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Papers are accepted by invitation only.

Printed by Lasertryk, Denmark. Printing date. 20. Aug. 2016.

ISBN 978-82-90724-51-6

Studies in Neotropical polypores 41, a new species of *Amylosporus* from Caatinga dry woodlands, Brazil

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Abstract

A new polypore, *Amylosporus auxiliadorae*, from Caatinga dry woodlands in Brazil, is described and illustrated and is characterized by eccentrically stipitate basidiomata, 3-6 pores per mm and dextrinoid skeletal hyphae. A key to the *Amylosporus* species is provided.

Key words: russuloid fungi; semiarid region; taxonomy.

Introduction

Amylosporus Ryvar den is characterized by annual or perennial, more or less whitish and resupinate to stipitate basidiomata. Micromorphologically, the genus is characterized by asperulate, small and amyloid bisidiospores and simple septate or multi-clamped generative hyphae (Ryvar den 1991, David & Rajchenberg 1985, 1987, Hattori 2008, Chen et al. 2015). Currently, *Amylosporus* comprises eight species, i.e. *Amylosporus campbellii* (Berk.) Ryvar den (the genus type), *A. succulentus* Jia J. Chen & L.L. Shen, *A. casuarinicola* (Y.C. Dai & B.K. Cui) Y.C. Dai, Jia J. Chen & B.K. Cui, *A. rubellus* (Y.C. Dai) Y.C. Dai, Jia J. Chen & B.K. Cui, *A. iobaphus* (Pat.) A. David & Rajchenb., *A. bracei* (Murrill) A. David & Rajchenb., *A. ryvar denii* Stalpers and *A. efibulatus* (I. Lindblad & Ryvar den) Y.C. Dai, Jia J. Chen & B.K. Cui (Stalpers 1966, Lindblad & Ryvar den 1999, Dai & Cui 2006, Chen & Shen 2014, Chen et al. 2015). In Brazil, only *A. brucei* and *A. campbellii* were recorded as occurrent in the southern Brazilian Atlantic Forest (Drechsler-Santos et al. 2008, Baltazar et al. 2009).

During collecting in the Caatinga dry woodlands, a northeastern Brazilian part of the Seasonally Dry Tropical Forests biome - SDTFs (Särkinen et al. 2011), one of us (E.R.D-S) came across two specimens that macro and microscopically resemble the *A. campbellii*. However, they were however, distinctly morphologically different, even after a comparison with other *Amylosporus* species.

Material and Methods

The specimens studied, from Brazilian semi-arid region of Parque Nacional do Catimbau (Buíque, Pernambuco state) and Serra da Jibóia (Santa Teresinha, Bahia state). Both areas are considered into the seasonally dry forest of SDTFs (Särkinen et al. 2011). Macro and microscopic characters were studied and used for identification (Ryvarden 1991). Colours are based on Watling (1969). Microscopic examinations were made from freehand sections mounted in 5% KOH solution and 1% aqueous phloxine solution, reaction (amyloid or dextrinoid) or not were observed in Melzer reagent (Melzer 1924). Microscopic structures were observed and measured in the optical microscopy. Scan-Electron Microscopy (SEM) were used to access the ornamentation pattern of the basidiospores. The specimens are deposited in the URM (URM78878) and HUEFS (HUEFS 61531) herbaria, and with duplicates in the Oslo herbarium (O) (Herbarium codes follow Thiers (2015).

Taxonomy

Amylosporus auxiliadora Drechsler-Santos & Ryvarden sp. nov. Fig. (1a-g)
Wrightoporiaceae Jülich (Russulales Kreisel ex P.M. Kirk, P.F. Cannon & J.C. David)
Index Fungorum 552272.

Fructificatio pileatae stipitatae, pileus glaber; hymenophorus regulariter porideus, 3-6 per mm; systema hyarum dimiticum, hyphae generativae efibulate, fibulatae et multifibulate, skeleticae dextrinoidea; spora elipsoidae vel ovoidae, 2.5-4.0 x 4-6.5 µm, tunica laevi, hyalinae, amyloideis. Holotypous URM herbarium (78878) et Isotypous O herbarium conservatur.

Holotype: URM78878; isotype in O. Brazil, Pernambuco State, Parque Nacional do Catimbau, Morro do Cachorro, March 2006, col. J. Ferreira DS1015

Etymology: *auxiliadora*, in honor of Dr. Maria Axiliadora de Queiroz Cavalcanti.

Basidioma annual, pileate, eccentrically stipitate. Pileus orbicular, up to 8.0 × 7.0 × 1.0 cm, solitary, soft to slightly coriaceous when dry; upper surface smooth, buff (52) to clay buff (32); margin sterile, concolours; pores surface buff (52), clay buff (32) to straw, 3-6 per mm, with irregular pores (not round) to lacerate in old portions; tubes concolorous, up to 2.0 mm deep; context homogenous, buff (52), up to 1.3 cm thick at the base; stipe as a contract base of the pileus, buff (52), 2 x 2.5 cm, with poroid portions decurrently, rigid when dry.

Hyphal system dimitic, generative hyphae thin-walled in different size, up to 10 µm wide, simple septate, sometimes septa with single or multiple clamps (verticillate septa

with up to 4 clamps); skeletal hyphae slightly to strongly thick-walled, slightly to dextrinoid, up to 7.0 µm wide, sometimes branched; clamp connections are absent in hymenium; gloepleural hyphae, hyphal pegs and cystidia not observed.

Basidia 10.0-15.0 × 6.0-8.0 µm, clavate.

Basidiospores ellipsoid to ovoid, 4.0-5.0 × 2.5-4.0 µm, hyaline, 1-gutulate, thin-walled, finely asperulate and amyloid in Melzers reagent.

Substrata. The holotype was found in sandy soil with litter of branches in advanced decomposition. The HUEFS exsiccata had no information on the substrate, However an examination of the specimen revealed a mix of clay soil and debris at stipe base.

Distribution. Currently known only from the Brazilian semiarid region, i. e. the type locality at Parque Nacional do Catimbau (Pernambuco state) and Serra da Jibóia (Bahia state).

Examined specimens: Brazil, Bahia State, Santa Terezinha, Serra da Jibóia (12°51'S x 39°28'W), 17 march 2001, col. M.F.O. Marques 004 (HUEFS 61531, as *Wrightoporia* sp.), “Poonah (Pune area, India), India orientalis, D. Campbell”, lectotype of *Amylosporus campbellii* (K).

Remarks. The combination of buff to clay buff basidiomata with an eccentrically stipe, 3-6 pores/mm, generative hyphae predominantly with simple septa or with single or multiple clamps and the size of ellipsoid to ovoid, finely asperulate and amyloid basidiospores characterize this species. *Amylosporus campbellii*, despite its similarity with simple and verticillate septa, has additional prominent e and frequently gloeoplerous hyphae. The skeletal hyphae of *A. campbellii* are not dextrinoid and pores are slightly larger, 2-3/mm (Dai 2007), than those of *A. auxiliadorae*. *Amylosporus succulentus* has dextrinoid skeletal hyphae too, however presents slighter larger pores (2-4/mm), frequently gloeoplerous hyphae and slightly thick-walled basidiospores (Chen & Shen 2014). Additionally, both species, *A. campbellii* and *A. succulentus*, were originally described from India and China, respectively (Ryvarden 1991, Chen & Shen 2014). In this case, records of *A. campbellii* from Brazillian Atlantic Forest and from other South American ecosystems should be revised in order to confirm if the species in fact occur in the Neotropical region.

Wrightoporia Pouzar and *Amylosporus*, as originally proposed, are morphologically very close (Larsson & Larsson 2003). The concepts of both genera had been debated by some authors (David and Rajchenberg 1985, 1987, Ryvarden 1991) and recently it was demonstrated that the genera are polyphyletic (Chen & Shen 2014, Chen et al. 2015). Several species of *Wrightoporia* were positioned in different clades for which there were proposed, new genera, such as, *Larssoniporia* Y.C. Dai, Jia J. Chen & B.K. Cui, *Pseudowrightoporia* Y.C. Dai, Jia J. Chen & B.K. Cui and *Wrightoporiopsis* Y.C. Dai, Jia J. Chen & B.K. Cui; then *Wrightoporia* s.s., *Amylonotus* Ryvarden and *Amylosporus* were morphologically redefined according to the phylogenetic analyses (Chen et al. 2015). *Wrightoporia* and *Amylosporus* were recovered in the same clade, named Wrightoporiaceae, while other genera were positioned in other clades corresponding to other families. In the proposed system generative hyphae with clamps characterize and distinguish *Amylosporus* from other genera (Chen et al. 2015).

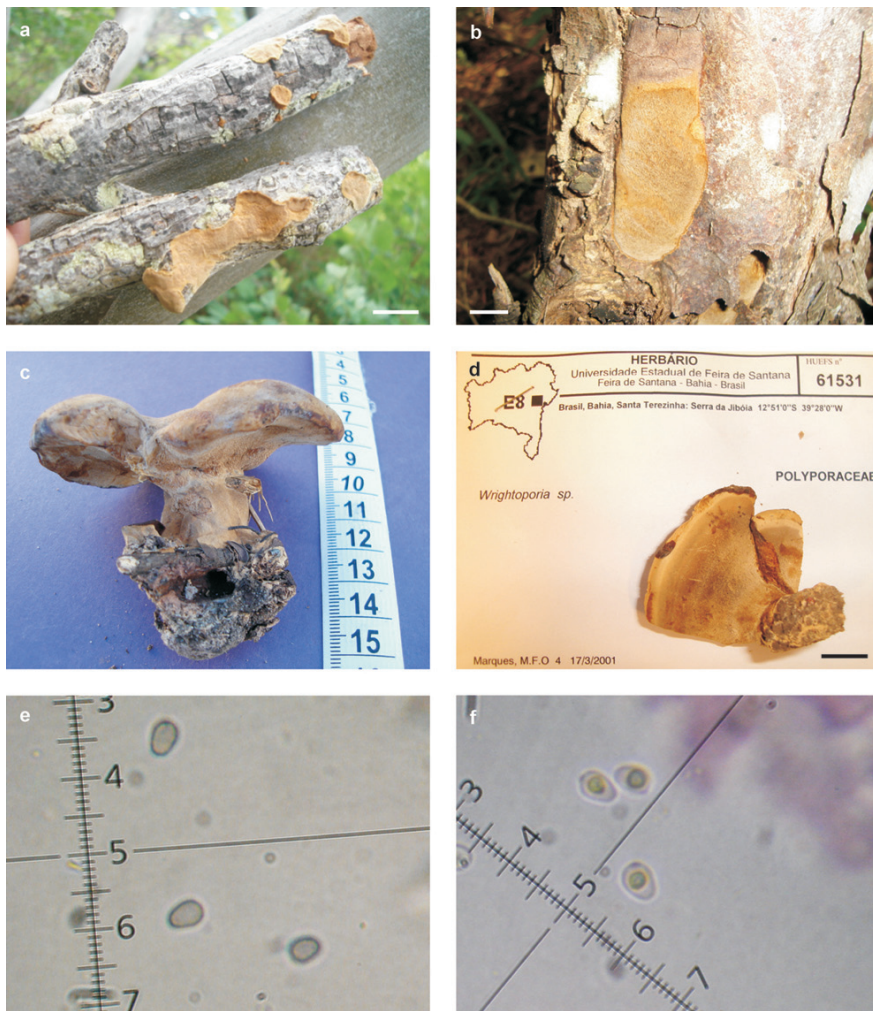


Figure 1. Morphological features of *Amylosporus auxiliadorae*: a-c. Basidioma: a. Holotype (URM78878), b, upper surface in detail, c. pores surface in detail (HUEFS 61531), d-g. Basidiospores: d. MO with KOH 5%, e. MO with Melzer reagent, f. SEM showing the finely asperulate ornamentation,

Acknowledgment

The authors thank the Parque Nacional do Catimbau for permission to sample collections; herbaria mentioned (URM, O and HUEFS); the University of Oslo for the SEM analysis; Dr. Mario Rajchenberg for taxonomic discussions; this research was supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq, Projects: Universal 478973/2006- 3 and 479961/2007-7, Pesquisa em Biodiversidade do Semi-árido 010105.00/2004/PPBio. CNPq granted the first author PhD financial support (modalities: GD 141072/2006-7 and SWE 201847/2008-6).

