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**DIVERSIDADE DE FUNGOS PORÓIDES (*AGARICOMYCETES*) NA AMAZÔNIA  
BRASILEIRA**

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**DIVERSIDADE DE FUNGOS PORÓIDES (*AGARICOMYCETES*) NA AMAZÔNIA  
BRASILEIRA**

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Dr<sup>a</sup>. Tatiana Baptista Gibertoni

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BRASILEIRA**

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“A curiosidade é mais importante que o conhecimento”

*Albert Einstein*

Dedico

A Deus por tudo que tenho e que sou...

Aos meus pais, Edegley e Célia, aos meus irmãos  
pelo amor e incentivo...

A Elton Bill, pelo amor e paciência dispensados...

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## RESUMO GERAL

Os fungos poróides são popularmente chamados de “orelhas-de-pau” devido ao hábito do basidioma, onde produzem holobasídios clavados, em himênio geralmente tubular bem definido. A maioria das espécies desse grupo de fungos apresenta um papel particularmente importante devido à capacidade de degradação de madeira nos diferentes ecossistemas. Para ampliar o conhecimento sobre a diversidade e aspectos ecológicos de fungos poróides na Amazônia brasileira, foram realizadas revisão de exsicatas de fungos poróides coletados na Amazônia e depositados em herbários e coletas em duas áreas de terra firme no município de Porto Velho, Rondônia: Parque Natural Municipal (PNM) e Estação Ecológica de Cuniã (ESEC), em julho de 2009 (período seco), fevereiro (chuvoso) e julho de 2010 (seco) e fevereiro de 2011 (chuvoso), totalizando oito visitas. Foram coletados 398 espécimes de fungos poróides, representantes de seis famílias, 32 gêneros e 77 espécies, das quais nove são novas para a ciência. Todas as famílias estiveram presentes nas duas áreas de estudo. Vinte espécies foram comuns para ambas as áreas; o PNM apresentou o maior número de espécies exclusivas (37, 19 para a ESEC). A riqueza de espécies não diferiu significativamente entre as áreas de coleta, mas maior abundância foi encontrada no PNM. Maior riqueza e abundância foram encontradas no período chuvoso. Cento e oitenta e oito espécimes foram coletados em áreas adicionais localizadas em Porto Velho e representaram 52 espécies, das quais quatro são novas para a ciência e 20 exclusivas a essas áreas. Desse modo, foram identificadas, ao todo, 97 espécies provenientes de coletas. A partir da revisão de 5.933 exsicatas de fungos poróides coletados na Amazônia e depositados nos Herbários INPA, SP, UFACPZ e URM foram encontradas 212 espécies, distribuídas nos diferentes Estados da Amazônia brasileira, das quais quatro espécies novas para a ciência e 137 encontradas exclusivamente nesses herbários. No total, 238 espécies são registradas para a Amazônia brasileira. Dezesete espécies são novas para a ciência, enquanto 17 são novos registros para o Brasil e 40 para Amazônia brasileira. Onze famílias foram registradas, sendo *Polyporaceae* com maior número de gêneros e espécies (27 e 104, respectivamente), seguida por *Hymenochaetales* (nove e 46) e *Ganodermataceae* (quatro e 42). Baseado em análises morfológicas e/ou moleculares da região ITS rDNA, 27 espécies de *Amauroderma*, muitas morfológicamente semelhantes, foram delimitadas, das quais nove (*A. albostipitatum*, *A. floriforme*, *A. laccatostiptatum*, *A. lemoniforme*, *A. minimum*, *A. ovisporum*, *A. paraelegantissimum*, *A. subsessile* e *A. sessile*) são propostas como novas para a ciência.

**Palavras-chave:** *Basidiomycota*, *Hymenochaetales*, *Polyporales*, Norte do Brasil, Micobiota, ecologia, taxonomia, herbários.



**ABSTRACT**

The polypores are usually called “orelhas-de-pau” (bracket fungi) because of the habit of the basidiomata, where clavated holobasidia are produce in tubular/poroid hymenophore. Most of the species are particularly important because of the ability of degradation of wood in different ecosystems. In order to expand the knowledge about the diversity and ecological aspects of the poroid fungi of the Brazilian Amazonia, eight field trips were undertaken in two areas of “terra firme” in the city of Porto Velho, Rondônia: Parque Natural Municipal (PNM) and Estação Ecológica de Cuniã (ESEC), on July 2009 (dry season), February (rainy season) and July 2010 (dry season) and February 2011 (rainy season). We collected 398 specimens of poroid fungi, representatives of six families, 32 genera and 77 species, of which nine are new to science. All families were recorded in the two areas of study. Twenty species were common to both areas; the PNM presented higher number of exclusive species (37, 19 for ESEC). Species richness did not significantly differed between areas, but highest abundance was observe in PNM. Higher richness and abundance were observed during the rainy season. One hundred and eighty-eight specimens were added from sporadic collections in areas also in Porto Velho and represented 52 species, of which four new to science and 20 were added to the collections from PNM and ESEC. From the revision of 5.933 exsicatae of poroid fungi deposited in the Herbaria INPA, SP, UFACPZ and URM, 212 species were found, 137 of which exclusive to the Herbaria, and four new to science. A total of 238 species was confirmed to the Brazilian Amazonia. Seventeen species are new to science, while 17 are new records for Brazil and 40 for the Amazonia region. Eleven families were recorded, being *Polyporaceae* with the highest number of genera and species (27 and 104, respectively), followed by *Hymenochaetaceae* (nine and 46) and *Ganodermataceae* (four and 42). Based on morphological and/or molecular analyses of the region ITS rDNA, 27 species of *Amauroderma*, several of them morphologically similar, were delimited, nine of which are proposed as new to science (*A. albostipitatum*, *A. floriforme*, *A. laccatostiptatum*, *A. lemoniforme*, *A. minimum*, *A. ovisporum*, *A. paraelegantissimum*, *A. subsessile* and *A. sessile*).

**Key-words:** *Basidiomycota*, *Hymenochaetales*, *Polyporales*, North Brazil, mycobiota, ecology, taxonomy, Herbaria

## Lista de figuras

	<b>Pág.</b>
<b>Figura 1</b> – Tipos de basidiomas quanto a sua inserção no substrato. <b>a.</b> ressupinado. <b>b.</b> efuso-reflexo. <b>c.</b> séssil. <b>d.</b> estipitado.....	17
<b>Figura 2</b> – Tipos de superfície himenial. <b>a.</b> Poróide circular. <b>b.</b> Poróide angular. <b>c.</b> Poróide com poros alongados (falso lamelar). <b>d.</b> Daedalóide. <b>e.</b> Lamelar.....	18
<b>Figura 3</b> – Tipos de basidiosporos e ornamentações. <b>A.</b> cilíndrico. <b>B.</b> alantóide. <b>C.</b> lunado. <b>D.</b> navicular. <b>E.</b> oblongo-elipsóide. <b>F.</b> elipsóide. <b>G.</b> subgloboso. <b>H-I.</b> globoso. <b>J.</b> verrucoso. <b>K.</b> crestado. <b>L.</b> dupla parede e ápice truncado.....	19
<b>Figura 4</b> – Tipos de cystídios. <b>A.</b> ápice incrustado e parede fina. <b>B.</b> ápice incrustado e parede espessa. <b>C.</b> liso e tubular. <b>D.</b> grosseiramente incrustado. <b>E.</b> ventricoso. <b>F.</b> ápice grosseiramente incrustado.....	20
<b>Figura 5</b> – Microestruturas estéreis. <b>a.</b> Seta himenial. <b>b.</b> Hifa setal. <b>c.</b> Medas.....	20
<b>Figura 6</b> – Tipos de hifas. <b>a.</b> Hifa generativa. <b>b.</b> Hifa esqueléteas. <b>c.</b> Hifa conectiva.....	21
<b>Figura 7</b> – Localização das áreas de coletas. <b>A)</b> Biomas brasileiros; <b>B)</b> Estado de Rondônia (1. Estação Ecológica de Cuniã; 2. Parque Natural Municipal de Porto Velho).....	28
<b>Figura 8.</b> Diversidade de fungos poróides (ESEC - Estação Ecológica de Cuniã; PNM - Parque Natural Municipal de Porto Velho; Coletas adicionais).....	32
<b>Figura 9.</b> Diversidade de fungos poróides depositados em Herbários (INPA – Instituto Nacional de Pesquisa na Amazônia; RB – Rio de Janeiro; SP – Instituto de Botânica; UFACPZ – Universidade Federal do Acre; URM – Herbário Universidade Federal de Pernambuco).....	33
<b>Figura 10.</b> Número de gêneros e espécies encontrados por família, a partir da análise dos espécimes coletados na Estação Ecológica de Cuniã e no Parque Natural Municipal de Porto Velho.....	44
<b>Figura 11.</b> Espécies e ocorrência de espécies exclusivas e em comum para as áreas de coleta (Parque Natural Municipal de Porto Velho – PNM; Estação Ecológica de Cuniã – ESEC).....	45
<b>Figura 12.</b> Diversidade de fungos poróides e número de espécimes depositados em Herbários (INPA – Instituto Nacional de Pesquisa na Amazônia; RB – Rio de Janeiro; SP – Instituto de Botânica; UFACPZ – Universidade Federal do Acre; URM – Herbário Universidade Federal de Pernambuco).....	47
<b>Figura 13.</b> Número de gêneros e espécies encontrados por famílias, a partir da análise de espécimes coletados e revisados.....	48
<b>Figura 14.</b> Espécies e ocorrência de espécies exclusivas nas áreas de coleta e nos	

herbários.....	49
<b>Figura 15.</b> Adições ao conhecimento de fungos poróides para a Amazônia brasileira.....	49
<b>Figura 16.</b> Composição de espécies na Amazônia brasileira.....	50
<b>Figura 17.</b> Reconstrução filogenética de <i>Amauroderma</i> obtida pelo alinhamento de 370 nucleotídeos das regiões ITS I e II. Valores de bootstrap (em %) foram gerados e somente valores acima de 50% são apresentados. A árvore de máxima parcimônia apresentou índice de consistência = 0.6596 e índice de retenção = 0.8453.....	52
<b>Figura 18.</b> Período de coleta [Abundância: $\chi^2 = 57,90$ ; Riqueza: $\chi^2 = 7,21$ . $\chi^2$ (crítico) = 3,481; GL = 1; p = 5%].....	54
<b>Figura 19.</b> Composição de espécies nas duas áreas de coleta (Parque Natural Municipal de Pernambuco e Estação Ecológica de Cuniã) de acordo com a sazonalidade.....	54
<b>Figura 20.</b> Período de coleta [Abundância: $x^2 = 7,21$ ; Riqueza: $x^2 = 3,30$ . $x^2$ (crítico) = 3,481; GL = 1; p = 5%].....	55
<b>Figura 21.</b> Composição de espécies por área de coleta.....	55

## Lista de tabelas

**Pág.**

<p><b>Tabela 1.</b> Famílias e espécies de fungos poróides e novas ocorrências para os estados com Floresta Amazônica (AC, AM, AP, PA, RO, RR e regiões do Norte do MT e oeste do MA), para o Bioma Amazônia (BioAm), para o Brasil (BR) e para a Ciência (CI). Espécies adicionais do Herbário INPA (●), MG (◆), RB (▶), SP (■), UFACPZ (☼) e URM (▲); Espécies de coletas adicionais da Fazenda Mosquito (1), Parque Natural Municipal (2), Estação Ecológica de Cuniã (3) e Terra Indígena Sete de Setembro (4).....</p>	35
<p><b>Tabela 2.</b> Lista de espécies de <i>Amauroderma</i> utilizadas na análise molecular para construção das árvores filogenéticas a partir do método de máxima parcimônia (MP) e <i>neighbour joining</i> (NJ) .....</p>	51

## SUMÁRIO

	<b>Pág.</b>
1. INTRODUÇÃO.....	14
2. FUNDAMENTAÇÃO TEÓRICA.....	16
2.1. Características gerais e taxonomia dos fungos poróides.....	16
2.2. Importância econômica e ecológica dos fungos poróides.....	21
2.3. Fungos poróides na Amazônia brasileira.....	24
3. MATERIAIS E MÉTODOS.....	27
3.1 Áreas de coletas.....	27
3.2 Coleta, herborização, análise e identificação dos espécimes.....	28
3.3 Extração do DNA, amplificação, sequenciamento da rDNA ITS e análise filogenética.....	30
3.4 Análise dos dados ecológicos.....	30
4. RESULTADOS E DISCUSSÃO.....	32
4.1 Diversidade de fungos poróides nas áreas de coleta na Amazônia brasileira.....	32
4.2 Diversidade de fungos poróides coletados na Amazônia e depositados em Herbários brasileiros.....	46
4.3 Análise dos dados moleculares.....	50
4.4. Aspectos ecológicos de fungos poróides ( <i>Basidiomycota</i> ) na Amazônia brasileira.....	53
5. CONCLUSÕES.....	57
REFERÊNCIAS BIBLIOGRÁFICAS.....	58
ANEXOS	
<b>Anexo 1.</b> Notes on <i>Fomitopsis</i> ( <i>Polyporales</i> , <i>Agaricomycetes</i> ) from North and Northeast Brazil.....	71
<b>Anexo 2.</b> Revisão do gênero <i>Amauroderma</i> Murrill da Amazônia brasileira.....	81
<b>Anexo 3.</b> <i>Amauroderma calcigenum</i> ( <i>Ganodermataceae</i> , <i>Basidiomycota</i> ) and its presumed synonym <i>A. partitum</i> . ....	124
<b>Anexo 4.</b> Neotypification of <i>Amauroderma picipes</i> Torrend, 1920 ( <i>Ganodermataceae</i> , <i>Agaricomycetes</i> ) .....	131
<b>Anexo 5.</b> New records of <i>Ganodermataceae</i> ( <i>Basidiomycota</i> ) from Brazil.....	136
<b>Anexo 6.</b> <i>Inonotus amazonicus</i> sp. nov., <i>I. calcitratus</i> comb. nov. and on <i>Phylloporia</i> ( <i>Hymenochaetaceae</i> , <i>Agaricomycetes</i> ) from the Brazilian Amazonia.....	150
<b>Anexo 7.</b> Two new species of <i>Phellinus</i> s.l. from the Brazilian Amazonia.....	160

<b>Anexo 8.</b> <i>Rigidoporus</i> ( <i>Meripilaceae</i> ) from the Brazilian Amazonia, Brazil: a new species and new records.....	168
<b>Anexo 9.</b> New records of <i>Meruliaceae</i> ( <i>Basidiomycota</i> ) from the Brazilian Amazonia.....	184
<b>Anexo 10.</b> Resupinate poroid fungi from tropical rain forests in Brazil: two new species and new records.....	195
<b>Anexo 11.</b> <i>Coriolopsis psila</i> comb. nov. ( <i>Agaricomycetes</i> ) and two new <i>Coriolopsis</i> records for Brazil.....	205
<b>Anexo 12.</b> Notes on <i>Perenniporia</i> Murrill ( <i>Basidiomycota</i> ) from the Brazilian Amazonia.....	214
<b>Anexo 13.</b> <i>Polyporus</i> ( <i>Basidiomycota</i> ) in Brazilian Amazonia, with notes on <i>Polyporus indigenus</i> I.J. Araujo & M.A. de Sousa and <i>P. Sapurema</i> A. Møller.....	228
<b>Anexo 14.</b> Notes on <i>Trametes</i> from the Brazilian Amazonia.....	241
<b>Anexo 15.</b> The genus <i>Trichaptum</i> ( <i>Agaricomycetes</i> , <i>Basidiomycota</i> ) in Brazil.....	253
<b>Anexo 16.</b> New records of <i>Phellinus</i> s.l. ( <i>Hymenochaetaceae</i> ) from the Brazilian Amazonia.....	267
<b>Anexo 17.</b> Interesting species of <i>Coltricia</i> and <i>Hymenochaete</i> ( <i>Hymenochaetaceae</i> ) from the Amazonia and the Atlantic Forest, Brazil: a new combination and new records.....	284

## 1. INTRODUÇÃO

Os fungos poróides são popularmente chamados de “orelhas-de-pau” devido ao hábito do basidioma, que produz holobasídios clavados, em himênio geralmente tubular bem definido (Donk, 1964; Alexopoulos *et al.*, 1996). Esse grupo de fungos constitui um grupo polifilético de basidiomicetos classificado no filo *Basidiomycota*, que atualmente apresenta cerca de 31.515 espécies (Kirk *et al.*, 2008), dentro da estimativa de 1,5 milhão de espécies fúngicas (Hawksworth, 1991, 2001). Os fungos poróides estão representado por aproximadamente 1200 espécies (Mueller *et al.*, 2007), na maioria sapróbias (Kendrick, 2000), desenvolvem-se em madeira em decomposição, promovendo a reciclagem de nutrientes e a manutenção dos ecossistemas terrestres. Entretanto, também são encontrados em árvores vivas e em solo, parasitando raízes ou em associações micorrízicas (Alexopoulos *et al.*, 1996; Webster & Weber, 2007; Tedersoo *et al.*, 2007).

Por serem os principais degradadores de madeira, devido à capacidade de produzirem um complexo enzimático capaz de degradar lignina e/ou celulose e hemicelulose, são conhecidos como fungos causadores da podridão branca e marrom (Ryvarden, 1991; Samuelson *et al.*, 1994; Carlile *et al.*, 2001; Webster & Weber, 2007). Devido a essa capacidade de degradação, as espécies desse grupo de fungos têm recebido particular atenção nas últimas décadas, no que tange ao seu potencial de aplicabilidade no tratamento de poluentes, biorremediação de solos e na produção de antibióticos (Namhyun *et al.*, 2000; Raghukumar, 2000; Groposo & Loguercio-Leite, 2005).

A Amazônia está representada por mais de seis milhões de quilômetros quadrados na América do Sul, e nada menos que 60% estão em território brasileiro, distribuída em nove estados da federação: Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins, oeste do Maranhão e norte do Mato Grosso (MMA, 2002). Esse bioma caracteriza-se por abrigar um mosaico de habitats bastante distintos, formados pelas florestas ombrófilas (abertas e densas), estacionais (deciduais e semideciduais), refúgios montanos, formações pioneiras, terra firme, várzea, igapós, campinaranas e savanas amazônicas (Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal, 1998; Museu Paraense Emílio Goeldi, 2008).

A Amazônia tem um papel particularmente importante na conservação da biodiversidade e no cenário econômico e estratégico do Brasil, consistindo na maior extensão de floresta tropical úmida contínua dentro da nação, caracterizada por uma notável riqueza de espécies e altos índices de endemismo (Capobianco *et al.*, 2001). Um estudo realizado pelo Instituto do Homem e Meio Ambiente da Amazônia (Imazon) em 2005 demonstrou que o Estado de Rondônia tem sofrido uma grande devastação em áreas protegidas (Ribeiro *et al.* 2005) . Assim, torna-se preocupante não só o fato do alto índice de desmatamento, que está estimado na Amazônia, para o ano de 2011, em 6.418 Km<sup>2</sup>, dos quais 865 Km<sup>2</sup> no estado de Rondônia (Instituto Nacional de Pesquisas Espaciais, 2011),

mas também as alterações do clima e dos ciclos de carbono em termos regionais e globais e, principalmente, no que se refere à perda da diversidade biológica. A Floresta Amazônica tem sido pouco investigada, principalmente em relação a pesquisas com fungos poróides. Alguns trabalhos com fungos macroscópicos foram desenvolvidos na Amazônia brasileira, sendo relatada a ocorrência de 151 espécies (Gomes-Silva & Gibertoni, 2009a), porém nenhum trabalho foi dedicado ao estudo de fungos poróides no estado de Rondônia.

Diante destas considerações, torna-se urgente o conhecimento sobre a diversidade dos fungos poróides, principalmente em áreas da Amazônia brasileira, onde a biodiversidade é ainda mal mensurada. Além disso, o papel de algumas espécies na sustentação da floresta, das interações entre as espécies e como respondem às variações do meio ambiente também são pouco investigadas.

No presente trabalho foi avaliada a diversidade de fungos poróides em áreas de Floresta Amazônica no Norte do Brasil através de coleta, identificação, descrição e ilustração de espécimes coletados em duas áreas de floresta com auxílio de microscopia de luz e eletrônica de varredura; revisão de todas as exsiccatas de fungos depositadas em Herbários do Acre (UFACPZ), Amazonas (INPA), Pernambuco (URM) e São Paulo (SP) e coletadas na região amazônica; elaboração de chaves de identificação para as famílias, gêneros e espécies identificadas; análise da diversidade dos fungos poróides de acordo com a variação sazonal; investigação do grau de similaridade de fungos poróides nessas áreas; extração e sequenciamento de DNA dos espécimes coletados que representem possíveis novas espécies, além de espécimes de *Amauroderma*, para delimitação das espécies do gênero.



## 2. FUNDAMENTAÇÃO TEÓRICA

### 2.1 Características gerais e taxonomia dos fungos poróides

Os fungos poróides são popularmente conhecidos como “orelhas-de-pau” devido ao hábito do basidioma, mas também são conhecidos como fungos lignolíticos/lignocelulolíticos devido à capacidade de degradar a lignina e ou/celulose e hemicelulose presentes na madeira (Newell *et al.*, 1996; Anagnost, 1998). As espécies desse grupo de fungos são caracterizadas por apresentarem a superfície himenial geralmente tubular (Donk, 1964) e pertencem ao filo *Basidiomycota*. Este filo é caracterizado por agrupar espécies capazes de formar estruturas denominadas basídios, onde se processa cariogamia e meiose, dando como resultado a formação de esporos (basidiosporos) que ficam inseridos diretamente sobre a parede ou sobre extensões da mesma (esterigma) (Fidalgo & Fidalgo, 1967).

A classificação dos fungos vem sofrendo modificações substanciais desde seu início, mas atualmente ainda permanece em processo de organização. A utilização de novas técnicas e conceitos como a microscopia eletrônica, a sistemática filogenética e a biologia molecular, vêm promovendo profundas alterações nos sistemas de classificação dos fungos (Baseia, 2007). Baseado em dados moleculares, Hibbett *et al.* (2007) propuseram um novo sistema de classificação que vem sendo utilizado atualmente. Dentro desta nova classificação, os fungos poróides estão distribuídos nas famílias de *Agaricomycetes*, do subfilo *Agaricomycotina*, que abrangem as ordens: *Gloeophyllales* (*Gloeophyllaceae*), *Hymenochaetales* (*Hymenochaetaceae* e *Schizoporaceae*), *Polyporales* (*Fomitopsidaceae*, *Ganodermataceae*, *Grammotheleaceae*, *Meripilaceae*, *Meruliaceae*, *Phanerochaetaceae*, *Polyporaceae* e *Steccherinaceae*), *Russulales* (*Albatrellaceae* e *Bondarzewiaceae*) e *Trechisporales* (*Hydnodontaceae*), grupos menos artificiais e referências para a taxonomia atual (Kirk *et al.*, 2001, 2008).

Apesar desses avanços científicos, a identificação dos fungos poróides é baseada na taxonomia clássica do estudo das características macro- e micromorfológicas do basidioma (Furtado, 1981; Ryvarden, 1991, 2004; Teixeira, 1993, 1994, 1995).

Os basidiomas produzidos por este grupo de fungos apresentam morfologia variada quanto à disposição no substrato, podendo ser: ressupinada (quando se encontra totalmente aderido ao substrato), efuso-reflexo (quando parte se encontra aderida ao substrato e outra se projeta na borda, formando um píleo), ou ainda pileado, séssil ou estipitado (Figura 1). Os píleos apresentam-se na forma aplanada, convexa, flabeliforme, imbricada, infudibuliforme e ungulada. Esses basidiomas apresentam coloração variada (passando pelas tonalidades do branco a marrom escuro) e consistência que pode ser esponjosa, carnosa, coriácea, corticóide ou lenhosa (Donk, 1964;

Gilbertson & Ryvardeen, 1986; Ryvardeen, 1991). Segundo Furtado (1981), a consistência do basidioma tem importância muito limitada para a identificação das espécies, mas pode ser distintivo em algumas.

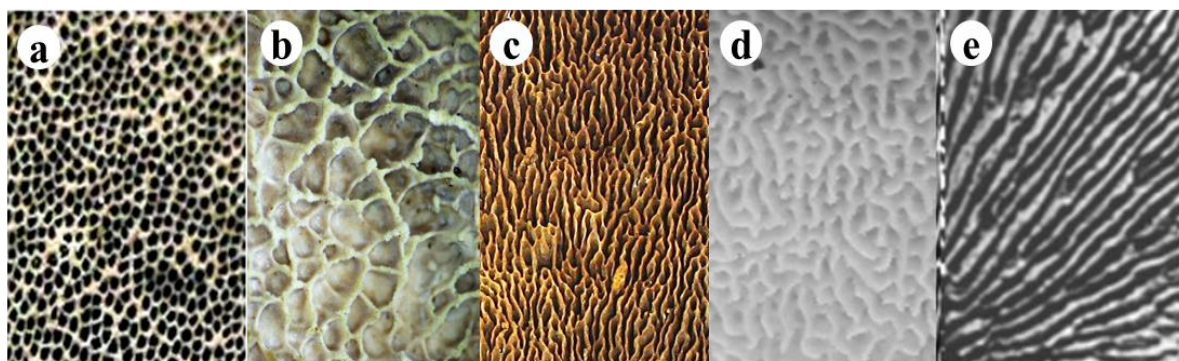


**Figura 1.** Tipos de basidiomas quanto à inserção no substrato. **a.** ressupinado. **b.** efuso-reflexo. **c.** séssil. **d.** estipitado. (Fotos: A.C. Gomes-Silva).

A superfície abhimenial (superfície superior do píleo) pode ser glabra ou coberta por algum tipo de pêlo (hirsuto ou hispido), pode ser fosca, brilhosa ou lacada, zonada (zonas concêntricas) ou azonada (sem zonas concêntricas), radialmente sulcadas ou não, e apresentar ou não uma cutícula avermelhada ou escura na base (Gilbertson & Ryvardeen, 1986; Ryvardeen, 2004). A margem do píleo pode ser lisa, involuta (com as margens enroladas para dentro ou para baixo), revoluta (com a margem enrolada para trás ou para cima), ondulada e estriada e, quanto à espessura, pode ser aguda (margem pontuda, com menos de 90°) ou obtusa (margem de extremidade robusta, que termina com a ponta arredondada) (Fidalgo & Fidalgo, 1967; Gilbertson & Ryvardeen, 1986; Ryvardeen, 2004). A margem torna-se distintiva em espécies de fungos poróides com basidiomas ressupinados, pois suas características e desenvolvimento são caracteres importantes para sua identificação (Ryvardeen, 2004).

O himênio dos fungos poróides está exposto desde a fase inicial até a maturação do basidioma, por isso é denominado gimnocárpico (Fidalgo & Fidalgo, 1967). A superfície himenial é geralmente tubular, e se abre na superfície formando poros onde são encontradas estruturas férteis (basídios e basidiosporos) e estéreis (cístídios, setas, medas, basidíolos, cistidíolos, pseudoparáfises, pseudófises, dendrohiáfídios) produzidas na camada himenial (Fidalgo & Fidalgo, 1967; Fidalgo, 1968; Ryvardeen, 2004).

A superfície himenial pode apresentar poros circulares, angulares, hexagonais, radialmente alongados, irregulares, sinuosos, dedalóides, hexagonais; mesmo que a superfície poróide seja predominante, outros tipos também são observados (Figura 2). Segundo Ryvardeen (2004), a cor, forma e tamanho (quantos poros tem por milímetro) da superfície himenial são caracteres taxonomicamente importantes para a distinção das espécies.



**Figura 2.** Tipos de superfície himenial. **a.** Poróide circular. **b.** Poróide angular. **c.** Poróide com poros alongados (falso lamelar). **d.** Daedalóide. **e.** Lamelar. (Fotos a,b,c: A.C. Gomes-Silva; d,e: Welte *et al.*, 2012).

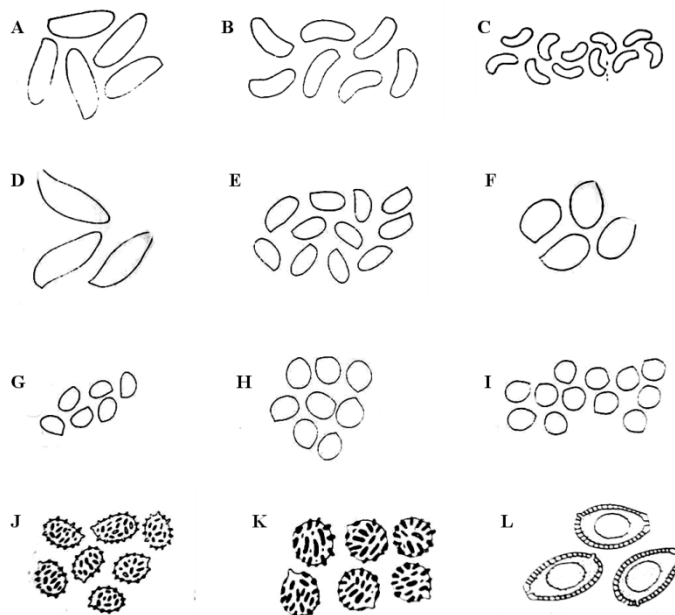
O contexto é a trama de hifas que constitui o basidioma entre a superfície abhimenial, nos tubos e denomina-se dissepimento (Fidalgo & Fidalgo, 1967); pode ser homogêneo (ausência de linhas negras) ou dúplex (presença de uma ou duas linhas negras), de consistência fibrosa a esponjosa e coloração diversificada (Ryvarden, 2004). A coloração do contexto tem sido usada como uma característica adicional, mas é a presença ou ausência de linhas no contexto que tem se mostrado uma característica importante e confiável para a distinção de espécies (Furtado, 1981; Ryvarden, 2004).

Quanto à biologia desses fungos, eles podem ser anuais, quando apresentam uma só camada de tubos, ou perenes, quando apresentam uma ou mais camadas de tubos que persiste dois ou mais anos (Figura 1c,d) (Fidalgo & Fidalgo, 1967). O dissepimento presente entre os tubos pode ser fino ou espesso, inteiro ou lacerado e de coloração variada (Ryvarden, 2004). Deve ser levado em consideração que diferenças entre a coloração, consistência e sistema hifálico contexto são caracteres taxonômicos importantes (Furtado, 1981; Ryvarden, 2004).

Os basídios são geralmente tetraesporados, clavados, hialinos, providos de esterigmas. Nos basídios ocorre o processo de cariogamia e meiose, para a formação dos basidiosporos (Fidalgo & Fidalgo, 1967). Essa microestrutura é de grande importância na caracterização de táxons de níveis elevados, mas de importância menor em níveis baixos (Fidalgo, 1968). Entretanto, para Ryvarden (2004) o tamanho dos basídios pode ser um caráter taxonômico importante, pois ocorre uma variação no tamanho de espécie para espécie.

Os basidiosporos são do tipo balistosporos (liberados violentamente) e não formam outros basidiosporos ao germinarem. Apresentam coloração hialina ou pigmentada (amarelada ou amarronzada). A parede dos basidiosporos pode ser fina, espessada e raramente dupla, lisa ou ornamentada (asperulados, tuberculados, equinulados, estriados, verrucosos, reticulados ou punctados). Esses apresentam tamanho e morfologia variada, podendo ser globosos, subglobosos,

obovados, elípticos, cilíndricos, alantóides, naviculares, entre outros, e ainda apresentar ápice truncado ou não (Figura 3) (Donk, 1964; Fidalgo & Fidalgo, 1967; Ryvardeen, 1991, 2004).

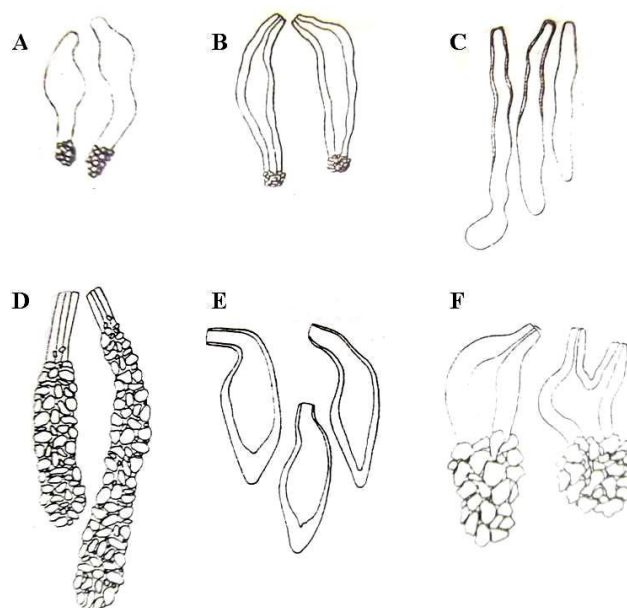


**Figura 3.** Tipos de basidiosporos e ornamentações. **A.** cilíndrico. **B.** alantóide. **C.** lunado. **D.** navicular. **E.** oblongo-elipsóide. **F.** elipsóide. **G.** subgloboso. **H-I.** globoso. **J.** verrucoso. **K.** crestado. **L.** dupla parede e ápice truncado (Fonte: Ryvardeen, 2004).

As características morfológicas dos basidiosporos são importante para a delimitação de gênero e de espécie (Ryvardeen, 2004), bem como a reação da parede dos basidiosporos a alguns reagentes, o que tem determinado a descrição de novas espécies (Baltazar *et al.*, 2010).

No himênio dos fungos poróides são encontradas diversas estruturas estéreis (cistídios, setas, medas, basidiolos, cistidiolos, pseudoparáfises, pseudófises, dendrohifídios) que apresentam valor taxonômicas na identificação das espécies (Fidalgo & Fidalgo, 1967; Fidalgo, 1968; Hawksworth *et al.*, 1995; Ryvardeen, 2004).

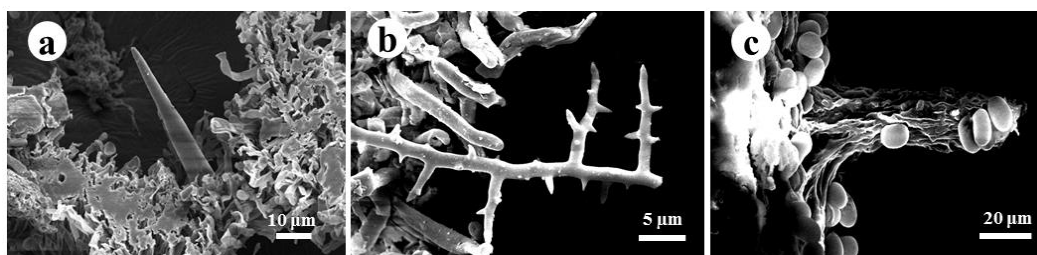
Cistídios são elementos homólogos aos basídios e que podem ser himeniais ou tramais usualmente clavados a cilíndricos, de parede fina a espessada, hialina ou, mais raramente corada, frequentemente com incrustações no ápice ou em maiores extensões (Figura 4) (Donk, 1964; Fidalgo & Fidalgo, 1967; Ryvardeen, 1991, 2004). Os cistidiolos são microestruturas estéreis claviformes ou ampuláceos, afilados ou cilíndricos, com paredes normalmente delgadas, hialinas, lisas ou incrustadas, com o mesmo tamanho dos basídios, mas diferindo por apresentar a extremidade distal pontuda, e diferenciando dos basidiolos por ficarem sempre abaixo do basídio (Fidalgo & Fidalgo, 1967; Ryvardeen & Johansen, 1980; Ryvardeen, 2004).



**Figura 4.** Tipos de cistídios. **A.** ápice incrustado e parede fina. **B.** ápice incrustado e parede espessa. **C.** liso e tubular. **D.** grosseiramente incrustado. **E.** ventricoso. **F.** ápice grosseiramente incrustado (Fonte: Ryvardeen, 2004).

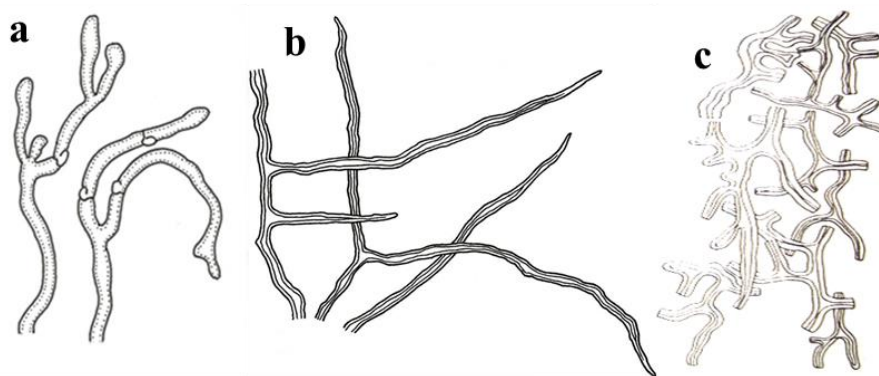
Setas tramais ou himeniais correspondem a uma formação pilosa estéril, espessa e de conteúdo escuro, parede espessada, formato acuminado, bifurcado, pontudo, subulado ou ventricoso (Figura 5) (Fidalgo & Fidalgo, 1967; Ryvardeen & Johansen, 1980; Ryvardeen, 2004). Essa microestrutura é característica da família *Hymenochaetaceae* e desempenha papel taxonômico importante em nível específico (Ryvardeen, 2004).

As medas são formações estéreis, constituídas por hifas delicadas e agrupadas à maneira de um feixe e que, atravessando o himênio, se projetam no exterior ou no lúmen dos tubos (Figura 5) (Fidalgo & Fidalgo, 1967). De acordo com Furtado (1981), a presença de medas não é um caráter de valor taxonômico. Entretanto, para Fidalgo (1968) as medas apresentam valor taxonômico infragenérico.



**Figura 5.** Microestruturas estéreis. **a.** Seta himenial. **b.** Hifa setal. **c.** Medas. (Fotos: A.C. Gomes-Silva).

O sistema hifálico é classificado de acordo com os tipos de hifas presentes, podendo ser monomítico (quando apresenta apenas hifas generativas), dimítico (quando apresenta hifas generativas e esqueléteas ou, mais raramente, generativas e conectivas) ou trimítico (quando os três tipos de hifa são encontrados no basidioma) (Figura 6) (Fidalgo, 1968). As hifas são muito importantes para a delimitação genérica, já que muitos gêneros incluem somente espécies com o mesmo tipo de configuração de hifas (Ryvarden, 2004). As hifas generativas podem apresentar ou não grampos de conexão e geralmente são hialinas, de parede fina, e ramificadas. As hifas esqueléteas apresentam parede grossa a sólida, hialinas a amareladas; são longas e não ramificadas, enquanto as hifas conectivas apresentam parede fina e são bastante ramificadas (Fidalgo, 1968; Teixeira, 1995; Ryvarden, 2004). Existem tipos de hifas intermediárias, como, por exemplo, as arboriformes encontradas em *Amauroderma*, com longa porção não ramificada e ápices com inúmeras ramificações (Ryvarden, 2004).



**Figura 6.** Tipos de hifas. **a.** Hifa generativa. **b.** Hifa esqueléteas. **c.** Hifa conectiva (Fonte: Gomes-Silva *et al.*, 2012; Ryvarden, 2004).

Quanto às reações químicas, as microestruturas podem ser amilóides, quando apresentam coloração cinza-azulada ou violácea em presença do Reagente de Melzer's; dextrinóides, quando a coloração se torna avermelhada em presença do mesmo reagente, cianófilas, quando coradas pelo Azul de Algodão (ou Amann), ou xantocróicas, quando escurecem na presença de KOH (Ryvarden, 1991; Teixeira, 1995).

Todas as características macro- e microscópicas citadas são muito importantes para a delimitação de gêneros e de espécies, sendo assim importantes na taxonomia do grupo.

## 2.2 Importância econômica e ecológica dos fungos poróides

Os fungos poróides são organismos extremamente importantes, para o equilíbrio da natureza. As espécies são geralmente sapróbias em madeira morta, mas também são encontradas em árvores vivas e em solo, parasitando raízes ou em associações micorrízicas (Webster & Weber, 2007). Esses

fungos são de grande importância biológica, pois são recicladores de carbono, promovendo assim um fluxo de nutrientes nos ecossistemas florestais através da reciclagem de elementos químicos vitais para a natureza, como ressaltado por Gilbertson (1980). Por viverem, crescerem e se desenvolverem sobre madeira e utilizarem os componentes da madeira para o seu crescimento, os fungos poróides são chamados de lignolíticos, lignocelulolíticos ou xilófilos, pois possuem um sistema enzimático extracelular que lhes permite degradar fontes complexas de carbono como a celulose, a hemicelulose e a lignina (Martinez, 2005).

Os fungos poróides podem causar dois tipos de podridão de madeira: marrom e branca. Os fungos que secretam enzimas que degradam a celulose e a hemicelulose são denominados causadores de podridão marrom, reduzindo o substrato a pedaços cúbicos amarronzados, quebradiços, fendidos e rachados no sentido das fibras, devido à presença da lignina residual; e os que, além dessas substâncias também degradam a lignina, são denominados causadores de podridão branca, que deixam o substrato com aparência esbranquiçada, macia, fibrosa e esponjosa (Ryvarden, 1991; Samuelsson *et al.*, 1994). No entanto, por apresentar essa capacidade de decomposição, podem ser um problema para a economia do país, pois causam deterioração de postes, pontes, reservas de madeira em armazéns e mesmo de espécies arbóreas aproveitáveis pelo homem.

Algumas espécies desse grupo são comestíveis, como *Favolus tenuiculus* P. Beauv., que é consumida por populações indígenas e apresenta um alto valor nutricional (Trufem & Bononi, 1985). Mas, devido ao fato de algumas espécies serem tóxicas e causarem irritações gastrointestinais, existe a necessidade da identificação correta dos fungos para evitar danos à saúde (Gilbertson, 1980; Pegler & Spooner, 1992; Alexopoulos *et al.*, 1996; Gerhardt, 2005).

Outras espécies de fungos poróides são utilizadas para fins medicinais (Gilbertson, 1980; Alexopoulos *et al.*, 1996; Fidalgo, 1965; Fidalgo & Prance, 1976), como *Pycnoporus sanguineus* (L.) Murrill, utilizado na cicatrização de feridas. Sotão & Figueiredo (1996) relatam a utilização deste fungo nos acabamentos peças de artesanais por comunidades indígenas no Estado do Amapá.

Subprodutos fabricados a partir de espécies de fungos poróides vêm sendo amplamente comercializados ([www.fungi.com](http://www.fungi.com)) como, por exemplo, chás e comprimidos de *Ganoderma lucidum* (M. A. Curtis) P. Karst., que vem sendo utilizados pelas propriedades antitumorais, antivirais, antiinflamatórias e bactericidas (Urban, 2004). Experimentos com extratos obtidos de espécies de fungos poróides têm demonstrado resultados promissores, principalmente em relação a atividades antibacterianas e antifúngicas (Suay *et al.*, 2000; Shon & Nam, 2001; Stamets, 2002; Rosa *et al.*, 2003; Lindequist *et al.*, 2005; Smânia *et al.*, 2007), atividade antimicrobiana contra bactérias de produtos alimentícios (Smânia *et al.*, 1998), atividade antiviral (Collins & Tzi, 1997; Smânia *et al.*, 2003), terapias contra o câncer (Smith *et al.*, 2002; Gao *et al.*, 2005a,b; Yang *et al.*, 2005; Silva,

2006), tratamentos de diabetes (Gao *et al.*, 2004; Chen *et al.*, 2005a,b), Hepatite B (Gao *et al.*, 2002; Lin *et al.*, 2003), além de terem sido testados para atividade viral do HIV-1 (Walder *et al.*, 1995a,b; el-Mekkawy *et al.*, 1998) e imunoestimulantes (Zhang *et al.*, 2002).

Somente a partir de meados da década de 80 foram apresentadas evidências de que *Phanerochaete chrysosporium* Burds tinha a capacidade de degradar e mineralizar compostos xenobióticos (Bumpus & Aust, 1987; Harazono & Nakamura, 2005.). Atualmente esta e outras espécies têm mostrado grande importância na biotecnologia (Chander & Arora, 2007), principalmente em processos de biorremediação (Balan & Monteiro, 2001; Zjalic *et al.*, 2006; Groposo & Loguercio-Leite, 2005; Chander & Arora, 2007; Nozaki *et al.*, 2008), como exemplo, *Ganoderma resinaceum* Boud., *Pycnoporus sanguineus* e espécies de *Phellinus* e *Inonotus* (Zulfadhly *et al.*, 2001; Anke & Weber, 2006; Vieira *et al.*, 2006), na indústria de papel, celulose e de óleo (Jaouani *et al.*, 2003; Eugenio *et al.*, 2008), como pesticidas (Papinutti *et al.*, 2006; Quinteros *et al.*, 2007; Rigas *et al.*, 2007), o que os tornam potencialmente importantes na biotecnologia.

A maioria das espécies desse grupo de fungos é aceita como indicadoras de florestas menos perturbadas, pois, além de mostrarem nítidas preferências por troncos mais deteriorados e com maiores dimensões, essas áreas mais preservadas disponibilizam madeira morta em vários estágios de decomposição (Rolstad *et al.*, 2004). Pode-se observar que as florestas estão sendo cada vez mais fragmentadas e sofrendo influência de distúrbios ambientais, como a exploração madeireira e queimadas, o que tem afetado a diversidade desses fungos. No entanto, a sobrevivência destes vai depender da capacidade de dispersão e de sua estratégia de colonização (Bader *et al.*, 1995; Gibertoni *et al.*, 2007).

A diversidade dos fungos poróides nos ecossistemas pode estar diretamente relacionada à influência que os insetos exercem na disseminação da espécie (Müller *et al.*, 2002), pois muitos basidiomas são utilizados por insetos e artrópodes como alimento e local de reprodução, realizando assim o processo de dispersão (Komonen, 2001, 2003; Jonsell & Nordlander, 2004; Hattori, 2005; Orledge & Reynolds, 2005). Outros fatores como o tamanho e a qualidade das espécies de plantas (Gilbert *et al.*, 2002b, Norden *et al.*, 2004, Hattori, 2005, Gibertoni *et al.*, 2007, 2008), a especificidade ou preferência por hospedeiro (Lindblad, 2000; Gilbert *et al.*, 2002, 2008; Robledo *et al.*, 2006; Drechsler-Santos *et al.*, 2010) e o gradiente de chuva (Lindblad, 2001b; Gibertoni *et al.*, 2007) são fatores que influenciam a diversidade desses fungos.

Estudos com fungos poróides com enfoque em aspectos ecológicos no Brasil são escassos (Gibertoni *et al.*, 2007; Drechsler-Santos *et al.*, 2010), principalmente na região da Amazônia brasileira. O único trabalho com enfoque ecológico na região foi publicado por Gibertoni (2008), que observou a influência do período de coleta (estação chuvosa e seca), ocorrência relacionada à



qualidade (preferência por famílias e/ou espécies de plantas e estágio de decomposição do substrato) e tamanho (raio, diâmetro, área e volume) dos troncos. A autora analisou ainda a similaridade de espécies entre os transectos que variou de 40,9 a 62,1%, sendo dois transectos mais desiguais. A similaridade, considerada alta, foi mais afetada pelo período estacional e o maior número de ocorrências foi observado em troncos largos e menos deteriorados.

### 2.3 Fungos poróides na Amazônia brasileira

O estudo de fungos na Amazônia brasileira, inicia-se com a vinda de Spruce para o Pará, o qual coletou espécimes principalmente nas regiões de Caripi e Tanaú e teve esse material analisado na metade do século XIX por Berkeley, que apresentou uma lista com 20 “cogumelos” (Berkeley, 1851). Destas, apenas duas espécies são poliporóides. Hennings também contribuiu nesta fase inicial dos estudos ao realizar um importante inventário, descrevendo espécies de diferentes grupos para o estado do Pará, das quais cinco *Basidiomycetes* poliporóides (Hennings, 1900, 1902). Mais tarde, Huber Henrich e Ernest Henrich Ule coletaram espécimes de fungos macroscópicos em expedições ao estado do Amazonas, posteriormente analisados por Hennings, que relacionou a ocorrência de 41 espécies de fungos poróides para a Amazônia (Hennings, 1904, 1905, 1908).

Após 75 anos da última publicação da qual se tem conhecimento sobre fungos macroscópicos (*Basidiomycota*) na Amazônia brasileira, Sousa (1980) desenvolveu o primeiro trabalho sobre fungos poróides para a região, com a tese intitulada “O gênero *Phellinus* Quélet (*Hymenochaetaceae*) na Amazônia brasileira”, sendo descritas 23 espécies deste gênero em áreas da região amazônica incluindo novas espécies e novas combinações nunca validamente publicadas. Mais tarde, Capelari & Maziero (1988) listaram a ocorrência de 84 táxons de fungos macroscópicos coletados na região dos rios Jarú e Ji-Paraná (Rondônia) em 1986, incluindo *Myxomycetes*, *Ascomycetes* e *Basidiomycetes*. Neste trabalho, são listadas 28 espécies de fungos poliporóides sendo, aparentemente, o primeiro para o Estado.

Posteriormente, Bononi (1992), ao realizar um curso de extensão sobre coleta e preservação de fungos em 1987 e com a finalidade de iniciar um Herbário Micológico na Universidade Federal do Acre, coletou exemplares de fungos macroscópicos em áreas de Rio Branco. Neste estudo, incluiu *Ascomycotina* e *Basidiomycotina* (49 táxons), listando 25 espécies de fungos poróides.

Nos manguezais da Amazônia brasileira, Sotão *et al.* (1991) relacionaram a ocorrência de 33 espécies de *Basidiomycetes* coletados na ilha de Maracá, das quais 20 são representantes de fungos poliporóides. Campos & Cavalcanti (2000) registraram pela primeira vez *Phellinus mangrovicus* (Imazeki) Imazeki para o Brasil, coletado na ilha de Algodal-Maiandeuá, no Estado do Pará. Para a mesma região, Campos *et al.* (2005) listaram 19 espécies de *Basidiomycetes*, das quais nove

espécies são poliporóides, enquanto Sotão *et al.* (2002a) listaram nove espécies de fungos poróides coletados em manguezais de Bragança, no Estado do Pará. Posteriormente, uma contribuição ainda mais significativa foi dada por Sotão *et al.* (2003) os quais, ao listarem 58 espécies de *Basidiomycetes* macroscópicos de quatro áreas de manguezais da costa norte brasileira, atualizaram os dados para os manguezais dos Estados do Amapá e Pará. Destes, 28 espécies são de fungos poliporóides para os manguezais de Algodual-Maiandeuá (PA), Augusto Correia (PA), Bragança (PA) e Maracá (AP).

Para o estado do Amazonas, De Jesus (1995) reportou 163 espécies de fungos lignícolas, relacionando 75 espécies de fungos com himênio tubular. Posteriormente, De Jesus (1996) listou 64 espécies de *Basidiomycetes* lignícolas para a Estação Ecológica da ilha de Maracá, Roraima, sendo 18 espécies poliporóides.

Em 1997, Sotão *et al.* listaram espécies de *Basidiomycotina* coletados na FLONA de Caxiuanã, também no Pará, sendo reportadas 20 espécies poliporóides, enquanto Sotão *et al.* (2002b), em uma nova listagem de *Basidiomycetes* poróides, relataram 30 espécies coletadas na mesma região. Posteriormente, Sotão *et al.* (2008) listaram 90 espécies de fungos macroscópicos para essa reserva, dos quais 86 são poliporóides, enquanto que Martins-Júnior *et al.* (2008) registraram *Diplomitoporus allantoporus* Ryvarden & Iturr. como nova ocorrência para o Brasil, coletado na mesma região.

Recentemente, Gomes-Silva & Gibertoni (2009a) compilaram as espécies de *Aphylophorales* registradas em literatura para a Amazônia brasileira, listando 216 espécies para a região, das quais 151 são poróides, bem como revisaram espécimes depositados no Herbário URM, listando 33 espécies válidas, das quais 25 poróides, sendo cinco novos registros para a região (Gomes-Silva & Gibertoni, 2009b). Gomes-Silva *et al.* (2009c) descreveram *Coltricia globispora* Gomes-Silva, Ryvarden & Gibertoni como nova para a ciência, além de citarem novos registros para a Amazônia brasileira.

De Jesus & Ryvarden (2010) descreveram duas espécies novas para a ciência (*Perenniporia amazonica* De Jesus & Ryvarden e *Phaeolus amazonicus* De Jesus & Ryvarden) coletadas no Estado do Amazonas. Um grande avanço ao conhecimento micológico é propiciado pela Lista de Espécies da Flora do Brasil (2012) ao disponibilizar uma lista online (<http://floradobrasil.jbrj.gov.br/2012>) com 4.515 espécies de fungos registradas para o país, das quais 181 são poróides e ocorrem na Amazônia brasileira.

Contribuições atuais significativas foram fornecidas por Martins-Júnior *et al.* (2011) ao listarem espécies de *Ganoderma* e *Phellinus* na Estação Científica Ferreira Penna, no Estado do Pará, com novos registros para Amazônia. Gibertoni *et al.* (2012) descreveram *Oxyporus mollis* sp. nov. coletada no mesmo local, enquanto Medeiros & Ryvarden (2011) descreveram *Microporellus*

*amazonicus* sp. nov. coletado na Floresta Nacional de Caxiuanã, no Estado do Pará. Recentemente, Medeiros *et al.* (2012) e Gibertoni *et al.* (2012) listaram 76 e 94 espécies de fungos poróides, respectivamente para a mesma região.

Apesar de não serem estudos específicos para Floresta Amazônica, algumas citações sobre fungos poróides nessa região podem ser encontradas nos trabalhos de Theissen (1911, 1912), Torrend (1920, 1922, 1924, 1935, 1938), Teixeira (1945), Steyaert (1962), Batista *et al.* (1966), Bononi (1981), Furtado (1981), Teixeira & Fidalgo (1983), Ryvardeen (1987), Corner (1983, 1989, 1992), Silva & Minter (1995), Decock & Ryvardeen (1999a, b) e Gibertoni *et al.* (2008).

Aparentemente, não existem registros sobre fungos poróides para as áreas de Floresta Amazônica do Maranhão e Tocantins.

### 3. MATERIAIS E MÉTODOS

#### 3.1 Áreas de coletas

A Amazônia ocupa uma área de 4.196.943 km<sup>2</sup> correspondendo a cerca de 49,29% do território nacional. Desempenhando um papel particularmente importante na conservação da biodiversidade e no cenário econômico e estratégico do Brasil, consiste na maior extensão de floresta tropical úmida contínua dentro de uma nação, caracterizada por uma notável riqueza de espécies e altos índices de endemismos (Capobianco *et al.*, 2001). Definida por critérios geopolíticos, a Amazônia brasileira é formada por cinco unidades da federação (Acre, Amapá, Amazonas, Pará e Roraima), grande parte de Rondônia (98,8%), mais da metade do Mato Grosso (54%), além de parte do Maranhão (34%) e do Tocantins (9%) (IBGE, 2003).

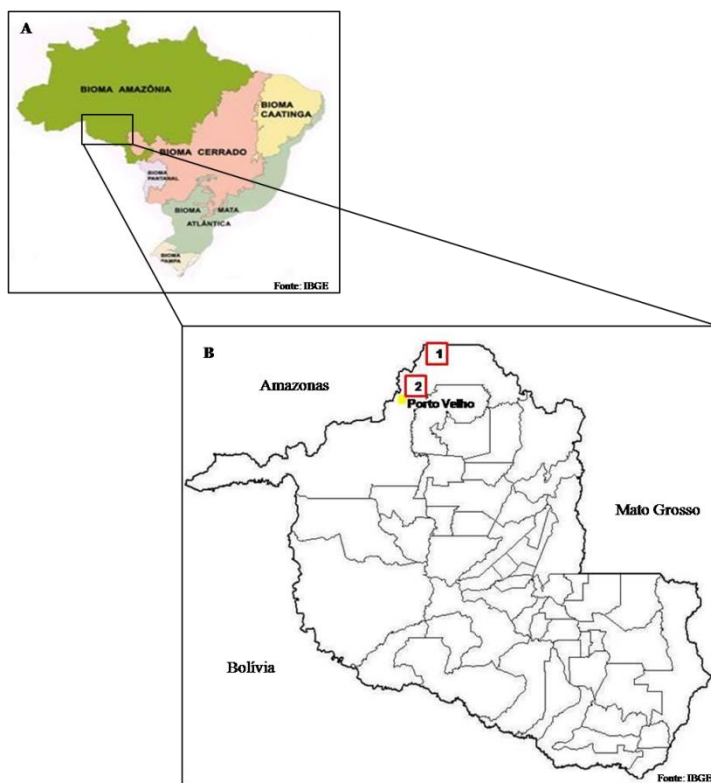
A Floresta Amazônica é formada por um mosaico de habitats bastante distintos: as florestas ombrófilas (abertas e densas), estacionais (deciduais e semideciduais), refúgios montanos, formações pioneiras, terra firme, várzea, igapós, campinaranas e savanas amazônicas (Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal, 1998; Museu Paraense Emílio Goeldi, 2007).

Em Rondônia, podem ser identificadas várias formações naturais ou pouco alteradas que ocupam 78% do Estado, dos quais 66,56% apresentam cobertura vegetal original formada por 55% de floresta ombrófila aberta, 4% de floresta ombrófila densa, 5% de campinaranas e savanas amazônicas, 2% de floresta estacional semidecidual e o restante representado por formações pioneiras de influência fluvial (várzea e igapó) (Olmos, 1999). A constituição e distribuição das formações vegetais variadas estão condicionadas ao clima do tipo equatorial quente e úmido com temperatura média anual de 24° a 26° °C (FIERO, 1997).

Foram escolhidas para estudo, duas áreas de floresta ombrófila aberta localizadas no município de Porto Velho, Estado de Rondônia: Estação Ecológica de Cuniã e Parque Natural Municipal de Porto Velho (Figura 7).

A Estação Ecológica (ESEC) de Cuniã (08°04' S e 63°31' O) é uma reserva composta por duas áreas que perfazem o total de 53.221,23 ha. A ESEC é administrada pelo Instituto Chico Mendes de Conservação da Biodiversidade e está coberta por floresta ombrófila aberta, formações savânicas e cerrado. A área escolhida para o estudo possui 46.120,28 ha e está situada em uma região que apresenta baixa densidade demográfica, excelente estado de conservação das florestas e rios, além de alta biodiversidade. Possui acesso local rodoviário pela BR 319 e fluvial pelo rio Madeira, distando 130 km de Porto Velho ([www.ibama.org.br](http://www.ibama.org.br)).

O Parque Natural Municipal (PNM) de Porto Velho – RO (08°45' S e 63°54' O) é administrado pela Secretária Municipal do Meio Ambiente (SEMA) e compreende uma área de 2.000 ha, dos quais 390,82 ha compostos por floresta ombrófila aberta em sua maior proporção no estado nativo, e cerca de 20% em área de vegetação secundária ou pioneira. O Parque dista cerca de 7 km do perímetro urbano e 15 km do centro da cidade de Porto Velho ([www.ronet.com.br](http://www.ronet.com.br)).



**Figura 7.** Localização das áreas de coletas. **A)** Biomas brasileiros; **B)** Estado de Rondônia (1. Estação Ecológica de Cuniã; 2. Parque Natural Municipal de Porto Velho).

### 3.2 Coletas, herborização, análise e identificação dos espécimes

Em cada área de estudo, foram percorridas três trilhas pré-existentes de 20 x 1.000 m. Todos os substratos propícios ao surgimento de fungos poróides, tais como troncos mortos, inclusive queimados, folhedo, raízes aparentes ou solo, foram observados e os representantes encontrados foram coletados com auxílio de uma faca ou facão. Os basidiomas foram acondicionados em sacos de papel, nos quais foi anotado o local, data de coleta, transecto, medidas dos troncos e espécie vegetal, quando possível.

Os basidiomas coletados foram colocados em estufa no Herbário Dr. Ary Tupinambá Penna Pinheiro da Faculdade São Lucas em Porto Velho - RO a 45-50°C pelo tempo necessário para a total secagem, entre dois e sete dias (Fidalgo & Bononi, 1989). Posteriormente, foram encaminhados ao Departamento de Micologia da Universidade Federal de Pernambuco, onde foram

analisados macroscopicamente quanto ao modo de fixação no substrato, forma, cor, consistência e dimensões do basidioma, e quanto às características da superfície do píleo (aspecto e cor), margem (aspecto e cor), superfície himenial (cor, número de poros por milímetro e comprimento dos tubos), estipe (posição, forma, dimensões, superfície e cor) e contexto (cor, espessura e aspecto). As medidas foram obtidas com uma régua milimetrada e as cores determinadas de acordo com a carta de cores de Watling (1969). Os basidiomas foram fotografados em campo e no laboratório, com régua milimetrada utilizada como escala.

Para observação do material ao microscópio de luz, foram feitos cortes à mão livre da superfície himenial, do contexto e da superfície abhimenial com lâminas de aço. Os cortes foram colocados entre lâmina e lamínula com solução aquosa de hidróxido de potássio 3-5% e floxina 1% (Martin, 1934). O hidróxido de potássio hidrata as estruturas e permite que se espalhem mais facilmente quando colocados entre a lâmina e a lamínula e, em basidiomicetos xantocróicos, escurecem as hifas permanentemente, enquanto a floxina cora o citoplasma em tons de rosa. Em alguns casos, foi utilizado o azul de metileno (Kotlaba & Pouzar, 1964) em lactofenol, que tingem de azul as paredes das hifas e basidiosporos (cianofilia) e impede a dissolução de material cristalino (Reeves & Welden, 1967). Também foi utilizado o reagente de Melzer (Singer, 1951), de modo a observar a reação amilóide (acinzentada, azulada ou violácea) ou dextrinóide (marrom-avermelhada) das paredes de basidiosporos, das hifas e de outras microestruturas. Além das reações bioquímicas, as microestruturas (hifas, basídios, setas, cítidios, etc.) foram analisadas quanto à forma, dimensões, tipo de ornamentação e cor (Teixeira, 1995). As medidas foram efetuadas, sempre que possível, a partir de 20 unidades de cada microestrutura, através de uma ocular com régua milimetrada e objetivas com aumento de 40X e 100X, esta última com óleo de imersão. Essas características bioquímicas, bem como a análise dos caracteres micro- e macroscópicos foram utilizadas para identificação e elaboração de chaves de identificação para os gêneros e espécies.

O material foi depositado nos herbários Dr. Ary Tupinambá Penna Pinheiro (HFSL) do Departamento de Ciências Biológicas da Faculdade São Lucas e no herbário Padre Camille Torrend (URM) do Departamento de Micologia da Universidade Federal de Pernambuco. Duplicatas de parte do material foram enviadas ao Instituto de Botânica da Universidade de Oslo, Noruega, para identificação ou confirmação da espécie pelo Dr. Leif Ryvarden e posterior incorporação ao herbário O.

Para identificação, foram utilizados os trabalhos de Furtado (1981), Ryvarden & Johansen (1980), Gilbertson & Ryvarden (1986, 1987), Ryvarden & Gilbertson (1994), Ryvarden, (1991, 2000, 2004, 2005), Núñez & Ryvarden (1995, 2000, 2001). A terminologia seguiu Kirk *et al.* (2008) e a classificação, Index Fungorum ([www.indexfungorum.org](http://www.indexfungorum.org)), CBS ([www.cbs.knaw.nl/databases](http://www.cbs.knaw.nl/databases)) e Mycobank ([www.mycobank.org](http://www.mycobank.org)).

### 3.3 Extração do DNA, amplificação, sequenciamento da rDNA ITS e análise filogenética

A extração do DNA genômico foi realizada com base no protocolo de Doyle & Doyle (1987), modificado por Góes-Neto *et al.* (2005). Fragmentos de basidiomas (50 mg) foram macerados utilizando nitrogênio líquido. Para maceração completa, os fragmentos foram novamente triturados em tubos contendo micropêrula de vidro com a utilização de homogeneizador (FastPrep–24 Cell Disruptor) (Malosso *et al.*, 2006) na presença de 650  $\mu$ L de tampão CTAB (100 mM Tris–HCl pH 8, 1,4 M NaCl, 2% CTAB, 20 mM EDTA, 1% PVP). Posteriormente, o produto pulverizado foi incubado a 65°C por 40 minutos. Após a incubação, o extrato foi lavado com clorofórmio–álcool isoamílico (24:1, v/v), precipitado em isopropanol (1:1, v/v), lavado com 1 mL de etanol 70% e, por último, ressuspendido em 50  $\mu$ L de água ultra pura.

As reações de amplificação da região ITS1–5.8S–ITS2 (rDNA) foram realizadas usando um termociclador (TECHNE TC–512) em um volume reacional de 25  $\mu$ L contendo os seguintes componentes: 1x Tampão KCl, 0.12 mM dNTPs, 1.5 mM MgCl<sub>2</sub>, 0.4 pmol/ $\mu$ L de cada oligonucleotídeo iniciador (*primers*), 0.04 U/ $\mu$ L de Taq Polimerase e aproximadamente 1ng/ $\mu$ L de DNA molde. Foram utilizados os iniciadores ITS1 (5'–TCCGTAGGTGAACCTGCGG–3') e ITS4 (5'–TCCTCCGCTTATTGATATGC–3') (White *et al.*, 1990). Os parâmetros utilizados nas reações basearam-se em Kaliyaperumal & Kalaichelvan (2008), com desnaturação inicial a 94°C por 5 min, seguido por 35 ciclos de desnaturação a 94°C por 45 s, anelamento dos primers a 58°C por 50 s, e extensão a 72°C por 60s, além de um período final de extensão a 72°C por 10 min. Controles negativos, contendo todos os componentes exceto DNA, foram utilizados em cada procedimento para detectar possíveis contaminações.

Os produtos de amplificação foram purificados com o kit PureLink PCR Purification – Invitrogen e encaminhados para sequenciamento no Centro de Estudos do Genoma Humano da USP, São Paulo.

Os cromatogramas do sequenciamento foram analisados para auxiliar na edição manual das sequências. O alinhamento das sequências obtidas em conjunto com as recuperadas do GenBank e edições das sequências obtidas foram realizados utilizando o programa MEGA5 (Tamura *et al.*, 2005). Árvores filogenéticas foram construídas a partir do método de máxima parcimônia (MP) e *neighbour joining* (NJ) com as distâncias de HKY+G, ambos com 1000 reamostragens de *bootstrap* utilizando o programa PAUP versão 4 (Swofford, 2003).

### 3.4 Análises dos dados ecológicos

Para a investigação sobre os aspectos ecológicos, foi analisada a diversidade de fungos em relação a cada área de estudo e à época de coleta.

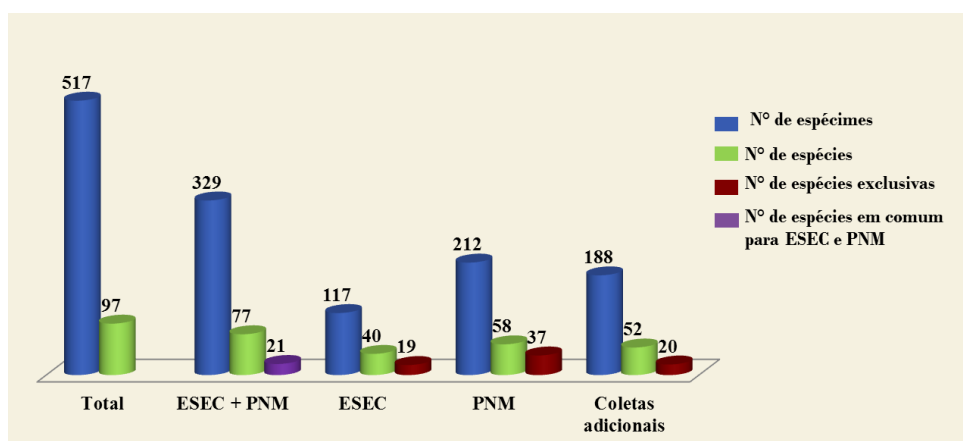
O teste de  $\chi^2$  (qui-quadrado) foi utilizado para avaliação da riqueza e abundância de acordo com a área e época de coleta (Krebs, 1989). A Análise de Similaridade (ANOSIM) foi utilizada para verificar se a composição da comunidade de fungos poróides variou de acordo com a área e o período de coleta (Clarke & Warwick, 1994). O nível de significância usado foi 5%.



## 4. RESULTADOS E DISCUSSÃO

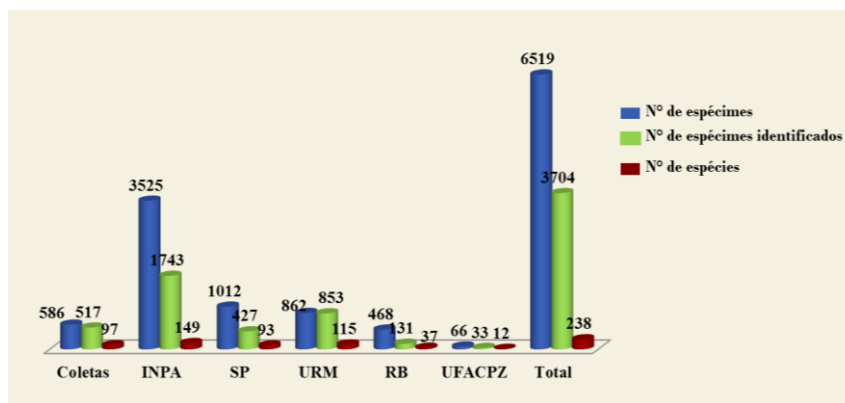
### 4.1 Diversidade de fungos poróides nas áreas de coletas na Amazônia brasileira

O estudo sobre fungos poróides na Amazônia brasileira permitiu ampliar o conhecimento sobre a diversidade em áreas onde o conhecimento ainda é mal mensurado. A partir de quatro coletas efetuadas no Parque Natural Municipal de Porto Velho (PNM) e quatro coletas na Estação Ecológica de Cuniã (ESEC) em Porto Velho, Rondônia foram coletados 398 espécimes de fungos poróides, dos quais 329 foram identificados e representam quatro ordens, seis famílias, 32 gêneros e 77 espécies (*sensu* [www.indexfungorum.org](http://www.indexfungorum.org)) (Tabela 1). Cento e oitenta e oito espécimes, distribuídos em 52 espécies, foram incorporados a partir de coletas aleatórias realizadas na Fazenda São Francisco, PNM, ESEC e da Terra Indígena Sete de Setembro, totalizando 586 espécimes coletados, desses 517 identificados, representando 97 espécies (Figura 8).



**Figura 8.** Diversidade de fungos poróides (ESEC - Estação Ecológica de Cuniã; PNM - Parque Natural Municipal de Porto Velho; Coletas adicionais).

Além disso, foram adicionados ao presente estudo todos os espécimes coletados na Amazônia brasileira e depositados nos Herbários UFACPZ, INPA, RB, SP e URM, totalizando 5.933 espécimes revisados, distribuídos em 141 espécies (Tabela 1). Um total de 6.519 espécimes foi analisado no presente estudo, em que 3.704 foram identificados e são representativos de 238 espécies confirmadas para a Amazônia brasileira (Figura 9, Tabela 1).



**Figura 9.** Diversidade de fungos poróides nas áreas de coletas e depositados em Herbários (INPA – Instituto Nacional de Pesquisa na Amazônia; RB – Rio de Janeiro; SP - Instituto de Botânica; UFACPZ- Universidade Federal do Acre; URM – Herbário Padre Camille Torrend da Universidade Federal de Pernambuco).

De acordo com a classificação de Kirk *et al.* (2008), as famílias encontradas pertencem às ordens *Gloeophyllales* Thorn (*Gloeophyllaceae*), *Hymenochaetales* Oberw. (*Hymenochaetaceae*, *Rickenellaceae* e *Schizoporaceae*), *Polyporales* Gäum. (*Fomitopsidaceae*, *Ganodermataceae*, *Meripilaceae*, *Meruliaceae*, *Phanerochaetaceae* e *Polyporaceae*) e *Russulales* (*Bondarwiaceae*) (Tabela 1).

Todas as famílias estiveram representadas nas duas áreas de coletas. *Polyporaceae* apresentou a maior número de gêneros e espécies (17 e 31, respectivamente) (Figura 10), estando representada por *Abundisporus roseoalbus*, *Corioloopsis caperata*, *C. floccosa*, *C. psila*, *Datronia mollis*, *Dichomitus cavernulosus*, *Fomes fasciatus*, *Hexagonia hydnoides*, *H. variegata*, *Lentinus velutinus*, *Lenzites elegans*, *Microporellus dealbatus*, *M. obovatus*, *Nigrofomes melanoporus*, *Nigroporus macroporus*, *N. vinosus*, *Perenniporia martii*, *P. stipitata*, *Polyporus dictyopus*, *P. guianensis*, *P. leprieurii*, *P. tenuiculus*, *Porogramme albocincta*, *Pycnoporus sanguineus*, *Trametes modesta*, *T. cubensis*, *T. lactinea*, *T. supermodesta*, *Trichaptum fumosoavellaneum*, *T. Sector* e *T. sprucei*.

A grande riqueza de espécies em *Polyporaceae* era esperada por ser uma família com maior diversidade (Ryvarden & Johansen, 1980; Gilbertson & Ryvarden, 1986; 1987; Núñez & Ryvarden, 2001), sendo representada por aproximadamente 636 espécies até o momento (Cannon & Kirk, 2007; Kirk *et al.*, 2008).

Os dados obtidos também corroboram os trabalhos de Gibertoni *et al.* (2012) e Medeiros *et al.* (2012), recentemente desenvolvidos na Amazônia brasileira sobre a diversidade de fungos poróides na Floresta Nacional de Caxiuanã, no Pará, sendo listadas 47 e 39 espécies,

respectivamente. Destas, 40 espécies foram em comum com as encontradas no presente estudo, ampliando o conhecimento sobre a distribuição geográfica dessas espécies na Amazônia brasileira.

Seguindo a família *Polyporaceae* estão *Ganodermataceae* (dois gêneros e 20 spp.) e *Hymenochaetaceae* (oito gêneros e 16 spp.) (Figura 10), o que também era esperado por serem famílias com grande número de espécies (Furtado, 1981; Ryvarden, 2004), mas essa grande diversidade também se deve ao número de espécies novas para a ciência que foram descobertas. *Ganodermataceae* contribuiu com o maior número de espécies novas (nove): *Amauroderma alboestiptatum* ined., *A. floriforme* ined., *A. laccatoestipitatum* ined., *A. limoniforme* ined., *A. minimum* ined., *A. ovisporum* ined., *A. paraelegantissimum* ined., *A. sessile* ined. e *A. subsessile* ined.

O último estudo taxonômico sobre *Amauroderma* foi realizado por Furtado (1981) ao publicar uma monografia para o grupo, na qual foram revisadas e delimitadas várias espécies. Após essa publicação, alguns trabalhos específicos foram publicados (Torrend, 1920; Ryvarden, 2004; Coelho *et al.*, 2007; Campacci & Gugliotta, 2009; Gomes-Silva *et al.*, 2010; Gomes-Silva & Gibertoni, 2012), mas a carência de pesquisas relacionadas a esse grupo de fungo provavelmente possibilitou este alto índice de espécies novas. O mesmo foi constatado para *Hymenochaetaceae*, com apenas uma espécie nova (*Phellinus sousae* Ryvarden, Gomes-Silva & Gibertoni) coletada na ESEC.

A família *Fomitopsidaceae* foi representada por dois gêneros e três espécies (*Daedalea aethalodes*, *Fomitopsis lilacinogilva* e *F. nivosa*); *Meruliaceae* foi representada por três gêneros e três espécies (*Flaviporus liebmannii*, *Gloeoporus thelephoroides* e *Steccherinum reniforme*), enquanto que *Meripilaceae* apresentou um gênero e duas espécies (*Rigidoporus amazonicus*) (Figura 10). Esses dados corroboram os de Capelari & Maziero (1988), em um trabalho sobre fungos macroscópicos em Ji-Paraná, Rondônia. Apesar da baixa diversidade encontrada nessas famílias, o que era esperado para famílias com poucas espécies, *F. lilacinogilva* representa a primeira ocorrência para o Brasil.

**Tabela 1.** Famílias e espécies de fungos poróides e novas ocorrências para os estados com Floresta Amazônica (AC, AM, AP, PA, RO, RR e regiões do Norte do MT e oeste do MA), para o Bioma Amazônia (BioAm), para o Brasil (BR) e para a Ciência (CI). Espécies adicionais do Herbário INPA (●), MG (◆), RB (▶), SP (■), UFACPZ (☼) e URM (▲); Espécies de coletas adicionais da Fazenda Mosquito (1), Parque Natural Municipal (2), Estação Ecológica de Cuniã (3) e Terra Indígena Sete de Setembro (4).

Famílias e Espécies		Novas ocorrências	Distribuição Amazônia/ Voucher	Descrição
<b>Bondarwiaceae</b> Kotl. & Pouzar				
1	<i>Wrightoporia avellanea</i> (Bres.) Pouzar	BioAm	PA (URM 79587)	Núñez & Ryvarden (2001)
2	<i>Wrightoporia porilacerata</i> Log.-Leite, A.L. Gerber & Ryvarden ●	BioAm	AM (INPA 178470)	Gilbertson & Ryvarden (1987)
<b>Fomitopsidaceae</b> Jülich				
3	<i>Daedalea aethalodes</i> (Mont.) Rajchenb.	RO, RR	RO (URM 83859), RR (INPA 77023)	Rajchenberg (1986)
4	<i>Daedalea dochmia</i> (Berk. & Broome) T. Hatt. ● ▲	BR	RO (URM 79174)	Hattori (2005)
5	<i>Daedalea microsticta</i> Cooke ●■	BR	AM (INPA 78673), RO (SP 211550)	Ryvarden & Johansen (1980)
6	<i>Fomitella supina</i> (Sw.) Murrill ●▶▲	AC	AC (INPA 100454)	Ryvarden & Johansen (1980)
7	<i>Fomitopsis cupreorosea</i> (Berk.) J. Carranza & Gilb.	AM, PA, RO	AM (SP 61739), PA (MG 202009), RO (URM 80488)	Carranza-Morse & Gilbertson (1986)
8	<i>Fomitopsis feei</i> (Fr.) Kreisel ●	BioAm	AC (INPA 100456), AM (INPA 153709), RO (INPA 110888)	Núñez & Ryvarden (2001)
9	<i>Fomitopsis lilacinogilva</i> (Berk.) J.E. Wright & J.R. Deschamps	BR	AM (INPA 128920), PA (URM 79681), RO (URM 83099), RR (INPA 78460)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 1</b> )
10	<i>Fomitopsis nivosa</i> (Berk.) Gilb. & Ryvarden	AC, AM, RO, RR	AC (INPA 910835), AM (INPA 183652), AP (MG 201984), RO (URM 83031), RR (INPA 77516)	Buchanan & Hood (1992)
11	<i>Fomitopsis scalaris</i> (Berk.) Ryvarden ●	BR	AM (INPA 130076), RR (INPA 78419)	Buchanan & Hood (1992)
12	<i>Ischnoderma resinosum</i> (Schrad.) P. Karst. ■	-	RO (SP 211601)	Ryvarden & Gilbertson (1993)
13	<i>Laetiporus persicinus</i> (Berk. & M.A. Curtis) Gilb. ▲	PA	PA ( URM 79688)	Gilbertson & Ryvarden (1986)
14	<i>Laetiporus sulphureus</i> (Bull.) Murrill ▶	BioAm	AM (SP 19939)	Burdsall & Banik (2001)
<b>Ganodermataceae</b> Donk				
15	<i>Amauroderma alboestiptatum</i> Gomes-Silva, Ryvarden & Gibertoni, ined.	CI	AM (SP 102772), RO (URM 83401), RR (SP 102721)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
16	<i>Amauroderma aurantiacum</i> (Torrend) Gibertoni & Bernicchia ▲	-	RO (URM 78847)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
17	<i>Amauroderma boleticeum</i> (Pat. & Gaillard) Torrend	-	PA (URM 79313), RO (URM 83863)	Ryvarden (2004)
18	<i>Amauroderma brasiliense</i> (Singer) Ryvarden	-	RO (URM 83578)	Ryvarden (2004)
19	<i>Amauroderma calcigenum</i> (Berk.) Torrend	RO	PA (INPA 103310), RO (URM 81053)	Gomes-Silva <i>et al.</i> (2010) ( <b>Anexo 3</b> )
20	<i>Amauroderma camerarium</i> (Berk.) J.S. Furtado ◆■▲	-	AM (SP 95970), PA (URM 79317)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
21	<i>Amauroderma corneri</i> Gulaid & Ryvarden ■	-	RO (SP 212009)	Gulaid & Ryvarden (1998)
22	<i>Amauroderma elegantissimum</i> Ryvarden & Iturr.	AM, PA, RO	AM (SP 211867), PA (URM 79295), RO (URM 79450), RR (INPA 143378)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
23	<i>Amauroderma exile</i> (Berk.) Torrend	RO, RR	AM (INPA 137055), PA (URM 79328), RO (URM 82791), RR (SP 112897)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )

	Famílias e Espécies	Novas ocorrências	Distribuição Amazônia/ Voucher	Descrição
24	<i>Amauroderma floriforme</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	PA (SP 193391), RO (URM 83250)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
25	<i>Amauroderma gusmanianum</i> Torrend	-	-	Furtado (1981)
26	<i>Amauroderma intermedium</i> (Bres. & Pat.) Torrend	RO, RR, MT	PA ( URM 79319), RO ( URM 79456), RR ( INPA 45354), MT (INPA 75623)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
27	<i>Amauroderma laccatoestipitatum</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	PA (URM 83246), RO (URM 83236)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
28	<i>Amauroderma limoniforme</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	PA (URM 83249), RO (URM 83234)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
29	<i>Amauroderma minimum</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	RO (URM 83228)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
30	<i>Amauroderma omphalodes</i> (Berk.) Torrend	-	AM (INPA 78717), PA (URM 79316), RO (SP 211532)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
31	<i>Amauroderma ovisporum</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	RO (URM 83240)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
32	<i>Amauroderma paraelegantissimum</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	PA (SP 193405), RO (URM 83414)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
33	<i>Amauroderma partitum</i> (Berk.) Wakef.	RO, RR	AM (INPA 155034), PA (SP 193426), RO (URM 81056), RR (INPA 45476)	Gomes-Silva <i>et al.</i> (2010) ( <b>Anexo 3</b> )
34	<i>Amauroderma picipes</i> Torrend	-	-	Gomes-Silva & Gibertoni (2012) ( <b>Anexo 4</b> )
35	<i>Amauroderma praetervisum</i> (Pat.) Torrend	AM, RO, RR	AM (INPA 33258), PA ( URM 79284), RO (URM 79465), RR (INPA 27324)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
36	<i>Amauroderma pseudoboletus</i> (Speg.) J.S. Furtado	BioAm *	-	Ryvarde (2004)
37	<i>Amauroderma rude</i> (Berk.) Torrend ■	-	PA (SP 103375)	Furtado (1981)
39	<i>Amauroderma sessile</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	PA (SP 193891), RO (SP 212002)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
38	<i>Amauroderma schomburgkii</i> (Mont. & Berk.) Torrend	RR	AM (INPA 153801), MT (INPA 75624), PA (URM 79307), RO (URM 79469), RR (INPA 78298)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
40	<i>Amauroderma sprucei</i> (Pat.) Torrend	RO, RR	AM (INPA 192709), PA (URM 79327)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
41	<i>Amauroderma subsessile</i> Gomes-Silva, Ryvarde & Gibertoni, ined.	CI	PA (URM 83248), RO (URM 83584)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
42	<i>Amauroderma trichodematum</i> J.S. Furtado ●	-	AM (INPA 45838)	Gomes-Silva <i>et al.</i> (2013) ( <b>Anexo 2</b> )
43	<i>Ganoderma amazonense</i> Weir. ●	AC	AC (INPA 100700)	Ryvarde (2004)
44	<i>Ganoderma australe</i> (Fr.) Pat.	AC, AM, AP, RR	AC (INPA 30749), AM (URM 36344), AP (SP233318), PA (URM 79273), RO (URM 81050), RR (INPA 143444)	Ryvarde (2004)
45	<i>Ganoderma citriporum</i> Ryvarde & Iturr. ●▲	BR	AM (INPA 216369), RO (URM 79486) RR (INPA45368)	Gomes-Silva <i>et al.</i> (2011) ( <b>Anexo 5</b> )
46	<i>Ganoderma colossus</i> (Fr.) C.F. Baker. ●▲	PA	AP (URM 48733), PA (INPA 74582)	Ryvarde (2004)
47	<i>Ganoderma multiplicatum</i> (Mont.) Pat.	RR	AM (INPA 74707), PA (URM 79280), RO (URM 81081), RR (INPA 186187)	Ryvarde (2004)
48	<i>Ganoderma orbiforme</i> (Fr.) Ryvarde ▲	-	AM (URM 47785)	Ryvarde (2004)
49	<i>Ganoderma perzonatum</i> Murrill ●	AM, RR	AM (INPA129605), RR (INPA143297)	Ryvarde (2004)
50	<i>Ganoderma resinaceum</i> Boud. ●■	AM, RO, RR	AM (INPA 153733), PA (INPA 74604), RO (SP 211267), RR (INPA 143420)	Ryvarde (2004)
51	<i>Ganoderma stipitatum</i> (Murrill) Murrill	AC, AM, AP, MT	AC (INPA 100123), AM (URM 47762) , AP (SP233309), PA (URM 79276), RO (URM 81051), MT (INPA 75625)	Ryvarde (2004)
52	<i>Ganoderma subformicatum</i> Murrill ■	BioAm	RO (SP 214815)	Ryvarde (2004)

53	<i>Ganoderma vivianimercedianum</i> M. Torres ■	-	RO (SP 233297)	Torres-Torres <i>et al.</i> (2008)
54	<i>Ganoderma zonatum</i> Murrill ▲	-	RO ( URM 78939)	Gomes-Silva <i>et al.</i> (2011) ( <b>Anexo 5</b> )
55	<i>Haddowia longipes</i> (Lév.) Steyaert ●▲	BR	PA ( URM 79279)	Gomes-Silva <i>et al.</i> (2011) ( <b>Anexo 5</b> )
56	<i>Humphreya coffeata</i> (Berk.) Steyaert ● ■ ▲	RR	PA ( URM 79277), RR ( INPA 28904)	Ryvarden (2004)
<b>Gloeophyllaceae</b> Jülich				
57	<i>Gloeophyllum striatum</i> (Sw.) Murrill ●►■▲	AC, AM, RO	AC (INPA 100231), AM (INPA 100037)	Núñez & Ryvarden (2001)
58	<i>Mycobonia flava</i> (Sw.) Fr. ■	-	*	Corner (1984)
<b>Hymenochaetaceae</b> Donk				
59	<i>Coltricia barbata</i> Ryvarden & de Meijer	<b>BioAm</b>	PA (SP 193443), RO (URM 82993)	Ryvarden & de Meijer (2002) ( <b>Anexo 17</b> )
60	<i>Coltricia cinnamomea</i> (Jacq.) Murrill	RO	AM (INPA 153750), PA (SP 194263), RO (URM 81046)	Ryvarden (2004) ( <b>Anexo 17</b> )
61	<i>Coltricia duportii</i> (Pat.) Ryvarden	<b>BioAm</b>	RO (URM 83115)	Ryvarden (2004) ( <b>Anexo 17</b> )
62	<i>Coltricia focicola</i> (Berk. & M.A. Curtis) Murrill ▲	AP	AP (URM 48728)	Ryvarden & Gilbertson (1993) ( <b>Anexo 17</b> )
63	<i>Coltricia hamata</i> (Romell) Ryvarden	RO	AM (SP 20190), MT, PA (URM 79463), RO (URM 80057), RR (INPA 45346)	Ryvarden (2004) ( <b>Anexo 17</b> )
64	<i>Coltricia montagnei</i> (Fr.) Murrill	RO	RO (URM 83030)	Ryvarden (2004) ( <b>Anexo 17</b> )
65	<i>Coltricia velutinea</i> Baltazar & Gibertoni	2° reg. CI	RO (URM 82898)	Baltazar <i>et al.</i> (2010)
66	<i>Coltriciella oblectabilis</i> (Lloyd) Kotl.	AM, RO	AM (INPA 76877), RO (URM 81052)	Ryvarden (2004)
67	<i>Fomitiporia apiahyna</i> (Speg.) Vlasák & Kout ●	<b>BioAm</b>	AM (INPA 84807)	Vlasák <i>et al.</i> (2011)
68	<i>Fomitiporia punctata</i> (Pilát) Murrill ■	-	*	Ryvarden (2004)
69	<i>Fomitiporia robusta</i> (P. Karst.) Fiasson & Niemelä ■	-	*	Ryvarden (2004)
70	<i>Fulvifomes dependens</i> (Murrill) Murrill ◆	AP, PA	AP(MG 204346), PA (MG 106395)	Larsen & Cobb-Pouille (1990)
71	<i>Fulvifomes fastuosus</i> (Lév.) Bondartseva & S. Herrera ●►■	AP	AM (INPA 84088), AP (MG 143669), MT (INPA 84107), PA (MG 204427)	Ryvarden (2004)
72	<i>Fulvifomes grenadensis</i> (Murrill) Murrill ●	<b>BioAm</b>	AM (INPA 130129), AP (MG 204374), PA (MG 195280)	Larsen & Cobb-Pouille (1990)
73	<i>Fulvifomes membranaceus</i> (J.E. Wright & Blumenf.) Baltazar & Gibertoni	<b>BioAm</b>	PA (MG 195276), RR (INPA 145395)	Ryvarden (2004)
74	<i>Fulvifomes merrillii</i> (Murrill) Baltazar & Gibertoni	AP, PA, RO	AP (MG 204376), PA (INPA 103770), RO ( URM 78992)	Ryvarden (2004)
75	<i>Fulvifomes melleoporus</i> (Murrill) Baltazar & Gibertoni ●	<b>BioAm</b>	PA (MG 195276), RR (INPA 143418)	Ryvarden (2004)
76	<i>Fulvifomes rimosus</i> (Berk.) Fiasson & Niemelä ◆	<b>BioAm</b>	AP (MG 204377), PA (MG 204442)	Ryvarden (2004)
77	<i>Fulvifomes umbrinellus</i> (Bres.) Y.C. Daif ▲	AP, MT	AP (MG 204378), MT (INPA 91961), PA (MG 204431)	Ryvarden (2004)
78	<i>Fuscoporia contigua</i> (Pers.) G. Cunn. ◆	<b>BioAm</b>	PA (MG 204422)	Ryvarden (2004)
79	<i>Fuscoporia ferrea</i> (Pers.) G. Cunn. ●	<b>BioAm</b>	AM (INPA 129409)	Ryvarden (2004)
80	<i>Fuscoporia ferruginosa</i> (Schrاد.) Murrill ●	<b>BioAm</b>	AC (INPA 100871)	Ryvarden (2004)
81	<i>Fuscoporia gilva</i> (Schwein.) T. Wagner & M. Fisch.	-	AC (INPA 24403), AM (INPA 32288), MT (INPA 83392), PA (URM 79363), RO (URM 78964), RR (INPA 19715)	Ryvarden (2004)
82	<i>Fuscoporia rhabarbarina</i> (Berk.) Groposo, Log.-Leite & Góes-Neto ◆	<b>BioAm</b>	PA ( MG 204443)	Groposo <i>et al.</i> (2007)
83	<i>Fuscoporia senex</i> (Nees & Mont.) Ghob.-Nejh ●	-	AM (INPA 78760)	Ryvarden (2004)
	<b>Famílias e Espécies</b>	<b>Ocorrências</b>	<b>Distribuição Amazônia/ Voucher</b>	<b>Descrição</b>
84	<i>Fuscoporia wahlbergii</i> (Fr.) T. Wagner & M. Fisch. ●	<b>BioAm</b>	AM ( INPA 84813), MT ( INPA 85125)	Ryvarden (2004)

85	<i>Hymenochaete iodina</i> (Mont.) Baltazar & Gibertoni	<b>Comb. nov.</b>	AC (INPA 30453), AM (INPA 129755), RO (URM 83015), RR (INPA 145352)	Ryvarden (2004)
86	<i>Hymenochaete porioides</i> T. Wagner & M. Fisch. ●	<b>BioAm</b>	AM ( INPA 129468), PA ( INPA 84129)	Ryvarden (2004)
87	<i>Inonotus amazonicus</i> Gomes-Silva, Ryvarden & Gibertoni, ined.	<b>CI</b>	MT (URM 83535)	Gomes-Silva et al. (2012) ( <b>Anexo 6</b> )
88	<i>Inonotus calcitratus</i> (Berk. & M.A. Curtis) Gomes-Silva & Gibertoni, ined.	<b>Comb. nov.</b>	RO (URM 83103)	Ryvarden (2004)
89	<i>Inonotus luteoumbrinus</i> (Romell) Ryvarden ●	AC, AP	AC ( INPA 100449), MT ( INPA 91949), RR (INPA 143387)	Ryvarden (2005)
90	<i>Phellinus baccharidis</i> (Pat.) Pat.	AC, AP	AC ( INPA 100415), AP ( MG 204329), PA ( MG 204439)	Ryvarden (2004)
91	<i>Phellinus caryophylleus</i> (Cooke) Ryvarden ●	<b>BioAm</b>	AC ( INPA 100574), PA ( INPA 84104)	Ryvarden (2004)
92	<i>Phellinus extensus</i> (Lév.) Pat. ●◆▲	RR	AM (INPA 85602), RR (INPA 78549)	Núñez & Ryvarden (2000)
93	<i>Phellinus fibrous</i> Ryvarden, Gomes-Silva & Gibertoni ●	<b>CI</b>	AM ( URM 83725)	Gomes-Silva et al. (2012) ( <b>Anexo 7</b> )
94	<i>Phellinus griseoporus</i> D.A. Reid ■	PA	PA (SP 178099), RO (SP 211454)	Ryvarden (2004)
95	<i>Phellinus labyinthica</i> Ryvarden, Gomes-Silva & Gibertoni, ined ●	<b>CI</b>	AC (INPA 100399)	-
96	<i>Phellinus linteus</i> (Berk. & M.A. Curtis) Teng ●	<b>BioAm</b>	PA ( INPA 84094)	Ryvarden (2004)
97	<i>Phellinus noxius</i> (Corner) G. Cunn. ●	RR	MT (INPA 85124), RR (INPA 192490)	Ryvarden (2004)
98	<i>Phellinus rhytiphloeus</i> (Mont.) Ryvarden ●	<b>BioAm</b>	AC ( INPA 100214), AM (INPA 102804)	Ryvarden (2004)
99	<i>Phellinus shaferi</i> (Murrill) Ryvarden	RO	RO ( INPA 110925)	Ryvarden (2004)
100	<i>Phellinus sousae</i> Ryvarden, Gomes-Silva & Gibertoni	<b>CI</b>	MT (URM 83858), RO (URM 83423)	Gomes-Silva et al. (2012) ( <b>Anexo 7</b> )
101	<i>Phellinus undulatus</i> (Murrill) Ryvarden ◆	AP	AP (MG 204382), PA (MG 195282)	Ryvarden (2004)
102	<i>Phylloporia chrysites</i> (Berk.) Ryvarden	AM	AM (INPA 137041), RO (URM 83102)	Wagner & Ryvarden (2002)
103	<i>Phylloporia pectinata</i> (Klotzsch) Ryvarden	RO	AM ( INPA 84112), RO ( URM 83112)	Wagner & Ryvarden (2002)
104	<i>Phylloporia spathulata</i> (Hook) Ryvarden	RR	AM ( INPA 19157), PA ( INPA 103493), RO ( URM 82865), RR ( INPA 29062)	Wagner & Ryvarden (2002)
<b>Meripilaceae</b> Jülich				
105	<i>Hydnopolyporus fimbriatus</i> (Fr.) D.A. Reid ■	PA	PA (SP 193641)	Ryvarden & Johansen (1980)
106	<i>Rigidoporus amazonicus</i> Ryvarden	AP, MT, PA, RO	AM, AP (MG 204319), MT (INPA 75627), PA (MG 204395), RO (URM 83862)	Ryvarden (1987)
107	<i>Rigidoporus aurantiacus</i> ▲	-	PA (URM 79601)	Ryvarden & Iturriaga (2003)
108	<i>Rigidoporus biokoensis</i> (Bres. ex Lloyd) Ryvarden ●	<b>BioAm</b>	AP (MG 204292), MA (MG 113911), PA (MG 204415), RO (INPA 110522)	Ryvarden & Johansen (1980)
109	<i>Rigidoporus crocatus</i> (Pat.) Ryvarden	<b>2° reg. BR</b>	PA ( MG 204429), RO ( URM 83870)	Westphalen & Silveira (2012)
110	<i>Rigidoporus lineatus</i> (Pers.) Ryvarden	AC, AM, MA, PA, RO, RR	AC (INPA 100320), AM (INPA 185395), AP (SP 233308), MA (MG 113910), PA (MG 23115) RO (SP 211467), RR (INPA 154874)	Leal & Gugliotta (2008)
111	<i>Rigidoporus mariae</i> Gibertoni, Gomes-Silva & Ryvarden, ined. ●	<b>CI</b>	AC (URM 84072), AM (INPA 178429), PA (URM 80011), RO (INPA 110522), RR (INPA 144868)	Gomes-Silva et al. (2012) ( <b>Anexo 8</b> )
112	<i>Rigidoporus microporus</i> (Fr.) Overeem	AP, MT	AC (INPA 100278), AM (SP 71468), AP (MG 204285), MT (MG 87570), PA (MG 195294), RO (URM 83026), RR (INPA 76952)	Ryvarden & Johansen (1980)
<b>Famílias e Espécies</b>				
113	<i>Rigidoporus ulmarius</i> (Sowerby) Imazeki ●	AP, AM, RR	AM (INPA 80482), AP (MG 204280), PA (MG 195272), RR (INPA 76935)	Ryvarden & Gilbertson (1994)

114	<i>Rigidoporus vinctus</i> (Berk.) Ryvarden ●▲	AC, PA, RO, RR	AC ( INPA 100293), AM ( INPA 192501), PA (MG 195151), RO (INPA 110788), RR (INPA 144843)	Ryvarden & Johansen (1980)
<b>Meruliaceae</b> Rea				
115	<i>Junghuhnia carneola</i> (Bres.) Rajchenb. ▲	<b>BioAm</b>	PA (URM 79633)	Gomes-Silva & Gibertoni (2013) ( <b>Anexo 9</b> )
116	<i>Bjerkandera adusta</i> (Willd.) P. Karst. ●	<b>BioAm</b>	AM (INPA 78630)	Ryvarden & Johansen (1980)
117	<i>Flaviporus hydrophilus</i> (Berk. & M.A. Curtis) Ginns ●■	<b>BioAm</b>	AC (INPA 100857)	Núñez & Ryvarden (2001)
118	<i>Flaviporus liebmannii</i> (Fr.) Ginns	RR, AC	AC ( INPA100541), PA ( URM 79634), RR (INPA145491)	Núñez & Ryvarden (2001)
119	<i>Gloeoporus cystidiatus</i> Ryvarden ●	-	AM ( INPA 129882)	Ryvarden (1987)
120	<i>Gloeoporus dichrous</i> (Fr.) Bres. ●▶■	PA	AM ( INPA 82752), PA ( SP 25413)	Ryvarden & Gilbertson (1993)
121	<i>Gloeoporus theleporoides</i> (Hook.) G. Cunn.	AC, AM, PA, RO, RR	AC ( INPA 100219), AM ( INPA 129917), MT, PA (URM 79584), RO ( URM 79493), RR (INPA 78395)	Gilbertson & Ryvarden (1986)
122	<i>Irpex lacteus</i> (Fr.) Fr. ●▲	AC, AM	AC (INPA 100509), AM (INPA 183662), PA (URM 79632)	Núñez & Ryvarden (2001)
123	<i>Junghuhnia nitida</i> (Pers.) Ryvarden ■	<b>BioAm</b>	RO ( SP 211996)	Ryvarden & Gilbertson (1993)
124	<i>Steccherinum reniforme</i> (Berk. & M.A. Curtis) Banker	RO	RO (URM 79547)	Mass (1974)
<b>Phanerochaetaceae</b> Jülich				
125	<i>Antrodiella angulatopora</i> Ryvarden ●▲	MT, RR	AM (INPA 75891), MT (INPA 75655), RR (INPA 145063)	Núñez & Ryvarden (2001)
126	<i>Antrodiella murrillii</i> (Lloyd) Ryvarden ●	<b>BR</b>	AC (INPA 100466), MT (INPA 128968)	Núñez & Ryvarden (2001)
127	<i>Antrodiella reflexa</i> Ryvarden & Núñez ●	<b>BioAm</b>	AM (INPA 216402)	Núñez & Ryvarden (2001)
128	<i>Antrodiella semisupina</i> (Berk. & M.A. Curtis) Ryvarden ●■	<b>BioAm</b>	AM (INPA 63300)	Núñez & Ryvarden (2001)
129	<i>Antrodiella versicutis</i> (Berk. & M.A. Curtis) Gilb. & Ryvarden ●	<b>BioAm</b>	RR (INPA 154917)	Gilbertson & Ryvarden (1986)
130	<i>Ceriporia angulata</i> Gomes-Silva, Ryvarden & Gibertoni	<b>CI</b>	AM (URM 83055)	Gomes-Silva <i>et al.</i> (2012) ( <b>Anexo 10</b> )
131	<i>Ceriporia spissa</i> (Schwein. ex Fr.) Rajchenb. ●	<b>BioAm</b>	AM (INPA 129670)	Coelho <i>et al.</i> (2005)
<b>Polyporaceae</b> Corda				
132	<i>Abundisporus roseoalbus</i> (Jungh.) Ryvarden	AC, RO	AC (INPA100588), PA (URM 79643)RO (INPA81087)	Ryvarden & Johansen (1980)
133	<i>Abundisporus violaceus</i> (Wakef.) Ryvarden ▲	<b>BioAm</b>	RO (URM 79508)	Ryvarden & Johansen (1980)
134	<i>Cerrena sclerodepsis</i> (Berk.) Ryvarden ●▶■	PA, RR, MT	PA (INPA74611), RR (INPA78461), MT (INPA75636)	
135	<i>Corioloopsis aspera</i> (Jungh.) Teng ●	<b>BioAm</b>	AM (INPA 44430)	Ryvarden & Johansen (1980)
136	<i>Corioloopsis byrsina</i> (Mont.) Ryvarden ●■	AM, RO, RR	AC (INPA 183806), AM ( INPA 183806), MT (INPA 75606), RO (INPA 65179), RR (INPA 78476)	Ryvarden & Johansen (1980)
137	<i>Corioloopsis brunneoleuca</i> (Berk.) Ryvarden ◆	<b>BR</b>	PA (MG195152)	Nogueira-Melo <i>et al.</i> (2012) ( <b>Anexo 11</b> )
138	<i>Corioloopsis caperata</i> (Berk.) Murrill	AM	AC (INPA 24394), AM ( INPA 129121), RO (URM 82831), RR (INPA 76933)	Ryvarden & Johansen (1980)
<b>Famílias e Espécies</b>		<b>Ocorrências</b>	<b>Distribuição Amazônia/ Voucher</b>	<b>Descrição</b>
139	<i>Corioloopsis floccosa</i> (Jungh.) Ryvarden	AC, AM, MT, AP	AC (INPA100886), AM (INPA19403), AP (SP233330), MT (INPA41843), RO (URM 79478), RR (INPA 154958)	Ryvarden & Johansen (1980)

