

## Two new species and first records for 13 other *Russula* (Russulales) from Zimbabwe

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**Abstract** – First records for 15 *Russulas* including 2 new species are shortly commented with regard to ecology and ethnomycological uses in Zimbabwe. The new taxa are described and illustrated in detail.

Taxonomical novelties: *Russula termitaria* Buyck sp.nov., *Russula terrena* Buyck & Sharp sp.nov.

**Africa / ectomycorrhiza / ethnomycology / miombo / taxonomy / ecology**

### INTRODUCTION

Zimbabwe covers over 390 000 square kilometers in south-central Africa and, with reference to the Zimbabwe Woody Cover Map published by the Forestry Commission (Anon. 1998), still has ca 53% of its area covered in woodland, comprising teak, “mopane” and especially “miombo” woodland that is dominated mainly by ectotrophic trees of the Caesalpiniaceae. It is situated above 1350 m altitude with 750-1150 mm rainfall per year. Although broadly classified as “drier Zambezian miombo woodland”, differences in rainfall and altitude create a mosaic of several different categories of “miombo”, each of these respective habitats determined by tree composition and variations in fungal richness.

Hardly anything is known yet on the fungal biodiversity of Zimbabwe, apart from a few studies focusing mainly on exotic introduced trees such as eucalypts and pines (Masuka 1992a-b, Masuka & Ryvarden 1992) and a popular introduction to some of the more common larger fungi of South-Central Africa (including Malawi, Zambia and Zimbabwe) by Ryvarden *et al.* (1994). Zimbabwe's extensive woodland are in continuation with those of neighbouring countries and thus likely to harbour a very similar mycoflora as suggested by a preliminary list for the genus *Lactarius* Pers. (Verbeken *et al.* 2000), probably the first account for one of Zimbabwe's more important genera of larger fungi that is ectomycorrhizal with the dominant miombo trees. Benefiting in part from well-documented recent collections made in Zimbabwe by experts in this genus, a total of 35 species were signaled for the first time and roughly 10% (4 out of 35) were new taxa, possibly linked with the drier climate conditions in Zimbabwe. In this study we report for the first time on the genus *Russula* Pers. in Zimbabwe. *Russula* is probably the most common and most divers ectomycorrhizal genus in the African tropics, and this first short list is certainly not representative for the diversity of the miombo-associated *Russulas* in Zimbabwe. Many more but insufficiently documented collections were available for this study. These collections highlight the presence not only of many more *Russulas*, but also of

many yet undescribed species. Unfortunately, absence of illustrations and also notes on very important features made these collections useless for the purpose of describing new taxa. This study, therefore, particularly underlines the need for well-documented collections and well-trained local taxonomists to describe the fungal biodiversity of Zimbabwe more efficiently.

Large tracts of the Zambezi Escarpment never have been surveyed for fungi in Zimbabwe, particularly where the endemic *Brachystegia allenii* Burt Davy & Hutch. occurs. Similarly, the Eastern Districts have *B. microphylla* Harms and *B. utilis* Burt Davy & Hutch. (Tree Society of Zimbabwe, Tree Atlas Project, 2002, unpublished records), neither of which have been visited for mushroom collecting in Zimbabwe, although both their associated fungi have been thoroughly studied for several years by Buyck and students between 1991 and 1994 in Burundi (see also Buyck 1994b for a first account).

## MATERIALS AND METHODS

Collections were made by the second author. The collections that have been studied in detail are kept in the mycological herbarium at the Natural History Museum in Paris (PC) and indicated as such. The present inventory is the result of visits for periods of two to three weeks each in May of 1997 and 2000, and Aug of 1997 and 1999. Identifications of the collections were done by the first author. The color notations indicated in the descriptions are from Kornerup & Wanscher (1978).

Microscopic features were examined and sketched by B. Buyck. All microscopic observations and measurements – except for basidiospores – 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  $\times 2400$ . In the figures, the long scale line is for the basidiospores and the short one for the other elements. Contents of hymenial and dermatocystidia in the illustrations are indicated schematically, except for a single element where contents are indicated as observed on preparations from exsiccata in Congo Red. All elements of the basidiomes were also examined for the presence of ortho- or metachromatic contents or incrustations in cresyl blue as explained in Buyck (1989). Observations and measurements of basidiospores were made in Melzer's reagent. Measurements are given according to Heinemann & Rammeloo (1985) and are based on 20 spores (n) per specimen for each species. The length/width ratio (Q) gives minimum, mean (in italics), and maximum values. We refer the reader to Buyck (1991) for explanation of cystidial terminology. The species are presented in alphabetical order. When known, their vernacular name is given and in several cases an Anglo-saxon name is suggested for common use.

## RESULTS

**1. *Russula albofloccosa*** Buyck, Bulletin du Jardin Botanique National de Belgique 60: 199. 1990.

*Suggested Anglo-saxon name:* "Primrose Russula"

*Iconography-Description:* Buyck 1994: 459, pl 76/1.

*Systematic position:* Sect. *Heterophyllae* Fr., most likely in subsect. *Ilicinae* (Romagn.) Buyck or *Griseinae* J. Schaeff.

*Ecology:* Grows singly or in small groups in *Brachystegia glaucescens* woodland. Common and widespread.

*Edibility:* Consumed in other African countries.

**2. *Russula brunneofloccosa*** Buyck, Bulletin du Jardin Botanique National de Belgique 60: 196. 1990.

*Iconography-Description:* Buyck 1993: 391, pl. 65/4.

*Systematic position:* previously placed in section *Fistulosae* subsection *Brunneofloccosinae* Buyck (Buyck 1994), but preliminary molecular data (Buyck, unpubl.) suggest closer affinities to predominantly dark-spored sections in Europe.

*Ecology:* Locally common in small groups or individually in mixed miombo (*Julbernardia globiflora* (Benth.) Troupin, *Brachystegia spiciformis* Benth and *Monotes glaber* Sprague).

*Edibility:* Consumed in other African countries.

**3. *Russula ciliata*** Buyck, Bulletin du Jardin Botanique National de Belgique 57: 387. 1987.

*Vernacular name:* ZONGORORO (Shona language, a name for millipede, which is very partial to these mushrooms).

