

# Polypores from Morro Santana, Rio Grande do Sul, Brazil

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**BSTRACT** - (Polypores from Morro Santana, Rio Grande do Sul, Brazil). In the survey of polypores from Morro Santana, Porto Alegre, Rio Grande do Sul, accomplished from March 2007 to March 2009, 44 species were identified. Identification keys and remarks about all the species are given. Full descriptions and illustrations of *Datronia caperata*, *Junghuhnia polycystidifera*, *Oxyporus obducens*, *Phellinus umbrinellus*, *Phylloporia frutica* and *Tinctoporellus epimiltinus* are presented. *Tinctoporellus epimiltinus* is a new records from Rio Grande do Sul.

**Key words:** Basidiomycota, neotropical mycobiota, Polyporales.

**RESUMO** - (Fungos Poróides do Morro Santana, Rio Grande do Sul, Brasil). No levantamento de fungos poróides do Morro Santana, Porto Alegre, Rio Grande do Sul, realizado entre os meses de março de 2007 e março de 2009, 44 espécies foram identificadas. São apresentadas chaves de identificação e comentários sobre todas as espécies. Descrições completas e ilustrações de *Datronia caperata*, *Junghuhnia polycystidifera*, *Oxyporus obducens*, *Phellinus umbrinellus*, *Phylloporia frutica* e *Tinctoporellus epimiltinus* são apresentadas. *Tinctoporellus epimiltinus* é uma nova citação para o Rio Grande do Sul.

**Palavras-chave:** Basidiomycota, micobiota neotropical, Polyporales.

## Introduction

Most of the polypores belong to the orders Polyporales Gäum. and Hymenochaetales Oberw., subclass Agaricomycetidae Parmasto, class Basidiomycetes G. Winter, phylum Basidiomycota R.T. Moore (Kirk *et al.* 2008). They are characterized by presenting a tubular hymenophore and being predominantly xylophilous, but can also grow on soil or plant litter and therefore are extremely important in nutrients and energy cycling (Webster & Weber 2007). Wood-decay Basidiomycota are divided into two large groups: the white rot fungi decompose cellulose and lignin, while the brown rot ones decompose only cellulose. Such fungi may cause damages when they attack wood, reducing its commercial value, and when they parasite species of economic interest, causing a slump in productivity (Wright & Albertó 2006).

In polypores, both macro and microscopic characters are highly variable. Macroscopically, the basidiomata can present two main habits:

resupinate or pileate. However, there can also be transitions between both forms (Ryvarden 1991). Although these characters are greatly important in the characterization of the taxa, the polypores do not necessarily form a monophyletic group, and several cases of morphological convergence exist (Hibbett & Binder 2002). The hyphae can be of three types: generative, skeletal or binding. The hyphal system is classified as monomitric, when only generative hyphae are present, dimitic, when two types of hyphae are present, or trimitic, when the three types of hyphae are present (Teixeira 1995). The basidiospores have a great variety of shapes and can be hyaline or colored; they can have thick or thin, ornamented or smooth walls (Gilbertson & Ryvarden 1986).

Rick was the pioneer in the study of macroscopic fungi in the state of Rio Grande do Sul, having published several papers on polypores (Fidalgo 1962, Rick 1960). More recently, several other taxonomic works have been undertaken in the State on that group. Among them, the following can be highlighted: Silveira & Guerrero (1991), Groposo

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& Loguercio-Leite (2002), Reck & Silveira (2008), Coelho *et al.* (2005, 2006).

The aim of this work is to contribute to the knowledge about the polypores in Rio Grande do Sul and in Brazil. Besides, this was the first survey of fungi accomplished in the studied area.

### Material and methods

The fungi were collected from March 2007 to March 2009 in Morro Santana (30°03'S and 51°07'W, 30 to 311 m above sea level), Porto Alegre. The area has approximately 1,000 hectares, 600 of which constituting the CU Refúgio da Vida Silvestre of Universidade Federal do Rio Grande do Sul. Morro Santana is one of the last natural remnants in the urban area of Porto Alegre, comprising great biological diversity (Mohr & Porto 1998). The climate in the region is humid subtropical, of the Cfa type, according to the Köppen Climate Classification, with rain well distributed along the year and hot summers, with an annual average temperature of 19,5 °C and rainfall of 1,348 mm (Moreno 1961). The forest formations are mainly located in the humid slopes turned to the south (Aguiar *et al.* 1986) and, according to the RADAM BRASIL classification, this is a Seasonal Semi-deciduous Forest (Leite 2002).

The collected basidiomata were dried in room temperature and later analyzed macro and microscopically. Other previously collected specimens were also examined. In the macroscopic analysis, characters such as color, size, consistence, number of pores per millimeter, and characteristics of the pileus surface and hymenophore were observed. For the microscopic analysis, freehand sections of the basidiomes were taken and mounted in a drop of 3% KOH solution and 1% phloxine solution. The sections were also mounted in Melzer's reagent to test for dextrinoid or amyloid reaction of the microscopic structures. At least 20 microstructures of each type were measured. Characterization of the hyphal system followed the definitions by Pegler (1996). The terms and codes applied to the colors follow Kornerup & Wanscher (1978). Specimens were identified using specialized bibliography, from which the following works can be highlighted: Gilbertson & Ryvarden (1986, 1987), Ryvarden (1991, 2004) and Silveira & Guerrero (1991). Abbreviations of the authors of the species were made according to Kirk and Ansell (1992). All the collections were deposited in the ICN-UFGRS Herbarium (Holmgren *et al.* 1990)

### Results and Discussion

Forty-four species have been identified. *Tinctoporellus epimiltinus* (Polyporales) is recorded for the first time in the state of Rio Grande do Sul. The distribution of the species can be found in Baltazar & Gibertoni (2009), Dreschler-Santos *et al.* (2009) and Gomes-Silva & Gibertoni (2009).

#### Identification key to polypores families

1. Basidiospores double-walled, inner wall ornamented.....Ganodermataceae (KEY A)
1. Basidiospores with simple walls
  2. Basidiomata with xanthocroic reaction ..... Hymenochaetaceae (KEY B)
  2. Basidiomata without xanthocroic reaction ..... Other families (KEY C)

#### KEY A – Key to Ganodermataceae species

1. Basidiomata with upper surface laccate ..... *Ganoderma resinaceum*
1. Basidiomata with upper surface dull
  2. Basidiomata sessile; context dark colored; basidiospores truncate..... *Ganoderma australe*
  2. Basidiomata stipitate; context light colored; basidiospores globose to sub-globose ..... *Amauroderma brasiliense*

*Amauroderma brasiliense* (Singer) Ryvarden, Syn. Fung. (Oslo) 19: 44. 2004.

Description: Coelho *et al.* (2007), Ryvarden (2004).

Species characterized by fleshy, whitish basidiomata, flabeliform pileus and dimitic hyphal system with dominance of generative hyphae. Coelho *et al.* (2007) observed in fresh specimens the presence of dendrohyphidia and gloeopleurous hyphae in the trama and context. However these structures were not observed in our specimen. Previously recorded from Rio Grande do Sul by Coelho *et al.* (2007).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, M.C. Westphalen 001/07 (ICN).