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Studies in Neotropical polypores 42

New and noteworthy polypores from Costa Rica and two new species *Elmerina phellinoides* and *Melanoporia condensata*

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Abstract

17 interesting and little known polypore species are reported from Costa Rica with short comments on their key features and ecology. Among them, four new records for Costa Rica are announced and two new species are described. The combination *Oligoporus leucomallus* is proposed.

Introduction

Polyporoid fungi of Costa Rica have been studied since the times of W.A. Murrill (1915) and H. Sydow (1927). To the end of 20th century, a number of mycological contributions of J. Carranza (e.g. Carranza-Morse 1991) completed the systematic survey of polypores in nearly all regions of this small country, which resulted in the compilation of a respectable check list of 304 polypore species (Carranza & Boyer 2005). The list contains more recorded species than the check lists of other, mostly much larger countries of tropical America. It was estimated to cover about 90% of all polypores potentially present in Costa Rica. 17 other species have been added to the list few years later (Mata et al. 2007, Ryvarden 2012).

Accordingly, when two of us (JVjr & JV) in 2013–2015 collected polypores during short trips in Costa Rica, mostly around hotels and hiking trails, the expectations were low. Nevertheless, morphological inspection supported by ITS region sequencing revealed four new records for Costa Rica and many other rare or little known species. Two collections that did not fit any known polypore are described below as new species.

Material and methods

About three hundred polypores were collected during one week trips in December 2013, July/August 2014, December 2014 and April 2015 in several localities in Costa Rica.

Voucher specimens are deposited in the private herbarium of the corresponding author (abbreviated JV); type material also in Herbarium of National Museum in Prague, Czech Republic (PRM) and in Botanical Museum, Oslo, Norway (O). The specimens were dried and microscopically inspected in Melzer's reagent (IKI) and 5% KOH. DNA isolation, nr DNA ITS region sequencing, and phylogenetic analyses methods follow Vlasák & Kout (2011). The phylogenetic affinities were inferred using the Maximal Likelihood approach and were conducted in MEGA6 (Tamura et al. 2013).

Results and discussion

Noteworthy collections are listed alphabetically by order, genus, and species. Descriptions are included for some species, with additional comments on distribution, ecology, and diagnostic or critical characters. 17 ITS rDNA sequences were prepared for this study and deposited in GenBank.

Auriculariales J. Schröt.

Elmerina dimidiata (A. David) D.A. Reid

Figs 1-4

Description: David 1974.

Specimens examined: Costa Rica, Monteverde Area, Santa Elena, hardwood, 29.XII.2013 J. Vlasák Jr., JV 1312/E3-J (GenBank KT156683); Bajo del Tigre Trail, hardwood, 28.VII.2014, J. Vlasák, JV 1407/54; Guanacaste Prov., Rincon de la Vieja, hardwood, 22.XII.2014, J. Vlasák Jr., JV 1412/2-J.

Remarks: New species record for Costa Rica. The basidiocarp is effused reflexed, with small (1cm), imbricate pilei, first white, then ochre colored (Fig. 1), quickly discoloring to red then dark brown on bruising. Pores variable, from 4 to 7 per mm, in young pilei and older pileus center much smaller than close to old pileus margin. Immature basidia clavate or somewhat barrel-shaped, later easily observed cruciately septate. Basidia and hyphae clampless, even if quite similar swellings close to hyphal septa were observed. Basidiospores hyaline, ellipsoid, $4-5 \times 3-3.3 \mu\text{m}$.

Our specimens perfectly fit to the original description and photo of A. David (1974). The problematic taxonomy of *Elmerina* /*Protomerulius* was summarized (Zhou & Dai 2013); our determination is supported by sequence identity (Fig. 4).



Fig. 1. *Elmerina dimidiata* spec. JV 1312/E3-J.



Fig. 2. *Elmerina phellinoides* sp. nov., JV 1408/24.

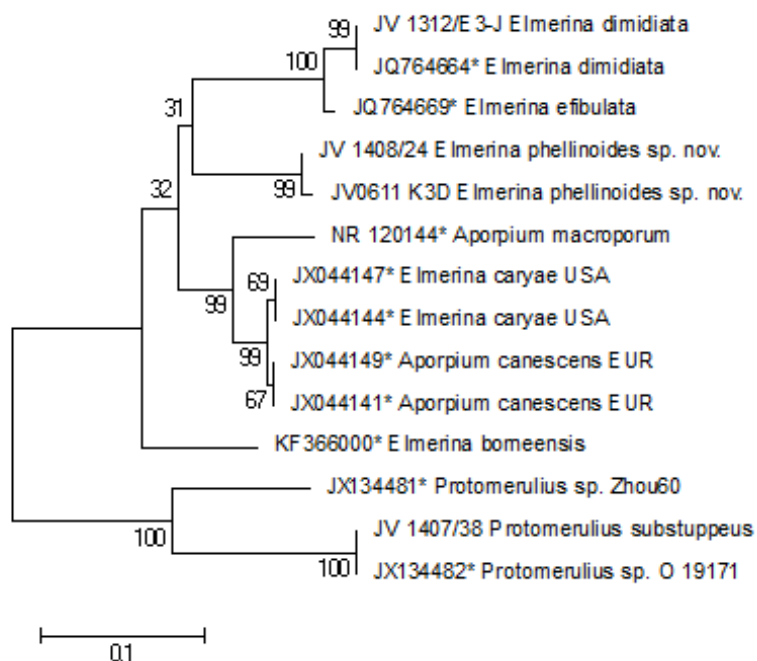


Fig. 3. Phylogenetic relationships of 14 poroid *Auriculariales* specimens inferred from ITS rRNA sequences. Topology from maximum likelihood (ML) analysis. Support values along branches from ML bootstrap (500 replicates). GenBank numbers* indicate sequences retrieved from GenBank; other GenBank numbers in Specimens examined.

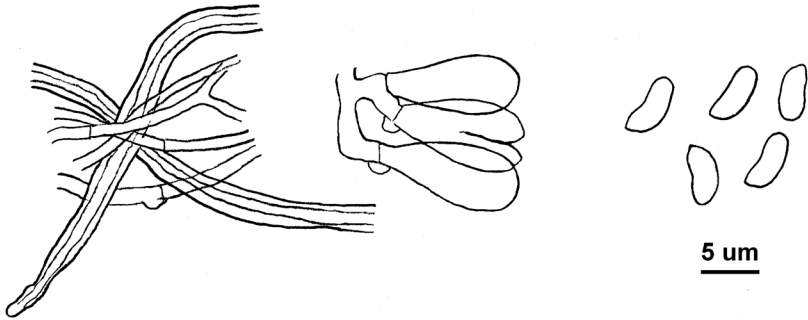


Fig. 4. Hyphae, basidia and basidiospores of *Elmerina phellinoides* JV 1408/24.

Elmerina phellinoides Vlasák & Ryvarden, sp. nov.

Figs 2–4

Holotype: Vlasák & Ryvarden., Santa Rosa Nat. Park, hardwood, 2.VII.2014 J. Vlasák, JV 1408/24 (PRM933856, GenBank KT156684). Mycobank: MB 812838.

Etymology: Referring to similarity with resupinate *Phellinus* Quél. species.

Diagnosis: The species is distinguished from *Elmerina caryae* (Schwein.) D.A. Reid by smaller pores, pore surface of lighter color and different ITS sequence.

Basidiocarp annual, resupinate, pore surface *café au lait*, the pore edges whitish, pores developed up to the very margin, angular, 6–8 per mm, on vertical substrate much elongated and in places lamellate (Fig. 2), context less than 0.2 mm thick or missing, tubes up to 2 mm long, on vertical substrate laterally opened.

Hyphal system dimitic, generative hyphae thin-walled, narrow, 1.5–2.0 µm in diam., with clamps, but sometimes also with simple septa, skeletal hyphae dominating, thick-walled but with a rather wide lumen, 2–4 µm in diam. On dissepiments edges, the skeletal hyphae are densely incrustated, the incrustation made of large, cubic crystals 1–3 µm in diam. In KOH skeletal swell to 3–6 µm in diam., then mostly solid, opalescent.

Cystidia absent.

Basidia cruciately septate, broadly clavate when immature, 5–7 × 10–15 µm.

Basidiospores allantoid, hyaline, smooth, negative in Melzer's reagent, 4.5–5.5 (6) × 2–2.5 µm (Fig. 3). On unknown hardwood.

Additional material examined:

Guatemala, Tikal, hardwood, XI.2006, J. Kout, JV 0611/K3D.

Remarks: A distinct species by its colors reminding of *Phellinus* sp. and unique sequence.

***Protomerulius substuppeus* (Berk. & Cooke) Ryvardeen**

Figs 4–6

Description of collected specimens using also comments and data of Rajchenberg (1987), Murril (1907) and Lowe (1957):

Basidiocarps effused-reflexed to sessile, mostly imbricate or laterally confluent, with individual pilei up to $3\text{--}5 \times 0.8$ cm, whitish at first, then pale rusty brown above or dark brown in old or dried basidiocarps, matted-tomentose to strigose, azonate, margin thin and entire. Pores whitish at first, later brown, to blackish brown after drying, angular, 2–4 per mm, on sloping surfaces elongated, tubes up to 5 mm long, drying somewhat translucent or cartilaginous. Context up to 5 mm thick, duplex, upper half strikingly soft, becoming firmer downwards; sometimes with a resinous zone in the lower context.

Hyphal system dimitic, generative hyphae thin-walled, rather broad, 2–5 μm in diam., with rare clamp connections; skeletal hyphae 3.5–5 μm , of very variable diameter, with thickened and somewhat yellowish walls and distinct lumen.

Basidia pear-shaped at first, then with four longitudinal cross-walls.

Basidiospores ellipsoid, hyaline, IKI-, 5–7 \times 4–5.5 μm .

Specimens examined: Costa Rica, Puntarenas Prov., Carara Nat. Park, hardwood, 26.VII.2014 J. Vlasák, JV 1407/20, JV 1407/20A; 27.VII.2014 JV 1407/38 (GenBank KT156685) JV 1407/41A; Monteverde Area, Santa Elena, Bajo del Tigre Trail, hardwood, 28.VII.2014 J. Vlasák Jr, JV 1407/53-J; Guanacaste Prov., Rio Tempisque Ford, 2 km south of Hwy No.1 crossing, hardwood, 31.VII.2014 J. Vlasák, JV1407/104. US Virgin Islands: St. John, hardwood, IX. 2004 J. Vlasák Jr. JV 0409/10-J.

Remarks: The species seems to be quite common in Costa Rica and other countries of tropical America, but it is very variable and not well understood in our opinion. In the field it is easily mistaken for a *Tyromyces* species because of its soft and white basidiocarps. Pileate as well as resupinate basidiocarps occur with young pilei more or less whitish but older ones greyish brown. In the field, the most important features to identify are the strigose, strikingly soft surface, pileus with duplex context, and relatively large, angular pores. Hairs on pileus surface are rusty at first but dark grey later. Split basidia can be readily seen in most cases and basidiospores are also typical and usually abundant. A fine picture of microscopic structures was published by Rajchenberg (1987), who also proved that *Polyporus gregarious* Rick 1940 from Argentina is the same species, even if with somewhat aberrant morphology. Zhou and Dai (2013) showed that *Protomerulius brasiliensis* Moller, *P. africanus* (Ryvardeen) Ryvardeen, and some collections from China are very similar both in morphology and sequence and their taxonomic status could be questioned.



Fig. 5. *Protomerulius substuppeus* JV 1407/38, Costa Rica.



Fig. 6. *Protomerulius substuppeus*, JV 0409/10-J, US Virgin Islands.

Hymenochaetales Oberw.

Phellinus membranaceus J.E. Wright & Blumenf. Fig. 7

Description: Ryvarden 2004.

Specimens examined: Costa Rica, Carara Nat. Park, hardwood, 25.XII.2013 leg. J. Vlasák Jr., det. L. Ryvarden, JV 1312/A2-J (GenBank KT156686); the same site, 26.VII.2014 J. Vlasák, JV 1407/11.

Remarks: Originally described from northern Argentine, the species occurs also in Brazil, Panama and Costa Rica (Ryvarden 2004) but it is rarely collected. The holotype of Wright & Blumenfeld (1984) represents probably atypical specimen, very thin, „membranaceous“, with extremely short tubes, which is not the case of other known specimens (Ryvarden 2004). The species is characterized by resupinate, widely effused basidiocarps (Fig. 7), absence of setae and hyaline, ellipsoid spores $3\text{--}4 \times 2.5\text{--}3 \mu\text{m}$. Our two specimens, collected on the same log in the course of 7-month time span, show some divergent features such as very long, stratified tubes in 3–4 layers, of overall length up to 18 mm, and narrowly ellipsoid, slightly bent spores, mostly $4\text{--}4.5 \times 2.2 \mu\text{m}$. The ITS sequence is unique in GenBank, showing, however, 97% similarity with the sequence of *Phellinus bicuspidatus* Lombard & M.J. Larsen.