*Iconography-Description:* Buyck 1993: 435, pl 76/2.

*Systematic position:* Sect. *Heterophyllae* Fr., Subsect. *Amoeninae* Singer

*Ecology:* Grows in small groups in *Julbernardia globiflora* woodland. Common and widespread.

*Edibility:* Consumed in other African countries.

**4. *Russula compressa*** Buyck, Bulletin du Jardin Botanique National de Belgique 59: 252. 1989.

*Suggested Anglo-saxon name:* “Yellow-gilled Red Russula”

*Vernacular name:* Its vernacular name “CHIROPACHEMBA” is a Karanga name meaning “liver of the dog”.

*Iconography-Description:* Buyck 1997: 551, pl. 91/2:

*Systematic position:* Sect. *Polychromae* Mre

*Ecology:* Common in large numbers within all miombo systems and with *Uapaca kirkiana* Mull.Arg.

*Edibility:* Consumed in Zimbabwe – dried first then boiled in water and eaten with peanut-butter.

**5. *Russula congoana*** Patouillard, Bulletin mensuel de la Société Mycologique de France 30: 336. 1914

*Suggested Anglo-saxon name:* “Small Pink-stemmed Russula”

*Vernacular name:* RIMIREMBA (Shona language, which translates as “tongue of the dog”).

*Iconography-Description:* Buyck 1994: 412, pl. 69/2.

*Systematic position:* Sect. *Russula*

*Ecology:* Fruits in large numbers in all types of miombo woodland. Common and widespread.

*Edibility*: Consumed in Zimbabwe – dried first then cooked in water and eaten as a side relish.

**6. *Russula flavobrunnea*** Buyck, Bulletin du Jardin Botanique National de Belgique 60: 200. 1990.

*Suggested Anglo-saxon name*: “Greenish yellow Russula”

*Iconography-Description*: Buyck 1994: 435, pl. 76/2

*Systematic position*: Sect. *Heterophyllae* Fr.

*Ecology*: Common in mixed miombo (*J.globiflora*, *B. spiciformis* and *Monotes*)

*Edibility*: Consumed in other African countries.

**7. *Russula heinemannii*** Buyck, Bull. Jard. Bot. Nat. Belg. 60: 195. 1990

*Suggested Anglo-saxon name*: “Bright orange Russula”

*Iconography-Description*: Buyck 1993: 397

*Systematic position*: although placed in Sect. *Fistulosae*, probably related to sections with typically deeper spore print color

*Ecology*: uncommon, in *Brachystegia spiciformis*. woodland.

*Edibility*: unknown, not consumed

**8. *Russula hiemisilvae*** Buyck, Karstenia 33 (1): 27. 1993

*Suggested Anglo-saxon name*: “Ringed woodland Russula”

*Iconography-Description*: Buyck l.c.

*Systematic position*: Sect. *Heterophyllae* Fr., subsect. *Heterophyllinae* Fr.

*Ecology*: Common in small groups in *B. spiciformis* – *Burkea africana* Hook. and also in *J. globiflora* – *Brachystegia boehmii* Taub. woodland.

*Edibility*: consumed in other African countries

**9. *Russula ochrocephala*** Buyck, Bulletin du Jardin Botanique National de Belgique 59: 249. 1989.

*Suggested Anglo-saxon name*: “Orange-gilled Hazel Russula”

*Iconography-Description*: Buyck 1997: 549, pl.93/1:

*Systematic position*: Sect. *Decolorantes* Singer

*Ecology*: *J. globiflora* or *B. boehmii* dominated woodlands.

*Edibility*: probably edible, but not consumed

**10. *Russula oleifera*** Buyck, Bulletin du Jardin Botanique National de Belgique. 60: 207. 1990.

*Suggested Anglo-saxon name*: “Cracked Russula”

*Vernacular name*: GUHWI (Shona)

*Iconography-Description*: Buyck 1993: 428, pl.68/2.

*Systematic position*: Sect. *Ingratae* Quél., subsect. *Foetentinae* Mlz. & Zv.

*Ecology*: Common in large groups under most miombo types, also with *Uapaca kirkiana*.

*Edibility*: consumed in the north-west province of Zimbabwe notwithstanding the strong disagreeable smell and acrid taste of this species. Baboons (*Papio ursinus Kerr*) have also been observed eating this species.

**11. *Russula sublaevis*** (Buyck) Buyck, Karstenia 33 (1): 34. 1993.

*Suggested Anglo-saxon name:* “Yellow Russula”

*Iconography-Description:* Buyck l.c.

*Systematic position:* Sect. *Heterophyllae* Fr., subsect. *Heterophyllinae* Fr.

*Ecology:* Grows in small groups in mixed miombo (*J. globiflora*, *B. spiciformis* and *Monotes*) and in *J. globiflora* dominated woodland.

*Edibility:* Consumed in other African countries.

**12. *Russula termitaria*** Buyck sp.nov.

**Figs. 1-6**

**Latin description:** *Pileus* 55-108 mm diam., depressus, leve striatus-tuberculatus marginem versus, pellis separabilis, siccus, glaber vel leviter pruinosis (*R. parazurea* modo), griseo-brunneus sed coloribus roseis, lilaceis vel viridis, interdum obscuriore et saturate azureo-viridis tinctus. *Lamellae* fragiles, adnatae, lamellis raris intermixtis, interdum locale furcatae vel anastomosae, acies concolor integra. *Stipes* 31-62 × 8 – 26 mm, fragilis, cylindricus vel paulum basim versus attenuatus, coloribus pileo similibus dilute tinctus. *Caro* in pileo 6-15 mm crassa, alba, immutabilis vel dilute viridis ope  $FeSO_4$ , brunnescens in stipite. *Odor* ingratus. *Sapor* mitis vel vix breviter acris. *Sporae* in cumulo saturate cremeae (IId codice Romagnesi).