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

Description: Ryvarden (2004).

Species with perennial basidiomata with black

bands in the context, brown-colored pileus and whitish hymenophoral surface, reaching large dimensions (up to 50 cm in diam.). *Ganoderma australe* used to be identified as *G. applanatum* in the South of Brazil, but according to Ryvarden (2004) the latter can be found in temperate zones and presents a context without black bands and smaller basidiospores.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen 002/07* (ICN); idem, 4-V-2007, *M.C. Westphalen 032/07* (ICN); idem, 14-XII-2007, *M.C.*

*Westphalen 086/07* (ICN).

*Ganoderma resinaceum* Boud., Bull. Soc. mycol. Fr. 5: 72. 1890.

Description: Ryvarden (2004).

Species easily recognizable for presenting a laccate pileus, and an excentric to lateral stipe. According to Ryvarden (2004), *G. resinaceum* is part of a complex of similar species.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 6-VII-2005, *M.A. Reck s.n.* (ICN154159).

#### KEY B – Key to Hymenochaetaceae species

1. Hyphal system monomitic
  2. Basidiomata becoming red with KOH; context without a black line ..... *Inonotus splitgerberi*
  2. Basidiomata becoming black with KOH; context with a black line
    3. Pores 5-6 per mm; basidiospores sub-globose to ellipsoid,  $3-4.5 \times 2.5-3.5 \mu\text{m}$ ; context duplex with the upper part loose and cottony and the lower part dark and dense ..... *Phylloporia fruticosa*
    3. Pores 6-8 per mm; basidiospores sub-globose,  $3-3.5 \times 2.5-3.5 \mu\text{m}$ ; context duplex with a distinct black line ..... *Phylloporia chrysis*
1. Hyphal system dimitic
  4. Setal hyphae and/or hymenial setae present
    5. Basidiomata pileate ..... *Phellinus gilvus*
    5. Basidiomata resupinate
      6. Pores 2-3 per mm; setal hyphae and hymenial setae present; basidiospores ellipsoid,  $5-7 \times 3-3.5 \mu\text{m}$  ..... *Phellinus contiguus*
      6. Pores 6-7 per mm; hymenial setae present, setal hyphae absent; basidiospores cylindrical,  $4.5-6 \times 2-3 \mu\text{m}$  ..... *Phellinus ferreus*
  4. Setal hyphae and hymenial setae absent
    7. Basidiomata pileate
      8. Upper surface velutinate; context with a black line ..... *Phellinus grenadensis*
      8. Upper surface glabrous and rimose; context without a black line ..... *Phellinus rimosus*
    7. Basidiomata resupinate
      9. Basidiospores dextrinoid, globose to sub-globose ( $5-7 \times 5-6.5 \mu\text{m}$ ) ..... *Phellinus punctatus*
      9. Basidiospores indextrinoid, sub-globose to ellipsoid ( $4-5 \times 3.5-4 \mu\text{m}$ ) ..... *Phellinus umbrinellus*

*Inonotus splitgerberi* (Mont.) Ryvarden, Norw. JI Bot. 19: 232. 1972.

Description: Ryvarden (2004).

Species characterized by red xanthocroic reaction with KOH and the absence of setae in the trama and hymenium. *Inonotus dentatus* also presents such characteristics. However the basidiomata are golden yellow while in *I. splitgerberi* they present a rusty brown coloration.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 7-VIII-2008, *L. Tramontini s.n.* (ICN154166).

*Phellinus contiguus* (Pers.) Pat., Hyménomyc. de France (Sceaux): 624. 1928.

Description: Ryvarden (2004).

Species characterized by dark brown resupinate basidiomata with large pores (2-3 per mm), the

presence of tramal and hymenial setae, and the and ellipsoid hyaline basidiospores.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-III-2008, *M.C. Westphalen 095/08* (ICN); idem, 14-III-2008, *M.C. Westphalen 097/08* (ICN); idem, 13-III-2009 *M.C. Westphalen 115/09* (ICN).

***Phellinus ferreus*** (Pers.) Bourdot & Galzin, Hyménomyc. de France (Sceaux): 627. 1928.

Description: Ryvarden (2004).

The resupinate basidiomata and the presence of hymenial setae and cylindrical and hyaline basidiospores (4.5-6 × 2-3 µm) characterize this species. Macroscopically, *P. ferreus* can be recognized by the thin (up to 1.3 mm thick) dark yellowish brown to chocolate brown basidiomata.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 12-IX-2007, *M.C. Westphalen 047/07* (ICN); idem, 12-IX-2007, *M.C. Westphalen 053/07* (ICN); idem, 12-IX-2007, *M.C. Westphalen 055/07* (ICN); idem, 6-VII-2005, *M.A. Reck s.n.* (ICN154156).

***Phellinus gilvus*** (Schwein.) Pat., Essai Tax. Hyménomyc.: 82. 1900.

Description: Ryvarden (2004).

*Phellinus gilvus* presents a high macroscopic variability, sometimes resembling an *Inonotus* species. However, it has dimitic hyphal system, while *Inonotus* species are monomitic. The ellipsoid to ovoid basidiospores and the abundant ventricose setae are characteristics of the species.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen 016/07* (ICN); idem, 4-V-2007, *M.C. Westphalen 028/07* (ICN); idem, 11-V-2007, *M.C. Westphalen 042/07* (ICN).

***Phellinus grenadensis*** (Murrill) Ryvarden, Norw. J. Bot. 19: 234. 1972.

Description: Ryvarden (2004).

The dark colored velutinate pileus and the presence of stratified tubes separated by context layers are distinctive characteristics of this species. Recently recorded from Rio Grande do Sul by Silveira et al. (2008).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-XI-2007, *M.C. Westphalen 061/07* (ICN); idem, 14-XII-2007, *M.C. Westphalen 075/07* (ICN).

***Phellinus umbrinellus*** (Bres.) S. Herrera & Bondartseva, Mikol. Fitopatol. 14(1): 8, 1980.

Figures 1-3

Basidiomata perennial, resupinate, sub woody; pore surface golden brown (5D7 – 5E6); margin yellowish brown (5E8); pores regular, round to angular, 5-7 per mm, tubes yellowish brown (5D5 – 5D7), up to 2 mm thick; context concolorous with the tubes, up to 2 mm thick. Hyphal system dimitic. Generative hyphae with simple septa, thin to thick-walled, hyaline to golden yellow, abundant in the trama and in the context, 2-4 µm in diameter; skeletal hyphae thick-walled, golden yellow to yellowish brown, abundant, 3.5-5 µm in diameter; setal hyphae and hymenial setae absent. Basidia not seen. Basidiospores sub-globose to ellipsoid, smooth, golden brown to dark brown, slightly thick-walled, IKI-, 4-5 × 3.5-4 µm.

*P. umbrinellus* is macroscopically similar to *P. punctatus*. However, the former presents thinner basidiomata (up to 4 mm thick) and smaller non-dextrinoid basidiospores. *Phellinus melleoporus* is a very similar species, differing only in hyaline to pale yellow basidiospores.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 12-IX-2007, *M.C. Westphalen 052/07* (ICN); idem, 13-III-2009, *M.C. Westphalen 108/09* (ICN); idem, 13-III-2009, *M.C. Westphalen 112/09* (ICN).