Fig. 7. *Phellinus membranaceus*, JV 1312/A2-J.



Fig. 8. *Phellinus turbinatus*, JV 1407/73-J.

Phellinus turbinatus Ryvarden. Fig. 8

Description: Ryvarden 2004.

Specimen examined: Costa Rica, Monteverde Area, Santa Elena, along the road to Cerro Amigos, hardwood, 29.VII.2014 J. Vlasák Jr., JV 1407/73-J (GenBank KT156687).

Remarks: A very distinct species with ungulate to columnar basidiocarps with many tube layers, glabrous black pileus, reddish colors on pores (Fig. 8) and especially by its unique, drop-shaped or somewhat pear-shaped basidiospores $6-8 \times 5-6 \mu\text{m}$. The species was described in 2004 from a near-by locality, and this is only the second known collection. The ITS sequence is unique in GenBank, indicating, surprisingly, a distant similarity to *P. ellipsoideus* (B.K. Cui & Y.C. Dai) B.K. Cui, Y.C. Dai & Decock and *P. caribaeo-querquicicola* Decock & S. Herrera, two species with hooked hymenial setae, even if the setae of *P. turbinatus* are mostly straight.

Tropicoporus guanacastensis L.W. Zhou, Y.C. Dai & Vlasák. Fig. 9

Description: Zhou et al. 2016, in press, available online.

Specimens examined: Costa Rica, Guanacaste Prov., Santa Rosa Nat. Park, hardwood, 31.VII.2014 J. Vlasák Jr., JV 1407/103-J; 2.VIII.2014 J. Vlasák, JV 1408/25; Barra Honda Nat. Park, hardwood, 23.IV.2015 J. Vlasák, JV 1504/84, JV 1504/86; La Ensenada Lodge, hardwood, 23.IV.2015 Vlasák Jr., JV 1504/91-J.

Remarks: The species was recently described (Zhou et al. 2016) and genus *Tropicoporus* L.W. Zhou, Y.C. Dai & Sheng H. Wu was erected for this and other species, which merge in DNA-based phylogeny into one clade among *Inonotus* P. Karst., but show dimittic hyphal system and perennial basidiocarps like *Phellinus* species. All the known *Tropicoporus* species occur in the tropics. They are characterized by small, yellowish,

broadly ellipsoid to subglobose spores and small, often very rare or indistinct hymenial setae. *Tropicoporus guanacastensis* is distinguished by flat pilei covered with hard, black tomentum in sharp, narrow zones (Fig. 9). Close to pileus margin, only very thin or indistinct black line is developed under tomentum. The species seems to be quite common in tropical dry forests growing mostly on standing trees.



Fig. 9. *Tropicoporus guanacastensis*, JV 1504/84.

Tropicoporus pseudolinteus (Vlasák & Y.C. Dai) L.W. Zhou, Y.C. Dai & Sheng H. Wu
Fig. 10

Description: Vlasák et al. 2013.

Specimens examined: Costa Rica, Guanacaste Prov., Bagaces, Biological Reserve Lomas Barbudal, hardwood, 30.XII.2014 J. Vlasák, JV 1407/89; Barra Honda Nat. Park, hardwood, 23.IV.2015 J. Vlasák Jr., JV 1504/80.

Remarks: The species was recently described (Vlasák et al 2013) based on two small collections from Venezuela and USA (Florida). Two GenBank sequences of “*Phellinus linteus*” isolates from Mexico and Costa Rica also represent this species (Vlasák et al. 2013), but to our knowledge no herbarium specimen from Costa Rica is known. *Tropicoporus pseudolinteus* is morphologically similar to *T. linteus* (Berk. & M.A. Curtis) L.W. Zhou & Y.C.Dai and it was described as a new species based on a distinct nrDNA sequence and a few morphological differences, such as skeletal hyphae unchanged in KOH and extremely rare setae in hymenium and dissepiments (Vlasák et al. 2013). Several large pilei collected now and of identical sequence show, however, abundant setae, mostly imbedded in dissepimental trama, but with tips often bent into hymenial layer. Most of the setae show also narrow but thick-walled root 30–50 µm deep in the trama, and so reminding of tramal setae. As a very distinct feature, black cuticle is always developed on pileus surface, often covered with silvery pruina at the very margin (Fig. 10). This feature could not be observed in rather old type material (Vlasák et al. 2013), where the surface was indurated and cracked.



Fig. 10. *Tropicoporus pseudolinteus*, JV 1407/89, in herbarium.

Polyporales Gäum.

Aurantiopileus mayanensis Ginns, D.L. Lindner & T.J. Baroni. Figs 11–12

Description: Ginns et. al. 2010

Specimens examined: Costa Rica, Monteverde Area, Monteverde Preserve, hardwood, 25.IV. 2015 J. Vlasák, JV 1504/128 (GenBank KT156706); Guatemala, San Pedro Mt., 14.XI.2006 J. Kout, JV 0611/D2-K; Laguna Chicabal, XI.2006 J. Kout, JV0611/K17-K.

Remarks: New species record for Costa Rica. *A. mayanensis* is a fleshy-gelatinous polypore, member of *Meruliaceae* family, recently described from tropical cloud forest in Belize. In most cases, it is distinguished by flaming red color when fresh. We studied also older collections of Jiri Kout from Guatemala, which were typical in this respect (Fig. 11), but our recent collection from Monteverde in Costa Rica was plain crème only (Fig. 12), even if the sequence and basidiocarps morphology and anatomy were identical. The reason for such color loss is unclear. Anyway, the fungus seems to be widespread in the mountains of Central America covered with tropical cloud forest.



Fig. 11. *Aurantiopileus mayanensis*, JV 0611/K17-K, Guatemala, photo Jiri Kout.



Fig. 12. *Aurantiopileus mayanensis*, JV 1504/128, Costa Rica.

Daedalea neotropica D.L. Lindner, Ryvarden & T.J. Baroni. Fig. 13

Description: Lindner et. al. 2011.

Specimens examined: Costa Rica, Puntarenas Prov., Coto Brus, Sabalito, sendero Hiyveron, 1200 m asl, *Quercus* sp., 29.III. 2000 L. Ryvarden 42929, deposited O.; Monteverde Area, Santa Elena, El Establo Hotel Trails, *Quercus* sp., 31.XII.2013 J. Vlasák Jr., JV1312/E18-J (GenBank KT156688); 29. VII.2014 J. Vlasák, JV 1407/61 & JV 1407/62; 25.IV.2015 J. Vlasák Jr., JV1504/110-J.

Remarks: *D. neotropica* was recently described based on several collections from Belize but it is probably widespread in the mountains of Central America wherever oak is growing. *D. neotropica* is similar to *D. quercina* L:Fr., but differs in having more poroid hymenophore, smaller pores and very characteristic dark violet spots on pileus (Fig. 13). Holotype and our collection JV1312/E18-J have identical ITS sequence.

Dichomitus amazonicus Gomes-Silva, Ryvarden & Gibertoni. Fig. 14

Description: Gomes-Silva et al. 2011.

Specimens examined: Costa Rica, Monteverde Area, Santa Elena, Bajo del Tigre Trail, hardwood, 28.VII. 2014 J. Vlasák, JV 1407/43 ; J. Vlasák Jr. JV 1407/47-J (GenBank KT156707).

Remarks: New species record for Costa Rica. *Dichomitus amazonicus* was only recently described from the state of Amazonas, Brazil, and it was known up to now only from



Fig. 13. *Daedalea neotropica*, JV 1312/E18-J.



Fig. 14. *Dichomitus amazonicus*, JV 1407/47-J, in herbarium.

the type locality, so that its occurrence on several logs in Monteverde area is somewhat surprising.

It is an inconspicuous, light isabelline or light ochre colored poria with medium size pores 2–4 per mm, and characterized mostly by its large, sub-cylindrical, smooth spores (9)10–12 × 3.5–4 µm. One specimen (JV 1407/43) growing on the top of lying log developed up to 5 mm thick and about 5 cm in diam. cushion-like basidiocarps distributed in patches along the whole log but with deformed tubes. The sequence is unique in GenBank, showing, however 95% similarity with sequence of *Dichomitus cavernulosus* (Berk.) Masuka & Ryvarden.

Fomitopsis lignea (Berk.) Ryvarden. Figs 15–18

Description (based on collected specimens):

Basidiocarps annual but sometimes reviving, sessile, ungluate to applanate, tough-woody, up to 8 × 4 × 3 cm, upper surface at first ivory white to ochraceous, later light rusty brown, azonate, appressed-velutinate, smooth, margin concolorous, at first rounded and sterile below, later sharp and fertile. In old pilei, crustose layer up to 1 mm thick develops from the base 2 mm deep in pileus context, the context above becoming necrotic, turning brown and finally disintegrating, exposing black crust. Pores circular, regular, relatively large, 3 per mm, with thick, entire dissepiments, pore surface wood-colored. Context wood-colored, up to 15 mm thick, extremely tough; tubes slightly darker, up to 7 mm long, usually in one layer, but in reviving basidiocarps second tube layer can be formed, separated by a thick layer of context tissue.

Hyphal system trimitic, generative hyphae thin-walled, hyaline, with clamps, 1.5–2.5 µm in diam., common in the tube trama but rare in the context; skeletal hyphae thick-walled to solid, 3–5 µm in diam., unbranched and straight; binding hyphae narrow, 1.5–2.5 µm in diam. and mostly with distinct lumen, somewhat uneven or terminally tortuous, with rare short branches that are often terminally accumulated.

Cystidia none.

Basidia narrowly clavate, 15–20 × 5–6 µm, with a basal clamp.

Basidiospores hyaline, thin-walled, narrowly ellipsoid, slightly fusiform, distinctly apiculate and tapering to the apex, (4.5) 5–6 × 2.5–2.9 µm (Fig. 17).

Type of rot. Brown rot.

Specimens examined: Costa Rica, Carara National Park, hardwood, 25.XII.2013 leg. J. Vlasák Jr., det. L. Ryvarden (JV1312/A4-J, GenBank KT156689); the same site, 26.VII.2014 JV 1407/12; 18.IV.2015 JV1504/15 (fertile! PRM 933860).

Remarks: Described in 1839 from St. Vincent Island in Caribbean, this enigmatic species was not described in modern terms until now and the basidiospores were unknown. We have found a log thickly covered with basidiocarps of *F. lignea* in different stages of development and inspected the log in regular intervals 3 times during one and half year. Basidiocarps start in the form of bulbous outgrowths 1 cm in diam to the end of July (Fig. 15), being fully developed and fertile in April next year (Fig. 16), with only rudimentary black crust developed on the pileus very base, however. The basidiocarps and the wood around have now a pleasant lemon smell that is partially retained also in herbarium. The crust is fully exposed from about July, when the basidiocarps appear sterile again and



Fig. 15, 16. *Fomitopsis lignea*, JV 1407/12c and 1504/15a. The same site in July 2014 and April 2015.



Fig. 17. *Fomitopsis lignea*, JV 1504/15c. Fully developed basidiocarp with patches of a black crust.

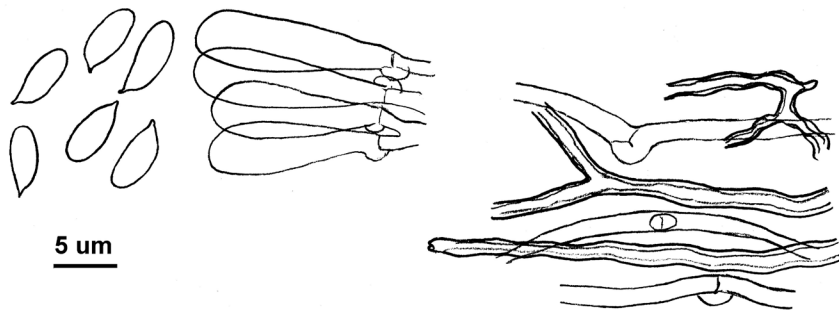


Fig. 18. Basidiospores, basidia and hyphae of *Fomitopsis lignea* JV 1504/15.

start to disintegrate. Some pilei, however, develop a second layer of tubes, which is rudimentary in July and only about 3 mm thick and sterile also in December. There are about ten collections in international herbaria from tropical America including Costa Rica. However, many of them may represent *Perenniporia martia* (Berk.) Ryv., because both Wright (1964) and Lowe (1957) applied the name *Polyporus ligneus* Berk. for *P. martia* (Ryvarden 1972). This is somewhat similar species growing in the same region, producing however abundant, large, dextrinoid, truncate spores (see below). The ITS sequence of *F. lignea* is unique in GenBank showing only distant similarities with sequences of *Antrodia* and *Fomitopsis*.

