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31 July 2011

Instructions to authors:

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- Articles should not be more than 800 words.
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Provisional macroscopic key to the edible mushrooms of tropical Africa: 100+ taxa from the Zambesian and Sudanian region

By André de Kesel

Abstract

A key is presented to identify more than a hundred edible African macromycetes used by local people in the Sudanian and Zambesian woodlands and rural areas. The macroscopic key is a field tool for identifying the edible mushrooms collected by local people.

Introduction

The wild edible mushrooms from tropical Africa play an important role in the livelihood of local people. Many hundreds of species are used for food (Rammeloo and Walley 1993, 1994). Most of these species are recognized and named through an ancestral system of folk classification. Local names are locally important, but so often without any meaning elsewhere. This key is meant for those who want to identify the edible mushrooms collected by local people. The species included here occur in a variety of Sudanian and Zambesian woodlands (pristine and secondary); they are either offered for sale on local markets and road stalls, or used at local peoples' homes.

The open forests in South-east Africa (miombo types) and West Africa are excessively rich in fungi, edible or not. We stress that this key is not suitable to determine the edibility of just any fungus collected in these habitats. Some of the edible taxa mentioned in the key have sibling species, unknown or rejected by local people, and possibly not edible or poisonous. Only one poisonous species (*Chlorophyllum molybdites*) was included in the key. It is strongly recommended to identify your own collected material by consulting monographic keys based on microscopic and macroscopic features (some are listed below).

Many of the more than hundred edible taxa (species and varieties) presented in this key are used for food in Niger, Burkina Faso, Nigeria, Togo, Benin, Tanzania, Burundi, D.R.Congo, Zambia, Malawi, Zimbabwe and neighbouring countries. Not all taxa used in this vast area are included in the key. Some species offered for sale, or used locally, or mentioned in the literature, may therefore not be included.

The key is a field tool and largely based on macroscopic features. The variation of the taxa has been taken into account as much as possible. It is recommended to use fruitbodies of different ages, preferably undamaged. We do realise that this will often not be possible as mushrooms picked for sale are often devoid of important features of the stipe base or the veil. We did not use the ecology as a primary character in the key (substrate, host, etc), as these data are often not available on the markets. In most cases, however, it won't be too difficult to determine whether a specimen was growing on wood or soil.

We encourage anyone encountering wild edible mushrooms on markets to buy and photograph them, to enquire about their use, their names and

properties. Finally, it is recommended to describe, dry and store these specimens, with their data, in a herbarium for later ethnomycological studies.

Some monographs and identification keys are available for Russulaceae (Buyck 1993, 1994, 1997; Verbeke & Walley 2010) or other taxa (Pegler 1977). Other contributions of important genera, such as *Amanita*, *Cantharellus* and *Termitomyces*, are scattered, incomplete or still lacking for tropical Africa. Interesting keys and species information can be found in Van der Westhuizen & Eicker (1990), Heim (1977), Buyck (1994b), Wong & Wells (1987), Pegler & Shah-Smith (1997), Pegler (1983), Eyssartier & Buyck (1999), Castellano et al. (2000), Härkönen et al. (2003), Heinemann (1966, 1975, 1977, 1978) and De Kesel et al. (2002), among others. A compilation of the literature on edible and poisonous fungi of tropical Africa is given by Rammeloo & Walley (1993), Walley & Rammeloo (1994) and Boa (2004). We do realize this macroscopic key is subject to improvement. We therefore acknowledge your comments and additions to make this key work better.

Key

- | | |
|--|------------------------------|
| 1. Fruit-body closed, more or less gasteroid, yellowish to whitish; semi-hypogeous
(only West-Africa) | <i>Octaviania ivoryana</i> |
| 1. Fruit-body different | 2 |
| 2. Fruit-body coral-shaped, with bifurcate branches..... | <i>Clavulina</i> spp. |
| 2. Fruit-body not coral-shaped | 3 |
| 3. Fruit-body without a stipe, sessile, often fan-shaped; on wood..... | 4 |
| 3. Fruit-body with a differentiated stipe (short or long, central or lateral); on soil or wood | 6 |
| 4. Fruit-body 1-4 cm, silvery white to grey, with pinkish gills | <i>Schizophyllum commune</i> |
| 4. Fruit-body without gills, gelatinous to rubbery, brownish, ear-shaped or cup-shaped | 5 |
| 5. Cap smooth, pale brown, lower side reticulate-veined, subporoid | <i>Auricularia delicata</i> |
| 5. Cap velvety, lower side smoother, not reticulate | <i>Auricularia cornea</i> |
| 6. Stipe lateral; on wood | 7 |
| 6. Stipe central or nearly so; on wood or not..... | 14 |
| 7. Cap deeply infundibuliform or bowl-shaped; stipe and cap soon coriaceous..... | 8 |
| 7. Cap not deeply infundibuliform, flabelliform or convex, never coriaceous | 9 |
| 8. Cap concentrically squamose, stipe 2-7 cm, no annulus | <i>Lentinus squarrosulus</i> |
| 8. Cap smooth, stipe shorter, 1.5-3 cm, with annulus at apex | <i>Lentinus sajor-caju</i> |
| 9. Lamellae relatively crowded | (<i>Pleurotus</i>) 10 |
| 9. Lamellae spaced, forked and interveined | 13 |