***Phellinus punctatus*** (Fr.) Pilát, Atlas des Champignons de l'Europe 3: 530. 1942.

Description: Ryvarden (2004).

Species characterized by the presence of sub-globose, hyaline and dextrinoid basidiospores (5-7 × 5-6.5 µm) and the lack of setal elements.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 12-IX-2007, *M.C. Westphalen 048/07* (ICN).

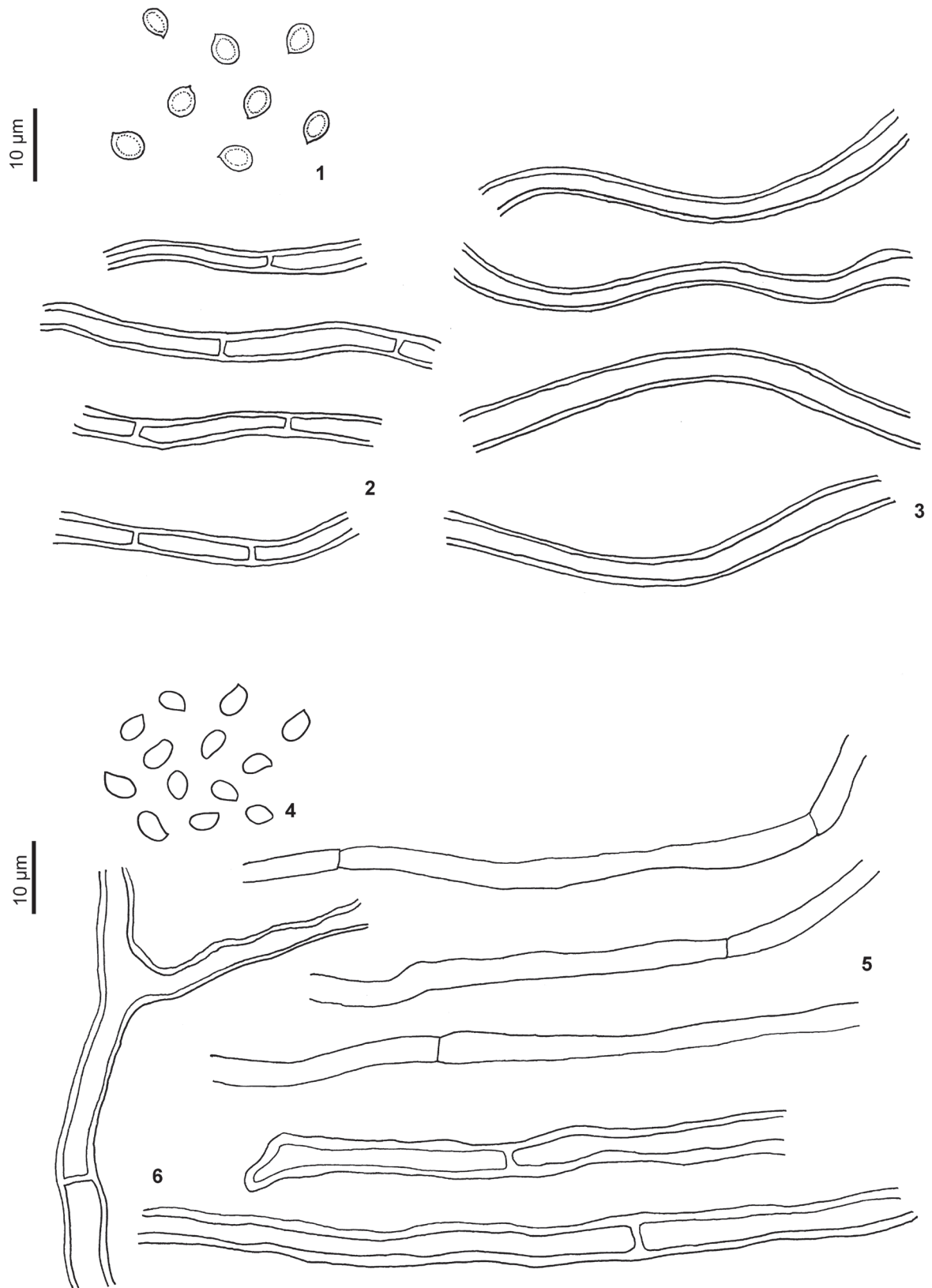
***Phellinus rimosus*** (Berk.) Pilát, Anns mycol. 38(1): 80.1940.

Description: Ryvarden (2004).

The species is easy to recognize for its large (up to 23 cm thick and 12 cm in diameter), dark brown, ungluate and rimose basidiomata.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 12-IX-2007, *M.C. Westphalen 049/07* (ICN); idem, *M.C. Westphalen 050/07* (ICN).





Figures 1-6. Microscopic characters. 1-3. *Phellinus umbrinellus*. 1. Basidiospores. 2. Generative hyphae. 3. Skeletal hyphae. 4-6. *Phylloporia frutica*. 4. Basidiospores. 5. Thin-walled generative hyphae. 6. Thick-walled generative hyphae.

***Phylloporia chrysita*** (Berk.) Ryvar den, Norw. J. Bot. 19: 235. 1972.

Description: Ryvar den (2004).

*Phylloporia chrysita* is similar to *P. frutica*, from which it differs by the slightly smaller basidiospores (3-3.5 µm long) and pores (6-8 per mm), the lighter yellow to yellowish brown colored pore surface and by the presence of an evident black line in the context. Generally found growing on lianas.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, M.C. Westphalen 007/07 (ICN); idem, 04-V-2007, M.C. Westphalen 031/07 (ICN); idem, 13-III-2009, M.C. Westphalen 107/09 (ICN).

***Phylloporia frutica*** (Berk. & M.A. Curtis) Ryvar den, Norw. J. Bot. 19: 235. 1972.

Figures 4-6

Basidiomata annual, pileate, semicircular to almost round, soft and spongy, up to 4 cm thick and 2.5 cm wide, upper surface velutinous, golden brown (5D7 – 5D8); pore surface yellowish brown (5E6

– 5F7), pores mostly regular, round to angular, 5-6 per mm; tubes concolorous with the pore surface, up to 1 mm thick; context duplex, upper part loose and cottony, golden brown (5D7 – 5D8), up to 3 cm thick, lower part compact and dense, dark brown (6F7), up to 0.5 mm thick. Hyphal system monomitic; generative hyphae with simple septa, thin to thick-walled, hyaline to rusty brown, with 3-7.5 µm in diameter. Basidia not seen. Basidiospores sub-globose to ellipsoid, smooth, thin-walled, hyaline to golden yellow, with 3-4.5 × 2.5-3.5 µm.

*Phylloporia frutica* is similar to *P. chrysita*. However it differs by the slightly longer basidiospores and pores, the darker pore surface and by the context formed by a dense dark layer near the tubes and a soft and spongy upper layer. Generally found growing on lianas. This is the second record of this species from Brazil and Rio Grande do Sul. Previously recorded by Rick (1960).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 11-V-2007, M.C. Westphalen 036/07 (ICN).

