UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE CIÊNCIAS BIOLÓGICAS
PROGRAMA DE PÓS-GRADUAÇÃO EM BIOLOGIA DE FUNGOS, ALGAS E PLANTAS

Thiago Kossmann Cardoso

Diversity and Conservation of Macrofungi from the Aparados da Serra with an emphasis on forest ecosystems

Florianópolis
2022

Thiago Kossmann Cardoso

Diversity and Conservation of Macrofungi from the Aparados da Serra with an emphasis on forest ecosystems

Dissertação submetida ao Programa de Pós-Gradução em Biologia de Fungos, Algas e Plantas da Universidade Federal de Santa Catarina para a obtenção do título de Mestre em Biologia de Fungos, Algas e Plantas.
Orientador: Dr. Elisandro Ricardo Drechsler dos Santos
Coorientador: Dr. Gregory M. Mueller

Florianópolis
2022

Ficha de identificação da obra elaborada pelo autor,
através do Programa de Geração Automática da Biblioteca Universitária da UFSC.

Kossmann Cardoso, Thiago
Diversity and Conservation of Macrofungi from the Aparados da Serra with an emphasis on forest ecosystems / Thiago Kossmann Cardoso ; orientador, Elisandro Ricardo Drechsler-Santos, coorientador, Gregory M. Mueller, 2022.
154 p.

Dissertação (mestrado) - Universidade Federal de Santa Catarina, Centro de Ciências Biológicas, Programa de Pós Graduação em Biologia de Fungos, Algas e Plantas, Florianópolis, 2022.

Inclui referências.

1. Biologia de Fungos, Algas e Plantas. 2. Ambientes de Altitude. 3. Espécies Ameaçadas. 4. Macrofungos. I. Drechsler-Santos, Elisandro Ricardo. II. Mueller, Gregory M.. III. Universidade Federal de Santa Catarina. Programa de Pós-Graduação em Biologia de Fungos, Algas e Plantas. IV. Título.

Thiago Kossmann Cardoso

Diversity and Conservation of Macrofungi from the Aparados da Serra with an emphasis on forest ecosystems

O presente trabalho em nível de mestrado foi avaliado e aprovado por banca examinadora composta pelos seguintes membros:

Prof. Dr. José Francisco Kuhar
Universidad Federal de Córdoba

Profa. Giulana Furci
Fundación Fungi

Profa. Dra. Maria Alice Neves
Universidade Federal de Santa Catarina

Certificamos que esta é a **versão original e final** do trabalho de conclusão que foi julgado adequado para obtenção do título de mestre em Biologia de Fungos, Algas e Plantas.

Documento assinado digitalmente
Fernanda Maria Cordeiro de Oliveira
Data: 22/08/2022 18:29:25-0300
CPF: 059.315.629-31
Verifique as assinaturas em https://v.ufsc.br

Profa. Dra. Fernanda Maria Cordeiro de Oliveira
Coordenação do Programa de Pós-Graduação

Documento assinado digitalmente
Elisandro Ricardo Drechsler dos Santos
Data: 23/08/2022 10:45:20-0300
CPF: 924.845.300-72
Verifique as assinaturas em https://v.ufsc.br

Prof. Dr.Elisandro Ricardo Drechsler dos Santos
Orientador
Florianopólis, 2022.

This work is dedicated to all those who give their lives in defense of nature and of human dignity.

Acknowledgements

This study is another step in the fulfillment of lifelong child's dream of working with nature. A step, it is true, in a neverending road, but as people say: the journey is more important than the destination.

To you, my reader, I ask the permission to switch to my mother tongue to thank for those that have allowed me to first begin this journey: my parents.

Aos meus pais, Neusa e Carlos, por todo apoio, amor e pelo incentivo à vida intelectual, meus mais profundos agradecimentos.

What is even more important than walking this road, are the people you share it with. And I could not be more thankfull to all the amazing people I have met in this short span of space and time in which I have the privilege of existing.

To my wife, Fran, for the companionship, for the shared love and for being the most amazing human being on this planet. Te amo!

To my advisor, Ricardo, whose enthusiasm has drawn my attention to the fungi, and for giving me the opportunity to start studying these amazing creatures: Thank you!

To my co-advisor, Greg, for his contributions to this study, for the comprehension, for the invaluable advices and for his work towards conservation of fungi: Thank you!

To all my MICOLAB and MIND.Funga colleagues: Felipe, Denyse, Funez, Marcel, Kelmer, Genivaldo, Diogo, Carlitos, Marcela, Mahatmã, Luan, Melissa, Eloísa, Iolly, Edilene, Duda, Mari, Ariadne, Gisele, Gustavo, and Carina. Thank you all for the shared moments, laughters and knowledges.

To those who contributed for this by sharing their knowledge about their specific groups of study and for kindly sharing literature: Prof. Felipe Wartchow, Prof. Ferndanda Karstedt, Prof. João Araujo, Prof. Juliano Marcon Baltazar, Prof. Mauro Westphalen, Prof. Paula Santos, Prof. Mario Rajchenberg, Prof. Gerardo Robledo, Prof. Rosa Mara da Silveira, Prof. José Luiz Bezerra, Prof. Jadergudson Pereira, Dr Peter Roberts, Prof. François Vallade, Prof. Renato Lúcio Alvarenga, and Peter Zuidland. Thank you!

For the committee members who kindly accepted to review and contribute to this study: Prof. Maria Alice Neves, Prof. Francisco Kuhar, Prof. Giuliana Furci, and Dr. Genivaldo Alves da Silva. Viva la Funga!

Finally, I thank FAPESC and CNPq for supporting this study my scholarship and funding all the activities needed to conduct it through the project "MIND.Funga - da Pesquisa com Macrofungos Ameaçados de Extinção das Matas Nebulares de Santa Catarina à Inovação na Identificação das Espécies", PRONEM Nº4/2019 - FAPESC/CNPq 2020TR733.

Resumo

Os fungos são organismos megadiversos e com uma variedade enorme de formas. Dentre estes, aqueles que apresentam estruturas reprodutivas macroscópicas são chamados macrofungos. Apesar de seu longo histórico de pesquisa se comparado a outros grupos do reino Fungi, estima-se que menos da metade das espécies de macrofungos sejam conhecidas, especialmente nas regiões tropicais, incluindo o Brasil. No sul do país, uma região que chama muita atenção por sua beleza cênica é a dos Aparados da Serra, uma área que apresenta ecossitstemas frágeis e carente de pesquisas com fungos. Este trabalho teve como objetivos acessar a diversidade de macrofungos da região dos Aparados da Serra a partir de expedições de coletas de espécimes e identificação morfológica, e eventualmente molecular, dos mesmos, e de compreender o estado de conservação das espécies lá encontradas de acordo com os critérios da IUCN. Foram analisados 241 espécimes, representando 120 espécies. Desses, 45 são novos registros para a região dos Aparados, 23 são novos registros para o estado de Santa Catarina e seis são novos registros para o Rio Grande do Sul. O número de espécies de macrofungos dos Aparados passou de 120 para 205 espécies, representando um aumento de quase 70% no número de espécies. Os gêneros *Pleurotopsis* e *Rhizomarasmius*, assim como a espécie *Ceriporia straminea* são novos registros para o Brasil e *Hymenochaete* cf. *cruenta* é um potencial novo registro para o país. Os gêneros *Coronicium* e *Vuilleminia* são registrados pela primeira vez na América do Sul. No total, 26 taxóns representam possíveis novidades taxonômicas, e quatro estão em preparação para publicação: *Resinomycena pleurotoides*, *Rhizomarasmius amylosetae*, *Sidera araucariae* e *Stereum gloeocystidiatum*. Em termos de conservação, 127 espécies foram preliminarmente avaliadas, sendo 108 delas consideradas como Pouco Preocupantes, 13 Vulneráveis, três Quase Ameaçadas e três como Dados Deficientes. As espécies *Fomitiporia nubicola, Laetiporus squalidus* e *Meruliopsis cystidiata* tiveram seus estados de conservação reavaliados, e a primeira passou de Vulnerável para Em Perigo. Apesar do aumento significativo no número de registros, nesse trabalho foram analisadas apenas uma fração dos materiais coletados durante as expedições aos Aparados, o que significa que ainda resta uma grande diversidade inexplorada, e que precisa ser estudada em trabalhos futuros.

Palavras-chave: Ambientes de Altitude. Espécies Ameaçadas. Macrofungos.

Resumo expandido

Introdução

Os fungos são organismos cruciais para a vida na Terra e para os seres humanos, fornecendo tanto serviços ecossitêmicos, como a decomposição da matéria orgânica e propiciando o estabelecimento de plantas, quanto produtos diretos para o ser humano, como remédios e produtos oriundos da fermentação. Megadiversos, os fungos apresentam uma diversidade enorme de formas, desde organismos unicelulares microscópicos a indivíduos ocupando mais de 1000 hectares. Dentre estes, os fungos que apresentam estruturas reprodutivas visíveis a olho nú são chamados macrofungos, e são encontrados nos filos Ascomycota e Basidiomycota. Por sua conspicuidade, dentre os fungos, são os que têm o maior histórico de estudo. Ainda assim, menos da metade das espécies de macrofungos estimadas são conhecidas para a ciência, especialmente nos trópicos.

A região Sul do Brasil apresenta um dos mais longos históricos de pesquisa micológica do país, porém, ambientes montanos, como a região dos Aparados da Serra, foram grandemente negligenciadas em pesquisas com fungos. A região dos Aparados da Serra é o extremo sul da cadeia de montanhas da Serra do Mar, localizada nos estados de Santa Catarina e Rio Grande do Sul, e apresenta paisagens exuberantes e um relevo marcado pela mudança abrupta de elevação no sentido leste-oeste, e abrange os pontos de maior altitude de ambos os estados em que se encontra. A região está completamente imersa na Mata Atlântica, e apresenta um clima Temperado Quente Úmido (Cfb) na classificação de Köppen-Geiger. Nesta região é possível encontrar uma alta diversidade vegetacional, que vai dos campos de altitude, passando pelos vassourais e as Matas de Araucária, bem como Floresta Ombrófila Densa altomontana e florestas nebulares.

Baseado na diversidade da Flora e nas estimativas da proporção de fungos:plantas, é possóvel estimar a diversidade de macrofungos da região em cerca de 1,000 espécies. Anteriormente a esse estudo, a diversidade de macrofungos conhecida para a região era de 120 espécies.

Em termos de conservação, os Aparados, e por consequência suas espécies fúngicas, estão expostos à uma série de fatores de risco, como gado, desmatamento, incêncios e os impactos das mudanças climáticas. Por conta disso, avaliar o estado de conservação das espécies lá encontradas se faz extremamente necessário. Das espécies atualmente conhecidas para a região, 11 estão publicadas na Lista Vermelha Global da IUCN, e apenas uma delas não se encontra ameaçada. Considerando isso, é crucial o estudo desta Funga tão pouco conhecida e ameaçada.

Objetivos

O objetivo geral desse estudo foi compreender a diversidade de espécies de macrofungos da região dos Aparados da Serra, com enfoque ecossistemas florestais, assim como avaliar o estado de conservação dessas espécies de acordo com os critérios da IUCN.

Os objetivos específicos foram providenciar uma sinopse da diversidade de macrofungos dos Aparados da Serra, e avaliar preliminarmente o estado de conservação de espécies potencialmente ameaçados de macrofungos dos Aparados da Serra.

Material e Métodos

As coletas foram realizadas em cinco áreas ao longo dos Aparados da Serra, ao longo da extensão latitudinal da região. As áreas foram selecionadas baseadas na maturação das florestas e na acessivilidade. As áreas amostradas foram RPPN Portal das Nascentes, Parque Nacional de São Joaquim (Módulos Santa Bárbara e Morro da Igreja), Parque Eolico Bom Jardim da Serra e Parque Nacional de Aparados da Serra/Serra Geral.

Cinco expedições foram realizadas, com algumas incluindo mais de uma área. Os esporomas foram coletados utilizando uma abordagem oportunística. Todos os espécimes foram etiquetados e fotografados com escala *in situ*, e notas sobre substrato, tipo de podridão, hospedeiro, microclima, etc., foram tomadas. Os espécimes foram desidratados com uma secadora de alimentos e uma porção foi desidrata em silica gel para procedimentos de biologia molecular. Todos os espécimes serão depositados no *fungarium* FLOR da Universidade Federal de Santa Catarina.

Para a identificação dos materiais, foram utilizados chaves dicotomicas e comprações com descrições apropriadas para cada táxon. Em algun casos, analises BLAST® de DNA também foram utilizadas.

Para a obtenção de sequências de DNA, o DNA total foi extraido através de um protocolo CETAB modificado. As sequências das regiões ITS e LSU foram geradas utilizando os marcadores ITS1/ITS4 ou ITS5/ITS 4 e LR0R/LR7F respectivamente. Os produtos de amplificação foram purificados utilizando protocolo PEG e sequenciados através do métido Sanger.

O estado de conservação das espécies for avaliado de acordo com os critérios da IUCN. Uma vez que as avaliações não foram formalmente propostas e revistas por pares, os estados de conservação apresentados aqui são considerados preliminares.

Resultados e Discussão

Um total de 241 espécimes foram analisados, representando 120 espécies. Dessas, 45 são novos registros para a região dos Aparados, com 13 novos registros a serem confirmados. Vinte e três espécies representam novos registros para o estado de Santa Catarina, com oito potenciais novos registros a serem confirmados, e seis espécies são novos registros para o Rio Grande do Sul. Os gêneros *Pleurotopsis* e *Rhizomarasmius* são registrados pela primeira vez no Brasil, e os gêneros *Coronicium* e *Vuilleminia* são registras pela primeira vez na América do Sul. *Ceriporia straminea* é um novo registro para o Brasil, e *Hymenochaete* cf. *Cruenta* é também um potencial novo registro para o país.