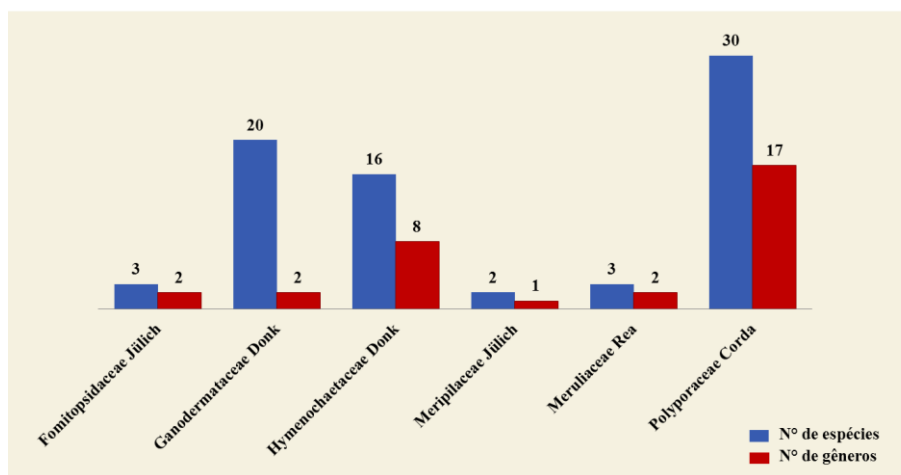


140	<i>Corioloopsis polyzona</i> (Pers.) Ryvarden ●►■▲	RO, RR	RO (INPA110688), RR (INPA76927)	Ryvarden & Johansen (1980)
141	<i>Corioloopsis psila</i> (Lloyd) Ryvarden	<b>Comb. nov.</b>	AM (INPA128955), RO (INPA 185947), RR (INPA78478)	Nogueira-Melo et al. (2012) ( <b>Anexo 11</b> )
142	<i>Corioloopsis rigida</i> (Berk. & Mont.) Murrill ●	RO	RO (URM 79478)	Ryvarden & Johansen (1980)
143	<i>Datronia decipiens</i> (Bres.) Ryvarden	<b>BR*</b>	-	-
144	<i>Datronia mollis</i> (Sommerf.) Donk	RO	-	Gilbertson & Ryvarden (1986)
145	<i>Datronia stereoides</i> (Fr.) Ryvarden ●■	AM	AM (INPA 77006), RO (INPA 64853)	Ryvarden & Johansen (1980)
146	<i>Dichomitus amazonicus</i> Gomes-Silva, Ryvarden & Gibertoni	<b>CI</b>	AM (URM 83054)	Gomes-Silva <i>et al.</i> (2012) ( <b>Anexo 10</b> )
147	<i>Dichomitus cavernulosus</i> (Berk.) Masuka & Ryvarden	AM, RO, RR	AM (INPA 100117), PA (URM 79692), RO (URM 822929), RR (INPA 78391)	Masuka & Ryvarden (1999)
148	<i>Dichomitus setulosus</i> ●	RR, AM	RR (INPA 144559), AM (INPA 78670)	Ryvarden & Johansen (1980)
149	<i>Earliella scabrosa</i> (Pers.) Gilbn. & Ryvarden	MT	MT ( INPA75594), PA (INPA 46131), RR (INPA 45455), RO (INPA 64798)	Ryvarden & Johansen (1980)
150	<i>Echinochaete brachypora</i> (Mont.) Ryvarden	AM	AM ( INPA130141)	-
152	<i>Fomes fasciatus</i> (Sw.) Cooke	AC, AM, MT, PA, RO	AC (INPA30733), AM (INPA19428), MT (INPA644120, PA (INPA74589), RO (INPA65090)	Ryvarden & Johansen (1980)
152	<i>Grammothele fuligo</i> (Berk. & Broome) Ryvarden	AC, AM	AC (INPA 100250), AM (INPA 125049)	Reck & Silveira (2009)
153	<i>Grammothele lineata</i> Berk. & M.A. Curtis	AM	AM (INPA 185837), RR(INPA 144762)	Ryvarden & Johansen (1980)
154	<i>Grammothele setulosa</i> (Henn.) Ryvarden	<b>BR</b>	RR (INPA 77016)	Ryvarden & Johansen (1980)
155	<i>Grammothele subargentea</i> (Speg.) Rajchenb.	-	-	Ryvarden & Johansen (1980)
157	<i>Hexagonia capillacea</i> Pat. ●	<b>BR</b>	PA (INPA 136914), RR (INPA 78543)	Ryvarden & Johansen (1980)
158	<i>Hexagonia glabra</i> (P. Beauv.) Ryvarden	-	PA (SP 177498)	Ryvarden & Johansen (1980)
159	<i>Hexagonia hydnoides</i> (Fr.) Fidalgo ■▲	AC, RR	AC (INPA 30728), AM (INPA 41189), PA (INPA 74530), RO (INPA 110696), RR (INPA 129072)	Ryvarden & Johansen (1980)
160	<i>Hexagonia variegata</i> Berk.	RO, MT	AM (INPA 18768), RR (INPA 19859), MT (INPA 75596)	Ryvarden & Johansen (1980)
161	<i>Lentinus crinitus</i> (L.) Fr. ▲	-	RO ( URM 79499)	Pegler (1983)
162	<i>Lentinus velutinus</i> Fr.	-	RO ( URM 79188)	Pegler (1983)
163	<i>Lenzites betulina</i> (L.) Fr. ▲	-	PA (SP 177540)	Ryvarden & Johansen (1980)
164	<i>Lenzites elegans</i> (Spreng.) Pat.	AC, RR	AC ( INPA100364), RR ( INPA20153)	Gilbertson & Ryvarden (1987)
165	<i>Lopharia cinerascens</i> (Schwein.) G. Cunn.	RO	RO ( INPA125066)	
166	<i>Microporellus dealbatus</i> (Berk. & M.A. Curtis) Murrill	RR	AM (INPA 1334), RR (INPA 145255)	Núñez & Ryvarden (2001)
167	<i>Microporellus iguazuensis</i> Rajchenb ●	<b>BioAm</b>	PA (INPA 103815)	Reck <i>et al.</i> (2010)
168	<i>Microporellus obovatus</i> (Jungh.) Ryvarden	AC, RR	AC (INPA 100717), RR (INPA 29386), RO (INPA 25113)	Gilbertson & Ryvarden (1987)
169	<i>Navisporus sulcatus</i> (Lloyd) Ryvarden ●	AM	AM (INPA 129976), RR (INPA 45539)	Ryvarden & Johansen (1980)
170	<i>Nigrofomes melanoporus</i> (Mont.) Murrill	AM	AM ( INPA85599)	Gilbertson & Ryvarden (1987)
171	<i>Nigroporus macroporus</i> Ryvarden & Iturr.	<b>2° reg para BR</b>	RO (URM 79515)	Ryvarden & Iturriaga (2003)
	<b>Famílias e Espécies</b>	<b>Ocorrências</b>	<b>Distribuição Amazônia/ Voucher</b>	<b>Descrição</b>
172	<i>Nigroporus rigidus</i> Ryvarden	MT, RR, AM	MT (INPA75631), RR (INPA78457), AM (INPA84284)	Ryvarden & Johansen (1980)
173	<i>Nigroporus vinosus</i> (Berk.) Murrill	AM, RR, PA	PA (INPA74543), AM (INPA74682), RR	Ryvarden & Johansen (1980)

			(INPA76990)	
174	<i>Pachykytospora alabamæ</i> (Berk. & Cooke) Ryvarden ▲	PA	AC (SP 100274)	Gilbertson & Ryvarden (1987)
175	<i>Pachykytospora papyracea</i> (Schwein.) Ryvarden ●	BioAm	AC (INPA 100207), RR (INPA 153786)	Gilbertson & Ryvarden (1987)
176	<i>Perenniporia amazonica</i> De Jesus & Ryvarden ●	-	-	De Jesus & Ryvarden (2010)
177	<i>Perenniporia aurantiaca</i> (A. David & Rajchenb.) Decock & Ryvarden ◆▲	-	PA (MG 195363)	Decock & Ryvarden (1999a)
178	<i>Perenniporia contraria</i> (Berk. & M.A. Curtis) Ryvarden	-	PA (URM 79731)	Decock <i>et al.</i> (2001)
179	<i>Perenniporia cremeopora</i> Decock & Ryvarden ◆	BR	PA (MG 195407)	Medeiros <i>et al.</i> (2012) (Anexo 12)
180	<i>Perenniporia dedrita</i> (Berk.) Ryvarden ◆	PA	PA (MG)	Decock & Ryvarden (1999b)
181	<i>Perenniporia ellipospora</i> Ryvarden & Gilb. ●	BR	AM (INPA192682)	Medeiros <i>et al.</i> (2012) (Anexo 12)
182	<i>Perenniporia inflexibilis</i> (Berk.) Ryvarden	MT, RO	AM (INPA 129582), MT (INPA91973), RO (URM792010)	Ryvarden & Johansen (1980)
183	<i>Perenniporia martii</i> (Berk.) Ryvarden	AC, RO	AC (INPA31693), RO (URM79204)	Gerber <i>et al.</i> (1999)
184	<i>Perenniporia medulla-panis</i> (Jacq.) Donk	AM, RO	AM ( INPA164350), RO ( URM 79206)	Núñez & Ryvarden (2001)
185	<i>Perenniporia minutopora</i> Ryvarden & Decock ●	BR	AC (INPA 100617), PA (INPA 103348), RO (INPA 110709)	Núñez & Ryvarden (2001)
186	<i>Perenniporia ohiensis</i> (Berk.) Ryvarden ● ◆	AM	AM ( INPA78668), PA (MG 195186)	Núñez & Ryvarden (2001)
187	<i>Perenniporia parvispora</i> Decock & Ryvarden ▲	BioAm	PA (URM 79802)	Decock & Ryvarden (2000)
188	<i>Perenniporia roseoisabellina</i> (Pat. & Gaillard) Ryvarden ◆	BR	PA (MG 195163)	Medeiros <i>et al.</i> (2012) (Anexo 12)
189	<i>Perenniporia stipitata</i> Ryvarden	RO	RO (URM79804)	Gerber <i>et al.</i> (1999)
190	<i>Perenniporia sprucei</i> Decock & Ryvarden ◆	PA	PA (MG 195182)	Decock & Ryvarden (1999a)
191	<i>Perenniporia tephropora</i> (Mont.) Ryvarden	BioAm	AM (INPA185952), RO (URM82928), RR (INPA77579)	Gilbertson & Ryvarden (1987)
192	<i>Polyporus elongoporus</i> Drechsler-Santos & Ryvarden ●	2° reg para BR	PA (INPA 103798)	Drechsler-Santos & Ryvarden (2008)
193	<i>Polyporus arcularius</i> (Batsch) Fr. ■ ▲	-	PA (URM 80780)	Louza & Gugliotta (2007)
194	<i>Polyporus dictyopus</i> Mont.	AC, MT	AC (INPA 100799), AM (INPA 129462), PA (INPA 79820), RO (INPA 78999), RR (INPA 78370), MT ( INPA41853)	Louza & Gugliotta (2007)
195	<i>Polyporus grammacephalus</i> Berk. ●◆▶■	AC, PA, RR, RO	AM (INPA 78687) , AC (INPA 100218), PA, RR (INPA 143286), RO (SP212015)	Núñez & Ryvarden (1995)
196	<i>Polyporus guianensis</i> Mont.	AP, RR, RO	AC (INPA 100883), AM (INPA 183645), PA (URM 79845), RO ( URM83107), AP ( SP98292), RR ( INPA45446)	Núñez & Ryvarden (2001)
197	<i>Polyporus indigenus</i> I.J.A. Aguiar & M.A. de Sousa ●	AM, RR	AM (INPA 90190), PA, RO, RR ( INPA144629)	Gomes-Silva <i>et al.</i> (2012) (Anexo 13)
198	<i>Polyporus leprieurii</i> Mont.	RO, RR	AC (INPA 100447), AM (INPA 14226), PA (URM 79869), RO (URM 82942), RR (INPA 143440)	Silveira & Wright (2005)
199	<i>Polyporus philippinensis</i> Berk. ●■ ▲	BioAm	AC (INPA 100849), RO (URM 79001), PA ( SP193543)	Silveira & Wright (2005)
200	<i>Polyporus puttemansii</i> Henn.●	BioAm	AM (INPA 81451)	-
	<b>Famílias e Espécies</b>	<b>Ocorrências</b>	<b>Distribuição Amazônia/ Voucher</b>	<b>Descrição</b>
201	<i>Polyporus sapurema</i> ▶	AC	AC (RB 218977)	Gomes-Silva <i>et al.</i> (2012) (Anexo 13)
202	<i>Polyporus tenuiculus</i> (Beauv.) Fr.	-	AC, AM (INPA 18762), PA (URM 79662), RR (SP 112248), RO (URM 82867)	Silveira & Wright (2005)

203	<i>Polyporus tricholoma</i> Mont. ◆◆▶■☀	RR	AC, AM (INPA 102040), PA (MG 195315), RO (SP 211617), RR (INPA 78479)	Núñez & Ryvarde (1995)
204	<i>Polyporus udus</i> Jungh. ■	-	-	-
205	<i>Polyporus ianthinus</i> Gibertoni & Ryvarde ▲	-	PA (URM 79847)	Gibertoni <i>et al.</i> (2004)
206	<i>Porogramme albocincta</i> (Cooke & Masee) J. Lowe	<b>BioAm</b>	RO (URM)	-
207	<i>Pseudofavolus cucullatus</i> (Mont.) Pat. ■	-	RO (SP 211615)	Núñez & Ryvarde (1995)
208	<i>Pseudofavolus miquelii</i> (Mont.) Pat. ■	-	RO (SP 211655)	Núñez & Ryvarde (1995)
209	<i>Pseudofavolus orinocensis</i> (Pat. & Gaillard) Ryvarde ■	<b>BR</b>	PA (SP 193879)	Núñez & Ryvarde (1995)
210	<i>Pycnoporus sanguineus</i> (L.) Murrill	AC, AP	AC (INPA100222), AP (SP97553)	Ryvarde & Johansen (1980).
211	<i>Pyrofomes lateritius</i> (Cooke) Ryvarde ●▶▲	AC, RO, RR	AC (INPA30915), RR ( INPA27231), RO ( URM 79213)	Ryvarde (1988)
212	<i>Pyrofomes perlevis</i> (Lloyd) Ryvarde ●	<b>BioAm*</b>	-	Ryvarde & Johansen (1980).
213	<i>Stiptophyllum erubescens</i> (Berk.) Ryvarde ●▶■☀▲	RO	RO (INPA125192)	Ryvarde (1973)
214	<i>Tinctoporellus epimiltinus</i> (Berk. & Broome) Ryvarde	AC, AM, RO	AM (INPA100061), AC (INPA100390), RO (SP211998)	Ryvarde & Johansen (1980).
215	<i>Trametes cotonea</i> (Pat. & Har.) Ryvarde ●	AM, RO, RR	AM (INPA 185336), PA, RO (INPA 110762), RR (INPA 76964)	Ryvarde & Johansen (1980).
216	<i>Trametes cubensis</i> (Mont.) Sacc.	AC, AM, RO, RR	AC (INPA 100437), AM (INPA 70059), PA (INPA 84083), RO (URM 79554), RR (INPA 78384)	Gilbertson & Ryvarde (1987).
217	<i>Trametes ectypa</i> (Berk. & M.A. Curtis) Gilb. & Ryvarde ■	<b>BioAm</b>	RO (SP 212025)	Núñez & Ryvarde (2001).
218	<i>Trametes lactinea</i> (Berk.) Sacc.	AC, AM, RO RR	AC (INPA 100484), AM (INPA 192732), PA (URM 79949), RO (URM 795590), RR (INPA78525)	Núñez & Ryvarde (2001).
219	<i>Trametes maxima</i> (Mont.) A. David & Rajchenb. ●	AC, AM, RR	AC ( INPA 30734), AM ( INPA 76880)	Gilbertson & Ryvarde (1987).
220	<i>Trametes membranacea</i> (Sw.) Kreisel ●▲	AM	AM ( INPA 78748), PA ( INPA 74633)	Gilbertson & Ryvarde (1987).
221	<i>Trametes modesta</i> (Kunze ex Fr.) Ryvarde	-	AC (INPA 100178), AM (INPA 128981), PA (URM 799290), RO (URM 79573), RR (INPA 154936)	Gilbertson & Ryvarde (1987).
222	<i>Trametes ochroflava</i> Cooke ●	<b>BioAm</b>	AC (INPA 100602), RO (INPA 125259), RR (INPA 145485), AM (INPA 18891), PA (INPA 103633)	Ryvarde (1988)
223	<i>Trametes olivaceopora</i> Ryvarde & Iturr. ●	<b>BR</b>	AM (INPA 91953)	Núñez & Ryvarde (2001).
224	<i>Trametes pavonia</i> (Hook.) Ryvarde ●■	<b>BioAm</b>	AM (INPA 153723), RO (INPA 110933), RR (INPA 145449), PA (SP177497)	Gilbertson & Ryvarde (1987).
225	<i>Trametes supermodesta</i> Ryvarde & Iturr.	<b>BR</b>	AM (INPA 32250), PA (INPA 103601), RO (URM 79578), RR (INPA 143282), AP (SP233287)	Gomes-Silva <i>et al.</i> (2010) ( <b>Anexo 14</b> )
226	<i>Trametes versicolor</i> (L.) Lloyd ●	AM	AM (INPA 129004)	Núñez & Ryvarde (2001).
	<b>Famílias e Espécies</b>	<b>Ocorrências</b>	<b>Distribuição Amazônia/ Voucher</b>	<b>Descrição</b>
227	<i>Trametes incerta</i> (Curr.) Cooke ▲	-	-	Núñez & Ryvarde (2001).
228	<i>Trametes villosa</i> (Sw.) Kreisel ●■▲	AM	AM (INPA 192826), RR ( INPA143318)	Gilbertson & Ryvarde (1987).
229	<i>Trichaptum bifforme</i> (Fr.) Ryvarde ●	-	AM (INPA 185948), PA (URM 76989), MT (INPA 75614)	Núñez & Ryvarde (2001)

229	<i>Trichaptum byssogenum</i> (Jungh.) Ryvarden ●■☀▲	AC, AM, AP	AC (INPA 100471), AM (INPA 125039), AP (SP233293), PA (URM 76991), RR (INPA 143304)	Ryvarden & Johansen (1980)
230	<i>Trichaptum durum</i> (Jungh.) Corner ▲	<b>BR</b>	PA (URM 79953)	Gibbertoni <i>et al.</i> (2011) ( <b>Anexo 15</b> )
231	<i>Trichaptum fumosoavellaneum</i> (Romell) Rajchenb. & Bianchin	<b>BR</b>	PA (URM 76990), RO (URM 79027)	Gibbertoni <i>et al.</i> (2011) ( <b>Anexo 15</b> )
232	<i>Trichaptum griseofuscens</i> Ryvarden & Iturr.	<b>BR</b>	AC (INPA 100369), AM (INPA 41186), MT (INPA 75616), PA (URM 79954), RO (INPA 65152), RR (INPA 143430)	Gibbertoni <i>et al.</i> (2011) ( <b>Anexo 15</b> )
233	<i>Trichaptum perrottetii</i> (Lév.) Ryvarden ●■▲	AC, AM, RO, RR	AC (INPA 31195), AM (INPA 128946), PA (URM 79966), RO (INPA 125081), RR (INPA 144645)	Gilbertson & Ryvarden (1987)
234	<i>Trichaptum sector</i> (Ehrenb.) Kreisel	MT, RR	AM (INPA 185843), MT (O12991), PA (URM 79974), RO, (INPA110861), RR (INPA 78405)	Gilbertson & Ryvarden (1987)
235	<i>Trichaptum sprucei</i> (Berk.) Rajchenb. & Bianchin.	PA, RO	PA (URM 79980), RO (URM 80780), AM (INPA 129695)	Gibbertoni <i>et al.</i> (2011) ( <b>Anexo 15</b> )
<b>Rickenellaceae</b> Vizzini				
236	<i>Sidera lenis</i> (P. Karst.) Miettinen ●▲	RO	RO (INPA 110864)	-
<b>Schizoporaceae</b> Jülich				
237	<i>Schizopora flavipora</i> (Berk. & M.A. Curtis ex Cooke) Ryvarden ●▲	AC, AM, RO	AC (INPA100335), AM (URM83914)	Núñez & Ryvarden (2001)
238	<i>Schizopora paradoxa</i> (Schrad.) Donk	<b>BioAm</b>	AC (INPA 100180), AM (INPA 129267), RO (INPA 110749)	Núñez & Ryvarden (2001)



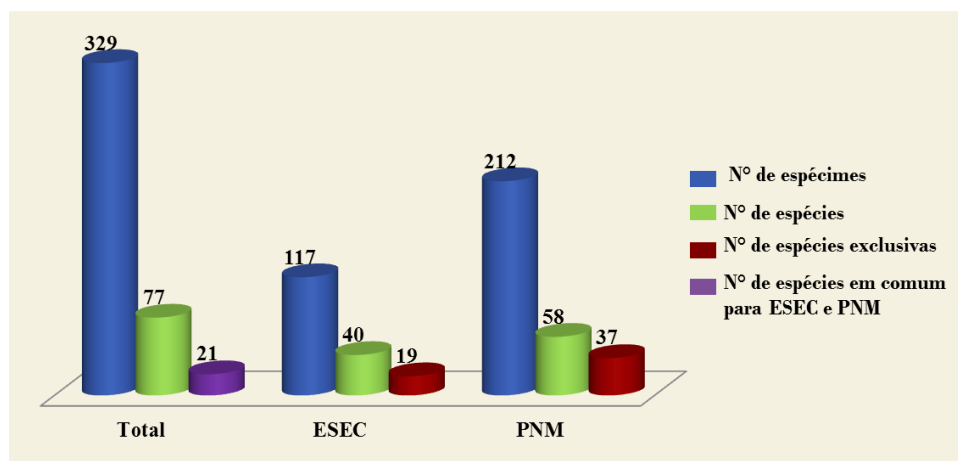
**Figura 10.** Número de gêneros e espécies encontrados por família, a partir da análise dos espécimes coletados na Estação Ecológica de Cuniã e no Parque Natural Municipal de Porto Velho.

Dentre os 32 gêneros registrados, 16 (*Abundisporus*, *Coltriciella*, *Daedalea*, *Datronia*, *Dichomitus*, *Fomes*, *Flaviporus*, *Fuscoporia*, *Fulvifomes*, *Gloeoporus*, *Hymenochaete*, *Inonotus*, *Lenzites*, *Loweporus*, *Porogramme* e *Pycnoporus*) estão representados por uma única espécie. *Amauroderma* apresentou o maior número de espécies (18), seguido por *Coltricia* (seis spp.), *Polyporus* e *Trametes* (quatro spp.). Entretanto, *Phellinus* (duas spp.), *Perenniporia* (duas spp.) e *Corioloopsis* (três spp.) apresentaram menor número de espécies, o que não era esperado para gêneros com grande número de espécies (Ryvarden & Johansen 1980; Gilbertson & Ryvarden 1986; 1987; Núñez & Ryvarden 2001; Ryvarden 2004).

No Parque Natural Municipal de Porto Velho (PNM) foram coletados 212 espécimes, representantes de 58 e na Estação Ecológica de Cuniã (ESEC) foram coletados 117 espécimes que representam 40 espécies. Apesar do PNM estar inserido em uma região com alto processo de antropização, o que poderia interferir diretamente na diversidade das espécies neste local, a área apresentou maior riqueza de espécies quando comparado à ESEC, que está inserida em área altamente preservada. A baixa diversidade encontrada na ESEC em relação ao PNM pode estar diretamente relacionada à escassez de substratos disponíveis, ou seja, troncos caídos nas trilhas pré-existentes, que contituem o substrato onde é encontrado maior número de espécimes de fungos poróides.

Além disso, fica evidente a riqueza de espécies presentes no PNM pelo registro de 37 espécies exclusivas: *Abundisporus roseoalbus*, *Amauroderma exile*, *A. praetervisum*, *A. floriforme* ined., *A. omphalodes*, *A. paraelegantissimum* ined., *A. subsessile* ined., *Coltricia cinnamomea*, *C.*

*duportii*, *C. hamata*, *C. velutinea*, *Coltriciella oblectabilis*, *Corioloopsis floccosa*, *C. psila*, *Daedalea aethalodes*, *Flaviporus liebmanni*, *Fomes fasciatus*, *Fulvifomes merrillii*, *Ganoderma multiplicatum*, *G. stipitatum*, *Gloeoporus thelephoroides*, *Lenzites elegans*, *Nigrofomes melanoporus*, *Perenniporia martii*, *P. stipitata*, *Polyporus dictyopus*, *Porogramme albocincta*, *Rigidoporus amazonicus*, *R. microporus*, *Trametes cubensis*, *T. modesta*, *T. lactinea*, *Trichaptum fumosoavellaneum*, *T. sector* e *T. Sprucei*. Na ESEC, apenas 19 espécies foram registradas: *Amauroderma alboestiptatum* ined., *A. brasiliense*, *A. limoniforme* ined., *A. minimum* ined., *A. ovisporum* ined., *Coltricia barbata*, *C. montagnei*, *Datronia mollis*, *Dichomitus cavernulosus*, *Fomitopsis lilacinogilva*, *F. nivosa*, *Hexagonia hydnoides*, *Nigroporus vinosus*, *Perenniporia tephropora*, *Phellinus shaferi*, *P. sousae*, *Phylloporia chrysites*, *P. pectinata* e *Polyporus tenuiculus*. Vinte e uma espécies foram comuns para ambas as áreas de estudo (Figura 11).



**Figura 11.** Espécies e ocorrência de espécies exclusivas e em comum para as áreas de coleta (Parque Natural Municipal de Porto Velho – PNM; Estação Ecológica de Cuniã – ESEC).

A maior parte das espécies (57) apresentou de um a três espécimes, enquanto poucas (11) tiveram número de espécimes maior que quatro. *Amauroderma schomburgkii* e *Microporellus dealbatus* apresentaram 10 espécimes, seguida por *A. elegantissimum* (14), *Trametes modesta* (14) e *Rigidoporus microporus* (14), *Corioloopsis caperata* (16) e *Fuscoporia gilva* (19). As espécies mais abundantes foram: *Amauroderma exile* (25) e *A. partitum* (51), que apresentam ocorrência em período chuvoso e foram coletadas em solo, conforme esperado para o gênero (Furtado, 1981; Ryvarden, 2004).

*Amauroderma partitum*, *Corioloopsis caperata*, *Fuscoporia gilva* e *Trametes modesta* foram as únicas espécies presentes em quatro ou cinco das oito coletas. Vinte e oito espécies foram registradas apenas uma vez, o que pode indicar que sejam raras para região, destacando entre essas,

quatro espécies novas para a ciência (*Amauroderma floriforme*, *A. laccatostipitatum*, *A. minimum* e *A. ovisporum*).

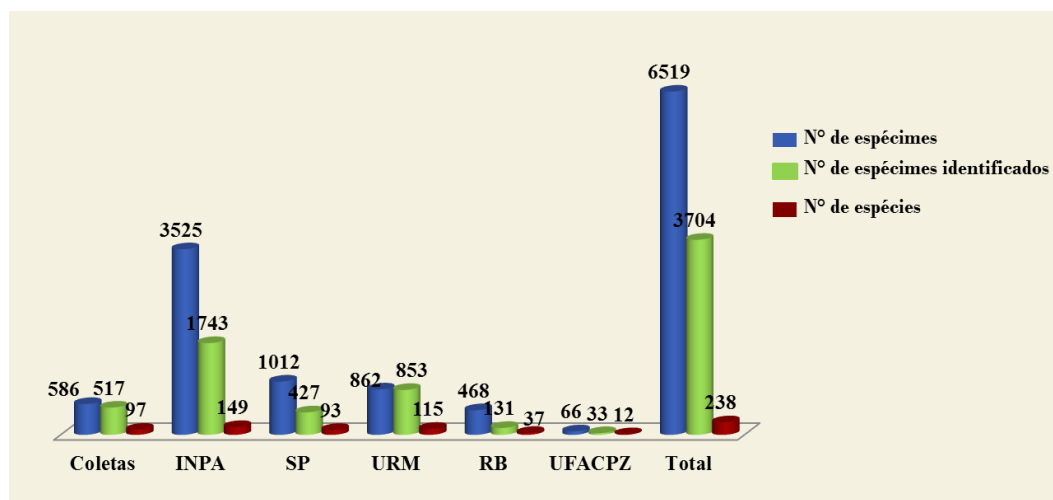
A maioria dos fungos coletados 49 (63%) foi encontrada causando podridão, o que confirma a importância dos fungos poróides na degradação de madeiras. Espécies causadores de podridão branca foram mais frequentes (41), enquanto para podridão marrom apenas cinco espécies foram registradas, corroborando com estudo em áreas tropicas, onde a maior parte dos fungos degradadores de madeira eram causadores de podridão branca (Nobles, 1971).

As coletas adicionais realizadas nas outras áreas contribuíram para o conhecimento sobre a distribuição geográfica das espécies no estado de Rondônia, com a adição de 20 espécies exclusivas a esses locais (*Amauroderma boleticeum*, *A. sessile* ined., *Ceriporia angulata*, *Dichomitus amazonicus*, *Earliella scabrosa*, *Fomitopsis cupreorosea*, *Grammothele fuligo*, *G. setulosa*, *Inonotus amazonicus*, *Nigroporus rigidus*, *Perenniporia amazonica*, *P. contraria*, *P. inflexibilis*, *Phellinus baccharidis*, *Rigidoporus crocatus*, *R. lineatus*, *Schizopora paradoxa*, *Tinctoporellus epilmintinus* e *Trichaptum griseofuscum*). Destas, três são novas para a ciência (*A. sessile* ined., *Ceriporia angulata* e *Inonotus amazonicus*), uma é rara e representa segundo registro (*Rigidoporus crocatus*) e uma é nova ocorrência (*Grammothele setulosa*) para o Brasil.

Os resultados deste estudo a partir de todas as coletas realizadas (áreas de coletas e coletas adicionais) ampliaram em 20 espécies o conhecimento sobre a diversidade de fungos poróides no estado de Rondônia, além de contribuir para a adição de 37 novos registros para a Amazônia brasileira e dez novas espécies para a ciência.

#### **4.2 Diversidade de fungos poróides coletados na Amazônia e depositados em Herbários brasileiros**

Cinco mil novecentos e trinta e três exsicatas de fungos poróides (*Basidiomycota*) provenientes da Amazônia brasileira e depositadas nos Herbários UFACPZ, INPA, RB, SP e URM foram taxonomicamente revisadas. Dessas 3.187 exsicatas foram confirmadas e/ou re-identificadas e tiveram a nomenclatura atualizada de acordo com as bases de dados CABI, CBS e Mycobank, correspondendo a 212 espécies, 86 comuns às áreas de estudo, totalizando 238 espécies confirmadas para a Amazônia brasileira (Figura 12).

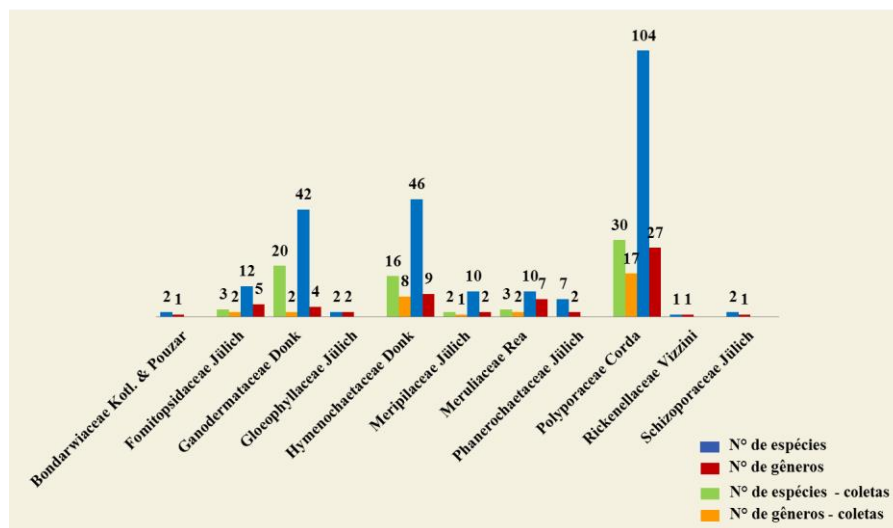


**Figura 12.** Diversidade de fungos poróides e número de espécimes depositados nos Herbários INPA – Instituto Nacional de Pesquisa na Amazônia, RB – Rio de Janeiro, SP - Instituto de Botânica, UFACPZ- Universidade Federal do Acre e URM – Herbário Universidade Federal de Pernambuco.

Duas mil e oitocentos e quarenta e seis exsicatas não foram incorporadas ao presente estudo devido à: (1) falta de informação sobre o local de coleta, o que inviabilizou o conhecimento sobre a distribuição geográfica das espécies (517 exsicatas); (2) ausência de microestruturas para identificação correta (200 exsicatas ao nível de gênero e 187 indeterminadas); (3) a espécimes que foram erroneamente identificados e que atualmente correspondem a outros grupos de fungos (97 exsicatas) e (4) e à má conservação dos espécimes, o que ocasionou o descarte de 1.090 exsicatas. Além disso, 647 exsicatas não foram localizadas nas dependências dos Herbários, podendo ter sido descartadas anteriormente, perdidas ou emprestadas.

Neste estudo, a coleção dos Herbários revelou uma diversidade pouco conhecida pela adição de cinco famílias (*Bondarwiaceae*, *Gloeophylaceae*, *Phanerochaetaceae*, *Rickenellaceae* e *Schizoporaceae*), 29 gêneros e 131 espécies quando comparado com os táxons registrados nas áreas de coletas (Figura 13). Isto demonstra que os Herbários são imprescindíveis para o estudo da diversidade, principalmente para pesquisas taxonômicas em áreas onde a diversidade ainda é pouco conhecida, uma vez que detêm um acervo de espécimes e dados que muitas vezes não estão disponíveis.





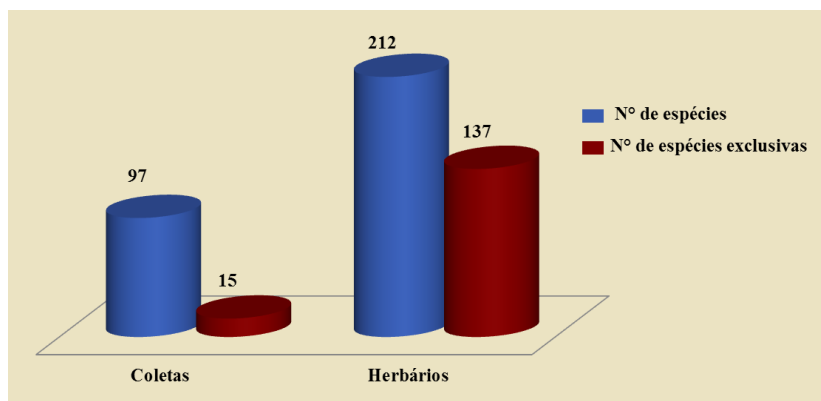
**Figura 13.** Número de gêneros e espécies encontrados por famílias, a partir da análise de espécimes coletados e revisados.

Das 212 espécies identificadas, 131 foram exclusivas de Herbários quando comparadas aos dados obtidos nas áreas de estudo, pois são espécies que não foram recentemente coletadas na região (Figura 14). Dos cinco Herbários que mantêm coleções de fungos poróides coletados em regiões da Amazônia brasileira, o INPA (Herbário do Instituto Nacional de Pesquisa na Amazônia) é o que detém a maior coleção, com 3.525 espécimes, distribuídos em 149 espécies, destas 50 exclusivas, seguido pelo URM com 862 e 115 espécies, das quais são 15 exclusivas (Tabela 1).

A coleção de fungos menos representativa é a do Herbário UFACPZ (Acre) com 66 espécimes, distribuídos em 33 espécies, das quais 12 exclusivas. O conhecimento sobre a diversidade de fungos poróides do Estado do Acre está restrito ao trabalho realizado por Bononi (1992), que lista 25 espécies. Entretanto, esses espécimes não foram localizados nas dependências do Herbário, o que inviabilizou a atualização da lista de fungos dessa região. Todos os espécimes revisados neste Herbário correspondiam a coletas aleatórias realizadas por amadores e muitos desses espécimes não apresentam número de tombamento.

O Herbário do INPA conta com 3.525 registros de fungos poróides, o que representa o maior número de exsicatas de fungos poróides coletados na Amazônia brasileira dentre todos os Herbários revisados neste estudo e que mantêm coleções micológicas da Amazônia. Vários espécimes foram depositados desde a sua fundação, sendo relevantes as descobertas de várias espécies novas: *Phellinus fibrous* Ryvarden, Gomes-Silva & Gibertoni (Anexo 7), *P. labyinthica* ined., *Phellinus sousae* Ryvarden, Gomes-Silva & Gibertoni (Anexo 7) e *Rigidoporus mariae* ined. (Anexo 8), além de espécies que representam nova ocorrência para o Brasil (*Daedalea microsticta*, *Perenniporia ellipsozona* e *P. minutopora*). Seguido estão os Herbário SP (1.012 registros) com três espécies novas, três novas ocorrências para o Brasil, além da localização de um espécime de *Amauroderma*

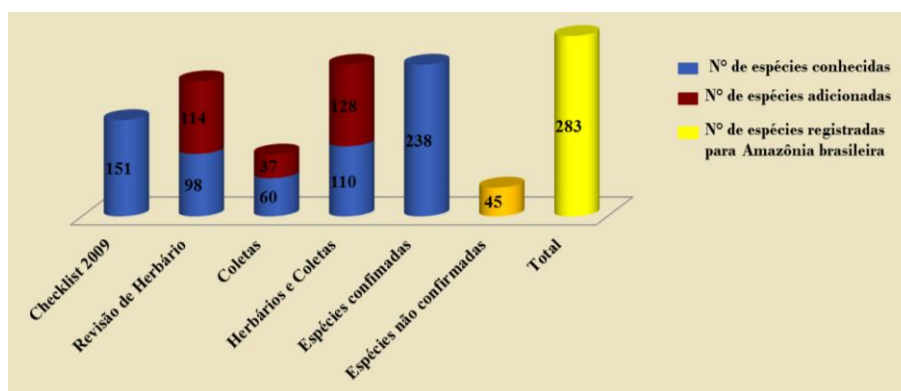
*picipes*, o que possibilitou a neotipificação da espécie (Anexo 4). Isso evidencia a importância de revisões de herbários e acessibilidade de dados.



**Figura 14.** Espécies e ocorrência de espécies exclusivas nas áreas de coleta e nos herbários.

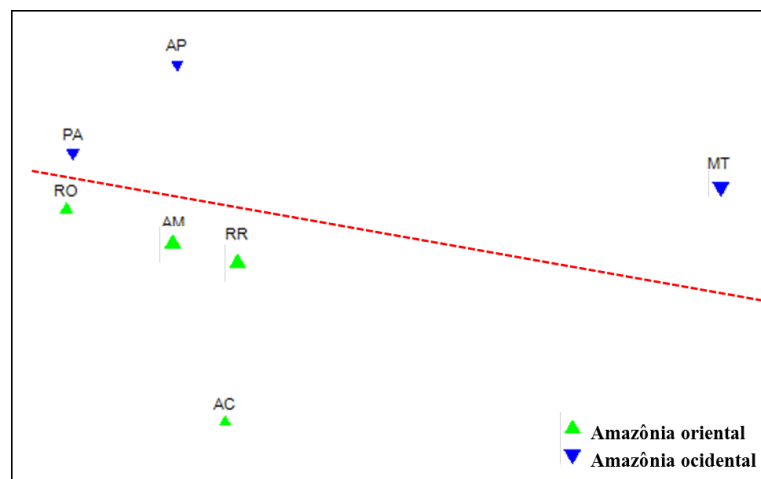
Gomes-Silva & Gibertoni (2009a) relatam a ocorrência de 151 espécies de fungos poróides para a Amazônia brasileira a partir da compilação de dados em referências bibliográficas. No presente estudo, a revisão dessas 151 espécies confirmou 110 para a região. Quarenta e cinco espécies corresponderam a outras espécies de outros grupos ou não foram localizadas nos Herbários. Diante disto, as espécies continuam sendo referidas para Amazônia brasileira, mas ressaltamos que das 283 atualmente conhecidas, apenas 238 são confirmadas para a região (Figura 15).

Após a reavaliação da diversidade conhecida através da revisão de exsicatas dos Herbários, os resultados ampliaram significativamente o conhecimento sobre a diversidade de fungos poróides da Amazônia brasileira com adição de 114 espécies, quando comparados à Checklist (Gomes-Silva & Gibertoni, 2009) (Figura 15). O total de 128 espécies foi adicionado a partir das coletas realizadas e revisão de exsicatas de Herbários (Figura 15).



**Figura 15.** Adições ao conhecimento de fungos poróides para a Amazônia brasileira.

Apesar de não apresentar suporte estatístico, observa-se a separação entre Amazônia Oriental e Amazônia Ocidental de acordo com a composição das espécies a partir da análise dos dados obtidos com a revisão de Herbário, mesmo sendo o esforço amostral diferente nos Estados (por exemplo, maior no PA e RO e menor no AC e AP). O resultado era esperado, uma vez que existem grandes diferenças entre a composição florística da Amazônia Oriental e Ocidental, que têm como divisores os rios Solimões e Amazonas (Braga, 2010).



**Figura 16.** Composição de espécies de fungos poróides na Amazônia brasileira.

### 4.3 Análise dos dados moleculares

Das 17 espécies novas, nove foram representantes de *Amauroderma* (cinco das quais provenientes de materiais coletados nas áreas de estudo ou em áreas adicionais), sendo este gênero selecionado para as análises moleculares.

Das 21 espécies de *Amauroderma* encontradas neste estudo, 11 (*A. aurantiacum*, *A. elegantissimum*, *A. exile*, *A. floriforme* sp. nov., *A. laccatostipitatum* sp. nov., *A. minimum* sp. nov., *A. paraelegantissimum* sp. nov., *A. partitum*, *A. praetervisum*, *A. schomburgkii* e *A. sessile* sp. nov.) foram determinadas a partir da taxonomia clássica combinada com a análise filogenética das regiões ITS. Para as outras 10 espécies (*A. allostipitatum* sp. nov., *A. calcigenum*, *A. camerarium*, *A. intermedium*, *A. limoniforme* sp. nov., *A. omphalodes*, *A. ovisporum* sp. nov., *A. sessile* sp. nov., *A. sprucei* e *A. trichodermatum*), os fragmentos dos basidiomas utilizados para extração de DNA foram retirados pós-processo de herborização, o que impossibilitou a obtenção de DNA de qualidade satisfatória para seu uso em reações de PCR. Assim, essas espécies foram determinadas pela taxonomia clássica.

O tamanho das regiões ITS1 de todos os espécimes estudados não diferiu acentuadamente, apresentando de 194 a 204 pb e estas foram alinhadas em 219 posições. Esta pequena variação entre os espécimes também foi observada para a região ITS2 que apresentou entre 198 e 214 pb e

alinhadas em 234 posições. Este resultado está próximo do que já foi descrito para *Ganoderma* (Moncalvo *et al.*, 1995; Gottlieb *et al.*, 2000).

Desse modo, a matriz de dados com 25 sequências de *Amauroderma*, três de *Ganoderma lucidum* (Curtis) P. Karsten (AF094511/90; AF37049/99; AF37096/73); três de *Tomophagus colossus* (Fries) Murrill (Z37071/91; JN184395; JN184396) e dois de *T. cattienensis* Tham & Moncalvo (JN184397; JN184398) incluiu 453 sítios. Destes, 299 foram constantes e 154 foram caracteres variáveis, porém 104 parcimoniosos informativos. Os resultados das análises filogenéticas obtidas pelos métodos de máxima verossimilhança (MV) e de máxima parcimônia (MP) apresentaram pequenas divergências nos valores de *bootstrap* e mesma topologia entre si (Figura 16). Observa-se que *Amauroderma* é um grupo monofilético bem delimitado em *Ganodermataceae* (100% de *bootstrap* para MP e NJ). Para simplificar a discussão, cinco clados (A, B, C, D, E e F) foram considerados.

Alguns caracteres morfológicos, como a consistência e o tamanho do basidioma, tamanho dos poros e forma dos basidiosporos apresentam-se como caracteres importantes para explicar a topologia da reconstrução filogenética.

No clado A, *A. floriforme* apresenta basidioma com vários píleos agrupados a partir de um único estipe, uma característica de distinção em relação às demais espécies de *Amauroderma*, enquanto *A. sprucei* (clado B) possui contexto branco e sem linhas. No clado C, observa-se a proximidade filogenética entre *A. exile*, *A. minimum* e *A. schomburgkii* com moderado valor de *bootstrap* (MP 76%). Todas elas são morfológicamente similares, possuindo basidiosporos globosos e poros pequenos. De modo particular, *A. exile* é macroscopicamente similar a *A. elegantissimum* e *A. paraelegantissimum* (clado D), diferindo em relação ao tamanho dos poros e ao formato dos basidiosporos.

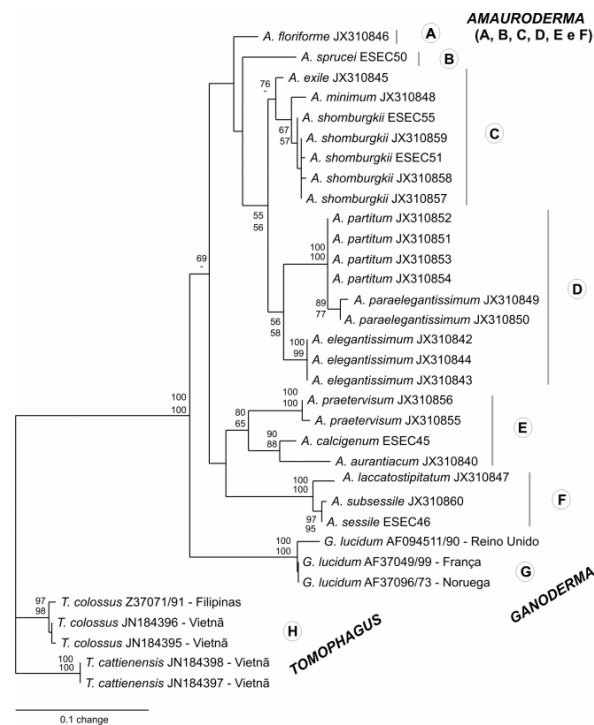
**Tabela 2.** Lista de espécies de *Amauroderma* utilizadas na análise molecular para construção das árvores filogenéticas a partir do método de máxima parcimônia (MP) e *neighbour joining* (NJ).

Espécie	Origem	Registro	GenBank
<i>A. aurantiacum</i> (Torrend) Gibertoni & Bernicchia	PNM-RO	URM78847	JX310840
<i>A. calcigenum</i> (Berk.) Torrend	ESEC-RO	URM83864	**
<i>A. elegantissimum</i> Ryvardeen & Iturr.	PNM-RO	URM82790	JX310842
<i>A. elegantissimum</i> Ryvardeen & Iturr.	ESEC-RO	URM82787	JX310843
<i>A. elegantissimum</i> Ryvardeen & Iturr.	ESEC-RO	URM82789	JX310844
<i>A. exile</i> (Berk.) Torrend	PNM-RO	URM82794	JX310845
<i>A. floriforme</i> Gomes-Silva, Ryvardeen & Gibertoni, ined	PNM-RO	URM83250	JX310846
<i>A. laccatostipitatum</i> Gomes-Silva, Ryvardeen & Gibertoni, ined	ESEC-RO	URM83238	JX310847
<i>A. minimum</i> Gomes-Silva, Ryvardeen & Gibertoni, ined	ESEC-RO	URM83228	JX310848
<i>A. paraelegantissimum</i> Gomes-Silva, Ryvardeen & Gibertoni, ined	PNM-RO	URM83229	JX310849
<i>A. paraelegantissimum</i> Gomes-Silva, Ryvardeen & Gibertoni, ined	PNM-RO	URM83233	JX310850
<i>A. partitum</i> (Berk.) Wakef.	ESEC-RO	URM82884	JX310851
<i>A. partitum</i> (Berk.) Wakef.	ESEC-RO	URM82882	JX310852

<i>A. partitum</i> (Berk.) Wakef.	PNM-RO	URM83039	JX310853
<i>A. partitum</i> (Berk.) Wakef.	PNM-RO	URM83040	JX310854
<i>A. praetervisum</i> (Pat.) Torrend	REC-AC	REC18707	JX310855
<i>A. praetervisum</i> (Pat.) Torrend	PNM-RO	GSilva909	JX310856
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	PNM-RO	URM82829	JX310857
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	PNM-RO	GSilva944	JX310858
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	PNM-RO	URM83420	JX310859
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	ESEC-RO	URM 83904	**
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	ESEC-RO	URM 83902	**
<i>A. sprucei</i> (Pat.) Torrend	ESEC-RO	URM83908	**
<i>A. subsessile</i> Gomes-Silva, Ryvardeen & Gibertoni, ined	PNM-RO	URM83239	JX310860
<i>A. subsessile</i> Gomes-Silva, Ryvardeen & Gibertoni, ined	ESEC-RO	URM83905	**

\*\* a ser depositada

Semelhanças morfológicas também foram observadas entre *A. minimum* e *A. schomburgkii* (tamanho dos poros, coloração do basidioma e presença de linha no contexto), sendo diferenciados pelo tamanho do basidioma e dos basidiosporos. No clado D, foram agrupadas todas as espécies que possuíam basidiosporos oblongo-elipsóides: *A. partitum*, *A. paraelegantissimum* e *A. elegantissimum* (MP 56% e NJ 58%). Porém, *A. elegantissimum* difere das demais pelos poros pequenos (5-7 por mm). Embora *A. partitum* e *A. paraelegantissimum* assemelhem-se por possuírem poros grandes (1-5 por mm), a presença de medas (microestruturas estéreis presentes no himênio) em *A. partitum* é o caráter que confirma a distinção filogenética entre essas duas espécies. *Amauroderma elegantissimum* é macro- e microscopicamente similar a *A. paraelegantissimum*, compartilhando o mesmo tipo de basidiosporos, mas diferenciando pelo tamanho dos poros.



**Figura 17.** Reconstrução filogenética de *Amauroderma* obtida pelo alinhamento de 370 nucleotídeos das regiões ITS I e II. Valores de bootstrap (em %) foram gerados e somente valores acima de 50% são apresentados. A árvore de máxima parcimônia apresentou índice de consistência = 0.6596 e índice de retenção = 0.8453.

Observaram-se ainda agrupamentos formados por espécimes de *A. praetervisum*, *A. calcigenum* e *A. aurantiacum* (clado E com MP 80%; NJ 65%) e por espécimes de *A. subsessile* e *A. laccatostipitatum* (clado F com MP e NJ 100%). *Amauroderma praetervisum* diferencia-se pela presença de basidioma firme, píleo acinzentado, contexto com duas linhas negras, poros pequenos e basidiosporos subglobosos ( $9-11 \times 7-9 \mu\text{m}$ ) e finamente ornamentados, enquanto *A. calcigenum* e *A. aurantiacum* apresentam basidioma esponjoso, píleo avermelhado, contexto sem linhas negras, poros grandes (1-2 por mm) e basidiosporos subglobosos. *Amauroderma subsessile* e *A. laccatostipitatum* diferenciam-se pela presença de basidioma subestipitado e estipe lacado, respectivamente. Características do estipe, bem como sua presença ou ausência, não apresentam um significado especial para a discriminação das espécies no gênero segundo Furtado (1981). No entanto, essas características também se mostraram relevantes na distinção dessas espécies em relação às demais dentro do gênero.

Todas as espécies novas propostas com base na divergência de caracteres da rDNA ITS (*A. floriforme*, *A. laccatostipitatum*, *A. minimum*, *A. paraelegantissimum* e *A. subsessile*) e morfologicamente analisadas (*A. allostipitatum*, *A. limoniforme*, *A. ovisporum*, e *A. sessile*) tiveram seus status delimitados neste estudo.

Embora demonstrado, nem sempre há correlação entre evolução dos caracteres morfológicos e relações filogenéticas baseadas em seqüências de rDNA em *Ganodermataceae*, o que dificulta estudos taxonômicos. Já foi observado que devido à alta plasticidade fenotípica em *Ganoderma*, são as relações geográficas e com os hospedeiros que melhor diferenciam várias espécies dentro desse gênero (Moncalvo *et al.*, 1995). Entretanto, para as espécies de *Amauroderma* em estudo, observa-se que apesar da plasticidade observada, caracteres morfológicos são capazes de diferenciar os exemplares geograficamente restritos (no caso das espécies novas, restritas até o momento, à região Amazônica) e que, a princípio, não podem ter diferenciações filogenéticas atribuídas a processos de especiação alopátrica.

A diferenciação das espécies, obtida a partir da análise da variação da região ITS, comprova que os caracteres morfológicos são relevantes taxonomicamente na sua diferenciação. Nessa perspectiva, seria importante que a análise de regiões do rDNA fossem usadas, adicionalmente aos métodos tradicionais.

#### **4.4 Aspectos ecológicos de fungos poróides (*Basidiomycota*) na Amazônia brasileira**

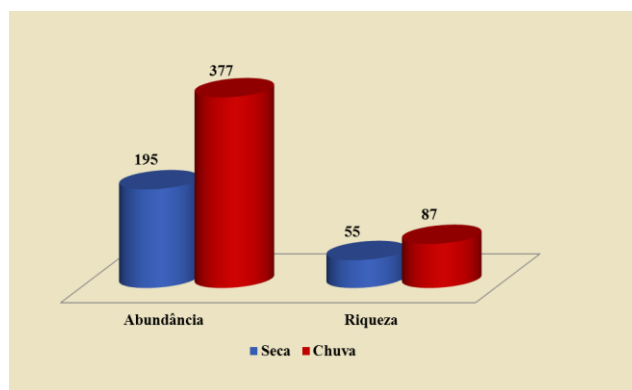
A diversidade (riqueza, abundância e composição de espécies) dos fungos poróides foi analisada de acordo com a época e a área de estudo.

Das quatro coletas realizadas em três transectos de 20 x 1.000 m em cada área de estudo (24 “amostras”), no período de julho 2009 (período seco), fevereiro (chuvoso) e julho 2010 (seco) e

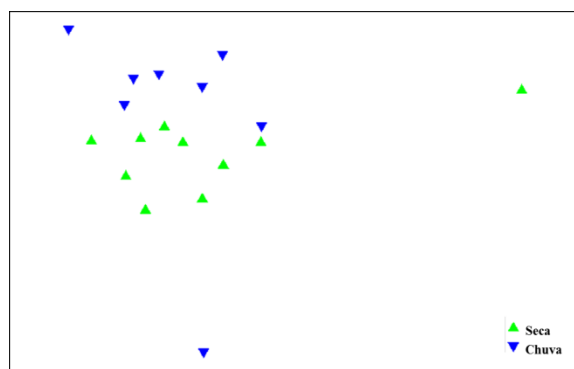
fevereiro 2011 (chuvoso), 398 espécimes e 77 espécies foram coletados. Lindblad (2001a, b) obteve dados semelhantes, relatando 86 e 69 espécies em áreas florestais da Costa Rica. Gilbert *et al.* (2002a) relataram 43 espécies coletadas em cinco transectos (500 x 10 m) no Panamá. Gibertoni *et al.* (2007) registraram 107 espécies de poliporóides em reservas na Mata Atlântica no Brasil, coletados em transectos de diferentes tamanhos, enquanto 96 espécies de fungos poróides foram registradas em seis transectos (20 x 1000 m) em áreas da Estação Científica Ferreira Penna na Amazônia brasileira, totalizando 24 visitas (Gibertoni, 2008).

Trinta e uma (41%) espécies de fungos poróides foram registradas durante a estação seca e 46 (59%) na estação chuvosa. Foi observada diferença significativa no total de espécies (riqueza) e espécimes (abundância) coletados nas duas estações (Figura 18). Dezoito espécies (23%) foram observadas tanto no período seco quanto no chuvoso. Lindblad (2001) também encontrou maior número de espécie durante os meses de chuva em três tipos de florestais na Costa Rica. Gibertoni *et al.* (2007) também observaram maior número de espécies nesse período, quando analisaram a diversidade em 13 reservas da Mata Atlântica.

A análise de similaridade (ANOSIM) mostrou que existe diferença na composição de espécies entre as épocas de coleta ( $R_{Global} = 0.195$ , o número de permutações = 9999,  $p = 5\%$ ) (Figura 19).

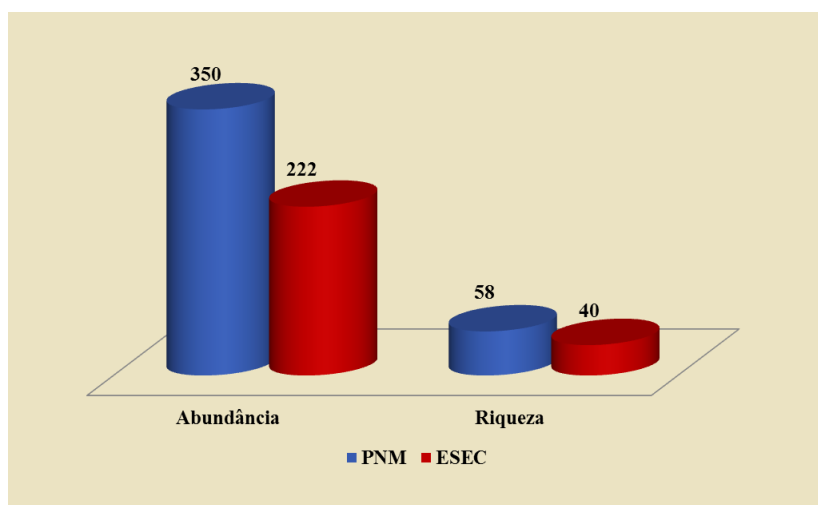


**Figura 18.** Período de coleta [Abundância:  $\chi^2 = 57,90$ ; Riqueza:  $\chi^2 = 7,21$ .  $\chi^2$  (crítico) = 3,481; GL = 1;  $p = 5\%$ ].

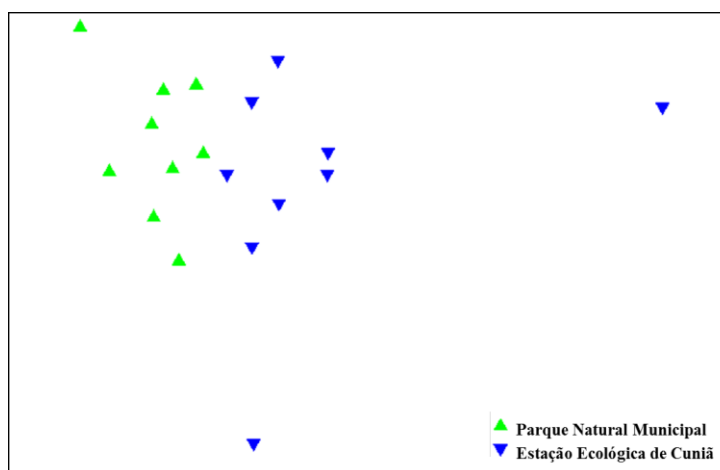


**Figura 19.** Composição de espécies nas duas áreas de coleta (Parque Natural Municipal de Pernambuco e Estação Ecológica de Cuniã) de acordo com a sazonalidade.

A riqueza de espécies não diferiu significativamente entre as áreas de coleta, mas maior abundância foi encontrada no PNM (Figura 20). O resultado obtido pela ANOSIM demonstrou alta dissimilaridade entre as áreas em relação à composição de espécies (Figura 21), apesar de encontrarem-se a uma distância de 125 km. Gibertoni (2008) observou grande semelhança entre transectos (parcelas), que eram muito próximos e em uma mesma área (Estação Científica Ferreira Penna no Pará). Esse resultado demonstra a necessidade de realizar coletas em várias áreas do Estado de Rondônia, mesmo as relativamente próximas, para se obter uma melhor amostragem da diversidade.



**Figura 20.** Período de coleta [Abundância:  $\chi^2 = 7,21$ ; Riqueza:  $\chi^2 = 3,30$ .  $\chi^2$  (crítico) = 3,481; GL = 1; p = 5%].



**Figura 21.** Composição de espécies por área de coleta.



A composição e a distribuição de fungos poróides estão relacionadas a diversos fatores, tais como: altitude, umidade relativa e influência da precipitação pluviométrica, como observado em estudos em áreas florestais na Costa Rica (Núñez 1996; Lindblad 2000).

Algumas pesquisas relacionadas a aspectos ecológicos dos fungos poróides no Brasil foram realizadas (Gibertoni *et al.*, 2007; Dreschsler-Santos *et al.*, 2010), mas apenas Gibertoni *et al.* (2007) estudaram a ecologia de fungos poróides na Amazônia brasileira. A de estudo com ecológicos é preocupante, uma vez que não se conhece a relação existente entre fungos poróides e o hospedeiro, bem como a influência da sazonalidade na ocorrência/produção de basidiomas. De modo geral, as duas áreas de estudo, apesar de apresentarem similaridade considerada alta, possuem várias espécies endêmicas e novas para ciência, sugerindo que ambas têm grande importância para a conservação desses fungos.

## 5. CONCLUSÕES

Com base em oito coletas realizadas em duas áreas de Floresta Amazônica no Norte do Brasil e em revisão de herbários, conclui-se que:

1. As áreas de estudos abrigam alta diversidade de espécies de fungos poróides quando comparados a outros estudos em áreas tropicais, sendo essas áreas importantes para a conservação da diversidade de fungos poróides na Amazônia brasileira.
2. As coletas foram relevantes para a ampliação do conhecimento sobre a diversidade de fungos poróides no estado de Rondônia e na Amazônia brasileira, com a adição de 20 novos registros e dez novas espécies para a ciência. Conferir a tabela = 15
3. A revisão de Herbário foi relevante para a ampliação do conhecimento sobre a diversidade de fungos poróides no estado de Rondônia e na Amazônia brasileira, com a adição de 25 novos registros, seis novas espécies para a ciência, além de novas ocorrências registradas para os demais estados da região Norte, para a Amazônia brasileira e para o Brasil.
4. Espécies de *Amauroderma* foram bem delimitadas por dados morfológicos, os quais foram bem sustentados pela análise filogenética a partir de dados moleculares, tornando-se assim, importante a análise de regiões do rDNA, adicionalmente aos métodos tradicionais.
5. Coletas em terra firme devem ser realizadas em todas as épocas do ano (chuvosa e seca) e em áreas diferentes, visto que a abundância e a composição de espécies diferem entre as áreas e épocas de coleta.

**REFERÊNCIAS BIBLIOGRÁFICAS**

- Alexopoulos, C. J., Mims, C. W., Blackwell, M. 1996. *Introductory Mycology*. 4<sup>th</sup> ed., John Wiley and Sons, Inc., Nova York, 868p.
- Anagnost, S.E. 1998. Light Microscopic Diagnosis of Wood Decay. *Iawa Journal* 19(2): 141-167.
- Anke, H., Weber, R.W.S. 2006. White-rots, chlorine and the environment – a tale of many twists. *Mycologist* 20: 83-89.
- Bader, P., Jansson, S., Jonsson, B.G. 1995. Wood-inhabiting and substratum decline in selective logged boreal spruce forests. *Biological Conservation* 72:355-362.
- Balan, D.S.L., Monteiro, R.T.R. 2001. Decolorization of textile indigo dye by ligninolytic fungi. *Journal of Biotechnology* 89: 141-145.
- Baseia, I.G. 2007. A sistemática baseada em dados moleculares: suas conseqüências na classificação dos fungos gasteróides. In: Baseia, I.G., Maia, L.C., Malosso, E. & Yano-Melo, A.M. (orgs.). *Micologia: avanços no conhecimento*. Recife: Editora Universitária UFPE, 1: 202-206.
- Baltazar, J. M., Ryvardeen, L., Gibertoni, T.B. 2010. The genus *Coltricia* 486 in Brazil: new records and two new species. *Mycologia* 102: 1253-1262.
- Batista, A.C., Falcão, R.G.S., Peres, G.E.P., Moura, N.R. 1966. Fungi Paraenses (Revisão da Coleção de Paul C. Hennings, do Museu Paraense Emílio Goeldi). *Instituto de Micologia*. 506: 10-290.
- Berkeley, M. J. 1851. Notices of some brazilian fungi (being a sequel to the contributions towards a Flora of Brazil, by G. Gardner). *Hooker's London Journal of Botany and Kew Garden Miscellany* 3: 14-18.
- Bononi, V.L. 1981. Alguns Basidiomicetos hidnóides da região amazônica. *Rickia* 9: 17-30.
- Bononi, V. L. 1992. Fungos macroscópicos de Rio Branco, Acre, Brasil. *Hoehnea* 19(1/2): 31-37.
- Bumpus, J.A., Aust, S.D. 1987. Biodegradation of chlorinated organic compounds by *Phanerochaete chrysosporium*, a wood-rotting fungus. In: Exner, J.H. (Ed.). *Solvent Hazardous waste problems: learning from dioxins*. Washington DC: American Chemistry Society, 340-349.
- Campacci, T.V.S., Gugliotta, A.M. 2009. A review of *Amauroderma* in Brazil, with *A. oblongisporum* newly recorded from the neotropics. *Mycotaxon* 110: 423-436.
- Campos, E.L., Cavalcanti, M.A.Q. 2000. Primeira ocorrência de *Phellinus mangrovicus* (Imaz.) Imaz. para o Brasil. *Acta Botânica Brasílica* 14(3): 263-265.
- Campos, E.L., Sotão, H.M.P., Cavalcanti, M.A.Q., Luz, A.B. 2005. Basidiomycetes de Manguezais da APA de Algodual-Maiandeuá, Pará, Brasil. *Boletim do Museu Paraense Emílio Goeldi* 1: 141-146.

- Cannon, P.F., Kirk, P.M. 2007. Fungal Families of the world. CAB Internacional. 456 p.
- Capelari, M., Maziero, R. 1988. Fungos macroscópicos do estado de Rondônia, região dos rios Jaru e Ji-Paraná. *Hoehnea* 15: 28-36.
- Capobianco, J.P.R., Veríssimo, A., Moreira, A., Sawyer, D., Santos, I.P., Pinto, L.P. 2001. Biodiversidade na Amazônia brasileira: avaliação e ações prioritárias para a conservação, uso sustentável e repartição de benefícios. Estação Liberdade: Instituto Sócio ambiental, São Paulo.
- Chander, M., Arora, D.S. 2007. Evaluation of some white-rot fungi for their potential to decolourise industrial dyes. *Dyes and Pigments* 72: 192-198.
- Chen, H.X. 2005. The research progress of the activity of fungi polysaccharides. *Lett. Biotechnol.* 16:460-462.
- Chen, W.Q., Huang, J.W., Luo, L.Q., Luo, S.H., Yang, H. 2005a. Study of Ganoderma polysaccharides modulating the blood sugar and lipid in experimental rats. *Chin. J. Gerontol.* 25: 957-958.
- Chen, W.Q., Luo, S.H., Li, H.Z., Yang, H. 2005b. Effects of *Ganoderma lucidum* polysaccharides on serum lipids and lipoperoxidation in experimental hyperlipidemic rats. *China J. Mater. Med.* 30: 1358-1360.
- Clarke, K. R., Warwick, R. M. 1994. Cahnge in marine communities – an approach to statistical analysis and interpretation. Plymouth Marine Laboratory, Plymouth, UK, 130p.
- Coelho, G., Reck, M., Silveira, R.M.B., Guerrero, R.T. 2005. *Ceriporia spissa* (Schwein. Ex Fr.) Rajchenb. (Basidiomycota): First record from Brazil. *Biociências* 13(2): 107-111.
- Coelho, G., Cortez, V.G., Guerrero, R.T. 2007. New morphological data on *Amauroderma brasiliense* (Polyporales, Basidiomycota). *Mycotaxon* 100: 177-183.
- Collins, R.A., Tzi, B. N. 1997. Polysaccharopeptide from *Coriolus versicolor* has potential for use against human immunodeficiency virus type 1 infection. *Life Sciences.* v. 60, n. 25, p. 383-387.
- Corner, E.J.H. 1983. Ad. Polyporaceae I. *Beih. Zur. Nova Hedwigia* 75: 5-182.
- Corner, E.J.H. 1989. Ad Polyporaceas V. The genera *Albatrellus*, *Boletopsis*, *Coriolopsis* (dimitic), *Cristelloporia*, *Diacanthodes*, *Elmerina*, *Fomitopsis* (dimitic), *Gloeoporus*, *Grifola*, *Hapalopilus*, *Heterobasidion*, *Hydnopolyporus*, *Ischnoderma*, *Loweporus*, *Parmastomyces*, *Perenniporia*, *Pyrofomes*, *Stecchericum*, *Trechispora*, *Truncospora* and *Tyromyces*. *Nova Hedwig* 96:1-218.
- Corner, E.J.H. 1992. Additional resupinate non-xanthochroic polypores from Brazil and Malesia. *Nova Hedwigia* 55(1-2): 119-152.
- Corner, E.J.H. 1984. Ad Polyporaceas II and III. *Beihefte zur Nova Hedwigia* 78: 1-222.
- Decock, C., Ryvarde, L. 1999a. Studies in neotropical polypores 1. Some coloured resupinate *Perenniporia* species. *Mycological Research* 103(9): 1138-1144.

- Decock, C., Ryvardeen, L. 1999b. Studies in *Perenniporia dedrita* and its taxonomic synonyms. *Mycologia* 91(2): 386-395.
- Decock, C., Ryvardeen, L. 2000. Studies in tropical polypores 6. New resupinate *Perenniporia* species with small pores and small basidiospores. *Micologia* 92 (2): 354-360.
- Decock, C., Herrera-Figueroa, S., Ryvardeen, L. 2001. Studies in *Perenniporia*. *Perenniporia contraria* and its presumed taxonomic synonym *Fomes subannosus*. *Mycologia* 93(1): 196-204.
- De Jesus, M.A. 1995. Contribution to the Knowledge of wood-rotting fungi in Brazil. I. Ocorrence and distribution of fungi on different substrates from the Manaus region, Amazonas state. Paper prepared for the 26<sup>th</sup> Annual Meeting Helsingør, Denmark. p. 1-21.
- De Jesus, M. A. 1996. Contribution to the knowledge of wood-rotting fungi in Brazil. II. Check-list of fungi from Maracá Island, Roraima State. *Mycotaxon* 57: 323-328.
- De Jesus, M.A., Ryvardeen, L. 2010. Studies in neotropical polypores 28. Two new species from Amazonas, Brazil. *Synopsis Fungorum* 27: 73-77.
- Donk, M.A. 1964. A conspectus of the families of *Aphylllophorales*. *Persoonia* 3: 199-324.
- Doyle, J.J., Doyle, J.L. 1987. A rapid DNA isolation method for small quantities of fresh tissues. *Phytochem. Bull. Bot. Soc. Amer.* 19: 11-15.
- Drechsler-Santos, E.R., Ryvardeen, L., Wartchow, F., Cavalcanti, M.A.Q. 2008c. *Polyporus elongoporus* (*Aphylllophorales*, *Poriaceae*) sp. nov. *Synopsis Fungorum* 25: 38-43.
- Drechsler-Santos, E.R., Gibertoni, T.B., Cavalcanti, M.A.Q. 2010. Ecological aspects of *Hymenochaetaceae* in an area of Caatinga (semi-arid) in Northeast Brazil. *Fungal Diversity* 42: 71-78.
- el-Mekki, S., Meselhy, M.R., Nakamura, N., Tezuka, Y., Hattori, M., Kakiuchi, N., Shimotohno, K., Kawahata, T., Otake, T. 1998. Anti-HIV-1 and anti-HIV-1-protease substances from *Ganoderma lucidum*. *Phytochemistry*: 49: 1651-1657.
- Eugenio, M.E., Carbajo, J.M., Terron, M.C., Gonzalez, A.E., Villar, J.C. 2008. Bioremediation of lignosulphonates by lignin-degrading basidiomycetous fungi. *Bioresource Technology* 99: 4929-4934.
- Fidalgo, O. 1965. Conhecimento micológico dos índios brasileiros. *Rickia* 2: 1-10.
- Fidalgo, M.E.P.K. 1968. Contribution to the fungi of Mato Grosso, Brazil. *Rickia* 3: 171-219.
- Fidalgo, O. & Prance, G. T. 1976. The ethnomycology of the Sanama indians. *Mycologia* 68: 201-210.
- Fidalgo, O., Bononi, V.L.R. 1989. Fungos e líquens macroscópicos. Pp. 24-26. In: Fidalgo O, Bononi VLR (coord.). Técnicas de coleta, preservação e herborização de material botânico. Instituto de Botânica, São Paulo.
- Fidalgo, O., Fidalgo, M.E.P.K. 1967. Dicionário Micológico. *Rickia* 2: 1-232.

- FIERO. 1997. Federação das Indústrias do Estado de Rondônia. Perfil Socio-Econômico e Industrial, Porto Velho.
- Furtado, J.S. 1981. Taxonomy of *Amauroderma* (Basidiomycetes, Polyporaceae). *Memoirs of the New York Botanical Garden* 34: 1-109.
- Gao, Y., Zhou, S., Chen, G., Dai, X., Ye, J., Gao, H. 2002. A phase I/II study of a *Ganoderma lucidum* (Curt.: Fr.) P. Karst. (Ling Zhi, Reishi mushroom) extract in patients with chronic hepatitis B. *Int. J. Med. Mushrooms* 4: 321-327.
- Gao, Y., Lan, J., Dai, X., Ye, J., Shou, S. 2004. A phase I/II study of Ling Zhi mushroom *Ganoderma lucidum* (W. Curt.: Fr.) Lloyd (Aphyllphoromycetidae) extract in patients with type II diabetes mellitus. *Int. J. Med. Mushrooms* 6: 3-9.
- Gao, J.L., Yu, Z.L., Li, S.P., Wang, Y.T. 2005a. Research advance on triterpenoids of *Ganoderma lucidum*. *Edible Fungi of China* 24: 6-11.
- Gao, Y., Gao, H., Chan, E., Tang, W., Xu, A., Yang, H., Huang, M., Lan, J., Li, X., Duan, W. Xu, C., Zhou, S. 2005b. Antitumor activity and underlying mechanisms of Ganopoly, the refined polysaccharides extracted from *Ganoderma lucidum*, in mice. *Immunol. Invest.* 34: 171-198.
- Gerhardt, E. 2005. Guida ai funghi. Ed. Zanichelli, Bologna.
- Gibertoni, T.B., Ryvarde, L., Cavalcanti, M.A.Q. 2004. Studies in neotropical polypores 18 New species from Brazil. *Synopsis Fungorum* 18: 44-56.
- Gibertoni, T.B.; Bernicchia, A.; Ryvarde, L., Gomes-Silva, A.C. 2008. Bresadola's polypore collection at the Natural History Museum of Trento, Italy. 2. *Mycotaxon.* 104: 321-323.
- Gibertoni, T.B.; Santos, P.J.P., Cavalcanti, M.A.Q. 2007. Ecological aspects of *Aphyllphorales* in the Atlantic rain forest in northeast Brazil. *Fungal Diversity* 25: 49-67.
- Gibertoni, T.B.; Martins-Junior, A., Ryvarde, L., Sotão, H. 2012. *Oxyporus mollis* sp. nov. (*Agaricomycetes*) from the Eastern Brazilian Amazonia. *Nova Hedwigia* 94(1-2): 175-179.
- Gibertoni, T.B.; Ryvarde, L.; Bernicchia, A.; Savino, E. 2012. Poroid fungi (*Agaricomycetes*, *Basidiomycota*) in the National Caxiuanã Forest. In: Lisboa, P. L. (org.). Caxiuanã: fungos e líquens. Belém: Museu Paraense Emílio Goeldi (no prelo).
- Gilbert, G.S.; Ferrer, A., Carranza, J. 2002b. Polypore fungal diversity and host density in a moist tropical forest. *Biodiversity and Conservation* 11: 947-957.
- Gilbert, G.S., Gorospe, J., Ryvarde, L. 2008. Host and habitat preferences of polypore fungi in Micronesian tropical flooded forests. *Mycological Research* 112(6): 674-680.
- Gilbertson, R. L., Ryvarde, L. 1986. North American Polypores. Vol. 1. Fungiflora, Oslo, 433p.
- Gilbertson, R. L., Ryvarde, L. 1987. North American Polypores. Vol. 2. Fungiflora, Oslo, 452p.
- Gilbertson, R. L. 1980. Wood-rotting fungi of North America. *Mycologia* 72(1): 1-49.

- Gomes-Silva, A.C., Gibertoni, T.B. 2009a. Checklist of the aphylloraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* 108: 319-322.
- Gomes-Silva, A.C., Gibertoni, T. B. 2009b. Revisão do herbário URM. Novas ocorrências de Aphyllorales (Basidiomycetes) para Amazônia brasileira. *Revista Brasileira de Botânica* (Impresso), 32: 587-596.
- Gomes-Silva, A.C., Ryvarde, L., Gibertoni, T.B. 2009c. New and interesting species of *Hymenochaetaceae* from the Brazilian Amazonia. *Mycological Progress* 8: 273-279.
- Góes-Neto, A., Loguercio-Leite, C., Guerrero, R.T. 2005. DNA extraction from frozen fieldcollected and dehydrated herbarium fungal basidiomata: performance of SDS and CTAB-based methods. *Biotemas* 18(2): 19-32.
- Groposo, C., Loguercio-Leite, C. 2005. Contribution to the lignocellulolytic fungi (*Basidiomycetes*) of the Atlantic Rain Forest in Southern Brazil. *Mycotaxon* 92: 103-106.
- Groposo, C., Loguercio-Leite, C., Góes-Neto, A. 2007. *Fuscoporia* (*Basidiomycota*, *Hymenochaetales*) in Southern Brazil. *Mycotaxon* 101: 55-63.
- Harazono, K., Nakamura, K. 2005. Decolorization of mixtures of different reactive textile dyes by the white-rot basidiomycete *Phanerochaete sordida* and inhibitory effect of polyvinylalcohol. *Chemosphere* 59: 63-68.
- Hattori, T. 2005. Type studies of the polypores described by E.J.H. Corner from Asia and West Pacific Areas. VII. Species described in *Trametes* (1). *Mycoscience* 46: 303-312.
- Hennings, P. 1900. Fungi Paraensis I. *Hedwigia*. 39 (3): 76-80.
- Hennings, P. 1902. Fungi Paraensis II. *Hedwigia*. 41: 15-18.
- Hennings, P. 1904. Fungi Amazonici I. a cl. Ernesto Ule collecti. *Hedwigia* 43(3): 154-186.
- Hennings, P. 1905. Fungi Amazonici IV. a cl. Ernesto Ule collecti. *Hedwigia* 44(2): 57-71.
- Hennings, P. 1908. Fungi Paraensis III. *Hedwigia* 48 (1-2): 101-117.
- Hibbett, D.S., Binder, M., Bischoff, J.F., Blackwell, M., Cannon, P.F., Eriksson, O.E., Huhndorf, S., James, T., Kirk, P.M., Licking, R., Thorsten-Lumbsch, H., Lutzoni, F., Matheny, P.B., Mclaughlin, D.J., Powell, M.J., Redhead, S., Schoch, C.L., Spatafora, J.W., Stalpers, J.A., Vilgalys, R., Aime, M.C., Aptroot, A., Bauer, R., Begerow, D., Benny, G.L., Castlebury, L.A., Crous, P.W., Dai, Y.C., Gams, W., Geiser, D.M., Griffith, G.W., Gueidan, C., Hawksworth, D.L., Hestmark, G., Hosaka, K., Humber, R.A., Hyde, K.D., Ironside, J.E., Koljalg, U., Kurtzman, C.P., Larsson, K.H., Lichtwardt, R., Longcore, J., Miadlikowska, J., Miller, A., Moncalvo, J.M., Mozley-Standridge, S., Oberwinkler, F., Parmasto, E., Reeb, V., Rogers, J.D., Roux, C., Ryvarde, L., Sampaio, J.P., Schusler, A., Sugiyama, J., Thorn, R.G., Tibell, L., Untereiner, W.A., Walker, C., Wang, Z., Weir, A., Weiss, M., White, M.M., Winka, K., Yao,

- Y.J., Zhang, N. 2007. A higher-level phylogenetic classification of the Fungi. *Mycological Research* 111 (5): 509–547.
- IBGE 2003. Mapa de Biomas. Disponível em: <http://www.ibge.gov.br/home/presidencia/noticias/>.
- Instituto nacional de Pesquisas Espaciais. 2010. Projeto de Monitoramento do Desflorestamento na Amazônia Legal (PRODES). Disponível em: <http://www.inpe.br>.
- Jaouani, A., Sayadi, S., Vanthourhout, M., Penninckx, M.J. 2003. Potent fungi for decolourisation of olive oil mill waste waters. *Enzyme and Microbial Technology* 33: 802-809.
- Jonsell, M., Nordlander, G. 2004. Host selection patterns in insects breeding in bracket fungi. *Ecological Entomology* 29: 697-705.
- Kaliyaperumal, M., Kalaichelvan, P.T. 2008. *Ganoderma australe* from southern India. *Microbiological Research* 163: 286-292.
- Kendrick, B. 2000. The fifth kingdom. 2<sup>a</sup> ed., Focus Information Group, Inc., Newburyport.
- Kirk, P.M., Cannon, P.F., David, J.C., Stalpers, J.A. 2001. Dictionary of the Fungi. 9<sup>rd</sup> edition, CAB International.
- Kirk, P.M., Cannon, P.F., David, J.C., Stalpers, J.A. 2008. Dictionary of Fungi. 10<sup>ed</sup>. CABI Publishing, Surrey, 771p.
- Komonen, A. 2001. Structure of insect communities inhabiting old-growth forest specialist bracket fungi. *Ecological Entomology* 26: 63-75.
- Komonen, A. 2003. Distribution and abundance of insect fungivores in the fruiting bodies of *Fomitopsis pinicola*. *Ann. Zoo. Fennici* 40: 495-504.
- Kotlaba, F., Pouzar, Z. 1964. Preliminary results on the staining of the spores and other structures of Homobasidiomycetes in cotton blue and its importance for taxonomy. *Transactions of the British Mycological Society* 47: 653-654.
- Krebs, C.J. 1989. Ecological Methodology. Harper Collins Publishers, NY, 654p.
- Lin, S.B., Li, C.H., Lee, S.S., Kan, L.S. 2003. Triterpene-enriched extracts from *Ganoderma lucidum* inhibit growth of hepatoma cells via suppressing protein kinase C, activating mitogen-activated protein kinases and G2-phase cell cycle arrest. *Life Sci.* 72: 2381-2390.
- Lindblad, I. 2000. Host specificity of some wood-inhabiting fungi in a tropical forest. *Mycologia* 92: 399-405.
- Lindblad, I. 2001a. Wood-inhabiting fungi in primary and secondary seasonally dry tropical forest, Costa Rica. Pp. 1–23. In: Lindblad I. Diversity and distribution of wood-inhabiting *Basidiomycetes* on decomposing logs-examples from tropical and boreal forests. Doctorate Thesis, University of Oslo.
- Lindblad, I. 2001b. Diversity of poroid and some corticioid wood-inhabiting fungi along the rainfall gradient in tropical forests, Costa Rica. *Journal of Tropical Ecology* 17: 353-369.



- Malosso, E., English, L., White, I.S., Hopkins, D.W., O'Donnel, A.G. 2006. Microbial diversity of Antarctic soils determined using a combination of culture isolation, molecular fingerprinting and cloning techniques. *Polar Biology* 29: 552-561.
- Martin, G. W. 1934. Three new Heterobasidiomycetes. *Mycologia* 26: 261-265.
- Martins-Júnior, A.S., Gibertoni, T.B., Sotão, H.M.P. 2008. *Diplomitoporus allantoporus* (Basidiomycetes): a new record to Brazil. *Mycotaxon* 106: 195-198.
- Martins-Júnior, A.S., Gibertoni, T.B., Sotão, H.M.P. 2011. Espécies de *Ganoderma* P. Karst (*Ganodermataceae*) e *Phellinus* Quéél. (*Hymenochaetaceae*) na Estação Científica Ferreira Penna, Pará, Brasil. *Acta Botanica Brasilica* 25(3): 531-533.
- Martínez, A.T. 2005. Biodegradation of lignocellulosics: microbial, chemical, and enzymatic aspects of the fungal attack of lignin. *International Microbiology* 8:195-204.
- Medeiros, P.S., Sotão, H.M.P., Gibertoni, T.B., Cattanio, J.H. 2012. Fungos poróides (*Agaricomycetes*) no sítio do Programa de Biodiversidade da Amazônia (PPBio) em Caxiuanã. In: Lisboa, P. L. (org.). Caxiuanã: Paraíso Conservado. Belém: Museu Paraense Emílio Goeldi (no prelo).
- Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal. 1998. Primeiro relatório nacional para a convenção sobre diversidade biológica - Brasil. MMA, Brasília.
- Müller, M.M., Varama, M., Heinonen, J., Hallaksela, A.M. 2002. Influence of insects on the diversity of fungi in decaying spruce wood in managed and natural forests. *Forest Ecology and Management* 166: 165-181.
- Mueller, G.M., Schmit, J.P., Leacock, P.R., Buyck, B., Cifuentes, J., Desjardin, D.E., Halling, R.E., Hjortstam, K., Iturriaga, T., Larsson, K.H., Lodge, D.J., May, T.W., Minter, D., Rajchenberg, M., Redhead, S.A., Ryvarden, L., Trappe, J.M., Watling, R., Wu, Q. 2007. Global diversity and distribution of macrofungi. *Biodiversity and Conservation* 16: 37-48.
- Museu Paraense Emílio Goeldi. 2007. Amazônia: Fundamentos da ecologia da maior região de florestas tropicais. [http://www.museu-goeldi.br/biodiversidade/o\\_amazonia.asp](http://www.museu-goeldi.br/biodiversidade/o_amazonia.asp). Acesso em 06/06/2007.
- Newell, S.Y., Porter, D., Lingle, W.L. 1996. Lignocellulolysis by Ascomycetes (fungi) of a Saltmarsh Grass (smooth cordgrass). *Microscopy Research and Technique* 33: 32-46.
- Nobles, M.K. 1971. Cultural characters as a guide to the taxonomy of the Polyporaceae. In: Petersen, R. (ed.) Evolution in the higher Basidiomycetes. Knoxville, University of Tennessee Press: 169-196.
- Norden, B., Ryberg, M., Gotmark, F., Olausson, B. 2004. Relative importance of coarse and fine woody debris for the diversity of wood-inhabiting fungi in temperate broadleaf forests. *Biological Conservation* 117: 1-10.

- Nozaki K, Beh CH, Mizuno M, Isobe T, Shiroishi M, Kanda T, Amano Y. 2008. Screening and Investigation of Dye Decolorization Activities of *Basidiomycetes*. *Journal of Bioscience and Bioengineering* 105(1): 99-72.
- Núñez, M., Ryvarden, L. 1995. *Polyporus* (Basidiomycotina) and related genera. Synopsis Fungorum 10, Fungiflora, Oslo.
- Núñez, M. 1996. Fructification of *Polyporaceae* s.l. (Basidiomycotina) along a gradient of altitude and humidity in the Guanacaste Conservation Area (Costa Rica). *Journal of Tropical Ecology* 12: 893-898.
- Núñez, M., Ryvarden, L. 2000. East Asian Polypores. Vol. 1. *Ganodermataceae* and *Hymenochaetaceae*. *Synopsis Fungorum* 13: 1-168.
- Núñez, M., Ryvarden, L. 2001. East Asian Polypores. Vol. 2. *Polyporaceae* s. lato. *Synopsis Fungorum* 14: 119-522.
- Olmos, F. 1999. As unidades de conservação de Rondônia. SEPLAN/PLANAFLORO/PNUD, Porto Velho.
- Orledge, G.M., Reynolds, S.E. 2005. Fungivore hostuse groups from cluster analysis: patterns of utilization of fungal fruiting body by ciid beetles. *Ecological Entomology* 30: 620-641.
- Papinutti, L., Mouso, N., Forchiassin, F. 2006. Removal and degradation of the fungicide dye malachite green from aqueous solution using the system wheat bran–*Fomes sclerodermeus*. *Enzyme and Microbial Technology* 39: 848-853.
- Pegler, D. N. 1983. The genus *Lentinus* – A world monograph. *Kew Bulletin Additional Series X*: 1-281.
- Pegler, D. N., Spooner, B. 1992. The mushroom identifier. The Apple Press, London, 144p.
- Quintero, J.C., Lu-Chau, T.A., Moreira, M.T., Feijoo, G., Lema, J.M. 2007. Bioremediation of HCH present in soil by the white-rot fungus *Bjerkandera adusta* in a slurry batch bioreactor. *International Biodeterioration & Biodegradation* 60: 319-326.
- Reeves, F., Welden, A. L. 1967. West Indian species of *Hymenochaete*. *Mycologia* 59: 1034-1049.
- Ribeiro, B., Veríssimo, A., Pereira, K. 2005. O Avanço do Desmatamento sobre as Áreas Protegidas em Rondônia. Estado da Amazônia nº 6, IMAZON.
- Rigas, F., Papadopoulou, K., Dritsa, V., Doulia, D. 2007. Bioremediation of a soil contaminated by lindane utilizing the fungus *Ganoderma australe* via response surface methodology. *Journal of Hazardous Materials* 140: 325-332.
- Robledo, G.L., Urcelay, C., Dominguez, L., Rajchenberg, M. 2006. Taxonomy, ecology, and biogeography of polypores (Basidiomycetes) from Argentinian *Polylepis* woodlands. *Canadian Journal of Botany* 84: 1561-1572.

- Rolstad, J., Saetersdal, M., Gjerde, I., Storaunet, K.O. 2004. Wood-decaying fungi in boreal forest: are species richness and abundances influenced by small-scale spatiotemporal distribution of dead wood?. *Biological Conservation* 117: 539-555.
- Rosa, L.C., Machado, K.M.G., Jacob, C.C., Capelari, M., Rosa, C.A., Zani, C.L. 2003. Screening of Brazilian Basidiomycetes for Antimicrobial Activity. *Memórias do Instituto Oswaldo Cruz* 98(7): 967-974.
- Ryvarden, L. 1987. New and noteworthy polypores from tropical America. *Mycotaxon* 28: 525-541.
- Ryvarden, L. 1991. Genera of Polypores - Nomenclature and Taxonomy. *Synopsis Fungorum* 5, Fungiflora, Oslo, 363 p.
- Ryvarden L. 2005. *Inonotus* – a synopsis. *Synopsis Fungorum* 22, Fungiflora, Oslo.
- Ryvarden, L., Gilbertson, R.L. 1994. European Polypores. Vol. 2. *Synopsis Fungorum* 6, Fungiflora, Oslo, 355p.
- Ryvarden, L., Joahnsen, I. 1980. A preliminary polypore flora of East Africa. Fungiflora, Oslo, 636p.
- Ryvarden, L. 2000a. Studies in neotropical polypores 2: a preliminary key to neotropical species of *Ganoderma* with laccate pileus. *Mycologia* 92 (1): 180-191.
- Ryvarden, L. 2000b. Studies in neotropical polypores 5. New and noteworthy species from Puerto and Virgin Islands. *Mycotaxon* 73: 119-129.
- Ryvarden, L. 2004. Neotropical polypores 19: Introduction, Ganodermataceae & Hymenochaetaceae. *Synopsis Fungorum* 19: 229p.
- Samuelsson, J., Gustafsson, L., Ingelög, T. 1994. Dying and dead trees – a review of their importance for biodiversity. Swedish Threatened Species Unit, Uppsala, 110p.
- Shon, Y.H., Nam, K.S. 2001. Antimutagenicity and induction of anticarcinogenic phase II enzymes by basidiomycetes. *Journal of Ethnopharmacology* 77: 103-109.
- Silva, D. 2006. *Ganoderma lucidum* in cancer research. *Leukemia Research* 30: 767-768.
- Silva, M., Minter, D.W. 1995. Fungi from Brasil - Recorded by Batista and co-workers. *Mycological Papers* 169: 1-585.
- Smânia, E.F.A., Smânia, J.R.A., Loguercio-Leite, C. 1998. Cinnabarin synthesis by *Pycnoporus sanguineus* strains and microbial activity against bacteria from food products. *Revista de Microbiologia* 29: 317-320.
- Smânia, A., Marques, C.J.S., Smânia, E.F.A., Zanetti, C.R., Carobrez, S.G., Tramonte, R., Loguercio-Leite, C. 2003. Toxicity and antiviral activity of cinnabarin obtained from *Pycnoporus sanguineus* (Fr.) Murr. *Phytotherapy Research* 17 (9): 1069-1072.
- Smânia, E.F.A., Monache, F., Yunes, R.A., Paulert, R., Smania-Junior, A. 2007. Antimicrobial activity of methyl australate from *Ganoderma australe*. *Revista Brasileira de Farmacognosia*

(Brazilian Journal of Pharmacognosy): 17(1): 14-16.

- Smith, J.E., Rowan, N.J., Sullivan, R. 2002. Medicinal mushrooms: a rapidly developing area of biotechnology for cancer therapy and other bioactivities. *Biotechnology Letters* 24: 1839-1845.
- Sotão, H.M.P., Bononi, V.L.R., Figueiredo, T.S. 1991. *Basidiomycetes* de manguezais da Ilha de Maracá, Amapá, Brasil. Boletim do Museu Paraense Emílio Goeldi, série botânica 7(1): 109-114.
- Sotão, H.M.P., Figueiredo, T.S. 1996. Utilização do fungo *Pycnoporus sanguineus* (L.: Fr.) Murr. na cerâmica do Muruanum, Amapá. Boletim do Museu Paraense Emílio Goeldi, série botânica 12(1): 15-20.
- Sotão, H.M.P., Hennen, J.F., Gugliotta, A.M., Melo, O.A., Campos, E.L. 1997. Os fungos – *Basidiomycotina*. In: Lisboa, P.L.B. (org.). Caxiuanã. Belém, Museu Paraense Emílio Goeldi. 213-219.
- Sotão, H.M.P., Campos, E.L., Costa, S.P.S.E.C., Melo, A.O., Azevedo, J.C. 2002a. Basidiomycetes macroscópicos de manguezais de Bragança, Pará, Brasil. *Hoehnea* 29(3): 215-224.
- Sotão, H.M.P., Gugliotta, A.M., Oliveira, A.P., Luz, A.B., Melo, O.A. 2002b. Fungos poliporóides. In: Lisboa, P.L.B. (org.). Caxiuanã, populações tradicionais, meio físico e diversidade biológica. Belém: Museu Paraense Emílio Goeldi. p. 433-444.
- Sotão, H.M.P., CAMPOS, E.L., Gugliotta, A.M., Costa, S.P.S.E.C. 2003. Fungos macroscópicos: *Basidiomycetes*. In: Fernandes, M. E. B. (org.). Os manguezais da costa norte brasileira. Maranhão: Fundação Rio Bacanga. 142 p.
- Sotão, H.M.P., Gibertoni, T.B., Maziero, R., Baseia, I., Medeiros, P.S., Martins-Júnior, A., Capelari, M. 2008. Fungos macroscópicos da Floresta nacional de Caxiuanã, Pará, Brasil: *Basidiomycota* (*Agaricomycetes*). In: Lisboa P.L.B. (org.). Caxiuanã: Desafios para conservação de uma Floresta Nacional na Amazônia. Belém: Museu Paraense Emílio Goeldi.
- Sousa, M. A. 1980. O gênero *Phellinus* Quélet (Hymenochaetaceae) na Amazônia brasileira. Tese de Doutorado, Instituto de Pesquisas Amazônicas/Fundação Universidade do Amazonas, Manaus, 190p.
- Stamets, P. 2002. Novel antimicrobials from mushrooms. *HerbalGram* 54: 29-33.
- Steyaert, R.L. 1962. Genus *Ganoderma* (Polyporaceae) taxa nova-2. *Bulletin du Jardin Botanique de L'etat Bruxelles* 32(1): 89-104.
- Suay, I., Arenal, F., Asensio, F.J., Basilio, A., Angeles-Cabello, M., Teresa-Díez, M., García, J.B., González del Val, A., Gorrochategui, J., Hernández, P., Peláez, F., Francisca Vicente, M. 2000. Screening of basidiomycetes for antimicrobial activities. *Antonie van Leeuwenhoek* 78 (12), 129-140.

- Swofford, D.L. (2003) PAUP\*. Phylogenetic Analysis Using Parsimony (\* and Other Methods), version 4. Sinauer Associates, Sunderland, Massachusetts.
- Teixeira, A.R. 1945. Himenomicetos Brasileiros - Hymeniales - Thelephoraceae. *Bragantia* 5(7): 397-434.
- Teixeira, A.R., Fidalgo, O. 1983. *Polyporus tricholoma* Mont. (Polyporaceae). *Revista Brasileira de Botânica* 6(2): 129-132.
- Teixeira, A.R. 1993. Chave para identificação dos gêneros de *Polyporaceae* com base na morfologia do basidiocarpo. *Boletim do Instituto de Botânica* 8: 1-55.
- Teixeira, A.R. 1994. Genera of *Polyporaceae*: an objective approach. *Boletim da Chácara Botânica de Itu* 1: 1-91.
- Teixeira, A.R. 1995. Método para o estudo das hifas dos basidiocarpos de fungos poliporáceos. Manual n.6, Instituto de Botânica, São Paulo.
- Tedersoo, L., Suvi, T., Beaver, K., Saar, I. 2007. Ectomycorrhizas of *Coltricia* and *Coltriciella* (*Hymenochaetales*, *Basidiomycota*) on *Caesalpinaceae*, *Dipterocarpaceae* and *Myrtaceae* in Seychelles. *Mycological Progress* 6(2): 101-107.
- Theissen, F. 1911. *Polyporaceae austro-brasilienses imprimis rio grandenses*. Kaiserlich-Königlichen Hof- und Staatsdruckerei, Wien, 60p.
- Theissen, F. 1912. *Hymenomyces Riograndenses*. *Brotéria, série botânica*. 10: 5-28.
- Torrend, C. 1920. *Les polyporacées du Brésil. Polyporaceus stipitées*. *Brotéria, série botânica*. 18(1): 21-42.
- Torrend, C. 1922. *Les polyporacées du Brésil. Les genres Amauroderma et Lignosus*. *Brotéria, série botânica*. 18(2): 21-42.
- Torrend, C. 1924. *Les polyporacées du Brésil. II*. *Brotéria, Ser. Bot.* 21 (1): 12-42.
- Torrend, C. 1935. *Les polyporacées du Brésil*. *Brotéria, série botânica*. 31(3): 108-120.
- Torrend, C. 1938. As poliporáceas da Bahia e estados limítrofes. *Anais da Primeira Reunião Sul-Americana de Botânica* 2: 326-341.
- Trufem, S. F. B., Bononi, V. L. R. *Cogumelos comestíveis*. São Paulo. Ed. Ícone. 1985. 169p.
- Yang, X.T., Zhou, Y.Q., Li, X.Q., Feng, H.Q., Mi, K., Yang, Q.Y. 2005. A comparison study of the *in vitro* anticancer activity and mechanism of ethanol extracts from mycelia of different *Ganoderma lucidum* strains. *Mycosystema* 24: 251-258.
- Urban, A.F. 2004. *Produção de Cogumelos por meio de tecnologia chinesa modificada*. 2 edição. Embrapa. 187p.
- Vieira, I.M., Rocha, M.H., Cunha, E.B., Kadowaki, M.K., Osaku, C.A. 2006. Basidiomicetos da cidade de Cascavel-Oeste do Paraná – e suas aplicações em biotecnologia. *Estud. Biol.* 28 (65): 21-31.

- Walder, R., Kalvatchev, Z., Garzaro, D., Barrios, M. 1995a. *In vitro* antiviral activity from *Fomitella supina*, *Phellinus rhabarbarinus*, *Trichaptum perrottettii* and *Trametes cubensis*. *Fitoterapia* 66(3): 249-256.
- Walder, R., Kalvatchev, Z., Garzaro, D., Barrios, M. 1995b. *In vitro* expression of interferon induced by extracts from *Fomitella supina*, *Phellinus rhabarbarinus*, *Trichaptum perrottettii* and *Trametes cubensis*: antiviral activity against HIV-1. *Fitoterapia* 66(6): 510-514.
- Watling, R. 1969. Colour Identification Chart. Her Majesty's Stationary Office, Edinburgh.
- Webster, J., Weber, R. 2007. Introduction to Fungi. 3 edition, Cambridge University Press, Cambridge, 841p.
- White, T.J., Bruns, T., Lee, S., Taylor, J. 1990. Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: Innis MA, Gelfand D, Sninsky J, White T (eds.). PCR protocols: a guide to methods and applications: 315–322. Academic Press, San Diego, California.
- Zjalic, S., Reverberi, M., Ricelli, A., Granito, V.M., Fanelli, C., Fabbri, A.A. 2006. *Trametes versicolor*: A possible tool for aflatoxin control. *International Journal of Food Microbiology* 107: 243-249.
- Zhang, J., Tang, Q., Zimmerman-Kordmann, M., Reutter, W., Fan, H. 2002. Activation of B lymphocytes by GLIS, a bioactive proteoglycan from *Ganoderma lucidum*. *Life Sciences* 71: 623-638.
- Zulfadhly, Z., Mashitah, M.D., Bhatia, S. 2001. Heavy metals removal infixed-be column by the macro fungus *Pycnoporus sanguineus*. *Environmental Pollution* 112: 467-470.

# **ANEXOS**

**ANEXO 1****NOTES ON *FOMITOPSIS (POLYPORALES, AGARICOMYCETES)* FROM NORTH AND NORTHEAST BRAZIL<sup>1</sup>**

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### Abstract

GOMES-SILVA, A. C., G. S. NOGUEIRA-MELO, C. R. S. LIRA, M. A. Q. CAVALCANTI, AND T. B. GIBERTONI (Universidade Federal de Pernambuco, Centro de Ciências Biológicas, Departamento de Micologia, Programa de Pós-Graduação em Biologia de Fungos, Av. Nelson Chaves s/nº, CEP 50760-420, Recife, PE, Brazil), J. M. BALTAZAR (Current address: Universidade Federal do Rio Grande do Sul, Instituto de Biociência, Departamento de Botânica, Programa de Pós-Graduação em Botânica, Av. Bento Gonçalves, 9500. CEP 91501-970, Porto Alegre, RS, Brazil), E. R. DRESCHSLER-SANTOS (Current address: Programa de Pós-Graduação em Biologia Vegetal, Depto. de Botânica, UFSC. Campus Trindade, CEP 88040-900, Florianópolis, SC, Brazil), P. S. MEDEIROS AND H. M. P. SOTÃO (Museu Paraense Emílio Goeldi, Coordenação de Botânica, Caixa Postal 399, CEP 66040170, Belém, PA, Brazil), L. RYVARDEN (University of Oslo, Department of Botany, P. O. Box 1045, Blindern, N-0316, Oslo, Norway). Notes on *Fomitopsis* (*Polyporales*, *Agaricomycetes*) from North and Northeast Brazil. J. Torrey. Bot. Soc. XXX: 000–000. 201X. — *Fomitopsis lilacinogilva* is reported as new to Brazil, *F. feei* to the Brazilian Amazonia and Caatinga, *F. cupreorosea* to the states of Pará, Pernambuco and Rondônia, and *F. nivosa* to the states of Acre, Amazonas, Rondônia and Roraima. Description of *F. lilacinogilva* and a key to the species of *Fomitopsis* reported for the Neotropics are provided.