#### KEY C – Key to species in other families

1. Generative hyphae with simple septa
  2. Basidiomata resupinate
    3. Cystidia present ..... *Oxyporus obducens*
    3. Cystidia absent ..... *Ceriporia xylostromatoides*
  2. Basidiomata pileate
    4. Cystidia absent ..... *Rigidoporus ulmarius*
    4. Cystidia present
      5. Cystidia usually thin-walled, not incrustated, 20-25 µm long; basidiospores sub-globose, 3.5-5 × 3.5-4 µm ..... *Rigidoporus microporus*
      5. Cystidia thick-walled, usually incrustated, up to 200 µm long; basidiospores globose to sub-globose, 4.5-6 × 4-5 µm ..... *Rigidoporus lineatus*
1. Generative hyphae clamped
  6. Basidiomata resupinate
    7. Basidiospores ornamented
      8. Cystidia present, hyphal system monomitic; basidiospores globose to sub-globose ..... *Trechispora regularis*
      8. Cystidia absent, hyphal system dimitic; basidiospores cylindrical ..... *Pachykytospora papyracea*
    7. Basidiospores smooth
      9. Vegetative hyphae dextrinoid
        10. Pore surface white to cream
          11. Pores 5-7 per mm; hyphal pegs absent; basidiospores dextrinoid, truncate and thick-walled ..... *Perenniporia medulla-panis*
          11. Pores 2-3 per mm, hyphal pegs present; basidiospores non-dextrinoid, cylindrical and thin-walled ..... *Dichomitus setulosus*
        10. Pore surface reddish-violet, dull violet or lilac grey

12. Basidiomata reddening the substrate; basidiospores sub-globose to broadly ellipsoid; dendrohyphidia absent ..... *Tinctoporellus epimiltinus*
12. Basidiomata not reddening the substrate, basidiospores cylindrical; dendrohyphidia present .....  
..... *Grammothele subargentea*
9. Vegetative hyphae non-dextrinoid
13. Thick-walled cystidia present ..... *Junghuhnia polycystidifera*
13. Cystidia absent, cystidioles present
14. Basidiospores allantoid; capitate cystidioles absent ..... *Skeletocutis lenis*
14. Basidiospores sub-globose to ellipsoid; capitate cystidioles present
15. Pores 1-3 per mm; basidiospores  $5-6.5 \times 3-4 \mu\text{m}$  ..... *Hyphodontia paradoxa*
15. Pores 3-5 per mm; basidiospores  $3.5-5 \times 2.5-3.5 \mu\text{m}$  ..... *Hyphodontia flavipora*
6. Basidiomata pileate
16. Basidiomata distinctly stipitate
17. Pores 2-4 per mm, upper surface beige to brown, margin cream colored; stipe central to excentric ..  
..... *Polyporus guianensis*
17. Pores 0.5-1 per mm, upper surface cream to beige, margin concolorous with the pileus surface; stipe central ..... *Polyporus guianensis* var. *puttemansii*
16. Basidiomata effuse-reflexed to sessile
18. Hyphal system monomitic
19. Basidiomata white, sessile, very soft and fragile ..... *Tyromyces leucomallus*
19. Basidiomata pinkish, effuse-reflexed, resinous ..... *Gloeoporus dichrous*
18. Hyphal system di-trimitic
20. Cystidia present
21. Basidiomata perennial, thick (up to 10 cm); vegetative hyphae dextrinoid; basidiospores pip-shaped ..... *Perenniporia martii*
21. Basidiomata annual, thin (up to 2 mm); vegetative hyphae non-dextrinoid; basidiospores cylindrical ..... *Trichaptum sector*
20. Cystidia absent
22. Context white to cream or golden yellow
23. Hyphal system dimitic
24. Pores 1-2 per mm; skeleto-binding hyphae present; skeletal hyphae absent; basidiospores cylindrical ..... *Polyporus alveolaris*
24. Pores smaller; skeletal hyphae present, skeleto-binding hyphae absent; basidiospores allantoid or pip-shaped
25. Basidiomata annual; pores 6-7 per mm; basidiospores allantoid ..... *Antrodiella duracina*
25. Basidiomata perennial; pores 4-5 per mm; basidiospores pip-shaped .....  
..... *Perenniporia martii*
23. Hyphal system trimitic
26. Upper surface glabrous; pores regular; vegetative hyphae golden yellow .....  
..... *Coriolopsis rigida*
26. Upper surface hirsute; pores irregular; vegetative hyphae hyaline ..... *Trametes villosa*
22. Context brownish, pinkish or reddish orange
27. Hyphal system dimitic to pseudo-trimitic
28. Basidiomata pinkish to ochraceous, very thin (up to 1,5 mm); generative hyphae with incrustations ..... *Skeletocutis roseola*
28. Basidiomata brownish to vinaceous, thicker; generative hyphae without incrustations
29. Context brown to dark brown; pores 3-5 per mm; basidiospores  $6.5-10 \times 2-3 \mu\text{m}$  .....  
..... *Datronia caperata*
29. Context violaceous to vinaceous-brown; pores 7-9 per mm; basidiospores smaller
30. Basidiospores allantoid to cylindrical,  $3.5-4.5 \times 1-1.5 \mu\text{m}$ ; skeletal hyphae unbranchend  
..... *Nigroporus vinosus*

30. Basidiopores ellipsoid, 4-5 × 2-3.5 µm; skeletal hyphae branched .....  
 ..... *Abundisporus subflexibilis*
27. Hyphal system strictly trimitic
31. Basidiomata reddish orange; basidiopores 11-16 × 5-6 µm ..... *Pycnoporus sanguineus*
31. Basidiomata greyish brown; basidiospores 7-9 × 3-3.5 µm ..... *Fomitella supina*

***Abundisporus subflexibilis*** (Berk. & M.A. Curtis)

Parmasto, Karstenia 40(1-2): 134. 2000.

Description: Parmasto & Hallenberg (2000).

Species frequently collected in the study area.

Macroscopically, it presents a great variability, from effuse-reflexed to sessile. It is characterized by the vinaceous brown coloration of the basidiomata, the pseudo-trimitic hyphal system and the pale yellow ellipsoid basidiospores, usually abundantly present.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, M.C. Westphalen 020/07 (ICN); idem, 4-V-2007, M.C. Westphalen 030/07 (ICN); idem, 11-V-2007, M.C. Westphalen 045/07 (ICN); idem, 30-XI-2007, M.C. Westphalen 067/07 (ICN); idem, 14-XII-2007, M.C. Westphalen 088/07 (ICN); idem, 14-IV-2005, M.A. Reck s.n. (ICN154154); idem, 6-VII-2005, M.A. Reck s.n. (ICN154155).

***Antrodiella duracina*** (Pat.) I. Lindblad & Ryvarden  
 , Mycotaxon 71: 336. 1999.

Description: Lindblad & Ryvarden 1999.

