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Diversity of the poroid Hymenochaetaceae (Basidiomycota) from the Atlantic Forest and Pampa in Southern Brazil

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Abstract – A synopsis of the current knowledge about the poroid Hymenochaetaceae from Southern Brazil (States Paraná, Santa Catarina and Rio Grande do Sul) is presented. Forty-two species belonging to nine genera are reported from the areas surveyed. An annotated, partly illustrated, checklist and identification keys are provided. The new combinations *Fomitiporia bambusarum* and *Fulvifomes rhytiphloeus* are also proposed.

Atlantic Forest / Hymenochaetales / Neotropics / Taxonomy

INTRODUCTION

Hymenochaetaceae was formally described by Donk in 1948. It includes taxa whose basidiomata present permanent positive xantochroic reaction – dark discoloration in alkali –, yellow to brown tubes trama, simple septate generative hyphae, mono- to dimitic hyphal system, and variable occurrence of setoid structures such as hymenial or extra-hymenial setae or setal hyphae. The family encompasses a group of wood-decomposing causing white rot of wood (Hoff *et al.* 2004).

The poroid basidiomycetes have been continuously surveyed in Southern Brazil, mainly in the last two decades (e.g. Drechsler-Santos *et al.* 2008, Campos-Santana and Loguercio-Leite 2008, 2010, Silveira *et al.* 2008, Baltazar and Gibertoni 2009, Campacci and Gugliotta 2009, Coelho *et al.* 2009, Meijer 2010, Westphalen *et al.* 2010, Gerlach *et al.* 2013). However, globally, the poroid Hymenochaetaceae have been less addressed than other groups (Baltazar and Gibertoni 2009, Baltazar *et al.* 2009, Gerlach *et al.* 2013).

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In this paper, we present a synopsis of the poroid Hymenochaetaceae species in Southern Brazil based on newly collected material, revision of reference herbarium material, and literature data. More than 600 collections of poroid Hymenochaetaceae species were gathered through field trips.

Forty-two species representing nine genera were identified. Ten species were previously unknown from the area, and the distribution ranges of several species are extended. Two new combinations are proposed, *Fomitiporia bambusarum* and *Fulvifomes rhytiphloeus*. The generic placement of several species also is discussed; some of the generic entities as commonly accepted are morphologically heterogeneous and more likely phylogenetically polyphyletic. Critical morphological studies complemented by DNA-based phylogenetic studies are still necessary to better circumscribe the different genera in Hymenochaetaceae.

MATERIALS AND METHODS

Newly collected materials originate from the States of Paraná (PR), Santa Catarina (SC) and Rio Grande do Sul (RS), between 22°30' and 33°45'S/ 48°02' and 57°40'W. Field trips were carried out periodically between March 2010 and April 2013 in 29 localities. The Region of Brazil comprises 576,409.6 km² and the climate is tropical to subtropical.

Two Biomes types, the Atlantic Forest and the Southern Grasslands (also known as “Pampa”) were surveyed. The Atlantic Forest is the second largest rain forest biome of South America. It extends from approx. from 3 to 30°S and 35°W to 60°W along the Atlantic coast of Brazil, with several incursions westward into smaller inland areas of Paraguay and Argentina (Ribeiro *et al.* 2009). The Atlantic Forest is a complex mosaic of different vegetation types, and encompasses mostly blocks of evergreen to semi-deciduous forest, or deciduous forests. It also includes areas of mangroves, swamps, restingas and even southernly, patches of mixed *Araucaria-Pinus* forest. Nowadays, only 12.5% of the original forest remains, consisting mostly of rather small surface, above 3 hectares. Forest areas of more 100 hectares cover only 8.5% of the original forest extension. The annual precipitation ranges from 1,000-4,200 mm.

The Southern Grasslands is characterized by grass dominated vegetation mixed with shrubs and small-stemmed trees. The annual precipitation ranges from 1200-1600 mm and the mean annual temperature is 13-17°C (Overbeck *et al.* 2007).

Macro- and microscopical descriptions of the specimens followed Campos-Santana *et al.* (2014). Colors are described according to Kornerup and Wanscher (1981). To study the staining reaction of the basidiospores and hyphae, sections of the basidiomata were examined in Melzer's reagent, lactic acid cotton blue, and KOH 4%. All microscopic measurements were done in Melzer's reagent. In presenting the size range of several microscopic elements, 5% of the measurements at each end of the range are given in parentheses when relevant. The following abbreviations are used: ave = arithmetic mean/average, Q = the ratio of length/width of basidiospores, and ave_q = arithmetic mean of the ratio R. Analyzed specimens are stored at ICN, and specimens from other herbaria (BAFC, CORD, LPS, MUCL, NY and PACA) were also analyzed to confirm some species identification (herbarium acronyms according to Thiers 2013).

TAXONOMY

Key to the genera of poroid Hymenochaetaceae found in southern Brazil

1. Basidiomata stipitate, meso/ pleuropodal *Phylloporia*
- 1'. Basidiomata sessile, resupinate to pileate 2
 2. Basidiomata fully resupinate 3
 - 2'. Basidiomata reflexed to pileate 6
3. Basidiospores dextrinoid *Fomitiporia*
- 3'. Basidiospores not dextrinoid 4
 4. Basidiospores hyaline, thin- to slightly thick-walled; basidiospores print white; hymenial setae present, straight to lanceolate *Fuscoporia*
 - 4'. Basidiospores yellow to brownish, thick-walled; basidiospores print cream to pale brown; hymenial setae absent or present then ventricose 5
5. Basidiomata cushion-shaped; setae present, ventricose; basidiospores yellowish; basidiospores print cream-colored *Phellinus*
- 5'. Basidiomata effused; setae absent; basidiospores brownish; basidiospores print brown *Fomitiporella*
6. Basidiospores dextrinoid *Fomitiporia*
- 6'. Basidiospores not dextrinoid 7
7. Basidiospores hyaline to pale yellow in KOH; basidiospores print white to cream 8
- 7'. Basidiospores distinctly brown coloured (olivaceous, rust to dark brown); basidiospores print brown 10
 8. Basidiospores yellowish, distinctly thick-walled; basidiospores print cream colored; setae ventricose *Phellinus*
 - 8'. Basidiospores hyaline, thin- (to slightly thick-walled); basidiospores print white 9
9. Hyphal system dimitic; setae lanceolate *Fuscoporia*
- 9'. Hyphal system monomitic; setae subulate *Cyclomyces*
10. Basidiospores olivaceous brown *Aurificaria*
- 10'. Basidiospores rust brown or darker 11
11. Setae (hymenial/extra-hymenial) present *Inonotus s.l.*
- 11'. Setae (hymenial/extra-hymenial) absent *Fulvifomes*

Aurificaria D.A. Reid, Kew Bull. 17(2): 278, 1963.

Aurificaria luteoumbrina (Romell) D.A. Reid, Kew Bull. 17: 279, 1963.

≡ *Phaeoporus luteoumbrinus* Romell, Bihang K. Svenska vet. akad. handlingar 26: 27, 1901.

Description: Ryvarden (2004).

Distribution in Southern Brazil: Santa Catarina (Gerber and Loguercio-Leite 2000, Drechsler-Santos *et al.* 2008).

Specimen examined: BRAZIL, SANTA CATARINA: Joinville, Bairro Paranaguamirim, 11/X/2010, *Campos-Santana* 292 (ICN).

Other specimen examined: ARGENTINA, CÓRDOBA: Jujuy, Dpto. Ledesma, Parque Nacional Calilegua, Sendero Pedemontano, 01/IV/2008, *Robledo* 1825 (CORD).

Remark: the species is characterized by pileate basidiomata with dimidiate to flabelliform pilei, soft when fresh, drying rigid and curved, a monomitic hyphal system, absence of setae, and hyaline to pale brown basidiospores, discoloring to olivaceous brown in KOH. The pileus surface has a hard cuticle.

Cyclomyces Fr., *Linnaea* 5: 512, 1830.

Cyclomyces iodinus (Mont.) Pat., *Essai taxonomique sur les familles et les genres des Hyménomycètes* 98, 1900. Figs 1-2

≡ *Polyporus iodinus* Mont., *Ann. Sci. Nat., Bot.* 16: 108, 1841.

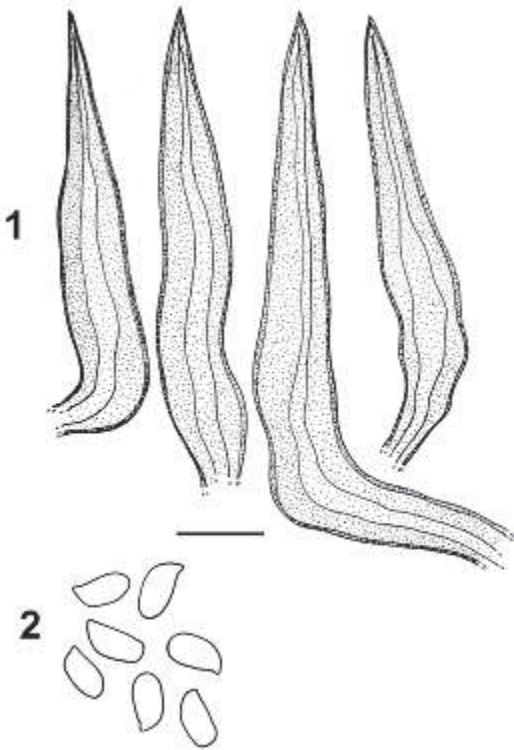
Description: Ryvarden (2004).

Distribution in Southern Brazil: Paraná (Ryvarden and Meijer 2002, Meijer 2006) and Santa Catarina (Loguercio-Leite and Wright 1991, Gerber 1996, Gonçalves and Loguercio-Leite 2001, Groposo and Loguercio-Leite 2005). First record from Rio Grande do Sul.

Specimens examined: **BRAZIL, PARANÁ:** Matinhos, APA Guaratuba, 13/XI/2010, *Campos-Santana* 411 (ICN); Foz do Iguçu, Parque Nacional do Iguçu, Trilha do Poço Preto, 12/XII/2010, *Campos-Santana* 467 (ICN); *ibid.*, Trilha da Bananeira, 13/XII/2010, *Campos-Santana* 480 (ICN); **SANTA CATARINA:** Itapuá, RPPN Volta Velha, 23/II/2011, *Campos-Santana* 512 (ICN); *ibid.*, *Campos-Santana* 519 (ICN); **RIO GRANDE DO SUL:** São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 26/III/2010, *Campos-Santana* 38 (ICN).

Other specimens examined: **ARGENTINA, CATAMARCA:** Dpto. Paclín, Arroyo Los laureles, Robledo 1733 (CÓRD).

Remark: the species is distinguished by its dimidiate to flabeliform, flattened pilei, with a tomentose and concentrically sulcate pileal surface. Microscopically, the species is characterized in having a monomitic hyphal system, abundant, straight hymenial setae and cylindrical to ellipsoid basidiospores, $4.0\text{-}4.5 \times 2.0\text{-}2.5 \mu\text{m}$ (Ryvarden 2004).



Figs 1-2. *Cyclomyces iodinus*. **1.** Hymenial setae. **2.** Basidiospores (1 and 2 scale bar = 10 μm).

Fomitiporella Murrill, *North Am. Flora* 9: 12, 1907.

Fomitiporella umbrinella (Bres.) Murrill, *North Am. Flora* 9(1): 13, 1907. Fig. 3

≡ *Poria umbrinella* Bres., *Hedwigia* 35: 282, 1896.

Description: Núñez and Ryvarden (2000), Ryvarden (2004).

Distribution in Southern Brazil: Paraná (Rajchenberg and Meijer 1990, Ryvarden and Meijer 2002, Meijer 2006); Santa Catarina (Loguercio-Leite 1990, as *Poria umbrinella*, Loguercio-Leite and Wright 1991, 1995, Groposo and

Loguercio-Leite 2005) and Rio Grande do Sul (Rick 1960, as *Poria umbrinella* Bres.).

Specimens examined: **BRAZIL, SANTA CATARINA:** Florianópolis, Morro da Lagoa da Conceição, 07/VIII/1987, Loguercio-Leite & Jimena Furlani 12 (FLOR 10495); *ibid.*, 06/X/2010, *Campos-Santana* 259 (ICN); *ibid.*, *Campos-Santana* 263 (ICN); **RIO GRANDE DO SUL:** Dom Pedro de Alcântara, RPPN do professor Luis Baptista, *Campos-Santana* 19 (ICN); *ibid.*, *Campos-Santana* 20 (ICN); São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 26/III/2010, *Campos-Santana* 49 (ICN); *ibid.*, 07/VI/2010, *Campos-Santana* 186 (ICN); *ibid.*, 22/05/2011, *Campos-Santana* 571 (ICN); São Francisco de Paula, Hotel Veraneio Hampel, 27/III/2010, *Campos-Santana* 56 (ICN); *ibid.*, Santa Maria, Itaara, Parque Pinhal, 02/VIII/1991, *G. Coelho* 3-1 (ICN 97803); São Leopoldo, 1940, *J. Rick* 18720 (PACA 8674).

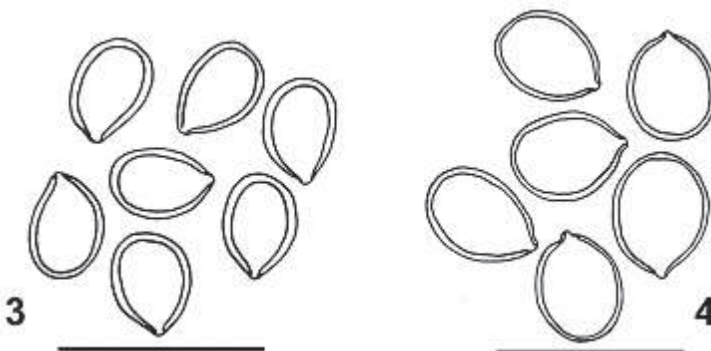
Remark: the species is characterized by a resupinate, effused and adnate basidiomata, with 8-9 pores/mm, and small, ellipsoid (with a flattened side), thick-walled, ochre brown to dark reddish brown (in KOH) basidiospores, $4.0-4.5(-5.0) \times 3.0-3.5(-4.0) \mu\text{m}$, and absence of setae.

Phylogenetic analysis (Wagner and Fischer 2002, Larsson *et al.* 2006) showed that *F. umbrinellus* clustered with other species with similar characters in an independent *Fomitiporella* clade, distant from the *Phellinus* s.s. clade. *Fomitiporella* is related to *Phylloporia*, *Inocutis* and *Fulvifomes*. *Fomitiporella*, *Fulvifomes* and *Phylloporia* have yellow to brown, ellipsoid basidiospores, with a flattened side and lack setae.

Fomitiporia Murrill, North Am. Flora 9: 7, 1907.

