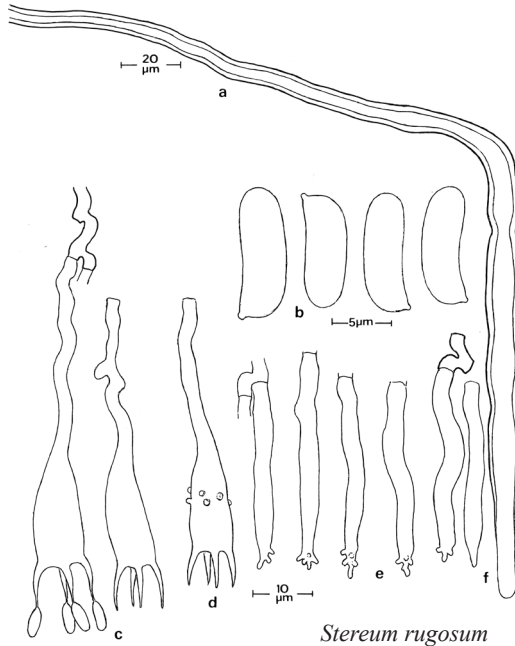


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Printing date 15. January 2020 ISBN 978-82-90724-57-8 ISSN 0802-8966

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# Cortinarius in Zimbabwe

Cathy Sharp

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## Abstract

In contrast to the thousands of *Cortinarius* species found in temperate zones, but based on previous studies, the genus is generally poorly represented in tropical and sub-tropical Africa. Five indigenous species of *Cortinarius* from miombo woodland in Zimbabwe are described here as new: *C. afropurpurissimus*, *C. azureolamellatus*, *C. brevirobustus*, *C. mukvusiensis*, and *C. mtaoensis*. Four other undetermined species are described and a new record of *C. diobensis* has extended its previously known range in the Democratic Republic of Congo. A preliminary key to species is provided based purely on microscopic features.

**Key Words:** *Cortinarius*, ectomycorrhizal fungi, miombo woodland, Zimbabwe.

## Introduction

*Cortinarius* is an important genus of macrofungi, forming ectomycorrhizal associations with trees from several families. While it is the largest genus of agaricoid mushrooms, especially well represented in temperate forests, it is poorly represented in Africa with up to now only one indigenous species described from the Democratic Republic of Congo (Beeli, 1928). The genus is estimated to incorporate 2000 to 4000 species described worldwide (Garnica et al., 2005, Cannon & Kirk, 2007), particularly from the northern hemisphere. Although some records are known from tropical India (Peintner et al., 2003), *Cortinarius* has been more widely reported in colder climates and yet no published records have come to light of species collected from woodland and forests in the cooler, higher altitudes of tropical and sub-tropical Africa. However, Peintner et al. (2003) mention reports of *Cortinarius* in temperate, montane habitats of tropical areas and Singer (1962) records its presence in oak forests of Columbia.

In the southern hemisphere, *Cortinarius* is found in southern Argentina, south Chile, Australia, New Zealand and Tasmania. Only a few species are known from tropical forests dominated by Caesalpinioideae and Dipterocarpaceae trees (Tedersoo et al., 2010). Several species are known to occur in Zimbabwe and Zambia, with many un-named collections from West Africa and Central Africa housed in the fungarium of the Botanic Garden, Meise, in Belgium. Some species have been introduced to Africa along with coniferous, poplar and eucalypt plantations or with ornamental trees. This is possibly true for the following species: *C. argutus* Fr., *C. brunneolimosus* A. Pearson, *C. valgus* Fr. (syn. *C. camurus*), *C. castaneus* (Bull.) Fr., *C. fuscotinctus* Rea, *C. anomalus* (Fr.) Fr. (syn. *C. lepidopus*) and *C. multiformis* (Fr.) Fr. reported from South Africa (Doidge, 1950; Pearson, 1950). *C. aurasiacus* Pat., is reported from Algeria (Patouillard, 1902) growing under *Quercus ilex*, the southern-most limit of Fagaceae in Africa (Melville, 1982).

The only indigenous species of *Cortinarius* described from Africa to date is *C. diobensis* Beeli based on a collection made in 1925: Goossens-Fontana 514, BR 031745-26), (Beeli, 1928) and as far as is known, never re-collected until it was determined amongst the Zimbabwean collections. However, it may be present amongst the samples awaiting attention at Meise, Belgium.

Zimbabwe is part of the Miombo Eco-region which covers an area of almost 3.6 million square kilometres (WWF, 2003) and closely follows the boundaries of the Zambeian Regional Centre of Endemism (White, 1983a). Indigenous woodland in Zimbabwe covers 65.5% of the country and 75% of that is miombo (Mufandaedza, 2002). The characteristic miombo in Zimbabwe is termed 'dry-miombo' and has an annual rainfall of 750 to 1150 mm. *Brachystegia spiciformis* and *Julbernardia globiflora* are the dominant trees belonging to the Caesalpinioideae sub-family of Fabaceae. *Uapaca* (Phyllanthaceae) is indicative of well-drained soils in frost-free zones and is an important associate in miombo, as is *Monotes* (Dipterocarpaceae). All these tree species are known to be ectomycorrhizal and in Zambia can constitute up to 70% of the basal cover in a stand of miombo woodland (Hogberg & Pearce, 1986). Miombo generally occurs on nutritionally poor soils of low pH (pH 5 - 6), (Frost, 1996a), but there are distinct floristic differences that relate to soil conditions. Although in Zimbabwe this type of miombo is most common above 1300 m, it extends down to lower altitudes (800 m in West Nicholson area and 195 m in Mahenye area of the south-east Lowveld) (pers. obs).

Of particular concern is the habitat loss in the northern miombo areas of the country where the previous 53% woody-cover is rapidly being destroyed by the small-scale tobacco industry. This lucrative industry is currently responsible for more than 15% of all deforestation in Zimbabwe (Anon., 2015, Kawadza, 2018). Other pressures on miombo woodlands arise from land-clearing and firewood harvesting due to increasing population pressures. Consequently, the miombo habitats with their remarkable diversity of ectomycorrhizal fungi (EMF) are under severe threat. Miombo woodland is claimed to have one of the richest mycobiota in the world (Ryvarden, pers comm.), and Zimbabwe alone has hundreds of EMF, many of which are still undescribed. The relevant groups represented in Zimbabwe have the following conservative estimates in numbers of species: *Amanita* - 25; boletes - 50; *Cantharellus* - 11; *Inocybe* - 6; *Lactarius/Lactifluus* - 36; *Russula* - 45 (Sharp, unpublished). The 'wet-miombo' north of the Zambezi River has a greater diversity of Caesalpinoid host trees and is therefore likely to have many more species of EMF.

Subsequent to the original work (Sharp, 2008), and after many more years of collecting, several other collections were recognized as being different and possibly new. Further microscope studies revealed significant differences between these collections which are now separated into different species. They are documented here using combined features of fruiting body morphology and microscopy.

#### Method

This study is based on examination of specimens collected during extensive field work in the miombo regions of southern Africa from 1988 until the present. Earlier photographic

records and artwork were also reviewed and noted accordingly. Collections of Madame Goosens-Fontana were studied at Botanic Garden Meise in Belgium.

Morphological characters are largely based on fresh material and colour codes taken either from Rayner (1970) (given in curled brackets, { }) or from Kornerup & Wanscher (1984) (given in square brackets, [ ]). Colour photographs and field sketches are provided where available. Measurements of stipe width are as follows: apex x median x base mm (or across swollen base where relevant). Density of lamellae was measured by counting the number of lamellae per cm at mid-radius of the cap. Details of lamella-edge were observed with a x 10 lens.

All microscope work was done on dried material using a Leitz Wetzlar microscope (Orthoplan 741 380). Details were studied under 100 x oil immersion lens and drawn with the aid of a Leitz drawing tube. Samples of dried lamellae were mounted in either 3% KOH (Garnica et al. 2005), Congo Red or Melzer's reagent. Basidia lengths do not include sterigmata lengths. Spore measurements are recorded as follows: (min length) average length (max length) x (min width) average width (max width)  $\mu\text{m}$ ; 'Q' represents the "quotient length/width" of the spores and is shown as follows: (min Q) average Q (max Q) where 'n' is the number spores measured (usually 30). Where there were isolated, extreme measurements that were not included in the calculations, these are noted in outer brackets. Scanning electron micrographs (SEMs) were produced by the technical team at Botanic Garden, Meise.

It must be noted that initially, spores were measured and counted in preparations of lamella soaked in either 3% KOH or Melzer's. By chance it was discovered that in several instances the KOH measurements were greater than those done using Melzer's. This was so dramatic in some cases that the specimen would have keyed out to a different species! It was decided to re-do all measurements under Melzer's so that results were comparable. As a result, three provisional 'new species' were abandoned. It can be seen from this that such discrepancies can potentially lead to distorted data and it should be clearly stated in any methodology which reagent is used for studying spore characters.

Holotypes are deposited in the herbarium of the Natural History Museum of Zimbabwe (BUL) or in the fungarium of Botanic Garden Meise, in Belgium (BR). Paratypes are lodged with the author (CS) and in Meise. All new species have been registered with MycoBank. The acronym CS is used in all other material which is retained in the author's collection in Bulawayo, Zimbabwe.

### Results and Species Descriptions

Identifying *Cortinarius* species in Zimbabwe based on field characters alone is both a challenge and inadequate as all fruiting bodies are in varying shades of purple. To date, no other colours of *Cortinarius* have been recorded in Zimbabwe. Size of fruiting body is also an unreliable feature as this may depend on the climatic conditions at the time of collection. Although not always obvious in fresh specimens, and generally very clear in exsiccatae, almost all species have a thick woolly sheath covering the stipe from the

base upwards (i.e. peronate), splitting horizontally near the apex, in line with the cortina. Consequently this feature has also not been helpful in separating species. As a result, it has not been possible to produce a field key to the *Cortinarius* species in Zimbabwe based purely on morphological features. However, use of the key to microscopic features is more promising and it is anticipated that future molecular research will enhance the morphologically based species concept presented here.

The available ecological knowledge of the different species is condensed and shown in Table 3. The dominant miombo (Caesalpinoid) tree species were recorded in the habitats of the respective *Cortinarius* collections along with any other trees known to have ectomycorrhizal associations with fungi (e.g. Dipterocarpaceae).

The pigments in the pileus particularly, seem to be soluble in rain-water and unstable in bright light, indicating sensitivity to oxidation (Moser, 1986). With maturity there is generally a colour-change at the centre of the fruiting bodies from purple to ochre and the pileus is usually devoid of colour under leaf litter that has stuck to the surface. There is also individual colour and size variation within a collection of the same species and extreme aberrations can occur to add to the confusion. This is well known in temperate areas of North America and Europe where there is also wide morphological variation within the same species of *Cortinarius* (Garnica et al., 2011). A careful protocol for observing characters in the field, based on good collections that include young specimens, is even more important than in many other groups of macrofungi. For this reason, delimitation of species on colour and size alone has been avoided (Jeewon & Hyde, 2016) even though mention is made of these features in the descriptions. The ‘stature’ of the species might eventually be a more stable field character rather than ‘size’ alone, although anomalies have been recorded.

For describing these new species of *Cortinarius*, it was suggested that at least two or three phenotypic differences be necessary to separate the species (D.C.H. Plowes pers. comm., Jeewon & Hyde, 2016) and these to be based on more than one collection. However, in the case of *C. mukuvusiensis* and *C. mtaoensis* which are single collections, the differences in spore details were considered different enough to designate two different taxa.

In summary, this study forms the basis for future research in surrounding countries within the Zambezi Miombo Eco-region and in Africa as a whole. Five new species and four provisional species of *Cortinarius* have been described from the Zimbabwe area of the Eco-region. *C. diobensis* is also described in more detail and its extension in range is discussed. Spore details are more reliable than fruiting body features in separating species and a list of the main spore differences in Zimbabwean *Cortinarius* is summarized in Table 2 along with a preliminary key using microscopic features. Further species may be discovered with additional collections together with the use of molecular tools to resolve the indeterminate species.

### **Taxonomic Descriptions**

***Cortinarius afrorepurpurissimus*** C. Sharp, sp. nov.

Synonymy: *C. afroviolaceus* nom. prov. Sharp 2008, 2016.

Fig 1-5



Mycobank MB832346

**Holotype:** Zimbabwe, Midlands Province, South of Beacon Hill Range, Central Estates, Mvuma. QDS 1930A4. In granitic sand in miombo woodland with *Monotes glaber*. 01 Jan 1997. Collector: C. Sharp, CS 489. (Holotype: BR5020162328472; paratype: BUL7960, Natural History Museum, Zimbabwe and personal collection of C. Sharp, CS 489).

**Description of Type:**

**Fruiting body** medium sized and robust. **Pileus** up to 70 mm diam., violaceous-grey and glabrous. **Lamellae** adnate, thin, papery, crowded with numerous lamellulae. **Stipe** length 45 x 18 mm across swollen base; white or greyish-lavender. **Flesh** white. **Ring** cortinoid. **Odour** acrid. **Spore-print colour** sienna. **Spores** ellipsoid; (7.5)8.3(9) x (5.5)6.0(6.5)  $\mu\text{m}$ ; Q = (1.25)1.40(1.55).

**Etymology:** the first *Cortinarius* the author recognized in Zimbabwe, representing Africa; fruiting body in beautiful, bright purple colours.

**Field Description:**

**Fruiting body** growing singly or in groups; small or medium in size and up to 55 mm in height; slender or robust in stature. **Pileus** 35-75 mm diam.; colour in various shades of purple:- pale violaceous-grey {115}, violaceous-grey {113}, greyish-lavender {98}, lavender-grey {125}, greyish-violet {78}, or pale mouse-grey {117}; purple colour soon fading or washing out to shades of brown, ochreous {44}, honey {64} or vinaceous-buff {86} at centre; shape first globose to convex becoming planate; texture slimy in wet weather, becoming sticky when dry; smooth, matt, minutely silky or with scales at centre; pellis peels easily. **Flesh** white, greyish-lavender {98} or greyish-lilac {100}; firmly pithy; translucent purple layers beneath pellis and immediately above lamellae. **Margin** pale vinaceous-grey {115}; smooth or cracking radially when drying out; incurved or slightly in-rolled; often with fragments of cortina attached. **Lamellae** first lavender-grey {125} to pale purple-grey {127} then taking on brown colour of ripe spores i.e. fawn {87}, fulvous {43}, cinnamon {62} or pale sienna {8}; edge often remaining purple; adnate or sinuate; texture thin, papery and brittle; 2-4 mm wide; edge smooth first then irregularly and finely eroded; edge of dry lamella cream-coloured; fairly crowded, 9-20/ cm; lamellulae numerous. **Stipe** length 30-55 mm x 5-7-20 x 4-12-15 x 7-17-20 mm wide; peronate, sheath tearing horizontally near apex; apex greyish-lavender {98}, pale grey-flax-blue {77}, pale purple-grey {127}; white or lavender-grey {125} towards white base; cylindrical in shape, stout with a swollen or distinctly bulbous base; surface smooth, matt, longitudinally silky, shiny or woolly. **Ring** cortinoid, median or superior, taking on colour of spore deposit; membranous, cream-coloured, clinging (Fig.3) (This may in fact be where the woolly sheath tears away from the apical part of the stipe). **Flesh** white, firmly pithy or solid, brittle, fibrous or firm. **Mycelium** thick, white. **Bruising** nil or with slight change to greyish-lavender {98}. **Odour** acrid, acrid-peppery, sweet-peppery, sweet-spicy or fungoid. **Spore-print colour** between cinnamon {62} and rich sienna {8}. **Chemical reactions:** nil reaction with ferrous sulphate on surface or on flesh of stipe.

**Microscopic Description:**

Spores ellipsoid; with a smooth, thick-walled perispodium that eventually loosens to expose fine to low verrucose ornamentation with inter-connections; plage clearly visible



Figure 1. *Cortinarius afropurpurissimus* (Holotype CS 489).



Figure 2. *C. afropurpurissimus* (CS 1985); scale bar = 1 cm.



Figure 3. *C. afropurpurissimus* (CS 2134). LHS shows broken membranous 'ring' at apex of stipe with cortina threads; RHS shows sheath tearing horizontally around stipe. Scale bar = 1 cm.

CS 397: (7.5) 8.2 (9.0) x (5.5) 5.9 (6.5)  $\mu\text{m}$ , Q = (1.23) 1.39 (1.55), n = 30;  
 CS 489: (7.5) 8.3 (9.0) x (5.5) 6.0 (6.5)  $\mu\text{m}$ , Q = (1.25) 1.40 (1.55), n = 30; (Holotype)  
 CS 1985: (7.5) 8.1 (8.5) x (5.5) 5.8 (6.0)  $\mu\text{m}$ , Q = (1.33) 1.39 (1.50), n = 30;  
 CS 2134: (7.5) 8.1 (8.5) x (5.0) 5.7 (6.5)  $\mu\text{m}$ , Q = (1.25) 1.41 (1.60), n = 30;  
 CS 3156: (8.0) 8.4 (9.5) x (5.5) 5.8 (6.5)  $\mu\text{m}$ , Q = (1.33) 1.44 (1.58), n = 30.

Overall average: 8.22 x 5.84  $\mu\text{m}$ ; Q = 1.406.

**Basidia** variable in size and shape, 13-21 x 6-9  $\mu\text{m}$ ; sometimes short, stubby with short sterigmata, sometimes elongate to clavate with longer sterigmata. **Cystidia** thin-walled, hyaline, ellipsoid to sub-clavate, 26-32 x 12-14  $\mu\text{m}$ . **Pilleipellis** composed of interwoven hyphae of 4-7  $\mu\text{m}$  diam., with clamps. **Stipitipellis** of parallel, regular hyphae which are 4  $\mu\text{m}$  diam.; no swollen elements and no clamps.

**Habitat:** Miombo woodland with specific details as follows: in granite outcrop with mixed miombo (*Brachystegia glaucescens*, *B. spiciformis* and *Julbernardia globiflora*);

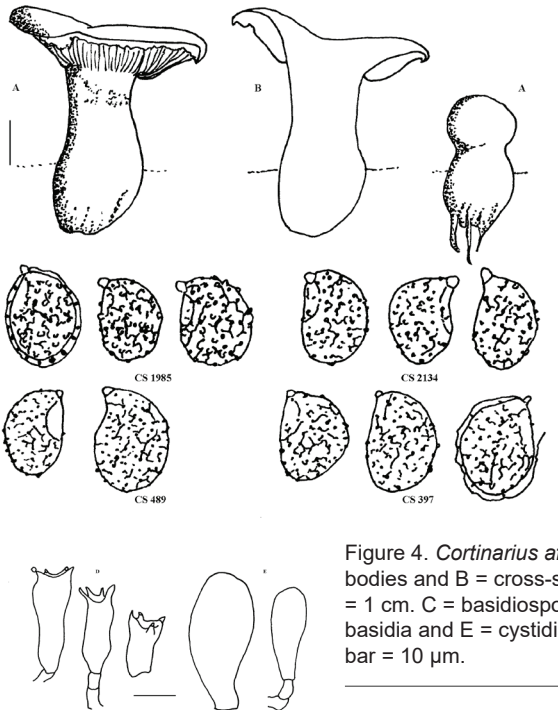


Figure 4. *Cortinarius afropurpurissimus*, A = fruiting bodies and B = cross-section, CS 1985, scale bar = 1 cm. C = basidiospores, scale bar = 10  $\mu\text{m}$ . D = basidia and E = cystidia CS 489 (Holotype), scale bar = 10  $\mu\text{m}$ .

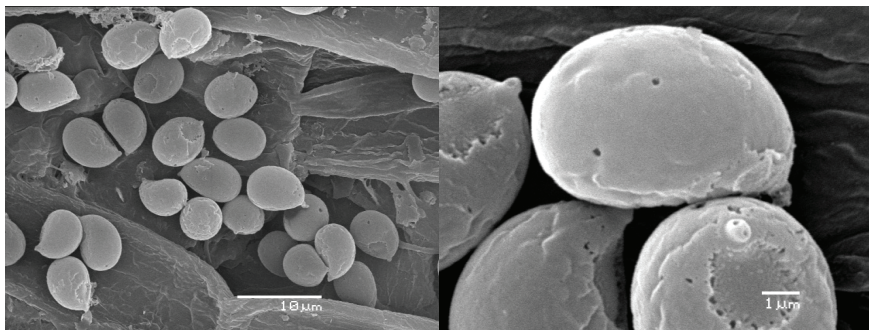


Figure 5. SEMs of *Cortinarius afropurpurissimus* (Holotype CS 489) showing distinct plage and smooth perisporium; no spores in this sample show any peeling of perisporium.

in miombo dominated by *B. spiciformis* and *J. globiflora* on red, sandy, ferrilitic soils; on grey-brown, regularly burnt soils under *J. globiflora*.

**Ethnomycology:** generally known as RIMIREMOMBE (chiShona), meaning ‘tongue of the cow’ which pertains to the colour.

**Specimens examined:**

CS 397, Mahamara Lodge, Lalapanzi, Midlands. QDS 1930A2. 26 Dec 1995. Coll. Beverley Hagger.

CS 489, South of Beacon Hill Range, Central Estates, Mvuma, QDS 1930A4. 01 Jan 1997. Coll. C. Sharp; BR 5020162328472 (Holotype).

CS 1985, Kariba Heights, Kariba, Mashonaland West Province. QDS 1628D2. 03 Feb 2007. Coll. Wendy Lapham.

CS 2134, Wafawafa Hills, east of Kariba, Mashonaland West Province. QDS 1629C1. 07 Jan 2009. Coll. Stanley Matondo & C. Sharp.

CS 3156, Plot B, Shangangwe, Debshan, Shangani. QDS 2029B1. 24 Jan 2013. Coll. C. Sharp.

**Notes:**

After much comparative work on personal collections and those in the fungarium of the Botanic Garden Meise in Belgium, an indigenous species of *Cortinarius* from miombo woodland in Zimbabwe was described provisionally as *C. afroviolaceus* but not published formally (Sharp, 2008). The ‘violaceus’ aspect has since caused confusion because of the inference that it belongs to the section Violacei, (which it does not), thus calling for a change in the provisional name and is now described here as *C. afropurpurissimus*.

Collection CS 3156 is very small (about 30 mm tall with a diameter up to 35 mm) in comparison to the other collections of *C. afropurpurissimus* and was originally thought to be closer to *C. brevirobustus* described further below. However, the smaller and finely

ornamented spores established this as *C. afropurpurissimus*. This is one of many examples that emphasize the unreliability of using size of fruiting-bodies as the sole defining feature of a species.

*Cortinarius* Species 1.

Figure 6.

**Fruiting body** up to 80 mm tall; medium to large in size, stout and fairly robust. **Pileus** 30 to 90 mm diam.; first vinaceous-purple {101}, to greyish-lilac {100}, purple colour soon fading or washing out to shades of brown or, cinnamon {62}, pale fulvous {43}; convex becoming planate; smooth. Margin smooth, often with fragments of cortina attached. **Lamellae** first vinaceous-buff {86} to yellowish-sienna {8}; dry lamella-edge cream-coloured or concolorous; adnate; texture waxy and brittle; up to 6 mm wide; moderately crowded, 9-16/cm; lamellulae present. **Stipe** length 48 mm x 11 x 12 x 17 mm across base; pale greyish-lilac {100} to white with age; cylindrical in shape, base swollen or very bulbous; surface smooth. Flesh white, solid. Ring cortinoid, superior. **Bruising** nil. **Odour** sweet-peppery. **Spore-print colour** sienna {8}. **Chemical reactions:** very slowly yellowing with ferrous sulphate.

Microscopic description:

Spores broadly-ellipsoid to ellipsoid; smooth perisporium peeling to expose fine to low verrucose ornamentation with some inter-connections; plage evident in some spores.

CS 534: (8.0) 8.7 (9.0) x (6.0) 6.5 (7.0)  $\mu\text{m}$ , Q = (1.21) 1.34 (1.50), n = 30;

CS 1133: (8.0) 8.7 (9.0)(9.5) x (6.0) 6.4 (7.0)  $\mu\text{m}$ , Q = (1.23) 1.35 (1.50), n = 30;

CS 2885: (8.0) 8.6 (9.0) x (6.0) 6.3 (7.0)  $\mu\text{m}$ , Q = (1.23) 1.36 (1.50), n = 30.

Overall average of above three collections: 8.66 x 6.40  $\mu\text{m}$ ; Q = 1.350.

Overall average of *C. afropurpurissimus*: 8.22 x 5.84  $\mu\text{m}$ , Q = 1.406 (for comparison).

Basidia 4-spored, variable in size: generally short, stumpy, 20-25 x 6-10  $\mu\text{m}$  to clavate 30-33 x 9-20  $\mu\text{m}$ ; sterigmata mostly relatively short, 1 – 3  $\mu\text{m}$ ; straight or curved. Cortina threads composed of very thin, straight hyphae with clamps. Pilleipellis of interwoven hyphae 4-7  $\mu\text{m}$  diam.; with clamps. Stipitipellis of parallel, regular hyphae 4  $\mu\text{m}$  diam.; no swollen elements and no clamps. Cystidia sparse, if present then clavate or elongate.

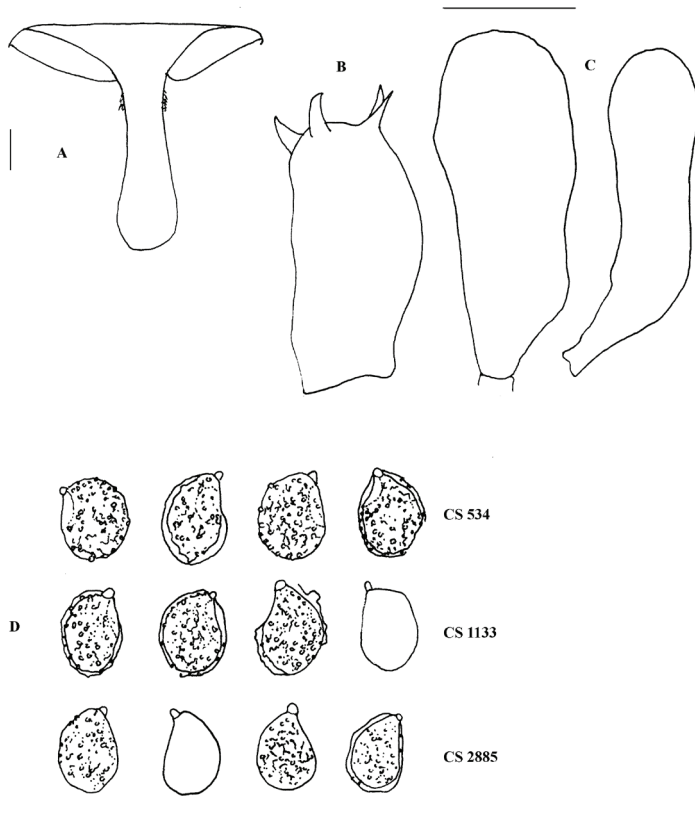


Figure 6. *Cortinarius* Species 1. A = cross-section CS 1133, scale bar = 1 cm; B = basidium and C = cystidia, CS 1133, scale bar = 10 µm; D = basidiospores, scale bar = 10 µm.

**Habitat:** Miombo woodland with specific details as follows: in granite outcrop with mixed miombo (*Brachystegia glaucescens*, *B. spiciformis* and *Julbernardia globiflora*); in miombo dominated by *B. spiciformis* and *J. globiflora* on red, sandy, ferrillitic soils; on grey-brown, regularly burnt soils under *J. globiflora*.

**Ethnomycology:** generally known as RIMIREMOMBE (chiShona), meaning ‘tongue of the cow’ which pertains to the colour.

**Specimens examined:**

CS 397, Mahamara Lodge, Lalapanzi, Midlands. QDS 1930A2. 26 Dec 1995. Coll. Beverley Hagger.

CS 489, South of Beacon Hill Range, Central Estates, Mvuma, QDS 1930A4. 01 Jan 1997. Coll. C. Sharp; BR 5020162328472 (Holotype).

CS 1985, Kariba Heights, Kariba, Mashonaland West Province. QDS 1628D2. 03 Feb 2007. Coll. Wendy Lapham.

CS 2134, Wafawafa Hills, east of Kariba, Mashonaland West Province. QDS 1629C1. 07 Jan 2009. Coll. Stanley Matondo & C. Sharp.

CS 3156, Plot B, Shangangwe, Debshan, Shangani. QDS 2029B1. 24 Jan 2013. Coll. C. Sharp.

### Notes:

After much comparative work on personal collections and those in the fungarium of the Botanic Garden Meise in Belgium, an indigenous species of *Cortinarius* from miombo woodland in Zimbabwe was described provisionally as *C. afroviolaceus* but not published formally (Sharp, 2008). The 'violaceus' aspect has since caused confusion because of the inference that it belongs to the section *Violacei*, (which it does not), thus calling for a change in the provisional name and is now described here as *C. afropurpurissimus*.

Collection CS 3156 is very small (about 30 mm tall with a diameter up to 35 mm) in comparison to the other collections of *C. afropurpurissimus* and was originally thought to be closer to *C. brevirobustus* described further below. However, the smaller and finely ornamented spores established this as *C. afropurpurissimus*. This is one of many examples that emphasize the unreliability of using size of fruiting-bodies as the sole defining feature of a species.

### *Cortinarius* Species 1.

### Figure 6.

**Fruiting body** up to 80 mm tall; medium to large in size, stout and fairly robust. **Pileus** 30 to 90 mm diam.; first vinaceous-purple {101}, to greyish-lilac {100}, purple colour soon fading or washing out to shades of brown or, cinnamon {62}, pale fulvous {43}; convex becoming planate; smooth. **Margin** smooth, often with fragments of cortina attached. **Lamellae** first vinaceous-buff {86} to yellowish-sienna {8}; dry lamella-edge cream-coloured or concolorous; adnate; texture waxy and brittle; up to 6 mm wide; moderately crowded, 9-16/cm; lamellulae present. **Stipe** length 48 mm x 11 x 12 x 17 mm across base; pale greyish-lilac {100} to white with age; cylindrical in shape, base swollen or very bulbous; surface smooth. **Flesh** white, solid. **Ring** cortinoid, superior. **Bruising** nil. **Odour** sweet-peppery. **Spore-print colour** sienna {8}. **Chemical reactions:** very slowly yellowing with ferrous sulphate.

Microscopic description:

**Spores** broadly-ellipsoid to ellipsoid; smooth perisporium peeling to expose fine to low verrucose ornamentation with some inter-connections; plage evident in some spores.

CS 534: (8.0) 8.7 (9.0) x (6.0) 6.5 (7.0)  $\mu\text{m}$ ,  $Q = (1.21) 1.34 (1.50)$ ,  $n = 30$ ;

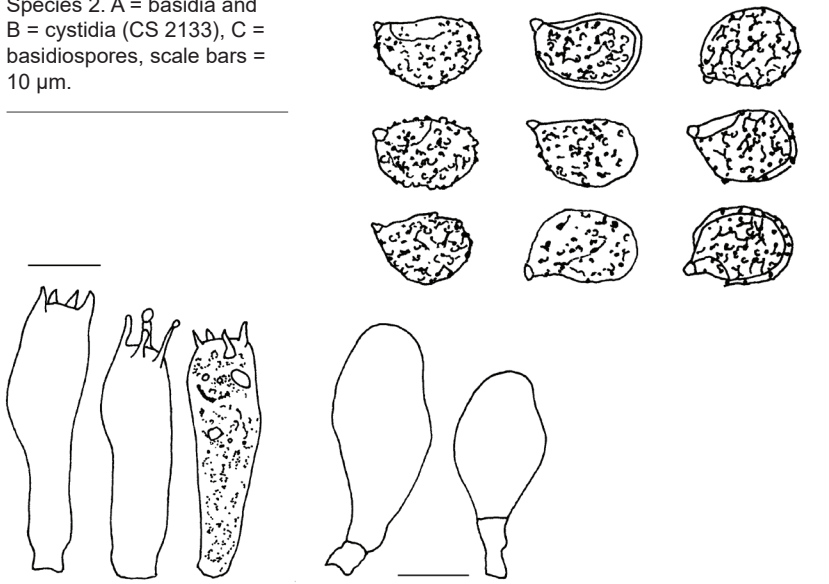
CS 1133: (8.0) 8.7 (9.0)(9.5) x (6.0) 6.4 (7.0)  $\mu\text{m}$ ,  $Q = (1.23) 1.35 (1.50)$ ,  $n = 30$ ;

CS 2885: (8.0) 8.6 (9.0) x (6.0) 6.3 (7.0)  $\mu\text{m}$ ,  $Q = (1.23) 1.36 (1.50)$ ,  $n = 30$ .



Figure 7. *Cortinarius* Species 2, a more slender form within the *C. afropurpurissimus*-group (CS 2133). Photo: Bart Wursten.

Figure 8. *Cortinarius* Species 2. A = basidia and B = cystidia (CS 2133), C = basidiospores, scale bars = 10  $\mu$ m.





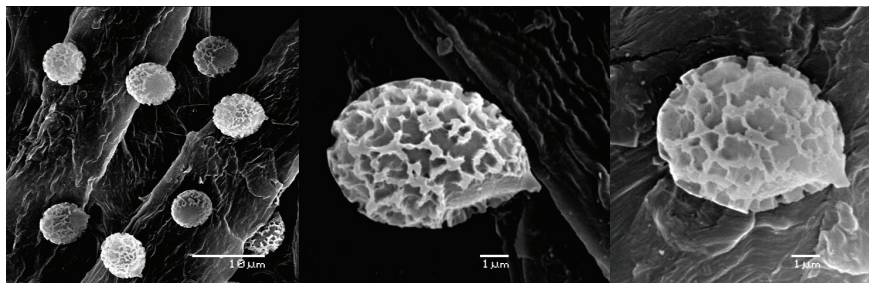


Figure 9. *Cortinarius* Species 2. SEMs of CS 517 showing distinct plage but absence of perispodium.

Overall average of above three collections:  $8.66 \times 6.40 \mu\text{m}$ ;  $Q = 1.350$ .