**Key words:** brown-rot species, diversity, *Fomitopsidaceae*

*Fomitopsis* is a cosmopolitan genus proposed by P. Karsten in 1881 and comprises about 29 species so far (www.indexfungorum.org, Kirk et al. 2008). Species of *Fomitopsis* cause brown rot on living or dead conifers and hardwoods (Ryvarden and Johansen 1980). The genus is characterized by its sessile to effuse-reflexed, white to pinkish basidiomata, poroid, white to pinkish pore surface with round, angular to irregular pores, dimitic or trimitic hyphal system, presence or absence of cystidia, and subglobose to cylindrical, hyaline, smooth basidiospores, negative in

Melzer's reagent (Ryvarden and Johansen 1980, Carranza-Morse and Gilbertson 1986). Many species of *Trametes* Fr. are morphologically similar to *Fomitopsis*, but they cause white rot.

The knowledge about *Fomitopsis* is still scarce in Brazil and only five species are cited to the country: *Fomitopsis cupreorosea*, *F. feei*, *F. meliae* (Underw.) Gilb., *F. nivosa* (frequently reported as *Trametes*), and *F. rosea* (Alb. & Schwein.) P. Karst. (Gugliotta and Abrahão 2012). Thus, the aim of this work is to contribute to the knowledge about polypore diversity in Brazil, with the report of new occurrences to the country and new distributional data on previous known species.

**Materials and methods.** Field trips were undertaken from January 2006 to July 2011. In Amazonia, materials were collected in Floresta Nacional (FLONA) de Caxiuanã (1°42'3"S 51°31'45"W) and Estação Científica Ferreira Penna (an area inside FLONA de Caxiuanã, 1°44' S 51°27' W) in the state of Pará; Estação Ecológica de Cuniã (8°04'S 63°31'W) and Parque Natural Municipal de Porto Velho (8°45' S 63°54' W) in the state of Rondônia; and Reserva Biológica do Lago Piratuba (01°20'S 50°19' W) in the state of Amapá. In the Atlantic Forest, materials were from Parque Ecológico João Vasconcelos Sobrinho (8°22'9"S 36°5'0"W), Mata do Estado (7°35'0"S 35°30'0"W), Reserva Particular do Patrimônio Natural (RPPN) Frei Caneca (8°43'34"S 35°46'49"W) and RPPN Carnijó (8°7'6"S 35°5'22"W), all in the state of Pernambuco. Also in Pernambuco, material was collected in the mangroves of Maria Farinha (7°51'24.8"S 34°50'32.7"W), Itamaracá (7°46'52.6"S 34°52'53.3"W) and Rio Formoso (8°41'20.8"S 35°6'06.6"W).

In addition to the recent collections, specimens deposited in HUEFS, INPA, MG, O and SP (Thiers, continuously updated) were also studied. For the identification, specimens were analyzed macro- (shape, color, hymenial surface) and micro-morphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Slide preparations with 3-5% KOH, stained with 1% aqueous phloxine, and Melzer's reagent (Ryvarden 1991) were made. Color designation followed Watling (1969). Newly collected material was deposited in HFSL, MG and URM.

### Taxonomy

*Fomitopsis cupreorosea* (Berk.) J. Carranza & Gilb., Mycotaxon 25(2): 476 (1986).

≡ *Polystictus cupreoroseus* (Berk.) Cooke, Grevillea 14(no. 71): 85 (1886).

**Description.** Carranza-Morse and Gilbertson (1986).

**Distribution.** Neotropical (Carranza-Morse and Gilbertson 1986). In Brazil, reported for the states of Alagoas, Bahia, Mato Grosso, Paraná, Rio Grande do Sul and Sergipe (Gugliotta and Abrahão 2012). It represents the first record for the states of Amazonas, Pará, Pernambuco and Rondônia.

**Substrate.** on deciduous wood.

**Specimens examined:** **BRAZIL.** AMAZONAS: Barcelos, loc.n.det., IX.1962, leg. *M. Kuhlmann* (SP 61739); PARÁ: Melgaço, Estação Científica Ferreira Penna, 1996 leg. *H.M.P. Sotão et al.* (MG 202009); PERNAMBUCO: Caruaru, Parque Ecológico João de Vasconcelos Sobrinho, VI.2008, leg. *J.M. Baltazar et al.* (URM 81345), VII.2008, leg. *J.M. Baltazar et al.* (URM 81346), VIII.2008, leg. *J.M. Baltazar et al.* (URM 81347), IX.2008, leg. *J.M. Baltazar et al.* (URM 81348), X.2008, leg. *J.M. Baltazar et al.* (URM 81349), VI.2009, leg. *J.M. Baltazar et al.* (URM 81350); São Vicente Férrer, Mata do Estado (Sirijí), VII.2008, leg. *J.M. Baltazar et al.* (URM 81351), VII.2008, leg. *J.M. Baltazar et al.* (URM 81352, 81353), IX.2008, leg. *J.M. Baltazar et al.* (URM 81354, 81355), V.2009, leg. *J.M. Baltazar et al.* (URM 81356); Jaqueira, RPPN Frei Caneca, XI/2009, leg. *G.S. Nogueira-Melo & L.S. Araujo-Neta* (URM83100, 83101).

**Taxonomic remarks.** The angular to daedaleoid pores, 1–2 per mm, and the ellipsoid basidiospores,  $5\text{--}7 \times 2.5\text{--}3.2 \mu\text{m}$ , distinguish this species from the other species of the complex *F. rosea* (Carranza-Morse & Gilbertson 1986). *Fomitopsis cupreoresea* is taken as *F. lilacinogilva*, but the latter has regular, smaller pores [2–5(–6) per mm] and larger basidiospores ( $6.5\text{--}12 \times 3\text{--}5 \mu\text{m}$ ). *Fomitopsis cupreoresea* was reported for the states of Alagoas and Sergipe by Gibertoni et al. (2004, 2007), but after revision of these specimens we concluded that they belong to *Trichaptum sprucei* (Berk.) Rajchenb. & Bianchin.

*Fomitopsis feei* (Fr.) Kreisel, Ciencias (Havana), Ser. 4 16: 83 (1971).

≡ *Polyporus feei* Fr., Linnaea 5: 518 (1830).

**Description.** Carranza-Morse and Gilbertson (1986), Núñez and Ryvarden (2001).

**Distribution.** North, Central and South America, Caribbean Islands, Asia, Australia and New Zealand (Carranza-Morse and Gilbertson 1986). In Brazil, the species was reported for the states of Paraíba, Paraná, Rio Grande do Sul, Santa Catarina and São Paulo (Gugliotta and Abrahão 2012). It is the first record to the Brazilian Amazonia and Caatinga biomes.

**Substrate.** on deciduous wood.

**Specimens examined:** **BRAZIL.** ACRE: Rio Branco, loc. n. det., X.1980, leg. *B. Lowy et al.* (INPA 100456, as *Poria* sp.); AMAZONAS: Barcelos, Serra de Aracá, VII.1985, leg. *E.S.S. Silva et al.* (INPA 153709); BAHIA: Santa Teresinha, Distrito de Pedra Branca, Serra da Jibóia, IV.2007, leg. *A. Góes-Neto* (HUEFS 132191, O), IV.2010, leg. *T.B. Gibertoni* (URM 84074); Itaberaba, Serra do Orobó, I.2006 leg. *P. Oinonen et al.* (HUEFS 108323, as *Fomitopsis* sp., O); RONDÔNIA: Vilhena, loc. n. det., XI.1979, leg. *R.H. Pertesen* (INPA 110888, as *Polyporus* sp.).

**Taxonomic remarks.** *Fomitopsis feei* is characterized by the pinkish brown basidiomata, circular to angular pores (5–7 per mm), and cylindrical to oblong basidiospores ( $5\text{--}6.5 \times 2\text{--}3.5 \mu\text{m}$ ). *Fomitopsis cupreoresea* is also a neotropical species with pinkish brown basidiomata and similar

basidiospores, but it has angular to daedaloid, larger pores (1–2 per mm). *Fomitopsis lilacinogilva*, another similar species, differs by the larger pores [2–5 (–6) per mm] and larger ellipsoid basidiospores (5–12 × 2.5–5 µm).

*Fomitopsis lilacinogilva* (Berk.) J.E. Wright & J.R. Deschamps., Rev. Inv. Agrop. 12(3): 143 (1975). **Fig 1**

≡ *Polyporus lilacinogilvus* Berk., Ann. Mag. Nat. Hist., Ser. 13: 324 (1839).

Basidiomata annual to biennial, pileate, semicircular to flabelliform, rarely semi-ungulate, with a contracted base, solitary to imbricate, 3–6.5 × 2–4.5 cm, 0.2–0.3 mm thick, slightly flexible. Pileus surface glabrous to slightly velutinous, dull, with concentrically sulcate zones, conspicuously radially striate, straw-coloured (clay buff 32 to milky coffee 28) when dry. Margin entire, acute, concolorous with the pileus surface. Context homogeneous, fibrous, thin, up to 0.1–0.2 mm thick, pale pink (clay pink 30) to pinkish-brown (purplish date 22), reddish brown in KOH. Tubes more or less concolorous with the pore surface, thin, up to 0.1–0.2 mm deep. Pore surface with round to somewhat angular pores next to the margin and slightly decurrently in the base, 2–5 (–6) per mm, dissepiments thin and entire, rose (vinaceous 76 to clay pink 30). Hyphal system trimitic; generative hyphae hyaline to yellow, clamped, thin-walled, 2–3 µm wide; skeletal hyphae hyaline to pale brown, thick-walled, 3.5–6 µm wide; binding hyphae hyaline to yellow, thin-walled to solid, 2–3.5 µm wide, very difficult to find. Basidia not observed. Basidiospores ellipsoid, 5–12 × 2–5 µm, hyaline, thin-walled, smooth, negative in Melzer's reagent.

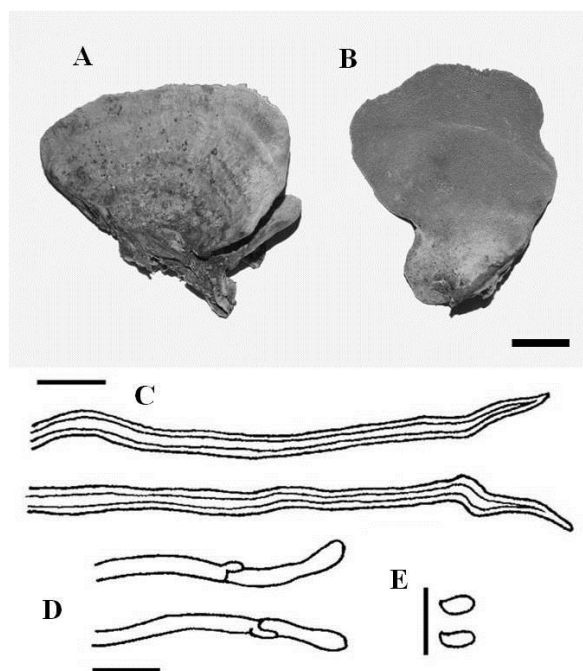
**Distribution.** South America, Australia, New Zealand, South Africa and Tasmania (Carranza-Morse and Gilbertson 1986). It is reported as new to Brazil.

**Substrate.** on deciduous wood.

**Specimens examined: BRAZIL.** AMAZONAS: Manaus, loc. n. det., IV.1985, leg. K.F. Rodrigues (INPA 128920, as *Polyporus* sp.); BAHIA: Santa Teresinha, Serra da Jiboia, I.2006, leg. P. Oinonen et al. (HUEFS 108310, 108315, O); PARÁ: Melgaço, Estação Científica Ferreira Penna, VIII.2007, leg. T.B. Gibertoni (URM 79681); PERNAMBUCO, Moreno, RPPN Carnijó, VIII.2008, leg. J.M. Baltazar et al. (URM 81357); IX.2008, leg. J.M. Baltazar et al. (URM 81358); V.2009, leg. J.M. Baltazar et al. (URM 81359); RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, III.2010, leg. A.C. Gomes-Silva et al. (URM 83099); VIII.2010, leg. A.C. Gomes-Silva et al. (URM 83097, 83098); II.2011, leg. A.C. Gomes-Silva et al. (URM 83096); VI.2011, leg. A.C. Gomes-Silva et al. (URM 83095); RORAIMA: BV-8, Posto da FUNAI, XI.1977, leg. I.J. Araújo et al. (INPA

78460, as *T. cupreorosea*); loc. n. det., VII.1974, leg. G.T. Prance et al. (INPA 45506, as *T. cupreorosea*).

**Taxonomic remarks.** The pinkish basidiomata, becoming pale and usually with brownish shade when dry, and the large basidiospores ( $5\text{--}12 \times 2\text{--}5 \mu\text{m}$ ) characterize *F. lilacinogilva*. This species has wide variation in the size of basidiospores, as observed by Ryvar den and Johansen (1980,  $5\text{--}7 \mu\text{m} \times 2.5\text{--}3.2$ ) and Carranza-Morse and Gilbertson (1986,  $5\text{--}12 \times 2.5\text{--}5 \mu\text{m}$ ). *Fomitopsis feei* is very similar, but its basidiomata are more brownish and the basidiospores smaller,  $5\text{--}7 \times 2\text{--}3.5 \mu\text{m}$  (Carranza-Morse and Gilbertson 1986). *Fomitopsis cupreorosea*, another similar species, differs by the large daedaleoid pores ( $1\text{--}2$  per mm) and smaller basidiospores ( $5\text{--}7 \times 2.5\text{--}3.2 \mu\text{m}$ ). Although two specimens were collected in living trees, we could not determine whether the plant tissue was living or dead, but some species of the genus such as *F. pinicola* (Sw.) P. Karst. are reported as parasitic



**Fig 1** – *Fomitopsis lilacinogilva*. **A** Abhymenial surface. **B** Hymenial surface. **C** Skeletal hyphae. **D** Generative hyphae. **E** Basidiospores. Scale bars: A–B= 10 mm; C–E = 10  $\mu\text{m}$ .

*Fomitopsis nivosa* (Berk.) Gilb. & Ryvar den, N. Amer. Polyp., Vol. 1: 275 (1986).

$\equiv$  *Polyporus nivosus* Berk., Hooker's J. Bot. 8: 196 (1856).

**Description.** Gilbertson & Ryvar den (1986), Buchanan & Hood (1992).

**Distribution.** Pantropical (Ryvar den and Johansen 1980, Buchanan and Hood 1992). In Brazil, the species is known from Amapá, Bahia, Pará, Paraná, Pernambuco and Santa Catarina (Silva and

Gibertoni 2006, Baltazar and Gibertoni 2009, Gomes-Silva and Gibertoni 2009, Trierveiler-Pereira et al. 2009). It is the first record for the state of Acre, Amazonas, Rondônia and Roraima.

**Substrate.** on deciduous wood.

**Specimens examined: BRAZIL.** ACRE: Rio Branco, Km 16 AC 040, X.1980, leg. B. Lowy et al. (INPA 910835, as *T. nivosa*); AMAPÁ: Reserva Biológica do Lago Piratuba, VI.2006, leg. S.V. Costa-Neto et al. (MG 201984); XI.2006, leg. L.C. Lobato et al. (MG 201997); Ilha de Maracá, VIII.1989, leg. H.M.P. Sotão et al. (MG 143665, as *T. chioneus*); IV.1990, leg. H.M.P. Sotão et al. (MG 143672, as *T. chioneus*); AMAZONAS: Manaus, II.1983, leg. M.A. Jesus (INPA 183652, as *Daedalea microsticta* Clarke); Presidente Figueiredo, IV.1983, leg. M.A. Jesus (INPA 183635, 183655); III.1984, leg. M.A. Jesus (INPA 185239, as *D. microsticta*; 185264, as *Trametes* sp.; 185279, as *T. nivosa*); IV.1984, leg. M.A. Jesus (INPA 185350); I.1984, leg. R. Carvalho (INPA 183853, 183898, 183910, as *T. nivosa*); IV.1984, leg. R. Carvalho (INPA 185357, as *T. nivosa*); I.1985, leg. R. Liege [INPA 185906, as *Schizopora paradoxa* (Fr.) Donk]; Campus do INPA, II.1988, leg. R.E. Hanada (INPA 185797, as *D. microsticta*, 185421, 185994, 186160, as *T. nivosa*); XI.1989, leg. R. Carvalho (INPA 192499, as *D. microsticta*; 185421, 192502, as *T. nivosa*); BR174, KM 44, EEST, IV.1996, leg. K. Vohland (INPA 216366, as *D. microsticta*); Lábrea, Rio Purus, Lago preto a 2 km de lábrea, VI.1971, leg. G.T. Prance et al. (INPA 13706); loc. n. det., VI.1971, leg. G.T. Prance et al. (INPA 32922); XII.1983, leg. M.A. Jesus (SP 193508, 193509); VI.1990, leg. M.A. Jesus (INPA 192667, as *T. nivosa*); XII.1996, leg. M.A. Jesus (INPA 192822, as *T. nivosa*); PARÁ: Castanhal, XI.2011, leg. P.M. Sanjuan (MG 202002); Melgaço, Estação Científica Ferreira Penna, V.1997, leg. H. M. P.Sotão et al. (MG 201992); Oriximinã, VI.1980, leg. V.L.R. Bononi (INPA 103195, 103474, 103479); Augusto Corrêa, manguezal, 1997, leg. E. L. Sotão et al. (MG 202040, 202035, as *T. chioneus*); Bragança, manguezal, IV.1995, leg. H.M.P. Sotão et al. (MG 148515, 143762, as *T. chioneus*); III.1997 leg. E.L Campos et al. (MG 163694, as *T. chioneus*); Manguezal da Ilha de Algodal-Maiandeuá, VII.1998, leg. E.L. Campos et al. [URM 77020, 77021, as *Antrodia albida* (Fr.: Fr.) Donk]; II.1999, leg. E.L. Campos et al. (URM 77033, 77034, as *A. albida*); VI.1999, leg. E.L. Campos et al. (URM 77047, as *A. albida*); 2004, leg. H.M.P. Sotão et al. (MG 202005, 202007, 202008, as *T. chioneus*); 2004, leg. T.B. Gibertoni (MG 202004); Soure, Ilha do Marajó, Manguezal, 2000, leg. H.M.P. Sotão (MG 201983, as *T. chioneus*); PERNAMBUCO: Moreno, RPPN Carnijó, VII.2008, leg. J.M. Baltazar et al. (URM 81360); VIII.2008, leg. J.M. Baltazar et al. (URM 81361); IX.2008, leg. J.M. Baltazar et al. (URM 81362); X.2008, leg. J.M. Baltazar et al. (URM 81363); V.2009, leg. J.M. Baltazar et al. (URM 81364); Manguezal de Itamaracá, VIII.2009, leg. G.S. Nogueira-Melo et al. (URM 82191); Manguezal de Maria Farinha, IV.2009, leg. G.S. Nogueira-Melo et al. (URM 82194); V.2009, G.S. Nogueira-Melo et al. (URM 82192); Manguezal de Rio Formoso, VII.2009, leg. G.S. Nogueira-

*Melo et al.* (URM 82193, 82195); XII.2009, leg. *G.S. Nogueira-Melo et al.* (URM 82192); Paulista, Jardim Paulista, VII.2002, leg. *R. Barbosa* (O 17846); RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, II.2011, leg. *A.C. Gomes-Silva et al.* (URM 83031); Ji-Paraná, Trilha próxima ao rio Ji-Paraná, V.1987, leg. *M. Capelari et al.* (SP 212020); RORAIMA: Caracará, BR174, KM 328, XI.1977, leg. *I.J. Araújo et al.* (INPA 77516, 76932); loc. n. det., VII.1974, leg. *G.T. Prance et al.* (INPA 45347, as *Polyporus nivosus* Berk.).

**Taxonomic remarks.** The white basidiomata of *F. nivosus* is similar to species of *Tyromyces* P. Karst. (Ryvarden and Johansen 1980), but the monomitic hyphal system keeps apart this genus.

### Key to species of *Fomitopsis* recorded in Neotropics

1. Basidiomata rose-pink to pinkish brown; pores round to daedaloid ..... 2
- 1'. Basidiomata white to pale buff; pores circular to angular ..... 4
2. Pileus surface velutinous, soft, pale pink to ochraceous pink; pores 5–7 per mm, basidiospores cylindrical to oblong ..... *F. feei*
- 2'. Pileus surface warted, veined or fibrillose, pinkish brown; pores larger, 1–5 per mm; basidiospores ellipsoid ..... 3
3. Pores angular to daedaloid, 1–2 mm wide; basidiospores 5–7 × 2.5–3.2 μm ..... *F. cupreorosea*
- 3'. Pores round to angular, 2–5 per mm; basidiospores 5–12 × 2–5 μm ..... *F. lilacinogilva*
4. Pileus surface azonate ..... 5
- 4'. Pileus surface zonate ..... 6
5. Pores 3 – 6 per mm; basidiospores ovoid to broadly ellipsoid, 5.5–7 × 4–5 μm; cystidiols 18–22 × 4–7 μm ..... *F. spraguei*
- 5'. Pores 6 – 8 per mm; basidiospores cylindrical, (6–) 7–9 × 2–3 μm; cystidiols 12–15 × 4–5 μm ..... *F. nivosus*
6. Pileus surface tomentose to glabrous, white to cream; pores angular, 2–4 per mm ..... *F. palustris*
- 6'. Pileus surface glabrous to finely velutinous, dark brown to pale buff; pores circular to angular, more than 4 per mm ..... 7
7. Pileus surface glabrous to finely velutinous, dark brown; pores circular, 6–8 per mm ..... *F. scalaris*
- 7'. Pileus surface glabrous to minutely tomentose, cream to pale buff; pores circular to angular, 4–5 per mm ..... *F. durescens*

## Results and discussion

Based on literature, five species of *Fomitopsis* are reported for Brazil, but the presence of *F. meliae* in the Neotropics is questioned here because this species is probably restricted to Eastern North America (Gilbertson and Ryvarden 1986, Nuñez and Ryvarden 2001). Baltazar and Gibertoni (2009) mentioned *F. meliae* based in works of Torrend (1938) and Rick (1960) who cited *Polyporus submurinus* (Murrill) Lloyd (= *F. meliae*) to Bahia and Rio Grande do Sul, respectively. Rajchenberg and Meijer (1990) cited *F. meliae* to Paraná based in one collection. Later, Ryvarden and Meijer (2002) determined this specimen as *F. nivosa*. Its duplicate is deposited in O, but we were not able to confirm its identity, since it is sterile.

In addition to the four species of *Fomitopsis* accepted for Brazil, we here report one new record (*F. lilacinogilva*) for the country. Of these six species, five occur in North and Northeast Brazil. *Fomitopsis feei* is recorded for the first time to the Brazilian Amazonia and Caatinga, being previously known from the Atlantic Forest of South and Southeast Brazil. *Fomitopsis cupreorosea* represents the first record to the states of Amazonas, Pará, Pernambuco and Rondônia, while *F. nivosa* is reported for the first time to the state of Acre, Amazonas, Rondônia and Roraima. Although recently collected, several unpublished new occurrences had already been deposited in herbaria, evidencing the importance of herbaria revisions and accessibility of herbaria records.

## References

- BALTAZAR, J. M., AND T.B. GIBERTONI 2009. A checklist of the aphylloroid fungi (*Basidiomycota*) recorded from the Brazilian Atlantic Forest. *Mycotaxon* 109: 439–442.
- BUCHANAN, P. K. AND I.A. HOOD 1992. New species and new records of *Aphyllorales* (*Basidiomycetes*) from New Zealand. *New Zealand J. Bot.* 30: 95 –112.
- CARRANZA-MORSE, J. AND R.L. GILBERTSON 1986. Taxonomy of the *Fomitopsis rosea* complex (*Aphyllorales*; *Polyporaceae*). *Mycotaxon* 25(2): 469–486.
- GIBERTONI, T. B., L. RYVARDEN AND M.A.Q. CAVALCANTI 2004a. Poroid fungi (*Basidiomycota*) of the Atlantic Rain Forest in Northern Brazil. *Syn. Fungorum* 18: 33–43.
- GIBERTONI, T. B., P. J. P. SANTOS AND M.A.Q. CAVALCANTI 2007. Ecological aspects of *Aphyllorales* in the Atlantic rain forest in northeast Brazil. *Fung. Diversity* 25: 49–67.
- GILBERTSON, R. L. AND L. RYVARDEN 1986. North American Polypores. Vol. 1. *Abortiporus–Lindtneria*. Fungiflora, Oslo.
- GOMES-SILVA, A. C. AND T. B. GIBERTONI 2009. Checklist of the aphylloraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* 108: 319–322. <<http://Mycotaxon.com/resources/weblists.html>>. doi: 10.5248/108.319.
- GUGLIOTTRA, A. M. AND M. C. ABRAHÃO 2012. *Polyporales* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <<http://floradobrasil.jbrj.gov.br/2011/FB092402>>.
- KIRK, P. M., P. F. CANNON, D. W. MINTER AND J.A.STALPERS 2008. Dictionary of the Fungi. 10 ed. CABI Publishing, Surrey. 771 pp.
- NÚÑEZ, M. AND L. RYVARDEN 2001. East Asian Polypores, Vol. 2. *Syn. Fungorum* 14: 167–522.



- RAJCHENBERG, M. AND A. A. R. MEIJER 1990. New and noteworthy polypores from Paraná and São Paulo States, Brazil. *Mycotaxon* 38: 173–185.
- RICK, J. 1960. *Basidiomycetes eubasidii* in Rio Grande do Sul – Brasilia. 4. *Meruliaceae, Polyporaceae, Boletaceae*. Iheringia: Botanica 7: 193–295.
- RYVARDEN, L. AND I. JOHANSEN 1980. A preliminary polypore flora of East Africa. Oslo, Fungiflora, 630p.
- RYVARDEN, L. 1991. Genera of Polypores – Nomenclature and taxonomy. *Syn. Fungorum* 5: 1–363.
- RYVARDEN, L. AND A. A. R. MEIJER 2002: Studies in neotropical polypores 14. New species from the state of Paraná, Brazil. *Syn. Fungorum* 15: 34–69.
- SILVA, G. T. AND T. B. GIBERTONI 2006. *Aphyllophorales (Basidiomycota)* em áreas urbanas da Região Metropolitana do Recife, PE, Brasil. *Hoehnea* 33: 533–543.
- THIERS, B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/>
- TORREND, C. 1938. As poliporáceas da Bahia e estados limítrofes. *Anais da Primeira Reunião Sul-Americana de Botânica* 2: 325-341.
- TRIERVEILER-PEREIRA, L., J. M. BALTAZAR AND C. LOGUERCIO-LEITE 2009. Santa Catarina Island mangroves 4 – xylophilous basidiomycetes. *Mycotaxon* 109: 107–110. <<http://Mycotaxon.com/resources/weblists.html>>. doi:10.5248/109.107
- WATLING, R. 1969. Colour Identification Chart. Her Majesty's Stationary Office, Edinburgh (Scotland).

**ANEXO 2****REVISÃO DO GÊNERO AMAURODERMA MURRILL NA AMAZÔNIA BRASILEIRA<sup>2</sup>**

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**Resumo:** Vinte e uma espécies de *Amauroderma* (*Ganodermataceae*, *Polyporales*) são registradas para a Amazônia brasileira. Nove espécies (*A. albstipitatum*, *A. floriforme*, *A. laccatostiptatum*, *A. lemoniforme*, *A. minimum*, *A. ovisporum*, *A. paraelegantissimum*, *A. subsessile* e *A. sessile*) são propostas como novas para a ciência, com base em espécimes coletados nos estados de Pará e Rondônia e em materiais revisados nos herbários INPA e SP. Este é o primeiro registro de *A. elegantissimum* e *A. trichodermatum* para o Pará e Amazonas, respectivamente. *Amauroderma elegantissimum*, *A. exile*, *A. intermedium* e *A. praetervisum* são novos registros para Rondônia. A análise filogenética de 13 espécies de *Amauroderma* inclui a utilização de dados da sequência da região ITS rDNA. Descrição completa para todas as espécies, ilustrações e uma chave de identificação são apresentadas.

**Palavras chave:** *Ganodermataceae*, *Agaricomycetes*, filogenia molecular, taxonomia

**Introdução**

*Amauroderma* que deriva do grego ‘amauro = escuro’ e ‘derma = cobertura’, foi proposto por Murrill (1905), baseado em *Fomes regulicolor* Berk. ex Cooke como espécie tipo. Esse gênero pertence à família *Ganodermataceae* Donk, devido às características peculiares dos basidiosporos, subglobosos a cilíndricos, hialinos a amarelados e com parede dupla, sendo a interna ornamentada a raramente lisa, pigmentada e a externa lisa e hialina (Ryvarden, 2004). Atualmente, compreende os gêneros *Amauroderma* Murrill, *Ganoderma* P. Karst., *Haddowia* Steyaert e *Humphreya* Steyaert

(Kirk *et al.*, 2008) com espécies que podem causar podridão branca ou ser parasitas de árvores (Ryvarden, 2004).

O status taxonômico de *Amauroderma* teve inúmeras interpretações, tanto ao nível genérico quanto específico, devido a grandes discordâncias entre alguns autores em relação à *Amauroderma* e *Ganoderma* serem considerados ou não gêneros diferentes (Heim, 1962). Entretanto, muitos consideraram esses gêneros com identidades distintas (Torrend, 1920; Donk, 1964, 1948; Imazeki, 1943; Furtado, 1965; Cunningham, 1965; Steyaert, 1961, 1972), o que atualmente também tem sido aceito por outros autores (Ryvarden, 2004; Coelho *et al.*, 2007; Campacci e Gugliotta, 2009; Gomes–Silva *et al.*, 2010).

A taxonomia tradicional de *Ganodermataceae* é baseada em características macro e micromorfológicas do basidioma (Furtado, 1981; Ryvarden, 2004). No entanto, esses caracteres morfológicos são contraditórios, ambíguos ou ausentes, devido à influência dos fatores ambientais (Chen, 1993).

Nos últimos anos, o uso de dados moleculares, nos casos em que a variação dos caracteres morfológicos é contraditória, tem sido aplicado por muitos taxonomistas, principalmente para distinguir espécies de *Ganoderma* (Moncalvo *et al.*, 1995; Hseu *et al.*, 1996; Gottlieb *et al.*, 1998, 2000; Smith e Sivasithamparam, 2000; Hong e Jung, 2004; Zheng *et al.*, 2009; Kaliyaperumal e Kalaichelvan, 2008; Meli e Langer, 2009). Nesses estudos, o grupo de genes mais utilizado é o que codifica o rRNA, onde destacam-se as regiões ITS que, em eucariotos, estão presentes em múltiplas cópias, não codificam proteínas e evoluem rapidamente, sendo, portanto, úteis na diferenciação de espécies (Fungaro, 2000; Rouland–Lefevre *et al.*, 2002). Porém, nenhum estudo sobre sistemática molecular de *Amauroderma* foi realizado até o momento.

O objetivo deste trabalho é contribuir para o conhecimento sobre a diversidade e distribuição de *Amauroderma* no Norte e Nordeste do Brasil. Além disto, uma análise molecular da região ITS rDNA foi incluída para delimitar espécies morfológicamente semelhantes.

## Material e método

### Área de estudo

A Amazônia abrange uma área de 4.196,943 km<sup>2</sup>, dos quais aproximadamente 50% pertence ao Brasil (Capobianco *et al.*, 2001), nos Estados do Acre, Amapá, Amazonas, Pará, Roraima, Rondônia e metade do Mato Grosso (54%), parte do Maranhão (34%) e Tocantins (9%) (IBGE, 2003).

Espécimes de *Amauroderma* foram coletados no período de 2007 a 2011 em duas áreas no estado de Rondônia. A Estação Ecológica de Cuniã – ESEC (53.221,23 hectares, 08° 04' S, 63°31'

O) e Parque Natural Municipal de Porto Velho – PNM (390.82 hectares, 08° 45 'S e 63° 54' W), são formados principalmente por floresta ombrófila aberta e floresta de transição com cerrado. Além disso, três áreas em Rondônia também foram visitadas em intervalos irregulares e espécimes coletados no estado do Pará na Estação Científica Ferreira Penna – ECFP (330.000 hectares, 1° 44 'S e 51° 27' W) no período de 2006 a 2008 foram adicionados. Espécimes depositados nos herbários INPA, SP e URM também foram estudados.

### **Análise morfológica**

Os basidiomas foram analisados macro (forma, coloração, superfície abhimental/ himenial, contexto, tubos e margem) e microscopicamente (sistema hifálico, presença/ausência de estruturas estéreis/férteis, basídios e basidiosporos). Observações microscópicas foram feitas a partir de cortes à mão livre de cada basidioma, com lâmina de aço inoxidável. Os cortes foram colocados entre lâminas e lamínulas com 5% KOH e 1% de floxina (Teixeira, 1995) e separadamente foi utilizado o reagente de Melzer (Ryvarden, 1991). Os cortes foram examinados em microscópio de luz. A coloração dos basidiomas foi determinada com auxílio da carta de cores de Watling (1969). Os espécimes foram depositados no herbário HFSL, MG, O e URM.

Microscopia eletrônica de varredura (MEV) foi realizada no Laboratório de Microscopia Eletrônica (DF/UFPE). Fragmentos dos basidiomas secos foram removidos e colocados diretamente sobre stubs de alumínio usando adesivo de carbono. Os fragmentos foram revestidos com 8–13 nm de ouro e examinados em microscópio eletrônico.

### **Extração do DNA, amplificação e sequenciamento da rDNA ITS**

A extração do DNA genômico foi realizada com base no protocolo de Doyle e Doyle (1987). Fragmentos de basidiomas (50 mg) foram macerados utilizando nitrogênio líquido. Para maceração completa os fragmentos, estes ainda foram novamente triturados em tubos contendo micropérola de vidro com a utilização de homogeneizador (FastPrep–24 Cell Disruptor) (Malosso *et al.*, 2006) na presença de 650 µL de tampão CTAB (100 mM Tris–HCl pH 8, 1,4 M NaCl, 2% CTAB, 20 mM EDTA, 1% PVP). Posteriormente, o produto pulverizado foi incubado a 65°C por 40 minutos. Após a incubação, o extrato foi lavado com clorofórmio–álcool isoamílico (24:1, v/v), precipitado em isopropanol (1:1, v/v), lavado com 1 mL de etanol 70% e, por último, ressuscitado em 50 µL de água ultra pura.

As reações de amplificação da região ITS1–5.8S–ITS2 (rDNA) foram realizadas usando um termociclador (TECHNE TC–512) em um volume reacional de 25 µL contendo os seguintes componentes: 1x Tampão KCl, 0.12 mM dNTPs, 1.5 mM MgCl<sub>2</sub>, 0.4 pmol/µL de cada

oligonucleotídeo iniciador (*primers*), 0.04 U/ $\mu$ L de Taq Polimerase e aproximadamente 1ng/ $\mu$ L de DNA molde. Foram utilizados os iniciadores ITS1 (5'-TCCGTAGGTGAACCTGCGG-3') e ITS4 (5'-TCCTCCGCTTATTGATATGC-3') (White *et al.*, 1990). Os parâmetros utilizados nas reações basearam-se em Kaliyaperumal e Kalaichelvan (2008), com desnaturação inicial a 94°C por 5 min, seguido por 35 ciclos de desnaturação a 94°C por 45 s, anelamento dos primers a 58°C por 50 s, e extensão a 72°C por 60s, além de um período final de extensão a 72°C por 10 min. Controles negativos, contendo todos os componentes exceto DNA, foram utilizados em cada procedimento para detectar possíveis contaminações.

Os produtos de amplificação de 21 exemplares de *Amauroderma* (Tabela 1), além de um exemplar de *Tomophagus colossus* (Fr.) Murrill foram purificados com o kit PureLink PCR Purification – Invitrogen e encaminhados para sequenciamento no Centro de Estudos do Genoma Humano da Universidade de São Paulo.

### **Análises Moleculares**

Posterior à extração do DNA genômico (Góes-Neto *et al.*, 2005), a amplificação da região ITS1–5.8S–ITS2 (rDNA) foi realizada utilizando os *primers* ITS1 e ITS4 (White *et al.*, 1990) com os parâmetros otimizados por Kaliyaperumal & Kalaichelvan (2008), e os produtos de amplificação de 25 espécimes de *Amauroderma* foram encaminhados para sequenciamento. O alinhamento das sequências obtidas em conjunto com as recuperadas do GenBank/NCBI [três *Ganoderma lucidum* (Curtis) P. Karsten (AF094511/90; AF37049/99; AF37096/73); três *Tomophagus colossus* (Fries) Murrill (Z37071/91; JN184395; JN184396) e dois *T. cattienensis* Tham & Moncalvo (JN184397; JN184398)] e edições foram realizadas utilizando o programa MEGA5 (Tamura *et al.*, 2011). Árvores filogenéticas foram construídas a partir do método de máxima parcimônia (MP) e neighbor joining (NJ) com as distâncias de HKY+G, ambos com 1000 reamostragens de *bootstrap* utilizando o programa PAUP versão 4 (Swofford, 2003). As cinco sequências de *Tomaphagus* foram selecionadas como grupo externo.

### **Resultados e discussão**

Das 30 espécies de *Amauroderma* aceitas atualmente (Kirk *et al.*, 2008), 16 espécies foram citadas na literatura para a Amazônia brasileira [*A. aurantiacum* (Torrend) Gibertoni & Bernicchia, *A. boleticeum* (Pat. & Gaillard) Torrend, *A. calcigenum* (Berk.) Torrend, *A. camerarium* (Berk.) J.S. Furtado, *A. exile* (Berk.) Torrend, *A. fasciculatum* (Pat.) Torrend, *A. intermedium* (Bres. & Pat.) Torrend, *A. omphalodes* (Berk.) Torrend, *A. partitum* (Berk.) Wakef., *A. praetervisum* (Pat.) Torrend, *A. subrugosum* (Bres. & Pat.) Torrend, *A. schomburgkii* (Mont. & Berk.) Torrend, *A.*

*sprucei* (Pat.) Torrend, *A. trichodermatum* J.S. Furtado, *A. unilaterum* (Lloyd) Ryvarden e *A. variabile* (Berk.) Lloyd ex Wakef.] (Gomes–Silva e Gibertoni, 2009). Dessas, cinco não constam no presente trabalho (*A. boleticeum*, *A. fasciculatum*, *A. subrugosum*, *A. unilaterum* e *A. variabile*), visto que não foram coletadas recentemente nem se encontrou exsicatas nos herbários investigados.

Durante as coletas, novas espécies (*A. albostipitatum*, *A. floriforme*, *A. laccatostipitatum*, *A. limoniforme*, *A. minimum*, *A. ovisporum*, *A. paraelegantissimum*, *A. sessile* e *A. sessile*) foram coletadas. *Amauroderma elegantissimum* é o primeiro registro para o Pará e Rondônia, enquanto *A. exile*, *A. intermedium* e *A. praetervisum* são novos registros para Rondônia.

Com a revisão dos herbários, uma nova ocorrência foi encontrada no herbário SP: *A. trichodermatum* que representa o primeiro registro para o Amazonas. As novas espécies *A. albostipitatum*, *A. sessile* e *A. floriforme* também foram dos herbários INPA e SP. Isso torna evidente a importância de revisões de herbários e acessibilidade dos dados.

Desse modo, existem 21 espécies de *Amauroderma* confirmadas para a Amazônia brasileira, sendo 13 espécies (*A. aurantiacum*, *A. calcigenum*, *A. elegantissimum*, *A. exile*, *A. floriforme*, *A. laccatostipitatum*, *A. minimum*, *A. paraelegantissimum*, *A. partitum*, *A. praetervisum*, *A. schomburgkii*, *A. sprucei* e *A. sessile*) determinadas por morfologia clássica e por análise da região ITS. Para as outras oito espécies (*A. albostipitatum*, *A. camerarium*, *A. intermedium*, *A. limoniforme*, *A. omphalodes*, *A. ovisporum*, *A. sessile* e *A. trichodermatum*), os fragmentos dos basidiomas utilizados para extração de DNA foram retirados pós-processo de herborização, o que impossibilitou a obtenção de DNA de qualidade satisfatória para seu uso em reações de PCR. Assim, essas espécies foram determinadas pela taxonomia clássica.

O tamanho das regiões ITS1 de todos os espécimes estudados não diferiu acentuadamente, apresentando de 194 a 204 pb e estas foram alinhadas em 219 posições. Esta pequena variação entre os espécimes também foi observada para a região ITS2 que apresentou entre 198 e 214 pb e alinhadas em 234 posições. Este resultado está próximo do que já foi descrito para *Ganoderma* (Moncalvo *et al.*, 1995; Gottlieb *et al.*, 2000).

Desse modo, a matriz de dados com 25 sequências de *Amauroderma*, três de *Ganoderma lucidum* (Curtis) P. Karsten, três *Tomophagus colossus* (Fries) Murrill e dois *T. cattienensis* Tham & Moncalvo (grupo externo) incluiu 453 sítios. Desses, 299 foram constantes e 154 foram caracteres variáveis, porém 104 parcimoniosos informativos. Os resultados das análises filogenéticas obtidas pelos métodos de máxima verossimilhança (MV) e máxima parcimônia (MP) apresentaram pequenas divergências nos valores de *bootstrap* e mesma topologia entre si (Fig 1). *Amauroderma* representa um grupo monofilético em *Ganodermataceae*. Para simplificar a discussão, cinco clados (A, B, C, D, E e F) foram considerados.

**Tabela 1.** Lista de espécies de *Amauroderma* utilizadas nas análises moleculares.

Espécie	Origem	Registro	GenBank
<i>A. aurantiacum</i> (Torrend) Gibertoni & Bernicchia	PNM-RO	URM78847	JX310840
<i>A. calcigenum</i> (Berk.) Torrend	ESEC-RO	URM83864	**
<i>A. elegantissimum</i> Ryvarden & Iturr.	PNM-RO	URM82790	JX310842
<i>A. elegantissimum</i> Ryvarden & Iturr.	ESEC-RO	URM82787	JX310843
<i>A. elegantissimum</i> Ryvarden & Iturr.	ESEC-RO	URM82789	JX310844
<i>A. exile</i> (Berk.) Torrend	PNM-RO	URM82794	JX310845
<i>A. floriforme</i> Gomes-Silva, Ryvarden & Gibertoni, ined	PNM-RO	URM83250	JX310846
<i>A. laccatostipitatum</i> Gomes-Silva, Ryvarden & Gibertoni, ined	ESEC-RO	URM83238	JX310847
<i>A. minimum</i> Gomes-Silva, Ryvarden & Gibertoni, ined	ESEC-RO	URM83228	JX310848
<i>A. paraelegantissimum</i> Gomes-Silva, Ryvarden & Gibertoni, ined	PNM-RO	URM83229	JX310849
<i>A. paraelegantissimum</i> Gomes-Silva, Ryvarden & Gibertoni, ined	PNM-RO	URM83233	JX310850
<i>A. partitum</i> (Berk.) Wakef.	ESEC-RO	URM82884	JX310851
<i>A. partitum</i> (Berk.) Wakef.	ESEC-RO	URM82882	JX310852
<i>A. partitum</i> (Berk.) Wakef.	PNM-RO	URM83039	JX310853
<i>A. partitum</i> (Berk.) Wakef.	PNM-RO	URM83040	JX310854
<i>A. praetervisum</i> (Pat.) Torrend	REC-AC	REC18707	JX310855
<i>A. praetervisum</i> (Pat.) Torrend	PNM-RO	GSilva909	JX310856
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	PNM-RO	URM82829	JX310857
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	PNM-RO	GSilva944	JX310858
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	PNM-RO	URM83420	JX310859
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	ESEC-RO	URM 83904	**
<i>A. schomburgkii</i> (Mont. & Berk.) Torrend	ESEC-RO	URM 83902	**
<i>A. sprucei</i> (Pat.) Torrend	ESEC-RO	URM83908	**
<i>A. subsessile</i> Gomes-Silva, Ryvarden & Gibertoni, ined	PNM-RO	URM83239	JX310860
<i>A. subsessile</i> Gomes-Silva, Ryvarden & Gibertoni, ined	ESEC-RO	URM83905	**

\*\* a ser depositada

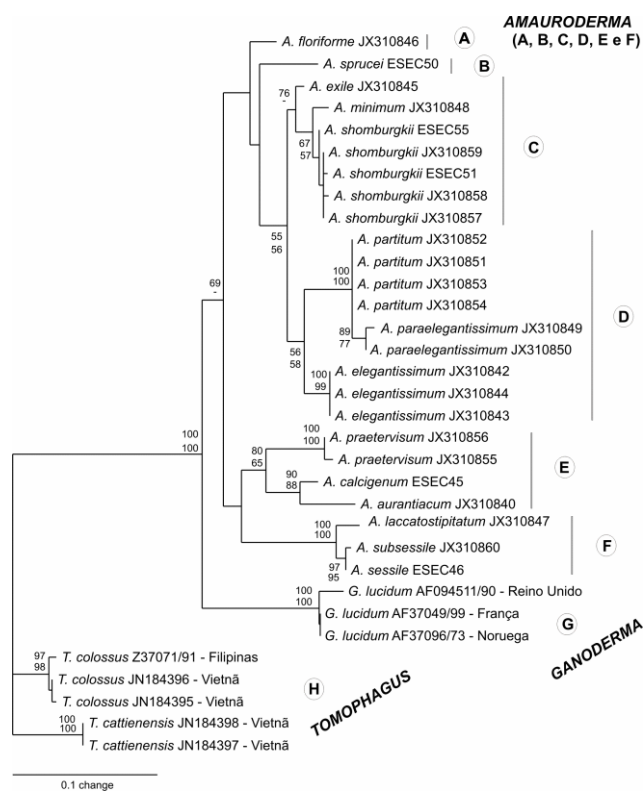
Alguns caracteres morfológicos, como a consistência e tamanho do basidioma, tamanho dos poros e forma dos basidiosporos apresentam-se como caráter importantes para explicar a topologia da reconstrução filogenética.

No clado A, *A. floriforme* apresenta basidioma com vários píleos agrupados a partir de um único estipe, uma característica de distinção em relação às demais espécies de *Amauroderma*, enquanto *A. sprucei* (clado B) possui contexto branco e sem linhas. No clado C, observa-se a proximidade filogenética entre *A. exile*, *A. minimum* e *A. schomburgkii* com moderado valor de *bootstrap* (MP 76%). Essas três espécies são morfológicamente similares, possuindo basidiosporos globosos e poros pequenos. De modo particular, *A. exile* é macroscopicamente similar a *A. elegantissimum* e *A. paraelegantissimum* (clado D), diferindo em relação ao tamanho dos poros e a forma dos basidiosporos. Semelhanças morfológicas também foram observadas entre *A. minimum* e *A. schomburgkii* (tamanho dos poros, coloração do basidioma e presença de linha no contexto), sendo diferenciados pelo tamanho do basidioma e dos basidiosporos.

No clado D, foram agrupadas todas as espécies que possuíam basidiosporos oblongo-elipsóides: *A. partitum*, *A. paraelegantissimum* e *A. elegantissimum* (MP 56% e NJ 58%). Porém, *A.*

*elegantissimum* difere das demais pelos poros pequenos (5-7 por mm). Embora *A. partitum* e *A. paraelegantissimum* assemelhem-se por possuírem poros grandes (1-5 por mm), a presença de medas (microestruturas estéreis presentes no himênio) em *A. partitum* é o caráter que confirma a distinção filogenética entre essas duas espécies. *Amauroderma elegantissimum* é macro- e microscopicamente similar a *A. paraelegantissimum*, compartilhando basidiosporos com a mesma morfologia, mas diferindo pelo tamanho dos poros.

Observaram-se ainda agrupamentos formados por espécimes de *A. praetervisum*, *A. calcigenum* e *A. aurantiacum* (clado E com MP 80%; NJ 65%) e por espécimes de *A. sessile* e *A. lacatostipitatum* (clado F com MP e NJ 100%). *Amauroderma praetervisum* diferencia-se pela presença de basidioma firme, píleo acinzentado, contexto com duas linhas negras, poros pequenos e basidiosporos subglobosos ( $9-11 \times 7-9 \mu\text{m}$ ) e finamente ornamentados, enquanto *A. calcigenum* e *A. aurantiacum* apresentam basidioma esponjoso, píleo avermelhado, contexto sem linhas negras, poros grandes (1-2 por mm) e basidiosporos subglobosos. *Amauroderma sessile* e *A. lacatostipitatum* diferenciam-se pela presença de basidioma subestipitado e estipe lacado, respectivamente. Características do estipe, bem como presença ou ausência, não apresentam um significado especial para a descrição das espécies no gênero segundo Furtado (1981). No entanto, essas características também se mostraram relevantes na distinção dessas espécies em relação às demais dentro do gênero.



**Fig. 1.** Reconstrução filogenética de *Amauroderma* obtida pelo alinhamento de 370 nucleotídeos das regiões ITS I e II. Valores de bootstrap (em %) foram gerados e somente valores acima de 50% são apresentados. A árvore de máxima parcimônia apresentou índice de consistência = 0.6596 e índice de retenção = 0.8453.



Todas as espécies, novas ou anteriormente descritas, foram bem delimitadas por dados morfológicos, os quais foram bem sustentados pela análise filogenética a partir de dados moleculares. Este estudo constitui a primeira abordagem filogenética de *Amauroderma* para os Neotrópicos e comprove a hipótese que *Amauroderma* é um grupo monofilético bem delimitado.

### Espécies de *Amauroderma* para a Amazônia brasileira

1. *Amauroderma allostipitatum* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
2. *Amauroderma aurantiacum* (Torrend) Gibertoni & Bernicchia
3. *Amauroderma calcigenum* (Berk.) Torrend
4. *Amauroderma camerarium* (Berk.) J.S. Furtado
5. *Amauroderma elegantissimum* Ryvarde & Iturr.
6. *Amauroderma exile* (Berk.) Torrend
7. *Amauroderma floriforme* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
8. *Amauroderma intermedium* (Bres. & Pat.) Torrend
9. *Amauroderma laccatostiptatum* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
10. *Amauroderma limoniforme* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
11. *Amauroderma minimum* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
12. *Amauroderma omphalodes* (Berk.) Torrend
13. *Amauroderma ovisporum* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
14. *Amauroderma paraelegantissimum* Gomes–silva, Ryvarde & Gibertoni **sp. nov.**
15. *Amauroderma partitum* (Berk.) Wakef.
16. *Amauroderma praetervisum* (Pat.) Torrend
17. *Amauroderma schomburgkii* (Mont. & Berk.) Torrend
18. *Amauroderma sessile* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
19. *Amauroderma sprucei* (Pat.) Torrend
20. *Amauroderma subsessile* Gomes–Silva, Ryvarde & Gibertoni **sp. nov.**
21. *Amauroderma trichodematum* J.S. Furtado

### Chave para as espécies de *Amauroderma* na Amazônia brasileira

- |  |                   |
|--|-------------------|
| 1 Basidioma séssil a subestipitado .....   | 2                 |
| 1* Basidioma distintamente estipitado .....  | 3                 |
| 2 Basidioma séssil, superfície abhimental azonada com uma cutícula preta na base, poros angulares, 6–7 por mm, dissepimento lacerado, basidiosporos subglobosos a globosos, 11–14 × 10–13 µm ..... | <i>A. sessile</i> |

2* Basidioma subestipitado, superfície abhimenial fortemente zonada sem uma cutícula na preta base, poros circulares, 6–7 por mm, dissepimento inteiro, basidiosporos globosos, 9–10 × 8–9 µm .....	<i>A. subsessile</i>
3 Basidioma com estipe lacado .....	<i>A. laccatostipitatum</i>
3* Basidioma sem estipe lacado .....	4
4 Basidioma com estipe esbranquiçado .....	<i>A. albstipitatum</i>
4* Basidioma com estipe com diferentes colorações.....	5
5 Poros 1–3 por mm.....	6
5* Poros 4–8 por mm.....	9
6 Basidioma espesso, esponjoso .....	7
6* Basidioma fino, rígido.....	8
7 Basidiosporos globosos a subglobosos, com endospório distintamente ornamentado, 13–16 × 12–15 µm, medas ausentes .....	<i>A. aurantiacum</i>
7* Basidiosporos elipsóides, endospório finamente ornamentado, (12–) 13–15 × 9–12 µm, medas presentes. ....	<i>A. calcigenum</i>
8 Superfície abhimenial vinácea, basidiosporos, 10–13 × 7–9,5(–10) µm, medas presentes.	<i>A. partitum</i>
8* Superfície abhimenial marrom vináceo, basidiosporos, 11–12 × 7–9 µm, medas ausentes .....	<i>A. paraelegantissimum</i>
9 Superfície abhimenial velutinea a tomentosa, alternando com zonas glabras .....	<i>A. trichodermatum</i>
9* Superfície abhimenial glabra a finamente velutina.....	10
10 Superfície abhimenial brilhosa e glabra.....	11
10* Superfície abhimenial opaca e finamente velutínea.....	13
11 Basidioma com píleos agrupados (2–9 píleos) a partir de um estipe, superfície abhimenial marrom avermelhada, poros angulares, 4–5 por mm .....	<i>A. floriforme</i>
11* Basidioma com píleo a partir de um estipe, superfície abhimenial marrom a acinzentada, poros angulares, 5–7 por mm .....	12
12 Superfície himenial marrom claro, basidiosporos globosos 7–10 µm de diâmetro, endospório distintamente ornamentado .....	<i>A. exile</i>
12* Superfície himenial acinzentada, basidiosporos oblongos–elipsóides, 12–15 (–16) × 8–10 µm, endospório finamente ornamentado.....	<i>A. elegantissimum</i>
13 Contexto sem linha preta .....	14
13* Contexto com duas linhas pretas .....	16

- 14 Superfície abhimenial preta, contexto creme, basidiosporos elipsóides a oblongos, 13–16 × 9–10 µm, endospório distintamente ornamentado .....*A. ovisporum*
- 14\* Superfície abhimenial marrom a marrom amarelada, contexto marrom amarelado a branco, basidiosporos globosos a elipsóides, menores que 13 µm de comprimento, endospório finamente ornamentado..... 15
- 15 Superfície abhimenial marrom amarelada, poros circulares, 5–6 (–7) por mm, creme, contexto marrom amarelado, basidiosporos subglobosos a elipsóides, 11–13 (–14) × 9–12 µm .....*A. camerarium*
- 15\* Superfície abhimenial marrom, poros angulares, 5-7 por mm, branca a alaranjada, contexto branco, basidiosporos globosos, 8 × 10 µm de diâmetro .....*A. sprucei*
- 16 Basidiosporos elipsóides a limoniformes, maiores que 13 µm de comprimento..... 17
- 16\* Basidiosporos globosos a subglobosos, menores que 13 µm de comprimento ..... 18
- 17 Basidioma até 12 cm de altura, superfície abhimenial preta, poros circulares a angulares, cinza pálidos, 4-5 por mm, contexto creme, basidiosporos limoniformes, 13–15 × 10–12 µm, endospório finamente ornamentado .....*A. limoniforme*
- 17\* Basidioma até 6,2 cm de altura, superfície abhimenial marrom, poros circulares, marrom acinzentado a marrom, 6–7 (–8) por mm, contexto marrom, basidiosporos elipsóides, (13–) 14–15 (–16) × 9–10 µm, endospório distintamente ornamentado .....*A. minimum*
- 18 Basidioma preto acinzentado ..... 19
- 18\* Basidioma marrom..... 20
- 19 Basidioma com píleo até 0,5 mm de espessura, poros angulares, 2–4 por mm, basidiosporos subglobosos, 9–11 × 7–9 µm ..... *A. intermedium*
- 19\* Basidioma com píleo até 1,2 cm de espessura, poros circulares, 4–6 por mm, basidiosporos subglobosos a globosos, 9–12 × 9–11 µm ..... *A. praetervisum*
- 20 Superfície abhimenial marrom amarelada, contexto marrom amarelado, poros angulares, 4–6 por mm, basidiosporos subglobosos a globosos, amarelos, 10–13 × 9–12 µm ..... *A. omphalodes*
- 20\* Superfície abhimenial marrom, contexto marrom, poros circulares, 4–5 por mm, basidiosporos globosos, marrom, 7–9 (–10) µm de diâmetro.....*A. schomburgkii*

### *Taxonomia*

**1. *Amauroderma albstipitatum*** Gomes–Silva, Ryvarden & Gibertoni **sp. nov.** (Fig 2)

MycoBank: a ser depositada

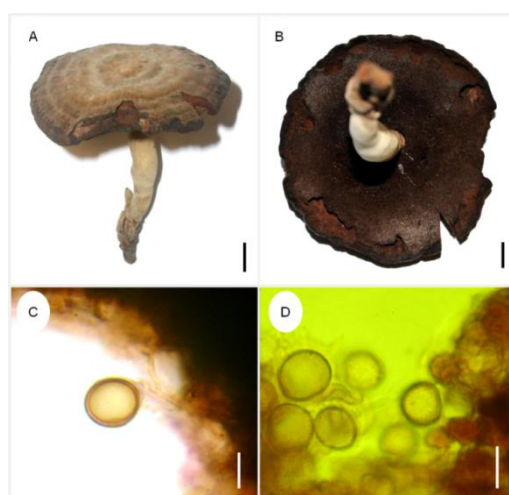
*Etimologia:* album (Latim) = branco; stipes (Latim) = pé; referindo-se ao estipe branco.

*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Fazenda Mucuí, madeira em decomposição, Jul.2007, A. C. Gomes–Silva 102 (URM).

*Basidioma* anual, solitário, centralmente estipitado. *Píleo* solitário, circular, plano, 3,5–7,5 cm largura, 3–7 cm comprimento e 0,5–0,11 mm espessura total, leve e rígido quando seco. *Superfície abhimental* opaca, glabra a levemente velutínea, concentricamente zonada e radialmente sulcada quando seca, marrom (Cigar brown 16, Snuff brown 17, Clay buff 32) quando seco, com seções com uma fina cutícula preta. *Margem* aguda a levemente obtusa, inteira, levemente ondulada, da mesma cor que a superfície abhimental. *Superfície himental* poróide, poros circulares, 4–5(–6) por mm, invisíveis a olho nu, superfície marrom (Cigar brown 16, Snuff brown 17), dissepimento inteiro e fino. *Contexto* homogêneo, esponjoso, aproximadamente 0,2–0,5 mm de espessura, marrom (Cigar brown 16). *Tubos* com a coloração de acordo com a superfície himental, aproximadamente 0,3–0,6 mm de profundidade, dissepimento fino e inteiro. *Estipe* centralmente inserido no píleo, cilíndrico, sólido, 7–8 cm de comprimento, 0,2–0,12 mm de diâmetro, esbranquiçado (White 84), opaco, glabro a levemente velutíneo, com fina cutícula, contexto do estipe homogêneo, esponjoso, marrom (Snuff brown 17). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3,5  $\mu\text{m}$  de diâmetro; hifas esqueléteas hialinas, parede espessa a sólida, arboriformes, 3–5  $\mu\text{m}$  de diâmetro, levemente dextrinóide. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* subglobosos, amarelos em KOH, parede espessa, endospório finamente ornamentado, usualmente com gutúla, 10–12  $\times$  8–9  $\mu\text{m}$ .

*Substrato*: Madeira em decomposição.

*Distribuição*: Brasil.



**Fig. 2.** *Amauroderma albostipitatum* (Holótipo) – A. Basidioma. – B. Superfície himental. – C. Basidiosporos em MO. – D. Basidiosporos em MO com reagente de Melzer. – Escala: A–B = 1 cm; C–D = 10  $\mu\text{m}$ .

*Material examinado:* BRASIL, Rondônia, Porto Velho, Fazenda Mucuim, madeira em decomposição, Jul.2007, A. C. Gomes–Silva 102 (**Holótipo:** URM; **Isótipo:** O); A. C. Gomes–Silva 97 (URM); Estação Ecológica de Cuniã, madeira em decomposição, Fev.2011, A. C. Gomes–Silva 2187 (URM); Jul.2008, A. C. Gomes–Silva 392 (URM). Roraima, Boa Vista, Estrada Boa Vista–Venezuela, solo, Dez.1977, I. Araújo *et al.* 755 (INPA 78474, como *A. praetervisum*).

*Comentários:* *Amauroderma allostipitatum* é caracterizada por basidiomas com píleo marrom, fortemente zonado, poros marrom escuro, pequenos [4–5 (–6) por mm], estipe esbranquiçado e basidiosporos subglobosos (10–12 × 8–9 µm). A presença do estipe esbranquiçado a diferencia das demais espécies de *Amauroderma* (Furtado, 1981; Ryvardeen, 2004).

**2. *Amauroderma aurantiacum*** (Torrend) Gibertoni & Bernicchia, Mycotaxon 104: 322 (2008). (Fig 3)

≡ *Ganoderma aurantiacum* Torrend, Iconogr. Mycol. 22: 1007 (1932).

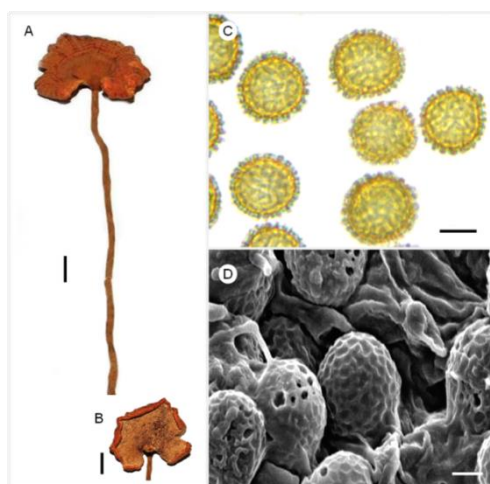
*Basidioma* anual, solitário, central a lateralmente estipitado. *Píleo* solitário, semicircular, levemente unglado e infundibuliforme, 3,5 cm largura, 3 cm comprimento, 0,5 mm espessura total, esponjoso quando seco. *Superfície abhimenial* levemente brilhante, mas sem aparência lacada, glabra a levemente velutínea, concentricamente zonada, radialmente sulcada, alaranjada (Sienna 11). *Margem* levemente obtusa, inteira a ondulada, levemente involuta quando seca, concolor com a superfície himenial. *Superfície himenial* poróide, poros angulares a radialmente alongados, 1–2 por mm, superfície amarela (C3) a marrom pálida (Buff 52), dissepimento inteiro a lacerado, fino. *Contexto* com uma linha preta originária do estipe, esponjoso, muito fino, aproximadamente 0,1 mm de espessura, marrom–amarelado pálido (D4). *Tubos* com a coloração de acordo com o contexto, aproximadamente 0,4 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, tubular, 14 cm de comprimento, 0,2 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro a levemente velutíneo, contexto do estipe com duas linhas pretas, marrom–amarelado pálido (D4). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–4 µm de diâmetro; hifas esqueléteas amarelo pálido, arboriformes, 3–6 µm de diâmetro. *Basídios* subclavados, hialinos, parede fina, tetraesporados, 30–50 × 10–20 µm. *Medas* ausentes. *Basidiosporos* subglobosos a globosos, amarelos a marrons em KOH, com endospório distintamente ornamentado, 13–16 × 12–15 µm.

*Substrato:* Solo.

*Distribuição:* Brasil e Venezuela (Ryvardeen, 2004; Gibertoni *et al.*, 2008); no Brasil, conhecida para o Pará e Rondônia (Gomes–Silva e Gibertoni, 2009), Paraná, São Paulo, Sergipe (Baltazar e Gibertoni, 2009) e Goiás (Gugliotta *et al.*, 2010).

*Material examinado:* BRASIL, Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, Fev. 2007, A.C. Gomes–Silva (URM 78847, URM 78848); Jul. 2007, A.C. Gomes–Silva (URM 78849, URM 78850); Goiás, loc. n. det., 1927, Torrend s.n. (TR 5332, como *Ganoderma aurantiacum*, holótipo).

*Comentários:* O basidioma alaranjado, levemente esponjoso e basidiosporos subglobosos a globosos (13–16 × 12–15 µm) com o endospório distintamente ornamentado caracterizam *A. aurantiacum*. Esta espécie é macroscopicamente similar a *A. calcigenum* (Berk.) Torrend, da qual difere devido à cor do basidioma, ausência de medas, forma e tamanho dos basidiosporos. *Amauroderma aurantiacum* foi proposta recentemente por Gibertoni *et al.* (2008) que, ao realizar a revisão da coleção dos fungos poliporóides de Bresadola depositados em TR, descobriu seu holótipo e, a partir de análise, propôs essa nova combinação.



**Fig. 3.** *Amauroderma aurantiacum* – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A–B = 1 cm; C = 10 µm; D = 5 µm.

**3. *Amauroderma calcigenum*** (Berk.) Torrend, Broteria, ser. bot. 13: 129 (1920). (Fig. 4)

≡ *Polyporus calcigenus* Berk., J. Bot., London 2: 636 (1843).

*Basidioma* anual, solitário, central a lateralmente estipitado. *Pileo* solitário, circular a semicircular, infudibuliforme, 3–5 cm largura, 4–4,5 cm comprimento e 0,5–12 mm espessura total, levemente esponjoso quando seco. *Superfície abhimenial* brilhante, mas sem a aparência lacada, glabra a levemente velutínea, concentricamente zonada, levemente sulcada radialmente quando seca, marrom avermelhada (Umber 18) em espécimes jovens e marrom (Cigar brown 16) em espécimes velhos, quando secos, com seções com uma fina cutícula preta. *Margem* obtusa, inteira, involuta quando seca em espécimes jovens, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros angulares, 1–2 (–3) por mm, decorrentes próximo à margem, superfície marrom clara (Fulvous 12) a marrom (Snuff brown 17), dissepimento inteiro a lacerado, fino.

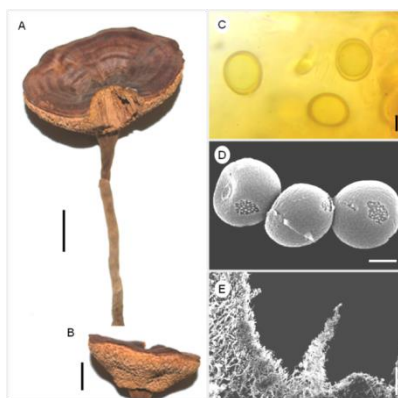
*Contexto* homogêneo, levemente esponjoso, fino, aproximadamente 0,2–0,4 mm de espessura, marrom pálido (Fulvous 12) a amarelo (Buff 52). *Tubos* com a coloração de acordo com a superfície himenial, aproximadamente 0,5–10 mm de profundidade, dissepimento fino, inteiro. *Estipe* centralmente a lateralmente inserido no píleo, cilíndrico, sólido ou tubular, usualmente ramificado no ápice, originando píleos solitários ou agrupados, 6–10 cm de comprimento, 0,2–0,4 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe com duas linhas negras até o ápice do estipe, contexto mais firme do que píleo, amarelo (Buff 52) a marrom claro (Clay buff 32). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3,5 µm de diâmetro; hifas esqueléteas hialinas, parede espessa, arboriformes, 3–5 µm de diâmetro, levemente dextrinóide, cutícula do estipe e píleo formada por hifas esqueléteas sem estruturas distintas. *Basídios* não observados. *Medas* presentes, abundantes, cônicas, amarelas, 80–130 µm de comprimento e 20–60 µm de largura. *Basidiosporos* elipsóides, amarelos em KOH, parede espessa, endospório finamente ornamentado, com gutúla, (12–) 13–15 × 9–12 µm.

*Substrato*: Solo.

*Distribuição*: Brasil, Venezuela e Guiana (Ryvarden, 2004); no Brasil, conhecida para a Amazonas, Bahia, Goiás, Mato Grosso, Pará, Rio de Janeiro, Rio Grande do Sul, São Paulo, Santa Catarina, Sergipe (Gugliotta *et al.*, 2010) e Rondônia (Gomes–Silva *et al.*, 2010).

*Material examinado*: BRASIL, Pará, Oriximiná, estrada de Oriximiná–Óbidos, Jun.1980, V.L. Bononi (INPA 103310); Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, Jul. 2007, A.C. Gomes–Silva (URM 78886, URM 78887, URM 78888, URM 78889, URM 78890, URM 78891); Jun. 2009, A. C. Gomes–Silva (URM 81053); Estação Ecológica de Cuniã, Fev. 2007, A. C. Gomes–Silva (URM 79509); Jul. 2007, A. C. Gomes–Silva (URM 78893); Fev. 2008, A. C. Gomes–Silva (URM 79145); Jul. 2008, A. C. Gomes–Silva (URM 79449); Fev. 2011, A. C. Gomes–Silva *et al.* (URM 82777, URM 82778).

*Comentários*: Espécie caracterizada pelo basidioma levemente esponjoso, superfície abhimenial marrom avermelhada brilhante, poros angulares largos (1–2 por mm), medas abundantes, basidiosporos elipsóides [(12–) 13–15 × 9–12 µm] e com endospório finamente ornamentado. Compartilha as mesmas características macroscópicas com *A. aurantiacum*, da qual difere pela forma e tamanho dos basidiosporos subglobosos (13–16 × 12–15 µm) e distintamente ornamentados e elipsóides (12–) 13–15 × 9–12 µm e finamente ornamentado em *A. calcigenum*.



**Fig. 4.** *Amauroderma calcigenum* – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em MO. – D. Basidiosporos em MEV. – E. Medas. – Escala: A–B = 1 cm; C = 5  $\mu$ m; D = 5  $\mu$ m; E = 100  $\mu$ m.

*Amauroderma partitum* é considerada sinônimo de *A. calcigenum* (Furtado, 1981; Ryvardeen, 2004; www.indexfungorum.org). Entretanto, Gomes–Silva *et al.* (2010) as consideram espécies distintas com base nas características macro– e micromorfológicas. *Amauroderma partitum* possui basidioma frágil e basidiosporos menores 10–13  $\times$  7–9,5 (–10), enquanto em *A. calcigenum* o basidioma é robusto e os basidiosporos maiores (11–) 12–15  $\times$  9–12  $\mu$ m.

**4. *Amauroderma camerarium*** (Berk.) J.S. Furtado, Revisão do gênero *Amauroderma* (*Polyporaceae*); Estudos baseados nas microestruturas do basidiocarpo: 140 (1968). (Fig 5)

≡ *Polyporus camerarius* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 143 (1856).

*Basidioma* anual, solitário, central a lateralmente estipitado. *Píleo* simples, circular a semicircular, convexo, levemente infudibuliforme, 5–7,5 cm largura, 3,4–4,5 cm comprimento e 0,4–0,6 mm espessura total, rígido quando seco. *Superfície abhimenial* opaca, glabra, concentricamente zonada, radialmente sulcada quando seca, marrom–amarelado (Buff 52), com seções com uma fina cutícula preta. *Margem* aguda, inteira, levemente involuta quando seca, da mesma cor que a superfície abhimenial. *Superfície himenial* poróide, poros circulares, 5–6 (–7) por mm, invisíveis a olho nu, creme (C3), dissepimento inteiro, fino. *Contexto* homogêneo, fibroso, fino, aproximadamente 0,3 mm de espessura, marrom–amarelado (Buff 52). *Tubos* concolor com a superfície himenial, finos, aproximadamente 0,4 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, sólido, 9–13 cm de comprimento, 0,4–0,5 mm de diâmetro, marrom (Fulvous 12), opaco, glabro, com uma fina cutícula, contexto do estipe homogêneo, fibroso, creme (C3). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3  $\mu$ m de diâmetro; hifas esqueléteas hialinas, parede espessa,



arboriformes, 4–7  $\mu\text{m}$  de diâmetro, dextrinóide, cutícula do estipe e píleo formada por hifas aglutinadas sem formar uma estrutura distinta. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* subglobosos a elipsóides, amarelados em KOH, parede espessa, endosporio distintamente ornamentado, 11–13 (–14)  $\times$  9–12  $\mu\text{m}$ .

*Substrato*: Solo.

*Distribuição*: Brasil, Colômbia, Peru e Belize (Furtado, 1981; Ryvar den, 2004); no Brasil conhecida para o Paraná (Baltazar e Gibertoni, 2009), Amazonas, Bahia, Mato Grosso, Pará Pernambuco, Rio Grande do Sul e Santa Catarina (Gugliotta *et al.*, 2010).

*Material examinado*: BRASIL, Pará, Melgaço, Estação Científica Ferreira Penna, Mar.2007, T. B. Gibertoni (URM 79317).

*Comentários*: O basidioma marrom amarelado, poros circulares, 5–6 por mm, contexto amarelo pálido, basidiosporos subglobosos a elipsóides grandes [11–13 (–14)  $\times$  9–12  $\mu\text{m}$ ] e distintamente ornamentados, caracterizam *A. camerarium*. Ryvar den (2004) relata que as hifas esqueléteas dextrinóides e os basidiosporos largos são características distintivas da espécie. Segundo Furtado (1981), esta espécie apresenta grande variação morfológica. *Amauroderma omphalodes* é similar, mas diferencia-se pelo contexto com duas linhas pretas, poros angulares (4–6 por mm) e basidiosporos subglobosos a globosos, 10–13  $\times$  9–12  $\mu\text{m}$  e distintamente ornamentados nesta. *Amauroderma camerarium* é relatada como parasita (Ryvar den, 2004).



**Fig. 5.** *Amauroderma camerarium* – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em MO. Escala: A–B = 1 cm; C = 5  $\mu\text{m}$ .

**5. *Amauroderma elegantissimum*** Ryvar den & Iturr., in Ryvar den, Syn. Fung. (Oslo) 19: 54 (2004). (Fig. 6)

*Basidioma* anual, solitário, central a lateralmente estipitado. *Píleo* simples, circular a semicircular, levemente infudibuliforme, 3–4,5 cm largura, 2,5–3 cm comprimento e 0,1–0,2 mm

espessura total, flexível e frágil quando seco. *Superfície abhimenial* brilhante, mas sem a aparência lacada, glabra a levemente velutínea, concentricamente zonada, levemente sulcada radialmente quando seca, marrom vináceo (Brown vinaceous 25, Purplish chestnut 21), com seções com fina cutícula preta. *Margem* aguda, inteira, levemente ondulada, involuta quando seca, da mesma cor que a superfície abhimenial. *Superfície himenial* poróide, poros angulares, 5–7 por mm, invisíveis a olho nu, superfície cinza (Smoke gray 34), dissepimento inteiro, fino. *Contexto* homogêneo, levemente fibroso, muito fino, aproximadamente 0,05 mm de espessura, marrom (Snuff brown 17). *Tubos* concolor com a superfície himenial, muito fino, aproximadamente 0,05 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, sólido, 14 cm de comprimento, 0,1 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe sem linhas negras distintas, marrom (Cigar brown 16) na região periférica e marrom pálido (Buff 52) no centro. *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–4 µm de diâmetro; hifas esqueléteas hialinas a marrom pálido, parede espessa, arboriformes, 4–6 µm de diâmetro, dextrinóide, cutícula do estipe e píleo formada por hifas esqueléteas sem estruturas distintas. *Basídios* clavados, 20–25 × 12–15 µm, tetraesporados (Ryvarden, 2004). *Medas* ausentes. *Basidiosporos* oblongos–elipsóides, hialinos a amarelados em KOH, parede espessa, endospório finamente ornamentado, gutulados, 12–15 (–16) × 8–10 µm.

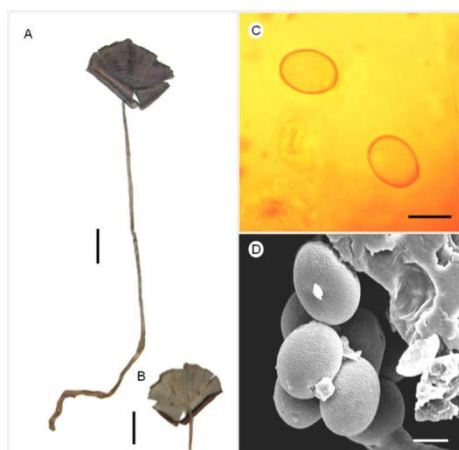
*Substrato*: Solo.

*Distribuição*: Brasil, Guiana e Venezuela (Ryvarden, 2004); no Brasil conhecida para Roraima (Gugliotta *et al.*, 2010). Este representa o primeiro registro para o Pará e Rondônia e o segundo para o Brasil.

*Material examinado*: BRASIL, Pará, Melgaço, Estação Científica Ferreira Penna, Mar. 2007, T. B. Gibertoni (URM 79295, URM 79298, URM 79297, URM 79296, URM 79299; Fev. 2008, T. B. Gibertoni (URM 79301, URM 79303, URM 79300, URM 79302, URM 79304, URM 79305); Rondônia, Porto Velho, Estação Ecológica de Cuniã, Fev.2007, A. C. Gomes–Silva (URM 79450); Fev.2008, A. C. Gomes–Silva (URM 79157, URM 79160, URM 79158); Fev.2011, A. C. Gomes–Silva *et al.* (URM 82787, URM 82788, URM 82789); Parque Natural Municipal de Porto Velho, Fev.2008, A. C. Gomes–Silva (URM 79149); Fev.2011, A. C. Gomes–Silva *et al.* (URM 82790); Roraima, Alto Alegre, Jun. 1986, K. F. Rodrigues *et al.* (INPA 143378, como *A. sprucei*).

*Comentários*: O basidioma marrom vináceo com longo estipe fino, poros pequenos (5–7 por mm), basidiosporos oblongo–elipsóides (12–15 × 8–10 µm), finamente ornamentados, caracterizam *A. elegantissimum*. *Amauroderma paraelegantissimum* e *A. exile* são muito similares macro– e microscopicamente a *A. elegantissimum*, diferindo pelo tamanho dos poros, 2–3 por mm em *A.*

*paraelegantissimum* e 5–7 por mm em *A. elegantissimum* e pela morfologia dos basidiosporos – globosos (7–10 µm em *A. exile*) e oblongo-elipsóides (12–15 × 8–10 µm em *A. elegantissimum*).



**Fig. 6.** *Amauroderma elegantissimum* – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A–B = 1 cm; C = 5 µm; D = 5 µm.

**6. *Amauroderma exile*** (Berk.) Torrend, Broteria, ser. bot. 18: 142 (1920).

(Fig 7)

≡ *Polyporus exilis* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 173 (1856).

*Basidioma* anual, solitário a agregado, central a lateralmente estipitado. *Píleo* solitário, circular a semicircular, infundibuliforme, 5–8 cm de largura, 6–8 cm comprimento, 0,1–0,2 mm de espessura total, flexível quando seco. *Superfície abhimenial* brilhante, mas sem a aparência lacada, glabra a levemente velutínea, concentricamente zonada e radialmente sulcada quando seca, marrom avermelhada (Purplish date 22, Date brown 24) a marrom vináceo (Brown vinaceous 25), com seções com uma fina cutícula preta. *Margem* aguda, inteira, involuta e levemente ondulada quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros angulares, 5–7 por mm, superfície cinza (D4, Smoke gray 34) em espécimes jovens e frescos, marrom clara (Clay buff 32) em espécimes velhos quando seco, dissepimento inteiro, fino. *Contexto* com duas linhas pretas originárias do estipe, fino, aproximadamente 0,1 mm de espessura, marrom (Snuff brown 17), tornando-se mais escuro com a idade. *Tubos* concolor com a superfície himenial, fino, aproximadamente 0,1 mm de profundidade, dissepimento fino, inteiro. *Estipe* centralmente a lateralmente inserido no píleo, cilíndrico, 15–25 cm de comprimento, 0,3–0,5 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe com duas linhas pretas, creme (B2) a marrom claro (Fulvous 12). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–4 µm de diâmetro; hifas esqueléteas amarelo pálido, parede espessa, arboriformes, 2–6 µm de diâmetro, fortemente dextrinóide, cutícula do píleo e do estipe composta por hifas aglutinadas sem qualquer estrutura

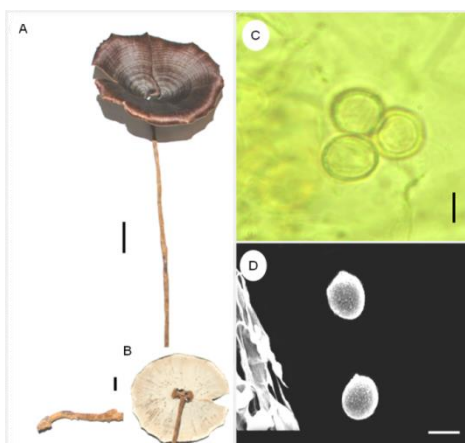
distinta. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* globosos, hialinos a amarelo pálido em KOH, parede espessa, endospório finamente ornamentado, com gutúla, 7–10 µm de diâmetro.

*Substrato*: Solo.

*Distribuição*: Brasil, Colômbia, Venezuela e Honduras (Furtado, 1981; Ryvarden, 2004); no Brasil, conhecida para Amazonas, Bahia, Pará, Pernambuco, Rio de Janeiro, Rio Grande do Sul e São Paulo (Gugliotta *et al.*, 2010). Representa o primeiro registro para o estado de Rondônia.

*Material examinado*: BRASIL, Amazonas, Manaus, Distrito Agropecuário da Suframa BR 174, Out.1085, K.F. Rodrigues (INPA 137055, como *Polyporus* sp.); Pará, Oriximinã, Jun. 1980, V.L.R. Bononi (INPA 103546, INPA 103608, como *Polyporus* sp.); Melgaço, Estação Científica Ferreira Penna, Jul. 2006, T.B. Gibertoni (URM 79328, URM 79331, URM 79338, URM 79334, URM 79337, URM 79330, URM 79332, URM 79335, URM 79340, URM 79336, URM 79329); Mar. 2007 (URM 79339, URM 79333); Ago. 2007 (URM 79344, URM 79341, URM 79342, URM 79343, URM 79346, URM 79347, URM 79345); Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, Jun. 2007, A. C. Gomes–Silva (URM 79452, URM 79453, URM 79454); Fev. 2008 (URM 79150, URM 79154, URM 79152, URM 79151, URM 79156, URM 79161, URM 79146, URM 79148, URM 79162, URM 79159); Fev. 2011, A. C. Gomes–Silva *et al.* (URM 82791, URM 82792, URM 82793, URM 82794, URM 82795); Fazenda Mucuí, Jul. 2007, A. C. Gomes–Silva (URM 79147, URM 79451); Estação Ecológica de Cuniã, Jul. 2008, A. C. Gomes–Silva (URM 79455).

*Comentários*: *Amauroderma exile* é caracterizado pelo basidioma marrom vináceo, com longo estipe fino e basidiosporos globosos e gutulados (7–10 µm de diâmetro) com endospório finamente ornamentado. *Amauroderma exile* é semelhante macroscopicamente a *A. elegantissimum* e *A. paraelegantissimum*, das quais difere pela forma e tamanho dos basidiósporos: globosos, 7–10 µm de diâmetro, em *A. exile* e oblongos–elipsóides em *A. elegantissimum* e *A. paraelegantissimum* (12–15 × 8–10 µm e 11–12 × 7–9 µm, respectivamente). Além disto, o tamanho dos poros distingue *A. exile* e *A. paraelegantissimum* (2–3 e 7–10 por mm, respectivamente).



**Fig. 7.** *Amauroderma exile* – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A–B = 1 cm; C = 5 µm; D = 5 µm.

**7. *Amauroderma floriforme*** Gomes–Silva, Ryvardeen & Gibertoni **sp. nov.** (Fig 8)

MycoBank: a ser depositada

*Etimologia:* flos (Latim) = flor; forma (Latim) = forma, referindo-se ao basidioma em forma de flor.

*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, solo, Fev.2009, A.C. Gomes-Silva 284 (URM).

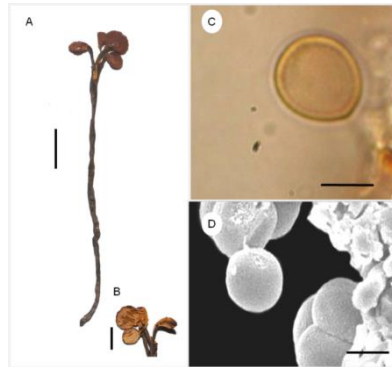
*Basidioma* anual, solitário a agregado, lateralmente estipitado. *Píleo* solitário a multipileado (2–9 píleos por estipe), semicircular, plano, 0,2–0,6 cm largura, 0,3–0,5 cm comprimento e 0,1 mm espessura total, frágil quando seco. *Superfície abhimenial* opaca a levemente brilhante, mas sem a aparência lacada, glabra a levemente velutínea, levemente zonada concentricamente e levemente sulcada radialmente quando seca, marrom avermelhado (Bay 19) quando seca. *Margem* aguda, inteira, levemente involuta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros angulares, 4–5(–6) por mm, superfície marrom (Snuff brown 17), dissepimento inteiro, fino. *Contexto* homogêneo, fibroso, fino, aproximadamente 0,05 mm de espessura, marrom (Snuff brown 17). *Tubos* concolor com a superfície himenial, aproximadamente 0,05 mm de profundidade, dissepimento fino, inteiro. *Estipe* lateralmente inserido no píleo, cilíndrico, sólido, ramificado no ápice, originando píleos solitários ou agrupados, 3,5–6,5 cm de comprimento, 0,1–0,2 mm de diâmetro, marrom (Snuff brown 17) a preto (Fuscous black 36), opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe homogêneo, fibroso, marrom (Snuff brown 17). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3,5 µm de diâmetro; hifas esqueléteas hialinas, parede espessa, arboriformes, 3–4 µm de diâmetro, levemente a distintamente dextrinóide. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* globosos, hialinos a amarelados em KOH, parede espessa, endospório ornamentado, usualmente gutulado, 8–10 × 8–9,5 µm.

*Substrato:* Solo.

*Distribuição:* Brasil.

*Material examinado:* BRASIL, Pará, Melgaço, Estação Científica Ferreira Penna, solo, Mar.2009, T. B. Gibertoni 102 (URM); Cachoeira Porteira, INPA, solo, Jun.1980, V.L. Bononi s.n (SP 193882, como *A. omphalodes*); Ago.1980, V.L. Bononi 729 [SP 193391, como *A. chaperi* (Pat.) Murrill]; Oriximiná, solo, Jun.1980, V.L. Bononi 606 (SP 193620, como *A. omphalodes*); Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, solo, Fev.2009, A.C. Gomes-Silva 284 (**Holótipo:** URM; **Isótipo:** O).

*Comentários:* *Amauroderma floriforme* é caracterizada por basidiomas pequenos, superfície do píleo vermelha escura, opaca, poros angulares, 4–5(–6) por mm, estipe preto e basidiosporos globosos (9–10 × 8–9,5 µm), finamente ornamentados. Macroscopicamente, esta espécie é semelhante a *A. partitum*, diferindo pelo basidioma com píleo partido, estipe longo e marrom, poros largos (1–3 por mm) e basidiosporos elipsóides a oblongos [10–13 × 7–9,5(–10) µm].



**Fig. 8.** *Amauroderma floriforme* (Holótipo). – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A = 1 cm; B = 5 mm; C = 10 µm; D = 5 µm.

**8. *Amauroderma intermedium*** (Bres. & Pat.) Torrend, Brotéria, sér. bot. 18: 128 (1920). (Fig 9)

≡ *Ganoderma intermedium* Bres. & Pat., Bull. Soc. mycol. Fr. 5(2,3): 76 (1889).

*Basidioma* anual, solitário, central a lateralmente estipitado. *Píleo* solitário, circular a semicircular, plano a convexo, 3–5 cm largura, 3,5–4,5 cm comprimento e 0,3–0,5 mm espessura total, rígido quando seco. *Superfície abhimenial* opaca, concentricamente zonada e levemente sulcada radialmente quando seca, glabra a levemente velutínea, preto acinzentado (Fuscous black 36) a marrom (Snuff brown 17), com seções com uma fina cutícula preta. *Margem* aguda, inteira, levemente involuta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros angulares, 2–4 por mm, superfície marrom clara (Fulvous 12) a creme (B2), dissepimento inteiro, fino. *Contexto* com duas linhas negras originárias do estipe, fibroso, fino, aproximadamente 0,1–0,3 mm de espessura, marrom (Cigar brown 16) a creme (B2). *Tubos* concolor com a superfície himenial, aproximadamente 0,3–0,5 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, tubular, 6–18 cm de comprimento, 0,2–0,4 mm de diâmetro, com coloração igual à da superfície abhimenial, opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe com duas linhas negras, fibroso, marrom (Snuff brown 17). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–6 µm de diâmetro; hifas esqueléteas hialinas a amareladas,

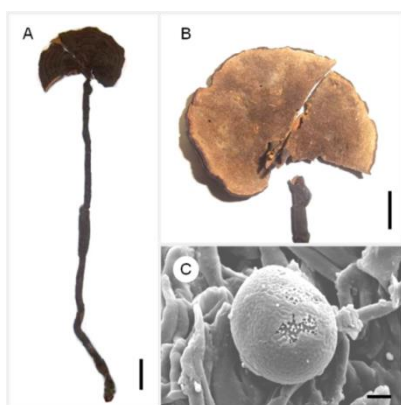
parede espessa a sólida, arboriformes, 3–7  $\mu\text{m}$  de diâmetro, levemente dextrinóide, córtex formado por pequenas células aglutinadas, mas sem formar uma paliçada. *Basídios* clavados, 20–30  $\times$  12–14  $\mu\text{m}$ , tetraesporados. *Medas* ausentes. *Basidiosporos* subgloboso, hialino a amarelo pálido em KOH, parede espessa, endospório finamente ornamentado, 9–11  $\times$  7–9  $\mu\text{m}$ .

*Substrato*: Solo.

*Distribuição*: Brasil, Paraguai e Porto Rico (Ryvarden, 2004); no Brasil, conhecida para o Amazonas (Furtado, 1981) e o Pará (Gomes–Silva e Gibertoni, 2009); este representa a primeiro registro para o estado de Rondônia.

*Material examinado*: BRASIL, Pará, Melgaço, Estação Científica Ferreira Penna, Fev.2007, T. B. Gibertoni (URM 79319, URM 79321, URM 79322, URM 79323, URM 79320, URM 79324); Fev. 2008, T. B. Gibertoni (URM 79318); Rondônia, Porto Velho, Fazenda Mucuí, Jul.2007, A. C. Gomes–Silva (URM 79163); Parque Natural Municipal de Porto Velho, Fev.2008, A. C. Gomes–Silva (URM 79458); Estação Ecológica de Cuniã, Fev.2008, A. C. Gomes–Silva (URM 79456, URM 79457); Roraima, Jul.1974, G.T. Prance *et al.* (INPA 45354, como *A. schomburgkii*).

*Comentários*: Espécie caracterizada pelo basidioma com píleo escuro, contexto com duas linhas negras e basidiosporos subglobosos finamente ornamentados (9–11  $\times$  7–9  $\mu\text{m}$ ). *Amauroderma intermedium* é considerado sinônimo de *A. rude* (Berk.) Torrend ([www.indexfungorum.org](http://www.indexfungorum.org)). Entretanto, *A. rude* é originalmente descrita para a Tasmânia e duas variedades (*A. rude* var. *rude* e *A. rude* var. *intermedium*) são descritas por Furtado (1981). O estudo do tipo se torna necessário para confirmar se essas espécies são realmente sinônimos. Baseado nas características de *A. rude* descrita por Furtado (1981), preferimos considerar as variedades como duas espécies distintas.



**Fig. 9.** *Amauroderma intermedium* – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em MEV. – Escala: A= 2 cm; B= 1 cm; C = 2  $\mu\text{m}$ .

**9. *Amauroderma laccatostipitatum* Gomes–Silva, Ryvarden & Gibertoni sp. nov.** (Fig 10)

MycoBank: a ser depositada

*Etimologia*: laccatus (Latim) = envernizado; stipes (Latim) = pé, referindo-se ao estipe lacado.

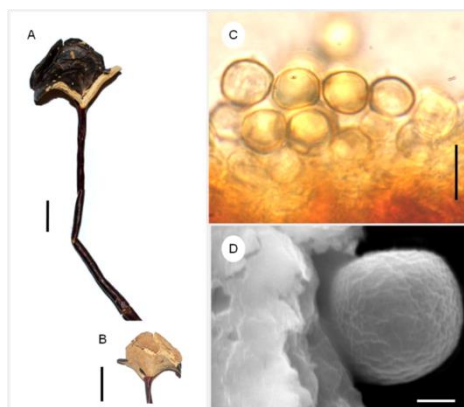
*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Estação Ecológica de Cuniã, solo, Fev.2008, A. C. Gomes–Silva 390 (URM).

*Basidioma* anual, solitário a agregado, central a lateralmente estipitado. *Píleo* solitário a agrupado, circular a semicircular, plano a levemente infudibuliforme, 1,3–3 cm largura, 1–2,5 cm comprimento e 0,1–0,3 mm espessura total, flexível e levemente esponjoso quando seco. *Superfície abhimental* levemente brilhante a opaca, glabra a levemente velutínea, concentricamente zonada em espécimes jovens, azonada em espécimes velhos e levemente sulcada radialmente, marrom escuro (Snuff brown 17) em espécimes jovem e cinza escuro (Olivaceous black 37) a preto (Violaceous black 38) em espécimes velhos, quando secos. *Margem* aguda, inteira, levemente involuta quando seca, concolor com a superfície abhimental. *Superfície himenial* poróide, poros angulares, 7–8 por mm, superfície creme (B2) a marrom pálido (Buff 52), dissepimento inteiro, fino. *Contexto* com duas linhas negras originárias do estipe, levemente esponjoso, fino, aproximadamente 0,1–0,2 mm de espessura, creme (B2). *Tubos* concolor com a superfície himenial, aproximadamente 0,1–0,2 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, sólido, levemente ramificado na parte superior originando usualmente dois píleos, 5–12 cm de comprimento, 0,3–0,5 mm de diâmetro, lacado, vermelho (Blood red 41) a preto (Fuscous black 36), brilhante, glabro, contexto do estipe levemente esponjoso, duas linhas negras, creme (B2). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 1,5–2,5  $\mu\text{m}$  de diâmetro; hifas esqueléteas hialinas a amareladas, parede espessa a sólida, arboriformes, 4–5  $\mu\text{m}$  de diâmetro, dextrinóide, cutícula do estipe com células agrupadas em paliçada. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* globosos a subglobosos, hialinos a amarelados em KOH, parede espessa, com endospório finamente ornamentado, com gutúla, 8–9 (–10)  $\times$  7–8  $\mu\text{m}$ .

*Substrato*: Solo.

*Distribuição*: Brasil.

*Material examinado*: BRASIL, Pará, Melgaço, Fev.2008, T. B. Gibertoni 260–303 (URM); Rondônia, Porto Velho, Estação Ecológica de Cuniã, Fev. 2008, A. C. Gomes–Silva 390 (**Holótipo**: URM; **Isótipo**: O); Parque Natural Municipal de Porto Velho, Fev.2008, A. C. Gomes–Silva 283 (URM); Jan. 2009, A. C. Gomes–Silva 654 (URM).





**Fig. 10.** *Amauroderma laccatostipitatum* (Holótipo) – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A–B = 1 cm; C = 10  $\mu$ m; D = 2  $\mu$ m).

*Comentários:* Espécie caracterizada pelo basidioma com píleo cinza, estipe lacado e basidiosporos globosos (8–10  $\times$  7–8  $\mu$ m) e finamente ornamentados. *Amauroderma picipes* é similar, mas diferencia-se por apresentar basidioma com píleo robusto, poros circulares, marrom, 5–6 por mm e basidiosporos globosos a subglobosos [8–11 (–12)  $\times$  7–8  $\mu$ m], enquanto *A. laccatostipitatum* apresenta basidioma com píleo delicado, poros angulares, creme, 7–8 por mm e basidiosporos globosos a subglobosos [8–9 (–10)  $\times$  7–8  $\mu$ m]. *Amauroderma renidens*, outra espécie similar, difere por apresentar basidioma com píleo lacado, mas sem o estipe lacado.

**10. *Amauroderma limoniforme*** Gomes–Silva, Ryvarden & Gibertoni **sp. nov.** (Fig 11)

MycoBank: a ser depositada

*Etimologia:* limum (Latim) = limão; forma (Latim) = forma, referindo-se a morfologia dos basidiosporos.

*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Estação Ecológica de Cuniã, madeira em decomposição, Fev.2008, A. C. Gomes–Silva 405 (URM).

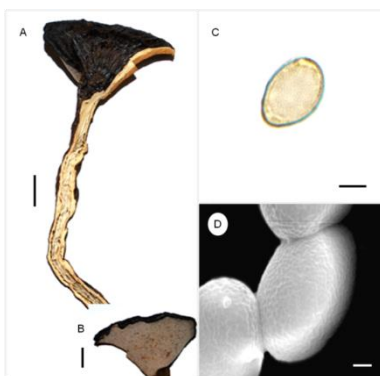
*Basidioma* anual, solitário, lateralmente estipitado. *Píleo* simples, semicircular, plano a infudibuliforme, 3,5–4 cm largura, 2,5–3,0 cm comprimento e 0,4–0,5 mm espessura total, rígido quando seco. *Superfície abhimenial* brilhante a opaca, glabra a levemente velutínea, zonada concentricamente em espécimes jovem, levemente zonada em espécimes velhos, radialmente sulcada quando seca, marrom escuro (Snuff brown 17) em espécimes jovens e preto (Fuscous black 36) em espécimes velhos quando seco. Margem aguda, inteira, levemente ondulata, levemente involuta quando seca, concolor com a superfície himenial. *Superfície himenial* poróide, poros circulares a angulares, 4–5 por mm, rasos, superfície cinza pálido (Smoke gray 34) quando seco, dissepimento inteiro e fino. *Contexto* com duas linhas pretas originárias do estipe, fibroso, fino, aproximadamente 0,1–0,3 mm de espessura, creme (B2). *Tubos* marrom (Snuff brown 17), aproximadamente 0,2–0,4 mm de profundidade, dissepimento fino, inteiro. *Estipe* lateralmente inserido no píleo, cilíndrico, tubular a sólido, 7–10,5 cm de comprimento, 0,5–0,6 mm de diâmetro, marrom (Cigar brown 16, Snuff brown 17), opaco, glabro a levemente velutíneo, levemente rugoso quando seco, em espécimes velhos, com uma fina cutícula, contexto do estipe fibroso, com duas linhas pretas, creme na parte periférica (B2). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2,5–3,5  $\mu$ m de diâmetro; hifas esqueléteas amarelas a marrom, parede espessa a sólida, arboriformes, 3–5  $\mu$ m de diâmetro, levemente dextrinóide. *Basídios* não observados. *Medas*

ausentes. *Basidiosporos* limoniformes, hialinos a amarelados em KOH, parede espessa, endospório finamente ornamentado,  $13\text{--}15 \times 10\text{--}12 \mu\text{m}$ .

*Substrato*: Madeira em decomposição.

*Distribuição*: Brasil.

*Material examinado*: BRASIL, Rondônia, Porto Velho, Estação Ecológica de Cuniã, madeira em decomposição, Fev.2008, A. C. Gomes–Silva 405 (**Holótipo**: URM; **Isótipo**: O); Pará, Melgaço, Estação Científica Ferreira Penna, Fev.2008, T.B. Gibertoni 262 (URM).



**Fig. 11.** *Amauroderma limoniforme* (Holótipo). – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A–B = 1 cm; C = 5  $\mu\text{m}$ ; D = 2  $\mu\text{m}$ .

*Comentários*: *Amauroderma limoniforme* é caracterizado pelo basidioma preto e basidiosporos limoniformes ( $13\text{--}15 \times 10\text{--}12 \mu\text{m}$ ), o que o distingue das demais espécies do gênero (Furtado, 1981; Corner, 1983; Ryvardeen, 2004).

### 11. *Amauroderma minimum* Gomes–Silva, Ryvardeen & Gibertoni **sp. nov.** (Fig 12)

MycoBank: a ser depositada

*Etimologia*: minimum (Latim) = muito pequeno, referindo-se ao tamanho do basidioma.

*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Estação Ecológica de Cuniã, solo, Fev.2011, A. C. Gomes–Silva *et al.* 2114 (URM).

*Basidioma* anual, solitário a agrupado, lateralmente estipitado. *Pileo* simples, semicircular, plano a levemente convexo, 0,8–1 cm largura, 0,6–0,8 cm comprimento e 0,1–0,2 mm espessura total, rígido quando seco. *Superfície abhimenial* opaca, glabra a levemente velutínea, levemente zonada concentricamente, levemente sulcada radialmente quando seca, marrom (Cigar brown 16, Snuff brown 17) quando seco, com seções usualmente com uma fina cutícula preta. *Margem* aguda, inteira, involuta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros circulares, 6–7 (–8) por mm, superfície marrom acinzentado (Mouse grey 35) em espécimes jovens e marrom (Snuff brown 17) em espécimes velhos, quando seco, dissepimento inteiro, espesso. *Contexto* com duas linhas originárias do estipe, fibroso, muito fino, aproximadamente 0,1

mm de espessura, marrom (Cigar brown 16). *Tubos* concolor com a superfície himenial, aproximadamente 0,1 mm de profundidade, dissepimento fino, inteiro. *Estipe* lateralmente inserido no píleo, cilíndrico, sólido, 3,5–6,5 cm de comprimento, 0,1–0,2 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe com duas linhas pretas no ápice, fibroso, marrom (Clay buff 32). Sistema hifálico dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3  $\mu\text{m}$  de diâmetro; hifas esqueléteas hialinas, parede espessa, arboriformes, 3–4  $\mu\text{m}$  de diâmetro, levemente dextrinóide, cutícula do estipe e píleo formada por hifas esqueléteas sem estruturas distintas. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* elipsóides, amarelos em KOH, parede espessa, endospório distintamente ornamentado, com gutúla, (13–)14–15 (–16)  $\times$  9–10  $\mu\text{m}$ .

*Substrato*: Solo.

*Distribuição*: Brasil.

*Material examinado*: BRASIL, Rondônia, Porto Velho, Estação Ecológica de Cuniã, Fev. 2011, A.C. Gomes–Silva *et al.* 2114 (**Holótipo**: URM; **Isótipo**: O).

*Comentários*: *Amauroderma minimum* é caracterizada por basidiomas marrons e pequenos (6,2 cm de altura), poros 6–7 por mm, contexto com duas linhas pretas, basidiosporos elipsóides (14–15  $\times$  9–10  $\mu\text{m}$ ) e distintamente ornamentados. *Amauroderma schomburgkii* é macroscopicamente similar, mas difere pelos basidiomas maiores. Microscopicamente, os basidiosporos das duas espécies são distintos, diferindo pela forma e tamanho - globosos [7–9 (–10)  $\mu\text{m}$  de diam.] em *A. schomburgkii* e elipsóides (14–15  $\times$  9–10  $\mu\text{m}$ ) em *A. minimum*.



**Fig. 12.** *Amauroderma minimum* (Holótipo). – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. Escala: A = 1 cm; B = 5 mm; C = 5  $\mu\text{m}$ .

**12. *Amauroderma omphalodes*** (Berk.) Torrend, Brotéria 18: 131 (1920). (Fig 13)  
 ≡ *Polyporus omphalodes* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 172 (1856).