Melanoporella carbonacea (Berk. & M.A. Curtis) Murrill. Fig. 19

Description: Lowe 1966.

Specimen examined: Costa Rica, Guanacaste Prov., Playa Panamá, inside a split trunk of *Ceiba pentandra*, 1.VIII.2014 J. Vlasák Jr. (JV1408/21-J).

Remarks: The widely-effused basidiomes with deep black and crispy tube layer make the species remarkable. The fungus was described already in 1868 from Cuba and it is widely distributed in Central and South America, but very rarely collected. Except for the black color, it is distinguished by its rather large, dentate pores and brown rot. After 4 months, the fungus was completely disintegrated in our locality.



Fig. 19. *Melanoporella carbonacea*, JV 1408/21-J, in herbarium.



Fig. 20. *Melanoporia condensa* sp. nov., JV 1312/E15-J, holotype.



Fig. 21. *Melanoporia condensata* sp. nov., JV 1407/72-J.

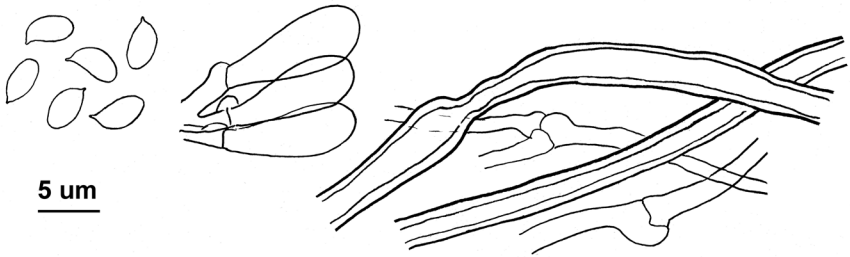


Fig. 22. Basidiospores, basidia and hyphae of *Melanoporia condensata*.

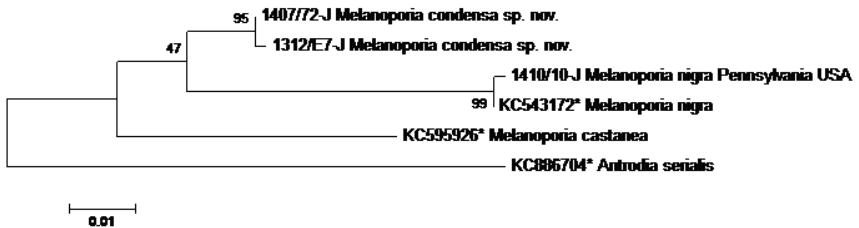


Fig. 23. Phylogenetic relationships of 5 *Melanoporia* taxa inferred from ITS rRNA sequences. Topology from maximum likelihood (ML) analysis. Support values along branches from ML bootstrap (500 replicates). GenBank numbers* indicate sequences retrieved from GenBank; other GenBank numbers in Specimens examined.

Melanoporia condensa Ryvarden & Vlasák, sp. nov. Figs 20–23

Holotype: Costa Rica, Monteverde Area, Santa Elena, El Establo Hotel trails, hardwood, 30.XII.2013 J. Vlasák Jr., JV1312/E15-J (JV, PRM 933857, O, GenBank KT156690, KT156691). Mycobank MB 812839.

Etymology: Referring to thick and dense basidiocarps.

Diagnosis: Basidiocarps pileate, woody, up to 11 cm thick, dark fuliginous brown, with stratified tubes and round pores 6–7 per mm. Hyphal system dimitic with thick-walled, dark brown, dextrinoid skeletal hyphae and hyaline generative hyphae with clamps. Spores ellipsoid, thin-walled, hyaline, IKI, 3–4 × 2–2.5 µm.

Basidiocarps perennial, pileate to effused-reflexed, very large in most cases, up to 30 × 20 cm and 11 cm thick, with up to 30 distinct tube layers(!), in upper part with pileus reflexed to 6 cm, fuliginous brown, woody, upper surface with a black crust, rugose and indistinctly concentrically sulcate in broad bands, margin lighter, dark brown, the pore surface blackish brown, often with bluish tints (Fig. 20, 21). Pores round, 6–7 per mm, with thick, entire dissepiments. Tubes concolorous, distinctly stratified in 2–5 mm thick zones and in total up to 10 cm deep, in older layers stuffed with white mycelium. Context about 1 cm thick, dark purplish brown, fibrous. Hyphal system dimitic, generative hyphae with clamps, hyaline, 2–4 µm wide, skeletal hyphae thick-walled, dextrinoid, dark brown, 2–4.5 µm in diam. tramal hyphae similar.

Cystidia and other sterile hymenial elements absent.

Basidia clavate, 10–13 × 4–5 µm, 4-sterigmate, with a clamp at the base.

Basidiospores ellipsoid, smooth, thin-walled, hyaline, negative in Melzers reagent, 3–4 × 2.0–2.5 µm (Fig. 22).

Additional material examined: Costa Rica, Monteverde Area, Santa Elena, El Establo Hotel trails, hardwood, 29.VII.2014 J. Vlasák, JV 1407/59, the same site as holotype, isotype; other sites around El Establo Hotel, JV 1407/60 (PRM 933858), JV 1407/67; along the road to Cerro Amigos, 29.VII.2014 J. Vlasák Jr., JV 1407/72-J (GenBank KT156692, KT156693).

Remarks: *M. nigra* is macro- and microscopically similar to *M. condensa* which differs by its pileate habit, occurrence in tropical region (*M. nigra* seems to be restricted to eastern USA), somewhat shorter spores that do not exceed 4 µm (quite often so in *M. nigra*) and distinctly different ITS sequence (in 13 positions of ITS1 and 19 of ITS2). The third and last member of the genus, *M. castanea*, is also pileate but it grows only in East Asia, has longer spores and a rather different sequence (Fig. 23). *Nigrofomes melanoporus* (Mont.) Murr. is also quite similar to *M. condensa*, but it has still smaller (8–9 per mm) and more black pores, sessile, applanate pilei with a crust in narrowly sulcate zones, and no clamps on hyphae. *Melanoporia condensa* is surely not rare in the Monteverde cloud forest, as we could find 4 localities in one day. It always grew on a dead wood of very thick trees, probably oaks, because *Daedalea neotropica* was also present on one of them and this species is said to be restricted to oaks.

Oligoporus leucomallus (Berk. & M.A. Curtis) Vlasák comb. nov. Fig. 24

Basionym: *Polyporus leucomallus* Berk. & M.A. Curtis Bot. J. Linnean Soc. 10: 308 (1869). MB 812840



Fig. 24. *Oligoporus leucomallus* comb. nov., JV 1407/66.

Specimens examined: Costa Rica, Monteverde Area, Santa Elena, Bajo del Tigre Trail, hardwood, 28.VII. 2014 J. Vlasák, JV1407/51, El Establo Hotel Trails, 29. VII.2014 J. Vlasák, JV 1407/65 & JV 1407/66 (GenBank KT156695). MycoBank no.: MB 812840.

Description: Gilbertson & Ryvarden et. 1987

Remarks: This well know tropical polypore is quite common in the Monteverde area. For years it has been regarded as a white rot species but our inspection of the wood under fresh basidiocarps revealed a typical brown rot, even if distinct only in deep layers of the wood. This indicates a brown rot species of which *Oligoporus* is the appropriate because the species is close to *O. tephroleucus*, and *O. subcaesius* showing very similar macromorphology, hyphae and spores. Accordingly, we proposed to transfer the species to *Oligoporus*. The ITS rDNA sequence was not yet present in GenBank and it is most related to sequences of brown rot species *O. subcaesius* (A. David) Ryvarden & Gilb. and *Postia pelliculosa* (Berk.) Rajchenberg.

Perenniporia martia (Berk.) Ryvarden. Fig. 25

Description: Ryvarden and Johansen 1980.

Specimens examined: Costa Rica, Monteverde Area, Santa Elena, hardwood, 30.XII.2013 leg. J. Vlasák Jr., det. L. Ryvarden (JV1312/E13-J), 25.IV.2015 J. Vlasák Jr. (JV 1504/111-J, GenBank KT156696). Puerto Rico, Caribbean National Forest, Angelito trail, dead hardwood, 8. VI. 1998 L. Ryvarden, (LR40886, O). St. Vincent, “Polyporus fasciatus Sw. Flora” (K) Lectotype. Venezuela, El Guacharo Cave, hard wood, IX. 2004, leg. J. Kout., det. J. Vlasák (JV0409/29-K)

Remarks: Described from Brazil, the species is widely distributed in South and Central America and in Africa, but it is rare everywhere. Very hard and tough basidiocarps have a black crust on pileus surface contrasting with white context and tubes. Dark violet-brown



Fig. 25. *Perenniporia martia*, JV 1312/E13-J.



Fig. 26. *Perenniporiella neofulva*, JV 1407/7.

spots often appear on pores and in the context. Large dextrinoid spores with tapering end, pip-shaped or sub-truncate, are also very characteristic. Argentina specimens in GenBank and our specimens from Venezuela and Costa Rica show rather variant sequences, the specimens from Costa Rica being the most distant to GenBank specimens (10 base changes in ITS region). The specimens of *P. martia* from Asia show even more different sequence. Larger set of collections from different countries have to be studied to decide if more species are involved.

Perenniporiella neofulva (Lloyd) Decock & Ryvar den

Fig. 26

Description: Ryvar den 1990, Decock & Ryvar den 2003

Specimens examined: Costa Rica, Carara Nat. Park, hardwood, 26.VII.2014 J. Vlasák, JV 1407/7 (GenBank KT156697).

Remarks: New species record for Costa Rica. Flat, sessile to decurrent pilei, light yellow or light brownish orange, and very small pores (only 8–9 per mm in our collection) characterize this species. The globose, somewhat thick-walled and sub-angular spores 3–4 µm in diam, indistinctly dextrinoid, and arboriform vegetative hyphae are also determining. The hyphae in the context show strikingly short and broad (5–6 µm) stems from which the tapering skeletal are branching in all directions, what is also characteristic. The species was described in 1915 from Brazil where most of the collections come from, some of them sequenced. The sequence of our specimen is identical.

Pyrofomes lateritius (Cooke) Ryvar den

Fig. 27

Description: Wright et al. 1996.

Specimen examined: Costa Rica, Monteverde Area, Santa Elena, El Establo hotel Trails, hardwood, 31.XII.2013 leg. J. Vlasák Jr., det. L. Ryvar den (JV1312/E17-J, GenBank KT156700).

Remarks: Conspicuous, large, light orange-brown, pileate polypore, brick red inside. Microscopic structures similar as in *Perenniporia*. It occurs in the whole South and Central America but it seems to be quite rare. On the locality, the fungus developed about ten pilei on a 2 m long band of dead wood in the living tree. After one and half year, it looked absolutely unchanged, which is very uncommon for tropical polypores. The ITS sequence is unique in GenBank showing only very distant similarities with *Perenniporia truncatospora* (Lloyd) Ryvar den and *Pyrofomes demidoffii* (Lév.) Kotl. & Pouz.



Fig. 27. *Pyrofomes lateritius*, JV 1312/E17-J.

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Some basidiomycetes (Aphylophorales) from Mexico

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Abstract

85 species from Corticiaceae (s. lato), one from Cyphellaceae, two from Ganodermataceae, 19 from Hymenochaetaceae, 53 from Polyporaceae (s. lato), three from Thelephoraceae and 10 heterobasidiomycetes are reported from Mexico, out of which many are new to Mexico. *Inonotus mexicanus* Ryvarden, *Ceriporiopsis dentata* Ryvarden and *Perenniporia duplexa* Ryvarden are described as new species.

Introduction

One of us (LR) was in 1978 kindly invited by the late Dr. G. Guzman at the University of Xalapa, Mexico, to join a student excursion in the southeastern part of Mexico. This was a successful excursion covering different localities from coniferous forests in the interior, to lowland localities at the coast. Totally 551 collections were made, and the results are given in the following with Dr. S. Spirin being responsible for the corticoid species and the Heterobasidiomycetes, while L. Ryvarden has determined the polypores. A number of Heterobasidiomycetes will later be treated in a separate paper.