*Sporae* ellipsoideae, (8.3)8.4-8.75-9.1(9.5) × (6.9)7.0-7.29-7.5(7.7)  $\mu m$ ,  $Q = 1.16-1.20-1.25$ , ornamentatione amyloidea subreticulata cristis ramosis tenuibus ac paucis elementis convexis parvis composita praeditae, macula suprahilaris inamyloidea. *Basidia* longa, (38)43-50(55) × (9)10-11  $\mu m$ , tetraspora raro basidiis bisporis intermixta. *Cystidia* dispersa (240-360/mm<sup>2</sup>), 70-100(130) × 9-11  $\mu m$ , lamellae aciem versus parviora et 60 × 10  $\mu m$ , sursum moniliformia, appendiculata-capitulata, tenuitunicata, contentu minute fibrillosa dense repleta. *Pili* cystidiformes in acie nulli. *Subhymenium* pauca inflatum. *Pileipellis* omnino orthochromatica in azureo cresylico, bistrata; subpellis gelatinosa hyphis intertextis cylindricis 2-4  $\mu m$  diam. *Composite*; suprapellis pilis tenuibus plus minusve erectis ramosis 5-6 septis praeditis composita, cellula terminalis (10)15-25(35)  $\mu m$  longa, vix attenuata sed plus minusve subapicale constricta et subcapitulata. *Pileocystidia* numerosa 30-80 × 3-4  $\mu m$  prope superficie, in subpelle atque pilei trama longiora, cylindrica, sursum subcapitata vel moniliformia, tenuitunicata, dense contentu granuloso-fibrillosa repleta, vix grisescens ope SV.

*Holotypus:* Burundi. Nkayamba hill, prope Rumonge, ca 850 m alt., inter folias putridas in termitariae monte prope *Brachystegia utile*, 30 jan. 1993, Buyck 4914 (holotypus, PC).

*Suggested Anglo-saxon name:* “Dappled Russula” or “Gregarious Russula”

**Description**

**Cap** 55-108 mm, rapidly depressed at the center, finally often funnel-shaped, at maturity faintly striate – tuberculate for 10-20 mm near the margin; pellis entirely separable, dry, dull when dry, smooth to slightly pruinose (aspect of *R. parazurea*), brownish gray with pink, lilac to greenish tints, sometimes predominantly dark bluish green, especially when younger, often decoloring in the center when old to ochre or cream. **Gills** remarkably fragile, shortly adnate, nearly 1/mm, high (8-12 mm) for the size of the mushroom, equal or with rare lamellulae, transversely anastomosing, sometimes forking or detached-disrupted close to the

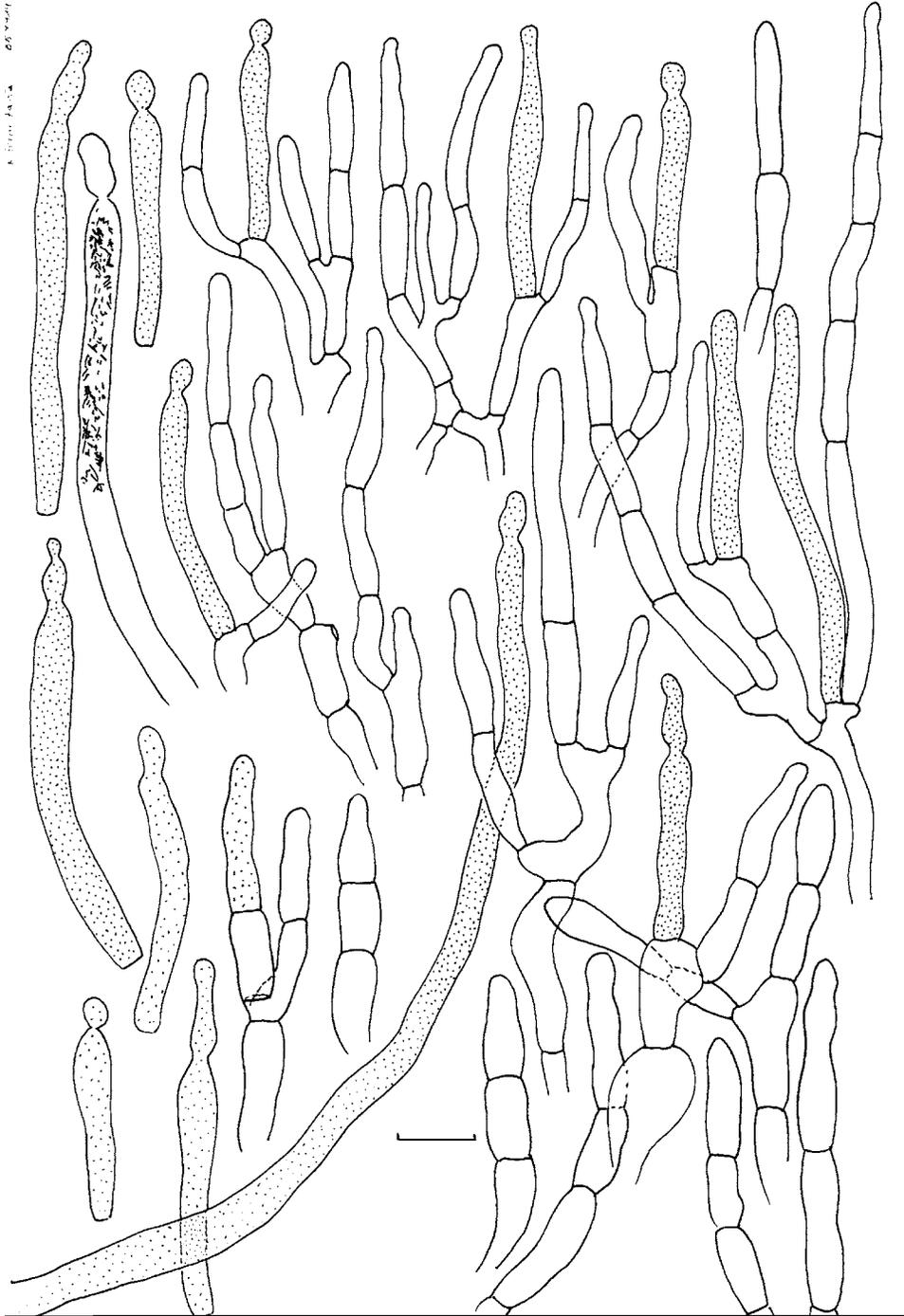


Fig. 1. *Russula termitaria*. Dermatocystidia and hyphal extremities composing the suprapellis; the two truncated longer cystidia arising from the subpellis, all cystidial contents represented schematically, except for one element. Bar = 10  $\mu$ m.