*Basidioma* anual, solitário, central a lateralmente estipitado. *Píleo* simples, circular a semicircular, convexo a infudibuliforme, 3–6 cm largura, 2,5–4,5 cm comprimento e 0,3–0,4 mm

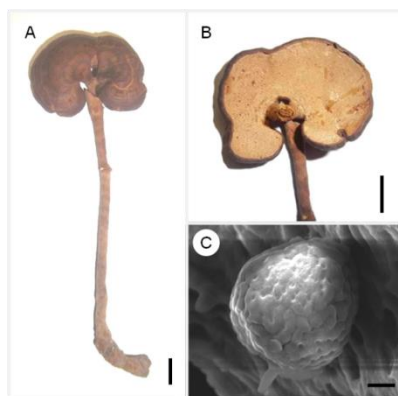
espessura total, rígido quando seco. *Superfície abhimenial* opaca, concentricamente zonada e levemente sulcada radialmente quando seca, glabra, marrom amarelada (Cigar brown 16, C3), com seções com uma fina cutícula preta. *Margem* aguda, inteira, levemente involuta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros angulares, 4–6 por mm, superfície marrom amarelada (Buff 52), dissepimento inteiro, fino. *Contexto* com duas linhas negras originárias do estipe, fibroso, fino, aproximadamente 0,1–0,3 mm de espessura, amarelo (Buff 52). *Tubos* concolor com a superfície himenial, aproximadamente 0,2–0,4 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, tubular, 6–13,5 cm de comprimento, 0,2–0,4 mm de diâmetro, com a coloração igual da superfície abhimenial, opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe com duas linhas negras, fibroso, amarelo (Buff 52). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–4 µm de diâmetro; hifas esqueléteas hialinas a amareladas, parede espessa a sólida, arboriformes, 3–6 µm de diâmetro, levemente dextrinóide, cutícula do estipe e píleo formada por hifas esqueléteas sem estruturas distintas. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* subglobosos a globosos, amarelos em KOH, parede espessa, endospório distintamente ornamentado, 10–13 × 9–12 µm.

*Substrato*: Solo.

*Distribuição*: Brasil, Venezuela e Colômbia (Ryvarden, 2004); no Brasil, conhecida para o Alagoas, Amazonas, Bahia, Minas Gerais, Pará, Paraná, Pernambuco, Rondônia, Rio de Janeiro, Santa Catarina, São Paulo e Sergipe (Gugliotta *et al.*, 2010).

*Material examinado*: BRASIL, Amazonas, São Gabriel da Cachoeira, Jan.1978, I.J. Araújo (INPA 78717, como *A. boleticeum* (Pat. & Gaillard) Torrend); Barcelos, Serra de Aracá, Jul.1985, E.S.S. Silva *et al.* (INPA 153720); Jutáí, loc. n. det., Out. 1986, E.S.S. Silva *et al.* 887 (INPA 155001); Pará, Melgaço, Estação Científica Ferreira Penna, Fev.2008, T. B. Gibertoni (URM 79315, URM 79316, URM 79314); Rondônia, Município de Jarú, d. indet., M. Capelari & R. Maziero (SP 211532).

*Comentários*: O basidioma marrom, poros angulares, 4–6 por mm, contexto amarelo com duas linhas pretas, basidiosporos subglobosos a globosos (10–13 × 9–12 µm) e distintamente ornamentados caracterizam esta espécie. *Amauroderma sprucei* é similar, mas difere pela coloração do contexto, da superfície himenial e tamanho dos basidiosporos, além da ausência de linhas no contexto.



**Fig. 13.** *Amauroderma omphalodes*. – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em MEV. – Escala: A–B= 1 cm; C = 2  $\mu$ m.

**13. *Amauroderma ovisporum*** Gomes–Silva, Ryvar den & Gibertoni **sp. nov.**

(Fig 14)

MycoBank: a ser depositada

*Etimologia:* ovum (Latim) = ovo, referindo-se a morfologia do basidiosporo.

*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Estação Ecológica de Cuniã, em madeira em decomposição, Fev. 2007, A. C. Gomes–Silva 35 (URM).

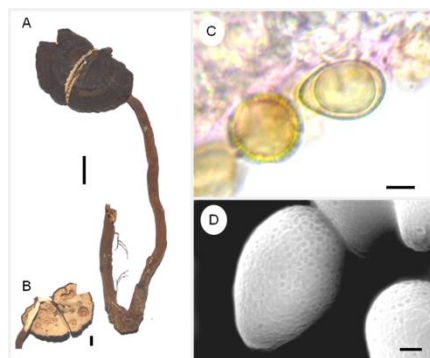
*Basidioma* anual, solitário, lateralmente estipitado. *Píleo* simples, semicircular, plano a levemente convexo, 3 cm largura, 2 cm comprimento e 0,7 mm espessura total, rígido quando seco. *Superfície abhimenial* opaca, glabra, zonada concentricamente, radialmente sulcada quando seca, preto (Fulvous black 36) quando seco, com seções usualmente com uma fina cutícula preta. *Margem* aguda, inteira, levemente involuta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros angulares, 5–6 por mm, superfície marrom (Milky coffee 28), dissepimento inteiro, fino. *Contexto* homogêneo, fibroso, fino, aproximadamente 0,2 mm de espessura, creme (B2). *Tubos* marrom (Snuff brown 17), aproximadamente 0,5 mm de profundidade, dissepimento fino, inteiro. *Estipe* lateralmente inserido no píleo, cilíndrico, sólido, 8,5 cm de comprimento, 0,3 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro, levemente enrugado, com uma fina cutícula, contexto do estipe homogêneo, fibroso, creme (B2). Sistema hifálico dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3  $\mu$ m de diâmetro; hifas esqueléteas amarelas a marrom pálido, parede espessa a sólida, arboriformes, 3–4  $\mu$ m de diâmetro, levemente dextrinóide, cutícula do estipe e píleo formada por hifas esqueléteas sem estruturas distintas. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* elipsóides a oblongos, hialinos a amarelados em KOH, parede espessa, endospório finamente ornamentado, usualmente com gutúla, 13–16  $\times$  9–10  $\mu$ m.

*Substrato:* Madeira em decomposição.

*Distribuição:* Brasil.

*Material examinado:* BRASIL, Rondônia, Porto Velho, Estação Ecológica de Cuniã, em madeira em decomposição, Fev. 2007, A. C. Gomes–Silva 35 (**Holótipo:** URM).

*Comentários:* *Amauroderma ovisporum* é caracterizada pelos basidiosporos elipsóides a oblongos grandes (13–16 × 9–10 µm). Macroscopicamente é similar a *A. praetervisum*, mas difere pelos basidiosporos globosos a subglobosos (9–12 × 9–11 µm).



**Fig. 14.** *Amauroderma ovisporum* – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A = 1cm; B = 5mm; C = 5 µm; D = 2 µm.

**14. *Amauroderma paraelegantissimum*** Gomes–silva, Ryvarden & Gibertoni **sp. nov.** (Fig 15)

MycoBank: a ser depositado

*Etimologia:* para (Grego) = ao lado de, referindo-se à semelhança com *A. elegantissimum*.

*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, solo, Fev.2008, A. C. Gomes–Silva 675 (URM).

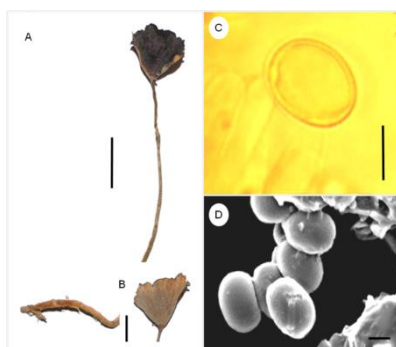
*Basidioma* anual, solitário a agregado, central a lateralmente estipitado. *Píleo* solitário a usualmente agrupado, circular a semicircular, plano a infudibuliforme, 2,5–5,5 cm largura, 3–4,5 cm comprimento e 0,1 mm espessura total, flexível quando seco. *Superfície abhimenial* brilhante, mas sem a aparência lacada, glabra a levemente velutínea, concêntricamente zonada e levemente sulcada radialmente quando seca, marrom vináceo (Brown vinaceous 25) com seções com uma fina cutícula preta. *Margem* aguda, inteira, involuta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros angulares a alongados, 2–3 por mm, superfície marrom (Cigar brown 16), dissepimento inteiro, fino. *Contexto* homogêneo, levemente fibroso, fino, aproximadamente 0,1 mm de espessura, marrom (Cigar brown 16). *Tubos* concolor com o contexto, aproximadamente 0,1 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, sólido, raramente ramificado na parte superior originando dois píleos, 7–16 cm de comprimento, 0,2 mm de diâmetro, marrom (Cigar brown 16), opaco, glabro a levemente velutíneo, incurvado na base quando seco, com uma fina cutícula, contexto do estipe homogêneo, fibroso, marrom pálido (Cigar brown 16) a creme (B2). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3 µm de diâmetro; hifas esqueléteas

amarelas a marrom pálido, parede espessa a sólida, arboriformes, 3–4  $\mu\text{m}$  de diâmetro, levemente dextrinóide. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* oblongo-elipsóides, amarelos em KOH, parede espessa, endospório finamente ornamentado, com gutúla, 11–12  $\times$  7–9  $\mu\text{m}$ .

*Substrato*: Madeira em decomposição.

*Distribuição*: Brasil.

*Material examinado*: BRASIL, Pará, Cachoeira Porteira, INPA, solo, Ago.1980, V.L. Bononi 812 [SP 193405, como *Amauroderma rude* (Berk.) Torrend]; Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, solo, Fev.2008, A. C. Gomes–Silva 675 (**Holótipo**: URM; **Isótipo**: O); Fev.2010, A. C. Gomes–Silva 902–919 (URM); Fev.2011, A. C. Gomes–Silva *et al.* 1055–2019 (URM).



**Fig. 15.** *Amauroderma paraelegantissimum* (Holótipo) – A. Basidioma. – B. Superfície himenial do basidioma. – C. Basidiosporos em ML. – D. Basidiosporos em MEV. – Escala: A–B = 1 cm; C = 10  $\mu\text{m}$ ; D = 5  $\mu\text{m}$ .

*Comentários*: Esta espécie é macroscopicamente similar a *A. elegantissimum* e *A. exile*, mas os basidiosporos oblongo–elipsóides (11–12  $\times$  7–9  $\mu\text{m}$ ) e poros largos (2–3 per mm) a distingue das demais.

**15. *Amauroderma partitum*** (Berk.) Wakef., *Bull. Misc. Inf.*, Kew: 242 (1934). (Fig 16)  
 $\equiv$  *Polyporus partitus* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 170 (1856).

*Basidioma* anual, solitário a agregado, central a lateralmente estipitado. *Píleo* solitário a agregado, circular a semicircular, plano a infudibuliforme, 1–4,5 cm largura, 1–4 cm comprimento e 0,1 – 0,3 mm espessura total, flexível e frágil quando seco. *Superfície abhymenial* brilhante a opaca, glabra a levemente velutínea, concentricamente zonada, levemente sulcada radialmente quando seca, vinácea (Brown vinaceous 25), marrom avermelhado (Bay 19) quando seco, em espécimes jovens, marrom (Cigar brown 16) a quase preto (Fuscous black 36) em espécimes velhos, quando seco. *Margem* aguda, inteira, involuta quando seca, concolor com a superfície abhymenial.

*Superfície himenial* poróide, poros angulares a alongados, 1–3 por mm, superfície creme (B2) em espécimes jovens e marrom (Cinnamon 10, Fulvous 12, Cigar brown 16, Snuff brown 17) em espécimes velhos quando seco, dissepimento inteiro, fino. *Contexto* homogêneo, fibroso, fino, aproximadamente 0,5 mm de espessura, creme (B2). *Tubos* concolor com a superfície himenial, aproximadamente 0,75 mm de profundidade, dissepimento fino e inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, sólido, ramificado no ápice com um ou mais píleos ou ramificado na base, originando vários estipes, 9–16 cm de comprimento, 0,1–0,3 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro, com uma fina cutícula, contexto do estipe fibroso, com uma linha negra até o ápice do estipe, creme (B2). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3,5 µm de diâmetro; hifas esqueléteas hialinas, parede espessa, arboriformes, 3–4 µm de diâmetro, levemente a distintamente dextrinóide, cutícula do estipe e píleo formada por hifas esqueléteas sem estruturas distintas. *Basídios* não observados. *Medas* presentes, abundantes, cônicas, hialinas, 50–150 µm de comprimento e 25–68 µm de largura. *Basidiosporos* elipsóides a oblongos, hialinos a amarelos em KOH, parede espessa, endospório finamente ornamentado, usualmente gutulado, 10–13 × 7–9,5(–10) µm.

*Substrato*: Solo.

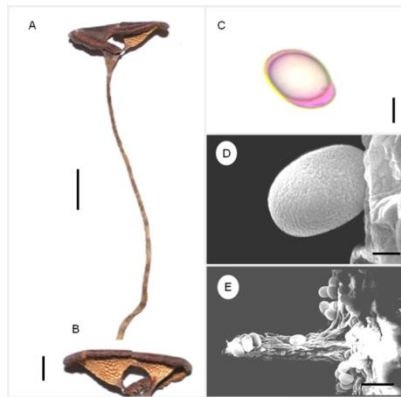
*Distribuição*: Brasil, Venezuela e Guiana (Ryvarden, 2004); no Brasil, conhecida para o Amazonas (Furtado, 1981), Pará (Gomes–Silva & Gibertoni, 2009), Rondônia, Roraima, Paraíba e Pernambuco (Gomes–Silva *et al.*, 2010).

*Material examinado*: BRASIL, Amazonas, Tefé, Lago de Tefé, Jul.1973, E. Lleras *et al.*, (INPA 39838); Fonte Boa, Greci, Nov.1986, E.L.S. Silva (INPA 155034); Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, Fev.2007, A.C. Gomes–Silva 20 (URM 79459); Fev.2008, A.C. Gomes–Silva (URM 79167, URM 79168, URM 79166, URM 79164, URM 79165, URM 79171); Jan.2009, A.C. Gomes–Silva (URM 80050, URM 80051, URM 80052, URM 80053, URM 80054, URM 80055, URM 80056); Jun.2009, A.C. Gomes–Silva (URM 81054, URM 81055, URM 81056, URM 81057); Estação Ecológica de Cuniã, Fev.2007, A.C. Gomes–Silva (URM 79460); Fev.2008, A.C. Gomes–Silva (URM 79170, URM 79169); Roraima, Amaraji, Auaris, Jul.1974, G.T. Prance *et al.* (INPA 45476, INPA 45353, INPA 45476); XII.1973, G.T. Prance *et al.* (INPA 43907).

*Comentários*: Esta espécie é caracterizada pelo basidioma vináceo, longo estipe fino com píleos agregados, poros largos (1–3 por mm), medas abundantes e basidiosporos elipsóides a oblongos, 10–13 × 7–9,5 µm (Gomes–Silva *et al.*, 2010). *Amauroderma floriforme* é semelhante macroscopicamente a *A. partitum*, porém difere pelo basidioma com píleo simples, estipe preto, ausência de medas e basidiosporos globosos (9–10 × 8–9,5 µm), enquanto em *A. partitum* o basidioma apresenta píleos repartidos, estipe marrom, medas e basidiosporos elipsóides a oblongos



[10–13 × 7–9,5(–10) μm]. *Amauroderma calcigenum* é considerado sinônimo de *A. partitum*, mas devido a característica macro e microscópicas, Gomes–Silva *et al.* (2010) propô a segregação dessa espécie (ver comentários de *A. calcigenum*).



**Fig. 16.** *Amauroderma partitum* (Berk.) Wakef. A. Basidioma; B. Superfície himenial. C. Basidiosporos em ML; D. Basidiosporos em MEV; E. Medas (escala: A = 1 cm; B = 5 mm; C = 5 μm; D = 2 μm; E= 20 μm).

**16. *Amauroderma praetervisum*** (Pat.) Torrend, Brotéria, sér. bot. 18: 131 (1920). (Fig 17)

≡ *Ganoderma praetervisum* Pat., Bull. Soc. mycol. Fr. 5(2,3): 78 (1889).

*Basidioma* anual, solitário, central a lateralmente estipitado. *Píleo* solitário, circular a semicircular, plano a convexo, ungulado, 3–5 cm largura, 4–4,5 cm comprimento e 0,5–0,12 mm espessura total, rígido quando seco. *Superfície abhimenial* opaca, distintamente zonada concentricamente, levemente sulcada radialmente quando seca, glabra a levemente velutínea, preta acinzentada (Fuscous black 36), com seções com uma fina cutícula preta. *Margem* obtusa, inteira, levemente involuta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros circulares, 4–6 por mm, superfície creme (B2) em espécimes jovens e marrom (Snuff brown 17) em espécimes velhos, dissepimento inteiro, fino. *Contexto* com duas linhas negras originárias do estipe, fibroso, fino, aproximadamente 0,2–0,4 mm de espessura, marrom pálido (Fulvous 12) a creme (C3). *Tubos* concolor com a superfície himenial, aproximadamente 0,5–0,10 mm de profundidade, dissepimento fino, inteiro. *Estipe* centralmente a lateralmente inserido no píleo, cilíndrico, tubular, 10–21 cm de comprimento, 0,4–0,5 mm de diâmetro, concolor com a superfície abhimenial, opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe com duas linhas negras, fibroso, marrom (Snuff brown 17). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–6 μm de diâmetro; hifas esqueléteas hialinas a amareladas, parede espessa a sólida, arboriformes, 3–7 μm de diâmetro, levemente dextrinóide. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* subglobosos a globosos,

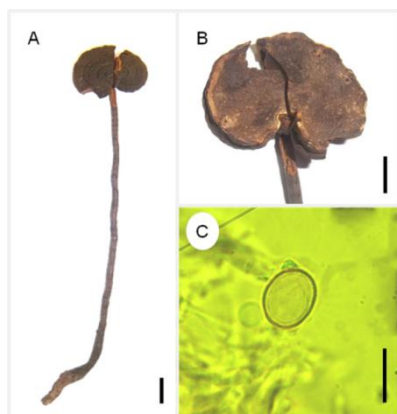
hialinos a amarelados em KOH, parede espessa, endosporio finamente ornamentado,  $9\text{--}12 \times 9\text{--}11 \mu\text{m}$ .

*Substrato*: Solo e madeira em decomposição.

*Distribuição*: Brasil, Belize, Costa Rica e México (Ryvarden, 2004); no Brasil, conhecida para a Bahia, Mato Grosso, Pará, Paraíba, Paraná, Pernambuco e Rio de Janeiro (Gugliotta *et al.*, 2010). Representa primeiro registro para o estado de Rondônia.

*Material examinado*: BRASIL, Pará, Melgaço, Estação Científica Ferreira Penna, Jul.2006, T. B. Gibertoni (URM 79284); Mar.2007, T. B. Gibertoni (URM 79288, URM 79287, URM 79285, URM 79286); Ago.2007, T. B. Gibertoni (URM 79291, URM 79287, URM 79290, URM 79289); Fev.2008, T. B. Gibertoni (URM 79292, URM 79293, URM 79294); Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, Fev.2008, A. C. Gomes-Silva (URM 79461); Fazenda Mucuim, Jul.2007, A. C. Gomes-Silva (URM 79462, URM 79463, URM 79464); Estação Ecológica de Cuniã, Fev.2008, A. C. Gomes-Silva (URM 79465); Jarú, d. indet., M. Capelari & R. Maziero (SP211532).

*Comentários*: *Amauroderma praetervisum* é caracterizada pelo basidioma preto acinzentado, com longo estipe, píleo fortemente zonado e unglado, poros creme, 4–6 por mm e basidiosporos subglobosos a globosos ( $9\text{--}12 \times 9\text{--}11 \mu\text{m}$ ) e finamente ornamentado. Estas características diferenciam *A. intermedium* de *A. omphalodes* e *A. pseudoboletum*, espécies similares.



**Fig. 17.** *Amauroderma praetervisum*. – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – Escala: A = 2 cm; B= 1 cm; C = 10  $\mu\text{m}$ .

**17. *Amauroderma schomburgkii*** (Mont. & Berk.) Torrend, Brotéria, sér. bot. 18: 140 (1920).

(Fig 18)

≡ *Polyporus schomburgkii* Mont. & Berk., J. Bot., Lond. 3: 331 (1844).

*Basidioma* anual, solitário a agregado, central a lateralmente estipitado. *Píleo* solitário a agrupado, circular a semicircular, plano a infudibuliforme, 6–7 cm largura, 4–5 cm comprimento e 0,3–0,5

mm espessura total, rígido quando seco. *Superfície abhimental* opaca a levemente brilhante, glabra, concentricamente zonada e sulcada radialmente quando seca, marrom (Snuff brown 17, Cigar brown 16), zonas marrom escuro (Cigar brown 16). *Margem* aguda, inteira, concolor com a superfície abhimental. *Superfície himental* poróide, poros circulares, 4–5 por mm, superfície marrom escuro (Snuff brown 16) quando seco, dissepimento inteiro, espesso. *Contexto* com duas linhas pretas originárias do estipe, levemente fofo, fino, aproximadamente 0,2–0,3 mm de espessura, marrom (Fulvous 12). *Tubos* concolor com a superfície himental, aproximadamente 0,2–0,3 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, sólido, 7–11 cm de comprimento, 1–2 cm de diâmetro, marrom (Snuff brown 16), opaco, glabro, contexto do estipe com duas linhas pretas, levemente esponjoso, marrom (Fulvous 12). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2,5–4 µm de diâmetro; hifas esqueléteas hialinas, parede espessa, arboriformes, 3–5 µm de diâmetro, córtex formada por hifas esqueléteas sem estruturas distintas. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* globosos, marrom em KOH, parede espessa, endospório distintamente ornamentado, 7–9 (–10) µm de diâmetro.

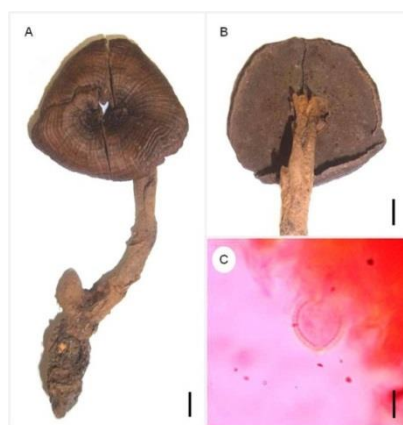
*Substrato*: Solo e madeira em decomposição.

*Distribuição*: Colômbia, Guiana Francesa, Nicarágua, Panamá, Trinidad e Venezuela (Furtado, 1981); Brasil, Cuba, Porto Rico e Jamaica (Ryvarden, 2004); no Brasil conhecida para o Amazonas, Bahia, Mato Grosso, Pará, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondônia, São Paulo e Sergipe (Gugliotta *et al.*, 2010).

*Material examinado*: BRASIL, Amazonas, Jutai, Out.1986, E.S.S. Silva (INPA 153801); Barcelos, Serra de Aracá, Jul.1985, E.S.S. Silva *et al.* (INPA 154966, como *Amauroderma* sp.); Mar.1984, G.J. Samuels (INPA 129636, INPA 129968); Manaus, Reserva Florestal Ducke, Jan.1961, P.S. Colares (INPA 75171, como *A. auriscalpium* (Pers.) Torrend); São Gabriel da Cachoeira, Jan.1978, I.J. Araújo *et al.* (INPA 78718); loc. indet., Abr.1971, G.T. Prance *et al.* (INPA 29802, como *Amauroderma* sp.); Mar.1969, G.T. Prance *et al.* (INPA 26176); Pará, Oriximinã, Jun.1980, V.L.R. Bononi (INPA 103508, INPA 103535, INPA 103578, como *Polyporus* sp.); Itaituba, Abr.1977, M.A. Sousa (INPA 74638, como *A. praetervisum*), Melgaço, Estação Científica Ferreira Penna, Mar.2007, T. B. Gibertoni (URM 79307, URM 79308, URM 79310, URM 79311, URM 79312); Ago.2007, T. B. Gibertoni (URM 79309); Fev. 2008, T. B. Gibertoni (URM 79306); Rondônia, Porto Velho, Fazenda Mucuí, Jul.2007, A. C. Gomes–Silva (URM 79466, URM 79467, URM 79468); Estação Ecológica de Cuniã, Fev.2008, A. C. Gomes–Silva (URM 79469); localidade indeterminada, Jul.1969, K.P. Dumont *et al.* (INPA 65092, INPA 65108); Out.1979, R.H. Pertesen (INPA 110743, como *Ganoderma* sp.); Roraima, Boa Vista, BR 174, Nov.1977, I.J. Araújo *et al.*

(INPA 78298, INPA 78334); localidade indeterminada, Jul.1973, G.T. Prance et al. (INPA 43909); Jul.1974, G.T. Prance et al. (INPA 45365, INPA 45476, INPA 45355, INPA 45473, como *Amauroderma* sp.); Jul.1986, B. Lowy et al. (INPA 145353, como *Hymenochaete damicornis* (Link) Lév.).

*Comentários:* *Amauroderma schomburgkii* é caracterizada pela superfície abhiminal marrom avermelhada, contexto marrom com duas linhas pretas, basidiosporos pequenos, globosos e distintamente ornamentados [7–9 (–10)  $\mu\text{m}$  de diâmetro]. *Amauroderma schomburgkii* é semelhante macroscopicamente a *A. sprucei*, da qual difere pelo contexto branco sem linhas pretas e marrom com linhas pretas na primeira. Ryvarden (2004) e Furtado (1981) não descrevem a presença de linhas pretas no contexto, o que pode ser visualizado nos espécimes analisados. *Amauroderma schomburgkii* é considerada sinônimo de *A. gusmanianum* (www.indexfungorum.org). Entretanto, o estudo do tipo se torna necessário para confirmar se estas espécies são realmente sinônimos. Com base nas características de *A. gusmanianum* descrita por Furtado (1981), preferimos considerar as duas espécies distintas.



**Fig. 18.** *Amauroderma schomburgkii*. – A. Basidioma. – B. Superfície himenial. – C. Basidiosporo em ML. – Escala: A = 1 cm; B= 1 cm; C = 5  $\mu\text{m}$ .

**18. *Amauroderma sessile*** Gomes–Silva, Ryvarden & Gibertoni **sp. nov.**

(Fig 19)

MycoBank: a ser depositada

*Etimologia:* sessilis (Latim) = sem pé, referindo-se ao basidioma aderido lateralmente ao substrato.

*Holotypus* hic designatus: BRASIL, Pará, Oriximinã, madeira em decomposição, Fev.1980, V. L. Bononi (INPA 103576).

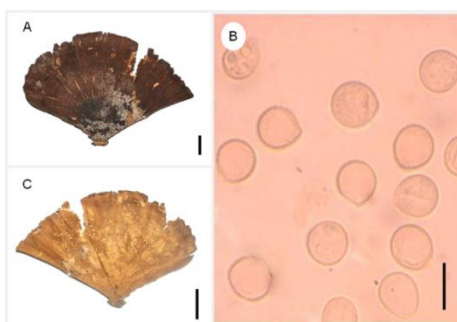
*Basidioma* anual, solitário, séssil. *Píleo* solitário, semicircular, plano, 4–6 cm largura, 3–5,5 cm comprimento e 0,1–0,2 mm espessura total, rígido quando seco. *Superfície abhiminal* opaca, azonada e radialmente sulcada quando seca, glabra, preta (Fuscous black 32) na base, marrom (Cigar brown 16, Snuff brown 17). *Margem* aguda, inteira, levemente ondulada, involuta quando

seca, concolor com a superfície abhimental. *Superfície himenial* poróide, poros angulares, 5–6 (–7) por mm, superfície marrom (Snuff brown 17), dissepimento inteiro a lacerado, fino. *Contexto* com duas linhas pretas originárias da base, fibroso, fino, aproximadamente 0,1–0,2 mm de espessura, creme (B2). *Tubos* concolor com a coloração de acordo com a superfície himenial, muito fino, aproximadamente 0,1 mm de profundidade, dissepimento fino, inteiro. *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3  $\mu\text{m}$  de diâmetro; hifas esqueléteas hialinas a amareladas, parede espessa a sólida, arboriformes, 3–6  $\mu\text{m}$  de diâmetro. *Basídios* não observados. *Medas* ausentes. *Basidiospоро* subgloboso a globoso, amarelo em KOH, parede espessa, endospório fortemente ornamentado, 11–14  $\times$  10–13  $\mu\text{m}$ .

*Substrato*: Madeira em decomposição.

*Distribuição*: Brasil.

*Material examinado*: BRASIL, Pará, Oriximinã, madeira em decomposição, Fev.1980, V. L. Bononi 581 (**Holótipo**: INPA 103576; **Isótipo**: O); Jun.1980, V. L. Bononi 581 [SP 214681, SP 193891, como *Earliella corrugata* (Pers.) Murrill]; Amazonas, Jutaí, Estação da SEMA, solo, Out.1986, E.S.S. Silva *et at.* 859 (INPA 154974); Amazonas, loc. n. det., solo, Jul.1971, G.T Prance *et at.* 14075 (INPA 32290); Mato Grosso, Aripuanã, loc. n. det., madeira em decomposição, Abr.1978, M.A. Sousa 467 (INPA 75622).



**Fig. 19.** *Amauroderma sessile* (Holótipo) – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – Escala: A–B = 1 cm; C = 10  $\mu\text{m}$ .

*Comentários*: *Amauroderma sessile* é caracterizada pelo basidioma séssil, superfície abhimental azonada com uma cutícula preta na base, poros angulares marrom, dissepimento lacerado, 6–7 por mm e basidiosporos subglobosos a globosos (11–14  $\times$  10–13  $\mu\text{m}$ ). *Amauroderma sessile* compartilha caracteres macroscópicos (basidioma séssil) com *A. andina* Ryvardeen, mas esta é descrita apenas para a Venezuela (Ryvardeen, 2004).

**19.** *Amauroderma sprucei* (Pat.) Torrend, Brotéria, sér. bot. 18: 121 (1920). (Fig 20)

$\equiv$  *Ganoderma sprucei* Pat., Bull. Soc. mycol. Fr. 10(2): 75 (1894).

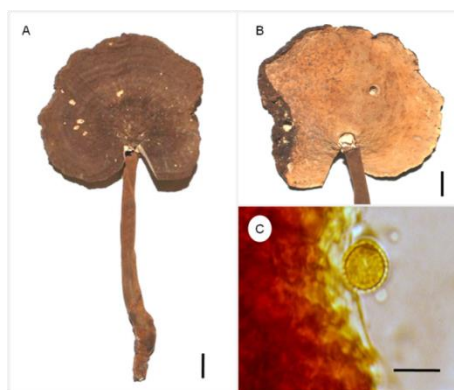
*Basidioma* anual, solitário, central a lateralmente estipitado. *Píleo* simples, circular a semicircular, plano a infudibuliforme, levemente ondulado, 7 cm largura, 6,5 cm comprimento e 0,7 mm espessura total, lenhoso quando seco. *Superfície abhimental* opaca, glabra a velutínea, concentricamente zonada, radialmente sulcada quando seca, marrom (Snuff brown 17, Date brown 24, Umber 18), com seções com uma fina cutícula preta. *Margem* aguda a levemente obtusa, inteira, ondulada, levemente involuta quando seca, concolor com a superfície abhimental. *Superfície himenial* poróide, poros angulares, 5–7 por mm, invisíveis a olho nu, superfície branca (B2) a creme (D4) em espécimes jovens, alaranjado brilhante (Fulvous 12) a vermelho alaranjado (Cinnamon 10) em espécimes frescos e mais velho e marrom alaranjado (Fulvous 12) quando seco, dissepimento inteiro, fino. *Contexto* homogêneo, levemente esponjoso a fibroso, aproximadamente 0,5–1,0 cm de espessura, branco (B2). *Tubos* creme (D 4), aproximadamente 0,3–0,5 mm de profundidade, dissepimento fino, inteiro. *Estipe* central a lateralmente inserido no píleo, cilíndrico, tubular, 9,2 cm de comprimento, 0,5 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro a velutíneo, com uma fina cutícula, contexto do estipe homogêneo, levemente esponjoso a fibroso, creme (D4). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–4 µm de diâmetro; hifas esqueléteas hialinas, parede espessa, arboriformes, 3–8 µm de diâmetro, dextrinóide; o córtex da superfície abhimental é formado por hifas esqueléteas parcialmente agrupadas, mas sem formar estruturas distintas. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* globosos, amarelo pálido em KOH, parede espessa, endosporio distintamente ornamentado, 8 × 10 µm de diâmetro.

*Substrato*: Madeira em decomposição.

*Distribuição*: Neotropical (Ryvarden, 2004); no Brasil, conhecida para o Amazonas, Mato Grosso, Minas Gerais, Pará, Pernambuco, Rio de Janeiro, Rio Grande do Sul, São Paulo e Sergipe (Gugliotta *et al.*, 2010).

*Material examinado*: BRASIL, Amazonas, Manaus, Dez.1990, M. A. Jesus (INPA 192709), loc. indet., Out.1997, E. M. L. Freire (INPA 70038, como *A. schomburgkii*); Pará, Melgaço, Estação Científica Ferreira Penna, Jul.2006, T. B. Gibertoni (URM 79327); Mar.2007, T. B. Gibertoni (URM 79325, URM 79326).

*Comentários*: *Amauroderma sprucei* é caracterizada pelo basidioma marrom, com poros invisíveis a olho nu (5–7 por mm) e basidiosporos globosos (8 x 10 µm de diâmetro). *Amauroderma dubiopansum* (Lloyd) Ryvarden é considerada por Ryvarden (2004) uma espécie similar a *A. sprucei*, diferindo apenas pela coloração da superfície himenial (alaranjada em *A. dubiopansum* e branca em *A. sprucei*). Atualmente, *A. dubiopansum* é considerada sinônimo de *A. sprucei* ([www.indexfungorum.org](http://www.indexfungorum.org)).



**Fig 20.** *Amauroderma sprucei*. – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos em ML. – Escala: A–B = 1 cm; C = 10  $\mu$ m.

**20. *Amauroderma subsessile*** Gomes–Silva, Ryvarden & Gibertoni **sp. nov.** (Fig 20)

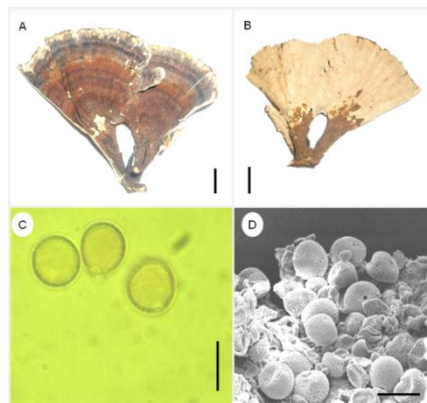
Mycobank: a ser depositada

*Etimologia*: sub (Latim) = menos que sessile; referindo-se ao basidioma com pequeno estipe.

*Holotypus* hic designatus: BRASIL, Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, madeira em decomposição, Fev.2011, A.C. Gomes–Silva 2975 (URM).

*Basidioma* anual, solitário a agrupado, lateralmente estipitado. *Píleo* solitário a agrupado, semicircular, plano, 2–5 cm largura, 2,5–4 cm comprimento e 0,1–0,2 mm espessura total, rígido quando seco. *Superfície abhimenial* opaca, fortemente zonada concentricamente e levemente sulcada radialmente quando seca, glabra, vermelho escuro (Bay 19) na base próximo ao estipe, alaranjada (Sienna 11) a marrom (Fulvous 12) na porção intermediária e cinza (Smoke grey 34) próximo a margem. *Margem* aguda, inteira, levemente revoluta quando seca, concolor com a superfície abhimenial. *Superfície himenial* poróide, poros circulares, 6–7 por mm, superfície creme (B2) a marrom (Snuff brown 17), dissepimento inteiro, fino. *Contexto* com duas linhas pretas originárias do estipe, fibroso, muito fino, aproximadamente 0,1–0,2 mm de espessura, branco (B2) a creme (C3). *Tubos* concolor com superfície himenial, muito fino, quase indistinto, dissepimento fino, inteiro. *Estipe* lateralmente inserido no píleo, usualmente ramificado no ápice, originando pequenos estipes com píleos simples, cilíndrico, sólido, 2–5 cm de comprimento, 0,2–0,4 mm de diâmetro, vermelho escuro (Bay 19), opaco, glabro, com uma fina cutícula, contexto do estipe com duas linhas pretas, fibroso, branco (B2) a creme (C3). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–3,5  $\mu$ m de diâmetro; hifas esqueléteas hialinas a amareladas, parede espessa a sólida, arboriformes, 3,5–4,5  $\mu$ m de diâmetro. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* globosos, amarelos em KOH, parede espessa, endospório distintamente ornamentado, com gutúla, 9–10  $\times$  8–9  $\mu$ m.

*Substrato*: Madeira em decomposição.



**Fig. 21.** *Amauroderma subsessile* (Holótipo). – A. Basidioma. – B. Superfície himenial. – C. Basidiosporos circulares. – D. Basidiosporos em ML em Melzer. – E. Basidiosporos em MEV. – Escala: A–B = 1 cm; D–E = 10  $\mu$ m).

*Distribuição*: Brasil.

*Material examinado*: BRASIL, Pará, Melgaço, Estação científica Ferreira Penna, madeira em decomposição, Mar.2007, T.B. Gibertoni 15 (URM); T.B. Gibertoni 161 (URM); Fev.2008, T.B. Gibertoni 265–5–184 (URM); Rondônia, Porto Velho, Parque Natural Municipal de Porto Velho, madeira em decomposição, Fev.2011, A.C. Gomes–Silva 2975 (**Holótipo**: URM; **Isótipo**: O).

*Comentários*: *Amauroderma subsessile* é caracterizada pelo basidioma subestipitado, superfície abhymenial com colorações distintas, fortemente zonadas concentricamente, poros circulares creme, dissepimento inteiro, 6–7 por mm e basidiosporos globosos (9–10  $\times$  8–9  $\mu$ m) e distintamente ornamentados. *Amauroderma sessile* é similar, mas difere por apresentar basidioma séssil, superfície abhymenial azonada, poros angulares marrom, com dissepimento lacerado, 6–7 por mm e basidiosporos subglobosos a globosos (11–14  $\times$  10–13  $\mu$ m), distintamente ornamentados.

**21. *Amauroderma trichodermatum*** J.S. Furtado, Revisão do gênero *Amauroderma* (Polyporaceae); Estudos baseados nas microestruturas do basidiocarpo: 311 (1968). (Fig 22)

*Basidioma* anual, solitário, central lateralmente estipitado. *Píleo* solitário, semicircular, aplanado, 4,5 cm largura, 3,5 cm comprimento e 0,4 mm espessura total, levemente esponjoso quando seco. *Superfície abhymenial* opaca, concentricamente zonada, levemente sulcada radialmente quando seca, zonas tomentosas alternando com zonas preta glabra, tomento levemente hirsuto a velutíneo, marrom (Cigar brown 16, Snuff brown 17), zonas pretas (Fuscous black 36), com seções com uma fina cutícula preta. *Margem* aguda, inteira, pilosa, levemente involuta quando seca, concolor com a superfície abhymenial. *Superfície himenial* poróide, poros angulares, 2–3 (–4)



por mm, superfície marrom clara (Fulvous 12) a marrom (Snuff brown 17) quando seco, dissepimento inteiro a lacerado, fino. *Contexto* homogêneo, rígido, fino, aproximadamente 0,1–0,2 mm de espessura, marrom pálido (Fulvous 12). *Tubos* concolor com a superfície himenial, aproximadamente 0,2 mm de profundidade, dissepimento fino, inteiro. *Estipe* lateralmente inserido no píleo, cilíndrico, sólido a tubular, 3 cm de comprimento, 0,4–0,7 mm de diâmetro, marrom (Snuff brown 17), opaco, glabro a levemente velutíneo, com uma fina cutícula, contexto do estipe homogêneo, rígido, creme (B2). *Sistema hifálico* dimítico; hifas generativas hialinas, com grampo de conexão, parede fina, 2–4  $\mu\text{m}$  de diâmetro; hifas esqueléteas hialinas a amareladas, parede espessa, arboriformes, 2–6  $\mu\text{m}$  de diâmetro, dextrinóide. *Basídios* não observados. *Medas* ausentes. *Basidiosporos* subglobosos, hialinos a amarelados em KOH, parede espessa, endosporio distintamente ornamentado, 7–8  $\times$  6,5–7,5  $\mu\text{m}$ .

*Substrato*: Madeira em decomposição.

*Distribuição*: Brasil e Venezuela (Ryvarden, 2004); no Brasil, conhecida para o Pará e Paraná (Gugliotta *et al.*, 2010). Este representa o primeiro registro para o estado do Amazonas.

*Material examinado*: BRASIL, Amazonas, localidade indeterminada, Abr. 1974, D. G. Campbell *et al.* (INPA 45838).

*Comentários*: *Amauroderma trichodermatum* é caracterizada pelo basidioma com a superfície abhimenial tomentosa, com zonas velutíneas alternando com zonas glabras, o que a distingue das outras espécies do gênero.



**Fig. 22.** *Amauroderma trichodermatum* – A. Basidioma. – B. Superfície himenial do basidioma. – C. Basidiosporos em MO. – Escala: A–B = 1 cm; C = 10  $\mu\text{m}$ .

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## Referências

- Baltazar JM, Gibertoni TB (2009) A checklist of aphyllorphoroid fungi (*Basidiomycota*) recorded from the Brazilian Atlantic rain forest. *Mycotaxon* 109: 439–442.
- Chen CS (1993) Methods for inducing various morphological fruiting body of *Ganoderma tsugae* Murr. *Trans. Mycol. Soc. Republ. China* 8: 9–16.
- Campacci TVS, Gugliotta AM (2009) A review of *Amauroderma* in Brazil, with *A. oblongisporum* newly recorded from the neotropics. *Mycotaxon* 110: 423–436.
- Capobianco JPR, Veríssimo A, Moreira A, Sawyer D, Santos IP, Pinto LP (2001) Biodiversidade na Amazônia brasileira: avaliação e ações prioritárias para a conservação, uso sustentável e repartição de benefícios. Estação Liberdade: Instituto Sócio Ambiental, São Paulo.
- Corner EJH (1983) Ad. Polyporaceae I. *Beih. Zur. Nova Hedwigia*. 75: 5–182.
- Coelho G, Cortez VG, Guerrero RT (2007) New morphological data on *Amauroderma brasiliense* (Polyporales, Basidiomycota). *Mycotaxon* 100: 177–183.
- Cunningham GH (1965) Polyporaceae of New Zealand. *N.Z. Dep. Sci. Industr. Res.* 164: 1–304.
- Donk MA (1964) A conspectus of the families of *Aphyllorphorales*. *Persoonia* 3: 199–324.
- Donk MA (1948) Notes on Malesian fungi. *Bull. Bot. Gard. Buitenz. III.* 17: 473–482.
- Douanla-Meli C, Langer E (2009) *Ganoderma carocalcareus* sp. nov., with crumbly-friable context parasite to saprobe on *Anthocleista nobilis* and its phylogenetic relationship in *G. resinaceum* group. *Mycol Progress* 8 (2): 145–155.
- Doyle JJ, Doyle JL (1987) A rapid DNA isolation method for small quantities of fresh tissues. *Phytochem. Bull. Bot. Soc. Amer.* 19: 11–15.
- Fungaro MHP (2000) PCR na Micologia. *Biotecnologia Ciência e Desenvolvimento* 14: 12–16.
- Furtado JS (1965) Relation of the microstructure to the taxonomy of the Ganodermoideae (*Polyporaceae*) with special reference to the structure of the cover of the pileas surface. *Mycologia* 57: 588–611.
- Furtado JS (1981) Taxonomy of *Amauroderma* (Basidiomycetes, Polyporaceae). *Memoirs of the New York Botanical Garden* 34: 1–109.
- Gibertoni TB, Bernicchia A, Ryvarden L, Gomes-Silva AC (2008) *Bresadola* s polypore collection at the Natural History Museum of Trento, Italy. 2. *Mycotaxon*. 104: 321–323.
- Góes-Neto A, Loguercio-Leite C., Guerrero RT (2005). DNA extraction from frozen fieldcollected and dehydrated herbarium fungal basidiomata: performance of SDS and CTAB-based methods. *Biotemas* 18(2): 19-32.
- Gomes-Silva AC, Gibertoni TB (2009) Checklist of the aphyllorphoraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* 108: 319–322.
- Gomes-Silva AC, Baltazar JM, Ryvarden L, Gibertoni TB (2010) *Amauroderma calcigenum* (Ganodermataceae, Basidiomycota) and its presumed synonym *A. partitum*. *Nova Hedwigia* 90( 3-4): 449–455.

- Gottlieb AM, Saidman BO, Wright JE (1998) Isoenzymes of *Ganoderma* species from southern South America. *Mycological Research* 102: 415–426.
- Gottlieb AM, Ferreri E, Wright JE (2000) rDNA analyses as an aid to the taxonomy of species of *Ganoderma*. *Mycol. Res.* 104 (9): 1033–1045.
- Gugliotta AM, Silveira RMB, Loguercio-Leite C, Campos-Santana M, Gibertoni TB, Drechsler-Santos ER, Gomes-Silva AC, Baltazar JM (2010) Polyporales in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. (<http://floradobrasil.jbrj.gov.br/2010/FB108367>).
- Heim R (1962) L'organisation architecturale des spores de Ganodermes. *Rev. Mycol.* 27: 199–212.
- Hong SG, Jung HS (2004) Phylogenetic analysis of *Ganoderma* based on nearly complete mitochondrial small-subunit ribosomal DNA sequences. *Mycologia* 96(4): 742–755.
- Hseu RH, Wang HH, Wang HF, Moncalvo JM (1996) Differentiation and grouping of isolates of the *Ganoderma lucidum* complex by Random Amplified Polymorphic DNAPCR compared with grouping on the basis of internal transcribed spacer sequences. *Appl Environ Microbiol* 62: 1354–1363.
- IBGE 2003. Mapa de Biomas. <<http://www.ibge.gov.br/home/presidencia/noticias/>>.
- Imazeki R (1943) The genera of Polyporaceae of Nippon. *Bull. Tokoy Sci. Mus. Tokoy* 6: 1–111.
- Kaliyaperumal M, Kalaichelvan PT (2008) *Ganoderma australe* from southern India. *Microbiological Research*. 163: 286–292.
- Kirk PM, Cannon PF, Minter DW, Stalpers JA (2008) Dictionary of the Fungi. 10 ed. CABI Publishing, Surrey. 771 pp.
- Malosso E, English L, White IS, Hopkins DW, O'Donnell AG (2006) Microbial diversity of Antarctic soils determined using a combination of culture isolation, molecular fingerprinting and cloning techniques. *Polar Biology*. 29: 552–561.
- Moncalvo JM, Lutzoni FM, Rehner SA, Johnson J, Vilgalys R (1995) Phylogenetic relationships in *Ganoderma* inferred from the internal transcribed spacers and 25S ribosomal DNA sequences. *Mycologia*, 87: 223–238.
- Rouland- Lefevre C, Diouf MN, Brauman A, Neyra M (2002) Phylogenetic relationships in *termitomyces* (Family *Agaricaceae*) based on the nucleotide sequence of ITS: A first approach to elucidate the evolutionary history of the symbiosis between fungus-growing termites and their fungi. *Molecular Phylogenetics and Evolution*. 22(3): 423–429.
- Ryvarden L (1991) Genera of Polypores – Nomenclature and taxonomy. *Synopsis Fungorum* 5: 1–363.
- Ryvarden L (2004) Neotropical Polypores. Part 1. *Synopsis Fungorum* 19, Fungiflora, Oslo.
- Smith BJ, Sivasithamparan K (2000) Internal transcribed spacer ribosomal DNA sequence of five species of *Ganoderma* from Australia. *Mycol Res* 104: 943–951.
- Steyaert RL (1961) Genus *Ganoderma* (Polyporaceae). *Taxa nova – 1*. *Bull. Jard. Bot. Etat Bruxelles* 31: 69–83.
- Steyaert RL (1972) Species of *Ganoderma* and related genera mainly of the Bogor and Leiden herbaria. *Persoonia* 7(1): 55–118.
- Swofford DL (2003) PAUP\*. Phylogenetic Analysis Using Parsimony (\* and Other Methods), version 4. Sinauer Associates, Sunderland, Massachusetts.
- Teixeira AR (1995) Método para o estudo das hifas dos basidiocarpos de fungos poliporáceos. Manual n.6, Instituto de Botânica, São Paulo.
- Torrend C (1920) Les polyporacées du Brésil. *Polyporaceus stipitées*. *Brotéria, Série Botânica*. 18 (1): 21–42.
- Watling R (1969) Colour Identification Chart. Her Majesty's Stationary Office, Edinburgh (Scotland).

White TJ, Bruns T, Lee S, Taylor J (1990) Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: Innis MA, Gelfand D, Sninsky J, White T (eds.). PCR protocols: a guide to methods and applications: 315–322. Academic Press, San Diego, California.

Zheng L, Xiaofanfei D, ZhirongYanga X (2009) An assessmentofthegeneticdiversitywithin *Ganoderma* strainswithAFLPandITSPCR-RFLP. MicrobiologicalResearch 164: 312-321.

*Amauroderma calcigenum* (*Ganodermataceae*, *Basidiomycota*) and its presumed synonym *A. partitum*

by

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**Abstract:** Specimens of *Amauroderma calcigenum* and *A. partitum* from North and Northeast Brazil were studied and macro- and microscopical data are presented to support their segregation. Descriptions, pictures of the basidiomata and basidiospores in light microscopy and SEM images of hyphal pegs and basidiospores are provided.

**Key words:** Amazonia, Atlantic Forest, *Ganodermataceae*, taxonomy.

### Introduction

*Amauroderma* Murrill was described in 1905 based on *Fomes regulicolor* Cooke, and actually comprises around 30 species (Kirk et al. 2008), which may cause white rot, but are usually parasitic on roots of living trees (Ryvarden 2004). *Amauroderma* is macroscopically characterized by the stipitate basidiomata with variable color and consistency, and the pore surface. It has a dimitic hyphal system and subglobose to cylindrical, hyaline to pale yellow, and double-walled basidiospores with an ornamented or very rarely smooth exosporium and a columnar endosporium (Ryvarden 2004, Coelho et al. 2007).

*Amauroderma partitum* was described as *Polyporus partitus* Berk. based on a collection from the Brazilian state of Amazonas (Furtado 1981). After its publication, some questions arose about its identity and its relation with *A. calcigenum*. Furtado (1981) studied several specimens of both species and considered *P. partitus* as a taxonomic synonym of *A. calcigenum*, which is currently accepted by the Index Fungorum database ([www.indexfungorum.org](http://www.indexfungorum.org)). He observed the presence of hyphal pegs in some specimens considered by him of "morphological resemblance to the type of *P.*

*partitus*"; however he did not consider the taxonomic value of these structures and maintained the synonymy.

This study was carried out with specimens recently collected in areas of Northern and Northeast Brazil and aimed to contribute to a better understanding of the morphology of *A. partitum* and *A. calcigenum* and to the elucidation of the distinction of these species.

### Material and methods

Specimens were collected during recent field trips in the two conservation units in Amazonia: the Parque Natural Municipal de Porto Velho (08°45'S and 63°54'W), and Estação Ecológica de Cuniã (08°04'S and 63°31'W), both in North Brazil, and one in the Atlantic Rain Forest: Parque Estadual Dois Irmãos (08°00'S and 34°56'W), in Northeast Brazil. The specimens were deposited in the herbaria of HFSL and URM (Holmgren & Holmgren 1998). Additional specimens deposited in INPA, JPB and URM were also studied.

The specimens were analyzed macro- (shape, color, pore surface) and micromorphologically (hyphal system, presence/absence and measures of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Color designation followed Watling (1969).

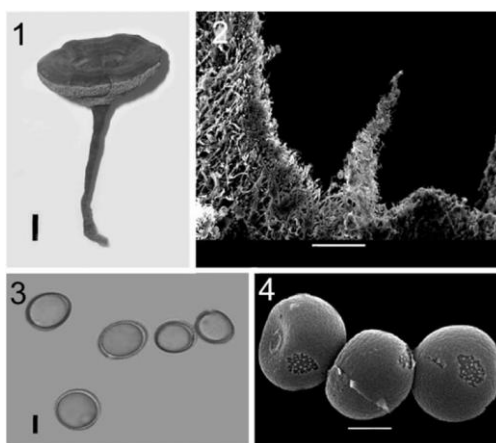
Scanning electron microscopy (SEM) was conducted at the Laboratório de Microscopia Eletrônica of the Departamento de Física of the Universidade Federal de Pernambuco (UFPE). Sections were removed from dried basidiomata and mounted directly on aluminium stubs using carbon adhesive tabs. The fragments were coated with 8–13 nm of gold using a Baltec SCD050 sputter coater and examined with a JEOL JSM-5900 scanning electron microscope.

### Taxonomy

***Amauroderma calcigenum*** (Berk.) Torrend, Broteria, Ser. bot. 13: 129 (1920). Figs 1–4  
≡ *Polyporus calcigenus* Berk., J. Bot., 2: 636 (1843).

Basidiomata annual, centrally to laterally stipitate, solitary. Pileus circular to rarely flabellate, often funnel shaped, up to about 3–5 cm wide, 4–4.5 cm high and 0.5–12 mm thick. Upper basidiome surface glabrous, concentrically zonate and slightly sulcate, shiny, reddish brown (umber-18) in young specimens, dark brown (cigar brown-16) in old specimens or when dry. Margin entire, acute to obtuse, rigid, deflexed when dry and in old specimens, concolorous to the upper basidiome surface. Pore surface pale brown (fulvous-12) to brown (snuff brown-17), pores angular, 1–2 per

mm. Tubes concolorous with context, up to 0.4–10 mm deep, dissepiments thin and entire. Context homogeneous, thin, 0.1–0.2 mm, pale brown (fulvous-12) to brown (snuff brown-17). Stipe cylindrical, rarely branched at the top, 6–10 cm long, 0.2–0.4 mm, glabrous, dull, brown (snuff brown-17), context of the stipe cream (B-2) to pale brown (clay buff-32), with a cuticle. Hyphal system dimitic; generative hyphae hyaline, with clamps, thin-walled, 2–3.5  $\mu\text{m}$ ; arboriform skeletal hyphae hyaline, thick-walled to solid, 3–5  $\mu\text{m}$ , slightly dextrinoid. Basidia not seen. Hyphal pegs absent or present, then abundant, conical, yellow, 80–130  $\mu\text{m}$  high and 20–60  $\mu\text{m}$  wide. Basidiospores ellipsoid, yellow, thick-walled, finely ornamented, with one large oil drop, (11–)12–15  $\times$  9–12  $\mu\text{m}$ .



Figs 1–4. *Amauroderma calcigenum*. 1. Basidiomata (scale bar = 1 cm). 2. Hyphal pegs (scale bar = 100  $\mu\text{m}$ ). 3. Light microscopy of the basidiospores (scale bar = 5  $\mu\text{m}$ ). 4. SEM micrograph of the basidiospores (scale bar = 5  $\mu\text{m}$ ).

MATERIAL EXAMINED: BRAZIL. PARÁ: Oriximiná, estrada de Oriximiná-Óbidos, V.L.Bononi 196, VI/1980 (INPA 103310). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 99-109-118-135-139, VII/2007 (URM 78886, URM 78887, URM 78888, URM 78889, URM 78890, URM 78891). BRAZIL. RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, A.C.Gomes-Silva 35, II/2007 (URM 79509). BRAZIL. RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, A.C.Gomes-Silva 251, VII/2007 (URM 78893). BRAZIL. RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, A.C.Gomes-Silva 393, II/2008 (URM 79145). BRAZIL. RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, A.C.Gomes-Silva 590, VII/2008 (URM79449). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 723, VI/2009 (URM 81053). BRAZIL. SERGIPE: Itabaiana, Estação Ecológica Serra de Itabaiana, T.B.Gibertoni, III/2002 (URM 77437).

SUBSTRATE: Forest soil.

DISTRIBUTION: Brazil, Venezuela and Guyana (Ryvarden 2004). In Brazil, recorded from the states of Amazonas, Mato Grosso and Pará (Gomes-Silva & Gibertoni 2009), Bahia, São Paulo, Rio de Janeiro, Rio Grande do Sul and Santa Catarina (Baltazar & Gibertoni 2009), Goiás (Torrend 1920), and Sergipe (Gibertoni et al. 2008). This is a new record to Rondônia.

REMARKS: This species is similar *A. aurantiacum* (Torrend) Gibertoni & Bernicchia, which differs by its conspicuously ornamented, globose to subglobose basidiospores (13–16 µm).

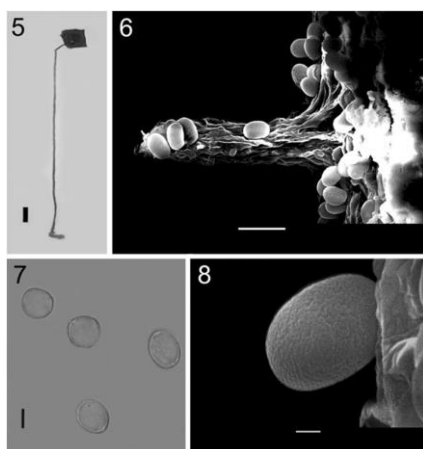
***Amauroderma partitum*** (Berk.) Wakef, Bull. Misc. Inform. Kew: 242 (1934). Figs 5–8  
≡ *Polyporus partitus* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 170 (1856).

Basidiomata annual, centrally to laterally stipitate, single to gregarious. Pilei circular to semicircular, infundibuliform, usually pliable, 1–4.5 cm wide, 1.5–4 cm high, 0.1–0.3 mm thick, and occasionally with two pilei per stipe. Upper basidiome surface glabrous, concentrically zonate, shiny to dull, vinaceous brown to brown (brown vinaceous-25 to snuff brown-17) in young specimens, brown to almost black (cigar brown-16, snuff brown-17 to fuscous black-36) in old specimens or when dry. Margin entire, acute, deflexed when dry, concolorous to the upper basidiome surface. Pore surface cream (B-2) in young specimens and brown (cinnamon-10, fulvous-12, cigar brown-16 to snuff brown-17) in old specimens, pores angular to elongated, 1–3 per mm. Tubes thin, concolorous to the pore surface, up to 0.75 mm deep, dissepiments entire. Context homogeneous, thin, white to cream (B-2), up to 0.5 mm thick. Stipe cylindrical, branched at the top, 9–16 cm long, 0.1–0.3 mm, glabrous, dull, brown (snuff brown-17), context of the stipe cream (B-2), with a cuticle. Hyphal system dimitic; generative hyphae hyaline, with clamps, thin-walled, 2–3.5 µm; arboriform skeletal hyphae hyaline, thick-walled, 3–4 µm, slightly to distinctly dextrinoid. Basidia not seen. Hyphal pegs absent or present, then abundant, conical, hyaline, 50–150 µm high and 25–68 µm wide. Basidiospores ellipsoid to oblong, hyaline to yellow, thick-walled, finely ornamented, usually with one large oil drop, 10–13 × 7–9.5(–10) µm.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Tefé, Lago de Tefé, E.Lleras et al., VII/1973 (INPA 39838). BRAZIL. AMAZONAS: Fonte Boa, Greci, E.L.S.Silva 920, XI/1986 (INPA 155034). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, III/1985 (JPB 6244). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, V/1985 (JPB 6255). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, IV/1986 (JPB 6847, JPB 6859). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, V/1986 (JPB 6853, JPB 8373, JPB 6854). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, V/1986 (JPB 6848). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, VI/1986 (JPB 6846). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, VIII/



1986 (JPB 6852, JPB 6851). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, X/1986 (JPB 6855). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, IV/1987 (JPB 6856). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, VI/1987 (JPB 7256). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, VIII/1987 (JPB 7257). BRAZIL. PARAÍBA: João Pessoa, Mata do Buraquinho, V.L.F.Araújo, IX/1989 (JPB 9241). BRAZIL. PERNAMBUCO: Recife, Parque Estadual Dois Irmãos, J.M.Baltazar et al. JMB 333-328-340-350-325, VI/2008 (URM 80059, URM 80060, URM 80061, URM 80062, URM 80063). BRAZIL. PERNAMBUCO: Recife, Parque Estadual Dois Irmãos, J.M.Baltazar et al. JMB 515, VII/2008 (URM 80064). BRAZIL. PERNAMBUCO: Recife, Parque Estadual Dois Irmãos, J.M.Baltazar et al. JMB 1337, I/2009 (URM 80065). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 20, II/2007 (URM 79459). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 277-292-313-336-337-447, II/2008 (URM 79167, URM 79168, URM 79166, URM 79164, URM 79165, URM 79171). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 639-649-704-678-700-679-666, I/2009 (URM 80050, URM 80051, URM 80052, URM 80053, URM 80054, URM 80055, URM 80056). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 724-725-726-727, VI/2009 (URM 81054, URM 81055, URM 81056, URM 81057). BRAZIL. RONDÔNIA: Estação Ecológica de Cuniã, A.C.Gomes-Silva 27, II/2007 (URM 79460). BRAZIL. RONDÔNIA: Estação Ecológica de Cuniã, A.C.Gomes-Silva 399-404, II/2008 (URM 79170, URM 79169). BRAZIL. RORAIMA: Amaraji, Auaris, G.T.Prance et al., VII/1974 (INPA 45476, INPA 45353, INPA 45476). BRAZIL. RORAIMA: Amaraji, Rio Uaricoeara, G.T.Prance et al., XII/1973 (INPA 43907).



Figs 5–8. *Amauroderma partitum*. 5. Basidiomata (scale bar = 1 cm). 6. Hyphal pegs (scale bar = 20  $\mu$ m). 7. Light microscopy of the basidiospores (scale bar = 5  $\mu$ m). 8. SEM micrograph of the basidiospores (scale bar = 2  $\mu$ m).

SUBSTRATE: Forest soil.

DISTRIBUTION: Brazil, Venezuela and Guyana (Ryvarden 2004). In Brazil, previously reported from the state of Amazonas (Furtado 1981) and Pará (Gomes-Silva & Gibertoni 2009), being a new record to the state of Rondônia, Roraima and to the Northeast region of Brazil.

REMARKS: This species is recognized by the thin stipe, the glabrous, vinaceous brown to brown upper basidiomata surface, the pale context, and the lower surface with large pores (Ryvarden 2004).

### Discussion

*Amauroderma partitum* has been treated as a synonym of *A. calcigenum* by some authors (Furtado 1981, Ryvarden 1984). Furtado (1981) was doubtful of the segregation of *Polyporus partitum* from *A. calcigenum* because of the presence of hyphal pegs and opted by keeping the synonymy, being followed by Ryvarden (1984). Later, however, Ryvarden (2004) treated them as separate species. The specimens studied in this work support the segregation since they differ both macro- and microscopically. In our concept, *A. calcigenum* has funnel-shaped and robust basidiomata with thick pilei, while *A. partitum* has smaller and more fragile basidiomata, with thinner and usually pliable pilei. The stipe of the latter is also thinner and proportionally longer than that of the former. Microscopically the species differs mainly by basidiospore size, as they are slightly longer and distinctly wider in *A. calcigenum* than in *A. partitum*.

The taxonomical value of the hyphal pegs has not been studied recently, but Fidalgo (1968) used them only for infra-generic delimitations in Polyporaceae. The recently collected specimens of both *A. calcigenum* and *A. partitum* have abundant to rare hyphal pegs, as well as in those collected by Lucena (1988), but they were not observed in the specimen of *A. calcigenum* collected in the state of Sergipe. Due to their variable presence in the studied species, we recommend to avoid the use of hyphal pegs as a characteristic of taxonomical significance. Nonetheless, we suggest that their presence or absence should be included in future descriptions of *Amauroderma* species to avoid further misunderstandings in the segregation of species in the genus.

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### References

- BALTAZAR J.M. & T.B. GIBERTONI (2009): A checklist of aphylophoroid fungi (Basidiomycota) recorded from the Brazilian Atlantic forest. *Mycotaxon* **109**: 439–442.
- COELHO, G., V.G. CORTEZ & R.T. GUERRERO (2007): New morphological data on *Amauroderma brasiliense* (Polyporales, Basidiomycota). *Mycotaxon* **100**: 177–183.
- FIDALGO, O. (1968): As microestruturas e sua importância na sistemática dos fungos superiores. *Rickia* **3**: 117–159.
- FURTADO, J.S. (1981): Taxonomy of *Amauroderma* (Basidiomycetes, Polyporaceae). *Mem. New York Bot. Gard.* **34**: 1–109.
- GOMES-SILVA, A.C. & T.B. GIBERTONI (2009): Checklist of the aphylophoraceous fungi (Agaricomycetes) of the Brazilian Amazonia. *Mycotaxon* **108**: 319–322.
- GIBERTONI, T.B., A. BERNICCHIA, L. RYVARDEN & A.C. GOMES-SILVA (2008): Bresadola's polypore collection at the Natural History Museum of Trento, Italy. 2. *Mycotaxon* **104**: 321–323.
- HOLMGREN, P.K. & N.H. HOLMGREN [1998 (continuously updated)]: Index Herbariorum: A global directory of public herbaria and associated staff. In: New York Botanical Garden's Virtual Herbarium. Available in <http://sweetgum.nybg.org/ih/> Accessed 4 Jun 2009.
- KIRK, P.M., P.F. CANNON, D.W. MINTER & J.A. STALPERS (2008): *Dictionary of the Fungi*. CABI Publishing, Surrey.
- LUCENA, V.L.A. (1988): Estudo da família Ganodermataceae Donk na Mata do Buraquinho, João Pessoa, Paraíba, Brasil. Master Dissertation, Universidade Federal de Pernambuco.
- RYVARDEN, L. (1984): Type studies in the Polyporaceae 16. Species described by J.M. Berkeley, either alone or with other mycologists from 1856 to 1886. *Mycotaxon* **20**(2): 329–363.
- RYVARDEN, L. (1991): *Genera of Polypores - Nomenclature and taxonomy*. Fungiflora, Oslo.
- RYVARDEN, L. (2004): *Neotropical Polypores. Part 1*. Fungiflora, Oslo.
- TORREND, C. (1920): Les Polyporacées du Brésil. Polyporacées stipitées. *Broteria, Ser. Bot.* **18**(1): 121–142.
- WATLING, R. (1969): *Colour Identification Chart*. Her Majesty's Stationary Office, Edinburgh.

**NEOTYPIFICATION OF *AMAURODERMA PICIPES* TORREND, 1920  
(*GANODERMATACEAE*, *AGARICOMYCETES*)<sup>4</sup>**

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The holotype of *Amauroderma picipes*, described by Torrend in 1920 from material collected in the State of Bahia, Brazil, was recently located in herbarium URM, but it was in poor conditions. Due to the loss of the typical characteristics of the species, a neotype is designated here. The material chosen for *A. picipes* was collected in the State of Rio de Janeiro and deposited in herbarium SP (95472) as *A. schomburgkii* f. *schomburgkii*. A full modern description, pictures of the basidiomata and basidiospores in light microscopy and SEM are provided.

**Key words** – *Ganodermataceae* – taxonomy – typification – Brazil

### Introduction

*Amauroderma* Murrill comprises about 30 species (Kirk et al. 2008) of tropical distribution, with the main centre of diversity in the neotropics (Ryvarden 2004). For the neotropical region 21 species were cited by Ryvarden (2004) while in Brazil this genus is represented by 20 species (Campacci & Gugliotta 2009, Gugliotta et al. 2010). *Amauroderma* is morphologically variable, but the basidiomata are usually centrally to laterally stipitate and the basidiospores are globose to subglobose, occasionally subelliptical, rarely oblong, hyaline to pale yellow and double-walled with an ornamented or very rarely smooth endosporium (Furtado 1981, Ryvarden 2004, Gomes-Silva et al. 2010).

After the description of the genus by Murrill in 1905, authors like Torrend (1920), Furtado (1981), Moncalvo & Ryvarden (1997) and Ryvarden (2004) provided valuable contributions to its systematics. Among these works, Torrend (1920) described 27 Brazilian species, of which three (*A. gusmanianum* Torrend, *A. mosselmanii* Torrend, *A. picipes* Torrend) were new to science. *Amauroderma gusmanianum* and *A. mosselmanii* are synonyms of *A. schomburgkii* (Mont. & Berk.) Torrend, but *A. picipes* is a valid species according to CBS ([www.cbs.knaw.nl](http://www.cbs.knaw.nl)), Index Fungorum ([www.indexfungorum.org](http://www.indexfungorum.org)) and Mycobank ([www.mycobank.org](http://www.mycobank.org)). However, Furtado (1981) and Ryvarden (2004) do not mention *A. picipes* in their works. According to Moncalvo & Ryvarden (1997) the type specimen was lost and they suggested that the name should be

abandoned. Campacci & Gugliotta (2009) reported 20 *Amauroderma* species in Brazil and mentioned that *A. picipes* is insufficiently known, because no modern description has been found in the literature. C. Torrend was a well-known mycologist and part of his fungal collection, including important Brazilian specimens, was later deposited in the Herbarium Padre Camille Torrend (URM). The type specimen of *A. picipes*, originally described from the State of Bahia (Torrend 1920), was recently located in URM (Fig 1), after nearly a century. Unfortunately, it was partially destroyed by insects and only the stipe remains in good condition. A duplicate of this type was not deposited in any other herbaria. This study aimed to designate a neotype and to provide a modern description and illustrations of the species.

## Methods

Specimens of *Amauroderma* deposited in Herbaria SP and URM were analysed. Basidiomata were examined macro- (shape, colour, hymenial surface) and micromorphologically (hyphal system, sterile structures and basidio-spores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Colour designation followed Watling (1969).

Scanning electron microscopy (SEM) was conducted at the Laboratório de Microscopia Eletrônica (DF/UFPE). Sections were removed from dried basidiomata and mounted directly on aluminum stubs using carbon adhesive tabs. The fragments were coated with 8–13 nm of gold using a Baltec SCD050 sputter coater and examined with a JEOL JSM-5900 scanning electron microscope.

## Taxonomy

*Amauroderma picipes* Torrend, Brotéria, sér. bot. 18: 132 (1920).

Figs 2–6

*Basidiomata* annual, solitary, centrally to laterally stipitate, very light in weight when dry, rigid; *pileus* single, circular to semicircular, plane to slightly convex, slightly depressed in the center, up to 3.2–3.7 cm wide, 2.2–3.5 cm high, 0.6–0.7 mm in total thickness, firm; *upper surface* glabrous to hispid, dull to slightly shiny, azonate, radially sulcate, cigar brown (16) to fuscous black (36); *margin* obtuse, entire, inflexed, concolorous with the upper basidiomata surface; *pore surface* snuff brown (17) to cigar brown (16), pores round, 5–6 per mm, dissepiments entire to slightly lacerate, thin; *context* snuff brown (17) to fulvous 12, with two black lines originated from stipe, fibrous, compact to loose, soft, up to 0.2–0.3 mm thick; *tubes* concolorous with the context, fibrous, compact, up to 0.2–0.4 mm deep; *stipe* fuscous black (36) to violaceous black (38), cylindrical, centrally to laterally inserted in the pileus, slightly incurved from the base, shiny, laccate, up to 7.5–

8.0 cm long, base and apex up to 0.4–0.5 cm in diam, context of the stipe cigar brown (16) and snuff brown (17) in center, with two black lines, soft but slightly firm. *Hyphal system* dimitic; generative hyph-ae with clamp connections, hyaline to yellow, thin-walled, 1.5–2.5  $\mu\text{m}$  in diam.; arboriform skeletal hyphae hyaline to yellow, thick-walled to solid, 4.0–5.0  $\mu\text{m}$  in diam., slightly dextri-noid; *basidia* not seen; *hyphal pegs* absent; basidiospores globose to subglobose, hyaline to pale yellow in KOH, thick-walled, with endo-sporium finely ornamented, 9.0–11.0  $\times$  7.0–8.0  $\mu\text{m}$ , slightly dextrinoid.

KNOWN DISTRIBUTION – Brazil (Torrend 1920).

MATERIAL EXAMINED – **Type:** BRAZIL, State of Bahia, Gongugy, loc. n. det., Jan 1916, C Torrend, 613 [URM 9784 (A-538)]. **Neotype** (here designated): BRAZIL, State of Rio de Janeiro, Rio de Janeiro, Jardim Botânico, May 1966, leg E.F. Guimarães, s.n [SP 95472, as *A. schomburgkii* f. *schomburgkii* (Mont. & Berk.) Torrend].

REMARK: The black to brownish, cen-trally stipitate basidiomata, the laccate stipe, azonate pileus surface, small pores (5–6 per mm), brownish context with two black lines and finely ornamented, large basidiospores (9.0–11.0  $\times$  7.0–8.0  $\mu\text{m}$ ) are typical for this species.

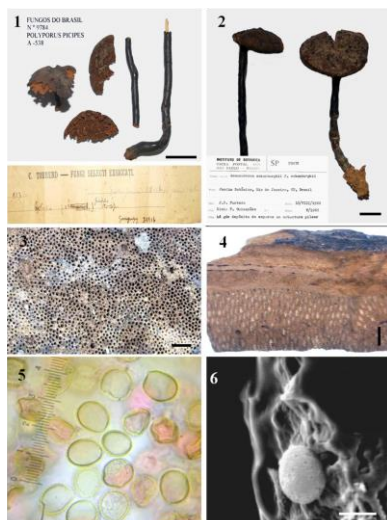
## Discussion

*Amuroderma picipes* was one of many new species described by Torrend while in Brazil. This species was described in 1920 and not mentioned again in the literature until Moncalvo & Ryvarden (1997) reported the type specimen as lost and suggested this name be abandoned. During the revision of *Amauro- derma* deposited in Herbaria SP and URM, new and interesting species were discovered, among these the type specimen of *A. picipes* in URM (1234) and a specimen identified in 1981 by Furtado as *A. schomburgkii* f. *schomburgkii* SP 95472), which is designated as the neotype of *A. picipes* in this article. These new discoveries, based in material deposited in Brazilian Herbaria, evidence the importance of herbarium revisions and accessibility of her-baria records to the knowledge of fungal diversity.

In the protologue, Torrend indicated the collection site (Forêt de Gongugy, Bahia) and briefly described the species in French: “*Chapeau orbiculaire légèrement deprime au centre, de près de 3 cm de diam., très régulier, brun-noirâtre, à bords très élégamment infléchis et appliqués sur un pourtour de près de 3–4 mm de longueur; stipe de 6–7 cm de long sur 3 mm de large recouvert d’une fine croûte noire et luisante, sur un tissu brun cannelle; tissu du chapéu brun cannelle; pores concolores, de 2–3 mm de long, très petits, brun pâle à l’orifice; spores lisses, jaunes, grandes, globuleuses, de 10–12  $\mu\text{m}$ , avec de nombreuses spores conidiales de 4–5  $\mu\text{m}$ ”.*

After examining the

type species, we conclude that the macro- and microscopic features of *A. schomburgkii* f. *schomburgkii*, collected in 1966 by E.F. Guimarães, in Jardim Botânico (= Botanical Gardens), in the former State of Guanabara, now State of Rio de Janeiro, in the city of Rio de Janeiro (SP 95472) agree with Torrend's original description of this taxon. According to Torrend (1920), this species is remarkable because of its regular shape, the inflexed margins, black laccate stipe and black basidiomata. *Amauroderma schomburgkii* (M-ont. & Berk.) Torrend is a distinct species, characterised by robust basidiomata, red brown upper surface, non laccate stipe, small and distinctly ornamented basidiospores (7–9 µm in diam.), features that distinguish this species from *A. picipes*.



**Figs 1–6** *Amauroderma picipes* **1** Type specimen. **2** Basidiomata (neotype). **3** Pore surface (neotype). **4** Context with two black lines and tubes (neotype). **5** Basidiospores in light microscopy (neotype). **6** Basidiospores in SEM (type). – Scale (1 and 2 = 1 cm, 3 and 4 = 1 mm, 6 = 5 µm).

In the original description, Torrend (1920) mentions “spores lisses”, but they are finely ornamented in light microscopy and slightly verrucose in SEM (Fig 6). The size of the basidiospores, 9.0–10.0 × 7.0–8.0 µm observed in type, differs from the original description (10–12 µm), but the analysis of the type revealed smaller basidiospores as well as in the neotype. The presence of “nombreuses spores conidiales de 4–5 µm” mentioned in the original description probably refers to spores of fungal contaminants and do not belong to the species. According to Torrend, *A. picipes* should be compared with *A. leptopus* (Pers.) J.S. Furtado, *A. renidens* (Bres.) Torrend and *A. nigrum* Rick, but the presence of a laccate stipe distinguishes it from the others species described in *Amauroderma*.

*Amauroderma picipes* is a valid species and should be taken into account in research about neotropical diversity. New collections will be welcomed and will provide data about the variability of the species.

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## References

- Campacci TVS, Gugliotta AM. 2009 – A review of *Amauroderma* in Brazil, with *A. oblongisporum* newly recorded from the neotropics. *Mycotaxon* 110, 423–436.
- Coelho G, Cortez VG, Guerrero RT. 2007 – New morphological data on *Amauroderma brasiliense* (*Polyporales*, *Basidiomycota*). *Mycotaxon* 100, 177–183.
- Furtado JS. 1981 – Taxonomy of *Amauroderma* (*Basidiomycetes*, *Polyporaceae*). *Mem. New York Bot. Gard.* 34, 1–109.
- Gomes-Silva AC, Baltazar MB, Ryvarden L, Gibertoni TB. 2010 – *Amauroderma calcigenum* (*Ganodermataceae*, *Basidiomycota*) and its presumed synonym *A. partitum* Nova Hedwigia 90 (3-4), 449–455.
- Gugliotta AM, Silveira RMB, Loguercio-Leite C, Campos-Santana M, Gibertoni TB, Drechsler-Santos ER, Gomes-Silva AC, Baltazar JM. 2010 – *Polyporales* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. (<http://floradobrasil.jbrj.gov.br/2010/FB092405>).
- Kirk PM, Cannon PF, Minter DW, Stalpers JA. 2008 – Dictionary of the Fungi. 10 ed. CABI Publishing, Surrey, 771 pp.
- Moncalvo, JM, Ryvarden L. 1997 – A nomenclatural study of the *Ganodermataceae*. *Synopsis Fungorum* 11. Fungiflora. Oslo. 114 p.
- Ryvarden L. 1991 – Genera of Polypores – Nomenclature and taxonomy. Fungiflora, Oslo.
- Ryvarden L. 2004 – Neotropical Polypores. Part 1. Fungiflora, Oslo.
- Torrend C. 1920 – Les Polyporacées du Brésil: Polyporacées stipitées. *Brotéria, Série Botânica* 18 (1), 121–142.
- Watling R. 1969. – Colour Identification Chart. Her Majesty's Stationary Office, Edinburgh.



**NEW RECORDS OF *GANODERMATACEAE* (*BASIDIOMYCOTA*) FROM BRAZIL**

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**Abstract:** *Ganoderma citriporum*, *G. multicornum*, *G. zonatum* and *Haddowia longipes* are reported as new for Brazil. Descriptions of the newly recorded species from Brazil and a key to the ten species of *Ganoderma* reported from the Brazilian Amazonia are provided.

**Key words:** *Ganoderma*, *Haddowia*, *Humphreya*, Brazilian Amazonia.

**Introduction**

*Ganodermataceae* Donk (*Basidiomycota*) was described in 1948 on the basis of double walled basidiospores, with an outer (exosporium) layer relatively thin and hyaline, and the inner (endosporium) usually pigmented, thick and often ornamented, rarely smooth (Cannon & Kirk 2007). This family includes four genera: *Amauroderma*, *Ganoderma*, *Haddowia* and *Humphreya* (Kirk et al. 2008), with economically and ecologically important species because of their medicinal properties and their role in cycling of nutrients in ecosystems. All species cause a white rot in their substrata, some being saprotrophs while others are parasitic on roots of living trees (Buchanan 2001, Ryvarden 2004).

Several species of *Ganodermataceae* have been reported from Brazil: four in the semi-arid region (Drechsler-Santos et al. 2009), five in the Cerrado (Gibertoni & Drechsler-Santos 2010), 29 in the Brazilian Amazonia (Gomes-Silva & Gibertoni 2009a, b), and 32 to the Atlantic rain forest (Baltazar & Gibertoni 2009). Descriptions of the new occurrences of *Ganoderma* spp. based on collections from the Brazilian Amazonia and a key to the species recorded in this region are presented below. Besides that, the two monospecific genera of *Ganodermataceae*, *Haddowia* and *Humphreya*, also collected in the area are discussed.

**Material and methods**

Specimens were collected in three conservation units located in the Brazilian Amazonia. The Parque Natural Municipal de Porto Velho (390 ha, 08°45'S and 63°54'W) and the Estação Ecológica de Cuniã (53 221 ha, 08°04'S and 63°31'W) include open ombrophilous forests and

transition forests with savannahs, and are both in the state of Rondônia. The Estação Científica Ferreira Penna (33 000 ha, 1°44'S and 51°27'W) is located in the State of Pará, and includes typical Amazonian ecosystems and its flora is reported to be one of the richest in the Amazonian basin (Lisboa 2002). The specimens were deposited in the herbaria of HFSL, URM and MG (Holmgren & Holmgren 1998). Additional specimens deposited in INPA and SP were also studied.

Basidiomata were studied macro- (shape, colour, hymenial surface) and microscopically (hyphal system, presence/absence and measures of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Colour designation follow Watling (1969).

Scanning electron microscopy (SEM) studies were conducted at the Laboratório de Microscopia Eletrônica (DF/UFPE). Sections were removed from dried basidiomata and mounted directly on aluminum stubs using carbon adhesive tabs. The fragments were coated with 8–13 nm of gold using a Baltec SCD050 sputter coater and examined with a JEOL JSM-5900 scanning electron microscope.

### Taxonomy

**Ganoderma amazonense** Weir, A pathological survey of the para rubber tree (*Hevea Brasiliensis*) in the Amazon Valley: 12 (1926).

DESCRIPTION in Ryvarden (2004).

COMMENTS: This species is characterized by the dull upper surface of the basidiomata, the cream context, pores 4–5(–6) per mm and ellipsoid basidiospores of (6–)7–8 × 5–6(–7) µm.

DISTRIBUTION: Neotropical (Ryvarden 2004). In Brazil, reported from the States of Amazonas, Pará, Mato Grosso and Rondônia (Gomes-Silva & Gibertoni 2009a). It is a new record to the state of Acre.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B.Lowy et al. 883, 23/X/1980 (INPA 100700, as *G. curtisii*).

**Ganoderma australe** (Fr.) Pat., Bull. Soc. mycol. Fr. 5: 65, 1890.

≡ *Polyporus australis* Fr., Elench. Fungi 1: 108, 1928.

DESCRIPTION in Ryvarden (2004).

COMMENTS: A very common species, it is macroscopically similar to *Fomes fasciatus* (Sw.) Cooke, which can be distinguished by the cylindrical, hyaline basidiospores, and to *G. applanatum* (Pers.)

Pat., which is a species of temperate zones and with smaller basidiospores. According to Ryvarden (2004), the distinct black cuticle and the dark brown context help to recognize *G. australe*.

DISTRIBUTION: Pantropical (Ryvarden 2004). In Brazil, reported from the states of Pará and Rondônia (Gomes-Silva & Gibertoni 2009a), Pernambuco (Drechsler-Santos et al. 2009), Bahia, Minas Gerais, Rio de Janeiro, Paraná, Rio Grande do Sul, São Paulo and Santa Catarina (Baltazar & Gibertoni 2009). It is a new record to the States of Acre, Amazonas and Roraima.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. ACRE: Cruzeiro do Sul, G. T. Prance et al. 13606, 24/IV/1971 (INPA 30749, as *Ganoderma* sp.). BRAZIL. ACRE: loc. n. det., B.Lowy et al. 737, 13/X/1980 (INPA 100648, as *Ganoderma* sp.). BRAZIL. ACRE: loc. n. det., B.Lowy et al. 839, 21/X/1980 (INPA 100706, as *Ganoderma* sp.). BRAZIL. ACRE: loc. n. det., B.Lowy et al. 810, 20/IX/1980 (INPA 100722, as *G. applanatum* (Pers.) Pat.). BRAZIL. ACRE: loc. n. det., G.T.Prance et al. 7594, 27/IV/1968 (INPA 24393, as *G. applanatum*). BRAZIL. ACRE: loc. n. det., G.T.Prance & J.F.Ramos 7456, 21/IV/1968 (INPA 24255, as *G. applanatum*). BRAZIL. ACRE: Cruzeiro do Sul, P.J.M.Maas et al. 12906, 13/V/1971 (INPA 31269, as *Favolus* sp.). BRAZIL. ACRE: loc. n. det., B. Lowy 370, 30/IX/1980 (INPA 100300, as *G. applanatum*). BRAZIL. ACRE: loc. n. det., B.Lowy et al. 322, 27/IX/1980 (INPA 100272, as *G. curtisii*). - BRAZIL. AMAZONAS: Manaus, A.C.Batista & G.E.P.Peres, II/1961 (URM 36344, as *F. australis* (Fr.) Cooke). BRAZIL. ACRE: loc. n. det., G.T.Prance et al. 7692, 30/IX/1968 (INPA 24490, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels et al. 301, 14/II/1984 (INPA 129335, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels 725, 4/III/1984 (INPA 129742, as *Ganoderma* sp.). BRAZIL. AMAZONAS: loc. n. det., M.A.Sousa 267, 20/X/1977 (INPA 74574, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Humaitá, G.T.Prance & J.F.Ramos 3457, 29/X/1966 (INPA 19032, as *G. applanatum*). BRAZIL. AMAZONAS: loc. n. det., G.J.Samuels et al. 1121, 24/III/1984 (INPA 130130, as *G. applanatum*). BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels & E.Cooper 931, 15/III/1984 (INPA 129945, as *G. applanatum*). BRAZIL. AMAZONAS: Manaus, M.A.Sousa 157, 12/IV/1977 (INPA 74646, as *G. applanatum*). BRAZIL. AMAZONAS: Manaus, Rio Negro, Tapuruquará, I.J.Araújo et al. 972, 22/I/1978 (INPA 78744, as *G. applanatum*). BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels 710, 4/III/1984 (INPA 129727, as *G. applanatum*). BRAZIL. AMAZONAS: loc. n. det., D.G.Campbell et al. 21971, 8/IV/1974 (INPA 45911, as *G. applanatum*). BRAZIL. AMAZONAS: loc. n. det., G.T.Prance et al. 10401, 2/III/1969 (INPA 26175, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Manaus, K.F.Rodrigues et al. 807, 6/X/1985 (INPA 137099, as *Phellinus* sp.). BRAZIL. AMAZONAS: Manaus, R.B.Singer 10910, 2/IV/1978 (INPA 77481, as *Fomes* sp.). BRAZIL.

AMAZONAS: Jutai, E.S.S.Silva et al. 842-845, 24/X/1986 (INPA 153827, INPA 153831). BRAZIL. AMAZONAS: Jutai, E.S.S.Silva et al. 852, 26/X/1986 (INPA 154969). BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels & E.Cooper 985, 15/III/1984 (INPA 129999, as *G. applanatum*). BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels et al. 353, 17/II/1984 (INPA 129387, as *G. applanatum*). BRAZIL. AMAZONAS: Manaus, BR174, km 44, EEST, K.Vohland 1826, 13/VI/1996 (INPA 216371, as *G. applanatum*). – BRAZIL. AMAZONAS: loc. n. det., B.Lowy et al. 143, 13/IX/1980 (INPA 100062, as *G. curtisii*). BRAZIL. PARÁ: Itaituba, loc. n. det., M.A.Sousa & L.F.Coêlho 119, 31/X/1977 (INPA 74736, as *Ganoderma* sp.). BRAZIL. PARÁ: Oriximinã, loc. n. det., V.R.L.Bononi, et al. 886, 1/VII/1980 (INPA 103763, as *Ganoderma* sp.). BRAZIL. PARÁ: Oriximinã, loc. n. det., V.L.R.Bononi et al. 389, 17/VI/1980 (INPA 103447, as *Ganoderma* sp.). BRAZIL. PARÁ: Itaituba, loc. n. det., M.A.Sousa & L.F.Coêlho 138, 3/X/1977 (INPA 74626, as *Ganoderma* sp.). BRAZIL. PARÁ: Itaituba, loc. n. det., M.A.Sousa & L.F.Coêlho 67, 1/X/1977 (INPA 74588, as *G. applanatum*). BRAZIL. PARÁ: Oriximinã, V.L.R.Bononi et al. 949, 2/VII/1980 (INPA 103814, as *G. applanatum*). BRAZIL. PARÁ: Itaituba, M.A.Sousa & L.F.Coêlho 130, 3/X/1977 (INPA 74792, as *G. colkinsii*). BRAZIL. PARÁ: Itaituba, M.A.Sousa 201, 5/X/1977 (INPA 74726, as *G. curtisii* (Berk.) Murrill). BRAZIL. PARÁ: Belém, L.J.Aguiar et al. 1420, 12/X/1979 (INPA 102939, as *G. applanatum*). BRAZIL. PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006 (URM 79273, URM 79272, URM 79274). BRAZIL. PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007 (URM 79249, URM 79250, 79251, URM 79248). BRAZIL. PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007 (URM 79254, URM 79253, URM 79255, URM 79252). BRAZIL. PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, II/2008 (URM 79256, URM 79263, URM 79266, URM 79261, URM 79262, URM 79267, TBG 290, URM 79260, URM 79264, URM 79269, URM 79257, URM 79265, URM 79268, URM 79270, URM 79258, URM 79259, URM 79271). – BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 75-140, VII/2007 (URM 79176, URM 78935). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A. C. Gomes-Silva 332, II/2008 (URM 79177). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 317, II/2008 (URM 79484). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 612, VII/2008 (URM 79485). BRAZIL. RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, A.C.Gomes-Silva 369-387-417-425-427, II/2008 (URM 79178, URM 79179, URM 79180, URM 79181, URM 79182). BRAZIL. RONDÔNIA: loc. n. det., G.T.Prance et al. 8492, 15/XI/1968 (INPA 25290, as *Ganoderma* sp.). BRAZIL. RONDÔNIA: loc. n. det., R.D.Goos et al. 1582, 23/V/1984 (INPA 125097, as *G. applanatum*). BRAZIL. RONDÔNIA: loc. n. det., K.P.Dumont et al. 103, 6/VII/1968 (INPA 65140,

as *G. applanatum*). BRAZIL. RONDÔNIA: Jarú Municipality, M.Capelari & R.Maziero, w/date (SP 211485, SP 211487). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 695, II/2009 (URM 81082). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 711, II/2009 (URM 81050). – BRAZIL. RORAIMA: loc. n. det., B.Lowy et al. 1918-2099-2187, 18/VII/1986 (INPA 145206, INPA 145384, INPA 145467, as *Ganoderma* sp.). BRAZIL. RORAIMA: Alto Alegre, loc. n. det., E.S.S.Silva et al. 426, 10/VI/1986 (INPA 154914, as *Ganoderma* sp.). BRAZIL. RORAIMA: Alto Alegre, loc. n. det., K.F.Rodrigues et al. 1110, 22/VI/1986 (INPA 143444, as *Ganoderma* sp.). BRAZIL. RORAIMA: Alto Alegre, loc. n. det., K.F.Rodrigues 907, 11/VI/1986 (INPA 143298, as *Ganoderma* sp.). BRAZIL. RORAIMA: loc. n. det., G.T.Prance et al. 9969, 15/II/1969 (INPA 27102, as *Fomes* sp.). BRAZIL. RORAIMA: Boa Vista, BR174, km 360, I.J.Araújo et al. 609, 18/XII/1977 (INPA 78294, as *G. applanatum*). BRAZIL. RORAIMA: Boa Vista, M.A.Jesus 881, 27/IX/1980 (INPA 186186, as *G. lucidum*). BRAZIL. RORAIMA: loc. n. det., B.Lowy et al. 1946, 18/VII/1986 (INPA 145232, as *Ganoderma* sp.). BRAZIL. RORAIMA: loc. n. det., B.Lowy et al. 2168, 18/VII/1986 (INPA 145448, as *Ganoderma* sp.).

***Ganoderma citriporum*** Ryvar den & Iturr., in Ryvar den, Syn. Fung. (Oslo) 19: 75, 2004.

Figs 1, 2

Basidiomata perennial, solitary, laterally stipitate. Pileus semicircular 7.7 cm wide, 6.5 cm long and 0.4 mm thick. Upper surface of the basidiomata dull, glabrous, sulcate and zonate, red (bark brick-20) when fresh, brown (snuff brow-17 to cigar brown-16) when dry. Margin entire, acute, cream (B-2). Context homogeneous, 0.2 mm thick, brown (clay buff 32). Tubes thin, brown (snuff brown-17). Pore surface cream, gray and citric yellow (B-2, A-1 and H-9), pores round, 4–5(–6) per mm, dissepiments thin and entire, decurrent near the stipe, 2–3 per mm. Stipe dull, glabrous, cylindrical to irregular, 15.5 cm long, 1.1 cm diam., red (bark brick-20) when fresh and brown (snuff brow-17 to cigar brown-16) when dry, context of stipe homogeneous, brown (cigar brown-16), with cuticle delimited. Hyphal system dimitic; generative hyphae with clamps, hyaline, thin-walled, 2–3 µm diam.; skeletal hyphae yellow, thick-walled to solid, arboriform, 3.5–5 µm diam. Basidia not seen. Basidiospores oblong, truncate, double-layered, pale brown, finely ornamented, 8–9(–10) × 5–6 µm.

COMMENTS: Previous studies of *G. citriporum* were based on material collected in Venezuela (Ryvar den 2004). The species is characterized by the irregularly shaped stipe, the citric pore surface and oblong basidiospores (9–10 × 4–5 µm). It is macroscopically similar to *G. australe*, the latter differing by the larger basidiospores (7–12 × 5–8 µm). The materials SP 211487 and URM 79486

differ macroscopically from the description of Ryvarden (2004) by the cream to white color of the pore surface and slightly larger pores.

DISTRIBUTION: Venezuela (Ryvarden 2004) and now proven to occur in Brazil.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Manaus, BR174, km 44, EEST, K.Vohland 1824, 7/V/1996 (INPA 216369, as *G. australe*). – BRAZIL. RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, A.C.Gomes-Silva 386, II/2008 (URM 79486). BRAZIL. RONDÔNIA: Município de Jarú, M.Capelari & R.Maziero, w/ date (SP 211487).

**Ganoderma colossus** (Fr.) C.F.Baker, Brotéria: 425 (1918).

≡ *Polyporus colossus* Fr., Nov. Symb. Myc.: 56 (1851)

DESCRIPTION in Ryvarden (2004).

COMMENTS: This species is characterized by the laccate upper surface of the basidiomata, the soft context, the ellipsoid basidiospores, 15–18(–19) × 10–12 μm, and many chlamydospores.

DISTRIBUTION: Neotropical (Ryvarden 2004). In Brazil, reported from the state of Amapá (Gomes-Silva & Gibertoni 2009b), Bahia (Baltazar & Gibertoni 2009) and now found in Pará.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. AMAPÁ: Macapá, Mazagão, VI/1961, P.Ledoux (URM 48733). BRAZIL. AMAPÁ: Macapá, Mazagão, VI/1961, A.C.Batista (URM 48437). BRAZIL. PARÁ: Itaituba, M.A.Sousa & L.F.Coêlho s.n., 10/X/1977 (INPA 74582).

**Ganoderma multicornum** Ryvarden, Mycologia 92(1): 184, 2000.

Fig. 3

Basidiomata perennial, sessile to stipitate, with a slightly contracted base. Pileus semicircular 6–8 cm wide, 13–16 cm long, 1–2 cm thick. Upper surface of the basidiomata laccate, glabrous, sulcate and zonate, red (bark brick-20 to bay-19). Margin entire, obtuse, concolorous to the upper surface of basidiomata. Context 0.4–0.5 cm thick, with black lines, brown to yellow (snuff brown-17 to buff-52). Tubes 0.9–1.2 cm long, brown to yellow (snuff brown-17 to buff-52). Pore surface cream (C-4), pores angular, 5–6 per mm, dissepiments thin and entire. Hyphal system dimitic; generative hyphae with clamps, hyaline, thin-walled, 2–2.5 μm diam.; skeletal hyphae pale yellow, thick-walled, arboriform, 3–5.5 μm diam. Cuticle amyloid, with cells apically antler-like branched. Basidia not seen. Basidiospores ellipsoid, truncate, double-layered, pale brown, finely ornamented, (8–)9–12(–13) × (–5)6–8 μm.

COMMENTS: This species was described from material collected in Venezuela (Ryvarden 2004), and is characterized macroscopically by the red, zonate upper surface of basidiomata, and microscopically by the apical antler-like cells and strongly amyloid cuticle.

DISTRIBUTION: Venezuela (Ryvarden 2004) and now proven to occur in Brazil.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 627, VII/2008 (URM 79487).

**Ganoderma multiplicatum** (Mont.) Pat., Bull. Soc. mycol. Fr. 5(2,3): 74, 1889.

≡ *Polyporus multiplicatus* Mont., Anns Sci. Nat., Bot., sér. 4 1: 128 (1854).

DESCRIPTION in Gottlieb & Wright (1999), Ryvarden (2004).

COMMENTS: This species has amyloid, tuberculate hyphal ends in the cuticle and small basidiospores ( $7-8 \times 5-6 \mu\text{m}$ ), as stated by Ryvarden (2004).

DISTRIBUTION: Neotropical (Ryvarden 2004). In Brazil, it was recorded in the States of Amazonas, Pará and Rondônia (Gomes-Silva & Gibertoni 2009a), Santa Catarina (Baltazar & Gibertoni 2009) and now found in Roraima.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Manaus, M.A.Sousa 151, 8/VIII/1977 (INPA 74707, as *G. lucidum*). BRAZIL. AMAZONAS: Manaus, M.A.Sousa 249, 13/V/1977 (INPA 74533, as *G. resinaceum*). BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, E.S.S. et al. 294, 11/VII/1985 (INPA 153737, as *G. lucidum*). – BRAZIL. PARÁ, Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007 (URM 79280). BRAZIL. PARÁ, Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, II/2008 (URM 79281, URM 79282, URM 79283). – BRAZIL. RONDÔNIA: Jarú, Acampamento JP-14, M.Capelari & R.Maziero, w/ date (SP 211484). BRAZIL. RONDÔNIA: loc. n. det., R.D.Goos et al. 1673, 26/V/1984 (INPA 125007, as *Ganoderma* sp.). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 646, II/2009 (URM 81081). BRAZIL. RORAIMA: Boa Vista, M.A.Jesus 882, 20/VII/1989 (INPA 186187, as *G. lucidum*).

**Ganoderma orbiforme** (Fr.) Ryvarden, Mycologia 92(1): 187. 2000.

= *Polyporus orbiformis* Fr., Epicr. syst. mycol. (Upsaliae): 463. 1838.

DESCRIPTION in Ryvarden (2004).

COMMENTS: This species is characterized by the amyloid, irregular cells of the cuticle and the ellipsoid basidiospores, 9–10(–11) × 6–7 µm.

DISTRIBUTION: Neotropical (Ryvarden 2004). In Brazil, reported from the States of Amazonas (Gomes-Silva & Gibertoni 2009b) and Paraná (Baltazar & Gibertoni 2009).

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Manaus, A.C.Batista, I/1961 (URM 47785, as *G. lucidum.*).

**Ganoderma resinaceum** Boud., in Patouillard, Bull. Soc. mycol. Fr. 5: 72, 1890. [1889].

DESCRIPTION in Moncalvo & Ryvarden (1997), Ryvarden (2004).

COMMENTS: This species is characterized by the laccate upper surface of the basidiomata, dimidiate to broadly attached pilei and basidiospores 9–10 × 5–6 µm.

DISTRIBUTION: Europe, Americas and China (Moncalvo & Ryvarden 1997). In Brazil, recorded in the States of Pará (Gomes-Silva & Gibertoni 2009a), Alagoas, Paraíba, Paraná, Pernambuco, Rio Grande do Sul and Santa Catarina (Baltazar & Gibertoni 2009) and São Paulo (Gibertoni & Drechsler-Santos 2010). It is a new record to the States Amazonas, Rondônia and Roraima.

Substrate: on dead wood.

Material examined: BRAZIL. AMAZONAS: Barcelos, Próximo a Base do Aracá, acesso pelo Rio Jauari, E.S.S.Silva et al. 290, 11/VII/1985 (INPA 153733, as *G. lucidum.*). BRAZIL. PARÁ: Itaituba, M.A.Sousa & L.F.Coêlho 202, 5/X/1977 (INPA 74608, as *Ganoderma* sp.). – BRAZIL. PARÁ: Itaituba, M.A.Sousa & L.F.Coêlho 115, 3/X/1977 (INPA 74604, as *G. lesinaceum.*). – BRAZIL. RONDÔNIA: Jarú, Acampamento JP-14, M.Capelari & R.Maziero, w/ date (SP 211267). BRAZIL. RORAIMA: Alto Alegre, K.F.Rodrigues et al. 1077, 21/VI/1986 (INPA 143420, as *G. lucidum.*).

**Ganoderma stipitatum** (Murrill) Murrill, N.Amer. Fl. (New York) 9(2): 122, 1908.

= *Fomes stipitatus* Murrill, Bull. Torrey bot. Club 30(4): 229 (1903)

DESCRIPTION in Ryvarden (2000, 2004).

COMMENTS: The species is characterized by the dark resinous bands in the pale brown context. According to Ryvarden (2004), its basidiomata can vary from dimidiate to laterally stipitate. Several collections of the Amazonian material were completely sessile.



DISTRIBUTION: Nicaragua, Costa Rica, Suriname, Bolivia, Brazil, Peru and Venezuela (Ryvarden 2004). In Brazil, it was recorded in the states of Pará and Rondônia (Gomes-Silva & Gibertoni 2009a), Alagoas, Paraíba, Pernambuco and Paraná (Baltazar & Gibertoni 2009), being a new record to Acre and Amazonas.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B.Lowy et al. 114, 9/VII/1980 (INPA 100123, as *G. lucidum*). BRAZIL. ACRE: loc. n. det., B.Lowy et al. 115, 10/IX/1980 (INPA 100045, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Manaus, A.C.Batista, II/1961 [URM 47762, as *G. lucidum* (Curtis) P.Karst.]. BRAZIL. PARÁ: Belém, A.F.Vital, w/date (URM 1311, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., G.T.Prance & J.F.Ramos 3329, 25/XII/1966 (INPA 18904, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Manaus, R.B.Singer & I.J.Araújo 12391, 9/III/1983 (INPA 108361, as *Ganoderma* sp.). BRAZIL. AMAZONAS: loc. n. det., E.Lleras & O.P.Monteiro 19678, 24/XII/1973 (INPA 43162, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., W.C.Steward et al. 20278, 14/II/1974 (INPA 44200, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., L.C.Ongley & J.F.Ramos 21760, 31/III/1974 (INPA 45695, as *G. lucidum*). BRAZIL. AMAZONAS: Manaus, Distrito Agropecuário, ZF3, K.F.Rodrigues & D.C.Daly 778, 5/X/1985 (INPA 137064, as *G. lucidum*). BRAZIL. AMAZONAS: Manaus, BR174, km 44, EEST, K.Vohland 1794, 13/XII/1996 (INPA 216367, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Negro, Paraná do Maipingi, I.J.Araújo 852, 13/I/1978 (INPA 78608, as *G. lucidum*). BRAZIL. AMAZONAS: Barcelos, Rio Negro, M.L.Farr et al. 121, 15/I/1978 (INPA 164361, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Rio Negro, Tapuruquará, M.L.Farr et al. 163, 20/I/1978 (INPA 164394, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Rio Negro, Carvoeiro, I.J.Araújo et al. 886, 14/I/1978 (INPA 78642, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Rio Negro, Ilha Carvão, M.L.Farr et al. 89, 13/VI/1978 (INPA 164337, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Rio Negro, M.L.Farr et al. 130, 17/I/1978 (INPA 164367, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Rio Negro, M.L.Farr et al. 100, 13/I/1978 (INPA 164346, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Rio Negro, Tapuruquará, M.L.Farr et al. 165, 20/I/1978 (INPA 164396, as *G. lucidum*). BRAZIL. AMAZONAS: loc. n. det., Rio Negro, Massarabe, M.L.Farr et al. 179, 21/I/1978 (INPA 164408, as *G. lucidum*). BRAZIL. AMAZONAS: Manaus, Distrito Agropecuário, ZF3, K.F.Rodrigues et al. 772, 4/X/1985 (INPA 137059, as *G. lucidum*). BRAZIL. AMAZONAS: Novo Aripuanã, K.F.Rodrigues et al. 351, 25/IV/1985 (INPA 128991, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Fonte Boa, E.S.S.Silva et al. 924, 1/XII/1986 (INPA 155038, as *Ganoderma* sp.). BRAZIL. AMAZONAS: Manaus, Campus do INPA, R.O.Freitas 2512 (INPA 216352, as *G. lucidum*). BRAZIL. AMAZONAS: Manaus, BR174, km 44,

EEST, K.Vohland 1825, 24/IV/1996 (INPA 216370, as *G. lucidum*). BRAZIL. AMAZONAS: Fonte Boa, E.S.S.Silva et al. 909, 1/XII/1986 (INPA 155024, as *G. lucidum*). BRAZIL. MATO GROSSO: Aripuanã, M.A.Sousa 474, 24/IV/1978 (INPA 75625, as *Ganoderma* sp.). BRAZIL. MATO GROSSO: Aripuanã, M.A.Sousa 437, 23/IV/1978 (INPA 91952, as *Ganoderma* sp.). – BRAZIL. PARÁ: Belém, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007 (URM 79275). BRAZIL. PARÁ: Belém, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007 (URM 79276). – BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 02, II/2007 (URM 78937). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 162, VII/2007 (URM 78938). BRAZIL. RONDÔNIA: loc. n. det., K.P.Dumont et al. 106, 12/VII/1980 (INPA 65143, as *G. parvulum*). BRAZIL. RONDÔNIA: loc. n. det., R.H.Petersen 269, w/date (INPA 110758, as *Ganoderma* sp.). BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 712, II/2009 (URM 81051).