Overall average of *C. afropurpurissimus*:  $8.22 \times 5.84 \mu\text{m}$ ,  $Q = 1.406$  (for comparison).

**Basidia** 4-spored, variable in size: generally short, stumpy,  $20\text{-}25 \times 6\text{-}10 \mu\text{m}$  to clavate  $30\text{-}33 \times 9\text{-}20 \mu\text{m}$ ; sterigmata mostly relatively short,  $1 - 3 \mu\text{m}$ ; straight or curved. Cortina threads composed of very thin, straight hyphae with clamps. **Pilleipellis** of interwoven hyphae  $4\text{-}7 \mu\text{m}$  diam.; with clamps. **Stipitipellis** of parallel, regular hyphae  $4 \mu\text{m}$  diam.; no swollen elements and no clamps. **Cystidia** sparse, if present then clavate or elongate.

**Habitat:** in *Brachystegia glaucescens* dominant miombo; with *B. spiciformis* and *B. boehmii* on reddish-brown soil; on ridge of Kalahari sand under *Julbernardia globiflora*.

**Ethnomycology:** RIMIREMOMBE (chiShona) and LULIMI DWANKOMBE (chiTonga) meaning 'tongue of the cow'. This is eaten by some people but not by the Tonga people in the escarpment of the Zambezi Valley.

Specimens examined:

CS 534, Beacon Hill Ridge, Central Estates, Mvuma, Midlands Province. QDS 1930A4.

10 Jan 1997. Coll. Graeme Sharp and Paul Wither. BR5020162326454.

CS 1133, Beacon Hill Ridge, Central Estates, Mvuma. Midlands Province. QDS 1930A4.

02 Jan 1999. Coll. Joanne & Graeme Sharp. BR5020162325440.

CS 2885, Binga District, Matabeleland North Province, QDS 1727C2. 29 Feb 2012. Coll. C. Sharp.

#### Notes:

The distinctive form detailed here as *Cortinarius* Species 1 involves three collections that have the typical finely ornamented spores of *C. afropurpurissimus* but these are larger than the average for the new species and their shape tends towards more broadly-elliptical than elliptical. Interestingly, the spores of all three were originally measured in 3% KOH and were so dramatically different from those of *C. afropurpurissimus* that they appeared to constitute two different species! The measurements were re-done in

Melzer's and although still larger, the spore drawings and details are now the same for all three collections. Apart from CS 534 being a very large specimen (90 mm diameter), morphologically they all fit broadly into the description of *C. afropurpurissimus*. Further material and molecular analysis may confirm whether the discrepancy between spore size and shape warrant allocation to a different taxon.

## *Cortinarius* Species 2.

Figures 7, 8 and 9.

**Fruiting body** slender, more often growing singly; up to 60 mm tall. **Pileus** 35-85 mm diam.; violaceous-grey {113}, lavender-grey, pale purple slate {102} to pale isabelline {65} when older; globose first to planate; slimy when wet and shiny when dry. **Flesh** grey-lavender {98}. **Margin** cracking radially with age; incurved at edge. **Lamellae** first lavender-grey {125} then dark fulvous with age; edge pale bluish-purple; smooth first, eroded with maturity; adnate to sinuate to sub-decurrent; waxy, thin and very brittle; to 3 mm wide; moderately crowded, 13-17/cm; with lamellulae. **Stipe** length 35-60 mm x 6-15-18 x 4-12-13 x 12-16-19 mm at base; apex grey-flax blue {77} or lavender-grey {125} to grey-lavender {98} midway to white at base; tapering towards base then swollen; surface longitudinally silky, shiny. **Flesh** white, firmly pithy. **Ring** a cortinoid line or ridge. **Bruising** nil. **Odour** acrid to rubbery or fungoid. **Spore-print colour** fulvous {43} to rich cinnamon {62}.

### **Microscopic description:**

**Spores** ellipsoid; moderately verrucose, ornamentation more rounded; some with fine inter-connections; perispodium not observed; plage evident.

CS 517: (7.0) 7.4 (8.0) x (5.0) 5.2 (5.5)  $\mu\text{m}$ , Q = (1.27) 1.41 (1.60), n = 30;

CS 2133: (7.0) 7.6 (8.5) x (5.0) 5.5 (6.0)  $\mu\text{m}$ , Q = (1.27) 1.38 (1.50), n = 30;

CS 3507: (7.0) 7.4 (8.0) x (5.0) 5.2 (6.0)  $\mu\text{m}$ , Q = (1.27) 1.41 (1.60), n = 30.

Overall average of above three collections: 7.46 x 5.30  $\mu\text{m}$ ; Q = 1.40.

Overall average of *C. afropurpurissimus*: 8.22 x 5.84  $\mu\text{m}$ , Q = 1.406 (for comparison).

**Basidia** mostly 4-spored, possibly 2- and 3-spored; elongate in shape, 27-37 x 8-10  $\mu\text{m}$ ; hyaline or with contents and vacuoles; sterigmata 4-5  $\mu\text{m}$ . **Cystidia** sparse, ellipsoid, 20-30 x 12-13  $\mu\text{m}$ .

**Habitat:** in miombo dominated by *Brachystegia glaucescens*; *Julbernardia globiflora* woodland on steep hillside; mixed miombo on granitic sand with *B. spiciformis* and *J. globiflora*.

Specimens examined:

CS 517, Incubator Ridge, Beacon Hill, Central Estates, Mvuma, Midlands Province. QDS 1930A4. 03 Jan 1997. Coll. C. Sharp.

CS 2133, Wafawafa Hills, east of Kariba, Mashonaland West Province. QDS 1629C1. 07 Jan 2009. Coll. Petra Ballings.

CS 3507, Bon Accord, Jabulani, Shangani, Matabeleland South Province. QDS 1929D3. 01 Jan 2014. Coll. Win Blackburn.

**Notes:** The second anomaly in the *C. afropurpurissimus* group applies to three collections that have spores with enough differences that may warrant separation into another species. The spores have distinctly low, verrucose ornamentation and are clearly different from the drawings of the more 'usual' finely ornamented ones of *C. afropurpurissimus* (Figure 4). Furthermore, these spores are considerably smaller than the range for the latter and again the question arises whether this discrepancy in spore-size along with the verrucose ornamentation, warrants creation of another taxon. Incidentally, collections 2133 and 3507 are smaller and less robust than *C. afropurpurissimus* but collection 517 is larger and more typical. These collections are designated as *Cortinarius* Species 2 and are morphologically part of the *C. afropurpurissimus* group.

Collection CS 2133 was immediately recognized as being different from CS 2134 (*C. afropurpurissimus*) in its less robust stature (and generally smaller size), despite growing in the same vicinity. Even though separation of collections based on these features alone is often futile, these particular collections were retained separately. Subsequent microscopy showed that spore details deviated from the 'norm' as discussed here.

Ornamented spores are usually measured without including their ornamentations, however low they may be. In many of the Zimbabwean *Cortinarius* species, there was a range of spores still covered by the perisporium, some with pieces of perisporium peeling off the spore and some without any sign of any covering, all within the same species. Drawings were made of all states where possible and measurements of the 'smooth' spores (i.e. with perisporium intact) were larger than those with exposed ornamentation (possible explanation for extreme sizes indicated in brackets outside the average). Obviously different states of maturity were often viewed on the same slide but it was not always easy illustrating and measuring these. Spore measurements recorded here generally included the whole range, with or without a perisporium. Allowing a wider range of spore sizes for each *Cortinarius* species therefore takes these variations into consideration.

The SEM for CS 489 (*C. afropurpurissimus*) shows all spores with smooth perisporium while microscope drawings of the same collection showed spores with and without a perisporium. One might immediately surmise that there was a difference in spore maturity but the SEM was taken from a spore-print which has always been recommended in order to obtain the most uniform measurements for ripe spores. Similarly, microscope work was done from spore-prints where available and from lamellae if spore-prints were not collected.

Focusing on spore ornamentation as a diagnostic character, along with spore size, it is still possible that the two groups discussed above may finally be distinct species or sub-species. Future molecular analysis will complement this original work. For the moment they are included here in the *C. afropurpurissimus* group.



Figure 10. *Cortinarius azureolamellatus* (Holotype CS 2609).

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Figure 11. *Cortinarius azureolamellatus* CS 2549.

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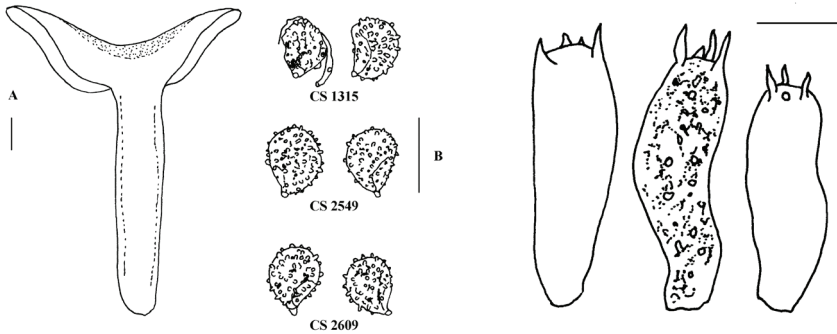


Figure 12. *Cortinarius azureolamellatus*. A = cross-section of fruiting body (CS 1315), scale bar = 1 cm; B = basidiospores, scale bar = 10 µm; C = basidia (Holotype CS 2609), scale bar = 10 µm.

*Cortinarius azureolamellatus* C. Sharp sp. nov.

Figures 10, 11 and 12.

Mycobank MB832347

**Holotype:** Zimbabwe, Manicaland Province, 49 Arcadia Road, Morningside, Mutare. QDS 1832D3. 29 Dec 2011. Coll. D. C. H. Plowes. CS 2609. (Holotype: BUL7962, Natural History Museum, Zimbabwe; paratype: private collection of C. Sharp, CS 2609).

**Description of Type:**

**Fruiting body** growing in large group; up to 70 mm in height. **Pileus** 40–70 mm diam.; buff-coloured with ochreous patches; surface slimy; pellis peels easily. **Flesh** white or greyish-flax-blue or pale-violaceous-grey with distinct greyish-violet band immediately beneath pellis. **Margin** first in-rolled. **Lamellae** adnate; greyish-lavender to fulvous or cinnamon when spores mature; thin, papery, brittle; up to 4.5 mm wide; edge minutely and irregularly eroded; relatively crowded especially towards margin, 12-15/cm; lamellulae present. **Stipe** length 45-65 mm x 5-15 mm (to 20 mm across base); white or pale greyish-flax-blue or lavender at apex to white at base; cylindrical or with swollen base; surface smooth, matt, minutely silky. **Ring** cortinoid, superior. **Flesh** white, pithy to solid. **Bruising** ochreous at base where handled. **Odour** acrid. **Spore-print colour** fulvous {43}. **Chemical reaction:** nil reaction with ferrous sulphate on stipe surface or flesh. **Spores** sub-globose to broadly-ellipsoid; (7.0) 7.7 (8.0) x (5.5) 6.0 (6.5) µm; Q = (1.15) 1.28 (1.33).

**Etymology:** describes the bluish-purple colouring of all parts, particularly the ‘blue’ lamellae in young specimens.

**Field description:**

**Fruiting body** grows singly or in groups; medium-sized to large, fairly robust in stature and up to 70 mm tall; characteristic bright blue lamellae in young specimens. **Pileus** 40-70 mm diam.; greyish-violet {78}, greyish-lavender {98}, honey {64} or buff-coloured {45} with pale ochreous patches {44}; convex first then expanding to planate and may be irregularly up-turned; surface very slimy, leaf litter often attached, silky and very shiny when dry; pellis peels easily. **Flesh** white, pale-violet {31}, greyish-flax-blue {77} or pale-violaceous-grey {113} with a distinct greyish-violet {78} band immediately beneath pellis. **Margin** in-rolled; smooth then cracking radially; often with remnants of cortina. **Lamellae** first greyish-flax-blue to greyish-violet {78}, livid violet {79}, greyish-lavender {98} becoming fulvous {43} or cinnamon {62} or golden-brown when spores are mature; adnate; thin, papery and very brittle; 3.5-4.5 mm wide; edge first entire and then minutely and irregularly eroded; moderately crowded, 12-20/cm; lamellulae numerous and particularly crowded towards margin. **Stipe** length 45-75 mm x 7-15 x 6-13 x 14-20 mm across widest part near base; apex white, buff {45} or very pale greyish-flax-blue {77}, greyish-lilac {100}, lavender {53}, greyish-lavender {98} becoming paler towards white base; cylindrical or swollen at base (clavate) or shortly tapering; surface smooth, shiny and minutely longitudinally silky-streaked. **Ring** cortinoid, at extreme apex; pale violet {31} or white 'skin' or remnant 'scales' present in some specimens. **Flesh** white, cream, greyish-lilac {100}; solid-pithy, brittle. **Bruising** nil or ochreous at base where handled. **Odour** acrid or fungoid. **Spore-print colour** sienna {8} or fulvous {43} spores on cortina. **Chemical reactions:** nil reaction with ferrous sulphate on stipe surface or on flesh.

**Microscopic description:**

**Spores** sub-globose to broadly-ellipsoid to ellipsoid; strongly verrucose; no inter-connections observed; perispodium peeling in many spores; plage evident.  
CS 1315: (7.5) 7.7 (8.0) x (5.5) 5.9 (6.0)  $\mu\text{m}$ ; Q = (1.25) 1.30 (1.36); n=30,  
CS 2549: (7.5) 8.2 (9.0) x (5.5) 6.3 (7.0)  $\mu\text{m}$ ; Q = (1.15) 1.31 (1.45); n=30,  
CS 2609: (7.0) 7.7 (8.0) x (5.5) 6.0 (6.5)  $\mu\text{m}$ ; Q = (1.15) 1.28 (1.33); n=30 (Holotype),  
Overall average of three collections: 7.866 x 6.066  $\mu\text{m}$ ; Q = 1.296.  
**Basidia** 4-spored, oblong to clavate, 25-30 x 8-12  $\mu\text{m}$ ; hyaline or with contents and vacuoles; sterigmata long and pointed. **Cystidia** not observed.

**Habitat:** Mixed miombo woodland dominated by *Brachystegia spiciformis*; on banded ironstone with *B. glaucescens*, following root-line of the latter.

**Specimens examined:**

CS 1315, Liemba Farm, Bromley, Mashonaland East Province. QDS 1831A2. 03 Feb 1999. Coll. Paul Goetgebeur.

CS 2549, Plot 32, Glenlivet, Masvingo Province. QDS 2031A1. 18 Dec 2011. Steph Walton & C. Sharp.

CS 2609, 49 Arcadia Road, Morningside, Mutare, Manicaland Province. QDS 1832D3. 29 Dec 2011. Coll. Darrel C. H. Plowes (Holotype).

**Notes:** This species is separated from *C. afropurpurissimus* by the lack of bulbous stipe and the startling blue lamellae in many young specimens. Even the exsiccateae have retained the blue-purple colours on lamellae and on stipe apex. The overall colour of the dry lamellae is rich-fulvous rather than the more rusty-red-fulvous of *C. afropurpurissimus*. Microscopically, the spores of *C. azureolamellatus* are strongly verrucose and more broadly-ellipsoid than ellipsoid.

***Cortinarius brevirobustus* C. Sharp sp. nov.**

**Figures 13 and 14.**

Mycobank MB832348

**Type:** Zimbabwe, Matabeleland South Province. In miombo woodland, near Jabulani Global Plot, Bon Accord, Shangani. QDS 1929D3. 17 Jan 2017. Coll. C. Sharp. CS 5112. (Holotype: BUL7959, Natural History Museum, Zimbabwe; paratype: personal collection of C. Sharp, CS 5112).

#### **Description of Type:**

**Pileus** up to 45 mm diam.; greyish-violet with ochre tinges at centre in older specimens; convex first to planate with low, central umbo. **Flesh** white, pale violet beneath pellis, firmly pithy. **Margin** smooth, down-curved. **Lamellae** greyish-violet to light brown when mature; sinuate; thin, papery; 3-4 mm wide; edge thin, undulating and irregularly eroded; moderately crowded to crowded, 7-11/half-cm; lamellulae present. **Stipe** length 18-37 mm x 6-10 x 7-9 x 9-14 across bulbous base; apex greyish-violet to white at base; cylindrical with swollen or bulbous base; surface shiny, with silky-fibrils. **Flesh** hollow at centre and pithy-fibrous at base; walls white with faint violet tinges at mid-section to white at base. **Ring** cortinoid, median. **Bruising** nil. **Odour** sweet-peppery, catches in the throat when freshly cut. **Spore-print colour** light brown. **Spores** ellipsoid; (8.0) 8.8 (9.5)(10.0) x (5.5) 6.0 (6.5)  $\mu\text{m}$ ; Q = (1.33) 1.47 (1.64).

**Etymology:** fruiting body relatively short and stout.

#### **Field description:**

**Fruiting body** small, robust and stout, growing in a close group amongst leaf litter; reaching a height of 25-40 mm. **Pileus** 25-45 mm diam.; greyish-violet [19D4-3] with ochreous tinges at centre in older specimens; convex first to finally planate, with low, central umbo; slimy when wet to matt and glistening when damp. **Flesh** firmly pithy; white to cream-coloured, pale violet immediately beneath pellis. **Margin** smooth or with fibrils on top surface; often down-curved. **Lamellae** greyish-violet [19D3] to light brown [7D5] as spores ripen; sinuate; thin, papery, 3-4 mm wide; edge thin, undulating and irregularly eroded; moderately crowded to crowded, 7-11/half-cm; lamellulae present. **Stipe** length 20-40 mm x 6-10 x 9-14 mm across bulbous base; pale purple, greyish-violet [19B4-C4] above 'ring' to white at base; cylindrical, base swollen or bulbous; surface shiny with silky fibrils. **Ring** cortinoid, above median or slightly lower. **Flesh** hollow at centre; walls white with faint violet tinges at mid-section and pithy-fibrous in texture; base white or cream-coloured and pithy. **Bruising** nil. **Odour** sweet-peppery,



Figure 13. *Cortinarius brevirobustus* (Holotype CS 5112).

catches in the throat when freshly cut. **Spore-print colour** light brown, [7D6-5-4] and [6D8] or rich, fulvous brown.

**Microscopic description:**

Spores ellipsoid; strongly verrucose with inter-connections; smooth perisporium on some and others peeling; plage present but often not clear.

CS 4541B: (8.0) 9.2 (10.0) x (6.0) 6.4 (7.0)  $\mu\text{m}$ ; Q = (1.23) 1.44 (1.60); n=30;  
CS 5112: (8.0) 8.8 (9.5)(10.0) x (5.5) 6.0 (6.5)  $\mu\text{m}$ ; Q = (1.33) 1.47 (1.64); n=30,  
(Holotype).

Overall average of two above collections: 9.00 x 6.20  $\mu\text{m}$ ; **Q** = 1.455.

Basidia 4-spored, oblong to clavate, 25-32 x 8.5-10.5  $\mu\text{m}$ ; hyaline or with contents and vacuoles; sterigmata mainly curved, 3-5  $\mu\text{m}$ . Cystidia very sparse, single observation well embedded in hymenium, oblong, 43 x 13  $\mu\text{m}$ .

**Habitat:**

Miombo woodland, in thick leaf litter under *Brachystegia spiciformis* and *Julbernardia globiflora*; under *B. spiciformis*.

Specimens examined:



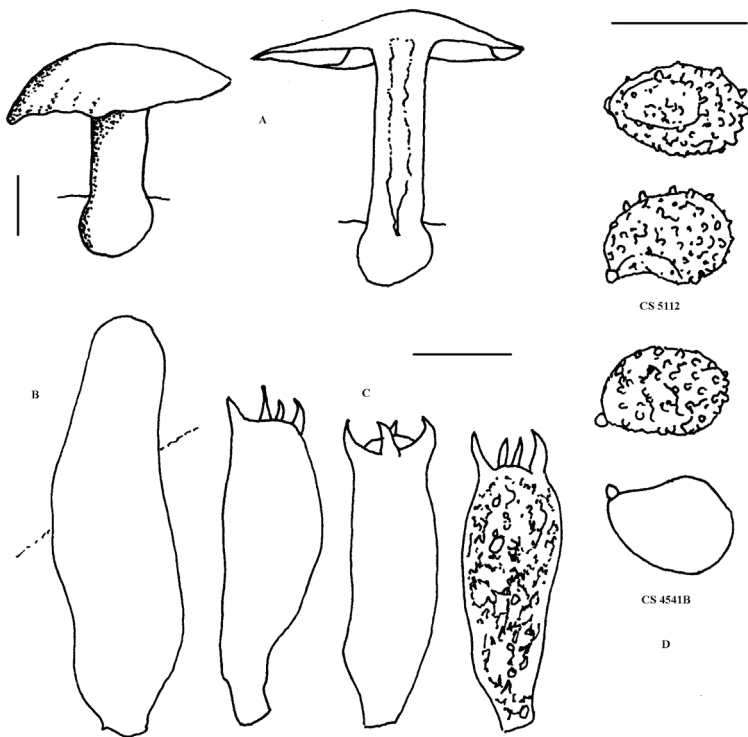


Figure 14. *Cortinarius brevirobustus*. A = fruiting body and cross-section, (Holotype CS 5112), scale bar = 1 cm; B = cystidium and C = basidia (Holotype CS 5112), scale bar = 10 µm; D = basidiospores, scale bar = 10 µm.

CS 4541B, Plot A, Shangangwe, Debshan Ranch, Shangani. Matabeleland South Province. QDS 2029 B1 30 Mar 2016. Coll. C. Sharp.

CS 5112, outside Jabulani Global Plot, Bon Accord, Shangani, Matabeleland South Province. QDS 1929D3 17 Jan 2017. Coll. C. Sharp (Holotype).

Notes:

Collection CS 4541B was immediately recognized as ‘different’ from the other species of *Cortinarius* that occurred in the same vicinity. Although size is not always a reliable field character, *C. brevirobustus* is much smaller, stouter and generally less robust than either

*C. afropurpurissimus* or *C. azureolamellatus*. Its tightly-grouped growth amongst the leaf litter was also unusual.

Microscopically, both *C. brevirobustus* and *C. azureolamellatus* have strongly ornamented spores but the spores of *C. brevirobustus* are larger and ellipsoid ( $Q = 1.455$ ) rather than broadly-ellipsoid ( $Q = 1.296$ ) in *C. azureolamellatus*.

There are two collections that share many similarities with *C. brevirobustus* but their differences are also significant. They were originally designated as a different species (and ultimately may still be given that status) but the hesitancy in confirming this may be purely subjective. Morphologically, the stipe in CS 5111 is slender with no bulbous base and the cap is not obviously umbonate. Microscopically, the spore dimensions are fairly close, but the shape ( $Q$ -value) is different. Collections CS 5112 (*C. brevirobustus*) and CS 5111 (the anomaly) were growing only 4 – 5 m apart but even in the field their morphological differences were evident. Are the spore details different enough to formally separate the two? Table 1 below lists the similarities and differences as evidence for separating the two sets of specimens. Despite having more than the required number of differences necessary for allocating a new taxon, there is still some hesitancy in doing this. Perhaps the overall and broad similarity in the spore drawings is the reason for this and therefore the anomaly is provisionally designated as *Cortinarius* Species 3 and fully described below.

### **Cortinarius Species 3.**

**Figures 15 and 16.**

Field description:

**Fruiting body** small and slender; up to 40 mm in height. **Pileus** 28-36 mm diam.; bluish-grey {97} with centre honey-coloured {64}; lavender-blue [18B3], greyish-violet [18C3], dull violet [18D4-3 to E4] to greyish-violet [18E5] at centre; buff patches when dry; convex to plano-convex in shape; surface slimy when wet to shiny when dry, with faint fibrils towards margin. **Flesh** firm; greyish-violet [19C4] and paler at centre to greyish-violet [19C5] beneath pellis. **Margin** edge smooth or with remnants of cortina attached. **Lamellae** isabelline {65} with bluish-purple edge; brownish-grey [8C2] to reddish-brown [8D4] as spores ripen; adnate; thin, papery and 2-5 mm wide; edge thin, irregularly eroded; moderately crowded, 6-10/half-cm; lamellulae present. **Stipe** length 25-45 mm x 6-9 x 8-12 mm (across widest part); evenly cylindrical or with broader base; apex violet-white [18A2] to greyish-violet [8C3] near base then white where under leaf litter; surface longitudinally fibrillose. **Flesh** pithy at centre with silky-fibrous walls; pastel- to pale-violet [19A4-3]; white at base. **Ring** cortinoid, just above mid-way or superior. **Mycelium** white. **Bruising** nil. **Odour** sweet-peppery when freshly cut. **Spore-print colour** between titian-red and light-brown [7D6-5].

**Microscopic description:**



Figure 15. *Cortinarius* Species 3, CS 5111.

Spores broadly-ellipsoid to ellipsoid; strongly verrucose with rounded ornamentation and a few inter-connections; smooth perisporium, peeling on some spores; plage present in a few spores but not very clear; sizes fairly uniform.

CS 23: (8.0) 8.8 (9.5)(10) x (6.0) 6.4 (7.0)  $\mu\text{m}$ ; Q = (1.29) 1.37 (1.50); n = 30,

CS 5111: (8.0) 8.5 (9.0) x (6.0) 6.5 (7.0)  $\mu\text{m}$ ; Q = (1.21) 1.30 (1.42); n = 30.

Overall average of above two collections: 8.65 x 6.45  $\mu\text{m}$ ; Q = 1.335.

Overall average of *C. brevirobustus*: 9.00 x 6.20  $\mu\text{m}$ ; Q = 1.455 (for comparison).

Basidia 4-spored, narrowly clavate, 26-36 x 8.5-10  $\mu\text{m}$ ; hyaline or with granular contents and vacuoles; sterigmata generally short and straight, 1-3.5(5)  $\mu\text{m}$ . Cystidia not observed.

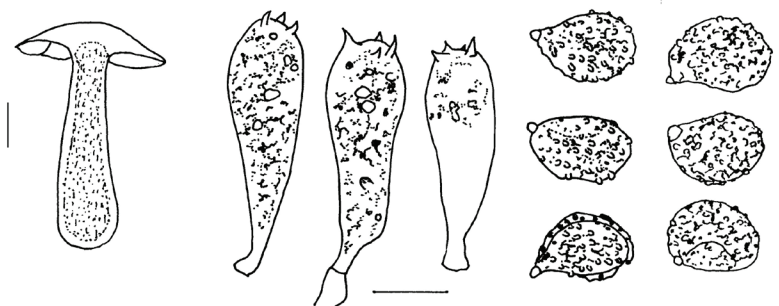


Figure 16. *Cortinarius* Species 3. A = cross-section of fruiting body (CS 5111), scale bar = 1 cm; B = basidia (CS 5111), scale bar = 10  $\mu\text{m}$ ; C = basidiospores, scale bar = 10  $\mu\text{m}$ .

**Habitat:** mixed miombo with *Brachystegia boehmii*; mixed miombo on granitic sand dominated by *Julbernardia globiflora* with some *B. spiciformis*.

Specimens examined:

CS 23, Beacon Hill, Central Estates, Mvuma, Midlands Province. QDS 1930A4. 06 Jan 1988. Coll. C. Sharp. CS 5111, Outside Global Plot, Bon Accord, Shangani, Matabeleland South Province. QDS 1929D3. 17 Jan 2017. Coll. C. Sharp.

<b>Morphological Features</b>	<i>C. brevirobustus</i> CS 4541B & CS 5112	<i>Cortinarius</i> Species 3 CS 23 & CS 5111
Small in size	*	*
Pileus umbonate	*	-
Flesh purple beneath pellis	*	*
Lamellae with purple edge	-	*
Stipe short & robust	*	-
Stipe flesh	hollow	solid-pithy
Cortina	median or lower	superior
Fresh odour sweet peppery	* (catches in throat)	* (not catching in throat)
Spore-print colour	light brown [7D5-4] & [6D8] or rich fulvous-brown	between light brown & titian-red [7D6-5]
<b>Microscopic Features</b>		
Average spore dimensions	9.00 x 6.20 µm	8.65 x 6.45 µm
Q-value	1.455	1.335
Shape	ellipsoid	broadly-ellipsoid to ellipsoid
Strongly verrucose	*	*
Basidia size range	*25-32 x 8.5-10.5 µm	*26-36 x 8.5-10 µm
Basidia shape	oblong to clavate	narrowly clavate
<b>No. similarities:</b>	3 ( morphological) & 2 (microscopic)	
<b>No. differences:</b>	7 (morphological) & 4 (debatable microscopic)	

Table 1. List of similarities and differences between collections of *Cortinarius brevirobustus* and *Cortinarius* Species 3. (\* denotes positive; - denotes negative/absent)

### *Cortinarius diobensis* Beeli

**Figures 17, 18 and 19.**

*Cortinarius diobensis* Beeli, *Bull. Soc. R. Bot. Belg.* **61**(1): 87 (1928)

#### **Field description:**

**Fruiting body** growing singly or in large groups; medium-sized to large and robust (a very small and fragile form is uncommon); to 50 mm tall. **Pileus** 25 - 90 mm diam.; pale blue [20A3] and greyish-blue [20B4], losing most of blue colouration when dry to become light-yellow [4A4]. **Flesh** solid with a sheen; greyish-violet [19C5] to royal blue [19C7] beneath pellis; colour eventually fades to shiny white or cream. **Margin** smooth, inrolled, cortinoid threads often attached. **Lamellae** brownish-yellow [5C8] and yellowish-brown [5D8] when mature; adnate to sub-decurrent; edge thin and smooth; with lamellulae. **Stipe** length 60-85 mm x 8-27 x 9-20 x 12-35 mm across widest part; often half-buried in soil; pale with tinges of purple and white beneath leaf litter or soil;

thick, robust, cylindrical with swollen to very bulbous base, sometimes tapering below bulb. Ring cortinoid, superior, often dusted with brownish-yellow spores. **Bruising** not recorded. **Odour** hot-peppery when freshly cut. **Spore-print colour** rich fulvous, brownish-yellow [5C8] and [5D8].

**Description of the Type (translated):**

**Cap** fleshy, plano-convex, margin curved, smooth, glabrous, bluish ochre at margin. 70 mm diameter. **Stipe** cylindrical, slightly thicker towards base, solid, glabrous, slightly grooved, bluish, base ochre. 110 x 10-12 mm. **Gills** adnate, slightly decurrent, narrow, thin, serrated, bluish then ochreous. **Spores** ellipsoid – with relatively pointed apex, rusty, granulose, 12 x 5-6  $\mu\text{m}$ . **Flesh** bluing on contact with air. Scattered on the soil in forest “ikombo”.

**Microscopic description:**

Spores amygdaliform to sub-fusiform; smooth or finely verrucose towards distal third of spore; no inter-connections observed; no perisporium and no plage evident; very small hilar appendage; spore sizes very variable.

CS 3356: (8.5) 9.4 (10.0)(11) x (4.5) 4.8 (5.0)  $\mu\text{m}$ ; Q = (1.7) 1.95 (2.22); n = 30,  
CS 4586A: (9.0) 9.8 (11.5)(12) x (4.3) 4.9 (5.5)  $\mu\text{m}$ ; Q = (1.8) 2.02 (2.44); n = 30,  
CS 4586B: (8.0) 8.9 (10.0)(11) x (4.0) 4.4 (5.0)  $\mu\text{m}$ ; Q = (1.78) 2.0 (2.25); n = 30,  
G-F 514: (9.0) 10.0 (11.0) x (4.3) 4.8 (5.0)  $\mu\text{m}$ ; Q = (1.8) 2.09 (2.35); n = 32 (Holotype).

Overall average of four collections: 9.525 x 4.725  $\mu\text{m}$ ; Q = 2.015.

Basidia 4-spored, of two sizes: short, broadly clavate, 16-21 x 8-10  $\mu\text{m}$  and longer, narrowly clavate 24-26 x 7-10  $\mu\text{m}$ , (intermediate size noted in CS 4586A); often with large cell at base; hyaline or with contents and vacuoles; sterigmata short and rounded in short basidia, long and pointed in long basidia. Cystidia not observed.



Figure 17. *Cortinarius diobensis*, fruiting body (CS 4586A).

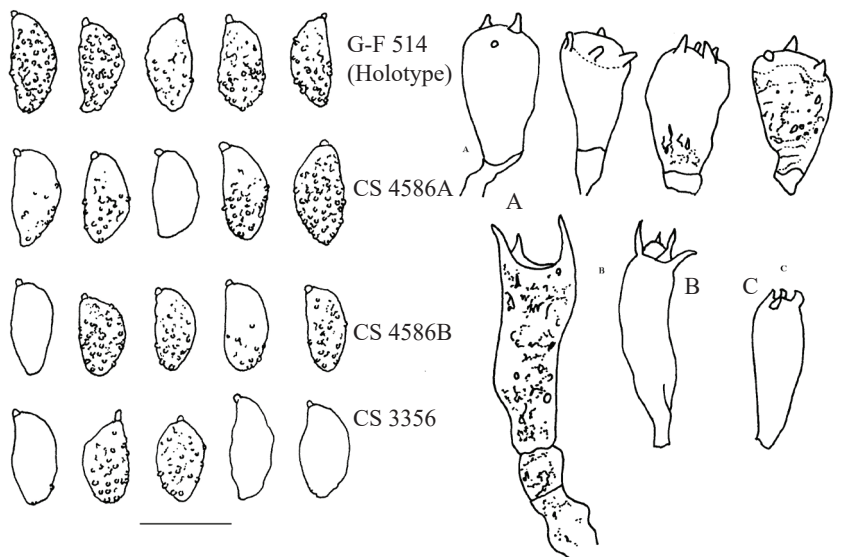


Figure 18. *Cortinarius diobensis*, basidiospores, scale bar = 10  $\mu$ m.

Figure 19. *Cortinarius diobensis*, A = short basidia, (Holotype GF-514), B = long basidia, C = intermediate basidium CS 4586A, scale bar = 10  $\mu$ m. LHS = Holotype GF-514, RHS = CS 4586A.