The collections were made at the following localities and where the collection number will tell where the specific specimens were collected.

Coll. 22993- 23168:

Loc 1. Vera Cruz State, Cofre de Perote, Mpio de Mexico, Los Gallos, 2850 m a.s.sl., forest with *Pinus* –*Abies*, 18-19. September 1985.

Coll. 23169 – 23209:

Loc. 2. Tlaxcala State, Parada de Conejo, 2600 m forest with *Pinus* and *Abies*, 21. September 1985,

Coll. 23210 – 23342:

Loc 3. Tlaxcala State Jardin Botanica, Xalapa, Vera Crux., 22. September 1985,

Coll. 23341 – 23430:

Loc 4. Vera Cruz State, Actopanm La Mancha, 23. Septemer18 1985.

Coll 23431 – 23503:

Loc. 5. Vera Cruz. State, Barranco de Pescado, road Xalapa-Huatusco by fork to Jalcomulco, 26. September 1985 550 m.

Coll- 23504 – 23544:

Loc. 6. Vera Cruz State, Cerca de Axocopan, km 2 road Tortula-Xalapa, 27. September 1350 m.

List of species are arranged alphabetically by genus within each taxonomic unit. Since all collections were made by one of us (L. R.), this is not indicated for each collections. Further, since all collections are registered within the 23000 thousand bracket, the digits 23 are not repeated except for the 7 collections numbered from 22993-22999. All specimens are deposited in the Oslo Herbarium (O) while isotypes are deposited as indicated under each new taxon.

Homobasidiomycetes

Corticiaceae

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P. laevis (Fr.) J. Erikss. & Ryvarden coll., *Quercus* 181.
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T. kavinioides B. de Vries, 323^a, 325A.
T. minuta K. H. Larss., 265.
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T. calothrix (Pat.) Donk, *Pinus patula* 133.
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C. fonsecoensis Cooke & Bonar 203, new to Mexico.
C. perennis (L.: Fr.) Murrill, 168.
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Hydnochaete olivacea (Schwein.) Banker, *Quercus* 176.
Hymenochaete legeri Parmasto, 284.
H. pinnatifida Burt, 239.
Inonotus leporinus (Fr.) P. Karst 172, new to Mexico.
Inonotus splitbergeri (Mont.) Ryvarden 211, new to Mexico.

Inonotus mexicanus Ryvarden, nov. Sp.

Holotype: Mexico, Vera Cruz State, Cofre de Perote, Mapio de Xico, Los Callos., 2800 m asl, 18 September 1985, L. Ryvarden 23154, on *Alnus* sp., O. Index Fungorum 552276.

Basidiocarps pileate, sessile to slightly dimidiate, semicircular in outline, up to 8 cm wide and 4 cm wide, up to 1.5 cm thick at base, soft when fresh, dense and hard and brittle when dry, margin sharp, pileus dark rust brown radially coarsely fibrous and slightly concentrically zoned, pore surface dark rusty brown, pores angular, irregular, 1-3 per mm, in parts sinuous and almost daedaleoid, tubes concolorous with pore surface, layer up to 5 mm deep, context cinnamon and dense, lighter in colour than tubes, 1-1.5 mm thick;

Hyphal system monomitic; generative hyphae hyaline to rusty brown, thin- to thick-walled, 3-8 μm wide.

Hymenial setae 15-40 x 5-10 μm , dark brown, ventricose, rare to abundant, straight often with a bent and elongated base,

Basidia 14-16 x 6-7 μm , broadly clavate, tetrasterigmatic, simple septate at the base.

Basidiospores 6 x 3 μm , ellipsoid, hyaline to pale yellowish with age,

Substrata. Dead hardwood log.

Distribution. Known only from the type locality.

Remarks. Macroscopically the species reminds one of *I-xanthoporus* Ryvarden, which however has regular pores (5-6 per mm) and smaller spores 4-5 x 3-3.5 μm .

Phellinus baccharidis (Pat) 364, new to Mexico.

P. contiguus (Fr.) Pat.347, new to Mexico.

P. ferreus (Pers.) Bourdot & Galzin, 176, new to Mexico.

P. gilvus (Schw.) Pat., 387.

P. maxonii (Murrill) Reid 337, new to Mexico.

P. nigrolimitatus (Romell) Bourdot & Galzin 023, new to Mexico.

P. rimosus (Berk.) Pilat, 369. 427.

P. ruftinctus (Cooke) Pat. 415, new to Mexico.

Phylloporia spathulata (Lev.) Ryvarden, 480.

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Bjerkandera fumosa (Pers.:Fr.) P. Karst. 267, 314.

Boletopsis leucomelaena (Pers.) Fayod 207.

Ceriporia ferruginicincta (Murrill) Ryvarden 385.

C. xylostromatoides (Berk.) Ryvarden 391, new to Mexico.

Ceriporiopsis cfr. *rivulosus* 116.

Ceriporiopsis dentata Ryvarden, nova species,

Holotype: Mexico, Vera Cruz State, Cofre de Perote, Mapio de Xico, El Revolcadera, 2800 m asl, 18 September 1985, on *Pinus patula*, L. Ryvarden 23116 O. Index Fungorum 552277.

Basidiocarp resupinate, pore surface dark ochraceous, reticulate to coarsely poroid, pores irregular, angular 1-2 mm wide, arising as individual protuberances that soon grow together to form the pores, up to 1 mm deep, context up to 200 μm loose in consistency.

Hyphal system monomitic; generative hyphae with clamps, 3-6 μm wide in the subiculum, 2-5 μm wide in the trama,

Cystidia absent.

Basidia 15-22 x 4-6 μm , tetrasterigmatic.

Basidiospores 5-6 x 4.5-5 μm , oblong-ellipsoid to subglobose, hyaline, thin-walled,

Substrata. On dead log of *Pinus patula*.

Distribution. Known only from the type locality

Remarks. The species is characterized by the large irregular pore surface becoming almost hydroid by age.

Further, there are few *Ceriporiopsis* species known from coniferous hosts.

Dichomitus setulosus (Henn.) Masuka & Ryvarden 377A, new to Mexico.

Diplomitoporus overholtsii Gilbn. & Ryvarden 311, new to Mexico.

D. venezuelicus Ryvarden & Iturr. 357, new to Mexico.

Earliella scabrosa (Pers.) Ryvarden & Gilbn. 409.

Fistulina radicata (Schw.) 428.

Fomitella supina (Sw.:Fr.) Murrill 517.

Hexagonia glabra (Beauv.) Ryvarden 376B.

H. hydroides (Fr.) Fidalgo 377B.

Junghuhnia collabens (Fr.) Ryvarden 158, new to Mexico.

J. subundata (Murrill) Ryvarden 508, new to Mexico.

J. polycystidifera (Rick) Rajchenb. 372, new to Mexico.

Nigroporus vinosus (Berk.) Murrill 246.

Oligoporus caesius (Fr.) Gilb. & Ryvarden, *Abies* 192.

O. floriformis (Quel) Gilb. & Ryarden 214, new to Mexico.

O. fragilis (Fr.) Gilbn. & Ryvarden 213.

O. hibernicus (Berk.) Ryvarden, *Pinus patula* 146, new to Mexico.

O. lowei (Pilát) Ryvarden & Gilb. 202, new to Mexico.

Oxyporus cuneatus (Murrill) Aoshima 164.

O. obducens (= *O. similis*) (Pers.) Donk 145.

Pachykytospora papyracea (Schw.) Ryvarden, 070B.

Perenniporia duplexa Ryvarden nov. sp.

Holotype: Mexico, Estado Vera Cruz, Xalapa, Jardín Botánico, 22 Sept. 1985, hard wood log, L. Ryvarden 23293 (O). Index Fung. 552278.

Basidiocarps annual, pileate, imbricate in the holotype, semicircular and broadly attached, 1 cm wide, 2 cm long and 2 mm thick at the base, flexible when fresh, slightly tougher when dry, upper surface finely adpressed tomentose in sulcate concentric zones, ochraceous to cream coloured in younger marginal part, greyish white in older parts towards the base, margin sharp and wavy, pore surface white to pale cream coloured, pores round, 7-8 per mm and almost inviable to the naked eye, tubes concolorous, up to 1 mm deep, context 1 mm thick, duplex, lower part pale cinnamon, darker than the tubes, separated from the pileus tomentum by a thin dark distinct line

Hyphal system dimitic; generative hyphae with clamps, hyaline, thin- to distinctly thick-walled, 2-4 μm wide, skeletal hyphae 3-6 μm wide, thick-walled, sinuous and mostly unbranched, strongly dextrinoid.

Cystidia absent.

Basidia clavate, 12-14 x 3-5 μm and tetrasterigmatic.

Basidiospores 5-6 μm in diameter, globose, smooth, hyaline and negative in Melzers reagent.

Distribution. Known only from the type locality, but do certainly have a wider distribution.

Substrate: Unknown hard wood log.

Remarks. The duplex context, tomentose to velutinate pileus, tiny pores and globose non dextrinoid spores characterize this species.

Perenninporia aurantiaca (David & Rajchenb.) Decock & Ryvarden 352, new to Mexico.

P. alboincarnata (Pat.) Decock 360, new to Mexico.

P. cremeopora Decock & Ryvarden 312, new to Mexico.

P. medulla-panis (Jacq.:Fr.) Donk 236.

P. ohiensis (Berk.) Ryvarden coll. 460.

Polyporus alveolaris (DC.:Fr.) Bonartsev & Singer 175 .

P. squamosus Huds.:Fr. 174.

Pseudofavolus cucullatus (Mont.) Pat. 382..

Rigidoporus microporus (Fr.) Overeem 375.

Schizopora flavipora (Cooke) Ryvarden coll., *Quercus*, 070C, 159.

S. paradoxa (Schrad.:Fr.) Donk, 313.

S. radula (Pers.:Fr.) Hallenb., 327.

Sidera lenis (P. Karst) Miettinen, 150, new to Mexico.

S. vulgaris (Fr.) Miettinen 339.

Skeletocutis alutacea (J. Lowe) J. Keller, on *Pinus* needles, 134. New to Mexico.

S. amorphia (Fr.) Kotl. & Pouzar 117.

Trametes maxima (Mont.) David & Rachjenb. 516.

T. pavonia (Hooker) Ryvarden,

T. villosa (Fr.) Kreisel, 408.

Trichaptum abietinum (Fr.) Ryvarden 060.

T. bifforme (Fr. in Kl.) Ryvarden 163.

T. perrettottii (Lev.) Ryvarden 484.

T. sector (Ehrenb.:Fr.) Kreisel 521.

Tyromyces fumidiceps G.F. Atk. 289.

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B. obscurum (G.W. Martin) L.D. Gómez, Kisim.-Hor. & Oberw., *Pteridium*, 274, 276.

B. rimosum (H.S. Jackson & G.W. Martin) Luck-Allen, 403.

B. spinosum (L.S. Olive) Wojewoda, *Pinus patula*, 131, *Cyathea*, 324.

Bourdotia petiolata (D.P. Rogers) K. Wells, 251.

Exidiopsis candida (L.S. Olive) K. Wells, 456.

E. endoramifera P. Roberts, 282.

E. mucedinea (Pat.) K. Wells, 277, 295, 301.
Heterochaete microspora Burt, 440.
H. minuta Pat., 395, 430.
H. sanctaecatharinae Möller, 233.
H. sanctaemartae Bodman, 296, 305, 321.
H. shearii (Burt) Burt, 257, 258, 260, 308, 454.
Heterochaetella dubia (Bourdot & Galzin) Bourdot & Galzin, *Abies*, 195.
Myxarium crystallinum D.A. Reid, 544.
Patouillardina cinerea Bres., 351, 366.
Saccoblastia sphaerospora Möller, 431, 458.

Uredinales

Pucciniastrum pyrolae (J.F. Gmel.) J. Schröt., 23993 on *Chimaphila ubellata* (L.) Barton.

Acknowledgements

Dr. J. Cifuentes Blanco, Universitaria Nacional Autonoma de Mexico, Mexico City has kindly sent us the updated checklist of fungi from Mexico, a most helpful tool for determination of what we could report as new species from the country.

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Some new species from tropical America

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Abstract

Inonotus pusillosporus Ryvarden, *Bjerkandera mikrofumosa* Ryvarden, *Ceriporiopsis allantosporus* Ryvarden and *Ceriporiopsis irregularis* Ryvarden are described as new species and keys to their respective genera in the Neotropical zone, are provided.