***Ganoderma zonatum*** Murrill, Bull. Torrey bot. Club 29: 606, 1902.

Fig. 4

Basidiomata annual to perennial, sessile. Pileus semicircular, 7.5 cm wide, 5.5 cm long, 0.5 mm thick. Upper surface of the basidiomata laccate, glabrous, sulcate, zonate with a distinct cuticle in section, red (bay-19 to fulvous-12). Margin entire, acute, concolorous to the pore surface. Context homogeneous, 0.2 mm thick, brown (fulvous-12 to snuff brown-17). Tubes 0.3 mm long, brown (milk coffee-28). Pore surface cream (C-3), pores circular, 4–5(–6) per mm, dissepiments thin and entire. Hyphal system dimitic; generative hyphae with clamps, hyaline, thin-walled, 2–3.5  $\mu\text{m}$  diam.; skeletal hyphae yellow, thick walled, arboriform, 3.5–6.0  $\mu\text{m}$  diam. Cuticle strongly amyloid, cells irregular. Basidia not seen. Basidiospores oblong, truncate, double-layered, yellow to pale brown, finely ornamented, 9–12(–13)  $\times$  6–7  $\mu\text{m}$ .

COMMENTS: The species is characterized by the red upper surface of basidiomata, the amyloid, irregular hyphae of the cuticle and the oblong basidiospores. The Brazilian *G. zonatum* differs microscopically from the description of Ryvarden (2004) by the smaller basidiospores.

DISTRIBUTION: EUA (Florida), Cuba (Ryvarden 2004) and now found in Brazil.

SUBSTRATE: on dead wood.

MATERIAL EXAMINED: BRAZIL. RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 01, II/2007 (URM 78939).

### Key to the species of *Ganoderma* of the Brazilian Amazonia

1 Basidiomata sessile or with short stipe..... 2

1' Basidiomata distinctly stipitate.....	11
2 Upper surface of basidiomata dull.....	3
2' Upper surface of basidiomata laccate.....	4
3 Context brown, usually with black lines, basidiospores ellipsoid 7–12 × 5–8 μm.....	<i>G. australe</i>
3' Context yellowish to cream, without black lines, basidiospores ellipsoid (6–)7–8 × 5–6(–7) μm.....	<i>G. amazonense</i>
4 Context spongy, basidiospores 15–18(–19) × 10–12 μm, cuticle cells not amyloid, ornamented chlamydospores present in trama and context.....	<i>G. colossus</i>
4' Context of different texture, basidiospores shorter than 15 μm long, cuticle cells weakly to strongly amyloid, ornamented chlamydospores lacking.....	5
5 Cuticle cells regular.....	6
5' Cuticle cells irregular.....	7
6 Context pale brown, usually without black lines, basidiospores 9–10(–11) × 5–6(–7) μm.....	<i>G. resinaceum</i>
6' Context dark brown, usually with black lines, basidiospores 7–9 × 5–6 μm.....	<i>G. stipitatum</i>
7 Context without black lines.....	8
7' Context with black lines.....	9
8 Cuticle cells smooth to slightly tuberculate, basidiospores 7–8 × 5–6.....	<i>G. multiplicatum</i>
8' Cuticle cells sinuous with occasional outgrowths and dichotomously lobed, basidiospores 10–13 × 7–8 μm.....	<i>G. nitidum</i>
9 Cuticle cells with numerous outgrowths or protuberances.....	<i>G. multicornum</i>
9' Cuticle cells sinuous and lobed with wide rounded outgrowths.....	10
10 Upper surface with distinct zones, pore surface cream, basidiospores oblong 9–12(–13) × 6–7 μm.....	<i>G. zonatum</i>
10' Upper surface azonate, pore surface dark brown, basidiospores ellipsoid 9–10(–11) × 6–7 μm.....	<i>G. orbiforme</i>
11 Upper surface of the basidiomata laccate, stipe 15 cm long, basidiospores 10–13 × 5–7 μm.....	<i>G. elegantum</i>
11' Upper surface of the basidiomata dull, stipe shorter than 15 cm, basidiospores shorter than 10 μm long.....	12
12 Context dark brown with black lines, pore surface usually citric yellow, basidiospores oblong 8–9(–10) × 5–6 μm.....	<i>G. citriporum</i>

12' Context yellowish to cream, without black lines, pore surface cream to white, basidiospores ellipsoid (6–)7–8 × 5–6(–7)  $\mu\text{m}$ ..... *G. amazonense*

**Haddowia longipes** (Lév.) Steyaert, Persoonia 7(1): 109 (1972).

Figs 5, 6

≡ *Polyporus longipes* Lév., Annl. Sci. Nat., Bot., sér. 3 5: 124 (1846).

Basidiomata annual, solitary, laterally stipitate. Pileus semicircular, 5 cm wide, 3.4 cm long and 1.2 mm thick. Upper surface of the basidiomata shiny, laccate, glabrous, sulcate and zonate, red (bay-19 to rusty tawny-14) when dry. Margin entire, obtuse, concolorous to the pore surface. Context homogeneous, 0.1 mm thick, cream (B-2). Tubes 0.7 mm long, pale brown (clay buff 32). Pore surface cream (B-2), pores angular to irregular, 2–3 per mm, dissepiments thin and entire. Stipe shiny, laccate, glabrous, cylindrical to irregular, 25 cm long, 0.5 cm diam., red to black (bay-19 to fuscous black-36) when dry, context of stipe homogeneous, cream (B-2). Hyphal system dimitic; generative hyphae with clamps, hyaline, thin-walled, 2–4  $\mu\text{m}$  diam.; skeletal hyphae yellow, thick-walled to solid, arboriform, 2.5–4.5  $\mu\text{m}$  diam. Basidia not seen. Basidiospores ellipsoid, longitudinally crested, yellowish to pale brown brown, 12–16(–17) × 10–13(15)  $\mu\text{m}$ .

COMMENTS: This species is characterized by the laccate upper surface of basidiomata and the crested basidiospores.

DISTRIBUTION: French Guiana, Costa Rica, Angola, Philippines (Furtado 1981) and now proven to occur in Brazil.

SUBSTRATE: on soil.

MATERIAL EXAMINED: BRAZIL. PARÁ, Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007 (URM 79279). BRAZIL. PARÁ, Oriximinã, C.A.C.Ferreira et al. 1921, 30/VIII/1980 (INPA 96089, as *A. calcigenum* (Berk.) Torrend).

**Humphreya coffeata** (Berk.) Steyaert [as 'coffeatum'], Persoonia 7(1): 102 (1972).

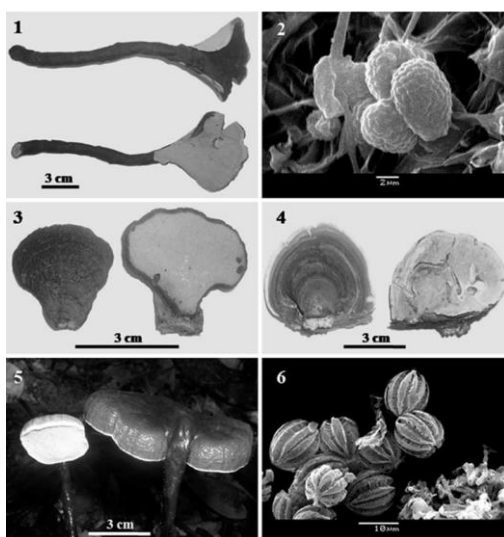
≡ *Polyporus coffeatus* Berk., *Ann. Mag. nat. Hist.*, Ser. 1 3: 385 (1839).

DESCRIPTION in Ryvarden (2004).

COMMENTS: This species might be taken as an *Amauroderma* species, but the reticulate, ellipsoid, truncate basidiospores distinguish *H. coffeata* from species of that genus.

DISTRIBUTION: Brazil, Bolivia, Cuba, and Puerto Rico (Ryvarden 2004). In Brazil, it was recorded in the states of Pará (Gomes-Silva & Gibertoni 2009a), Bahia, Paraná and Santa Catarina (Baltazar & Gibertoni 2009) and now found in Roraima.

SUBSTRATE: on soil.



Figs 1–6. Basidiomata and basidiospores. 1–2. *Ganoderma citriporum*. 3. *Ganoderma multicornum*. 4. *Ganoderma zonatum*. 5–6. *Haddowia longipes*.

MATERIAL EXAMINED: BRAZIL. PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, II/2008 (URM 79277, URM 79278). – BRAZIL. RORAIMA, loc. n. det., G.T.Prance et al. 10572, 16/II/1971 (INPA 28904, as *Ganoderma* sp.).

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### References

BALTAZAR, J.M. & T.B. GIBERTONI (2009): A checklist of aphylloroid fungi (*Basidiomycota*) recorded from the Brazilian Atlantic rain forest. *Mycotaxon* **109**: 439-442.

- BUCHANAN, P. (2001): A taxonomic overview of the genus *Ganoderma* with special reference to species of medicinal and nutraceutical importance. *Proc Int Symp Ganoderma Sci*, 27-29.
- CANNON, P.F. & P.M. Kirk (2007): *Fungal Families of the world*. CAB Internacional. 456p.
- DRECHSLER-SANTOS, E.R., T.B. GIBERTONI, A. GÓES-NETO & M.A.Q. CAVALCANTI (2009): A re-evaluation of the lignocellulolytic *Agaricomycetes* from the Brazilian semi-arid region. *Mycotaxon* **108**: 241–244.
- FURTADO, J.S. (1965): Relation of microstructures to the taxonomy of the Ganodermoideae (*Polyporaceae*) with special reference to the structure of the cover of the pilear surface. Reprinted from *Mycologia* 57 (4): 588-611.
- FURTADO, J.S. (1981): Taxonomy of *Amauroderma* (*Basidiomycetes, Polyporaceae*). *Memoirs of the New York Botanical Garden* **34**: 1-109.
- GIBERTONI, T.B., E.R. DRECHSLER-SANTOS (2010): Lignocellulolytic *Agaricomycetes* from the Brazilian Cerrado biome. *Mycotaxon* **111** (in press).
- GOMES-SILVA, A.C. & T.B. GIBERTONI (2009a): Checklist of the aphylloraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* 108: 319-322.
- GOMES-SILVA, A.C. & T.B. GIBERTONI (2009b): Revisão do Herbário URM. Novas ocorrências de Aphyllorales para a Amazônia brasileira. *Revista Brasileira de Botânica* **32**(3): 585-594.
- GOTTLIEB, A.M. & J.E.WRIGHT (1999): Taxonomy of *Ganoderma* from southern South America: subgenus *Ganoderma*. *Mycological Research* **103** (6): 661-673.
- KIRK, P.M., P.F. CANNON, D.W. MINTER & J.A STALPERS (2008): *Dictionary of the Fungi*. 10ed. CABI Publishing, Surrey, 771p.
- LISBOA, P.L.B. (2002): A Estação Científica Ferreira Penna/ECFPn (1993-2000). In: P.L.B. Lisboa, ed.). *Caxiuanã: Populações tradicionais, Meio Físico e Diversidade Biológica*. Belém, Museu Paraense Emílio Goeldi, pp. 35-55.
- MONCALVO, J.M. & L. RYVARDEN (1997): A nomenclatural study of the Ganodermataceae. *Synopsis Fungorum* **11**. Fungiflora. Oslo. 114 p.
- RYVARDEN, L. (1991): Genera of Polypores – Nomenclature and taxonomy. *Synopsis Fungorum* **5**, Fungiflora, Oslo.
- RYVARDEN, L. (2000): Studies in neotropical polypores 2: a preliminary key to neotropical species of *Ganoderma* with a laccate pileus. *Mycologia* **92**: 180-191.
- RYVARDEN, L. (2004): Neotropical Polypores. Part 1. *Synopsis Fungorum* **19**, Fungiflora, Oslo.
- WATLING, R. (1969): *Colour Identification Chart*. Her Majesty's Stationary Office, Edinburgh (Scotland).

***INONOTUS AMAZONICUS* SP. NOV., *I. CALCITRATUS* COMB. NOV. AND ON  
*PHYLLOPORIA* (*HYMENOCHAETACEAE*, *AGARICOMYCETES*) FROM THE  
BRAZILIAN AMAZONIA<sup>6</sup>**

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### **Abstract**

*Inonotus amazonicus* is described and illustrated as a new species based on specimens collected in Aripuanã, in the state of Mato Grosso, Brazil, and deposited in herbarium INPA 34 years ago. This species is mainly distinguished from the others in the genus by the abundant, huge tramal setae and the duplex context covered by a persistent adpressed dark brown tomentum. Besides the description of the new species, one new combination is proposed: *I. calcitratus*. *Inonotus luteoumbrinus* and *Phylloporia spathulata* are reported as new to the state of Roraima, *P. chrysite* to the state of Amazonas and *P. pectinata* to the state of Rondônia. Description and illustration of the new species and keys to the species of *Inonotus* and *Phylloporia* known to Brazil are provided.

**Keywords:** *Basidiomycota*, Diversity, *Hymenochaetaceae*, Taxonomy

### **1. Introduction**

*Inonotus* sensu Wagner and Fischer (2002) has been widely used to accommodate species with pileate, effused-reflexed or resupinate, annual to perennial basidiomata, a monomitic to dimitic hyphal system, presence of hymenial setae and/or setal hyphae, ellipsoid to subglobose and yellowish to brownish basidiospores, negative in Melzer's reagent. Species with similar features but with oblong ellipsoid basidiospores and absence of setae have been placed in *Phylloporia* Murrill (Wagner and Ryvarde 2002; Ryvarde 2004). Morphologically and molecularly, *Inonotus* and *Phylloporia* are well defined genera (Wagner and Fisher 2001, 2002; Gottlieb et al. 2002; Ryvarde 2005; Martínez 2006; Zhou and Dai 2012) and 17 and four species are found in Brazil, respectively (Gibertoni et al. 2012). Basidiomata of these genera are commonly found on hardwood, causing a

white rot, on leaves or on remarkably thin dead branches of living trees (Ryvarden 2004; Dai 2012). The aim of the present study is to contribute to the knowledge about the diversity of *Inonotus* and *Phylloporia* in Brazil, with new records from the Brazilian Amazonia, and description and illustration of one new species.

## 2. Materials and methods

Field trips were undertaken from January 2009 to July 2011 in two reserves in Brazilian Amazonia: Estação Ecológica de Cuniã (8°04'S 63°31'W) and Parque Natural Municipal de Porto Velho (8°45' S 63°54' W) in the state of Rondônia. Additionally, one area in Rondônia (Fazenda Mucuim - 8°22' S 64°07' W) was also visited once. The specimens were deposited in Instituto Nacional de Pesquisas da Amazônia (INPA) and Instituto de Botânica (SP) were also studied (Thiers, continuously updated).

For the identification, specimens were analyzed macro- (shape, colour, hymenial surface) and micro-morphologically (type of hyphal system, basidia, setae and form, size, type of ornamentation and colour of the basidiospores) (Teixeira 1995). Slide preparations with 3-5% KOH, stained with 1% aqueous phloxine, and Melzer's reagent (Ryvarden 1991) were made. Colour designation followed Watling (1969). Newly collected materials were deposited in the herbaria HFSL (Faculdade São Lucas) and URM (Universidade Federal de Pernambuco).

## 3. Taxonomy

*Inonotus amazonicus* Gomes-Silva, Ryvarden & Gibertoni, sp. nov.

Fig. 1

MycoBank no.: MB 564298

This species differs from the other *Inonotus* species by its abundant, huge tramal setae and by the duplex context covered by a persistent adpressed dark brown tomentum.

Type: (designated here) Brazil, Mato Grosso, Aripuanã, on hardwood tree, 24 Apr 1978, leg. M.A. Sousa 458 (holotype, INPA 92004; isotype in URM 83535).

Etymology: "Amazonicus" (Lat.) refers to the type locality.

*Basidiomata* annual, pileate, sessile to slightly dimidiate, semicircular, up to 9 cm long and 5 cm wide from base to edge and 1.5 cm thick at base, dense when dry; *pileus* dull, velutine and soft, deep fulvous (12), cigar brown (16) to snuff brown (17), sulcate, covered with a persistent adpressed layer of tomentum, up to 0.5 mm thick, a black thin zone present between the tomentum and the distinctly fulvous (12) to cinnamon (10) dense context; *margin* rather sharp and undulating in the largest specimens; *pore surface* cigar brown (16) to snuff brown (17), pores round, 7–10 per mm, invisible to the naked eye; *tubes* concolorous with pore surface, dense, up to 1 cm long and a



distinct thin dark line present between tubes and the dense, fulvous (12) to cinnamon (10) context, up to 3 mm thick at the base.

*Hyphal system* monomitic, generative hyphae, hyaline, simple-septate, in the trama pale yellow, 3–7  $\mu\text{m}$  in diam., in the context rusty brown and almost solid to very thick-walled, 4–8  $\mu\text{m}$  in diam; *tramal setae* 30–120  $\times$  10–35  $\mu\text{m}$ , abundant in trama and dissepiments, acute slightly widened in the middle part, tapering towards the base, dark brown, and thick-walled, arising from a simple septum; *hymenial setae* absent; *basidia* not seen in the type specimen; *basidiospores* subglobose, pale yellow in 3% KOH, smooth, thin-walled, negative, but almost hyaline in Melzer's reagent, 5–5.5  $\times$  4–4.5  $\mu\text{m}$ .

Distribution and ecology: Known only from the state of Mato Grosso, Brazil. The species has been reported on hardwood tree.

Other specimen examined: Brazil, State of Mato Grosso, Aripuanã, 24 Apr 1978, leg. M.A. Sousa 471 (INPA 85338, as *Inonotus* sp.).

Taxonomic remarks: This is a remarkable species with its abundant, huge tramal setae and the duplex context covered by a persistent adpressed dark brown tomentum. The zone between the context and the tubes is thinner and slightly paler than the black zone between the context and the tomentum. It reminds one of the zones seen above the tubes in the common and widespread *Bjerkandera adusta* (Fr.) P. Karst. and it seems to be related to *I. pseudoglomeratus* Ryvarden, species known only from Venezuela and Belize and as growing on unknown hardwood tree (Ryvarden 2004), which however has a glabrous pileus, and much longer and slender setal hyphae besides hymenial setae. *Inonotus compositus* Han C. Wang is similar to *I. amazonicus* by sharing pileate basidiomata, a monomitic hyphal structure, presence of tramal setae and absence of hymenial setae, and yellowish basidiospores. However, the former has homogeneous context, larger pores (2–3 per mm) and ellipsoid basidiospores (Dai 2010).

***Inonotus calcitratus*** (Berk. & M.A. Curtis) Gomes-Silva & Gibertoni, comb. nov.

MycoBank no.: MB 564574

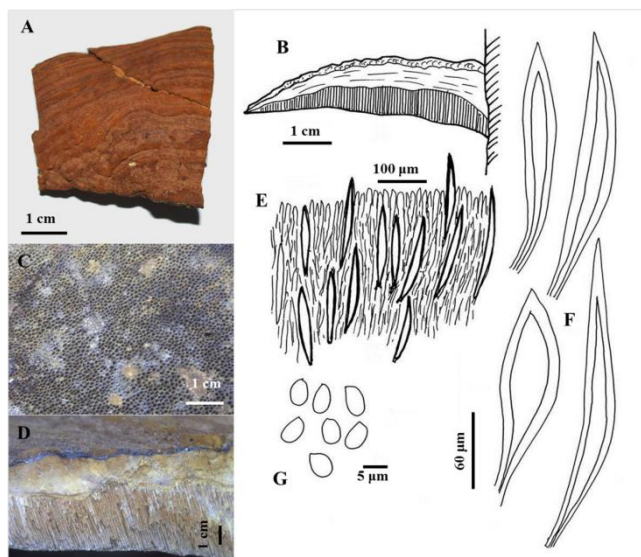
Basionym: *Polyporus calcitratus* Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10 (no. 45): 314 (1868) [1869].

Description see *Phellinus calcitratus* (Berk. & M.A. Curtis) Ryvarden by Ryvarden (2004).

Distribution and ecology: American species known from the West Indies and South America (Ryvarden 2004). In Brazil, it is reported for the states of Amazonas, Bahia, Pará, Pernambuco, Rio Grande do Sul and Rondônia (Gibertoni et al. 2012, as *P. calcitratus*). The species has been reported on hardwood tree.

Specimens examined: Brazil, State of Rondônia, Porto Velho, Fazenda Mucuí, 31 Jul 2007, leg. A.C. Gomes-Silva et al. 99 (URM 82895); Estação Ecológica de Cuniã, 20 Aug 2010, leg. A.C. Gomes-Silva et al. 3039 (URM 83103); Parque Natural Municipal de Porto Velho, 21 Aug 2010, leg. A.C. Gomes-Silva et al. 3043 (URM 83118).

Taxonomic remarks: Wagner and Fischer (2002) proposed the segregation of *Phellinus* s.l. in smaller genera based in morphological and molecular characters and included in *Inonotus* species with annual to perennial, resupinate, effused-reflexed and pileate basidiomata, a monomitic to dimic hyphal system, hymenial or hyphoid setae, and ellipsoid, globose and pigmented (yellowish to brownish) basidiospores. *Phellinus calcitratus*, by presenting hymenial setae (5–8  $\mu\text{m}$  width), and globose to subglobose, yellowish brown basidiospores (5–6  $\times$  4.5–5  $\mu\text{m}$ ), is thus transferred to *Inonotus*. The combination of *P. calcitrauts* in *Fulvifomes calcitratus* (Berk. & M.A. Curtis) Murrill in 1915 is currently not accepted ([www.mycobank.org](http://www.mycobank.org); [www.indexfungorum.org](http://www.indexfungorum.org)) because this genus accommodates species without setae (Wagner and Fischer 2002).



**Fig. 1.** *Inonotus amazonicus* (all from holotype). **A.** Basidioma. **B, D.** Section through the basidiomata. **C.** Pore surface. **E.** Section through dissepiments showing the tramal setae. **F.** Tramal setae. **G.** Basidiospores. Photos by A.C. Gomes-Silva and drawings by L. Ryvarden

*Inonotus luteoumbrinus* (Romell) Ryvarden [as '*luteo-umbrinus*'], Syn. Fung. (Oslo) 21: 79 (2005). Basionym: *Phaeoporus luteoumbrinus* Romell, K. svenska Vetensk-Akad. Handl., ser. 3 26: 27 (1901).

Description: In Ryvarden (2005).

Distribution and ecology: American species known from Brazil to Louisiana and Texas in United States, but apparently rare (Ryvarden 2004). In Brazil, it is reported for the states of Acre, Bahia,

Mato Grosso, Pernambuco, Tocantins and Santa Catarina (Gibertoni et al. 2012). It is a new record to state of Roraima. The species has been reported on hardwood tree.

Specimens examined: Brazil, Acre, loc. n. det., 8 Oct 1980, leg. B. Lowy et al. 544 (INPA 100449, as *Polyporus* sp.); Roraima, Alto Alegre, 18 Jun 1986, leg. K.F. Rodrigues et al. 1029 (INPA 143387); Caracará, BR 174, Km 335, 17 Nov 1977, leg. I.J. Araújo et al. 552 (INPA 77535, as *P. fastuosus*); Ilha de Maracá, 16 May 1986, leg. B. Lowy et al. s.n (INPA 144628, as *Polyporus* sp.); Mato Grosso, Aripuanã, 23 Apr 1978, leg. M.A. Sousa 438 (INPA 91949, as *Inonotus* sp.).

Taxonomic remarks: This species differs from the others of the genus by the olivaceous basidiospores in KOH and the thin cuticle below a thin tomentum.

### Key to species of *Inonotus* known from Brazil

1. Basidiomata resupinate to nodulose..... 2
  1. Basidiomata pileate or effused reflexed ..... 4
  2. Hymenial setae and setal hyphae absent; basidiospores rusty brown.....
    - ..... *I. venezuelicus* Ryvarden (see Ryvarden 2005)
  2. Hymenial setae and/or setal hyphae present; basidiospores yellowish brown..... 3
  3. Hymenial setae and setal hyphae present; pore surface dark, 5–7 per mm; basidiospores globose to subglobose, 10–13 × 8–12 µm, in the largest dimension.....
    - ..... *I. micantissimus* (Rick) Rajchenb. (see Ryvarden 2005)
  3. Hymenial setae present and setal hyphae absent; pore surface reddish, 7–9 per mm; basidiospores ellipsoid to oval, 3–4.5 × 2.5–4 µm .....
    - ..... *I. tropicalis* (M.J. Larsen & Lombard) T. Wagner & M. Fisch. (see Wagner and Fischer 2002)
  4. Setal hyphae present in the dissepiments ..... 5
  4. Setal hyphae absent in the dissepiments ..... 10
  5. Upper surface azonate; chlamydospores usually present in the context.....
    - ..... *I. rickii* (Pat.) D.A. Reid (see Ryvarden 2005)
  5. Upper surface zonate; chlamydospores absent in the context..... 6
  6. Hymenial setae present; basidiospores subglobose, pale rusty brown, < 5 µm.....
    - ..... *I. portoricensis* (Overh.) Baltazar & Gibertoni [see Ryvarden 2004, as *Phellinus portoricensis* (Overh.) O. Fidalgo]
  6. Hymenial setae absent; basidiospores subglobose to ellipsoid, hyaline to pale yellow, > 5 µm long..... 7
  7. Pileus with a distinct umbo, pileal surface glabrous and concentrically sulcate
    - ..... *I. pseudoglomeratus* Ryvarden (see Ryvarden 2005)

7. Pileus without umbo, pileal surface finely tomentose or velutinous to glabrous with age, but then even ..... 8
8. Context duplex; pores 7–10 per mm; basidiospores subglobose ..... *I. amazonicus*
8. Context homogeneous; pores 3–4 per mm; basidiospores ovoid to ellipsoid..... 9
9. Hymenial setae rare, 15–21 × 5–9 µm; basidiospores (5.5–)6–8 µm in the largest dimension ..... *I. patouillardii* (Rick) Imazeki (see Ryvar den 2005)
9. Hymenial setae frequent, 15–40 × 6–14 µm; basidiospores 5–6(–6.5) µm in the largest dimension ..... *I. radiatus* (Sowerby) P. Karst.
10. Hymenial setae present ..... 11
10. Hymenial setae absent..... 14
11. Hymenial setae hooked ..... *I. fulvomelleus* Murrill (see Ryvar den 2005)
11. Hymenial setae straight..... 12
12. Pore surface greyish brown to umber brown, pores 8–10 per mm; basidiospores globose to subglobose, pale yellowish brown, 5–6 × 4.5–5 µm ..... *I. calcitratus* (see Ryvar den 2004, as *P. calcitratus*)
12. Pore surface of different colour, pores < 8 per mm; basidiospores ellipsoid to oblong ellipsoid, hyaline, 4–5 × 3–3.5 µm ..... 13
13. Hymenial setae 10–14 µm wide; pore surface dark rusty brown, pores 3–5 per mm..... *I. pseudoradiatus* (Pat.) Ryvar den (see Ryvar den 2005)
13. Hymenial setae 4–7 µm wide; pore surface yellow, pores 5–6 per mm ..... *I. xanthoporus* Ryvar den (see Ryvar den 2005)
14. Pores 7–8 per mm; basidiospores globose to subglobose, olivaceous brown.....*I. luteoumbrinus*
14. Pores < 7 per mm; basidiospores oblong ellipsoid, different colour ..... 15
15. Pores 4–6 per mm; basidiospores hyaline to pale yellow, 4–5(–6) × 3–4.5 µm..... *I. splitbergeri* (Mont.) Ryvar den (see Ryvar den 2005)
15. Pores 3–4 per mm; basidiospores rusty to umber brown, 5–7 × 4–5 µm ..... *I. jamaicensis* (Murrill) A.M. Gottlieb et al. (see Ryvar den 2005)

***Phylloporia chrysites*** (Berk.) Ryvar den, Norw. Jl Bot. 19: 235 (1972).

Basionym: *Polyporus chrysites* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 233 (1856).

Description: In Wagner and Ryvar den (2002) and Ryvar den (2004).

Distribution and ecology: Species known from Florida and south to Brazil (Ryvar den 2004). In Brazil, reported in the states of Acre, Bahia, Pará, Paraíba, Paraná, Pernambuco, Rio Grande do

Norte, Rondônia, Santa Catarina and São Paulo (Gibertoni et al. 2012). It is a new record to state of Amazonas. The species has been reported on living trees or hardwood.

Specimens examined: Brazil, Amazonas: Manaus, Distrito Agropecuário - ZF3, 3 Oct 1985, leg. K.F. Rodrigues & D.C. Daly 754 (INPA 137041); Campus do INPA, 14 May 1979, leg. M.A. Sousa 612 [INPA 85611, as *Phellinus ribis* (Schumach.) Quél.]; loc. n. det., 13 Mar 1974, leg. G.T. Prance et al. 20488 (INPA 44466, as *P. ribis*); Rondônia, Porto Velho, Estação Ecológica de Cuniã, 11 Jan 2011, leg. A.C. Gomes-Silva et al. 2116 (URM 83102); Jarú, loc. n. det., 15 Oct 1986, leg. M. Capelari & R. Maziero 1149 (SP 211480).

Taxonomic remarks: *Phylloporia chrysites* is recognized by the basidiomata with a thick, velvety, spongy, easily-compressed tomentum, tiny pores (6–8 per mm) and small basidiospores (2.5–3.5 µm in diam.). It is related to *P. weberiana* (Sacc.) Ryvarden, which has a zonate, dark brown pileus and larger basidiospores, 3–4.5 × 2.5–3.5 µm (Wagner and Fischer 2002). *Phylloporia frutica* (Berk. & Curt.) Ryvarden is another similar species, but it differs by the duplex context and larger pores, 2–4 per mm (Ryvarden 2004).

***Phylloporia pectinata*** (Klotzsch) Ryvarden, Syn. Fung. (Oslo) 5: 196 (1991).

Basionym: *Polyporus pectinatus* Klotzsch, Linnaea 8: 485 (1833).

Description: In Wagner and Ryvarden (2002) and Ryvarden (2004).

Distribution and ecology: Pantropical and widespread (Ryvarden 2004). In Brazil, it was reported in the states of Amazonas, Bahia, Mato Grosso, Pará, Paraná, Pernambuco, Rio Grande do Norte, Rio Grande do Sul, Rio de Janeiro, Roraima, São Paulo, Santa Catarina (Gibertoni et al. 2012). It is a new record to state of Rondônia. The species has been reported on hardwood tree.

Specimens examined: Brazil, State of Amazonas, Manaus, Campus INPA, 13 Jun 1979, leg. M.A. Sousa 625 (INPA 84112); State of Rondônia, Porto Velho, Estação Ecológica de Cuniã, on hardwood, 11 Feb 2011, leg. A.C. Gomes-Silva et al. 2149, 2109, 2091 (URM 83112, URM 83041, URM 83042); 11 Mar 2011, leg. A.C. Gomes-Silva et al. 882 (URM 83043).

Taxonomic remarks: This species is characterized by the upper surface with numerous sulcate zones, yellow-brown pore surface, tiny pores (8–10 per mm), small and subglobose basidiospores [3–3.5(–4) × 3 µm]. It is related to *P. ephedrae* (Woron.) Parmasto, a Central Asian species with larger pores (6–7 per mm) (Wagner and Ryvarden 2002).

***Phylloporia spathulata*** (Hook.) Ryvarden, Syn. Fung. (Oslo) 5: 196 (1991).

Basionym: *Boletus spathulatus* Hook., in Kunth, Synopsis Plantarum, Quas in Itinere ad Plagam Aequinoctialem Orbis Novi, Collegerunt Al. de Humboldt et Am. Bonpland (Paris) 1: 9 (1822).

Description: In Wagner and Ryvarden (2002) and Ryvarden (2004).

Distribution and ecology: Pantropical (Ryvarden 2004). In Brazil, it was reported in the states of Amazonas, Bahia, Minas Gerais, Pará, Paraíba, Paraná, Rio Grande do Sul, Rondônia, Santa Catarina and São Paulo (Gibertoni et al. 2012). It is a new record to state of Roraima. The species has been reported as inhabiting in ground of forest.

Specimens examined: Brazil, State of Amazonas, Humaitá, loc. n. det., on soil, 3 Dec 1996, leg. G.T. Prance & J.F. Ramos 3584 (INPA 19157, as *Coltricia* sp.); Jutaiá, loc. n. det., 26 Oct 1986, leg. E.S.S. Silva et al. 866 (INPA 154981); Manaus, Distrito Agropecuário - ZF3, on soil, 2 Oct 1985, leg. K.F. Rodrigues & D.C. Daly 719 (INPA 137008); SE de Manaus, 2 Oct 1985, leg. G. Guzman & V.L.R. Bononi s.n. (SP 193562, as *Polyporus* sp.); Campus do INPA, 1980, leg. V.L.R. Bononi 294, 777 (SP 211856, SP 211865); loc. n. det., 19 Oct 1976, leg. G.T. Prance et al. 23927 [INPA 63311, as *Coltricia cinnamomea* (Jacq.) Murrill]; State of Pará, Cachoeira da Porteira: loc. n. det., 26 Jun 1980, leg. V.L.R. Bononi 677, 739, 876 (SP 178100, SP 193984, SP 194249); Aug 1980, leg. V.L.R. Bononi s.n. (SP 193437, 193442, as *Amauroderma rude* (Berk.) Torrend); Oriximiná, loc. n. det., 19 Jun 1980, leg. V.L.R. Bononi 455 [INPA 103493, as *Phellinus gilvus* (Schwein.) Pat.]; 23 Jun 1980, leg. V.L.R. Bononi 558 (INPA 103563, as *Polyporus* sp.); 28 Jun 1980, leg. V.L.R. Bononi 677 (INPA 103632, as *Phellinus* sp.); Jun 1980, leg. V.L.R. Bononi s.n. (SP 193906, SP 214710, as *Coltricia* sp.); Tucuruí, Rio Tocantins, May 1978, leg. M.G. Silva s.n. (INPA 85126); State of Rondônia, Jarú, Margem direita do rio Jarú, on soil, Jan 1987, leg. M. Capelari & R. Maziero 1078 [SP 211677, as *Coltricia spathulata* (Hook.) Murrill]; Porto Velho, Parque Natural Municipal de Porto Velho, 2 Feb 2010, leg. A.C. Gomes-Silva et al. 1004 (URM 82865); 20 Jun 2009, leg. A.C. Gomes-Silva & E.B.A. Souza 765 (URM 81086); Estação Ecológica de Cuniã, 11 Mar 2010, leg. A.C. Gomes-Silva et al. 805 (URM 83049); State of Roraima, loc. n. det., 26 Feb 1971, leg. G.T. Prance et al. 10710 (INPA 29062).

Taxonomic remarks: The species is characterized by the stipitate basidiomata, small pores (7–9 per mm) and golden-yellow basidiospores, 3–4 × 2–3 µm. According to Wagner and Ryvarden (2002), the stipitate basidiomata with a thin dark zone below the adpressed tomentum both on the pileus and the stipe should be good characteristics for separation from the other species. *Phylloporia veracruzis* (Sacc.) Ryvarden is related to *P. spathulata*, but differs by the larger basidiospores, 4–4.5 × 3–3.5 µm (Ryvarden 2004).

### Key to species of *Phylloporia* known from Brazil

- 1 Basidiomata stipitate, on soil ..... *P. spathulata*
- 1\* Basidiomata resupinate to sessile, on living trees or hardwood. .... 2
- 2 Basidiomata dense and perennial with distinct skeletal hyphae ..... *P. pectinata*
- 2\* Basidiomata soft and fragile, annual and only with generative hyphae..... 3

- 3 Pores angular, 2–4 per mm; basidiospores ellipsoid to subglobose, pale yellow, 3–4.5 × 2.5–3 µm.  
 ..... *P. frutica* (see Ryvardeen 2004)
- 3\* Pores round, 6–8 per mm; basidiospores subglobose, pale yellowish brown, 2.5–3.5 µm .....  
 ..... *P. chrysitata*

#### 4. Discussion

Up to now, 17 species of *Inonotus* and four of *Phylloporia* have been recorded from Brazil (Gibbertoni et al. 2012). Two of them [*I. tabacinus* (Mont.) G. Cunn. and *I. porrectus* Murrill] have not been included in the work because these species were recently transferred to *Hymenochaete porrioides* T. Wagner & M. Fisch. and *Inocutis porrecta* (Murrill) Baltazar, respectively, based on molecular and/or morphology analysis (Wagner and Fischer 2002; Baltazar et al. 2010). After revision of fungal collections in INPA and SP, one new species, *Inonotus amazonicus*, collected 34 years ago, was discovered in INPA, which demonstrates the importance of accessibility and re-evaluation of dried fungal collections.

Besides the new species, new records were found and one new combination (*I. calcitratus*) were proposed based on material collected during the field trips and deposited in the herbaria. *Inonotus luteoumbrinus* and *Phylloporia spathulata* are new to the state of Roraima, *P. chrysitata* to the state of Amazonas and *P. pectinata* to the state of Rondônia. Thus, 16 species of *Inonotus* and four species of *Phylloporia* are known from Brazil so far.

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#### References

- Baltazar JM, Trierveiler-Pereira L, Ryvardeen L, Loguercio-Leite C, 2010. *Inonotus* s.l. (*Hymenochaetales*) in the Brazilian herbaria FLOR and SP. *Sydowia* 62: 1–9.

- Dai YC, 2010. *Hymenochaetales (Basidiomycota) in China*. *Fungal Diversity* 45: 131–343; doi: 10.1007/s13225-010-0066-9.
- Dai YC, 2012. Polypore diversity in China with an annotated checklist of Chinese polypores. *Mycoscience* 53: 49–80; doi: 10.1007/s10267-011-0134-3.
- Gibertoni T B, Gomes-Silva AC, Lira CRS, Melo GN, Silva VF, Drechsler-Santos ER, 2012. *Hymenochaetales. Lista das espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/2012/FB000017>. Accessed 2 May 2012.
- Gottlieb AM, Wright JE, Moncalvo JM, 2002. *Inonotus* s.l. in Argentina – morphology, cultural characters and molecular analyses. *Mycological Progress* 1: 299–313.
- Martínez S, 2006. The genera *Inocutis* and *Inonotus (Hymenochaetales)* in Uruguay. *Mycotaxon* 96: 1–8.
- Ryvarden L, 1991. Genera of *Polypores* – Nomenclature and taxonomy. *Synopsis Fungorum* 5: 1–363.
- Ryvarden L, 2004. Neotropical Polypores. Part 1. *Synopsis Fungorum* 19: 1–229.
- Ryvarden L, 2005. The genus *Inonotus* a synopsis. *Synopsis Fungorum* 21: 1–149.
- Thiers B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih>. Accessed 2 May 2012.
- Wagner T, Fischer M, 2001. Natural groups and a revised system for the European poroid *Hymenochaetales (Basidiomycota)* supported by nLSU rDNA sequence data. *Mycological Research* 105: 773–782; doi: 10.1017/S0953756201004257.
- Wagner T, Fischer M, 2002. Proceedings towards a natural classification of the worldwide taxa *Phellinus* s.l. and *Inonotus* s.l., and phylogenetic relationships of allied genera. *Mycologia* 94: 998–1016.
- Wagner T, Ryvarden L, 2002. Phylogeny and taxonomy of the genus *Phylloporia (Hymenochaetales)*. *Mycological Progress* 1: 105–116.
- Watling R, 1969. *Colour identification chart*. Her Majesty's Stationery Office, Edinburgh.
- Zhou LW, Dai YC, 2012. Phylogeny and taxonomy of *Phylloporia (Hymenochaetales)*: new species and a worldwide key to the genus. *Mycologia* 104: 211–222; doi: 10.3852/11-093.



## TWO NEW SPECIES OF *Phellinus* S.L. FROM THE BRAZILIAN AMAZONIA

### Abstract

*Phellinus fibrosus* sp. nov. and *P. sousae* sp. nov. have a distinct combination of morphological characteristics not known in other *Phellinus* species and are described as new species to science. They were collected in the states of Amazonas and Mato Grosso, and deposited in herbarium INPA 34 years ago. Morphological descriptions, pictures of the basidiomata and basidiospores in light microscopy and/or SEM, and a key to the species of *Phellinus* s.l. from the Brazilian Amazonia are provided.

**Key words:** *Basidiomycota*, *Hymenochaetaceae*, taxonomy, Brazilian Amazonia

### Introduction

*Phellinus* Quél. (*Hymenochaetaceae* Donk, *Hymenochaetales*) is a cosmopolitan genus that accommodates species with annual to perennial, resupinate to pileate, brown basidiomata, with or without hymenial setae, tramal setae and/or setal hyphae, a dimitic hyphal system, hyaline to rusty brown, smooth, thin- to thick-walled, dextrinoid or not dextrinoid basidiospores (Larsen & Cobb-Pouille 1990, Ryvarden 2004). The species of *Phellinus* cause a white rot and occur on dead wood of both gymnosperms and angiosperms, or on living trees causing damage to the tissues of their host (Lindblad 2001, Ryvarden 2004, Dai et al. 2007, Gibertoni et al. 2007, Dai 2012).

*Phellinus* has been accepted by several authors based on morphological characters (Ryvarden & Johansen 1980, Fiasson & Niemelä 1984, Gilbertson & Ryvarden 1986, Ryvarden & Gilbertson 1993, Núñez & Ryvarden 2000, Ryvarden 1991, 2004). However, other authors, based on molecular studies, have shown it to be an artificial genus with convergent species (Wagner & Fischer 2001, 2002, Jeong et al. 2005, Larsson et al. 2006, Dai 2010). Currently, 57 species are reported to Brazil, of which 12 to the Brazilian Amazonia (Gibertoni et al. 2012).

The aim of the present article is to contribute to the knowledge about the diversity of *Phellinus* s.l. in the neotropical region with description and figures of two new species.

### Material and Methods

Specimens collected in one reserve in the Brazilian Amazonia from 2010 to 2011 were studied: Estação Ecológica de Cuniã (8°04'S 63°31'W) in the state of Rondônia. Additionally, specimens deposited in herbarium INPA was also studied (Thiers, continuously updated).

For the identification, specimens were analyzed macro- (shape, color, hymenial surface) and micro-morphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Color designation followed Watling (1969). Newly collected materials were deposited in HFSL, O and URM.

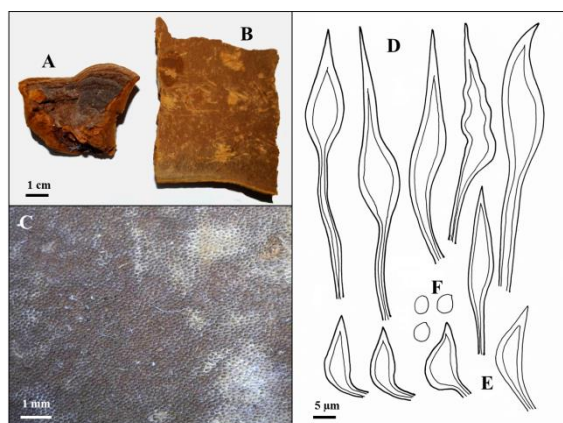
Scanning electron microscopy (SEM) was conducted at Laboratório de Microscopia Eletrônica (DF/UFPE). Sections were removed from dried basidiomata and mounted directly on aluminum stubs using carbon adhesive tabs. The fragments were coated with 8–13 nm of gold using a Baltec SCD050 sputter coater and photographed with a JEOL JSM-5900 scanning electron microscope.

## Taxonomy

### *Phellinus fibrosus* Ryvarden, Gomes-Silva & Gibertoni *sp. nov.* (Figs. 1 A–F)

Mycobank no.: MB 564296

This species differs from other *Phellinus* species by its abundant tramal setae with a long hyphal-like base, a distinctly swollen middle part and a tapering long acute apex, and by fibrous consistency of tubes and context.



**FIGURE 1.** Microscopic features of *P. fibrosus* (all from holotype). **A.** Basidiomata. **B, C.** Pore surface. **D.** Tramal setae. **E.** Hymenial setae. **F.** Basidiospores.

**Type (designated here):** —BRAZIL. Amazonas: Manaus, Campus do INPA, on angiosperm tree, April 1978, *leg. M.A. Sousa & L.F. Coelho 396* (holotype: INPA 84261, isotype: O and URM 83725).

**Etymology:** — “Fibrosus” (Lat.) refers to the loose and fibrous tubes.

Basidiomata perennial, reflexed resupinate with a narrow pileus in upper edge of one of the basidiomata, up to 8 cm long and 1 cm thick in the resupinate part; pileus glabrous, dull, sulcate, fulvous (12) to snuff brown (17) at the margin and becoming darker at the older parts and ultimately black and slightly indurated in the oldest part, hard and fragile as dry; pore surface umber (18) to

snuff brown (17) slightly cracked in the resupinate part; pores round to angular, 7–10 per mm, invisible to the naked eye; dissepiments distinctly thin; margin rounded and smooth; tubes concolorous with pore surface, indistinct by the naked eye, about 1 cm thick at resupinate part, fibrous and easily disintegrated, up to 5 mm deep and further losing its distinct structure boundary of context; context and upper part of tubes fibrous, fulvous (12) to snuff brown (17) with a black zone up to 1 mm wide between the context and the substrate. Hyphal system dimitic; generative hyphae thin walled, hyaline, simple-septate, 2–4  $\mu\text{m}$  wide and difficult to find in the type specimen; skeletal hyphae yeollowish to rusty brown in KOH, thick-walled with a very narrow lumen, 3–5  $\mu\text{m}$  wide; tramal setae abundant, acute with a distinct swollen middle part, tapering to a long narrow hyphal “tail” down to the simple septum from which they arised, 8–15  $\mu\text{m}$  in the widened middle part, up to 90  $\mu\text{m}$  in length; hymenial setae 12–24  $\times$  5–10  $\mu\text{m}$ , dark brown, thick-walled, acute ventricose, less common than tramal setae; basidia not seen in the type specimen; basidiospores subglobose to ellipsoid, pale yellow in 3% KOH, smooth, slightly thick-walled, negative in Melzer's reagent, 4–5  $\times$  3–3.5  $\mu\text{m}$ .

**Habitat:** —Found on angiosperm tree.

**Distribution:** —*Phellinus fibrosus* is only known from the state of Amazonas, Brazil.

**Remarks:** —This is an unique species in which the abundant tramal setae have a long hypha like base, a distinctly swollen middle part and ending with a tapering long acute apex. This together with the presence of small hymenial setae and the fibrous consistency of tubes and context make it very distinct. By using the key in Fidalgo (1968), Larsen & Cobb-Pouille (1990) and Ryvardeen (2004) there is no species with the combination of characters as outlined above. *Phellinus pachyphloeus* (Pat.) Pat. is similar, but differs by firm to woody hard basidiomata, larger setal hyphae (850–900  $\times$  8–35  $\mu\text{m}$ ), smooth hymenial setae that are straight or curved at the base and globose to ellipsoid basidiospores, 4.5–6  $\times$  4–5.5  $\mu\text{m}$  (Fidalgo 1968, Ryvardeen & Johansen 1980).

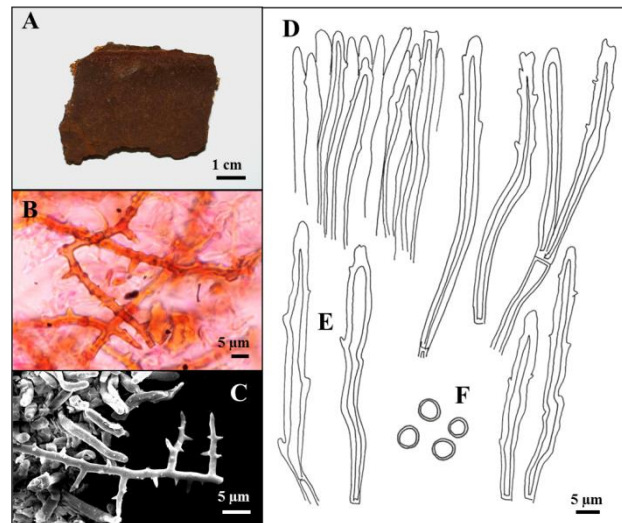
***Phellinus sousae* Ryvardeen, Gomes-Silva & Gibertoni sp. nov. (Figs. 2 A–F)**

MycoBank no.: MB 564297

This species differs from other *Phellinus* species by numerous setal hyphae, being mostly smooth, but also with scattered protuberances.

**Type (designated here):** —BRAZIL. Mato Grosso: Aripuanã, Estrada do Rio Branco, on angiosperm tree, April 1978, leg. M.A. Sousa 451 (holotype: INPA 85175, isotype: O and URM 83858).

**Etymology:** —Called after the eager collector M. A. Sousa who left fine selected collections of *Phellinus* and *Inonotus* spp. at INPA herbarium in Manaus.



**FIGURE 2.** Microscopic features of *P. sousae* (all from holotype). **A.** Basidiomata. **B, C, D.** Section through dissepiments showing setal hyphae. **E.** Setal hyphae. **F.** Basidiospores.

Basidiomata perennial, resupinate, pulvinate with distinct raised margins, in the type up to 10 × 10 cm and 1 cm thick, woody hard upon drying; pores surface dark umber (18) to cigar brown (16), smooth; pores round and regular, 7–8 per mm invisible to the naked eye; margin rounded, smooth and almost vertical, in a few places, zonate and sulcate reminding as if a nodulose pileus is under development; in section with a black zone, up to 1 mm wide between the context and the substrate; tubes concolorous with pores surface, up to 9 mm deep indistinctly stratified; context almost invisible, dark rusty brown, in a few places up to 1 mm thick. Hyphal system dimitic; generative hyphae simple-septate, thin-walled, hyaline, 2–3 µm in diam, skeletal hyphae yellowish brown in KOH, thick-walled, 2.5–4 µm in diam; setal hyphae abundant in trama, smooth to slightly tuberculate, thick-walled and dark brown, 4–6 µm wide, up to 85 µm long; hymenial setae absent; basidia 10–13 × 6–8 µm, clavate, 4-sterigmate, simple-septate at the base; basidiospores, globose, pale yellow to golden yellow in 3% KOH, smooth, thick walled and without reaction in Melzer's reagent, 4.5–5 µm in diam.

**Habitat:** —Found on unknown angiosperm wood.

**Distribution:** —*Phellinus sousae* is known from the state of Mato Grosso and Rondônia, Brazil.

**Remarks:** —The prominent and unique character of this new species is the numerous setal hyphae, being mostly smooth, but also with scattered protuberances. We interpret them as setal hyphae more than tramal setae since they are of even width and with a rounded apex, while usually tramal setae are considerably wider and with an acute apex (Ryvarden 2004). The only other *Phellinus* species with spiny to tuberculate setae or setal hyphae is *P. spinescens* J. E. Wright & G. Coelho (for a description, see Coelho & Wright 1996, Ryvarden 2004). However, in this species the setae arise in the hymenium, besides that its basidiospores are dextrinoid.

**Additional specimens examined:** —BRAZIL. Rondônia: Porto Velho, Estação Ecológica de Cuniã, August 2010, *leg. A.C. Gomes-Silva s.n.* (URM 83423); February 2011, *leg. A.C. Gomes-Silva s.n.* (URM 83422).

### Key to species of *Phellinus* s.l. from the Brazilian Amazonia

1. Hymenial setae lacking or rare..... 2
  - Hymenial setae present..... 7
2. Hyphal system monomitic to dimitic; basidiospores hyaline, globose, dextrinoid (*Fomitiporia*). 3
  - Hyphal system dimitic; basidiospores yellowish to pale rusty brown, ellipsoid to globose, not dextrinoid (*Fulvifomes*)..... 4
3. Basidiomata resupinate; basidiospores ovoid to subglobose,  $6.5\text{--}8.5 \times 5.5\text{--}7 \mu\text{m}$ .....
  - ..... *F. punctata* s.l. (P. Karst.) Murrill
  - Basidiomata pileate; basidiospores subglobose,  $5\text{--}6 \times 4.5\text{--}5 \mu\text{m}$ .....
    - ..... *F. apiahyna* (Speg.) Robledo, Decock & Rajchenb.
4. Basidiomata resupinate ..... *F. umbrinellus* (Bres.) Y.C. Dai
  - Basidiomata pileate..... 5
5. Pores 4–7 per mm..... *F. grenadensis* (Murrill) Murrill
  - Pores 7-10..... 6
6. Black line present in the context, basidiospores subglobose to ellipsoid,  $4.5\text{--}6 \times 4\text{--}5.5 \mu\text{m}$ , rusty brown ..... *F. fastuosus* (Lév.) Bondartseva & S. Herrera
  - Black line absent in the context, basidiospores subglobose to globose,  $5\text{--}6 \times 4\text{--}5 \mu\text{m}$ , pale golden yellow..... *F. merrillii* (Murrill) Baltazar & Gibertoni
7. Basidiomata annual to perennial; hyphal system monomitic/dimitic; basidiospores hyaline, ellipsoid, allantoid to cylindric (*Fuscoporia*) ..... 8
  - Basidiomata perennial; hyphal system dimitic; basidiospores hyaline, ellipsoid to globose (*Phellinus* s.l.) ..... 12
8. Basidiomata resupinate ..... 9
  - Basidiomata pileate..... 10
9. Pores 6–7 per mm; setal hyphae absent; basidiospores  $5\text{--}7.5 \times 2\text{--}2.5 \mu\text{m}$  .....
  - ..... *F. ferrea* (Pers.) G. Cunn.
  - Pores 7–9 per mm; setal hyphae present; basidiospores  $5\text{--}7 \times 3\text{--}3.5 \mu\text{m}$  .....
    - ..... *F. ferruginosa* (Schrad.) Murrill
10. Hymenial setae hooked ..... *F. wahlbergii* (Fr.) T. Wagner & M. Fisch.
  - Hymenial setae straight..... 11

11. Basidiomata usually annual, glabrous to scruPOSE or hispid; hymenial setae 20–30 × 5–6 μm; basidiospores 4–5 × 3–3.5 μm.....*F. gilva* (Schwein.) T. Wagner & M. Fisch.  
 - Basidiomata perennial, tomentose, ultimately glabrous in zones; hymenial setae 15–40 × 5–9 μm; basidiospores 4.5–6 × 3.5–5 μm ..... *F. senex* (Nees & Mont.) Ghob.-Nehj.
12. Basidiomata resupinate ..... 13  
 - Basidiomata pileate to effused reflexed..... 16
13. Setal hyphae with scattered protuberances ..... *P. sousae* sp. nov.  
 - Setal hyphae absent..... 14
14. Pores 7–9 per mm ..... *P. ferrugineovelutinus* (Henn.) Ryvarden  
 - Pores < 6 per mm..... 15
15. Pore surface reddish brown; hymenial setae straight, 12–20 × 4–8 μm; basidiospores globose, pale yellow to rusty brown, 3.5–4.5 μm in diameter .....*P. shaferi* (Murrill) Ryvarden  
 - Pore surface greyish brown; hymenial setae hooked, 18–25 × 6–8.5 μm; basidiospores ellipsoid, hyaline, 3.5–4.5 × 2.5–3.5 μm ..... *P. undulatus* (Murrill)
16. Setal hyphae and/or tramal setae present ..... 17  
 - Setal hyphae and/or tramal setae absent ..... 18
17. Tramal setae present; setal hyphae absent; hymenial setae present..... *P. fibrosus* sp. nov.  
 17. Tramal setae absent; setal hyphae present; hymenial setae absent .... *P. noxius* (Corner) G. Cunn.
18. Hymenial setal present..... 19  
 - Hymenial setal absent ..... 20
19. Basidiospores ovoid to subglobose, pale golden brown, 4.3–5.5 × 3.8–4.8 μm; pores 6–8 per mm ..... *P. linteus* (Berk. & M.A. Curtis) Teng  
 - Basidiospores globose, pale yellowish, 3–4 μm; pores 7–10 per mm .....*P. extensus* (Lév.) Pat.
20. Basidiomata on *Rhizophorae mangle* .....*P. mangrovicus* (Imazeki) Imazeki  
 - Basidiomata on other angiosperms ..... 21
21. Basidiospores globose, rusty brown, 4–5 μm; context bright yellowish brown and reddish in KOH.....*P. rhytiphloeus* (Mont.) Ryvarden  
 - Basidiospores globose to subglobose, hyaline to pale golden yellow, 4–6 μm; context cinnamon to fulvous and black in in KOH ..... 22
22. Upper surface adpressed tomentose to velutinate with a black zone; pores 6–7 per mm.....  
 .....*P. baccharidis* (Pat.) Pat.  
 - Upper surface velutinate, soon glabrous, no black zone or cuticle; pores 8–10 per mm .....  
 .....*P. griseoporus* D.A. Reid

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## References

- Fiasson, J.L., Niemelä, T. (1984). The *Hymenochaetales*: a revision of the European poroid taxa. *Karstenia* 24: 14–28.
- Gibertoni, T.B., Santos, P.J.P., Cavalcanti, M.A.Q. (2007). Ecological aspects of *Aphylophorales* in the Atlantic Rain Forest in Northeast Brazil. *Fungal Diversity* 25:49–67.
- Gibertoni, T.B., Gomes-Silva, A.C., Lira, C.R.S., Melo, G.S.N., Silva, V.F., Araújo-Neta, L., Drechsler-Santos, E.R. (2012). *Hymenochaetales* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. (<http://floradobrasil.jbrj.gov.br/2012/FB092348>). Accessed 2 May 2012.
- Gilbertson, R.L., Ryvarden, L. (1986). North American Polypores. Vol. 1 *Abortiporus – Lindtneria*. Oslo, Norway: Fungiflora. 433 p.
- Jeong, W.J., Lim, Y.W., Lee, J.S., Jung, H.S. (2005). Phylogeny of *Phellinus* and related genera inferred from combined data of ITS and mitochondrial SSU rDNA sequences. *J. Microbiol. Biotechnol.* 15: 1028–1038.
- Larsen, M.J., Cobb-Pouille, L.A. (1990). *Phellinus* (*Hymenochaetaceae*) A survey of the world taxa. *Syn Fungorum* 3: 1–206.
- Larsson, K.H., Parmasto, E., Fischer, M., Langer, E., Nakasone, K.K., Redhead, S. (2006). *Hymenochaetales*: a molecular phylogeny for the hymenochaetoid clade. *Mycologia* 98: 926–936.
- Lindblad, I. (2001). Diversity of poroid and some corticoid woodinhabiting fungi along the rainfall gradient in tropical forests, Costa Rica. *Journal of Tropical Ecology* 17:353–369.
- Núñez M, Ryvarden L, 2000. East Asian Polypores Volume 1. *Ganodermataceae* and *Hymenochaetaceae*. *Syn Fungorum* 13: 1–168.
- Núñez, M., Ryvarden, L. (2001). East Asian Polypores. Volume 2. *Polporaceae s. lato*. *Syn Fungorum* 14: 169–522.
- Ryvarden, L. (1991). Genera of polypores, nomenclature and taxonomy. *Syn Fungorum* 5: 1–363.
- Ryvarden, L. (2004). Neotropical Polypores Part 1. Introduction, *Ganodermataceae* & *Hymenochaetaceae*. *Syn Fungorum* 19:1–229.

- Ryvarden, L., Gilbertson, R.L. (1993). European Polypores. Part 1. *Abortiporus* – *Lindtneria*. *Syn Fungorum* 6:1–387.
- Ryvarden, L., Johansen, I. (1980). A preliminary polypore flora of East Africa. Oslo, Norway: Fungiflora. 636 p.
- THIERS, B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/>. Accessed 2 May 2012.
- Wagner, T., Fischer, M. (2001). Natural groups and a revised system for the European poroid *Hymenochaetales* (*Basidiomycota*) supported by nLSU rDNA sequence data. *Mycological Research* 105: 773–782.
- Wagner, T., Fischer, M. (2002). Proceedings towards a natural classification of the worldwide taxa *Phellinus s.l.* and *Inonotus s.l.*, and phylogenetic relationships of allied genera. *Mycologia* 94: 998–1016.
- Watling, R. (1969). *Colour Identification Chart*. Edinburgh, Scotland: Her Majesty's Stationary Office.



***Rigidoporus* (Meripilaceae) from the Brazilian Amazonia, Brazil: a new species and new records<sup>8</sup>**

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**Abstract**

A new polypore, *Rigidoporus mariae*, is described from the Brazilian Amazonia based on morphological characteristics. The new species is macroscopically similar to *R. biokoensis*, but distinguished by the absence of cystidia. Besides the description of the new species, *R. biokoensis* and *R. undatus* are reported as a new record to the Brazilian Amazonia and *R. crocatus* is recorded for the second time to Brazil. *Rigidoporus amazonicus*, *R. lineatus*, *R. ulmarius* and *R. vinctus* are new records to different states of the Brazilian Amazonia. A key to the *Rigidoporus* species known to Brazil is provided.

**Key words:** Basidiomycota, Diversity, taxonomy, Brazilian Amazonia

**Introduction**

*Rigidoporus* is a cosmopolitan genus described by Murrill in 1905 and comprises about 40 species so far (Kirk *et al.* 2008). Species of *Rigidoporus* are all white rotters in hardwoods, rarely in coniferous wood or parasitic on deciduous trees (Ryvarden & Johansen 1980, Ryvarden 1991). The genus includes species with resupinate to pileate, annual to perennial basidiomata, while the color is variable from reddish orange to pinkish, isabelline or ochraceous. The hyphal system is monomitic to pseudodimitic with or without cystidia and mammillate cystidioles. The presence of forked cystidia is reported in *R. furcatus* Nuñez & Ryvarden (Nuñez & Ryvarden 2001). The basidiospores are in general, ellipsoid to globose and negative in Melzer's reagent (Silveira & Guerrero 1989, Ryvarden 1991, Cui *et al.* 2009).

*Rigidoporus* has been widely accepted by several authors based on the characters outlined above (Ryvarden & Johansen 1980, Gilbertson & Ryvarden 1987, Silveira & Guerrero 1989, Ryvarden & Gilbertson 1994, Ryvarden 1991, Dai 1998, Nuñez & Ryvarden 2001, Cui *et al.* 2009, Westphalen & Silveira 2012). Recently, Vampola & Vlasák (2012) studied morphologically related species which were redefined based on based on DNA sequencing. Currently nine species are reported to Brazil, six of which in the Brazilian Amazonia (Gugliotta & Abrahão 2012, Westphalen & Silveira 2012).

The aim of the present study is to contribute to the knowledge about the diversity and distribution of *Rigidoporus* in Brazil, with new records from the Brazilian Amazonia, and description of one new species.

## **Material and Methods**

Specimens collected in five reserves in the Brazilian Amazonia from 2006 to 2012 were studied: Estação Ecológica de Cuniã (8°04'S 63°31'W) and Parque Natural Municipal de Porto Velho (8°45'S 63°54'W) in the state of Rondônia; Floresta Nacional do Amapá (051°36'S 00°57'W) in the state of Amapá; Floresta Nacional de Caxiuanã (01°57'S 51°36'W) and Parque Ambiental de Belém

(48°23'S 01°23'W) in the state of Pará. Additionally, specimens deposited in INPA, MG, SP and URM were also studied (Thiers, continuously updated).

For the identification, specimens were analyzed macro- (shape, color, hymenial surface) and micro-morphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Color designation followed Watling (1969). Newly collected materials were deposited in HFSL, MG, O and URM. The nomenclature is based on databases CBS, CABI and Mycobank.

### Taxonomy

#### New species

*Rigidoporus mariae* Gibertoni, Gomes-Silva & Ryvarden, *sp. nov.*

Mycobank no.: MB 801796

*This species differs from the other Rigidoporus species by its small stipitate basidiomata, tiny pores (10-12 per mm), lack of cystidia and cystidiols, and globose basidiospores (4–6 μm).*

**Type (designated here):** — BRAZIL. Acre: BR 317, Km 13, on road between Brasileia and Assis Brasil, 2 November 1980, *leg. B. Lowy et al. 1056* (holotype: INPA 100922, isotype: URM 84072).

**Etymology:** — The specific epithet refers to the Brazilian renowned mycologist, Maria Auxiliadora de Queiroz Cavalcanti.

Basidiomata annual, pileate and laterally stipitate, pileus dimidiate to flabelliform, up to 1-1.5 cm wide, 1.5 cm long and 0.1–0.2 mm thick; upper surface glabrous, concentrically zoned, dull to slightly shining, cinnamon (10), fulvous (12) to snuff brown (17); pore surface poroid, pores angular, 10–12 per mm, fulvous (12), dissepiments thin and entire; tubes up to 0.1 mm deep, fulvous (12); context homogeneous, up to 0.1 mm thick, radially fibrous, buff (52); stipe up to 0.7–

1.0 cm long, 0.2–0.3 mm wide, black the front and and concolorous with the upper pileus surface at the back, without cuticle, context homogeneous, fibrous, concolorous with context of the pileus. Hyphal system monomitic; generative hyphae with simple septa, thin- to slightly thick-walled, 3–5 (–6)  $\mu\text{m}$  wide; cystidia none; cystidiols none; basidia not seen; basidiospores globose, hyaline, thin-walled, 4–6  $\mu\text{m}$ .

**Distribution:** — *Rigidoporus mariae* is known from the states of Acre, Amazonas, Pará, Rondônia and Roraima.

**Ecology:** — On soil forest and unknown angiosperm.

**Specimens examined:** — BRAZIL. Acre: loc. n. det., October 1980, leg. B. Lowy et al. 1056, 541 (INPA 100408, as *Polyporus* sp.). Amazonas: Porto Urucu, December 1993, leg. I.J. Aguiar s.n. (INPA 178429), loc. n. det., September 1980, leg. B. Lowy et al. 173 (INPA 100077, as *Polyporus* sp.). State of Pará: Melgaço, Estação Científica Ferreira Penna, March 2007, leg. T.B. Gibertoni (URM 80011, 80012), February 2008, leg. T.B. Gibertoni (URM 80013, 80014). Rondônia: Km 7, at wide bridge – Estrada 421 west of Campo Novo, October 1979, leg. R.H. Petersen 32 (INPA 110522). State of Roraima: Ilha de Maracá, June 1986, leg. B. Lowy et al. s.n. (INPA 144868, as *Polyporus* sp.), Alto Alegre, Ilha de Maracá, June 1986, leg. E.S.S. Silva 445 (INPA 154922, as *Polyporus* sp.).

**Taxonomic remarks:** — *Rigidoporus mariae* is characterized by the small stipitate basidiomata, tiny pores (10–12 per mm), lack of cystidia and cystidiols and globose basidiospores (4–6  $\mu\text{m}$ ). It resembles *R. bioloensis* and *R. amazonicus* due to the laterally stipitate basidiomata, but the presence of cystidia in *R. biokoensis* and the robust basidiomata with large pores in *R. amazonicus* distinguish these species from *R. mariae*.

#### New records

*Rigidoporus amazonicus* Ryvardeen, Mycotaxon 28(2): 537 (1987).

**Description:** — Ryvardeen (1987).

**Distribution:** —Brazil (Ryvarden 1987), Venezuela and Bolivia (Ryvarden pers. com). In Brazil, it is known from the States of Amazonas and Santa Catarina (Gugliotta & Abrahão 2012), being the first record to Amapá, Mato Grosso, Pará and Rondônia.

**Ecology:** —According to Ryvarden (1987), *R. amazonicus* is collected on dead hardwoods, but URM 83862 was found on forest soil.

**Specimens examined:** — BRAZIL. State of Amapá: Porto Grande, Floresta Nacional do Amapá, PPBio, September 2011, *leg. A.M.S. Soares et al.* (MG 204319). State of Pará: Melgaço, Floresta Nacional de Caxiuanã, PPBIO, October 2009, *leg. P.S. Medeiros* (MG 204395, 204396), February 2007, *leg. P.S. Medeiros* (MG 195395, 195396). State of Rondônia: Jarú, Margem esquerda do Rio Jarú, October 1986, *leg. M. Caparlari & R. Maziero* (SP 211465, as *Rigidoporus* sp.); Porto Velho, Parque Natural Municipal de Porto Velho, January 2009, *leg. A.C. Gomes-Silva* (URM 83862). State of Mato Grosso: Aripuanã, April 1978, *leg. M.A. Sousa* [INPA 75627, as *Amauroderma camerarium* (Berk.) J.S. Furtado].

**Taxonomic remarks:** — *Rigidoporus amazonicus* is characterized by the stipitate basidiomata, ochraceous, finely tomentose pileus, black line in the context, isabelline pore surface, small pores (6–9 per mm), lack of cystidia, and ellipsoid basidiospores (4–4.5 × 3–3.5 µm). *Rigidoporus biokoensis* is a similar species, but differs by the thick-walled cystidia and large subglobose basidiospores. *Rigidoporus mutabilis* I. Lindblad & Ryvarden, other similar species, differs by the white to brown-greyish basidiomata with age, glabrous and without black line in the context.

*Rigidoporus biokoensis* (Bres. ex Lloyd) Ryvarden [as 'biokoense'], Norw. JI Bot. 19: 236 (1972).

≡ *Polyporus biokoensis* Bres. ex Lloyd, Mycol. Writ. 3 (Syn. Stip. Polyporoids): 131 (1912).

**Description:** — Ryvarden & Johansen (1980).

**Distribution:** — Pantropical (Ryvarden & Johansen 1980). In Brazil it is known from the States of Alagoas, Pernambuco and Sergipe (Gugliotta & Abrahão 2012), being the first record to the Brazilian Amazonia.

**Ecology:** — On dead hardwoods (Ryvarden & Johansen 1980).

**Specimens examined:** —BRAZIL. State of Amapá: Porto Grande, Floresta Nacional do Amapá, PPBio, July 2009, leg. *H.M.P. Sotão et al.* (MG 204292, 204293), December 2009, leg. *H.M.P. Sotão et al.* (MG 204298, 204299), June 2010, leg. *H.M.P. Sotão et al.* (MG 204310). State of Maranhão, Santa Luzia, Fazenda Cacique, March 1983, leg. *E.L. Taylor et al.* (MG 113911). State of Pará: Belém, Parque Ambiental de Belém, January 2012, leg. *Medeiros* (MG 204415); Melgaço, Floresta Nacional de Caxiuanã, PPBIO, December 2006, leg. *H.M.P. Sotão et al.* (MG 195290, 195309), August 2007, leg. *P.S. Medeiros et al.* (MG 195271). State of Rondônia: loc. n. det., 1980, leg. *B. Lowy et al.* (INPA 100922, as *Polyporus* sp.), October 1979, leg. *R.H. Pertesen* (INPA 110522).

**Taxonomic remarks:** — *Rigidoporus biokoensis* is recognized by the small, laterally stipitate basidiomata, thick-walled cystidia (20–25 × 10–12 µm) and subglobose basidiospores (4.5–5 µm). The species may be mistaken with *R. concrescens* (Mont.) Rajchenb. (= *R. microporus*), but it differs by the lack of cystidia.

*Rigidoporus crocatus* (Pat.) Ryvarden, Occ. Pap. Farlow Herb. Crypt. Bot. 18: 13 (1983).

≡ *Poria crocata* Pat., J. Bot., Paris 8: 220 (1894).

**Description:** — Ryvarden & Gilbertson (1994), Westphalen & Silveira (2012).

**Distribution:** — North America (Gilbertson & Ryvarden 1987), Argentina (Rajchenberg 2006), Brazil, Costa Rica, Estonia, Uganda (Westphalen & Silveira 2012) and Venezuela (Ryvarden & Iturriaga 2001). In Brazil, it is known from the State of Rio Grande do Sul (Westphalen & Silveira 2012), representing the second record of the species to Brazil and first record to the Brazilian Amazonia.

**Ecology:** — On dead conifers and hardwoods (Ryvarden & Gilbertson 1994).

**Specimens examined:** — BRAZIL. State of Pará: Belém, Parque Ambiental de Belém, October 2011, *leg. P.S. Medeiros* (MG 204429, 204435). State of Rondônia: Porto Velho, Parque Natural Municipal de Porto Velho, March 2012, *leg. A.C. Gomes-silva & T.B. Gibertoni* (URM 83870).

**Taxonomic remarks:** — This species was recently reported from Brazil by Westphalen & Silveira (2012), and it is characterized by the orange to cream, resupinate basidiomata, lack of cystidia, and ovoid to subglobose basidiospores,  $3.5\text{--}5.5 \times 3.5\text{--}5 \mu\text{m}$ . Based in molecular analyses, Vampola & Vlasák (2012) described *R. pouzarii* Vampola & Vlasák from the Czech Republic, Slovakia and Ukraine, and commented this species as closely related to *R. crocatus*, differing macroscopically by the annual, at first whitish or pale pinkish basidiomata which show a striking red staining after bruising. These authors did not examine the type of *R. crocatus*, but analyzed the type of *R. nigrescens* (Bres.) Donk, currently a synonymous of *R. crocatus*. According Westphalen & Silveira (2012), *Poria nigrescens* Bres. is not synonymous to *R. crocatus*, because the type specimen has cystidia in the trama and in the hymenium. Thus, *R. pouzarii* would be related to *R. nigrescens*, because both present encrusted cystidia, which are not observed in *R. crocatus*.

***Rigidoporus lineatus*** (Pers.) Ryvarden, *Norw. J Bot.* 19: 236 (1972).

≡ *Polyporus lineatus* Pers., *Gaudichaud Bot. Frey. Voy. Monde:* 174 (1827).

**Description:** — Ryvarden & Gilbertson (1994), Leal & Gugliotta (2008).

**Distribution:** — Widespread in America, Asia and Africa (Ryvarden & Gilbertson 1994). In Brazil it is known from the States of Alagoas, Amapá, Bahia, Paraíba, Paraná, Pernambuco, Rio Grande do Sul, São Paulo and Santa Catarina (Gugliotta & Abrahão 2012), being the first record to Acre, Amazonas, Maranhão, Pará, Rondônia and Roraima.

**Ecology:** — On hardwood trees (Gilbertson & Ryvarden 1987), recorded in *Robinia* (Ryvarden & Gilbertson 1994) and *Rhizophora* sp. (SP 233308).

**Specimens examined:** —BRAZIL. State of Acre: River Jurá Mirim, September 1901, *leg. E. Ule* (MG 20704), loc. n. det., October 1980, *leg. B. Lowy et al.* (INPA 100320, 100477, as *Polyporus*

sp.). State of Amapá: Mangé, Ilha de Maracá, September 1988, *leg. V.L.R. Bononi & H. Sotão* (SP 233308), Porto Grande, Floresta Nacional do Amapá, PPBio, July 2009, *leg. H.M.P. Sotão et al.* (MG 204321, 204281), July 2009, *leg. H.M.P. Sotão et al.* (MG 204286, 204289), December 2009, *leg. H.M.P. Sotão et al.* (MG 204291, 204295). State of Amazonas: Tapuruquára, Rio Negro, January 1978, *leg. I.J. Araújo et al.* (INPA 78753, 164440), Presidente Figueiredo, loc. n. det., October 1983, *leg. M.A. Jesus* (INPA 183844, 185272), June 1984, *leg. M.A. Jesus* (INPA 185395), January 1985, *leg. R. Liege* (INPA 185911), Manaus, Campus do INPA, February 1985, *leg. R.S. Carvalho* (INPA 185929), October 1989, *leg. M.A. Jesus* (INPA 192494), March 1974, *leg. G.T. Prance et al.* (INPA 44481), December 1977, *leg. M.A. Sousa* (INPA 74723), April 1978, *leg. B. Lowy et al.* 125 (INPA 100078, as *Polyporus* sp.), August 1979, *leg. A.C. Webber* (INPA 109155). State of Maranhão: Santa Luzia, Fazenda Cacique, March 1983, *leg. E.L. Taylor et al.* (MG 113910). State of Pará: Belém, August 1950, *leg. P. Ledoux* (MG 23115), Parque Ambiental de Belém, October 2011, *leg. P.S. Medeiros* (MG 204423, 204424), January 2012, *leg. Medeiros* (MG 204411, 204412), Melgaço, Floresta Nacional de Caxiuanã, PPBIO, August 2007, *leg. P.S. Medeiros et al.* (MG 195270, 195268). State of Rondônia: Jarú, Margem esquerda do Rio Jarú, October 1986, *leg. M. Capelari & R. Maziero* (SP 211467, 211471, as *Rigidoporus* sp.). State of Roraima: Estação Ecológica da Ilha de Maracá, June 1986, *leg. E.L. Sette* (INPA 154874).

**Taxonomic remarks:** — *Rigidoporus lineatus* is characterized by the sessile to rarely substipitate basidiomata, pinkish buff to reddish-brown pileus surface, small pores (6–9 per mm), thick-walled, smooth to strongly encrusted cystidia, and subglobose to globose basidiospores (5–6 × 4–5 µm). It is macroscopically similar to *R. microporus*, differing only microscopically by the lack of cystidia and pores size, 3.5–4.5(–5) × 3.5–4 µm.

***Rigidoporus microporus*** (Sw.) Overeem, Icon. Fung. Malay. 5: 1 (1924).

≡ *Boletus microporus* Sw., Fl. Ind. Occid. 3: 1925 (1806).

**Description:** — Ryvarden & Johansen (1980), Leal & Gugliotta (2008).



**Distribution:** — Pantropical (Ryvarden & Johansen 1980). In Brazil, it is known in several states (Gugliotta & Abrahão 2012), being the first record to Amapá and Mato Grosso.

**Ecology:** — Parasitic on deciduous trees (Ryvarden & Johansen 1980), but only one specimen was collect in living host (URM 83023). The other specimens were collected on dead hardwoods.

**Specimens examined:** —BRAZIL. State of Acre: loc. n. det. October 1980, *leg. B. Lowy et al.* (INPA 100278, 100555). State of Amapá: Porto Grande, Floresta Nacional do Amapá, PPBio, July 2009, *leg. H.M.P. Sotão et al.* (MG 204285), December 2009, *leg. H.M.P. Sotão et al.* (MG 204303), June 2010, *leg. H.M.P. Sotão et al.* (MG 204308), September 2011, *leg. A.M.S. Soares et al.* (MG 204316). State of Amazonas: Manaus, Rio Negro, 1966, *leg. G. Eiten et al.* (SP 71468), Barcelos, Serra do Aracá, March 1984, *leg. G.J. Samuels* (INPA 129729, Itacoatiara, loc. n. det., October 2005, *leg. G. Eiten et al.* (SP 71478), Jutaiá, loc. n. det., October 1986, *leg. E.S.S. Silva et al.* (INPA 153796), Fonte Boa, November 1986, *leg. E.S.S. Silva et al.* (INPA 155027), Tapuruquará, Rio Negro, January 1978, *leg. M.L. Farr et al.* (INPA 164426), Coari, Rio Urucu, December 1993, *leg. I.J.A. Aguiar* (INPA 178430), Presidente Figueiredo, Usina Hidrelétrica de Balbina, s. date, *leg. M.A. Jesus* (INPA 183739), BR174, km 44, EEST, June 1996, *leg. K. Vohland* (INPA 216394), Campus do INPA, February 1985, *leg. R.S. Carvalho* (INPA 185930), March 1985, *leg. M.A. Jesus* (INPA 185932). State of Pará: Belém, Parque ambiental de Belém, October 2011, *leg. P.S. Medeiros* (MG 204426), January 2012, *leg. P. S. Medeiros* (MG 204409), Parauapebas, June 1982, *leg. Sperling et al.* (MG 106057), Melgaço, Floresta Nacional de Caxiuanã, PPBIO, August 2007, *leg. H.M.P. Sotão et al.* (MG 185260), *leg. P.S. Medeiros et al.* (MG 195294), Oriximinã, loc. n. det., June 1980, *leg. V. L.Bononi* (SP 194211), Itaituba, loc. n. det., October 1977, *leg. M. A. Sousa et al.* (INPA 74529). State of Rondônia: Porto Velho, Parque Natural Municipal de Porto Velho, January 2009, *leg. A.C. Gomes-Silva & E.B.A. Souza* (URM 81031, 81038, 81043), June 2009, *leg. A.C. Gomes-Silva & E.B.A. Souza* (URM 81067, 81072, 81073), January 2010, *leg. A.C. Gomes-Silva et al.* (URM 83026, 83028, 83027), February 2011, *leg. A.C. Gomes-Silva et al.* (URM 83023, 83024, 83025), Jarú, margem direita do rio Jarú,

aproximadamente 3 km do acampamento, October 1986, *leg. M. Capelari & R. Maziero* (SP 211470), May 1987, *leg. M. Capelari & R. Maziero* (SP 212001). State of Mato Grosso: São Vicente, March 1982, *leg. L. Carreira et al.* (MG 87570). State of Roraima: Caracaraí, BR174, km 328, November 1977, *leg. I.J. Arapujo et al.* (INPA 76952), Ilha de Maracá, July 1986, *leg. B. Lowy et al.* (INPA 145015), Boa Vista, loc. n. det., July 1989, *leg. M.A. Jesus* (INPA 186205).

**Taxonomic remarks:** — *Rigidoporus microporus* is characterized by the sessile basidiomata, orange-reddish-brown pileus surface, lack of cystidia, and subglobose basidiospores,  $3.5\text{--}4.5(-5) \times 3.5\text{--}4 \mu\text{m}$ .

***Rigidoporus ulmarius*** (Sowerby) Imazeki, Bull. Gov. Forest Exp. St. Tokyo 57: 119 (1952).

≡ *Boletus ulmarius* Sowerby, Col. fig. Engl. Fung. Mushr. 1: 39 (1797) [1795-97].

**Description:** — Ryvardeen & Gilbertson (1994).

**Distribution:** — Southeastern U.S. and Arizona, also in Central America, circumglobal species (Gilbertson & Ryvardeen 1987). In Brazil, it is known from the States of Pará, (Sotão et al. 2008), Paraná, Rio Grande do Sul, São Paulo and Santa Catarina (Gugliotta & Abrahão 2012), being the first record to Amapá, Amazonas and Roraima.

**Ecology:** — Living hardwoods and dead trees (Ryvardeen & Gilbertson 1994). This species has been reported by Silveira & Guerrero (1989) in living *Araucaria angustifolia* (Bertol.) Kuntze.

**Specimens examined:** —BRAZIL. State of Amapá: Porto Grande, Floresta Nacional do Amapá, PPBio, July 2009, *leg. H.M.P. Sotão et al.* (MG 204280), December 2010, *leg. H.M.P. Sotão et al.* (MG 204312). State of Amazonas: Manaus, Campus do INPA, June 1977, *leg. I.J. Araújo* (INPA 80482), Barcelos, Serra de Aracá, February 1984, *leg. G.J. Samuels* (INPA 129626), Jutai, loc. n. det., October 1986, *leg. E.S.S. Silva* (INPA 153798). State of Pará: Belém, Parque ambiental de Belém, October 2011, *leg. P.S. Medeiros* (MG 204430), January 2012, *leg. P.S. Medeiros* (MG 204416), Melgaço, Floresta Nacional de Caxiuanã, PPBIO, August 2007, *leg. P.S. Medeiros et al.* (MG 195272), Itaituba, loc. n. det., September 1977, *leg. M.A. Sousa & L.F. Coelho* (INPA 74630),

Oriximinã, loc. n. det., June 1980, *leg. V.L.R. Bononi* (INPA 103211, as *Daedalea* sp.). State of Roraima: Caracarái, BR 174, KM 328, November 1977, *leg. I.J. Araújo et al.* (INPA 76935).

**Taxonomic remarks:** — This species is distinguished in the genus by large, globose to subglobose basidiospores, 7–10(–11) × 6.5–9(–10) μm.

*Rigidoporus undatus* (Pers.) Donk, Persoonia, 5 (1): 115 (1967).

≡ *Polyporus undatus* Pers., Mycol. Europ., 2: 90, 1825

**Description:** — Ryvar den & Gilbertson (1994) and Westphalen & Silveira (2012)

**Distribution:** — Belize (Ryvar den 2007), Brazil and Costa Rica (Westphalen & Silveira 2012). In Brazil, it is known from the State of Rio Grande do Sul (Westphalen & Silveira 2012), being the first record to the Brazilian Amazonia.

**Ecology:** — On dead hardwoods (Ryvar den 2007).

**Specimens examined:** — BRAZIL. State of Pará: Belém, Parque Ambiental de Belém, January 2012, *leg. Medeiros* (MG 203518).

**Taxonomic remarks:** — *Rigidoporus undatus* is recognized by the resupinate basidiomata, isabelline to beige pore surface and globose basidiospores (5–6 μm).

*Rigidoporus vinctus* (Berk.) Ryvar den, Norw. J. Bot. 19(2): 143 (1972).

≡ *Polyporus vinctus* Berk., Ann. Mag. nat. Hist., Ser. 2 9: 196 (1852).

**Description:** — Ryvar den & Johansen (1980), Leal & Gugliotta (2008).

**Distribution:** — Pantropical (Ryvar den & Johansen 1980). In Brazil, it is known from the States of Alagoas, Amazonas, Paraná, Pernambuco, São Paulo, Santa Catarina (Gugliotta & Abrahão 2012), Rio Grande do Sul (Westphalen & Silveira 2012), being the first record to Acre, Pará, Rondônia and Roraima.

**Ecology:** — On dead hardwoods (Ryvar den & Johansen 1980).

**Specimens examined:** —BRAZIL. Acre: Rio Branco, loc. n. det., September 1980, *leg. B. Lowy et al.* (INPA 100293, as *Poria* sp.). State of Amazonas: Manaus, Campus do INPA, November 1989, *leg. R. Carvalho* (INPA 192501), May 1990, *leg. M.A. Jesus* (INPA 192644), Presidente Figueiredo, loc. n. det., January 1985, *leg. R. Liege* (INPA 185913), Manaus, loc. n. det., May 1985, *leg. M.A. Jesus* (INPA 185979). State of Pará: Melgaço, Floresta Nacional de Caxiuanã, PPBIO, August 2007, *leg. P.S. Medeiros et al.* (MG 195151). State of Rondônia: Vilhena, loc. n. det., October 1979, *leg. R.H. Pertesen* (INPA 110788, as *Poria* sp.), loc. n. det., October 1979, *leg. B. Lowy et al.* (INPA 110633, as *Poria* sp.), November 1979, *leg. R.H. Pertesen* (INPA 110813, as *Poria* sp.). State of Roraima: Ilha de Maracá, June 1986, *leg. B. Lowy et al.* (INPA 144843, as *Poria* sp.), loc. n. det., January 1984, *leg. G.J. Samuels* (INPA 129086).

**Taxonomic remarks:** — *Rigidoporus vinctus* is characterized by the pink to black basidiomata, tiny pores (6–12 per mm) and strongly encrusted cystidia. It is related to *R. undatus* (Pers.) Donk, differing by the colour of the basidiomata (isabelline to beige), larger pores (7–9 per mm) and smooth or only apically encrusted cystidia.

#### Key to species of *Rigidoporus* from Brazil

1. Basidiomata pileate ..... 2
  - Basidiomata resupinate ..... 7
2. Basidiomata pale buff to cream, up to 6 cm thick; pores 5-6 per mm; basidiospores, 7–11 × 6.5–10 µm ..... *R. ulmarius*
  - Basidiomata of different colour, up to 1 cm thick; pores > 6 per mm; basidiospores < 7 µm long .. 3
3. Thick-walled cystidia present ..... 4
  - Thick-walled cystidia absent ..... 5
4. Basidiomata distinctly stipitate, pileus surface tan to dark; pore surface tan to reddish brown .....
  - ..... *R. biokoensis*
  - Basidiomata sessile to substipitate, pileus surface pinkish buff to reddish buff; pore surface orange red ..... *R. lineatus*

5. Basidiomata sessile to occasionally resupinate, orange reddish brown; hyphal system pseudodimitic ..... *R. microporus*
- Basidiomata stipitate, pileus surface ochraceous to snuff brown; hyphal system monomitic..... 6
6. Basidiomata zonate, cinnamon, fulvous to snuff brown; context buff without black lines; pore surface fulvous, pores 10–12 per mm; cystidiols absent; basidiospores globose 4–6  $\mu\text{m}$  ..... *R. mariae* sp. nov.
- Basidiomata azonate, ochraceous; context white with black lines; pore surface isabelline, pores 6–9 per mm; cystidiols 12–15  $\mu\text{m}$  long; basidiospores ellipsoid, 4–4.5  $\times$  3–3.5  $\mu\text{m}$  ..... *R. amazonicus*
7. Pores 5–7 per mm; thick-walled cystidia and cystidiols absent ..... *R. crocatus*
- Pores > 7 per mm; thick-walled cystidia and cystidiols present..... 8
8. Basidiomata resupinate to effused-reflexed, pale ochraceous buff to pinkish ochraceous; hyphal system pseudodimitic; basidiospores ovoid to subglobose 4–5.5  $\times$  3–4  $\mu\text{m}$  ..... *R. vinctus*
- Basidiomata resupinate, isabelline to beige; hyphal system monomitic; basidiospores globose 5–5.5 (–6) ..... *R. undatus*

## Results and discussion

Up to date, 12 species of *Rigidoporus* have been recorded from Brazil (Silveira & Guerrero 1989, Góes-Neto 1999, Gugliotta & Abrahão 2012, Westphalen & Silveira 2012) and four of these are reported to the Brazilian Amazonia. Four species previously published from Brazil were excluded: *R. albostygius* (Berk. & M.A. Curtis) Rajchenb (= *R. vinctus*), *R. conrescens* (Mont.) Rajchenb. and *R. umbonatipes* Rajchenb. (= *R. microporus*) and *R. sanguinolentus* (Alb. & Schwein.) Donk [= *Physisporinus sanguinolentus* (Alb. & Schwein.) Pilát.] (see [www.indexfungorum.org](http://www.indexfungorum.org), [www.mycobank](http://www.mycobank)). *R. umbonatipes* Rajchenb was cited from Brazil by Silveira and Guerreiro in 1989, based on material collected in Rio Grande do Sul. During the field trips and after revision of

fungal collections in herbaria, one new species, *R. mariae*, two new records to the Brazilian Amazonia (*R. biokoensis* and *R. undatus*), a second record for Brazil (*R. crocatus*) and several new records to States in the Brazilian Amazonia were found. This demonstrates the importance of accessibility and re-evaluation of dried fungal collections. Thus, nine species of *Rigidoporus* are known from Brazil and six from the Brazilian Amazonia so far.

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### **References**

Cui, B.K., Dai, Y.C., Li, B.D. (2009) Notes on the genus *Rigidoporus* (*Basidiomycota*, *Polyporaceae*) in China. *Nova Hedwigia* 88: 189–197.

- Dai, Y.C. (1998) Changbai wood-rotting fungi 9. Three new species and other species in *Rigidoporus*, *Skeletocutis* and *Wolfiporia* (*Basidiomycota*, *Aphyllphorales*). *Ann. Bot. Fennici* 35: 134–154.
- Gilbertson, R.L., Ryvarden, L. (1987) North American Polypores. Vol. 2. *Fungiflora*, Oslo.
- Góes-Neto, A. (1999) Polypore diversity in the state of Bahia, Brazil: a historical review. *Mycotaxon* 72: 43–56.
- Gugliotta, A.M., Abrahão, M.C. (2012): *Polyporales* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <<http://floradobrasil.jbrj.gov.br/2012>>.
- Leal, G.R., Gugliotta, A.M. (2008) Criptógamos do Parque Estadual das Fontes do Ipiranga, São Paulo, SP. Fungos, 9: *Meripilaceae*. *Hoehnea* 35(1): 99–110.
- Núñez, M., Ryvarden, L. (2001). East Asian Polypores, Vol. 2. *Syn. Fungorum* 14: 167–522.
- Kirk, P.M., Cannon, P.F., Minter, D.W., Stalpers (2008) Dictionary of the Fungi. 10 ed. CABI Publishing, Surrey. 771 pp.
- Rajchenberg, M. (2006) Los Políporos (*Basidiomycota*) de los Bosques Andinos Patagónicos da Argentina. *Biblioteca Mycologica* 201: 1–300.
- Ryvarden, L. (1987) New and noteworthy polypores from tropical America. *Mycotaxon* 28 (2): 525–542.
- Ryvarden, L. (1991) Genera of polypores, nomenclature and taxonomy. *Syn Fungorum* 5: 1–363.
- Ryvarden, L. (2007) Studies in Neotropical Polypores 23. New and interesting wood-inhabiting fungi from Belize. *Syn Fungorum* 23: 32–50.
- Ryvarden, L., Gilbertson, R. L. (1994) European Polypores. Vol. 2. *Synopsis Fungorum* 6, Fungiflora, Oslo, 355p.
- Ryvarden, L., Iturriaga, T. (2003). Studies in neotropical polypores 10. New polypores from Venezuela. *Mycologia* 95: 1066–1077.
- Ryvarden, L., Johansen, I. (1980) A preliminary polypore flora of East Africa. Oslo, Norway: Fungiflora. 636 p.

Silveira, R.M.B., Guerrero, R.T. (1989) Os gêneros *Rigidoporus* Murr. e *Flaviporus* Murr. (*Basidiomycetes*) do Parque Nacional de Aparados da Serra, RS. *Acta Botanica Brasilica* 3: 29–45.

Sotão, H.M.P., Gibertoni, T.B., Maziero, R., Baseia, I., Medeiros, P.S., Martins-Júnior, A., Capelari, M. (2008) Fungos macroscópios da Floresta nacional de Caxiuanã, Pará, Brasil: *Basidiomycota* (*Agaricomycetes*). In: Lisboa P.L.B. (org.). Caxiuanã: Desafios para conservação de uma Floresta Nacional na Amazônia. Belém: Museu Paraense Emílio Goeldi.

Thiers, B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/>. Accessed 2 May 2012.

Vampola, P., Vlasák, J. (2012) *Rigidoporus pouzarii*, a new polypore species related to *Rigidoporus crocatus*. *Czech Mycology* 64(1): 3–11.

Watling, R. (1969) Colour Identification Chart. Edinburgh, Scotland: Her Majesty's Stationary Office.

Westphalen, M.C., Silveira, R.M.B. (2012) Interesting resupinate species of *Rigidoporus* from Brazil. *Nova Hedwigia* 94(3-4): 397–404.



**New records of *Meruliaceae* (*Basidiomycota*) from the Brazilian Amazonia<sup>9</sup>**Allyne Christina Gomes-Silva<sup>1\*</sup> and Tatiana Baptista Gibertoni<sup>1</sup>

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**Abstract.** Interesting species of *Meruliaceae* are reported to the Brazilian Amazonia. Some of these were collected in field trips in the states of Pará and Rondônia, while others were discovered during the revision of the exsiccates deposited in herbaria INPA and SP. *Junghuhnia carneola*, *J. nitida* and *Steccherinum reniforme* are new records for the Brazilian Amazonia. *Gloeoporus theleporoides* is newly recorded in the states of Acre, Amazonas, Pará, Rondônia and Roraima. *Aquascypha hydrophora* is reported as new for the state of Pará and Rondônia, while *Irpex lacteus* is new for the state of Acre and Amazonas. Keys to the species of *Cymatoderma*, *Gloeoporus* and *Steccherinum* recorded in Brazilian Amazonia are provided.

Key words: *Polyporales*, fungal taxonomy, diversity

**Introduction**

*Meruliaceae* Rea (*Polyporales*) was described in 1922 ([www.mycobank.org](http://www.mycobank.org)) and comprises species with resupinate to pileate basidiomata, smooth, radially folded, spinose or poroid hymenium surface, monomitic or rarely dimitic hyphal system, usually with cystidia, and ellipsoid, cylindrical or allantoid, hyaline, smooth basidiospores, negative in Melzer's reagent (Cannon and Kirk, 2007). The species are saprobes or parasitic on woody plants, causing a white rot. Some species of the family cause decay of timber trees, though damage is frequently of minor impact (Cannon and Kirk, 2007).

This family comprises about 47 genera and 420 species (Kirk et al., 2008), but few have been reported to Brazil: two in the semi-arid region, nine in the Cerrado, 26 in Brazilian Amazonia, and 67 in the Atlantic rain forest (Gugliotta and Abrahão, 2012). Thus, the aim of this work is to contribute to the knowledge about *Meruliaceae* in the Brazilian Amazonia, with new occurrences and new distributional data on previous known species.

## Material and Methods

Specimens were collected in three reserves located in the Brazilian Amazonia from 2007 to 2011. The Estação Ecológica de Cuniã (53.221 ha, 8°04'S 63°31'W) and Parque Natural Municipal de Porto Velho (390.82 ha, 8°45'S 63°54'W) are represented by open ombrophilous forest and transition forest with savannas, and are both in the State of Rondônia. The Estação Científica Ferreira Penna (an area inside FLONA de Caxiuanã with 33.000ha, 1°44' S 51°27' W with ) is located in the State of Pará with typical Amazonian ecosystems are found and its flora is one of the richer in the Amazonian basin (Lisboa, 2002).

Additionally, one area in Rondônia (Fazenda Mucuí - 8°22' S 64°07' W) was visited once. The specimens deposited in Instituto Nacional de Pesquisas da Amazônia (INPA) and Instituto de Botânica (SP) were also studied (Thiers, continuously updated).

For the identification, specimens were analyzed macro- (shape, color, hymenial surface) and micro-morphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Slide preparations with 3-5% KOH, stained with 1% aqueous phloxine, and Melzer's reagent (Ryvarden 1991) were made. Color designation followed Watling (1969). Newly collected material was deposited in Herbarium Dr. Ary Tupinambá Penna Pinheiro (HFSL) and Herbarium Padre Camille Torrend (URM).

## Taxonomy

*Aquascypha hydrophora* (Berk.) D.A. Reid, Beih. Nova Hedwigia 18: 52 (1965).

≡ *Stereum hydrophorum* Berk., Ann. Mag. nat. Hist., Ser. 1 14: 327 (1844).

*Description and illustration:* Reid (1965), Ryvarden (2010).

*Distribution and ecology:* Known from Brazil, British Guiana, Colombia, Suriname, French Guiana, Panamá and Venezuela (Ryvarden, 2010). In Brazil, it is known from the States of Amapá, Amazonas, Pará and São Paulo (Gugliotta and Abrahão, 2012), being the first record to the State of Rondônia and Roraima. The species has been reported on hardwood.

*Specimens examined:* Brazil. State of Amazonas: Manaus, Cachoeira Janarate, leg. V.F. Kinupp, date indet. (INPA 211680); Reserva Ducke, leg. D.M. Vital, July 1974 (INPA 211680), leg. V.L.R. Bononi, date indet. (SP 211859); loc.n.det., leg. Luetzelburg, December 1928 (SP 60078), leg. G. Eiten, January 1963 (SP 71485). State of Pará: Oriximiná, loc. n. det., leg. V.L.R. Bononi, June 1980 (SP 211803). State of Rondônia: Jarú, Margem direita do rio Ji-Paraná, leg. M. Capelari and R. Maziero, October 1986 (SP 211559, SP 211560, SP 211561, SP 211562, SP 211594, SP 211641, SP 211691), leg. M. Capelari et al., May 1987 (SP 214584, SP 214606, SP 214629). State of Roraima: Boa Vista, BV-8, Posto da FUNAI, leg. M.A. Sousa et al., November 1977 (INPA 211680).

*Taxonomic remarks:* This species is characterized by its large, dark brown, centrally stipitate, infudibuliform basidiomata with dense tufts in the base of the funnel, tomentose to velutine upper surface, smooth hymenial surface, trimitic hyphal system and cylindrical basidiospores.

***Cymatoderma dendriticum*** (Pers.) D.A. Reid, Kew Bull. 13(3): 523 (1959) [1958].

≡ *Thelephora dendritica* Pers., in Gaudichaud-Beaupré in Freycinet, Voy. Uranie. Bot. 5: 176 (1827) [1826-1830].

*Description and illustration:* Reid (1965), Ryvarden (2010).

*Distribution and ecology:* Pantropical (Ryvarden, 2010). In Brazil, it is known from the States of Amapá, Amazonas, Pará, Paraná, Paraíba, Rondônia, Roraima, São Paulo, Santa Catarina, Sergipe and Rio Grande do Sul (Gugliotta and Abrahão, 2012). The species has been reported on dead

wood, but one specimen (URM 82908) was collected in seeds of *Orbignya phalerata* Mart. (“babaçú”).

*Specimens examined:* Brazil. State of Amazonas: Manaus, Itacoatiara, leg. G. Eiten et al., date indet. (SP 71461); SE Manaus, leg. G. Guzman and V.L. Bononi, December 1983 (SP 193570, as *Cymatoderma* sp.). State of Pará: Belém, Matas da Uma, leg. P. Occhioni, January 1928 (SP 31699, as *Cladorerris dendritica* Pers). State of Rondônia: Porto Velho, Estação Ecológica de Cuniã, leg. A.C. Gomes-Silva, February 2011 (URM 82908).

*Taxonomic remarks:* According to Reid (1965) and Ryvar den (2010), this species is characterized by the lateral stipe, complex system of ridges on hymenial surface, dimidiate or flabellate basidiomata, tomentose pileus surface, hyphae system trimitic and ellipsoid to subglobose basidiospores.

#### **Key to species of *Cymatoderma* recorded in Brazilian Amazonia**

1. Hyphae system trimitic; basidiospores ellipsoid to subglobose,  $3-4 \times 2.5-3 \mu\text{m}$ ..... *C. dendriticum*
- 1'. Hyphae system dimitic; basidiospores subcylindrical to ellipsoid,  $7.5-12 \times 2.5-4 \mu\text{m}$  .....  
..... *C. caperatum* (Berk. & Mont.) D.A. Reid (see Ryvar den, 2010)

***Gloeoporus cystidiatus*** Ryvar den, Mycotaxon 28(2): 528 (1987).

*Description and illustration:* Ryvar den (1987).

*Distribution and ecology:* Known from the State of Amazonas, Brazil (Ryvar den, 1987). The species has been reported on dead hardwood.