No total, 26 taxa representam potenciais novidades taxonomicas, e quatro delas estão em preparação para publicação: *Resinomycena pleurotoides, Rhizomarasmius amylosetae*, *Sidera araucariae* e *Stereum gloeocystidiatum*.

Com as espécies incluídas neste estudo, o número de espécies conhecidas para os Aparados passou de 121 para 205, representando um aumento de 70% no número de espécies conhecidas.

Das espécies ocorrentes na região dos Aparados, 19 foram selecionadas como potencialmente ameaçadas e tiveram seu estado de conservação avaliado, e três das espécies previamente publicadas na Lista Vermelha da IUCN foram reavaliadas. Dessas, 13 foram classificadas como Vulnerável, três como Quase Ameaçadas e três como Dados Deficientes. *Fomitiporia nubicola* passou de Vulnerável para Em Perigo.

Conclusão

Esse estudo for pioneiro na coleta, identificação e síntese da informação sobre a diversidade e a conservação de macrofungos da região dos Aparados da Serra.

Esse trabalho mostrou que há uma alta proporção de espécies ameaçadas na região, assim como um alto número de espécies novas a serem publicadas.

Além disso, um grande número de espécimes coletados no escopo desse trabalho não foram analisados, potencialmente representando mais 400 espécies, em sua maioria representando grupos subestudados como Ascomycota, fungos agaricoides e fungos gelatinosos.

Plano de comunição e publicações

Os resultados desse trabalho resultarão em publicações almejando tanto o público geral quanto a comunidade científica. Como forma de divulgação científica, um livro, bem como guias de campo, serão preparados apresentando as espécies dos Aparados, e distribuídos gratuitamente para a comunidade da região.

As novidades científicas serão publicadas no formato de artigo em revistas com classificação Qualis B2 e fator de impacto >1.0. Atualmente, quatro artigos descrevendo novas espécies estão em preparação.

Abstract

Fungi are megadiverse organisms with an enormous variety of forms. Among these, those that present macroscopic reproductive structures are called macrofungi. Despite having a longer research history than other groups of the kingdom Fungi, it is estimated that less than half of the species of macrofungi are known, especially in tropical zones, including Brazil. In the South of the Country, a region that grabs attention for its scenic beauty is the Aparados da Serra, an area with fragile ecosystems and that lacks fungal research. This study aims at understanding the diversity of macrofungi from the Aparados da Serra region through collection expeditions and identifying the species though morphological and eventually molecular analyses, as well as assessing the conservation status of species found in the region according to IUCN criteria. A total of 241 specimens were analyzed, representing 120 species. Among them, 45 are new records from the Aparados, 23 are new records from Santa Catarina state, and six are new records from Rio Grande do Sul state. The number of known macrofungi species from the Aparados region went from 120 to 205, representing an increase of nearly 70%. The genera *Pleurotopsis* and *Rhizomarasmius*, as well as the species *Ceriporia straminea* are new records from Brazil, *Hymenochaete* cf. *cruenta* is potentially another new record from the country. The genera *Coronicium* and *Vuilleminia* are recorded for the first time in South America. In total, 26 taxa represent potential taxonomic novelties, and four are in preparation for publication: *Resinomycena pleurotoides*, *Rhizomarasmius amylosetae*, *Sidera araucariae* and *Stereum gloeocystidiatum*. In terms of conservation, 127 species have been preliminarily assessed, with 108 species considered Least Concern, 13 Vulnerable, three Near Threatened and three as Data Deficient. The species *Fomitiporia nubicola*, *Laetiporus squalidus* and *Meruliopsis cystidiata* had their conservation status reassessed, and the first went from Vulnerable to Endangered. Despite the large increase in the number of recorded species, only a fraction of total collected materials during our expeditions to the Aparados have been analyzed and identified, meaning that the regions still holds a largely unexplored diversity that should be studied in the future.

Keywords: Montane environments. Threatened species. Macrofungi.

List of Figures

List of Tables

Summary

1. Introduction

Fungi play many crucial roles in every Earth's ecosystems. They are the quintessential decomposers, being the major lignocellulose degraders, and establish vital symbiotic relationships with algae, plants, and animals. In fact, there is evidence that fungi have changed the course of life on Earth by allowing the colonization of land by plants, ca. 450 Mya, by facilitating nutrient and water absorption through mycorrhiza, without which life on land may not have been possible as we know today (Heckman et al. 2001, Wang et al. 2010, Delaux et al. 2015). Fungi are equally important to modern human life as they are to the balance of the ecosystem. We have managed to harness the useful applications of fungal metabolism, in the form of fermentation and the production of metabolites, into the production of beverages, baking products, fuel, and medicines such as penicillin, which have revolutionized the 20th century and largely increased human life expectancy. The biotechnological applications, together with the edible and medicinal fungal market, are worth over a trillion dollars/year (Cannon 2018).

The Kingdom Fungi has no shortage of shapes and sizes, from microscopic unicellular organisms to individuals covering almost 1,000 hectares (Schmitt and Tatum 2008). Among those, species that produce reproductive structures that are visible to the naked eye are called macrofungi. Macrofungi belong mostly to the phyla Basidiomycota R.T. Moore and Ascomycota Caval.-Sm, and are usually treated as a separate unit from lichenized-fungi (Mueller et al. 2007).

Due to their conspicuity, macrofungi are historically better known and studied among the fungi, but still, even considering the most conservative estimates, less than half estimated species of macrofungi are known to science (Mueller et al. 2007). This is exacerbated in the tropics, including Brazil, where, for a number of reasons – from a shorter mycological history to a lack of specialists and funding issues – fungal diversity is extremely poorly known (Subramanian 1982, Aime and Brearley 2012, Gryzenhout et al. 2012).

In Brazil, mycological science began with the sporadic exploration by European researchers during the colonial period, especially in Southeastern and Central Brazil (Fidalgo 1985). However, it was in Southern Brazil, during late XIX and early XX centuries that Brazilian mycology was born, with the work of Johannes Rick, considered the "Father of mycology in Brazil" (Fidalgo 1962, Fidalgo 1968), and the

region has probably the longest effective mycological history in the country. Despite that, montane ecosystems have been largely neglected in fungal surveys and studies in Southern Brazil, including the Aparados da Serra, one of the most fascinating regions of Brazil.

The Aparados da Serra, or simply Aparados, is a region located in the southern part of the Serra do Mar mountain range, in the states of Santa Catarina and Rio Grande do Sul (Figure 1). The region's most striking feature, the characteristic escarpments that give it its name ("Aparado" meaning "cut", as if the mountains were cut by knife), mark the end of the Southern Brazil plateau, with vertiginous altitude drops from 1,000–1,800 m.a.s.l. to 200–800 m.a.s.l., and rock faces nearly 800 m tall (Falkenberg 2003) (Figure 2).The region encompasses the localities with highest altitudes in Rio Grande do Sul (Pico do Monte Negro, 1398 m.a.s.l., 28°37'10" S, 49°48'5" W) and Santa Catarina (Morro da Boa Vista, 1827 m.a.s.l., 27°54'35" S, 49°19'18" W, and its contender, Morro da Igreja, 1822 m.a.s.l., 28°07′30″S, 49°28′28″W).

In the Köppen-Geiger climate classification (Peel et al. 2007), the region presents a Warm Temperate Humid (Cfb) climate, without a dry season and rainfall distributed throughout the year, and with mean highest temeperatures in the hottest months bellow 22 ºC (Pandolfo et al. 2002). According to the IUCN Global Ecosystem Typology, the region is covered by Warm temperate laurophyll forests (T2.4), which includes the full extent of Araucaria Forests and partially the Southern Coastal Atlantic Forest (Keith et al. 2020).

Completely immersed in the Atlantic Forest domain, a biodiversity hotspot (Myers 2000), the geographic characteristics of the region, with its abrupt elevation changes, create the condition for the occurrence of a truly unique landscape, where in only a few hundred meters it is possible to see a variety of vegetational types, from montane grasslands to shrublands and different forest formations (Upper-montane Coastal Atlantic Forests, Araucaria Forests and Cloud Forests) (Figure 3, 4).

Figure 1. Partial map of Southern Brazil showing the location and approximate outline of the Aparados da Serra region in Santa Catarina and Rio Grande do Sul states.

Source: adapted from Google Earth [taken 10 June 2022].

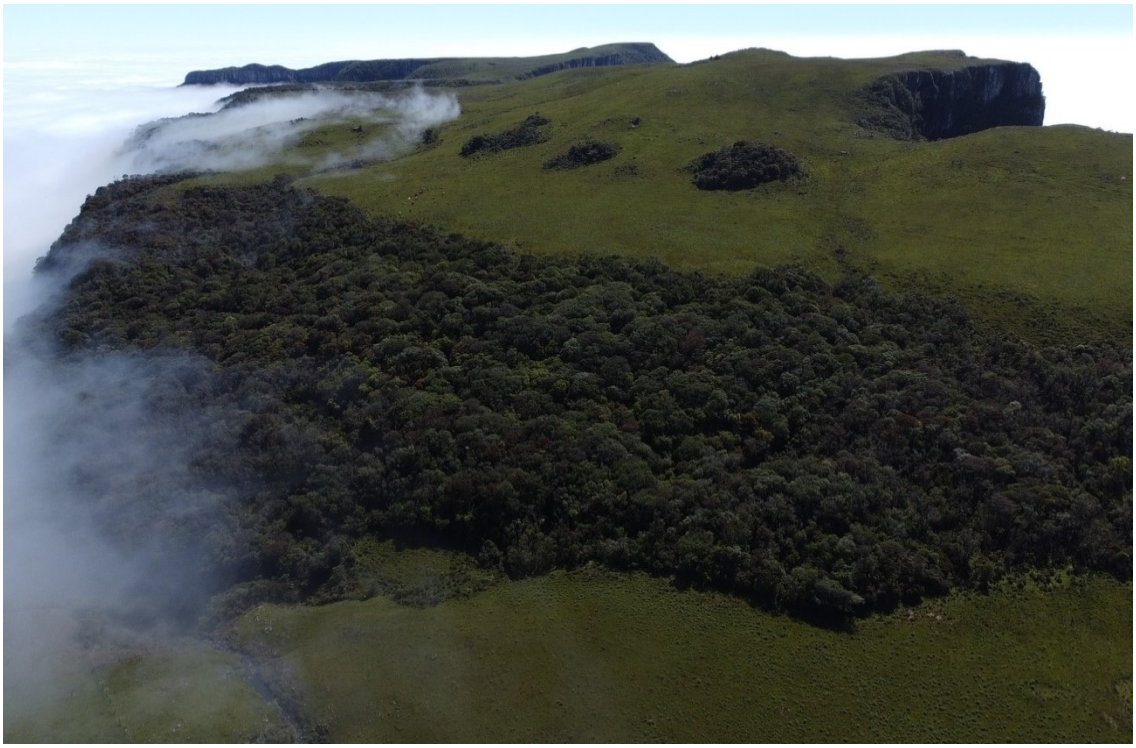
Figure 2. Drone picture from the Aparados scarpments at Itaimbézinho Canyon, Parque Nacional de Aparados da Serra.

Source: Elisandro Ricardo Drechsler dos Santos.

Figure 3. Drone view from the Aparados at Bom Jardim da Serra, near Serra do Rio do Rastro, showing the Upper-montane Coastal Atlantic Forest transitioning into Cloud Forests, followed by Montane grasslands, and in the back, patches of Araucaria Forests.

Source: Elisandro Ricardo Drechlser-Santos.

Figure 4. Drone view from a Cloud Forest patch with raising fog, surrounded by Montane Grasslands at Bom Jardim Wind Farm.



Source: Elisandro Ricardo Drechlser-Santos.

Despite its fascinating features, due to difficulties in accessing the areas and the harsh weather, the flora of the region is on the least explored in Southern Brazil (Falkenberg 2003). Several studies have been conducted in the region, mainly focused on the Aparados in Rio Grande do Sul state, and some in Santa Catarina state (Falkenberg 2003). Falkenberg (2003) was the first and so far, the only to do a broad sampling in the region. His study focused exclusively on the Cloud Forests and Rupicolous plant communities from the Aparados, where he lists 461 and and 642 vascular plants species respectively, for a combined total of 871 species. Due to methodological inconcistencies, it is not possible to count the total number of known species from previous studies, such as Rambo (1956), that lists 742 seed plant species from the the Aparados in Rio Grande do Sul state, but errouniously assumes that a plant species can only occupy one of the vegetal formations (Falkenberg 2003).

It is known that the diversity of fungal communities is highly correlated with plant communities (Lodge et al. 1997), and that the total number of macrofungi species in a locality can be closely estimated based on the number of plants (or at least angiosperms) present (Mueller et al. 2007). Since the exact number of plants in the Aparados is not clear, it is also very difficult to estimate the number of fungal species that are expected to be found in the region. Falkenberg (2003) estimates that about 1/3 of the plant species of Santa Catarina state are found in the Aparados da Serra region (which corresponds to about 1% of the state's area), making the region the most floristically diverse area in Southern Brazil.

Currently, Santa Catarina state has 6,612 known plant species, of which 6,045 are vascular plants (Flora e Funga do Brasil 2022). Although Mueller et al. (2007) estabilishes the ratio of plants to fungi species based only on angiosperms, our field experience indicates that this rate is also applicable to other vascular plant groups, at least in the region studied. Assuming the estimated 1/3 of Santa Catarina state's plant vascular plant species (~2,000), and the rate of two plant species for every fungus species for temperate zones, it is possible to rougly estimate the total number of macrofungi expected to be found in the Aparados at circa 1,000 species.