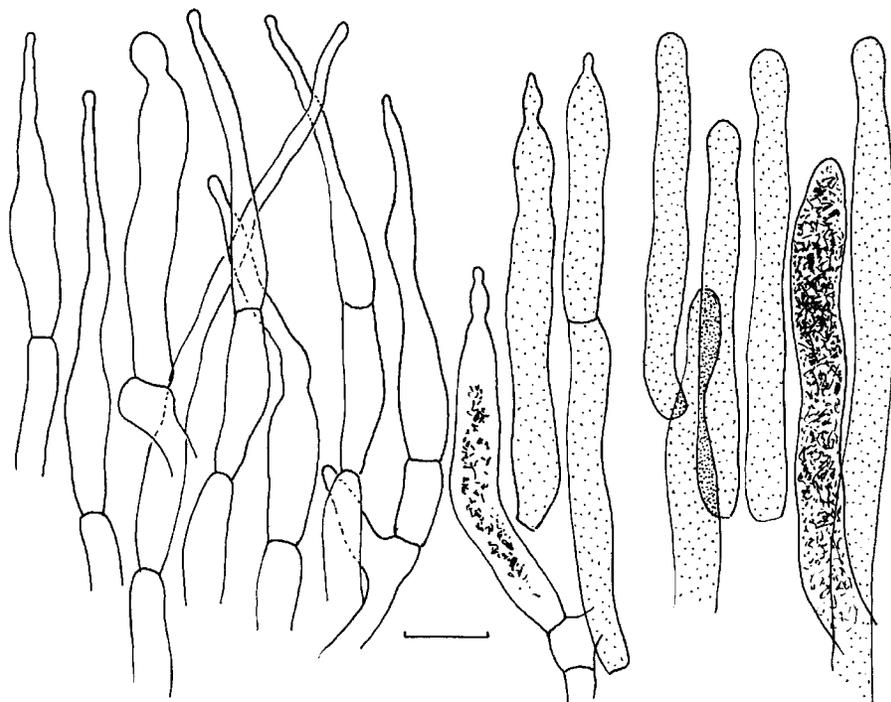
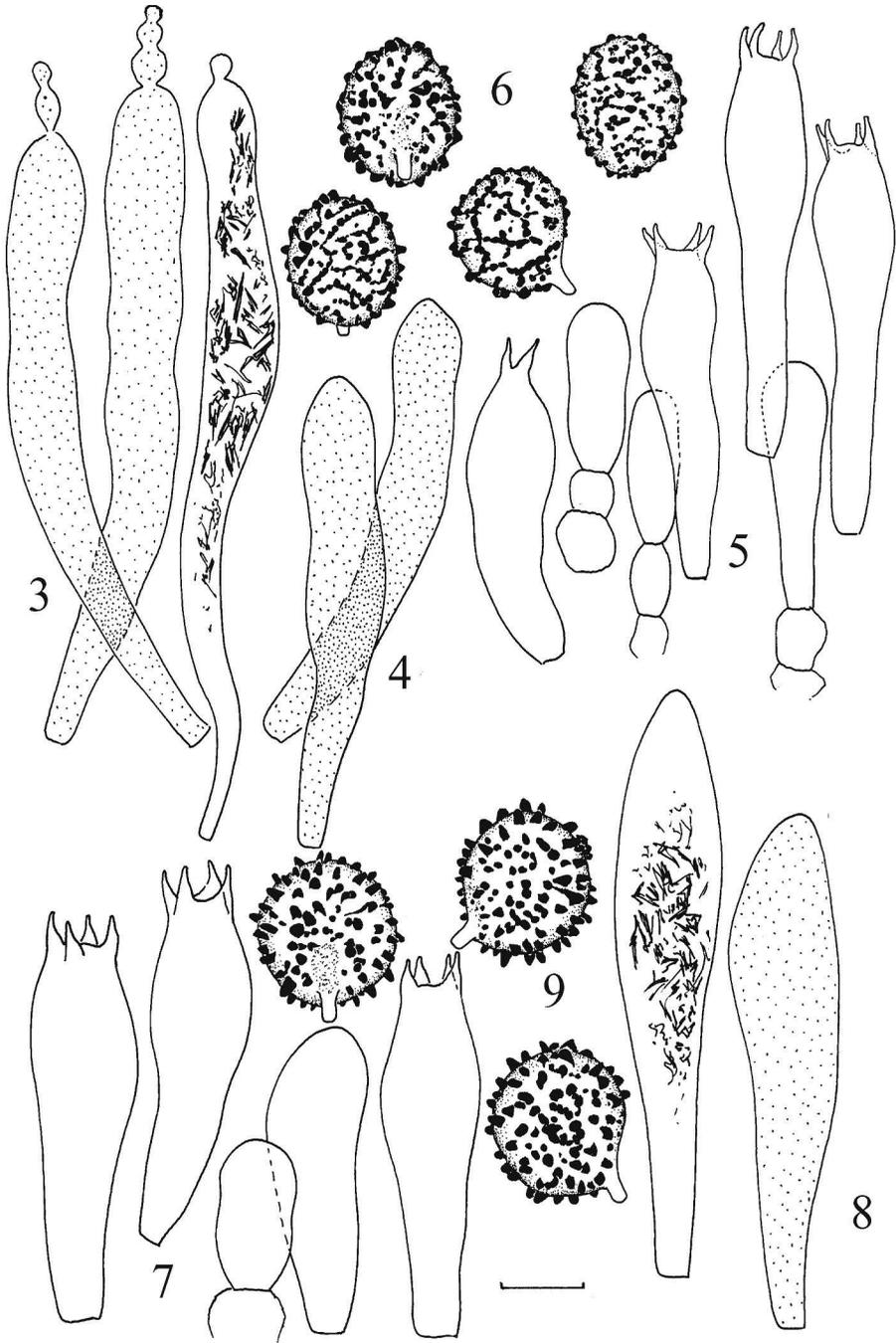


Fig. 2. *Russula termitaria*. Dermatocystidia and hyphal extremities composing the stipitipellis; all cystidial contents represented schematically, except for two elements. Bar = 10  $\mu$ m.

stipe, ivory to pale cream, but with age rapidly spotted brown; edge entire and concolorous. **Stipe** 31-62  $\times$  8 – 26 mm, cylindrical or almost so, narrowing at the very base, although sometimes slightly inflated just above, almost entirely tinged with brownish gray, pink, lilac to bluish or metallic green, except for the base which remains white, not annulate, spongy to lacunar, then quickly hollowing, with mycelial traces in the soil around the base. **Context** very brittle and fragile, 6-15 mm thick in cap, white, stipe surface hardly reacting or faintly greenish with  $\text{FeSO}_4$ , browning with age, strongly so in the stipe. **Smell** turning very rapidly disagreeable with age (green beans or fishy), several specimens smelling already even when very fresh. **Taste** mild or with a rapidly passing, very faint acrid taste. **Spore print** dark cream (IId Romagnesi, 8 Dagron).