Key to *Fomitiporia* species

1. Basidiomata pileate. 2
- 1'. Basidiomata resupinate, effused, cushion-shaped, or pseudopileate 3
 2. Pores 5-6/mm; pileus rimose with age; basidiospores $6.0-7.5 \times 6.0-6.5 \mu\text{m}$; basidiomata appanate to unguulate. . *Fomitiporia* sp. (*F. robusta* complex)
 - 2'. Pores 7-10/mm; pileus not rimose; basidiospores $5.0-6.0 \times 4.0-5.0 \mu\text{m}$; basidiomata triquetrous. *F. apiahyna* s.l.
3. Hymenial setae present 4
- 3'. Hymenial setae absent 5



Figs 3-4. *Fomitiporella umbrinella*. **3.** Basidiospores; *Fomitiporella apiahyna*. **4.** Basidiospores (3 and 4, scale bar = 10 μm).

4. Hymenial setae slightly ventricose, apex acute; basidiospores $4.0-5.0 \times 3.5-4.5 \mu\text{m}$; on bamboo *F. bambusarum*
- 4'. Hymenial setae fusiform, slightly ventricose or lageniform, apex pointed to rounded; basidiospores $5.0-7.0(-7.5) \times 4.5-7.0 \mu\text{m}$; on other hosts.
..... *F. neotropica*
5. Basidiomata cushion-shaped, pseudopileate; basidiospores $(5.5-)6.0-8.0(-8.5) \times (5.0-)5.7-7.3 (-7.5) \mu\text{m}$ *F. dryophila*
- 5'. Basidiomata resupinate, effused; basidiospores $5-7(-7.5) \times 4.5-7 \mu\text{m}$
..... *F. neotropica*

Fomitiporia apiahyna (Spegazzini) Robledo, Decock & Rajchenberg *s.l.*,
Mycologia 102(6): 1315, 2010.

Fig. 4

≡ *Fomes apiahynus* Speng., Bol. Acad. Nac. Cien., Córdoba 11(4): 438, 1889.

Description: Loguercio-Leite and Wright (1995), Ryvarden (2004).

Distribution in Southern Brazil: Paraná (Rajchenberg and Meijer 1990, Meijer 2006); Santa Catarina (Loguercio-Leite and Wright 1991, 1995, Gerber 1996, Groposo and Loguercio-Leite 2002, Drechsler-Santos *et al.* 2008a); Rio Grande do Sul (Groposo and Loguercio-Leite 2002).

Specimens examined: **BRAZIL, PARANÁ:** Ponta Grossa, Parque Estadual de Vila Velha, 30/IV/1989, *A.de Meijer 1225* (BAFC 31979); **SANTA CATARINA:** Itapua, RPPN Volta Velha, Trilha da Casa de Vidro, 24/IV/2013, *Campos-Santana 661* (ICN).

Other specimens examined: **ARGENTINA, MISSIONES:** Parque Nacional do Iguacu, 27/X/1973, *Wright, Dechamps & Del* (BAFC 24382, Cult. 2626, holotype of *Phellinus elegans*); **BRAZIL, SÃO PAULO:** Apiaí, V/1888, *J.Puiggari 1438* (BAFC 24922, holotype of *Fomes apiahynus*).

Remark: the species concept used here follows Ryvarden (2004) and should be considered as *sensu lato* (or *sensu* Ryvarden 2004). As shown by Amalfi and Decock (2013), *F. apiahyna s. l.* (Ryvarden 2004) encompasses more than one species; the *F. apiahyna* lineage comprises at least 4 distinct phylogenetic species in the Neotropics (Amalfi and Decock 2013).

Fomitiporia apiahyna s.l. is characterized by pileate basidiomata, small triquetrous pileus the surface of which thinly sulcate, 7-10 pores/mm, lack of hymenial setae and globose to subglobose, thick-walled basidiospores $5-6 \times 4-5 \mu\text{m}$. Wright and Blumenfeld (1984) described this species as *Phellinus elegans*, with thin-walled basidiospores. In our materials, the basidiospores are typically thick-walled and dextrinoid, as previously described (Loguercio-Leite and Wright 1995, Ryvarden 2004).

Fomitiporia bambusarum (Rick) Campos-Santana & Decock **comb. nov.** Figs 5-7

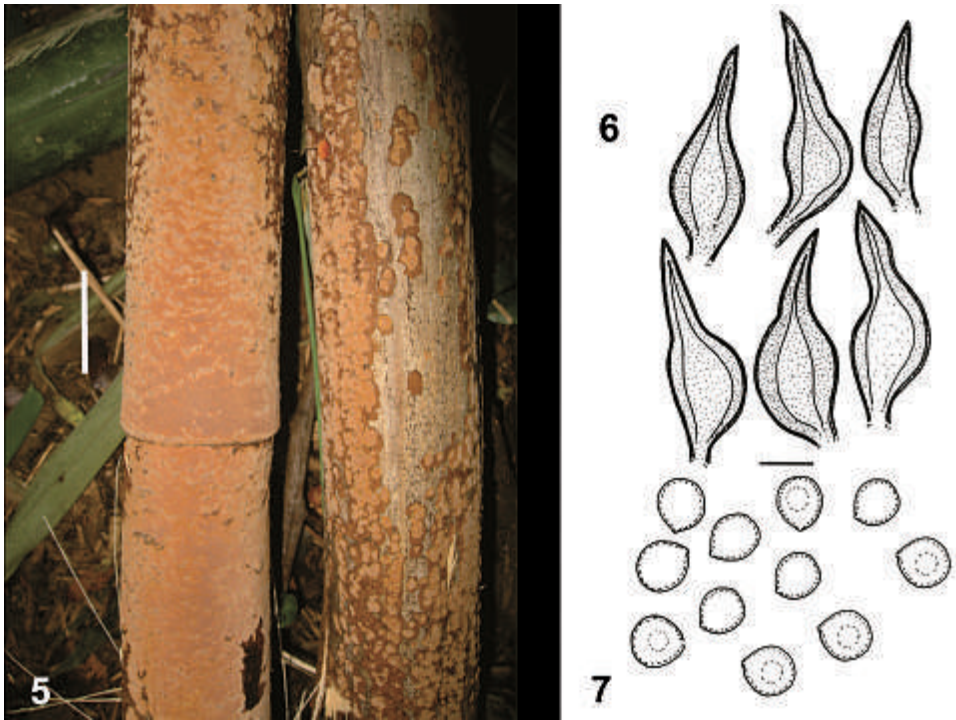
[Mycobank MB 809550]

≡ *Poria bambusarum* Rick, Brotéria, Ci. Nat. 6: 146, 1937 (basionym).

≡ *Phellinus rickianus* J.E. Wright & J.R. Deschamps, Mycotaxon 21: 414, 1984.

Description: Larsen and Cobb-Poullé (1990).

Distribution in Southern Brazil: Paraná (Rajchenberg and Meijer 1990, Ryvarden and Meijer 2002, Meijer 2006); Santa Catarina (Gerber and Loguercio-Leite 2000, Drechsler-Santos *et al.* 2008, Loguercio-Leite *et al.* 2008b); Rio Grande do Sul (Coelho *et al.* 2009).



Figs 5-7. *Fomitiporia bambusarum*. 5. Basidiomata *in situ* (scale bar = 3 cm). 6. Hymenial setae. 7. Basidiospores (6 and 7, scale bar = 10 μ m).

Specimens examined: **BRAZIL, PARANÁ**: Piraquara, Morro do Canal, 12/XI/2010, *Campos-Santana* 378 (ICN); *ibid.*, *Campos-Santana* 394 (ICN); *ibid.*, *Campos-Santana* 395 (ICN); **RIO GRANDE DO SUL**: Dom Pedro de Alcântara, RPPN do professor Luis Baptista, 12/III/2010, *Campos-Santana* 2 (ICN); *ibid.*, *Campos-Santana* 14 (ICN); *ibid.*, 13/VIII/2011, *Campos-Santana* 630 (ICN); *ibid.*, *Campos-Santana* 633 (ICN); *ibid.*, *Campos-Santana* 637 (ICN); *ibid.*, Mourinhos do Sul, Lajeado, 13/III/2010, *Campos-Santana* 26 (ICN); *ibid.*, *Campos-Santana* 28 (ICN); *ibid.*, *Campos-Santana* 29 (ICN); São Salvador, 1939 (*Fungi Rickiani* 13938, PACA, lectotype of *Poria bambusarum*); *ibid.*, Santa Maria, Distrito de Boca do Monte, EPAGRO, 26/III/2003, leg. G. Coelho 382-7 (ICN 139047).

Other specimens examined: **BRAZIL, RIO GRANDE DO SUL**: Francisco de Paula, Potreiro Velho, Pró-Mata, Três Forquilhas trail, 10/VI/2005, G. Coelho *et al.*, (ICN139044, holotype of *Fomitiporia sanctichampagnatii* G. Coelho, R.M.Silveira & Rajchenb); *ibid.*, 01/VI/2006, G.Coelho *et al.*, (ICN 139201, *F. sanctichampagnatii*); *ibid.*, (ICN 139202, *F. sanctichampagnatii*); *ibid.*, (ICN 139203, *F. sanctichampagnatii*).

Remark: the globose to subglobose, hyaline, and dextrinoid basidiospores clearly point toward *Fomitiporia*, as already noted by Coelho *et al.* (2009). For a more detailed discussion on this taxon see Rajchenberg (1987a), Rajchenberg (1987b), Larsen and Cobb-Pouille (1990), and Coelho *et al.* (2009).

Fomitiporia bambusarum belongs to a bamboo-specific species complex, which includes *F. sanctichampagnatii*, *F. spinescens* and *Phellinus garuhapensis*.

Fomitiporia bambusarum and *F. sanctichampagnatii* are differentiated by their pore size, respectively (8-)9-11(-12)/mm and 2-5/mm; *Fomitiporia spinescens* is differentiated in having spinulated setae, whereas *P. garuhapensis* in having undextrinoid basidiospores (Coelho *et al.* 2009). A phylogenetic approach is desirable to solve the relationships within this complex.

Hjortstam and Ryvardeen (1990) also revised the holotype of *Lopharia bambusae* and determined it as “cfr. *Phellinus punctatus* (Fr.) Pilát”.

Fomitiporia dryophila Murrill, North Am. Flora 9(1): 8, 1907.

≡ *Poria dryophila* (Murrill) Sacc. & Trotter, Sylloge Fungorum 73: 11, 1948.

Description: Decock *et al.* (2007), Raymundo *et al.* (2012).

Distribution in Southern Brazil: First record from Brazil.

Specimen examined: **BRAZIL, RIO GRANDE DO SUL:** São Francisco do Sul, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 07/VI/2010, Campos-Santana 190 (ICN).

Remark: *Fomitiporia dryophila* is characterized by resupinate to pseudopileate basidiomata, developing a black pseudopileus, becoming rimose in aging, and by the lack of hymenial setae.

The taxonomic status of the species has been for a long time questioned (Lowe 1966). *Fomitiporia dryophila* was considered as a synonym of *Fomes robustus* (Lowe 1957) or of *F. punctata* (Lowe 1966, Fiasson and Niemelä 1984, Fischer 1996, 2002, Ryvardeen 1985, 1991, Gilbertson and Ryvardeen 1987). However, critical morphological analysis and phylogenetic studies recognized *F. dryophila* as a distinct species (Decock *et al.* 2007). Decock *et al.* (2007) separated this species from *F. punctata* by having a brighter pores surface and by forming a black and rimose pseudopileus. *Fomitiporia robusta* is distinguished by its true pileate basidiomata. *Fomitiporia langloissi* is a related species, sympatric with *F. dryophila* in Southeastern United States and Northeastern Mexico. It is distinguished by having effused resupinate basidiomata and smaller basidiospores [6.0-6.5(-7.0) × 5.0-6.5 µm].

Fomitiporia punctata was reported from Southern Brazil as *F. punctata* or *Phellinus punctatus* (Campos-Santana and Loguercio-Leite 2008, Ryvardeen and Meijer 2002, Silveira and Guerrero 1991). However, very likely, *F. punctata* is restricted to the temperate areas of the Northern hemisphere and absent from the Neotropics. The voucher specimens of *F. punctata* in Southern Brazil should be revised and compared to *F. dryophila*.

Fomitiporia neotropica Campos-Santana, Amalfi, R.M. Silveira, Robledo & Decock, Mycol. Progr., 2014.

Description: Campos-Santana *et al.* (2014).

Distribution in Southern Brazil: Santa Catarina and Rio Grande do Sul (Campos-Santana *et al.* 2014).

Specimens examined: **BRAZIL, SANTA CATARINA:** Florianópolis, Unidade de Conservação Ambiental Desterro – UCAD, 02/X/2010, Campos-Santana 253/10 (ICN 190599; culture ex-MUCL 54206); **RIO GRANDE DO SUL:** Itapuã, Parque Estadual de Itapuã, 16/X/2010, Campos-Santana 319/10 (ICN 190600; culture ex-MUCL 54212); *ibid.*, Morrinhos do Sul, Lajeado, 13/III/2010, Campos-Santana 030/10 (ICN 190598; culture ex-MUCL 54196); *ibid.*, Porto Alegre, Refúgio da Vida Silvestre da UFRGS, approx, 16/VIII/2011, Campos-Santana 644/11 (ICN 190601; culture ex-MUCL 54246).

Other specimens examined: **ARGENTINA, CORDOBA:** San Justo, Miramar, Mar Chiquita, 29/VII/2007, *Robledo 1713* (MUCL 49549; culture ex-MUCL 49549); *ibid.*, Jujuy province, Parque Nacional Calilegua, Sendero La Junta, IV/2008, *M. Amalfi, AR 7508* (holotype, MUCL 51335; isotype NY, culture ex-holotype MUCL 51335, CBS); *ibid.*, *M. Amalfi, AR 7608* (MUCL 51336, culture ex- MUCL 51336). **FRENCH GUIANA:** Regina, Nouragues Natural Reserve, CNRS “inselberg” research plots, “grand Plateau”, 04/VIII/2010, *C. Decock, FG-10-263* (MUCL 53114, culture ex-MUCL 53114); *ibid.*, 21/VII/2013, *C. Decock, FG-13-789* (MUCL 55071, culture ex-MUCL 55071).

Remark: *Fomitiporia neotropica* was described from the Neotropics on the basis of collections originating from Argentina, Brazil and French Guiana (Campos-Santana *et al.* 2014). Hymenial setae are variably present in this taxon; most of the collections examined lack setae, which were only present in two collections from Argentina.

Fomitiporia maxonii Murrill has been reported from Brazil (Ryvarden and Meijer 2002). The voucher specimens at the origin of these citations should be carefully revised; they might represent *F. neotropica*.

***Fomitiporia sp. (F. robusta* (P. Karst.) Fiasson & Niemelä complex), Karstenia 24: 25, 1984. Fig. 8**

≡ *Fomes robustus* P. Karst., *Bidrag till Kännedom av Finlands Natur och Folk* 48: 467, 1889.

Description: Larsen and Cobb-Pouille (1990), Ryvarden (2004).