The difficulties that lead to the lack of plant studies in the Aparados cited by Falkenberg (2003) have also led to a lack of fungal studies in the region. The first publication with macrofungi from the Aparados da Serra was only published in 1989 (Silveira and Guerrero 1989), with a treatment on species of *Rigidoporus* Murr. and

Flaviporus Murr. from Parque Nacional de Aparados da Serra/Serra Geral (PNAS), citing four species in total. On to the 1990s, Silveira and Guerreiro (1991) published a taxonomic survey of polypores from the PNAS citing 38 species, after which there would be no new publications with macrofungi from the Aparados for almost 20 years. In 2008, Cortez and Silveira (2008) present a record of *Protostropharia alcis* (Kytöv.) Redhead from the Aparados in Rio Grande do Sul state. In 2011, Westphalen et al. (2011) publish the first record of *Byssomerulius incarnatus* (Schwein.) Gilb.from Brazil, from the PNAS. In 2013, Cortez et al. (2013) present a record of *Lycoperdon marginatum* Vittad., also from the PNAS. In his study, Baltazar (2014), presents 20 species of corticioid fungi from the Aparados in Rio Grande do Sul state. In the same year, Drechsler-Santos et al. (2014) published the first study with macrofungi from the Aparados in Santa Catarina state, from Parque Nacional de São Joaquim (PNSJ), presenting 25 species. Their study is the first to include ascomycetes, as well as jelly fungi species from the region. In 2016, Kaipper-Figueiró et al. (2016) publish a new species *Antrodia neotropica* Kaipper-Fig., Robledo & Drechsler-Santos. In her dissertation, Seger (2016) presents a record of *Stropharia venusta* P.S. Silva, Cortez & R.M. Silveira. Furtado et al. (2016) present a record of *Clavulinopsis amoena* (Zoll. & Moritzi) Corner), all three from PNSJ. In 2017, Alves et al. (2017) published a new species, *Morganella austromontana* C.R. Alves, Cortez & R.M. Silveira, from PNAS. In 2019, Westphalen et al. (2019) publish a new species, *Mycorraphium hispidum* Westph. & Miettinen, from PNAS, and Bittencourt (2019), in his dissertation, presents 35 polypore species from PNSJ. In 2020, Calle et al. (2020a), present a record of *Fomitiporia bambusarum* (Rick) Camp.-Sant. & Decock, and Alves-Silva (2020), in his thesis, presents 3 additional *Fomitiporia* Murrill species recorded in the Aparados. Also in 2020, Monteiro (2020) in her dissertation, presents 11 *Hymenochaete* Lév. species from PNSJ, Dreschler-Santos et al. (2020c) presen a record of *Laetiporus squalidus* R.M. Pires, Motato-Vásq. & Gugliottta, Calle et al. (2020b), present a record of *Meruliopsis cystidiata* (Ryvarden) P.E. Jung & Y.W. Lim, Robledo et al. (2020a) and Robledo et al. (2020b) present records of *Wrightoporia araucariae* Westph. & Reck and *Wrightoporia porilacerata* Log.-Leite, A.L. Gerber & Ryvarden respectively, all from PNSJ. In total, 120 macrofungi species have been recorded from the Aparados da Serra region prior to this study, which represents 12% of the ca. 1,000 estimated here.

The strong focus on wood-rotting fungi, and especially polypores, in these studies, is a reflection from the taxonomic expertise of the specialistis publishing studies

on the macrofungi from the Aparados. Two particular areas: Parque Nacional de Aparados da Serra/Serra Geral, in Rio Grande do Sul State, and Parque Nacional de São Joaquim, in Santa Catarina state, have been the focus of all the studies with fungi in the Aparados, which highlits the importance of conservation unities not only for the preservation of nature, but also for the promotion of scientific research.

In terms of conservation, the Aparados da Serra, and by consequence, its Funga, are in an extremely vulnerable situation. The mountain range is part of the Atlantic Forest, a biodiversity hotspot (Myers et al. 2000), from which estimates indicate that only 11–28% is left, and with the remnants highly fragmented (Ribeiro et al. 2009, Rezende et al. 2018). While the Apardos has a more recent colonization history, a much lower population density, and a climate inappropriate for large-scale agriculture compared to some areas of the Atlantic Forest and within the states of Santa Catarina and Rio Grande do Sul, the region faces a significant set of threatening factors. Its extense flats and natural grasslands are extremely practical for free-roaming cattle ranching (Figures 5 and 6), and are prone to fires set for renewal of grazing pastures. Its forested areas are negatively impacted due to logging of *Araucaria angustifolia* (Bertol.) Kuntze (Critically Endangered), firewood harvesting due to the cold winters, and convertion of native forests into exotic pine plantations. Additionally, the entire area is being impacted by climate change (FAO 1993, Bruijnzeel & Hamilton 2000, Foster 2001, Guerra et al. 2002, Falkenberg 2003, Vibrans et al. 2012, Vibrans et al. 2013, Marchioro et al. 2019, Kilca et al. 2020, Liebsch et al. 2021, Tagliari et al. 2021a, Tagliari et al. 2021b).

Red Lists are important tools in defining conservation priorities and strategies (Palmer et al. 1997, Rodrigues et al. 2006, Hayward 2011). The International Union for Conservation of Nature, the most important entity on the assessments of the conservation status of species, establishes categories and criteria for the evaluation of the extinction risk of species (IUCN 2022) and publishes the IUCN Red List of Threatened Species, which in its last edition comprises over 142,000 assessed thousand species (IUCN 2021).

Figure 6. Cattle grazing inside a Cloud Forest at Parque Nacional de Aparados da Serra/Serra Geral. The presence of cattle is a common sight even in corsevation areas, such as in the picture.

Source: Thiago Kossmann Cardoso

Figure 5. Cloud forest with its undergrowth completely destroyed by cattle from trampling and herbivory at Parque Nacional de Aparados da Serra/Serra Geral.

Source: Thiago Kossmann Cardoso.

Fungal species from the Aparados da Serra region were among the first fungal species from Brazil to be incorporated into the IUCN Global Red List in 2020 (Bittencourt et al. 2020, Calle et al. 2020a, Calle et al. 2020b, Drechsler-Santos et al. 2020a, Drechsler-Santos et al. 2020b, Drechsler-Santos et a. 2020c, Robledo et al. 2020a, Robledo et al. 2020b). Additional species were added in 2021 (Kossmann et al. 2021a, Martis da Cunha et al. 2021a, Martns da Cunha et al. 2021b).

Of the 11 species from the Aparados published in the IUCN Red List, only one is not listed as a threatened species, *Fomitiporia bambusarum* (LC) (Calle et al. 2020a). See section 4. Results for a synopsis of the species conservation status of published specis, which indicates a high rate of threatened species, and the need for further studies regarding the conservation of fungi in the area.

Considering the lack of knowledge about the Funga from the Aparados da Serra and the fragility of its ecosystems, studies to understand the fungal communities of the region and their conservation status are extremely necessary.

2. Objectives

2.1.General Objective

The general objective of this study was to understand the diversity of species of macrofungi from the Aparados da Serra, with a focus on forest areas, and to assess the conservation status of these species according to IUNC criteria.

2.2.Specific Objectives

- Provide a comprehensive synopsis of the diversity of macrofungi from the Aparados da Serra region, with an emphasis on Forest ecosystems;
- Preliminarely assess the conservation status of potentially threatened species of macrofungi from the Aparados da Serra region;

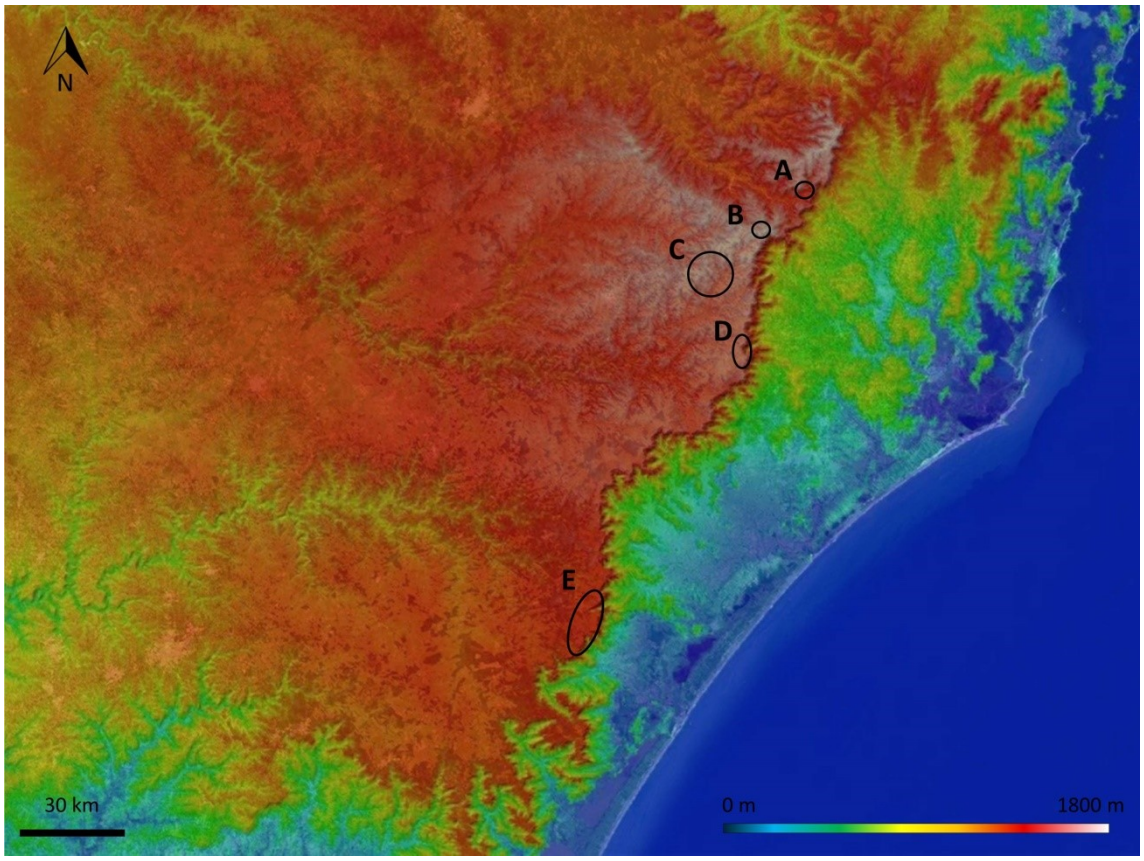
3. Material and Methods

3.1.Study area

Collections were carried out in five areas along the Aparados da Serra, comprising areas along the region's latitudinal range. Areas were selected based on forests maturation stage (only primary forests were sampled) and accessibility (viable lodging, accessibility, etc.). These areas were RPPN Portal das Nascentes, Parque Nacional de São Joaquim, here divided into two locations – Santa Bárbara and Morro da Igreja – both in Urubici municipality, Santa Catarina state; Bom Jardim Wind Farm in Bom Jardim da Serra municipality, Santa Catarina state; and Parque Nacional de Aparados da Serra/Serra Geral, in Rio Grande do Sul state (Figure 7).

.

Figure 7. Topographic map centered in the Aparados da Serra showing the surveyed areas.



A – RPPN Portal das Nascentes; B – Parque Nacional de São Joaquim, Morro da Igreja; C – Parque Nacional de São Joaquim, Santa Bárbara; D – Bom Jardim Wind Farm; E – Parque Nacional de Aparados da Serra/Serra Geral. Adapted from topographic-map.com (consulted 10 June 2022).

The northernmost point of the Aparados region is in Alfredo Wagner, Santa Catarina, around Morro Pedras Brancas (27º48'S, 49º18'W). The southernmost point is Manpituba river springs (29º21'S, 50º02'W) (Falkenberg 2003). Its latitudinal range, although not estabilished, was considered roughly 10–12 km away from the borders/cliffs, were the influence of the cliff's geomorphological and relief peculiarities are still clear, such as western localities at Parque Nacional de São Joaquim (i.e. the formation of orographic clouds allowing the occurrence of cloud forests),

Selected areas range from 1,000 to 1,800 m.a.s.l., with the lowest altitudes in the southern part of the Aparados, and the highest altitudes at Morro da Igreja, Parque Nacional de São Joaquim. The areas comprise upper-montane grasslands, *vassourais* shrublands, upper-montane Araucaria forests and at the borders of the Aparados, in areas where the declivity allows, the upper-montane Coastal Atlantic forest, as well as the Cloud Forests associated with both forest formations, usually on east-facing cliffs under oceanic wind influence allowing the formation of orographic clouds (Falkenberg and Voltolini 1995).

Although we could not collect near the northernmost point of the Aparados (Campo dos Padres region), and a large area between Bom Jardim da Serra and Parque Nacional de Aparados da Serra/Serra Geral, our surveys covered all forest types found in the region and a significant area spanning the longitudinal, latitudinal and altitudinal range of the Aparados. In this study only collections from forests and shrublands were included.

3.2.Collections

A total of five collection expeditions were carried out, with some expeditions including more than one area. Surveyed areas and dates are summarized in Table 1.
Sporomata were surveyed using an opportunistic approach along selected sites (Mueller et al. 2004). All specimens were labeled and photographed with scale *in situ*, and notes were taken regarding substrate, type of rot, host, microclimate, etc. Sporomata were then carefully collected using a knive. The substrate was inspected in search for any hidden structures (e.g. a sclerotium). Sturdy specimens were placed into paper bags, and delicate specimens were placed into plastic organizer boxes with dividers. Specimens were dried using a food dryer at 35–40 ºC for at least 24 hours before they were permanently allocated in hermetic plastic bags.