*Specimens examined:* Brazil. State of Amazonas: Barcelos, Serra de Aracá, leg. G.J. Samuels, March 1984 (INPA 129882, holotype).

*Taxonomic remarks:* According to Ryvar den (1987), this species is easy to recognize because of the numerous cystidia in the hymenium.

***Gloeoporus dichrous*** (Fr.) Bres., Hedwigia 53: 74 (1913).

≡ *Polyporus dichrous* Fr., Observ. mycol. (Havniae) 1: 125 (1815).

*Description and illustration:* Gilbertson and Ryvar den (1986), Ryvar den and Gilbertson (1993).

*Distribution and ecology:* Cosmopolitan species (Ryvar den and Gilbertson, 1993). In Brazil, it is known from several States (Gugliotta and Abrahão, 2012), being the second record to Brazilian Amazonia and the first record to Pará as well. The species has been reported on numerous hardwoods.

*Specimens examined:* Brazil. State of Amazonas: loc. n. det., leg. R.B. Singer and I.J. Araújo, July 1978 (INPA 82752, as *G. combretus* Mont.). State of Pará: Óbidos, Castanhal do Lago Salgado, leg. P. Occhioni, September 1927 (SP 25413, SP 27622).

*Taxonomic remarks:* The reddish pore surface and the white, cottony context and upper surface characterize this species. *Gloeoporus theleporoides* is a macroscopically similar species, but the generative hyphae with simple septa distinguish this species.

***Gloeoporus theleporoides*** (Hook.) G. Cunn., Bull. N.Z. Dept. Sci. Industr. Res., Pl. Dis. Div. 164: 111 (1965).

≡ *Boletus theleporoides* Hook., in Kunth, Syn. pl. (Paris) 1: 10 (1822).

*Description and illustration:* Gilbertson and Ryvar den (1986).

*Distribution and ecology:* Pantropical (Gilbertson and Ryvar den, 1986). Brazil, it is known from the States of Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Rio Grande do Sul, Santa Catarina and São Paulo (Gugliotta and Abrahão, 2012), being the first record to the State of Acre,

Amazonas, Pará, Rondônia and Roraima. The species has been reported on dead deciduous wood of many genera.

*Specimens examined:* Brazil. State of Acre: loc. n. det., leg. B. Lowy et al., October 1980 (INPA 100219, INPA 100344, as *Polyporus* sp.). State of Amazonas: Barcelos, Serra de Aracá, leg. G.J. Samuels, March 1984 (INPA 129917); loc. n. det., leg. G.J. Samuels et al., February 1984 (INPA 129122, INPA 130108); leg. G.T. Prance et al., July 1971 (INPA 32852, as *Gloeoporus* sp.). State of Pará: Belém, Cachoeira da Porteira, leg. V.L.R. Bononi, June 1980 (SP 214660); Melgaço, Estação Científica Ferreira Penna, leg. T.B. Gibertoni, July 2007 (URM 79584, URM 79585, URM 79582, URM 79583), February 2008 (URM 79586). State of Rondônia: Porto Velho, Fazenda Mucuí, leg. A.C. Gomes-Silva, July 2007 (URM 79488); Parque Natural Municipal de Porto Velho, leg. A.C. Gomes-Silva, July 2007 (URM 79489, URM 79490, URM 79491, URM 79492), July 2008 (URM 79493, URM 79494), June 2009 (URM 81075, URM 81077); loc. n. det., leg. K.P. Dumont et al., July 1968 (INPA 65176, INPA 65119, as *Gloeoporus* sp.). State of Roraima: Boa Vista, loc. n. det., leg. L.L.J. Aguiar et al., November 1977 (INPA 78395); loc. n. det., leg. G.T. Prance et al., January 1967 (INPA 19714); leg. G.J. Samuels, January 1984 (INPA 129110).

*Taxonomic remarks:* The gelatinous, pinkish pore surface, monomitic hyphal system with simple septa and cylindrical to allantoid basidiospores ( $3.5\text{--}5 \times 0.7\text{--}1 \mu\text{m}$ ) characterize this species. *Gloeoporus dichrous* is a similar species, but the generative hyphae with large clamps distinguish this species.

### **Key to species of *Gloeoporus* recorded in Brazilian Amazonia**

- 1'. Pore surface reddish; generative hyphae with clamps ..... *G. dichrous*  
 1. Pore surface pale pink to purplish; generative hyphae with simple septa ..... 2  
 2. Basidiomata pileate; cystidia absent from the hymenium ..... *G. thelephoroides*  
 2'. Basidiomata resupinate to pileate; cystidia present from the hymenium ..... *G. cystidiatus*

*Irpex lacteus* (Fr.) Fr., Elench. fung. (Greifswald) 1: 142 (1828).

≡ *Sistotrema lacteum* Fr., Observ. mycol. (Havniae) 2: 266 (1818).

*Description and illustration:* Gilbertson and Ryvardeen (1986), Núñez and Ryvardeen (2001).

*Distribution and ecology:* Cosmopolitan (Gilbertson and Ryvardeen 1986, Núñez and Ryvardeen 2001). Brazil, it is known from the States of Pará, Paraná, Pernambuco, Rio Grande do Sul, São Paulo and Santa Catarina (Gugliotta and Abrahão, 2012), being the first record to the State of Acre and Amazonas. The species has been reported on dead deciduous wood.

*Specimens examined:* Brazil: State of Pará, Melgaço, leg. T.B. Gibertoni, February 2008 (URM 79632). State of Amazonas, Presidente Figueiredo, leg. M.A. Jesus, September 1983 (INPA 183662), June 1984 (INPA 185798); Manaus, Campus do INPA, leg. M.A. Jesus, August 1989 (INPA 186260); loc. n. det., leg. O. Fonseca, March 1961 (INPA 75177). State of Acre, loc. n. det., leg. B. Lowy et al., October 1980 (INPA 100509, INPA 100687). *Taxonomic remarks:* *Irpex lacteus* is characterized by the incrustated cystidia, and irpicoid hymenial surface.

*Junghuhnia carneola* (Bres.) Rajchenb., Revta Investnes agrop., Sér. 5 19(1): 45 (1984).

≡ *Poria carneola* Bres., Hedwigia 35: 282 (1896).

*Description and illustration:* Ryvardeen and Johansen (1980).

*Distribution and ecology:* Tropical Africa and America (Ryvardeen and Johansen, 1980). In Brazil, it is known from the States of Paraná, Rio Grande do Sul and Santa Catarina (Westphalen et al., 2012), being the first record to the Brazilian Amazonia. The species has been reported on dead wood of numerous species of angiosperms.

*Specimens examined:* Brazil. State of Pará, Melgaço, leg. T.B. Gibertoni, february 2008 (URM 79633).

*Taxonomic remarks:* *Junghuhnia carneola* is characterized by the resupinate, citric yellow basidiomata, and by the finely incrustated hyphae. According to Westphalen et al. (2012), this species

differs from the other resupinate species of the genus by the yellowish basidiomata that become reddish when bruised.

***Junghuhnia nitida*** (Pers.) Ryvardeen, Persoonia 7(1): 18 (1972).

≡ *Poria nitida* Pers., Observ. mycol. (Lipsiae) 2: 15 (1800) [1799].

*Description and illustration:* Ryvardeen and Johansen (1980), Ryvardeen and Gilbertson (1993).

*Distribution and ecology:* Cosmopolitan (Ryvardeen and Gilbertson, 1993). In Brazil, it is known from the States of Alagoas, Paraná, Rio Grande do Sul and São Paulo (Gugliotta and Abrahão, 2012), being the first record to the Brazilian Amazonia. The species has been reported on dead wood of numerous species of angiosperms.

*Specimens examined:* Brazil. State of Rondônia: Jarú, Reserva Biológica do Jarú, leg. M. Capelari et al., may 1987 (SP 211996).

*Taxonomic remarks:* This species is easy to recognize macroscopically by the resupinate basidiomata, cream pore surface with a distinct buff pinkish tint, 5–7 pores per mm, and microscopically by hyphae system dimitic, abundant encrusted cystidia and ellipsoid to ovoid basidiospores,  $3.5\text{--}4.5 \times 2.5\text{--}3 \mu\text{m}$ .

### **Key to species of *Junghuhnia* recorded in Brazilian Amazonia**

- 1'. Basidiomata pileate to effused reflexed; pore surface ochraceous with pink tint when fresh; basidiospores ellipsoid to subglobose,  $3.5\text{--}4 \mu\text{m}$  in diam .....  
 ..... *J. undigera* (Berk. & M.A. Curtis) Ryvardeen (see Westphalen et al., 2012)
1. Basidiomata resupinate; pore surface differently colored; basidiospores ellipsoid, different sizes 2  
 2. Pore surface cream to pale orange pink; pores 6–10 per mm; basidiospores (2.5–) 3–4  $\mu\text{m}$  in diam; coarsely encrusted hyphal ends..... *J. nitida*



2. Pore surface pale citric yellow; pores 3–6 per mm; basidiospores 3–5  $\mu\text{m}$  in diam; finely encrusted hyphal ends ..... *J. carneola*

*Steccherinum reniforme* (Berk. & M.A. Curtis) Banker, Mem. Torrey bot. Club 12: 127 (1906).

≡ *Hydnum reniforme* Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10(no. 46): 325 (1868) [1869].

*Description and illustration*: Mass (1974).

*Distribution and ecology*: Neotropical (Mass (1974)). In Brazil, it is known from the States of Amazonas, Goiás, Mato Grosso, Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, São Paulo and Santa Catarina (Gugliotta and Abrahão, 2012), being the second record to the Brazilian Amazonia and the first record to the State of Rondônia. The species has been reported on hardwood.

*Specimens examined*: Brazil. State of Rondônia: Porto Velho, Fazenda Mucuí, leg. A.C. Gomes-Silva et al., July 2007 (URM 79547).

*Taxonomic remarks*: Species characterized by the pink, hydroid hymenial surface and cystidia in the hymenium.

### Key to species of *Steccherinum* recorded in Brazilian Amazonia

1. Pore surface pink; basidiospores ellipsoid, 2.5–3 (–4)  $\times$  1.5–2  $\mu\text{m}$ ..... *S. reniforme*  
 1'. Pore surface pale ochraceous; basidiospores ellipsoid, 3–3.5  $\times$  2–2.5  $\mu\text{m}$  .....  
 .....*S. ochraceum* (Pers.) Gray (See Bernicchia and Gorjón, 2010)

### Discussion

Based on literature, 26 species of *Meruliaceae* are reported to the Brazilian Amazonia up to date. After revision of fungal collections in INPA and SP and trips, three new records to the region and several for some States of the Brazilian Amazonia were discovered, which demonstrates the importance of accessibility and re-evaluation of dried fungal collections and new collections in

areas of the Amazonia forest. Thus, 29 species of *Meruliaceae* are accepted to the Brazilian Amazonia.

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### References

- Bernicchia, A. and S.P. Gorjón. 2010. *Fungi Europaei – Corticiaceae s.l.* Edizioni Candusso. Vol. 12. 1008pp.
- Cannon, P.F. and P.M. Kirk. 2007. *Fungal Families of the world.* CAB Internacional. 456pp.
- Gilbertson, R.L. and L. Ryvardeen. 1986. *North American Polypores.* Vol. 1. *Abortiporus–Lindtneria.* Fungiflora, Oslo.
- Gugliotta, A.M. and M.C. Abrahão. 2012. *Polyporales* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/2012/FB000023>. última consulta: 13.VI.2012.
- Kirk, P.M., P.F. Cannon, D.W. Minter and J.A. Stalpers. 2008. *Dictionary of the Fungi.* 10 ed. CABI Publishing, Surrey. 771 pp.

Lisboa, P.L.B. 2002. A Estação Científica Ferreira Penna/ECFPn (1993-2000). In: P.L.B. Lisboa, ed.). Caxiuanã: Populações tradicionais, Meio Físico e Diversidade Biológica. Belém, Museu Paraense Emílio Goeldi, pp. 35–55.

Maas, G. R. A. 1974. Studies in the genera *Irpex* and *Steccherinum*. *Persoonia* 7(4): 443–581.

Núñez, M. and L. Ryvarden. 2001. East Asian Polypores, Vol. 2. *Syn. Fungorum* 14: 167–522.

Ryvarden, L. and I. Johansen. 1980. A preliminary polypore flora of East Africa. Oslo, *Fungiflora*, 630pp.

Ryvarden, L. and R.L. Gilbertson. 1993. European Polypores. Vol. 1. *Fungiflora*, Oslo, 387pp.

Ryvarden, L. 1991. Genera of Polypores – Nomenclature and taxonomy. *Syn. Fungorum* 5: 1–363.

Ryvarden, L. 2010. Stereoid fungi of America. *Syn. Fungorum* 28: 1-232.

Ryvarden, L. 1987. New and noteworthy polypores from tropical America. *Mycotaxon* 28: 525–541.

Thiers, B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/>. Última consulta: 13.VI.2012 .

Watling, R. (1969): Colour Identification Chart. Her Majesty's Stationary Office, Edinburgh (Scotland).

Westphalen, M.C., M.A. Reck and R.M.B. Silveira. 2012. The genus *Junghuhnia* in Brazil. *Nova Hedwigia* 94(1-2): 209–220.

## RESUPINATE POROID FUNGI FROM TROPICAL RAIN FORESTS IN BRAZIL: TWO NEW SPECIES AND NEW RECORDS

**Abstract** *Ceriporia angulata* and *Dichomitus amazonicus* are described and illustrated as new species based on specimens collected in Reserva Ducke, in the state of Amazonas. *Dichomitus ecuadoriensis* is reported as new to Brazil and *D. cavernulosus* is a new record for the states of Amazonas, Rondônia and Roraima. *Ceriporia spissa* is a new record for the Brazilian Amazonia. Descriptions and illustrations of the new species, and keys to species of *Ceriporia* and *Dichomitus* known for the Neotropics are provided.

**Keywords** Basidiomycota . Polyporaceae . Phanerochaetaceae . Taxonomy . Brazilian Amazonia

### Introduction

Donk (1933) proposed the genus *Ceriporia* Donk (*Phanerochaetaceae* Jülich, Polyporales) and currently it comprises about 22 to 52 species (Kirk et al. 2008; <http://www.mycobank.org/MycoTaxo.aspx>), 15 of which have been reported from the Neotropics. This genus is characterized by a monomitic hyphal system with simple-septate generative hyphae, hyaline basidiospores, lack of cystidia, and causes a white rot (Ryvarden 1991).

*Dichomitus* D.A. Reid was described in 1965 (Ryvarden and Gilbertson 1993) based on *D. squalens* (P. Karst.) D.A. Reid and actually includes about seven to 26 species (Kirk et al. 2008; <http://www.mycobank.org/MycoTaxo.aspx>). The genus was described to accommodate species with annual to perennial basidiomata, resupinate to pileate or rarely effused-reflexed pileus, white to cream pore surface, a dimitic hyphal system with clamped generative hyphae, variably dextrinoid arboriform skeletal hyphae, absence of cystidia, hyaline, smooth, thin-walled and non-amyloid, cylindrical to oblong ellipsoid basidiospores (Ryvarden 1991; Masuka and Ryvarden 1999). The species usually occur on dead wood, both of gymnosperms and angiosperms (Ryvarden 1991). *Dichomitus* has been accepted by several authors (Ryvarden 1991; Masuka and Ryvarden 1999; Robledo and Rajchenberg 2007) although it is closely related to *Megasporoporia* Ryvarden & J.E. Wright by similar basidiomata, hyphal structure and basidiospores. *Megasporoporia* was treated as a synonym of *Dichomitus* by Masuka and Ryvarden (1999) and Robledo and Rajchenberg (2007). The former authors considered *Megasporoporia* an artificial genus containing convergent species, while the latter authors considered the genus a tropical counterpart, but not sufficiently different from, the temperate *Dichomitus*. Many authors, however, have treated *Megasporoporia* as an

independent genus (Dai and Wu 2004; Zhou and Dai 2008; Du and Cui 2009), because it differs in the dextrinoid skeletal hyphae (Dai and Wu 2004). In the present study, *Megasporoporia* is treated as a synonym of *Dichomitus*.

Therefore, the aim of the present study is to contribute to the knowledge about the diversity of *Ceriporia* and *Dichomitus* in Brazil with new records from the area, and descriptions and illustrations of two new species.

## Material and methods

Specimens recently collected in the Brazilian Amazonia and in the Atlantic Rain Forest from 2006 to 2011 were studied. Three reserves in Amazonia were visited: the Estação Ecológica de Cuniã (53,221 ha, 08°04' S, 63°31' W) in the state of Rondônia, the Floresta Nacional de Caxiuanã (330,000 ha, 1°44' S, 51°27' W) in the state of Pará, and the Reserva Florestal Adolfo Ducke (10,000 ha, 03°08' S, 59°52' W) in the state of Amazonas. Visits were also made in the Atlantic Forest to the Parque Ecológico João de Vasconcelos Sobrinho (08°22' S, 36°05' W) in the state of Pernambuco.

Basidiomata were analyzed macro– (shape, colour, hymenial surface) and micromorphologically (hyphal system, presence/absence and measurement of sterile structures and basidiospores). Microscopic observations were made from slide preparations with 5% KOH, stained with 1% aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Colour designation followed Watling (1969). The collected specimens were deposited in HFSL, MG, O and URM. Additionally, specimens previously deposited in INPA and O were also studied.

## Results and discussion

Prior to this study, five species of *Dichomitus* [*D. anoetoporus* (Berk. & M.A. Curtis) Ryvarden, *D. cavernulosus* (Berk.) Masuka & Ryvarden, *D. citricremeus* Masuka & Ryvarden, *D. hexagonoides* (Speg.) Robledo & Rajchenb. and *D. setulosus* (Henn.) Masuka & Ryvarden] and four of *Ceriporia* [*C. spissa* (Schwein. ex Fr.) Rajchenb., *C. tarda* (Berk.) Ginns, *C. viridans* (Berk. & Broome) Donk and *C. xylostromatoides* (Berk.) Ryvarden] had been recorded in Brazil (Baltazar and Gibertoni 2009; Gomes-Silva and Gibertoni 2009; Gibertoni and Drechsler-Santos 2010).

During the field trips, two new species, *Ceriporia angulata* Gomes-Silva, Ryvarden & Gibertoni and *Dichomitus amazonicus* Gomes-Silva, Ryvarden & Gibertoni, were collected. *Dichomitus cavernulosus* is reported as new to Rondônia and *D. ecuadoriensis* Ryvarden as new to Brazil.

After revision of existing fungal collections, new records were found. *Ceriporia spissa* is newly recorded from the Brazilian Amazonia, while *D. cavernulosus* is a new record for the states of

Amazonas and Roraima. This demonstrates the importance of accessibility and re-evaluation of dried fungal collections.

### Taxonomy

*Ceriporia angulata* Gomes-Silva, Ryvardeen & Gibertoni, sp. nov.

Figs. 1–4

*Mycobank* MB 563041

*Holotype* (designate here) BRAZIL, Amazonas: Manaus, Reserva Ducke, on dead hardwood log., 28 Oct 2009, leg. L. Ryvardeen 48268 (URM 83055, Isotype in O).

*Etymology* the name is related to the distinctly angular pores.

Basidiomata annual, resupinate, adnate, up to 1 mm thick, membranous to slightly firm when dried; margin wide, white (B2) and cottony, subiculum white (B2) and cottony, up to about 500  $\mu\text{m}$  thick in the centre of the basidiomata; hymenial surface poroid, ochraceous (D4 to buff 52), pores shallow (up to 0.3 mm), angular, 2–3 per mm, dissepiments entire to lacerate, thin; context concolourous with the hymenial surface, homogeneous, fibrous, very thin; tubes concolourous with the hymenial surface, up to 1 mm deep.

Hyphal system monomitic, generative hyphae simple septate, hyaline to pale yellow, 2.5–4.5  $\mu\text{m}$  wide, thinwalled in the subhymenium, thick-walled in the deep trama and context, in the dissepiments and margin, pointed appearance at hyphal ends with distinct scattered crystals, almost looking like projecting cystidia; cystidia absent from the hymenium; basidia clavate, thin-walled, 12–16 $\times$ 4–5  $\mu\text{m}$ , 4–sterigmate; basidiospores oblong ellipsoid, hyaline, thinwalled, smooth, 4–4.5 $\times$ 1.7–2.2  $\mu\text{m}$  and non-dextrinoid.

*Substrate* on dead hardwood log.

*Know distribution* Known from the state of Amazonas, Brazil.

*Specimen examined* BRAZIL, Amazonas: Manaus, Reserva Ducke, on dead hardwood log., 28 Oct 2009, leg. L. Ryvardeen 48268 (URM 83055, holotype).

*Additional specimens examined* PUERTO RICO, Luquillo, on dead hardwood log., 6 Jun 1997, leg. L. Ryvardeen 40303 (O 10309); DOMINICAN REPUBLIC, San Juan de La Maguan, Parque Nacional Sierra de Neiba, Sabana Pinar Salteado, on dead hardwood log., 3 May 2001, leg. O. P. Perdomo et al 887 (O 16206); USA, Florida: Olustee, loc. n. det., on dead hardwood log., Sep 1959, leg. L. Ryvardeen 19 (O 11215, as *Poria alachuana* Murrill).

*Notes* The resupinate, white basidiomata, the monomitic hyphal system with simple-septate generative hyphae, and hyaline and smooth basidiospores place this species in the genus *Ceriporia*.

This species is characterized by its angular, rather shallow pores, the white subiculum and margin, as well as the encrusted hyphae. It is macroscopically similar to *C. alachuana* (Murrill) Hallenb., but differs by having distinctly angular, shallow pores (cf. round pores, 3–5 per mm, up to 2.5 mm deep in *C. alachuana*, Gilbertson & Ryvarden 1986: 178). Microscopically, these species differ by the type of hyphae (smooth in *C. alachuana* and encrusted in *C. angulata*). *Ceriporia incrustata* M. Mata & Ryvarden, another similar species, differs in the pore size (6–8 per mm, cf. 2–3 per mm in *C. angulata*), smaller basidiospores (3–3.5×1.8–2 µm and 4–4.5×1.7–2.2 µm, respectively), and strongly encrusted hyphae in the trama and context (encrusted hyphae in the margin and dissepiments only of *C. angulata*). *Ceriporia albobrunnea* Ryvarden & Iturr. is a species recently described from Venezuela (Ryvarden and Iturriaga 2003) and is macro- and microscopically similar to *C. angulata*, as to shape and size of the pores (cf. round to angular, 2–3 per mm in *C. albobrunnea*) and basidiospores (cf. cylindrical, 4–4.5×1.5 µm in *C. albobrunnea*), but differs by absence of the encrusted hyphae in the margin and dissepiments. Further, *C. albobrunnea* has a brown pore surface while it is pale ochraceous in *C. angulata*.

*Ceriporia spissa* (Schwein. ex Fr.) Rajchenb., Mycotaxon 17: 276 (1983).

≡ *Polyporus spissus* Schwein. ex Fr., Elench. fung. (Greifswald) 1: 111 (1828).

*Description* in Ryvarden and Gilbertson (1993) and Coelho et al. (2005).

*Substrate* on dead hardwood log.

*Known distribution* Temperate to tropical, rare in Europe, Asia, Oceania, and more common in the Americas (Coelho et al. 2005; Dai 2011). This is a new record to the Brazilian Amazonia.

*Specimen examined* BRAZIL, Amazonas: Barcelos, Serra de Aracá, on dead hardwood log., 12 Mar 1984, leg. G. J. Samuels 652 [INPA 129670, as *Gloeoporus spissus* (Schwein. ex Fr.) Zmitr. & Spirin].

*Notes* The intense reddish orange colour of the basidiomata and small pores (7–9 per mm) are distinctive in this species. *Ceriporia purpurea* (Fr.) Donk is similar, but differs by having purplish basidiomata and larger pores (3–4 per mm).

### Key to Neotropical species of *Ceriporia* (Colours refer to dried basidiomata)

- 1 Cystidia present in the hymenium.....2
- 1\* Cystidia absent from the hymenium.....3
- 2 Basidiospores globose, basidiomata blackish.....*C. merulioidea*
- 2\* Basidiospores allantoid, basidiomata whitish.....*C. cystidiata*

3 Basidiomata purplish or deep orange.....	4
3* Basidiomata white, ochraceous to pale brown.....	5
4 Basidiomata purplish, pores 3–4 per mm.....	<i>C. purpurea</i>
4* Basidiomata deep orange to reddish brown, pores 7–9 per mm.....	<i>C. spissa</i>
5 Basidiospores 7–9 µm long.....	6
5* Basidiospores <7 µm long.....	7
6 Basidiospores allantoid, basidiomata white.....	<i>C. reticulata</i>
6* Basidiospores oblong-ellipsoid to subcylindrical, basidiomata pale citric yellow.....	<i>C. citrina</i>
7 Basidiospores allantoid to cylindrical.....	8
7* Basidiospores subcylindrical, ellipsoid to subglobose.....	9
8 Basidiospores allantoid, 4–6 µm long, pores thin-walled, 3–5 per mm.....	<i>C. viridans</i>
8* Basidiospores cylindrical, 4–4.5 µm long, pores thick-walled, 2–3 per mm.....	<i>C. albobrunnea</i>
9 Basidiospores subcylindrical to oblong ellipsoid.....	10
9* Basidiospores subglobose.....	<i>C. xylostomatoides</i>
10 Pore surface evenly brown when dry, often with whitish margin.....	<i>C. ferrugineocincta</i>
10* Pore surface white, cream to pale tan or buff.....	11
11 Pores 6–8 per mm, basidiospores 3–3.5×1.5–2 µm.....	12
11* Pores and basidiospores >4 µm long.....	13
12 Basal hyphae strongly encrusted.....	<i>C. incrustata</i>
12* Basal hyphae more or less smooth.....	<i>C. microspora</i>
13 Pores angular to hexagonal, 1–2 per mm, basidiospores 5–6×2.6–3 µm.....	<i>C. dentipora</i>
13* Pores round to angular, 3–5 per mm, basidiospores <5 µm long.....	14
14 Pores round, 3–5 per mm, basidiospores 4–5×2–2.5 µm, margin with hyphae glabrous.....	<i>C. alachuana</i>
14* Pores angular, 2–3 per mm, basidiospores 4–4.5×1.7–2.2 µm, margin with hyphae encrusted.....	<i>C. angulata</i>

*Dichomitus amazonicus* Gomes-Silva, Ryvarden & Gibertoni, sp. nov.

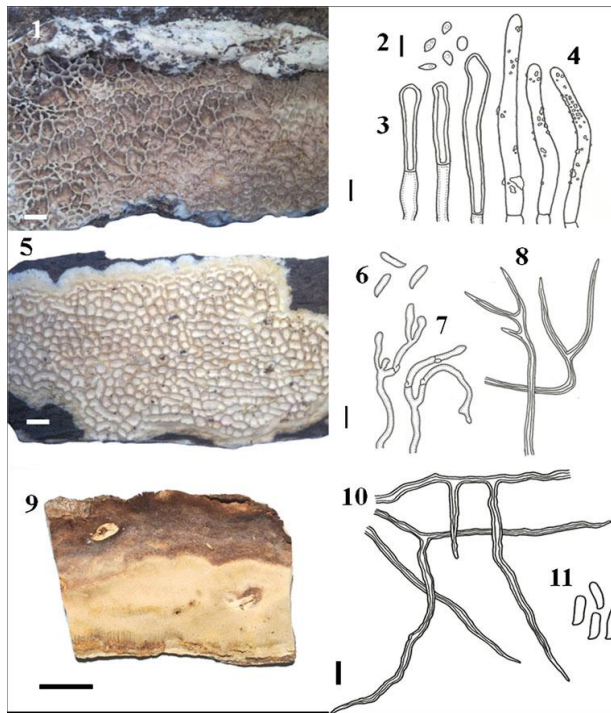
Figs. 5–8.

*Mycobank* MB 563040

*Holotype* (designate here) BRAZIL, Amazonas: Manaus, Reserva Ducke, on dead hardwood log., 28 Oct 2009, leg. L. Ryvarden 48295 (URM 83054, Isotype in O).

*Etymology* the name is related to the region where the material was collected.





Figs. 1–11 1. *Ceriporia angulata* (all from holotype). 2. Basidiospores. 3. Thick-walled generative hyphae from context. 4. Encrusted hyphae from margin; 5. *Dichomitus amazonicus* (all from holotype). 6. Basidiospores. 7. Generative hyphae with clamp connections. 8. Skeletal hyphae. 9. *Dichomitus ecuadoriensis* (URM 83056). 10. Skeletal hyphae. 11. Basidiospores. Scale bars. 1, 5 = 1 mm; 9 = 10 mm; 1, 3, 4, 6-8, 10, 11 = 10  $\mu$ m.

Basidiomata annual, resupinate, effused, adnate, up to 500  $\mu$ m thick; margin narrow and white (B2); hymenial surface pale ochraceous (D4), pores angular to hexagonal, about 2 per mm, dissepiments thin; context concolourous with the pore surface, homogeneous, very thin; tubes concolourous with pore surface, about 200  $\mu$ m deep, subiculum thin, pale cream (B2).

Hyphal system dimitic, generative hyphae with clamp connections, hyaline, thin to thick-walled, richly branched in the subiculum, 2–5  $\mu$ m wide, skeleto-binding hyphae present, sparingly branched, solid, hyaline, 2–6  $\mu$ m wide, strongly dextrinoid in Melzer's reagent; cystidia absent; basidia not seen; basidiospores (9–) 10–12 $\times$ 3.5–4  $\mu$ m, ellipsoid to subcylindrical, hyaline, smooth, negative in Melzer's reagent.

*Substrate* on dead hardwood log.

*Known distribution* Known only from the type locality in the state of Amazonas, Brazil.

*Specimen examined* BRAZIL, Amazonas: Manaus, Reserva Ducke, on dead hardwood log., 28 Oct 2009, leg. L. Ryvar den 48295 (URM 83054, holotype).

*Notes* This species is characterized by the resupinate, ochraceous, basidiomata, angular to hexagonal pores (2 per mm) and ellipsoid to subcylindrical basidiospores (9–12 $\times$ 3.5–4  $\mu$ m).

*Dichomitus cavernulosus* (Berk.) Masuka & Ryvarden is macroscopically similar, but differs in the larger cylindrical basidiospores (12–15×5–7 µm, cf. ellipsoid to subcylindrical, 9–12×3.5–4 µm in *D. amazonicus*). *Dichomitus cylindrosporus* Ryvarden, another similar species, differs in having smaller and narrower basidiospores (8–10×2.5–3 µm).

*Dichomitus cavernulosus* (Berk.) Masuka & Ryvarden, Mycol. Res. 103(9): 1127, 1999.

≡ *Polyporus cavernulosus* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 235, 1856.

*Description* in Masuka and Ryvarden (1999) and Núñez and Ryvarden (2001).

*Substrate* on dead hardwood log.

*Known distribution* Pantropical (Núñez and Ryvarden 2001); in the Brazilian Amazonia, it was previously known for the state of Pará (Gomes-Silva and Gibertoni 2009, as *Megasporoporia cavernulosa*). The species is here newly recorded from the states of Amazonas, Rondônia and Roraima.

*Specimens examined* BRAZIL, Amazonas: Manaus, loc. n. det., on dead hardwood log., Sep 1980, leg. B. Lowy et al. 187 (INPA 100117); Feb 1984, leg. G.J. Samuels et al. 201 (INPA 129242, as *M. cavernulosa*); Oct 1997, leg. M.A. Jesus 2489 (INPA 216459, as *M. cavernulosa*); Barcelos, Serra de Aracá, dead hardwood log., Mar 1984, leg. G.J. Samuels 827, 857 (INPA 129844, 129872 as *M. cavernulosa*); Pará: Melgaço, Floresta Nacional de Caxiuanã, on dead angiosperm, Jul 2006, leg. T.B. Gibertoni (URM 79692, 79691, 79694, 79693); Mar 2007, leg. T.B. Gibertoni (URM 79695); Aug 2007, leg. T.B. Gibertoni (URM 79696, 79697); Feb 2008, leg. T.B. Gibertoni (URM 79698, 79699); Rondônia: loc. n. det., on dead hardwood log., Jun 1968, leg. K.P. Dumont et al. 7 (INPA 64822, as *Poria* sp.); Porto Velho, Estação Ecológica de Cuniã, on dead hardwood log., Feb 2007, leg. A.C. Gomes-Silva 196 (URM 79191); Jul 2007, leg. A.C. Gomes-Silva 199 (URM 79192); Jul 2008, leg. A. C. Gomes-Silva 611, 626 (URM 79502, 79503); Aug 2010, leg. A. C. Gomes-Silva et al. 3001, 3002, 2159 (URM 822929, 82931); 11 Feb 2011, leg. A. C. Gomes-Silva et al. 2159 (URM 82930); Roraima: Boa Vista, loc. n. det., dead hardwood log., Nov 1977, leg. L.L.J. Aguiar et al. 672 (INPA 78391, as *M. cavernulosa*); BR 174 KM 333 Novo Paraíso, dead hardwood log., Nov 1977, leg. I.J. Araújo et al. 540, 648 (INPA 77523, INPA 78367, as *M. cavernulosa*), BV 8 KM 219 Boca da Mata, dead hardwood log., Dec 1977, leg. I.J. Araújo et al. 768 (INPA 78487, as *M. cavernulosa*).

*Notes* The resupinate, cream to salmon basidiomata, large pores (2–4 per mm), cylindrical to sub-ellipsoid basidiospores (15–18×6–8 µm) and the dextrinoid reaction of the skeletal and binding hyphae characterize *D. cavernulosus*. This species is macroscopically similar to *D. setulosus*, but

differs in the absence of hyphal pegs. *Pachykytospora papyracea* (Schwein.) Ryvar den, another similar species, differs in the ornamented basidiospores.

*Dichomit us ecuadoriensis* Ryvar den, in Læssøe & Ryvar den, Syn. Fung. (Oslo) 27: 46 (2010).

Figs. 9–11

Basidiomata annual, resupinate and cushion-like, up to 9.5 cm long, 2.5 cm wide, 4 mm thick in the centre; margin narrow, yellow (Buff 52) to pale black (Fuscous black 36); hymenial surface pale black (Fuscous black 36) to yellow (Buff 52), pores round to angular, about 4–5 per mm, tubes elongated near the margin, dissepiments entire and thick; context pale yellow (C3), homogeneous, very thin; tubes concolourous with pore surface, up to 3 mm deep, dissepiments entire and thin.

Hyphal system dimitic, generative hyphae with clamp connections, hyaline, thin to thick-walled, richly branched in the subiculum, 2–3 µm wide, skeleto-binding hyphae present, sparingly branched, solid, hyaline, 2–4 µm wide, strongly dextrinoid in Melzer's reagent; cystidia absent; basidia not seen; basidiospores 9–11(–12) × 4–5.5 µm, cylindrical to oblong-ellipsoid, hyaline, smooth, negative in Melzer's reagent.

*Substrate* On dead hardwood trunk.

*Known distribution* Ecuador (Læssøe and Ryvar den 2010), and here newly recorded from Brazil.

*Specimen examined* BRAZIL, Pernambuco: Caruaru, Parque Ecológico Prof. João de Vasconcelos Sobrino, on dead hardwood trunk, 17 Mar 2009, leg. J. M. Baltazar et al. 1481 (URM 83056).

*Notes* This species is characterized by the resupinate, cushion-like basidiomata, black line along the margin, round pores, 4–5 per mm, and cylindrical to oblongellipsoid (10–11×5–5.5 µm) basidiospores. *Dichomit us perennis* Ryvar den and *D. cavernulosus* are similar, but they are distinguished by their larger pores (2–3 per mm and 2–4 per mm, respectively) and larger basidiospores (12–16×5–7 µm and 12–15×5–7 µm, respectively).

### Key to Neotropical species of *Dichomit us* (Colours refer to dried basidiomata)

- |  |                        |
|--|------------------------|
| 1 Skeletal hyphae non-dextrinoid.....        | 2                      |
| 1* Skeletal hyphae dextrinoid.....           | 4                      |
| 2 Basidiospores 8–10 µm long.....            | <i>D. pendulus</i>     |
| 2* Basidiospores longer than 10 µm long..... | 3                      |
| 3 Basidiospores 20–27 µm long.....           | <i>D. grandisporus</i> |

3* Basidiospores 15–18 $\mu\text{m}$ long.....	<i>D. anoetoporius</i>
4 Pores 1–3 mm wide with a variable number of hyphal pegs.....	5
4* Pores 2–4 per mm and without hyphal pegs.....	6
5 Basidiospores 11–17 $\times$ 3–4.5 $\mu\text{m}$ , hyphal pegs numerous.....	<i>D. setulosus</i>
5* Basidiospores 20–26 $\times$ 6–9 $\mu\text{m}$ , hyphal pegs few.....	<i>D. mexicanus</i>
6 Basidiospores cylindrical.....	7
6* Basidiospores ellipsoid to subcylindrical.....	8
7 Basidiospores 8–10 $\times$ 2.5–3 $\mu\text{m}$ .....	<i>D. cylindrosporus</i>
7* Basidiospores 10–12 $\times$ 3.5–4 $\mu\text{m}$ .....	<i>D. amazonicus</i>
8 Pores 4–5 per mm, basidiospores 9–12 $\times$ 4–5.5 $\mu\text{m}$ .....	<i>D. ecuadoriensis</i>
8* Pores 2–5 per mm, basidiospores 12–16 $\times$ 5–7 $\mu\text{m}$ .....	9
9 Basidiomata perennial, up to 1.3 cm thick, cork-coloured.....	<i>D. perennis</i>
9* Basidiomata annual, up to 3 mm thick, white to pale straw-coloured.....	<i>D. cavernulosus</i>

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### References

- Baltazar JM, Gibertoni TB (2009) A checklist of the aphylloroid fungi (Basidiomycota) recorded from the Brazilian Atlantic Forest. *Mycotaxon* 109: 439–442.
- Coelho G, Reck M, Silveira RMB, Guerrero RT (2005) *Ceriporia spissa* (Schwein. ex Fr.) Rajchenb. (Basidiomycota): first record from Brazil. *Biociências* 13(2): 107-111.
- Dai YC, Wu SH (2004) *Megasporoporia* (Aphyllorales, Basidiomycota) in China. *Mycotaxon* 89 (2): 379-388.

- Dai YC (2011) Polypore diversity in China with an annotated checklist of Chinese polypores. *Mycoscience*. DOI 10.1007/s10267-011-0134-3.
- Donk MA (1933) Revisie van de Nederlandse Heterobasidiomyceteae (uitgez. Uredinales en Ustilaginales) en Homobasidiomyceteae-Aphylllophraceae: II. Mededelingen van het botanisch Museum en Herbarium van de Rijksuniversiteit Utrecht 9: 1-278.
- Du P, Cui BK (2009) Two new species of *Megasporoporia* (*Polyporales*, *Basidiomycota*) from tropical China. *Mycotaxon* 110: 131-138.
- Gomes-Silva AC, Gibertoni TB (2009) Checklist of the aphylllophoraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* 108: 319–322.
- Gibertoni TB, Drechsler-Santos ER (2010) Lignocellulolytic *Agaricomycetes* from the Brazilian Cerrado biome. *Mycotaxon* 111: 87–90.
- Gilbertson RL, Ryvarden L (1986) North American Polypores. Vol. 1. Oslo, Fungiflora.
- Kirk PM, Cannon PF, Minter DW, Stalpers JA (2008) Dictionary of the Fungi. 10 ed. CABI Publishing, Surrey. 771 p.
- Læssøe T, Ryvarden L (2010) Some new and rarely recorded polypores from Ecuador. *Synopsis Fungorum* 27: 34–58.
- Masuka AJ, Ryvarden L (1999) *Dichomitus* in Africa. *Mycological Research* 103(9): 1126–1130.
- Núñez M, Ryvarden L (2001) East Asian Polypores. *Synopsis Fungorum* 14: 167–522.
- Robledo GL, Rajchenberg M (2007) South American polypores: first annotated checklist from Argentinean Yungas. *Mycotaxon* 100: 5–9.
- Ryvarden L (1991) Genera of *Polypores* – Nomenclature and taxonomy. *Synopsis Fungorum* 5: 1–363.
- Ryvarden L, Gilbertson RL (1993) European Polypores. Vol 1. Fungiflora, Oslo, 387p.
- Watling R (1969) Colour Identification Chart. Her Majesty's Stationery Office, Edinburgh (Scotland).
- Zhou XS, Dai YC (2008) A new species of *Megasporoporia* (*Polyporales*, *Basidiomycota*) from China. *Mycological Progress* 7(4): 253–255

***CORIOLOPSIS PSILA* COMB. NOV. (AGARICOMYCETES) AND TWO NEW  
*CORIOLOPSIS* RECORDS FOR BRAZIL**

ABSTRACT — The new combination *Corioloopsis psila* is proposed and *C. brunneoleuca* and *C. hostmannii* are reported as new to Brazil. Descriptions of these collections and a key to the eight accepted *Corioloopsis* species reported from Brazil are provided.

KEY WORDS — *Polyporaceae*, diversity, *C. byrsina*, *C. caperata*, *C. floccose*

### Introduction

*Corioloopsis* Murrill (Murrill 1905) comprises about 17 valid species (Kirk et al.2008). The genus is cosmopolitan, although several species are restricted to the temperate or tropical zones (Ryvarden & Johansen 1980, Ryvarden & Gilbertson 1993, Núñez & Ryvarden 2001, Dai 2011, Dai et al. 2011). It is characterized by the annual (rarely perennial) pileate or sessile (rarely resupinate) basidiomata with great color variation. The hyphal system is trimitic with clamp connections on generative hyphae, cystidia are absent, and basidiospores are cylindrical, smooth, thin-walled, non-amyloid, oblong–ellipsoid, and hyaline to pale brown (Ryvarden & Johansen 1980, Ryvarden 1991, Ryvarden & Gilbertson 1993).

Only seven *Corioloopsis* species have previously been reported from Brazil: *C. aspera* (Jungh.) Teng, *C. badia* (Berk.) Murrill, *C. burchellii* (Berk. ex Cooke) Ryvarden, *C. byrsina*, *C. caperata*, *C. floccosa*, and *C. gallica* (Fr.) Ryvarden (Ryvarden 1988, Gugliotta & Abrahão 2011).

To increase the knowledge of polypore diversity in Brazil, we record two additional species, propose a new combination, and provide identification keys to all known Brazilian species.

### Material & methods

In the Brazilian Amazonia, field trips were undertaken in Pará State from July 2006 to February 2008 in the Floresta Nacional de Caxiuanã (1°42'3"S 51°31'45"W) and in Rondônia State from 2007 to 2008 in the Estação Ecológica de Cuniã (8°04'S 63°31'W) and Parque Natural Municipal de Porto Velho (8°45'S 63°54'W). In Pernambuco State, Brazilian mangroves were surveyed from March 2009 to March 2010 in Maria Farinha (7°51'24.8"S 34°50'32.7"W), Itamaracá (7°46'52.6"S 34°52'53.3"W), Maracaípe (8°32'22.8"S 35°00'29.1"W), and Rio Formoso (8°41'20.8"S 35°06'06.6"W).

Both recent collections and specimens deposited in INPA, O, RB, and SP were studied. Specimens were analyzed macro- (shape, color, hymenial surface) and micromorphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Slides were prepared with 5% KOH (stained with 1% aqueous phloxine) or Melzer's reagent (Ryvarden

1991). Color designation followed Watling (1969). The material was incorporated to HFSL, MG, O, and URM.

## Results & discussion

After identification of new collections and revision of herbaria, eight *Corioloropsis* species are reported for Brazil. The presence of *C. gallica* is not confirmed, as previous reports actually represent *Hexagonia hydnooides* (Sw.) M. Fidalgo (Tavares 1939, URM 608/IPA 281) or *Trametes* sp. (Bononi et al. 1984, SP 156751). *Corioloropsis badia* is a dubious species because it is considered a synonym of either *Phellinus badius* (Cooke) G. Cunn. (<http://www.cbs.knaw.nl>, <http://www.mycobank.org>) or *C. aspera* (Ryvarden & Johansen, 1980). The only record of *C. badia* in Brazil (Gibertoni et al. 2004, URM 77849) represents a *Trametes* sp.

*Corioloropsis brunneoleuca* and *C. hostmannii* are new occurrences for the country. *Corioloropsis psila*, here transferred from *Fomes*, is probably a new occurrence for the Brazilian Amazonia. *Corioloropsis byrsina* represents a new record for the states of Amazonas, Rondônia, and Roraima, *C. caperata* for Amazonas, and *C. floccosa* for Acre, Amazonas, and Mato Grosso. These new occurrences were studied also from collections deposited in INPA, RB and SP, underscoring the importance of herbarium revisions and accessibility of herbaria records to the knowledge of fungal diversity.

***Corioloropsis brunneoleuca*** (Berk.) Ryvarden, Norw. Jl Bot. 19: 230 (1972).

BASIDIOMATA annual, effused-reflexed, gregarious, coriaceous,  $\leq 5.5$  cm, 1.5 cm wide and to 1 mm thick. ABHYMENIAL SURFACE tomentose, dull, cigar brown (16) to fuscous black (36) with concentric zones of dark color. MARGIN entire, acute, concolorous with the abhymenial surface. CONTEXT homogeneous, fibrous,  $\leq 100$   $\mu\text{m}$  thick, milky coffee (28) to cinnamon (10). HYMENIAL SURFACE with pores angular, 2–3 per mm, dissepiments 50–100  $\mu\text{m}$  thick, snuff brown (17) to clay buff (32). HYPHAL SYSTEM trimitic; generative hyphae hyaline, branched, clamped, thin-walled, 1.5–2.5  $\mu\text{m}$  diam.; skeletal hyphae yellowish to pale brown, thick-walled, 4–7.5  $\mu\text{m}$  diam., dextrinoid; binding hyphae goldenyellow, almost solid, 3–5  $\mu\text{m}$  diam. CYSTIDIA absent. BASIDIA not observed. BASIDIOSPORES cylindrical, hyaline, thin-walled, smooth, inamyloid,  $7\text{--}11 \times 3\text{--}4$   $\mu\text{m}$ .

ECOLOGY & DISTRIBUTION: On deciduous wood. According to Ryvarden & Johansen (1980), the species is pantropical. It is new to Brazil.

SPECIMENS EXAMINED: **BRAZIL. Pará**, Floresta Nacional de Caxiuanã, VIII.2007, leg. P.S Medeiros et al. PS122, PS226, PS342 (MG195152, MG195155, MG195182).

REMARKS: A cigar brown to fuscous black pileus surface, rather large shallow pores, and broad dextrinoid skeletal hyphae characterize the species.

***Corioloropsis byrsina*** (Mont.) Ryvarden, Norw. Jl Bot. 19: 230 (1972).

DESCRIPTION: This species is characterized by small pores, soft rusty-brown basidiomata, and ellipsoid to sub-cylindrical basidiospores,  $9\text{--}14 \times 4.5\text{--}5 \mu\text{m}$ . For further details see Ryvarden & Johansen (1980).

ECOLOGY & DISTRIBUTION: On deciduous wood. In tropical Africa, America, and Asia (Ryvarden & Johansen 1980; Dai 2011). In Brazil, previously known from the states of Acre, Mato Grosso, Rio Grande do Sul, and São Paulo (Gugliotta & Abrahão 2011); newly reported from Amazonas, Rondônia, and Roraima.

SPECIMENS EXAMINED: **BRAZIL. Acre:** Rio Branco, 24.IX.1980, leg. B. Lowy et al. 241 (INPA 183806); Amazonas: Presidente Figueiredo, 18.I.1983, leg. M.A Jesus 123 (INPA 183806); Mato Grosso: Aripuanã, 23.IV.1978, leg. M.A. Sousa 427 (INPA 75606); Rondônia: Jarú, Reserva Biológica de Jarú, 13.V.1987, leg. M. Capelari et al. (SP 211995); location not determined, 4.VII.1968, leg. K.P. Dumont et al. 143 (INPA 65179); 3.II.1984, leg. G.J. Samuels 55 (INPA 129095); Roraima: locality unknown, 1.XII.1977, leg. I.J. Araújo et al. 757 (INPA 78476); São Paulo: Itaicý, 06.VII.1957, leg. not determined (URM 7880, as *Polystictus byrsinus*).

*Corilopsis caperata* (Berk.) Murrill, N. Amer. Fl. 9(2): 77 (1908).

DESCRIPTION: *Corilopsis caperata* is characterized by effused-reflexed to pileate darkly colored basidiomata and a zonate abhymenial surface in different shades of brown. For further details see Ryvarden & Johansen (1980).

ECOLOGY & DISTRIBUTION: On deciduous wood. Tropical Africa and America (Ryvarden & Johansen 1980). In Brazil, it is reported for the states of Acre, Alagoas, Amapá, Bahia, Espírito Santo, Mato Grosso, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Rio Grande do Norte, Rondônia, Roraima, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo, Sergipe (Baltazar & Gibertoni 2009, Gugliotta & Abrahão 2011), and now for Amazonas State.

SPECIMENS EXAMINED: **BRAZIL: Acre:** Sena Madureira, 27.IX.1968, leg. G. T. Prance et al. 7595 (INPA 24394); Amazonas: Barcelos, II.1984, leg. G. J. Samuels 72 (INPA 129121); Borba, 6.V.1985, leg. K.F. Rodrigues et al. 490 (INPA 129022, as *Coriolus versicolor*); Manaus, 1.V.1977, leg. M. A. Souza 149 (INPA 74657, as *Corilopsis polyzona*); 6.X.1985, leg. K.F. Rodrigues et al. 800 (INPA 137086); 5.X.1927, leg. P. Occhioni (SP 25530); 23.XII.1983, leg. G. Guzman et al. (SP 193577); Manicoré, IV.1985, leg. K.F. Rodrigues et al. 91 (INPA 128914, as *Corilopsis* sp.); Nova Aripuanã, 29.IV.1985, leg. K.F. Rodrigues et al. 410, 389 (INPA 129009, as *C. polyzona*, INPA 129005, as *Polyporus* sp.); Tapuruquara, 22.I.1978, leg. I. J. Araújo et al. 973 (INPA 78745, as *Hexagonia* sp.); Tefé, 11.VII.1973, leg. E. Lleras et al. 16611 (INPA 39800); Cachoeira de Tarumã, 5.X.1927, leg. P. Occhioni (RB 217241); Serra de Araçá, 29.II.1984, leg. G. J. Samuels (RB 24785); Manicoré, Estrada do Estanho, 20.IV.1985, leg. K.F. Rodrigues (RB 238166); Novo



Aripuanã, Vila do Apuy, 29.IV.1985, leg. K.F. Rodrigues et al. (RB 238334); Distrito Agropecuário da Suframa, 03.X.1985, leg. N. Rodrigues et al. (RB 237012, RB 240587); Pará: Belém, 13.IX.1968, leg. B. Santiago (SP 106707); 3.VI.1980, leg. V. L. Bononi (SP 177467); Melgaço, VIII.2007, leg. T. B. Gibertoni (URM 79656 on *Xylopi* sp.; URM 79653 on *Pouteria* sp.; URM 79650 on *Nectandra* sp.; URM 79649 on *Licania* sp.; URM 79646 on *Parkia* sp.; URM 79647 on *Sclerolobium* sp.; URM 79648 on *Eschweilera* sp.; URM 79652 on *Dinizia excelsa*); Redenção, 20.VIII.1984, leg. N. Rodrigues (RB 224462); Oriximinã, 28.VI.1980, leg. V.L. R. Bononi et al. 638, 241 (INPA 103609, as *Coriolus* sp., INPA 103335, as *Trametes pinsita*); Itaituba, IX.1977, leg. M.A. Sousa et al. 25 (INPA 74631, as *Hexagonia caperata*); Pernambuco: Escada, 26.X.1954, leg. not determined (URM 1010, as *Polystictus occidentalis*); Recife, 24.VII.1957, leg. not determined (URM 12468, as *P. caperatus*); Tapera, 1932, leg. not determined (URM 762, as *P. caperatus*); Rondônia: Caracaraí, 3.VII.1968, leg. G.T. Prance et al. 5497 (INPA 22257); Campo Novo, X.1979, leg. R.H. Petersen 155 (INPA 110517, as *Polyporus* sp.); Jarú, 2.X.1986, leg. M. Capelari & R. Maziero (SP 211273); Vilhena, X.1979, leg. R. H. Petersen 218 (INPA 110706, as *Polyporus* sp.); Porto Velho, Estação Ecológica de Cuniã, II.2007, leg. A. C. Gomes-Silva 33 (URM 78898); II.2008, leg. A. C. Gomes-Silva 222 (URM 78906); 11.III.2010, leg. A.C. Gomes-Silva et al. 815 (URM 82837); Parque Natural Municipal de Porto Velho, VII.2007, leg. A. C. Gomes-Silva 59 (URM 78900); VII.2008, leg. A.C. Gomes-Silva 603 (URM 79552); 20.VI.2009, leg. A.C. Gomes-Silva et al. 738 (URM 82833); 29.I.2010, leg. A.C. Gomes-Silva et al. 941 (URM 82831); 3.II.2011, leg. A.C. Gomes-Silva et al. 1089 (URM 82903); Fazenda Mucuí, VII.2007, leg. A.C. Gomes-Silva 91 (URM 78901); Roraima: Alto Alegre, 21.VI.1986, leg. K.F. Rodrigues et al. 1083 (INPA 143425); Caracaraí, 16.XI.1977, leg. I .J. Araújo et al. 438 (INPA 76933, as *Hexagona* sp.).

*Corioloopsis floccosa* (Jungh.) Ryvarden, Norw. J Bot. 19(3–4): 230 (1972).

DESCRIPTION: The umber brown tomentose to hirsute or even velutine pileus surface and fairly large pores are diagnostic for this species. For further details see Ryvarden & Johansen (1980).

ECOLOGY & DISTRIBUTION: On deciduous wood. Pantropical (Ryvarden & Johansen 1980). In Brazil, reported for the states of Alagoas, Bahia, Pará, Paraíba, Paraná, Pernambuco, Rio Grande do Sul, Rondônia, Roraima, Santa Catarina and São Paulo (Gugliotta & Abrahão 2011). Newly recorded for Acre, Amazonas, and Mato Grosso.

SPECIMENS EXAMINED: **BRAZIL:** **Acre:** location not determined, 3.X.1980, leg. B. Lowy et al. 1069 (INPA 100886, as *Polyporus* sp.); Amazonas: Manaus, 10.X.1989, leg. R. Carvalho 1332 (INPA 192503, as *Corioloopsis* sp.); 21.VI.1985, leg. M. A. Jesus 755 (INPA 185984); 10.IX.1977, leg. M. A. Sousa & I. J. Araújo 219 (INPA 74661, as *Coriolus maximus*); Itacoatiara, 21.XII.1966,

leg. G. T. Prance et al. 3778 (INPA 19403, as *Corioloopsis* sp.); 10.IX.1980, leg. B. Lowy et al. 129 (INPA 100040, as *Polyporus* sp.); Bahia: Conde, 08.II.1955, leg. A.C. Batista (URM 1242, as *Polystictus pinsitus*); Amaro, 23.V.1957, leg. not determined (URM 7450, as *Polystictus membranaceus*); Mato Grosso: Aripuanã, 23.IV.1978, leg. M.A. Sousa et al. 431 (INPA 75610); Pará: Belém, 17.IV.1979, leg. I.J. Araújo 1239 (INPA 102851); Itaituba, 3.X.1977, leg. M.A. Sousa et al. 140 (INPA 74538, as *Corioloopsis* sp.); Pernambuco: Recife, 23.VII.1955, leg. not. Determined (URM 12498, as *P. membranaceus*); Rio Grande do Sul: São Leopoldo, 1932, leg. J. Rick (URM 9023, as *Polystictus rigens*); Roraima: Alto Alegre, 16.VI.1986, leg. E.S.S. Silva et al. 493 (INPA 154958); Boa Vista, 19.VII.1989, leg. M.A. Jesus 880 (INPA 186185, as *Corioloopsis* sp.); 1.XII.1977, leg. L.L.J. Aguiar et al. 750 (INPA 78469, as *Corioloopsis* sp.); 31.I.1984, leg. G.J. Samuels 39 (INPA 129089); Rondônia: Porto Velho, Estação Ecológica de Cuniã, VII.2007, leg. A.C. Gomes-Silva 204 (URM 78909); Parque Natural Municipal de Porto Velho, VII.2007, leg. A.C. Gomes-Silva 186 (URM 79477, as *Corioloopsis rigida*); Fazenda Mucuim, VII.2007, leg. A.C. Gomes-Silva 258 (URM 79478, as *C. rigida*).

*Corioloopsis hostmannii* (Berk.) Ryvarden, Syn. Fung. 23: 39 (2007).

BASIDIOMATA perennial, sessile, hard and brittle when dry, dimidiate to flabelliform, solitary, projecting 2–4 cm, 3–5 cm wide and 0.5–1.5 mm thick. ABHYMENIAL SURFACE glabrous, dull to subshiny, zonate with brown and purple zones, hazel (27) to drab (33). MARGIN acute, concolorous with abhymenial surface. CONTEXT homogeneous, ≤ 0.5 mm thick, fulvous (12) to cigar brown (16). TUBES concolorous with context, ≤ 0.5 mm long. HYMENIAL SURFACE with pores round, 6–7 per mm, dissepiments 50–100 µm thick, cigar brown (16). HYPHAL SYSTEM trimitic, generative hyphae hyaline, clamped, thin-walled, 1.5–2.5 µm diam.; skeletal hyphae yellowish to pale brown, thick-walled, 4–7.5 µm diam.; binding hyphae golden-yellow, almost solid, 3–5 µm diam. CYSTIDIA absent. Basidia not observed. BASIDIOSPORES cylindrical, hyaline, thin-walled, inamyloid, 8–10 × 2.5–4.0 µm.

ECOLOGY & DISTRIBUTION: On deciduous wood. Neotropical, from Southern United States and south to Venezuela (Ryvarden & Johansen 1980). It is new to Brazil.

SPECIMENS EXAMINED: **BRAZIL. Pernambuco:** Paulista, Manguezal de Maria Farinha, on dead *Rhizophora mangle*, 20.VIII.2009, leg. G.S. Nogueira-Melo et al. NM003 (URM 82147); on dead *Avicennia schaueriana*, 31.I.2010, leg. G.S. Nogueira-Melo et al. NM002 (URM 82146); Itamaracá, Manguezal do Canal de Santa Cruz, on live *A. schaueriana*, 25.VI.2009, leg. G. S. Nogueira-Melo et al. NM002, NM025 (URM 82134, URM 82138); on dead *A. schaueriana*, 10.III.2009, leg. G.S. Nogueira-Melo et al. NM001, NM004 (URM 82136, 82145); 26.VI.2009, leg. G.S. Nogueira-Melo et al. NM003, NM007, NM011 (URM 82144, URM 82143, 82137); 26.VII.2009, leg. G.S.

Nogueira-Melo et al. NM002 (URM 82139); 22.VIII.2009, leg. G.S. Nogueira-Melo et al. NM006, NM012 (URM 82141, URM 82140); 17.I.2010, leg. G.S. Nogueira-Melo et al. NM002 (URM 82135); 19.III.2010, leg. G.S. Nogueira-Melo et al. NM004 (URM 82142).

REMARKS: *Corioloopsis hostmannii* may be confused with *C. aspera*, which has similar hyphae and basidiospores. However, *C. hostmannii* has smaller pores (3–4 pores per mm in *C. aspera*) and smooth pilei. The zonate abhymenial surface may cause the species to be mistaken for *Funalia polyzona* (Pers.) Niemelä, although *Funalia* usually has a distinct variably zoned tomentum.

***Corioloopsis psila*** (Lloyd) Ryvarden, comb nov.

MYCOBANK MB561160

≡ *Fomes psila* Lloyd, Syn. Fomes: 233 (1915). [BPI!].

≡ *Phylloporia psila* (Lloyd) Ryvarden, Norw. JI Bot. 19: 235 (1972).

BASIDIOMATA annual to perennial, sessile, solitary, sessile, pileus dimidiate to flabelliform, ≤ 6 cm in diam. and 2 cm thick with the tomentum, the latter as a dense mat of intertwined hairs in reddish brown colours, ≤ 1 cm thick. CONTEXT cigar brown (16) to umber (18), ≤ 4 mm thick in lower denser part, no black zone towards the cottony dense hair surface mat, tubes single layer or stratified as in the type, individual layer 3–4 mm thick. HYMENIAL SURFACE rusty-brown; dissepiments entire, relatively thick; pores round, 6–7 per mm, almost invisible to the naked eye. HYPHAL SYSTEM trimitic, generative hyphae often collapsed and difficult to observe, hyaline, thin-walled, but always with a distinct lumen often with secondary adventitious septa, ≤ 8 μm in diam., binding hyphae irregular in outline, frequently branched or with a few long tapering branches, thick-walled, yellow to light brown, ≤ 6 μm in diam. Basidiospores cylindrical, 9–12 × 3–4.5 μm, hyaline, thin-walled and non-amyloid.

ECOLOGY & DISTRIBUTION: On deciduous wood. Known from Brazil and Mexico. The type locality in Brazil is not detailed but J. Rick, who collected the material, used to work in Rio Grande do Sul State, South Brazil. If so, it is probably a new occurrence for the Brazilian Amazonia and Northeast Brazil.

SPECIMENS EXAMINED: **BRAZIL. Amazonas:** Manaus, 20.IV.1985, leg. M.A. Jesus 709 (INPA 185947, as *Perenniporia* sp.); 2.V.1990, leg. M.A. Jesus 1384 ([NPA 192652, as *Microporus* sp.); Manicoré, 20.IV.1985, leg. K.F. Rodrigues 233 (INPA 128955, as *Polyporus* sp.); Bahia: location not determined, date not determined, leg. C. Torrend (O 10486); Gongogi, V.1910, leg. C. Torrend, s.n. (URM 8893, as *Trametes ocellata* Berk. & M.A. Curtis); Rondônia: location not determined, 21.IX.1980, leg. B. Lowy et al. 230 (INPA 185947, as *Perenniporia* sp.); 20.V.1987, leg. M. Capelari et al. (SP 212021). Extralimital specimen examined: MEXICO. Oaxaca: Tehuantepec, 13.VI.1976, leg. A.L. Welden 3606 (O 10488).

REMARKS: *Coriolopsis psila* is a conspicuous species due the dense thick mat of entangled reddish brown hairs covering the pileus. Superficially it reminds one of *H. hydnoides*, which, however, has black and stiffer hairs on the pileus. Basidiospores of the two species are similarly cylindrical, but those of *H. hydnoides* are longer (12–14  $\mu\text{m}$ ). The generic concepts among polypores with a trimitic hyphal system producing white rot (*Coriolopsis*, *Hexagonia*, *Pycnoporus*, *Trametes*) are unclear and are based in part on basidioma color, a character of dubious value at the generic level. Further DNA sequencing will reveal the true phylogeny within these genera. For the time being we place *F. psila* in *Coriolopsis* due to its brown context and a spore length that is closer to other *Coriolopsis* species than in *Hexagonia*.

The combination in *Phylloporia* was based on the presence of a black line between the hairy cover of the pileus and context, a prominent character for *Phylloporia* species. However *Phylloporia* was later characterized by small ellipsoid basidiospores and a parasitic life strategy (Wagner & Ryvarden 2002), while *C. psila* is saprophytic and has larger basidiospores. Seemingly a biological convergent character, the hairy pilear covering occurs in many polypore genera and is apparently an adaption to resist drying.

#### Key to the species of *Coriolopsis* recorded in Brazil

- |   |                        |
|---|------------------------|
| 1a. Basidiomata mostly sessile.....   | 2                      |
| 1b. Basidiomata mostly effused-reflexed.....  | 5                      |
| 2a. Pores 1–4 per mm.....   | 3                      |
| 2b. Pores 6–7 per mm.....   | 4                      |
| 3a. Abhymenial surface finely tomentose at the margin, pores angular, 1–2 per mm, basidiospores not known.....  | <i>C. burchellii</i>   |
| 3b. Abhymenial surface with scrupose tuft of agglutinated hairs, pores round, 3–4 per mm, basidiospores cylindrical 9–16 $\times$ 3–5 $\mu\text{m}$ ..... | <i>C. aspera</i>       |
| 4a. Abhymenial surface glabrous, basidiospores 8–10 $\times$ 2.5–4 $\mu\text{m}$ .....  | <i>C. hostmannii</i>   |
| 4b. Abhymenial surface with a dense mat of intertwined hairs, basidiospores 9–12 $\times$ 3–4.5 $\mu\text{m}$ .....                                       | <i>C. psila</i>        |
| 5a. Basidiospores oblong ellipsoid to subcylindrical, 10–14 $\times$ 4.5–6 $\mu\text{m}$ , hyaline to very pale yellowish.....                            | <i>C. byrsina</i>      |
| 5b. Basidiospores ellipsoid to cylindrical, fusiform, hyaline, 7–11(–14) $\times$ 2–4 $\mu\text{m}$ .....   | 6                      |
| 6a. Context distinctly duplex, tobacco-brown and shiny.....   | <i>C. floccosa</i>     |
| 6b. Context mostly homogeneous, dark brown to bay and dull.....   | 7                      |
| 7a. Context distinctly darker than the tubes, hymenial surface bay to deep brown, pores round to angular, (2–)4–5 per mm.....                             | <i>C. brunneoleuca</i> |

7b. Context dark date-brown concolorous with tubes, hymenial surface ochraceous, to cinnamon to deep chocolate brown, pores round, 3–5 per mm.....*C. caperata*

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### Literature cited

- Baltazar JM, Gibertoni TB. 2009. A checklist of the aphylloroid fungi (*Basidiomycota*) recorded from the Brazilian Atlantic Forest. *Mycotaxon* 109: 439–422.
- Baltazar JM, Trierveiler–Pereira L, Loguercio–Leite C. 2009. A checklist of xylophilous basidiomycetes (*Basidiomycota*) in mangroves. *Mycotaxon* 107: 221–224.
- Drechsler–Santos ER, Groposo C, Loguercio–Leite C. 2008. New records of lignocellulolytic fungi (*Basidiomycetes*) from the Atlantic Rain Forest in the State of Santa Catarina, Brazil. *Hoehnea* 35(1): 57–61.
- Gibertoni TB, Drechsler–Santos ER. 2010. Lignocellulolytic *Agaricomycetes* from the Brazilian Cerrado biome. *Mycotaxon* 111: 87–90.
- Gomes–Silva AC, Gibertoni TB. 2009. Checklist of the aphylloraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* 108: 319–322.
- Kirk PM, Cannon PF, Minter DW, Stalpers JA. 2008. *Dictionary of the Fungi*. 10 ed. CABI Publishing, Surrey. 771 p.
- Núñez, M., Ryvar den, L. 2001. *East Asian Polypores*, Vol. 2. *Synopsis Fungorum* 14, Fungiflora, Oslo, 352pp.
- Ryvar den, L. 1988. Type Studies in the Polyporaceae 19 species described by M. C. Cooke. *Mycotaxon* 31(1): 45–58.

Ryvarden L. 1991. Genera of Polypores – Nomenclature and taxonomy. Synopsis Fungorum 5, Fungiflora, Oslo, 363pp.

Ryvarden L, Gilbertson RL. 1993. European Polypores, Vol. 2. Fungiflora, Oslo. pp. 394–743.

Ryvarden L, Johansen I. 1980. A preliminary polypore flora of East Africa. Oslo, Fungiflora, 630pp.

Watling R. 1969. Colour identification chart. Her Majesty's Stationary Office, Edinburgh.

## NOTES ON *PERENNIPORIA* MURRILL (*BASIDIOMYCOTA*) FROM THE BRAZILIAN AMAZONIA

**Abstract:** *Perenniporia cremeopora*, *P. roseoisabellina* and *P. ellipospora* are reported as new to Brazil, while *P. parvispora* and *P. tephropora* are new to the Brazilian Amazonia. Description and figures of the new records for Brazil and a key to the species of *Perenniporia* registered for the Brazilian Amazonia are provided.

**Key words** – Diversity, taxonomy, Polyporales, Brazilian Amazonia

### Introduction

The genus *Perenniporia* was described by Murrill in 1942 (Ryvarden 1991), and is a large cosmopolitan genus with the following characteristic: basidioma perennial or rarely annual, 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).

*Perenniporia* comprises 60 species so far (Kirk et al. 2008), but only 17 species are known in Brazil: *Perenniporia amazonica* De Jesus & Ryvarden, *P. aurantiaca* (A. David & Rajchenb.) Decock & Ryvarden, *P. contraria* (Berk. & M.A. Curtis) Ryvarden, *P. detrita* (Berk.) Ryvarden, *P. inflexibilis* (Berk.) Ryvarden, *P. martia* (Berk.) Ryvarden, *P. medulla-panis* (Jacq.) Donk, *P. neofulva* (Lloyd) Ryvarden, *P. ochroleuca* (Berk.) Ryvarden, *P. ohiensis* (Berk.) Ryvarden, *P. parvispora* Decock & Ryvarden, *P. piperis* (Rick) Rajchenb., *P. sprucei* Decock & Ryvarden, *P. sinuosa* Ryvarden, *P. stipitata* Ryvarden, *P. subannosa* (Bres.) Decock, S. Herrera & Ryvarden and *P. tephropora* (Mont.) Ryvarden (Decock & Ryvarden 1999; De Jesus & Ryvarden 2010; Gugliotta et al. 2010).

Thus, the aim of the present work is to contribute to the knowledge about the diversity of *Perenniporia* in Brazil with new records from the Brazilian Amazonia, descriptions and figures of the new occurrences and a key to the genus in the region.

### Material and Methods

THE STUDY AREA: The Amazonia rainforest is the largest and more diverse tropical forest of the world, occurring in nine countries of South America (Silva et al. 2005). The Brazilian Amazonia

covers an area of 4.015.401 km<sup>2</sup> (48% of the Brazilian territory) (Ferreira et al. 2001) in nine Brazilian States (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins, west of Maranhão, and north of Mato Grosso). That area is composed by 23 ecoregions with several types of habitats, different physiognomies, structures and vegetation types (Ferreira et al. 2001). However, the knowledge about the diversity, phylogeny and distribution of the organisms in that area is still poorly known (Silva et al. 2005).

Field trips were undertaken four times from 2007 to 2011 in the state of Rondônia and four times from 2006 to 2008 in the state of Pará. In Rondônia, the areas of study were located in the city of Porto Velho: Estação Ecológica de Cuniã (08°04' S and 63°31' W) and Parque Natural Municipal de Porto Velho (08°45' S and 63°54' W). The former has an area of 53.221 ha, while the latter has an area of 391 ha. Both areas are mostly covered by open ombrophilous forest and transition forest with savannahs. Additionally, three areas in Rondônia were also visited at irregular intervals. In Pará, the areas of study were located in the cities of Melgaço and Portel: the Estação Científica Ferreira Penna (1°44' S and 51°27' W) has an area of 33,000 ha and the site of the Programa de Pesquisa em Biodiversidade da Amazônia (PPBio) (1°57' S and 51°36' W), an area of 25 km<sup>2</sup>. Both are located in the Floresta Nacional de Caxiuanã. These two areas have typical Amazonian ecosystems and its flora is one of the richer in the Amazonian basin (Lisboa 2002).

**ANALYSIS OF BASIDIOMA:** The basidioma 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, MG, and URM. Specimens previously deposited in INPA were also studied.

Scanning electron microscopy (SEM) was conducted at the Museu Paraense Emílio Goeldi. Sections were removed from dried basidioma and mounted directly on aluminium stubs using carbon adhesive tabs. The fragments were coated with 8–13 nm of gold using a Baltec SCD050 sputter coater and examined with a LEO 1450 VP scanning electron microscope.

## Results

Based on literature (Decock & Ryvarden 1999; De Jesus & Ryvarden 2010; Gugliotta et al. 2010), ten species of *Perenniporia* are reported to the Brazilian Amazonia. However, the presence of *P. medulla-panis* in the Neotropics is questioned by Decock and Ryvarden (2011), because this species is restricted to temperate areas of Northern and Central Europe, where it grows preferably *Quercus*. Furthermore, *P. medulla-panis* differs in several morphological features as the size pores,



basidiospores and type of reaction vegetative hyphae (Decock & Ryvarden 2011) and the specimens reported to the Brazil need further analysis. *Perenniporia cremeopora*, *P. roseoisabellina* and *P. ellipisopora* represent the first record for Brazil. *Perenniporia parvispora* and *P. tephropora* are new records for the Brazilian Amazonia, while *P. detrita* and *P. sprucei* are new records for the state of Pará, *P. inflexibilis* to the states of Rondônia and Mato Grosso, *P. martia* to the state of Rondônia, and *P. stipitata* to the state of Rondônia.

### Taxonomy

**Perenniporia amazonica** De Jesus & Ryvarden, Syn. Fung. (Oslo) 27: 74 (2010).

DESCRIPTION in De Jesus & Ryvarden (2010).

COMMENTS: The basidioma with strongly dextrinoid skeletal hyphae which partly penetrate the hymenium and partly project along the dissepiments, making the species microscopically distinct and easily separated from other species of the genus.

DISTRIBUTION: Brazil (De Jesus & Ryvarden 2010).

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. RORAIMA, Estação Ecológica de Maracá, leg. Ricardo 4428, IV.2008 (INPA).

**Perenniporia aurantiaca** (A. David & Rajchenb.) Decock & Ryvarden, Mycol. Res. 103(9): 1140. 1999.

≡ *Pyrofomes aurantiacus* A. David & Rajchenb., Mycotaxon 22(2): 312 (1985).

DESCRIPTION in Decock & Ryvarden (1999).

COMMENTS: The bright orange to brick red basidioma distinguish *P. aurantiaca* from the resupinate species of *Perenniporia*. *Perenniporia xantha* Decock & Ryvarden is closely related, but distinguished by the colour of the pileus surface (yellow to orange yellow).

DISTRIBUTION: Brazil, French Guiana and Venezuela (Decock & Ryvarden 1999). In the Brazilian Amazonia, it is reported for the state of Pará (Gugliotta et al. 2010).

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. H.M.P. Sotão et al., XII.2006 (MG 195363); Estação Científica Ferreira Penna, leg. T.B. Gibertoni, VIII.2007 (URM 79730); leg. T.B. Gibertoni, II.2008 (URM 79731, URM 79732).

**Perenniporia contraria** (Berk. & M.A. Curtis) Ryvarden, Norweg J Bot. 19: 233. 1972.

≡ *Polyporus contrarius* Berk. & M.A. Curtis, Trans. Linn. Soc. London, Bot., Ser. 2 2: 60 (1882).

DESCRIPTION in Decock et al. (2001).

COMMENTS: This species is characterised by the pileus surface with reddish to black cuticle or crust, small regular pores (6-8 per mm) and strongly dextrinoid skeletal hyphae. The pores of the Brazilian material are slightly larger than those of the description of the holotype [7–8 µm in the Decock, Figueroa & Ryvarden (2001)]. *Perenniporia subannosa* (Bres.) Decock, S. Herrera & Ryvarden was erroneously regarded as *P. contraria*, but according to Decock et al (2001), the two species can be distinguished by a round margin of the basidioma, larger pores (4-5 per mm) and wider skeletal hyphae (4.8 µm) in *P. subannosa*. Microscopically, *P. piperis* (Rick.) Rajchenb. is similar to *P. contraria*, since both species have basidiospores with similar size and shape, but the former does not have a cuticle in the basidioma (Gerber et al. 1999).

DISTRIBUTION: Neotropical (Ryvarden & Meijer 2002). In the Brazilian Amazonia, it is reported for the state of Pará (Gugliotta et al. 2010).

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. PARÁ, Melgaço, leg. T.B. Gibertoni, II.2008 (URM 79731).

***Perenniporia cremeopora*** Decock & Ryvarden, Mycologia 92(2): 355 (2000).

Figs.1- 3

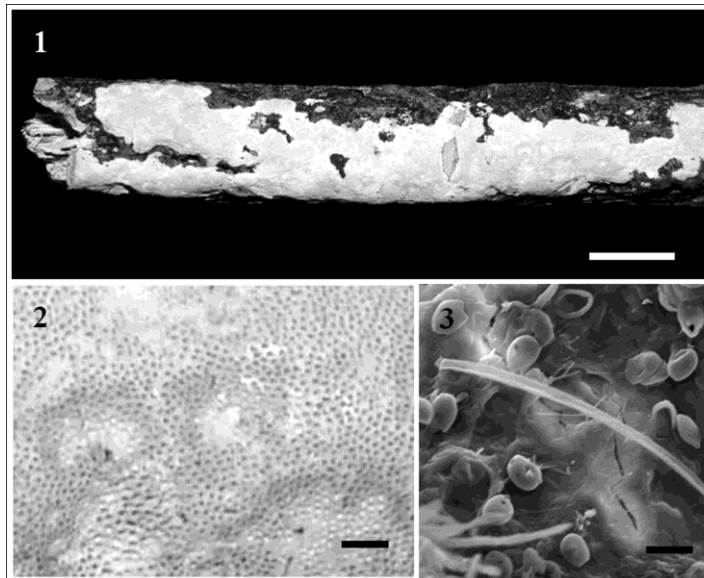
*Basidioma* annual, resupinate, 2 mm thick; *pore surface* with round pores, 6-8 per mm, white (B2) to pale cream (D4) when dry; *margin* white (B2); *context* very thin, almost absent, concolorous with the pore surface; *tube* layer distinct, not stratified, up to 1.8 mm thick, concolorous with the context; *hyphal system* dimitic; generative hyphae, hyaline, difficult to see, clamped, thin-walled, 1.5-2.5 µm diam.; skeletal hyphae, arboriform, hyaline, thick-walled, 2.0-2.5 µm diam., dextrinoid; *cystidia* absent; *basidia* not observed; *basidiospores* ellipsoid to ovoid, truncate at the apex, thick-walled, smooth, hyaline, variably dextrinoid, with an apical germ pore, 4.8-5.0 x 3.0-3.2 µm.

COMMENTS: *Perenniporia cremeopora* is recognized by the cream pileus surface and the round pores (6-8 per mm) (Decock & Ryvarden 2000). The basidiospores differ only slightly from the original description [= 3.9-4.8 (-5) x 3.3-3.8]. It is related to *P. minutopora* Ryvarden & Decock, but differs by the colour of the pore surface (grayish orange to pale brownish orange, cream in *P. cremeopora*) and the reaction of the skeletal hyphae (non-dextrinoid in *P. minutopora* and dextrinoid in *P. cremeopora*). *Perenniporia parvispora* Decock & Ryvarden is another similar species, but it differs by the whitish to pale orange white pore surface and smaller basidiospores (3.5-4 x 3-3.7 µm).

**DISTRIBUTION:** Known only from the type locality in Dominican Republic (Decock & Ryvarden 2000) and now proven to occur in Brazil.

**SUBSTRATE:** On deciduous wood.

**MATERIAL EXAMINED:** BRAZIL. PARÁ, Floresta Nacional de Caxiuanã, PPBio, leg. T. B. Gibertoni et al., XII.2006 (MG 195407).



**Figs 1-3** – *Perenniporia cremeopora*. **1** Basidioma. **2** Pore surface. **3** SEM micrograph of the basidiospores. Bars: 1 = 1cm, 2 = 1mm, 3 = 5 $\mu$ m.

***Perenniporia detrita*** (Berk.) Ryvarden, in Ryvarden & Johansen, Prelim. Polyp. Fl. E. Afr. (Oslo): 467. 1980.

$\equiv$  *Polyporus detritus* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 197 (1856).

**DESCRIPTION** in Núñez & Ryvarden (2001).

**COMMENTS:** The whitish to yellowish basidioma, the globose to truncate, dextrinoid basidiospores and the presence of chlamydospores distinguish *P. detrita* from the pileate species of *Perenniporia*. *Perenniporia detrita* similar to *P. ochroleuca* but the size and shape basidiospores distinguish these species [ellipsoid, 12-17 (-20) x 7-10 (-11)  $\mu$ m].

**DISTRIBUTION:** Pantropical (Núñez & Ryvarden 2001). In the Brazilian Amazonia, it is reported for the state of Amazonas (Gugliotta et al. 2010), and now for Pará.

**SUBSTRATE:** On deciduous wood.

**MATERIAL EXAMINED:** BRAZIL. PARÁ, Melgaço, "capoeira", leg. T.B. Gibertoni 170, II.2008 (MG).

**Perenniporia ellipsospora** Ryvar den & Gilb., Mycotaxon 19: 140. 1984.

Figs. 4- 6

*Basidioma* annual, resupinate, about 1 mm thick and hard when dry; *pore surface* with round to angular pores, 3-4 (-5) per mm, decurrently near the margin, dissepiments thin and entire, cream (D4 to C3) to pale yellowish brown (Fulvous 12) when dry; *margin* white (B2); *context* reduced to a thin layer above the substrate, concolorous with the pore surface; *tubes* thin, concolorous with the pore surface; *hyphal system* dimitic; generative hyphae hyaline, clamped, thin-walled, 2-3.5 µm diam.; skeletal hyphae, hyaline to pale yellow, thick-walled, 2-4 µm diam., dextrinoid; *cystidia* absent; *basidia* not observed; *basidiospores* ellipsoid, truncate at the apex, slightly thick-walled, smooth, hyaline, dextrinoid, 3.5-4 x 3-4 µm.

COMMENTS: *Perenniporia ellipsospora* is recognized by the pale yellowish brown pore surface with angular pores and ellipsoid basidiospores (3.5-4 x 3-4 µm). It may be mistaken for *P. subacida* (Peck) Donk, a species associated with coniferous trees, but *P. ellipsospora* is distinguished by the harder basidioma when dry and the larger pores [3-4 (-5) per mm, 5-6 per mm in *P. subacida*].

DISTRIBUTION: Eastern United States (Gilbertson & Ryvar den 1987) and now proven to occur in Brazil.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS, Manaus, leg. M.A. Jesus, XI.1990 (INPA 192682).

**Perenniporia inflexibilis** (Berk.) Ryvar den, Norweg J Bot. 19: 233 (1972).

≡ *Polyporus inflexibilis* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 199 (1856).

DESCRIPTION in Ryvar den & Johansen (1980).

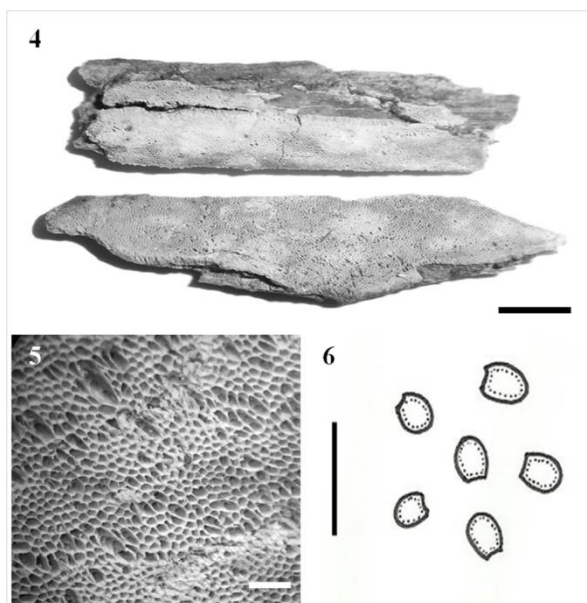
COMMENTS: The resupinate to unguulate, dark grey and rimose basidioma distinguish *P. inflexibilis* from the other pileate species of *Perenniporia*.

DISTRIBUTION: Pantropical (Ryvar den & Johansen 1980). In the Brazilian Amazonia, it is reported for the states of Amazonas, Pará and Roraima (Gugliotta et al. 2010). This is a new record for the states of Mato Grosso and Rondônia.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS, Barcelos, Serra de Aracá, leg. Samuels, II.1984 (INPA 129582); Manaus, leg. Vohland, V.1996 (INPA 216365, as *Perenniporia* sp.); loc. n. det., leg. M.A. Jesus, X.1997 (INPA 216460, as *Nigroporus nivosus* (Berk.) Murrill); MATO GROSSO, Aripuanã, leg. Sousa, IV.1978 (INPA 91973, 92000, 92005, as *Phellinus* sp.); PARÁ, Melgaço,

Floresta Nacional de Caxiuanã, PPBio, leg. Medeiros et al., VIII/2007 (MG 19538); leg. H.M.P. Sotão et al., VIII.2007 (MG 195230, MG 195239, MG 195241); Estação Científica Ferreira Penna, leg. T.B. Gibertoni, VII.2006 (URM 79754, URM 79755, URM 79756, URM 79757, URM 79758); leg. T.B. Gibertoni, III.2007 (URM 79759, URM 79760, URM 79762, URM 79763, URM 79764, URM 79765, URM 79766, URM 79767, URM 79768, URM 79769, URM 79771, URM 79772, URM 79773); leg. T.B. Gibertoni, VIII.2007 (URM 79774, URM 79776, URM 79777, URM 79778, URM 79779, URM 79780, URM 79781, URM 79782, URM 79783, URM 79784); leg. T.B.



**Figs 4-6** – *Perenniporia ellipsospora*. **4** Basidioma. **5** Pore surface. **6** Basidiospores. Bars: 4 = 1cm, 5 = 1mm, 6 = 10 $\mu$ m.

Gibertoni, II.2008 (URM 79733, URM 79734, URM 79735, URM 79736, URM 79737, URM 79738, URM 79739, URM 79740, URM 79741, URM 79742, URM 79743, URM 79744, URM 79745, URM 79746, URM 79747, URM 79748, URM 79749, URM 79750, URM 79751, URM 79752, URM 79753); Oriximinã, leg. V.L. Bononi, VI.1980 (INPA 103295); leg. V.L. Bononi, VII.1980 (INPA 103808); Itaituba, leg. Sousa, V.1977 (INPA 74542, INPA 74603); RONDÔNIA, Porto Velho, Parque Natural Municipal de Porto Velho, leg. A.C. Gomes-Silva, II.2007 (URM 79517); leg. A.C. Gomes-Silva, II.2008 (URM 79199, URM 79200); Estação Ecológica de Cuniã, leg. A.C. Gomes-Silva, II.2007 (URM 79195, URM 79196, URM 79198); leg. A. C. Gomes-Silva, VII.2007 (URM 79197, URM 79519); leg. A. C. Gomes-Silva, II.2008 (URM 79201, URM 79202, URM 79203); Fazenda Mucuí, leg. A. C. Gomes-Silva, VII.2007 (URM 79518); RORAIMA, Boa Vista, leg. Araújo et al., V.1977 (INPA 78448); Caracará, leg. Araújo et al., V.1977 (INPA 77013, as *Fomes* sp.).

***Perenniporia martia*** (Berk.) Ryvarden [as 'martius'], Norweg J Bot. 19: 143. 1972.

≡ *Polyporus martius* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 198 (1856).

DESCRIPTION in Gerber et al. (1999); Núñez & Ryvar den (2001).

COMMENTS: This species is characterized by the thick, woody, almost black, and rimose basidioma, the lacrimoid, dextrinoid basidiospores and presence of cystidia. *Perenniporia sprucei* is a similar species, but its basidiospores are ellipsoid to ovoid, the cystidia are absent and the clamydospores are present in the context and trama.

DISTRIBUTION: Pantropical (Núñez & Ryvar den 2001). In the Brazilian Amazonia, it is reported for the state of Amazonas and Pará (Gugliotta et al. 2010). This is a new record for the state of Rondônia.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Barcelos, Serra de Aracá, leg. Samuels, III.1984 (INPA 129801); leg. Silva et al., VII.1985 (INPA 154965, as *Ganoderma* sp.); Manaus, leg. Rodrigues et al., V.1985 (INPA 137022, as *Fomes* sp.); Tefé, leg. Amaral et al., XII.1982 (INPA 107154); loc. n. det., leg. Sousa, VIII.1977 (INPA 74664); leg. Sousa, IV.1978 (INPA 75635, as *Fomes* sp.); leg. Prance et al., II.1969 (INPA 26054, as *Fomes* sp.); leg. Prance et al., IX.1973 (INPA 41129); leg. Samuels et al., III.1984 (INPA 1301284); leg. Webber, VIII.1979 (INPA 109146); PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.M. Medeiros et al., VIII.2007 (MG 195197, MG 195198, MG 195199, MG 195200); leg. H.M.P. Sotão et al., VIII.2007 (MG 195201, MG 195202); Estação Científica Ferreira Penna, leg. H.M.P. Sotão et al., II.1997 (MG 195183, MG 195157); leg. Martins et al., X.2003 (MG 195156); leg. Martins et al., X.2004 (MG 195165); leg. Martins & T. B. Gibertoni, I.2006 (MG 195160, MG 195181); leg. T.B. Gibertoni, VII.2006 (URM 79785); leg. T. B. Gibertoni, III.2007 (URM 79786, URM 79787, URM 79788, URM 79789, URM 79790); leg. T.B. Gibertoni, VIII.2007 (URM 79791, URM 79792, URM 79793, URM 79794); leg. T.B. Gibertoni, II.2008 (URM 79795, URM 79796, URM 79797, URM 79798); RONDÔNIA, Porto Velho, Parque Natural Municipal de Porto Velho, leg. A.C. Gomes-Silva, VII.2007 (URM 79204, URM 79520); leg. A.C. Gomes-Silva, II.2008 (URM 79524); leg. A.C. Gomes-Silva, VII.2008 (URM 79522); leg. A.C. Gomes-Silva, VII.2008 (URM 79522); leg. A.C. Gomes-Silva et al., I.2009 (URM 82945); leg. A.C. Gomes-Silva et al., VI.2009 (URM 89923); Estação Ecológica de Cuniã, leg. A.C. Gomes-Silva, VII.2007 (URM 79523); leg. A.C. Gomes-Silva, II.2008 (URM 79521); leg. A.C. Gomes-Silva, VII.2008 (URM 79525); loc. n. det., leg. Dumont, VII.1968 (INPA 65129, as *Phellinus* sp.); leg. Petersen, X.1979 (INPA 110881, as *Fomes* sp.).

**Perenniporia ohiensis** Ryvar den, Norweg J Bot. 19: 143. 1972.

≡ *Trametes ohiensis* Berk., Grevillea 1(no. 5): 66 (1872).

DESCRIPTION in Núñez & Ryvar den (2001).

COMMENTS: The species is characterized by the small basidioma and small pores (5-6 per mm), large, truncate, dextrinoid basidiospores (13-16 x 7-10 µm), and weakly dextrinoid hyphae. The size of the basidiospores and the shape of basidioma make *P. ohiensis* similar to *P. ochroleuca* but they can be distinguished by the pore size (5-6 per mm and 2-4 per mm, respectively).

DISTRIBUTION: Neotropical (Gerber et al. 1999). In the Brazilian Amazonia, it is reported for the states of Mato Grosso and Pará (Gugliotta et al. 2010).

SUBSTRATE: On deciduous Wood.

MATERIAL EXAMINED: BRAZIL. PARÁ, Melgaço, Floresta Nacional de Caxiuanã, leg. H.M.P. Sotão et al., XII.1996 (MG 195186); leg. H.M.P. Sotão et al., II.1997 (MG 195159); Estação Científica Ferreira Penna, leg. Martins & T.B. Gibertoni, I.2006 (MG 195180).

**Perenniporia parvispora** Decock & Ryvar den, Mycologia 92(2): 357. 2000.

DESCRIPTION in Decock & Ryvar den (2000).

COMMENTS: The white, resupinate basidioma, the small pores [(6-)7-8 per mm] and small dextrinoid, ellipsoid to ovoid basidiospores [3.5-4 x 3-3.7 (-4) µm] distinguish *P. parvispora* from the other resupinate species of *Perenniporia*.

DISTRIBUTION: Venezuela (Decock & Ryvar den 2000). It is a new record for the Brazilian Amazonia.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. PARÁ, Melgaço, Floresta Nacional de Caxiuanã, ECFPn, leg. T.B. Gibertoni, VII.2006 (URM 79802).

**Perenniporia roseoisabellina** (Pat. & Gaillard) Ryvar den, Occ. Pap. Farlow Herb. Crypt. Bot. 18: 32. 1983. Figs. 7-9

*Basidioma* annual, resupinate, very thin, less than 1 mm thick; *Pore surface* with angular pores, 2-3 per mm, white (B2) to pale cream (D4) when dry; *margin* white (B2); *context* very thin, almost absent, concolorous with the pore surface; *tube* layer thin, concolorous with the pore surface;

*Hyphal system* dimitic; generative hyphae hyaline, clamped, thin-walled, 1.5-4.5 µm diam.; skeletal hyphae, hyaline to pale yellow, thick-walled, 1.5-3.5 µm diam., not dextrinoid; *cystidia* absent; *basidia* not observed; *basidiospores* subglobose, truncate at the apex, thick-walled, smooth, hyaline, dextrinoid, 7.5-9 x 5.5-7 µm.

COMMENTS: *Perenniporia roseoisabellina* is recognized by the isabelline pore surface with large pores (2-3 per mm) and large subglobose basidiospores (7.5-9 x 5.5-7 µm). *Perenniporia isabellina* (Pat.) Ryvar den may also be mistaken for *P. roseoisabellina* due to its similar basidiomata colour, but the pores are smaller (4-5 per mm) in *P. isabellina* than in *P. roseoisabellina*.

DISTRIBUTION: Formerly known only from the type locality at Puerto Zamuro in Venezuela (Ryvarden 1983) and now proven to occur in Brazil.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. PARÁ, Floresta Nacional de Caxiuanã, PPBio, leg. H.M. Sotão et al., XII.2006 (MG 195163).

***Perenniporia sprucei*** Decock & Ryvarden, *Mycologia* 91(2): 388 (1999).

DESCRIPTION in Decock & Ryvarden (1999).

COMMENTS: This species is characterized by a basidiomata with a creamy to brown pileus, occasionally orange when young and a dimitic hyphal system composed of heavily branched arboriform skeletal hyphae. The absence of cystidia, ellipsoid to ovoid basidiospores and the presence of chlamydospores are good features that differs *P. sprucei* from *P. martia*. It is separated from *P. detrita* by the smaller basidiospores and hyphal system trimitic in *P. detrita*.

DISTRIBUTION: Venezuela and Brazil (Decock & Ryvarden 2000). It is a new record for the state of Pará.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.M. Medeiros et al., VIII.2007 (MG 195182, MG195183); leg. P.M. Medeiros, XII.2009 (MG199279, MG199280).

***Perenniporia stipitata*** Ryvarden, *Mycotaxon* 28(2): 535. 1987.

DESCRIPTION in Ryvarden (1987); Gerber et al. (1999).



COMMENTS: This species is characterized by the laterally stipitate, yellowish basidioma and small pores (8-10 per mm).

DISTRIBUTION: Neotropical (Decock & Ryvarden 1998). In the Brazilian Amazonia, this species is reported for the states of Pará and Roraima (Gugliotta et al. 2010). It is a new record for the Rondônia.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. PARÁ, Melgaço, Floresta Nacional de Caxiuanã, ECFPn, leg. H.M.P. Sotão et al., VIII.2002 (MG 195170, MG 168028, MG 168081); leg. T.B. Gibertoni, VII.2006 (URM 79803); leg. T.B. Gibertoni, III.2007 (URM 79804, URM 79805, URM 79806, URM 79808, URM 79809); leg. T.B. Gibertoni, VIII.2007 (URM 79807, URM 79810, URM 79811); leg. T.B. Gibertoni, II.2008 (URM 79813, URM 79814, URM 79815, URM 79816, URM 79817); PPBio, leg. P.M. Medeiros et al., VIII.2007 (MG 195189, MG 195191, MG 195190, MG 195192, MG 195194, MG 195195, MG 195173); leg. H.M.P. Sotão et al., VIII.2007 (MG 195196); Oriximinã, leg. V.L. Bononi, VI.1980 (INPA 103678, *Polyporus* sp.); RONDÔNIA, Porto Velho, Parque Natural Municipal de Porto Velho, leg. A.C. Gomes-Silva et al., VI.2009 (URM 82924); leg. A.C. Gomes-Silva et al., II.2011 (URM 82925).

***Perenniporia tephropora*** (Mont.) Ryvarden, *Norweg J Bot.* 19: 233 (1972).

≡ *Polyporus tephroporus* Mont., *Annls Sci. Nat., Bot.*, sér. 3 4: 358 (1845).

DESCRIPTION in Gilbertson & Ryvarden (1987); Gerber et al. (1999).

COMMENTS: Comments: This species is characterized by the greyish pore surface, pores (3-) 4-6 per mm and ellipsoid, ovoid to subglobose basidiospores (4.5-6 x 3.5-4.5 µm).

DISTRIBUTION: Pantropical (Gilbertson & Ryvarden 1987). It is a new record for the Brazilian Amazonia.

SUBSTRATE: On deciduous wood.

MATERIAL EXAMINED: BRAZIL. RONDÔNIA, Porto Velho, Estação Ecológica de Cuniã, leg. A.C. Gomes-Silva et al., VIII.2010 (URM 82928).

**Key to the *Perenniporia* species of Brazilian Amazonia** (Colours refer to dried basidioma)

- |                               |   |
|-------------------------------|---|
| 1. Basidioma resupinate ..... | 2 |
| 1'. Basidioma pileate.....    | 9 |
| 2. Basidioma greyish .....    | 3 |

- 2.' Basidioma white, cream, ochraceous, yellow, orange to brick ..... 4
3. Pores 6-8 per mm; skeletal hyphae which project cystidia-like present; basidiospores oblong-ellipsoid; 7.5-8.5 x 2.8-3.5  $\mu\text{m}$  ..... *P. amazonica*
- 3.' Pores 4-6 per mm; skeletal hyphae which project cystidia-like absent; basidiospores ellipsoid; 4.5-6 x 3.5-4.5  $\mu\text{m}$ .....*P. tephropora*
4. Pores 2-3 per mm; basidiospores subglobose ..... 5
- 4.' More than 3 pores per mm; basidiopores ellipsoid to ovoid ..... 6
5. Pore surface white; pores angular; basidiospores 7.5-9 x 5.5-7..... *P. roseoisabellina*
- 5.' Pore surface cream to ochraceous; pores angular to sinuous; basidiospores 11-13 x 7-8  $\mu\text{m}$  .....  
..... *P. sinuosa*
6. Basidiospores shorter than 4  $\mu\text{m}$ ..... 7
- 6.' Basidiospores longer than 4  $\mu\text{m}$  ..... 8
7. Pores 3-4 per mm; basidiospores ellipsoid to subglobose; 3.5-4 x 3-4  $\mu\text{m}$  .....*P. ellipsospora*
- 7.' Pores 7-8 per mm; ellipsoid to slightly ovoid; 3.5-4 x 3-3.7  $\mu\text{m}$  ..... *P. parvispora*
8. Pore surface bright orange to brick red; basidiospores ellipsoid; 4.5-5.5 x 3-3.5  $\mu\text{m}$ .....  
..... *P. aurantiaca*
- 8.' Pore surface cream colour to cream-buff or bright yellow; basidiospores ellipsoid to ovoid, 8-5 x 3-3.2  $\mu\text{m}$ ..... *P. cremeopora*
9. Basidioma laterally stipitate..... *P. stipitata*
- 9.' Basidioma semicircular, dimidiate, or effused-reflexed..... 10
10. Pores 4-5 per mm ..... 11
- 10.' Pores 5-10 per mm..... 12
11. Basidiospores subglobose; 5-9 x 5-6  $\mu\text{m}$ ..... *P. detrita*
- 11.' Basidiospores lacrimoid; 5-10 x 3-6  $\mu\text{m}$  ..... *P. martia*
12. Pileus glabrous; context cream; pores 5-7 per mm ..... *P. ohiensis*
- 13.' Pileus tomentose in some zones; context brownish orange, pale brown to brown; pores 6-10 per mm ..... 13
13. Basidiospores ellipsoid to subglobose; non dextrinoid..... *P. contraria*
- 13.' Basidiospores ellipsoid to ovoid; slightly to strongly dextrinoid ..... 14
14. Basidioma pileate to resupinate; pore surface whitish grey to ashy blue; chlamydospores absent; basidiospores 4-6 x 3.5-5.5  $\mu\text{m}$ ..... *P. inflexibilis*
- 14.' Basidioma pileate; pore surface greyish cream; chlamydospores usually present in context and trama; basidiospores 6.5-8.7 x 4.2-5.5  $\mu\text{m}$  ..... *P. sprucei*

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## References

- DECOCK, C. & L. RYVARDEN (1998): *Microporellus straminellus* comb. nov. and a note on *Perenniporia stipitata*. *Crypt. Mycol.* **19**: 171–179.
- DECOCK, C & L. RYVARDEN (1999): Studies in tropical polypores 1. Some coloured resupinate *Perenniporia* species. *Mycological Research* **103** (9):1138–1144.
- DECOCK, C & L. RYVARDEN (2000): Studies in tropical polypores 6. New resupinate *Perenniporia* species with small pores and small basidiospores. *Micologia* **92** (2): 354–360.
- DECOCK, C, S.H. FIGUEROA & L. RYVARDEN (2001): Studies in *Perenniporia*. *Perenniporia contraria* and its presumed taxonomic synonym *Fomes subannosus*. *Micologia* **93** (1): 196–204.
- DECOCK, C & L. RYVARDEN (2011): Additions to the Neotropical *Perenniporia*: *Perenniporia albo-incarnata* comb. nov. and *Perenniporia guyanensis* sp. nov. *Cryptogamie Mycologie* **32** (1): 13–23.
- DE JESUS, M.A. & L. RYVARDEN (2010): Studies in neotropical polypores 28. Two new species from Amazonas, Brazil. *Synopsis Fungorum* **27**: 73–77.
- FERREIRA, L.V., R.L. SÁ, R. BUSCHBACHER, G. BATMANIAN, J.M.C SILVA, M.B ARRUDA, E. MORETTI, L.F.S.N. SÁ, J. FALCOMER & M.L. BAMPI (2001): Identificação de áreas prioritárias para a conservação de biodiversidade por meio da representatividade da Unidades de Conservação e tipos de vegetação nas ecorregiões da Amazônia brasileira. In: João Paulo Ribeiro Capobianco; Adalberto Veríssimo; Adriana Moreira; Donald Sawyer; Iza do Santos; Luiz Paulo Pinto. (Org.). *Biodiversidade na Amazônia brasileira*. 1 ed. São Paulo: Estação Liberdade: Instituto Socioambiental **1**: 13–540.