**Spores** ellipsoid, (8.3)8.4-8.75-9.1(9.5)  $\times$  (6.9)7.0-7.29-7.5(7.7)  $\mu$ m, Q=1.16-1.20-1.25, densely crested, subreticulate; ornamentation mostly 0.5-1  $\mu$ m high, composed of short to long crests and some isolated, smaller, especially interstitial warts, distinctly amyloid; suprahilar spot not amyloid, verrucose. **Basidia** long and slender, pedicellate-clavate, mostly 4-spored, but in some specimens quite often 2-spored; sterigmata not small, sometimes more or less inflated, ca 4-5(6)  $\times$  1.5-2  $\mu$ m. **Cystidia** widely dispersed originating profoundly in the subhymenium or trama, clavate-pedicellate, capitulate, appendiculate or with a moniliform apex, thin-walled, filled with dense, minutely crystalline contents, gray faintly in SV. **Marginal cells** not or hardly differentiated, some cells tapering apically. **Subhymenium** a rather dens tissue of poorly inflated cells. **Lamellar trama** mainly composed of sphaerocytes (25-50  $\mu$ m diam.) and some oleiferous hyphae.



Figs. 3-6. *Russula termitaria*. 3. Pleurocystidia with contents as observed in Congo red. 4. Cheilocystidia. 5. Basidia and basidiola. 6. Spores.

Figs. 7-9. *Russula terrena*. 7. Basidia and basidiola. 8. Pleurocystidia. 9. Spores. (all cystidial contents represented schematically, except for one element). Bar = 10  $\mu$ m, but only 5  $\mu$ m for spores.

**Pileipellis** entirely orthochromatic in cresyl blue, obscurely two-layered; subpellis gelatinized, composed of narrow, intertwined, cylindrical hyphae, 2-4  $\mu\text{m}$  diam., forming a dense mat close to the pileus trama. Suprapellis composed of ramified, more densely septate and more or less erect or ascending extremities; these composed of up to 6-7 cylindrical cells, 3-5  $\mu\text{m}$  diam., the terminal cell (10)15-25(35)  $\mu\text{m}$  long, not or hardly tapering but often more or less constricted subapically and subcapitulate. Pileocystidia numerous on the cap surface, slender, mostly 30-80  $\times$  3-4  $\mu\text{m}$ , longer in the subpellis, cylindrical, at the apex generally subcapitate to distinctly capitate or sometimes moniliformous, thin-walled, with dens, finely granular to minutely crystalline contents, continuing in underlying trama and there also broader, up to 10  $\mu\text{m}$ , hardly reacting in SV. **Stipitipellis** composed of basically similar elements as in cap, but with terminal cells often narrowing much more towards their tip. **Clamps** absent.

**Systematic position:** Sect. *Heterophyllae* Fr., probably subsect. *Ilicinae* (Romagn.) Buyck or *Griseinae* J. Schaeff. ex Bon

**Ecology:** particularly common under deep shade in miombo woodland dominated by *Brachystegia* spp. (*B. glaucescens* Burtt Davy & Hutch. in Zimbabwe, *B. utilis* in Burundi), but apparently associated with various tree genera, emerging from amongst leaf litter or grass and is consequently very camouflaged.

**Edibility:** unknown, but very likely not toxic. The smell may be unfavorable for consumption however.

#### **Distribution:**

**ZIMBABWE. MASHONALAND NORTH PROVINCE:** Makuti Hotel, 1629 A3, 27/02/2001, under *Brachystegia boehmii*, observation record only; Kariba, 1628 D2, 02/04/2001, under *Afzelia quanzensis*. C. Sharp 1575/01 (PC); Kariba Heights, 1628 D2, 26/04/2002, under *Julbernardia globiflora* after unseasonal, late rains, observation record only. **MASHONALAND CENTRAL PROVINCE:** Plant Protection Research Institute, Harare, 1731 C3, 05/03/1980, collector C. Sharp, only spore print. **MIDLANDS PROVINCE:** Central Estates, Mvuma, Beacon Hill Homestead, 1930 A4, under *Brachystegia glaucescens*, 03/02/1988, C.Sharp 100/88; 04/01/1996, C.Sharp 415/95; 12/01/1997, C. Sharp 540/97; 10/01/1998, C.Sharp 1025/98; 30/12/1998, C.Sharp 1122/98 (PC); 08/01/1998, C.Sharp 1489/01; ibidem, Beacon Hill Incubator, 1930 A4, 02/03/1988, in mixed miombo woodland with *Uapaca kirkiana*, C.Sharp 202/88; ibidem, Chewodza Homestead, 1930 A2 11/02/1988, leg. C. Whitehead-Willson, under *J. globiflora*, C.Sharp 101/88.

**BURUNDI. RUMONGE PROV.:** Nkayamba hill, near Rumonge, ca 850 m alt., amongst rotting leaves on top of shaded, old (?) termite mound near *Brachystegia utilis*, 4 dec. 1992, Buyck 4676, 4685; ibid., 8 jan. 1993, Buyck 4874; ibid., 30 jan. 1993, Buyck 4914, 4915; ibid., 26 nov. 1993, Buyck 5236 (all collections PC).

#### **Comments:**

The Zimbabwe collections agree in all respects with the Burundi material, and their spores have a tendency to be more frequently smaller and less elongate. We have chosen to select the type among the Burundian collections

because of the abundance of sporophores and more complete documentation for these collections.