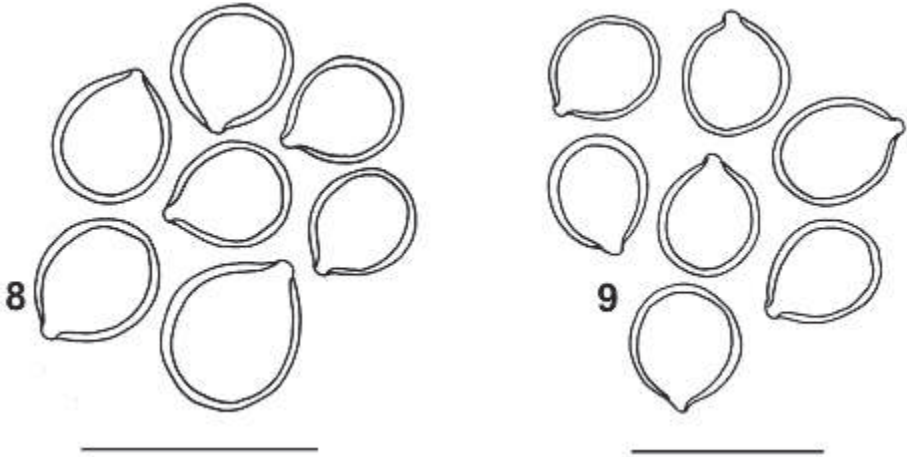
Distribution in Southern Brazil: Rio Grande do Sul (Rick 1960, as *Fomes robustus* P. Karst.; Loguercio-Leite *et al.* 2008a); Santa Catarina (Loguercio-Leite *et al.* 2008a).

Specimens examined: **BRAZIL, SANTA CATARINA:** Florianópolis, Morro da Lagoa da Conceição, 27/V/2011, *Campos-Santana 596* (ICN); **RIO GRANDE DO SUL:** São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 24/V/2010, *Campos-Santana 155* (ICN); *ibid.*, *Campos-Santana 163* (ICN); *ibid.*, 07/VI/2010, *Campos-Santana 172* (ICN); *ibid.*, *Campos-Santana 187* (ICN); Viamão, Parque Estadual de Itapuã, 16/X/2010, *Campos-Santana 311* (ICN); Santa Maria, Caturrita, Sítio Aldorino, 05/IV/1992, *G. Coelho 16-8* (ICN 97785, *Phellinus robustus*); São Leopoldo, 01/XII/1994, *J. Rick 22977* (PACA 7585).

Remark: our collections are characterized by pileate, unguulate basidiomata, the pileus surface deeply concentrically furrowed and becoming rimose in aging, with radial cracks forming small cubic blocks, overall grayish to black. The macro- and micromorphological characters of our collections points towards *F. robusta sensu* Ryvarden (2004).

However, the concept of *F. robusta* used by Ryvarden (2004) should be considered as *sensu lato*. Phylogenetic analysis demonstrated that the *F. robusta* concept in North America (Gilbertson and Ryvarden 1987) encompassed several species, as for instance *F. bakeri* or *F. calkinsii* (Vlasák and Kout 2011). *Fomitiporia robusta s.s.* is more likely restricted to Eurasia (Amalfi *et al.* 2010, 2012, Amalfi and Decock 2013, Vlasák and Kout 2011) and absent from North America; *a fortiori*, it is also absent from the Neotropics (Decock *et al.* 2007, Amalfi and Decock 2013).

As it was not possible to obtain good PCR quality DNA from our collections, the species is here accepted as *Fomitiporia sp.*



Figs 8-9. *Fomitiporia* sp. (*F. robusta* complex). 8. Basidiospores; *Fulvifomes fastuosus*. 9. Basidiospores (8 and 9, scale bar = 10 μ m).

Fulvifomes Murrill, Northern Polypores (5): 49, 1914.

Key to *Fulvifomes* species

1. Basidiomata resupinate..... 2
- 1'. Basidiomata pileate..... 3
 2. Pores circular; basidiospores ellipsoid, yellowish brown, 3.0-4.0 \times 2.5-3.0 μ m..... *F. membranaceus*
 - 2'. Pores angular; basidiospores ovoid to ellipsoid, yellowish to pale golden brown, 4.0-5.0 \times 3.0-3.5 μ m..... *F. melleoporus*
3. Pores 4-5/mm; pileal surface distinctly rimose with age..... *F. rimosus*
- 3'. Pores 7-10/mm; pileal surface not rimose with age..... 4
 4. Context dark fulvous to reddish-brown, up to 6 mm thick.... *F. merrillii*
 - 4'. Context golden-brown or bright with a silky luster, up to 15 mm thick... 5
5. Basidiospores thin-walled, yellow brown in KOH..... *F. durissimus*
- 5'. Basidiospores thick-walled, golden to rusty brown in KOH..... 6
 6. Context golden-brown to more cinnamon or ferruginous.... *F. fastuosus*
 - 6'. Context golden-brown or bright with a silky luster, up to 15 mm thick....
..... *F. rhytiploeus*

Fulvifomes durissimus (Lloyd) Bondartseva & S. Herrera, Mikol. Fitopatol. 26(1): 13, 1992.

≡ *Fomes durissimus* Lloyd, Mycol. Writings 6(62): 943, 1920.

Description: Roy (1979), Herrera and Bondartseva (1985).

Distribution in Southern Brazil: This is the first record from Brazil.

Specimen examined: BRAZIL, RIO GRANDE DO SUL: São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 08/XI/2010, Campos-Santana 375 (ICN).

Remark: the species is characterized by applanate to unguulate basidiomata, the pileus surface concentrically furrowed, 7-10 pores/mm, lack of hymenial setae and setal hyphal, and subglobose, thin-walled, dark reddish brown (in KOH) basidiospores (Herrera and Bondartseva 1985).

Fulvifomes fastuosus (Lév.) Bondartseva & S. Herrera, Mikol. Fitopatol. 26(1): 13, 1992. Fig. 9

≡ *Polyporus fastuosus* Lév., Ann. Sci. Nat., Bot. 2: 190, 1844.

Description: Núñez and Ryvar den (2000).

Distribution in Southern Brazil: Paraná (Gerber and Loguercio-Leite 2000, Ryvar den and Meijer 2002, Meijer 2006, as *Fulvifomes fastuosus* (Lév.) Bondartseva & S. Herrera); Rio Grande do Sul (Teixeira 1950, Rick 1960, as *Fomes fastuosus* (Lév.) Cooke).

Specimens examined: **BRAZIL, PARANÁ:** Céu Azul, Trilha Manuel Gomes, 14/XII/2010, *Campos-Santana 483* (ICN); **RIO GRANDE DO SUL:** Santa Maria, Barragem Ibucuú-mirim, 12/XI/1991, *G. Coelho 4-2* (ICN 97699).

Remark: in our collection and the ICN – 97699, we noticed that this species has ungluate basidiome, with the pileus surface concentrically furrowed, 7-10 pores/mm, lack of setae, and subglobose dark reddish brown (in KOH) basidiospores as noted by Núñez and Ryvar den (2000) and Ryvar den (2004).

Fulvifomes melleoporus (Murrill) Baltazar & Gibertoni, Mycotaxon 111: 205, 2010.

≡ *Fomitiporella melleopora* Murrill, North Am. Flora 9(1): 13, 1907.

Description: Larsen and Cobb-Poull e (1990), Ryvar den (2004).

Distribution in Southern Brazil: Rio Grande do Sul (Westphalen *et al.* 2010, as *Phellinus melleoporus*). First record from Paraná and Santa Catarina.

Specimens examined: **BRAZIL, RIO GRANDE DO SUL:** Viamão, Parque Estadual de Itapuã, 16/X/2010, *Campos-Santana 309* (ICN); *ibid.*, *Campos-Santana 316* (ICN); Derrubadas, Parque Estadual do Turvo, 26/X/2010, *Campos-Santana 341* (ICN).

Remark: *Fulvifomes melleoporus* is characterized by a resupinate, effused basidiomata. The pore surface is golden brown, discoloring to dark purplish brown in older specimens, and the pores are angular, 5-7/mm. The basidiomata lack setae and the basidiospores are ellipsoid to subglobose, yellow to golden brown basidiospores, 3.0-5.0 × 3.0-4.0 µm. This is the first record for Paraná and Santa Catarina.

We follow here the taxonomic placement in *Fulvifomes* as proposed by Baltazar and Gibertoni (2010). However, the resupinate basidiomata and the small basidiospores might indicate a different alliance of species within the Hymenochaetaceae. Affinities might be searched for in *Fomitiporella*.

DNA-based phylogenetic inferences would be desirable to ascertain its affinities and those of other related taxa such as *Fulvifomes membranaceus* for instance.

Fulvifomes membranaceus (J.E. Wright & Blumenf.) Baltazar & Gibertoni, Mycotaxon 111: 206, 2010.

≡ *Phellinus membranaceus* J.E. Wright & Blumenf., Mycotaxon 21: 422, 1984.

Description: Larsen and Cobb-Poull e (1990).

Distribution in Southern Brazil: First record from Southern Brazil.

Specimen examined: **BRAZIL, RIO GRANDE DO SUL:** Santa Maria, 14/V/2010, *Campos-Santana 137* (ICN).

Remark: the species is characterized by resupinate basidiomata, with a hard consistency, lack of setae and hyaline to pale yellow, thick-walled

basidiospores, $3.0\text{-}4.0 \times 2.5\text{-}3.0 \mu\text{m}$. The resupinate habit and the small basidiospores might also indicate a different alliance of species (cf. remark under *F. melleoporus*).

Fulvifomes merrillii (Murrill) Baltazar & Gibertoni, Mycotaxon 111: 206, 2010.

Fig. 10

≡ *Pyropolyporus merrillii* Murrill, Bull. Torrey Bot. Club 34: 479, 1907.

Description: Núñez and Ryvarden (2000).

Distribution in Southern Brazil: Paraná (Rajchenberg and Meijer 1990, Meijer 2006, as *Fomitiporella merrillii* (Murrill) Teixeira). First record from Rio Grande do Sul.

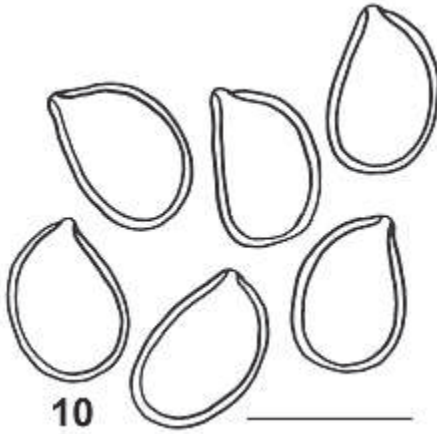


Fig. 10. *Fulvifomes merrillii*. 10. Basidiospores (scale bar = $10 \mu\text{m}$).

Specimens examined: **BRASIL, RIO GRANDE DO SUL:** São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 24/V/2010, *Campos-Santana 153* (ICN); *ibid.*, 22/V/2011, *Campos-Santana 573* (ICN); *ibid.*, *Campos-Santana 580* (ICN).

Other specimen examined: **PHILIPPINE, PALAWAN:** Culion, XII/1902, Murrill #3579, BAFC 27760 (Ex. NY 883, type of *Pyropolyporus merrillii* Murrill.).

Remark: the species is distinguished by its unguulate basidiomata, with a concentrically furrowed pileus surface, reddish brown, darkening with age er, not rimose, the poorly developed to absent context, small pores, absence of setae and broadly ellipsoid dark reddish brown basidiospores.

Fulvifomes rhytiphloeus (Mont.) Campos-Santana & Robledo **comb. nov.**

Figs 11-13

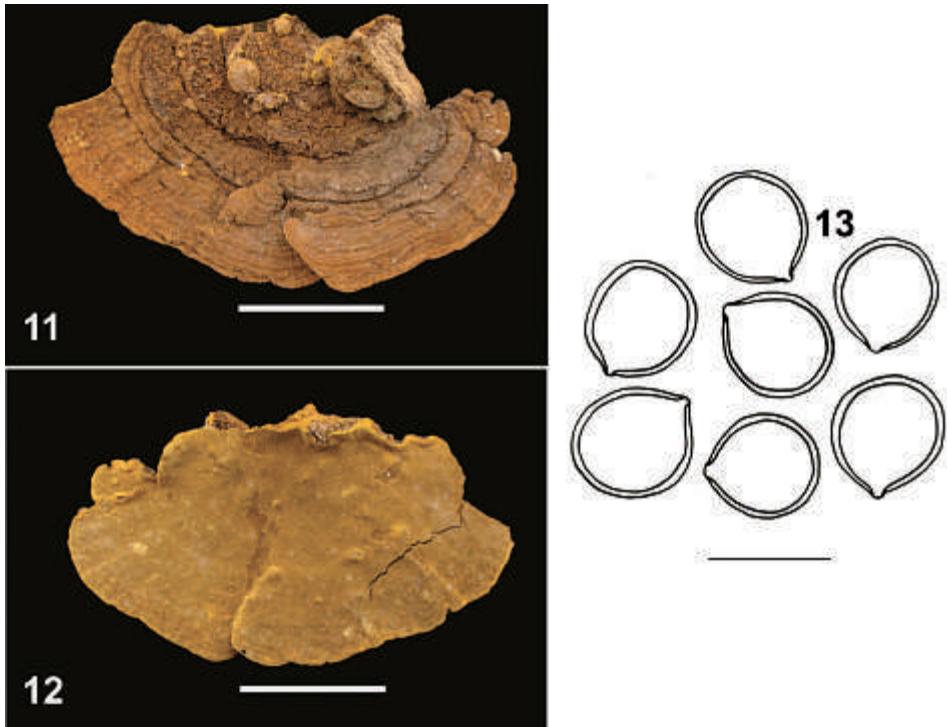
[Mycobank MB 809551]

≡ *Polyporus rhytiphloeus* Mont., Ann. Sci. Nat., Bot. 5: 369, 1856 (basionym).

Description: Larsen and Cobb-Pouille (1990), Ryvarden (2004).

Distribution in Southern Brazil: Santa Catarina (Campos-Santana and Loguercio-Leite 2010). First record from Paraná.

Specimens examined: **BRAZIL, PARANÁ:** Foz do Iguaçu, Parque Nacional do Iguaçu, Trilha do Poço Preto, 12/XII/2010, *Campos-Santana 453* (ICN); *ibid.*, *Campos-Santana 460* (ICN); *ibid.*, *Campos-Santana 469* (ICN); *ibid.*, Trilha da Bananeira, 13/XII/2010, *Campos-Santana 476* (ICN); *Campos-Santana 477* (ICN); Céu Azul, Trilha Manoel Gomes, 14/XII/2010, *Campos-Santana 484* (ICN); *Campos-Santana 489* (ICN); **SANTA CATARINA:** Itapuaá, RPPN Volta Velha, Trilha da Casa de Vidro, 23/02/2011, *Campos-Santana 525* (ICN); Mondai, Linha Uruguai, *Campos-Santana & Zanella 77*, 15/VI/2006 (FLOR 32218); *ibid.*, *Campos-Santana & Santana 257, 290, 25/V/07* (FLOR 32219, FLOR 32220).



Figs 11-13. *Fulvifomes rhytiphloeus*. **11.** Pileus surface. **12.** Pore surface [Source: Campos-Santana and Loguercio Leite 2008; 11 and 12, scale bar = 6 cm (modified)]. **13.** Basidiospores (scale bar = 10 μ m).

Remark: *Fulvifomes rhytiphloeus* is distinguished by its flattened basidiome with a yellowish brown context, discoloring to red in KOH, and a thin black line separating an upper thin, ochre brown tomentum.