Introduction

Over many years there has been a box named “Neotropical problems” on my desk. From time to time its content has been re-examined and its number of specimens have slowly decreased. However, a small number has resisted all efforts to be identified, and thus, they are described in the following as new species.

Inonotus pusillosporus Ryvarden, nov. sp.

Holotype: Brazil, Sao Paulo, Campinas Moji-u, Fazenda Campina. 29. January 1982, on unknown hard wood log, Ryvarden 24562 (O), SP 213360 (SP).

Index Fungorum 552296.

Basidiocarps resupinate, widely effused, up to 10 cm wide and long in the holotype, up to 3 mm deep measured vertically along the tubes, soft when fresh, hard and fragile as dry, pore surface dark brown, 6-8 pores per mm, tubes up to 3 mm deep, concolorous with pores surface, context 500 µm thick, dense homogenous and with a black thin line, up to 50 µm thick towards the substrate.

Hyphal system monomitic, generative hyphae with simple septa, hyaline to rusty brown, 3-5 µm wide.

Setae and setal hyphae absent.

Basidia not seen.

Basidiospores numerous, globose, 3-4 µm in diameter, hyaline, negative in Melzers reagent.

Substrate: Hard wood log.

Distribution: Known only from the type locality.

Remarks. The species comes close to *I. costaricensis* but is easily separated by smaller spores.

Key to resupinate Neotropical *Inonotus* species

1. Hymenial setae and setal hyphae absent 2
1. Hymenial setae and setal hyphae present 4
2. Pores 3-4/mm, basidiospores ellipsoid 5-6 x 4.5-5 μm **I. venezuelicus**
2. Pores 6-8 per mm, basidiospores globose **3**
3. Spores 5.5-6.5 μm in diam **I. costaricensis**
3. Spores 3-4 μm in diameter **I. pusilloporus**
4. Basidiospores 10-13 x 8-12 μm **I. micantissimus**
4. Basidiospores globose and smaller **5**
5. Basidiospores 7-8 μm in diam, margin thin to absent **I. adnatus**
5. Basidiospores 4.5-5 μm in diam, margin sharp and distinct **I. marginatus**

Bjerkandera mikrofumosa Ryvarden nov. sp.,

Holotype: Venezuela, Estado Aruga, Choroni, 400 m.a.s.l. 5. February 2006, on dead hard wood log, L. Ryvarden 47468 (O). Index. Fungorum 552 297.

Basidiocarps annual, pileate, broadly attached and semicircular, 1 cm wide, 2 cm long and 2 mm thick at the base, flexible when fresh, hard when dry, upper surface ochraceous, finely floccose, fluffy to fibrous in radial direction, azonate, soft to touch, pore surface deep ochraceous, pores round, 8-10 per mm and invisible to the naked eye, tubes concolorous, up to 1 mm deep and with a distinct dark line between bottom of pores and the context, the latter 1 mm thick, homogeneous, ochraceous, and of lighter colour than the tubes.

Hyphal system monomitic; generative hyphae with clamps and with a few scattered simple septa, hyaline, thin- to distinctly thick-walled, 2-4 μm wide.

Cystidia absent.

Basidia 12-14 x 3-5 μm , clavate and tetrasterigmatic.

Basidiospores 3.5-4.5 x 2.2-2.5 μm , ellipsoid, smooth, hyaline and negative in Melzers reagent.

Distribution. Known only from the type locality in Venezuela, but easily overlooked because of its rather tiny basidiocarps.

Substrate: Unknown hard wood log.

Remarks. The species is characterized by its fine fluffy to fibrous ochraceous pileus, the dark line separating the tubes from the context, the tiny pores and the small spores.

Key to Neotropical species

1. Pore surface and tubes buff to isabelline (ochre); context thick, with a brown zone at the base of the tubes and darker than the latter 2
1. Pore surface and tubes dark smoky grey to blackish; context thin, with a grey to black zone at the base of the tubes, concolorous with the latter **B. adusta**
2. Basidiospores 5.5-7 x 2.53.5 μm **B. fumosa**
2. Basidiospores 3.5-4.5 x 2.2-2.5 μm **B. microfumosa**

Ceriporiopsis allantosporus Ryvarden nov. sp.

Holotype: Colombia, Dept. Magdalena, Parque Nacional Tayrona, Estacion Canaveral, about 30 m.a.s.l., 14. June 1978, Leg. L. Ryvarden 15826 (O).

Index Fungorum 552 300.

Basidiocarps annual, resupinate, adnate, up to 4 x 4 cm and 2 mm thick, margin almost absent, pore surface deep ochraceous, pores angular with entire dissepiment, slightly irregular, 1-4 per mm, tubes concolorous, up to 1 mm deep, context white, cottony about 1 mm deep.

Hyphal system monomitic; generative hyphae with clamps, hyaline, thin- to distinctly thick-walled, 2-4 μm wide,

Cystidia absent.

Basidia clavate, 12-14 x 3-5 μm and tetrasterigmatic.

Basidiospores 3-4.2 x 0.8-1 μm , allantoid, smooth, hyaline and negative in Melzers reagent.

Distribution. Known only from the type locality in Colombia, but do certainly have a wider distribution.

Substrate- Hard wood log.

Remarks. The thin-walled angular pores and the small allantoid basidiospores characterize this species.

Ceriporiopsis irregularis Ryvarden,

Holotype: Venezuela, Estado Miranda, Tacata área, Rio Tacata, 14. June 2003, on trunk of dead hard wood, Leg. L. Ryvarden 45711 (O). Index Fungorum 552298..

Basidiocarps annual, resupinate, adnate, up to 4 x 5 cm and 2 mm thick, margin almost absent, soft and waxy when fresh. Contracted and hard with slightly lifted margins when dry, pore surface deep ochraceous, pores angular with entire dissepiment, irregular, 1-4 per mm some even 2 mm wide, dissepiments white and very finely fimbriate (lens), tubes concolorous, up to 2 mm deep, context dense and cartilaginous, up to 200 μm thick.

Hyphal system monomitic; generative hyphae with clamps, hyaline, thin- to distinctly thick-walled, 2-4 μm wide, mixed with numerous irregular crystal druses.

Cystidia absent.

Basidia clavate, 12-18 x 4-6 μm and tetrasterigmatic.

Basidiospores 5-6.5 x 1-1.2 μm , allantoid, smooth, hyaline and negative in Melzers reagent.

Distribution. Known only from the type locality

Substrate: unknown hard wood log.

Remarks. The thin-walled irregular angular pores, the dense basidiocarp, especially the cartilaginous context and the long narrow allantoid basidiospores characterize this species.

Key to Neotropical species of *Ceriporiopsis*

- 1. Pores 6-8 per mm2
- 1. Pores larger8

- 2. Basidiospores cylindrical to allantoid3
- 2. Basidiospores ellipsoid to subglobose4

- 3. Basidiospores allantoid 3.5-5 x 1-1.2 μm **C. loweii**
- 3. Basidiospores cylindrical 3 - 3.5 x 1.5-1.7 μm **C. lagerheimii**

- 4. Spores subglobose 5-6 x 4.5-5 μm , pore surface cinnamon **C. cinnamomea**
- 4. Spores smaller, pore surface differently coloured5

- 5. Pore surface deep brown to vinaceous6
- 5. Pore surface whitish to yellowish7

- 6. Pore surface deep vinaceous, becoming black by drying, cystidia absent..... **C. vinosa**
- 6. Pore surface deep brown, hyaline cystidia present in hymenium **C. obscura**

- 7. Basidiospores subcylindrical 3.5-4.5 x 2-2.5 μm **C. jensenii**
- 7. Basidiospores ellipsoid, 3-3.5 x 2-3 μm **C. flavilutea**

- 8. Basidiospores subcylindrical, 8-10 x 3-4.5 μm **C. cerrusata**
- 8. Basidiospores shorter, variously shaped9

- 9. Pores irregular, up to 3 per mm becoming daedaleoid to sinuous 10
- 9. Pores more or less angular to round and smaller 13

- 10. Basidiospores allantoid 11
- 10. Basidiospores ellipsoid 12

- 11. Basidiospores 3-4.2 x 0.8-1 μm **C. allantosporus**
- 11. Basidiospores 5-6.5 x 1-1.2 μm **C. irregularis**
- 12. Basidiospores 3-4 μm long, pores irpicoid to daedaleoid, 1-2 per mm...**C. latemarginata**
- 12. Basidiospores 4-5 μm long, pores round to angular, in parts split 2-3 per mm
..... **C. balaenae**

13. Basidiospores subglobose	14
13. Basidiospores ellipsoid to cylindrical	15
14. Basidiospores 2.5-3.5 x 2-2.5 μm	C. mucida
14. Basidiospores 5-6 x 4-5 μm see	Obba rivulosa
15. Smooth, tubular cystidia present, basidiospores cylindrical, 5-6 x 2.5-3.5 μm	C. cystidiata
15. Cystidia absent, basidiospores ellipsoid, 3.5-4.5 x 2.5-3 μm	16
16. Basidiospores slightly amyloid, pore surface white	C. myceliosa
16. Basidiospores non amyloid, pore surface ochraceous to pale brown	17
17. Pore surface brown (reminding of a <i>Phellinus</i> spp.).....	C. umbrinescens
17. Pore surface pale ochraceous	C. costaricensis

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A note on the genus *Tyromyces* in tropical America

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Abstract

Tyromyces angulatozona Ryvarden, *Tyromyces costaricensis* Ryvarden, *Tyromyces diffusus* Ryvarden and *Tyromyces spatulata* Ryvarden are described as new and a key to Neotropical species in the genus is provided.

Introduction

Over many years there has been a box named “Neotropical *Tyromyces*??” on my desk. From time to time its content has been re-examined and its number of specimens has slowly decreased. However, a small number has resisted all efforts to be identified, and thus, they are described as new species.

Tyromyces angulatozona Ryvarden nov. species. sp.

Holotype: Colombia, Antioquia, Caldas, Finca Himalaya, 1700 m.a. s. l. 25. June 1978, on hard wood log, Ryvarden 16584 (O). Index Fungorum 552279.

Basidiocarp sessile, annual, dimidiate, pilei 3 x 3 cm and up to 0.8 cm thick at the base, flat when fresh, slightly curled and contracted when dry, upper surface pale brown, matted, adpressed velutinate to irregularly finely rugulose, azonate, pore surface white when fresh, pale ochraceous when dry, pores thin-walled, angular, 1-3 per mm, some even up to 2 mm wide in the dry holotype, tubes concolorous, up to 3 mm deep, context duplex, lower part dense and ochraceous and coherent with pore tubes, 200 -300 μ m, upper context up to 0.5 cm, very pale brown and of cottony consistency and without separating dark line towards the lower part.

Hyphal system monomitic, generative hyphae with clamps, 3-8 μ m wide in the trama, in the context 5-9 μ m wide and thick walled in 3 % KOH.

Gloeocystidia present, smooth, hyaline, thin walled and irregular of outline, 15-40 x 6-16 μ m, IKI negative.

Basidia 15-20 x 5-8 μ m, tetrasterigmatic and with basal clamp.

Basidiospores globose, 4-5 μ m in diameter, some 4-5 x 3.5-4.5 μ m, smooth, thin walled and negative in Melzers agent.

Substrata. Unknown hard wood tree.

Distribution. Only known from the type locality in Colombia.

Remarks. The species is similar to *T. semilimitatus*, which however has much smaller pores, i.e. 6-8 per mm and is lacking gloeocystidia.

Tyromyces costaricensis Ryvarden nov. sp.

Holotype: Costa Rica, San Gerardo de Dota, 2000 m.a.s.l. 1. July 2000, L. Gomez 24243 (O), isotype in CR. Index Fungorum 552280.

Basidiocarp annual, dimidiate to flabelliform to slightly fan shaped, 1 cm wide, up to 3 cm long and 1.5 mm thick at base, pileus white when fresh, ochraceous when old, glabrous, slightly radially striate with irregular radial veins to scurpouse with some pointed tips, pore surface white when fresh, pale ochraceous when dry, pores round to slightly angular (lens) 7- 8 /mm, tubes concolorous, up to 1 mm deep, context with a thin dark line next to the tubes, otherwise white and dense.

Hyphal system monomitic, generative hyphae with clamps, 2-3.5 μm wide and thin walled in the trama, in the context 5-10 μm wide and with up to 2 μm wide walls in 3 % KOH.