Basidiomata varying from effuse-reflexed to sub-stipitate. Mainly characterized by presenting monomitic context and dimitic trama, and small allantoid to cylindrical basidiospores (4-4.5 × 1-1.5 µm). According to Ryvarden and Iturriaga (2003), *A versicutis* is a similar species, distinguished by having smaller pores and dimitic context.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 11-V-2007, M.C. Westphalen 037/07 (ICN); idem, 6-VII-2005, M.A. Reck s.n. (ICN154158).

***Ceriporia xylostromatoides*** (Berk.) Ryvarden,  
 Prelim. Polyp. Fl. E. Afr. (Oslo): 276. 1980.

Description: Gilbertson & Ryvarden (1986).

Basidiomata white to cream, resupinate and with byssoid margins. Microscopically, it is characterized by the monomitic hyphal system with thin to thick walled hyphae with simple septa and ellipsoid basidiospores. The specimens studied presented dendrohyphidia in the dissepiments, a structure that has not been recorded before for this species.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-III-2008, M.C. Westphalen 100/08 (ICN); idem, 13-III-2009, M.C. Westphalen 118/09 (ICN).

***Corioloopsis rigida*** (Berk. & Mont.) Murrill, N.  
 Amer. Fl. (New York) 9(2): 75. 1908.

Description: Gilbertson & Ryvarden (1986).

The yellowish effuse-reflexed basidiomata, which can be easily separated from the substrata, is a diagnostic character of this species. It is distinguished from the *Trametes* Fr. species and *Pycnoporus sanguineus* by the yellowish coloration of the context and by the golden context hyphae.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 11-V-2007, M.C. Westphalen 035/07 (ICN); idem, 14/XII/2007, M.C. Westphalen 068/07 (ICN).

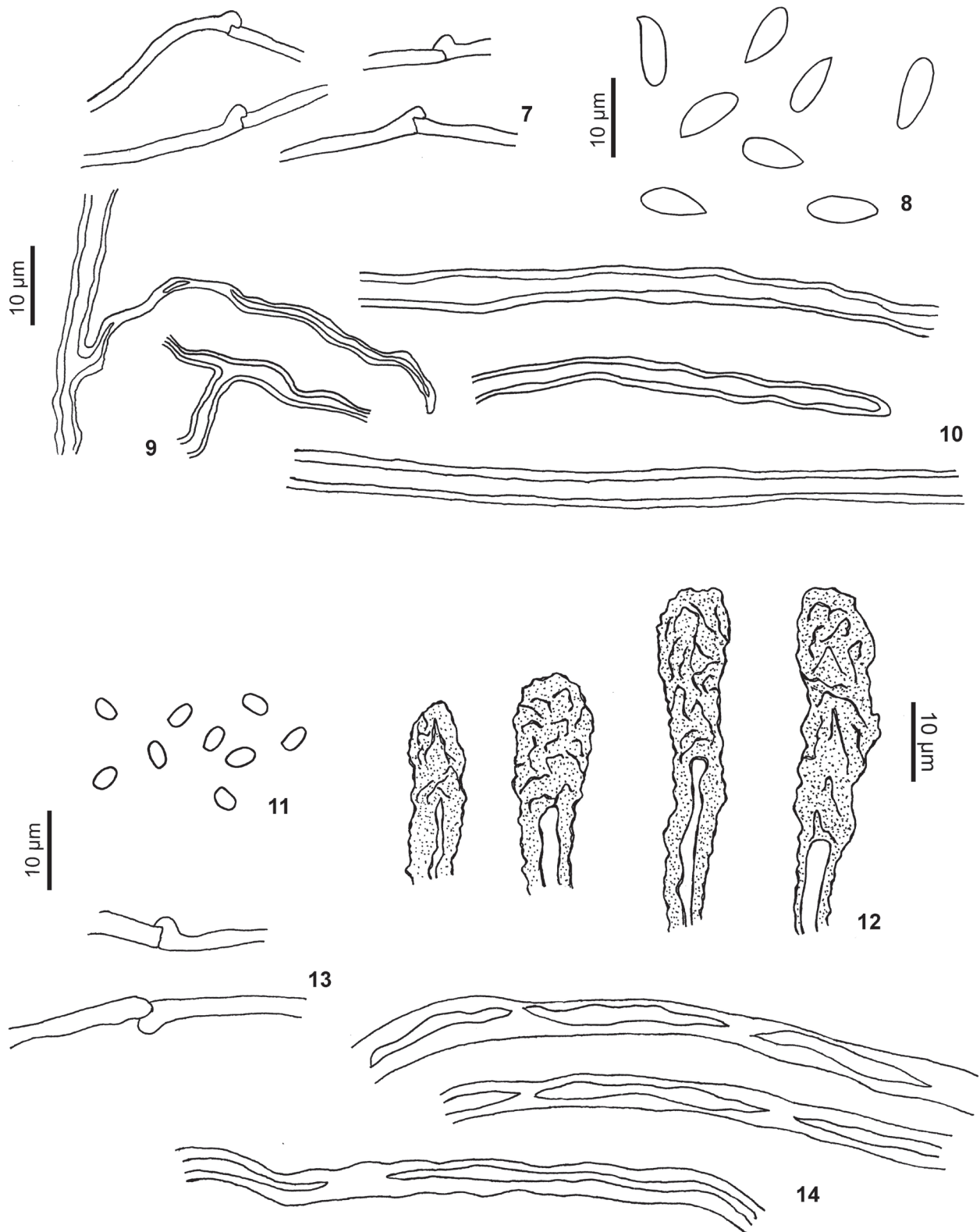
***Datronia caperata*** (Berk.) Ryvarden (Figs. 12-15),  
 Mycotaxon 23: 172. 1985.

Figures 7-10

Basidiomata annual, pileate, applanate, sessile to effuse-reflexed, semicircular, coriaceous to sub-woody, with 2,7 cm in ray and 4,8 cm in diameter; upper surface zonate, tomentose, brown (6E5) to dark brown (6F8) and margins brownish grey (4E2); pore surface yellowish white (4A2) to light brown (6D5), pores regular, circular to angular, 4-6 per mm; tubes concolorous with the pore surface, up to 2,5 mm thick; context dark brown (6F7), up to 5 mm thick. Hyphal system dimitic; generative hyphae with clamps, thin-walled, hyaline, with 1.5-2.5 µm in diameter; skeletal hyphae straight to curved with or without ramifications, thick walled, golden yellow to rusty brown, with 2-4 µm in diameter. Basidia not seen. Basidiospores cylindrical, hyaline, smooth, 8.5-10 × 3-4.5 µm.

*Datronia caperata* differs from *Trametes* species by the dark color of the pileus and context. It is distinguished from *Hexagonia* by the smaller and deeper tubes. This species was previously recorded for Rio Grande do Sul by Rick (1960) as *Trametes caperata* (Berk.) Teixeira and as *T. cirrifer* (Berk. & M.A. Curtis) Lloyd.