10. Cap olivaceous beige, silky striate, becoming villous; stipe hairy	<i>Pleurotus djamor</i>	
10. Cap without olivaceous tint, never villous and stipe not hairy		11
11. Cap 2-6 cm, white to ivory, with distinctly undulate margin, context thin.....	<i>Pleurotus flabellatus</i>	
11. Cap 4-20 cm, not white-ivory, margin not undulate, context more fleshy		12
12. Base of stipe and mycelium with coremia; cap cream coloured to pale brownish	<i>P. cystidiosus</i>	
12. Without coremia; cap brownish to pale ochraceous, sometimes with grey-bluish hue.....		
.....	<i>Pleurotus ostreatus</i> (s.l., introduced species)	
13. Cap 1-3 cm, stipe base with pink-orange tomentum	<i>Marasmiellus inoderma</i>	
13. Cap larger, stained purplish brown; stipe without pinkish-orange tomentum; bitter	<i>Nothopanus hygrophanus</i>	
14. Lower side of the cap with gills, veins or smooth		19
14. Lower side of the cap with pores.....		15
15. Fruit-body tough, coriaceous, pore-layer (tubes) not separable	Polypores pp. (not treated)	
15. Fruit-body soft, tubes separable (the diverse group of Boletes, only very few are eaten).....		16
16. Cap always dry.....		17
16. Cap slimy (at least when young); growing under pine (only in plantations).....		
.....	<i>Suillus granulatus</i> (annulus absent) or <i>S. luteus</i> (annulus present)	
17. Cap scaly, flesh becoming grayish; stipe slender, floccose.....	<i>Afroboletus luteolus</i>	
17. Cap smooth, tomentose or minutely roughened, context blueing or not; stipe clavate		18
18. Cap 7-9 cm, vivid red, cinnabarine, context cyanescent, pores red.....	<i>Boletus spectabilissimus</i>	
18. Cap 15-45 cm, olivaceous brown, context yellowish, pores olive yellow	<i>Phlebopus sudanicus</i>	
19. Lower side of the cap (hymenophore) smooth or rugose		20
19. Lower side of the cap either gilled or veined.....		21
20. Hymenial surface rugose; cap distinctly funnel-shaped, flabellate, thin	<i>Cymatoderma, Cotyldia</i>	
20. Hymenial surface smooth; cap infundibuliform, more fleshy.....	(Cantharelloids)	42
21. Lower side of the cap falsely lamellate, most often veined.....	(<i>Cantharellus</i>)	45
21. Lower side of the cap with true gills, rarely veined		22
22. Fruit-bodies very brittle flesh; stipe breaks (snaps) like school chalk.....	(Russulaceae)	23
22. Fruit-bodies not so brittle; stipe always longitudinally fibrous when broken		24
23. Bruised parts of the fruit-body secrete a milky substance.....	(<i>Lactarius</i>)	87
23. Bruised parts of the fruit-body do not secrete liquids	(<i>Russula</i>)	103
24. Lamellae (mature) white, cream, pale yellow or very pale pink		25
24. Lamellae and spore print green, greyish pink, brown or black.....		37
25. Base of the stipe with a sac-like structure (volva) or stipe bulbous; cap with velar patches and context reddening; lamellae free		26
25. Base of stipe without volva; stipe with or without annulus.....		27
26. Lamellae (mature) white to cream, with or without annulus.....	(<i>Amanita</i>)	62
26. Lamellae (mature) pink; without annulus.....	(<i>Volvariella</i>)	39
27. Stipe moderately to deeply rooting (pseudorrhiza) or originating from an hypogeous sclerotium		28

27. Stipe not rooting.....	30
28. Stipe originating from an underground (pseudo-)sclerotium (large resting body).....	29
28. Stipe with long pseudorrhiza originating from termite nest; no sclerotium.....	(<i>Termitomyces</i>) 67
29. Cap infundibuliform, centre squamulose; lamellae decurrent; large sclerotium.....	<i>Lentinus tuberregium</i>
29. Cap convex to plane, glabrous; lamellae adnate; pseudosclerotium.....	<i>Macrocybe lobayense</i>
30. Stipe with annulus	31
30. Stipe without annulus; stipe not bulbous; lamellae subfree, adnexed or deeply decurrent	33
31. On wood; lamellae decurrent; stipe short; cap bowl-shaped, cream, smooth.....	<i>Lentinus sajor-caju</i>
31. On soil; lamellae free; stipe long, bulbous; cap innately scaly.....	32
32. Cap whitish, minutely squamulose, umbo dark brown; context white.....	<i>Macrolepiota dolichaula</i>
32. Cap white, disk and squamules ochraceous brown; context reddening.....	<i>Chlorophyllum rhacodes</i>
33. Cap very small (<2 cm diam.), pointed; fruit-bodies gregarious in large numbers.....	(<i>Termitomyces</i>) 68
33. Cap not umbonate, not pointed; fruit-bodies either larger or growing on wood	34
34. Large white fruit-bodies, 6-20 cm; in tufts on the ground (near trees).....	<i>Macrocybe lobayense</i>
34. Not so large, growing on wood	35
35. Cap 2-7 cm, infundibuliform, concentrically squamose	<i>Lentinus squarrosulus</i>
35. Cap 1-3 cm, smooth to minutely fibrillose	36
36. Lamellae crowded; cap and stipe bright to mustard yellow; grows in tufts.....	<i>Collybia aurea</i>
36. Lamellae spaced; cap white; stipe base with pink-orange tomentum	<i>Marasmiellus inoderma</i>
37. Lamellae (mature) yellow-greenish; spores greenish; cap scaly; annulus present..... (poisonous!) <i>Chlorophyllum molybdites</i>
37. Lamellae not yellowish or greenish	38
38. Lamellae (mature) and spore print pinkish brown, greyish pink; with volva	39
38. Lamellae (mature) and spores dark brown or black; no volva	40
39. Cap 5-10 cm, greyish brown with almost black disk; on or near dead wood	<i>Volvariella volvacea</i>
39. Cap 3-7 cm, slightly glutinous, cream-coloured to white; on the ground (fields).....	<i>Volvariella earlei</i>
40. Lamellae liquefying or 'melting' away like ink.....	<i>Coprinus</i> spp.
40. Lamellae not liquefying	41
41. Stipe and entire fruit-body slender; lamellae not free; cap with velar remnants.....	(<i>Psathyrella</i>) 86
41. Stipe not slender; lamellae free, pink then black, usually crowded; with annulus.....	(<i>Agaricus</i>) 83
42. Fruit-body at first tubulate with straight cap margin, stipe hollow	<i>Craterellus</i>
42. Fruit-bodies not so, at first with incurved margin; stipe solid	43
43. Fruit-bodies tough, thin; hyphae with secondary septa; no clamps	<i>Pseudocraterellus</i>
43. Fruit-bodies fleshier; mostly with clamps	44
44. Hymenophore plicate or lamellate	(<i>Cantharellus</i>) 45
44. Hymenophore smooth to rugose (like <i>C. cibarius</i> , but without gills)	<i>Cantharellus cf. odoratus</i>
45. Cap greyish brown; flesh turning grey when exposed	<i>Cantharellus congolensis</i>