The thick-walled, brown to dark reddish brown, and ellipsoid to broadly ellipsoid basidiospores and the absence of setae are characteristic of *Fulvifomes* rather *Phellinus* s.s.; hence the species is transferred to *Fulvifomes*. Besides, the species is close to *Fulvifomes fastuosus* in having coriaceous consistence and by the presence of a thin black line in context.

Fulvifomes rimosus (Berk.) Fiasson & Niemelä,
Karstenia 24(1): 26, 1984. Fig. 14

≡ *Polyporus rimosus* Berk, London
J. Botany 4: 54, 1845.

Description: Núñez and Ryvar den (2000).

Distribution in Southern Brazil: Rio Grande do Sul (Theissen 1911, Rick 1960, as *Fomes rimosus* (Berk.) Cooke; Teixeira 1950).



Fig. 14. *Fulvifomes rimosus*. **14.** Basidiospores (scale bar = 10 μ m).

Specimens examined: **BRAZIL, RIO GRANDE DO SUL:** São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 24/V/2010, *Campos-Santana 158* (ICN); Caçapava do Sul, Pedra do Segredo, 06/VI/2011, *Campos-Santana 612* (ICN).

Other specimen examined: **PORTUGAL,** Curaçao, Savonet (BAFC 29368, ex S, type of *Fomes subendothejus* Bres.).

Remark: *Fulvifomes rimosus* is characterized by having the pileus surface typically blackened and rimose with age, relatively large pores and basidiospores $6.0-7.5 \times 5.0-6.0 \mu\text{m}$. Macroscopically, it resembles *Phellinus chaquensis*, but the latter has hymenial setae and yellowish basidiospores (characters that connect *P. chaquensis* to *Phellinus s.s.*).

Fuscoporia Murrill, North Am. Flora 9: 3, 1907.

Key to *Fuscoporia* species

1. Basidiomata resupinate 2
- 1'. Basidiomata pileate 4
 2. Extra-hymenial setae present *F. contigua*
 - 2'. Extra-hymenial setae absent 3
3. Pores large, 2-3/mm *F. palmicola*
- 3'. Pores small, 6-7/mm *F. ferrea*
 4. Hymenial setae apically hamate, hooked *F. wahlbergii s.l.*
 - 4'. Hymenial setae apically straight 5
5. Pores 5-7/mm; context brown *F. gilva s.l.*
- 5'. Pores 7-10/mm; context yellow *F. rhabarbarina*

Fuscoporia contigua (Pers.) G. Cunn, Bull. New Zealand Dept. Sci. Industr. Res. 73: 4, 1948. Figs 15-16

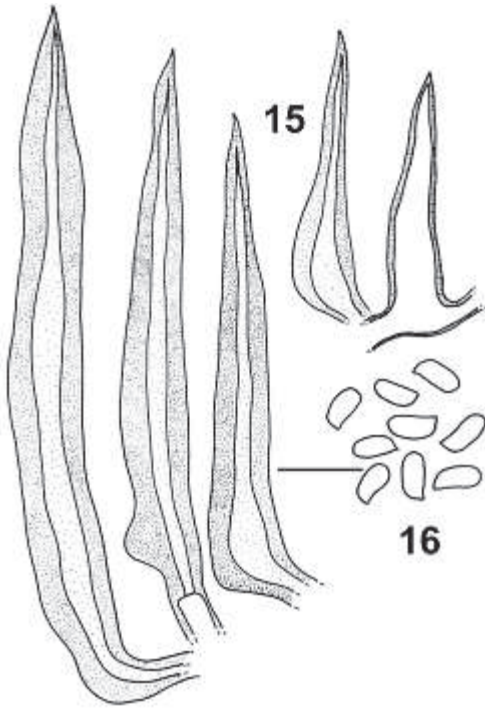
≡ *Boletus contiguus* Pers., Synopsis methodica fungorum 2: 544, 1801.

Description: Ryvarden (1978).

Distribution in Southern Brazil: Santa Catarina (Groposo *et al.* 2007, Loguercio-Leite *et al.* 2008a) and Rio Grande do Sul (Rick 1960, as *Hexagonia dubiosa* Rick, *Poria suberis* (Durieu & Mont.) Cooke, *Poria bicolor* Bres. and *Poria cryptacantha* (Mont.) Cooke; Rajchenberg 1987a; Groposo *et al.* 2007; Loguercio-Leite *et al.* 2008a). First record from Paraná.

Specimens examined: **BRAZIL, PARANÁ:** Céu Azul, Parque Nacional do Iguaçu, Trilha Manuel Gomes, 14/XII/2010, *Campos-Santana 491* (ICN); **SANTA CATARINA:** Joinville, Bairro Paranaguamirim, 11/X/2010, *Campos-Santana 293* (ICN); Itapua, RPPN Volta Velha, Trilha do Sambaqui, 24/II/2011, *Campos-Santana 528* (ICN); *ibid.*, *Campos-Santana 534* (ICN); Mondai, Linha Sanga Forte, 25/IV/2011, *Campos-Santana 538* (ICN); **RIO GRANDE DO SUL:** Riozinho, 10/IV/ 2010, *Campos-Santana 62* (ICN); *ibid.*, *Campos-Santana 63* (ICN); *ibid.*, *Campos-Santana 65* (ICN); *ibid.*, *Campos-Santana 66* (ICN); Santa Maria, Sítio Aldorino, *G. Coelho 20-3* (ICN 97696); *ibid.*, 07/VI/1993, *G. Coelho 40-3* (ICN 97697); Viamão, Parque Estadual de Itapuã, 16/X/2010, *Campos-Santana 327* (ICN); *ibid.*, *Campos-Santana 334* (ICN); *ibid.*, *Campos-Santana 335* (ICN); Derrubadas, Parque Estadual do Turvo, 26/X/2010, *Campos-Santana 349* (ICN); *ibid.*, 29/X/2010, *Campos-Santana 369* (ICN); *ibid.*, 26/X/2010, *JMB 502* (ICN).

Other specimen examined: **ARGENTINA, BUENOS AIRES:** La Plata, Bosque, VII/1906, *C. Spegazzini* (LPS 21507, type of *Daedalea effusa* Speg.).



Figs 15-16. *Fuscoporia contigua*. **15.** Extra-hymenial setae. **16.** Basidiospores (15 and 16, scale bar = 10 μ m).

Remark: the species is characterized by a resupinate basidiomata, with large and irregular pores, long hymenial setae and presence of extrahymenial setae in marginal areas and in decayed wood, and hyaline thin-walled basidiospores.

Fuscoporia ferrea (Pers.) G. Cunn., Bull. New Zealand Dept. Sci. Industr. Res. 73: 7, 1948. Figs 17-18

\equiv *Polyporus ferreus* Pers., Mycol. Eur. 2: 89, 1825.

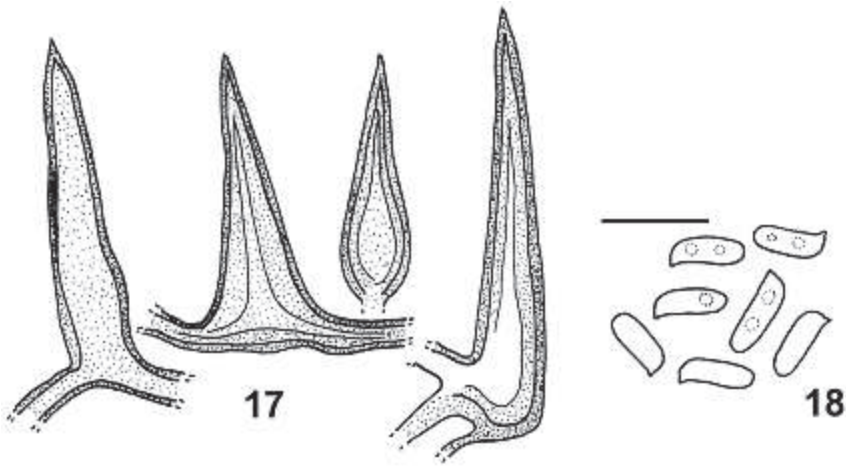
Description: Ryvarden (1978), Larsen and Cobb-Pouille (1990).

Distribution in Southern Brazil: Santa Catarina (Loguercio-Leite and Wright 1991, 1995, Groposo *et al.* 2007, Loguercio-Leite *et al.* 2008b, as *F. ferrea*; Drechsler-Santos *et al.* 2008) and Rio Grande do Sul (Rick 1960, as *Poria subcanescens* Rick, *Poria vestita* Rick and *Poria cinnamomea* Rick; Rajchenberg 1987a, Silveira and Guerrero 1991, Groposo *et al.* 2007, as *Fuscoporia ferrea* (Pers.) G. Cunn.). First record from Paran.

Specimens examined:

BRAZIL, PARAN: Piraquara, Morro do Canal, 12/XI/2010, *Campos-Santana* 387 (ICN); **SANTA CATARINA:** Florianpolis, Morro da Lagoa da Conceio, 06/X/2010, *Campos-Santana* 258 (ICN); *ibid.*, *Campos-Santana* 265 (ICN); *ibid.*, 27/V/2011, *Campos-Santana* 597 (ICN); *ibid.*, Costa da Lagoa, 25/V/1985, Loguercio-Leite & Zanin (FLOR 10133); Joinville, Bairro Paranaguamirim, 11/X/2010, *Campos-Santana* 297 (ICN); So Francisco do Sul, 30/04/2013, *Campos-Santana* 673 (ICN); **RIO GRANDE DO SUL:** Caapava do Sul, Pedra do Segredo, 16/IV/2010, *Campos-Santana* 103 (ICN); Derrubadas, Parque Estadual do Turvo, 26/X/2010, *Campos-Santana* 342 (ICN); *ibid.*, *Campos-Santana* 343 (ICN); *ibid.*, *Campos-Santana* 350 (ICN); Cambar do Sul, Itaimbezinho, 09/XII/1989, Silveira & Guerrero 243 (ICN 80536); Dom Pedro de Alcntara, RPPN do Professor Luis Baptista, 12/III/2010, *Campos-Santana* 04 (ICN); *ibid.*, *Campos-Santana* 08 (ICN); *ibid.*, 13/VIII/2011, *Campos-Santana* 632 (ICN); Guaba, Fazenda So Maximiano, 22/VIII/2010, *Campos-Santana* 240 (ICN); Cambar do Sul, Itaimbezinho, 09/XII/1989, Silveira & Guerrero 243 (ICN 80536); So Francisco de Paula, Centro de Pesquisas e Conservao da Natureza, PRO-MATA – PUC, 08/XI/2010, *Campos-Santana* 374 (ICN); Viamo, Parque Estadual de Itapu, 16/X/2010, *Campos-Santana* 310 (ICN); *ibid.*, *Campos-Santana* 314 (ICN); *ibid.*, *Campos-Santana* 317 (ICN); *ibid.*, *Campos-Santana* 320 (ICN); *ibid.*, *Campos-Santana* 365 (ICN); *ibid.*, *Campos-Santana* 368 (ICN).

Remark: this species is recognized by its resupinate, widely effused basidiomata, circular pores 6-7/mm, and hymenial setae 30-36 μ m long (Ryvarden and Johansen 1980).



Figs 17-18. *Fuscoporia ferrea*. **17.** Hymenial setae. **18.** Basidiospores (17 and 18, scale bar = 10 μ m).

Fuscoporia contigua presents similar basidiomata and basidiospores but differs in having larger pores (2-3/mm), longer hymenial setae (45-75 \times 5.0-7.5 μ m) and the presence of the (extra-hymenial) tramal setae, 75-190 \times 7.0-10 μ m. *Fuscoporia ferruginosa* (Schrad.) Murrill is macroscopically similar to *F. ferrea*. According to Gilbertson (1979), the presence of setal hyphae, longer (up to 65 μ m) hymenial setae and wider basidiospores (3-3.5 μ m) distinguish *F. ferruginosa* from *F. ferrea*.

Fuscoporia gilva (Schwein.) T. Wagner & M. Fisch., *Mycologia* 94(6): 1013, 2002.

Figs 19-21

\equiv *Boletus gilvus* Schwein., *Schriften Berlin. Ges. Naturf. Freunde* 1: 96, 1822.

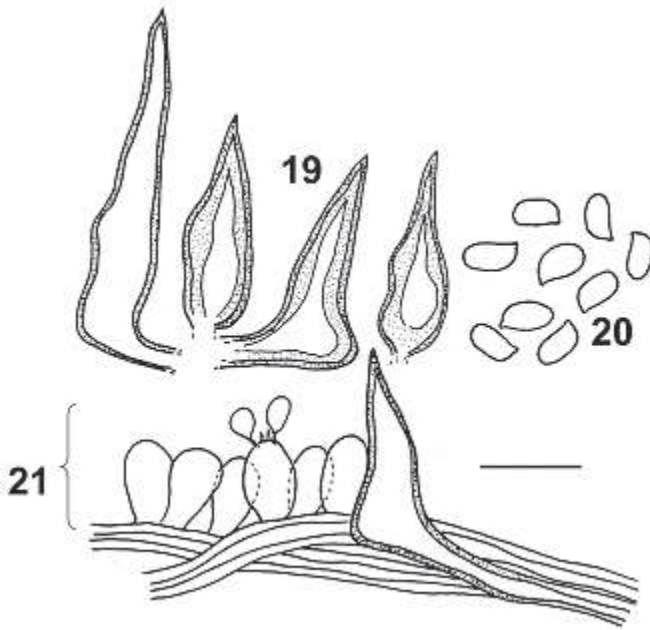
Fuscoporia gilva is one of the most common species in Southern Brazil. It is a very variable species (Fidalgo and Fidalgo 1968); more likely, molecular and critical morphological studies will show the current species concept to encompass other taxonomic entities.

In this work, we segregated our collections into three distinct varieties on the basis of macro-morphological characters first and subsequently micro-morphological characteristics, following Wright *et al.* (1988).

Fuscoporia gilva* var. *gilva (Schwein.) T. Wagner & M. Fisch.

Distribution in Southern Brazil: Paran, Santa Catarina and Rio Grande do Sul.

Specimens examined: **BRAZIL, PARAN:** Piraquara. Morro do Canal, 12/XI/2010, *Campos-Santana* 392 (ICN); *ibid.*, Matinhos, 13/XI/2010, *Campos-Santana* 409 (ICN); **SANTA CATARINA:** Joinville, Bairro Paranaguamirim, 11/X/2010, *Campos-Santana* 300 (ICN); *ibid.*, *Campos-Santana* 425 (ICN); Itapua, RPPN Volta Velha, 21/II/2011, *Campos-Santana* 496 (ICN); *ibid.*, 24/II/2011, *Campos-Santana* 529 (ICN); **RIO GRANDE DO SUL:** Caapava do Sul, Pedra do Segredo, 16/IV/2010, *Campos-Santana* 119 (ICN); Santa Maria, Morro da Caturrita, 15/V/2010, *Campos-Santana* 141 (ICN); Dom Pedro de Alcntara, RPPN do professor Luis Baptista, 11/VI/2010, *Campos-Santana* 201 (ICN); Porto



Figs 19-21. *Fuscoporia gilva*. **19.** Hymenial setae. **20.** Basidiospores. **21.** Hymenium (19, 20 and 21, scale bar = 10 μ m).