Cystidia absent.

Basidia 12-15 x 4-7 μm , tetrasterigmatic and with basal clamp.

Basidiospores cylindrical to oblong ellipsoid, 4.5-5 x 2-2.5 μm , smooth, thin walled and negative in Melzers agent.

Substrata. Unknown hard wood tree.

Distribution. Known from Costa Rica.

Remarks. The species is similar to *T. caesioflavus*, which however, has smaller and narrower, allantoid spores (3-4.5 x 1-1.5 μm).

Specimen examined: Costa Rica, San Jose prov. El Alto de Cabeza, 13 November 1929, leg. C. W. Dodge, ex BPI.

Tyromyces diffusus Ryvarden nov. sp.

Holotype: Venezuela, Estado Miranda, Mt. Avila above Caracas, 2100 m.a.s.l. On dead hard wood log, 2. February 2006, Ryvarden 47327 (O). Index Fungorum 552281.

Basidiocarp annual, effused reflexed to fan shaped with contracted base, pilei 1 x 1 cm and up to 1.5 mm at the base, the effused resupinate part p to 1-2 cm wide and 2 mm thick, soft when fresh, rigid and fragile when dry, upper surface ochraceous, dull, azonate, adpressed velutinate in parts, glabrous towards the margin, pore surface probably white when fresh, ochraceous when dry, pores thin-walled, angular, 1-3 per mm, some even up to 2 mm wide in the dry holotype, tubes concolorous, up to 1.5 mm deep, context dense, ochraceous and homogenous, 200 -300 μm thick .

Hyphal system monomitic, generative hyphae with clamps, 3-5 μm wide, distinctly parallel in both trama and context.

Basidia 15-20 x 5-8 μm , tetrasterigmatic and with basal clamp.

Basidiospores ellipsoid, 4.5-5 x 2.5- 3 μm , smooth, thin walled and negative in Melzers agent.

Substrata. Unknown hard wood tree.

Distribution. Only known from the type locality in Colombia.

Remarks. The species is similar to *T. xuchilensis*, which however has smaller spores, i.e. 3.5-4.5 x 2.5- 3.5 μm . *T. pseudoacteus* has almost the same type of spores as *T. diffusus*, but has much smaller pores, i.e. 4-6 per mm.

Tyromyces spatulatus Ryvarden nov. sp.

Holotype: Costa Rica, San Jose, C. W. Dodge, 9. November 1929, host unknown, in herb O. Index Fungorum 552295.

Basidiocarp spatulate to fanshaped, up to 4 cm wide and long along the margin of individual basidiocarps, 2-5 mm thick, probably soft when fresh, hard and fragile when dry, upper surface strongly radially veined and with concentric bands, pale ochraceous in bands with a black cuticle shining through the radially veined bands of tufted hyphae, as if the surface has been slightly weathered or degraded, margin sharp and thin, pore surface pale straw coloured, pores 1-4 per mm, irregular and angular, in parts collapsed and flattened, probably by the collecting, dissepiments finely hairy or penicillate, tubes concolorous, up to 2 mm deep, context black, dense, in parts exposed as a cuticle on the pileus, about 1 mm thick.

Hyphal system monomitic, generative hyphae with clamps, 3-8 µm wide, clamps conspicuous and some present as an open ring and then up to 10 µm wide.

Cystidia absent.

Basidia 12-18 x 5-7 µm, tetrasterigmatic and with basal clamp.

Basidiospores ellipsoid, 4-5 x 2.5-3 µm, smooth, thin walled and negative in Melzer's agent.

Substrata. Unknown presumably a hard wood tree.

Distribution. Only known from the type locality in Costa Rica.

Remarks. This is a striking species with its distinct fan shaped basidiocarps with a veined ochraceous surface where a black cuticle is shining through and the black dense context, fresh specimens are desirable to have a complete description of it from nature. The holotype gives an impression of having been flattened in the drying process.

Key to Neotropical species of *Tyromyces*

- 1. Basidiocarps stipitate, semistipitate to pendant **Key A**
- 1. Basidiocarp sessile, dimidiate to spatulate **2**
- 2. Spores allantoid to cylindrical **Key B**
- 2. Spores globose to ellipsoid **Key C**

Key A

- 2. Pileus warm chocolate brown or cinnamon **3**
- 2. Pileus differently coloured **4**
- 3. Basidiospores allantoid, pileus warm chocolate brown **T. polyporoides**
- 3. Basidiospores broadly ellipsoid to subglobose, pileus cinnamon **T. cinnamomeus**
- 4. Basidiocarps distinctly reddish, basidiospores shorter than 8 µm in longest dimension.. **5**
- 4. Basidiocarps differently coloured **6**

5. Basidiospores 8-10 μm long **T. aquosus**
 5. Basidiospores 4.5-5 x 2-2.5 μm **T. costaricensis**
6. Basidiocarp pendant, basidiospores subglobose 4-5 x 3.5-4.5 μm **T. navarrii**
 6. Basidiocarp flabellate to semistipitate basidiospores oblong ellipsoid 6-8 μm long
 **T. singeri**

Key B

Basidiospores allantoid to cylindrical

1. Gloeocystidia present **T. hypocitrinus**
 1. Gloeocystidia absent **2**
2. Context duplex, lower part cinnamon, upper part white **T. duplex**
 2. Context homogenous, white to ochraceous **3**
3. Basidiospores 5-6 μm long, pores 3-4 per mm, bulbous cystidia present in the
 dissepiments **T. nodulosus**
 3. Basidiospores shorter than 5 μm , pores 4-9 per mm, cystidia absent in the dissepiments
 **4**
4. Pileus pale reddish to dark brown, pores 4-7 per mm **5**
 4. Pileus surface whitish to pale yellow, pores 7-9 per mm **7**
5. Pileus strigose by bundles of stiff dark brown hairs **T. neostrigosus**
 5. Pileus adpressed velutinate to glabrous **6**
6. Pileus pale reddish brown, basidiospores 4-4.5 x 1.5-2 μm wide **T. preguttulatus**
 6. Pileus chocolate brown, basidiospores 3-4 x 1.2-1.5 μm **T. americanus**
7. Pileus velvety to tomentose, basidiocarps 1-2 cm thick **T. leucomallus**
 7. Pileus glabrous, basidiocarps rarely more than 3 mm thick **8**
8. Spores allantoid 3-4.5 x 1-1.5 μm **T. caesioflavus**
 8. Spores cylindrical to oblong ellipsoid 4.5-5 x 2-2.5 μm **T. costaricensis**

Key C

Basidiospores ellipsoid to globose

1. Basidiocarps contracting strongly and become dense and resinous with drying **2**
 1. Basidiocarps not contracting and becoming dense and resinous by drying **3**

2. Upper surface hirsute to velvety, whitish to ochraceous grey, basidiospores 5-5.5 x 4-4.5 μm	T. subgiganteus
2. Upper surface glabrous, dirty white to pink, basidiospores 3.5-4.5 x 2.5-3.2 μm	T. venustus
3. Context duplex with or without a dark line	4
3. Context homogenous	6
4. Pores 1-3 per mm, gloeocystidia present	T. angulatoportia
4. Pores 7-10 per mm, gloeocystidia absent	5
5. Pores 7- 9 per mm, a dark resinous zone separating upper and lower part.....	T. limitatus
5. Pores 8-12 per mm	T. semilimitatus
6. Upper surface white to grey becoming beige to pale reddish brown, soon glabrous, strong odour of anise when fresh and becomes brown when bruised in fresh condition	T. atroalbus
6. Upper surface white to cream or ochraceous, no distinct smell of aniseed when fresh and more or less unchanged when bruised in fresh condition	7
7. Pileus glabrous, basidiospores globose 4-5 μm in diameter	T. oxyporoides
7. Pileus velvety to tomentose or scrupose, may become glabrous with age, basidiospores ellipsoid	8
8. Pores 1-3 per mm	10
8. Pores smaller	9
9. Upper surface white and silky velvety, pores angular 3-5 per mm, basidiospores 3.5-4.5 x 2.5-3.5 μm	T. xuchilensis
9. Upper surface white to cream, tomentose to scrupose, becoming glabrous in parts, pores round to angular, 4-6 per mm, basidiospores 4-5 x 2.5-3.5 μm	T. pseudolacteus
10. Context black and dense, pileus radially fibrous	T. spatulata
10. Context ochraceous, pileus velutinate.....	T. diffusus

Some Basidiomycetes (Aphyllphorales) from Namibia

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Abstract

17 basidiomycetes (Aphyllphorales) are reported from Central Namibia and *Ceriporiopsis namibiensis* Ryvarden is described as a new species.

Introduction

In 2014 I had the opportunity to make a preliminary collection of wood-inhabiting fungi in an area close to Otjiwango in the central part of the country. Even if the conditions were far from optimal due to a rather dry spell in the weather, some collections were made and the results are given below. The mycota of Namibia is virtually unknown, which partly is due to the sparse vegetation in the country and its dry climate in general. All collections are within the Ryvarden number bracket 49331-386, thus only the three last digits are given behind each collection.

The following localities were visited:

Otjiwango, 19. January 2014, coll. 49331-55.

Waterberg Lodge, 20-21. January 2014, coll. 49356-86.

All specimens are deposited in the Oslo Herbarium (O).

List of species

Corticiaceae:

Hyphoderma corymbata G. Cunningh., 385.

Porostereum spadiceum (Fr.) Hjortst. & Ryvarden, 380.

Phanerochaete chrysosporium Burds., 340.

Radulomyces confluens (Fr.) M. P. Chr., 381.

Scytinostroma durisculum (Berk. & Broome) Donk, 343, 362.

S. portentosum (Berk. & MA. Curtis) Donk, 358.

Subulcystidium longisporum (Pat.) Parmasto, 369.

Ganodermataceae

Amauroderma sericatum (Lloyd) Wakefield, 371.

Hymenochaetaceae

Phellinus rimosus (Berk.) Pilat, 355.

Polyporaceae

Corioloopsis strumosa (Fr.) Ryvarden 359.

Ceriporia leptoderma (Berk. & Broome) Ryvarden, 341.

Ceriporiopsis namibiensis Ryvarden, nov. species,

Holotype: Otjiwango, Namibia, 19. January 2014, on dead hard wood log, Ryvarden 49351 (O). Index Fungorum 552299.

Basidiocarps annual, resupinate, separable and soft; 2-3 x 0.3 mm, margin narrow to almost non-existent, white, pore surface white to cream, even; pores round to angular, 5-6 per mm, tube layer concolorous with pore surface, up to 0.2 mm deep, subiculum very thin, white and cottony; fragile.

Hyphal system monomitic; generative hyphae with clamps, hyaline, delicately thin-walled, richly branched, 2-5 μm in diam.

Cystidia absent.

Basidia 9-12 x 4-5 μm , ovoid to clavate, tetrasterigmatic with a basal clamp.

Basidiospores 3-4 x 1 μm , allantoid, hyaline, smooth, negative in Melzer's reagent, **Substrata.** Found on dead hard wood log.

Distribution. Known only from the type locality.

Remarks. The species is similar to the European species *C. portrosensis* (for a description, see Ryvarden & Melo 2014:145), which however has larger spores, i.e. 4.5-5 x 1.5-1.8 μm .

Corioloopsis floccosa (Jungh.) Ryvarden, 347.

C. polyzona (Pers.) Ryvarden, 378.

Ceriporia viridans (Berk. & Broome) Donk, 383.

C. xylostromatioides (Berk.) Ryvarden, 353.

Dichomitus leucoplanceus (Berk.) Ryvarden, 331.

Flavodon flavus (Kl.) Ryvarden, 379.

Trametes lactinea Berk., 375.

Acknowledgements

Shelly Rothman and Jürg Dickmann were most helpful and hospitable during our stay on their farm, and their support is deeply acknowledged.

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Two new species (*Polyporales*, *Agaricomycetes*) from the Brazilian Amazonia

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Abstract

Ceriporiopsis cinnamoma and *Perenniporia ganodermoides* are described as new species from Brazil based on morphological evidence. *Ceriporiopsis cinnamoma* differs from the other species in the genus by its pale cinnamon pore surface and large basidiospores (5–6 µm). *Perenniporia ganodermoides* is distinguished in the genus by ochraceous surface, reddish pore surface and ganodermatoid basidiospores. Keys are provided to the neotropical species of their respective genera.