This *Russula* fruits prolifically throughout the rains and is particularly susceptible to fly infestation. In Burundi, this species sporulates very prolifically: 150 sporophores were counted in Buyck 4676, and 250 in Buyck 4685, in each case for a surface of only a few square meters!

Details for spores measurements are as follows:

Sharp 98.1575 (7.3)7.6-7.96-8.3 × (6.4)6.5-6.80-7.1(7.4)	Q = 1.10-1.17-1.23
Sharp 98.1122 (8.1)8.2-8.40-8.6 × (6.3)6.6-6.97-7.3(7.7)	Q = 1.09-1.21-1.28
BB5236 (7.9) 8.0-8.42-8.8(9.3) × 6.7-7.06-7.4-7.6	Q = 1.14-1.19-1.25
BB4914Type (8.3)8.4-8.75-9.1(9.5) × (6.9)7.0-7.29-7.5(7.7)	Q = 1.16-1.20-1.25

### 13. *Russula terrena* Buyck & Sharp **sp.nov.**

**Figs. 7-11**

**Latin diagnosis:** *Russula albofloccosa praecipue differt carpophoris generaliter pallidioribus sporis verrucis brevibus isolatis, locale subtilissime connectis vel in cristis brevibus confluentibus ornatis extremitatibus densiore septatis subsectione griseinis modo. Holotypus: Zimbabwe, Central Estates, Mvuma, Beacon Hill Homestead, 1930 A4, sub Brachystegia glaucescente, 30/12/1998, C. Sharp 1121/98 (in herbario PC conservatur).*

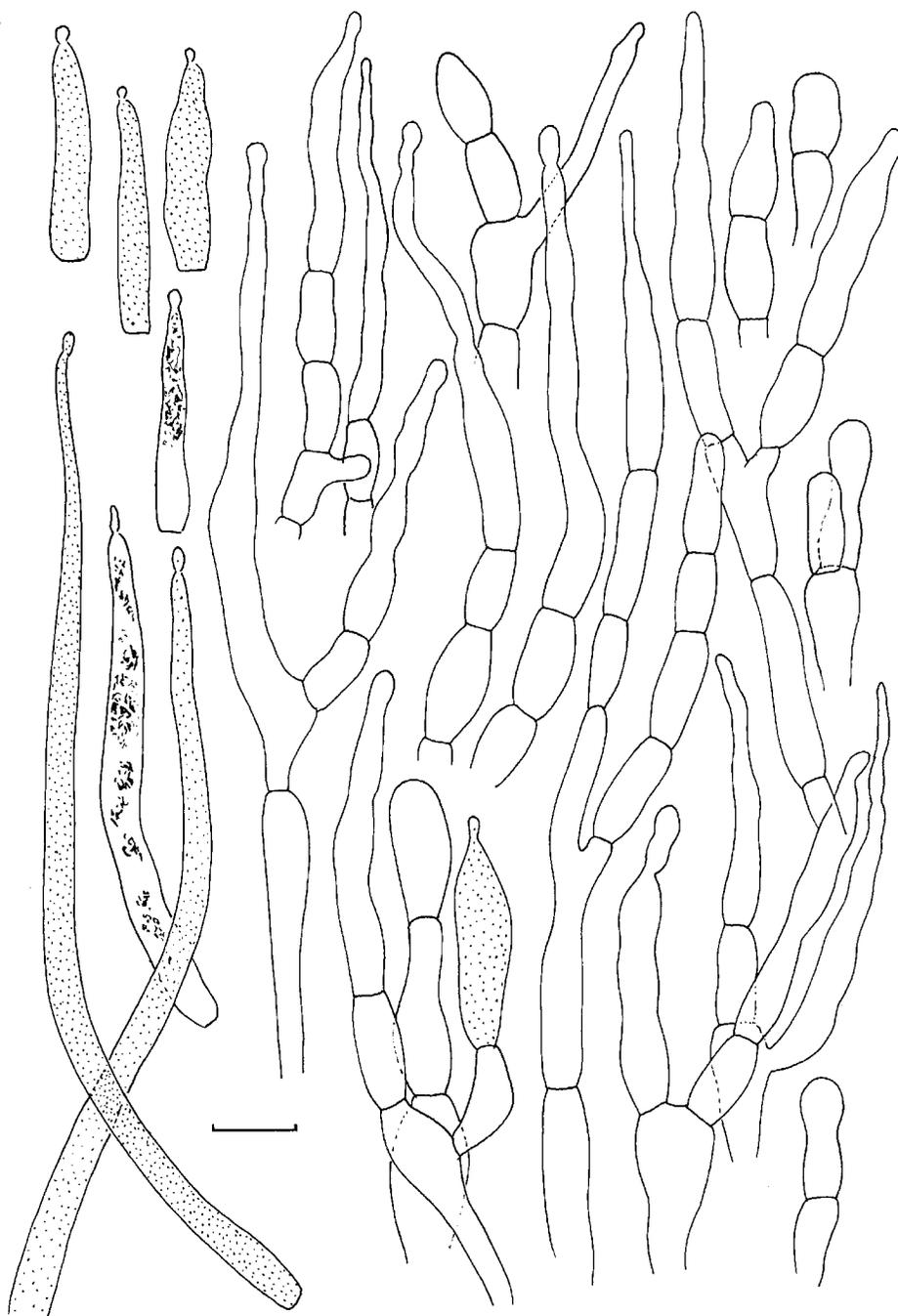
**Etymology:** *terrena* meaning “earthy”, “of the earth”