Figures 7-14. Microscopic characters. 7-10. *Datronia caperata*. 7. Generative hyphae. 8. Basidiospores. 9. Branched skeletal hyphae. 10. Unbranched skeletal hyphae. 11-14. *Junghuhnia polycystidifera*. 11. Basidiospores. 12. Incrustated cystidia. 13. Generative hyphae. 14. Skeletal hyphae.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 6-VII-2007, *M.A. Reck s.n.* (ICN 154162).

***Dichomitus setulosus*** (Henn.) Masuka & Ryvardeen, Mycol. Res. 103(9): 1130. 1999

Description in: Gilbertson & Ryvardeen (1987) as *Megasporoporia setulosa*.

Species with resupinate basidiomata with large pores (1-2 per mm) and white to cream pore surface. The large cylindrical basidiospores (10-14 × 4-6 µm) and the presence of hyphal pegs in the hymenium and dissepiments are the microscopic diagnostic characteristics.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 13-III-2009, *M.C. Westphalen 117/09* (ICN).

***Fomitella supina*** (Sw.) Murrill, Bull. Torrey bot. Club 32(7): 365. 1905.

Description: Gilbertson & Ryvardeen (1986).

*Fomitella supina* is a common trametoid species characterized by the effused-reflexed to dimidiate brownish grey basidiomata with smooth and glabrous upper surface. According to Gilbertson & Ryvardeen (1986), *Fomitella* Murrill is differentiated from *Fomitopsis* P. Karst. by causing white rot, while the latter causes brown rot.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 11-V-2007, *M.C. Westphalen 041/07* (ICN); idem, 12-IX-2007, *M.C. Westphalen 051/07* (ICN); idem, 30-XI-2007, *M.C. Westphalen 057/07* (ICN).

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

Description: Gilbertson & Ryvardeen (1986).

The basidiomata are variable, from effuse-reflexed to sessile. This species is macroscopically characterized by the reddish-pink color of the pore surface and microscopically by the monomitic hyphal system and the cylindrical to allantoid basidiospores. Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen 012/07* (ICN).

***Grammothele subargentea*** (Speg.) Rajchenb., Mycotaxon 17: 280. 1983.

Description: Rajchenberg (1984).

This species is characterized by the resupinate basidiomata with pinkish pore surface, the cylindrical

basidiospores and the presence of dendrohyphidia in the dissepiments.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-XII-2007, *M.C. Westphalen 077/07* (ICN); idem, 13-III-2009, *M.C. Westphalen 105/09* (ICN).

***Hyphodontia flavipora*** (Berk. & M.A. Curtis ex Cooke) Sheng H. Wu, Mycotaxon 76: 54. 2000.

Description: Gilbertson & Ryvardeen (1987) as *Schizopora flavipora*.

This species is similar to *H. paradoxa*, but it differs by presenting more regular pores and slightly smaller basidiospores (3.5-5 × 2.5-3.5 µm).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 4-V-2007, *M.C. Westphalen 026/07* (ICN).

***Hyphodontia paradoxa*** (Schrad.) Langer & Vesterh., Nordic J. Bot. 16(2): 211. 1996.

Description: Gilbertson & Ryvardeen (1987) as *Schizopora paradoxa*.

This species is very similar to *H. flavipora*. However it presents irpicoid hymenophore and slightly larger basidiospores (5-6.5 × 3.5-4 µm).

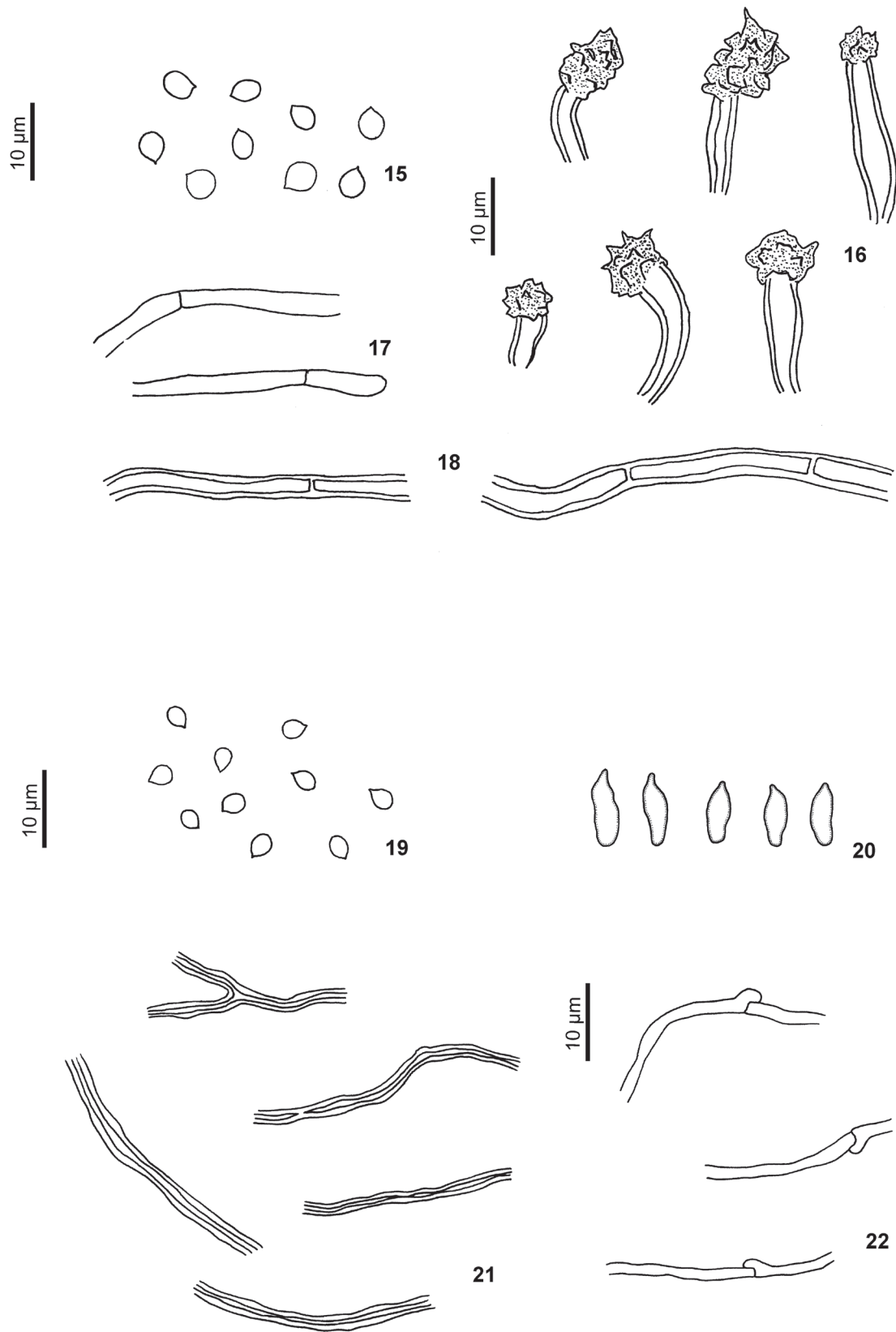
Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen 015/07* (ICN); idem, 11-V-2007, *M.C. Westphalen 044/07* (ICN).