Table 1. Surveyed areas and collection dates.

Locality	Date
RPPN Portal das Nascentes	08–10 January 2021 21 June 2021
Parque Nacional de São Joaquim – Morro da Igreja	11 January 2021
Parque Nacional de Aparados da Serra/Serra Geral	25–27 May 2021
Parque Nacional de São Joaquim – Santa Bárbara	22–24 June 2021
Bom Jardim Wind Farm	31 October 2021 23–25 November 2021

For molecular studies, small pieces of the sporomata were also taken and dried in containers with silica gel to preserve the DNA molecules integrity.

All field expeditions and analyses were funded by the project "MIND.Funga - da Pesquisa com Macrofungos Ameaçados de Extinção das Matas Nebulares de Santa Catarina à Inovação na Identificação das Espécies", through PRONEM Nº4/2019 - FAPESC/CNPq 2020TR733.

All analysed specimens will be deposited into FLOR fungarium at Universidade Federal de Santa Catarina.

3.3. Identification

For the taxonomic identification of the collected specimens, morphological analyses and ecological data were compared with dichotomous keys and descriptions appropriate for each species (see Results section 4.2). BLAST® analyses of DNA sequences were also used in specific cases when morphology alone was not sufficient or with potential new taxa.

For the macromorphological analyses, measurements, and notes (color, size, shape, texture, etc.) on the characteristics of the hymenial and structural parts of the sporomata, accordingly to each morphological group. Table 2 presents the most important characters observed for each group.

For micromorphological analyses, slides were mounted with free-cut sections of the hymenial and structural parts of the sporomata. Observations were made using water and KOH 3% with Phloxin or Congo Red using a Nikon E-100 optic microscope with micrometric scale under 400× and 1000× magnification. Reaction to Melzer's

reagent, Lugol and Cotton Blue was tested accondingly for each taxonomic group (Kimbrough 1970, Hjorstam et al. 1973, Largent et al. 1977, Rogers 1979, Spooner 1987, Ryvarden 2004, Baral 2009). The micromorphological characters observed were the type of septation, the disposition of hyphae, the presence, type, size, and forms of structural hyphae (skeletal and binding) and other sterile structures (cystidia, paraphyses, setae, etc.); the size, shape, wall ornamentation and thickness, and septation of spores; the size, shape, contents and number of sterigmata of basidia; and the size, shape, type and number of spores of asci. Measurements were taken from images with scale obtained from the microscope's field of view under 1000× magnification, using ImageJ (Schneider et al. 2012).

Table 2. Most important macromorphologic characters observed for each morphogroup.

Group/Morphogroup	Characters	Reference
Discoid	Apothecium size, and habit; presence, absence, and size of stipe; abhymenial color and texture; hymenial color and texture; flesh consistency and color.	Kimbrough 1970
Sordariomycetes O.E. Erikss. & Winka	Stromata size, shape and habit; presence, absence, size and texture of stipe; stromatal surface color and texture; perithecia shape and size; flesh consistency and color; substrate; pigments released in KOH 10%.	Roger 1979, Zhang et al. 2006
Agaricoid	Habit; pileus and stipe size, shape, color and texture; presence or absence of partial and universal veil; lamellae attachment, spacing and edges; spore print color.	Largent 1986
Corticioid	Habit; basidiomata size shape and size; hymenium shape, color and texture; margin shape, size and color;	Hjortstam et al. 1973
Coralloid	Basidiomata color, texture and branching.	Corner 1950
Jelly fungi	Habit; basidiomata shape, size color and texture.	Lowy 1971

Group/Morphogroup	Characters	Reference
Polyporoid	Habit; basidiomata shape and size; pilear surface color and texture; pores shape, size, distribution and color; context size, color and texture.	Ryvarden 2004

Species with significant morphological, ecological or other differences are commented in the respective *Remarks* on section 4.1. For distribution data, only published data was accepted, unless stated stated otherwise. For additional distribution data, only published data were accepted, unless stated stated otherwise. Distribution data from online platforms (GBIF.com, specieslink.com) were accepted upon close inspection of the records available for inconsistencies. New records reported here consider the literature reviewed in section 1 as well as specific data for each species. Habitat data presented in section 4.1. represent the habitat observed in this study only, unless stated otherwise.

3.4.DNA sequences generation

In specific cases when morphology alone was not enough for identification or for a suspected new taxataxon, DNA sequences were obtained for BLAST® analyses and for future taxonomic studies.

Total DNA was extracted from the silica gel dried sporomata fragments following a modified Góes-Neto et al. (2005) CETAB extraction protocol. The sporomata fragments were macerated with a micropistil in 200 µL CTAB buffer. Then another 200 µL of CTAB were added, and the tubes were kept in bain-marie at 65 ºC for 60 minutes. After this incubation period, the extract was washed with chloroform:isoamyl alcohol (24:1), precipitated in isoproponal, washed with 70% ethanol and ressuspended in 35 µL ultrapure Milli-Q water. The ITS and nrLSU (28S) nuclear DNA regions were amplified using the primer pairs ITS8F/ITS6R for Basidiomycota and ITS1/ITS4 or ITS5/ITS4 for Ascomycota for the ITS region and LR0R/LR7F for nrLSU region (White et al. 1990, Detinger et al. 2010). Amplification products were purified with Poliethylene glycon glycol (PEG) (Sambrook et al. 1989) for removal of impurities from the Polymerase Chain Reaction (PCR). Amplification and purification products were analysed in 1.3% ultrapure agarose gel (UltraPure™

Agarose) prepared with Tris/Borate/EDTA (TBE) Buffer. In each well, 1µL of PCR/purification product, 1 µL of blue juice buffer 2×, and 1µL of GelRed 500× were added to indirectly estimate the quantity and concentration of DNA in the electrophoresis bands revealed through UV Transilluminator. The gel was photographedphotographed, and the pictures were analysed with ImageJ (Schneider et al. 2012). Only samples with at least 20 ng/µL DNA were sequenced. Purification products were Sanger sequenced at Macrogen Inc.

Resulting chromatograms were manually curated on Geneious v.4.8.5 (Drummond et al. 2010). Sequences obtained in this study will be submitted into GenBank® (https://www.ncbi.nlm.nih.gov/genbank/) database.

3.5.Conservation Status assessment

The conservation status of of a species was assessed following the IUCN criteria applied to fungi (Dahlberg and Mueller 2011, IUCN 2022). Because they are not yet formally proposed and peer reviewed, the assessments done in this study will be presented as preliminary conservation status assessments.

The first step in the assessment process was filtering species that could be assessed. Following the IUCN guidelines (IUCN 2022), species with taxonomic uncertainty and species with uncertain identification were not assessed.

The second step was identifying species that are widespread, common and without an obvious population decline. These species were preliminarily assessed as Least Concern. The remaining species were then considered potentially threatened and had their conservation status assessed and are presented in section 4.3.

Population change (Criteria A and C) was inferred based on data available on online databases (i.e. globalforestwatch.com) and published resources.

Since the Area of the Aparados da Serra exceeds the threshold for any threat category, Extent of Occurrence and Area of Occupation was not calculated, and Criterion B was not applied.

For the estimation of population size (criteria C and D), distribution and ecology were used to estimate the number of potential sites that the species occupies, multiplied by the number of individuals per site on average, which is calculated by taking in consideration the characteristics of the species (detectability and abundance) and the known records, which gives an estimate of the number of total functional individuals. To account for mature individuals, this value is multiplied by the number of

ramets on average that each functional individual represents based on the biology of the species (Dahlber and Mueller 2011).

Criterion E (extinction probability) was not used, since it is not possbile to apply with the current knowledge of the species presented here.

The estimated values of population change and size were then compared to the thresholds estabilished by IUCN for each category and the conservation status presented here follow the IUCN guidelines (IUCN 2022).

Assessed species will be submitted to the Global Fungal Red List Initiative website (http://iucn.ekoo.se/en/iucn/welcome), where the proposals can be scrutinized and contributed to by other researchers, evaluated by the IUCN fungal specialists, and be published in the global IUCN Red List of Threatened Species.

4. Results and Discussion

A total of 241 specimens were analysed, representing 120 species. Of these, 45 represent new records from the Aparados da Serra region, with an additional 13 potential new records to be confirmed. Twenty-three species represent new records from Santa Catarina state, with eight potential new records to be confirmed, and six species are newly recorded from Rio Grande do Sul. The genera *Pleurotopsis* (Henn.) Earle and *Rhizomarasius* R.H. Petersen are newly reported in Brazil, and the genera *Coronicium* J. Erikss. & Ryvarden and *Vuilleminia* Maire are recorded for the first time in South America. *Ceriporia straminea* Ryvarden is a new record for Brazil with *Hymenochaete* cf. *cruenta* (Pers.) Donk also potentially representing a new country record.

Overall, 26 taxa represent potential taxonomic novelties, with *Resinomycena pleurotoides* nom. prov. Kossmann, G.M. Muell. & Drechsler-Santos, *Rhizomarasmius amylosetae* nom. prov. Kossmann, G.M. Muell. & Drechsler-Santos, *Sidera araucariae* nom. prov. Kossmann, G.M. Muell. & Drechsler-Santos, and *Stereum gloeocystidiatum* nom. prov. Kossmann, G.M. Muell. & Drechsler-Santos in preparation for effective publication.

With the species included in this study, the number of macrofungi species known from the Aparados went from 120 to 205, representing an increase of nearly 70% in the number of known species. This is remarkable, especially considering the relatively low number of collection days (15). This, correlated to the high rate of specimens/species (2:1), means that most species have been only collected once or a few times, and mostly in one locality. Thus the species discovery curve for the region is far from reaching a plateau (Chao and Shen 2004).

This was the first study to investigate the macrofungal communities in areas outside Parque Nacional de Aparados da Serra/Serra Geral and Parque Nacional de São Joaquim, and our results highlight the importance of a spatio-temporal variation of surveys to better understand a region's fungal diversity.

All species found in this study are presented in section 4.1, with descriptions or references to consulted descriptions, distribution data, and comments about their distribution, morphology, and taxonomy when judged necessary.

Ten of the 11 species from the Aparados da Serra that previously have had their conservation status globally assessed and published on the IUCN Red List were

assessed as threatened. Section 4.2 presents preliminary assessments of 19 additional potentially threatened species plus preliminary reassessments of three of the 11 previously red listed species from the Aparados da Serra.

Species that are common, broadly distributed in a wide range of ecosystems (or both), and without an obvious population decline were classified as Least Concern. Species with a "cf.", "aff.", species identified at genus or family level, and species with an uncertain taxonomy were not assessed, following the guidelines from IUCN (Dahlberg and Mueller 2011, IUCN 2022). 108 species were considered as Least Concern, and 68 were Not Evaluated.

Of the 19 newly preliminarily assessed species, 13 were classified as Vulnerable, three as Near Threatened, and three as Data Deficient. Of the reassessed species, *Fomitiporia nubicola* Alves-Silva, Bittencourt & Drechsler-Santos went from Vulnerable to Endangered; *Laetiporus squalidus*' categories were corrected according to its previous assessment, and *Meruliopsis cystidiata* data were update to more realistic estimates, with the application of the correct criteria based on the new data.

A synopsis of all known species from the Aparados da Serra, as well as their conservations status (published or preliminary), is presented in Table 3.

Table 3. Species known from the Aparados da Serra region and their conservation status. The conservation status from this study are preliminary.

Order	Species	Reference	Conservation Status
Agaricales	*Agrocybe perfecta* (Rick) Singer	This Study	VU C1+2a(ii)
	Chlorophyllum hortense (Murrill) Vellinga	Drechsler-Santos et al. 2014	LC
	Clavulinopsis amoena	Furtado et al. 2016	LC
	Coronicium sp.	This study	NE
	Cystidiodontia aff. *Laminifera* (Berk. & M.A. Curtis) Hjortstam	This study	NE
	Cystidiodontia laminifera	Baltazar 2014	LC
	Dactylosporina steffenii(Rick) Dörfelt	This study	LC
	Entoloma cf. *bloxamii* (Berk. & Broome) Sacc.	This study	NE
	Favolaschia aff. *aurantiaca* Singer	This Study	NE
	Hypholoma subviride (Berk. & M.A. Curtis) Dennis	This study	LC
	Lepista nuda (Bull.) Cooke	This study	LC
	Leptonia atrocyanea nom. prov. Karstedt & Capelari	Drechsler-Santos et al. 2014	NE
	Lycoperdon marginatum	Cortez et al. 2013	LC
	Marasmius cf. a*raucariae* Singer	This study	NE
	Marasmius cladophyllus Berk.	This study	LC