**Habitat:** Mixed miombo woodland on weak fersiallitic sand.

**Specimens examined:**

CS 3356, Plot C, Shangangwe, Debshan Ranch, Matabeleland South Province. QDS 2029B1. 24 Mar 2013. Coll. C. Sharp.

CS 4586A and B, Plot C, Shangangwe, Debshan Ranch, Matabeleland South Province. QDS 2029B1. 02 Apr 2016. Coll. C. Sharp.

G-F 514, Diobo, Democratic Republic of Congo. Dec 1925. Coll. Madame Goosens-Fantana. (BR031745-26) (Holotype).

**Notes:** In the field, CS 4586B collections were very small and slender and were therefore kept separate from the larger, more robust collections of CS 4586A that were growing over a metre away. The only common feature between the two was the bulbous base. Later, microscope studies showed that the spore details matched perfectly, again emphasizing how misleading a size character can be.

Morphologically, this species is very similar to *C. afropurpurissimus* but is perhaps more blue than purple and generally large and robust with a very bulbous base. The spore deposit on the cortina is cinnamon to sienna in *C. afropurpurissimus* and more yellow-brown in *C. diobensis*. Microscopically, the spores are very different in the latter, being long and sub-fusiform with only the distal third having verrucose ornamentation. Amongst all the current Zimbabwean species, this latter feature is unique. The presence of two different-sized basidia is interesting and the intermediate-sized observation in CS 4586A may only be an immature basidium.

Another closely associated species described below as *C. mtaoensis* has fairly similar spore shape (but more broadly amygdaliform than subfusiform) and fine, verrucose ornamentation over the whole surface. The stipe is tapered rather than bulbous as shown in *C. diobensis*.

*Cortinarius mtaoensis* C. Sharp sp. nov.

Figures 20 and 21.

Mycobank MB832349

**Holotype:** Zimbabwe, Midlands Province. Global Plot, Mtao Forest, Mvuma. QDS 1930B3. 23 Mar 2016. Coll. F. Chikomba. CS 4491. (Holotype: BUL7961, Natural History Museum, Zimbabwe; paratype: personal collection of C. Sharp, CS 4491).

**Type description:**

**Fruiting body** large and robust. **Pileus** up to 70 mm diam.; pale blue; flesh white with blue layer beneath pellis. **Lamellae** pastel-violet; adnate; with lamellulae. **Stipe** 75 x 16 mm (22 mm across swollen base); campanula–blue to bluish-grey to pale at base; cylindrical, swollen at base then tapering. **Flesh** white with purple marbling and creamy-yellow at base. **Ring** cortinoid, superior. **Odour** unpleasant. **Spore-print colour** yellow-ochre. **Spores** broadly amygdaliform; (8.0)8.5(9.0) x (4.2)4.7(5.0)  $\mu\text{m}$ ; Q = (1.6)1.78(2.0).

**Etymology:** named after the Mtao Forest in which the collection was made.

**Field description:**

**Fruiting body** large, robust and up to 65 mm tall. **Pileus** up to 70 mm diam.; pale blue [20A3]; surface sticky and peels easily. **Flesh** white, shiny; pale blue and bluish-white [20A3+2] beneath pellis; above lamellae there is a bright white zone over a dark purple, firm, translucent zone. **Lamellae** adnate; light violet or pastel-violet [19A5+4]; edge smooth with irregular undulations; lamellulae present. **Stipe** length 75 mm x 16 x 15 x 22 mm across swollen base; apex campanula-blue [20B5] to greyish-violet [19C5] and bluish-grey [19B3+2], base cream-coloured or bluish-white [20A2]; cylindrical, swollen towards base (not bulbous) then tapering; surface of base woolly in texture. **Flesh** white with purple marbling; fibrous, base firmly pithy and creamy-yellow in colour. **Ring** cortinoid, superior. **Bruising** not recorded. **Odour** unpleasant, of stink-bugs/coriander. **Spore-print colour** oxide yellow = yellow ochre [5C7]. **Chemical reactions:** nil reaction with ferrous sulphate.



Figure 20. *Cortinarius mtaoensis* (Holotype CS 4491).

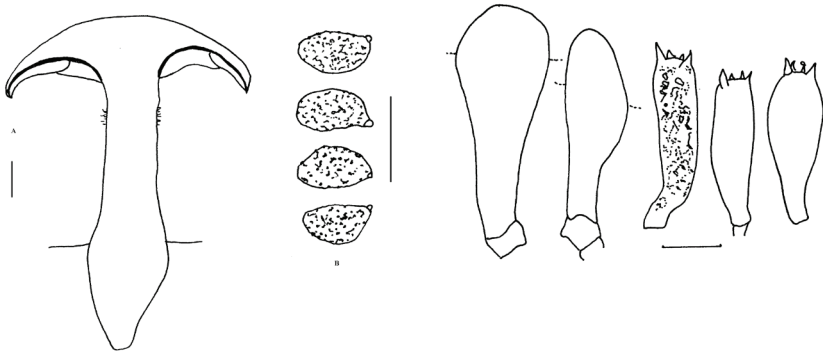


Figure 21. *Cortinarius mtaoensis*, (Holotype CS 4491). A = cross-section of fruiting body, scale bar = 1 cm; B = basidiospores, scale bar = 10  $\mu$ m; C = cystidia and D = basidia, scale bar = 10  $\mu$ m.



**Microscopic description:**

Spores broadly amygdaliform; verrucose with fine ornamentation sparsely distributed over whole surface of spore; some inter-connections; perisporium not evident; plage not observed; fairly uniform in size and shape.

CS 4491: (8.0) 8.5 (9.0) x (4.2) 4.7 (5.0)  $\mu\text{m}$ ; Q = (1.6) 1.78 (2.0); n = 30 (Holotype)

Basidia 4-spored, oblong to clavate, 21-31 x 6.5-9  $\mu\text{m}$ ; hyaline or with granular contents and vacuoles; sterigmata relatively short and pointed. Cystidia sparse, shortly projecting beyond basidia, thin-walled, hyaline, 32-37 x 9-15  $\mu\text{m}$ .

**Habitat:** in mixed miombo woodland on Kalahari Sand with *Brachystegia spiciformis* and *Monotes glaber*.

**Specimen examined:**

CS 4491, Global Plot, Mtao Forest, Mvuma, Midlands Province. QDS 1930B3. 23 Mar 2016. Coll. Farai Chikomba (Holotype).

**Notes:** This species differs from *C. diobensis* in having a tapered stipe rather than bulbous but this observation is limited to only one collection. Microscopically, the spores are more broadly amygdaliform than sub-fusiform and have fine, verrucose ornamentation over the whole surface.

**Discussion of *C. diobensis*-*mtaoensis* group**

The overall longer spores of *C. diobensis* and *C. mtaoensis* together, separate these two species from all other *Cortinari* in Zimbabwe. Individually, the spores of *C. mtaoensis* are shorter than those of *C. diobensis* which are predominantly sub-fusiform and consequently the average Q-values are very different, 1.78 vs 1.95-2.02 respectively (Table 2). It is not certain whether the difference in habitat is significant. CS 4491 is from miombo woodland on Kalahari sand with *Monotes glaber*, compared to *C. diobensis* also in mixed miombo but without *Monotes* and on granite-derived fersiallitic sand (Table 3). However, details of *C. mtaoensis* are based on a single sample and with more collections, it may turn out that the range of both morphological and spore differences is reduced enough to consider these two the same species.

The original description of *C. diobensis* is morphologically similar to *C. afropurpurissimus* except for “bluing of the flesh when exposed to air”. None of the Zimbabwean collections showed this feature. Any blue/purple colours of the flesh were a ‘normal’ feature without showing any colour-changes. The differences in spore detail immediately separated *C. diobensis* from *C. afropurpurissimus*. Referring to Goossens-Fontana’s spore data alone, three collections from Debshan Ranch proved to be different from *C. diobensis*.

In the initial sorting of collections, the option of *C. diobensis* for the above three collections was not considered and they were relegated to another different species. The original microscope work was done under 3% KOH which ultimately proved very misleading. Recent access to Type material from Meise in Belgium and an independent look at that same Type material by A. De Kesel provided more detailed ranges of spore sizes for *C. diobensis*. It was then possible to confirm that the Debshan collections matched *C. diobensis*.

Madame Goossens-Fontana's access to a simple compound microscope of her day may account for the variation in her spore measurements. The spore length of 12  $\mu\text{m}$  is remarkable if that is an average measurement. Only one of the Zimbabwean collections had that figure as an outlier rather than an average measurement. Her measurements for spore width are larger than the ones quoted in the description above and larger than those measured under an even more sophisticated microscope: (8.8-)9-10-11.1(-11.2)  $\times$  (4.4-)4.3-4.8-5.3(-5.5)  $\mu\text{m}$  (n = 46) (observed in Congo Red, DeKesel, pers. com.). Goossens-Fontana described the shape as 'ellipsoid' but even with her dimensions of 12  $\times$  5-6  $\mu\text{m}$ , the shape would have been longer with a Q value near 2. It is not known which reagent she used in her microscope work, because as mentioned earlier, this may also have influenced her results.

The spore colour of *C. diobensis* and *C. mtaoensis* is rather unusual, being in the yellow-ochre range rather than in the usual shades of brown common to the other species. It is interesting that Goossens-Fontana mentioned 'yellow-ochraceous spores' in her description of specimen GF-730 (BR031748-29) from Binga in the DRC. The 'firm' and 'fibrous' stipe matches *C. mtaoensis* as does the 'superior, floccose trace' of the 'ring'. Unfortunately the rest of her description of this collection is incomplete regarding sizes and colours of fruiting body, and also lacks spore details. The illustration shows a dark-purple-coloured fruiting body but the whole stature of her specimen is more delicate than the robust nature of *C. mtaoensis*.

In Zimbabwe, *C. diobensis* has only been collected from the Shangangwe research plots on Debshan Ranch and despite the author's forty years of mycological research, it has not been found elsewhere in the country. This in itself is interesting. What limiting factors are involved in its distribution, if any? The Debshan locality has an altitude of 1300 m, an average rainfall of 660 mm per annum and lies on weak fersiallitic sand derived from granitic parent material. The Caesalpinoid trees on the plots are common in the rest of the country and no plant (which may have an ectomycorrhizal habit) has yet been identified as being particular to this locality.

However, the geographic and ecological distances between Diobo/Binga in the DRC and Zimbabwe could lead to speciation (D. C. H. Plowes, pers. comm.) let alone considering the distance between Debshan Ranch and Mtao Forest in the case of *C. mtaoensis*.

***Cortinarius mukuvusiensis* C. Sharp & B. Dima sp. nov. Figure 22.**

Mycobank MB 832350

**Type:** Zimbabwe, Mashonaland Central Province, Mukuvisi Woodlands, Harare. On granitic sand in miombo woodland. QDS 1731C3. 18 Jan 2012. Coll. Daniel Nyamajiwa. CS 2679. (Holotype: BUL 7963 Natural History Museum, Zimbabwe; paratype: personal collection of C. Sharp, CS 2679).

**Type description:**

**Fruiting body** medium to large and robust, up to 60 mm tall. **Pileus** up to 50 mm diam; surface sticky when wet. **Stipe** up to 60 mm long, tapering to 'radicate' beneath bulbous

base. **Odour** strongly acrid when freshly cut. **Spore-print** not observed. **Chemical tests:** nil reaction with ferrous sulphate on stipe surface or flesh. **Spores** ellipsoid to elongate; smooth or with fine to fairly low verrucose ornamentation; smooth perisporium present; plage not observed; (8.0) 8.5 (9.0) x (5.0) 5.4 (6.0)  $\mu\text{m}$ ; Q = (1.33) 1.58 (1.80).

**Etymology:** named after the Mukuvusi Woodland in which the collection was made.

**Field description:**

**Fruiting-body** small to medium in size and robust; up to 50 mm tall. **Pileus** 25-55 mm diam.; purple; surface sticky when wet. **Lamellae** (from exsiccatae): colour of mature lamellae is raw-sienna to cinnamon-brown [6D7-6] and rust-brown to cognac [6E8-7]; dry lamella-edge distinctly cream-coloured or concolourous. **Stipe** (from exsiccatae): robust in stature; peronate with smooth apex; base swollen then tapering. **Bruising** not recorded. **Odour** strongly acrid when freshly cut. **Spore-print colour** not recorded. **Chemical tests:** nil reaction with ferrous sulphate on stipe surface or on flesh.

**Microscopic description:**

**Spores** amygdaliform; smooth or finely verrucose; no inter-connections observed; uncertain evidence of smooth perisporium; plage not observed; uniform in size. CS 2679: (8.0) 8.5 (9.0) x (5.0) 5.4 (6.0)  $\mu\text{m}$ ; Q = (1.33) 1.58 (1.80); n = 30 (Holotype).

**Basidia** 4-spored, elongated to oblong, 20-34 x 7-10  $\mu\text{m}$ ; sterigmata long and slender, 5-6  $\mu\text{m}$ . **Cheilocystidia** shortly projecting beyond basidia, clavate, thin-walled, hyaline, 33-34 x 11  $\mu\text{m}$ . Hymenial trama with **hyphae** 5-6  $\mu\text{m}$  diam.; terminal hyphae broadly swollen to 10  $\mu\text{m}$ ; no clamps observed. Thin hyphae 3-5  $\mu\text{m}$  diam.; with clamps.

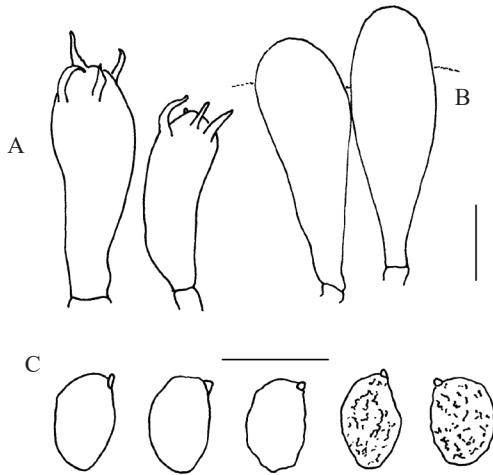


Figure 22. *Cortinarius mukuvusiensis*. A = basidia; B = cheilocystidia; C = basidiospores, scale bars = 10  $\mu\text{m}$ .

**Habitat:** on granitic sand in mixed miombo woodland.

**Specimen examined:**

CS 2679, Mukuvisi Woodlands, Harare, Mashonaland Central Province, QDS 1731C3. 18 Jan 2012. Coll. Daniel Nyamajiwa (Holotype).

**Notes:** There is only a single collection of this species which was originally thought to be *C. afropurpurissimus* in all other morphological features except for having an almost radicate stipe. Unfortunately, very little field data was recorded and further collections are needed before a more comprehensive field description is possible. However the spores are distinctly different enough to warrant a new species.

*C. mukuvusiensis* is very similar to *C. mtaoensis* in having a stipe with swollen base that then tapers, but more so in the former species. However, the spores immediately separate the two species. B. Dima (unpublished) has also noted some DNA molecular differences in this species that may later confirm the status.

**Cortinarius Species 4.**

**Figure 23.**

**Field description:**

**Fruiting body** medium-sized to large and fairly robust; up to 70 mm in height. **Pileus** 50-95 mm diam.; bright purple or mauve becoming brown with age; plano-convex; very slimy when wet, sticky and shiny on drying. **Flesh** overall pale purple, white at centre. **Margin** incurved, smooth or cracked. **Lamellae** purple to brown or fawn {87} at maturity, purple-edged especially towards margin; free; very brittle; 6.5-7 mm wide; moderately crowded, 11-16/cm; lamellulae present. **Stipe** length up to 80 mm x 20 x 18 x 12 mm wide; pale purple or mauve to silvery when dry; surface matt; peronate, sheath splitting just above mid-way (from exsiccata); cylindrical, tapering or swollen towards base. **Flesh** solid, white at centre, purple mid-way and brownish-buff {45} at base. **Ring** cortinoid consisting of two lines: superior and median. **Bruising** nil. **Odour** sweet, spicy. **Spore-print colour** vinaceous buff {86} to fawn {87}.

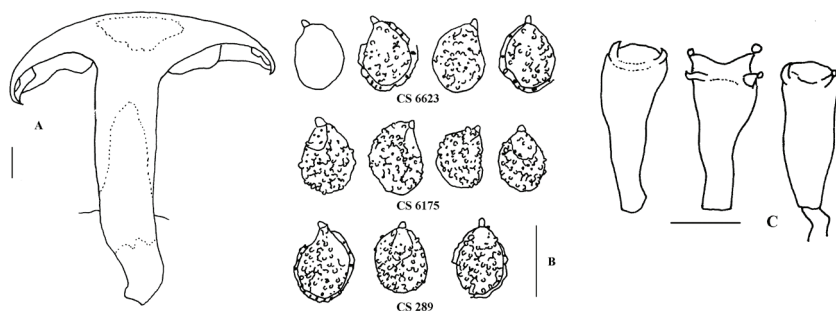


Figure 23. *Cortinarius* Species 4. A = cross-section of fruiting body (CS 6175), scale bar = 1 cm; B = basidiospores, scale bar = 10 µm; C = basidia (CS 289), scale bar = 10 µm.

**Microscopic description:**

Spores predominantly broadly-ellipsoid; strongly verrucose with rounded ornamentation and inter-connections; smooth perisporium peeling in some; plage clear in some spores but not always evident.

CS 289: (8.0) 8.8 (10.0) x (6.0) 6.7 (7.5)(8.0)  $\mu\text{m}$ ; Q = (1.21) 1.31 (1.54); n = 30,

CS 6175: (8.0) 8.6 (9.5) x (6.0) 6.8 (7.5)  $\mu\text{m}$ ; Q = (1.13) 1.26 (1.42); n = 30,

CS 6623: (7.5) 8.7 (10.0) x (6.0) 6.8 (7.5)  $\mu\text{m}$ ; Q = (1.13) 1.28 (1.43); n = 29.

Overall average of these three collections: 8.70 x 6.77  $\mu\text{m}$ ; Q = 1.283.

Basidia 4-spored, relatively short, clavate, hyaline, 17-23 x 7-10  $\mu\text{m}$ ; sterigmata short and stubby, curved. Cystidia not observed.

**Habitat:** in degraded, mixed miombo on granitic sands; on banded-ironstone ridge under *Brachystegia glaucescens*; *B. spiciformis*-dominated miombo woodland.

**Ethnomycology:** ULIMI LWENKOMO (siNdebele) and considered non-edible. It is interesting that the Ndebele person consulted on the edibility of this mushroom, considered it inedible. Preliminary results from a national survey of mushroom knowledge (Sharp, 2013) showed that many of the ecto-mycorrhizal species were not recognized by the Ndebele people. This is explained by the fact that their home areas in Matabeleland North and South Provinces do not have much miombo woodland, although the teak forests in the N-W of Zimbabwe sometimes have *Brachystegia spiciformis* and *B. boehmii* scattered amongst the teak (*Baikiaea plurijuga*). Perhaps mushroom utilization is not as important to this ethnic group as it is in other groups around Zimbabwe.

**Specimens examined:**

CS 289, Gadzanga Crossing on Sebakwe River, Central Estates, Mvuma, Midlands Province. QDS 1930A2. 23 Jan 1994. Coll. C. Sharp. BR5020162327468.

CS 6175, Harben Park, Gweru, Midlands Province. QDS 1929B4. 23 Mar 2001. Coll. C. Sharp.

CS 6623, on eastern slope between miombo woodland and riverine forest, Westaway, Vumba, Manicaland Province. QDS 1932B2. 27 Dec 2010. Coll. Colleen Taylor.

Notes: This species is differentiated from *C. afropurpurissimus* by the stipe shape which may be tapered or broad at the base but is not bulbous. In *C. Species 4* the colouration of the flesh of both pileus and stipe is white at the centre surrounded by purple while that of *C. afropurpurissimus* is all white, sometimes with tinge of greyish-lilac in pileal flesh. Microscopically, *C. Species 4* has similarities to *C. brevirobustus* in the strongly verrucose ornamentation of the spores but dimensions and shape seem too different to be 'lumped' with that species. Similarly, *C. Species 4* is close to *C. azureolamellatus* morphologically and in spore shape and ornamentation but there is some hesitancy in 'lumping' the two when considering the variation in spore dimensions shown in Table 2.

Species	Overall average size (µm)	Q value	Shape	Verrucose Ornamentation
<i>C. afropurpurissimus</i>	8.13 x 5.84	1.390	ellipsoid	fine-low
<i>Cortinarius</i> Sp. 1	8.66 x 6.40	1.350	broadly-ellipsoid to ellipsoid	fine-low
<i>Cortinarius</i> Sp.2	7.46 x 5.30	1.400	amygdaliform	moderate
<i>C. azureolamellatus</i>	7.86 x 6.06	1.296	broadly-ellipsoid to ellipsoid	strong
<i>C. brevirobustus</i>	9.00 x 6.20	1.455	ellipsoid	strong
<i>Cortinarius</i> Sp. 3	8.65 x 6.45	1.335	broadly-ellipsoid to ellipsoid	strong
<i>C. diobensis</i>	9.50 x 4.70	2.015	sub-fusiform	smooth-fine-moderate, distal
<i>C. mtaoensis</i>	8.50 x 4.70	1.780	broadly amygdaliform	finely
<i>C. mukuvusiensis</i>	8.50 x 5.40	1.580	amygdaliform	smooth-fine-low
<i>Cortinarius</i> Sp.4	8.70 x 6.76	1.283	broadly-ellipsoid	strong

**Table 2. Comparison of basidiospores in Zimbabwean *Cortinarius* species.**

Key to *Cortinarius* species in Zimbabwe using microscopic features.

Spore details were studied in Melzer's Iodine under oil immersion (x 100) and 30 spores measured.

1. a. Spores with fine or low verrucose ornamentation..... 2
1. b. Spores moderately or strongly verrucose ..... 6
2. a. Spore shape ellipsoid (average Q value = 1.30-1.60) or broadly-ellipsoid (average Q value = 1.15-1.3)..... 3
2. b. Spore shape amygdaliform to sub-fusiform..... 4
3. a. Spores ellipsoid; one size of basidia; sterigmata short or long, .. *C. afropurpurissimus*
3. b. Spores broadly-ellipsoid; two sizes of basidia; short sterigmata ..... **Species 1**
4. a. Spores smooth or finely verrucose especially at distal end; shape amygdaliform to sub-fusiform (Av. Q = 2.015); average size = 9.525 x 4.725 µm ..... *C. diobensis*
4. b. Spores smooth or finely verrucose over whole surface ..... 5
5. a. Spores more broadly-amygdaliform (Av. Q = 1.78); sterigmata short, pointed.....  
..... *C. mtaoensis*
5. b. Spores amygdaliform Av.Q = 1.58; sterigmata long, pointed (5-6 µm) .....  
..... *C. mukuvusiensis*
6. a. Spores moderately verrucose, ellipsoid, relatively small (7.46 x 5.30 µm)....**Species 2**
6. b. Spores strongly verrucose and larger in size..... 7
7. a. Spores sub-globose to broadly-ellipsoid to ellipsoid (Av.Q = 1.296); average size = 7.866 x 6.066 µm ..... *C. azureolamellatus*
7. b. Spores broadly-ellipsoid to ellipsoid and spores longer ..... 8
8. a. Spores broadly-ellipsoid (Av. Q = 1.335) and avg. size = 8.65 x 6.45 µm .... **Species 3**
8. b. Spores ellipsoid (Av. Q = 1.455) and average size = 9.00 x 6.20 µm, *C. brevirobustus*

Table 3. List of trees and soil types found in habitats of Cortinarius collections in Zimbabwe.

Species (CS Collections)	Miombo Trees					Soil Type	Locality
	Fabraceae - Caesalpinioideae			Dipterocarpaceae			
	<i>Brachystegia spiciformis</i>	<i>Jubberardia globiflora</i>	<i>Brachystegia boehmi</i>	<i>Brachystegia glaucescens</i>	<i>Afzelia quanzensis</i>	<i>Monotes glaber</i>	
<i>dhropurpurissimus</i>	*	*		*			
397	*	*		*			granitic sand
489	*	*				*	granitic sand
1985		*			*?		lithosols
2134		*					lithosols
3156	*	*					ferriallitic sand
<i>Cortinarius</i> Sp.1							
534				*			banded ironstone
1133	*		*	*			banded ironstone
2885		*			*?		Kalahari sand
<i>Cortinarius</i> Sp. 2							
517				*			banded ironstone
2133		*					lithosols
3507	*	*					granitic sand
<i>azureolamelilatus</i>							
1315	*						granitic sand
2549				*			banded ironstone
2609	*						ferriallitic soil
<i>brevirobustus</i>							
4541B	*						ferriallitic sand
5112	*	*					granitic sand
							Debslan Ranch, Shangani Jabulani, Shangani

Species (CS Collections)	Miombo Trees					Soil Type	Locality
	Fabaceae - <u>Caesalpinioideae</u>						
	<u>Brachystegia spiciformis</u>	<u>Jilbermaria globiflora</u>	<u>Brachystegia boehmiti</u>	<u>Brachystegia glaucescens</u>	<u>Alzelia quanzenensis</u>		<u>Dipterocarpaceae</u> <u>Monotes glaber</u>
<u>Corinarius</u> Sp.3							
23	*	*	*			banded ironstone	Beacon Hill, Mvumba
5111	*	*				granitic sand	Jabulani, Shangani
<u>dlobensis</u>							
3356	*	*				fersiallitic sand	Debshan Ranch, Shangani
4586A	*	*				fersiallitic sand	Debshan Ranch, Shangani
4586B	*	*				fersiallitic sand	Debshan Ranch, Shangani
<u>mlaoensis</u>							
4491	*					Kalahari sand	<u>Miao Forest, Mvumba</u>
<u>mukuvusiensis</u>							
2679	*	*				granitic sand	<u>Mukuvusi Woodland, Harare</u>
<u>Corinarius</u> Sp.4							
289	*	*		*		granitic sand	<u>Gadzanga, Mvumba</u>
6175				*		banded ironstone	<u>Harben Park, Gweru</u>
6623	*					fersiallitic/quartzite	<u>Yumba</u>



## Discussion

The presence of at least six species of *Cortinarius* along with four indeterminate taxa in Zimbabwe's miombo woodlands marks a significant expansion in the knowledge of ectomycorrhizal fungi (EMF) in this region. The finding of multiple *Cortinarius* species is an important extension of this genus from the temperate zones. In these temperate and boreal ecosystems ectomycorrhizae are the most frequent mycorrhizal type (Alexander, 2006 & Bâ et al., 2012) and *Cortinarius* is often the dominant ectomycorrhizal group (Cannon & Kirk, 2007, Garnica, 2011). This cannot be said for sub-tropical miombo ecosystems where in Zimbabwe, *Russula*, *Amanita*, boletes and *Lactarius/Lactifluus* are the most speciose ectomycorrhizal genera (Sharp, unpublished data). Generally, the reported diversity of EMF in African forests and woodlands is relatively low (Tedersoo et al., 2011) with only a few species of *Cortinarius* known from tropical forests dominated by Caesalpinaceae and Dipterocarpaceae (Tedersoo et al. 2010).

Until recently it was considered that *Cortinarius* was generally absent in the Afrotropical region aside from *C. diobensis* in the D.R.C., *C. boy-scoutorum* from Madagascar, (Bouriquet 1942-1943) and *C. aurasiacus* Pat. growing with *Quercus* in Algeria (Patouillard, 1902). Pearson (1950) described two species from the Cape Province in South Africa: *C. brunneolimosus* growing under *Eucalyptus* and *Pinus* and *C. radiofibrillosus* growing under *Populus canescens*, with uncertainty raised about the associations of these last *Cortinarius* species, given that their tree host species are exotic. It is unlikely that any of the above species will be recorded in indigenous miombo woodland although 'host-switching' has been noted in Seychelles (Tedersoo et al., 2007) and in Zambian *Eucalyptus* plantations (Jairus et al., 2011). The latter study showed that ectomycorrhizae are shared between co-occurring indigenous and exotic tree roots and eucalypts in mixed plantations were often colonized by African EMF. At all the sites where the new *Cortinarius* species were collected there was no sign of exotic trees in close enough proximity to consider 'host-switching'.

The presence of *C. aurasiacus* in the African Mediterranean zone is a reasonable expectation given the radiation of *Cortinarius* on temperate host tree families, Fagaceae and Pinaceae. However the report of *C. diobensis* in the D.R.C. was largely forgotten and only came to light during studies of Zimbabwean material when a search was made into the database at Meise, Belgium. The suggestion that *Cortinarius* occurred in Zimbabwe was only fully accepted when SEMs clearly showed the characteristics of the genus, except for one major feature: the presence of a supra-hilar plage on the basidiospore which should not have been present (Singer, 1962) but is observed in many of the Zimbabwean collections. However, Singer went on to say that 'a slight plage has been observed in spores of *C. violaceus*'. Also in Singer's generic description was the mention of spores 'without loosening perisporium' but which confusingly went on to say 'a perisporium also often evident'. There is now more published evidence of this plage (Moser, 1986) and less obvious in one of the Indian species (Peitner et al., 2003). These anomalies were of some concern and led to the original thought that perhaps these collections were not the same as the temperate *Cortinarius* after all. This thought was supported by others who also questioned whether a vast gap in the geographic distribution between continents along with differences in host genera was enough to merit

a new generic designation (Garnica et al. 2011, D.C.H. Plowes & M.F. Coates Palgrave pers. com.). For the moment they are classified here as the same genus as the temperate *Cortinarius*.

This expansion of *Cortinarius* into the Afrotropical Miombo Eco-region spurs questions about partner associations and biogeographic origins of the group, either as one genus or potentially as two closely related genera. The phylogeographic origins of EMF have received considerable attention with the advent of metagenomic tools (e.g. Looney et al., 2016, Strullu-Derrien et al., 2018). While many ectomycorrhizal groups may have had a tropical origin (Buyck et al., 1996; Matheny et al., 2009; Smith et al., 2011), their radiation has often occurred in the temperate areas which now have the highest diversity of most ectomycorrhizal lineages (Looney et al. 2016). It may be expected that some of the more basal lineages would persist in the tropics.

In the case of *Cortinarius*, the Caesalpinioid and Dipterocarp partners of *Cortinarius* in Zimbabwe are far removed from the Pinaceae and Fagaceae hosts elsewhere. Wilf et al. (2019) found fossil evidence of Fagaceae from the Early Eocene (52 MYA) in southern Argentina. These fossils represent the rainforest vegetation from the terminal phase of Gondwana before South America, Antarctica and Australia had broken away and there would have been interchange of flora and fauna on these landmasses. Meanwhile, the miombo woodlands may have arisen during the Miocene (27 – 7 MYA) although *Brachystegia* itself belongs in the Amherstieae clade which diverged around 68 – 64 MYA (de la Estrella et al. 2017). Thus, opportunities occurred for partner switching from Fagaceae to Caesalpinioid hosts prior to the breakup of Gondwana.

In a current timeframe, the key concern is the conservation of miombo woodlands in the face of increased habitat loss and human population growth. Woodlands have been formed and maintained by continuous human activity (Morris, 1970; Wood, 1984), particularly by fire (Lawton, 1963). However, increased fire frequency and intensity is likely to exceed the resilience of even these fire-adapted miombo species. During hot burns in the late cool-dry season, the fire intensity ranges from 500 – 5000 kJ/s/m and is at its most destructive (Robertson, 1993). Along with increased elephant damage that opens up miombo woodland and allows more grass cover, the effects of annual hot burns were observed over ten years (1999 – 2009) on the Zambezi Escarpment near Makuti. In that relatively short time, the woodland was increasingly replaced by grassland (Sharp, pers. obs.). Meanwhile woodland clearing for agriculture and tree removal for firewood intensifies the pressure on these threatened miombo systems and their fungal diversity.

## Conclusion

The description of five new species of *Cortinarius*, four indeterminate taxa and new distribution of one other species in Zimbabwe's miombo woodlands is an important extension of this genus from the temperate zones. This study of *Cortinarius* in the miombo zone is based primarily on discoveries of distinct taxa during field collections. It would be extremely useful to corroborate these morphological findings with molecular analyses, and through this process the discovery of more novel taxa is expected (Dima & Sharp, in prep.). Field-based studies provide important information on distribution, ecology, tree associations, and ethnomycology, all of which are needed for the conservation of the species and to identify further opportunities for scientific research.

The confirmed addition of *Cortinarius* species to the already known diverse mycobiota of the miombo woodlands emphasizes the importance of studies into the taxonomy and ecology of the ectomycorrhizal associates of this ecosystem.

The palaeohistory of the miombo EMF is likely to reflect the possible tropical origin of *Cortinarius* with subsequent diversification in temperate areas. The presence of further discoveries of *Cortinarius* in Africa is anticipated after studying the collections in European fungaria. Of major importance is the future survival of miombo woodland in the light of current unsustainable anthropogenic activities and the very real likelihood of extinction of both plant and fungal species. Their habitat is critically endangered along with all the other co-habiting biota.

#### Acknowledgements

Ann Bogaerts, Frank Caekenberghe, Andre De Kesel, Eske de Crop, Moira FitzPatrick, Mark Hyde, Mthandazo Ngungu, Nicky Pegg, Paul Pirot, Darrel Plowes, Rob Plowes, Judy Ross, Brian Spooner, Joanne Taylor, Mieke Verbeke, Marcel Verhaegen, Roy Watling and Gabi Watson are all thanked for their various contributions to this work. Riana Jacobs-Venter, Ursula Peintner and Andy Taylor were unsuccessful in their individual attempts to extract DNA from several early collections but their efforts are nonetheless much appreciated. Balint Dima has now begun some molecular analyses and I look forward to seeing these results. Mr. Sidindi of Girls' College, Bulawayo, kindly assisted with provision of chemical reagents. The owners, management and staff of Big Cave Camp are acknowledged for their support in this mycological research.