**Suggested Anglo-saxon name:** “Muddy White *Russula*”

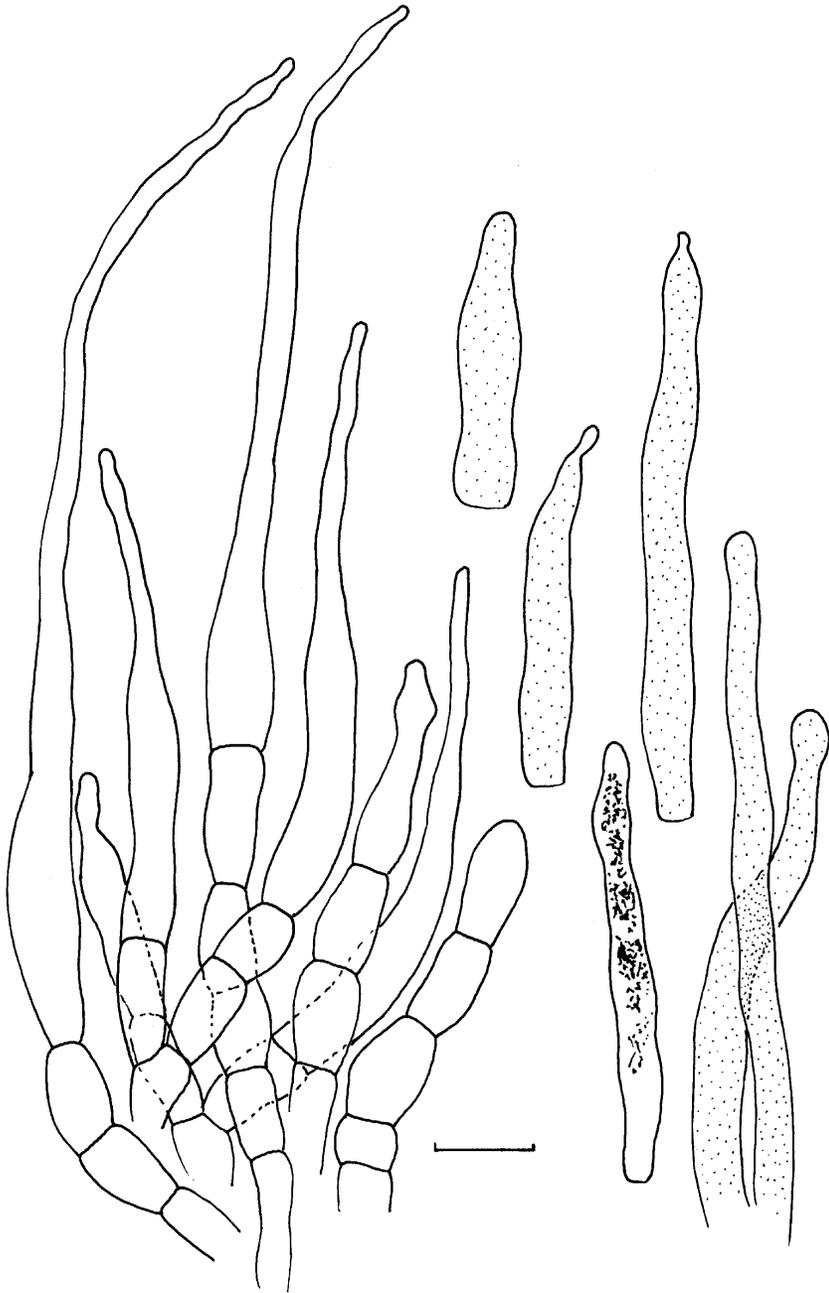
#### **Description:**

**Pileus** 40 - 53(75) mm diam., cap remaining depressed in the centre, margin incurved when young, becoming tuberculate-striate in age, sometimes retaining veil-like remnants still attached; cap viscid when wet with litter sticking to surface, drying smooth or matt, sometimes cracking radially, white or creamy white with earth stains. **Lamellae** adnate, equal, pale cream in color, thick, waxy, brittle, sparse (8-9/cm at mid-radius), 9 mm high. **Stipe** 23-38 × 9-15 mm, cylindrical or with swollen base, white, dull, firm, pithy inside with 0 to 3 chambers; browning where insect-damaged. **Context** white, turning very slowly yellow with FeSO<sub>4</sub> in stipe. **Smell** strongly acrid, peppery, chemical. **Taste** unknown, but likely acrid. **Spore print** off-white or very pale cream (needs to be verified!).

**Spores** subglobose to shortly ellipsoid, quite large, (8.6)9.1-9.32-9.60-10.1(10.3) × (7.7)8.1-8.32-8.47-8.8 μm (Q = (1.08-1.12-1.13-1.22)), with a strongly amyloid and dens ornamentation of truncated to conical or simply convex to granular warts, up to 1(-1.5) μm high but very variable in height, locally fused or aligned in very short crests, round or more often irregular at the base, mostly without any well-developed linear elements but short, subtle connections locally present; suprahilar spot hardly differentiated, verruculose and often faintly amyloid up to the apiculus. **Basidia** 43-50 × 12-14 μm, subclavate to subfusiformous, four-spored; sterigmata short and firm, 3.5-4.5 × 1.5-2 μm. **Cystidia** 64-82 × 12-15 μm, fusiformous-pedicellate, hardly emergent, originating in the subhymenium; contents not abundant, coarsely crystalline-refrangent, insensitive to SV. **Marginal cells** not differentiated. **Subhymenium** composed of cells, which are neither remarkably small nor large. **Lamellar trama** with many sphaerocytes. **Pileipellis** orthochromatic in Cresyl blue, a loose subcutis composed



Figs. 10. *Russula terrena*. Dermatocystidia and hyphal extremities composing the suprapellis; the longest cystidia arising in the subpellis, all contents represented schematically, except for two pileocystidia. Bar = 10  $\mu$ m.



Figs. 11. *Russula terrena*. Dermatocystidia and hyphal extremities composing the stipitipellis; all cystidial contents represented schematically, except for one element. Bar = 10  $\mu$ m.

of rather large hyphae of (2.5-)3-4(-5)  $\mu\text{m}$  separated by gelification; suprapellis composed of dispersed to aggregated extremities of 3-7(10)  $\mu\text{m}$  diam., usually ramified near the base, composed of 4-6 cells; the terminal article generally aculeate – tapering, sometimes more or less swollen at the extreme tip. Pileocystidia in suprapellis conical; in subpellis aculeate to narrowly cylindrical, 3-5  $\mu\text{m}$  diam., up to 150  $\mu\text{m}$  long, minutely capitate, thin-walled, with refringent, locally abundant contents. **Stipitipellis** composed of basically similar elements as in cap, but with terminal cells often more strongly narrowing and longer. **Clamps** absent in all parts.