45. Cap yellow, orange, orange-red, pink, red or brown, flesh not turning grey when exposed.....	46
46. Cap usually less than 3 (4) cm diam.; small and fragile taxa	47
46. Cap more than (3) 4 cm diam.; taller and not so fragile taxa	49
47. Gills spaced; cap bright orange, usually smooth (sometimes finely hirsute)	<i>C. pseudocibarius</i>
47. Gills crowded	48
48. Cap bright to pale yellow, rather thick, finely squamulose in the centre.....	<i>C. luteopunctatus</i>
48. Cap bright red, very thin, smooth.....	<i>Cantharellus floridulus</i>
49. Gills crowded (L+l: 20/cm)	50
49. Gills more spaced (L+l: 3-15/cm or less)	51
50. Gills not interveined; cap pale cream to (orange) ochraceous, finely punctate.....	<i>C. densifolius</i>
50. Gills abundantly interveined; cap bright lemon-yellow, finely squamulose	<i>C. luteopunctatus</i>
51. Cap yellow, orange, ochraceous, brownish or greyish (without red, blue, violet or pinkish tinges)	52
51. Cap red, reddish-brown, violet or pink; sometimes with shades of orange or blue	57
52. Gills at first concolorous with the cap, soon becoming pale yellow, finally pink.....	<i>C. isabellinus</i>
52. Gills concolorous with the cap, at least in the same tinge, never pink	53
53. Cap and stipe soon becoming moderately to strongly squamose	<i>Cantharellus rufopunctatus</i>
53. Cap and stipe usually smooth, at most subsquamulose in the centre of the cap	54
54. Gills not or scarcely veined; fruit-body bright orange	55
54. Gills strongly veined and anastomosing; fruit-body orange or yellowish	56
55. Fruit-body small, cap 2-4(5) cm; gills moderately spaced (L+l: 8-14/cm)	<i>C. pseudocibarius</i>
55. Fruit-body massive, cap 7-18 cm; gills very spaced (L+l: 3-5/cm)	<i>Cantharellus splendens</i>
56. Cap orange, not pruinose, margin strongly lobed; without clamps	<i>Cantharellus defibulatus</i>
56. Cap yellowish (bright), white pruinose; with clamps.....	<i>Cantharellus cibarius</i> var. <i>latifolius</i>
57. Cap violaceous, dark violet, bluish-violaceous or orange with distinct bluish tinges	58
57. Cap without any shade of violet or blue	59
58. Gills violaceous pink, bruising yellowish brown.....	<i>Cantharellus cyanoxanthus</i>
58. Gills cream-coloured, with greyish tinges, becoming pinkish	<i>C. platyphyllus</i> var. <i>cyanescens</i>
59. Cap red-brown to pinkish orange; gills pinkish to incarnate orange; with clamps	<i>C. subincarnatus</i>
59. Cap without brown; gills without incarnate tinges	60
60. Fruit-body entirely pink to reddish pink; context white, bruising brown	<i>Cantharellus ruber</i>
60. Cap bright red, becoming partly pinkish; gills yellowish orange	61
61. Fruit-body fleshy; spores broadly ellipsoid to subglobose (Q = 1.35)	<i>Cantharellus platyphyllus</i>
61. Fruit-body less fleshy, fragile; spores ellipsoid (Q = 1.88)	<i>Cantharellus symoensii</i>
62. Cap covered in patches/scales	63
62. Cap usually without small patches	64
63. Cap 6-12 cm, whitish to pale reddish brown, with greyish patches; context reddening	<i>Amanita rubescens</i>
63. Cap 4-6 cm, white, sticky, with white to pale brownish orange patches; not reddening.....	<i>Amanita subviscosa</i>