- GERBER, A.L., M.A. NEVES & C. LOGUERCIO-LEITE (1999): Some species of *Perenniporia* Murrill (*Poriales, Basidiomycotina*) from Southern Brazil. *Revista Brasileira de Botânica* **22**(2): 185–193.
- GILBERTSON, R.L. & L. RYVARDEN (1987): *North American Polypores*, Vol. 2. *Fungiflora*, Oslo. 452 pp.
- GOMES-SILVA, A.C. & T.B. GIBERTONI (2009): Checklist of the aphyllorhaceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* **108**: 319–322.
- GUGLIOTTA, A.M., R.M.B. SILVEIRA, C. LOGUERCIO-LEITE, M. CAMPOS-SANTANA, T.B. GIBERTONI, E.R. DRECHSLER-SANTOS, A.C. GOME-SILVA & J.M. BALTAZAR (2010): *Polyporales in Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. (<http://floradobrasil.jbrj.gov.br/2010/FB092517>).
- KIRK, P.M., P.F. CANNON, D.W. MINTER & J.A. STALPERS (2008): *Dictionary of the Fungi*. 10 ed. CABI Publishing, Surrey. 771 p.
- LISBOA, P.L.B. (2002): *Natureza, Homem e Manejo de Recursos Naturais na Região de Caxiuana, Melgaço*. Belém: Museu Paraense Emílio Goeldi, 237 p.
- NÚÑEZ, M. & L. RYVARDEN (2001): East Asian Polypores. *Synopsis Fungorum* **14**: 167–522.
- RYVARDEN, L. & R.L. GILBERTSON (1994): European polypores 2. *Meripilus* to *Tyromyces*. *Synopsis Fungorum* **6**: 389–743.
- RYVARDEN, L. & I. JOHANSEN (1980): A preliminary polypore flora of East Africa. *Fungiflora*, Oslo, 630 pp.
- RYVARDEN, L. & A.A.R. MEIJER (2002): Studies in neotropical polypores 14. New species from the State of Paraná, Brazil. *Synopsis Fungorum* **15**: 34–69.
- RYVARDEN, L. (1983): Type studies in the Polyporaceae. 14 Species described By N. Patouillard, either alone or with other mycologist. *Occas Pap Farlow Herb Cryptog Bot* **18**: 1–39.
- RYVARDEN, L. (1987): New and noteworthy polypores from tropical America. *Mycotaxon* **28**: 525–541.
- RYVARDEN, L. (1991): Genera of *Polypores* – Nomenclature and taxonomy. *Synopsis Fungorum* **5**: 1–363.
- SILVA, J.M.C., A.B. RYLANDS & G.A.B FONSECA (2005): O destino das áreas de endemismo da Amazônia. *Megadiversidade* **1**(1): 124–131.
- WATLING, R. (1969): *Colour Identification Chart*. Her Majesty's Stationary Office, Edinburgh (Scotland).

***POLYPORUS (BASIDIOMYCOTA) IN BRAZILIAN AMAZONIA, WITH NOTES ON  
POLYPORUS INDIGENUS I.J. ARAUJO & M.A. DE SOUSA AND P. SAPUREMA A.  
MØLLER***

**Abstract:** The genus *Polyporus* is revised for the Brazilian Amazonia and eleven species are reported. *Polyporus indigenus* is rediscovered, described in English and illustrated, as well *P. sapurema*. *Polyporus philippinensis* is the first record for Brazilian Amazonia. A key to the eleven species of *Polyporus* reported to the Brazilian Amazonia is provided.

**Key words** – *Agaricomycetes*, *Polyporales*, Brazilian Amazonia

### Introduction

*Polyporus* Fr. (*Polyporaceae*) was described in 1821 with *P. tuberaster* (Jacq. ex Pers.) Fr. as type species (Ryvarden 1991). The stipitate basidiomata, dimitic hyphal system with mostly clamped generative hyphae (in some species with simple septa), binding hyphae of a type often called skeleto-binding hyphae, absence of cystidia, presence or absence of hyphal pegs, cylindrical to subellipsoid and smooth basidiospores characterise the genus (Núñez & Ryvarden 1995, Silveira & Wright 2005). Molecular studies indicated the genus to be polyphyletic (Sotome et al. 2008).

This cosmopolitan genus actually comprises 26 species (Kirk et al. 2008), most of them lignicolous, rarely on conifers and rarely parasitic, causing white rot, or developing from a sclerotium buried in the ground or immersed in wood (Núñez & Ryvarden 1995, Silveira & Wright 2005, Sotome et al. 2008).

The knowledge about the genus is still scattered in the Brazilian Amazonia and only eight species have been reported to the region so far (Gomes-Silva & Gibertoni 2009). For this reason, the aim of the present work was to update the information about *Polyporus* in the Brazilian Amazonia through analysis of recently collected material and also herbarium material, formerly deposited.

### Material and Methods

THE STUDY AREA: Specimens were collected in three reserves in the Brazilian Amazonia from 2006 to 2011. The Parque Natural Municipal de Porto Velho (PNM, 390.82 ha) (08°45' S and 63°54' W) and the Estação Ecológica de Cuniã (ESEC, 53.221, 23 ha) (08°04' S and 63°31' W) are represented by open ombrophilous forest and transition forest with savannahs, and are both in the state of

Rondônia. The Floresta Nacional de Caxiuanã (FNC, 330.000 ha) (1°44' S and 51°27' W) is located in the State of Pará. This reserve includes typical Amazonian ecosystems and its flora is one of the richer in the Amazonian basin (Lisboa 2002).

ANALYSIS OF BASIDIOMATA: The basidiomata were analysed macro– (shape, colour, hymenophore) and micromorphologically (hyphal system, presence/absence and measurement of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). The specimens were deposited in URM, HFSL, and MG. Additionally, specimens deposited in INPA, RB and SP were studied.

### Results and discussion

Eleven species of *Polyporus* are reported to the Brazilian Amazonia. *Polyporus indigenus* was validly published in 1981 (Aguiar & Sousa 1981), while *P. sapurema* was validly published in 1900, but are usually excluded from treatments about polypores (Nuñez & Ryvarden 1995, Ko & Jung 2002, Krüger & Gargas 2004, Silveira & Wright 2005, Sotome et al. 2008). *Polyporus philippinensis* represents the first record to the Brazilian Amazonia. *Polyporus dictyopus* is a new occurrence in the states of Acre and Mato Grosso, *P. grammocephalus* in the states of Acre, Pará and Roraima, *P. tricholoma* in the state of Roraima, and *P. sapurema* in the state of Acre. These new occurrences were studied also from collections deposited in INPA, RB and SP, evidencing the importance of herbarium revisions and accessibility of herbaria records to the knowledge of fungal diversity.

### Taxonomy

***Polyporus arcularius*** (Batsch) Fr., Syst. mycol. (Lundae) 1: 342 (1821).

DESCRIPTION: Núñez & Ryvarden (2001), Silveira & Wright (2005), Louza & Gugliotta (2007).

COMMENTS: This species is recognized by the scaly pileus surface, ciliate margin, yellowish to brown, centrally stipitate basidiomata, and the large, hexagonal pores (1-2 per mm). According with Louza & Gugliotta (2007), the ciliate margin and the scaly pileus surface are variable characteristics. *Polyporus arcularius* is similar to *P. tricholoma*, but the colour of the basidiomata (pale brown and white to cream, respectively), pores size (1-2 per mm and 4-6 per mm, respectively) and stipe morphology (velutine and glabrous, respectively) distinguish these species. The presence of hyphal pegs in *P. arcularius* discerns this species from *P. arcularioides* A. David & Rajchenb. (Silveira & Wright 2005).

KNOWN DISTRIBUTION: Cosmopolitan, except for the boreal zones (Núñez & Ryvarden 2001). In the Brazilian Amazonia, reported in the states of Pará and Rondônia (Gomes-Silva & Gibertoni 2009).

SUBSTRATE: on dead angiosperm.

MATERIAL EXAMINED: BRAZIL. PARÁ, Floresta Nacional de Caxiuanã, T.B. Gibertoni, III/2007 (URM 79819).

**Polyporus dictyopus** Mont., Anns Sci. Nat., Bot., sér. 2 3: 349 (1835).

DESCRIPTION: Núñez & Ryvarden (2001), Silveira & Wright (2005), Louza & Gugliotta (2007).

COMMENTS: This species is characterised by the basidiomata with dark brown to vinaceous-brown abhymenial surface, stipe with a black cuticle and basidiospores 6-8 x 2.5-4 µm. *Polyporus badius* (Pers.) Schwein. and *P. melanopous* (Pers.) Fr. are similar species, but are recorded from the temperate zones (Silveira & Wright 2005). According with Gugliotta et al. (1996), this species has basidiomata with high variation in colour, disposition of stipe and basidiospores size.

KNOWN DISTRIBUTION: Pantropical (Núñez & Ryvarden 2001). In the Brazilian Amazonia, reported in the states of Amazonas, Pará, Rondônia and Roraima (Gomes-Silva & Gibertoni 2009). It is a new record in the states of Acre and Mato Grosso.

SUBSTRATE: on deciduous wood.

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B. Lowy et al., X/1980 (INPA 100779); B. Lowy et al., XI/1980 (INPA 100835); AMAZONAS: Barcelos, Serra de Aracá, G.J. Samuels et al., II/1984 (INPA 129462, 129503, 129646); E.S.S. Silva, VII/1985 (INPA 153726); Manaus, M.A. Souza & I.J. Araújo, IX/1977 (INPA 74704); loc. n. det., G.T. Prance et al., X/1966 (INPA 187766); M.A. Souza, X/1977 (INPA 74576); B. Lowy et al., IX/1980 (INPA 100033); MATO GROSSO, loc. n. det., C.C. Berg et al., X/1973 (INPA 41853); PARÁ: Oriximinã, V.L.R. Bononi, VI/1980 (INPA 103356, 103501, 103705); V. L. R. Bononi, VI/1980 (SP 177499, 177526, 177541, 214669); loc. n. det., V. L. R. Bononi, VIII/1981 (SP 157632, 193384); Floresta Nacional de Caxiuanã, H.M.P. Sotão et al., XII/2006 (MG 195203, 195204, 195205, 195206, 195207, 195208, 195221, 195222, 195237); P.S Medeiros et al., VII/2007 (MG 195209, 195256, 195273, 195274, 195279, 195297, 195298); T.B. Gibertoni, III/2007 (URM 79820, 79821, 79823, 79824, 79825, 79826, 79827); T.B. Gibertoni, VIII/2007 (URM 79822, 79828); T.B. Gibertoni, II/2008 (URM 79829, 79830, 79831, 79832, 79833, 79834, 79835, 79836, 79839, 79840, 79841, 79842, 79843, 79844, 79837, 79838); RONDÔNIA: Vilhena, , R.H. Pertesen, X/1979 (INPA 110756, 110781); Porto Velho, Estação Ecológica de Cuniã, A.C. Gomes-Silva et al., VII/2007 (URM 78999); A. C. Gomes-Silva, VII/2008 (URM 79539); Parque Natural Municipal de Porto Velho, A.C. Gomes-

Silva et al., II/2008 (URM 79000); A.C. Gomes-Silva et al., VII/2008 (URM 82891); RORAIMA: Boa Vista, L.L.J. Aguiar, XI/1977 (INPA 78370); I.J. Araújo et al., XI/1977 (INPA 78297); M.A. Jesus, XII/1989 (INPA 186256); Caracará, I.J. Araújo et al., XI/1977 (INPA 76974, 77021, 77234, 78402, 78422, 78426,); loc. n. det., I.J. Araújo et al., XI/1977 (INPA 78435); I.J. Araújo et al., XII/1977 (INPA 78485).

***Polyporus grammocephalus*** Berk., Hooker's J. Bot. Kew Gard. Misc. 1: 1184 (1842).

DESCRIPTION: Núñez & Ryvardeen (1995).

COMMENTS: The laterally stipitate basidiomata, the radially fibrillose, yellowish pileus surface, and the small pores (3-5 per mm) characterise this species. *Polyporus philippinensis* is similar, but differs by having larger pores (1-2 per mm). *Polyporus guianensis*, another similar species, differs by the black cuticle on stipe, and shape and size of basidiospores (cylindrical, 8-12 x 2.5-4 µm, in *P. guianensis* and oblong ellipsoid to subellipsoid, 6-8 (10) x 2.5-3 µm, in *P. grammocephalus*).

KNOWN DISTRIBUTION: Tropical and subtropical (Núñez & Ryvardeen 1995). In the Brazilian Amazonia, recorded in the state of Amazonas (Gomes-Silva & Gibertoni 2009). It is now reported to Acre, Pará and Roraima.

SUBSTRATE: on deciduous wood.

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B. Lowy et al., IX/1980 (INPA 100218); B. Lowy et al., X/1980 (INPA 100567, 100707); AMAZONAS, loc. n. det., I.J. Araújo et al., I/1978 (INPA 78687); W. Milliken, VIII/1993 (INPA 174584); PARÁ: Floresta Nacional de Caxiuanã, P.S. Medeiros et al., XII/2007 (MG 195318, 195319); RORAIMA: Alto Alegre, K.F. Rodrigues et al., VI/1986 (INPA 143286, 143305); E.S.S. Silva, VI/1986 (INPA 160341); loc. n. det., B. Lowy et al., VI/1986 (INPA 144548).

***Polyporus guianensis*** Mont., Annl. Sci. Nat., Bot., sér. 2 13(1): 201 (1840).

DESCRIPTION: Núñez & Ryvardeen (2001), Louza & Gugliotta (2007).

COMMENTS: The brownish, laterally to centrally stipitate basidiomata, the striate pileus surface, and the large pores (1-2 per mm) are typical for this species. *Polyporus leprieurii* and *P. tricholoma* are similar, but the smaller pores (5-8 per mm and 9 per mm, respectively), smaller basidiospores (4.5-7 x 2-2.5 µm and 6-7 x 2-3 µm, respectively) and the pileus with ciliate margin in *P. tricholoma* distinguish this latter species from *P. guianensis*.



KNOWN DISTRIBUTION: Tropical Asia, South America (Nuñez & Ryvardeen 2001) and Africa (Ryvardeen & Johansen 1980). In the Brazilian Amazonia, recorded in the states of Acre, Amazonas and Pará (Gomes-Silva & Gibertoni 2009).

SUBSTRATE: on deciduous wood.

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B. Lowy et al., X/1980 (INPA 100883); AMAZONAS: Manaus, M.A. Jesus, IV/1983 (INPA 183645); R.E. Hanada, VI/1989 (INPA 186280); Presidente Figueiredo, M.A. Jesus, III/1984 (INPA 185285); M.A. Jesus, XI/1984 (INPA 185894); PARÁ: Floresta Nacional de Caxiuanã, H.M.P. Sotão et al., XII/2007 (MG 195322, 195323, 195324); P.S Medeiros et al., XII/2007 (MG 195320, 195321); T.B. Gibertoni, II/2008 (URM 79845).

**Polyporus ianthinus** Gibertoni & Ryvardeen, in Gibertoni, Ryvardeen & Cavalcanti, Syn. Fung. 18: 53 (2004).

DESCRIPTION: Gibertoni et al. (2004).

COMMENTS: The species is mainly characterised by the lilac to pale brown, glabrous and smooth pileus. In shape, it is reminiscent of *P. grammacephalus*, which has radial veins or lines on an ochraceous pileus and longer basidiospores (6-8 µm, versus 5-6 µm in *P. ianthinus* (Gibertoni et al. 2004).

KNOWN DISTRIBUTION – Brazil and Guyana (Gibertoni et al. 2004). In the Brazilian Amazonia, recorded in the state of Pará (Gomes-Silva & Gibertoni 2009).

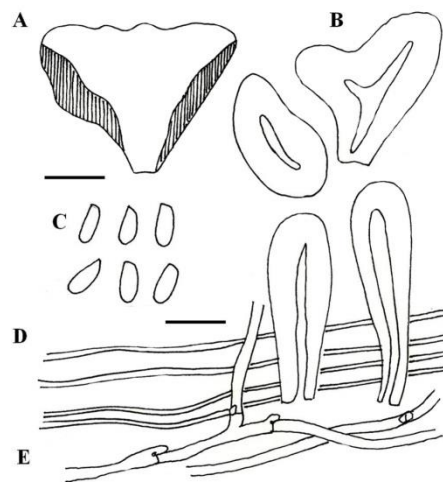
SUBSTRATE: on dead angiosperm.

MATERIAL EXAMINED: BRAZIL. PARÁ: Floresta Nacional de Caxiuanã, T.B. Gibertoni, III/2007 (URM 79846); T.B. Gibertoni, II/2008 (URM 79847).

**Polyporus indigenus** I.J. Araujo & M.A. de Sousa, Acta Amazonica 11(3): 450 (1981). Fig. 1

Basidiomata annual, solitary, stipitate with an evenly expanded stipe from the ground making it funnel-like, up to 5 cm high, light of weight; pileus circular and 5 cm in diam.; pileus surface azonate, pale cream, glabrous and rugulose as if it has contracted under drying; margin white and obtuse; hymenophore poroid, pores angular, 3-4 per mm, dissepiments thin and entire, white to pale cream; context up to 3 mm thick at the base, homogeneous, soft and cheesy, pale cream; tubes concolorous with the pileus surface, 1 cm measured vertically; stipe white, glabrous, cylindrical, about 1 cm in diam. Sclerotium present, spherical, about 8 cm in diam., very dense and bone hard, outer surface irregularly brown, inner part marmorated with 1-3 mm large spots of semi translucent

cartilaginous material in a whitish hyphal matrix. Hyphal system dimitic; generative hyphae with clamps, difficult to find in the context, abundant in the trama and subhymenium, 2-4  $\mu\text{m}$  wide, skeletal hyphae evenly thick-walled and with a wide lumen, pale yellow, rare dichotomously branched, outline distinct in Melzer's reagent, gelatinized and irregular in 3% KOH, 4-10  $\mu\text{m}$  wide. Mostly solid sclerids or twisted hyphal sections without any other discernible structure, up to 15  $\mu\text{m}$  wide present in the sclerotium. Cystidia absent from the hymenium. Basidia 18-24 x 4-6  $\mu\text{m}$ , obconical with 4 rather blunt and short sterigmata. Basidiospores oblong ellipsoid, hyaline, thin-walled, and non-amyloid, 5-6 x 3.5-4  $\mu\text{m}$ , many partly collapsed in the type.



**Fig 1** – *Polyporus indigenus* (INPA 90190). **A** Basidiomata. **B** Sclerids from the sclerotium. **C** Basidiospores. **D** Skeletal hyphae from the context. **E** Generative hyphae with clamps from the context. Bars A = 1 cm, B-C-D-E = 10  $\mu\text{m}$ .

COMMENTS: *Polyporus indigenus* was described by Aguiar & Sousa (1981) from specimens identified as *P. sapurema* based on observation of sclerotium. Aguiar & Sousa (1981), who cultivated fragments of the sclerotium and were able to grow basidiomata, observed that it was a distinct species. *Polyporus indigenus* has a very distinctive morphology when compared to the other stipe-like base or sessile basidiomata: glabrous abhymenial surface, small pores (4 per mm), sclerotium with large hyphae (3-15  $\mu\text{m}$  de diam.) and small basidiospores (5.6-7 x 2.8-3.9  $\mu\text{m}$ ). This sclerotium is known as “pão do índio” (Indian bread) and is used as food by “caboclos” (miscegenated, local population) (Aguiar & Sousa 1981). Although it lacks the typical dichotomously branched solid arboriform binding hyphae as seen in the other species of *Polyporus* s. str., we prefer to keep this species in *Polyporus* s. str. species with sclerotium, presenting laterally stipe. A sclerotium is also known in the temperate boreal *P. tuberosus* Jacq. Fr. which, however, has much longer cylindrical spores (10-16 x 4-7  $\mu\text{m}$ ) and a scaly pileus surface.

KNOWN DISTRIBUTION: Amazonas, Pará and Rondônia (Souza & Aguiar 1981).

SUBSTRATE: on the ground from a sclerotium

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Manaus, Itacoatiara Km 12, Fazenda Arauna, B. Singer, VIII/1977 (INPA 90190).

**Polyporus leprieurii** Mont., Anns Sci. Nat., Bot., sér. 2 13: 203 (1840).

DESCRIPTION: Núñez & Ryvarden (2001), Silveira & Wright (2005).

COMMENTS: This species is characterized by the flabelliform basidiomata, with lateral stipe with a black cuticle, the beige to pale brown pileus surface and the small pores (5-8 per mm). *Polyporus guianensis* is similar, but differs by having larger pores (1-2 per mm) and smaller basidiospores [8-12 x 2.5-4 µm in *P. guianensis* and 4.5-7 x 2-2.5(3) µm in *P. leprieurii*].

KNOWN DISTRIBUTION: Tropical and subtropical areas of America and oriental Asia (Núñez & Ryvarden 2001). In the Brazilian Amazonia, recorded in the states of Acre, Amazonas and Pará (Gomes-Silva & Gibertoni 2009).

SUBSTRATE: on deciduous wood.

MATERIAL EXAMINED – BRAZIL. ACRE: loc. n. det., B. Lowy et al., XI/1980, (INPA 100447, 100633, 100693, 100746, 100765, 100815); AMAZONAS: Manaus, L.F. Coêlho, VII/1955 (INPA 14226); G.T. Prance et al., XII/1966 (INPA 19213); E. Lleras et al., XI/1973 (INPA 43097); G.T. Prance et al., III/1974 (INPA 44480); D.G. Campbell et al. IV/1974 (INPA 45843); L. Leite et al., I/1977 (INPA 63426); M.A. Souza, V/1977 (INPA 74559, as *Melanopus leprieurii*); R.B. Singer, V/1977 (INPA 81440); R.B. Singer & I.J. Araújo, VII/1977 (INPA 81503); E.M.L Freire, XI/1977 (INPA 70042, as *Melanopus leprieurii*); M.A. Sousa, XII/1977 (INPA 74732); M.A. Souza, V/1978 (INPA 91964); B. Lowy et al., IX/1980 (INPA 100079); M.A. Jesus, V/1985 (INPA 185971); M.A. Jesus, I/1990 (INPA 192661, as *Polyporus infernalis*); M.A. Jesus, VII/1990 (INPA 192693); M.A. Jesus, XII/1990 (INPA 192683, 192689); M.A. Jesus, I/1998 (INPA 216457); K. Arens, V/1905 (SP 62143); São Paulo de Olivença, P. Occhioni, XI/1927 (SP 27595); Barcelos, Serra de Aracá, G.J. Samuels, II/1984 (INPA 129251); G.J. Samuels, III/1984 (INPA 129892, 130055); MATO GROSSO: Aripuanã, M.A. Sousa, IV/1978 (INPA 75588); loc. n. det., C.C. Berg & W.C. Steward, X/1973 (INPA 43367); A. J. Sampaio, XI/1928 (SP60080); PARÁ: Floresta Nacional de Caxiuanã, H.M.P. Sotão et al., IV/1995 (MG 149618, 195395, 195411); H.M.P. Sotão et al., IX/1996 (MG 195397, 195408, 195412, 195418); H.M.P. Sotão et al., X/1997 (MG 195400, 195410, 195417); H.M.P. Sotão et al., X/2002, (MG 105407, 168086); A. Martins, XI/2004 (MG 195389, 195393, 195399, 195403, 195409); A. Martins & T.B. Gibertoni, I/2006 (MG 195287, 195388, 195390,

195391, 195398, 195401, 195402, 195404, 195414); H.M.P. Sotão et al., XII/2006 (MG 194931, 194935, 194994, 195075, 195076, 195082, 195083, 195098, 195113); H.M.P. Sotão et al., XII/2007 (MG 194961, 194963.); P.S Medeiros et al., XII/2007 (MG 194937, 194938, 194939, 194940, 194942, 194946, 194947, 194049, 194950, 194951, 194953, 194955, 194959, 194984, 194930); T.B. Gibertoni, VII/2006 (URM 79848); T.B. Gibertoni, III/2007 (URM 79849, 79850, 79851, 79852, 79853, 79854, 79855, 79856, 79857, 79858, 79859, 79860, 79861, 79862, 79863, 79864, 79865, 79866, 79867, 79868); T.B. Gibertoni, VIII/2007 (URM 79869, 79870, 79871, 79872, 79873, 79874, 79875, 79876, 79878); T.B. Gibertoni, II/2008 (URM 79879, 79880, 79881, 79882, 79883); Oriximinã, V.L.R. Bononi, VI/1980 (INPA 103203, 103461, 103485, 103502, 103603, 103618, 103640, 103644, SP 214667); V.L.R. Bononi, VII/1980 (INPA 103851); Rodovia Belém, M. Kuhlmann, IX/1959 (SP 46142); loc. n. det., V. L. R. Bononi, VI/1980 (SP 178049, 193618); V. L. R. Bononi, VII/1980, (SP 177455); RORAIMA: Alto Alegre, K.F. Rodrigues et al., VI/1986 (INPA 143440); I.J. Araújo et al., XI/1977 (INPA 78410); B. Lowy et al., VI/1986 (INPA 144537, 144538); Boa Vista, L.L.J. Aguiar et al., XI/1977 (INPA 78421, 78425); RONDÔNIA: Vilhena, R.H. Pertesen, X/1979 (INPA 110738); Porto Velho, Parque Natural Municipal de Porto Velho, A.C. Gomes-Silva et al., II/2008 (URM 79208, URM 79209, URM 79211); A. C. Gomes-Silva, VII/2008 (URM 79541); A.C. Gomes-Silva et al., II/2011 (URM 82900, 82901); Estação Ecológica de Cuniã, A.C. Gomes-Silva et al., II/2008 (URM 79210); A. C. Gomes-Silva, VII/2008 (URM 79540); A.C. Gomes-Silva et al., VIII/2010 (URM 82942); A.C. Gomes-Silva et al., II/Feb 2011 (URM 82796, 82797); loc. n. det., R.D. Groos et al., VI/1984 (INPA 125225); R.H. Pertesen, XI/1979 (INPA 110895).

***Polyporus philippinensis*** Berk., J. Bot., London 1(3): 148 (1842).

DESCRIPTION: Núñez & Ryvardeen (1995), Silveira & Wright (2005), Louza & Gugliotta (2007).

COMMENTS: The laterally stipitate basidiomata, the radially fibrillose, cream to pale brown pileus surface and the large pores (1-2 per mm) characterise this species. It is similar to *P. grammocephalus*, but the smaller pores (3-5 per mm in *P. grammocephalus*) differentiate these species. Silveira & Wright (2002), through crossing tests, proved that *P. philippinensis* and *P. tenuiculus* are independent species despite being morphologically similar.

KNOWN DISTRIBUTION: Tropical and subtropical zones, rare in Africa (Núñez & Ryvardeen 1995). This is a new record to the Brazilian Amazonia.

SUBSTRATE: on deciduous wood.

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B. Lowy et al., XI/1980 (INPA 100849); RONDÔNIA. Porto Velho: Parque Natural Municipal de Porto Velho, A. C. Gomes-Silva, I/2008 (URM 79001).

*Polyporus sapurema* Möller, in Engler & Prantl, Nat. Pflanzenfam., Teil. I (Leipzig) 1: 172 (1900).

Figs. 2,3,4,5

Basidiomata annual, solitary, stipitate with an evenly expanded stipe from the ground making it funnel-like, up to 10 cm high; pileus circular and 4.5 cm in diameter; pileus surface azonate, scaly, cream to brown when dry; margin concolorous with pileus surface and slightly obtuse; hymenophore poroid, pores angular, 1-2 per mm, dissepiments thin and entire, yellow to pale cream; context up to 8 mm thick at the base, homogeneous, soft, yellow to pale cream; tubes concolorous with the hymenophore surface, 2 mm measured vertically; stipe yellow, velutinous, cylindrical, about 10 cm in diameter. Sclerotium present, spherical, about 11 cm in diameter, very dense, outer surface irregularly brown. Hyphal system dimitic; generative hyphae with clamps, hyaline, thin-walled, 1.5-2  $\mu\text{m}$  wide, skeletal hyphae evenly thick-walled and with a wide lumen, hyaline, rare dichotomously branched, 4-6  $\mu\text{m}$  wide. Mostly solid sclerids or twisted hyphal sections without any other discernible structure, up to 10  $\mu\text{m}$  wide present in the sclerotium. Cystidia absent from the hymenium. Basidia not seen, but club-like with 4 sterigmata (Viégas 1942). Basidiospores cylindrical, hyaline, thin-walled, non-amyloid, 9-11 x 4-5  $\mu\text{m}$ , many partly collapsed.

COMMENTS: The centrally stipitate basidiomata, pileus surface with scales, large pores (2 per mm), large basidiospores (9-11 x 3-5 $\mu\text{m}$ ) and hyphal system of the sclerotium differentiate this species from *P. indigenus*. *Polyporus sapurema* differs microscopically from the specimens deposited in (B, SP, RB) and studied by Aguiar & Sousa (1981) by the smaller basidiospores (8-13.4 x 3.2-4.9  $\mu\text{m}$ ).

KNOW DISTRIBUTION: Brazil (Meijer 2006). It is a new occurrence in the state of Acre.

SUBSTRATE: on the ground from a sclerotium.

MATERIAL EXAMINED: BRAZIL. ACRE: Instituto de Arqueologia, col. n. det., V/1979 (RB 218977); J. G. Kuhmann, date n. det (RB 218978); SÃO PAULO: Bocaina, Sucre & P. Braga, V/1968 (RB 220146); Espírito Santo, loc. n. det., Hempel, 12/1917 (SP 27849); D. Martins, IX/1958 (SP 46033).

*Polyporus tenuiculus* (P. Beauv.) Fr., Syst. mycol. 1: 344 (1821).

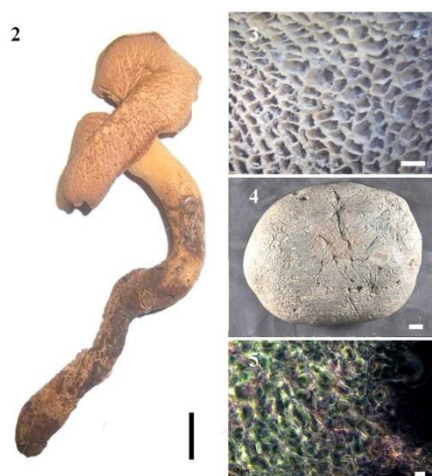
DESCRIPTION: Núñez & Ryvarden (1995), Silveira & Wright (2005).

COMMENTS: The fleshy, white to cream basidiomata, and the large hexagonal pores (1-2 per mm) characterise this species. *Polyporus tenuiculus* is similar to *P. philippinensis*, but the pale brown pileus surface and the small pores (3-5 per mm) in *P. philippinensis* distinguish this species. Other similar species is *P. saltensis* (Speg.) R.M. Silveira & J.E. Wright, which has no clamps. According to Silveira & Wright (2005), *P. tenuiculus* is a very polymorphic species. Fidalgo & Prance (1976) reported this species as edible by the indigenous Yanomamis.

KNOWN DISTRIBUTION: Pantropical (Núñez & Ryvarden 1995). In the Brazilian Amazonia, recorded in the state of Acre, Amazonas, Pará and Rondônia (Gomes-Silva & Gibertoni 2009).

SUBSTRATE: on deciduous wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Manaus, G.T. Prance et al., XI/1969 (INPA 18762); G.T. Prance & J.F. Ramos, VIII/1975 (INPA 75890, 75894); R.B. Singer, IV/1977 (INPA 81446); M.F.C. Cardias, VI/1987 (INPA 183923, as *Favolus brasiliensis*); R.B. Singer & I.J. Araújo, VII/1978 (INPA 82770, *Polyporus subcaperatus*); M.A. Jesus, VII/1991 (INPA 192720); R.E. Hanada, V/1998 (INPA 216448); Jutaí, E.S.S. Silva et al., IX/1986 (INPA 153806, 155009); PARÁ: Floresta Nacional de Caxiuanã, H.M.P. Sotão et al., IV/1995 (MG 195312); H.M.P. Sotão et al., IX/1996 (MG 195311); H.M.P. Sotão et al., IX/1997 (MG195316); H.M.P. Sotão et al., IX/2002 (MG 168040, 168060, 168061); H.M.P. Sotão et al., XII/2006 (MG 195331); A. Martins & T.B. Gibertoni, I/2006 (MG 195164); A. Martins, XI/2004 (MG 195310, 195313,); T.B. Gibertoni, III/2007 (URM 79662, 79666, as *Favolus tenuiculus*); T.B. Gibertoni, VIII/2007 (URM 79663, 79664, as *Favolus tenuiculus*); T.B. Gibertoni, II/2008 (URM 79665, as *Favolus tenuiculus*); loc. n. det., V. L. Bononi, II/1980 (SP 193639, 214655); RONDÔNIA: Porto Velho, Fazenda Mucuí, A.



**Figs 2-4** – *Polyporus sapurema* (SP 27849). **2** Basidiomata. **3** Pore surface. **4** Sclerotium. **5** Sclerids from the sclerotium. Bars 2-4 = 1cm, 3 = 1mm, 5 = 10  $\mu$ m.

C. Gomes-Silva, VII/2007 (URM 79482); Estação Ecológica de Cunião, A.C. Gomes-Silva et al., III/2008 (URM 82867); Jarú, M. Capelari et al., V/1987 (SP 212206, 211240, 212150, 211255, 211284); loc. n. det., R.D. Goos et al., III/1984 (INPA 125168, *Hexagonia* sp.); R.D. Goos et al., VI/1984 (INPA 125228); RORAIMA: Auaris, Prance, XII/1973 (SP112248, as *Favolus brasiliensis*); loc. n. det., I.J. Araújo et al., IX/1977 (INPA 78413, as *Favolus brasiliensis*).

**Polyporus tricholoma** Mont., Annls Sci. Nat., Bot., sér. 2 8: 365 (1837).

DESCRIPTION: Núñez & Ryvardeen (1995), Silveira & Wright (2005).

COMMENTS: The centrally stipitate, brownish basidiomata with ciliate margin and minute pores (9 per mm) distinguishes *P. tricholoma* from all other species of *Polyporus*. It is similar to *P. ciliatus*, but the large pores (5-7 per mm versus 9 per mm in *P. tricholoma*) and shape and size basidiospores (allantoid to cylindrical, 5-7 x 2 µm, cylindric, 6-7 x 2-3 µm in *P. tricholoma*) keep these species apart.

KNOWN DISTRIBUTION: Neotropical, rare in the paleotropics (Núñez & Ryvardeen 1995). In the Brazilian Amazonia, recorded in the state of Acre, Amazonas, Pará, Rondônia (Gomes-Silva & Gibertoni 2009). It is now reported to Roraima.

SUBSTRATE: on deciduous wood.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Manaus, R.B. Singer, VII/1974 (INPA 102040); R.B. Singer & I.J. Araújo, IV/1977 (INPA 77040); PARÁ: Floresta Nacional de Caxiuanã, PPBio, H.M.P. Sotão et al., V/1997 (MG 195315, 195341); RORAIMA: loc. n. det., G.T. Prance et al., VII/1974 (INPA 45292); I.J. Araújo et al., XII/1977 (INPA 78479); RONDÔNIA: Jarú, M. Capelari & R. Maziero, I/19887 (SP 211617, 211624).

### Key to the Amazonia Brazilian species of *Polyporus*

1. Growing from a sclerotium ..... 2
- 1'. Growing on wood ..... 3
2. Pileus surface scaly, pores 2 per mm, basidiospores 8-13.4 x 3-5 µm ..... *P. sapurema*
- 2'. Pileus surface glabrous, pores 3-4 per mm, basidiospores 5-6 x 3.5-4 µm ..... *P. indigenus*
3. Basidiomata with black cuticle on the stipe .....4
- 3'. Basidioma without black cuticle on the stipe ..... 6
4. Pileus surface brown to vinaceous-brown ..... *P. dictyopus*
- 4'. Pileus surface white or pale brown ..... 5
5. Pores 1-2 per mm ..... *P. guianensis*

5 <sup>o</sup> . Pores 5-8 per mm .....	<i>P. lepreurii</i>
6. Basidiomata centrally stipitate .....	7
6 <sup>o</sup> . Basidiomata laterally stipitate .....	8
7. Basidiomata with ciliate margin, pores 9 per mm .....	<i>P. tricholoma</i>
7 <sup>o</sup> . Basidiomata without ciliate margin, pores 1-2 per mm .....	<i>P. arcularius</i>
8. Pileus surface whitish .....	<i>P. tenuiculus</i>
8 <sup>o</sup> . Pileus surface differently coloured .....	9
9. Basidiomata surface vinaceous, pores 5-6 per mm .....	<i>P. ianthinus</i>
9 <sup>o</sup> . Basidiomata brownish, pores up to 5 per mm .....	10
10. Pores 2-5 per mm .....	<i>P. grammacephalus</i>
10 <sup>o</sup> . Pores 1-2 per mm .....	<i>P. philippinensis</i>

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### References

- AGUIAR, I.J.A & M.A. SOUSA (1981): *Polyporus indigenus* I. Araújo and M.A. Sousa, nova espécie da Amazônia. *Acta Amazônica* **11**(3): 449-455.
- ENGLER, A & K. PRANTL (1900): Die natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten insbesondere den Nutzpflanzen: Fungi (Eumycetes). *Nat. Pflanzenfam, I* (Leipzig) **1**: 1-570.



- FIDALGO, O. & G.T. PRANCE (1976): The ethnomycology of the Sanama indians. *Mycologia* **68**: 201-210.
- GIBERTONI, T.B., L. RYVARDEN & M.A.Q. CAVALCANTI (2004): Poroid fungi (*Basidiomycota*) of the Atlantic Rain Forest in Northeast Brazil. *Synopsis Fungorum* **18**: 33-43.
- GOMES-SILVA, A.C. & T.B. GIBERTONI (2009): Checklist of the aphyllorphaceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* **108**: 319-322.
- GUGLIOTTA, A.M., M. CAPELARI & V.L.R.BONONI (1996). Estudo taxonômico e sinonimização das espécies do grupo *Polyporus dictyopus* Mont. (*Polyporaceae*, *Aphyllorphales*). *Revista Brasileira de Botânica* **19**: 185-192.
- KIRK, P.M., P.F. CANNON, D.W. MINTER & J.A. STALPERS (2008): *Dictionary of the Fungi*. 10 ed. CABI Publishing, Surrey. 771 pp.
- KO, K.S & H.S. JUNG (2002): Phylogenetic evaluation of *Polyporus s.str.* based on molecular sequences. *Mycotaxon* **82**: 315-322.
- KRÜGER, D. & A. GARGAS (2004): The basidiomycete genus *Polyporus* – an emendation based on phylogeny and putative secondary structure of ribosomal RNA molecules. *Feddes Repertorium* **115**: 530-546.
- LISBOA, P.L.B. (2002): A Estação Científica Ferreira Penna/ECFPn (1993-2000). In: Lisboa PLB (org.). Caxiuana: populações tradicionais, meio físico e diversidade biológica. Museu Paraense Emilio Goeldi, Belém.
- LOUZA, G.S.G. & A.M. GUGLIOTTA (2007): *Polyporus* Fr. (*Polyporaceae*) no Parque Estadual das Fontes do Ipiranga, São Paulo, SP, Brasil. *Hoehnea* **34**(3): 365-382.
- MEIJER, A.A.R. (2006): Preliminary list of the macromycetes from the Brazilian state of Paraná. *Bol. Mus. Bot. Munic.* **68**: 1-55.
- NÚÑEZ, M & L. RYVARDEN (1995). *Polyporus* (*Basidiomycota*) and related genera. *Synopsis Fungorum*, Oslo.
- NÚÑEZ, M. & L. RYVARDEN (2001): East Asian Polypores. *Synopsis Fungorum* **14**: 167-522.
- RYVARDEN, L. (1991): Genera of Polypores – Nomenclature and taxonomy. *Synopsis Fungorum* **5**: 1-363.
- SOTOME, K, T. HATTORI, W. OTA, TO-ANUN W., SALLEH C. & KAKISHIMA M. (2008): Phylogenetic relationships of *Polyporus* and morphologically allied genera. *Mycologia* **100**(4): 603-615.
- SILVEIRA, R.M.B. & J.E. WRIGHT (2002): *Polyporus s. str.* In southern South America: mating tests. *Mycological Research* **106**: 1323-1330.
- SILVEIRA, R.M.B. & J.E. WRIGHT (2005): The taxonomy of *Echinochaete* and *Polyporus s. str.* in southern South America. *Mycotaxon* **93**: 1-59.
- VIÉGAS, A.P. (1942): Notas sobre *Polyporus sapurema* Moeller. *Rodriguésia* **6**: 57-60.

## NOTES ON *TRAMETES* FROM THE BRAZILIAN AMAZONIA

**Abstract** — *Trametes supermodesta* is reported as new to Brazil and the collection represents the second from South America. *Trametes ochroflava* and *T. pavonia* represent first records for the Brazilian Amazonia. A description of *T. supermodesta* and a key to the accepted species of *Trametes* reported for the Brazilian Amazonia are provided.

**Key words** — *Polyporaceae*, diversity

### Introduction

*Trametes* is a cosmopolitan genus proposed by Fries and comprises about 48–50 species so far (www.indexfungorum.org; Kirk et al. 2008). The species of *Trametes* cause white rot of dead hardwood and (rarely) conifers. The genus is characterized by its sessile to effused–reflexed, light-colored basidiomata, poroid hymenial surface with round, angular to irregular pores, trimitic hyphal system, presence or absence of cystidia, and ellipsoid to allantoid, hyaline, smooth basidiospores that do not react in Melzer’s reagent (Ryvarden & Gilbertson 1993).

Despite the high biodiversity of the Brazilian Amazonia, the knowledge about *Trametes* is still scarce, with only nine species reported: *T. cotonea*, *T. cubensis*, *T. lactinea*, *T. marianna* (Pers.) Ryvarden 1973, *T. maxima*, *T. membranacea*, *T. modesta*, *T. pubescens* (Schumach.) Pilát 1939, and *T. villosa* (Gomes-Silva & Gibertoni 2009). *Trametes supermodesta* was first described from Venezuela (Ryvarden & Iturriaga 2003), and we provide a description of the species based on collections from the Brazilian Amazonia, a key of the species of the genus in the area, and comments on the species recently collected or deposited in INPA.

### Material and methods

The Amazonia covers an area of 4,196,943 km<sup>2</sup> out of which approximately 50% belongs to Brazil (Capobianco et al. 2001), in the states of Acre, Amapá, Amazonas, Pará, Roraima, Rondônia, half of Mato Grosso (54%), and part of Maranhão (34%) and Tocantins (9%) (IBGE 2003). Field trips were undertaken four times from 2007 to 2008 in the state of Rondônia and four times from 2006 to 2008 in the state of Pará. In Rondônia, the study areas were located in Estação Ecológica de Cuniã (08°04’S 63°31’W) of the city of Porto Velho, the state capital and Parque Natural Municipal de Porto Velho (08°45’S 63°54’W). Both areas are covered mostly by open ombrophilous forest and transition forest with savanna. In Pará, the Estação Científica Ferreira Penna (1°44’S 51°27’W) includes typical Amazonian ecosystems and its flora is one of the richer in the Amazonian basin

(Lisboa 2002). Additionally, three areas in Rondônia were also visited at irregular intervals, and specimens deposited in INPA were also studied.

The basidiomata were analyzed macro- (shape, color, hymenial surface) and micromorphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Color designations follow Watling (1969). The specimens are deposited in the HFSL and in URM.

### Results

Thirteen species of *Trametes* are reported for the Brazilian Amazonia. *Trametes supermodesta*, previously was only from its type locality, is reported for the second time. Although recently described, several earlier collections had already been deposited in INPA. *Trametes ochroflava* and *T. pavonia* are new records for the Brazilian Amazonia and, together with another seven species that are new records for individual Brazilian States in Amazonia, were studied only from collections deposited in INPA, underscoring the importance of herbaria revisions and accessibility of herbaria records.

### Taxonomy

*Trametes supermodesta* Ryvarden & Iturr., Mycologia 95(6): 1074 (2003).

Basidiomata annual, pileate, semicircular to flabelliform with a contracted base, solitary or gregarious, up to 3.5–5 cm wide and 2.3–3.5 cm high, 0.2 mm thick, slightly flexible. Abhymenial surface glabrous, dull, concentrically zonate, slightly sulcate, cinnamon (10) to buff (52). Margin entire, acute, concolorous with the abhymenial surface. Context homogeneous, fibrous, thin, up to 0.1 mm thick, cinnamon (10) to buff (52), red in KOH. Tubes more or less concolorous with the pore surface, thin, up to 0.1 mm thick. Hymenial surface with angular pores next to the margin and irregular to slightly decurrent in the rest of the hymenial surface, 2–3 per mm, fawn (29) to clay pink (30). Hyphal system trimitic; generative hyphae hyaline to yellow, clamped, thin-walled, 2–3.5  $\mu\text{m}$ ; skeletal hyphae yellow, thick-walled, 3–5  $\mu\text{m}$ ; binding hypha hyaline to yellow, thick-walled to solid, 2–3.5  $\mu\text{m}$ . Cystidia absent. Basidia not observed. Basidiospores cylindrical, hyaline, thin-walled, smooth, inamyloid, 8–9  $\times$  2.8–3.5  $\mu\text{m}$ .

SUBSTRATE — on deciduous wood.

MATERIAL EXAMINED: BRAZIL. Amazonas: loc. n. det., 10.VII.1971, G.T. Prance et al. 14035-14074 (INPA 32250, INPA 32289); 24.VII.1971, G.T. Prance et al. 14545 (INPA 32761); 16.IX.1980, B. Lowy et al. 185-196 (INPA 100113, INPA 100083); Presidente Figueiredo, 27.II.1985, C. Dick 678 (INPA 185927); Manaus, 17.II.1990, M.A. de Jesus 1454 (INPA 192699,

as *T. modesta*); 17.VII.1990, M.A. de Jesus 1449 (INPA 192695, as *T. modesta*); Pará: Oriximinã, 27.VI.1980, V.L.R. Bononi 618 (INPA 103601); 28.VI.1980, V.L.R. Bononi 658 (INPA 103622); 30.VI.1980, V.L.R. Bononi 816 (INPA 103723); Rondônia: loc. n. det., 4.VII.1968, K.P. Dumont et al. 63-65 (INPA 65103, INPA 65105, as *T. scabrosa*); 6.VII.1968, K.P. Dumont et al. 98 (INPA 65136, as *T. scabrosa*); 23.V.1984, R.D. Goos et al. 1631 (INPA 125136); 1.VI.1984, R.D. Goos et al. 1719 (INPA 125221); Porto Velho, Parque Natural Municipal de Porto Velho, VII.2007, A.C. Gomes-Silva 06-60 (URM 79570, URM 79579); Estação Ecológica de Cuniã, II.2007, A.C. Gomes-Silva 236 (URM 79578); Roraima: Alto Alegre, 10.VI.1986, K.F. Rodrigues et al. 885-895 (INPA 143282, INPA143289); 10.VI.1986, E.S.S. da Silva 410 (INPA 154906, INPA 154940); loc. n. det., 18.VI.1986, B. Lowy et al. 2069 (INPA 145354, as *Daedalea* sp.).

REMARKS: *Trametes supermodesta*, first described from Venezuela by Ryvarden & Iturriaga (2003), is recognized by its large pores and long basidiospores. *Trametes supermodesta* may be mistaken for *T. modesta* due to its similar basidiomata color, but the pores are larger (2–3 per mm) in *T. supermodesta* than in *T. modesta* (6–10 per mm). The Brazilian specimens of *T. supermodesta* differ macroscopically from the original description by the smaller pores (2–3 per mm vs. 3–4 per mm in the original) and thinner basidiomata.

#### Key to the species of *Trametes* recorded from the Brazilian Amazonia

- 1a. Context with black lines.....2
- 1b. Context without black lines.....4
- 2a. Pores daedaloid, 2–3 per mm, basidiospores 4.5–5.5  $\mu\text{m}$  long.....*T. maxima*
- 2b. Pores regular or lacerate, 1–5 per mm, basidiospores 5–8.5  $\mu\text{m}$  long.....3
- 3a. Pores dentate to lacerate, 1–3 per mm, basidiospores cylindrical to allantoid 5.5–8.5  $\times$  2.5–3.5  $\mu\text{m}$ .....*T. villosa*
- 3b. Pores angular to circular, 4–5 per mm, basidiospores cylindrical 5–6  $\times$  1.5  $\mu\text{m}$ .....*T. versicolor*
- 4a. Abhymenial surface with reddish cuticle from the base.....*T. cubensis*
- 4b. Abhymenial surface without reddish cuticle from the base.....5
- 5a. Abhymenial surface azonate or slightly zoned.....6
- 5b. Abhymenial surface strongly zoned.....9
- 6a. Abhymenial surface tomentose to finely pubescent, context not reacting in KOH.....*T. pubescens*
- 6b. Abhymenial surface velutine to glabrous, context reacting in KOH.....7
- 7a. Basidiomata white to cream, context dark brown in KOH, basidiospores cylindrical-ellipsoid 4–7.5  $\times$  2–3  $\mu\text{m}$ .....*T. lactinea*
- 7b. Basidiomata pale pinkish brown, context red in KOH, basidiospores cylindrical.....8
- 8a. Pores 6–10 per mm, basidiospores 4–6  $\times$  1.5–2  $\mu\text{m}$ .....*T. modesta*

- 8b. Pores 2–3 per mm, basidiospores  $8-9 \times 2.8-3.5 \mu\text{m}$ .....*T. supermodesta*
- 9a. Basidiomata sessile to effused-reflexed, basidiospores cylindrical.....10
- 9b. Basidiomata sessile, basidiospores cylindrical-ellipsoid to ellipsoid.....12
- 10a. Basidiomata ochraceous to brown, abhymenial surface smooth to tuberculate, glabrous, context homogeneous, basidiospores  $4 \mu\text{m}$  long.....*T. ochroflava*
- 10b. Basidiomata whitish to cream, abhymenial surface finely velutine to tomentose, context cottony or fibrous, basidiospores up to  $3.5 \mu\text{m}$  long.....11
- 11a. Context cottony, pores 3–5 per mm, dissepiments entire, basidiospores  $7-11 \times 2.5-3.5 \mu\text{m}$ .....*T. cotonea*
- 11b. Context fibrous, pores 5–6 per mm, dissepiments lacerate to dentate, basidiospores  $4.5-6 \times 2-2.5 \mu\text{m}$ .....*T. membranacea*
- 12a. Abhymenial surface glabrous, pores round, basidiospores cylindrical-ellipsoid,  $6-7 \times 2-2.5 (-3) \mu\text{m}$ .....*T. marianna*
- 12a. Abhymenial surface tomentose, pores angular, basidiospores ellipsoid,  $5-6 \times 3-4 \mu\text{m}$ .....*T. pavonia*

***Trametes cotonea*** (Pat. & Har.) Ryvarden, Norw. JI Bot. 19: 236 (1972).

≡ *Polyporus cotoneus* Pat. & Har., Bull. Soc. mycol. Fr. 9: 208 (1893).

MATERIAL EXAMINED: BRAZIL. Amazonas: Presidente Figueiredo, 3.IV.1984, M.A. de Jesus 390 (INPA 185336, as *T. nivosa*); Rondônia: loc. n. det., 27.X.1979, R. H. Petersen 273 (INPA 110762, as *Polyporus* sp.); Roraima: Caracará, 16.XI.1977, I. de J. Araújo et al. 437-506 (INPA 76964, INPA 77217); loc. n. det., 30.XI.1977, I. de J. Araújo et al. 733 (INPA 78452, as *T. membranacea*).

DESCRIPTION – Ryvarden & Johansen (1980).

DISTRIBUTION – Pantropical (Ryvarden & Johansen 1980, Ryvarden 2000). In Brazil, reported for the states of Acre, Pará (Gomes-Silva & Gibertoni 2009), and now for the states of Amazonas, Rondônia and Roraima.

NOTES – This species can be recognized in the field by the flexible, cream basidiomata. Macroscopically it is similar to *T. membranacea* but differs by shorter basidiospores.

***Trametes cubensis*** (Mont.) Sacc., Syll. Fung. 9: 198 (1891).

≡ *Polyporus cubensis* Mont., Annls Sci. Nat., Bot., sér. 2, 8: 364 (1837).

MATERIAL EXAMINED: BRAZIL. Acre: loc. n. det., 10.X.1980, B. Lowy et al. 585 (INPA 100437, as *Polyporus* sp.); 26.X.1980, B. Lowy et al. 988 (INPA 100762, as *Polyporus* sp.); Amazonas: loc. n. det., 6.XI.1977, E.M.L. Freire 158 (INPA 70059); 22.V.1978, R. Singer & I.J. Araújo 11033

(INPA 76881, as *Microporellus* sp.); 1.VIII.1979, A.C. Webber 62 (INPA 84271, as *Fomitopsis* sp.); 16.IX.1980, B. Lowy et al. 170 (INPA 100084, as *Polyporus* sp.); Presidente Figueiredo, 21.IX.1983, M.A. de Jesus 31-32 (INPA 183649, INPA 183650); Fonte Boa, 1.XI.1986, E.S.S. da Silva et al. 923 (INPA 155037); Pará: Itaituba, 29.IX.1977, M. A. Sousa 8-38 (INPA 84083, INPA 84082, as “*Fomitopsis cubensis*”); Rondônia: loc. n. det., 29.VI.1968, K.P. Dumont et al. 12 (INPA 64827, as *T. scabrosa*); Porto Velho, Parque Natural Municipal de Porto Velho, VII.2007, A.C. Gomes-Silva 276 (URM 79554); Roraima: loc. n. det., 24.VII.1974, G.T. Prance et al. 21386-21366 (INPA 112093, as *Polyporus phlebeius*, INPA 45341); Boa Vista, 21.XI.1977, L. de L. J. Aguiar et al. 665 (INPA 78384).

DESCRIPTION – Gilbertson & Ryvardeen (1987).

DISTRIBUTION – Neotropical, and subtropical areas of the USA (Gilbertson & Ryvardeen 1987). In Brazil, reported for the states of Pará (Gomes-Silva & Gibertoni 2009), Bahia, Paraná, Pernambuco, Rio Grande do Sul, São Paulo and Santa Catarina (Baltazar & Gibertoni 2009). It is a new record for the states of Acre, Amazonas, Rondônia and Roraima.

NOTES – This species can be recognized in the field by the dimidiate basidiomata with a reddish cuticle from the base.

*Trametes lactinea* (Berk.) Sacc., Syll. Fung. 6: 343 (1888).

≡ *Polyporus lactineus* Berk., Ann. Mag. nat. Hist. 10: 373 (1842).

MATERIAL EXAMINED: BRAZIL. Acre: loc. n. det., 11.X.1980, B. Lowy et al. 644 (INPA 100484, as *Polyporus* sp.); Amazonas: Manaus, 1.II.1992, M.A. de Jesus 1523 (INPA 192732); 28.IV.1996, K. Vohland 1808 (INPA 216386, as *T. menziesii*); Pará: Melgaço, VIII.2007, T. B. Gibertoni (URM 79949, URM 79950); II.2008, T. B. Gibertoni (URM 79951); Rondônia: Porto Velho, Bairro Arigolândia, VII.2007, A.C. Gomes-Silva 41 (URM 79557); Estação Ecológica de Cuniã, VII.2008, A.C. Gomes-Silva 568-584 (URM 79555, URM 79556); Fazenda Mucuí, VII.2007, A.C. Gomes-Silva 106-156-261 (URM 79558, URM 79564, URM 79566); Parque Natural Municipal de Porto Velho, II.2007, A.C. Gomes-Silva 05-04-14 (URM 79561, URM 79562, URM 79569); VII.2007, A.C. Gomes-Silva 62-259 (URM 79563, URM 79565); II/2008, A.C. Gomes-Silva 461-462-450-455 (URM 79559, URM 79560, URM 79567, URM 79568).

DESCRIPTION – Núñez & Ryvardeen (2001).

DISTRIBUTION – Pantropical (Núñez & Ryvardeen 2001). In Brazil, recorded in the state of Pará (Gomes-Silva & Gibertoni 2009). It is a new record for the states of Acre, Amazonas and Rondônia.

NOTES – The glabrous abhymenial surface and variable brown color of the basidiomata are similar to those of *Lenzites elegans* (Spreng.) Pat., but this species is macroscopically different due to its thicker basidiomata and the lamellate to sinuous hymenial surface.

***Trametes maxima*** (Mont.) A. David & Rajchenb., Mycotaxon 22(2): 315 (1985).

≡ *Irpex maximus* Mont., Annls Sci. Nat., Bot., sér. 2, 8: 364 (1837).

MATERIAL EXAMINED: BRAZIL. Acre: loc. n. det., 24.IV.1971, G.T. Prance et al. 12411 (INPA 30734); Amazonas: loc. n. det., 4.IV.1978, R.B. Singer & I. de J. Araújo 10930 (INPA 76880, as *Irpex* sp.); Roraima: Caracarái, 16.XI.1977, I. de J. Araújo et al. 421 (INPA 76948, as *Coriolus maximus*).

DESCRIPTION – Gilbertson & Ryvardeen (1987).

DISTRIBUTION – Neotropical, also known in subtropical areas of the USA (Gilbertson & Ryvardeen 1987). In Brazil, recorded in the state of Amapá and Pará (Gomes-Silva & Gibertoni 2009). It is a new record for the states of Acre, Amazonas and Roraima.

NOTES – The hydroid hymenial surface and the context with black zone characterize this species.

***Trametes membranacea*** (Sw.) Kreisel, Monografias, Ciências, Univ. Habana, Ser. 4, 16: 83 (1971).

≡ *Boletus membranaceus* Sw., Fl. Ind. Occid. 3: 1922 (1806).

MATERIAL EXAMINED: BRAZIL. Amazonas: Manaus, 22.I.1978, I. de J. Araújo et al. 976 (INPA 78748, as *Coriolus* sp.); 22.VI.1985, M.A. de Jesus 726 (INPA 185959); 1.VI.1990, M.A. de Jesus 1392 (INPA 192659); Pará: Itaituba, 29.IX.1977, M.A. de Sousa & L.F. Coêlho 55 (INPA 74633, as *Coriolus pinsitus*).

DESCRIPTION – Gilbertson & Ryvardeen (1987).

DISTRIBUTION – Neotropical, also known in subtropical areas of the USA and Argentina (Gilbertson & Ryvardeen 1987). In Brazil, recorded in the state of Amapá, Pará (Gomes-Silva & Gibertoni 2009), Bahia, Minas Gerais, Paraíba, Paraná, Pernambuco, Rio Grande do Sul, Santa Catarina (Baltazar & Gibertoni 2009) and now found in Amazonas.

NOTES – This species is characterized by the papyraceous, flabelliform, cream to beige basidiomata. It is similar to *T. pavonia*, but differing by the cylindrical basidiospores.

***Trametes modesta*** (Kunze) Ryvardeen, Norw. JI Bot. 19: 236 (1972).

≡ *Polyporus modestus* Kunze, in Weigelt, Surinam Exsiccati (1828).

MATERIAL EXAMINED: BRAZIL. Acre: Rio Branco, 24.IX.1980, B. Lowy et al. 247 (INPA 100178, as *Polyporus* sp.); 7.X.1980, B. Lowy et al. 510-511 (INPA 100427, INPA 100478, as *Polyporus* sp.); 9.X.1980, B. Lowy et al. 554 (INPA 100407, as *Polyporus* sp.); 20.X.1980, B. Lowy et al. 819 (INPA 100669, as *Polyporus* sp.); 24.X.1980, B. Lowy et al. 906 (INPA 100777, as *Polyporus* sp.); 1.XI.1980, B. Lowy et al. 1018 (INPA 100842, as *Polyporus* sp.); loc. n. det., 27.IX.1980, B. Lowy et al. 309 (INPA 100279, as *Polyporus* sp.); 28.IX.1980, B. Lowy et al. 332 (INPA 100233); 4.XI.1980, B. Lowy et al. 1102-1094 (INPA 100866, INPA 100928, as *Polyporus* sp.); Amazonas: Aripuanã, 23.IV.1985, K.F. Rodrigues et al. 307 (INPA 128981, as *Polystictus* sp.); Barcelos, 14.II.1984, G.J. Samuels et al. 303 (INPA 129337); 17.II.1984, G.J. Samuels et al. 354 (INPA 129388); 19.II.1984, G.J. Samuels et al. 458 (INPA 129486); 28.II.1984, G.J. Samuels et al. 545 (INPA 129569); 29.II.1984, G.J. Samuels et al. 592 (INPA 129612); Itacoatiara, 14.XI.1966, G.T. Prance et al. 3175 (INPA 18727); 31.XII.1966, G.T. Prance et al. 3628 (INPA 19214); 23.VII.1968, K.P. Dumont et al. 147 (INPA 65183, as *Coriolus* sp.); Manaus, 13.V.1977, M.A. de Sousa 150 (INPA 74656, as *Corioloopsis byrsina*); 10.IX.1977, M.A. de Sousa & I. de J. Araújo 147 (INPA 74654, as *Corioloopsis byrsina*); 1.XI.1977, E.M. de L. Freire 1 (INPA 92688, as *Corioloopsis byrsina*); 28.VI.1978, R. B. Singer & I. de J. Araújo 11266 (INPA 82954, as *Polyporus modestus*); 1.VIII.1978, R. B. Singer & I. de J. Araújo 11342 (INPA 82956, as *Polyporus modestus*); 27.VI.1983, M.A. de Jesus 132 (INPA 183814); 29.VII.1983, M.A. de Jesus 125 (INPA 183808); 22.V.1985, M.A. de Jesus 735-746 (INPA 185965, INPA 185976); 6.X.1985, K.F. Rodrigues et al. 801 (INPA 137087); 22.VI.1989, R.E. Hanada 1006 (INPA 186282); 17.VII.1990, M.A. de Jesus 1448 (INPA 192694); 14.XII.1990, M.A. de Jesus 1433 (INPA 192686); 17.XII.1990, M.A. de Jesus 1455 (INPA 192700); 9.I.1992, R.E. Hanada 1522 (INPA 192731); 15.IX.1992, M.A. de Jesus 1533 (INPA 192739); 9.II.1993, M.A. de Jesus 1542 (INPA 192744); Manicoré, 14.IV.1985, K.F. Rodrigues et al. 126 (INPA 128926, as *Polystictus* sp.); Novo Aripuanã, 23.IV.1985, K.F. Rodrigues et al. 323 (INPA 128987); Presidente Figueiredo, 25.VI.1984, M.A. de Jesus 443 (INPA 185381); loc. n. det., 6.X.1966, G.T. Prance et al. 2602 (INPA 18770, as *Polyporus modestus*); 1.XI.1977, E. M. de L. Freire 145 (INPA 70048, as *Corioloopsis* sp.); 14.I.1978, I. de J. Araújo et al. 887 (INPA 78643, as *Polyporus* sp.); 21.I.1978, M. L. Farr et al. 176 (INPA 164405); 22.I.1978, M. L. Farr et al. 222 (INPA 164432); Pará: Itaituba, 29.IX.1977, M.A. de Sousa & L. F. Coêlho 19 (INPA 74690, as *Fomitopsis* sp.); 1.X.1977, M.A. de Sousa & L. F. Coêlho 82 (INPA 74528, as *Corioloopsis* sp.); 2.X.1977, M.A. de Sousa & L. F. Coêlho 105 (INPA 74534, as *Corioloopsis* sp.); 4.X.1977, M.A. de Sousa & L. F. Coêlho 19 (INPA 74627, as *Fomitopsis* sp.); Oriximinã, 17.VI.1980, V.L.R. Bononi 347 (INPA 103419, as *Polyporus* sp.); 19.VI.1980, V.L.R. Bononi 439 (INPA 103483); 29.VI.1980, V.L.R. Bononi 788 (INPA 103706); 1.VII.1980, V.L.R. Bononi 889 (INPA 103766, as *Coriolus* sp.); 2.VII.1980, V.L.R. Bononi 970 (INPA 103829, as *Coriolus* sp.);



Melgaço, VII.2006, T. B. Gibertoni (URM 79929, URM 79928, URM 79931, URM 79934, URM 79927, URM 79930, URM 79932, URM 79933, URM 79935); VII.2007, T. B. Gibertoni (URM 79937, URM 79944, URM 79941, URM 79943, URM 79940, URM 79942, URM 79938, URM 79945, URM 79948, URM 79939, URM 79936); II.2008, T. B. Gibertoni (URM 79947, URM 79946); Rondônia: loc. n. det., 3.VII.1968, K.P. Dumont et al. 56-61 (INPA 65097, INPA 65101); Porto Velho, Parque Natural Municipal de Porto Velho, II.2007, A.C. Gomes-Silva 172-241 (URM 79217, URM 79572); VII.2007, A.C. Gomes-Silva 06-52-53-173-191-233-237 (URM 79570, URM 79571, URM 79216, URM 79218, URM 79221, URM 79219, URM 79220); II.2008, A.C. Gomes-Silva 285-318 (URM 79024, URM 79025); VII.2008, A.C. Gomes-Silva 613-619 (URM 79576, URM 79577); Estação Ecológica de Cuniã, VII.2007, A.C. Gomes-Silva 233-237-242 (URM 79219, URM 79220, URM 79222); VII.2008, A.C. Gomes-Silva 566-567-578 (URM 79573, URM 79574, URM 79575); Roraima: Alto Alegre, 10.VI.1986, E.S.S. da Silva et al. 465-412 (INPA 154936, INPA 154908); 12.VI.1986, K.F. Rodrigues et al. 948 (INPA 143328); 19.VI.1986, K.F. Rodrigues et al. 1052 (INPA 143400); Boa Vista, 21.XI.1977, L. de L. J. Aguiar et al. 701 (INPA 78420); 19.VII.1989, M.A. de Jesus 886 (INPA 186191); Caracaraí, 16.XI.1977, I. de J. Araújo et al. 461 (INPA 76988); loc. n. det., 13.I.1969, G.T. Prance et al. 9275 (INPA 26410); 17.I.1969, G.T. Prance et al. 9320 (INPA 26456); 6.II.1969, G.T. Prance et al. 9643 (INPA 26779); 24.III.1971, G.T. Prance et al. 11197 (INPA 29598, as *Corioloopsis* sp.).

DESCRIPTION – Gilbertson & Ryvar den (1987).

DISTRIBUTION – Pantropical (Núñez & Ryvar den 2001). In Brazil, it was recorded in the states of Bahia, Pernambuco, São Paulo (Baltazar & Gibertoni 2009), Acre, Amazonas, Pará, Rondônia, Roraima (Gomes-Silva & Gibertoni 2009), and Mato Grosso (Gibertoni & Drechsler-Santos 2010).

NOTES – The species may be confused with *T. supermodesta*, but is distinguished by the smaller pores (6–10 per mm) and basidiospores ( $4-6 \times 1.5-2 \mu\text{m}$ ).

***Trametes ochroflava*** Cooke, Grevillea 9(no. 49): 12 (1880).

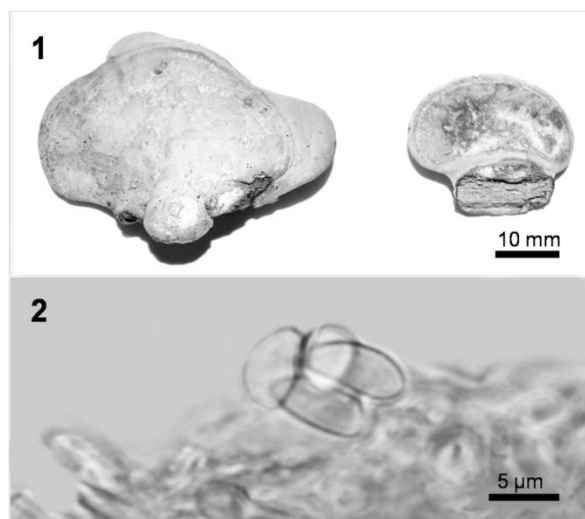
Figures 1–2

MATERIAL EXAMINED: BRAZIL. Acre: loc. n. det., 17.X.1980, B. Lowy et al. 750 (INPA 100602, as *Polyporus* sp.); 22.X.1980, B. Lowy et al. 850 (INPA 100679, as *Polyporus* sp.); Amazonas: Humaitá, 25.XI.1966, G.T. Prance & J.F. Ramos 3316 (INPA 18891); loc. n. det., 20.IX.1977, M.A. de Sousa 330 (INPA 74749); Rondônia: loc. n. det., 2.VI.1984, R.D. Goos et al. 1760 (INPA 125259, as *Polyporus* sp.); Roraima: loc. n. det., 17.XI.1977, I. de J. Araújo et al. 570 (INPA 77559, as *Daedalea* sp.); 18.VII.1986, B. Lowy et al. 2208 (INPA 145485, as *Ganoderma* sp.); Pará: Oriximinã, 28.VI.1980, V.L.R. Bononi 679 (INPA 103633).

DESCRIPTION – Ryvar den (1988).

DISTRIBUTION – Known from Brazil (Ryvarden 1988). In Brazil, reported from the states of Bahia, Rio de Janeiro and Rio Grande do Sul (Baltazar & Gibertoni 2009). It is a new record for the Brazilian Amazonia.

NOTES – This species (Fig 1) resembles poroid specimens of *Lenzites elegans*, which are whitish and thinner. The basidiospores were not found in the type and not previously known (Ryvarden 1988), but a few were seen in INPA 18891 (Fig 2) and are cylindrical, hyaline, thin-walled,  $8\text{--}10 \times 4 \mu\text{m}$ .



Figures 1–2. *Trametes ochroflava*. 1. Basidiomata. 2. Basidiospores.

*Trametes pavonia* (Hook.) Ryvarden, Norw. Jl Bot. 19: 236 (1972), nom. illegit., non (Berk.) Fr. 1851.

≡ *Boletus pavonius* Hook., Syn. Pl. 1: 10 (1822).

MATERIAL EXAMINED: BRAZIL. Amazonas: Barcelos, 11.VII.1985, E.S.S. da Silva et al. 283 (INPA 153723); Manaus, 13.V.1977, M.A. de Sousa & I. de J. Araújo 88-325 (INPA 74662, INPA 74718); 28.I.1997, M.A. de Jesus 1912 (INPA 216449); 2.V.1997, A. Luis 2270 (INPA 192823); loc. n. det., 26.VI.1971, G.T. Prance et al. 13735 (INPA 31951, as *Coriolopsis* sp.); Rondônia: loc. n. det., 8.XI.1979, R. H. Petersen 445 (INPA 110933, as *Polyporus* sp.); Roraima: Alto Alegre, 21.VI.1986, K.F. Rodrigues et al. 1090 (INPA 143431); loc. n. det., 18.VI.1986, B. Lowy et al. 2169 (INPA 145449, as *Polyporus* sp.).

DESCRIPTION – Gilbertson & Ryvarden (1987).

DISTRIBUTION – Tropical America to northern Argentina (Gilbertson & Ryvarden 1987). In Brazil, reported from the states of Alagoas, Pernambuco and Santa Catarina (Baltazar & Gibertoni 2009). It is a new record for the Brazilian Amazonia.

NOTES – This species is similar to *T. membranacea*, but the flexible, concentrically zonate basidiomata distinguish *T. pavonia*.

***Trametes versicolor*** (L.) Lloyd, Mycol. Writ. 6: 1045 (1921).

≡ *Boletus versicolor* L., Sp. pl. 2: 1176 (1753).

MATERIAL EXAMINED: BRAZIL. Amazonas: Novo Aripuanã, 27.IV.1985, K.F. Rodrigues 388 (INPA 129004, as *Daedalea* sp.); loc. n. det., 12.VIII.1977, M.A. de Sousa 244 (INPA 74642, as *Coriolus* sp.).

DESCRIPTION – Núñez & Ryvardeen (2001).

DISTRIBUTION – Cosmopolitan (Núñez & Ryvardeen 2001). In Brazil, in Pará (Gomes-Silva & Gibertoni 2009), Bahia, Paraná, Rio Grande do Sul, São Paulo, Santa Catarina (Baltazar & Gibertoni 2009) and now in Amazonas.

NOTES – This species is characterized by the thin, tomentose, zonate basidiomata, also extremely variable in color.

***Trametes villosa*** (Sw.) Kreisel, Monografias, Ciências, Univ. Habana, Ser. 4, 16: 83 (1971).

≡ *Boletus villosus* Sw., Fl. Ind. Occid. 3: 1923 (1806).

MATERIAL EXAMINED: BRAZIL. Amazonas: Manaus, 6.III.1997, M.A. de Jesus 2060 (INPA 192826, as *T. menziesii*); 2.V.1997, M.A. de Jesus 2269 (INPA 192827, as *T. menziesii*); 1.VII.1997, M.A. de Jesus 2346 (INPA 192818); 21.X.1997, M.A. de Jesus 2501 (INPA 192820); Roraima: Alto Alegre, 12.VI.1986, K.F. Rodrigues et. al. 938 (INPA 143318); 16.VI.1986, K.F. Rodrigues et. al. 996 (INPA 143363); 17.VI.1986, E.S.S. da Silva et al. 483 (INPA 154950); 18.VI.1986, K.F. Rodrigues et. al. 1037 (INPA 143391); 21.VI.1986, K.F. Rodrigues et. al. 1071 (INPA 143415); Boa Vista, 20.VII.1989, M.A. de Jesus 920 (INPA 186221); loc. n. det., 24.VII.1974, G.T. Prance et al. 21368 (INPA 45343, as *Coriolus pinsitus*); 16.VI.1986, B. Lowy et al. 1227 (INPA 144553, as *Coriolus* sp.).

DESCRIPTION – Gilbertson & Ryvardeen (1987).

DISTRIBUTION – Neotropical, also known from subtropical areas in the USA and Argentina (Gilbertson & Ryvardeen 1987). In Brazil, recorded in the states of Amapá, Pará, Roraima (Gomes-Silva & Gibertoni 2009), Bahia, Paraná, Rio de Janeiro, Rio Grande do Sul, São Paulo, Santa Catarina (Baltazar & Gibertoni 2009, Gibertoni & Drechsler-Santos 2010), and now in Amazonas.

NOTES– The thin basidiomata with large pores (2–3/mm) characterizes this species.

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### Literature cited

- Baltazar JM, Gibertoni TB. 2009. A checklist of the aphylophoroid fungi (*Basidiomycota*) recorded from the Brazilian Atlantic Forest. *Mycotaxon* 109: 439–422.
- Capobianco JPR, Veríssimo A, Moreira A, Sawyer D, Santos IP, Pinto LP. 2001. Biodiversidade na Amazônia brasileira: avaliação e ações prioritárias para a conservação, uso sustentável e repartição de benefícios. Estação Liberdade: Instituto Sócio ambiental, São Paulo.
- Gibertoni TB, Drechsler-Santos ER. 2010. Lignocellulolytic *Agaricomycetes* from the Brazilian Cerrado biome. *Mycotaxon* 111: 87–90.
- Gilbertson RL, Ryvarden L. 1987. North American Polypores, Vol. 2. *Fungiflora*, Oslo. 452 pp.
- Gomes-Silva AC, Gibertoni TB. 2009. Checklist of the aphylophoraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. *Mycotaxon* 108: 319–322.
- IBGE 2003. Mapa de Biomas. <<http://www.ibge.gov.br/home/presidencia/noticias/>>.
- Kirk PM, Cannon PF, Minter DW, Stalpers JA. 2008. *Dictionary of the Fungi*. 10 ed. CABI Publishing, Surrey. 771 p.
- Lisboa PLB. 2002. A Estação Científica Ferreira Penna/ECFPn (1993–2000). In: Lisboa PLB (org.). Caxiuana: populações tradicionais, meio físico e diversidade biológica. Museu Paraense Emilio Goeldi, Belém.
- Núñez, M., Ryvarden, L. 2001. East Asian Polypores. *Synopsis Fungorum* 14, *Fungiflora*, Oslo, Vol. 2: 352pp.
- Ryvarden L, Johansen I. 1980. A preliminary polypore flora of East Africa. Oslo, *Fungiflora*, 630pp.
- Ryvarden L. 1988. Type studies in the Polyporaceae 19. Species described by M.C. Cooke. *Mycotaxon* 31: 45–58.

Ryvarden L. 1991. Genera of Polypores – Nomenclature and taxonomy. *Synopsis Fungorum* 5: 1–363.

Ryvarden L. 2000. Studies in neotropical polypores 8. Poroid fungi from Jamaica – a preliminary checklist. *Mycotaxon* 76: 349–360.

Ryvarden L, Iturriaga T. 2003. Studies in neotropical polypores 10. New polypores from Venezuela. *Mycologia*, 95(6): 1066–1077.

Ryvarden L, Gilbertson RL. 1993. *European Polypores*, Vol. 2. *Fungiflora*, Oslo. pp. 394–743.

Watling R. 1969. *Colour Identification Chart*. Her Majesty's Stationary Office, Edinburgh (Scotland).

## THE GENUS *TRICHAPTUM* (AGARICOMYCETES, BASIDIOMYCOTA) IN BRAZIL

**Abstract:** The genus *Trichaptum* is re-evaluated from Brazil and 10 species are accepted. *Trichaptum durum*, *T. fumosoavellaneum* and *T. griseofuscens* are reported as new for Brazil, while *T. perrottetii* is a new record to the Brazilian Semi-Arid and Cerrado, and to mangrove areas of north and northeast Brazil. Descriptions and line drawings of the new recorded species from Brazil and a revised key to the neotropical species of *Trichaptum* are provided.

**Key words:** diversity, neotropics, *Polyporaceae* s.l., polypore, taxonomy.

### Introduction

*Trichaptum* Murrill is a quite well delimited genus that includes species with annual to perennial basidiomata, hispid to adpressed tomentose abhymenial surface, variable hymenophore (irpicoid, lamellate or poroid), with brownish to purplish hymenial surface, duplex context, mainly dimitic hyphal system with clamped generative hyphae, predominately cylindrical basidiospores, and presence of cystidia (Ryvarden & Johansen 1980, Gilbertson & Ryvarden 1987, Ryvarden 1991, Ryvarden & Gilbertson 1994, Núñez & Ryvarden 2001).

Currently, 20 species of *Trichaptum* are accepted (but compare *T. sprucei*). Of the 10 species reported to the neotropics ([www.indexfungorum.org](http://www.indexfungorum.org), [www.cbs.knaw.nl](http://www.cbs.knaw.nl)), only four species have been listed for Brazil until now (Baltazar & Gibertoni 2009, Drechsler-Santos et al. 2009, Gomes-Silva & Gibertoni 2009, Gibertoni & Drechsler-Santos 2010).

Descriptions and drawings of the *Trichaptum* species recently proven to occur in Brazil and an emended key to the neotropical species are presented below.

### Material and methods

Specimens were collected in several areas in the Brazilian States of Pará and Rondônia (Amazonia), Maranhão, and Pernambuco (Atlantic Rain Forest, Caatinga, and mangroves). Besides, collections deposited in herbaria O, URM, ALCB, HUEFS, INPA (Thiers, continuously updated) were also analysed. The study of basidiomata was based on macro- (shape, colour, hymenophore type) and microscopic characters (hyphal system, presence/absence and measures of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Colour designation followed Watling (1969).

The recently collected specimens were deposited in HFSL, URM, MG, and O.

### Taxonomy

**Trichaptum biforme** (Fr.) Ryvarden, *Norweg. J. Bot.* 19(3-4): 237 (1972).

≡ *Polyporus biformis* Fr., in *Klotzsch, Linnaea* 8: 486 (1833).

DESCRIPTION: Ryvarden & Johansen (1980), Gilbertson & Ryvarden (1987), Ryvarden & Gilbertson (1994), Núñez & Ryvarden (2001).

MATERIAL EXAMINED: BRAZIL. ALAGOAS: Barra de São Miguel, RPPN Rosa do Sol, T.B.Gibertoni, X/2000 (URM78593, as *T. sector*). AMAZONAS: Manaus, loc. n. det., M.A.Jesus 710, IV/1985 (INPA 185948). BAHIA: Itaberaba, Serra do Orobó (12°19'07"S–40°29'26"W), P.Oinonen, L.Paganucci & D.Cardoso 60120004, 20/I/2006 (HUEFS108336, as *Trametes* sp.). BAHIA: Santo Amaro, A.C.Batista s.n., 5/XII/1957 (URM 9731, as *Polystictus pallido-mollis*). BAHIA: Santa Terezinha, Serra da Jibóia (12°51'S, 39°28'W), J.L.A.Dias 24, 16/II/2002 [HUEFS61555, as *Gloeophyllum trabeum* (Pers.) Murrill]. MARANHÃO: Alcântara, L.A.N.N. Agra 002, 04/X/2009, on *Rhizophora mangle* (URM 82065). MATO GROSSO: Aripuanã, M.A.Sousa 449, IV/1978 (INPA 75614, as *Hexagonia* sp.). PARÁ: Maracanã, mangrove of the Ilha de Algodual-Maiandeuá, E.L.Campos & A.Luz, VII/1998 [URM 76988, as *T. abietinum* (Dicks.) Ryvarden]. PARÁ: Maracanã, mangrove of the Ilha de Algodual-Maiandeuá, E.L.Campos & H.Sotão, V/1999 [URM 76989, as *T. abietinum* (Dicks.) Ryvarden]. PARAIBA: Santa Rita, RPPN Engenho Gargaú, T.B.Gibertoni, on dead *Tapirira guianensis*, I/2002 (URM78583, as *T. sector*), V/2002 (URM78582, as *T. sector*); Sapé, RPPN Fazenda Pacatuba, T.B.Gibertoni, III/2001 (URM78592, as *T. sector*). PERNAMBUCO: Cabo, Mata de Gurjaú, T.B.Gibertoni, III/2001 (URM78586, as *T. sector*). PERNAMBUCO: Serra Talhada, Estação Experimental do IPA (7°53'20"S–38°18'24"W, 486 m), Drechsler-Santos DS057PE, 11/III/2008, on dead angiosperm (URM80527). PERNAMBUCO: Serra Talhada, Estação Experimental do IPA (7°53'48"S–38°18'11"W, 500 m), Drechsler-Santos DS141PE, 5/III/2009, on dead angiosperm (URM80745). PERNAMBUCO: Serra Talhada, Estação Experimental do IPA (7°53'50"S–38°18'12"W, 495 m), Drechsler-Santos DS148PE, 5/III/2009, on dead wood in the soil (URM80762). PERNAMBUCO: Buíque, Parque Nacional do Catimbau, Serra das Torres (8°34'04"S, 37°14'23"W, 770 m), Drechsler-Santos DS275, 31/X/2007, on burned log (URM80841). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S. Nogueira-Melo NM003, 19/III/2009, on *Avicennia schaueriana* (URM 81091). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM006, 21/V/2009, on dead wood (URM 81092). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM018, 26/VI/2009, on dead wood (URM 81093). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz,

G.S.Nogueira-Melo NM021, 26/VI/2009, on dead wood (URM 81094). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM012, 26/VI/2009, on dead wood (URM 81094). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM001, 26/VI/2009, on dead wood (URM 81095). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM001, 26/VI/2009, on *Avicennia schaueriana* (URM 81096). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo 024, 26/VI/2009, on dead wood (URM 81097). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM023, 26/VI/2009, on dead wood (URM 81098). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo 001, 26/VII/2009, on dead wood (URM 81099). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM014-007, 22/VIII/2009, on *Avicennia schaueriana* (URM 81100, URM 81102). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM003, 22/VIII/2009, on dead wood (URM 81101). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM001-006-004-005-003-009-010, 19/IX/2009, on *Avicennia schaueriana* (URM 81103, URM 81104, URM 81106, URM 81107, URM 81108, URM 81109, URM 81110). PERNAMBUCO: Itamaracá, mangrove of the Canal de Santa Cruz, G.S.Nogueira-Melo NM005, 19/IX/2009, on on dead wood (URM 81105). PERNAMBUCO: Paulista, mangrove of Maria Farinha, G.S.Nogueira-Melo NM010, 28/VI/2009, on dead wood (URM 81111). PERNAMBUCO: Paulista, mangrove of Maria Farinha, G.S.Nogueira-Melo NM005, 21/VIII/2009, on *Rhizophora mangle* (URM 81112). PERNAMBUCO: Tamandaré, mangrove of Praia dos Carneiros, G.S.Nogueira-Melo NM001, 25/IV/2009, on *Avicennia schaueriana* (URM 81113, URM 8114). PERNAMBUCO: Tamandaré, mangrove of Praia dos Carneiros, G.S.Nogueira-Melo NM008, 25/VII/2009, on *Laguncularia* sp. (URM 81115). PERNAMBUCO: Tamandaré, mangrove of Praia dos Carneiros, G.S.Nogueira-Melo NM005, 23/VIII/2009, on *Laguncularia* sp. (URM 81116). PERNAMBUCO: Tamandaré, mangrove of Praia dos Carneiros, G.S.Nogueira-Melo NM002, 18/IX/2009, on *Laguncularia* sp. (URM 8117). PERNAMBUCO: Tamandaré, mangrove of Praia dos Carneiros, G.S.Nogueira-Melo NM001, 19/IX/2009, on *Avicennia schaueriana* (URM 81118). PERNAMBUCO: Recife, col. n. det., 1939 (URM 679, as *Polystictus friesii* Klotzsch). PERNAMBUCO: Vitória, Reitz & Klein s. n., 1927 (URM 378, as *Polystictus friesii* Klotzsch). RIO GRANDE DO SUL: São Leopoldo, col. n. det., X/1957 [URM 8715, as *Polystictus flabelliformis* (Klotzsch) Sacc.].

DISTRIBUTION: Cosmopolitan (Ryvarden & Johansen, 1980). In Brazil, reported for the States of Amazonas, Alagoas, Bahia, Pará, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina and São Paulo (Baltazar et al. 2009, Baltazar & Gibertoni 2009, Drechsler-Santos et al. 2009, Gomes-Silva & Gibertoni 2009, Trierweiler-Pereira et al. 2009,



Gibertoni & Drechsler-Santos 2010). It is a new record for the State of Maranhão and from the northern and northeastern Brazilian mangroves.

REMARKS: The soft resupinate basidiomata or pileate basidiomata growing in imbricate clusters habitat and the slightly violet hymenial surface when fresh render this species in the field. *Trichaptum biforme* is similar to *T. sector*, but the latter presents dark greyish to almost black pore surface and entire pores.

**Trichaptum byssogenum** (Jungh.) Ryvar den, Norweg. J. Bot. 19(3–4): 237 (1972).

≡ *Polyporus byssogenus* Jungh., Praemissa in floram cryptogamicam Javae insulae (Batavia): 43 (1838).

DESCRIPTION in Ryvar den & Johansen (1980).

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B.Lowy et al. 505, X/1980 (INPA 100471, as *Lenzites* sp.). AMAZONAS: Manaus, Usina Hidrelétrica de Balbina, M.A.Jesus, V/1983 (INPA 192837); loc. n. det., B.Lowy et al., IX/1980 (INPA 100097). AMAZONAS: Presidente Figueiredo, M.A.Jesus 14, VIII/1983 (INPA 183632, as *Corioloopsis occidentalis* (Klotzsch) Murrill). AMAZONAS: loc. n. det., Goos, R.D. et al. 1527, 13/V/1984 (INPA 125039). AMAZONAS: Manaus, Campus do INPA, Carvalho, R. 1352, 18/XII/1989 (INPA 192627, as *T. biforme* (Fr.) Ryvar den). AMAZONAS: loc. n. det. Prance, G.T. et al. 11562, 23/III/1971 (INPA 29873). AMAZONAS: Presidente Fegueiredo, M.A.Jesus 426-528, 25/VI/1984 (INPA 185364, INPA185828, as *T. biforme*). Manaus, Carvalho, R. 1374, 28/III/1990 (INPA 192643, as *T. biforme*). AMAZONAS: Manaus: Distrito Agropecuário ZF3, M.A. Jesus 1398-1399, 21/I/1990 (INPA 192662, INPA 192663, as *T. biforme*). AMAZONAS: Manaus: Campus do INPA, F. Cardias 821, 22/VI/1987 (INPA 185341, as *Schizophyllum commune* Fr.). AMAZONAS: Manaus: loc. n. det., P.J.M.Maas & H.Maas 444, IX/1971 (INPA 34994, as *Pogonomyces* sp.). PARÁ: Maracanã, mangrove of the Ilha de Algodual-Maiandeua, E.L.Campos & H.Sotão, V/1999 (URM 77003, URM 77004). PARÁ: Maracanã, mangrove of the Ilha de Algodual-Maiandeua, E.L.Campos & A.Luz, VII/1998 (URM 76991, URM 76992, URM 76996, URM 76998,). PARÁ: Aracá, I. J.Araújo et al. 1273, IV/1979 (INPA 102884, as *Hexagonia* sp.). PARÁ: Oriximã, Bononi, V.L.R. 61, 3/VI/1980 (INPA 103216). PERNAMBUCO: Camaragibe, Aldeia, T.B.Gibertoni 216, V/2002, on dead angiosperm (O18304). RORAIMA: Porto Alegre, Rodrigues, K.F. et al. 919, 11/VI/1986 (INPA 143304). SÃO PAULO: area of Campinas-Moji-Guaçú, Fazenda Campinha, D.Pegler, K.Hjortstam & L.Ryvar den 24417, 29-30/I/1987 (SP213215, O12789).

DISTRIBUTION: Pantropical (Ryvar den & Johansen, 1980). In Brazil, reported for the States of Bahia, Pará, Paraná, Pernambuco, Rio Grande do Sul, Rondônia, Roraima, Santa Catarina, and São

Paulo (Baltazar et al. 2009, Gomes-Silva & Gibertoni 2009, Baltazar & Gibertoni 2009). It is a new record for the States of Acre and Amazonas.

REMARKS: The species is characterized by the tomentose to hispid or strigose pileus, large pores (1–2 per mm) and fusoid, apically incrusted cystidia. This specie is related to *T. strigosum* but separated by the smaller pores (2–4 per mm), basidiospores ( $4.5\text{--}6 \times 2.5\text{--}3 \mu\text{m}$ ,  $5.5\text{--}9 \times 3.5\text{--}4 \mu\text{m}$  in *T. byssogenum*) and cystidia ( $10\text{--}14 \times 2\text{--}5 \mu\text{m}$ ,  $12\text{--}21 \times 4\text{--}6 \mu\text{m}$  in *T. byssogenum*), and thicker, fibrous context (up to 25 mm).

**Trichaptum durum** (Jungh.) Corner, Beih. Nova Hedwigia 86: 219 (1987).

Fig. 1

≡ *Polyporus durus* Jungh., Praemissa in floram cryptogamicam Javae insulae (Batavia): 62 (1838).

Basidiomata effused-reflexed, broadly attached, solitary to imbricate, usually laterally fused, woody hard and firm; pileus applanate,  $3.5 \times 1$  cm and 0.5 cm thick; abhymenial surface glabrous, smooth to concentrically scrupose, azonate, drab (33); margin thin to slightly thick; hymenophore poroid, pore surface sepia (26) to hazel (27), pores round to slightly angular, 8–10 per mm, dissepiments entire, slightly thick; tubes two-layered, up to 3 mm deep, concolorous with the pore surface; context up to 3 mm, milky coffee (28), with darker zones. Hyphal system dimitic, generative hyphae with clamps, hyaline to pale yellow, thin to slightly thick-walled,  $(1.5\text{--})2\text{--}4 \mu\text{m}$ ; skeletal hyphae pale yellow, thick-walled to almost solid,  $2\text{--}4.5 \mu\text{m}$ . Cystidia common, ventricose, thin-walled, finely incrusted at the apex but incrustations usually dissolving,  $7\text{--}13 \times 5\text{--}6 \mu\text{m}$ . Basidia clavate,  $7.5\text{--}10 \times 4.5\text{--}5 \mu\text{m}$ . Basidiospores broadly ellipsoid, hyaline, thin-walled and smooth,  $(3)3.5\text{--}5 \times 2\text{--}2.5\text{--}(3) \mu\text{m}$ , IKI.

MATERIAL EXAMINED: BRAZIL. PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007, on dead angiosperm (URM 79953). INDONESIA. JAVA: loc. n. det., Junghuhn 45, date n. det., on trunk (L 53182, holotype).

DISTRIBUTION: Paleotropical [Ryvarden & Johansen (1980, as *Nigroporus durus* (Jungh.) Murrill, Núñez & Ryvarden 2001], but found already in Venezuela by Ryvarden & Iturriaga (2001). It is the first record from Brazil.

REMARKS: The species is characterized by the usually scrupose and tomentose pileus, besides the pores almost invisible to naked eyes. The cystidia are often difficult to observe because they collapse easily. The apparent lack of cystidia, the hyphal structure and the general colour of the basidiomata lead some authors to place this species in *Nigroporus* Murrill (Murrill 1907; Ryvarden & Johansen 1980). *Trichaptum durum* is very similar to *Nigroporus* species indeed, however the presence of cystidia is a strong enough character to place this species in *Trichaptum* (Corner 1987).

This species is related to *T. fumosoavellaneum*, which has larger basidiomata and pores (3–4 per mm).

***Trichaptum fumosoavellaneum*** (Romell) Rajchenb. & Bianchin, *Nordic J. Bot.* 11(2): 225 (1991)

Fig. 2

≡ *Trametes fumosoavellanea* Romell, *K. svenska Vetensk-Akad. Handl.*, III 26: 37 (1901).

Basidiomata annual to perennial, sessile to effused-reflexed, solitary to imbricate, woody, hard and firm; pileus dimidiate, up to 3–5.7 × 2.5–4.5 cm and 0.2–0.4 mm thick; abhymenial surface dull, finely velutine, slightly zonate and sulcate, scrupose, snuff brown (17) to clay buff (32) when dry; margin entire, acute, velutine, concolorous with abhymenial surface; hymenophore poroid, pores round, dissepiments thin and entire, 2–3 per mm, decurrents next to the basidiomata base, clay buff (32), milk coffee (28) to cigar brown (16) when dry; tubes thin, up to 0.1–0.2 mm deep, concolorous with the pore surface; context homogeneous, thin, up to 0.1–0.2 mm thick, fibrous, cigar brown (17). Hyphal system trimitic; generative hyphae with clamps, hyaline to pale brown, thin-walled, 2–3 µm diam.; skeletal hyphae yellow, thick-walled to almost solid, 2.5–4 µm diam; binding hyphae yellow, thick-walled, 2–3 µm diam. Cystidia clavate, thin- to thick-walled, 12–15 × 4–5 µm. Basidia clavate, 12–14 × 4.5–5 µm. Basidiospores ellipsoid, hyaline, smooth, 4–5 × 2–2.5 µm.

MATERIAL EXAMINED: BRAZIL. PARÁ: Maracanã, mangrove of the Ilha de Algodoal-Maiandeuá, E.L.Campos & H.Sotão, V/1999 (URM 77001, URM 77002, URM 77005, as *T. byssogenum*). PARÁ: Maracanã, mangrove of the Ilha de Algodoal-Maiandeuá, E.L.Campos & A.Luz, VII/1998 (URM 76990, URM 76993, URM 76994, URM 76995, URM 76997, URM 76999, URM 77000, as *T. byssogenum*). RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 184, VII/2007 (URM 79026). RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 301, II/2008 (URM 79027). RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 596 (URM 80717). SÃO PAULO: area of Santos-Ubatuba, Ilha Anchieta, D.Pegler, K.Hjortstam & L.Ryvarden 24250, I/1987 (SP213048, O12844).

DISTRIBUTION: It was recorded from Argentina, Colombia, Nicaragua and Paraguay (Rajchenberg & Bianchinotti 1991), and now proven to occur in Brazil.

REMARKS: This species is characterized by the usually large and hard basidiomata, scrupose abhymenial surface and large pores (2–3 per mm). It is related to *T. durum*, which has smaller pores [(6–)7–9(–10) per mm] and ventricose cystidia.

**Trichaptum griseofuscens** Ryvar den & Iturr., *Mycologia* 95(6): 1074 (2003).

Fig. 3

Basidiomata annual, solitary to imbricate, sessile to effused-reflexed. Pileus fanshaped up to 2 cm wide, 4 cm long and 0.5 cm thick. Abhymenial surface dull, finely adpressed velutine, slightly zonate, pale to clay brown (hazel-27 to milk coffee-28). Margin entire, acute. Context duplex, 0.5 mm thick, dark brown (cigar brown-17). Hymenophore almost completely hydroid, unusually with angular pores and then lacerate, with flattened teeth, 1–3 per mm, up to 0.4 long, greyish brown (sepia-26). Hyphal system dimitic; generative hyphae hyaline to pale yellow, with clamps, thinwalled, 2.5–4 µm diam.; skeletal hyphae yellow to pale brown, thick-walled, 3–5 µm diam. Cystidia fusoid, slightly thick-walled, 12–16 × 4–6 µm. Basidia clavate, 12–16 × 4–5 µm. Basidiospores cylindric, slightly curved, 6–7 × 1.5–2 µm.

MATERIAL EXAMINED: BRAZIL. ACRE: loc. n. det., B.Lowy et al. 416, 2/X/1980 (INPA 100369, as *Polyporus* sp.). ACRE: loc. n. det., B.Lowy et al. 1105, 4/XI/1980 (INPA 100860, as *Polyporus* sp.). ACRE: loc. n. det., B.Lowy et al. 495, 6/X/1980 (INPA 100353, as *Polyporus* sp.). AMAZONAS: loc. n. det., G.T.Prance et al. 17882, 13/IX/1973 (INPA 41186). AMAZONAS: Manaus: Rio Negro, near Serra Jacamin, I.J.Araújo et al. 962, 21/I/1978 (INPA 78734, as *Irpex* sp.). BAHIA: Utinga, Irwin H.S. s.n., 1971 (ALCB30436, as *Irpex* sp., URM80300). BAHIA: Itabuna, R.B. Singer 11137, 10/VI/1978 [INPA 82952, as *Polyporus sector* (Ehrenb.) Fr.]. MATO GROSSO: Aripuanã, M.A.Sousa 455, 23/IV/1978 (INPA 75616, as *Nigroporus* sp.). PARÁ: Oriximinã, V.L.R.Bononi et al. 233, 9/VI/1980 (INPA 103330). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006, on dead *Protium* sp. (URM 79954). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006, on dead *Sclerolobium* sp. (URM 79955). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006, on dead *Protium* sp. (URM 79973). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007, on dead angiosperm (URM 79957, URM 79956). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007, on dead *Guatteria* sp. (URM 79961). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007, on dead *Protium* sp. (URM 79960). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007 on dead angiosperm (URM 79958). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, II/2008, on dead angiosperm (URM 79963, URM 79962). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007, on dead *Protium* sp. (URM 79975). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007, on dead *Protium* sp. (URM 79976). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007, on dead *Licania* sp. (URM 79959). PARAÍBA: João Pessoa, Mata do Buraquinho, T.B.Gibertoni, XI/2001 (URM78589, as *T. sector*), I/2002 (URM78590, as *T. sector*). RONDÔNIA: loc. n. det.,

K.P.Dumont et al. 115, 12/VII/1968 (INPA 65152, as *Daedalea* sp.). RORAIMA: loc. n. det., B.Lowy et al. 1412, 5/VI/1986 (INPA 144726, *Daedalea* sp.). RORAIMA: Alto Alegre, K.F.Rodrigues et al. 1089, 21/VI/1986 (INPA 143430).

DISTRIBUTION: North-eastern part of South America (Ryvarden & Iturriaga 2003). This is the first record from Brazil.

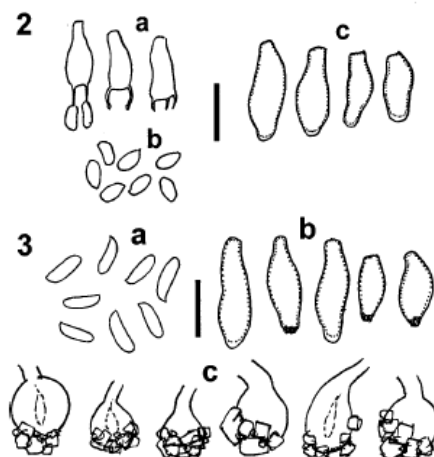
REMARKS: The appanate to effused-reflexed basidiomata, and the purplish, almost hydroid hymenial surface characterise *T. griseofuscens*.

***Trichaptum perrottetii*** (Lév.) Ryvarden, Norweg. J. Bot. 19: 237 (1972).

≡ *Trametes perrottetii* Lév., Annl. Sci. Nat., Bot., sér. 3 2: 195 (1844).

DESCRIPTION: Ryvarden (1981), Gilbertson & Ryvarden (1987).

MATERIAL EXAMINED: BRAZIL. ACRE: Igarapé São Francisco, lower Rio Moa, Forest on terra firme, 9/V/1971, W.C.Steward et al. s.n., on dead angiosperm (O12893). ACRE: Cruzeiro do Sul, P.J.M.Maas et al. 12833, 9/V/1971 (INPA 31195). ACRE: Rio Branco, B.Lowy et al. 246, 24/IX/1980 (INPA 100199, as *P. trichomallus* Berk. & Mont.). ACRE: loc. n. det., B.Lowy et al. 804, 20/X/1980 (INPA 100199, as *Polyporus trichomallus* Berk. & Mont.). AMAZONAS: Manicoré, K.F.Rodrigues 192, 16/IV/1985 (INPA 128946, as *Polyporus* sp.). AMAZONAS: loc. n. det., K.P.Dumont & J.F.Lima 257, 26/VII/1968 (INPA 65382, as *Polyporus trichomallus* Berk. & Mont.). CEARÁ: Reriutaba, Serrote do Boqueirão (4°01'13"S–40°38'43"W, 290 m alt.), Drechsler-Santos DS035CE, 15/VI/2007, on dead log (URM80471). GOIÁS: loc. n. det., G.Lloyd 1321, 1923 (URM 9117, as *Polystictus trichomallus* Berk. & Mont.). GOIÁS: Nova Iguaçu de Goiás, col. n. det., 1924 (URM 8851, as *Polystictus trichomallus* Berk. & Mont.). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006, on dead *Dinizia excelsa* (URM 79966). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006, on dead *Nectandra* sp. (URM 79965). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007, on dead *Nectandra* sp. (URM 79967). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni,



Figs 1–3: Microscopic structures of *Trichaptum* species. 1. *T. durum*: 1.a. basidia. 1.b. basidiospores. 1.c. cystidia. 2. *T. fumosoavellaneum*: 2.a. basidia. 2.b. basidiospores. 2.c. cystidia. 3. *T. griseofuscens*: 3.a. basidiospores. 3.b. fusoid, thin-walled cystidia. 3.c. capitated, thick-walled cystidia (scale bars = 10 µm).

VIII/2007, on dead *Caryocar* sp. (URM 79968). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B. Gibertoni, II/2008, on dead angiosperm (URM 79969, URM 79970). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B. Gibertoni, II/2008, on dead *Nectandra* sp. (URM 79971). PARÁ: Itaituba, M.A.Sousa & L.F.Coêlho 109, 2/X/1977 (INPA 74561, as *Hexagonia* sp.). PARAÍBA: Mamanguape, Reserva Biológica Guaribas, Mata Cabeça de Boi, T.B. Gibertoni N19, V/2002, on dead angiosperm (O18553). SÃO PAULO: Reg. Campinas-Moji-Guaçu, Fazenda Campinha, D.Pegler, K.Hjortstam & L.Ryvarden 24448, 29-30/I/1987 (SP213246, O12884). RONDÔNIA: loc. n. det., R.H.Petersen 165, 17/X/1979 (INPA 110655). RONDÔNIA: loc. n. det., R.D.Goos et. al. 1571, 23/V/1984 (INPA 125081, as *P. trichomallus* Berk. & Mont.). RORAIMA: Auaris, G.T.Prance et. al. 21384, 24/VII/1974 (INPA 45357, as *Polyporus* sp.). RORAIMA: loc. n. det., B.Lowy et. al. 2019, 18/VI/1986 [INPA 145305, as *Polyporus hydroides* (Sw.) Fr.]. RORAIMA: loc. n. det., B.Lowy et. al. 1328, 16/VI/1986 (INPA 144645, as *P. hydroides* (Sw.) Fr.). RORAIMA: loc. n. det., B.Lowy et. al. 2218, 14/VI/1986 (INPA 145494, as *Polyporus trichomallus* Berk. & Mont.).

DISTRIBUTION: North America to Argentina (Gilbertson & Ryvarden 1987). In Brazil, reported for the States of Amapá, Bahia, Pará, Paraíba, Paraná and São Paulo (Baltazar & Gibertoni 2009, Gomes-Silva & Gibertoni 2009, Gibertoni & Drechsler-Santos 2010). It is the first record from the Semi-Arid region of Brazil, for the Cerrado and for the States of Acre, Amazonas, Ceará, Goiás, Rondônia, and Roraima.

REMARKS: The soft basidiomata, and the dense and dark brown, strigose abhymenial surface, with long and branched hairs, and the angular pores (2-3 per mm) characterize *T. perrottetii*.