Order	Species	Reference	Conservation Status
Agaricales	*Morganella austromontana*	Alves et al. 2017	VU C1+2a(ii)
	Mycena paranaensis Maas Geest. & de Meijer	This study	DD
	Mycena sp. (Pers.) Roussel	This study	NE
	Mycena violacella (Speg.) Singer	This study	LC
	Oudemansiella cf. *platensis* (Speg.) Speg.	This study	NE
	Panellus pusillus (Pers. ex Lév.) Burds. & O.K. Mill.	Drechsler-Santos et al. 2014, This study	LC
	Protostropharia alcis	Cortez and Silveira 2008, Seger 2016	LC
	Radulomyces cf. *rickii* (Bres.) M.P. Christ.	This study	NE
	Resinomycena pleurotoides nom. prov.	This study	NE
	Rhizomarasmius amylosetae nom. prov.	This Study	NE
	Schizophyllum commune Fr.	This study	LC
	Stropharia rugosoannulata Farl. ex Murrill	This study	LC
	Stropharia venusta	Seger 2016	VU C2a(ii) (Kossmann et al. 2021b)
Auriculariales	*Auricularia fuscosuccinea* (Mont.) Henn.	This study	LC
	Eichleriella cf. alliciens *(Berk. & Cooke) Burt*	This study	NE
	Heteroradulum brasiliense (Bodman) Spirin & Malysheva	This study	VU C2a(ii)
	Pseudohydnum gelatinosum (Scop.) P. Karst.	This study	LC
Boletales	*Hydnomerulius pinastri* (Fr.) Jarosch & Besl	Baltazar 2014	LC
	Meiorganum curtisii (Berk.) Singer, J. García & L.D. Gómez	This study	LC
Corticiales	*Vuilleminia* sp.	This study	NE
Dacrymycetales	*Calocera* cf. *viscosa* (Pers.) Fr.	This study	NE
	Calocera cornea (Batsch) Fr.	This study	LC
	Guepiniopsis buccina (Pers.) L.L. Kenn.	This study	LC
Gomphales	*Ramaria flavobrunnescens* (G.F. Atk.) Corner	Drechsler-Santos et al. 2014	LC
Helotiales	*Chlorociboria aeruginascens* (Nyl.) Kanouse	Drechsler-Santos et al. 2014, This study	LC
	Dicephalospora rufocornea (Berk. & Broome) Spooner	This study	LC
	Encoelia aff. c*ubensis* (Berk. & Curtis) Iturriaga	This study	NE
	Erioscyphella brasiliensis (Mont.) Baral, Šandová & B. Perić	This study	LC
Hymenochaetales	*Arambarria destruens* Rajchenb. & Pildain	Bittencourt 2019	LC
	Coltricia aff. *cinnamomea* (Jacq.) Murrill	Bittencourt 2019	NE
	Coltricia stuckertiana (Speg.) Rajchenb. & J.E. Wright	This study	VU A2c+3c+4c
	Fibrodontia brevidens (Pat.) Hjortstam & Ryvarden	Baltazar 2014	LC

Order	Species	Reference	Conservation Status
Hymenochaetales	*Fomitiporella umbrinella* (Bres.) Murrill	Bittencourt 2019	LC
	Fomitiporia apihayna (Speg.) Robledo, Decock & Rajchenb.	This study	VU A3c
	Fomitiporia bambusarum	Calle et al. 2020a, This study	LC (Calle et al. 2020a)
	Fomitiporia impercepta Morera, Robledo & Urcelay	Alves-Silva 2020, This study	LC
	Fomitiporia neotropica Camp.-Sant., Amalfi, R.M. Silveira, Robledo & Decock	Silveira and Guerrero 1991, Bittencourt 2019, Alves-Silva 2020, This study	LC
	Fomitiporia nubicola	Drechsler-Santos et al. 2014, Alves-Silva et al. 2020a, This study	VU C2a(ii) (Drechsler-Santos et al. 2020b); EN C2a(ii) (This study)
	Fuscoporia aff. s*eptiseta* Y.C. Dai, Q. Chen & J. Vlasák	This study	NE
	Fuscoporia ferrea (Pers.) G. Cunn.	Silveira and Guerrero 1991, Bittencourt 2019, This study	LC
	Fuscoporia gilva (Schwein.) T. Wagner & M. Fisch.	Silveira and Guerrero 1991, Bittencourt 2019	LC
	Fuscoporia wahlbergii (Fr.) T. Wagner & M. Fisch.	Silveira and Guerrero 1991, Bittencourt 2019, This study	LC
	Hymenochaete aff. c*arpatica* Pilát	Monteiro 2020	NE
	Hymenochaete aff. *curtisii* (Berk.) Morgan	Monteiro 2020	NE
	Hymenochaete aff. *dictator* G. Cunn.	Monteiro 2020	NE
	Hymenochaete aff. *longispora* Parmasto	Monteiro 2020	NE
	Hymenochaete aff. *minuscula* G. Cunn.	Monteiro 2020	NE
	Hymenochaete aff. *plurimaesetae* G. Cunn.	Monteiro 2020	NE
	Hymenochaete aff. r*ubiginosa* (Dicks.) Lév.	Monteiro 2020	NE
	Hymenochaete cf. *aberrans* G.A. Escobar	Monteiro 2020	NE
	Hymenochaete cf. *cinnamomea* (Pers.) Bres.	Monteiro 2020	NE
	Hymenochaete cf. *cruenta* (Pers.) Donk	This study	NE
	Hymenochaete cf. *spinulosetosa* Parmasto	Monteiro 2020	NE
	Hymenochaete cf. *unicolor* Berk. & M.A. Curtis	Monteiro 2020	NE
	Hymenochaete tabacina (Sowerby) Lév.	Silveira and Guerro 1991	LC
	Hyphodontia corticioides (Rick) Baltazar & Rajchenb.	Baltazar 2014, Baltazar et al. 2016	LC
	Schizopora paradoxa (Schrad.) Donk	Drechsler-Santos et al. 2014	LC
	Sidera araucariae nom. prov.	This study	NE
	Sidera sp. Miettinen & K.H. Larss.	Bittencourt 2019	NE
	Skvortzovia furfurella (Bres.) Bononi & Hjortstam	Baltazar 2014	LC
	Trichaptum aff. s*ector* (Ehrenb.) Kreisel	Silveira and Guerrero 1991, This study	NE
	Tropicoporus tropicalis (M.J. Larsen & Lombard) L.W. Zhou &	Bittencourt 2019	LC

Order	Species	Reference	Conservation Status
Hymenochaetales	Y.C. Dai		
	Xylodon raduloides Riebesehl & Langer	Bittencourt 2019	LC
	Phellinus fastuosus (Lév.) S. Ahmad	Bittencourt 2019	LC
Hypocreales	*Ascopolyporus polychrous* Möller	This study	NE
	Ascopolyporus villosus Möller	This study	NE
	Cordyceps aff. *militaris* (L.) Fr.	Drechsler-Santos et al. 2014	NE
	Ophiocordyceps aff. *thyrsoides* (Möller) G.H. Sung, J.M. Sung, Hywel-Jones & Spatafora	Drechsler-Santos et al. 2014	NE
	Ophiocordyceps cf. *curculionum* (Tul. & C. Tul.) G.H. Sung, J.M. Sung, Hywel-Jones & Spatafora	Drechsler-Santos et al. 2014	NE
	Ophiocordyceps unilateralis (Tul. & C. Tul.) Petch	Drechsler-Santos et al. 2014	LC
Pezizales	*Galiella spongiosa* (Berk. & M.A. Curtis) Pfister	This study	LC
	Wynnea gigantea Berk. & M.A. Curtis	This study	VU
Phallales	*Aseroë rubra* Labill.	Drechsler-Santos et al. 2014, This study	LC
Polyporales	*Abundisporus roseoalbus* (Jungh.) Ryvarden	This study	LC
	Aegis luteocontexta (Ryvarden & de Meijer) Westph.	Bittencourt 2019, Westphalen et al. 2019	VU C1 (Bittencourt et al. 2020)
	Amauroderma camerarium (Berk.) J.S. Furtado	Silveira and Guerro 1991	LC
	Amauroderma schomburgkii (Mont. & Berk.) Torrend	Drechsler-Santos et al. 2014, Bittencourt 2019, This study	LC
	Antrodia neotropica	Drechsler-Santos et al. 2014, Bittencourt 2019, This study	VU C1 (Drechsler-Santos et al. 2020a)
	Antrodiella trivialis Westph., Rajchenb. & Tomšovský	This study	VU C2a(ii)
	Aurantiopileus mayaensis Ginns, D.L. Lindner & T.J. Baroni	Bittencourt 2019, This study	Near Threatened A3c+C1
	Auriporia aurulenta A. David, Tortič & Jelić	Bittencourt 2019	LC
	Bjerkandera adusta (Willd.) P. Karst.	Drechsler-Santos et al. 2014	LC
	Byssomerulius incarnatus (Schwein.) Gilb.	Westphalen et al. 2011, Drechsler-Santos et al. 2014, This study	LC
	Cerioporus scutellatus (Schwein.) Zmitr.	Bittencourt 2019, This study	LC
	Cerioporus varius (Pers.) Zmitr. & Kovalenko	Silveira and Guerro 1991	LC
	Ceriporia cf. *alachuana* (Murrill) Hallenb.	Bittencourt 2019	NE
	Ceriporia reticulata (Hoffm.) Domański	Bittencourt 2019	LC
	Ceriporia straminea Ryvarden	This study	Near Threatened C1
	Ceriporia viridans (Berk. & Broome) Donk	Bittencourt 2019	LC
	Ceriporia xylostromatoides (Berk.) Ryvarden	Silveira and Guerro 1991	LC
	Cinereomyces dilutabilis (Log.-Leite & J.E. Wright) Miettinen	Martins da Cunha et al. 2021a	VU A2+4c; C1

Order	Species	Reference	Conservation Status
Polyporales	*Dentocorticium portoricense* (Fr.) Nakasone & S.H. He	Bittencourt 2019	LC
	Echinoporia aculeifera (Berk. & M.A. Curtis) Ryvarden	Silveira and Guerro 1991, This study	LC
	Epithele aff. *bambusae* (Burt) Nakasone	This study	NE
	Etheirodon purpureum Westphalen	Westphalen et al. 2021	Near Threatened C1
	Flaviporus tenuis Westphalen, Rajchenberg & Tomšovský	This study	LC
	Flaviporus venustus A. David & Rajchenb.	Silveira and Guerrero 1989, Silveira and Guerrero 1991, Drechsler-Santos et al. 2014, This study	LC
	Fomitella supina (Sw.) Murrill	This study	LC
	Funalia floccosa (Jungh.) Zmitr. & Malysheva	Silveira and Guerro 1991, This study	LC
	Ganoderma australe (Fr.) Pat.	Silveira and Guerrero 1991, Bittencourt 2019, This study	LC
	Henningsia brasiliensis (Speg.) Speg.	This study	LC
	Hyphoderma litschaueri (Burt) J. Eriksss. & Å. Strid	Baltazar 2014	LC
	Hyphodontiastra virgicola Hjortstam & Melo	Baltazar 2014	VU C1+2a(ii)
	Hypochnicium horridulum (Rick) Baltazar & Rajchenb.	Baltazar 2014, Baltazar et al. 2016	DD
	Irpex lacteus (Fr.) Fr.	Silveira and Guerrero 1991, Drechsler-Santos et al. 2014, Bittencourt 2019, This study	LC
	Laetiporus squalidus R.M. Pires, Motato-Vásq. & Gugliottta	Drechsler-Santos et al. 2020c	VU C2a(ii) (Drechsler-Santos et al. 2020c); VU C1+2a(ii) (This study)
	Lentinus berteroi (Fr.) Fr.	Drechsler-Santos et al. 2014	LC
	Lentinus crinitus (L.) Fr.	Drechsler-Santos et al. 2014, This study	LC
	Lenzites betulinus (L.) Fr.	Silveira and Guerrero 1991, Bittencourt 2019	LC
	Meruliopsis cystidiata (Ryvarden) P.E. Jung & Y.W. Lim	Calle et al. 2020b, This study	VU B2ab(ii,iii,v); C2a(i); D1 (Calle et al. 2020b); VU C2a(ii) (This study)
	Microporellus brasiliensis Ryvarden & Decock	This study	VU C1+2a(ii)
	Mycorrhaphium hispidum Westph. & Miettinen	Westphalen et al. 2019	VU C1+2a(ii)
	Pachykytospora alabamae (Berk. & Cooke) Ryvarden	Silveira and Guerro 1991	LC
	Pachykytospora papyracea (Cooke) Ryvarden	Drechsler-Santos et al. 2014, This study	LC
	Panus velutinus (Fr.) Sacc.	This study	LC
	Perenniporia aff. *paraguyanensis* C.R.S. de Lira & Gibertoni	Bittencourt 2019	NE
	Perenniporia cf. *inflexibilis* (Berk.) Ryvarden	Drechsler-Santos et al. 2014	NE
	Perenniporia piperis (Rick) Rajchenb.	Silveira and Guerro 1991	VU C2a(ii)
	Phanerochaete cf. *xerophila* Burds.	Baltazar 2014	NE
	Phanerochaete sp. P. Karst.	This study	NE

