basidiola. 5. Pleurocystidia. (BB 5711). Scale = 10 μ m, the longest bar applying to spores only.

ing context, strongly fissured pileus and scurfy-scaly stipe surface. The latter species differ, however, in the inamyloid suprahilar spot on the spores, making identification with a microscope necessary but straightforward.

***Russula nkayambae* spec. nov.**

Figs. 7-9

A ceteris Mamillatinis differt pilei colore brunneo-aurantiaco marginem versus roseo-aurantiaco. Holotypus: Burundi: in monte "Nkayamba", prope oppidum Rumonginis, in silva clariore sub *Brachystegia* spec., Buyck 4958 (PC)

Pileus 62-137 mm diam., dry, dull, smooth or veined (as in *Pluteus* sect. *Cellulodermi*) and brownish to brownish orange (6BC4-6) in the centre, pinkish orange (6AB2-3, 4-6B2) and smooth towards the margin, locally finely fissured under a hand lens. Stipe 40-60 \times 16-34 mm, subcylindrical or attenuating at the base, pinkish brown on a whitish background, white near the lamellae, finely squamulose-scaly towards the base and there sometimes brownish (as in *R. cellulata*), compact-spongy inside. **Lamellae** ivory, very brittle, subfree or decurrent with a tooth, obtuse towards the margin, anastomosed-forked towards the stipe; edge even, concolorous.

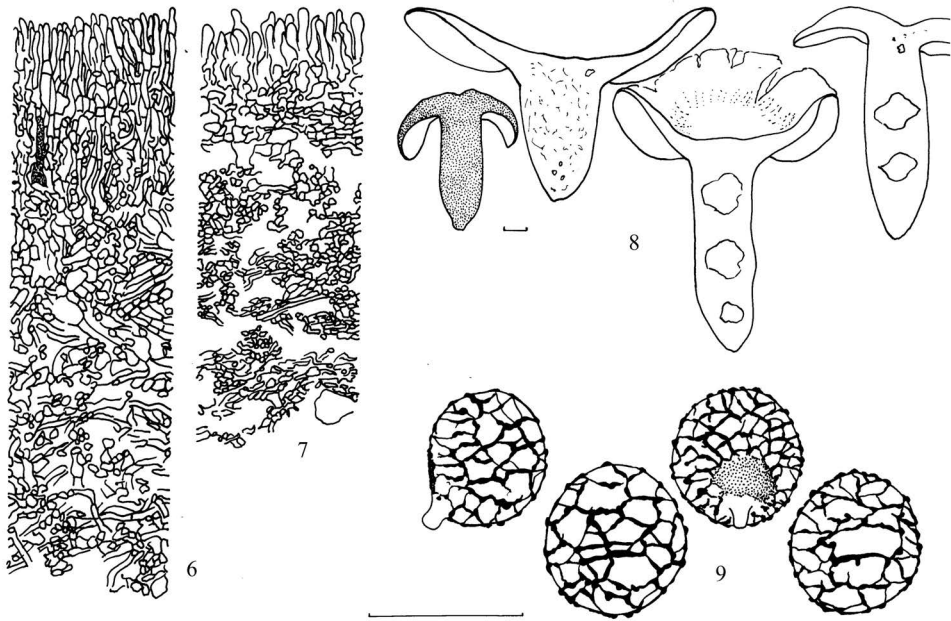


Fig. 6. *R. immaculata* fo. *julbernardiae*. Section through pileipellis. Figs. 7-9. *R. nkayambae*. 7. Section through the pileipellis (BB 4958). 8. Habit of carpophores (from left to right: BB 4959, 4958, 4842, 4288). 9. Spores (BB 4842). Scale = 1 cm for habit, 10 μ m for microscopic elements, the longest bar applying to spores only.

Context rather firm, strongly browning in the stipe, faintly greyish in pileus, unchanging with FeSO₄. **Taste** mild. **Smell** weakly agreeable. **Spore print** (pale cream (IIa Romagn., 3-4 Dagrøn)). **Exsiccatum** retaining most of its original colours.

Microscopic features very similar to the other *Mamillatinae*. Spores (7.2)7.4-8.24-8.73(9.7)10.2 \times 7.0-7.61-7.89-8.6(8.8), Q = (1.05)1.11-1.14(1.19), n = 80.

Habitat: miombo woodland

Distribution:

Burundi: hill of Nkayamba, under *Brachystegia utilis*, 3 Jan. 1992, Buyck 4172, *ibid.*, under *B. microphylla* and *B. spiciformis*, 26 March 1992, Buyck 4288, *ibid.*, *id.*, under *B. bussei*, 18 Dec. 1992, Buyck 4842, *ibid.*, under *B. microphylla* and *B. spiciformis*, 24 Feb. 1993, Buyck 4958 (holotype), 4959

Among *Mamillatinae*, this is possibly the closest species to *R. cellulata*, as suggested by the coloration of the stipe base and general habit, but it lacks the frequently forked gills so typical of many species of the *R. cellulata* complex.