**Trichaptum sector** (Ehrenb.) Kreisel, Monografias, Ciências, Univ. Habana, Ser. 4 16: 84 (1971).  
≡ *Boletus sector* Ehrenb., Horae Phys. Berol.: 86 (1820).

DESCRIPTION: Gilbertson & Ryvarden (1987).

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Presidente Figueiredo, M.A.Jesus 544, 27/VIII/1984 (INPA 185843). AMAZONAS: loc. n. det., G.J.Samuels et al. 110, 3/II/1984 (INPA 129157). AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels et al. 330-347, 17/II/1984 (INPA 129364, INPA 129381). AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels et al. 520, 23/II/1984 (INPA 129548). AMAZONAS: Barcelos, Serra de Aracá, G.J.Samuels 648, 12/III/1984

(INPA 129667). AMAZONAS: loc. n. det., G.J.Samuels 96, 3/II/1984 (INPA 129144). MATO GROSSO: Rio Ouro Preto, J.Weir s.n., 17/IX/1923 (O12991, O12992). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006, on dead *Aniba* sp. (URM 79974). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VII/2006, on dead *Inga* sp. (URM 79972). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007, on dead *Sclerolobium* sp. (URM 79977). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007, on dead *Vismia* sp. (URM 79978). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, VIII/2007, on dead angiosperm (URM 79979). PARAÍBA: Mamanguape, Reserva Biológica Guaribas, T.B.Gibertoni, XI/2001 (URM78584, as *T. sector*). PARANÁ: São Paulino near Irati, S.Plank & M.F.Broggi SAM/Brás 80, 17/I/1981, on lying *Araucaria angustifolia* log (O13025, O13075). PERNAMBUCO: Recife, Reserva Ecológica de Dois Irmãos, T.B.Gibertoni, X/1997, on dead angiosperm (URM 76764). PERNAMBUCO: Cabo, Mata de Gurjaú, T.B.Gibertoni, III/2001, VII/2001 (URM78588, as *T. sector*); PERNAMBUCO: Tamandaré, Reserva Biológica Saltinho, T.B.Gibertoni, III/2002 (URM78596, as *T. sector*), on dead *Byrsonima* sp., III/2002 (URM78595, as *T. sector*). PERNAMBUCO: Recife, Reserva Ecológica de Dois Irmãos, T.B.Gibertoni, IV/1998 (URM 76765). RIO GRANDE DO SUL: São Leopoldo, col. n. det., VII/1957 (URM 7977, as *Polystictus ludens* Speg.). RIO GRANDE DO SUL: São Leopoldo, J.Rick, s. n., 1935 [URM 8685, as *Polystictus sector* (Ehrenb.) Fr.]. RIO DE JANEIRO: Parque Nacional de Itatiaia, K.Hjortstam 16090, 29/VI/1985 (O17980). RONDÔNIA: Vilhena, R.H.Petersen 213, 25/X/1979 (INPA 110701, as *Daedalea* sp.). RONDÔNIA: Vilhena, R.H.Pertesens 373, 3/XI/1979, on dead wood (INPA110861). RORAIMA: Alto Alegre, K.F.Rodrigues et al. 1102, 22/VI/1986, on dead wood (INPA143438). RORAIMA: BV-8, km 219, Boca da Mata, I.J.Araújo et al. 769, 1/XII/1977 (INPA 74488). RORAIMA: BV-8, km 219, Boca da Mata, I.J.Araújo et al. 686, 29/XI/1977 (INPA 78405). RORAIMA: Boa Vista, M.A.Jesus 939, 19/VII/1989 (INPA 186238, as *Antrodiella overholtsii* Ryvarden & Gilb.).

DISTRIBUTION: Tropical America to North Argentina (Gilbertson & Ryvarden 1987). In Brazil, reported from the States of Alagoas, Amazonas, Bahia, Pará, Paraná, Paraíba, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina, and São Paulo (Baltazar & Gibertoni 2009, Gomes-Silva & Gibertoni 2009, Gibertoni & Drechsler-Santos 2010), being a new record to Mato Grosso and Roraima.

REMARKS: The flabelliform, whitish to greyish basidiomata and the grey hymenial surface characterise *T. sector*.

**Trichaptum sprucei** (Berk.) Rajchenb. & Bianchin. Mycol. Res. 96(11): 957 (1992).

≡ *Daedalea sprucei* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 236 (1856).

Basidiomata perennial, pileate, effused-reflexed or entirely resupinate, solitary to imbricate, woody, hard and firm; pileus semicircular to dimidiate, up to 5 × 26 cm and 0.5–1 cm thick; abhymenial surface finely tomentose to glabrous, concentrically zonate and sulcate, hazel (27), clay buff (32), milk coffee (28), date brown (24), snuff brown (17) when dry; margin thin to rather thick, acute, entire, buff (52) to snuff brown (17); hymenophore poroid to daedaleoid and labyrinthine, cigar brown (16) to milk coffee (28), pores radially elongate to irregular, 3–4 per cm, dissepiments entire, slightly thick; tubes single-layered, up to 5–10 mm deep, concolorous with the pore surface; context homogeneous, thin, up to 0.1 mm thick, fibrous, concolorous with the pore surface, in resupinate specimens often difficult to observe. Hyphal system trimitic, generative hyphae with clamps, hyaline to pale yellow, thin to slightly thick-walled, 2–3 µm; skeletal hyphae pale yellow to pale brown, thick-walled to almost solid, 4–5 µm; binding hyphae hyaline to pale yellow, appearing solid, 2–2.5 µm. Cystidia abundant, ventricose, thin-walled, hyaline, sometimes with apical incrustation, 13–27 × 5–7 µm. Basidia and basidiospores not seen.

MATERIAL EXAMINED: BRAZIL. AMAZONAS: Barcelos: Serra de Aracá, G.J. 677, 12/III/1984 (INPA 129695, as *Daedalea sprucei* Berk.). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, III/2007, on dead *Sclerolobium* sp. (URM 79980). PARÁ: Melgaço, Estação Científica Ferreira Penna, T.B.Gibertoni, II/2008, on dead angiosperm (URM 79964). PARAÍBA: João Pessoa, R.Singer B 3370, 11/VII/1960 (O17838). RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, A.C.Gomes-Silva 781, VI/2009 (URM 80780).

DISTRIBUTION: South and Central America, Asia and Africa (Ryvarden & Johansen 1980). In Brazil, reported from the States of Amazonas, Bahia, Mato Grosso, Paraná, São Paulo and Rio Grande do Sul (Baltazar & Gibertoni 2009, Gomes-Silva & Gibertoni 2009, Gibertoni & Drechsler-Santos 2010). It is a new record for the states of Rondônia, Pará and Paraíba.

REMARKS: The resupinate to effused-reflexed basidiomata, and the labyrinthiform, vinaceous, large pores characterise *T. sprucei*. It is currently considered synonymous to *Trametes incerta* (Curr.) Cooke ([www.indexfungorum.org](http://www.indexfungorum.org)), but we decided to keep it in *Trichaptum* because of the presence of hymenial, apically incrustated cystidia.

***Trichaptum strigosum*** Corner, Beih. Nova Hedwigia 86: 228 (1987).

DESCRIPTION in Corner (1987).

MATERIAL EXAMINED: BRAZIL: GOIÁS, Goiânia, E.J.H., Corner, 17/I/1968, on dead fallen trunk in a thicket (E 326690, holotype).

DISTRIBUTION: Known only from Brazil.



REMARKS: This species is mostly characterised by the strigose abhymenial surface, the large pores (2–3 per mm), and the thick (up to 25 mm), fibrous and loose context, composed of branched and interwoven fibrils (Corner 1987). It is related to *T. byssogenum*, which has larger pores (1–3 per mm), thinner context (0.1–4 mm), and larger basidiospores ( $5.5\text{--}9 \times 3.5\text{--}4 \mu\text{m}$ ,  $4.5\text{--}6 \times 2.5\text{--}3 \mu\text{m}$  in *T. strigosum*).

### Key to the neotropical species of *Trichaptum*

1. Abhymenial surface glabrous to adpressed tomentose mixed with glabrous zones..... 2
1. Abhymenial surface strongly strigose..... 8
2. Pores large, 3–8 per cm, whole basidiomata dense and deep purplish to almost black..... *T. sprucei*
2. Pores smaller, basidiomata greyish, clay coloured to pale brown..... 3
3. Hymenophore usually distinctly hydroid, unusually with angular or lacerate pores.....*T. griseofuscens*
3. Hymenophore poroid..... 4
4. Basidiomata rarely above 3 mm thick, flexible, petaloid to fanshaped or effused-reflexed often in clusters, pileus velutinate to hirsute..... 5
4. Basidiomata usually 1–10 cm thick, dense and hard, usually single, pileus glabrous..... 6
5. Hymenophore grey to black, pores entire, abhymenial surface often grey to whitish, radially striate..... *T. sector*
5. Hymenophore pale violet when fresh fading to beige or pale brown, pores often lacerate with tendencies to irpicoid, abhymenial surface grey to deep beige, often with dense, concentric zones ..... *T. biforme*
6. Pores irregular at least in parts, 1–2 per mm or larger, pore surface split by age, basidiomata brown..... *T. variabilis*
6. Pores regular and round, pore surface even, basidiomata greyish to clay coloured..... 7
7. Pores 8–10 mm, hardly visible with naked eye, basidiomata often bluish grey, up to 2 cm thick ..... *T. durum*
7. Pores 3–4 per mm, basidiomata greyish to clay coloured or brown, up to 14 cm thick in massive specimens..... *T. fumosoavellanea*
8. Pileus with a dense mat of dark brown to black strigose to hirsute hairs, basidiomata effusedreflexed to sessile..... *T. perrottetii*
8. Pileus with gray to pale brown strigose hairs; basidiomata resupinate, effused-reflexed or sessile..... 9
9. Pores 1–2 per mm, basidiospores cylindrical,  $5.5\text{--}8 \times 2\text{--}2.5 \mu\text{m}$ ..... *T. byssogenum*

9. Pores 2–4 per mm, basidiospores ellipsoid,  $4.5\text{--}6 \times 2.5\text{--}3 \mu\text{m}$ ..... *T. strigosum*

### Dubious occurrence in Brazil

#### **Trichaptum abietinum (Dicks.) Ryvarden**

This species was recorded in the state of Rio Grande do Sul as *Poria dentipora* (Pers.) Cooke by Rick (1960), and in the state of Santa Catarina as *P. favillacea* (Berk. & M.A.Curtis) Sacc. by Bresadola (1896). However, this is a temperate species only reported occurring on conifers (Overholts 1953). Unfortunately we could not trace those specimens to confirm their identity.

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### References

- BALTAZAR J.M. & T.B. GIBERTONI (2009): A checklist of aphylophoroid fungi (*Basidiomycota*) recorded from the Brazilian Atlantic rain forest. - *Mycotaxon* **109**: 439-442.
- BALTAZAR J.M., L. TRIERVEILER-PEREIRA & C. LOGUERCIO-LEITE (2009): A checklist of xylophilous basidiomycetes (*Basidiomycota*) in mangroves. - *Mycotaxon* **107**: 221–224.
- BRESADOLA J. (1896): Fungi Brasiliensis: Lecti a cl. Dr. Alfred Möller. - *Hedwigia* **35**: 276-302.

- CORNER E.J.H (1987): Ad Polyporaceas IV. The genera *Daedalea*, *Flabellophora*, *Flavodon*, *Gloephyllum*, *Heteroporus*, *Irpex*, *Lenzites*, *Microporellus*, *Nigrofomes*, *Nigroporus*, *Oxyporus*, *Paratrichaptum*, *Rigidoporus*, *Scenidium*. - Nova Hedwigia Beiheft **86**: 1-226.
- DRECHSLER-SANTOS E.R., T.B. GIBERTONI, A. GÓES-NETO & M.A.Q. CAVALCANTI (2009): A re-evaluation of the lignocellulolytic *Agaricomycetes* from the Brazilian semi-arid region. - Mycotaxon **108**: 241-244.
- GIBERTONI T.B. & R.E. DRECHSLER-SANTOS (2010): Lignocellulolytic *Agaricomycetes* from the Brazilian Cerrado biome. - Mycotaxon **111**, in press.
- GILBERTSON R.L. & L. RYVARDEN (1987): North American Polypores. Vol. 2. - Fungiflora, Oslo.
- GOMES-SILVA A.C. & T.B. GIBERTONI (2009): Checklist of the aphyllorphoraceous fungi (*Agaricomycetes*) of the Brazilian Amazonia. - Mycotaxon **108**: 319-322.
- MURRILL W.A. (1907). (*Agaricales*) *Polyporaceae* (*pars*). North American Flora **9**(1): 1-72.
- NÚÑEZ M. & L. RYVARDEN (2001): East Asian Polypores. Vol. 2. - Fungiflora, Oslo.
- OVERHOLTS L.O. (1953): The Polyporaceae of the United States, Alaska and Canada. University of Michigan Press, Ann Arbor.
- RAJCHENBERG M. & V. BIANCHINOTTI (1991): *Trametes fumoso-avellanea* (*Aphyllorphorales*): a taxonomic study. Nordic Journal of Botany **11**: 225-230.
- RICK J. 1960. *Basidiomycetes eubasidii* in Rio Grande do Sul – Brasilia. 4. *Meruliaceae*, *Polyporaceae*, *Boletaceae*. Iheringia: Botanica: **7**: 193-295.
- RYVARDEN L. (1981): Type studies in the Polyporaceae 13. Species described by J.H. Lévillé. - Mycotaxon **13**: 175-186.
- RYVARDEN L. (1991): Genera of Polypores - Nomenclature and Taxonomy. Synopsis Fungorum **5**, - Fungiflora, Oslo.
- RYVARDEN, L. & R.L. GILBERTSON (1994): European Polypores. Vol. 2. - Synopsis Fungorum **6**. Fungiflora, Oslo.
- RYVARDEN L. & T. ITURRIAGA (2003): Studies in neotropical polypores 10. New polypores from Venezuela. - Mycologia **95**(6): 1066-1077.
- RYVARDEN L. & T. ITURRIAGA (2001): Studies in neotropical polypores 9. A checklist of poroid fungi from Venezuela. - Mycotaxon **78**: 393-405.
- WATLING R. (1969): Colour Identification Chart. - Her Majesty's Stationary Office, Edinburgh.

**New records of *Phellinus* s.l. (*Hymenochaetaceae*) from the Brazilian Amazonia<sup>16</sup>**

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**Abstract**

In a recent survey on polyporoid fungi in five reserves in the Brazilian Amazonia and herbaria revision Brazilian, 13 species (*Fomitiporia apiahyna*, *Fulvifomes grenadensis*, *F. membranaceus*, *F. melleoporus*, *F. rimosus*, *Fuscoporia contigua*, *F. ferrea*, *F. ferruginosa*, *F. rhabarbarina*, *F. wahlbergii*, *Phellinus caryophylleus*, *P. linteus* and *P. rhytiphloeus*) were added as new records for the Brazilian Amazonia and ten species (*Fulvifomes dependens*, *F. fastuosus*, *F. merrillii*, *F. umbrinellus*, *Phellinus baccharidis*, *P. extensus*, *P. griseoporus*, *P. shaferi* and *P. undulatus*) are first occurrences for several states in the Brazilian Amazonia. A key to the accepted species of *Phellinus* s.l. from the Brazilian Amazonia is provided.

**Key words** – *Basidiomycota*, *Hymenochaetales*, diversity, taxonomy

**Introduction**

*Phellinus* s.l. accommodates species with annual to perennial, resupinate to pileate, brown basidiomata, absence or presence of hymenial setae, tramal setae and/or setal hyphae, dimitic hyphal system, hyaline to rusty brown, smooth, thin- to thick-walled, dextrinoid or not dextrinoid, globose to cylindrical basidiospores (Larsen & Cobb-Poule 1990; Ryvardeen 2004). This genus comprises lignicolous species causing white rot or colonizing living trees causing or not damage to the tissues of the host (Wagner & Fischer 2002, Ryvardeen 2004, Dai et al. 2007, Gibertoni et al. 2007, Zhou et al. 2010, Dai et al. 2012).

Fifty-nine species of *Phellinus* s.l. are listed to Brazil (Gibertoni et al. 2012), but only 16 for the Brazilian Amazonia (Campos & Cavalcanti 2000, Gomes-Silva & Gibertoni 2009, Gomes-Silva et al. 2009, Dreschler-Santos et al. 2010, Martins-Júnior et al. 2011, Gibertoni et al. 2012a,b). These species were described based on morphological characters, which has been accepted by several authors (Ryvardeen & Johansen 1980, Fiasson & Niemelä 1984, Gilbertson & Ryvardeen 1986,

Ryvarden & Gilbertson 1993, Núñez & Ryvarden 2000, Ryvarden 1991, 2004). However, other authors, based on molecular studies, have shown *Phellinus* to be an artificial genus with convergent species (Wagner & Fischer 2001, 2002, Jeong *et al.* 2005, Larsson *et al.* 2006, Dai 2010), proposed segregation of species to smaller genera, these being: *Fomitiporella*, *Fomitiporia*, *Fulvifomes*, *Fuscoporia* and *Phellinus* s.s.

Thus, the aim of the present work is to contribute to the knowledge about the diversity of *Phellinus* s.l in the Brazilian Amazonia with the report of new records to the regions and States in the region.

### Material and Methods

Specimens collected in five reserves in the Brazilian Amazonia from 2006 to 2012 were studied: Estação Ecológica de Cuniã (8°04'S 63°31'W) and Parque Natural Municipal de Porto Velho (8°45'S 63°54'W) in the state of Rondônia; Floresta Nacional do Amapá (051°36'S 00°57'W) in the state of Amapá; Floresta Nacional de Caxiuanã (01°57'S 51°36'W) and Parque Ambiental de Belém (48°23'S 01°23'W) in the state of Pará. Additionally, specimens deposited in Herbaria INPA, MG, SP and URM were also studied (Thiers, continuously updated).

For the identification, specimens were analyzed macro- (shape, color, hymenial surface) and micro-morphologically (hyphal system, presence/absence and measurements of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Color designation followed Watling (1969). Newly collected materials were deposited in Herbaria HFSL, MG, and URM. The nomenclature is based on databases CBS, CABI and Mycobank.

A key to the accepted species of *Phellinus* s.l. from the Brazilian Amazonia is provided based on the species studied and reported in the literature.

### Results and discussion

Up to date, 16 species of *Phellinus* s.l. have been recorded from the Brazilian Amazonia (Gibertoni *et al.* 2012, Gomes-Silva *et al.* 2012a). After herbaria revision, two species were excluded because of the absence of basidiospores [*P. robustus* (P. Karst.) Bourdot & Galzin and *P. robiniae* (Murrill) A. Ames]. *Phellinus pseudosenex* (Murrill) Bondartseva & S. Herrera was also excluded because the reports of the species actually represent *Fulvifomes fastuosus* (Lév.) Bondartseva & S. Herrera and *P. rhytiphloeus* (Mont.) Ryvarden. Recently, Gomes-Silva *et al.* (2012b) proposed *Inonotus calcitratus* Gomes-Silva & Gibertoni as a new combination for *Phellinus calcitratus* (Berk. & M.A. Curtis) Ryvarden.

After field trips and herbaria revision, 13 species were added as new occurrence to the Brazilian Amazonia (*Fomitiporia apiahyna*, *Fulvifomes grenadensis*, *F. membranaceus*, *F. melleoporus*, *F. rimosus*, *Fuscoporia contigua*, *F. ferrea*, *F. ferruginosa*, *F. rhabarbarina*, *F. wahlbergii*, *Phellinus caryophylleus*, *P. linteus* and *P. rhytiphloeus*). This demonstrates the importance of accessibility and re-evaluation of dried fungal collections. Thus, 27 species of *Phellinus* s.l. are known from the Brazilian Amazonia so far.

Besides those, *Fulvifomes fastuosus*, *F. merrillii*, *F. dependens* and *Phellinus undulatus* are new to the state of Amapá, *F. umbrinellus* is new Amapá and Mato Grosso, *P. baccharidis* to Acre and Amapá, *P. extensus* to Roraima, *P. griseoporus* to Pará, and *P. shaferi* to Rondônia.

## Taxonomy

### \*New record from Brazilian Amazonia

\**Fomitiporia apiahyna* (Speg.) Vlasák & Kout, Mycotaxon 118: 161 (2011).

≡ *Fomes apiahynus* Speg., Boln Acad. nac. Cienc. Córdoba 11(4): 438 (1889).

Description: Ryvarden (2004), as *P. apiahynus* (Speg.) Rajchenb. & J.E. Wright and Vlasák et al. (2011).

Substrate: Known only from different hardwoods (Ryvarden 2004). Living in *Ocotea* sp. (Larsen & Cobb-Pouille 1990) and sabal palm, *Sabal palmetto* (Walter) Lodd. ex Schult. (Vlasák et al. 2011).

Known distribution: Argentina, Costa Rica (Ryvarden 2004), Brazil (Meijer 2006) and Estados Unidos (Vlasák et al. 2011). In Brazil, present in several states (Gibertoni et al. 2012, as *P. apiahynus*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF AMAZONAS: Manaus, loc. n. det., leg. I.J. Araújo & L.F. Coelho, VII/1979 (INPA 84807, as *Phellinus* sp.); leg. L.L.J. Aguiar et al., II/1979 (INPA 102769, as *Phellinus* sp.).

Remarks: The dark brown to black basidiomata, round pores, 7–9 per mm, absence of setal hyphae in the dissepiments, and the small, dextrinoid basidiospores,  $5\text{--}6 \times 4.5\text{--}5 \mu\text{m}$ , distinguish this species from the other species in the genus. *Fomitiporia apiahyna* may be mistaken with *F. robusta* (P. Karst.) Fiasson & Niemelä, but the latter has larger basidiospores ( $6\text{--}8.5 \times 5.5\text{--}7 \mu\text{m}$ ).

*Fulvifomes dependens* (Murrill) Murrill, Mikol. Fitopatol. 26(1): 13 (1992).

≡ *Pyropolyporus dependens* Murrill, N. Amer. Fl. (New York) 9(2): 106 (1908).

Description: Larsen & Cobb-Pouille (1990) and Ryvarden (2004), as *Phellinus dependens* (Murr.) Imaz.

Substrate: On dead deciduous trees (Ryvarden 2004) and on *Lysiloma* sp. (Larsen & Cobb-Pouille 1990)

Known distribution: Cited from the United States, West Indies and south to Brazil (Ryvarden 2004). In Brazil, it was registered in the states of Amazonas, Pernambuco and Rio Grande do Sul, (Gibertoni et al. 2012). It is a new record to the state of Amapá and Pará.

Specimens examined: BRAZIL. STATE OF AMAPÁ, Porto Grande, Floresta Nacional do Amapá, PPBio, leg. H.M.P. Sotão et al., VII.2009 (MG 204346); leg. H.M.P. Sotão et al., VI.2010 (MG 204347); STATE OF PARÁ, Parauapebas, Serra dos Carajás, leg. C.R. Sperling et al., VI.1982 (MG 106395); Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros, VIII.2010 (MG 195381)

Remarks: The characteristics of this species are the pendant basidiomata, sulcate and rimose pilear surface that resemble *Fulvifomes rimosus*, the small basidiospores ( $3.5\text{--}5 \times 2.5\text{--}3.5 \mu\text{m}$ ), presence of hymenial setae and small pores (6–8 per mm) (Ryvarden 2004). *Phellinus extensus* is a similar species, differs by shape and thickness of basidiocarp (up to 7 cm thick at the base in *F. dependens* and rarely above 1 cm thick at the base in *P. extensus*) (Ryvarden 2004).

***Fulvifomes fastuosus*** (Lév.) Bondartseva & S. Herrera, Mikol. Fitopatol. 26(1): 13 (1992).

≡ *Polyporus fastuosus* Lév., Annls Sci. Nat., Bot., sér. 3 2: 190 (1844).

Description: Ryvarden (2004), as *Phellinus fastuosus* (Lév.) Ryvarden.

Substrate: On deciduous trees of many genera (Ryvarden 2004). Larsen & Cobb-Pouille (1990) reports this species on *Dillenia* sp. and *Embothrium* sp.

Known distribution: Pantropical [Ryvarden 2004, as *P. fastuosus* (Lév.) Ryvarden], widespread in Brazil (Gibertoni et al. 2012, as *P. fastuosus*). It is a new record to Amapá.

Specimens examined: BRAZIL. STATE OF AMAPÁ: Macapá, Arquipélago de Bailique, leg. H.M.P. Sotão et al., IX/1988 (MG 143669); Porto Grande, Floresta Nacional do Amapá, PPBio, leg. H.M.P. Sotão et al., VII/2009 (MG 204348, 204349, 204350, 204351, 204352, 204353, 204354, 204355); leg. H.M.P. Sotão et al., VI/2010 (MG 204356, 204357, 204358, 204359); leg. A.M.S Soares et al., IX/2011 (MG 204360, 204361). STATE OF MATO GROSSO: Aripuanã, loc. n. det., leg. M.A. Sousa, IV/1978 (INPA 84107); STATE OF AMAZONAS: Itabuna, loc. n. det., leg. M.A. Sousa, X/1977 (INPA 84088, 84097); loc. n. det., leg. G.T. Prance, II/1969, (INPA 26036). STATE OF PARÁ: Belém, Parque ambiental de Belém, leg. P.S. Medeiros, X/2011 (MG 204427, 204428); Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. H.M.P. Sotão et al., III/2007 (MG 195250); leg. P.S. Medeiros et al., VIII/2007 (MG 195246, 195247, 195248, 195249, 195251, MG 195252); Estação Científica Ferreira Penna, leg. H.M.P. Sotão et al., IV/1995 (MG 149554).

Remarks: The large, applanate basidiomata, yellow to cinnamon or rusty brown pore surface, (6–)7–10 pores per mm, lack of setae, and the rusty brown basidiospores,  $4.5\text{--}6\text{--}(6.5) \times 4\text{--}5.5 \mu\text{m}$  characterize *F. fastuosus*. Actually, this species is also supported by molecular studies (Jeong et al. 2005). The genus has been recognized by the rusty brown basidiospores, lack of setae, and unguulate basidiomata that rapidly become black and rimose (Jeong et al. 2005).

**\**Fulvifomes grenadensis*** (Murrill) Murrill, Tropical Polypores: 83 (1915).

≡ *Pyropolyporus grenadensis* Murrill, N. Amer. Fl. (New York) 9(2): 107 (1908).

Description: Larsen & Cobb-Pouille (1990) and Ryvarden (2004), as *Phellinus grenadensis* (Murrill) Ryvarden.

Substrate: On living *Quercus virginiana* Mill. (Larsen & Cobb-Pouille 1990), also reported on dead hardwoods of numerous genera (Ryvarden 2004).

Known distribution: Widespread in the tropics (Ryvarden 2004). In Brazil, present in the states of Alagoas (Drechsler-Santos et al. 2010), Bahia, Paraná, Pernambuco, Rio Grande do Norte, Santa

Catarina (Gibertoni et al. 2012, as *P. grenadensis*), Rio Grande do Sul (Rick 1960, as *Fomes grenadensis*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF AMAPÁ: Porto Grande, Floresta Nacional do Amapá, PPBio, leg. H.M.P. Sotão et al., VII/2009 (MG 204374); leg. H.M.P. Sotão et al., VI.2010 (MG 204375). STATE OF AMAZONAS: loc. n. det., leg. G.J. Samuels et al., II/1984 (INPA 130129). STATE OF PARÁ: Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII/2007 (MG 195280, 195281).

Remarks: *Fulvifomes grenadensis* is characterized by the dark, velvety pilei with distinct crust, distinctly stratified tubes separated by context-layers, and the wide context hyphae. *Fulvifomes fastuosus* is a similar species, but differs by the shape and size of the basidiospores (subglobose,  $4.5\text{--}6 \times 4\text{--}5.5 \mu\text{m}$ ; ellipsoid,  $4\text{--}6 \times 3\text{--}4 \mu\text{m}$  in *F. grenadensis*). The combination of *P. grenadensis* to *Fomitiporella grenadensis* (Murrill) Teixeira in 1992 is currently not accepted. Based on molecular and morphology studies, Wagner & Fischer (2002) mention that *Fomitiporella* accommodates species with resupinate to effused-reflexed basidiomata.

\**Fulvifomes membranaceus* (J.E. Wright & Blumenf.) Baltazar & Gibertoni, Mycotaxon 111: 206 (2010).

≡ *Phellinus membranaceus* J.E. Wright & Blumenf., Mycotaxon 21: 422 (1984).

Description: Ryvarden (2004), as *Phellinus membranaceus* J.E. Wright & Blumenf.

Substrate: On dead hardwoods (Ryvarden 2004).

Known distribution: Widespread in the tropics (Ryvarden 2004). In Brazil, present in the states of Bahia and Pernambuco (Gibertoni et al., 2012, as *P. membranaceus*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII/2007 (MG 195276). STATE OF RORAIMA, Ilha de Maracá, leg. B. Lowy et al., VII/1986 (INPA 145395, as *Polyporus* sp.).

Remarks: *Fulvifomes membranaceus* is characterized by resupinate basidiomata, lack of setae and small basidiospores ( $3\text{--}4 \times 2.5\text{--}3 \mu\text{m}$ ). *Fulvifomes melleoporus* is similar, but its basidiospores are larger ( $4\text{--}5 \times 3\text{--}3.5 \mu\text{m}$ ).

\**Fulvifomes melleoporus* (Murrill) Baltazar & Gibertoni, Mycotaxon 111: 205 (2010).

≡ *Fomitiporella melleopora* Murrill, N. Amer. Fl. (New York) 9(1): 13 (1907).

Description: Ryvarden [2004, as *P. melleoporus* (Murrill) Ryvarden].

Substrate: On *Acer* sp., *Celtis* sp., *Quercus* sp. (Larsen & Cobb-Pouille 1990) and on dead hardwoods of many kinds (Ryvarden 2004).



Known distribution: United States to South America (Ryvarden 2004). In Brazil, present in the states of Bahia, Mato Grosso do Sul, Pernambuco, Rio Grande do Norte (Gibertoni et al., 2012, as *P. melleoporus*) and Rio Grande do Sul (Westphalen et al., 2010, as *P. melleoporus*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII/2007 (MG 195276). STATE OF RORAIMA, Alto Alegre, loc. n. det., leg. K.F. Rodrigues et al., VI/1986 (INPA 143418, as *Poria* sp.), Ilha de Maracá, loc. n. det., leg. B. Lowy et al., VII/1986 (INPA 145294, as *Poria* sp.).

Remarks: Species characterized by resupinate basidiomata, lack of setae and pale golden yellow basidiospores ( $4-5 \times 3-3.5 \mu\text{m}$ ). The presence the brown basidiospores in *P. umbrinellus* distinguish these species.

***Fulvifomes merrillii*** (Murrill) Baltazar & Gibertoni, Mycotaxon 111: 206 (2010).

≡ *Pyropolyporus merrillii* Murrill, Bull. Torrey bot. Club 34: 479 (1907).

Description: Ryvarden (2004), as *Phellinus merrillii* (Murrill) Ryvarden.

Substrate: On dead conifers and hardwoods (Larsen & Cobb-Poullé 1990, Ryvarden 2004).

Known distribution: Brazil and Costa Rica (Ryvarden 2004). In Brazil, present in the states of Bahia, Pará, Paraná, Pernambuco, Rondônia and Tocantis (Gibertoni et al. 2012, as *P. merrillii*). It is a new record to Amapá.

Specimens examined: BRAZIL. STATE OF AMAPÁ, Porto Grande, Floresta Nacional do Amapá, PPBio, leg. A.M.S. Soares et al., IX/2011 (MG 204376). STATE OF PARÁ: Oriximinã, loc. n. det., leg. V.L.R. Bononi, VII/1980 (INPA 103770, as *Phellinus* sp.); Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII/2007 (MG 195283)

Remarks: The species is easy to recognize by the small pores (7–10 per mm), lack of setae, pale golden yellow, globose to subglobose basidiospores ( $5-6 \times 4-5 \mu\text{m}$ ). *Fulvifomes rimosus* (Berk.) Fiasson & Niemelä is similar, but its pores are larger [(3–)4–5 per mm].

**\**Fulvifomes rimosus*** (Berk.) Fiasson & Niemelä, Karstenia 24(1): 26 (1984).

≡ *Polyporus rimosus* Berk., London J. Bot. 4: 54 (1845).

Description: Ryvarden (2004), as *Phellinus rimosus* (Berk.) Pilát.

Substrate: dead and living hardwood frequently on *Fabaceae* specimens (Ryvarden 2004). Dreschler-Santos et al. (2010) related the presence of *F. rimosus* on *Caesalpinia microphylla* Mart. (*Fabaceae*).

Known distribution: Widespread in the tropics (Ryvarden 2004). In Brazil, present in several states (Gibertoni et al. 2012). It is a new record from the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF AMAPÁ, Porto Grande, Floresta Nacional do Amapá, PPBio, leg. A.M.S. Soares et al., IX.2011 (MG 204377); STATE OF PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII.2007 (MG 204442).

Remarks: The dark rusty brown basidiospores ( $5\text{--}6.5 \times 3.5\text{--}5 \mu\text{m}$ ), lack of hymenial setae and unguulate basidiomata characterize *P. rimosus*. It is similar to *P. merrillii*, only separated by the pores (7–9 per mm, 4–6 per mm in *P. rimosus*) (Ryvarden 2004). *Fulvifomes cambodiensis* L.W. Zhou & W.M. Zhang is macroscopically similar to *F. rimosus*, but differs by hymenial setae and large, yellowish acyanophilous basidiospores (Zhou et al. 2012).

*Fulvifomes umbrinellus* (Bres.) Y.C. Dai, Fungal Diversity 45: 203 (2010).

≡ *Poria umbrinella* Bres., Hedwigia 35(5): 282 (1896).

Description: Ryvarden [2004, as *P. umbrinellus* (Bres.) S. Herrera & Bondartseva].

Substrate: On deciduous trees of many genera (Ryvarden 2004).

Known distribution: From the Gulf States in United States and south to Brazil (Ryvarden 2004). In Brazil, present in several states (Gibertoni et al. 2012, as *P. umbrinellus*). It is a new record to states of Amapá and Mato Grosso.

Specimens examined: BRAZIL. STATE OF AMAPÁ, Porto Grande, Floresta Nacional do Amapá, PPBio, leg. H.M.P. Sotão et al., VII/2009 (MG 204378, 204379, 204380, 204381). STATE OF MATO GROSSO: Aripuanã, loc. n. det., leg. M.A. Sousa, IV/1978, (INPA 91961, as *Phellinus* sp.). STATE OF PARÁ, Parque ambiental de Belém, leg. P.S. Medeiros, X/2011 (MG 204431); Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII/2007 (MG 195262, 195263, 195264, 195265, 195266).

Remarks: The species is characterized by resupinate basidiomata, fulvous to dark cinnamon or greyish brown pore surface, small pores (6–8 per mm), and pale rusty brown basidiospores,  $4\text{--}5 \times 3.5\text{--}4 \mu\text{m}$ .

\**Fuscoporia contigua* (Pers.) G. Cunn., Bull. N.Z. Dept. Sci. Industr. Res., Pl. Dis. Div. 73: 4 (1948).

≡ *Boletus contiguus* Pers., Syn. meth. fung. (Göttingen) 2: 544 (1801).

Description: Ryvarden (2004), as *Phellinus contiguus* (Fr.) Pat.

Substrate: On dead wood of numerous genera (Ryvarden 2004).

Known distribution: Cosmopolitan (Ryvarden 2004). In Brazil, present in the states of Alagoas, Bahia, Pernambuco, Rio Grande do Sul and Santa Catarina (Gibertoni et al. 2012, as *P. contiguus*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF PARÁ, Belém, Parque Ambiental de Belém, leg. P.S. Medeiros, X.2011 (MG 204422); Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII.2007 (MG 195277, 195278)

Remarks: This species is characterized by large pores, ellipsoid basidiopores ( $5-7 \times 3-3.5 \mu\text{m}$ ) and especially by the presence of two types of setae (acute tramal setae and very abundant subulate hymenial setae) (Ryvarden 2004).

\**Fuscoporia ferrea* (Pers.) G. Cunn., Bull. New Zealand Dept. Sci. Industr. Res. 73: 7 (1948).

≡ *Polyporus ferreus* Pers., Mycol. eur. (Erlanga) 2: 89 (1825).

Description: Ryvarden [2004, as *P. ferreus* (Pers.) Bourd. et Galzin].

Substrate: Dead wood of many hardwood and conifer genera (Ryvarden 2004).

Known distribution: Cosmopolitan (Ryvarden 2004). In Brazil, present in the states of Pernambuco, Rio Grande do Sul, São Paulo and Santa Catarina (Gibertoni et al. 2012, as *P. ferreus*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF AMAZONAS: Barcelos, Serra de Aracá, leg. G.J. Samuels, II/1984 (INPA 129409).

Remarks: *Fuscoporia ferrea* is similar to *F. ferruginosa* (Schrad.) Murrill, but differs by the larger pores (6–7 per mm, 7–9 per mm in *F. ferruginosa*), absence of hyphal setae (present in *F. ferruginosa*) and narrower basidiospores ( $5-7.5 \times 2-2.5 \mu\text{m}$ ,  $5-7 \times 3-3.5 \mu\text{m}$  in *F. ferruginosa*). *Fuscoporia punctatiformis* (Murrill) Zmitr., Malysheva & Spirin, other similar species, differs by the smaller basidiospores ( $4-6 \times 1.5-2 \mu\text{m}$ ) and hymenial setae [ $18-25 (-30) \times 4-8 \mu\text{m}$ , in  $22-29 \times 6-7 \mu\text{m}$  in *F. ferrea*] (Ryvarden 2004).

\**Fuscoporia ferruginosa* (Schrad.) Murrill [as '*ferruginosus*'], N. Amer. Fl. (New York) 9(1): 5 (1907).

≡ *Boletus ferruginosus* Schrad., Spicil. fl. germ. 1: 172 (1794).

Description: Ryvarden (2004), as *P. ferruginosus* (Schrad.:Fr.) Bourd.&Galzin.

Substrate: On dead wood of numerous hardwood genera (Ryvarden 2004).

Known distribution: Cosmopolitan (Ryvarden 2004). In Brazil, present in the states of Pernambuco, Rio Grande do Norte, Rio Grande do Sul and Santa Catarina (Gibertoni et al. 2012, *P. ferruginosus*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF ACRE: loc. n. det., leg. B. Lowy et al., XI/1980 (INPA 100871, as *Polyporus* sp.).

Remarks: This species is characterized by the presence of hyphae setal and small basidiospores ( $5-7 \times 3-3.5 \mu\text{m}$ ). Macroscopically, it is similar to *F. ferrea*, in which hyphae setal are absent. *Fuscoporia contigua* (Pers.) G. Cunn., other similar species, differs by the larger pores (2–3 per mm; 7–9 per mm in *F. ferruginosa*) and presence of tramal setae (Ryvarden 2004).

\**Fuscoporia rhabarbarina* (Berk.) Groposo, Log.-Leite & Góes-Neto, Mycotaxon 101: 61 (2007)

≡ *Polyporus rhabarbarinus* Berk., Ann. Mag. nat. Hist., Ser. 1 3: 388 (1839).

Description: Ryvar den (2004), as *Phellinus rhabarbarinus* (Berk.) Cunningh. and Groposo et al. (2007).

Substrate: On deciduous wood (Ryvar den 2004).

Known distribution: Pantropical (Groposo et al. 2007). In Brazil, present in the states of Rio Grande do Sul and Santa Catarina (Gibertoni et al. 2012, as *P. rhabarbarinus*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII.2007 (MG 204443).

Remarks: The small, hyaline basidiospores ( $3\text{--}4 \times 2\text{--}3 \mu\text{m}$ ) and glabrous, black surface characterizes *F. rhabarbarina*. It is similar to *P. neocallimorphus*, only separated by the sub-cylindrical basidiospores ( $3.5\text{--}4.5 \times 2\text{--}2.5 \mu\text{m}$ ) and absence of hymenial setae in the latter (Ryvar den 2004).

\**Fuscoporia wahlbergii* (Fr.) T. Wagner & M. Fisch., Mycol. Res. 105(7): 780 (2001).

≡ *Trametes wahlbergii* Fr., K. svenska Vetensk-Akad. Handl., ser. 2: 11 [repr.] (1849) [1848].

Description: Ryvar den (2004), as *Phellinus wahlbergii* (Fr.) D. Reid.

Substrate: On angiosperms (Ryvar den & Johansen 1980).

Known distribution: Pantropical (Ryvar den 2004). In Brazil, present in the states of Bahia, Paraná, Rio de Janeiro, Rio Grande do Sul Santa Catarina and São Paulo (Gibertoni et al. 2012, as *P. wahlbergii*). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF AMAZONAS: Manaus, loc. n. det., leg. A.C. Webber, VIII/1979 (INPA 84813, as *Phellinus* sp.). STATE OF MATO GROSSO: Aripuanã, loc. n. det., leg. M.A. Sousa, IV/1978, [INPA 85125, as *P. gealandicus* (Cooke) G.H.Cunn.].

Remarks. The species is recognized by the reddish brown to umber, velutine to tomentose upper surface, small pores (7–8 per mm), hooked setae [ $15\text{--}30\text{--}(35) \times 6\text{--}9 \mu\text{m}$ ], and subglobose, hyaline to pale yellowish basidiospores,  $4\text{--}5 \times 3.5\text{--}4.5 \mu\text{m}$ .

*Phellinus baccharidis* (Pat.) Pat., *Essai Tax. Hyménomyc.* (Lons-le-Saunier): 97 (1900).

≡ *Polyporus baccharidis* Pat., Bull. Soc. mycol. Fr. 9: 129 (1893).

Description: Ryvar den (2004).

Substrate: On deciduous wood (Ryvar den 2004).

Known distribution: Brazil, Ecuador and Venezuela (Ryvarden 2004). In Brazil, present in several states (Gibertoni et al. 2012, as *P. baccharidis*). It is a new record to the state of Amapá.

Specimens examined: BRAZIL. STATE OF ACRE: loc. n. det., leg. B. Lowy et al., X/1980 (INPA 100415, as *Polyporus* sp.). STATE OF AMAPÁ, Porto Grande, Floresta Nacional do Amapá, PPBio, leg. H.M.P. Sotão et al., VII/2009 (MG 204329, 204330, 204331); leg. H.M.P. Sotão et al., VI/2010 (MG 204332, 204333, 204334, 204335, 204336, 204337, 204338); leg. A.M.S Soares et al., IX/2011 (MG 204339, 204340, 204341, 204342). STATE OF PARÁ, Belém, Parque ambiental de Belém, leg. P.S. Medeiros, X/2011 (MG 204425), leg. P.S. Medeiros, I/2012 (MG 204419, 204421); Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. H.M.P. Sotão et al., VIII/2007 (MG 195163); leg. P.S. Medeiros et al., VIII/2007 (MG 204439, 204440, 204441); Belém, Bosque Rodrigues Alves, leg. W.A. Egler, II/1958 (MG 23231).

Remarks: *Phellinus baccharidis* is characterized by the pale fulvous to cinnamon basidiomata, with a distinct black line below a tomentum, dark fulvous to sienna pore surface, 8–10 pores per mml, setal hyphae absent in the dissepiments, and globose [6(–6.5)  $\mu\text{m}$  in diam.], hyaline to yellow basidiospores. *Phellinus griseoporus* is a similar species, but the absence of a black zone or cuticle in tomentum, the grey color of the pore surface, 6–7 pores per mm, small (4–5.5  $\mu\text{m}$  in diam.) and hyaline basidiospores distinguish this species.

\**Phellinus caryophylleus* (Cooke) Ryvarden, Norw. JI Bot. 19: 234 (1972)

≡ *Fomes caryophylleus* Cooke, Grevillea 15(no. 73): 21 (1886)

Description: Ryvarden (2004).

Substrate: On dead hardwoods (Ryvarden 2004).

Known distribution: Brazil (Ryvarden 2004), in the states of Rio de Janeiro and Rio Grande do Sul (Gibertoni et al. 2012, as *P. caryophylleus*). This is the first report from the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF ACRE: loc. n. det., leg. B. Lowy et al., X/1980 (INPA 100574, as *Polyporus* sp.). STATE OF PARÁ: Itaituba, loc. n. det., leg. M.A. Sousa et al., IX/1977 (INPA 84104); Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII/2007 (MG 195282); P.S. Medeiros, II/2010 (MG 204397), P.S. Medeiros, VI/2010 (MG 204398).

Remarks: This species is characterized by the brown to reddish brown basidiomata, small pores (6–8 per mm), ventricose hymenial setae, and sub-globose, yellow to rusty brown basidiospores (4–5.5  $\times$  3–4.5  $\mu\text{m}$ ).

*Phellinus extensus* (Lév.) Pat., *Essai Hymen.* (Lons-le-Saunier): 97 (1900).

≡ *Polyporus extensus* Lév., *Annls Sci. Nat., Bot.*, sér. 3 5: 129 (1846).

Description: Núñez and Ryvarden (2000); Ryvarden (2004).

Substrate: On dead hardwood (Ryvarden 2004).

Known distribution: Pantropical (Ryvarden 2004). In Brazil, present in the states of Pará (Sotão et al. 2008), Amazonas, Bahia, Pernambuco, Rio Grande do Sul, Roraima, São Paulo and Tocantins (Gibertoni et al. 2012). It is a new record to Roraima.

Specimens examined: BRAZIL. STATE OF RORAIMA: Boa Vista, loc. n. det., leg. L.L.J. Aguiar, XI/1977 (INPA 78549, as *Phellinus* sp.). STATE OF AMAZONAS: loc. n. det., leg. M.A. Sousa, VI/1978 (INPA 85602).

Remarks: According to Ryvarden (2004), an applanate basidiomata with a black zone below an adpressed tomentum, very short ( $10\text{--}20 \times 5\text{--}9 \mu\text{m}$ ) and strongly ventricose setae and small ( $3\text{--}4 \mu\text{m}$  in diam.), hyaline to pale yellow basidiospores characterize this species. *Phellinus linteus* is similar, but differs by larger setae ( $17\text{--}35 \times 6\text{--}8 \mu\text{m}$ ) and basidiospores ( $4.5\text{--}6 \times 4\text{--}5 \mu\text{m}$ ).

According to the Index Fungorum, *P. extensus* is currently accepted in *Fomes extensus* (Lév.) Cooke, but the presence of dimitic hyphal system, hymenial setae, globose and pale yellow basidiospores support this species in *Phellinus sensu* Wagner & Fischer (2002). According to CBS and Mycobank, *P. extensus* is currently accepted as synonym of *Fulvifomes nilgheriensis* (Montagne) Bontadtseva & S. Herrera. However, Wagner & Fischer (2002) place in *Fulvifomes* only species with ellipsoid, yellowish basidiospores and without setae.

\**Phellinus linteus* (Berk. & M.A. Curtis) Teng, Chung-kuo Ti Chen-chun, [Fungi of China]: 762 (1963).

≡ *Polyporus linteus* Berk. & M.A. Curtis, Proc. Amer. Acad. Arts & Sci. 4: 122 (1860) [1858].

Description: Ryvarden (2004).

Substrate: On dead hardwoods in many genera (Ryvarden 2004).

Known distribution: Tropical and subtropical regions (Ryvarden 2004). In Brazil, present in the states of Alagoas, Bahia, Ceará, Paraíba, Piauí, Sergipe (Drechsler-Santos et al. 2010), Paraná Pernambuco and Santa Catarina (Gibertoni et al. 2012). It is a new record to the Brazilian Amazonia.

Specimens examined: BRAZIL. STATE OF PARÁ: Belém, loc. n. det., leg. M.A. Sousa, III/1978 (INPA 84094).

Remarks: The dark reddish brown to fulvous pore surface, round to angular pores, 5–7 per mm, abundant hymenial setae, and golden brown, ovoid to subglobose basidiospores characterize *P. linteus*. Wagner and Fischer (2002) proposed a new combination, *Inonotus linteus* (Berk. & Curt.) T. Wagner & M. Fischer based on molecular studies, but this species had already been proposed by Teixeira in 1992 (www.mycobank.org). Jeong et al. (2005), also based on molecular studies, placed this species in *Phellinus*, mentioning that the genus is well defined by the hyaline or slightly pigmented basidiospores, negative to Melzer's reagent.

\**Phellinus rhytiphloeus* (Mont.) Ryvarden, in Ryvarden & Johansen, Prelim. Polyp. Fl. E. Afr. (Oslo): 206 (1980).

≡ *Polyporus rhytiphloeus* Mont., Anns Sci. Nat., Bot., sér. 4 5: 369 (1857) [1856].

Description: Ryvarden (2004).

Substrate: On deciduous wood (Ryvarden 2004).

Known distribution: Brazil and Venezuela (Ryvarden 2004). In Brazil, present in the states of Bahia (Drechsler-Santos et al. 2010), Pernambuco, Rio Grande do Norte and São Paulo (Gibertoni et al. 2012). It is first record to the Brazilian Amazonia.

Specimens examined: BRAZIL, ACRE: Rio Branco, loc. n. det., IX 1980, leg. B. Lowy et al. (INPA 100214, as *Fomes* sp.); AMAZONAS: São Gabriel da Cachoeira, I 1979, leg. I.J. Araújo (INPA 102804, as *Phellinus* sp.); Manaus, loc. n. det., IV 1996, leg. K. Vohland & M.A. Jesus [INPA 216375, as *P. umbrinellus* (Bres.) Ryvarden].

Remarks: This species is characterized by the cinnamon to ochraceous pale brown basidiomata, dark brown pore surface, tiny pores, 7–9 per mm, lack of setae, and globose, golden to rusty brown basidiospores, 4–5(–5.5)  $\mu\text{m}$ . *Fulvifomes grenadensis* is a similar species, but differs by the fulvous to dark reddish brown pore surface, larger pores (4–7 per mm), and elliptical to subglobose basidiospores, 4–6  $\times$  3–4  $\mu\text{m}$ .

*Phellinus shaferi* (Murrill) Ryvarden, Norw. Jl Bot. 19: 235 (1972).

≡ *Fuscoporella shaferi* Murrill, N. Amer. Fl. (New York) 9(1): 7 (1907).

Description: Ryvarden (2004).

Substrate: On hardwood (Ryvarden 2004).

Known distribution: West-Indies, Panama and Venezuela (Ryvarden 2004). In Brazil, present in the states of Alagoas, Pará and Pernambuco (Gibertoni et al. 2012). It is a new record to Rondônia.

Specimens examined: BRAZIL. STATE OF RONDÔNIA, Vilhena, loc. n. det., leg. R.H. Pertesen, 5.XII.1979 (INPA 110925, as *Poria* sp.).

Remarks: This species is easily recognized by reddish-brown, resupinate basidiomata, small pores (5–6 per mm), straight setae (12–20  $\times$  4–8  $\mu\text{m}$ ), and globose basidiospores (3.5–4.5  $\mu\text{m}$  in diam.).

*Phellinus undulatus* (Murrill) Ryvarden, Norw. Jl Bot. 19: 235 (1972).

≡ *Fomitiporia undulata* Murrill, N. Amer. Fl. (New York) 9(1): 10 (1907).

Description: Ryvarden (2004).

Substrate: On dead hardwoods (Ryvarden 2004)

Known distribution: Central and South America (Ryvarden 2004). In Brazil, present in the states of Alagoas, Pará and Santa Catarina (Gibertoni et al. 2012). It is a new record to the state of Amapá.

Specimens examined: BRAZIL. STATE OF AMAPÁ, Porto Grande, Floresta Nacional do Amapá, PPBio, leg. H.M.P. Sotão et al., VII.2009 (MG 204382); leg. H.M.P Sotão et al., VI.2010 (MG 204383); STATE OF PARÁ, Melgaço, Floresta Nacional de Caxiuanã, PPBio, leg. P.S. Medeiros et al., VIII.2007 (MG 195282).

Remarks: This species is easily recognized by the hooked setae ( $20\text{--}22.5 \times 5\text{--}7.5 \mu\text{m}$ ), basidiospores hyaline ( $3.5\text{--}5 \times 2.5\text{--}3.5 \mu\text{m}$ ), and angular pores (4–5 per mm) (Ryvarden 2004).

**Key to species of *Phellinus* s.l. from the Brazilian Amazonia (based on Gomes-Silva et al. 2012).**

- 1a. Hymenial setae lacking or rare ..... 2  
 1b. Hymenial setae present ..... 11
- 2a. Hyphal system monomitic to dimitic; basidiospores hyaline, globose, dextrinoid (*Fomitiporia*) 3  
 2b. Hyphal system dimitic; basidiospores yellowish to pale rusty brown, ellipsoid to globose, not dextrinoid (*Fulvifomes*) ..... 4
- 3a. Basidiomata resupinate; basidiospores ovoid to subglobose,  $6.5\text{--}8.5 \times 5.5\text{--}7 \mu\text{m}$  .....  
 ..... *F. punctata* s.l. (P. Karst.) Murrill  
 3b. Basidiomata pileate; basidiospores subglobose,  $5\text{--}6 \times 4.5\text{--}5 \mu\text{m}$  .....  
 ..... *F. apiahyna* (Speg.) Robledo, Decock & Rajchenb.
- 4a. Basidiomata resupinate ..... 5  
 4b. Basidiomata pileate ..... 7
- 5a. Basidiomata fulvous to dark cinnamon; basidiospores subglobose,  $4\text{--}5 \times 3.5\text{--}4 \mu\text{m}$  .....  
 ..... *F. umbrinellus* (Bres.) Y.C. Dai  
 5b. Basidiomata different colours; basidiospores ellipsoid,  $< 3.5 \mu\text{m}$  wide ..... 6
- 6a. Basidiomata brown to greyish-brown; pores 5–9 per mm; basidiospores  $3\text{--}4 \times 2.5\text{--}3 \mu\text{m}$  .....  
 ..... *F. membranaceus*  
 6b. Basidiomata golden brown to dark purplish brown; pores 4–6 per mm; basidiospores  $4\text{--}5 \times 3\text{--}3.5 \mu\text{m}$  ..... *F. melleoporus*
- 7a. Pores 4–7 per mm ..... 8  
 7b. Pores 7–10 ..... 9
- 8a. Basidiomata with distinct crust; basidiospores  $4\text{--}6 \times 3\text{--}4 \mu\text{m}$  ..... *F. grenadensis*  
 8b. Basidiomata rimose; basidiospores  $5.5\text{--}7 \times 4.5\text{--}6 \mu\text{m}$  ..... *F. rimosus*
- 9a. Basidiomata unguulate to pendent ..... *F. dependens*



- 9b. Basidiomata dimidiate to sessile ..... 10
- 10a. Black line present in the context, basidiospores subglobose to ellipsoid,  $4.5-6 \times 4-5.5 \mu\text{m}$ , rusty brown ..... *F. fastuosus* (Lév.) Bondartseva & S. Herrera
- 10b. Black line absent in the context, basidiospores subglobose to globose,  $5-6 \times 4-5 \mu\text{m}$ , pale golden yellow ..... *F. merrillii* (Murrill) Baltazar & Gibertoni
- 11a. Basidiomata annual to perennial; hyphal system monomitic/dimitic; basidiospores hyaline, ellipsoid, allantoid to cylindric (*Fuscoporia*) ..... 12
- 11b. Basidiomata perennial; hyphal system dimitic; basidiospores hyaline, ellipsoid to globose (*Phellinus* s.l.) ..... 18
- 12a. Basidiomata resupinate ..... 13
- 12b. Basidiomata pileate ..... 15
- 13a. Pores 6–7 per mm; hymenial setae present and setal hyphae absent; basidiospores  $5-7.5 \times 2-2.5 \mu\text{m}$  ..... *F. ferrea* (Pers.) G. Cunn.
- 13b. Pores different size; hymenial setae and setal hyphae present; basidiospores  $> 2.5 \mu\text{m}$  in wide 14
- 14a. Pores reddish to umber brown, 2–3 per mm; setal hyphae  $5-12 \mu\text{m}$  in diam., hymenial setae  $40-60 \times 6-10 \mu\text{m}$  ..... *F. contigua*
- 14b. Pores rusty brown, 7–9 per mm; setal hyphae  $5-8 \mu\text{m}$  in diam., hymenial setae  $25-65 \times 6-8 \mu\text{m}$  ..... *F. ferruginosa* (Schrad.) Murrill
- 15a. Hymenial setae hooked ..... *F. wahlbergii* (Fr.) T. Wagner & M. Fisch.
- 15b. Hymenial setae straight ..... 16
- 16a. Basidiomata perennial, tomentose, ultimately glabrous in zones; hymenial setae  $15-40 \times 5-9 \mu\text{m}$ ; basidiospores  $4.5-6 \times 3.5-5 \mu\text{m}$  ..... *F. senex* (Nees & Mont.) Ghob.-Nejh
- 16b. Basidiomata usually annual, glabrous to scrupose or hispid; hymenial setae  $20-30 \times (4-5)5-6 \mu\text{m}$ ; basidiospores different size ..... 17
- 17a. Basidiomata reddish to yellowish brown; pore surface dark purplish brown, pores 6-5 per mm; context yellowish brown, without black line; basidiospores ellipsoid to ovoid,  $4-5 \times 3-3.5 \mu\text{m}$  ..... *F. gilva* (Schwein.) T. Wagner & M. Fisch.
- 17b. Basidiomata dark reddish brown; pore surface yellowish to reddish brown, pores 6-9 per mm; context reddish brown, with black line; basidiospores elipsoid,  $3.5-4 \times 2-3 \mu\text{m}$  .... *F. rhabarbarina*
- 18a. Basidiomata resupinate ..... 19
- 18b. Basidiomata pileate to effused reflexed ..... 22
- 19a. Setal hyphae with scattered protuberances ..... *P. sousae* Ryvardeen, Gomes-Silva & Gibertoni
- 19b. Setal hyphae absent ..... 20
- 20a. Pores 7–9 per mm ..... *P. ferrugineovelutinus* (Henn.) Ryvardeen
- 20b. Pores  $< 6$  per mm ..... 21

- 21a. Pore surface reddish brown; hymenial setae straight, 12–20 × 4–8 µm; basidiospores globose, pale yellow to rusty brown, 3.5–4.5 µm in diameter .....  
 ..... *P. shaferi* (Murrill) Ryvarden
- 21b. Pore surface greyish brown; hymenial setae hooked, 18–25 × 6–8.5 µm; basidiospores ellipsoid, hyaline, 3.5–4.5 × 2.5–3.5 µm ..... *P. undulatus* (Murrill)
- 22a. Setal hyphae and/or tramal setae present ..... 23
- 22b. Setal hyphae and/or tramal setae absent ..... 24
- 23a. Tramal setae present; setal hyphae absent; hymenial setae present .....  
 ..... *P. fibrosus* Ryvarden, Gomes-Silva & Gibertoni
- 23b. Tramal setae absent; setal hyphae present; hymenial setae absent .....  
 ..... *P. noxius* (Corner) G. Cunn.
- 24a. Hymenial setal present ..... 25
- 24b. Hymenial setal absent ..... 26
- 25a. Basidiospores ovoid to subglobose, pale golden brown, 4.3–5.5 × 3.8–4.8 µm; pores 6–8 per mm ..... *P. linteus* (Berk. & M.A. Curtis) Teng
- 25b. Basidiospores globose, pale yellowish, 3–4 µm; pores 7–10 per mm.....  
 ..... *P. extensus* (Lév.) Pat.
- 26a. Basidiomata on *Rhizophorae mangle* ..... *P. mangrovicus* (Imazeki) Imazeki (see
- 26b. Basidiomata on other angiosperms ..... 27
- 27a. Basidiospores globose, rusty brown, 4–5 µm; context bright yellowish brown and reddish in KOH.....*P. rhytiphloeus*
- 27b. Basidiospores globose to subglobose, hyaline to pale golden yellow, 4–6 µm; context cinnamon to fulvous and black in in KOH ..... 28
- 28a. Upper surface adpressed tomentose to velutinate with a black zone; pores 6–7 per mm  
 .....*P. baccharidis*
- 28b. Upper surface velutinate, soon glabrous, no black zone or cuticle; pores 8–10 per mm  
 ..... *P. griseoporus*

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## References

- CAMPOS, E.L. & M.Q. CAVALCANTI (2000): Primeira ocorrência de *Phellinus mangrovicus* (Imaz.) Imaz. para o Brasil. *Acta Botânica Brasílica* **14**(3): 263–265.
- DAI, Y.C., B.K. CUI, H.S. YUAN & B.D. LI (2007): Pathogenic wood-decaying fungi in China. *Forest Pathology* **37**: 105–120.
- DAI, Y.C. (2012): Polypore diversity in China with an annotated checklist of Chinese polypores. *Mycoscience* **53**: 49–80
- DRESCHLER-SANTOS, E.R., P.J.P. SANTOS, T.B. GIBERTONI & M.A.Q. CAVALCANTI (2010): Ecological aspects of *Hymenochaetaceae* in an area of Caatinga (semi-arid) in Northeast Brazil. *Fungal Diversity* **42**:71–78.
- GIBERTONI, T.B., P.J.P. SANTOS & M.Q.A. CAVALCANTI (2007): Ecological aspects of *Aphylophorales* in the Atlantic Rain Forest in Northeast Brazil. *Fungal Diversity* **25**: 49–67.
- GIBERTONI, T.B., A.C. GOMES-SILVA, C.R.S. LIRA, G.S.N. MELO, V.F. SILVA, L. ARAÚJO-NETA & E.R. DRECHSLER-SANTOS (2012): *Hymenochaetales* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. (<http://floradobrasil.jbrj.gov.br/2012/FB092348>).
- GOMES-SILVA, A.C., L. RYVARDEN & T.B. GIBERTONI (2009): New and interesting species of *Hymenochaetaceae* from the Brazilian Amazonia. *Mycol Progress* **8**(4):273–279.
- GOMES-SILVA, A.C., L. RYVARDEN & T.B. GIBERTONI (2012a): Two new species of *Phellinus* s.l. from the Brazilian Amazonia. *Phytotaxa* **67**: 55–60.
- GOMES-SILVA, A.C., L. RYVARDEN & T.B. GIBERTONI (2012b): *Inonotus amazonicus* sp. nov., *I. calcitratus* comb. nov. and notes on *Phylloporia* (*Hymenochaetaceae*, *Agaricomycetes*) from the Brazilian Amazonia. *Mycoscience* (no prelo).
- GROPOSO, C., C. LOGUERCIO-LEITE & A. GÓES-NETO (2007): *Fuscoporia* (*Basidiomycota*, *Hymenochaetales*) in Southern Brazil. *Mycotaxon* **101**: 55–63.

- JEONG, W.J., Y.W. LIM, J.S. LEE & H.S. JUNG (2005): Phylogeny of *Phellinus* and related genera inferred from combined data of ITS and mitochondrial SSU rDNA sequences. *J. Microbiol. Biotechnol.* **15**: 1028–1038.
- LARSEN, M.J. & L.A. COBB-POULLE (1990): *Phellinus* (*Hymenochaetaceae*) A survey of the world taxa. *Syn Fungorum* **3**: 1–206.
- MARTINS-JÚNIOR, A.S., T.B. GIBERTONI & H.M.P. SOTÃO (2011): Espécies de *Ganoderma* P. Karst (*Ganodermataceae*) e *Phellinus* Quél. (*Hymenochaetaceae*) na Estação Científica Ferreira Penna, Pará, Brasil. *Acta Bot. Bras.* **25**(3): 531–533.
- MEIJER, A.A.R. de. (2006): Preliminary list of the macromycetes from the Brazilian state of Paraná. *Bol. Mus. Bot. Munic.* **68**: 1–55
- NÚÑEZ, M. & L. RYVARDEN (2000): East Asian Polypores Volume 1. *Ganodermataceae* and *Hymenochaetaceae*. *Syn Fungorum* **13**: 1–168.
- RICK, J. (1960). *Basidiomycetes eubasidii* in Rio Grande do Sul – Brasilia. 4. *Meruliaceae, Polyporaceae, Boletaceae*. *Iheringia Botanica* 7: 193-295.
- RYVARDEN, L. (1991): Genera of polypores, nomenclature and taxonomy. *Syn Fungorum* **5**: 1–363.
- RYVARDEN, L. (2004): Neotropical Polypores Part 1. Introduction, *Ganodermataceae* & *Hymenochaetaceae*. *Syn Fungorum* **19**:1–229.
- THIERS, B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/>
- VLASÁK, J., J. KOUT, J. VLASÁK JR & L. RYVARDEN (2011): New records of polypores from southern Florida. *Mycotaxon* 118: 159–176.
- ZHOU, LI-WEI & WEI-MIN, Z. (2012): A new species of *Fulvifomes* (*Hymenochaetaceae*) from Cambodia. *Mycotaxon* **119**: 175–179.
- WAGNER, T. & M. FISCHER (2002): Proceedings towards a natural classification of the worldwide taxa *Phellinus s.l.* and *Inonotus s.l.*, and phylogenetic relationships of allied genera. *Mycologia* **94**(6): 998–1016.
- WATLING, R. (1969): Colour Identification Chart. Edinburgh, Scotland: Her Majesty's Stationary Office.
- WESTHALEN, M.C., M.A. RECK & SILVEIRA, R.M.B. (2010): Polyores from Morro Santana, Rio Grande do Sul, Brazil. *Hoehnea* 37(3): 645–661.

*Coltricia* and *Hymenochaete* (*Hymenochaetaceae*) from the Amazonia and the Atlantic Forest,  
Brazil: a new combination and new records

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**Abstract**

GOMES-SILVA, A.C. AND T.B. GIBERTONI (Universidade Federal de Pernambuco, Centro de Ciências Biológicas, Departamento de Micologia, Programa de Pós-Graduação em Biologia de Fungos, Av. Nelson Chaves s/nº, CEP 50760-420, Recife, PE, Brazil), J. M. BALTAZAR (Current address: Universidade Federal do Rio Grande do Sul, Instituto de Biociência, Departamento de Botânica, Programa de Pós-Graduação em Botânica, Av. Bento Gonçalves, 9500. CEP 91501-970, Porto Alegre, RS, Brazil). *Coltricia* and *Hymenochaete* (*Hymenochaetaceae*) from the Amazonia and the Atlantic Forest, Brazil: a new combination and new records. J. Torrey. Bot. Soc. XXX: 000–000. 201X. — A recent survey in areas of the Amazonia and the Atlantic forest in Brazil, and revision of the exsiccates deposited in herbaria INPA, SP and URM, resulted in new records of *Hymenochaetaceae*: seven for the State of Rondônia, one for the States of Acre, Amapá and Amazonas, and two for the States of Pará and Roraima. *Coltricia barbata*, *C. duportii*, *Hymenochaete porioides* and *H. unicolor* are new records to the Brazilian Amazonia, while *C. velutina* is recorded for the first time since its description. A key to *Hymenochaete* species known from Brazil is provided and the new combination *Hymenochaete iodina* is proposed.

Key words: *Hymenochaetales*, *Agaricomycetes*, taxonomy, diversity

*Hymenochaete* Lév. has been widely used to accommodate species with resupinate to stipitate basidioma, usually thin and flexible pileus, generally velutine to tomentose upper surface (when a pileus is present), smooth hymenophore, monomitic hyphal system with clampless generative hyphae, straight hymenial setae, and hyaline, usually cylindrical to ellipsoid basidiospores (Léger 1998). Wagner and Fischer (2002) reevaluated the genus with molecular evidence and changed the concept to include species with lamellate to poroid hymenophore previously placed in *Cyclomyces* Fr.

*Coltricia* Gray is a genus characterized by stipitate basidiomata, poroid to rarely lamellate hymenophore, absence of hymenial setae (although some species have setal hyphae), and smooth basidiospores (Ryvarden 2004). Traditionally it has been separated from *Phylloporia* Murrill by the duplex pileal context with a black line below the tomentum in the latter. *Coltriciella* Murrill differs from *Coltricia* mainly by having ornamented basidiospores.

*Coltricia* and *Hymenochaete* are classified in *Hymenochaetaceae* (Kirk et al. 2008) and currently comprise ten and 26 species in Brazil, respectively (Baltazar et al. 2010, Gibertoni et al. 2012). In these genera, basidiomata are commonly found on wood, causing white rot (Ryvarden 2004). However, Tedersoo et al. (2007) reported an ectomycorrhizal association of *C. perennis* (L.) Murrill

with angiosperm trees of several families, while some authors reported *H. damicornis* (Link) Lév. as parasitic, growing on roots, or as terrestrial saprobe (Ryvarden 1985, Job 1990). Wagner and Fischer (2002) asserted that extensive studies on a possible mycorrhizal association are still missing.

This study was carried out with specimens recently collected in areas of North and Northeast Brazil and aimed to contribute to a better understanding of the geographical distribution of *Coltricia* and *Hymenochaete* species in the country.

**Materials and methods.** Specimens were collected in three reserves located in the Brazilian Amazonia and Atlantic Forest from 2007 to 2011. In the Brazilian Amazonia, the areas were: Estação Científica Ferreira Penna (an area inside FLONA de Caxiuanã, 1°44' S 51°27' W) in the state of Pará; Estação Ecológica de Cuniã (8°04'S 63°31'W) and Parque Natural Municipal de Porto Velho (8°45'S 63°54'W), both in the State of Rondônia. In the Atlantic Forest, the materials were from the Parque Ecológico João Vasconcelos Sobrinho (8°22'S 36°5'W) and Reserva Ecológica Carnijó (8°10'S, 35°05'S) in the State of Pernambuco. Additionally, areas in Rondônia were also visited at irregular intervals and specimens deposited in INPA, SP and URM were also studied.

The basidiomata were analysed macro- (shape, color, hymenial surface) and micromorphologically (hyphal system, presence/absence and measurement of sterile structures and basidiospores). Microscopical observations were made from slide preparations with 5% KOH, stained with 1% of aqueous phloxine, and Melzer's reagent (Ryvarden 1991). Color designation followed Watling (1969). The specimens were deposited in the Herbarium Padre Camille Torrend (URM) of the Universidade Federal de Pernambuco, and Herbarium Dr. Ary Tupinambá Penna Pinheiro (HFSL) of the Faculdade São Lucas in Porto Velho, Rondônia. Herbaria acronyms follow Thiers (continuously updated).

## Taxonomy

*Coltricia barbata* Ryvarden & de Meijer, Syn. Fung. 15: 46 (2002).

**Description.** Ryvarden and de Meijer (2002), Ryvarden (2004).

**Distribution.** Only known from the type locality in the State of Paraná, Brazil (Ryvarden and de Meijer 2002, Gibertoni et al. 2012), being the first record to the Brazilian Amazonia.

**Ecology.** On soil forest (Ryvarden 2004).

**Specimens examined.** BRAZIL. PARÁ: Belém, Cachoeira Porteira, VIII.1980, leg. V.L. Bononi (SP 193443, as *Polyporus cinnamomeus* Sacc. ex Fr.); Melgaço, Estação Científica Ferreira Penna, II.2007, leg. T.B. Gibertoni (URM 79884, URM 79885, as *Polyporus tricholoma* Mont.); RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, II.2011, leg. A.C. Gomes-Silva et al. (URM 82993).

**Taxonomic remarks.** *Coltricia barbata* is characterized by small basidiomata, shiny pileus surface, barbate margin with hanging tufts and globose to subglobose basidiospores (5–6 µm in diameter). *Coltricia velutina* Baltazar & Gibertoni is a similar species, but differs by pileus surface (velutinate to tomentose; glabrous in *C. barbata*), size and reaction of the basidiospores in Melzer's solution (subglobose to broadly ellipsoid, dextrinoid in *C. velutina* and globose to subglobose, indextrinoid in *C. barbata*).

*Coltricia cinnamomea* (Jacq.) Murrill, Bull. Torrey bot. Club 31(6): 343 (1904).

≡ *Boletus cinnamomeus* Jacq., Collnea bot. 1: 116 (1787) [1786].

**Description.** Ryvardeen (2004).

**Distribution.** Cosmopolitan (Ryvardeen 2004). In Brazil it is known from the States of Amazonas, Pará, Paraná, Pernambuco, Rio de Janeiro, Rondônia and Rio Grande do Sul (Gibertoni et al. 2012).

**Ecology.** On humous soil, but two specimens (URM 81046, URM 81058) were collected in roots of *Orbignya phalerata* Mart ('babaçú'). Although we have not checked the mycorrhizal association, this species was reported as ectomycorrhizal by Tedersoo et al. (2007). According to Ryvardeen (2004), *C. cinnamomea* is collected on hardwood or mixed forest and is rarely reported in coniferous forests.

**Specimens examined.** BRAZIL. AMAZONAS: Barcelos, Serrá de Aracá, VII.1985, leg. E.S.S. Silva et al. (INPA 153750, as *Amauroderma macrosporium* J.S. Furtado); PARÁ: Melgaço, Estação Científica Ferreira Penna, VII.2007, leg. T.B. Gibertoni 563 (URM); RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, I.2009, leg. A.C. Gomes-Silva et al. (URM 81046, URM 81058), VI.2009, leg. A.C. Gomes-Silva et al. (URM 81058).

**Taxonomic remarks.** *Coltricia cinnamomea* is distinguished by the yellow pore surface, large pores (2–4 per mm) and small basidiospores (6–8 × 5–5.5 µm), although the species is variable and deviating specimens are frequently found (Baltazar et al. 2010). Macroscopically, it is almost identical to *Coltriciella oblectabilis* (Lloyd) Kotl. et al., which has finely verrucose basidiospores (smooth in *C. cinnamomea*), and *C. montagnei* (Fr.) Murrill, which has larger basidiospores (9–14 × 5.5–7.5 µm) and usually lamellate hymenophore.



*Coltricia duportii* (Pat.) Ryvarden [as ‘*duporti*’], Occas. Pap. Farlow Herb. Crypt. Bot. 18: 15 (1983).

≡ *Xanthochrous duportii* Pat. [as ‘*duporti*’], Bull. Soc. mycol. Fr. 28: 34 (1912).

**Description.** Ryvarden (2004).

**Distribution.** Known from the French Guyana and Brazil (Ryvarden 2004). In Brazil, it is known from the State of Paraná (Gibertoni et al. 2012), being the first record to the Brazilian Amazonia.

**Ecology.** On deciduous trees (Ryvarden 2004).

**Specimens examined. BRAZIL. RONDÔNIA:** Porto Velho, Parque Natural Municipal de Porto Velho, I.2011, leg. A.C. Gomes-Silva et al. (URM 83115, URM 83116).

**Taxonomic remarks.** The soft, azonate and dull pileus, and ellipsoid, rusty brown and large basidiospores (8–10 × 6–7 µm) characterise this species. Our specimen deviates from others by the semistipitate basidiomata. *Coltricia cinnamomea* is a similar species, but the shiny, multizonate upper surface, and small, golden yellow basidiospores (6–8 × 5–5.5 µm) distinguish this species.

*Coltricia focicola* (Berk. & M.A. Curtis) Murrill, N. Amer. Fl. 9(2): 92 (1908).

≡ *Polyporus focicola* Berk. & M.A. Curtis, Bot. J. Linn. Soc. 10(45): 305 (1868).

**Description.** Ryvarden and Gilbertson (1993), Ryvarden (2004).

**Distribution.** Known from Asia, Europe, and Americas (Ryvarden and Gilbertson 1993, Ryvarden 2004, Dai and Niemelä 2006, Baltazar et al. 2010). In Brazil it is known from the States of Paraíba and Rio Grande do Norte (Gibertoni et al. 2012), being the first record to Amapá.

**Ecology.** On the ground, usually on burnt wood over soil, or around old campfire sites (Ryvarden 2004) and on arenous soil (Baltazar et al. 2010).

**Specimens examined. BRAZIL. AMAPÁ:** Mazagão, VII.1965, leg. A.C. Batista (URM 48734, URM 48728, URM 48736, as *Polyporus schweinitzii* Fr.).

**Taxonomic remarks.** The large and robust basidiomata, large pores (1–2 per mm) and cylindrical to oblong-ellipsoid, thick-walled basidiospores (8–11 × 4–5 µm) characterise this species. Specimens from the State of Amapá differ microscopically from other specimens by the smaller basidiospores (6–7.5 × 3–4.5 µm); however, many of them were collapsed.

*Coltricia hamata* (Romell) Ryvarden, Svensk Bot. Tidskr. 68: 276, 1974.

Fig 1

≡ *Pelloporus hamatus* Romell, K. svenska Vetensk-Akad. Handl., III 26: 26, 1901.

**Description.** Ryvarden (2004).

**Distribution.** Known from South American (Ryvarden 2004). In Brazil it is known from the States of Amazonas, Pará, Roraima and Mato Grosso (Gibertoni et al. 2012), being the first record to Rondônia.

**Ecology.** On the ground in rain forests (Ryvarden 2004) and on decayed wood (Baltazar et al. 2010).

**Specimens examined. BRAZIL.** AMAZONAS: loc. n. det., Nov 1927, leg. *P. Occhioni* (SP 20190, as *Polystictus hamatus* Rom.); PARÁ: Melgaço, Estação Científica Ferreira Penna, I.2008, leg. *T.B. Gibertoni* (URM 79463); RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, I.2009, leg. *A.C. Gomes-Silva & E.B.A. Souza* (URM 80057, URM 80058); II.2010, leg. *A.C. Gomes-Silva et al.* (URM 83120); II.2011, leg. *A.C. Gomes-Silva et al.* (URM 83011).

**Taxonomic remarks.** This species is separated from others included here by its conspicuous, dark brown setal hyphae. Baltazar et al. (2010) related the presence of branched setal hyphae and/or with bifurcate apex in *C. hamata* and that this feature has also been observed in *C. duostratosa* (Lloyd) Ryvarden.

*Coltricia montagnei* (Fr.) Murrill, Mycologia 12(1): 13 (1920).

≡ *Polyporus montagnei* Fr. in Mont., Annls Sci. Nat., Bot., sér. II 5: 341 (1836) [1834].

**Description.** Ryvarden (2004).

**Distribution.** A very rare but cosmopolitan species, and in tropical America was only reported from Brazil, Costa Rica and Guyana (Aime et al. 2003, Ryvarden 2004). In Brazil, it is known from the State of Amazonas (Gibertoni et al. 2012), being the first record to State of Rondônia.

**Ecology.** On the ground in hardwood forests, rarely in coniferous forests (Ryvarden 2004).

**Specimens examined. BRAZIL.** RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, II. 2011, leg. *A.C. Gomes-Silva et al.* (URM 83030).

**Taxonomic remarks.** This species is separated from others included here by the large and thick basidiomata and poroid to concentric lamellate hymenophore. It resembles *C. cinnamomea* and *C. verrucata* Aime et al., but they are separated by the pore (1–3 mm wide in *C. montagnei*, smaller in both other) and the basidiospores size (9–14 µm in *C. montagnei*, < 8 µm in the largest dimension in *C. cinnamomea* and *C. verrucata*).

*Coltricia velutina* Baltazar & Gibertoni, Mycologia 102(6): 1258 (2010).

**Description.** Baltazar et al. (2010).

**Distribution.** Known from the State of Pernambuco, Brazil (Baltazar et al. 2010). This is the first record of this species outside its type locality, and the first record to Rondônia as well.

**Ecology.** On soil forest (Baltazar et al. 2010).

**Specimens examined. BRAZIL. RONDÔNIA:** Porto Velho, Parque Natural Municipal de Porto Velho, VI.2009, *leg. A.C. Gomes-Silva & E.B.A. Souza* (URM 82898).

**Taxonomic remarks.** The small basidiomata with shiny, adpressed velutinate to tomentose pileus surface, barbate margin and dextrinoid basidiospores distinguish *C. velutina* from others in the genus (Baltazar et al. 2010).

**A key to *Coltricia* species known from the Neotropics is given in Baltazar et al. (2010)**

*Hymenochaete damicornis* (Link: Fr.) Lév. [as ‘*damaecornis*’], Ann. Sci. Nat., sér. Bot. III, 5:151(1846). Fig 2

≡ *Stereum damicorne* Link [as ‘*damaecorne*’], Mag. Gesell. naturf. Freunde, Berlin 3(1-2): 40 (1809).

**Description.** Job (1990), Parmasto (2001).

**Distribution.** Neotropical (Parmasto 2001). In Brazil, it is known from several States (Gibertoni et al. 2012), being the first record to Pará, Rondônia and Roraima.

**Ecology.** On soil forest (Parmasto 2001). Ryvardeen (1985) and Parmasto (2001) suggested this species as parasitic on roots, while Job (1990) describes it as terrestrial. Wagner and Fischer (2002) pointed for a possible mycorrhizal association, but further studies are necessary to a better understanding of this species.

**Specimens examined. BRAZIL. AMAZONAS:** Manaus, INPA, 1980, *leg. V.L.R. Bononi* (SP 211855); PARÁ, Oriximinã, Óbidos, VI.1980, *leg. V.L.R. Bononi* (SP 193369, SP 194245); Cachoeira da Porteira, VI.1980, *leg. V.L.R. Bononi* (SP 177453, SP 177471); Rio mapuera, VI.1980, *leg. V.L.R. Bononi* (SP 177995); loc. n. det., VI.1980, *leg. V.L.R. Bononi* (INPA 103720, as *Polyporus* sp.); RONDÔNIA: Jarú, Reserva Biológica do Jarú, VI.1987, *leg. M. Capelari et al.* (SP 212078, SP 212100); Porto Velho, Parque Natural Municipal, II.2007, *leg. A.C. Gomes-Silva et al.* (URM 78943, URM 78944, URM 78946); II.2008, *leg. A.C. Gomes-Silva et al.* (URM 78949, URM 78950); I.2009, *leg. A.C. Gomes-Silva & E.B.A. Souza* (URM 81019, URM 81024); I.2010, *leg. A.C. Gomes-Silva et al.* (URM 82998, URM 81047); II.2011, *leg. A.C. Gomes-Silva et al.* (URM 82786, URM 83000); Estação Ecológica de Cuniã, II.2008, *leg. A.C. Gomes-Silva et al.* (URM 78955, URM 78952); III.2010, *leg. A.C. Gomes-Silva et al.* (URM 82840, URM 82842); II.2011, *leg. A.C. Gomes-Silva et al.* (URM 82999, URM 82779); Fazenda Mucuim, VII.2007, *leg. A.C. Gomes-Silva et al.* (URM 78948, URM 78947); RORAIMA: Boa Vista, loc. n. det., VII.1986, *leg. E.S.S. Silva* (INPA 153767).

**Taxonomic remarks.** This species is separated from other *Hymenochaete* species by the stipitate basidiomata, although in some specimens it is reduced to a contracted base. *Hymenochaete reniformis* (Fr.) Lév., another stipitate species, differs from *H. damicornis* mainly by the smaller hymenial setae in the first — 40–70 × 10–15 µm in the first, (75–) 100–175 (–200) × (7–) 8–15 (–20) µm in *H. damicornis* (Léger 1998).

***Hymenochaete iodina*** (Mont.) Baltazar & Gibertoni, **comb. nov.**

MycoBank: MB 800110

≡ *Polyporus iodinus* Mont., Ann. Sci. nat. II 16: 108 (1841). (basionym).

**Description.** Ryvar den [2004, as *Cyclomyces iodinus* (Mont.) Pat.].

**Distribution.** Pantropical (Cunningham 1965; Ryvar den 2004). In Brazil, it is known from several States (Gibertoni et al. 2012, as *C. iodinus*), being the first record to Acre, Amazonas and Roraima.

**Ecology.** On a living tree (URM 81119). According to Ryvar den (2004), *H. hyodina* is collected on deciduous hardwood.

**Specimens examined.** BRAZIL. ACRE: loc. n. det., IV.1971, leg. G.T. Prance et al. (INPA 30453); AMAZONAS: Barcelos, Serra de Aracá, III.1984, leg. G.J. Samuels (INPA 129755); loc. n. det., XII.1977, leg. M.A. Sousa (INPA 84127, as *Phellinus* sp.); VIII.1977, leg. M.A. Sousa (INPA 84128, as *Inonotus* sp.); PERNAMBUCO: Caruaru, Parque Ecológico Professor João de Vasconcelos Sobrinho, VII.2008, leg. J.M. Baltazar et al. (URM 81119); IX.2008, leg. J.M. Baltazar & L. Trierveiler-Pereira (URM 81121); RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, I.2009, leg. A.C. Gomes-Silva & E.B.A. Souza (URM 81048); Estação Ecológica de Cuniã, III.2010, leg. A.C. Gomes-Silva et al. (URM 83015); I.2011, leg. A.C. Gomes-Silva et al. (URM 83013, URM 83014); loc. n. det., X.1979, leg. R.H. Pertesen (INPA 110808, as *Polyporus* sp.); RORAIMA: loc. n. det., VI.1986, leg. B. Lowy et al. (INPA 145352, as *Ganoderma* sp.).

**Taxonomic remarks.** This species is similar to *H. cyclolamellata* T. Wagner & M. Fisch., from which differs by the pore size and width of basidiospores [poroid, 2–2.5 µm in *H. iodina* and cyclolamellate, 1.5–2 µm in *H. cyclolamellata* (Ryvar den 2004)]. Corner (1991) gave little importance to these variations, and considered *H. iodina* as a variety of *H. cyclolamellata*. However, the pore surface appears to be important feature at specific level, and these species are treated separated in this work. *Hymenochaete porioides* T. Wagner & M. Fisch., other similar species, differs by the smaller pores and hymenial setae.

*Hymenochaete leonina* Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10(46): 334 (1868) [1869]

**Description.** Job (1990), Parmasto (2001).

**Distribution.** Pantropical (Parmasto 2001). In Brazil it is known from several States (Gibertoni et al. 2012), being the first record to Pará.

**Ecology.** On *Parinarium* sp. (URM 83589), *Vouacapoua americana* Aubl. (URM 83590), *Licania* sp. (URM 83591, URM 83592, URM 83594) and *Dinizia excelsa* Ducke (URM 83593). According to Parmasto (2001), *H. leonine* is collected on deciduous wood.

**Specimens examined. BRAZIL.** PARÁ: Melgaço, Estação Científica Ferreria Penna, VII.2006, leg. T.B. Gibertoni (URM 83587, URM 83588, URM 83590, URM 83591, URM 83593, URM 83594); VIII.2007, leg. T.B. Gibertoni (URM 83589, URM 83595); II.2008, leg. T.B. Gibertoni (URM 83592, URM 83592); s. date, leg. T.B. Gibertoni (URM 83589); PERNAMBUCO: Moreno, Reserva Ecológica Carnijó, 14.VIII.2008, leg. J.M. Baltazar (URM 83597); RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, 02.I.2010, leg. A.C. Gomes-Silva (URM 83540).

**Taxonomic remarks.** According to Léger (1998) and Parmasto (2001), *H. leonina* is characterised by the distinct cortex, which in this species is found in the middle of context. In young specimens, however, the cortex is sometimes not seen.

*Hymenochaete luteobadia* (Fr.) Höhn. & Litsch., Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1 116: 750 (1907) [1906]. Fig 3

≡ *Thelephora badia* Fr, Linnaea 5: 526 (1830).

**Description.** Job (1990), Parmasto (2001).

**Distribution.** Pantropical (Parmasto 2001). In Brazil it is known from several States (Gibertoni et al. 2012), being the first record to Rondônia.

**Ecology.** On *Licania* sp. (URM 83598, URM 83599) and *Eschweilera coriacea* (DC.) S.A. Mori (URM 83600). According to Parmasto (2001), *H. luteobadia* is collected on deciduous wood.

**Specimens examined. BRAZIL.** AMAZONAS: Cidade Visconde de Mauá, XI.1965, leg. B. Lowy (SP 83562, as *Stereum* sp.); PARÁ: Belém, Cachoeira da Porteira, VI.1980, leg. V.L. Bononi (SP 177489, SP 193635); Rio Mapuera, VI.1980, leg. V.L. Bononi (SP 193625, SP 193981); Oriximinã, loc.n.det., VI.1980, leg. V.L. Bononi (SP 177451, SP 177475); Melgaço, Estação Científica Ferreira Penna, VII.2006, leg. T.B. Gibertoni (URM 83598, URM 83599); VIII.2007, leg. T.B. Gibertoni (URM 83600, URM 83600); RONDÔNIA: Porto Velho, Parque Natural Municipal de Porto Velho, VII.2007, leg. A.C. Gomes-Silva et al. (URM 78957); VII.2008, leg. A.C. Gomes-Silva et al. (URM 82889); I.2009, leg. A.C. Gomes-Silva & E.B.A. Souza (URM 81040); I.2010, leg. A.C. Gomes-Silva et al. (URM 82853, URM 83019); VIII.2010, leg. A.C.

*Gomes-Silva et al.* (URM 83020); Estação Ecológica de Cuniã, VII. 2007, *leg. A.C. Gomes-Silva et al.* (URM 78958); II.2008, *leg. A.C. Gomes-Silva et al.* (URM 78959); VIII.2010, *leg. A.C. Gomes-Silva et al.* (URM 83021); II.2011, *leg. A.C. Gomes-Silva et al.* (URM 82798, URM 83018); Fazenda Mucuim, VII.2007, *leg. A.C. Gomes-Silva et al.* (URM 83021).

**Taxonomic remarks.** The effuse-reflexed to sessile basidiomata with imbricate pilei, presence of cortex and numerous brownish encrusted hyphidia characterize *H. luteobadia*.

*Hymenochaete porioides* T. Wagner & M. Fisch., Mycol. Progr. 1(1): 101 (2002).

≡ *Polyporus tabacinus* Mont., Ann. Sci. Nat. (Ser. 3) 3: 349 (1835).

**Description.** Ryvarden [2004, as *Cyclomyces tabacinus* (Mont.) Pat.].

**Distribution.** Pantropical (Ryvarden 2004). In Brazil it is known from the States of Rio de Janeiro, Rio Grande do Sul, São Paulo and Santa Catarina (Gibertoni et al. 2012, as *Cyclomyces tabacinus*). This is the first record to the Brazilian Amazonia.

**Ecology.** On deciduos wood (Ryvarden 2004).

**Specimens examined. BRAZIL.** AMAZONAS: Barcelos, Serrá do Aracá, II.1984, *leg. G.S. Samuels et al.* (INPA 129468, as *C. tabacinus*); PARÁ: Belém, loc. n. det., III.1978, *leg. M.A. Sousa & M.G. Silva* (INPA 84129, as *Inonotus* sp.).

**Taxonomic remarks.** The thin, flexible, dark brown colored basidiomata, tiny pores (7–9 per mm) and a thin black zone in the context characterized *H. porioides*. This species is related to *H. iodina*, but the pore (3–6 per mm in *H. iodina*) and basidiospore size [ $3.5\text{--}4 \times 2\text{--}2.5 \mu\text{m}$  in *H. iodina*;  $2.5\text{--}3.5 \times 1.5\text{--}2 \mu\text{m}$  in *H. porioides* (Ryvarden 2004)], besides the abundant hymenial setae in *H. porioides* distinguish these species.

*Hymenochaete unicolor* Berk. & M.A. Curtis, J. Linn. Soc., Bot. 10(46): 335 (1868) [1869].

**Description.** Parmasto (2001).

**Distribution.** Pantropical (Parmasto 2001). In Brazil it is known from the States of Rio Grande do Sul, São Paulo and Santa Catarina (Gibertoni et al. 2012). This is the first record to the Brazilian Amazonia.

**Ecology.** On deciduos wood (Parmasto 2001).

**Specimens examined. BRAZIL.** RONDÔNIA: Porto Velho, Estação Ecológica de Cuniã, VIII.2010, *leg. A.C. Gomes-Silva et al.* (URM 83542).

**Taxonomic remarks.** This species is characterised by the resupinate basidiomata, the cracked hymenophore, thick setal layer and thin context (Léger 1998). Thick specimens may be confused

with *H. cervina* Berk. & M.A. Curtis and *H. jobii* Parmasto, but they differ by the smaller setae and basidiospores in *H. unicolor* (Parmasto 2001).

**Key to *Hymenochaete* species known from Brazil, based on Léger (1998), Parmasto (2001) and Ryvarden (2004). The genera and sections given between brackets do not reflect the phylogenetic relationships for the treated species.**

1. Hymenophore poroid ( <i>Cyclomyces</i> ).....	2
1'. Hymenophore smooth.....	3
2. Pores 3–6 per mm, basidiospores $3.5\text{--}4 \times 2\text{--}2.5 \mu\text{m}$ .....	<i>H. iodina</i>
2'. Pores 7–9 per mm, basidiospores $2.5\text{--}3.5 \times 1.5\text{--}2 \mu\text{m}$ .....	<i>H. porioides</i>
3. Basidiomata stipitate ( <i>Stipitochaete</i> ) .....	4
3'. Basidiomata resupinate to pileate sessile ( <i>Hymenochaete</i> ) .....	5
4. Hymenial setae $40\text{--}70 \times 10\text{--}15 \mu\text{m}$ .....	<i>H. reniforme</i> (Fr.) Lév.
4'. Hymenial setae $(75\text{--}) 100\text{--}175\text{--}(200) \times (7\text{--}) 8\text{--}15\text{--}(20) \mu\text{m}$ .....	<i>H. damicornis</i>
5. Context present .....	6
5'. Context absent .....	24
6. Cortex present (sect. <i>Hymenochaete</i> ).....	7
6'. Cortex absent (sect. <i>Fultochaete</i> G.A. Escobar ex J.C. Léger) .....	15
7. Hymenial dendrophyses present .....	8
7'. Hymenial dendrophyses absent .....	9
8. Crystals present in the base of the context, setae without encrustations, $15\text{--}30 \times 3.5\text{--}5 \mu\text{m}$ , basidiospores $3.8\text{--}4.5\text{--}(5) \times 1.5\text{--}2 \mu\text{m}$ .....	<i>H. pinnatifida</i> Burt
8'. Crystals absent in the context, setae encrusted, $(55\text{--})60\text{--}80\text{--}(90) \times 6\text{--}9\text{--}(10) \mu\text{m}$ , basidiospores $6\text{--}7 \times 2.5\text{--}3 \mu\text{m}$ .....	<i>H. floridea</i> Berk. & Broome
9. Cortex placed in the middle of the context .....	10
9'. Cortex basal .....	11
10. Cortex $20\text{--}50 \mu\text{m}$ thick.....	<i>H. leonina</i>
10'. Cortex $100\text{--}200 \mu\text{m}$ thick .....	<i>H. tuberculosa</i> Cooke
11. Paraphysoid hyphae present in the hymenium.....	12
11'. Paraphysoid hyphae absent.....	13
12. Paraphysoid hyphae dichotomously branched, without encrustations.....	<i>H. dura</i> Berk. & Curt.
12'. Paraphysoid hyphae unbranched, apically encrusted .....	<i>H. luteobadia</i>
13. Setae without encrustations.....	<i>H. rubiginosa</i> (Dicks.) Lév.

- 13'. Setae apically encrusted..... 14
14. With two kinds of setae: 35–45 × 5–7 µm, projecting up to 25 µm above the hymenium; 50–75 × 9–15 µm, not projecting..... *H. rigidula* Berk. & Curt.
- 14'. With one kind of setae, 50–110(–130) × 6–16(–18) µm ..... *Pseudochaete tabacina* (Sowerby) T. Wagner & M. Fisch.(separated from *Hymenochaete* by nuclear behavior and phylogenetic evidence; see Wagner and Fischer 2002)
15. Basidiomata resupinate ..... 16
- 15'. Basidiomata pileate, effuse-reflexed to sessile..... 20
16. Encrusted cystidia present in the hymenium..... *H. anomala* Burt
- 16'. Encrusted cystidia absent..... 17
17. Reddish brown granules present among hyphae..... *H. rhabarbarina* Masee
- 17'. Reddish brown granules absent ..... 18
18. Paraphysoid hyphae present..... *H. unicolor*
- 18'. Paraphysoid hyphae absent..... 19
19. Setae 50–150 × 5–8 µm, basidiospores cylindrical to subalantoid ..... *H. cinnamomea* (Pers.) Bres.
- 19'. Setae 30–55 × 4–6.5 µm, basidiospores ovoid to ellipsoid ..... *H. epichlora* (Berk. & M.A.Curtis) Cooke
20. Dichohyphae present in the context and in the hymenium ..... *H. aspera* Berk. & M.A. Curtis
- 20'. Dichohyphae absent..... 21
21. Dichohyphae absent ..... *H. cacao* (Berk.) Berk. & M.A.Curtis
- 21'. Setae longer than 45 µm ..... 22
22. Contextual hyphae almost hyaline and 4–6 µm large, setae 12–18 µm large  
..... *H. berkeleyana* (Mont.) Cooke
- 22'. Contextual hyphae brownish, up to 4 µm large, setae up to 12 µm large..... 23
23. Setae 60–120 × 9–12 µm, basidiospores 5–6 × 1.5–2.5 µm  
..... *H. rheicolor* (Mont.) Lév.
- 23'. Setae 45–75 × 6–9 µm, basidiospores 3.5–4.5 × 1.5–2 µm.....  
..... *H. attenuata* (Lév.) Lév.
24. Cortex present (sect. *Paragymnochaete* J.C. Léger).....  
..... *H. ustulata* G.A.Escobar ex J.C.Léger
- 24'. Cortex absent (sect. *Gymnochaete* G.A. Escobar ex J.C. Léger) ..... 25
25. Dichophyses present, projecting up to 20 µm above the hymenium .....



.....	<i>H. ceratophora</i> D.J. Job	
25'. Dichophyses absent .....		26
26. Setae longer than 80 $\mu\text{m}$ .....		27
26'. Setae shorter than 80 $\mu\text{m}$ .....		28
27. Basidiomata dark rusty brown, crystals present.....	<i>H. contiformis</i> G.H. Cunn.	
27'. Basidiomata paler, crystals absent.....	<i>H. aberrans</i> G.A. Escobar ex J.C. Léger	
28. Setae encrusted.....		29
28'. Setae without encrustations .....		31
29. Setae 70–85 $\mu\text{m}$ long, projecting up to 65 $\mu\text{m}$ above the hymenium .....		
.....	<i>H. cervina</i> Berk. & Curt.	
29'. Setae up to 75 $\mu\text{m}$ long, projecting up to 45 $\mu\text{m}$ above the hymenium.....		30
30. Basidiomata 100–400 $\mu\text{m}$ thick, hymenophore cracking.....	<i>H. corrugata</i> (Fr.) Lév.	
30'. Basidiomata 25–70 $\mu\text{m}$ thick, hymenophore even.....	<i>H. proxima</i> Rick	
31. Basidiospores 6.5–7 $\mu\text{m}$ long.....	<i>H. pratensis</i> Viégas	
31'. Basidiospores up to 5 $\mu\text{m}$ long .....		32
32. Setal layer formed by two or three rows of setae.....	<i>H. minuscula</i> G.Cunn.	
32'. Setal layer not in layers.....		33
33. Crystals present, setae with straight and verrucose apex .....	<i>H. tenuis</i> Peck	
33'. Crystals absent, setae with a slightly curved and smooth apex .....	<i>H. vallata</i> C.G. Cunn.	

## Results and discussion

Ten species of *Coltricia* and 26 of *Hymenochaete* were reported from Brazil up to date. These, four and eight species of *Coltricia* and *Hymenochaete*, respectively are reported from Brazilian Amazonia and six and 27 species from Atlantic forest. After recent collections in areas in North and Northeast Brazil and revision of specimens deposited in herbaria, one species previously unknown to the country was found (*H. iodina*), and three species of *Coltricia* (*C. barbata*, *C. duportii* and *C. velutinea*) and three species of *Hymenochaete* (*H. unicolor*, *H. porioides* and *H. iodina*) was added to Brazilian amazonia. One species, *H. iodine* was added to Atlantic forest.

Additionally, new occurrences to the Brazilian Amazonia and to the Amazonian States of Acre, Amapá, Amazonas, Pará, Rondônia and Roraima are reported. Among those, *C. velutina* was recently described by Baltazar et al. (2010) based on specimens collected in the Atlantic Forest and now found in the Brazilian Amazonia, representing the second record of the species. These results show that further inventories are needed in North and Northeast Brazil in order to get to know the diversity of these genera. Furthermore, several of these new occurrences were found among

previously deposited material in INPA, SP and URM, evidencing the importance of herbarium revisions and accessibility of herbaria records.

## References

- AIME, M. C., T. W. HENKEL AND L. RYVARDEN. 2003. Studies in Neotropical polypores 15: new and interesting species from Guyana. *Mycologia* 95(4): 614–619.
- BALTAZAR, J. M., L. RYVARDEN AND T. B. GIBERTONI. 2010 – The genus *Coltricia* in Brazil: new records and two new species. *Mycologia* 102: 1253–1262.
- CORNER, E. J. H. 1991. *Ad Polyporaceas* VII. Beihefte zur Nova Hedwigia 101: 1–175.
- CUNNINGHAM, G. H. 1965. *Polyporaceae* of New Zealand. *New Zealand Department of Scientific and Industrial Research Bulletin* 164: 1–304.
- DAI, Y. C. AND T. NIEMELÄ. 2006. *Hymenochaetaceae* in China: hydroid, stereoid and annual poroid genera, plus additions to *Phellinus*. *Acta Botanica Fennica* 179:1–78.
- GIBERTONI, T. B., A. C. GOMES-SILVA, C. R. S. LIRA, G. S. N. MELO, V. F. SILVA, L. ARAÚJO-NETA AND E. R. DRECHSLER-SANTOS. 2012. *Hymenochaetales* in Lista de Espécies da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/2012/FB092348>).
- JOB, D. J. 1990. Le genre *Hymenochaete* dans les zones tempérées de l'hémisphère sud. *Mycologia Helvetica* 4: 1–51.
- KIRK, P. M., P. F. CANNON, D. W. MINTER AND J. A. STALPERS. 2008. Ainsworth and Bisby's dictionary of the fungi. 10<sup>th</sup> ed. Wallingford, CAB International.
- LÉGER, J. C. 1998. Le genre *Hymenochaete* Léveillé. *Bibliotheca Mycologica* 171: 1–319.
- PARMASTO, E. 2001. Hymenochaetoid fungi (*Basidiomycota*) of North America. *Mycotaxon* 79: 107–176.
- RYVARDEN, L. 1985. Type studies in the *Polyporaceae* 17. Species described by W.A. Murrill. *Mycotaxon* 23: 169–198.
- RYVARDEN, L. 1991. Genera of Polypores – Nomenclature and taxonomy. *Synopsis Fungorum* 5: 1–363.
- RYVARDEN, L. 2004. Neotropical Polypores Part 1. Introduction, *Ganodermataceae* & *Hymenochaetaceae*. *Synopsis Fungorum* 19: 1–229.
- RYVARDEN, L. AND R. L. GILBERTSON. 1993. European Polypores. Part 1. *Abortiporus* – *Lindtneria*. *Synopsis Fungorum* 6:1–387.
- RYVARDEN, L. AND A. A. R. DE MEIJER. 2002. Studies in Neotropical polypores 14 – new species from the state of Parana, Brazil. *Synopsis Fungorum* 15:34–69.

- TEDERSOO, L., T. SUVI, K. BEAVER AND I. SAAR. 2007. Ectomycorrhizas of *Coltricia* and *Coltriciella* (*Hymenochaetales*, *Basidiomycota*) on *Caesalpinaceae*, *Dipterocarpaceae* and *Myrtaceae* in Seychelles. *Mycological Progress* 6(2): 101–107.
- THIERS, B. [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/>
- WAGNER, T. AND M. FISCHER. 2002. Classification and phylogenetic relationships of *Hymenochaete* and allied genera of the *Hymenochaetales*, inferred from rDNA sequence data and nuclear behaviour of vegetative mycelium. *Mycological Progress* 1(1): 93–104.
- WATLING, R. 1969. Colour Identification Chart. Edinburgh, Scotland: Her Majesty's Stationary Office.