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# The genus *Stereum* – a synopsis

by

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## Abstract

Types for almost all species described in *Stereum* have been examined and 12 species are accepted and a key to them is provided. 545 taxonomic synonyms are given predominantly based on type studies. *Stereum ellipticum* Ryvar den (p. 52) is described as new species, and the following new combinations are proposed *Podoscypha curta* (Fr.) Ryvar den (p. 75), *Xylobolus peculiare* (Boidin & Dhingra) Ryvar den (p. 86) and *Porostereum submembranaceum* (Henn.) Ryvar den (p. 92).

## Introduction

*Stereum* was described by Persoon (1794) for pileate species with a smooth or almost smooth hymenophore. Later mycologists adopted his broad concept and over time some 550 species have been described in the genus. Leveille was the first to adopt a narrower concept, as he described *Hymenochaete* to which he transferred a number of species. This trend continued and over time more and more species were excluded and either treated as taxonomic synonyms or transferred to other genera. Today the genus is universally accepted in a narrow sense including a rather restricted number of species out of which many can be recognized already in the field.

During my fieldwork in many tropical countries I frequently met a number of stereoid species but experienced that it was difficult to find comprehensive literature covering large areas such as continents. In my types studies in the Polyporaceae I often took the opportunity also to look into *Stereum* types in the fungaria I visited. This resulted in numerous notes and drawings of many stereoid species and a small number of types studies in *Stereum* were published (Ryvar den 2014).

Later I decided it was better to make up a synopsis in an effort to stabilize the use of names for this wide spread genus. In an effort to find possible types for names which over time have passed into oblivion, I revisited a number of fungaria in Uppsala, Stockholm, London, Edinburgh, New York, Paris, Leiden and Beltsville to mention the most important ones. In all these collections the *Stereum* collections and those of other steroid genera were examined and sifted in an effort to find types or authentic material. The curators of these institutions are thanked for their cooperation over many years and in many cases by sending specimens for examination.

In the “Nomenclator” chapter, the species are listed alphabetically according to epithet with an abbreviated reference to the place of publication.

## **Stereum Pers.,**

Neues Mag. Bot. 1:110, 1794.

Basidiocarps annual or perennial, resupinate, orbicular, effused- reflexed to pileate, tough and pliable to hard, pileus (if present) initially tomentose, hispid or velutinous, tomentum white to rusty brown, in most species becoming glabrous in zones to expose a dark coloured cuticle; hymenium smooth to slightly tuberculate, yellow, clay-coloured, orange to beige, some species (in living condition) bleeding or discolouring bright yellow, red or purplish red when damaged; hymenium homogenous or stratose, context thin and dense, in most species separated from the tomentum by a thin brown zone this becoming the cuticle when exposed by loss of the tomentum; hyphal system dimitic, generative hyphae with simple septa, skeletal hyphae moderately thick-walled, hyaline to yellowish.

Cystidia may be present, of three types,

1. Skeletocystidia, smooth, hyaline to yellow to light brown, filled with an oily to granular substance, thick-walled except in the apical part, where often constricted and with one, or occasionally two, schizopapillae, normally originating from horizontal skeletal hyphae in the trama which bend into the hymenium.
2. Acutocystidia, smooth and with a pointed apex.
3. Pseudoacanthocystidia with a few protuberances near the apex.

Basidia elongate to clavate, with 4 sterigmata; spores elliptic, narrowly elliptic to cylindrical, often slightly bent, thin-walled, smooth, hyaline and amyloid.

Cosmopolitan. Causing a white rot in wood of hardwoods and conifers.

**Type species:** *Stereum hirsutum* (Willd.) S.F. Gray.

**Remarks.** The genus is well defined by the dimitic hyphal system with simple-septate hyphae, oleiferous skeletocystidia (present in all species), acutocystidia and acanthocystidia (in some species), and smooth, amyloid spores.

However, as is often the case, if a genus is easy to identify, species within it are often difficult to separate! This is the situation in *Stereum* since clamp connections are always absent, and there are probably different strains with morphological characters that may seemingly warrant specific separation seen in isolation.

In some of the complexes described here, especially in the tropical *S. versicolor* s. lato, many 'species' have been described, these based on rather subtle differentiating characters.

Here, it is regarded as a single species displaying rather wide variations in basidiocarp morphology and characteristics.

### **Type of cystidia**

The following drawing, based on a living basidiocarp of *S. rugosum* from Gothenburg in Sweden, illustrates the three types of cystidia or sterile organs which may occur in *Stereum* species.

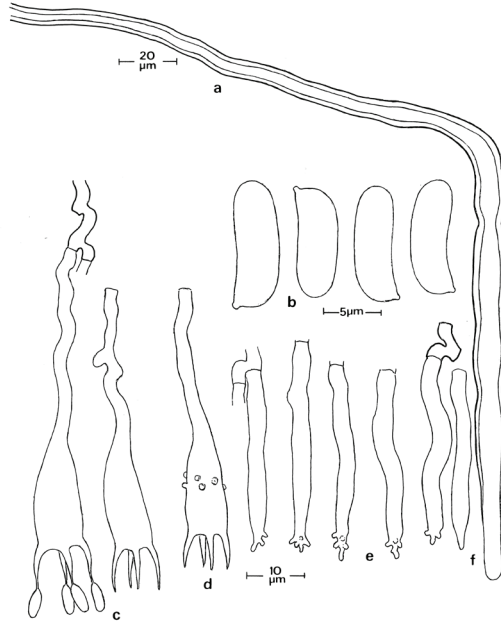


Fig. 1. Basidia and types of cystidia. seen in *Stereum* a) skeletocystidium, b) spores, c) basidia, d) acanthocystidia, f) acutocystidium. Del. John Eriksson.

### Key to species

- |  |                          |
|--|--------------------------|
| 1. On wood of conifer .....  | <b>S. sanguinolentum</b> |
| 1. On hardwoods .....  | 2                        |
| 2. Hymenium bleeding when damaged, in fresh condition .....                                | 3                        |
| 2. Hymenium not bleeding .....   | 6                        |
| 3. Bleeding red when damaged .....   | 4                        |
| 3. Bleeding yellowish or rarely slightly reddish .....                                     | 5                        |
| 4. Hymenial surface pale orange, resupinate or with a narrow, black, glabrous pileus ..... | <b>S. rugosum</b>        |
| 4. Hymenial surface greyish to pale brown, pileus hirsute, mostly on <i>Quercus</i> .....  | <b>S. gausapatum</b>     |



5. Boreal-temperate, pseudo-acanthocystidia absent ..... **S. arcticum**  
5. Tropical to temperate, pseudo-acanthocystidia present ..... **S. versicolor**
6. Acanthocystidia present, mostly tropical ..... **7**  
6. Acanthocystidia absent, widespread, but predominantly warm temperate to boreal..... **8**
7. Pileus adpressed tomentose to velutinate, whitish-grey to pale brown, tomentum often intermixed with brown glabrous zones, basidiospores 2-3  $\mu\text{m}$  wide, very common .....  
..... **S. versicolor**
7. Pileus tomentose to hirsute, pinkish brown to deep brown lacking glabrous zones, basidiospores 3-4  $\mu\text{m}$  wide, rare ..... **S. illudens**
8. Pileus initially velutinate, radially striate and shiny, with age glabrous, whitish, grey to pale orange, no cuticle between tomentum and context, American species .....**S. striatum**
8. Pileus, velutinate, tomentose to hirsute in concentric zones, whitish grey, with age yellowish grey to dirty brown, dark line absent or present between tomentum and context, wide spread species ..... **9**
9. Basidiocarp to 6.0 cm wide, flabelliform to spatulate with contracted base, upper surface whitish grey, tomentum often eroded in zones to expose a brown cuticle; bleeding bright to dull yellowish when fresh ..... **S. arcticum**
9. Basidiocarps rarely bigger than 3.0 cm wide, resupinate, effused-reflexed to cupulate, broadly attached to the substrate, upper surface whitish grey to brownish, tomentum mostly persistent, rarely eroded with age to show a few indistinct zones; never bleeding when fresh ..... **10**
10. Spores elliptic, African species ..... **S. ellipticum**  
10. Spores cylindrical to narrowly elliptic, wide spread species ..... **11**
11. Basidiocarps usually distinctly pileate, to 4.0 cm wide and 2.0 mm thick, stiff when dry, hymenium orange yellow, tomentum hirsute to striate, dark line always present between tomentum and context ..... **S. hirsutum**
11. Basidiocarps cupulate to effused reflexed, often attached by a central point, 0.5-0.8 mm thick, flexible (because of the thin basidiocarp), hymenium ochraceous yellow, tomentum thin and adpressed, soft and velutinous, dark line between tomentum and context absent in young basidiocarp, and only weakly developed in old specimens .....  
..... **S. complicatum**

**NB** Since all species have basidia with 4 sterigmata, all generative hyphae are simple septate, all basidiospores are hyaline, smooth and amyloid, thus, these characteristics are not repeated for each species.

### ***Stereum arcticum* Fr.,**

Hymen. Europ. p. 639, 1879. – , *Stereum atrorubrum* Ellis & Ev., Proc. Acad. Nat. Sci. Phil. 1890:219, 1890. - *Stereum subtomentosum* Pouzar, Ceska Mykol. 18:147-148, 1964.

**Basidiocarp** annual, normally reflexed with a distinct pileus, commonly in dense imbricate clusters, occasionally singly, coriaceous and tough, pilei to 5.0 cm wide and, in fused basidiocarps, 3.0-7.0 cm long, fan shaped to spatulate with a distinctly tapering, short, stipe-like base, or may also be broadly attached, lobed and undulate, involute especially when dried, upper surface initially finely tomentose to velutinate, in narrow zones, yellowish grey to pale brown often more hirsute and grey in older specimens, sometimes with a greenish tint at the base due to algal growth in the tomentum, some of the zones may be separated by dark bands reflecting distinct stages in the development. Margin thin and light-coloured. Hymenium smooth, tuberculate or undulate, light beige to ochraceous, when fresh, immediately bright to dull yellowish damaged; context beige to ochraceous, separated from the tomentum by a distinct, dark brown zone of agglutinated hyphae.

**Hyphal system** dimitic, consisting of simple septate generative hyphae, 3-6 µm wide, in the hymenium thin-walled and abundantly branched; skeletal hyphae 3-10 µm wide, thick-walled and sparsely branched, present in the cortex and the tomentum, often with adventitious 'septa' of contracted protoplasm.

**Cystidia** present, of two kinds:

1) **Skeletocystidia** 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia and often with an apical appendix.

2) **Acutocystidia** 35-40 x 4-5 µm, abundant, projecting slightly above the basidia.

**Basidia** 25-40 x 4-6 µm, clavate.

**Basidiospores** 5.5-8 x 2-3 µm, cylindrical to narrowly elliptic.

**Substrate.** On dead hard wood.

**Distribution.** Previously confused with *S. versicolor* but separated by lacking acanthocystidia and a temperate-boreal distribution. The type (in UPS) was described based on a specimen from Bossekop in Finnmark, Northern Norway at 70° N.

**Remarks.** Easily recognizable in the field due to large, often distinctly fan shaped to spatulate basidiocarps, soft velutinate tomentum and the yellowish bleeding reaction when fresh. The species has more or less the same type of basidiocarp as *S. versicolor* which is however, a southern -tropical species with acanthocystidia.

### ***Stereum complicatum*, (Fr.) Fr.,**

Epicr. Mycol., p. 548. 1838. - *Thelephora complicata* Fr., Elench. Fung. 1:179, 1828. - *Stereum bellum* (Kunze) Sacc., Syll. Fung. 6:563, 1888. *Thelephora bella* Kunze, Flora (Regensburg) 12:370, 1830. - *Stereum ochraceo-flavum* (Schw.) Ellis, North. Am. Fungi no 17, 1878. - *Theleporus ochraceo-flava* Schw., Trans Amer. Phil. Soc. New series 4:167, 1832. - *Stereum sulphuratum* Berk. & Ravenel, J. Linn. Soc. Bot. 10:331, 1868. - *Stereum rameale* (Pers.) Burt, Ann. Rep. Mis. Bot. Gard. 7: 169, 1920, (Basionym: *Thelephora*



Fig. 3. Basidiocarps of *Stereum arctium* Photo I.-J. Fonneland.

*hirsuta*  $\delta$  *rameale* Pers., Syn. meth. Fung.: 570, 1801) nom. illegit, non *Stereum rameale* (Berk.) Masee J. Linn. Soc. Bot. 27:187, 1889. (= *Hymenochaete ramealis* Berk., J. Linn. Soc., Bot. 14: 68, 1875. - *Stereum reflexulum* D. A. Reid, Rev. Mycol. 33:10, 1968.

**Basidiocarps** annual, cupulate to effused-reflexed, often attached by a more or less central point, often imbricate, individual basidiocarps spatulate to flabelliform, to 3.0 cm wide and long and 2.0-3.0 mm thick, flexible when fresh, stiff when dry, upper surface initially finely tomentose to velutinate, yellowish grey to pale brown in narrow zones, with age often more hirsute and grey, often with a greenish tint due to growths of algae in the tomentum, hymenium smooth, rarely slightly tuberculate, light orange to greyish orange, becoming darker with age. Context to 0.5 mm thick, concolorous with the hymenium, cuticle usually absent, but may be weakly developed in old specimens with distinct and persistent tomentum. In living material, not bleeding or discoloured when damaged.

**Hyphal system** dimitic, generative hyphae simple septate in the hymenium 3-5  $\mu$ m wide, thin-walled and abundantly branched; skeletal hyphae 3-10  $\mu$ m wide, present in the in the cortex and the tomentum, thick-walled, sparsely branched, and often with adventitious 'septa' of contracted protoplasm.

**Skeletocystidia** present, 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia,

and often with an apical appendix

**Acutocystidia** absent.

**Acanthocystidia** absent.

**Basidia** 25-35 x 4-6 µm, clavate.

**Basidiospores** 5-7 x 2-3 µm, cylindrical to narrowly elliptic.

**Substrate.** Seemingly on all types of hard woods.

**Distribution.** Widespread in the warm temperate and into the tropical zone,

**Remarks.** Belongs to the *S. hirsutum* group or complex, but separated from it by the much smaller, thinner basidiocarps, the usual occurrence on small, or thin, sticks and branches, cuticle below pileus tomentum is very thin or and occasionally lacking.

**Stereum ellipticum** Ryvarden, nova species Index Fungorum 556921.

Holotype: Zimbabwe, Midlands province, Mvuma district, Beacon Hill, 5. January 1989, on dead *Acacia* sp., Ryvarden, coll 25678 in fungarium O.

**Basidiocarps** effused-reflexed to distinctly pileate, more rarely resupinate or orbicular, with a distinct margin, tough when fresh, hard when dried, to 1.0 mm thick, pileus up to 3.0 cm wide, dimidiate to broadly attached, laterally fused or slightly imbricate, often lobed and wavy, upper surface tomentose in variable zones, greyish at the margin becoming more brown towards the base, in a few narrow zones glabrous with a brown cortex, hymenium smooth, greyish to brownish grey or buff, not bleeding when touched, hymenium about 250 µm thick, subhymenium to 600 µm above white there is a dark brown dense zone.

**Hyphal system** dimitic, generative hyphae 2-5 µm wide, simple septate, skeletal hyphae thin- to slightly thick-walled 4-8 µm wide, thick-walled, and infrequently branched and bending into the hymenium as skeletocystidia.

**Skeletocystidia** 7-10 µm wide and often more than 100 µm long, abundant, thick-walled except for the apical part, sometimes with a schizopapillae, in the upper part filled with oily contents, not or rarely projecting above the basidia, arising from the trama and forming a fairly dense layer next to the hymenium.

**Acutocystidia** absent.

**Acanthocystidia** absent.

**Basidia** not seen.

**Basidiospores** 5-6 x 2-2.5 µm, elliptic, smooth and amyloid.

**Substrate.** Dead *Acacia* sp., and *Juniperus procera*.

**Distribution.** Beside the type locality also seen from Ethiopia.

**Remarks.** The small elliptic spores and the hard consistency characterize this species.

**Stereum gausapatum** (Fr.) Fr.

Fig 4-5

Hymenomycetes Europ. p. 638, 1874. - *Thelephora gausapata* Fr., Elenchus fung. 1: 171, 1828.

**Basidiocarps** effused, resupinate to reflexed, orbicular and confluent, tough when fresh, rather hard when dried, to 1.0 mm thick; pilei dimidiate to broadly attached, lobed, often laterally fused, to 2.0 cm wide, tomentose or velutinous in narrow zones, grey to pale brown and almost rusty brown with age; tomentum present on the pileus, eventually eroded to expose a glabrous, dark brown cortex, margin paler than the rest of the surface. Hymenium smooth to tuberculate, in larger specimens often partially folded in a radial pattern, wood-coloured to pale olivaceous or buff, darker with age, distinctly red or reddish when damaged, then discoloured to shades of reddish-brown or brown. Context pale ochraceous, to 0.5 mm thick, separated from the tomentum by a thick, dark-brown zone of compacted hyphae to 25-75  $\mu\text{m}$  thick.

**Hyphal system** dimittic, generative hyphae 2-5  $\mu\text{m}$  wide, skeletal hyphae thin- to thick-walled, with transitions to skeletocystidia. In the cortex and tomentum thick-walled, not or only sparsely branched, strongly pigmented and agglutinated by a resinous substance.

**Cystidia** present, of two kinds:

1. **Skeletocystidia** 5-10  $\mu\text{m}$  wide and often more than 150  $\mu\text{m}$  long, thick-walled except in the apical part, hyaline to yellowish, filled with grainy to oily contents.
2. **Acutocystidia** 20-30 x 2-4  $\mu\text{m}$ , projecting slightly above the basidia and easily observed in thin sections.

**Basidia** 30-60 x 4-6(-8)  $\mu\text{m}$ , elongate clavate.

**Basidiospores** 6-9(-10) x 3.5-4.5  $\mu\text{m}$ , elliptic to narrowly elliptic.

**Substrate.** On dead wood. Most frequent on *Quercus* spp., often dead standing trunks with still attached branches, less commonly on fallen trunks or branches.

**Distribution.** Follows *Quercus* throughout its range.

**Remarks.** Easily recognizable in the field by the bleeding reaction of the hymenium and by the host.



Fig. 4. *Stereum gausapatum*, lower side of basidiocarps, photo I-I. Fonneland



Fig . 5. *Stereum gausapatum* Basidiocarps, Photo I.L. Fonneland.

***Stereum hirsutum*** (Willd.: Fr.) S.F. Gray.

Fig 6-8

Nat. Arr. Br. Pl. 1: 653, 1821. - *Thelephora hirsuta* Willd.: Fr. Syst. mycol. I: 439, 1821. - *Thelephora hirsuta* Willd., Fl. Berol. Prodr. p. 397, 1787. See the following list p. 68 for numerous taxonomic synonyms.

**Basidiocarps** effused-reflexed to distinctly pileate, more rarely resupinate or orbicular, with a distinct margin, tough when fresh, harder when dried, to 2.0 mm thick. Pilei to 3.0 cm wide, dimidiate to broadly attached, often laterally fused or densely imbricate, often lobed and wavy, upper surface tomentose, hirsute or hispid, generally zonate, initially white, becoming greyish to unevenly dirty brown; with age the tomentum erodes to expose a glabrous, brown cortex.

Hymenium smooth to tuberculate, greyish to yellowish or pale orange, with a white margin in actively growing specimens, later more yellow to ochraceous, and, in dead and hibernating specimens, almost buff. Context yellow to ochraceous, to 1.0 mm thick.

**Hyphal system** dimitic, generative hyphae 2-5  $\mu\text{m}$  wide, skeletal hyphae thin- to slightly thick-walled and frequently branched; in the trama 4-6  $\mu\text{m}$  wide, thick-walled, and infrequently branched and bending into the hymenium as skeletocystidia, in the cortex, yellowish brown and thick-walled, and in the tomentum 5-8  $\mu\text{m}$  wide, thick-walled, with numerous adventitious septa.

**Cystidia** present, of two kinds:

1. **Skeletocystidia** 7-10  $\mu\text{m}$  wide and often more than 100  $\mu\text{m}$  long, abundant, thick-walled except for the apical part, sometimes with a schizopapillae, in the upper part filled with oily contents, not or rarely projecting above the basidia, arising from the trama and forming a fairly dense layer next to the hymenium.
2. **Acutocystidia** 20-30 x 2-4  $\mu\text{m}$ , abundant, projecting slightly above the basidia and easily observed in a thin section.

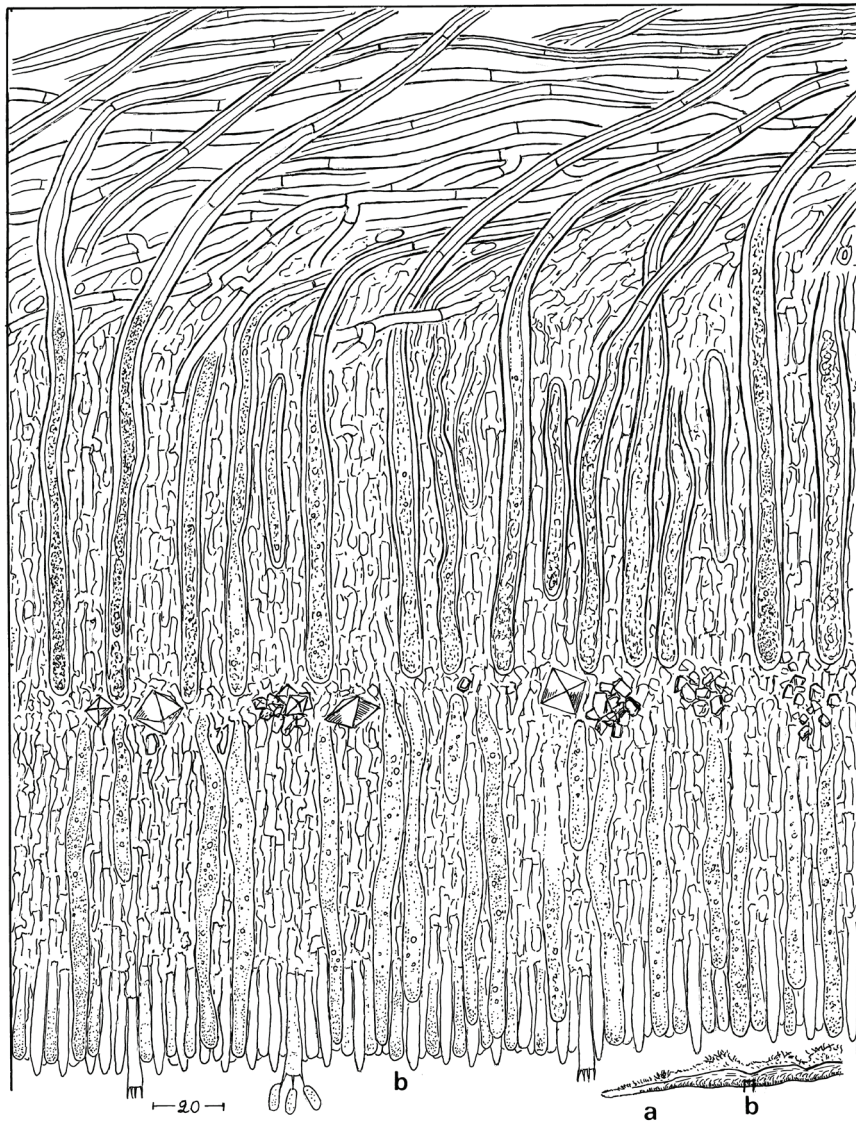


Fig. 6. *Stereum hirsutum*, a) section through basidiocarp, b) section through two-layered hymenium. Del. J. Eriksson.

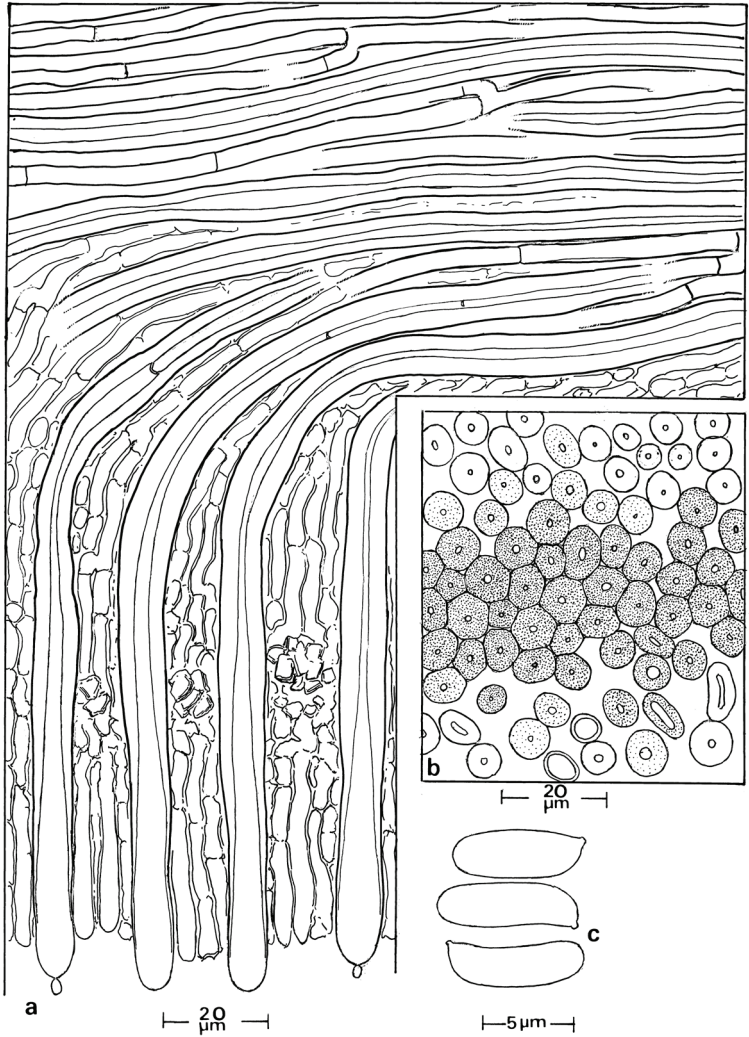


Fig 7. *Stereum hirsutum*, a) section through hymenium, b) vertical section through cortex of young basidiocarp, c) basidiospores. Coll. Høeg 4. June 1928. Del. J. Eriksson.





Fig. 8. *Stereum hirsutum* Photo I.L Fonneland.

**Basidia** 25-60 x 3-5  $\mu\text{m}$ , elongated clavate.

**Basidiospores** 5-8 x 2-4(-3.5)  $\mu\text{m}$ , narrowly elliptic to cylindrical.

**Substrate.** On dead wood, of almost any genus of hardwood, very rarely on coniferous wood.

**Distribution.** Cosmopolitan. Common in temperate areas, rarer in the tropical zones.

**Remarks.** Easily recognized by the white to grey, woolly to hirsute tomentum and the yellow to orange hymenium. It is a highly variable species which has been described several times from different zones.

***Stereum illudens* Berk.,**

**Fig. 9 & 10**

London J. Bot. 4:59, 1845.

**Basidiocarps** annual, cupulate to effuse-reflexed often attached by a more or less central point and often imbricate, up to 3.0 cm wide and long and 2.0-3.0 mm thick, flexible when fresh, stiff when dry, upper surface densely tomentose to strigose, slightly concentrically zonate, initially pinkish brown then deeper brown, hymenium smooth, rarely slightly tuberculate, light brown, pinkish brown at the margin and often with a purplish tint towards the centre or point of attachment, context thin and pale brown, separated toward the tomentum by a thin black line.

**Hyphal system** dimitic, generative hyphae 3-5  $\mu\text{m}$  wide, simple septate, in the tomentum with coloured walls, in the cuticle to 7  $\mu\text{m}$  wide, while those of the context are pale

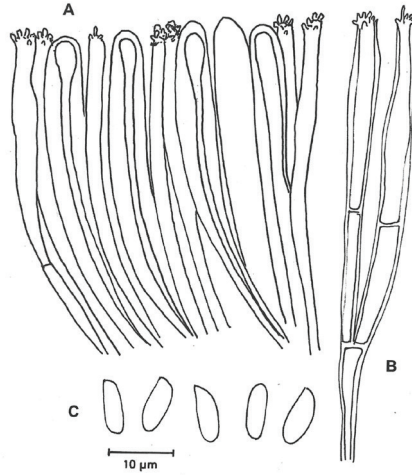


Fig. 10. *Stereum illudens*, New Zealand, Auckland, Del. L. Ryvarden

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Fig. 9. *Stereum illudens*, A) section through hymenium, B) acanthocystidia, C) basidiospores, Coll. Costa Rica, Gomez 24238. Photo L. Ryvarden.

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yellow and thick-walled; skeletal hyphae 3-8 µm wide, with thick walls and often with adventitious 'septa' of contracted protoplasm.

**Skeletocystidia** present, 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia, and often with an apical appendix.

**Acanthocystidia** present, to 30 µm long and 4-7 µm wide with numerous small tubercles in the apex.

**Basidia** 25-35 x 4-6 µm, clavate.

**Basidiospores** 6-8 x 3-4 µm, subcylindrical to narrowly elliptic.

**Substrate.** On dead hard woods.

**Distribution.** Described from Australia, rare in America, Asia and Africa.

**Remarks.** The species is recognized by the dark brown tomentum with a distinct pinkish tint when fresh and the black line below the tomentum.

***Stereum pseudorimosum*** Boidin & Gilles,

Bull. Soc. Mycol. Fr. 105:147, 1989.

**Basidiocarps** annual, flabellate, up to 3 cm wide and 0.5 mm thick, often attached centrally with narrow pileus, flexible when fresh, stiff when dry, upper surface densely tomentose to strigose, slightly concentrically zonate, initially snuff brown, hymenium smooth, cracking by age, rarely slightly tuberculate, brown, to ochraceous, becomes red by touching or cutting, context thin and pale brown, separated toward the tomentum by a thin black line.

**Hyphal system** dimitic, generative hyphae 3-5 µm wide, simple septate, in the tomentum with coloured walls, in the cuticle to 7 µm wide, while those of the context are pale yellow and thick-walled; skeletal hyphae 3-8 µm wide, with thick walls and often with adventitious 'septa' of contracted protoplasm.

**Skeletocystidia** present, 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia, and often with an apical appendix.

**Acanthocystidia** present, to 25 µm long and 4-7 µm wide with numerous small tubercles in the apex.

**Basidia** 25-35 x 4-6 µm, clavate.

**Basidiospores** 5-7.5 x 2-3 µm, cylindrical.

**Substrate.** On dead hard woods such as *Acacia*.

**Distribution.** La Reunion, Mauritius and Madagascar.

**Remarks.** The species is recognized by the dark brown tomentum and the numerous acanthocystidia besides bleeding when fresh. It is closely related to *S. illudens* but separated by its cylindrical spores, small discoid basidiocarp and its distribution.

***Stereum rimosum*** Berk.,

**Basidiocarps** broadly effused, narrowly reflexed, narrowly attached and laterally attached or resupinate on larger branches, pileus buff to ochre to fulvous, covered with a thick, felty, pad-like or somewhat spongy tomentum, margin even or lobate, lower side

conspicuously rimose and rugose with phlebioid radiating ridges and tubercles. sometimes appearing. blistered. thicker specimens often cracking to show a pallid silky context. often concentrically furrowed or grooved, pale yellow, buff to cream coloured, saffron to salmon tinged when fresh. sometimes becoming fawn to hazel, bleeding orange to red when bruised, injured parts drying violaceous black., cuticle present relatively thin, orange to rust coloured.

**Hyphal system** dimitic, generative hyphae, thin-walled, 2.0-3.5  $\mu\text{m}$  wide, skeletal hyphae: 5.0- 10.0  $\mu\text{m}$ , wall thickness 1.0-3.0  $\mu\text{m}$ , lumen often with orange brown contents.

**Basidia** 30.0-60.0 x 4.0-6.0  $\mu\text{m}$ , clavate to subcylindrical.

**Basidiospores** 5.0-7.0(- 8.0) x 2.5-3.5  $\mu\text{m}$ , elliptic to cylindrical.

**Skeletocystidia** sub cylindrical to cylindrical, yellow to orange. somewhat oily contents, relatively thin- to slightly thick-walled. 4.0-9.0  $\mu\text{m}$  diam.

**Substrate.** Different hardwoods.

**Distribution.** Australia.

**Remarks.** As *S. rimosum* is a bleeding species, the colour of the hymenium may vary considerably, becoming cinereous to black when bruised but seeming to dry a very pale creamy buff when unharmed, which tends to darken somewhat with age.

**Stereum rugosum** (Pers.: Fr.) Fr.

Fig. 11 & 12.

Epicr. Mycol. p. 522, 1838. - *Thelephora rugosa* Pers.: Fr., Syst. mycol. 1: 439, 1821. - *Thelephora rugosa* Pers. Syn. meth. fung.: 569. 1801.

**Basidiocarp** perennial, resupinate to effused-reflexed, coriaceous to very hard, forming as rounded and orbicular patches with a loosening margin, or with a narrow reflexed pileus, often confluent or forming dense imbricate clusters; pilei narrow, undulate to lobate, occasionally lacking, often fused laterally, rarely more than 1.0 cm wide, initially greyish, with a finely depressed tomentum, soon becoming glabrous and dark brown, finally black in narrow and sharp zones and with a distinct cortex in section, margin rounded, white to pale ochraceous; hymenium smooth, tuberculate to undulating, pale ochraceous to buff, pale yellowish brown with age, often with black spots in older specimens, in living material bleeding red where damaged this becoming blackish brown after a while. In section distinctly strатose, each zone clearly defined by a thin dark line, in total to 2 mm thick, in young parts ochraceous, in older parts darker, often greyish to dirty brown, due to oxidization of the contents of the skeletocystidia.

**Hyphal system** dimitic, generative hyphae simple-septate, 3-4  $\mu\text{m}$  wide, thin-walled, and frequently branched; skeletal hyphae 3-6  $\mu\text{m}$  wide, thick-walled, horizontal; hyphae in the tomentum are of an intermediate type, hyaline to yellowish and sparingly branched, and in the cortex fairly thick-walled and pale brown.