Order	Species	Reference	Conservation Status
Polyporales	*Phlebia* aff. *subochracea* (Bres.) J. Erikss. & Ryvarden	This study	NE
	Phlebia tremellosa (Schrad.) Nakasone & Burds.	Baltazar 2014	LC
	Phlebiopsis amethystea (Hjortstam & Ryvarden) R.S. Chikowski & C.R.S. Lira	Baltazar 2014	LC
	Phlebiopsis cf. *crassa* (Lév.) Floudas & Hibbett		NE
	Physisporinus sp. P. Karst.		NE
	Podofomes mollis (Sommerf.) Gorjón	Silveira and Guerro 1991	LC
	Podoscypha cf. *cristata* (Berk. & M.A. Curtis) D.A. Reid		NE
	Polyporus aff. *ciliatus* Fr.		NE
	Polyporus ciliatus	Silveira and Guerro 1991	LC
	Polyporus guianensis Mont.	Silveira and Guerro 1991	LC
	Polyporus leprieurii Mont.	Silveira and Guerro 1991	LC
	Polyporus tricholoma Mont.	Silveira and Guerrero 1991, Drechsler-Santos et al. 2014	LC
	Postia caesia complex (Schrad.) P. Karst.	Silveira and Guerrero 1991, Bittencourt 2019	NE
	Postia cf. *caesioflava* (Pat.) V. Papp	This study	NE
	Pycnoporus sanguineus (L.) Murrill	Silveira and Guerrero 1991, Drechsler-Santos et al. 2014, Bittencourt 2019, This study	LC
	Rigidoporus concrescens (Mont.) Rajchenb.	Silveira and Guerrero 1989, This study	LC
	Rigidoporus lineatus (Pers.) Ryvarden	Silveira and Guerrero 1989, This study	LC
	Rigidoporus populinus (Schumach.) Pouzar	Bittencourt 2019	LC
	Rigidoporus ulmarius (Sowerby) Imazeki	Silveira and Guerrero 1989	LC
	Skeletocutis roseola (Rick ex Theiss.) Rajchenb.	Silveira and Guerrero 1991, Bittencourt 2019, Martins da Cunha et al. 2021	VU C2a(ii) (Martins da Cunha et al. 2021)
	Spongipelis cf. *caseosus* (Pat.) Ryvarden	Silveira and Guerrero 1991	NE
	Steccherinum fimbriatum (Pers.) J. Erikss.	Baltazar 2014	LC
	Steccherinum neonitidum Westphalen & Tomšovský	Silveira and Guerrero 1991, Westphalen et al. 2018	VU C1+2a(ii)
	Steccherinum ochraceum (Pers. ex J.F. Gmel.) Gray	Baltazar 2014, This study	LC
	Steccherinum subochraceum Bononi & Hjortstam	This study	LC
	Steccherinum undigerum (Berk. & M.A. Curtis) Westphalen & Tomšovský	Silveira and Guerro 1991, This study	LC
	Trametes aff. *versicolor* (L.) Lloyd	This study	NE
	Trametes maxima (Mont.) A. David & Rajchenb.	Bittencourt 2019	LC
	Trametes membranacea (Sw.) Kreisel	Silveira and Guerrero 1991, Drechsler-Santos et al. 2014, This study	LC
	Trametes versicolor	Silveira and Guerrero 1991,	LC

Order	Species	Reference	Conservation Status
Polyporales		Bittencourt 2019, This study	
	Trametes villosa (Sw.) Kreisel	Silveira and Guerrero 1991, Bittencourt 2019	LC
	Trullella cf. *duracina* (Pat.) Zmitr.	This study	LC
	Tyromyces leucomallus (Berk. & M.A. Curtis) Murrill	Silveira and Guerrero 1991	LC
Russulales	*Aleurodiscus* aff. a*urantius* (Pers.) J. Schröt.	This study	NE
	Gloeosoma aff. *mirabile* sp. 1 (Berk. & M.A. Curtis) Rajchenb.	This study	NE
	Gloeosoma aff. *mirabile* sp. 2	This study	NE
	Gloeosoma mirabile	Baltazar 2014, This study	LC
	Amylostereum ferreum (Berk. & M.A. Curtis) Boidin & Lanq.	This study	LC
	Bondarzewia guaitecasensis (Henn.) J.E. Wright	Bittencourt 2019, This study	LC
	Dentipellicula cf. *leptodon* (Mont.) Y.C. Dai & L.W. Zhou	This study	NE
	Laxitextum bicolor (Pers.) Lentz	This study	LC
	Licrostroma subgiganteum (Berk.) P.A. Lemke	This Study	LC
	Megalocystidium aff. *chelidonium* (Pat.) Boidin, Lanq. & Gilles	This study	NE
	Peniophora carneorosea (Rick) Baltazar & Rajchenb.	Baltazar 2016	DD
	Pleurotopsis aff. *subgrisea* (G. Stev.) E. Horak	This study	NE
	Scytinostroma albocinctum (Berk. & Broome) Boidin & Lanq.	Baltazar 2014	LC
	Scytinostroma duriusculum (Berk. & Broome) Donk	Baltazar 2014	LC
	Stereaceae sp. Pilát	This study	NE
	Stereum gloeocystidiatum nom. prov.	This study	NE
	Stereum hirsutum (Willd.) Pers.	Baltazar 2014, This study	LC
	Stereum striatum (Fr.) Fr.	This study	LC
	Wrightoporia araucariae Westph. & Reck	Robledo et al. 2020a	CR A3c (Robledo et al. 2020a)
	Wrightoporia porilacerata Log.-Leite, A.L. Gerber & Ryvarden	Robledo et al. 2020b	VU C2a(ii) (Robledo et al. 2020b)
	Wrightoporia sp. Pouzar	This study	NE
	Xenasmatella vaga (Fr.) Stalpers	Baltazar 2014, This study	LC
Trechisporales	*Subulicystidium* cf. *meridense* Oberw.	Baltazar 2014	NE
	Trechispora farinacea (Pers.) Liberta	This study	LC
	Trechispora mollusca (Pers.) Liberta	Bittencourt 2019	LC
	Trechispora regularis (Murrill) Liberta	Silveira and Guerro 1991, This study	LC
	Tubulicium aff. *vermiferum* (Bourdot) Oberw.	Baltazar 2014	LC
Tremellales	*Sirobasidium sanguineum* Lagerh. & Pat.	This study	LC
	Tremella aff. *mesenterica* (Schaeff.) Pers.	This study	NE

Order	Species	Reference	Conservation Status
Tremellales	*Tremella mesenterica*	This study	LC
Xylariales	*Hypoxylon* cf. *dieckmannii* Theiss.	This study	NE
	Hypoxylon cf. *subgilvum* Berk. & Broome	This study	NE
	Xylaria aff. *telfairii* (Berk.) Sacc.	This study	NE
	Xylaria apiculata Cooke	This study	LC
	Xylaria enteroleuca (J.H. Mill.) P.M.D. Martin	This study	NE
	Xylaria pseudoapiculata Hamme & Guerrero	This study	VU C2a(ii)
	Xylaria telfairii	especies	LC

4.1. Species recorded in this study's surveys

Ascomycota Caval.-Sm., Biol. Rev. 73: 247 (1998)

Helotiales Nannf., Nova Acta R. Soc. Scient. upsal., Ser. 4 8(no. 2): 68 (1932)

Chlorociboria aeruginascens (Nyl.) Kanouse, Mycologia 39(6): 641 (1948) [1947] (Figure 8A)

Description: Dixon (1975).

Distribution: Cosmopolitan (Dixon 1975).

Habitat: On fallen branches of various hardwoods, causing a white rot with a typical blueing of the wood.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1034.

Dicephalospora rufocornea (Berk. & Broome) Spooner, Biblthca Mycol. 116: 272 (1987) (Figure 8B)

Description: Dumont (1980, as *Helotium rufo-corneum* Berk & Broome), Spooner (1987). See Zheng and Zhuang (2019) for a key to all known species in the genus.

Distribution: Pantropical and subtropical (Dumont 1980, Spooner 1987). In Brazil, known from Roraima (according to the coordinates from the herbarium record NY10874), Rio Grande do Sul and Santa Catarina (type localities of *Helotium*

camerunense Henn. var. *brasiliensis* Rick, and *Lanzia flavor-aurantia* Henn., both synonyms of *D. rufocornea*). First record from the Aparados da Serra region.

Habitat: Dead branches and twigs, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 340.

Encoelia* aff. *cubensis (Berk. & Curtis) Iturriaga, Samuels & Korf (1994) (Figure 8C)

Description: Apothecia gregarious, arising from a shared subiculum, sessile, initially globose to broadly-ellipsoid when closed, partially immersed in the subiculum, with age urceolate to applanate, up to 1.2 mm wide and 0.8 mm tall. *Hymenium* smooth, cream when fresh, drying reddish-brown to blackish, margin whitish to cream, drying greyish, exposed (not covered by subiculum). *External part* glabrous, smooth, reddish-orange to cinnamon, drying reddish-brown. *Subiculum* fibrillose, ochraceous, drying pale-cinnamon, margin lighter colored. *Pigments* yellowish released in KOH 3%.

Ectal excipulum of textura angularis, but globose cells commonly found, hyphae slightly thick-walled, yellowish, 6–18 × 6–9 µm. *Medually excipulum* of textura inctricata, tightly packed, hyphae slightly thick-walled, yellowish, 5-6 um wide. *Ascii* clavate, 70–90 × 4.5–5.0 µm, thick-walled, walls up to 1 um thick, hyaline to yellowish, 8-spored, opening inconspicuous, IKI-, MLZ-. *Ascospores* 6.1–8.6 × 2.4–3.2, Q = 2.2–3.0, cyllindric, hyaline, smooth, aseptate, slightly thick-walled, with two guttulae, IKI-, MLZ-, CB-. *Paraphyses* filiform, abundant, aseptate to multi-septate, straight, 1.4–2.0 µm wide, simple or with 1–4 branches, projecting up to 15 µm above the ascii.

Habitat: Growing on stromata of *Xylaria* cf. *anisopleura* (Mont.) Fr.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, 08 January 2021, MIND.Funga 323.

Remarks: Our specimen differs from *E. cubensis*, a species found in northern South America and in Central America growing on Xylariaceous fungi, by having larger spores (5.1–7.3 × 2.2–2.9 µm in *E. cubensis*), larger ascii (54.5–73.4 × 3.7–4.4 µm in *E. cubensis*), branched paraphyses, and the absence of a well-developed stipe (Iturriaga 1994). *Cordierites coralloides* Berk & M.A. Curtis is another similar species, also

found growing on Xylareaceous fungi in tropical America. However, it differs by having a long stipe, from which commonly many apothecia arise up to 3–7 mm, reddish pigments in KOH, smaller ascii (up to 74 µm), smaller spores (4.5–6.3 × 1.8–2.5 µm), and wider paraphyses (2.7–3.0 µm), which are coarse and brownish (Rifai 1977). Both species seem to be rare, and share many morphological and ecological features, and it seems like they could be congeneric, but there are no DNA sequences available of both *E. cubensis* and *C. coralloides* on Genbank, and no phylogenetic studies have been conducted on these species. This is the first record of the genus in Santa Catarina state and the Aparados da Serra region.

Erioscyphella brasiliensis (Mont.) Baral, Šandová & B. Perić, in Peric & Baral, Mycologia Montenegrina 17: 103 (2015) [2014] (Figure 8D)

Description: Haines and Dumont [1984 as *Lachnum brasiliense* (Mont.) Haines & Dumont].

Distribution: Pantropical (Haines and Dumont 1984).

Habitat: Found growing on dead branches and stems of hardwoods, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, 08 January 2021, MIND.Funga 327; *ibidem*, Parque Nacional de São Joaquim, Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 480; Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1486.

Hypocreales Lindau, in Engler & Prantl, Nat. Pflanzenfam., Teil. I (Leipzig) 1(1): 343 (1897)

Ascopolyporus polychrous Möller, *Bot. Mitt. Trop.* 9: 300 (1901) (Figure 8E)

Description: Möller (1901)

Distribution: Apparently Neotropical (GBIF 2022), but records should be examined closely, as this species is poorly studied morphologically, with only slight differences to other species of *Ascopolyporus* Möller. Originally described from Blumenau, Santa Catarina state. First record from the Aparados da Serra region.

Habitat: Growing from insects on culms of *Chusquea* sp.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 405; *ibidem,* 10 January 2021, MIND.Funga 427; Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1377.

Remarks: This species is very similar to *A. villosus* Möller, another species described from Santa Catarina state, being micromorphologically equal, which was even stated by Möller (1901). Although Möller did not provide a description for the surface of *A. polychrous*, we saw pictures of the type specimens of both species, and the main factor for differentiating the two seems to be the presence of a tomentum in *A. villosus*, while *A. polychrous* is glabrous to slightly velutinous. Bischoff et al. (2005) and Chaverri et al. (2005) present phylogenies showing *A. polychrous* and *A. villosus* as distinct species, but with specimens from Bolivia and Panama respectively. Further phylogenetic studies with material from the type localities are needed to elucidate if the specimens included in these phylogenies are in fact *A. polychrous* and *A. villosus*, and to better elucidate the relationship between the two species.

Ascopolyporus villosus Möller, *Bot. Mitt. Trop.* 9: 300 (1901) (Figre 8F)

Description: Möller (1901)

Distribution: Known from southern Brazil (type locality) (Möller 1901), Misiones, Argentina (Suija 2022), and Panama (Bischoff et al. 2005). First record from the Aparados da Serra region.

Habitat: Growing from insects on culms of *Chusquea* sp.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim - Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 512; *ibidem, idem*, MIND.Funga 514; Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1382.

Remarks: See *A. polychrous*.

Pezizales J. Schröt., in Engler & Prantl, Nat. Pflanzenfam., Teil. I (Leipzig) 1(1): 173 (1897)

Galiella spongiosa (Berk. & M.A. Curtis) Pfister, J. Agric. Univ. P. Rico 58(3): 363 (1974) (Figure 8G)

Description: Meijer (2008), Triervelier-Pereira (2014), Carbone and Agnello (2015).

Distribution: Neotropical (Meijer 2008). First record from Santa Catarina and from the Aparados da Serra region.

Habitat: Dead branches of angiosperm, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail", 10 January 2021, MIND.Funga 469.

Wynnea gigantea Berk. & M.A. Curtis, J. Linn. Soc., Bot. 9: 424 (1867) (Figure 8H)

Description: Pfizter (1979).

Distribution: Mexico (type locality), Peru, Southern Brazil, China and Japan (Pfister 1979, Zhuang 2003), but Asian specimens probably represent a distinct species (Xu et al. 2019). This is likely the first record from Santa Catarina state, since Rick, who first recorded the species in Brazil, collected mostly in Rio Grande do Sul state. Also the first record from the Aparados da Serra region.

Habitat: Found on the ground, probably in association with *Armillaria* spp. (Fr.) Staude, as shown by Xu et al. (2019).