Alegre, Refúgio da Vida Silvestre-UFRGS, 21/VI/2010, *Campos-Santana 221* (ICN); *ibid.*, 16/VIII/2011, *Campos-Santana 643* (ICN); São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 22/V/2011, *Campos-Santana 574* (ICN).

Other specimens examined: **ARGENTINA, JUJUY:** Abra de Cañas, 07/XI/1973, *Cordo et al.*, J29 (LPS 45513); **PARAGUAI:** Guarapí, 1880, *Balansa 3396* (LPS 24978, type of *Polyporus balansae* Seg.).

Remark: *Fuscoporia gilva* s.l. is characterized by an annual, pileate to effused-reflexed, mainly dimidiate basidiomata, abundant subulate hymenial setae, 18-32 \times 4.0-8.0 μ m, and ovoid to ellipsoid, hyaline and thin-walled basidiospores, 2.5-4.0 \times 1.5-2.5 μ m. The pilei are appanate and imbricate, frequently sulcate, up to 8 \times 9 \times 2 cm, with a glabrous to slightly velutinous pileus surface when young (see table 1).

Table 1. Comparison of three varieties of *Fuscoporia gilva*

| | <i>var. gilva</i> | <i>var. licnoide</i> | <i>var. scruposa</i> |
|----------------|--|---------------------------------|----------------------------------|
| Basidiospores | 2.5-4 \times 1.5-2.5 μ m | 2.5-5 \times 1.5-3 μ m | 2.5-4.5 \times 1.5-2.5 μ m |
| Setae | 10-27 \times 4.5-6 μ m | 15-32 \times 4-7 μ m | 11-27 \times 2-3 μ m |
| Pores per mm | (6-) 8-10 | 6-8 (-9) | 7-8 |
| Context | 10-25 mm | 1-8 mm | 2-7,5 mm |
| Pileus surface | Glabrous, slightly velutinous when young | Glabrous, concentrically zonate | Radially scrupose |

Fuscoporia gilva* var. *licnoide (Mont.) Lloyd in Corner, Trans. Br. Mycol. Soc., 17(1-2): 1932.

≡ *Polyporus licnoides* Mont., Ann. Sci. Nat., Bot. 13: 204, 1840.

Distribution in Southern Brazil: Paraná, Santa Catarina and Rio Grande do Sul.

Specimens examined: **BRAZIL, PARANÁ:** Matinhos, 13/XI/2010, *Campos-Santana* 406 (ICN); *ibid.*, *Campos-Santana* 413 (ICN); *ibid.*, *Campos-Santana* 419 (ICN); *ibid.*, *Campos-Santana* 421 (ICN); *ibid.*, Foz do Iguaçu, Parque Nacional do Iguaçu, Trilha do Poço Preto, 12/XII/2010, *Campos-Santana* 458 (ICN); 12/XII/2010, *ibid.*, *Campos-Santana* 459 (ICN); *ibid.*, Trilha da Bananeira, 13/XII/2019, *Campos-Santana* 479 (ICN); *ibid.*, Céu Azul, Trilha Manuel Gomes, 14/XII/2010, *Campos-Santana* 486 (ICN); *ibid.*, *Campos-Santana* 488 (ICN); **SANTA CATARINA:** Florianópolis, Unidade de Conservação Ambiental Desterro (UCAD), 02/X/2010, *Campos-Santana* 245 (ICN); *ibid.*, *Campos-Santana* 248 (ICN); Joinville, Bairro Paranaguamirim, 11/X/2010, *Campos-Santana* 291 (ICN); *ibid.*, *Campos-Santana* 294 (ICN); *ibid.*, *Campos-Santana* 296 (ICN); *ibid.*, *Campos-Santana* 303 (ICN); *ibid.*, 15/XI/2010, *Campos-Santana* 432 (ICN); Mondai, Linha Sanga Forte, 25/IV/2011, *Campos-Santana* 537 (ICN); **RIO GRANDE DO SUL:** Caçapava do Sul, Pedra do Segredo, 16/IV/2010, *Campos-Santana* 114 (ICN); Dom Pedro de Alcântara, RPPN do Professor Luis Baptista, 11/06/2010, *Campos-Santana* 194 (ICN); *ibid.*, *Campos-Santana* 196 (ICN); *ibid.*, *Campos-Santana* 205 (ICN); *ibid.*, 13/VII/2011, *Campos-Santana* 627 (ICN); *ibid.*, *Campos-Santana* 631 (ICN); *ibid.*, *Campos-Santana* 634 (ICN); *ibid.*, *Campos-Santana* 638 (ICN); *ibid.*, *Campos-Santana* 639 (ICN); Derrubadas, Parque Estadual do Turvo, 29/10/2010, *Campos-Santana* 358 (ICN); *ibid.*, *Campos-Santana* 362 (ICN); Porto Alegre, Refúgio da Vida Silvestre-UFRGS, 21/VI/2010, *Campos-Santana* 217 (ICN); *ibid.*, 17/V/2011, *Campos-Santana* 551 (ICN); 16/XI/2011, *Campos-Santana* 641 (ICN); Santa Maria, 14/V/2010, *Campos-Santana* 132 (ICN); *ibid.*, *Campos-Santana* 133 (ICN); *ibid.*, *Campos-Santana* 134 (ICN); *ibid.*, Morro da Caturrita, 15/V/2010, *Campos-Santana* 147 (ICN); *ibid.*, *Campos-Santana* 148 (ICN); *ibid.*, *Campos-Santana* 149 (ICN); *ibid.*, *Campos-Santana* 150 (ICN); São Francisco do de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 24/V/2010, *Campos-Santana* 156 (ICN).

Remark: *Fuscoporia gilva* var. *licnoides* differs from *F. gilva* var. *gilva* in having thin basidiome, effused to pileate, the pileus surface concentrically zoned. The basidiospore and hymenial setae are also slightly larger than in var. *gilva* (see table 1).

Fuscoporia gilva* var. *scruposa (Fr.) Corner, Trans. Br. Mycol. Soc., 17(1-2): 79, 1932.

≡ *Polyporus gilvus* var. *scruposus* (Fr.) Bres., Hedwigia Ser. Bot. 56(4): 292, 1915.

Distribution in Southern Brazil: Paraná, Santa Catarina and Rio Grande do Sul.

Specimens examined: **BRAZIL, PARANÁ:** Matinhos, 13/XI/2010, *Campos-Santana* 416 (ICN); **SANTA CATARINA:** Itapua, RPPN Volta Velha, Trilha Apegatur, 22/II/2011, *Campos-Santana* 505 (ICN); **RIO GRANDE DO SUL:** Dom Pedro de Alcântara, RPPN do professor Luis Baptista, 12/III/2010, *Campos-Santana* 06 (ICN); *ibid.*, 11/VI/2010, *Campos-Santana* 197 (ICN); Porto Alegre, Refúgio da Vida Silvestre-UFRGS, 17/V/2011, *Campos-Santana* 549 (ICN); *ibid.*, *Campos-Santana* 550 (ICN); *ibid.*, 31/V/2011, *Campos-Santana* 608

(ICN); Mourinhos do Sul, Morro da Perdida, 13/III/2010, *Campos-Santana 21* (ICN); São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 26/III/2010, *Campos-Santana 38* (ICN); *ibid.*, *Campos-Santana 48* (ICN); *ibid.*, 21/V/2011, *Campos-Santana 556* (ICN); *ibid.*, Hotel Veraneio Hampel 27/03/2010, *Campos-Santana 52* (ICN).

Remark: *Fuscoporia gilva* var. *scruposa* and *F. gilva* var. *gilva* are morphologically very similar, both at macro- and microscopic level; both taxa share thick basidiomes and identical basidiospore and hymenial setae. *Fuscoporia gilva* var. *scruposa* differs mainly by having the pileus surface radially scrupose (see table 1).

Fuscoporia palmicola (Berk. & M.A. Curtis) Bondartseva & S. Herrera, Mikol. Fitopatol. 26(1): 13, 1992. Figs 22-23

≡ *Polyporus palmicola* Berk. & M.A. Curtis, Bot. J. Linn. Soc. 10: 317, 1869.

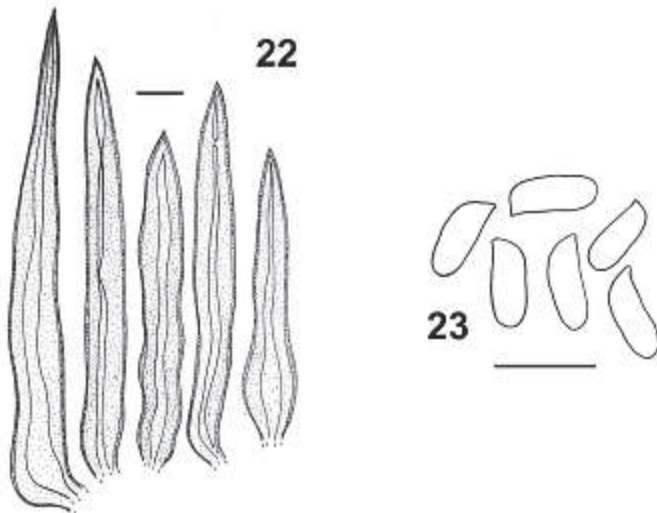
Description: Raymundo *et al.* (2013), Ryvarden (2004).

Distribution in Southern Brazil: Rio Grande do Sul (Rick 1960, as *Poria palmicola* (Berk. & M.A. Curtis) Cooke). First record from Santa Catarina.

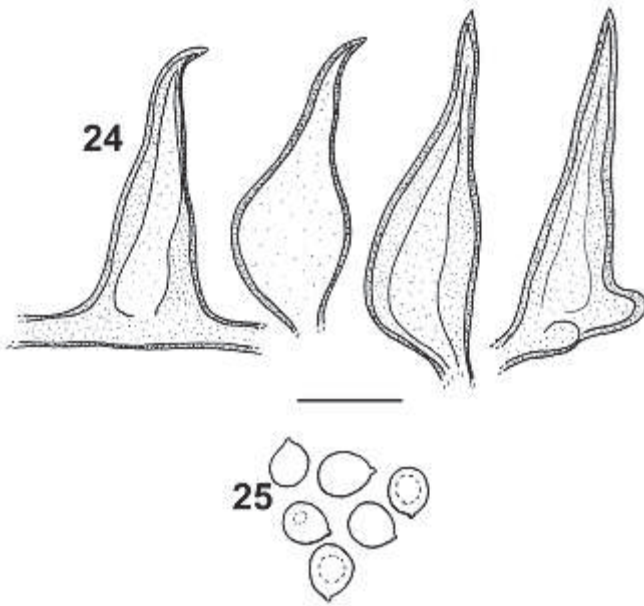
Specimen examined: **BRAZIL, SANTA CATARINA:** Itapuá, RPPN Volta Velha, Trilha do Sambaqui, 24/II/2011, *Campos-Santana 535* (ICN).

Other specimens examined: **ARGENTINA, MISSIONES:** Santa Ana, 14/I/2993, Ibénez Cristina 135 (LPS 45254).

Remark: *Fuscoporia palmicola* is characterized by effused-reflexed to pileate basidiomata, large pores (1-2/mm) and long hymenial setae. It is related to *F. contigua*, which is distinguished by having fully resupinate basidiomata, extrahymenial setae, shorter hymenial setae and larger basidiospores.



Figs 22-23. *Fuscoporia palmicola*. **22.** Hymenial setae. **23.** Basidiospores (22 and 23, scale bar = 10 μ m).



Figs 24-25. *Fuscoporia rhabbarbarina*. **24.** Hymenial setae. **25.** Basidiospores (24 and 25, scale bar = 10 μ m).

Fuscoporia rhabbarbarina (Berk.) Groposo, Log.-Leite & Góes-Neto, Mycotaxon 101: 61, 2007. Figs 24-25

\equiv *Polyporus rhabbarbarinus* Berk., Ann. Mag. Nat. Hist. 3: 388, 1839.

Description: Gerber and Loguercio-Leite (1997).

Distribution in Southern Brazil: Santa Catarina (Gerber 1996, Gerber and Loguercio-Leite 1997, Groposo and Loguercio-Leite 2002, Drechsler-Santos *et al.* 2008, as *P. rhabbarbarinus*, Groposo *et al.* 2007) and Rio Grande do Sul (Groposo and Loguercio-Leite 2002, as *Phellinus rhabbarbarinus* (Berk.) G. Cunn., Groposo *et al.* 2007). First record from Paraná.

Specimens examined: **BRASIL, PARANÁ:** Foz do Iguaçu, Parque Nacional do Iguaçu, Trila do Poço Preto, 12/XII/2010, *Campos-Santana 470* (ICN); **SANTA CATARINA:** Florianópolis, Morro da Lagoa da Conceição, 26/XII/1988, *Loguercio-Leite & Furlani 186* (FLOR 10929); **RIO GRANDE DO SUL:** Cachoeirinha, Reserva Biológica Tancredo Neves, 11/VIII/1997, *Groposo 149* (PACA 85544); Riozinho, 10/IV/2010, *Campos-Santana 446* (ICN).

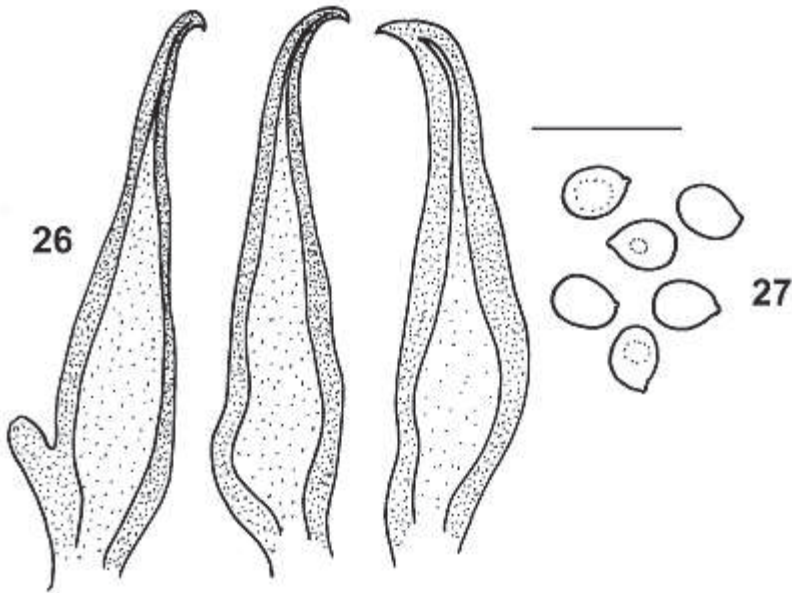
Other specimen examined: **ARGENTINA, SALTA:** Santa Victoria, Cuadrada El Nogalar, 19/III/1986, *Palau 467* (BAFC 30716).

Remark: *Fuscoporia rhabbarbarina* is characterized by the yellow context, glabrous pileus in sulcate zones, distinct black crust and ventricose hymenial setae.