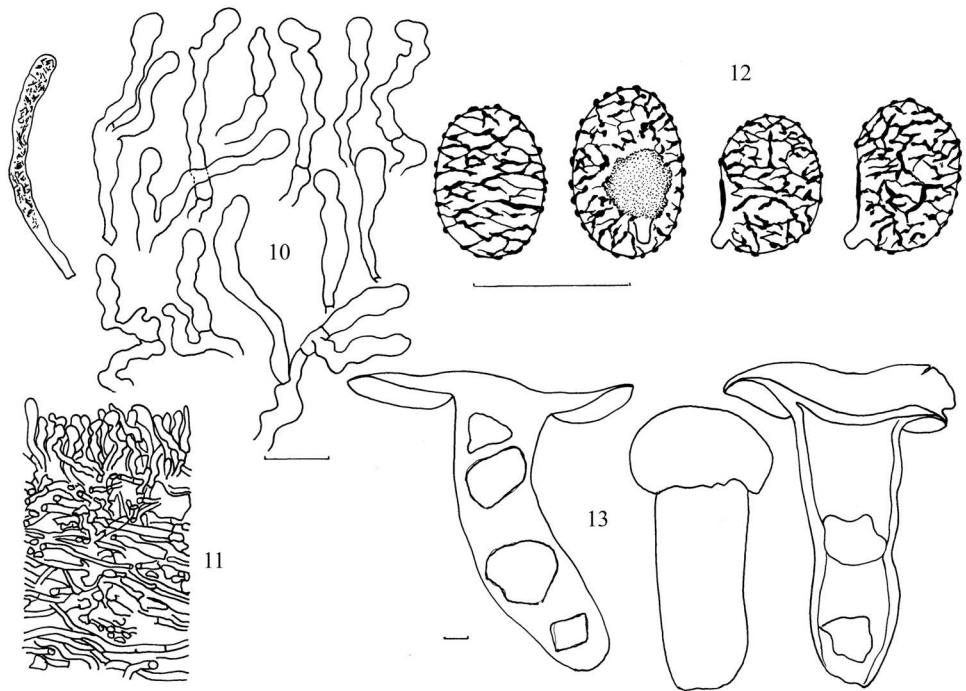
R. nkayambae is only known from Burundi for the moment – and even from a single locality – and might be much more restricted geographically or ecologically than the other species.

Russula rubrorobusta spec. nov.

Figs. 10-13

A *R. mamillata* differt pilei stipitique coloribus rubris vinaceis sporis longioribus dermatocystidiis rarioris. Holotypus: Burundi: Buyck 4825 (PC)

Basidiomata very firm, large, sometimes half buried in the soil or between the moss cover. **Pileus** very firm and hard, 76-150 mm diam.; margin regular or undulated, sometimes radially fissured, shortly striate-tuberculate; pellis attached except at the extreme margin, in young specimens sometimes peeling to mid-radius exposing the pink underlying context, dry, never viscose, dark vinaceous red (11 DEF 5-8, 10 EF 6-8), sometimes locally blood-red or orange-red, violaceous brown (10E6) near the centre, often developing cream-coloured to yellowish (4B3) patches or brown to cream-coloured spots, sometimes areolate towards the margin. **Lamellae** free, equal, 8-14 mm broad, thick but very brittle, spaced (6L/cm), occasionally forked towards the stipe, not anastomosed, cream-coloured (2A2), greyish (7B1) in old fruit bodies; gill edge concolorous, turning brown in age, finely powdery. **Stipe** central, robust and tall, 52-130 × 18-43 mm, straight, cylindrical, whitish to grey with reddish or pinkish (10A4-6, 10BC3-5) or orange-brown (5C5) tints, longitudinally wrinkled; the interior with few but large super-



Figs. 10-13. *R. rubrorobusta*. 10. Terminal elements of the pileipellis, a single DC shown and filled with granular contents (BB 4826). 11. Upper part of section through pileipellis (BB 4826). 12. Spores (BB 4825). 13. Habit of carpophores (from left to right: BB 4118, 3242, 4824). Scale = 1 cm for habit, 10 μ m for microscopic elements, the longest bar applying to spores only.

posed cavities, sometimes finally hollow under a thick cortex. **Context** ca 10 mm thick above the attachment site of lamellae and stipe, whitish, soon intensely greying (3C1) especially in the stipe, strongly browning near the stipe base and in injuries; orange brown with FeSO₄, greyish in old fruit bodies; quickly dark blue with gaiac. **Taste** mild. **Smell** none. **Spore print** pale cream (Ib scale Romagnesi, 3 scale Dagron), turning soon deep cream in the herbarium. Exsiccatum retaining the red pigmentation on stipe and cap.