64. Cap ivory with olivaceous brown centre, 9-25 cm; stipe stout with saccate volva.....	<i>Amanita loosii</i>
64. Cap orange or brownish	65
65. Cap copper brown to chestnut; stipe pale yellow.....	<i>Amanita mafingensis</i>
65. Cap brighter orange.....	66
66. Stipe white; lamellae white; cap bright orange	<i>Amanita tanzanica</i>
66. Stipe yellow; lamellae yellow; cap 3-7 cm, yellow orange.....	<i>Amanita masasiensis</i>
67. Cap small, 2-4 cm, rarely more	68
67. Cap larger, usually at least 4 cm diameter	70
68. Fruit-body without pseudorrhiza; cap very small (<2 cm).	<i>Termitomyces microcarpus</i>
68. Fruit-body with pseudorrhiza; cap larger	69
69. Cap rimose, blackish grey with bluish tinges; stipe grey, swollen at ground level	<i>T. entolomoides</i>
69. Cap without bluish tints; stipe white, not swollen at ground level	<i>Termitomyces medius</i>
70. Perforatorium very long and pointed, spiniform	71
70. Perforatorium not so long spiniform, continuous, or demarcated, or absent	72
71. Perforatorium entirely warty, dark fuliginose; cap grey	<i>Termitomyces spiniformis</i>
71. Perforatorium smooth, brown to blackish brown; cap silky greyish brown to ash grey	<i>T. clypeatus</i>
72. Perforatorium demarcated and prominent, either submammillate, mammiform or cylindric	73
72. Perforatorium absent or not demarcated, small, broadly conical, a continuation of the cap	75
73. Perforatorium mammiform and scrobiculate, blackish brown; cap white, 3-7 cm	<i>T. mammiformis</i>
73. Perforatorium cylindric, smooth; cap brownish or dark brown, 9-25 cm.....	74
74. Cap brownish, tomentose; perforatorium cylindric, dark brown; annulus persistent	<i>T. letestui</i>
74. Cap scrobiculate or radially ridged, glabrous; perforatorium submammillate; no annulus.....	<i>T. robustus</i>
75. Cap with distinct velar remnants	76
75. Cap without velar remnants or with few minute whitish evanescent membranous squamules	77
76. Cap white, with large dark squamules; perforatorium absent.	<i>Termitomyces schimperi</i>
76. Cap brownish, with greyish fluffy veil; perforatorium pointed, broad conical	<i>T. singidensis</i>
77. Pseudorrhiza blackish (cortex); cap greyish brown, viscid, rugulose; annulus inconstant.....	<i>T. eurhizus</i>
77. Pseudorrhiza pale, not entirely blackish	78
78. Cap very large (30-60 cm), white, greyish, subsquamulose; stipe with annulus	<i>T. titanicus</i>
78. Cap smaller; stipe usually without annulus (1 exception).....	79
79. Cap globose; perforatorium low, small and poorly defined	<i>Termitomyces globulus</i>
79. Cap first conical, then convexo-applanate; perforatorium small, broadly conical	80
80. Cap 10-20 cm, concentrically scrobiculate; pseudorrhiza partly blackish	<i>Termitomyces robustus</i>
80. Cap smaller (4-12 cm), not concentrically scrobiculate, at most radially striate	81
81. Cap orange, small (up to 8 cm).	<i>Termitomyces striatus</i> var. <i>aurantiacus</i>
81. Cap ochraceous brown to grey brown, larger (up to 12 cm)	<i>T. striatus</i> var. <i>striatus</i> 82

82. Stipe with annulus	f. <i>annulatus</i>
82. Stipe without annulus; cap ochraceous brown.	f. <i>ochraceus</i>
82. Stipe without annulus; cap grey to greyish brown.	f. <i>griseus</i>
83. Stipe not bulbous; cap white, or pinkish or pale reddish.....	84
83. Stipe bulbous; cap centre brownish to blackish	85
84. Large vigorous sp.; cap 7-13 cm, squamose, entirely white; ring complex.....	<i>Agaricus sp.(in press)</i>
84. Small sp.; cap 2.5-5 cm, white with pinkish lilac to reddish squamules; ring simple.....	<i>Agaricus goossensiae</i>
85. Bulb normal; cap 3.5-5 cm, centre with dark brown squamules	<i>Agaricus bulbillosus</i>
85. Bulb marginate-depressed; cap 4-9 cm, black, radially fissurate; stipe yellowing	<i>Agaricus volvatulus</i>
86. Cap centre reddish brown; stipe with annulus; tufts on rotten wood.....	<i>Psathyrella tuberculata</i>
86. Cap centre black; stipe without annulus; on twigs or lawn	<i>Psathyrella atroumbonata</i>
87. Stipe with a fugaceous annulus	(sect. <i>Lactariopsis</i>) <i>Lactarius pelliculatus</i> and <i>L. heimii</i>
87. Stipe without an annulus	88
88. Cap greyish brown, dark brown, fruit-body without orange or yellow tinges	89
88. Cap differently coloured; young fruit-body with yellow, orange, ochre or reddish brown tinges	93
89. Lamella with a differently coloured edge	90
89. Lamella with concolorous edge.....	91
90. Cap brown to dark brown (locally blackish); flesh bruising reddish to brownish	<i>Lactarius congolensis</i>
90. Cap pale brown to greyish brown, with traces of orange; flesh unchangeable	<i>L. saponaceus</i>
91. Cap dark red-brown, pruinose, areolate margin; white context turns ochraceous	<i>L. xerampelinus</i>
91. Cap dark brown, fading grey; context unchanged or turning light orange-grey	92
92. Robust species; cap dark brown, fading brownish grey; flesh in stipe base orange	<i>L. kabansus</i>
92. Slender species; cap dark brown, fading grey; flesh in stipe base white	<i>Lactarius tenellus</i>
93. Flesh staining brownish when bruised; cap vivid ochraceous or bright orange.....	94
93. Flesh not staining or at most yellowish or greyish	95
94. Cap vivid ochraceous orange; stipe concolorous; lamellae very dense; acrid	<i>Lactarius angustus</i>
94. Cap bright orange; stipe entirely white or cream-coloured; mild.....	<i>Lactarius tanzanicus</i>
95. Cap less than 2.5 (3) cm diameter	96
95. Cap more than (3) 4 cm diameter	97
96. Cap pale orange, greyish to brownish orange; stipe pale orange, whitish base	<i>Lactarius pumilus</i>
96. Cap bright to pale yellow, orange yellow; stipe entirely vivid yellow	<i>Lactarius luteopus</i>
97. Lamellae crowded	98
97. Lamellae distant	99
98. Cap orange brownish to sienna, tomentose, cracking into small darker flocks	<i>Lactarius inversus</i>
98. Cap pale brownish yellow, apricot orange to cream, tomentose, but not so cracking	<i>L. densifolius</i>
99. Context very hard; cap yellow to orange, soon pale ochraceous cream; lamellae cream	<i>L. edulis</i>
99. Context normal; cap and lamellae not so pale	100