***Junghuhnia polycystidifera*** (Rick) Rajchenb., Nordic J. Bot. 7(5): 566. 1987.

Figures 11-14

Basidiomata annual, resupinate, corky when fresh becoming brittle upon drying; pore surface beige (4C3), pores regular, circular to angular, 6-8 per mm; tubes concolorous with the pore surface with 0.5-2 mm thick; subiculum white (4A1) to yellowish white (4A2), up to 0.5 mm thick. Hyphal system dimitic; generative hyphae clamped, thin-walled, hyaline, present both in the trama and in the subiculum, up to 4 µm in diameter; skeletal hyphae thick-walled, hyaline to pale golden yellow, abundant, up to 6 µm in diameter; incrustated cystidia present but not abundant, immerse in the trama or projecting in the hymenium, club-like to cylindrical, thick-walled, 8-11 µm in diameter. Basidia not seen. Basidiospores ellipsoid, hyaline, smooth, thin-walled, 3-4 × 1.5-2 µm.

This species is macroscopically characterized by the beige colored basidiomata and the small pores. Microscopically, it can be identified by the presence



Figures 15-22. Microscopic characters. 15-18. *Oxyporus obducens*. 15. Basidiospores. 16. Encrusted cystidia. 17. Thin-walled generative hyphae. 18. Thick-walled generative hyphae. 19-22. *Tinctoporellus epimiltinus*. 19. Basidiospores. 20. Fusoid cystidioles. 21. Skeletal hyphae. 22. Generative hyphae.

of incrustated cystidia and by the small ellipsoid to sub-cylindrical basidiospores. This species was described and recorded for the first time from Rio Grande do Sul by Rick (1960), as *Poria polycystidifera*. Rajchenberg (1987), transferred this species to the genus *Junghuhnia*.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-XII-2007, M.C. Westphalen 070/07 (ICN).

Additional material examined: BRAZIL. RIO GRANDE DO SUL: São Salvador, 4-IV-1944, J. Rick s.n. (holotype PACA18603 as *Poria polycystidifera*).

***Nigroporus vinosus*** (Berk.) Murrill, Bull. Torrey bot. Club 32(7): 361. 1905.

Description: Gilbertson & Ryvarden (1987).

Species macroscopically characterized by the sessile and vinaceous brown basidiomata. *Nigroporus vinosus* may be confused with *A. subflexibilis* due to the similar coloration. However it differs by having hyaline, cylindrical to allantoid basidiospores and skeletal hyphae without ramifications.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-XI-2007, M.C. Westphalen 059/07 (ICN); idem, 14-XII-2007, M.C. Westphalen 087/07 (ICN); idem, 13-III-2009, M.C. Westphalen 111/09 (ICN).

***Oxyporus obducens*** (Pers.) Donk, Meddel. Bot. Mus. Herb. Rijhs Universit. Utrecht. 9: 202. 1933. Figures 15-18

Basidiomata annual to perennial, resupinate, very fragile and soft; pore surface white (4A1) to yellowish white (4A2); pores round to angular, 5-9 per mm; tubes concolorous with the pore surface, up to 2mm thick; subiculum white (4A1) to yellowish white (4A2), up to 3 mm thick. Hyphal system monomitic; generative hyphae with simple septa, thin to thick-walled, hyaline, 3-5 µm in diameter; cystidia present, abundant, both immerse in the trama or projecting in the hymenium, club-like, incrustated apically, 5-11µm in diameter. Basidia not seen. Basidiospores globose to sub-globose, hyaline, thin-walled, 4-5 × 3.5-4.5 µm.

*Oxyporus obducens* is macroscopically characterized by the fragile resupinate white to cream-colored basidiomata with small pores. Microscopically, it is identified by the monomitic hyphal system, hyphae with simple septa, globose to sub-globose basidiospores and club-like cystidia with a crown of crystals. This species was previously recorded for Rio Grande do Sul by Rick (1960) as

*Poria obducens* (Pers.) Cooke. This is the second record of the species from Brazil.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-III-2008, M.C. Westphalen 101/08 (ICN).

Additional material examined: BRAZIL. RIO GRANDE DO SUL: São Leopoldo, 1933, J. Rick s.n. (PACA18603 as *Poria obducens*); idem, 1933, J. Rick s.n. (PACA18656 as *Poria obducens*); 1933, J. Rick s.n. (PACA18686 as *Poria obducens*); 1936, J. Rick s.n. (PACA178744 as *Poria obducens*).

***Pachykytospora papyracea*** (Schwein.) Ryvarden, Norw. J. Bot. 19: 233. 1972

Description: Gilbertson & Ryvarden (1987).

Species characterized, macroscopically, by the resupinate basidiomata with large pores (2-3 per mm) and, microscopically, by the large ornamented warted basidiospores (14-17 × 6-8 µm)

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 13-III-2009, M.C. Westphalen 103/09 (ICN); idem, M.C. Westphalen 109/09 (ICN).

***Perenniporia martii*** (Berk.) Ryvarden, Norw. J. Bot. 19: 143. 1972.

Description: Ryvarden & Johansen (1980).

This species presents large perennial basidiomata with dark brown upper surface and beige pore surface. Microscopically, it has dimitic hyphal system with dextrinoid hyphae and pip shaped or tapering basidiospores. According to Ryvarden & Johansen (1980), the presence of cystidia is more common in the African and Asian specimens than in the American ones. Cystidia were not observed in our specimen.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-III-2008, M.C. Westphalen 093/08 (ICN).

***Perenniporia medulla-panis*** (Jacq.) Donk, Persoonia 5(1): 76. 1967.

Description: Gilbertson & Ryvarden (1987).

Annual to perennial resupinate species with white to cream basidiomata. Microscopically, it presents trimitic hyphal system with dextrinoid vegetative hyphae and ellipsoid to ovoid dextrinoid thick-walled basidiospores.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 12-IX-2007, M.C. Westphalen 046/07 (ICN).



***Polyporus alveolaris*** (DC.) Bondartsev & Singer, *Anns mycol.* 39(1): 58. 1941.

Description: Gilbertson & Ryvardeen (1987).

This species is easily recognizable due to its cartilaginous consistency when fresh, the orange brown upper surface and the cream pore surface with large pores. Even though Ibañez (1998) reported this species for the first time from South America, it had been previously registered by Rick (1960) as *Favolus europaeus*, an accepted synonym of *P. alveolaris*. This is the second record of this species from Brazil.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-XII-2007, *M.C. Westphalen 085/07* (ICN).

Additional material examined: BRAZIL. RIO GRANDE DO SUL: Itaara, Parque Pinhal, 10-III-2002, *G. Coelho GC340-2* (ICN); Santa Maria, Morro do Elefante, 30-IX-2010, *G. Coelho GC407-3* (ICN); São Leopoldo, 1930, *J. Rick FR.15741* (PACA as *Favolus europaeus*).

***Polyporus guianensis*** Mont., *Anns Sci. Nat., Bot.*, sér. 2 13(1): 201. 1840.

Description: Silveira & Wright (2005).