Fuscoporia wahlbergii (Fr.) T. Wagner & M. Fisch., Mycol. Res. 105(7): 780, 2001. Figs 26-27

\equiv *Trametes wahlbergii* Fr., Bihang K. Svenska vet. akad. Handlingar 1848: 131, 1849.

Description: Larsen and Cobb-Pouille (1990), Ryvarden and Gilbertson (1994), Ryvarden (2004).



Figs 26-27. *Fuscoporia wahlbergii*. **26.** Hymenial setae. **27.** Basidiospores (26 and 27, scale bar = 10 μ m).

Distribution in Southern Brazil: Paraná (Ryvarden and Meijer 2002, Meijer 2006); Santa Catarina (Loguercio-Leite and Wright 1991, 1995, Gerber 1996, Gonçalves and Loguercio-Leite 2001, Groposo and Loguercio-Leite 2005, Groposo *et al.* 2007, as *F. wahlbergii*); Rio Grande do Sul (Silveira and Guerrero 1991, Groposo *et al.* 2007, as *Fuscoporia wahlbergii* (Fr.) T. Wagner & M. Fisch.).

Specimens examined: **BRAZIL, PARANÁ:** Céu Azul, Parque Nacional do Iguaçu, Trilha Manuel Gomes, 14/12/2010, *Campos-Santana* 487 (ICN); Foz do Iguaçu, Parque Nacional do Iguaçu, Trilha do Poço Preto, 12/12/2010, *Campos-Santana* 450 (ICN); Piraquara, Morro do Canal, 12/11/2010, *Campos-Santana* 379 (ICN); **SANTA CATARINA:** Florianópolis, Unidade de Conservação Ambiental Desterro (UCAD), 02/10 2010, *Campos-Santana* 245 (ICN); Itapuí, RPPN Volta Velha, Sede, 21/II/2011, *Campos-Santana* 498 (ICN); *ibid.*, *Campos-Santana* 499 (ICN); *ibid.*, Trilha do Apegatur, 22/02/2011, *Campos-Santana* 503 (ICN); *ibid.*, *Campos-Santana* 508 (ICN); *ibid.*, Trilha da Casa de Vidro, 23/II/2011, *Campos-Santana* 520 (ICN); Trilha do Sambaqui, 24/II/2011, *Campos-Santana* 530 (ICN); Mondaí, Linha Sanga Forte, 25/IV/2011, *Campos-Santana* 540 (ICN); **RIO GRANDE DO SUL:** Derrubadas, Parque Estadual do Turvo, 26/10/2010, *Campos-Santana* 356 (ICN); Dom Pedro de Alcântara, RPPN do professor Luis Baptista, 12/III/2010, *Campos-Santana* 09 (ICN); *ibid.*, 16/VI/2010, *Campos-Santana* 203 (ICN); *ibid.*, 13/08/2011, *Campos-Santana* 626 (ICN); Mourrinhos do Sul, Morro da Perdida, 13/III/2010, *Campos-Santana* 25 (ICN); São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 26/III/2010, *Campos-Santana* 35 (ICN); *ibid.*, 24/V/2010, *Campos-Santana* 152 (ICN); *ibid.*, *Campos-Santana* 162 (ICN); *ibid.*, *Campos-Santana* 165 (ICN); *ibid.*, *Campos-Santana* 168 (ICN); *ibid.*, 07/VI/2010, *Campos-Santana* 189 (ICN); *ibid.*, 22/V/2011, *Campos-Santana* 564 (ICN); *ibid.*, *Campos-Santana* 575 (ICN); *ibid.*, *Campos-Santana* 586 (ICN); Viamão, Parque Saint' Hilaire, 08/XI/2011, *Campos-Santana* 652 (ICN).

Other specimens examined: **AUSTRALIA, VICTORIA:** Maite Rain Forest, 2001, *Burdsall, H.H.* (FP 140105); **PHILIPPINE, MINDANAO:** Lake Lanao, Camp Keithly, IX/1907, *Mary S. Clemens* 58431-2 (NY 00743051, type for *Pyropolyporus subextensus* Murrill); *ibid.*, Davão, 22/IV/1904, *E. B. Copeland* "E" (NY 00743052, *Pyropolyporus subextensus*); **JAMAICA,** Monkey Hill, July 11, 1904, *Miss W.J. Robinson* (NY 00743008, type for *Pyropolyporus robinsoniae* Murrill).

Remark: this species is recognized by a perennial basidiomata, roughly sulcate, a velutinate to tomentose pileus, and microscopically by straight to more commonly apically hooked hymenial setae and hyaline broadly ellipsoide basidiospores.

Inonotus P. Karst. Meddeland. Soc. Fauna Fl. Fenn. 5: 39, 1879.

Key to *Inonotus* species

1. Basidiomata resupinate to effuse-reflexed 2
- 1'. Basidiomata pileate 4
 2. Pores 4-6/mm; hymenial setae and setal hyphae absent *Inonotus* sp.
 - 2'. Pores > 6/mm; hymenial setae and setal hyphae present or absent 3
3. Setal hyphae in the dissepiments; hymenial setae up to 40 µm long; basidiospores globose/subglobose, yellow pale brown, up to 13 µm; pores 6-7/mm, round *I. micantissimus*
- 3'. Setal hyphae absent; hymenial setae up to 25 µm long; basidiospores subglobose, hyaline, up to 5 µm long; pores 7-9/mm *I. tropicalis*
 4. Setal hyphal present 5
 - 4'. Setal hyphal absent 7
5. Pores 8-10/mm; basidiospores subglobose, 3.5-5.0 × 3.0-4.0 µm. *I. portoricensis*
- 5'. Pores < 8/mm; basidiospores ellipsoid, > 5 × 4 µm 6
 6. Pileal surface cracking; pore surface umber to sepia often with a yellowish tint; pores 3-4/mm; basidiospores 6.0-8.0 × 4.0-5.5 µm *I. patouillardii*
 - 6'. Pileal surface glabrous, concentrically sulcate, with a black cuticle in section; pore surface rusty brown; pores 4-6/mm, basidiospores 5.0-6.0 × 4.0-4.5 µm *I. pseudoglomeratus*
7. Hymenial setae ventricose or subulate, dark brown, 20.0-32.0 × 4.0-7.5 µm; darkening in KOH *I. linteus*
- 7'. Hymenial setae absent; turning red in KOH *I. splitgerberii*

Inonotus linteus (Berk. & M.A. Curtis) Teixeira, Rev. Bras. Bot. 15(2): 126, 1992.

≡ *Polyporus linteus* Berk. & M.A. Curtis, Proc. Am. Acad. Arts Sci. 4: 122, 1858.

Description: Ryvarden (2004).

Distribution in Southern Brazil: Paraná (Ryvarden and Meijer 2002, Meijer 2006; Santa Catarina (Drechsler-Santos *et al.* 2008, Campos-Santana and Loguercio-Leite 2008, as *Phellinus linteus* (Berk. & M.A. Curtis) Teng.). First record from Rio Grande do Sul.

Specimens examined: **BRAZIL, PARANÁ:** Foz do Iguacu, Parque Nacional do Iguacu, Trilha do Poço Preto, 12/XII/2010, *Campos-Santana* 463 (ICN); *ibid.*, *Campos-Santana* 472 (ICN); **SANTA CATARINA:** Joinville, Bairro Paranaguamirim, 15/XI/2010, *Campos-Santana* 424 (ICN); *ibid.*, Salto Veloso, 24/VIII/1992, *Willerding, Folle, Cantú and Bridi* 180 (FLOR 10902); *ibid.*, Major Gercino, 11/VIII/1993, *Willerding and Atanazio* 279 (FLOR10906); *ibid.*, 290, 11/

VIII/1993 (FLOR 10909); **RIO GRANDE DO SUL**: Derrubadas, Parque Estadual do Turvo, 26/X/2010, *Campos-Santana* 338 (ICN); *ibid.*, *Campos-Santana* 399 (ICN); Caçapava do Sul, Pedra do Segredo, 07/VI/2010, *Campos-Santana* 618 (ICN).

Remark: diagnostic characteristics of this species are the pale golden brown, ovoid to subglobose basidiospores and variably abundant setae (Ryvarden 2004).

The species concept adopted here follows Ryvarden (2004). However, as demonstrated by Tian *et al.* (2013) and Vlasák *et al.* (2013), *I. linteus sensu* Ryvarden (2004) is a species complex; in addition to *I. linteus s.s.*, three other taxa occur in the Neotropics, viz., *I. cubensis* Y.C. Dai *et al.*, *I. pseudolinteus* Vlasák & Y.C. Dai and *I. sideroxylicola* Vlasák & Y.C. Dai. A phylogenetic approach is desirable to ascertain the species concept in southern Brazil.

Inonotus micantissimus (Rick) Rajchenb., Nord. J. Bot. 7(5): 565, 1987. Figs 28-30
 = *Poria micantissima* Rick, Iheringia Ser. Bot. 7: 287, 1960.

Description: Ryvarden (2004).

Distribution in Southern Brazil: Paraná (Ryvarden and Meijer 2002, Meijer 2006); Rio Grande do Sul (Rick 1960, as *Poria micantissima* Rick; Rajchenberg 1987). This is the first record from Santa Catarina.

Specimens examined: **BRAZIL, SANTA CATARINA**: São Francisco do Sul, 30/IV/2013, *Campos-Santana* 672 (ICN); **RIO GRANDE DO SUL**: Santa Maria, Caturrita, Sítio Aldorindo, 1992, G. Coelho 20-6 (ICN 97676); Itaara, Parque Pinhal, 07/VI/1992, G. Coelho 24-13 (ICN 97677).

Other specimen examined: **ARGENTINA, CÓRDOBA**: Córdoba, Jujuy, Dpto. Ledesma, Parque Nacional Calilegua, Sendero Momota, 07/III/2005, *Robledo 400* (CORD).

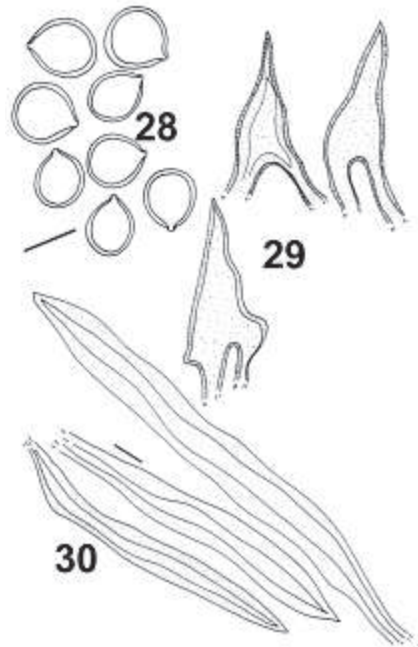
Remark: the species is easily identified by a remarkable combination of characters including abundant setal hyphae and large (10.0-13.0 × 8.0-12.0 μm, fide Ryvarden 2004), subglobose to ovoid and yellowish basidiospores. There is no other Neotropical *Inonotus* species with such large basidiospores.

Inonotus patouillardii (Rick) Imazeki, Bull. Natl. Sci. Mus. 6: 105, 1943. Figs 31-33

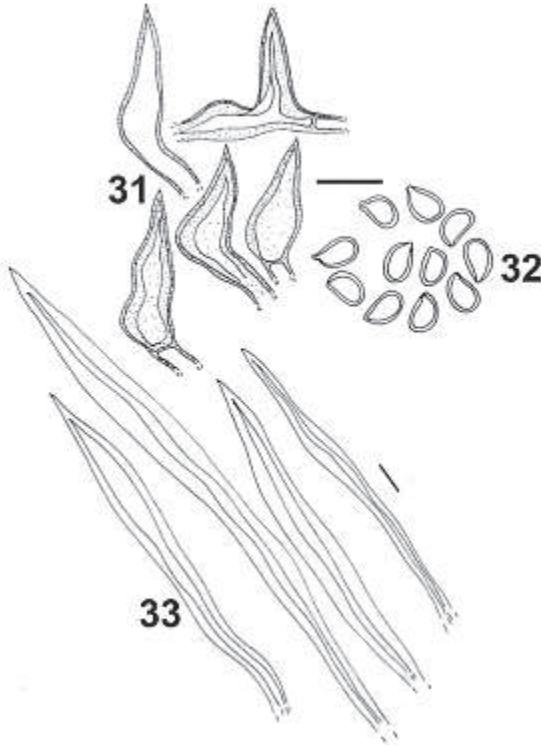
= *Polystictus patouillardii* Rick, Brotéria, Sér. Bot. 6: 89, 1907.

Description: Núñez and Ryvarden (2000), Gottlieb *et al.* (2002).

Distribution in Southern Brazil: Paraná (Ryvarden and Meijer 2002, Meijer 2006); Santa Catarina (Rick 1960, as *Phellinus patouillardii*; Loguercio-Leite and Wright 1991, Drechsler-Santos *et al.* 2008, Campos-Santana and Loguercio-Leite 2008b) and Rio Grande do Sul (Rajchenberg 1987a).



Figs 28-30. *Inonotus micantissimus*. **28.** Basidiospores. **29.** Hymenial setae. **30.** Setal hyphae (28, 29 and 30, scale bar = 10 μm).



Figs 31-33. *Inonotus patouillardii*. **31.** Hymenial setae. **32.** Basidiospores. **33.** Setal hyphae (31, 32 and 33, scale bar = 10 μ m).

Specimens examined:
BRAZIL, PARANÁ: Foz do Iguaçu, Parque Nacional do Iguaçu, Trilha da Bananeira, 13/XII/2010, *Campos-Santana* 474 (ICN); ibis., Céu Azul, Trilha Manoel Gomes, 14/XII/2010, *Campos-Santana* 493 (ICN); **SANTA CATARINA:** Florianópolis, Ratonés, 27/I/1989, *Loguercio-Leite & Furlani* 394 (FLOR 10700); ibid., Rio Tavares, 18/IX/1985, *M.A.Da Ré & P. Ivo* (FLOR 10192); Mondaí, Linha Sanga Forte, 15/IV/06, *Campos-Santana & Santana* 66 (FLOR 32208); ibid., Linha Uruguai, 27/XII/06, *Campos-Santana, Santana & Rodrigues-Souza* 198 (FLOR 32240).

Remark: *Inonotus patouillardii* is characterized by a zonate pileus with alternate brown and black zones, a hard, lustrous context, large setal hyphae and yellow, ovoid to ellipsoid, thick-walled basidiospores.

In its present circumscription, the species has a pantropical distribution, also

reported from Africa and Asia. According to Gottlieb *et al.* (2002), the current species concept could correspond to a species complex.

Inonotus portoricensis (Overh.) Baltazar & Gibertoni, *Mycotaxon* 111: 206, 2010.