**Distribution: Midlands Province:** Central Estates, Mvuma, Beacon Hill Homestead, 1930 A4, under *Brachystegia glaucescens*, 06/01/1988, C.Sharp 13/88; 29/01/1994, CS 298/94; 17/12/1995, C. Sharp 385/95; 22/01/1995, CS 346/95; *ibid.*, 28/01/1996, C. Sharp 1031/1998; *ibid.*, 30/12/1998, C. Sharp 1121/98; Harben Park, Gweru, 1929 B4, 09/12/1998, under *B. glaucescens*, C. Sharp 1077/98.

**Systematic position:** apparently either sect. *Ingratae* Quél., subsect. *Pectinatinae* Bon or Sect. *Heterophyllae* Fr. Subsect. *Ilicinae* (Schaeffer) Buyck

**Ecology:** more heliophilic, preferring a more open, sunny habitat in litter under *Brachystegia glaucescens*.

**Comments:** Unfortunately, not all important field characters have been noted for this species: particularly spore print colour and taste need more precision. The spore print color was noted from spore print on black paper and from an insufficient deposit, it might therefore be a darker cream than mentioned here.

This small species of up to 40 mm in height has a very thin pileus. It fruits throughout the rains. The muddy earth stains on the cap are quite characteristic, and are not easily washed off in the rain. The latter feature is also very prominent in *R. albobloccosa* Buyck, another very common miombo inhabitant, that is apparently extremely similar in the field especially when the characteristically yellow colors have been washed away by heavy rains.

Beetles are particularly partial to this species, often burrowing underground to eat the basidiome before it has even emerged. In most collections a white mycelium is evident and prolific. Because of the color, *Russula terrena* may be confused with other whitish species, which are usually more stout and fleshy though, such as *R. afrodelica* Buyck and related species occurring in the same habitat. The latter taxa are usually more deeply depressed at the centre and have crowded lamellae intermixed with numerous shorter lamellulae and often with a greenish tinge when viewed at an angle; their flesh also reacts more vividly with ferric salts and their cap margin is not striate-tuberculate.

**Edibility:** unknown, though probably not toxic.

**14. *Russula testacea*** Buyck, Bulletin du Jardin Botanique National de Belgique 58: 475. 1988.

*Suggested Anglo-saxon name:* “Orange brown Russula”

*Iconography-Description:* Buyck 1997: 562. pl. 87/4.

*Systematic position:* uncertain

*Ecology:* Grows in small groups in *B.spiciformis* and *B.glaucescens* woodlands. Not common.

*Edibility:* unknown

**15. *Russula velutina*** (Bres.) Buyck, Bulletin du Jardin Botanique National de Belgique. 58: 476. 1988

*Iconography-Description:* Buyck 1993: 400, pl. 62/2.

*Systematic position:* previously placed in section *Fistulosae* subsection *Testaceo-aurantiacinae* Buyck (Buyck 1994), but preliminary molecular data (Buyck, unpubl.) suggest closer affinities to principally dark-spored sections in the genus.

*Ecology:* In *B. glaucescens* woodland. Rare.

*Edibility:* unknown, but very likely perfectly edible

## DISCUSSION

The relative areas of the different miombo ecotypes covering Zimbabwe are not yet known and several of these have never been studied for their ectomycorrhizal fungi. According to the experience of the second author, *Julbernardia globiflora*-dominated miombo, either exclusively or in combination with *Brachystegia glaucescens*, shows the highest diversity of fungi. In the higher rainfall areas, *B. spiciformis*-dominated miombo also shows a great richness of *Russula* species (Tab. 1).

*Russula* is the most common and divers of the various ectomycorrhizal genera that inhabit Zimbabwe's miombo woodland. Although most tropical ectomycorrhizal fungi are probably not as selective about their host trees as they are in northern temperate areas and generally occur with various miombo trees, the phenomenon of associations of mushrooms with certain trees has been recognized in Zimbabwe even before any European colonization brought such knowledge to the country. The Shona people had already given particular vernacular names

Table 1. Biodiversity of *Russula* species in Zimbabwe related to host trees.

<i>Dominant Trees in Different Miombo Ecotypes</i>		<i>Nbr of species</i>
Mid-High Altitude (1200-2000 m) - Wet (1000-1600 mm)	<i>Brachystegia spiciformis</i>	22
Mid Altitude (600-1500 m) - Wet (800-1000 mm)	<i>Brachystegia spiciformis</i> <i>Julbernardia globiflora</i>	7
Mid Altitude (600-1500 m) - Dry - Wet (600-800 mm)	<i>Brachystegia spiciformis</i> <i>Julbernardia globiflora</i> <i>Monotes sp.</i> <i>Julbernardia globiflora</i>	6 23
	<i>Brachystegia spiciformis</i> <i>Burkea africana</i>	8
	<i>Brachystegia boehmii</i>	13
	<i>Brachystegia glaucescens</i>	20
	<i>Brachystegia glaucescens</i> <i>Julbernardia globiflora</i>	23
	<i>Uapaca kirkiana</i>	7

to fungi growing under *Brachystegia spiciformis* (“HOWAMUSASA”) and under *Julbernardia globiflora* (“HOWAMUNONDO”).

Ongoing documentation of ethnomycological data (Sharp, unpubl.) in Zimbabwe suggests that *Russula* has less culinary value than does *Cantharellus* Fr., *Termitomyces* Heim or even *Lactarius* Pers. To date, there are no records of *Russula* for sale along Zimbabwe’s roadsides – a common phenomenon is neighboring Zambia, Tanzania or in Burundi for example – and this is probably because they are not produced in great quantities as are the former genera. Only one species, “NYABURURU, (as yet undetermined), is said to surpass all other edible fungi in its popularity among the Korekore people of northwestern Zimbabwe. Other vernacular names in different Shona dialects (S = Shona, K = Karanga; Ko = Korekore) for yet undetermined consumed *Russula*-species include: CHAMBWE (S) or SHAMBGWE (K), CHAPISIRA (S), CHIVANDUKIRA (K, S), and for undetermined but not consumed *Russula* GODZAMUTO (K), MATIBURA (K) and MUTEKERAMAVU (K). No medicinal uses of *Russula* have been recorded in this country.

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