100. Cap reddish brown to cinnamon-brown; lamella very distant, orange to yellowish orange or pale brownish orange *L. latifolius*
 100. Cap bright yellow, bright orange or greyish orange..... 101
101. Stipe vivid yellow; cap bright to pale yellow, orange yellow, rarely greyish orange*L. luteopus*
 101. Stipe not vivid yellow; cap orange, either bright or greyish..... 102
102. Cap and stipe smooth, deep bright orange; lamellae pale; taste mild *Lactarius flammans*
 102. Cap wrinkled, cracking, greyish orange to orange, soon paler; lamellae light yellow; taste bitter.....
 *Lactarius gymnocarpoides*
103. Stipe with an annulus; cap 5-6 cm, smooth, greyish violet; margin long involute*Russula hiemisilvae*
 103. Stipe without annulus..... 104
104. Lamellulae abundant, not bifurcate; flesh bruising red, then brown (black)*Russula phaeocephala*
 104. Lamellulae absent or rare 105
105. Lamellae very rarely or not forked, crowded or not..... 106
 105. Lamellae clearly forked; crowded *Russula cellulata*
 Cap greyish brown, pale towards the margin grey-brown form
 Cap yellowish orange, cream-coloured towards the margin yellow form
 Cap almost blackish, becoming paler in the centre typical form
106. Cap cream-coloured or yellowish, greenish yellow, orange, yellow-discoloured red 107
 106. Cap greyish violet or vivid bright red, without cream or green..... 108
107. Cap 2-4 cm, greenish yellow to orange or red; always with discoloured yellow areas*R. ciliata*
 107. Cap 5.5-7 cm, entirely cream-coloured, floccose with flat scales, slimy and viscid*R. albofloccosa*
108. Cap bright red 109
 108. Cap without red, 6-13 cm, margin fissurate, greyish pink to purplish lilac*Russula roseoviolacea*
 Cap entirely smooth and yellowishvar. *roseoviolacea* forma *sublaevis*
109. Cap 4-8 (10) cm; stipe white; yellowing *Russula compressa*
 109. Cap 2-5 (6) cm; stipe pink to reddish *Russula congoana*

Remarks

L+I/cm represents the number of lamellae and lamellulae per cm cap margin
 Q is the ratio of spore length over spore width)

Termitomyces badius Otieno, probably a brown form of *T. microcarpus*

Termitomyces magoyensis Otieno, septate cystidia place it in *T. schimperi*

Termitomyces lanatus is invalid, very close to *T. singidensis*

Termitomyces rabuori, probably exannulate form of *T. mammiformis*

Termitomyces fuliginosus, synonym of *T. robustus*

Termitomyces biyi, synonym of *T. letestui*

Russula heimii, close to *R. phaeocephala*, but spores almost smooth

Russula liberiensis, close to *R. cellulata*, but without pileocystidia

Auricularia tenuis and *A. polytricha*, are synonyms of *Auricularia cornea*

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Enumeration of fungi collected in May 1993 by Orson and Hope Miller in and around Cape Town and Stellenbosch

By JC Coetzee

During a brief sojourn in southern Africa in 1993, the renowned North American mycologist Orson K. Miller also visited Cape Town for a few days between 14–18 May in the company of his amicable wife and research partner Hope, a mycological expert in her own right who, apart from her own mushroom cookbook, also co-authored a number of Orson's various mushroom books. More information on the life and work of Orson and Hope Miller can be found on the website 'Orson & Hope Miller's Mushrooms' (<http://www.mushrooms-millers.com>) and various links leading from there. Sadly Orson Miller passed away in 2006, shortly after having completed what, according to comments, already seems to be regarded as an indispensable field guide to the mushrooms of

North America [MILLER, O.K. & MILLER, H. 2006. *North American mushrooms: A field guide to edible and inedible fungi*. Globe Pequot Press (Falcon), Guilford.]

During the Millers' brief Cape visit the current author was privileged to act as their local host and guide for two days, in which capacity a wonderful weekend was spent foraging and mushrooming in the company of two absolute masters of their subject. It was late autumn (which means it was still mushroom season in the Cape) and the mushroom gods certainly were kind to us: mushrooms were aplenty and the harvest bountiful. The Millers' knowledge astounded, their gentle, unassuming demeanour impressed and the enthusiasm for their work was inspirational. From one of my students I

had learnt of a stand of *Kalchbrennera corallocephala* (nowadays also referred to again as *Lysurus corallocephalus*) fruiting on a lawn in Milnerton and, since Orson had never seen this species in its natural habitat before, that was where we were heading for first thing that Saturday morning. I can still vividly remember Prof. Miller's excitement when we came across several beautiful specimens of this remarkable fungus at the locality as indicated. I still wonder who was the more thrilled: he, with his new encounter, or I, savouring his excitement!