Spores mostly ellipsoid to elongate, $7.7\text{-}8.85\text{-}9.42\text{-}10.2(10.5) \times 6.1\text{-}6.83\text{-}6.84\text{-}7.5 \mu\text{m}$, $Q = 1.19\text{-}1.29\text{-}1.38\text{-}1.50$, $n = 40$. Dermatozystidia in the cap more rare and less apparent, smaller also, with scattered granular contents. Other microscopic features as in *R. immaculata*.

Habitat: disturbed or degraded woodland areas, on sandy soil, in xerophytic conditions

Distribution: Burundi: Bururi prov., hill of Nkayamba, N of Rumonge, under *Brachystegia microphylla*, on rocky, acid sandy soil covered with mosses, Dec. 23, 1991, Buyck 4088; *ibid.*, Jan. 4, 1992, Buyck 411; *ibid.*, Dec. 04, 1992, Buyck 4824, 4825, 4826; *ibid.*, Jan. 08, 1993, Buyck 4857, 4876; *ibid.*, Jan 30, 1993, Buyck 4905. Zambia: Copperbelt prov., Chati forest, in degraded miombo near *Strychnos cocculoides*, on sandy soil, Dec. 22, 1990, Buyck 3242. Tanzania: Southern Prov., Masasi/Newala distr., Makonde plateau, on slope under *Brachystegia*, 700 m alt., 23 Jan. 1993, Tiina Saarimaki et al. 1370 (H,PC)

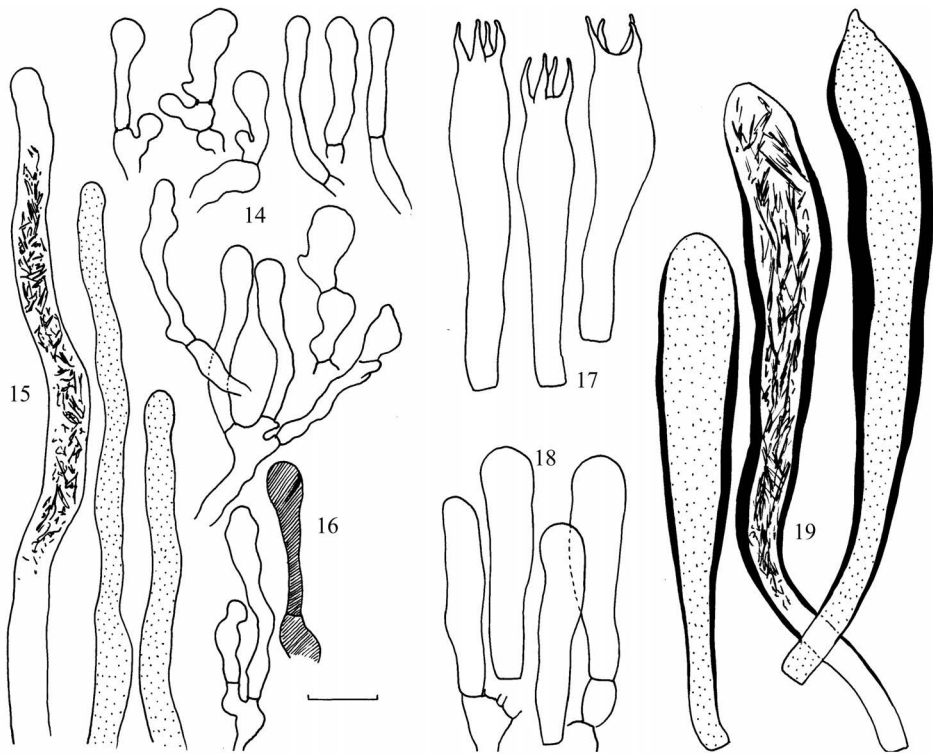
– var. **repleta** var. nov.

Figs. 14-19

A var. *rubrorobusta* praesertim differt carpophoris parvioribus stipiteque brevior concolore non cavernosa basim versus squamosa-fissurata carne paulum grisescente sporis generaliter brevioribus. Holotypus: Zambia: Buyck 3413 (PC).