**Cystidia** present, of two kinds:

1) **Skeletocystidia** 5-12  $\mu\text{m}$  wide, usually more than 100  $\mu\text{m}$  long, smooth, thick-walled except for the apical part, hyaline to yellowish, with oily contents, more or less constricted and slightly projecting.

2) **Acanthocystidia** 30-35 x 3-4  $\mu\text{m}$ , projecting slightly above the basidia, and easily observed.

**Basidia** 30-50(-100) x 6-8  $\mu\text{m}$ , elongated clavate.

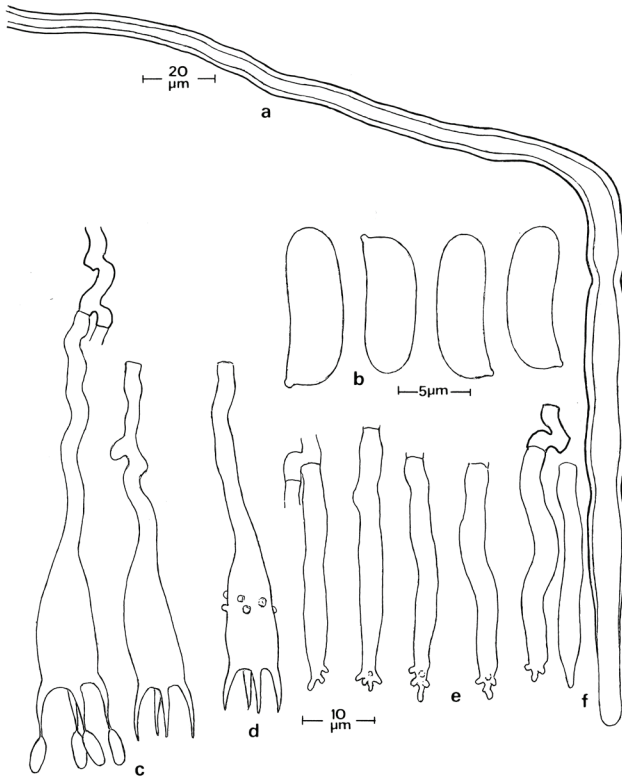


Fig. 11. *Stereum rugosum*, a) skeletocystidium, b) basidiospores, c) acanthocystidia, d) acutocystidium. Del. J. Eriksson.

**Basidiospores** 7-12 x 3-4.5 µm, narrowly elliptical to cylindrical, slightly bent.

**Substrate** On deciduous wood, often dead standing trunks, on which it may cover large areas. *Corylus*, *Betula*, and *Alnus* are seemingly the most common hosts, but also known from most other species of deciduous tree in the area.

**Distribution.** Widespread and common in Canada and the eastern United States. How south it is distributed on the continent is unknown to me.

**Remarks.** Easily recognized by the perennial and often extensive, hard, resupinate to effused reflexed basidiocarps, bleeding red when damaged. Rapidly glabrous with age, and much harder in texture than all of the other species dealt with here.



Fig. 12. *Stereum rugosum*, Photo Inger-Lise Fonneland

***Stereum sanguinolentum*** (Alb. & Schw.:Fr.) Fr.

Fig. 13 & 14.

Epicr. p. 549, 1838. - *Thelephora sanguinolenta* Alb. & Schw.:Fr., Syst. mycol. 1: 440, 1821. - *Thelephora sanguinolenta* Alb. & Schw. Consp. fung. Lusat.: p. 274, 1805.

**Basidiocarps** annual to perennial, resupinate and orbicular with a slightly loosening margin, effused-reflexed to distinctly pileate, often covering large areas, especially on the lower sides of logs, to 1.0mm thick, tough when fresh, hard to coriaceous when dried; pileus present or absent, if present then narrow, mostly less than 10.0 mm wide, often laterally fused, undulate, lobed and incised, or as dense imbricate clusters, initially finely adpressed-tomentose to hirsute, greyish white to brownish, soon becoming glabrous in zones and exposing a brown cortex in narrow bands, these dark brown to almost black, with narrow and sharp zones, then almost completely glabrous when old.

Hymenium smooth, undulate or tuberculate, beige to buff when young, dark brown when older, bleeding strongly red where damaged, this darkening after a short while and becoming brown. Margin narrow, white to pale buff; context beige to ochraceous, often with small dark spots, separated from the tomentum by a thin dark brown zone, less than 50  $\mu\text{m}$  thick.

**Hyphal system** dimitic, generative hyphae simple-septate hyphae, in the hymenium 2-6  $\mu\text{m}$  wide, thin- to thick-walled, skeletal hyphae in the tomentum, cortex and trama 3-6  $\mu\text{m}$  wide, thick-walled, hyaline to pale brown.

**Cystidia** present, of two kinds:

**1. Skeletocystidia** 3-6  $\mu\text{m}$  wide and usually longer than 100  $\mu\text{m}$  somewhat wider in the upper parts (to 4-10  $\mu\text{m}$ ), thick-walled except in the apical part, hyaline to yellowish in the

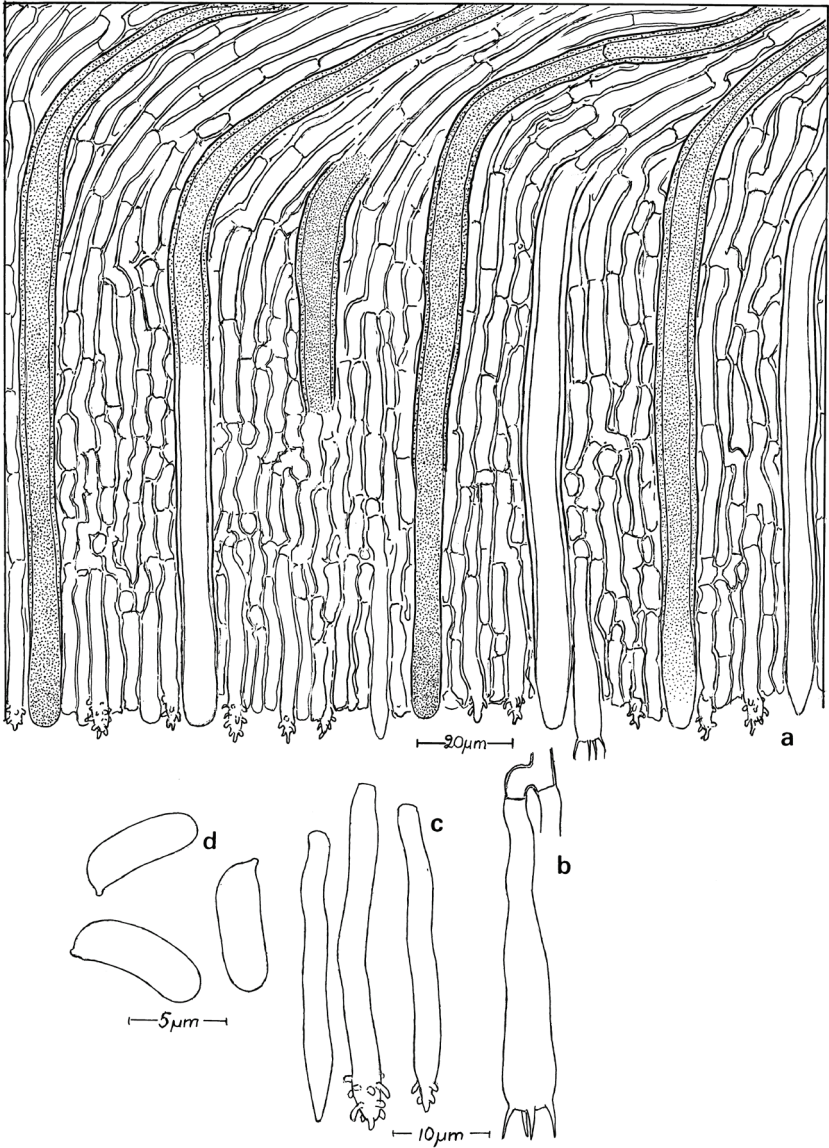


Fig. 13 *Stereum sanguinolentum*, a) section through hymenium, b) basidium, c) cystidia, d) basidiospores, coll. Hjortstam 12722. Del. J. Eriksson.

basal parts, filled with a pale brown, oily to grainy contents, projecting very slightly above the basidia.

**2. Acanthocystidia** 30-40 x 3-5  $\mu\text{m}$ , projecting above the basidia

**Basidia** 25-40 x 5-6  $\mu\text{m}$ , elongate clavate.

**Basidiospores** (6)7-10 x (2.5)3-4.5  $\mu\text{m}$ , narrowly elliptic to cylindrical.

**Substrate.** On dead wood of numerous conifer species.

**Distribution.** Very common in the coniferous forests throughout the temperate boreal conifer zone. Distribution in subtropical pine forests, such as on Cuba and in Belize is unknown.

**Remarks.** Easily recognized due to the bleeding reaction and occurrence on coniferous wood.

***Stereum scutellatum*** G. H. Cunningham,  
Trans Royal. Soc. N. Zeal. 84:210, 1956.

**Basidiocarps** annual, membranous, resupinate to semi pileate with a raised margin, first orbicular, then developing into numerous scattered colonies, 2-10 mm in diameter, then growing together to more complex basidiocarps, pileus when present up to 3 mm wide,



Fig. 14. *Stereum sanguinolentum*, photo I.-L. Fonneland.



straw coloured, radially fine fibrillose, hymenium smooth, beige to buff when young, dark brown when older, bleeding strongly red where damaged, this darkening after a short while and becoming blackish, margin narrow, white to pale buff; context beige to ochraceous, often with small dark spots, separated from the tomentum by a thin yellowish zone, less than 50 µm thick.

**Hyphal system** monomitic, generative hyphae simple-septate, 2-6 µm wide, thin- to thick-walled.

**Skeletocystidia** 3-6 µm wide and up to 100 µm bending into the hymenium somewhat wider in the upper parts, hyaline to yellowish in the basal parts, filled with oily granular content, projecting very slightly above the basidia.

**Basidia** 25-40 x 5-6 µm, elongate clavate.

**Basidiospores** 7-10 x 5-6 elliptic, amyloid.

**Substrate.** On dead hard wood.

**Distribution.** Known only from New Zealand.

**Remarks.** The species is related to *S. sanguinolentum* but easily separated by wider spores, restrictions to hard wood hosts and its restricted distribution.

### ***Stereum striatum* (Fr.) Fr.**

Epicr. Syst. Mycol. p. 548, 1838. - *Thelephora striata* Fr. Elench. Fung. 1:179, 1828.

**Basidiocarps** annual, effused-reflexed, often imbricate, individual basidiocarps dimidiate with a contracted base, or spatulate to flabelliform, to 2.0 cm wide and long and 2.0 mm thick, flexible when fresh, stiff when dry, upper surface initially velutinate, soon more or less glabrous, shiny, sericeous, radially striate, often zoned, grey to greyish white when young, becoming orange to pale brown with age. Hymenium smooth, rarely slightly tuberculate, pale orange to greyish orange, darker with age. Context to 0.2 mm thick, concolorous with the hymenium, cuticle absent, in living material not bleeding or discolouring when damaged.

**Hyphal system** dimitic, generative hyphae simple septate hyphae 3-5 µm wide, in the hymenium thin-walled and often branched; skeletal hyphae 3-10 µm wide, in the cortex and the tomentum thick-walled and sparsely branched, often with adventitious 'septa' of contracted protoplasm.

**Skeletocystidia** 4-12 µm wide, usually longer than 100 µm, thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia, and often with an apical appendix

**Acanthocystidia** absent.

**Acutocystidia** 15-25 x 4-5 µm.

**Basidia** 25-35 x 4-6 µm, clavate.

**Basidiospores** 5-7 x 2-3 µm, cylindrical to narrowly ellipsoid, often slightly bent.

**Substrate.** On dead wood, apparently of any genus of hardwoods, but in the southern United States often on *Carpinus caroliniana*.

**Distribution.** Widespread in America from eastern and southern United States to Brazil.

**Remarks.** Recognized in the field by the small size, and a shiny, finely striate, greyish pileus.

**Stereum versicolor** (Schw.:Fr.) Fr.

Fig. 15 & 16

Epicr. Mycol. p. 547, 1838. - *Thelephora versicolor* Sw.: Fr., Syst. Mycol. 1:438, 1821. - *Helvella versicolor* Sw., Flora India occidentale 3:1933, 1778 (K!). - *Stereum ostrea* (Blume & Nees: Fr.) Fr., Epicr. Syst. Mycol. p.547, 1838. - *Thelephora ostrea* Blume et Nees, Nova Acta Acad. Caes. Leop. Carol. 13:13, 1826. *ibid* Fr. Elench. Fung. 1:175, 1828. - *Stereum fasciatum* (Schw.) Fr. Epicr. Syst. mycol. 546, 1838. - *Stereum lobatum* (Kunze:Fr.) Fr., Epicr. Syst. Mycol. P. 547. - *Stereum australe* Lloyd, Lloyd Mycol. Writ. 4, Letter 48:10, 1913. For more taxonomic synonyms, see chapter "Nomenclator".

**Basidiocarps** annual, normally reflexed with a distinct pileus, single or more commonly in dense imbricate clusters, coriaceous and tough, pileus to 5.0 cm wide and 3.0-7.0 cm long in fused basidiocarps, fan shaped to spatulate, broadly attached or with a distinctly tapering base, this resembling a short stipe, margin thin and light-coloured, involute (especially when dried), lobed and undulate, initially finely tomentose to velutinate, yellowish grey to pale brown in narrow zones, some of which may be separated by dark bands, these reflecting distinct stages in the development, often becoming more hirsute and greyish with age, and sometimes showing a greenish tint at the base due to the growth of algae in the tomentum, hymenium smooth, tuberculate or undulate, light beige to ochraceous; in living material immediately discolouring yellowish where damaged; context beige to ochraceous, separated from the tomentum by a distinct, dark brown zone of agglutinated hyphae.

**Hyphal system** dimittic, generative hyphae 3-5  $\mu\text{m}$  wide; skeletal hyphae 3-10  $\mu\text{m}$  wide, in the cortex and the tomentum thick-walled and sparsely branched, often with adventitious 'septa' of contracted protoplasm.

**Cystidia** present, of two kinds:

- 1) **Skeletocystidia** 4-12  $\mu\text{m}$  wide, usually longer than 100  $\mu\text{m}$ , thick-walled except in the apical part, filled with yellowish contents, often constricted, projecting slightly above the basidia and often with an apical appendix.
- 2) **Acanthocystidia** 35-40 x 4-5  $\mu\text{m}$ , numerous, projecting slightly above the basidia.

**Basidia** 25-40 x 4-6  $\mu\text{m}$ , clavate.

**Basidiospores** 5.5-8 x 2-3  $\mu\text{m}$ , cylindrical to narrowly elliptic.

**Substrate.** Seemingly on any species of hard woods.

**Distribution.** Pantropical and common. Replaced by *S. arctium* in temperate zones, which could easily be interpreted as a form of *S. versicolor* although the latter has acanthocystidia.

**Remarks.** Undoubtedly the most common and variable species of *Stereum* in the tropics. Easily recognized in the field due to the large, often distinctly fan shaped to spatulate basidiocarps with a soft and concentrically zonate, velutinate tomentum in variable colours.

When fresh the yellowish bleeding reaction is distinctive, but this disappears as the basidiocarp dries out. The colour of the lower side is variable and may become dark ochraceous when old.

Fig. 15. *Stereum versicolor* A) section through hymenium, B) basidiospores, Coll. Costa Rica, Gomez 24249. Del. L. Ryvardeen.

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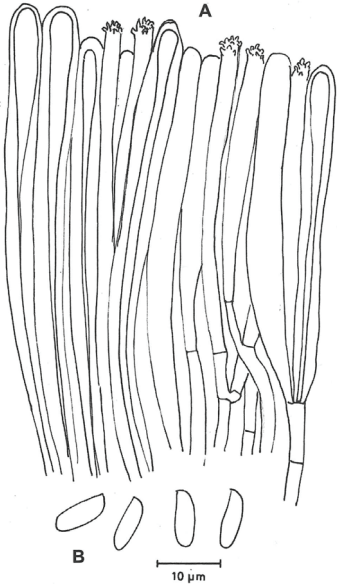


Fig. 16. *Stereum versicolor*, Costa Rica, photo L. Ryvardeen.

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# Nomenclator

- abietinum, Stereum** Fr., Obs. Myc. 2:274, 1818.  
= *Veluticeps abietinum* (Pers. ex Fr.) Hjortstam.
- acanthophysatum, Stereum** Rehill & Bakshi, Ind. For. New Ser. 250:6, 1966.  
= *Stereum sanguinolentum* (Fr.) Fr. (teste D.A. Reid in K).
- acerinum, Stereum** (Fr.) Fr. Epicr. Myc. p 554. 1838. UPS!  
= *Thelephora acerina* Fr. Syst. Mycol. 1:453. 1821.  
= *Dendrothele acerina* (Fr.) Lemke.
- aculeatum, Stereum** (Berk. & Curt.) Lloyd, Mycol. Writ. 4:32, 1913.  
= *Podoscypha aculeata* (Berk. & Curt.) Boidin.
- aculeatum, Stereum** Vel., Ceske Houby p.763, 1922.  
= Nomen illegit. non Lloyd 1913.
- adnatum, Stereum** Lloyd, Lloyd Mycol. Writ.7:74,1925.  
= *Stereum rimosum* Berk.
- adustum, Stereum** Lev., Ann. Sci. Nat. ser. 3, vol 2:213, 1844.  
= *Hymenochaete adusta* (Lev.) Pat.
- aerolatum, Stereum** (Fr.) Fr. Epicr. Myc.:552. 1838.  
= *Amylostereum areolatum* (Fr.) Boid.
- affine, Stereum** (Berk. & Curt.) Henn., Hedwigia 43:198,1904.  
= Nomen illegit., non Leveille 1844.
- affine, Stereum** Lév., Ann. Sci. nat. Ser. III, 2, 210. 1844.  
= *Podoscypha pusilla* (Berk.) Ryvarden.
- ahmadi, Stereum** Boidin., Biologia (Lahore) 2:217,1956.  
= *Xylobolus ahmadii* (Boidin) Boidin.
- albescens, Stereum** (Rick) Rick., Iheringia Bot.4:68,1959.  
= *Crystallocystidium albescens* Rick, Broteria N.S. 9:142, 1940.  
= Type not found.
- albidum, Stereum** Lloyd Mycol. Writ. 4:555,1916.  
= *Cotylidia komabensis* (Henn.) D. Reid.
- albo-badium, Stereum** (Schw.:Fr.) Fr. Epicr. Mycol.:551. 1838.  
= *Thelephora albobadia* Schw.:Fr., Elench. p.189, 1828.  
= *Dendrophora albobadia* (Schw.:Fr.) Chamuris.
- albo-cinctum, Stereum** Berk. & Broome, J. Linn. Soc. Bot. 14:66, 1875.  
= *Scytinostroma albo-cinctum* (Berk. & Br.) Boid. & Lanq.
- albostrigatum, Stereum** Lloyd Mycol. Writ. 4:36,1913.  
= *Cotylidia aurantica* (Pers.) Welden.
- album, Stereum** Quel. Bull. Ass. France. Avanc. Sci. 1882: 400, 1882.  
= *Phlebia albida* V. Post (teste Bourd. & Galz. 1928: 386).
- alliciens, Stereum** Berk. & Cooke, Jour. Linn. Soc. 15:389. 1876.  
= *Eichleriella alliciens* (Berk. & Cke.) Burt.
- alneum, Stereum** (Fr.) Fr. Epicr. Myc.: 554. 1838.  
= *Thelephora alneum* Fr., Syst. mycol. 1:446, 1821.  
= *Scytinostroma odoratum* (Fr.) Donk.

- aloescens, Stereum** (Rick) Rick Iheringia bot. 4:69. 1959.  
= The type is lost.
- alutaceum, Stereum** Berk. & Cooke, Jour. Linn. Soc. 15:388, 1877.  
= *Cotylidia aurantica* (Pers.) Welden.
- ambiguum, Stereum** Peck, Ann. Rep. Reg. N. Y. St. Mus. 47:145, 1894.  
= *Veluticeps ambiguum* (Peck.) Hjortstam.
- amoenum, Stereum** (Lév) Masee.  
= *Thelephora amoena* Lev., Ann. Sci. Nat. Bot. 5:149, 1846.  
= *Porostereum friesii* (Lev.) Hjorst. & Ryvardeen.
- amoenum, Stereum** Kalchbr., Grevillea 10:58, 1881.  
= Nomen illegit. non Leveille 1844 (= *Stereum hirsutum*).  
Name changed to *Stereum kalchbrenneri* Sacc.
- amorphum, Stereum** (Pers.) Krause, Arch. Freud. Nat. Gesellsch. Mecklenb. 3:81, 1929.  
= *Aleurodiscus amorphus* (Pers.) J. Schröt.
- amphibolium, Stereum** (Fr.) Fr., Epicr. Mycol., p. 554. 1838.  
= *Thelephora amphibolia* Fr., Observ. Mycol. 1:151, 1815.
- amphirhytes, Stereum** Sacc. et Berl., Bol. Soc. Broteriana 7:113, 1889.  
= *Cymatodema dendriticum* (Pers.) D. Reid.
- anastomosans, Stereum** Lloyd, Lloyd Mycol. Writ. 4: St. 35, 1913.  
= *Hydnopolyporus hartmannii* (Mont.) D. Reid.
- annosum, Stereum** Berk. & Broome, J. Linn. Soc. Bot. 14, 67, 1874.  
= *Xylobolus princeps* (Jungh.) Boidin.
- antarticum, Stereum** (Speg.) Rachjenb. Sydowia 40:248, 1988.  
= *Aleurodiscus antarcticum* (Speg.) Nunes & Ryvardeen.
- aotearoa, Stereum** G. H. Cunn., Trans. Roy. Soc. N. Zeal. 84:212, 1956.  
= *Porostereum* sp. The type is not available, but from the description, i.e. presence of clamps, it is clearly not a *Stereum* s. str.
- aratae, Stereum** Speg., Anal. Soc. Cient. Argent. 9:283, 1880.  
= *Stereum hirsutum* (Willd.:Fr.) S. F. Gray.
- aratum, Stereum** Pat., Bull. Soc. Myc. Fr. 23:72, 1907.  
= *Xylobolus princeps* (Jungh.) Boidin.
- archeri, Stereum** Berk., Fl. Tasm. 2:259, 1860.  
= *Stereum illudens* Berk.
- arcticum, Stereum** Fr., Hymen. Europ. p. 639, 1879.  
= accepted in the genus.  
= Type: Norway, "Finmarch, Bosekop" UPS.
- ardoisiacum, Stereum** Lloyd Mycol. Writ. 7:1197, 1923.  
= *Chondrostereum purpureum* (Fr.) Pouz.
- arenicola, Stereum** Berk. in Masee, Linn. Soc. Bot. Jour. 27:201. 1890.  
= Corticoid sp., sterile.
- areolatum, Stereum** Fr. Epicr. Mycol. p. 552, 1838.  
= *Amylostereum aerolatum* (Fr.) Boidin.
- argentinum, Stereum** Speg., Anal. Mus. Nat. Hist. B. Aires 6:180, 1899.  
= *Chondrostereum purpureum* (Fr.) Pouzar.

- armeniacum, Stereum** Boidin & Gilles, Bull. Soc. Mycol. Fr. 105:1140, 1989.  
= *Stereum hirsutum* (Willd.:Fr.) S. F. Gray.
- aterrimum, Stereum** Cooke, Grevillea 13:3, 1884.  
= *Punctularia strigozonata* (Schw.) Talbot.
- atratum, Stereum** (Sw.:Fr.) Fr. Epicr. Myc.p.547, 1838.  
= *Helvella atrata*, Swartz . Ann Mag. Nat. Hist. suppl., 2, p. 382, 1843.  
= *Stereum versicolor* (Sw.) Fr.
- atrocinereum, Stereum** (Masse) v. d. Byl, Ann. Univ. Stellenb. 7, pt. 3:44, 1929.  
= *Porostereum spadicum* (Pers.:Fr) Hjorst. & Ryvarden.
- atropurpureum, Stereum** Lloyd Mycol. Writ. 5:712,1917.  
= *Punctularia strigoso-zonatum* (Schw.) Talbot.
- atrorubrum, Stereum** Ellis & Ev., Proc. Acad. Nat. Sci. Phil. 1890:219, 1890.  
= *Stereum arcticum* Fr.
- attenuatum, Stereum** (Lév.) Lloyd, Lloyd Mycol. Writ. 4: Letter 46:6, Apr. 1913.  
= *Hymenochaete attenuata* Lév.
- atrozonatum, Stereum** Speg. Anal. Soc. Cient. Argent.9:166, 1880.  
= *Chondrostereum purpureum* (Fr.) Pouzar.
- atrum, Stereum** (Weinm.) Cooke ex G. Cunn., Proc. Linn. Soc. N.S. Wales 77:276, 1953.  
= *Thelephora atra* Weinm. Hymen. Geas. Imp. Ross. P. 636, 1836.
- aurantiacum, Stereum** (Pers.) Lloyd Mycol. Writ. 4 Letter 46:2,1913.  
= *Cotylidia aurantiaca* (Pers.) Welden.
- auriforme, Stereum** Lloyd Mycol. Writ. 7:1246,1924.  
= *Stereopsis radicans* (Berk.) D. Reid.
- auriscalpium, Stereum** Lloyd, Lloyd Mycol. Writ. 6:1056, 1921.  
= The type is apparently lost.
- aurora, Stereum** Kill. Ann. Myc. 41:275, 1943.  
= *Corticium roseum* Fr, teste Pilat, Ann. Mycol 3\41:275, 1943.
- australe, Stereum** Lloyd, Lloyd Mycol. Writ. 4:10,1913.  
= *Stereum versicolor* (Swartz) Fr.
- avellanaceum, Stereum** Lloyd, Lloyd, Bull. Lloyd Library 34:51, 1936.  
= *Stereum fasciatum* (Fr.) Fr.
- avellanum, Stereum** Fr. Epicr. Myc.:551. 1838.  
= *Hymenochaete tabacina* (Sow. ex Fr.) Lév.
- azonum, Stereum** Vel. Ceske Houby p. 761,1922.  
= *Stereum hirsutum* (Willd: Fr.) S. F. Gray.
- badio-ferrugineum, Stereum** Mont., Ann. Sci. Nat. Bot. ser. 2, 20:367. 1843.  
= *Hymenochaete tabacina* (Sow.:Fr.) Lév.
- bagliettoanum, Stereum** (Fr.) Pat., Essai Tax., p. 73, 1900.  
= *Corticium bagliettoanum* Fr., Hymenom. Eur., p. 705, 1874.  
= *Septobasidium bagliettoanum* (Fr.) Bres.
- baileyianum, Stereum** Berk. Ex Cooke, Handb. Austral. Fungi p. 183, 1892.  
= *Podoscypha involuta* (Kl. apud Fr.) Imazeki.  
Nomen invalid. Art 36, 1.
- balsameum, Stereum** Pk., N.Y. State Mus. Ann. Rpt. 27:99. 1875.  
= *Stereum sanguinolentum* (Alb. & Schw.:Fr.) Fr.

- begehymenium, Stereum** Teix., *Bragantia* 5:403, 1945.  
= *Stereum illudens* Berk.
- bellum, Stereum** (Kunze) Sacc. Syll. 6:563, 1888.  
*Thelephora bellum* Kunze, *Flora* p. 370, 1830.  
Type: Portugal, Madeira, Nov. 9., 1827, leg. Ribeira, Delago, on *Laurus cinera* (K).  
= *Stereum complicatum* (Fr.) Fr.
- berkeleyanum, Stereum** Mont., *Ann. Sci. Nat. Bot.* IV. 1:140. 1854.  
= *Hymenochaete berkleyana* (Mont.) Cooke.
- berkeleyanum, Stereum** Cesati, *Atti. Accad. Sci. Napoli* 8. No.3:10, 1879.  
= Nomen illegit. non Mont. 1854.
- bertolonii, Stereum** Sacc., Syll. Fung. 11:120. 1895.  
= *Stereum complicatum* (Fr.) Fr.
- bicolor, Stereum** (Pers.:Fr.) Fr. *Epicr. Mycol.* p. 549, 1838.  
= *Laxitextum bicolor* (Pers.:Fr.) Lentz.
- bizonatum, Stereum** Berk. & M. A. Curtis, *Grevillea* 1:163-164,  
= *Dendrophora albobadia* (Schw. ex Fr.) Chamuris.
- bolleanum, Stereum** Mont. in Syll. Crypt. P. 177. 1856.  
= *Podoscypha bolleana* (Mont.) Boidin.
- boltonii, Stereum** (Fr.) Sacc., *Michelia* 1:239, 1878.  
= *Corticium boltonii* Fr., *Epicr. Syst. Mycol.* p. 558, 1838.  
= *Porostereum spadiceum* Pers. ( Hjortst. et Ryvardeen.
- bombycinum, Stereum** Lloyd, *Lloyd Mycol. Writ.* 7:1336, 1925.  
= *Stereum hirsuta* (Willd.:Fr.) Fr.
- boniense, Stereum** Yasuda, *Botan. Mag. Tokyo* 33:112. 1919.  
= *Hymenochaete boinensis* (Yasuda) Yasuda.
- boreale, Stereum** (Karst.) Sacc. Syll. Fung. 9:223, 1891.  
= *Cyphellostereum laeve* (Fr.) D. Reid.
- boryanum, Stereum** (Fr.) Fr., *Epicr. Myc.* p.547, 1838.  
= *Stereum versicolor* (Swartz) Fr.
- braunii, Stereum** (Henn.) Beeli, *Bull. Soc. Roy. Bot. Belg.* 58:208. 1926.  
= *Thelephora braunii* Henn., *Bot. Jahrb.* 30:41, 1901.
- bresadoleanum, Stereum** Lloyd *Mycol. Writ.* 4:41, 1913.  
= *Podoschypha involuta* (Kl. apex Fr.) Imazeki.
- bufonium, Stereum** (Pers.) Sacc., Syll. Fung. 6:588, 1888.  
= *Thelephora bufonia* Pers., *Synopsis Meth. Fung.* 1:706, 1801.  
= *Coniophora bufonia* (Pers.) Weinm.
- burtianum, Stereum** Peck, *N.Y. State Mus. Bul.* 75:21, 1904.  
= *Stereopsis burtianum* (Peck) D. A. Reid.
- burtianum, Stereum** Lloyd, *Lloyd Mycol. Writ.* 7:1288, 1924.  
Nomen illegit, non Peck 1904.  
= *Xylobolus princeps* (Jungh.) Boidin.
- burtissimum, Stereum** Lloyd *Mycol. Writ.* 7:1288, 1924.  
= *Stereopsis burtianum* (Peck) D. A. Reid.

- cacao, Stereum** Berk. Hook. J. Bot. 6:169. 1854.  
= *Hymenochaete cacao* (Berk.)
- cacao, Stereum** Lloyd, Lloyd Mycol. Writ.7:1337.1920.  
= Nomen illegit, non Berkeley 1854.
- caespitosum, Stereum** Burt, Ann. Mo. Bot. Gard. 7:1161, 1920.  
= *Podoscypha caespitosa* (Burt.) Boidin.
- calyculus, Stereum** Berk. & M. A. Curtis, Jour. Bot.1:238, 1849.  
= *Pseudocraterellus calyculus* (Berk. & Curtis) D. Reid.
- campaniforme, Stereum** Pat., Bull. Soc. Myc. Fr. 24:165, 1908.  
= *Stereum cfr hirsutum* (Fr.) Fr.
- candidum, Stereum** Schw. ex Fr., Epicr. Mycol. p. 552, 1838.  
= *Dendrothele candidum* (Schw.: Fr.) Lemke.
- caperatum, Stereum** (Berk. & Mont.) Berk., J. Linn.Soc.18:385, 1881.  
= *Cymatoderma caperatum* (Berk. & Mont.) D. Reid.
- caperatum, Stereum** Lloyd, Lloyd Mycol. Writ. 4:549, 1916.  
= Nomen illegit. non (Berk. & Mont.) Berk. 1881.
- carbonarium, Stereum** Britz., Hymen. Kunde III:14,1897.  
= *Amylostereum chailletii* (Pers.: Fr.) Boidin.
- caroliniense, Stereum** Cke. & Ravenel, Jour. Myc. 1:130,1885.  
= *Sparassis spathulatus* (Schw.) Fr.
- carpaticum, Stereum** Pilat, Hedwigia 70:79, 1930.  
= *Veluticeps ambigua* (Peck.) Hjortstam.
- carthusianum, Stereum** E. H. L. Krause, Arch. Freunde Natgesch. Mecklenb. 3:57, 1928.  
= *Stereum sanguinolentum* (Fr.) Fr.
- cartilagineum, Stereum** (Fr.) Fr. Epicr. Mycol. p.545, 1838.  
*Thelephora cartilaginea* Fr. Elench. p. 165, 1828.  
= *Podoscypha cartilaginea* (Fr.) Ryvarden.
- centrifugum, Stereum** Weinm.:Fr., Epicrisis Syst. Mycol. p 554, 1838.  
= Nomen dubium, no type seems to exist.
- ceriferum, Stereum** Wakef., Kew. Bull. 1915:370.  
= *Punctularia strigoso-zonata* (Schw.) Talbot.
- chailletii, Stereum** Fr. Epicr. Mycol. p. 551. 1838.  
= *Amylostereum chailletii* (Pers.: Fr.) Boidin.
- chartaceum, Stereum** (G. Mey.) Fr., Epicr. Mycol, p. 546. 1838.  
= *Thelephora chrtacea* G. Mey., Prim. Fl. Esseq., p. 305, 1818.  
= cfr. *Stereum versicolor* (Sw.) Fr., The type came from Surinam and is lost.
- chelidonium, Stereum** (Pat.) v. Höhnel. et Litsch., Sitzungsab. Akad. Wiss. Wien, math.-naturw. Kl. 116, abt. 1:741. 1907.  
= *Megalocystidium chelidonium* (Pat.) Boidin, Lanq. & Gilles.
- cinerascens, Stereum** (Schw.) Massée J. Linn. Soc. Bot.27:179, 1890.  
= *Lopharia cinerascens* (Schw.) G. Cunn.
- cinereobadium, Stereum** Fr., Epicr. Mycol p 547. 1838.  
= *Hymenochaete badia* Hooker, Humboldt no 168 Colombia Bolivar.