Correspondence received from the Millers upon their return to the USA included an inventory of the fungi they had encountered during their Cape stay, but, with other matters requiring more immediate attention, the document was, at the time, merely filed for later attention. 'Later', in this case, stretched into several years, however, and the Miller list was only 'rediscovered' recently during a long overdue office spring-clean. The document lists thirty-nine basidiomycetes recorded from Cape Town and the Stellenbosch area, with no less than six representing taxa which, to this author's best knowledge, do not seem to have been reported from South Africa before.

The whereabouts of the Millers' Cape material is uncertain at this stage. Only a few of the specimens seem to have found their way to the herbarium of the Virginia Polytechnic Institute and State University (VPI) to which Prof Miller was affiliated for 31 years until his retirement in 2002. Enquiry revealed that his collection notebooks only mention three South African collections, while the VPI mycological herbarium database contains only two records, *Kalchbrennera corallocephala* (OKM #25973) and a *Hypholoma* sp. (OKM #25566), both of which are also physically present in the herbarium. The third specimen in Miller's collecting log, *Coprinus picaceus* (OKM #25565), however, is neither in the herbarium nor on the database. Fortunately, a part of OKM #25565 has remained in the possession of the current author, however, and will be sent to the South African National Collection of Fungi (PREM) in due course. A spot check of several of the other listed species failed to locate any other specimens at VPI [personal communication, Thomas F. Wieboldt, Curator, Massey Herbarium (VPI), Dept. of Biological Sciences, Virginia Tech, Blacksburg, Virginia]. None of the material in question has also been deposited at the University of Pretoria (PRUM), Prof. Miller's main base during his stay in South Africa, or at PREM.

The current author was able to confirm the

identity of OKM #25565 as *Coprinopsis picacea* (Bull.) Redhead, Vilgalys & Moncalvo [formerly *Coprinus picaceus* (Bull.) Gray]. A similar mushroom, collected from Fouriesburg in the eastern Free State Province, had also been identified as this species some two years ago already, but that was on macroscopic features only and the identification was never verified microscopically (personal communication, Dr. Marieka Gryzenhout, University of the Free State). This note therefore represents the first confirmed report of the occurrence of *Coprinopsis picacea* in South Africa.

The six 'new records', albeit largely unsubstantiated in the apparent absence of voucher specimens, certainly make the Millers' list of Cape fungi noteworthy. All the fungi noted by Orson and Hope Miller during their Cape visit are therefore enumerated in Table 1 below. The collecting localities are also provided so that future forayers may keep a special eye out for the 'new records' requiring verification. The first column contains the names as noted in Prof. Miller's original list, in the same order and without any alteration to his original spelling. The second (middle) column contains the 'current name' and author citation for the taxon as per Index Fungorum, while the third (last) column contains references to previous South African records of the taxa concerned. Abbreviations and numbers used are explained at the base of the table.

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TABLE 1. Fungi from Cape Town and Stellenbosch collected and identified by Prof. Orson K. Miller and Mrs. H. Miller during the period 14–18 May 1993.

Name as provided by O.K. Miller	'Current name' as provided in Index Fungorum	Reference to previous South African record(s)
Locality: Table View suburb in Milnerton		
<i>Kalchbrennera corallocephala</i> (on lawn)	<i>Lysurus corallocephalus</i> Welw. & Curr.	(1), (3), (4) all as <i>K. corallocephala</i>
<i>Marasmius oreades</i> (on lawn)	<i>Marasmius oreades</i> (Bolton) Fr.	(3), (4). (1) lists <i>M. oreadoides</i> , but that is <i>Gymnopus oreadoides</i>
<i>Coprinus comatus</i> (soil on vacant lot)	<i>Coprinus comatus</i> (O.F.Müll.) Pers.	(1), (2), (3), (4), (5), (7), (8)
Locality: Lawn surrounding fountain at entrance to Neethlingshof wine estate, Stellenbosch		
<i>Hygrocybe conicus</i>	<i>Hygrocybe conica</i> (Schaeff.) P.Kumm.	(4), (7), (8)
Locality: Jan S. Marais Park, Stellenbosch		
<i>Amanita phalloides</i>	<i>Amanita phalloides</i> (Vaill. ex Fr.) Link	(1), (2), (3), (4), (5), (6), (8)
<i>Amanita rubescens</i>	<i>Amanita rubescens</i> Pers. var. <i>rubescens</i>	(1), (2), (3), (4), (5), (6), (8)
<i>Amanita pantherina</i>	<i>Amanita pantherina</i> (DC.) Krombh.	(1), (2), (3), (4), (5), (6), (7), (8)
<i>Boletus edulis</i>	<i>Boletus edulis</i> Bull.	(1), (2), (3), (4), (5), (7), (8)
# <i>Gymnopilus</i> cf <i>penetrans</i>	<i>Gymnopilus penetrans</i> (Fr.) Murrill	
<i>Phaeolus schwinitzii</i>	<i>Phaeolus schweinitzii</i> (Fr.) Pat.	(1) as <i>Polyporus</i> ; (3), (4), (8)
# <i>Mycena</i> sp. fuzzy stipe	<i>Mycena</i> (Pers.) Roussel	
<i>Rhizopogon rubescens</i>	<i>Rhizopogon roseolus</i> (Corda) Th.Fr.	(1) & (3) as <i>R. rubescens</i>
* <i>Rhizopogon nigrellus</i>	No such name. Miller probably meant <i>Rhizopogon nigrescens</i> Coker & Couch	No previous S.A. record found.
* <i>Lepiota clypeolaria</i>	<i>Lepiota clypeolaria</i> (Bull.) P.Kumm.	No previous S.A. record found.
# <i>Agaricus</i> cf <i>melagris</i> group	No <i>melagris</i> in Index Fungorum, only <i>meleagris</i> . Might be <i>Agaricus meleagris</i> With., <i>Leucoagaricus meleagris</i> (Sowerby) Singer or <i>Agaricus moelleri</i> Wasser	
<i>Picnoporus sanguineus</i>	<i>Pycnoporus sanguineus</i> (L.) Murrill	(1) & (2) as <i>Polystictus</i> ; (2) as <i>Polyporus</i> ; (3), (4), (8)
<i>Omphalina ericitorum</i>	<i>Lichenomphalia umbellifera</i>	(3) as <i>O. ericitorum</i>