Figs 34-35

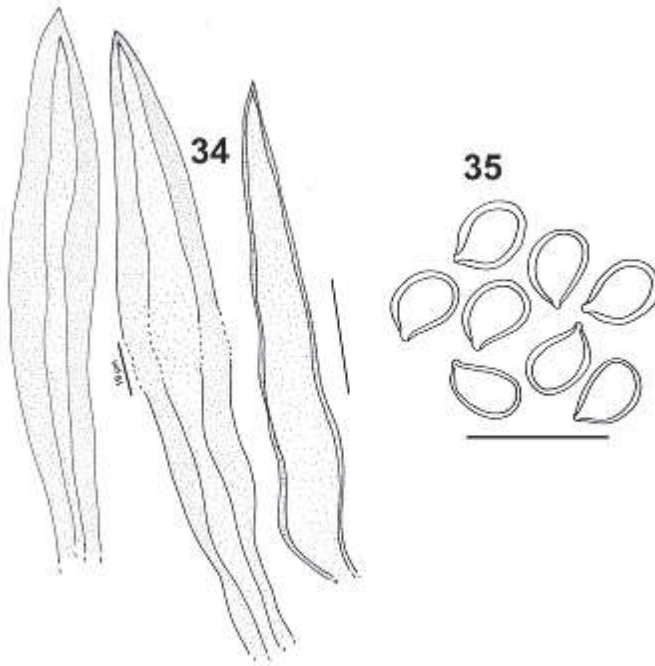
\equiv *Fomes portoricensis* Overh., *Scientific Survey of Porto Rico and the Virgin Islands* 8(1): 158, 1926.

Description: Fidalgo (1968b).

Distribution in Southern Brazil: This is the first record from Southern Brazil.

Specimens examined: **BRAZIL, RIO GRANDE DO SUL:** Dom Pedro de Alcântara, RPPN do professor Luis Baptista, 12/III/2010, *Campos-Santana* 17 (ICN); **SANTA CATARINA:** Florianópolis, Unidade de Conservação Ambiental Desterro (UCAD), 02/X/2010, *Campos-Santana* 247 (ICN).

Remark: *Inonotus portoricensis* is recognized by a pileate basidiomata, presence of setal hyphae and hymenial setae, and globose to ellipsoid, thin-walled, basidiospores first yellowish then pale rusty brown at maturity, 4.0-6.0 \times 4.0-5.5 μ m.



Figs 34-35. *Inonotus portoricensis*. **34.** Basidiospores. **35.** Setal hyphae (34 and 35, scale bar = 10 μm).

The taxonomic placement of this species has been debated; it has been considered as belonging either to *Inonotus* (Baltazar and Gibertoni 2010) or *Phellinus* (Borba-Silva *et al.* 2013, Ryvarden 2004).

We follow here the taxonomic placement in *Inonotus*. The presence of setal hyphae in the hymenophoral trama and hymenial setae, and the brown basidiospores would point better toward *Inonotus sensu* Wagner and Fischer (2002) than to *Phellinus s.s.* Molecular data are desirable to ascertain the affinities of this species.

Inonotus pseudoglomeratus Ryvarden, Synopsis Fung. 15: 78, 2002.

Description: Ryvarden (2004, 2005).

Distribution in Southern Brazil: This is its first record from Southern Brazil.

Specimen examined: **BRAZIL, SANTA CATARINA:** Florianópolis, Unidade de Conservação Ambiental Desterro (UCAD), 02/X/2010, *Campos-Santana 244* (ICN).

Remark: *Inonotus pseudoglomeratus* is characterized by pileate basidiomata. The pileus is dimidiate with a (strongly) contracted base, the surface concentrically sulcate. The pore surface is olivaceous yellow. Both setal hyphae and hymenial setae are present.

Inonotus pseudoglomeratus is comparable to *I. patouillardii* Ryvarden (2004). They mainly differ by the size of the pores and basidiospores, respectively 4-6 pores/mm and 5.0-6.0 \times 4.0-4.5 μm and 3-4 pores/mm and 6.0-8.0 \times 4.0-5.5 μm .

Inonotus splitgerberi (Mont.) Ryvar den, Norw. J. Bot. 19: 232, 1972. Fig. 36

≡ *Polyporus splitgerberi* Mont., Ann. Sci. Nat., Bot. 16: 109, 1841.

Description: Ryvar den (2004).

Distribution in Southern Brazil: Paraná (Rajchenberg and Meijer 1990, Ryvar den and Meijer 2002, Meijer 2006); Santa Catarina and Rio Grande do Sul. (Theissen 1911, as *Polyporus shulfuratus* (Fr.) Trotter, Baltazar and Gibertoni 2009, Westphalen *et al.* 2010).

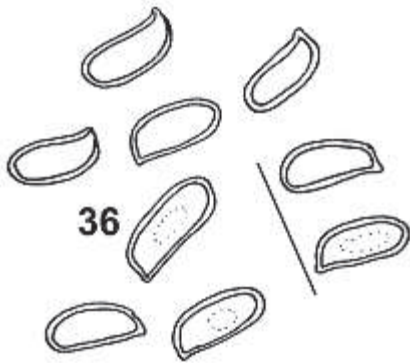


Fig. 36. *Inonotus splitgerberi*. 36. Basidiospores (scale bar = 10 μ m).

Specimens examined: **BRAZIL, RIO GRANDE DO SUL:** Guaíba, Fazenda São Maximiano, 21/VIII/2010, Campos-Santana 231 (ICN); Viamão, Parque Saint-Hilaire, 1992, R. T. Guerrero & R. M. Silveira (ICN 97684); Santa Maria, Camobí, Cidade dos Meninos, 25/V/1993, G. Coelho 39-1 (ICN 97 683).

Remark: the species is characterized by hyaline to pale golden yellow basidiospores and absence of setae. According to Ryvar den (2004), another remarkable character of *I. splitgerberi* is the cherry red discoloration of the basidiomata in KOH, a feature also known in *Inonotus dentatus* Decock & Ryvar den (Ryvar den 2004). All other *Inonotus* species turn dark brown to black in KOH.

Inonotus tropicalis (M.J. Larsen & Lombard) T. Wagner & M. Fisch., Mycologia 94: 1009, 2002. Figs 37-38

≡ *Poria rickii* Bres., Ann. Mycol. 18(1-3): 37, 1920.

≡ *Phellinus rickii* (Bres.) A. David & Rajchenb., Mycotaxon 22(2): 288, 1985.

≡ *Phellinus tropicalis* M.J. Larsen & Lombard, Mycologia 80:73, 1988.

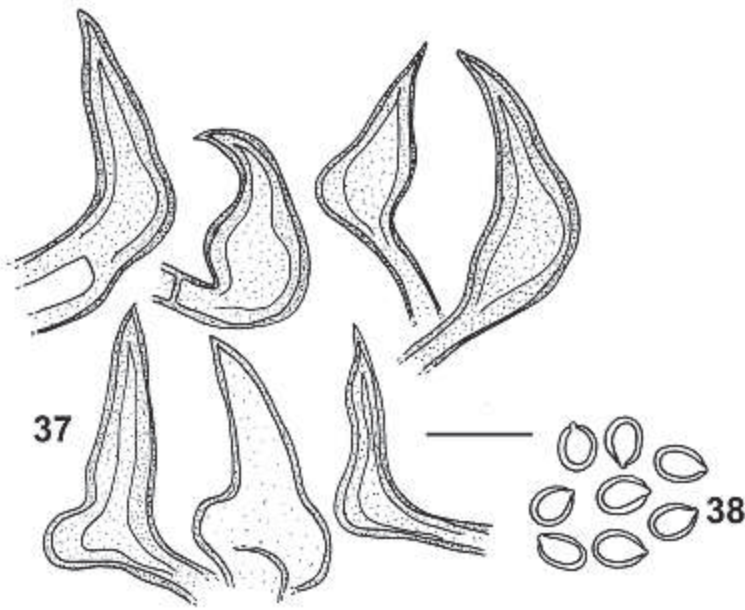
Description: Larsen and Lombard (1988).

Distribution in Southern Brazil: Paraná (Meijer 2006); Rio Grande do Sul [Rick (1960), as *Poria rickii* Bres.].

Specimens examined: **BRAZIL, PARANÁ,** Morro do Canal, 12/XI/2010, Campos-Santana 383 (ICN); **RIO GRANDE DO SUL:** Dom Pedro de Alcântara, RPPN do professor Luis Baptista, 12/III/2010, Campos-Santana 15 (ICN); *ibid.*, 16/XI/2010, Campos-Santana 199 (ICN), *ibid.*, 11/VI/2010, Campos-Santana 206 (ICN); São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA- SFP), 21/V/2011, Campos-Santana 560 (ICN); *ibid.*, Centro de Pesquisas e Conservação da Natureza, PRÓ-MATA – PUC/RS, 25/VI/2010, Campos-Santana 222 (ICN); Santa Maria, Parque Pinhal, I/1992, G. Coelho 8-5 (ICN 97791).

Remark: *Inonotus tropicalis* has a resupinate basidiomata. Microscopically, it is characterized by a dimittic hyphal system, small pores (7-9/ mm), small and abundant hymenial setae (15.0-25.0 \times 5.0-9.0 μ m), and hyaline, subglobose basidiospores, 4.0-5.0 \times 2.5-3.5(-4.0) μ m.

The taxonomic position of *I. tropicalis* is still subject to debate. Larsen & Lombard (1988) described this species (as *Phellinus tropicalis*) with annual



Figs 37-38. *Inonotus tropicalis*. **37.** Hymenial setae. **38.** Basidisporae (37 and 38, scale bar = 10 μ m).

basidiomata and two kinds of contextual hyphae: generative hyphae and thick-walled, infrequently simple-septate skeletal hyphae. Previously, Lowe (1966) pointed out that *P. tropicalis* (as *Poria rickii*) has an annual to biennial basidiomata with a monomitic hyphal system with simple-septate.

Wagner and Fischer (2002) transferred this taxon to *Inonotus sensu* Wagner and Fischer (2002) after phylogenetic analysis based on rDNA nLSU sequence data.

Inonotus sp.

Distribution in Southern Brazil: Santa Catarina and Paraná.

Specimens examined: **BRAZIL, PARANÁ:** Céu Azul, Parque Estadual do Iguaçu, 14/XII/2010, *Campos-Santana* 492 (ICN); **SANTA CATARINA:** Alfredo Wagner, Reserva Rio das Furnas, *Gerlach et al.* 14, 01/IX/2007 (FLOR 32325); *ibid.*, *Gerlach & Giovanka* 76, 07/VII/2008, (FLOR 32324), *ibid.*, ipse 109, 07/VII/2008 (FLOR 32326).

Remark: *Inonotus* sp. is characterized by a dense, heterogeneous context, a black line present between several layers and by the absence of setae. This species could be compared to *I. venezuelicus* Ryvardeen (Robledo *et al.* 2006, Ryvardeen 2004), from which it differs in having multilayered context and smaller pores (4-6/mm *versus* 3-4/mm).

Phellinus Quél. *Enchiridion Fungorum in Europa media et praesertim in Gallia Vigentium:* 172, 1886.

Key to *Phellinus* species

1. Basidiomata pileate 2
- 1'. Basidiomata resupinate to effused 3
 2. Pores 8-10/mm; hymenial setae acuminate, 16.0-25.0 × 6.5-7.5 μm *P. calcitratus*
 - 2'. Pores 6-7/mm; hymenial setae ventricose, 20.0-28.0 × 7.0-10.0 μm *P. caryophylleus*
3. Pores ≥ 7/mm (7-11/mm) 4
- 3'. Pores 5-8/mm 6
 4. Hymenial setae straight *P. detonsus*
 - 4'. Hymenial setae hooked 5
5. Pore surface deep tobacco brown; basidiospores globose to subglobose (3.0-) 3.5-4.5 × 2.5-3.5(-4.0) μm *P. lopezii*
- 5'. Pore surface light to dark brown; basidiospores broadly ellipsoid 4.5-5.5 × 3.5-4.0 μm *Phellinus* sp. (*P. gabonensis* complex)
6. Setal hyphal present; hymenial setae conical to ventricose; pore surface light brown; basidiospores (hyaline) to pale yellowish 3.5-4.5 × 3.0-4.0 μm *P. anchietanus*
- 6'. Setal hyphal absent; hymenial setae subventricose to acuminate; pore surface reddish-brown; basidiospores pale yellow, 3.5-4.5 × 3.0-4.0 μm *P. shaferi*

Phellinus anchietanus Decock & Ryvarden, Cryptogam. Mycol. 18: 222, 1997.

Description: Decock and Ryvarden (1997), Ryvarden (2004).

Distribution in Southern Brazil: Rio Grande do Sul (Decock and Ryvarden 1997).

Specimen examined: **BRAZIL, RIO GRANDE DO SUL:** São Salvador, 1942, [*Fungi Rickiani* 13938, PACA, leg. J.Rick as *Poria chromatica* Berkeley & Cooke (Rick 1960)].

Remark: this species is easily recognized by the combination of the following characteristics: resupinate basidiomata; presence of setal hyphae and hymenial setae, the latter straight to commonly apically curved to distinctly hamate; small, subglobose, (hyaline) to pale yellowish basidiospores. According to Decock and Ryvarden (1997), these characteristics are unique within the genus and make the species distinct. *Phellinus lopezii* and *Phellinus undulatus* also have curved to hooked hymenial setae but both lack setal hyphae.

The taxonomic placement of this species might be reconsidered, however. The presence of both setal hyphae and hymenial setae would indicate better affinities with several species of *Inonotus sensu* Wagner and Fischer (2002).

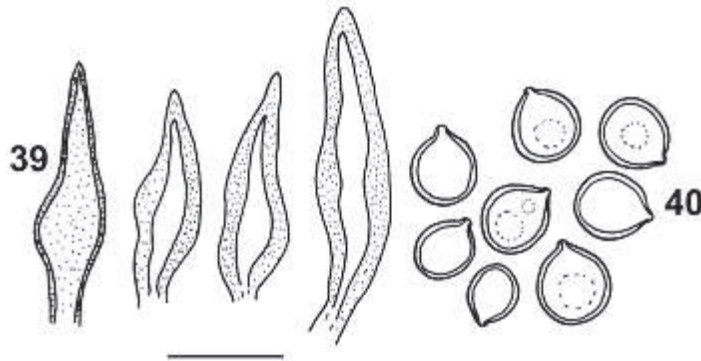
Phellinus calcitratus (Berk. & M.A. Curtis) Ryvarden, Norw. J. Bot. 19: 234, 1972. Figs 39-40

≡ *Polyporus calcitratus* Berk. & M.A. Curtis, Bot. J. Linn. Soc. 10: 314, 1869.

Description: Lowe (1957), Ryvarden and Johansen (1980).

Distribution in Southern Brazil: Rio Grande do Sul (Rick 1960, as *Fomes calcitratus* (Berk. & M.A. Curtis) Cooke).

Specimens examined: **BRAZIL, RIO GRANDE DO SUL:** Caçapava do Sul, Pedra do Segredo, 16/IV/2010, Campos-Santana 85 (ICN); *ibid.*, Campos-Santana 92 (ICN); Santa Maria, Morro da Caturrita, 15/V/2010, Campos-Santana



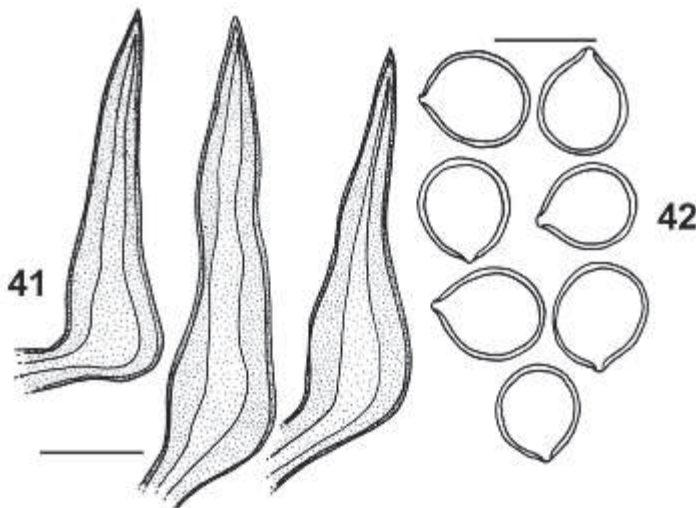
Figs 39-40. *Phellinus calcitratus*. **39.** Hymenial setae. **40.** Basidiospores (39 and 40, scale bar = 10 μ m).