- cinerobadium, Stereum** Kl., Nova Acta Phys. Acad. Caes. Leop. Suppl.1:19: 238, 1843.  
= Nomen illegit. Non Fr. 1838.
- cinericium, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1131,1922.  
= *Stereum hirsutum* (Willd.:Fr.) S. F. Gray.
- cinereum, Stereum** Lev., Ann. Sci. Nat. Bot. Ser. 3, 2:211, 1844.  
= *Stereum versicolor* (Sw.) Fr.
- coalescens, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1338, 1925.  
= abnormal state of some terrestrial brown-fleshed polypore.
- coffeatum, Stereum** Berk. & M. A. Curtis, Jour. Linn. Soc. 10:332. 1868.  
= *Dendrothele albobadium* (Schw.: Fr.) Chanuris.
- coffeatum, Stereum** Berk. & M. A. Curtis, Grevillea 1:164, 1873.  
= Nomen illegit., non Berk. & M.A. Curtis 1868 (*Laxitextum bicolor* (Schw.: Fr.) Lentz).
- complicatum, Stereum** (Fr.) Fr., Epicr. Mycol., p. 548. 1838.  
= *Thelephora complicata* Fr., Elench. Fung. 1:179, 1828.  
= Type: "Mexico" in Fries handwriting, in K.  
= Accepted species.
- conchatum, Stereum** (Fr.) Fr. Epicr. Mycol. p. :549. 1838.  
= *Veluticeps abietina* (Pers. ex Fr.) Hjortstam.
- conchoides, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1338, 1925.  
= corticoid species of unknown identity.
- concolor, Stereum** Berk., Fl. Tas. 2:259. 1860.  
= Nomen illegit. non Mont. 1841 (= *Stereum versicolor* (Swartz) Fr.).  
= name changed to *Stereum tasmanicum* Sacc.
- concolor, Stereum** (Jungh.) Mont. Ann. Sci. Nat. II, 16:312, 1841.  
= *Stereum versicolor* (Swartz) Fr.
- conicum, Stereum** Burt, Ann. Mo. Bot. Gard. 7:179, 1920.  
= *Stereum ochraceo-flavum* (Schw.) Ellis.
- consobrinum, Stereum** (Karst.) Sacc. et Trott., Syll. Fung.21: 388, 1912.  
= *Xerocarpus consobrinus* Karst., Acta soc. Fauna et Fl. Fenn 27:6,1905.  
= *Scytinostroma galactinum* (Fr.) Donk.
- conspurcata, Stereum** Berk. & M. A. Curtis ex Massee, J. Linn. Soc. Bot. 27:196, 1890.  
= *Hymenochaete conspurcata* Sacc. ex Berk. & M. A. Curtis, Syll. Fung. 6:603, 1888.
- contrarium, Stereum** Berk., Jour. Linn. Soc. 16:52. 1878.  
= *Xylobolus princeps* (Jungh.) Boidin.
- contrastum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1261,1924.  
= *Hymenochaete* sp.
- corbiforme, Stereum** (Fr.) Rick, Iheringia Bot. 4:67, 1959.  
= *Podoschypha corbiformis* (Fr.) D. Reid.
- coriaceum, Stereum** (Berk. & Broome) Petch, Ann. Roy. Bot. Gard. Peradeniya 9:138, 1924.  
= *Kneiffia coriacea* Berk. & Broome, J. Linn. Soc. Bot. 14:62, 1873.  
= *Porostereum papyrinum* (Mont.) Hjorst. & Ryvardeen.

- corrugatum, Stereum** Sacc. Chaamps. Jura Vosges 3:359, 1873.  
 Nomen illegit., non (Fr.) Quel. 1873.  
 = *Boreostereum radiatum* (Peck.) Parm.
- corrugatum, Stereum** (Fr.) Quel., Mem. Soc. Emulation Monteb. p. 349. 1873.  
 = *Hymenochaete corrugata* (Fr.) Lév.
- corrige, Stereum** Lloyd, Llypyd Mycol. Writ. 5:826, 1919.  
 = *Porostereum papyracea* (Jungh.) Hjorst. & Ryvar den.
- coryli, Stereum** Pers., Obs. Mycol. 1:35-36. 1796.  
 = *Stereum rugosum* (Pers.: Fr.) Fr.
- cotyledoneum, Stereum** Fr., Epicr. Mycol., p. 551, 1838.  
 = cfr. *Stereum hirsutum*, Fries took the name from Wienm. Ross. P. 382. The type is lost, came from Russia and was collected on *Betula*.
- craspedium, Stereum** (Fr.) Burt, Ann. Mc. Bot. Gard. 7:113, 1920.  
 = *Hydnopolyporus fimbriatus* (Cooke) D.A. Reid
- crassum, Stereum** (Lev.) Fr., Nova Acta Soc. Sci. Upsal. Ser. 3, 1:111. 1855 (1851).  
 = *crassum*, *Thelephora* Lév., Ann. Sci. Nat., III, 2:209. 1844.  
 = *Porostereum crassa* (Lév.) Hjorst. & Ryvar den.
- crateriforme, Stereum** (P. Henn.) v. Höhn. et Litsch., Sitzungs b. Akad. Wiss. Wien, math.- naturw; Kl. 116, abt. 1:756. 1907.  
 = *Aquascypha hydrophora* (Berk.) D. Reid.
- crenatum, Stereum** Lév., Ann. Sci. nat. Ser.3, 2: 210, 1844.  
 = *Podoschypha pusillum* (Berk.) Ryvar den.
- crispulum, Stereum** Lloyd apud Stevenson & Cash, Bull. Lloyd Libr. 35:52. 1936.  
 = invalid name, no Latin description.
- crispum, Stereum** (Pers.) Quel., Assoc. Franc. Avan. Sci. 20:469, 1892.  
 = *Stereum sanguinolentum* (Alb. & Schw.: Fr.) Fr.
- cristatum, Stereum** Berk. & M. A. Curtis, Grevillea 1:163, 1873.  
 = *Podoschypha cristata* (Berk. & M. A. Curtis) D. Reid.
- cristulatum, Stereum** Quel., Mem. Soc. Emul. Montb. Ser. 2. comp. 5:443-444. 1875.  
 = *Stereum gausapatum* (Fr.) Fr.
- crocatum, Stereum** Fr., Epicr. Myc.:550-551. 1838.  
 = *Hymenochaete tabacina* (Sow.) Lév.
- cruciculiforme, Stereum** Masee, J. Linn. Soc. 27, 168. 1890.  
 = *Nidularia emodensis* (Berk.) Lloyd.
- crustaceum, Stereum** (Karst.) Sacc. Fung. 14:215. 1899.  
 = *Intextomyces contiguus* (P. Karst.) J. Eriksson.
- crustosum, Stereum** (Dur. et Lev.) Sacc., Syll. Fung. 6:583, 1888.  
 = *Thelephora crustosa* Durieu & Lev. in Durieu Expl. Sci. Alg. Fl. Alger 1:tab 33, 1849. Alg. t. 33, f. 5.  
 = Type not seen.
- cryptacanthum, Stereum** (Pat.) v. H. et L., Sitzungsarb. Akad. Wiss. Wien, Math.- naturw. Kl. 116, abt. 1.742. 1907.  
 = *Gloeocystidiopsis cryptacanthum* (Pat.) E. Larss. & K.H. Larsson, Mycologia 95:1012, 2003.

- cuneatum, Stereum** Lloyd, Lloyd Mycol. Writ. 4, Let. 54:7, 1915.  
= *Tremelodendron cuneatum* (Lloyd) Lloyd.
- cuneiforme, Stereum** Lloyd, Lloyd Mycol. Writ. 6:988, 1920.  
= *Stereopsis hiscens* (Berk. & Ravenel) D. Reid.
- cupulatum, Stereum** Pat., Enum. Champ. Guadeloupe & Martinique p.23. 1903.  
= Imperfect fungus (teste Welden p. 16, 1971).
- curreyi, Stereum** Sacc. in Sylloge Fungorum 6: 557, 1888.  
= *Nidularia emodesis* (Berk.) Lloyd.
- curtisii, Stereum** Berk., Grevillea 1:164. May 1873.  
= *Hymenochaete curtisii* (Berk.) Morgan.
- curtum, Stereum** (Fr.) Fr., Epicr. Mycol. p. 545. 1838. S!  
= *Thelephora curta* Fr., Linnea 5:523, 1830. "Ex herb Wildenowia" S!  
= *Podoscypha curta* (Fr.) Ryvarden comb nov. Basionym as cited above.,  
Index Fung. 556922.  
= *P. fulvonites* Berk 1858.
- cyathiforme, Stereum** Currey, Trans. Linn. Soc. Lond. (Bot.) Ser. II, 1:127, 1880.  
= Nomen illegit. non Fries 1838.  
= *Podoscypha thozetii* (Berk.) Reid.
- cyathiforme, Stereum** (Fr.) Fr. Epicr. Mycol. p.545, 1838.  
*Thelephora cyathiforme* Fr. Linnea 5:523, 1830.  
=The type is lost (*Cymatoderma* ??).
- cyathoides, Stereum** P. Henn., Hedwigia 37:284, 1898.  
= *Podoscypha thozetii* (Berk.) Boidin.
- cyclothelis, Stereum** (Pers.) Fr., Epicr. Mycol. p. 554, 1838.  
= *Hymenochaete tabacina* (Fr.) Lev., det J. Eriksson.
- cyphelloides, Stereum** Berk. & M. A. Curtis, Jour. Linn. Soc. 10:331, 1869.  
= *Cyphellostereum pusiolum* (Berk. & Curt.) D. Reid.
- damaecorne, Stereum** Link, Ges. Naturf. Freunde Berlin, Mag. 3:40, 1809.  
= *Stiptochaete damaecornis* (Link) Ryvarden.
- deceptivum, Stereum** Lloyd, Lloyd Mycol. Writ. 5:786, 1918.  
= *Punctularia strigoso-zonata* (Schw.) Talbot.
- decolorans, Stereum** (Berk & M. A. Curtis) Lloyd, Lloyd Mycol. Writ. 4:18, 1913.  
= *Cotylidia aurantiaca* (Pers.) Welden.
- desolationis, Stereum** Speg., Boln. Acad. Nat. Cienc. Cordoba 11:166, 1887.  
= indeterminable, teste Rajchenberg.
- diaphanum, Stereum** (Schw.) Cooke Syll. Fung. 6: 558, 1888.  
= *Cotylidia aurantiaca* (Pers.) Welden.
- dichroides, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1271, 1924.  
= *Gloeoporus dichrous* (Fr.) Bres.
- dichroum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1158, 1922.  
= *Tremellostereum dichroum* (Lloyd) Ryvarden.
- dimiticum, Stereum** Rehill & Bakshi, Indian Forestry Bull. 250:8, 1966.  
= *Stereopsis radicans* teste D. Reid in K
- disciforme, Stereum** (DC.) Fr., Epicr. Mycol. p.551, 1838.  
= *Aleurocystidiellum disciformis* (DC.) Lemke.

- dissitum**, *Stereum* Berk., Grevillea 1:164, 1873.  
= *Lopharia cinerascens* (Schw.) Cunn.
- divisum**, *Stereum* Petch, Ann. Roy. Bot. Gard. Peradeniya 9:270., 1925.  
= *Stereopsis hiscens* (Berk. & Ravenel) D. Reid.
- dubium**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1335, 1925.  
= *Hohenbuehlia bursaeformis* (Berk.) D. Reid.
- durbanense**, *Stereum* Van der Byl, Trans. Roy. Soc. S. Afr. 10: 155, 1950.  
= *Stereum versicolor* (Swartz) Fr. Teste Talbot 1954.
- duriusculum**, *Stereum* Berk. & Broome, J. Linn. Soc. Bot. 14:66, 1873.  
= *Scytinostroma duriusculum* (Berk. & Bres.) Donk.
- durum**, *Stereum* Burt, Ann. Mo. Bot. Gard. 7:226, 1920.  
= Nomen illegit., non Lloyd 1919 (= *Xylobolus annosum*).
- durum**, *Stereum* Lloyd, Lloyd Mycol. Writ. 6:885, 1919.  
= *Stereum versicolor* (Swartz) Fr.
- earlei**, *Stereum* Burt, Ann. Mo. Bot. Gard. 7:199, 1920.  
= *Hjortstamia crassa* (Lév.) Boidin & Gilles.
- eberstalleri**, *Stereum* Wettst., Bot. Centr. 1888, n. 38. p. 354.  
= *Chondrostereum purpureum* Pers.
- effusum**, *Stereum* Berk., Jour. Linn. Soc. 16:44, 1876.  
= Insect eaten old polypore, teste Bresadola in herb K.
- elegans**, *Stereum* (G. Meyer) Fr., Epicr. Mycol. p.545, 1838.  
= *Podoscypha petaloides* (G. Meyer) Pat.
- elegantissimum**, *Stereum* Speg., Soc. Cien. Argentina Anal. 16:38, 1883.  
= *Hymenochaete sallei* Berk. & M. A. Curtis.
- elevatum**, *Stereum* Berk. & Cooke, Jour. Linn. Soc. 15:388. 1877.  
= *Amauroderma partitium* (Berk.) Wakef.
- elongatum**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7, Mycol. Notes 69:1194, 1923.  
= The type is lost.
- endocrocinum**, *Stereum* Berk., Hooker Journ. Bot. 6:169, 1854.  
= *Perplexostereum endocrocinum* (Berk.) Ryvarden & Tutka.
- endoleucum**, *Stereum* Berk. & Broome, J. Linn. Soc. Bot. 14: 66, 1873. Sri Lanka.  
= The type has not been examined.
- epigaeum**, *Stereum* Yasuda, Bot. Mag. Tokyo 32:75, 1918.  
= *Asterostromella rhodospora* Wakef.
- erumpens**, *Stereum* Burt, Ann. Mo. Bot. Gard. 7:209, 1920.  
= *Dendrophora erumpens* (Burt) Chamuris.
- evolvens**, *Stereum* (Fr.) Karst., Bidr. Finl. Nat. Folk 37:126. 1882.  
= *Cylindrobaidium evolvens* (Fr.) Jül.
- exiguum**, *Stereum* (Peck) Burt., Ann. Mo. Bot. Gard. 7:99, 1920.  
= *Cotylidia undulata* (Fr.) Karst.
- fallax**, *Stereum* Pat., Bull. Soc. Mycol. Fr. 7:162. 1891.  
= *Asterostroma cervicolor* (Berk. & M. A. Curtis) Masee.
- fasciatum**, *Stereum* (Schw.) Fr., Epicr. Mycol. p.546, 1838.  
= *Stereum versicolor* (Swartz) Fr.

- fastidiosum, Stereum** (Pers.) Lloyd, Lloyd Mycol. Writ. 5:743, 1917.  
 = *Corticium fastidiosum* (Pers.) Karst. Bidr. Känn. Finl. Nat. Folk. 37:142, 1882.  
 = *Trechispora fastidiosum* (Pers.) Liberta.
- fechtneri, Stereum**, Vel., Ceske Houby p. 762, 1922.  
 = *Gloeocystidiellum* sp.
- felloi, Stereum** Lloyd, Lloyd Mycol. Writ. 6:1087, 1921.  
 = *Dacryopinax felloi* (Lloyd) D. Reid.
- fenixii, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1115, 1922.  
 = *Cymatoderma dendriticum* (Pes.) D. Reid.
- ferrugineum, Stereum** Fr., Epicr. Mycol. p.550, 1838.  
 = *Hymenochaete rubiginosa* (Dickson: Fr.) Lév.
- ferreum, Stereum** Berk. & M. A. Curtis, J. Linn. Soc. 10:332, 1869.  
 = *Xylobolus princeps* (Jungh.) Boidin.
- fimbriatum, Stereum** Ellis, Bull. Torr. Bot. Club 6:133, 1877.  
 = Nomen ambiguum, type is sterile without hymenium (NY).
- fissum, Stereum** Berk., Jour. Bot. 8:273, 1856.  
 = *Inflatostereum glabrum* (Lév.) D. A. Reid.
- flabellatum, Stereum** P. Henn.  
 = nomen nudum in Saccardo 23:509, 1925.
- flabellatum, Stereum** Pat., Bull. Soc. Myc. Fr. 16:179, 1901.  
 = *Podoscypha pusilla* (Berk.) Ryvarden.
- flavo-ferrugineum, Stereum** (Karst.) Saccardo Syll. Fung. 11: 8, 1895.  
 = *Xerocarpus flavo-ferrugineum* P. Karst., Hedwigia 34:8, 1895.  
 = *Pheliba serialis* (Fr.) Donk.
- fodinarum, Stereum** Mont. Ann. Sci. Nat. Bot. Ser. 2, 18>22, 1842.  
 = The type is apparently lost.
- floriforme, Stereum** Bres., Ann. Mycol. 18:44, 1920.  
 = *Podoscypha petaloides* (Berk.) Pat.
- fomitopsis, Stereum** Lloyd, Lloyd Myc. Writ. 7:1245, 1924.  
 = *Xylobolus princeps* (Jungh.) Boidin.
- fragile, Stereum** Pat., Bull. Soc. Myc. Fr. 16:179, 1901.  
 = *Stereum versicolor* (Sw.) Fr.
- friesii, Stereum** (Lév.) Sacc., Syll. Fung. 6:566, 1888.  
 = *Thelephora friesii* Lev, p. 12, in Zollinger, 1854.  
 = *Porostereum friesii* (Lév.) Hjortst. & Ryvarden.
- frustulatum, Stereum** (Pers.: Fr.) Fr., Epicr. Mycol, p 552. 1838, UPS!  
 = *Xylobolus frustulatus* (Pers.: Fr.) Karst.
- fuliginosum, Stereum** (Pers.) Fr., Epicr. Mycol, p. 554. 1838.  
 = *Hymenochaete fuliginosa* (Pers.) Bres.
- fuliginosum, Stereum** Vel., Ceské Houby p. 764, 1922.  
 = Nomen illegit. non Fries 1838.
- fulvidum, Stereum** Otth., Mittheil. natur. Ges. Bern. 654-683:39, 1868.  
 = Type not found, probably lost. The description suggests *Stereum hirsutum*.

- fulvo-nitens**, *Stereum* Berk., Ann. Mag. Nat. Hist. Ser. 2, 9:198, 1852.  
= *Podoscypha fulvo-nitens* (Berk.) D. Reid.
- fulvum**, *Stereum* (Lév.) Sacc. Syll. 6:570, 1888.  
= *Porostereum spadiceum* (Pers.: Fr.) Hjortst. & Ryvardeen.
- fuscio-olivaceum**, *Stereum* Otth., Mitth. natur. Gesell. Bern. 385-407, p. 40, 1857.  
= The type is apparently lost.
- fuscum**, *Stereum* Britz., Hym. Kunde 3:14, 1897.  
= Nomen illegit. non (Schrad.) Karst. 1883.
- fuscum**, *Stereum* (Schrad.) Karst., Ic. Hymen. Fenn. Fasc. 1:6, 1883.  
= *Laxitextum bicolor* (Pers.: Fr.) Lentz.
- galeottii**, *Stereum* Berk., Jour. Bot. 3:15, 1851.  
= *Stereum versicolor* (Sw.) Fr.
- gausapatum**, *Stereum* (Fr.) Fr., Hymen. Eur. p.638, 1874.  
Accepted species.
- glabrescens**, *Stereum* Berk. & M. A. Curtis, Jour. Linn. Soc. 10:330, 1869.  
= *Podoscypha glabrescens* (Berk. & M. A. Curtis) D. Reid.
- glabrum**, *Stereum* (Lév.) Lév. Syst. Verzeich. Zoll. p.123, 1845.  
= *Thelephora glabra* Lev., Ann. Sci. Nat. Ser. 3, 5:147, 1846.  
= *Inflatostereum glabrum* (Lév.) D. Reid.
- glaucescens**, *Stereum* Fr., Hymen. Eur., p. 644. 1874.  
*Veluticeps abietina* (Fr.) Hjortstam.
- goliath**, *Stereum* Speg., Anal. Soc. Cient. Argent. 17:77, 1884.  
= *Cymatoderma caperatum* (Berk. & Mont.) D. Reid.
- gossweileri**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1115, 1922.  
= *Podoscypha involuta* (Kl.) Imaz.
- grantii**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1314, 1924.  
= *Aphelaria tuberosa* (Grev.) Corner.
- guadelupense**, *Stereum* Pat., Bull. Soc. Myc. Fr. 15:201, 1899.  
= *Gomphus guadelupense* (Pat.) D. Reid.
- harmandii**, *Stereum* Lloyd, Lloyd Mycol. Writ. 4:22, 1913.  
= *Cotylidia harmandii* (Lloyd) D. Reid.
- hartmanni**, *Stereum* (Mont.) Lloyd, Lloyd Mycol. Writ. 4: 553, 1913.  
= *Hydnopolyporus fimbriatus* (Fr.) D. Reid.
- haydeni**, *Stereum* Masee, Linn. Soc. Bot. Jour. 27:199, 1890.  
= *Cylindrobasidium evolvens* (Fr.) Jülich. (K).
- helveticum**, *Stereum* (Pers.) Krause, Bas. Rostock Suppl. 3:125, 1931.  
= *Cristinia helvetica* (Pers.) Parmasto.
- hepaticum**, *Stereum* (Fr.) Fr. Epicr. Syst. Mycol., p. 550, 1838.  
= *Thelephora hepatica* Fr., Syst. Mycol. 1:439, 1821.  
= *Auricularia levis* Sowerby.
- heterosporum**, *Stereum* Burt, Ann. Mo. Bot. Gard. 7:220, 1920.  
= *Dendrophora albobadia* (Schw.:Fr.) Chamuris.

- hilare**, **Stereum** Kalchbr. In Thuem. Forsch. Gazette 1874-1876, Teil 4, Bot., Pilze p. 3. 1889.  
= The type is lost.
- hirsutum**, **Stereum** (Willd.:Fr.) Pers., Obs. Myc. 2:90, 1799.  
= *Thelephora hirsuta* Wild., Fl. Berol. Prodr. , p. 397, 1787,  
= *Thelephora hirsuta* Willd.:Fr., Syst. Mycol 1:439, 1821.  
accepted species.
- hispidulum**, **Stereum** (Berk.) Cunn., Proc. Linn. Soc. N. South Wales 77:284, 1953.  
= *Punctularia strigoso-zonatum* (Schw.) Talbot.
- hiugense**, **Stereum** Imazeki, Jour. Japan. Bot. 15:580, 1939.  
= *Xylobolus princeps* (Jungh.) Boidin.
- hollandi**, **Stereum** Lloyd, Lloyd Mycol. Writ. 4:30, 1913.  
= *Podoscypha involuta* (Kl.) Imaz.
- huberianum**, **Stereum** P. Henn., Hedwigia Beih. 41:15, 1902.  
= *Inflatostereum glabrum* (Lev.) D. Reid.
- humillimum**, **Stereum** Rick, Iheringia Bot. 4: 68, 1959.  
= *Phanerochaete sordida* (P. Karst.) Eriksson & Ryvarden.
- hydrophorum**, **Stereum** Berk., Jour. Bot. 8:273, 1856.  
= *Aquaschypha hydrophora* (Berk.) D. A. D. Reid.
- hylocrater**, **Stereum** Speg. Ann. Soc. Cient. argent. 17, 77, 1884.  
= *Cymatoderma caperatum* (Berk. & Mont.) D. A. Reid.
- hymenoglium**, **Stereum**, Speg., Fungi Fuegiani 25:26, 1921.  
= *Stereum hirsutum* (Willd.:Fr.) Fr.
- illudens**, **Stereum** Berk., Lond. Jour. Bot. 4:59, 1845.  
= accepted species.
- imbricatum**, **Stereum** (Schw.) Sacc. Syll. Fung. 6>593, 1888.  
= *Hymenochaete tabacina* (Sowerby) Lev.
- incisum**, **Stereum** Lloyd, Lloyd Mycol. Writ. 6:988, 1920.  
= *Stereopsis hiscens* (Berk. & Br.) D. A. Reid.
- incrustans**, **Stereum** Eherenberg, Sylv. Mycol. Berlin. p 23, 1818.  
= The type is presumably lost, stated to be brown, thus no *Stereum* s. str.
- induratum**, **Stereum** Berk., Jour. Linn. Soc. 16:44, 1878.  
= *Scytinostroma albo-cinctum* (Berk. & Br.) Boidin.
- infundibuliforme**, **Stereum** (Hook.) Fr., Epicr Mycol. p. 545, 1838.  
= Type presumably lost, not in K.
- insidiosum**, **Stereum** (Bourd. & Galzin) Bourd. & Galzin.  
= *Conferticum insidiosum* (Bourd. & Galz.) Hallenb.
- insigne**, **Stereum** Bres., Nuovo G. Bot. Ital. 23:158, 1891.  
= *Xylobolus semipileatus* (Berk. & M. A. Curtis) Boidin.
- insignitum**, **Stereum** Quel., Assoc. Trans. XVI, Suppl. p.6, 1889.  
= *Stereum versicolor* (Sw.) Fr. S. lato.
- insinuans**, **Stereum** (Schw.) Sacc., Syll. Fung. 6:586, 1888.  
= *Thelephora insinuans* Schw., Trans. Am. Phil. Soc. N. Ser. 4:167, 1832.  
= *Dichostereum pallescens* (Schw.) Boidin & Lanq.

- insolitum, Stereum** Lloyd, Lloyd Mycol. Writ. 5:665, 1917.  
= *Stereopsis hiscens* (Berk. & Rav.) D. Reid.
- insulare, Stereum** Berk. & Broome, J. Linn. Soc. Bot. 14:66, 1873.  
= *Xylobolus* K Check! Aleurodiuscus??
- intricatissimum, Stereum** (P. Karst.) Sacc. Syll. Fung. 21:387, 1912.  
= *Chondrostereum purpureum* (Fr.) Pouzar.
- intricatum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1157, 1922.  
= *Hymenochaete* sp.
- involutum, Stereum** (Kl.) Fr., Epicr. Mycol. p. 546, 1838.  
*Thelephora involuta* Kl. Linnea 7: 499, 1833.  
= *Podoscypha involuta* (Kl.) Imazeki.
- japonicum, Stereum** Yasuda, Bot. Mag. Tokyo 37:60, 1923.  
= The type in BPI has not been available.
- javanicum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1245, 1924.  
= *Stereum versiforme* Swartz: Fr.
- junghuhnii, Stereum** Fr., Nova Acta Soc. Sci. Upsal. Ser. 3. 1:109. 1855.  
= *Thelephora striata* Jungh., 1838, nomen illegit. non Fries 1828.  
= Type is lost.
- juniperi, Stereum** (Karst.) Boidin, Publ. Mus. Nat. Hist. Nat. 17:128. 1957.  
= *Amylostereum laevigatum* (Fr.) Boidin.
- kalchbrenneri, Stereum** Sacc. Syll. Fung. IV:568. 1888.  
= *Stereum vellereum* Berk.
- karstenii, Stereum** Bres. Atti. Accad. Agiatio Rovereto 3:109, 1897.  
= *Dacrybolus karstenii* (Bres.) Parmasto.
- kunzei, Stereum** (Hook.) Berk., Jour. Linn. Soc. 15:51. 1877.  
= *Thelephora kunzei*, Hooker, Bot. Misc. 2:163, 1838.  
= *Hymenochaete kunzei* (Hook.) Massee,  
= *Hymenochaete luteobadia* (Fr.) Höhn. & Litsch.
- kurilense, Stereum** Yasuda, Bot. Mag. Tokyo 38:145. 1924.  
= Type lost, probably destroyed during World War 2.
- kurzianum, Stereum** Cooke, Grevillea 18:55-56. Mar. 1890.  
= *Amylostereum ferreum* (Berk.) Boidin.
- laciniatum, Stereum** Pers., Obs. Mycol. 1.36. 1796.  
= *Thelephora caryophyllea* (Schaeff.) Pers. 1801.
- lacunosum, Stereum** Vel., Ceske Houby p. 763, 1922.  
= *Stereum gausapatum* Fr. teste Pilat.
- laetum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1157, 1922.  
= Nomen illegit. non Berk. 1853.
- laetum, Stereum** Berk., Jour. Acad. Phila. Ser. 2, 2:279, 1853.  
= *Hymenochaete luteobadia*.
- laevigatum, Stereum** (Fr.) Spég., Ann. Soc. Cien. Argent. 10:130, 1880.  
= *Amylostereum laevigatum* (Fr.) Boidin.
- lagerheimi, Stereum** Pat., Bull. Soc. Myc. Fr. 7:162, 1891.  
= *Porostereum crassum* (Lev.) Hjortst. & Ryvarden.



- lamellatum, Stereum** (Berk. & M. A. Curtis.) Wakef. in Sarasin & Roux “Nova Caledonia” Botany, 1, 100, 1920.  
= *Cymatoderma elegans* Jungh.
- lateritium, Stereum** Kalchbr. & Thuem. Journ. Sci. Math. Phys. Nat. Lisboa ser. 1, 6:244, 1878.  
= *Stereum complicatum* (Fr.) Fr.
- latissimum, Stereum** Berk., Flora N. Z. Z:183. 1855.  
= The type is lost, not in K.
- latum, Stereum** Cooke & Mass., Grevillea 20:92, 1892.  
= *Porostereum papyrinum* (Mont.) Hjortstam & Ryvarden.
- laxum, Stereum** Lloyd, Lloyd Mycol. Writ. 4: Letter 60:10, 1915.  
= *Laxitextum bicolor* (Pers.:Fr.) Lentz.
- leichhardtianum, Stereum** (Lev.) Sacc., Syll. Fung. 6: 559, 1888.  
= *Stereum versicolor* (Sw.) Fr. teste D. Reid i K.
- leoninum, Stereum** Skovst.. C. Lab. Carlsb. Ser. Physiol. 25:396, 1956.  
= *Stereum hirsutum* (Willd.:Fr.) Fr.
- lepra, Stereum** Berk. & Broome, J. Linn. Soc. Bot. 14:67, 1873.  
= *Dendrothele lepra* (Berk. & Broome) Lemke.
- leprosum, Stereum** Fr., Epicr. Mycol. p. 551, 1838.  
= *Hymenochaete kunzei* (Hook) Masee.
- leucophaeum, Stereum** Lév., Anns. Sci. Nat. Ser 3, 2:212, 1844.  
= *Stereum versicolor* (Sw.) Fr.
- leveilleanus, Stereum** Berk. & M. A. Curtis, Hook. Kew. Misc. I. p. 238  
= *Porostereum friesii* (Lev.) Hjortstam & Ryvarden.
- lignosum, Stereum** Beccarini, in Pirota, Ann. Bot., Roma 14:123, 1917.  
= The type is apparently lost.
- lignosum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1336, 1925.  
= Nomen illegit. non Beccarini 1917.
- lilacinofuscum, Stereum** (Berk. & M. A. Curtis) Lloyd, Lloyd Mycol. Writ. 5: Letter 68:8, 1918.  
= *Corticium lilacinofuscum* Berk. & M. A. Curtis, Grevillea 1:180, 1873.  
= *Corticium roseocarneum* (Schein.) Hjortstam.
- lilacinum, Stereum** (Fr.) Pass., Nuovo Gior. Bot. Ital. 4:159, 1872.  
= Nomen illegit. non Persoon 1799.
- lilacinum, Stereum** (Batch.:Fr.) Fr. Epicr. mycol. p.548, 1838.  
= Nomen illegit. non Persoon 1799.
- lilacinum, Stereum** Pers., Obs. Myc. 2:91-92. 1799.  
= *Chondrostereum purpureum* (Pers.:Fr.) Pouzar.
- liratum, Stereum** Lloyd, Lloyd Mycol. Writ. 5:764, 1918.  
= *Porostereum vibrans* (Berk. & M. A. Curtis) Ryvarden.
- lobatum, Stereum** (Kunze: Fr.) Fr., Epicr. Myc. p.547, 1838.  
= *Stereum versicolor* (Sw.) Fr.
- lugubre, Stereum** Cooke, Grevillea 12:85, 1884.  
= *Punctularia strigoso-zonatum* (Schw.) Talbot.