Key words – polypores, diversity, *Basidiomycota*

Introduction

Dománski (1963) proposed the genus *Ceriporiopsis* Dománski (*Phanerochaetaceae* Jülich), characterized by resupinate basidiomata, monomitic hyphal system with clamps, hyaline basidiospores, negative in Melzer's reagent, lack of cystidia, and by causing a white rot (Ryvarden & Gilbertson 1993). It currently comprises about 25 species (Kirk et al. 2008), ten of which reported from the Neotropics and six for Brazil (Gugliotta et al. 2014).

The genus *Perenniporia* was described by Murrill in 1942 (Ryvarden 1991) based on *Polyporus medulla-panis* (Jacq.) Fr. and actually comprises 60 species (Kirk et al. 2008), 25 of which reported from the Neotropics and 20 for Brazil (Medeiros et al. 2012). The genus was described to accommodate species with perennial or rarely annual basidioma, resupinate to pileate, pileus smooth, ochraceous to clay or greyish with age, hard and woody; pore surface white to cream, small to irregular; hyphal system di- to trimitic,

skeletal hyphae dextrinoid in variable degrees, solid to thick-walled, unbranched to moderately branched; cystidia absent or present; basidiospores smooth, globose, ellipsoid, pip-shaped, usually distinctly truncate, with variable dextrinoid reaction (Ryvarden & Gilbertson 1994, Núñez & Ryvarden 2001). The species usually occur on dead wood, both of gymnosperms and angiosperms (Ryvarden 1991).

Due to the few studies about these genera in Brazil, mostly in Amazonia, the aim of the present study is to contribute to the knowledge about the diversity of *Ceriporiopsis* and *Perenniporia* in Brazil with descriptions of two new species and with keys to the species of the genera found in the Neotropics.

Material and Methods

The material was collected during field trip undertaken in the Estação Ecológica de Cuniã (8°10'55"S and 63°32'13"W), an area of 53.221 ha in the state of Rondônia covered by open ombrophilous forest and transition forest with savannahs. Additionally, specimens previously deposited in INPA were also studied.

The basidiomata were analysed macro- (shape, colour, pore surface) and micromorphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Microscopical observations were made from slide reparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Colour designation followed Watling (1969). The specimens were deposited in the Herbarium HFSL and URM.

Taxonomy

Ceriporiopsis cinnamomea Ryvarden, Gomes-Silva & Gibertoni, *sp. nov.*

Mycobank no.: MB 805273

This species differs from the other *Ceriporiopsis* species by its pale cinnamon pore surface and large basidiospores (5–6 µm).

Holotype: BRAZIL. RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, leg. A. C. Gomes-Silva, 20/VIII/2010 (holotype URM 84790, isotype in O).

Etymology: The specific epithet refers to the colour of the pore surface.

Basidiomata annual, resupinate, up to 6 cm in longest dimension, 1–3 mm thick, soft when fresh, brittle and fragile and resinous when dry; margin narrow to lacking, whitish (2B), subiculum whitish (2B), up to 150 µm thick, strongly contrasting the cinnamon resinous tube layer; pore surface poroid, cinnamon (12), pores round, hardly visible to the naked eye, 6–8 per mm, dissepiments very thin and entire; context concolourous with the hymenial surface, homogeneous, fibrous, very thin; tubes up to 2.5 mm deep, concolourous with the pore surface.

Hyphal system monomitic, generative hyphae thin- to thick-walled, in 3% KOH, distinctly thick walled in Melzer's reagent, smooth and with clamps which can be difficult to find, 2–4 µm wide.

Cystidia or other sterile elements absent.

Basidia clavate with four sterigmata, 14–18 × 4–6 µm.

Basidiospores 5–6 × 4.5–5 µm, subglobose, smooth, thin-walled and without reaction in Melzer's reagent.

Substrata: Dead hardwood.

Distribution: Known from the state of Rondônia, Brazil.

Remarks: The pale uniform cinnamon pore surface and the subglobose basidiospores characterize this species.

Key to Neotropical species of *Ceriporiopsis*

- 1a. Pores 6–8 per mm 2
- 1b. Pores larger 6

- 2a. Basidiospores cylindrical to allantoid 3
- 2b. Basidiospores ellipsoid to subglobose 4

- 3a. Basidiospores allantoid $3.5\text{--}5 \times 1\text{--}1.2 \mu\text{m}$ *C. lowei* (see Rajchenb 1987)
- 3b. Basidiospores cylindrical $3\text{--}3.5 \times 1.5\text{--}1.7 \mu\text{m}$
..... *C. lagerheimii* (see Læssøe & Ryvarden 2010)
- 4a. Basidiospores subglobose $5\text{--}6 \times 4.5\text{--}5 \mu\text{m}$, pore surface cinnamon *C. cinnamomea*
- 4b. Basidiospores smaller, pore surface differently coloured 5

- 5a. Basidiospores subcylindrical $3.5\text{--}4.5 \times 2\text{--}2.5 \mu\text{m}$
..... *C. jensii* (see Læssøe & Ryvarden 2010)
- 5b. Basidiospores ellipsoid, $3\text{--}3.5 \times 2\text{--}3 \mu\text{m}$ *C. flavilutea* (see Ryvarden 1985)

- 6.a Basidiospores subcylindrical, $8\text{--}10 \times 3\text{--}4.5 \mu\text{m}$ *C. cerussata* (see Ryvarden 1988)
- 6.b Basidiospores shorter, variously shaped 7

- 7a. Pores irregular, up to 3 per mm becoming daedaeloid to sinuous 8
- 7b. Pores more or less angular to round and smaller 9

- 8.a Basidiospores 3–4 μm long, pores irpicoid to daedaeloid, 1–2 per mm
..... *C. latemarginata* (see Rajchenb 1987)
- 8b. Basidiospores 4–5 μm long, pores round to angular, in parts split 2–3 per mm
..... *C. balaenae* (see Niemelä 1985)

- 9a. Basidiospores subglobose 10
- 9b. Basidiospores ellipsoid to cylindrical 11

- 10a. Basidiospores $2.5\text{--}3.5 \times 2\text{--}2.5 \mu\text{m}$ *C. mucida* (see Gilbertson & Ryvarden 1985)
- 10b. Basidiospores $5\text{--}6 \times 4\text{--}5 \mu\text{m}$ *C. rivulosa* (see Gilbertson & Ryvarden 1986)

- 11a. Smooth, tubular cystidia present, basidiospores cylindrical, $5\text{--}6 \times 2.5\text{--}3.5 \mu\text{m}$
..... *C. cystidiata* (see Log.-Leite & Ryvarden 2001)
- 11b. Cystidia absent, basidiospores ellipsoid, $3.5\text{--}4.5 \times 2.5\text{--}3 \mu\text{m}$ 12

- 12a. Basidiospores slightly amyloid, pore surface white
 *C. myceliosa* (see Ryvarden & Gilbertson 1993)
- 12b. Basidiospores not amyloid, pore surface ochraceous to pale brown 13
- 13a. Pore surface brown (reminding of *Phellinus* spp.) *C. umbrinescens* (see Ryvarden 1985)
- 13b. Pore surface pale ochraceous *C. costaricensis* (see Mata & Ryvarden 2010)

Perenniporia ganodermoides Ryvarden, Gomes-Silva & Gibertoni, *sp. nov.*

Mycobank no.: MB 805274

This species differs from the other *Perenniporia* species by its ochraceous surface, reddish pore surface and ganodermatoid basidiospores.

Type (designated here). Brazil. Amazonas: Santa Isabel do Rio Negro, 35-40Km west from Tapuruquará, leg. M.L. Farr, I. Araújo & J.F. Ramos, Farr-AM 173, 20/1/1978 [holotype INPA 164403, isotypes in URM (84791) and O].

Etymology: The specific epithet refers to the ganodermatoid basidiospores.

Basidiomata annual, pileate, dimidiate to sessile, 5 cm wide and 10 cm long, 1 cm thick at the base, applanate, semicircular, probably flexible when fresh, bony hard when dry as in the type; pileus glabrous, smooth to tuberculate, azonate, ochraceous (12 to 52) towards the margin, in older parts reddish dark brown (18) and more and irregularly warted and tuberculate; margin sharp, entire, acute to obtuse, rigid, deflexed when dry and in old specimens, concolorous to the upper basidioma surface; pore surface reddish brown (18), pores round and invisible to the naked eye, 10–12 per mm; tubes evenly reddish brown (12), up to 6 mm deep, dissepiments thin and entire; context dense homogenous, light ochraceous (52), up to 3 mm thick and strongly contrasting the dense reddish brown tubes.

Hyphal system dimitic; generative hyphae thin-walled and with clamps, 2–3 µm in diam., skeletal hyphae arboriform and strongly branched in upper part, up to 6 µm wide in main stem ending in thin whip like branches, hardly more than 0.5 µm thick in the apex, all hyphae without reaction Melzer's reagent.

Cystidia absent.

Basidia not seen in the type.

Basidiospores 6–7 (8) × 4–5 µm, truncate and strikingly like the *Ganoderma* basidiospores in shape, thick-walled, smooth, without reaction Melzer's reagent.

Substrata: Unknown hard wood log.

Distribution: Known from the state of Amazonas, Brazil.

Remarks: This is striking species is characterized partly by the ochraceous glabrous warted surface, the dense reddish pore surface and tubes with invisible, very smaller pores, and the ganodermatoid basidiopores.

Key to pileate neotropical *Perenniporia s. l.*

- 1a. Basidiospores longer than 10 μm 2
 1b. Basidiospores shorter than 10 μm 3
- 2a. Basidiospores 13-16 μm long *P. ochroleuca* (see Decock & Ryvarden 1999)
 2b. Basidiospores 10.3-12.5 μm long *P. detrita* (see Núñez & Ryvarden 2001)
- 3a. Basidiomata laterally stipitate *P. stipitata* (see Ryvarden 1987)
 3b. Basidiomata slightly contracted basally, sessile to effused reflexed 4
- 4a. Basidiospores longer than 5 μm 5
 4b. Basidiospores shorter than 5 μm 8
- 5a. Basidiomata annual, small, effused reflexed, pileus rarely above 1 cm wide, upper surface white to ochraceous *P. tepeitensis* (see Ryvarden 1985)
 5b. Basidiomata perennial, 5-15 cm wide, dense and hard, upper surface dirty whitish, reddish to black from the base 6
- 6a. Hyphae and basidiospores without reaction in Melzer's reagent *P. ganodermoides*
 6b. Hyphae and/or basidiospores dextrinoid in Melzer's reagent 7
- 7a. Basidiospores pip shaped, 5-9 x 3-6 μm , cystidia variably present, chlamydospores absent from trama and context *P. martia* (see Núñez & Ryvarden 2001)
 7b. Basidiospores globose to truncate, 7-9 x 4-5.5 μm , cystidia absent, strongly dextrinoid chlamydospores usually present in context and trama
 *P. sprucei* (see Decock & Ryvarden 1999)
- 8a. Basidiospores 3-4 μm in diam *P. neofulva* (see Decock & Ryvarden 2003)
 8b. Basidiospores 4-5 μm in diam 9
- 9a. Upper surface first velutinate, ochraceous or brown, species with cuticle 10
 9b. Upper surface glabrous, white to pale tan or pale brown from the base without cuticle, pore surface white to cream, skeletal hyphae non-dextrinoid
 *P. micropora* (see Decock & Ryvarden 2003)
- 10a. Pileus brown, first velutinate, then glabrous from base, strongly sulcate in narrow zones, basidiomata light of weight, pore surface bluish ashy in actively growing specimens, later pale brown *P. inflexibilis* (see Ryvarden & Johansen 1980)
 10b. Pileus first ochraceous and finely velutinate, later glabrous and with a dark brown to almost black cuticle from the base, pores surface cream to pale brown, never with bluish tints 11
- 11a. Pores regular 7-8 per mm, margin sharp, skeletal hyphae 2.5-4.0 μm wide
 *P. contraria* (see Decock *et al.* 2001)
 11b. Pores irregular, 4-5 per mm, often a few are fused to irregular cavities, margin rounded, skeletal hyphae 4.0-7.0 μm wide growing *P. subannosa* (see Decock *et al.* 2001)

Acknowledgments

We would like to thank to the curator of INPA for the loan of exsiccates and access to the collections. Further, we acknowledge the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes) for the doctorate scholarship of ACGS; the Pós-Graduação em Biologia de Fungos (UFPE, Brazil) and the CNPq [INCT - Herbário Virtual de Plantas e Fungos (573883/2008-4) and Universal (470303/2009-3)] for financing this research.

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