151 (ICN); Santa Maria, Itaara, Parque Pinhal, 1992, *G. Coelho* 14-5 (ICN 97693); *ibid.*, 08/III/1993, *G. Coelho* 37-4 (ICN 97694).

Remark: *Phellinus calcitratus* is an interesting poroid Hymenochaetaceae. As observed by Góes-Neto *et al.* (2000) and Ryvar den (2004), *P. calcitratus* can be easily distinguished from the other species of the genus by its sharply zoned pileus, the slightly translucent and cartilaginous tubes and a black line below the tomentum. Our specimens has 8-10 pores/mm, hymenial setae, 16.0-25.0 \times 6.5-7.5 μ m, and basidiospores measuring 4.5-6.0 \times 4.5-6.5 μ m, as previously reported by Ryvar den (2004).

Phellinus caryophylleus (Cooke) Ryvar den, *Norw. J. Bot.* 19: 234, 1972. Figs 41-42
 \equiv *Fomes caryophylleus* Cooke, *Grevillea* 15(73): 21, 1886.

Description: Ryvar den (2004), Ryvar den and Johansen (1980).



Figs 41-42. *Phellinus caryophylleus*. **41.** Hymenial setae. **42.** Basidiospores (41 and 42, scale bar = 10 μ m).

Distribution in Southern Brazil: Rio Grande do Sul (Rick 1960, as *Polyporus caryophylleus* (Cooke) Lloyd). First record from Paraná and Santa Catarina.

Specimens examined: **BRAZIL, PARANÁ:** Foz do Iguaçu, Parque Nacional do Iguaçu, Trilha do Poço Preto, 12/XII/2010, *Campos-Santana 462* (ICN); *ibid.*, *Campos-Santana 464* (ICN); *ibid.*, *Campos-Santana 468* (ICN); **SANTA CATARINA:** Mondaí, Linha Uruguai, 10/XII/2010, *Campos-Santana 436* (ICN).

Remark: the examined material is show the typical features of this species, including a perennial, pileate, broadly attached basidiomata, a velutinous to tomentose pileus and small pores (6-7/mm). Microscopically it is characterized by mostly ventricose, dark brown hymenial setae, 20.0-28.0 × 7.0-10.0 µm and yellow to rusty brown, subglobose basidiospores, 5.0-6.0 × 4.0-5.5 µm.

Ryvarden (2004) pointed out that this species is similar to *Inonotus linteus* (under *Phellinus linteus*) mainly because of the dark reddish-brown pore surface, the small pores and subglobose basidiospores. *Inonotus linteus* lacks the black line below a persistent tomentum, besides the setae are slender and not as distinctly ventricose as in *P. caryophyllaceus*. *Phellinus calcitratus* differs in the slender acuminate setae.

Phellinus detonsus (Fr.) Ryvarden, Synopsis Fung. 19: 173, 2004.

≡ *Polyporus detonsus* Fr., Linnaea 5: 519, 1830.

Description: Ryvarden (2004).

Distribution in Southern Brazil: This is its first record from Southern Brazil.

Specimens examined: **BRAZIL, PARANÁ:** Matinhos, 13/XI/2010, *Campos-Santana 398* (ICN); **RIO GRANDE DO SUL:** Mampituba, Silveirão, 12/I/2008, *M.A. Reck 007/08* (ICN 154008); Porto Alegre, Refúgio da Vida Silvestre – UFRGS, 31/V/2011, *Campos-Santana 600* (ICN).

Remark: *Phellinus detonsus* is easily recognizable by the resupinate basidiomata, a reddish-brown to brown pore surface, 9-11 pores/mm, round. Microscopically it can be identified by the ventricose, hymenial setae scattered, acuminate, dark brown, 16.0-26.0 × 5.0-7.5 µm and subglobose to ellipsoid, hyaline and with age pale yellow basidiospores, 3.0-4.0(-5.0) × 2.5-3.0 µm, as described by Ryvarden (2004).

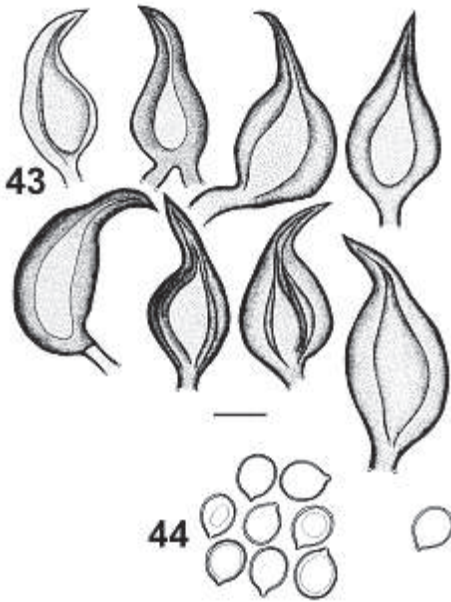
Phellinus sp. (P. gabonensis Decock & Yombiyeni morpho-ecological complex), Mycol. Prog. 10: 351-362, 2011. Figs 43-44

Description of P. gabonensis: Yombiyeni *et al.* (2011).

Distribution in Southern Brazil: This is a first record from South America.

Specimens examined: **BRAZIL, SANTA CATARINA:** Itapuá, RPPN Volta Velha, 23/II/2011, *Campos-Santana 515* (ICN); *ibid.*, *Campos-Santana 516* (ICN); *ibid.*, *Campos-Santana 655* (ICN); **RIO GRANDE DO SUL:** Dom Pedro de Alcântara, RPPN do professor Luis Baptista, 12/III/2010, *Campos-Santana 13* (ICN).

Remark: this species is recognized by the thickly cushion-shaped basidiomata, ventricose, apically curved hymenial setae, and broadly ellipsoid, slightly thick-walled, pale yellowish basidiospores, accumulating in a cream spore print. These morphological characteristics are also found (nearly) identical in *P. caribaeo-quercicolus* (Decock *et al.* 2005), *P. gabonensis* (Yombiyeni *et al.*



Figs 43-44. *Phellinus* sp. (*P. gabonensis* morpho-ecological complex). **43.** Hymenial setae. **44.** Basidiospores (43 and 44, scale bar = 10 μ m).

Distribution in Southern Brazil: New record for Brazil.

Specimen examined: **BRAZIL, RIO GRANDE SUL:** Dom Pedro de Alcântara, RPPN do professor Luis Baptista, 2009, *Reck* 232 (ICN).

Remark: *Phellinus lopezii* is characterized by round pores, 8-10/mm and abundant hymenial setae, ventricose to acuminante, mostly hooked, 13.0-27.0 \times 6.0-11.0 μ m. The basidiospores are small, globose to subglobose, thin walled, pale yellow, (3.0-)3.5-4.5 \times 2.5-3.5 μ m (Mata and Ryvarden 2010). *Phellinus undulatus* (Murrill) Ryvarden is similar but has angular pores, 4-6/mm and broadly ellipsoid and hyaline basidiospores (Mata and Ryvarden 2010).

Phellinus undulatus belongs to the *Inonotus sensu* Wagner and Fischer (2002) clade (Yombiyeni *et al.* 2011). The morphology of *P. lopezii* also points toward *Inonotus*. Molecular data are desirable to ascertain the affinities of this species.

Phellinus shaferi (Murrill) Ryvarden, *Norw. J. Bot.* 19: 235, 1972. Figs 45-46

= *Fuscoporella shaferi* Murrill, *North Am. Fl.* 9(1): 7, 1907.

Description: Larsen and Cobb-Poullé (1990), Valenzuela *et al.* (2012).

Distribution in Southern Brazil: First record from Southern Brazil.

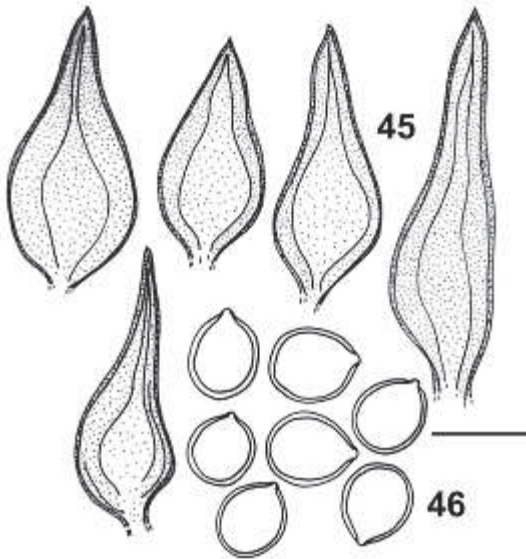
Specimens examined: **BRAZIL, PARANÁ:** Piraquara, Morro do Canal, 12/XI/2010, *Campos-Santana* 385 (ICN); *ibid.*, Foz do Iguaçu, Parque Nacional do Iguaçu, Trilha do Poço Preto, 12/XII/2010, *Campos-Santana* 456 (ICN); **SANTA CATARINA:** Itapuí, RPPN Volta Velha, Trilha da Casa de Vidro, 29/IV/2013, *Campos-Santana* 658 (ICN); **RIO GRANDE DO SUL:** São Francisco de Paula, Floresta Nacional de São Francisco de Paula (FLONA-SFP), 07/VI/2010, *Campos-Santana* 170 (ICN).

2011), *P. ellipsoideus* (Dai and Cui 2011, Cui and Decock 2013), and *P. castanopsidis* (Cui et Decock 2013). These species form a morphological complex. Our collections from Southern Brazil also share with *P. gabonensis* the same type of habitat; hence they form a morpho-ecological complex.

However, a single sequence (ITS region) from a collection from southern Brazil shows that it is more closely related to *P. caribaeo-quercicolus* than to *P. gabonensis*. *Phellinus caribaeo-quercicolus* is found northerly in the Caribbean area, in Cuba and southern Florida, and grows (presumably) exclusively on *Quercus*. More material and multilocus sequences data are necessary to ascertain the status of the material from southern Brazil.

Phellinus lopezii M. Mata & Ryvarden, *Synopsis Fung.* 27: 60, 2010.

Description: Mata and Ryvarden (2010).



Figs 45-46. *Phellinus shaferi*. 45. Hymenial setae. 46. Basidiospores (45 and 46, scale bar = 10 μ m).

Distribution in Southern Brazil: Paraná, Santa Catarina and Rio Grande do Sul (Baltazar *et al.* 2012).

Specimens examined: **BRAZIL, RIO GRANDE DO SUL:** Caçapava do Sul, Pedra do Segredo, 16/IV/2010, *Campos-Santana 127* (ICN); Santa Maria, Itaara, Parque Pinhal, 17/VI/1993, *G. Coelho 43-08* (ICN 97845).

Remark: this species was for a long time accepted in *Coltricia* Gray because of its stipitate basidiomata. However, its small coloured spores, a duplex context with a thin black line below a pileal tomentum indicate *Phylloporia* (Baltazar and Gibertoni 2010, Wagner and Ryvarden 2002). Its generic position is also supported by molecular data (Wagner and Ryvarden 2002).



Fig. 47. *Phylloporia spathulata*. 47. Basidiospores (scale bar = 5 μ m).

Remark: *Phellinus shaferi* is characterized by resupinate basiomata, the pore surface cracked with age, yellowish brown to dark brown, subventricose to acuminate hymenial setae (15.0-23 \times 5.5-10.0 μ m) and ellipsoid, thin-walled, pale yellow to rusty brown basidiospores, 3.5-4.5 \times 3.0-4.0 μ m.

Phylloporia Murrill, Torreyia 4: 141, 1904.

Phylloporia aff. *spathulata* (Hook.) Ryvarden (*P. spathulata* morpho-ecological type), Synopsis Fung. 5: 196, 1991. Fig. 47

\equiv *Boletus spathulatus* Hook., Syn. Pl. 1: 9, 1822.

Description: Núñez and Ryvarden (2000), Wagner and Ryvarden (2002), Ryvarden (2004).

Phylloporia veraecrucis (Sacc.) Ryvarden, another species with stipitate basidiomata, differs mainly by its slightly larger basidiospores (4.0-4.5 \times 3.0-3.5 μ m versus 3.0-4.0 \times 2.0-3.0 μ m in *P. spathulata*) (Wagner and Ryvarden 2002).

Phylloporia aff. *chrysites* (Berk.) Ryvarden, Norw. J. Bot. 19: 235, 1972.

\equiv *Polyporus chrysites* Berk., Hooker's J. Bot. Kew Gard. Misc. 8: 233, 1856.

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

Distribution in Southern Brazil: Paraná (Rajchenberg and Meijer 1990, Ryvarden and Meijer 2002, Meijer 2006); Santa Catarina (Loguercio-Leite and Wright 1991a, Gonçalves and Loguercio-Leite 2001, Drechsler-Santos *et al.* 2008, Loguercio-Leite *et al.* 2008); Rio Grande do Sul (Westphalen *et al.* 2010).

Specimens examined: **BRAZIL, RIO GRANDE DO SUL:** Caçapava do Sul, approx. 30°30'44"S, 53°29'29"W, elev. approx. 444 masl, on the bark of a small-stemmed dead standing, unidentified liana, 16 Apr. 010, *Campos-Santana 117/10* (ICN 177687); Porto Alegre, Refúgio da Vida Silvestre da UFRGS, approx. 30°03' S, 51°07'W, elev. approx. 130 m, on living stem, unidentified liana, 06 Jun. 2011, *Campos-Santana 555/11* (ICN 177688); *ibid.*, 31 May 2011, *Campos-Santana 610/11* (ICN 177689; *ibid.*, Viamão, Parque Estadual de Itapuã, approx. 30°27' S-30°20' S, 51°03' W-50°50' W, on living stem, unidentified liana, 16 Oct. 2010, *Campos-Santana 333/10* (ICN 177700).

Remark: This species presents a combination of morphological features that, obviously, point toward *P. chrysites* (Ryvarden 2004). It is characterized by broadly attached to amplexens basidiomata with a duplex context with a thin black line, an upper thick, spongy tomentum, and a thin context and tube layers. It differs from *P. chrysites sensu* Ryvarden (2004) in having distinctly ellipsoid basidiospores, whereas the basidiospores are typically globose to subglobose in *P. chrysites* (Ryvarden 2004). We refrain from describing this species for the moment; the status of several names currently considered as synonym of *P. chrysites* (cf. <http://www.indexfungorum.org/Names/Names.asp>) and based on type originating from the Neotropics, including Brazil, should be first reevaluated.

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