- luteo-badium, Stereum** (Fr.) Fr. Epicr. Myc.:547. 1838.  
= *Hymenochaete luteobadia* (Fr.) Høhn. & Litsch.
- luzoniense, Stereum**, Ricker, Phillip. J. Sci. C. Bot. 1:283, 1906.  
= *Stereum versicolor* (Sw.) Fr.
- lymenogleum, Stereum** Speg., Bot. Acad. Cienc. Córdoba 25, 26, 1921.  
= *Stereum hirsutum* (Willd.) Fr.
- macrocystidium, Stereum** Welden, Brittonia 19:328, 1967.  
= *Stereum versicolor* (Sw.:Fr.) Fr.
- macrorrhizum, Stereum** (Lev.) Pat., Jour. Bot. Paris 3:341, 1889.  
= *Podoscypha macorhiza* (Lev.) Pat.
- maculatum, Stereum** Beeli, Bull. Soc. Roy. Bot. Belg. 58:208, 1926.  
= *Podoscypha involutum* (Kl.) Imaz.
- magellanicum, Stereum** Hjortstam, & Ryvarden, Trans. Br. Mycol. Soc. 89:114, 1987.  
= *Aleurodiscus antarcticum* (Speg.) Hjortst. & Ryvarden.
- magnisporum, Stereum** Burt, Ann. Mo. Bot. Gard. 7:207, 1920.  
= *Aleurocystis magnispora* (Burt) P. A. Lemke 1964.
- malabarensis, Stereum** Lloyd, Lloyd Mycol. Writ. 4: 13, 1913.  
= *Podoscypha pusilla* (Berk.) Ryvarden.
- mancinianum, Stereum** Sacc. & Cub. in Sacc. Syll. Fung. 6:583. 1888.  
= *Dendrothele strumosa* (Fr.>) P. A. Lemke.
- martini, Stereum** Sacc. et Syd., Syll. Fung. 14:217, 1899.  
= *Laxitextum bicolor* (Fr.) Lentz.
- medicum Stereum**, Curr., Bull. N. J. Agric. Expt. Sta. 1:127, 1874.  
= *Porostereum medica* (Curr.) Hjortstam & Ryvarden.
- melaleucum, Stereum** Mont., Anns. Sci. Nat. Bot. Ser. 4, 5:371, 1856.  
= *Stereum versicolor* (Sw.:Fr.) Fr.
- melanopsis, Stereum** Sacc. & Syd., Kew. Bull. 1899:171.  
= *Punctularia strigosozonata* (Schwein) P. H. Talbot.
- mellisii, Stereum** Sacc., Syll. Fung. 6:553, 1888.  
= *Podoscypha mellisii* (Sacc.) Pat.
- monochroum, Stereum** Cooke & Masee, Grevillea 20:91, 1892.  
= *Stereum versicolor* (Sw.Fr.) Fr.
- membranaceum, Stereum** Fr., Epicr. Mycol, p. 547. 1838.  
= Type is lost, probably *Auricularia mesenterica* (Dicks.) Pers.
- mesentericum, Stereum** S. F. Gray, Nat. Arr. Brit. Pl. 1:653. 1821.  
= *Auricularia mesenterica* (Dicks.) Pers.
- metallicum, Stereum** Rick, Brot. Cienc. Nat. 9:45, 1940.  
= Undeterminable, bad condition, sterile.
- micheneri, Stereum** Berk. & M. A. Curtis., Grevillea 1:162,1873.  
= *Chondrostereum purpureum* (Pers.) Pouzar.
- micraspis, Stereum** Speg. Anals. Soc. Cient. Argent. 17:79, 1884.  
= Sterile ascomycete in *Xylariaceae*.
- minimum, Stereum** (Berk. & Broome) Lloyd, Lloyd Mycol. Writ. 4:36, 1913.  
= *Cylindrobasidium evolvens* (Fr.) Jülich.

- miquelianum, Stereum** Mont. Tijdschr. Naturk. Wetensch. 4:203, 1851.  
= *Amauroderma miquelianum* (Mont.) D. Reid.
- mirabile, Stereum** Vel., Ceske Houby p.763, 1922.  
= *Aleurocystidiellum disciforme* (DCandolle) Boidin.
- modestum, Stereum** (Berk. & Br.) Petch, Ann. Roy. Bot. Gard. Perad. 9:285, 1925.  
= Nomen illegit, non Kalchbr. 1878.  
= *Corticium modestum* Berk. & Broome, J. Linn. Soc., Bot. 14: 69, 1873.
- modestum, Stereum** Kalchbr., Bull. Soc. Nat. Moscou 53:239, 1878.  
= Type not found. See Reid 1965:370 for comments.
- molle, Stereum** (Lev.) Berk., Grevillea 1:163. 1873.  
= *Stereum versicolor* (Sw.) Fr.
- mølleri, Stereum** Bres. et Henn., Hedwigia 35:288, 1896.  
= *Podoscypha mølleri* (Bres. & Henn.) D. Reid.
- monochroum, Stereum** Cooke & Mass., Grevillea 20:91, 1892.  
= *Stereum hirsutum* (Willd.:Fr.) Pers.
- moricola, Stereum** Berk., Grevillea 1:162, 1873.  
= *Lopharia cinerascens* (Schw.) G. Cunn.
- monochroum, Stereum** Cooke & Masee, Grevillea 20:91, 1892.  
= *Stereum versicolor* (Sw.) Fr.
- moselei, Stereum** Berk., Jour. Linn. Soc. 16:48, 1878.  
= *Podoscypha moselei* (Berk.) D. A. D. Reid.
- mougeotii, Stereum** (Fr.) Quel., Hooker J. Bot. Garden Misc. 6:170, 1854.  
= *Hymenochaete mougeotii* (Fr.) Cooke.
- multifidum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1311, 1924.  
= *Stereopsis hiscens* (Berk. & Rav.) D. Reid.
- multizonatum, Stereum** (Berk. & Broome Masee, J. Linn. Soc. 27:167, 1890.  
= *Podoscypha multizonata* (Berk. & Broome.) Pat.
- murrayii, Stereum** (Berk. & M. A. Curtis) Burt, Ann. Mo. Bot. Gard. 7:131, 1920.  
= *Cystostereum murrayii* (Berk. & Curtis) Pouzar.
- muscicolum, Stereum** Pat., Ann. Jard. Bot. Buitenz. Suppl.1:116, 1897.  
= *Cyphellostereum muscicolum* (Pat.) D. Reid.
- mytilinum, Stereum** Fr., Epicr. Mycol. p. 548, 1838.  
= *Stereum versicolor* (Sw.) Fr.  
Neotype: Brazil, Iguazu, Fevrier 1889, leg. Malme (S!).
- necator, Stereum** Vilala, Annals. Epiphyt. 7:1, 1926.  
= *Stereum hirsutum* (Willd.:Fr.) Fr.
- neglectum, Stereum** Peck, N.Y. State Mus. Ann. Rpt. 33:22, 1880.  
= *Lopharia cinerascens* (Schw.) Cunn.
- neocaledonicum, Stereum** Pat. & Har., J. Bot.17:6, 1903.  
= *Porostereum vibrans* (Berk. & M. A. Curtis) Ryvarden
- nephrodes, Stereum** Mont., Ann. Sci. nat. Ser.4, Vol 5:371, 1856.  
= The type is lost according to D. Reid 1965:371.
- neuwirthii, Stereum** Vel., Ceske Houby p. 760, 1922.  
= *Stereum hirsutum* (Fr.) Fr.

- nicaraguense**, *Stereum* Berk. & M. A. Curtis, Proc. Am. Acad. 4:123, 1860.  
= *Porostereum crassum* (Lev.) Hjortstam & Ryvar den.
- nicotianum**, *Stereum* (Bolton) Wettstein, Oester. Bot. Zeit. 38:177, 1888  
= *Hymenochaete tabacina* (Sowerby) Lev.
- nigricans**, *Stereum* Lev., Ann. Sci. nat., Ser. 3, 2:212, 1844.  
= *Hymenochaete villosa* (Lev.) Bres.
- nigrobasum**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1339, 1925.  
= *Podoscypha involutum* (Kl.) Imaz.
- nigroporum**, *Stereum* Stevenson, Bull. Lloyd Libr. 32:56; 1933.  
= *Podoscypha mellisii* (Sacc.) Pat.
- nigropus**, *Stereum* Lloyd, Lloyd Mycol. Writ. 6:886, 1919.  
= *Podoscypha mellisii* (Sacc.) Pat.
- nigrorugosum** *Stereum*, Lloyd, Lloyd Mycol. Notes 7:1195, 1923.  
= *Peniophora* sp.
- nigrum**, *Stereum* Britz., Hym. Südbayer. X, p. 178, f. 42.  
= *Xylobolus subpileatum* (Berk. & M. A. Curtis) Boidin
- nipponicum**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1273, 1924.  
= *Chondrostereum pupureum* (Fr.) Pouzar.
- nitens**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1158, 1922.  
= *Stereum illudens* Berk.
- nitidulum**, *Stereum* Berk., Hooker Lond. Jour. Bot. 2:638, 1843.  
= *Podoscypha cartilaginea* (Fr.) Ryvar den.
- nitidum**, *Stereum* Pers., Neues Mag. Bot. 1.110, 1794.  
= *Stereum hirsutum* (Willd.: Fr.) Fr.
- notatum**, *Stereum* Berk. & Bres., J. Linn. Soc. Bot. 14:66, 1873.  
= *Stereum versicolor* (Sw.) Fr.
- novomolle**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1159, 1922.  
= *Stereum versicolor* (Sw.) Fr., the type is sterile.
- nummularium**, *Stereum* Vel., Ceske Houby p. 764, 1922.  
= *Xylobolus frustulatum* (Fr.) Boidin.
- nunezii**, *Stereum* Lloyd, Lloyd Mycol. Writ. 7:1300, 1924.  
= *Stereum versicolor* (Sw.) Fr.
- obliquulum**, *Stereum* Ito et Imai, Trans. Sapp. Nat. Hist. Soc. 16:128, 1940.  
= *Podoscypha pusillum* (Berk.) Ryvar den.
- obliquum**, *Stereum* Mont. & Berk., Hooker Lond. J. Bot. 3:334, 1844.  
= *Podoscypha pusillum* (Berk.) Ryvar den.
- obliquum**, *Stereum* Lloyd, Mycol. Notes 66:1115, 1922.  
= Nomen illegit. non Mont. & Berk. 1844.
- obliteratum**, *Stereum* Rick, Brot. Cienc. Nat. 9:76, 1940.  
= In bad condition and sterile, teste J. M. Baltazar in letter.
- obscurum**, *Stereum* Burt, Ann. Missouri Bot. Gard. 11:39, 1924.  
= nomen illegit. Non Lloyd 1915.
- obscurum** *Stereum* Lloyd, Lloyd Mycol. Writ 4, Letter 59:4, 1915.  
= *Xylobolus spectabile* (Kl.) Boidin

- occidentale, Stereum** Lloyd, Lloyd Mycol. Writ. 5:12,1919.  
= *Stereum gausapatum* Fr.
- ochraceo-flavum, Stereum** (Schw.) Ellis, North Am Fungi no 17, 1878.  
= *Stereum complicatum* (Fr.) Fr.
- ochraceum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1207,1923.  
= *Stereum hirsuta* (Willd.:Fr.) Fr.
- ochroleucum, Stereum** Fr., Hymen. Eur. p. 639. 1874.  
= *Phlebia albida* V. Post, teste Bresadola in K.
- ochroleucum, Stereum** Bres., Ann. Myc. 1:91. 1903.  
= Nomen illegit., non Fries 1874.
- ochroleucum, Stereum** Vel. Ceske Houby p. 760, 1922.  
= Nomen illegit. non Fries 1874.
- odoratum, Stereum** (Fr.) Fr. Epicr. Mycol., p.553, 1838, UPS!  
= *Scytinostroma odorata* (Fr.) Donk.
- orthosporum, Stereum** Krause, Basidiomycet. Rostoch., p. 103,1930.  
= *Cylindrobasidium evolvens* (Fr.) Jülich.
- ostrea, Stereum** (Blume & Nees: Fr.) Fr. Epicr. Mycol. p.547. 1838.  
= *Stereum versicolor* (Sw.) Fr.
- pallens, Stereum** (P. Karst.) Sacc., Syll. Fung. 9:223, 1891.  
= *Stereophyllum pallens* P. Karst.  
= *Cyphellostereum pusiolum* (Berk.) D. A. Reid.
- pallescens, Stereum** (Schw.) Sacc., Syll. Fung. 6:586. 1888.  
= *Dhostereum pallescens* (Schw-) Boidin, Mycotaxon 6:284, 1977.
- pallidum, Stereum** (Pers.) Cooke, Cat. Br. Basidiomycetes, genus 88, 1909.  
= *Cotylidia pannosa* (Sow.: Fr.) D. Reid.
- pallidum, Stereum** Lloyd, Lloyd Mycol. Writ. 4: St. 31, p. 550, 913.  
= Nomen illegit. non Cooke 1909.
- pannosum, Stereum** (Sow. ex Fr.) Lloyd, Lloyd Mycol. Writ. 4:21,1913.  
= Nomen illegit., non Cooke 1879.
- pannosum, Stereum** Cke., Grevillea 8:56, 1879.  
= *Stereum illudens* Berk.
- pannosum Stereum** Cke & Mass. Grevillea 21:38,1892.  
= Nomen illegit., non Cooke 1879. (= *Laxitextum bicolor* (Fr.) Lentz).
- papillatosporum, Stereum** Rehill & Bakshi, Ind. For. Bull. 250:11,1966.  
= *Stereum sanguinolentum* Fr. Teste D. A. Reid in herb. K.
- papyraceum, Stereum** Masee, Bull. Inf. Kew, p. 94, 1906.  
= the type is lost
- papyrinum, Stereum** Mont., Hist. Cuba Pl. Cell., p. 374, 1845.  
= *Porostereum papyrinum* (Mont.) Hjortst. & Ryvarden.
- paraguariense, Stereum** Spæg., Fungi Guar. Pug. I, n. 75.  
= *Porostereum papyrinum* (Mont.) Hjortst. & Ryvarden.
- partitum, Stereum** Berk. & Broome, J. Linn. Soc. Bot. 14:65,1873.  
= *Inflatostereum glabrum* (Lev.) D. A. Reid.
- parvulum, Stereum** Lloyd, Lloyd Mycol. Writ. 7:1225,1923.  
= *Podoscypa parvula* (Lloyd) D. A. Reid.

- patelliforme**, *Stereum* Burt, Ann. Mo. Bot. Gard. 7:182, 1920.  
= *Cyrtidia patelliforme* (Burt.) Welden.
- peculiare**, *Stereum* Parmasto, Boidin & Dhingra, Persoonia 10:311, 1979.  
= *Xylobolus peculiare* (Parmasto, Boidin & Dhingra) Ryvarden, comb. nov.  
= Basionym as cited above, Index Fung. 557088.  
= For a description, see op.cit.
- pekinense**, *Stereum* Imazeki, Acta Phytotax. Geob. Kyoto 13:247, 1943.  
= *Xylobolus subpileatus* (Berk. & M. A. Curtis) Boidin.
- pendulum**, *Stereum* Sasaki, Bull. Tokyo Univ. For. 47:148, 1954.  
= *Xylobolus frustulatus* (Pers.:Fr.) P. Karst.
- percome**, *Stereum* Berk. & Broome J. Linn. Soc. 14:65, 1873.  
= *Porostereum friesii* (Lev.) Hjortstam & Ryvarden.
- pergameneum**, *Stereum* Berk. & M. A. Curtis, Grevillea 1:161, 1873.  
= *Podoscypha ravenelii* (Berk. & M. A. Curtis) Pat.
- pergamenum**, *Stereum*, Speg. Anal. Soc. Cient. Argent. 10:130, 1880  
Nomen illegit. non, Berk. & M. A. Curtis, 1873.
- perlatum**, *Stereum* Berk., Lond. Jour. Bot. 1:153. 1842.  
= *Stereum versicolor* (Sw.) Fr.
- persoonianum**, *Stereum* Britz., Bot. Centbl. 71:91, 1897.  
= *Stereum hirsutum* (Willd: Fr.) Fr.
- petalodes**, *Stereum* Berk., Ann. Mag. Nat. Hist. Ser. 2, 9:198, 1852.  
= *Podoscypha petalodes* (Berk.) Pat.
- phaeum**, *Stereum* Berk., Flora N. Z. 2:183. 1855.  
= *Hymenochaete villosa* (Lev.) Bres.
- philippense**, *Stereum* Lloyd, Mycol. Writ. 7:1115, 1922.  
= *Podoscypha involutum* (Kl.) Imaz.
- philippinense**, *Stereum* (Bres.) Lloyd, Lloyd Mycol. Writ. 5:8, 1919.  
= *Podoscypha involuta* (Kl.) Imazeki.
- phoca**, *Stereum* Lloyd, Lloyd Mycol. Writ. 5:786, 1918.  
= *Stereum illudens* Berk.
- pictum**, *Stereum* Berk. ex Masee, J. Linn. Soc. 27:185. 1890.  
= *Stereum versicolor* (Sw.) Fr.
- pileolatum**, *Stereum* E. H. L. Krause, Basidiomycet. Rostoc., p. 56, 1928.  
= *Cylindrobasidium evolvens* (Fr.) Jülich.
- pineum**, *Stereum* (Alb. & Schwein.) Sacc., Fl. Ital. crypt. Hymen. 1: 1152, 1016.  
= *Veluticeps abietinum* (Pers. ex Fr.) Hjortstam & Telleria.
- pini**, *Stereum* (Fr.) Fr. Epicr. Mycol p. 553, 1838.  
= *Peniophora pini* (Fr.) Boidin.
- pinicola**, *Stereum* Vel., Ceske Houby p. 764, 1922.  
= *Veluticeps abietinum* (Pers.) Hjortstam & Telleria.
- platani**, *Stereum* Roumeguere, Fungi Gallici exsiccati, nr. 802. 1914.  
= *Dendrothele acerina* (Pers.) P. Lemke.
- plicatum**, *Stereum* (Peck) Lloyd, Lloyd Mycol. Writ. 7:1157, 1922.  
= Nomen illegit. non Lloyd 1918.  
= *Porostereum spadiceum* (Pers.) Hjortstam & Ryvarden).

- plicatum, Stereum** Lloyd, Lloyd Mycol. Writ. 5:807,1918.  
= *Cymatoderma plicatum* (Lloyd) D. Reid.
- populneum, Stereum** Peck, N. Y. State Mus. Rept. 47:145. 1894.  
= *Mutatoderma populneum* (Peck) Gomez.
- porrectum, Stereum** Fr., Epicr. Mycol, p. 548, 1838.  
= *Thelephora grisea* Schwein. Nomen illegit., non Person 1822
- portentosum, Stereum** (Berk. & M. A. Curtis) Höhn. & Litsch. Sber. Akad. Wiss. Math Naturw. Kl. 1:116:743, 1907.  
= *Scytinostroma portentosum* (Berk. & Curt.) Donk.
- princeps, Stereum** (Jungh.) Lev., Ann. Sci. Nat. Ser.3, 2:210, 1844.  
= *Xylobolus princeps* (Jungh.) Boidin.
- proliferum, Stereum** (Berk.) Lloyd Mycol. Writ. 4:554,1913.  
= *Scytinopogon scaber* (Berk. & Curt.) D. Reid.
- prolificans, Stereum** Berk., Jour. Linn. Soc. 16:41, 1878.  
= *Podoscypha involuta* (Kl.) Imazeki
- proximum, Stereum** Lloyd, Lloyd Mycol. Writ. 4: 40,1913.  
= *Podoscypha involutum* (Kl.) Imazeki.
- pruinatum, Stereum** Berk. & M. A. Curtis, Jour. Linn. Soc. 10:332, 1869.  
= *Peniophora pruinata* (Berk. & M. A. Curtis) Burt.
- pseudorimosum, Stereum** Boidin & Gilles, Bull. Soc. Mycol. Fr. 105:147, 1889.  
= Accepted species.
- puberulum, Stereum** Klotzsch ex Bres., Malpighia 4: 11, 1890.  
= *Lopharia cinerascens* (Schw.) G. H. Cunn.
- pubescens, Stereum** Burt, Ann. Mo. Bot. Gard. 7:178:1920.  
= *Auriculariopsis ampla* (Lév.) Maire.
- puiggarii, Stereum** Speg., Boln. Acad. Nac. Cienc. Córdoba 11: 461, 1889.  
= Ascomycete, teste Rahjensberg & Wright 1987 :262.
- pulverulentum, Stereum** Peck, Bull. Torrey Club 27:20,1900.  
= *Cystostereum murrayi* (Berk. & M. A. Curtis) Pouzar.
- pulchellum, Stereum** Sacc. et Bert. Bot. Soc. Broteriana 7:112. 1889.  
= *Podoscypha involuta* (Kl.) Imaz.
- pulchrum, Stereum** Sacc., Syll. Fung. 6:561, 1888.  
In Saccardo's text (op.cit.) there are references to names suggested both by Schweinitz (in Berkeley's herbarium) and to Cooke ("in litt."), consequently neither published the name validly. Thus, the specimens named by Berkeley in Kew should be taken as the type.  
= *Hymochaete luteobadia* (Fr.) Höhn. & Litsch.
- pulverulentum, Stereum** (Lév.) Mont. Ann. des Sci. Nat. (ser. 3) Bot. 7:174, 1847.  
= *Hymenochaete luteobadia* (Fr.) Höhn. & Litsch.
- purpurascens, Stereum** Lloyd, Lloyd Mycol. Writ. 4:15,1914.  
= *Lopharia cinerascens* (Schw.) G. Cunn.
- purpureum, Stereum** Pers., Neues Mag. Bot. 1:110, 1794.  
= *Chondrostereum purpureum* (Pers.:Fr) Pouzar.
- pusillum, Stereum** Berk., Ann. Mag. Nat. Hist. 10:381,1842.  
= *Podoscypha pusilla* (Berk.) Ryvarden, Synopsis Fung. 33:17, 2015.

- pusiolum, Stereum** Berk. & M. A. Curtis, Jour. Linn. Soc. 10:330,1869.  
= *Cyphellostereum pusiolum* (Berk. & Curt.) D. Reid.
- quercinum, Stereum** Potter, Lich. Succ. Exs: 7, 1901.  
= *Stereum gausaptum* (Fr.) Fr.
- quintasianum, Stereum** (Bres. & Roumeg.) v. Höhn. et Litsch., Sitzungsab. Akad. Wiss. Wien, math. naturw. Kl. 116, abt. 1:746. 1907.  
= *Scytinostroma quintasianum* (Bres. & Roumeg.) Nakasone.
- quisquiliare, Stereum** (Berk. & Curt.) Lloyd, Lloyd Mycol. Writ. 4:36,1913.  
= *Cotylidia aurantiaca* (Pers.) Welden.
- radians, Stereum** Fr., Nova Acta Soc. Sci. Upsal. Ser. 3, 1:110. 1851.  
= *Stereum versicolor* (Sw.) Fr. Teste D. A. Reid in K.
- radiato-fissum, Stereum** Berk. & Bres., Trans. Linn. Soc., II, 2:63. 1883.  
= *Xylobolus spectabile* (Kl.) Boidin.
- radiatum, Stereum** Peck, Bull. Buffalo Soc. Nat. Hist. 1:63, 1873.  
= *Boreostereum radiatum* (Peck) Parm.
- radicale, Stereum** (Berk.) Mass., Jour. Linn. Soc. 27:187. 1890.  
= *Corticium radicale* Berk. Nomen ambiguum, type too bad for determination.
- radicans, Stereum** (Berk.) Burt, Ann. Mo. Bot. Gard. 7:108,1920.  
= *Stereopsis radicans* (Berk.) D. Reid.
- rameale, Stereum** (Schw.) Burt, Ann. No. Bot. Gard. 7:169. 1920.  
= Nomen illegit. non (Berk.) Mass. 1890.
- rameale, Stereum** (Berk.) Masee, J. Linn. Soc. Bot. 27:187, 1890.  
= *Hymenochaete rameale* Berk., J. Linn. Soc. Bot. 14:68, 1875.  
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# Aphylophorales of Africa 35 – New species of *Antrodiella* and *Ceriporiopsis* from Cameroon

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## Abstract

*Antrodiella subnigra* Oba, Mossebo & Ryvarden and *Ceriporiopsis nigroeffusus* Oba, Mossebo & Ryvarden are described as new species based on collections from Cameroon.

## Introduction

The tropical forests of Cameroon have a rich mycota and under a current investigation, we have come across two new species which are described in the following.

They will later be included in a forthcoming book on “Poroid fungi of Africa” (in prep.).

***Antrodiella subnigra*** Oba, Mossebo & Ryvarden, nov. sp. Index Fung. 557089

**Holotype:** Cameroon, Yaoundé 25. October 2018, on dead unknown hard wood, Coll. Mossebo (DM) in HUY1-DM 1597 (Herbarium of the Department of Plant Biology and Physiology of the University of Yaoundé 1 in Cameroon), isotype in O.

**Basidiocarps** pileate, annual, imbricate, individual pilei about 8-10 cm wide, 12-15 cm long and 0.6-1.2 cm thick, soft-corky when fresh, corky to rigid when dry, margin thin and sharp, slightly bent when dry, pileus greyish-white to pale greyish, grey dull to sub shiny, glabrous, smooth, pore surface whitish when fresh, drying greyish, pores round to slightly angular, thin-walled, invisible to the naked eye, 8-10 per mm, tubes whitish, 3 mm deep, context white to pale greyish, up to 9 mm thick.

**Hyphal system** dimitic; generative hyphae with clamps, delicately thin walled, 2-3 µm in diam., skeletal hyphae dominating in the trama, thick walled to solid, 2-6 µm in diam.



Fig. 1. *Antrodiella subnigra* (DM 1597)

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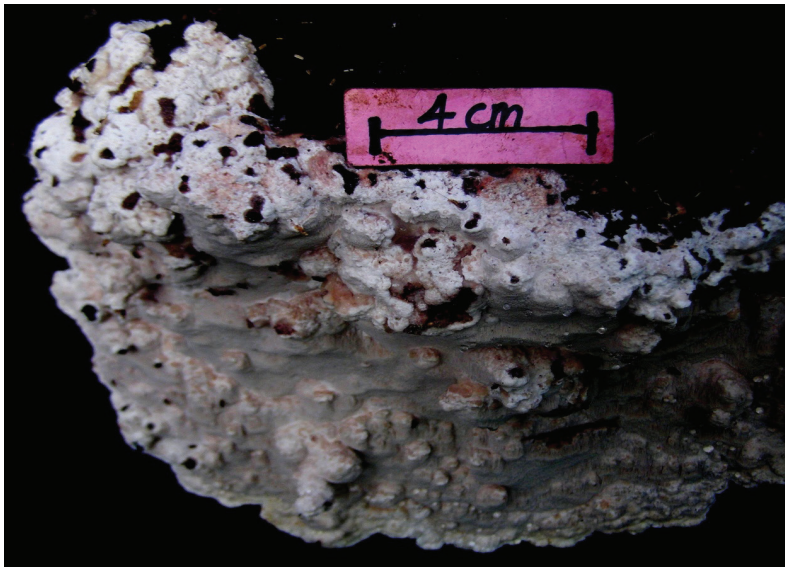
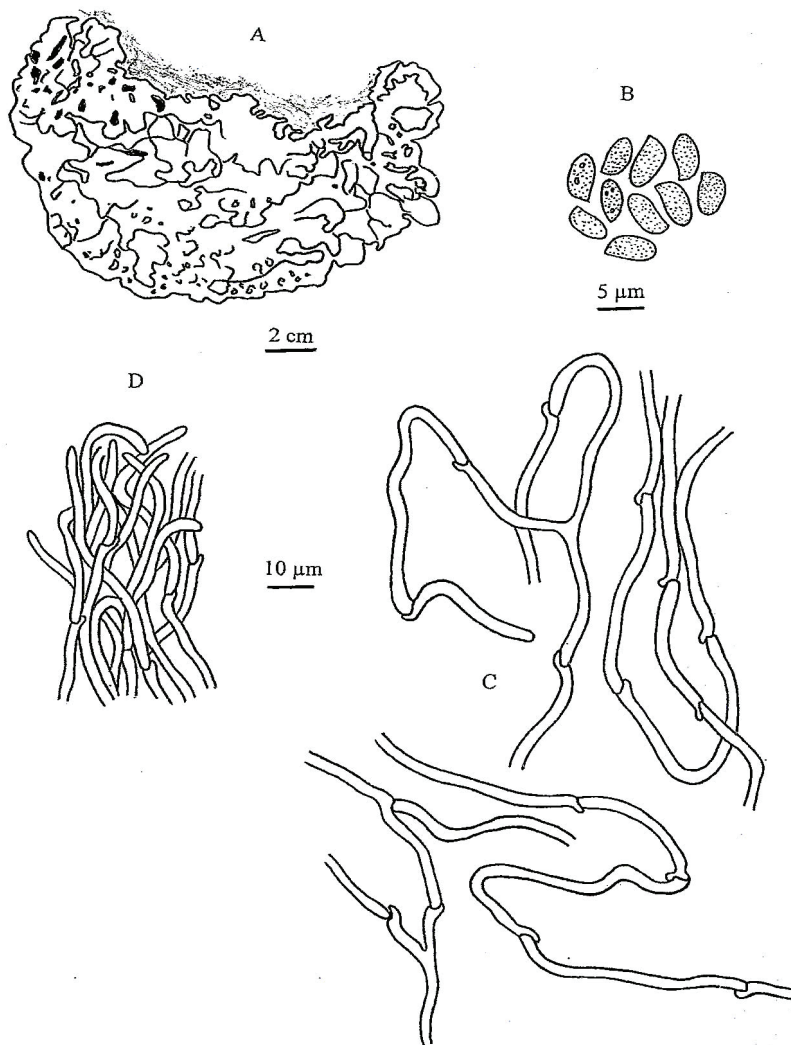


Fig. 2. *Ceriporiopsis nigroeffusus* (DM 1408)

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**Fig. 3.** *Ceriporiopsis nigroeffusus*. A. Basidiocarp, B. Basidiospores, C. Generative hyphae, D. Cuticle cells

**Basidia** 12-14 x 4-6  $\mu\text{m}$  tetrasterigmatic.

**Basidiospores** 4-5 x 3-4  $\mu\text{m}$ , globose to subglobose, smooth, thin walled and IKI negative.

**Substrate** Unknown dead hard wood tree.

**Distribution** Known only from the type locality.

**Remarks** The species is characterized by the greyish-white to pale greyish pileus with a whitish pore surface and the contrasting tubes and context.

**Ceriporiopsis nigroeffusus** Oba, Mossebo & Ryvarden nov. sp. Index Fung. 557090

**Holotype** Cameroon, Centre Region, Village Ndebene in the outskirts of Akonolinga town, 4. November 2017, on dead hard wood log, Coll. Mossebo (DM) in HUY1-DM 1408 (Herbarium of the Department of Plant Biology and Physiology of the University of Yaoundé 1 in Cameroon), isotype in O.

**Basidiocarps** annual, resupinate, effused on an almost vertical surface of a burnt log, 10 x 5 cm, up to 1 cm thick in knob-like areas, soft when fresh, brittle when dry, margin 1-5 mm wide, whitish, contrasting the greyish to grey pore surface, pores round 3-4 mm, tubes 4 mm deep, more or less concolorous with pore surface, subiculum white, thin, in parts almost invisible, up to 5 mm thick, fibrous.

**Hyphal system** monomitic; generative hyphae with clamps, 2-4  $\mu\text{m}$  in diam.

**Basidia** 8-12 x 3-5  $\mu\text{m}$ , tetrasterigmatic, clavate.

**Basidiospores** 4-4.5 x 2-2.2  $\mu\text{m}$ , cylindrical, hyaline, smooth.

**Substrata** On unknown hard wood log.

**Distribution** Known only from the type locality.

**Remarks.** The greyish to grey pore surface, contrasting the white soft margin is a striking macroscopic character of this new species.

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## More new African polypores

by

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### Abstract

*Amauroderma velutina*, *Antrodiella nigropora*, *Diplomitoporus minutoporus*,  
*Diplomitoporus nigrus*, *Ganoderma cinnamomea*, *Junghuhnia mininitida*, *Navisporus*  
*obscurus*, *Perenniporia reflexa* and *Rigidoporus subvinctus* are described as new.

### Introduction

Over 20 years collecting in different African countries has resulted in an accumulation of specimens which had been placed aside since proper keys were lacking. In connection with preparation of a forthcoming book, "Poroid fungi of Africa" (Ryvar den, Mossebo & Masuka spring 2020), these specimens were reinvestigated and a number of them seem to represent new species. They are described in the following.

### New species

***Amauroderma velutina*** Ryvar den, nova species Index Fung. 556973.

Holotype: Cameroon, South West Province, Korup forest, Mundemba forest reserve, 25. January 1989, Coll. R. Watling no 21301, in Fungarium O.

**Basidiocarp** stipitate, pileus circular, flat to slightly depressed centrally, up to 3 cm in diameter, 2 mm thick at the centre, coriaceous to brittle when dry, pileus evenly brown, finely adpressed velutinate, azonate, pore surface white, pores angular, thin walled, 3-4 per mm, tubes concolorous with pore surface about 1 mm deep, context 0,5 mm, dense, pale ochraceous with a black dense zone below the brown pileus tomentum, towards the stipe duplex with two black zones surrounding a whitish cottony core, stipe smooth, greyish, up to 3 cm long, 2 mm in diameter.

**Hyphal system** dimitic, generative hyphae with clamps, 24  $\mu\text{m}$  wide, skeletal hyphae thickwalled, hyaline, 27  $\mu\text{m}$  wide, solid to thick walled, negative in Melzers reagent.

**Basidiospores** globose, 7.5-9  $\mu\text{m}$  in diameter, slightly dextrinoid.

**Substrata.** The type was collected on dead wood.

**Distribution.** Known only from the type locality.

**Remarks.** The species is above all characterized by its even brown velutinate pileus in section with a black zone below the tomentum besides the white pore surface and tubes. *A. kwiluensis* has similar thin pileus, but is of much darker colours and a glabrous pileus.

**Antrodiella nigropora** Ryvar den, nov. species Index Fung. 556974

Holotype: Zimbabwe, Manicaland, Stapleford, John Meikele Research Station, 1600 m a. s. l. 11 March 1995, on dead hard wood log, Coll. Ryvar den 36883 in Fungarium O.

**Basidiocarps** annual, tough when fresh, hard and brittle when dry, effused reflexed, individual pilei up to 1 cm wide, flabelliform widely attached, upper surface azonate, dull, ochraceous becoming black from base, pore surface horizontal to widely effused down on the substrate, ochraceous with black colour on tuberculate to slight protruding parts, giving part of the basidiocarp a sooty appearance, pores angular to round, in parts split in front on effused parts of basidiocarp, 3-5 per mm, tubes up to 4 mm deep, ochraceous to pale resinous brown, context up to 2 mm thick, dense ochraceous, azonate.

**Hyphal system** dimitic; generative hyphae with clamps, hyaline, thin-walled, branched, 2-8  $\mu\text{m}$  wide, skeletal hyphae thick walled to solid, 3-6  $\mu\text{m}$  wide.

**Basidiospores** 4.5-5 x 2-3.5  $\mu\text{m}$ , elliptic, smooth, hyaline, non dextrinoid.

**Substrate:** Dead hard wood log.

**Distribution.** Known only from the type locality.

**Remarks.** The patchy sooth pore surface makes this a distinct species, which one should be able to recognize in the field. Microscopically the wide generative hyphae and the elliptic spores are diagnostic.