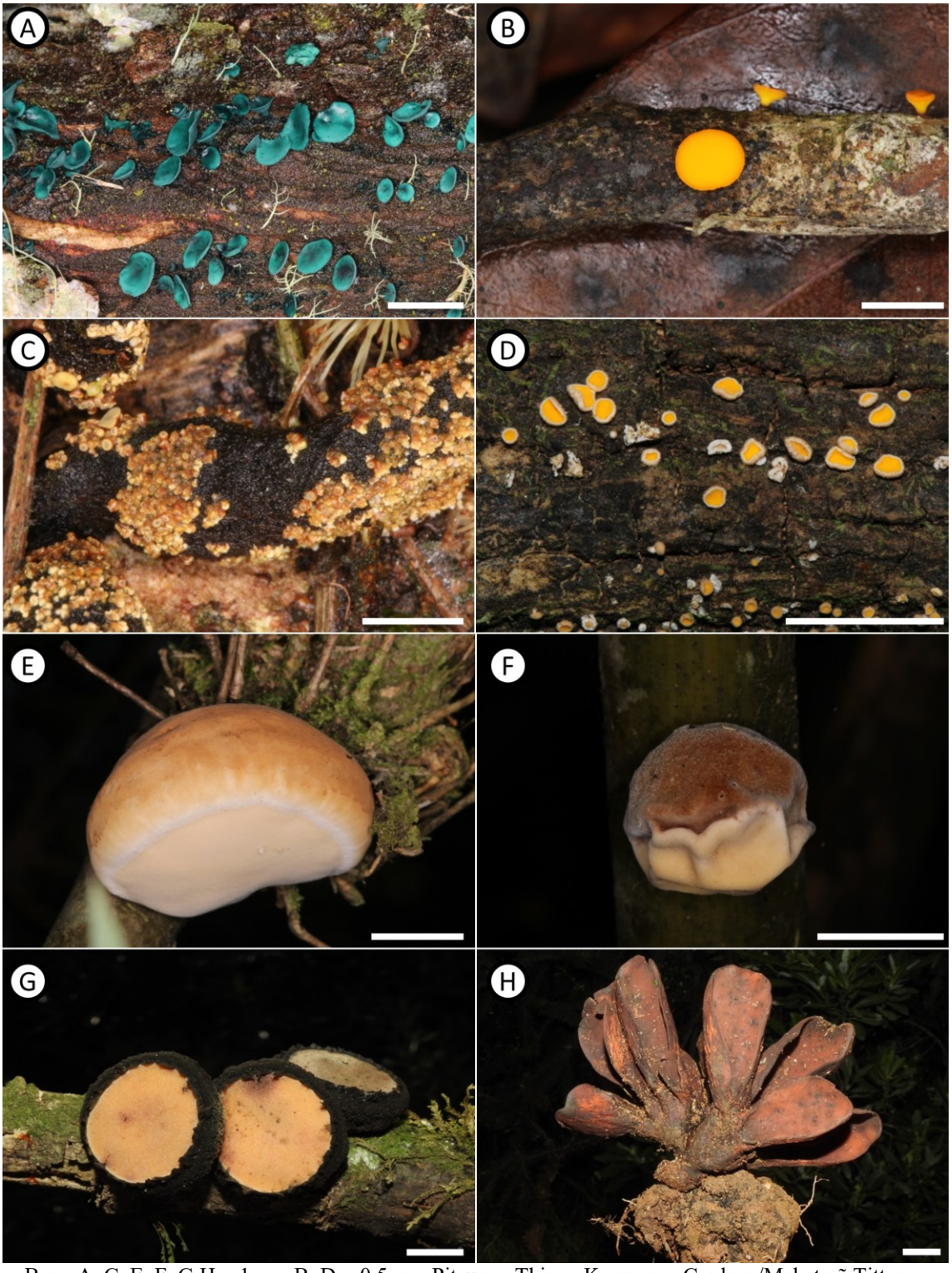
Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, 08 January 2021, MIND.Funga 295; *ibidem, idem*, MIND.Funga 296; *ibidem, idem*, MIND.Funga 299; *ibidem*, 10 January 2021, MIND.Funga 470; *ibidem, idem*, MIND.Funga 471.

Xylariales Nannf., Nova Acta R. Soc. Scient. upsal., Ser. 4 8(no. 2): 66 (1932)

Hypoxylon* cf. *dieckmannii Theiss., Annls mycol. 6(4): 346 (1908) (Figure 9A)

Description: Miller [1961, as *H. rubiginosum* var. *dieckmannii* (Theiss) Mill.], but see Gutch and Veken (1992), Fourier and Lechat (2015) and Fourier et al. (2015) for further comments about the species.

Figure 8. A - *Chlorociboria aeruginascens*; B – *Dicephalospora rufocornea*; C - *Encoelia* aff. *cubensis*; D - *Erioscyphella brasiliensis*; E - *Ascopolyporus polychrous*; F - *Ascopolyporus villosus*; G - *Galiella spongiosa*; H - *Wynnea gigantea*.



Bars: A, C, E, F, G,H = 1 cm, B, D = 0.5 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton

Distribution: Neotropics, Southern USA and Southeast Asia (Miller, 1961, Vasilyeva and Stephenson 2014). If confirmed, would represent the first record of the species from Santa Catarina state and the Aparados da Serra region.

Habitat: Fallen angiosperm branches, causing a white pocket rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1399.

Remarks: Descriptions of *H. dieckmannii* diverge in relation to spore size. Miller (1961), who analyzed the type specimen, describes the spores as being 6.0–8.0 × 3.0–3.8 µm, while Fourier and Lechat (2015) presents the spores as measuring 6.5–10 × 3.5–4 µm in their key. Our specimen differs by both by having spores measuring up to 12.5 µm, and by the apparent absence of an amyloid reaction in the apical ring of the ascii. But the combination of small (up to 0.3 mm), sphaerical to obovoid perithecia, ascospores with indehiscent perispore, and greyish extractable pigments are good indicatives that this could represent *H. dieckmannii*, which was described from not too far from where our specimen was collected (Theissen 1908). Another species with similarlly small perithecia, inamyloid apical rings, and indehiscent perispores is *H. inconspicuous* J.D. Rogers & Y.M. Ju, from Costa Rica, but this species differs by having small stromata with conspicuous perithecial mounds and shorter (up to 9.5 um long) ascospores (Ju et al. 2017).

Hypoxylon* cf. *subgilvum Berk. & Broome, J. Linn. Soc., Bot. 14(no. 74): 120 (1873) [1875] (Figure 9B)

Description: Cruz and Cortez (2015).

Distribution: Known from the Americas, Africa and Asia (Cruz and Cortez 2015). If confirmed, it would be the first record from Santa Catarina and the Aparados da Serra region.

Habitat: On the underside of dead branches in the ground, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 804;

Santa Catarina. Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1518.

Remarks: Perithecia and spore size and shape, pigments and granules, fit those of *H. subigilvum*, however, in our specimen, I only observed straight germ-slits. *Hypoxylon rubiginosum* (Pers.) Fr. is another species occurring in Southern Brazil with similar spores and straight germ-slits, but which has smaller and rounder perithecia (Cruz and Cortez 2015).

Xylaria apiculata Cooke, Grevillea 8(no. 46): 66 (1879) (Figure 9C)

Description: Rogers and Samuels (1986), Rubio (2019). For illustrations and comprehensive comments about the species, check Vandergrift (2017).

Distribution: Pantropical and subtropical, with some records also from temperate zones (Rubio 2019). In Brazil, recorded from the Northern Atlantic Forest in Pernambuco to the Southern Atlantic Forest in Rio Grande do Sul (Pereira 2015). First record from Santa Catarina state and the Aparados da Serra region.

Habitat: Fallen trunk of angiosperm, causing a white pocket rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 1006.

Xylaria enteroleuca (J.H. Mill.) P.M.D. Martin, Jl S. Afr. Bot. 36(2): 100 (1970) (Figure 9D)

Description: *Stromata* pulvinate to hemisphaerical campanulate, sometimes broadly attached to the substrate, more often with a small stipe, only visible in section due to the campanulate form when stipe present, up to 15 mm long, 10 mm wide and 6 mm high; *External surface* regular to sometimes cracking in nearly geometrical shapes; *Flesh* white to whitish-cream, not hollow; *Perithecia* globose to almost tubular, up to 0.8 mm long and 0.8 mm wide, perithecial mounds small (<0.1 mm high).

Ascii 8-spored, cyllindrical, not measured, apical ring amyloid; *Ascospores* greyish-hyaline to greyish-brown, broadly-fusiform in dorsal view, in lateral view nearly equilateral to inequilateral, perispore smooth, 11.0–15.0 × 7.0–9.0, Q = 1.5–2.2, Qmed = 1.7, without a visible germ-slit.

Distribution: Neotropical (Hladki 2001). Originally described from Argentina (Spegazzini 1898), in Brazil, known from Minas Gerais (Chardón et al. 1940). First record from Santa Catarina state and the Aparados da Serra region.

Habitat: Fallen branches of angiosperms, causing a white pocket rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 376; Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1426.

Remarks: Our specimens present wider spores than the descriptions by Spegazzini (1898) and Chardón et al. (1940) (6 µm, and 5–6 µm respectively), but agree with the descriptions by Callan and Rogers (1990) and Hladki (2001), with the exception of the presence of a germ-slit, which was not observed in our specimens, and is present (albeit indistinct), according to Callan and Rogers (1990).

Endophyte genomic barcoding records from Brazil, Costa Rica, Hawaii and Spain are presented in GBIF (2022), and their sequences are available on GenBank. However, I could not find any source of the identification of these sequences. Still, it is important noticing that in a Blast analysis, our specimen matched several of these sequences with ≥ 94% cover, 0.0 e-value and ≥ 99.0% identity.

It is also important to notice that *X. enteroleuca* is based on *H. enteroleucum* Speg. (1898) which is an invalid name (Art. 53.1), as it conflicts with the previously stabilished *H. enteroleucum* (Fr.) J. Kickx f. (1835) (Turland et al 2018). A revision of the type specimen of *H. enteroleucum* Speg. (1898) is desired before the proposition of a new and valid name is made.

Xylaria pseudoapiculata Hamme & Guerrero, Mycotaxon 64: 198 (1997) (Figure 9E)

Description: Hamme and Guerrero (1997).

Distribution: Previously known only from the type locality in Rio Grande do Sul (Hamme and Guerreiro 1997). First record from Santa Catarina state and from the Aparados da Serra region.

Habitat: Dead angiosperm branch in the ground, causing a white pocket rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1073.

Xylaria telfairii (Berk.) Sacc., Syll. fung. (Abellini) 1: 320 (1882) (Figure 9F)

Description: Dennis (1956), Van der Gutch (1995), Trieveiler-Pereira (2009), Cruz and Cortez (2015).

Distribution: Pantropical (Van der Gutch 1995). First record from the Aparados da Serra region.

Habitat: Dead trunks of angiosperms, causing a white pocket rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, 08 January 2021, MIND.Funga 309; *ibidem*, "Water trail", 09 January 2021, MIND.Funga 372; *ibidem, idem*, MIND.Funga 396.

Xylaria* aff. *telfairii (Figure 9G)

Description: Dennis (1956), Van der Gutch (1995), Trierveiler-Pereira (2009), Cruz and Cortez (2015).

Habitat: Fallen branches, causing a white pocket rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 394.

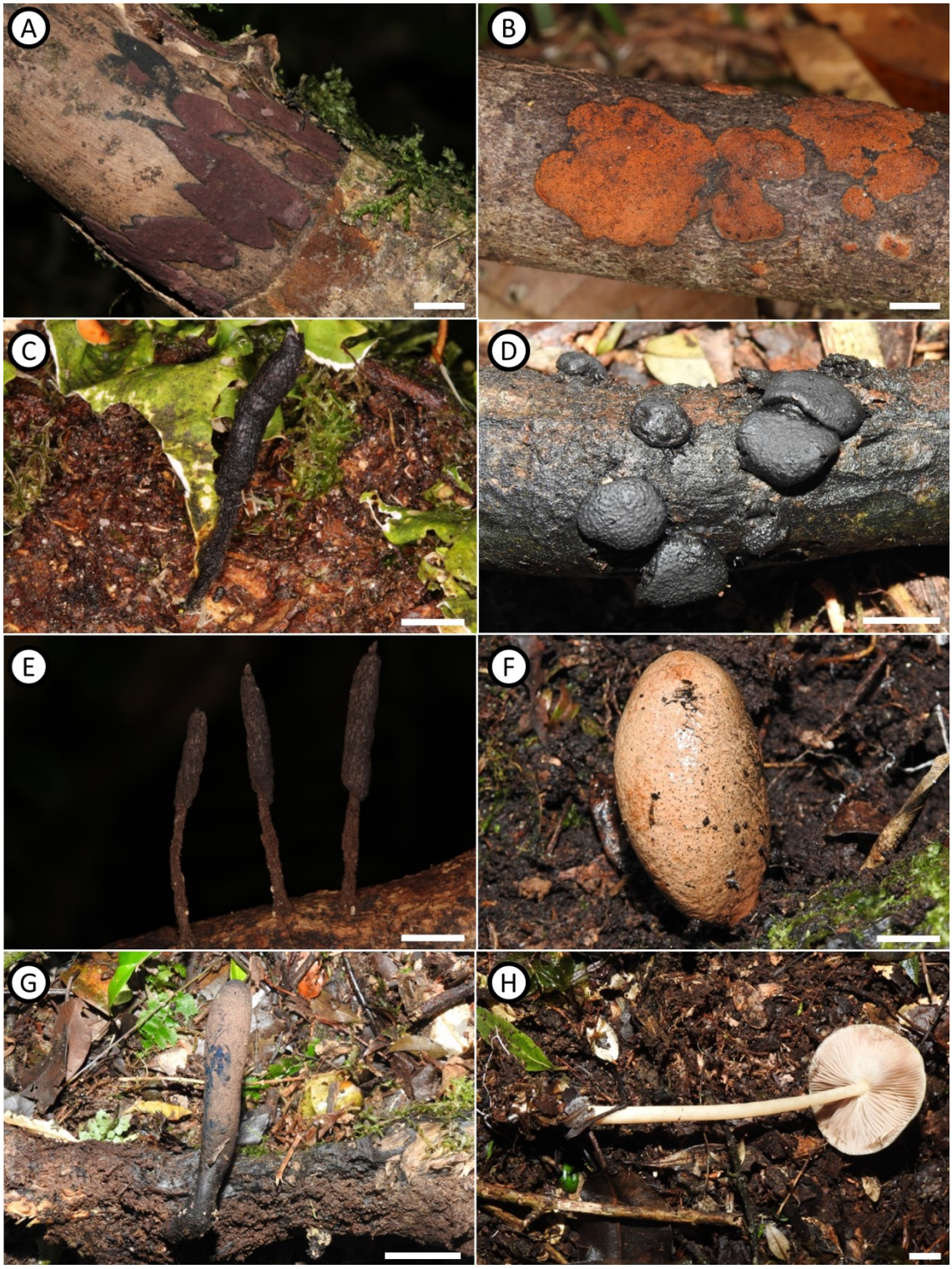
Remarks: Our specimen is macromorphologicaly very similar to *X. telfairii*, having a clavate stroma, a yellowish-brown stromatic surface, and the characteristic liquefied interior (Dennis 1956, Van der Gutch 1995, Trierveiler-Pereira 2009, Cruz and Cortez 2015). However, our specimen presents spores that are significantly longer [35.5–40.0 × 5.5–7.3 µm versus 19–26(–29) × 7–8 µm in Trierveiler-Pereira (2009)], notably curved (nearly boomerang-shaped) and with strictly straight germ-slits, while *X. telfairii* present almost straight to wavy gem-slits.