Basidiomata very firm. **Pileus** 76-135 mm diam., irregularly sinuose-lobed or sometimes slightly depressed in the center; margin not striate; pileipellis dull, not elastic nor viscid, separable only at the margin, orange-red, blood-red to deep wine-red (9-10CDE7-8). **Lamellae** remarkably firm and thick, 10-14 mm broad, cream-coloured, equal or with occasionnal lamellulae, without anastomoses or bifurcations; edge entirely brown or developing brown spots, even. **Stipe** 52-72 × 19-30 mm, subcylindrical or narrowed towards the base, pinkish red (10A4) or locally whitish, from the base upwards generally developing a brown, more or less horizontally fissured tomentum, exposing the whitish context underneath; pileal trama compact to stuffed. **Context** whitish, quickly brown-grey, especially in the stipe, pinkish lilac under the pileipellis, turning dirty greyish brown with FeSO₄. **Taste** mild. **Smell** none. **Spore print** distinctly cream (insufficient for correct interpretation). **Exsiccatum** retaining the red pigmentation on pileus and stipe, the scaly-scurfy aspect of lower stipe being accentuated.

Spores subglobose to ellipsoid, $8.4\text{-}9.21\text{-}10.1 \times 7.2\text{-}7.75\text{-}8.5(8.8) \mu\text{m}$ ($Q = 1.11\text{-}1.19\text{-}1.23(1.29)$, $n = 20$). Cystidia numerous on the edge, elsewhere dispersed (550-650/mm²). Pileipellis surface with numerous more or less clavate terminal cells that are filled with a brown, oily substance, also apparently with brown encrusting material on some larger dermatocystidia near the surface, the latter few in number. **Other features** typical of *Mamillatinae*.



Figs. 14-19. *R. rubrorobusta* var. *repleta*. 14. Extremities of the pileipellis, with one element (16) shown as being filled with brown, oily content. 15. Dermatocystidia. (BB 3497). 17. Basidia. 18. Basidiola. 19. Pleurocystidia. (BB 3413). Scale = 10 μ m.

Habitat: woodland dominated by *Julbernardia globiflora*, *Marquesia macroura* and *Brachystegia* div. sp.

Distribution: Zambia: Luangwa prov., road to Ntumbachushi falls near Kawambwa, under *Brachystegia boehmi* in woodland dominated by *Julbernardia globiflora*, *Marquesia macroura* and *Brachystegia* div., 6 Jan. 1991, Buyck 3413 (holotype, PC), North Western prov., near Mwinilunga, in rich *Brachystegia*–*Marquesia* woodland, 29 Jan. 1991, Buyck 3497 (PC)

This taxon is easily taken for a member of subsection *Sardoninae* of which several species are known from tropical Africa (see Buyck, 1994), but the latter lack the strongly greying context, have a less dens pileipellis and higher spore ornamentation.

Microscopically, *R. rubrorobusta* var. *rubrorobusta* is well defined by a pileipellis which contains very few dermatocystidia that are also rather small and unapparent (contrary to the oleiferous hyphae which are often clear and distinct!), and by the much more elongate spores. Moreover, the elements of the pileipellis are already much more easy to disperse when making microscopic squash prepa-

rations then are those of *R. immaculata*. The spore print colour is somewhat disturbing, since the field notations are way below the intensity the spore print develops in the herbarium, where they are deep cream (10-15 years later).

In the var. *repleta*, the stipe is densely covered with a brown, scaly-scurfy “ornamentation”, as is the case in some other woodland taxa. Both collections apparently differ also from the type variety by the fact that the stipe has a much less pronounced tendency to become hollow with age and very likely also by their ecology (rich miombo with presence of *Marquesia* (Dipterocarpaceae)). The ecology might explain the fact that we did not find this taxon in Burundi, where we collected in much poorer sites and never near *Marquesia*. The var. *repleta* possesses also terminal elements in the cap, and also stipe, with brown contents or brown encrusting substance on the wall. This feature is strongly reminding of subsection *Viscidinae* Sarnari (see also Buyck, 2003) where such pigmented extremities are much longer though. Moreover, the latter subsection contains acrid tasting species, with similar spores, but very white gills giving white spore deposits, but also a more or less greying context.

DISCUSSION

The described taxa form a very homogeneous unity. The closest related subsections might be the African *Brunneodermatinae* (especially *R. cellulata* and allies) and, to a lesser degree, *Sardoninae* and the northern temperate *Lepidinae*, as already suggested by Buyck (1989a) as well as *Viscidinae* Sarnari, but these have white spore prints and acrid taste. The first differ by the inamyloid plage of the spores, the frequently forked gills... *Lepidinae* have different features of the flesh, but resemble more in microscopic features.

The ecology of the various taxa offers some interesting aspects. Because of the prolonged collecting in rain forest area by Miss Goossens, and later also by several French mycologists and myself, it seems rather safe to assume that *R. rubrorobusta* and *R. nkayambae* are strict woodland species, whereas *R. immaculata* occurs in both rain forest and woodland habitats. The relation to certain trees may be an important factor but this is as yet impossible to ascertain.

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