**Diplomitoporus minutoporus** Ryvar den, nova species Index Fung. 556975

Holotype: Zambia, Copperbelt prov. Ndola, Ndola burning plots, 21. January 1988, on dead hard wood log, Coll. Ryvar den 25231 in Fungarium O.

**Basidiocarps** resupinate, up to 2 mm thick, adnate, brittle when dry, margin with, 1-2 mm wide, pore surface cream coloured pores invisible to the naked eye, round to angular, 7-9 per mm, tube layer concolorous with pores, up to 2 mm thick, subiculum very thin and white.

**Hyphal system** dimitic, generative hyphae with clamps, 2-4  $\mu\text{m}$  wide, skeletal hyphae, solid to thick-walled, hyaline, negative in Melzer's reagent, 2-3  $\mu\text{m}$  in diam.

**Basidiospores** 3-3.5 x 2.5  $\mu\text{m}$ , broadly elliptic.

**Basidia** not seen.

**Substrate.** Dead hard wood log.

**Distribution.** Known only from the type locality.

**Remarks.** The species is remarkable by its tiny spores and pores, in the field mistaken to be a corticoid species. It may be widespread, but being resupinate with almost invisible pores it will easily be overlooked as a corticoid species which few has collected in Africa up to quite recently.

**Diplomitoporus nigrus** Ryvar den, nova species Index Fung. 556976

Holotype: Mozambique, Sofala province, 7 km South East of Chiengo, by Pongoe river, 27 July, 2016, on dead hardwood log, Coll. Ryvar den 50132 in Fungarium O.

**Basidiocarps** resupinate, up to 2 cm thick up to 10 cm wide, adnate, woody hard, margin with, 1-2 mm wide, pore surface buff to pale brown with white mycelial areas between some poroid areas since the type was growing on a very oblique substrate, pores invisible to the naked eye, round to angular, 7-9 per mm, tube layer dark brown, stratifies with at

least three distinct strata, totally up to 1.5 cm long measured along the pores, subiculum very thin and white.

**Hyphal system** dimitic, generative hyphae with clamps, 2-4  $\mu\text{m}$  wide, skeletal hyphae, solid to thick-walled, hyaline, slightly dextrinoid, , 2-6  $\mu\text{m}$  in diam.

**Basidiospores** 3.5-4  $\mu\text{m}$  in diameter, globose,

**Basidia** not seen.

**Substrate.** Dead hard wood log

**Distribution.** Known only from the type locality.

**Remarks.** The species is remarkable by its tiny spores and pores, the massive hard consistency and the deep brown tubes.

**Ganoderma cinnamomea** Ryvarden, nova species, Index Fung. 556977.

**Holotype:** Cameroon, Mbakmayo forest reserve, village Ayack, 10. April 2001, on dead log of *Avicenna officinalis*, coll. Clovis Dovaulo, in Fungarium O.

**Basidiocarps** pileate, sessile and broadly attached, corky to woody, 5 x 3 x 1 cm; upper surface slightly sulcate, glabrous and laccate, deep reddish brown with a bluish exudate, pore surface white, pores 4-5 per mm, tubes white up to 7 mm thick, context cinnamon brown, pulverulent, without structures, consisting mostly of a dense mass of chlamydospores.

**Hyphal system** dimitic; generative hyphae hyaline, thin-walled, with clamps, 2-4  $\mu\text{m}$  in diam, skeletal hyphae arboriform, pale brown, up to 5  $\mu\text{m}$  in diameter, sparingly branched.

**Cuticle** about 60  $\mu\text{m}$  thick, thin, a palisade of clavate hyphal ends, thick walled, 25-30 x 5-10  $\mu\text{m}$ , dextrinoid.

**Basidiospores** 8-10 x 4-5  $\mu\text{m}$ , oblong elliptic, probably very finely ornamented, invisible in microscopic preparations.

**Chlamydospores** globose, 8-10  $\mu\text{m}$  in diameter, massively present in context, smooth, yellow, thick walled and hyaline.

**Substrata.** Dead log of *Avicenna officinalis*.

**Distribution.** Known only from the type locality.

**Remarks.** The chlamydospores reminds one of *Ganoderma rufoalbum* where same type of chlamydospores occurs. However, this species as wider spores, i.e 8-10 x 6-7  $\mu\text{m}$  and much darker tubes.

**Junghuhnia mininitida** (Fr.) Ryvarden, nova species Index. Fung. 556978

**Holotype.** Malawi, Thyo district, Mulanje mts. Lichenya hut, 2100 m a. s. l. on dead hard wood log, 22. January 1992, coll. Ryvarden 31344 in Fungarium O.

**Basidiocarps** annual, resupinate, effused up to 5 cm, partly separating from the substratum on drying, toughfibrous, drying brittle margin white, finely velutinate, up to 2 mm wide, pore surface ochraceous buff, the pores angular, 5-7 per mm, with thin, entire dissepiments, subiculum cream coloured, fibrous, up to 1 mm thick, tube layer concolorous and continuous with the subiculum, up to 1 mm thick, taste mild.

**Hyphal system** dimitic, subicular generative hyphae thinwalled, with clamps, rarely branched, 24 µm in diam, subicular skeletal hyphae thickwalled, 24 µm in diam, tramal hyphae similar.

**Cystidia** 40-100 x 5-10 µm, abundant and conspicuous, thickwalled, cylindrical to clavate, heavily encrusted, completely imbedded or projecting to 30 µm.

**Basidiospores** 3-3.5 x 2.5-2.8 µm broadly elliptic.

**Substrate.** Unknown hard wood tree.

**Distribution.** Only the type has been seen.

**Remarks.** The diagnostic characters for this species are the same as for of *J. nitida* except for the distinctly smaller spores and a more distinct cream coloured pore surface.

**Navisporus obscurus** Ryvar den, nova species Index Fung. 556979

**Holotype:** Uganda, Kabarole district, Makerere University field station, on dead hard wood, 20. April 2002, Coll. Ryvar den 44772 in Fungarium O.

**Basidiocarps** annual, semicircular, partly effused, sessile, imbricate in the type, 1-6 cm wide and long and 0.2-0.5 cm thick, corky and flexible, upper surface brown, dull, zonate, adpressed velutinate, slightly concentrically sulcate, margin thin, ochraceous and wavy, pore surface pale cinnamon, pores whitish, partly irregular on sloping part of basidiocarp, 1-3 per mm, angular, 1-3 mm deep, context cinnamon, up to 3 mm thick near the base.

**Hyphal system** dimitic, generative hyphae hyaline, delicately thin-walled, with clamps, 2-5 µm wide, skeletal hyphae dominating, hyaline, thick-walled to solid, 3-4 µm in diameter, strongly dextrinoid.

**Basidiospores** 6-7 x 2.5-3 µm, cylindrical to slightly navicular, non-dextrinoid.

**Substrate:** Dead hard wood.

**Distribution.** Known only from the type locality in Uganda

**Remarks.** The relatively small spores, the large pores and the cinnamon colour characterize this species.

**Perenniporia reflexa** Ryvar den nova. species. Index Fung. 556980

**Holotype:** Zimbabwe, Western province, Victoria Falls, 22 January 1988, on dead hard wood log, L. Ryvar den 25265 in Fungarium O.

**Basidiocarps** perennial, resupinate to slightly reflexed with a 2 cm wide elongated pileus, separable, fragments up to 10 cm long and wide, 8 mm thick, margin slightly reflexed, forming narrow pileus, projecting up to 1 cm wide, up to 1 cm thick mm thick, the upper surface irregular, black from base, pale ochraceous in new developed zones, glabrous, dull, margin of resupinate part well delimited, rounded, pale cinnamon brown, pore surface even, pale brown, pores even, round to angular, occasionally elongated, rectangular, 5-7(8) per mm., tube layers stratified, totally 7 mm thick, pale cork coloured, context almost absent, pale cinnamon.

**Hyphal system** dimitic; generative hyphae with clamps, hyaline, thin- to slightly thick-walled, 1.5 – 2.8 µm wide; vegetative hyphae dextrinoid, arboriform, 2-6 µm wide.

**Basidiospores** 6-8 x 5-6 µm, subglobose, truncate, thick walled, distinctly dextrinoid.



**Substrate:** Dead hard wood.

**Distribution.** Known only from the type locality in Cameroon.

**Remarks.** *P. reflexa* is similar to *P. abyssinica* with regard as to type of basidiocarp, but the latter has smaller spores, i.e. 4.5-6.5 x 3.5-4 µm

**Rigidoporus subvinctus** Ryvardeen, nova species Index Mycol. 557103

Holotype: Zimbabwe, Manicaland, Vumba, Leopards rock, 14. March 1995, on dead hardwood log, Coll. L. Ryvardeen 37098, in Fungarium O.

**Basidiocarp** annual, resupinate, effused, adnate, up to 5 cm long and wide and 1-2 mm thick, the fresh greyish fertile pore layer is developed on an old brown basidiocarp being up to 8 mm thick, pore surface whitish grey, pores round 7-8 per mm, invisible to the naked eye, tubes concolorous with the pore surface, up to 1 mm deep, subiculum whitish up to 300 µm thick.

**Hyphal system** dimitic, generative hyphae thinwalled and simple septate, 2- 4 µm wide, skeletal hyphae dominating in the basidiocarp, in parts distinctly thick walled to almost solid, 3-7 µm wide

**Cystidia** of two kinds a) club shaped and widened in the upper part and apically to coarsely encrusted, hyaline, encrusted part up to 15 µm wide and 50 µm long, b) mammillate smooth, thin- to thick walled, up to 40 µm and 10 µm in widest part.

**Basidiospores** 3 x 2 µm, elliptic, smooth, thin walled, IKI negative.

**Substrate.** Dead hard wood log.

**Distribution.** Known only from the type locality in Zimbabwe.

**Remarks.** The species may be recognized by the two types of cystidia beside the rather small elliptic spores. Generative hyphae are seemingly collapsing fast and are difficult to observe properly.

The striking difference in colour between the fertile part overlaying a dark brown lower part, reminds one of *R. vinctus* where the colour can vary from pinkish to almost black when dried. This species has however only one type of cystidia and larger spores.

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## A note on the genus *Plicatura*

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&

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### Abstract

*Plicatura alba* Henkel & Ryvar den is described as new and a key to accepted species is provided together with a survey of rejected names.

### *Plicatura* Peck,

Ann. Rep. New York St. Mus. 24:75, 1872.

Basidiocarps resupinate - dimidiate, loosely adnate, white, soft, when dried fragile; upper side not especially differentiated, composed of intertwined hyphae similar to those of the trama (= subiculum), in older basidiocarps forming a thin pileipellis of collapsed hyphae; hymenial side smooth to more or less wrinkled or irregularly plicate, not forming regular gills or pores; hyphae with clamps, conspicuous especially in the trama, hyphae of the subhymenium thin-walled and richly branched, those of the trama and the upper side with more or less thickened walls, more straight and sparsely branched; no cystidia; basidia subclavate, forming a dense palisade; spores allantoid to ovoid, smooth, thin-walled, amyloid, not cyanophilous.

**Type species:** *Plicatura alni* Pk = *Plicatura nivea* (Fr.) P. Karsten.

**Remarks.** The basidiocarp reminds one of *Amylocorticium* and is hence placed in Amylocorticieae by Parmasto, but also of *Ceraceomyces*. In many respects it shows affinities to *Plicaturopsis* Reid, but we prefer to keep them in separate genera.

### Key to species

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1. Spores ovoid, hymenium smooth, tropical Africa ..... **P. alba**  
1. Spores allantoid, hymenium wrinkled, temperate species ..... **P. nivea**

### Descriptions

***Plicatura alba*** Henkel & Ryvar den nov. sp. Index Fungorum 556984

Fig 1

**Holotype:** Cameroon, Dja River Basin, 3 km S of Somaloma village, Coll. Henkel 10747 in Humboldt State University Fungarium, HSC, isotype in O.



Fig. 1. *Plicatura alba*, the holotype. Photo Noah Siegel.

**Basidiocarp** dimidiate, fan shaped, up to 8 cm wide and long, papery thin. loosely attached to the substrate, soft and lax when fresh, fragile and very light when dry, pileus even, white, lower side smooth, white.

**Hyphal system** monomitic; hyphae with clamps 2-4  $\mu\text{m}$  wide, thin-walled, richly branched. **Cystidia** none.

**Basidia** subcylindrical - narrowly clavate, 20-24 x 4-6  $\mu\text{m}$ , with 4 sterigmata and basal clamp.

**Basidiospores** 4-5 x 3-41  $\mu\text{m}$ , ovoid to broadly elliptic, smooth, thin-walled, amyloid,

**Habitat.** On dead hard wood.

**Distribution.** Known only from the type locality.

**Remarks.** The fan shaped, pure white smooth basidiocarp make this a distinct species.

***Plicatura nivea* (Fr.) P.A. Karsten**

Bidr. Känned. Finl. Nat. Folk 48:342, 1889. - *Merulius niveus* Fr., Elench. Fung. 1:59, 1828.

**Basidiocarp** resupinate to dimidiate, orbicular and some cm wide, or confluent, loosely attached to the substrate, in the living state soft and lax, when dried fragile and very light; upper side smooth, in very young specimens and in the growing margin of older ones finely velvety (lens), in the beginning white but turning greyish or pale beige brown; hymenial side white, turning yellowish with age and on drying, even orange or pale brown, smooth in the young basidiocarp but becoming distinctly and irregularly plicate but not forming net-like pores.

**Hyphal system** monomitic; hyphae with large clamps with a conspicuous “eye” at least in the wider hyphae; in the subhymenium 2-3 µm wide, thin-walled, richly branched; hyphae of the trama (subiculum) 3-6 µm, over the clamp to 8 or 10 µm wide; most hyphae with somewhat thickened walls, straight, sparsely branched.

**Cystidia** none.

**Basidia** 12-18 x 3-4 µm, subcylindrical - narrowly clavate with 4 sterigmata and basal clamp.

**Basidiospores** 4-4.5 x 1 µm, allantoid, smooth, thin-walled, amyloid, non-cyanophilous.

**Habitat.** On dead hanging or fallen branches, standing or fallen trunks etc. of *Alnus* ssp., rarely on other deciduous trees, e.g. *Prunus*, *Salix*, *Betula*, once found on *Picea*.

**Distribution.** Circumpolar in the boreal-temperate zones.

**Remarks.** Easily recognized by its white colour, its irregularly wrinkled hymenium and hyaline, amyloid spores.

### Nomenclator

*alni Plicatura* Peck, Ann. Rep. N. Y. State Mus. Nat. Hist. 24:76, 1872.

= *P. nivea* (Fr.) P. Karsten.

*aurea Plicatura* (Fr.) Parm. Eesti NSV Tead. Akad. Toi. 16:393, 1967.

= *Pseudomerulius aureus* (Fr.) Jülich.

*crispa Plicatura* (Pers.) Rea, British Basidiom. p. 626, 1922.

= *Plicaturopsis crispa* (Pers.) D. A. Reid.

*faginea Plicatura* (Schrad.) P. Karst., Bidr. Känn. Finl. Nat. Folk 48:342. 1889.

= *Plicaturopsis crispa* (Pers.) D. A. Reid.

*flabelliformis Plicatura* (Berk. & Ravenel) Murrill, North Am. Fl. 9:164, 1910.

= *Hygrophoropsis flabelliformis* (Berk. & Ravenel) Corner.

*guadelupensis Plicatura* (Pat.) Murrill, North Am. Fl. 9:164, 1910.

= *Marasmiellus guedelupensis* (Pat) Singer.

*lateritia Plicatura* (Berk. & M.A. Curtis) Murrill, North Am. Fl. 3:164, 1910.

= *Anthracophyllum lateritium* (Berk. & M.A. Curtis) Singer.

*obliqua Plicatura* (Berk. & M.A. Curtis) Murrill, Mycologia 2:25, 1910.

= *Nothopanus hygrophanus* (Mont.) Singer ex Pegler, see Pegler 1987, p. 564.

*rigida Plicatura* Pat., Bull. Soc. Mycol. Fr. 43:31, 1927.

= Type from Annam, Viet Nam, unknown identity.

*spodoleuca Plicatura* (Berk. & Broome) Singer, Lilloa 8:444, 1942.

= *Hohenbuehelia cyphelliformis* (Berk.) O. K. Miller.

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# Aphylophorales of Africa 38

## Some new poroid species from Southern Africa

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### Abstract

*Amauroderma aurantiaca*, *Navisporus laccatus* and *Polyporus culmicola* are described as new based on collections from Zambia and Zimbabwe.

### Introduction.

One of us (CS) lives in Zimbabwe and has collected fungi over many years. Besides agarics (see separate paper in this volume), wood-inhabiting specimens, particularly poroid ones, have also been collected. In connection with a forthcoming book on “Poroid fungi of Africa” by one of us (LR), these specimens were examined, and 3 new species were identified and described as follows.

### Descriptions

***Amauroderma aurantiaca*** nov. sp. Fig. 1. Index Fung. no 556985.

**Holotype:** Zambia, Mutinondo Wilderness, Muchinga Province, on the ground under *Brachystegia spiciformis*, 10 February 2016, leg. C. Sharp, CS 4817; Natural History Museum of Zimbabwe, Bulawayo, (BUL7957); paratype in O.

**Basidiocarp** annual, centrally to laterally stipitate, flat to umbilicate, up to 7 cm wide and 2 mm thick, hard when dry, pileus concentrically zoned in variable shades of brown to deep ochraceous, glabrous intermittent with hairy cover giving it a velutinate texture, slightly and radially wrinkled and slightly shiny in dry condition, cortex thin, dark cinnamon, stipe, single or twin, up to 4.5 cm long and 5 mm wide, hazel brown, sepia brown towards the base, circular to flattened, extending to 3 cm under the ground where connected to tree roots, pore surface bright rust orange, bruises dark red and then slowly changes to black, fading to greyish when dry, pores round, invisible to the naked eye, 7-8 per mm, tubes pale grey, dense, up to 1 mm deep, context light cinnamon brown, up to 1 mm thick, strongly contrasting the differently coloured tubes.

**Spore print** rosy-buff in colour.

**Hyphal system** dimitic, generative hyphae with clamps, hyaline 3-6  $\mu\text{m}$  wide, skeletal hyphae 3-6  $\mu\text{m}$  wide, unbranched, pale rusty brown, thick walled to solid, running parallel to the tube wall, sharply pointed in the dissepiments.

**Basidiospores** 1012  $\mu\text{m}$  in diameter, globose, hyaline to pale golden brown, very finely ornamented, ornamentation hardly visible at 1000 x magnification, some spores seemingly glabrous in microscopic preparations.

**Substrata** On the ground under *Brachystegia spiciformis*.

**Distribution** Only known from the type locality in Zambia.

**Remarks.** The species is above all characterized by the deep orange to red pore surface when fresh which fades to grey when dry, the globose, very finely ornamented spores and the sharply pointed skeletal hyphae.



Figure 1. The holotype of *Amauroderma aurantiaca*. Photo C. Sharp.

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**Navisporus laccatus** Sharp & Ryvarden, nov. species Index Mycol 556986.

Holotype: Zimbabwe, near Whitewaters, Matobo Hills, 13 August 2016, on unknown, dead hard wood, leg. J. P. Harris, CS 4762, Natural History Museum of Zimbabwe, Bulawayo (BUL7964); isotype in O.

**Basidiocarps** annual, triquetrous, 1 cm wide, 2 cm long and 1 cm thick, dense, pileus reddish and laccate at the base, smooth, pale cinnamon at the rounded margin, pore surface and tubes pale cinnamon, pores round 3-4 per mm, 1-2 mm deep, context white up to 3 mm thick near the base.

**Hyphal system** dimitic, generative hyphae hyaline, delicately thin-walled, with clamps, 2-4  $\mu\text{m}$  wide, skeletal hyphae dominating, hyaline, thick-walled to solid, 3-4  $\mu\text{m}$  in diameter, slightly, but distinctly amyloid.

**Basidia** 25-40 x 8-15  $\mu\text{m}$  with 2 to 4 sterigmata,

**Basidiospores** 14-16 x 6-7  $\mu\text{m}$ , smooth, cylindrical to slightly navicular and with about 1  $\mu\text{m}$  thick dextrinoid walls.

**Distribution.** Known only from the type locality in Zimbabwe.

**Remarks.** Microscopically this species may remind one of *N. floccosus* which however is a massive species with a dull pileus surface and dextrinoid skeletal hyphae.

**Polyporus culmicola** Sharp & Ryvarden nov. species Index Mycol. 556987.

Holotype: Zambia, Mutiaondo Wilderness, on grass rhizomes, 12 March 2017, leg. C.

Sharp, CS5403, Natural History Museum of Zimbabwe, Bulawayo (BUL7965); isotype in O.

**Basidiocarps** annual, centrally stipitate; pilei circular, solitary, up to 1.5 cm in diam. and 4 mm thick at centre, pileus surface pileus pale to dark brown, azonate, glabrous, but with fine, dark radiating line with tiny tufts of raised hairs, margin with pale, up-turned hairs, stipe 1.5 cm long, central, dull, ochraceous, glabrous, in part covered with angular sandy grains, pore surface white, sub-decurrent, pores irregular angular, mostly 1-2 per mm, tubes white, up to 2 mm deep, context white homogenous and dense.

**Hyphal system** dimitic; generative hyphae hyaline, thin-walled, often branched, 2-4  $\mu\text{m}$  wide, arboriform hyphae dominating in basidiocarp, thick-walled, with dendroid branching to tapering with narrow tips, 2-5  $\mu\text{m}$  in diam.

**Basidiospores** 6-7 x 3-3.5  $\mu\text{m}$ , elliptic, smooth, thin walled and IKI negative.

**Distribution.** Known only from the type locality in Zambia.

**Remarks.** The habitat and substrate, the large irregular pores and the elliptic spores make this to a distinct species. It is probably widespread in African grassland, where almost nobody has collected poroid fungi.

#### **Acknowledgements**

Mr and Mrs Merrett and their staff at Mutinondo Lodge, Zambia, are thanked for their hospitality during field work by one of us (C. S).

# Nomenclatorial notes

## A note on *Inonotus*

In my publication on *Inonotus* (Ryvarden 2005) I made a mistake by inadvertently indicating two types for *Inonotus novoguineensis* with different numbers. This make the name illegitimate and thus, the following new name is proposed:

*Inonotus novoguineensis* Ryvarden, nomen nova Index Fungorum 557233.

Holotype: Papua, New Guinea, Madang province, Gunn River valley, Ohu butterfly farm area, 50o 10 S, 145o 45 W, 6. February 1997, leg. P. van der Veken 97/322, fungarium O, description as given in Ryvarden 2005: 94.

## Reference

Ryvarden, L. 2005: The genus *Inonotus*, a synopsis, *Synopsis Fung.* 21:1-149.



# Some new combinations of corticioid fungi (Basidiomycota. Agaricomycetes)

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## Abstract

The following new combinations are proposed: *Bourdotiella crustula*, basionym *Odontia crustula*, *Chaetodermella incrassata*, basionym *Peniophora incrassata*, *Crustoderma cryptocallimon*, basionym *Hyphoderma cryptocallimon*, *Dentipellis lindtneri*, basionym *Gloeocystidium lindtneri*, *Fibricium subodoratum*, basionym *Corticium subodoratum*, *Gloeocystidiellum granulatum*, basionym *Boidinia granulata*, *Gloeocystidiellum permixtum*, basionym *Boidinia permixta*, and *Xenasmatella alnicola*, basionym *Grandinia alnicola*. *Bourdotiella crustula* is introduced as an older name for *Bourdotiella complicata* and *Fibricium subodoratum* replaces the younger name *Fibricium lapponicum*.

## Introduction

While working on a new version of the identification handbook Corticiaceae of North Europe (Eriksson et al 1973-1988) some taxonomical and nomenclatural issues emerged that we prefer to resolve in a separate publication rather than in the upcoming book itself.

## Materials and methods

Studied material is listed with each species in the taxonomy section below. Specimens were studied in preparations of 2% KOH, Melzer's solution, and Cotton blue. For morphological descriptions of treated taxa, we refer to the original publications of basionyms and synonyms.

## Taxonomy

***Bourdotiella crustula*** (L.W. Mill.) K.H. Larss. & Ryvarde comb. nov.

Basionym: *Odontia crustula* L.W. Mill., Mycologia 26(1): 29 (1934).

Mycobank MB 834066

Synonym: *Bourdotiella complicata* Duhem & Schultheis, Cryptog. Mycol. 32(4): 393 (2011).

We compared authentic material of *Odontia crustula* with the type of *Bourdotiella complicata*. The material of *Odontia crustula* is less developed and has a lighter colour but shares with *B. complicata* the cylindrical, penicillate spines, a porulose hymenium between the spines, and a surprisingly soft structure. We could not find any substantial micromorphological differences. Miller (1934) states that the species is not uncommon but there are few reports in the literature. Gilbertson (1964) studied authentic material but did not suggest any redistribution of the species but compared it with *Odontia pruni* Lasch. Ginns (1993) listed the species as a synonym of *Xylodon brevisetus* (as *Hyphodontia breviseta*). Although he studied a collection from the same locality and the same date as the type, it was collected on pine while the type grew on linden. Apparently, the specimens identified by Miller as *Odontia crustula* included several species.

The protologue does indicate any collector's number. In American herbaria there are several specimens with the same locality, substrate, and date but with different collector's number. Gilbertson (1964) studied number 15 and 21, both from the University of Iowa Herbarium (IS, today a part of ISC) and selected the former as lectotype.

Material studied: *Odontia crustula*. USA. Iowa, Milford, Little Sioux River, on linden, 16 June 1931, leg. L.W. Miller 21 (GB). *Bourdotiella complicata*. France. Vaucluse, Parc Naturel Régional du Luberon, commune des Baumettes, au bord de la rivière le Coulon ou le Cavalon. On wood of *Salix* sp. or *Populus* sp., 11 Nov. 2007, leg. B. Schultheis 383/07 (PC 0084610).

***Chaetodermella incrassata*** (Malençon) K.H. Larss. & Ryvarden comb. nov.  
Basionym: *Peniophora incrassata* Malençon, Bull. trimest. Soc. mycol. Fr. 68: 316 (1952). Mycobank MB 834067

Malençon moved his species to *Chaetoderma* (Malençon 1982). However, the genus name *Chaetoderma* Parmasto (1968) cannot be used for fungi since it is a homonym of *Chaetoderma* Kützing (1843), a genus of algae in Rhodophyta. Rauschert (1988) introduced *Chaetodermella* to replace Parmasto's illegitimate name but only combined the type species, *Chaetodermella luna*. We studied a specimen from Cyprus and could verify that the species has its place alongside *C. luna* in Gloeophyllales.

Material studied: Cyprus. Nicosia, Paphos Forest, Cedar Valley, on dead standing *Cedrus brevifolia*, 22 Nov. 2011, leg. A. Henrici (K, GB).

***Crustoderma cryptocallimon*** (B. de Vries) K.H. Larss. & Ryvarden comb. nov.  
Basionym: *Hyphoderma cryptocallimon* B. de Vries, Mycotaxon 28: 77 (1987).  
Mycobank MB 834068

We sequenced a Portuguese specimen of this rarely collected species and recovered the sequence in the *Crustoderma* cluster (data not shown). With its long, projecting, apically often widened cystidia and subclavate basidia *C. cryptocallimon* fits well into the genus.

Material studied: Portugal, Baixo Alentejo; Mértola, Corte do Pinto, Mina de S. Domingos, on *Eucalyptus* sp., 14 Dec. 1994, leg. I Melo & J. Cardoso 6495 (LISU 170965, as *Hyphoderma multicystidium*; GB)

***Dentipellis lindtneri*** (Pilát) K.H. Larss. & Ryvarden comb. nov.

Basionym: *Gloeocystidium lindtneri* Pilát, Bull. trimest. Soc. mycol. Fr. 53(1): 94 (1937).  
Mycobank MB 834069

This species is known from a few river-side forests in Central and South-East Europe. Attempts to generate DNA sequences from the most recent collections have failed and we are reduced to use morphological traits when searching for a proper place for the species. We believe the species is best placed in family Hericiaceae and can then choose between *Dentipellis* and *Laxitextum*. Both genera would have to be emended to allow for *Gloeocystidium lindtneri* to fit and it is perhaps a matter of taste which one to choose. Like *Dentipellis fragilis*, the type of the genus, *G. lindtneri* has two kinds of gloeocystidia. One type occurs as the the terminal cell of gloeoplerous hyphae extending from the subiculum into the hymenium. The other type develops from generative hyphae in the hymenium. *Laxitextum bicolor*, the type of *Laxitextum*, has only one type of gloeocystidia. For this reason, we prefer to place *G. lindtneri* in *Dentipellis*. Since extant *Dentipellis* species are hydroid while *Gloeocystidium lindtneri* has a smooth hymenophore inclusion of the latter species changes the definition of the genus.

Material studied: Bulgaria, Burgas, montes Stara Plania, inter pagos Banja et Obsor, ad ramum arbor. frondos. ad terram iacentem. Ca. 120 m s.m. 21 June 1978, leg. J. Kutan BG 78-107 (GB-0182230). Slovakia, Trnavsky kraj, silva “Kralov les” ap. Trstena na O. (distr. Gabčíkovo), in silva madida; ad ramum iacentem Salicis. 26 Aug. 1974, leg. Z. Pouzar PRM 8665572 (GB-0182229). Slovakia, Bratislavsky kraj, silva Sur ap. Jur pri Bratislave; in Alneto glutinosae madidio, ad ramum iacentem Alni glutinosae. 13 Oct. 1978, leg. Z. Pouzar PRM 8665573 (GB-0182228).

***Fibricium subodoratum*** (P. Karst. ex Bourdot & Galzin) Spirin comb. nov.

Basionym: *Corticium subodoratum* P. Karst. ex Bourdot & Galzin, Hyménomyc. de France p 226, 1928.

Mycobank MB 834070

Synonym: *Fibricium lapponicum* J. Erikss., Symb. bot. upsal. 16(no. 1): 114, 1958.  
MBT 390308

We studied original material preserved at herb. PC. The specimen is not in the best condition but it is still possible to observe the membranous-pellicular basidioma, skeletal hyphae, presence of clamps on generative hyphae, a few cystidia, and basidiospores. These features make it possible to identify the specimen as the species previously named *Fibricium lapponicum*.

Bourdot & Galzin (1928) compared *Corticium subodoratum* with *Corticium odoratum* (syn. *Scytinostroma odoratum*) but noticed that tramal hyphae were wider in *C.*

*subodoratum* and that dendrohyphidia (“hyphes capillaires”) were lacking. They did not observe cystidia, maybe not surprising considering the condition of the material and that cystidia sometimes are few in this species.

Since the name has not been typified, we here select as lectotype the material we studied. Lectotype (designated here): Finland. Etelä-Häme, Tammela, Mustiala, ad ligna pini, leg. P.A. Karsten 7485 (Bourdot 8683), herb. PC 706689.  
Mycobank MBT 390308

***Gloeocystidiellum granulatum*** (Sheng H. Wu) E. Larss. & K.H. Larss. comb. nov.  
Basionym: *Boidinia granulata* Sheng H. Wu, Mycotaxon 58: 17 (1996).  
Mycobank MB 834071

For a discussion, see below under *Gloeocystidiellum permixtum*.

Material studied: Taiwan. Taipei, roadside of highway between Hsintien and Pinglin, on brach of angiosperm, 27 Apr. 1991, leg. S.H. Wu 910427-21 (isotype GB) – Taiwan. Ilan, Fushan nat. res., on branch of angiosperm, 3 Sep. 1992, leg. S.H. Wu 9209-34 (GB).

***Gloeocystidiellum permixtum*** (Boidin, Lanq. & Gilles) E. Larss. & K.H. Larss. comb. nov.  
Basionym: *Boidinia permixta* Boidin, Lanq. & Gilles, Bull. trimest. Soc. mycol. Fr. 113(1): 17 (1997).  
Mycobank MB 834072

Larsson & Larsson (2003) showed that the type species of *Boidinia* and *Gloeocystidiellum* do not cluster together and concluded that *Boidinia* perhaps should be restricted to the type, *B. furfuracea*. They also found that a specimen of *Boidinia granulata* and two unidentified specimens clustered with the type of *Gloeocystidiellum*. Larsson (2007) included *G. porosum*, *B. granulata* and one of the unidentified specimens from Larsson & Larsson (2003) in an Agaricomycetes-wide sampling of corticioid species. The sequences were recovered in a clade that received 100% bootstrap support and a posterior probability value of 1.0 in a Bayesian analysis. The unidentified specimen was compared with the type of *Boidinia permixta* and found to be conspecific. Hence *Boidinia granulata* and *B. permixta* are transferred to *Gloeocystidiellum*.

Material studied: France. Lot-et-Garonne, Cucumont, on *Carpinus*, LY 13231 (holotype) – Turkey. Trabzon district, vicinity of Malavaci, alt 1200 masl, on fallen branch of *Fagus sylvatica* in a *Fagus* forest mixed with *Corylus avellana* and *Rhododendron*, 26 Sep. 1996, N. Hallenberg 13258 (GB).

***Xenasmatella alnicola*** (Bourdot & Galzin) K.H. Larss. & Ryvarden comb. nov.  
Basionym: *Grandinia alnicola* Bourdot & Galzin, Bull. Soc. mycol. Fr. 30(2): 254 (1914).  
Mycobank MB 834073

Synonym: *Trechispora alnicola* (Bourdot & Galzin) Liberta, Taxon 15(8): 318 (1966).  
*Phlebiella alnicola* (Bourdot & Galzin) Bondartsev & Singer, Trut. Grib Evrop. Chasti SSSR Kavkaza [Bracket Fungi Europ. U.S.S.R. Caucasus] p. 51 (1953).

Kunttu et al (2010) pointed out that *Grandinia alnicola* has mostly pleural basidia and the presence of ampullate septa on subicular hyphae is doubtful. Thus, they preferred to place the species in *Phlebiella*. Molecular data confirm this arrangement (data not shown). However, *Phlebiella* is now regarded as not validly published and the species referred to that genus have been moved to *Xenasmatella* (Duhem 2010).

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