	(L.) Redhead, Lutzoni, Moncalvo & Vilgalys	
<i>Stropharia coronilla</i>	<i>Stropharia coronilla</i> (Bull.) Quél.	(1), (3)
<i>Psilocybe coprophila</i>	<i>Psilocybe coprophila</i> (Bull.) P.Kumm.	(2), (5), (8)
# <i>Poria</i> cf <i>subacida</i>	<i>Perenniporia subacida</i> (Peck) Donk	Genus in (1); no record of <i>P. subacida</i>
<i>Trametes versicolor</i>	<i>Trametes versicolor</i> (L.) Lloyd	(1) & (2) as <i>Polystictus</i> ; (2) as <i>Polyporus</i> ; (3), (4), (8) as <i>Coriolus</i>
Locality: Jonkershoek State Forest, outside Stellenbosch		
<i>Tricholoma saponaceum</i>	<i>Tricholoma saponaceum</i> var. <i>saponaceum</i> (Fr.) P.Kumm.	(1), (3), (4), (5), (8)
<i>Tricholoma saponaceum</i> v. <i>squamulosua</i>	<i>Tricholoma saponaceum</i> var. <i>squamosum</i> (Cooke) Rea	(4)
<i>Lactarius deliceosus</i>	<i>Lactarius deliciosus</i> (L.) Gray	(1), (2), (3), (4), (5), (8)
<i>Cryptotrama chrysopepla</i>	<i>Cyptotrama chrysopeplum</i> (Berk. & M.A.Curtis) Singer	(2) as <i>Collybia</i> ; (4), (8) as <i>Cyptotrama asprata</i>
# <i>Russula</i> -a purple taxon	<i>Russula</i> Pers.	
# <i>Russula</i> cf <i>rosacea</i>	<i>Russula</i> cf. <i>rosacea</i> (Pers.) Gray	
# <i>Russula</i> sp. hot, red taxon	<i>Russula</i> Pers.	
<i>Agaricus semotus</i>	<i>Agaricus semotus</i> Fr.	(4), (5), (8)
<i>Coprinus plicatilis</i>	<i>Parasola plicatilis</i> (Curtis) Redhead, Vilgalys & Hopple	(1), (2), (3), (4), (5), (7), (8) all as <i>C. plicatilis</i>
Locality: 'Old pine woods in park near the tram, Cape Town.' (Note: It is not clear what the word 'tram' refers to, but the author believes that Miller actually referred to the Table Mountain cable way and the wooded area of 'The Glen' picnic area near Kloofnek, which was one of the sites visited during the weekend.)		
* <i>Inocybe geophila</i>	<i>Inocybe geophylla</i> var. <i>geophylla</i> (Fr.) P.Kumm.	No previous S.A. record found.
# <i>Inocybe</i> cf <i>dulcamera</i>	<i>Inocybe</i> cf <i>dulcamara</i> (Alb. & Schwein.) P.Kumm.	
# <i>Inocybe</i> sp.	<i>Inocybe</i> (Fr.) Fr.	
<i>Gymnopilus penetrans</i>	<i>Gymnopilus penetrans</i> (Fr.) Murrill	(3), (4), (8)
* <i>Laccaria proximans</i>	<i>Laccaria proxima</i> (Boud.) Pat.	No previous S.A. record found.
Locality: Kirstenbosch Botanic Gardens, Cape Town		
* <i>Naematoloma sublateritium</i>	<i>Hypholoma sublateritium</i> (Schaeff.) Quél.	No previous S.A. record found. Genus reported in (2)
* <i>Coprinus picaceus</i>	<i>Coprinopsis picacea</i> (Bull.) Redhead, Vilgalys & Moncalvo	No previous S.A. record found.
# <i>Agrocybe</i> sp.	<i>Agrocybe</i> Fayod	Genus in (3), (4), (7), (8)
<i>Laetiporus sulphureus</i> (old)	<i>Laetiporus sulphureus</i> (Bull.) Murrill	(1) as <i>Polyporus</i> ; (3), (4), (8)

* = Unsubstantiated new South African record; # Uncertain sp.; (1) = Doidge (1950); (2) = Gorter (1979); (3) = Gorter & Eicker (1988); (4) = Levin et al. (1987); (5) = Pearson (1950); (6) = Reid & Eicker (1991); (7) = Van der Westhuizen & Eicker (1988); (8) = Van der Westhuizen & Eicker (1994).

Opinion

The plight of an African student of mycology

By George N. Ngala

I was very pleased to read the article, 'The Future of Mycology in Africa: The South African example' by Levi Yafetto (2008) in *MycoAfrica*. Pleased, because through it, one could see that others also realize the plight of the African student/scientist interested in mycology.

To illustrate this point, I would like to draw attention to my personal mycological experiences and endeavours. I was introduced to mycology by professors Taligoola and I.M. Smith at Makerere University, Kampala (Uganda), through the Botany courses offered there (1968–1971), but I became particularly interested in the field as a result of a practical course on 'The Fungi in Plant Pathology'. Upon graduation I was interested in doing graduate work in Plant Pathology, hence I accepted an AFGRAD scholarship to attend the University of California, Riverside. Thereafter I transferred to the University of Ibadan, Nigeria, where I completed the M.Sc., M.Phil. and Ph.D. degrees in Agricultural Biology, majoring in Plant Pathology (Mycology) between 1979 and 1987.