This species is characterized by the dark central to excentric stipe, the beige to light brown infundibuliform pileus with lighter margins and by the large circular to angular pores (2-4 per mm).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen 019/07* (ICN); idem, 13-III-2009, *M.C. Westphalen 110/09* (ICN).

***Polyporus guianensis*** var. *puttemansii* (Henn.) R.M. Silveira & J.E. Wright, *Mycotaxon* 93: 27. 2005

Description: Silveira & Wright (2005).

It differs from the var. *guianensis* by a the lighter cream to beige pileus surface and larger pores (0.5-1.5 per mm).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-IV-2005, *M.A. Reck s.n.* (ICN154157).

***Pycnoporus sanguineus*** (L.) Murrill, *Bull. Torrey bot. Club* 31(8): 421. 1904.

Description: Gilbertson & Ryvardeen (1987).

It is characterized by the reddish-orange color of the basidiomata and by the trimitic hyphal system and cylindrical basidiospores.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen 024/07* (ICN).

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

Description: Gilbertson & Ryvardeen (1987).

Presents reddish basidiomata, fleshy when fresh becoming very hard upon drying. Microscopically, it is characterized by metuloid cystidia, apically incrustated or not, and by sub-globose basidiospores (4.5-6 × 4-5 µm).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-XI-2007, *M.C. Westphalen 064/07* (ICN); idem, 13-III-2009, *M.C. Westphalen 106/09* (ICN).

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

Description: Gilbertson & Ryvardeen (1987).

*Rigidoporus microporus* is very similar to *R. lineatus*. However it does not present thick-walled cystidia and the basidiospores are smaller (3.5-5 × 3.5-4 µm).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, IV-2006, *M.A. Reck s.n.* (ICN154161).

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

Description: Gilbertson & Ryvardeen (1987).

This species presents pileate, large, thick basidiomata (up to 6 cm thick) with cream colored upper surface and pinkish hymenophore. Microscopically it has monomitocytic hyphal system, generative hyphae with simple septa and globose to sub-globose basidiospores (5.5-7.5 × 4-7 µm).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-III-2008, *M.C. Westphalen 090/08* (ICN); idem, 13-III-2009, *M.C. Westphalen 104/09* (ICN).

***Skeletocutis lenis*** (P. Karst.) Niemelä, *Karstenia* 31(1): 23. 1991.

Description: Gilbertson & Ryvardeen (1986) as *Diplomitoporus lenis*.

This species is macroscopically recognized for its white resupinate basidiomata with small pores. Microscopically, it has dimitic hyphal system, cystidioles with apical incrustations and allantoid basidiospores (3.5-5 × 1-1.5 µm).

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen* 023/07 (ICN); idem, 14-XII-2007, *M.C. Westphalen* 071/07 (ICN).

***Skeletocutis roseola*** (Rick ex Theiss.) Rajchenb., *Nordic J. Bot.* 7(5): 561. 1987.

Description: Rajchenberg (1987).

Species with ceraceous hymenophore, small pores (6-7 per mm) and small allantoid basidiospores ( $3-4.5 \times 0.5-1 \mu\text{m}$ ). It is distinguished from *S. lenis* by the effuse-reflexed basidiomata with beige upper surface and pinkish to vinaceous hymenophore. Macroscopically, this species is similar to *Gloeoporus dichrous*. However the latter presents a gelatinous hymenophore.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 14-III-2008, *M.C. Westphalen* & *M.A. Reck* 102/08 (ICN).

***Tinctoporellus epimiltinus*** (Berk. & Broome) Ryvarden, *Trans. Br. mycol. Soc.* 73(1): 18. 1979

Figures 19-22

Basidiomata perennial, resupinate, woody hard, brittle when dried, up to 3 mm thick; pore surface dull violet (15 E4) to lilac grey (16 C2), pores round to angular, 7-9 per mm; tubes whitish due to the presence of a cover of excreted crystals and a white mycelium stuffing the old tubes, up to 3 mm thick. Hyphal system dimitic. Generative hyphae clamped, hyaline, thin-walled, 1.5-2.5  $\mu\text{m}$  wide, restricted to the subhymenium; skeletal hyphae hyaline to golden yellow, thick-walled, 1.5-3  $\mu\text{m}$  in diameter, weakly dextrinoid; cystidia absent, fusoid cystidioles present, 8-14  $\times$  4-6  $\mu\text{m}$ ; basidia clavate, tetraspored. Basidiospores sub-globose to broadly ellipsoid, 3.5-4.5  $\times$  3-3.5  $\mu\text{m}$ .

This species is easily recognizable because it reddens the substrate. Macroscopically, it is characterized by the resupinate lilac grey basidiomata, and microscopically by the fusoid cystidioles and the sub-globose basidiospores. First record from Rio Grande do Sul.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 13-III-2009, *M.C. Westphalen* 116/07 (ICN).

***Trametes villosa*** (Sw.) Kreisel, *Monografias, Ciencias, Univ. Habana, Ser. 4* 16: 83. 1971.

Description: Gilbertson & Ryvarden (1987).

It is a common species characterized by the grayish, thin, effused-reflexed basidiomata with large pores (2-4 per mm) and tomentose to hirsute upper surface.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-XI-2007, *M.C. Westphalen* 060/07 (ICN); idem, 14-XII-2007, *M.C. Westphalen* 078/07 (ICN); idem, 14-XII-2007, *M.C. Westphalen* 080/07 (ICN).

***Trechispora regularis*** (Murrill) Liberta, *Can. J. Bot.* 51(10): 1878. 1974.

Description: Gilbertson & Ryvarden (1987).

*Trechispora regularis* presents white, fragile and cottony resupinate basidiomata with fimbriate margins. Microscopically, it is easily identifiable due to the monomitic hyphal system with clamped hyphae, the ornamented echinulate globose basidiospores and the cystidia with crystals incrustations.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen* 014/07 (ICN); idem, 30-III-2007, *M.C. Westphalen* 017/07 (ICN).

***Trichaptum sector*** (Ehrenb.) Kreisel, *Monografias, Ciencias, Univ. Habana, Ser. 4* 16: 84. 1971.

Description: Gilbertson & Ryvarden (1987).

Presents small effused-reflexed basidiomata, grey to pinkish-grey hymenophore, irregular pores (2-5 per mm) and pinkish to beige pileus surface. Microscopically, it has incrustated cystidia and cylindrical basidiospores.

Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 30-III-2007, *M.C. Westphalen* 018/07 (ICN); idem, 30-III-2007 *M.C. Westphalen* 022/07 (ICN).

***Tyromyces leucomallus*** (Berk. & M.A. Curtis) Murrill, *N. Amer. Fl. (New York)* 9(1): 36. 1907.

Description: Gilbertson & Ryvarden (1987).

This species is characterized by white, pileate and soft basidiomata, that becomes very light when dried, and by the small pores (5-8 per mm). Microscopically, it presents allantoid basidiospores and monomitic hyphal system with clamped hyphae. Material examined: BRAZIL. RIO GRANDE DO SUL: Porto Alegre, Morro Santana, 11-V-2007, *M.C. Westphalen* 038/07 (ICN); idem, 14-IV-2005, *M.A. Reck s.n.* (ICN154153).

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