During these graduate-school years I conducted field surveys of the fungi associated with rice diseases in Nigeria and Cameroon. Isolations were made and pure cultures were sent to the CMI for proper identification (Ngala 1982, 1983). During this time I also got in touch with Dr David W Minter and Dr Paul Cannon of CMI who identified some of my samples in 1985. In 1983, after having successfully defended my M.Phil. at the University of Ibadan, I hoped to join the University of Dschang (Cameroon) to do a Ph.D., part-time, but this was not possible. I therefore pressed on in Nigeria and completed my Ph.D. in 1987, upon which I returned to Cameroon. Anxious to make a contribution in teaching and research I submitted applications to different departments at three different

universities, but to no avail. Despite that, I continued to attempt to attend national and international scientific meetings relating to plant pathology and/or mycology, at two of which I presented a paper (Ngala & Adjeniji 2005).

One of the greatest challenges that I have faced concerning the attendance of scientific meetings has been the funding issue, even with invitations in hand to present accepted papers. Due to funding problems I missed the 1999 International Society for Plant Protection Congress in Jerusalem (Israel); the South African Society for Plant Pathology Congress of 1994; the American Phytopathological Society Annual meeting of 1996 in Montreal, Canada; the 8th International Congress of Plant Pathology in Christchurch (New Zealand, 2003) and the 9th International Congress of Plant Pathology in 2008 in Turin, Italy. For the latter meeting I had three papers accepted, and for the others, one paper each. One funding agency (CTA, the Netherlands) to which I shall forever remain indebted, has kindly supported me to attend two meetings (Ngala & Adjeniji 2005). A serious problem I have encountered, however, is that many organizers of scientific meetings to which CTA are willing to sponsor participants, complain that CTA's conditions are too stringent and rigid. Organizers have suggested that participants be sponsored directly, but CTA prefers that organizers sign a contract with them (CTA), sponsor the participants, and then claim reimbursement from CTA. I missed both the SASPP 1994 and ICPP 2008 meetings because agreements could not be reached between CTA and the organizers. What will the future now hold? I have attended the 1st International Edible Legumes Conference and 4th World Cowpea Congress in Durban, South Africa in 2005 after having had to submit a special appeal to the chair of the organizing committee (Professor

Theresa Aveling, University of Pretoria) who kindly accepted to sign the necessary agreement in accordance with CTA policy.

The second challenge facing this African scientist has been that of visas. I missed the opportunity to present an invited paper at an 'International Conference on Education for a Sustainable Future' in India in 2005, and another (Fungal conservation in Cameroon) at a recently held 'International Scientific meeting on Fungal Conservation: Science, Infrastructure and Politics' in the UK in 2009, both because of visa problems.

In addition, I have missed several useful training opportunities in mycology and plant pathology, also because of funding difficulties.

Such experiences, coupled with a lack of the most basic laboratory infrastructure, do not allow me the opportunity to concentrate on some basic but important mycological (pathological) problems currently facing Africa in agriculture, industry, nutrition and the medical field.

Above all, connectivity for networking with colleagues and institutions, and for sourcing mycological literature, has been a further significant problem and challenge confronting this African scientist in his mycological endeavours.

To conclude this 'lament': the experiences shared here are not at all meant to point fingers or to blame, but to help to further an understanding and, hopefully, an improvement of our situation, considering that Africa has to compete and progress in a scientifically and technologically advancing world.

1. There is an urgent need for African governments to be better schooled, not only with regard to their poor perception of mycological science and its applications to the benefit of mankind (Ngala 2009), but also with regard to the potential of their own (African) scientists, and for foreign governments with regard to a more sympathetic attitude

concerning visas to deserving scientists wishing to attend and present at scientific meetings.

2. I do not believe that an inherent lack of interest exists with regard to mycological science among young African scientists. Given the opportunity, some basic equipment and, most importantly, the sympathy and the will of governments, the situation could be reversed.

3. African scientists are still at the mercy of the funding agencies. A further re-consideration of these agencies' policies could assist in the way forward.

4. Funding agencies should consider dealing with applicant scientists either directly, or through the AMA. The AMA should be able to better select candidates for UNESCO and other scholarships for mycological science training than, for example, home governments.

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African Library

Rusts from Africa II

A list of literature mainly pertinent to South Africa was published in *MycoAfrica* 3(2):13-15. The literature listed below deals with rust taxa occurring between South Africa and Sub-Saharan Africa. Both lists deal only with taxonomic work published since the 1940s. In addition, a number of useful disease lists are provided at the end. In some instances, country names are given where these differ from old colonial names used in the titles.

The literature in these two lists is by no means exhaustive, but rather represents what was found during research on the taxonomy of the South African rust fungi. It is hoped that others interested in African rusts will add to these lists, especially from the non-English literature which is not widely available.

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QUESTIONNAIRE OF AFRICAN MYCOLOGISTS FOR THE AMA

(please post/fax to Marieka Gryzenhout)

Name:

Title:

Institution and Postal Address:

Country:

Country or origin:

Email:

Website:

Phone number:

Fax number:

Research interests (choose one or between cell biology, physiology, ecology, pathology, molecular biology, systematics, evolution, medical mycology):

Specific interests:

Details of other African mycologists who may want to join AMA:

Skills to offer AMA (committee member, conference organiser, fund raising etc.):