Basidiomycota Whittaker ex R.T. Moore, Botanica Marina 23 (6): 371 (1980)

Agaricales Underw., Moulds, mildews and mushrooms: 97 (1899)

Agrocybe perfecta (Rick) Singer, Lilloa 26: 57-159 (1953) (Figure 9H)

Figure 9. A - *Hypoxylon* cf. *dieckmannii*; B - *Hypoxylon* cf. *subgilvum*; C- *Xylaria apiculata*; D - *Xylaria enteroleuca*; E - *Xylaria pseudoapiculata*; F - *Xylaria telfairii*; G - *Xylaria* aff. *telfairii*; H - *Agrocybe perfecta*.



Bars: A, B, D, F, G,H = 1 cm, C, E = 0.5 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton

Description: Niveiro et al. (2020)

Distribution: Originally described from Rio Grande do Sul (Rick 1938, as *Pholiota vermifua* var. *platensis* Rick). In Brazil, also known from Paraná (Meijer 2006). In Argentina and Bolivia, known from the Yungas (Melgarejo-Estrada 2020, Niveiro et al. 2020). First record from Santa Catarina and from the Aparados da Serra region.

Habitat: On litter, inside the forest.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 996.

Remarks: Our specimen fits perfectly the description of *A. perfecta* by Niveiro et al. (2020), with the exception of the absence of an annulus in our specimen. However, there are clear signs of a partial veil at the borders, thus, we believe this is either a morphological variation of the species or that the annulus has been lost.

***Coronicium* sp.** J. Erikss. & Ryvarden, Cortic. N. Eur., 3 Coronicium-Hyphoderma (Oslo): 295 (1975) (Figure 10A)

Description: *Basidiomata* pellicular, smooth, at parts with some projections reflecting irregularities on the surface of the substrate. *Hymenical surface* whitish, up to 100 um thick. *Margin* indefinite.

Hyphal system monomitic; *hyphae* hyaline, clamped, compact and difficult to discern, thin to slighlty thick-walled, 1.5–3.5 um wide. *Cystidia* hyaline, thin-walled, subulate to fusiform, with a distinct papilla separated by a narrow neck. *Basidia* 4-sterigmate, hyaline, thin-walled, clavate, terminal. *Basidiospores* hyaline, ellipsoid citriform to navicular, 7.5–8.5 × 4.0–4.6 µm (n<10), slightly thick-walled, IKI-.

Habitat: Growind on dead (standing) culms of *Chusquea* bamboos.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1376.

Remarks: The inamyloid navicular basidiospores, monomitic hyphal system, thin basidiomata, and the distinctly papilate cystidia characterize the genus *Coronicium* (Eriksson and Ryvarden 1975). Currently, the genus comprises 5 species, which are, with exception of *C. molokaiense* Gilb. & Hemmes, which is found in Hawaii, from Northern Temperate zones (Eriksson and Ryvarden 1975, Jülich 1975, Gilbertson and Hemmes 2004).

In a Blast analysis of the ITS region, our specimen matched several "Unculterd Basidiomycota" and "Uncultured Corticiales", but the closest identified voucher was a *Coronicium alboglaucum* (Bourdot & Galzin) Jülich (MK953245.1), with 84% cover, 0.0 e-value, and 98,23% identity. This species differs from our specimen by presenting cream colored basidiomata, and thinner basidiospores (6.5–9 × 2.5–3 μm), as well being only known to grow in hardwoods in the Northern Hemisphere (Jülich 1975, Eriksson and Ryvarden 1976).

It is highly unlikely that our specimen belongs to any of the known *Coronicium* species, but more specimens and phylogenetic analyses are desired for a better understanding of this species identity and its relations. This is the first record of the genus from South America.

Cystidiodontia* aff. *laminifera (Berk. & M.A. Curtis) Hjortstam, Mycotaxon 39: 416 (1990) (Figure 10B)

Description: Hjortstam and Ryvarden [1986, as *Cystostereum artocreas* (Berk. & Curt. Ex Cooke) Hjorts.]

Habitat: On fallen logs and trunks of dead angiosperm trees, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail". 10 January 2021, MIND.Funga 444; Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Fortaleza Canyon Upper Trail, 27 May 2021, MIND.Funga 826; *ibidem, idem*, MIND.Funga 885.

Remarks: Our specimens differ from the descriptions of *C. laminifera* by having a defined and dark margin, in some specimens even raised and zoned, and abundant crystals in the hymenium. In a BLAST analysis of the ITS region, it matched with 100% cover. 0.0 e-value and 97.4% identity with *C. laminifera* sequences from Costa Rica

(EU118622.1). *Cystidiodontia. laminifera* was originally described from Cuba, and the sequence from Costa Rica was obtained by K.H. Larsson, so it is safe to assume that these sequences represent in fact *C. laminifera*. The morphological differences and the genetic distance point to our specimens representing a new species in *Cystidiodontia* Hjortstam. *Cystidiodontia* has a taxonomically confusing history, being originally described based on specimens of *C. artocreas* (Berk. & M.A. Curtis ex Cooke) Hjortstam from East Africa, which later turned out to be *Kneiffiella isabellina* Berk. & Br. [currently *C. isabellina* (Berk. & Br.) Hjortstam & Ryvarden], which differs mainly by having dextrinoid skeletal hyphae. *C. artocreas* was originally described from Venezuela, and is now a synonym of *C. laminifera* (despite Index Fungorum still presenting the two as distinct species) (Hallenberg and Ryvarden 1975, Hjortstam and Ryvarden 1986, Hjortstam 1990).

Dactylosporina steffenii (Rick) Dörfelt, Feddes Repert. Spec. Nov. Regni Veg. 96(3): 237 (1985) (Figure 10C)

Description: Capelari and Gugliotta (2005), Wartchow et al. [2010 as *Oudemansiella steffenii* (Rick) Singer], Scheibler (2016).

Distribution: Neotropical (Wartchow et al. 2010). First record from Santa Catarina state and from the Aparados da Serra region.

Habitat: On soil/litter inside forests.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the “Novo Mundo” trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1427; *ibidem*, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1514.

Entoloma* cf. *bloxamii (Berk. & Broome) Sacc. [as 'bloxami'], Syll. fung. (Abellini) 5: 684 (1887) (Figure 10D)

Description: Morgado et al. (2013), Putzke and Putzke (2018).

Distribution: Despite being record in North America and in Brazil, it has been shown that this species is probably exclusively European, with records from other continents representing different lineages (Meijer 2008, Morgado et al. 2013, Magnano et al.

2015). If confirmed, it would represent the first record of the species from Santa Catarina state and the Aparados da Serra region.

Habitat: Found in the ground inside forests.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 966.

Favolaschia* aff. *aurantiaca Singer, Beih. Nova Hedwigia 50: 101 (1974) (Figure 10E)

Description: Basidiomata gregarious, pileus up to 3.5 mm in diameter, conchate, dimidiate to semicircular, surface slightly pruinose, orange with greyish tinges to greyish-yellow; Stipe up to 1.6 mm long and 0.6 mm wide, widening at the attachments, lateral, attaching to the upper surface of the pileus, pruinose to basally smooth, orange, greyish-yellow to lemon yellow; Pore surface orange, greyish-yellow to whitish, pores round to angular, regular, 3-6/mm, dissepiments thick, entire;

Trama of the tubes gelatinized, but not as much as in the context, interwoven, hyphae hyaline, thin-walled, up to 5 µm wide; Contextual trama strongly gelatinized, with a wide space in between hyphae, slightly interwoven, with a tendency of verticalization of the hyphae in the upper stratum, hyphae up to 5 µm wide; Trama of the stipe with two distinct strata, centrally with a compact, regularly vertical disposition, not gelatinized, with straight, up to 10 µm wide hyphae with relatively thick-walls, cortically, with a interwoven and gelatinized disposition, with tortuous and thin-walled hyphae ending as caulocystidia; All *hyphae* clamped; Hymenial *cystidia* absent, cystidia present in the dissepiments, pileipellis and in the stipitiellis as acanthocystidia and gloeocystidia, acanthocystidia bulbous to clavate, up to 12 µm wide and 20 µm long (spines and stipe excluded), with the upper 2/3covered in acute spines up to 2 µm long, generally stalked, in the pileipellis sometimes arising as terminations from clavate to irregularly widened hyphae 6–8 µm wide, in the dissepiments arising from normally shaped to slightly widened hyphae, gloeocystidia bulbous to clavate, up to 20 µm wide, long-stalked, in the pileipellis often arising from straight hyphae coming from deep into the context, refractive contents greyish to more often yellowish; *Basidia* clavate, 4-sterigmate, not measured; *Basidiospores* hyaline, smooth, thin-walled, globose to ellipsoid, sometimes with an irregular and slightly angular outline, 7.7–10 × 6.0–7.6, Lmed = 8.7, Wmed = 7.1, Q = (1.0–) 1.1–1.4, Qmed = 1.2, amyloid.

Habitat: On dead bamboos of the genus *Chusquea*, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1379; *ibidem, idem*, MIND.Funga 1397.

Remarks: Differs from *F. aurantiaca*, a species that also grows on bamboos in montane environments of South America, by having smaller basidiomata with more vivid colors, absence of gloeoplerous hyphae, larger spores, and the abundance of gloeocystidia in the dissepiments (Gillen et al. 2012). *Favolaschia dealbata* Singer is another species growing in bamboo in Southern Brazil, but it differs by having smaller basidiomata, hymenial gloeocystidia, and simple-septate hyphae (Magnano et al. 2013).

Hypholoma subviride (Berk. & M.A. Curtis) Dennis, Kew Bull. 15(1): 134 (1961) (Figure 10F)

Description: Cortez and Silveira (2007), Scheibler (2016).

Distribution: Pantropical and subtropical (Cortez and Silveira 2007). First record from the Aparados da Serra region.

Habitat: Found on trunks of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, 21 June 2021, MIND.Funga 914.

Lepista nuda (Bull.) Cooke, Handb. Brit. Fungi 1: 192 (1871) (Figure 10G)

Description: Crevel (1995)

Distribution: Cosmopolitan (GBIF, 2022). First record from the Aparados da Serra region.

Habitat: On soil, in a forest clearing.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1059.

Marasmius cladophyllus Berk., Hooker's Journal of Botany and Kew Garden Miscellany 8: 138 (1856) (Figure 10H)

Figure 10. A - *Coronicium* sp.; B - *Cystidiodontia* aff. *laminifera*; C - *Dactylosporina steffenii*; D - *Entoloma* cf. *bloxamii*; E - *Favolaschia* aff. *aurantiaca*; F - *Hypholoma subviride*; G - *Lepista nuda*; H - *Marasmius cladophyllus*.

Bars: A = 2 cm B, C, D, E, F, G, H = 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton

Description: Singer (1976).

Distribution: Neotropical (Singer 1976). First record from Santa Catarina and the Aparados da Serra region.

Habitat: Litter.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 380; *ibidem, idem*, MIND.Funga 385.

Marasmius* cf. *araucariae Singer, Sydowia 18: 333. 1965 (Figure 11A)

Description: *Basidiomata* solitary to gregarious; *Pileus* up to 40 mm wide when mature, initially parabolic to campanulate, then applanate with maturity, surface smooth, homogenous, slightly velutinous, dark orange throughout, drying ferruginous and wrinkled; *Margin* initially incurved, then straight to decurved with maturity, entire to eroded at parts, concolorous with the rest of the pileus; *Lamellae* narrow, straight to sinuose, horizontally adnate to adnexed, subdistant, with 1 lamelulla, sometimes forked, small intervenosities present, whitish to cream, drying pale ferruginous, edges drying slightly lighter and pulverulent under magnification from the cheilocystidia; *Stipe* central, smooth hollow, up to 75 mm long and 4 mm wide, at the top concolorous with the lamellae, then gradually darker in tones of red and finally brownish toward the base, drying ferruginous throughout; *Basal mycelium* small, whitish, hyphoid;

Pileipellis a hymenial layer composed exclusively of brownish *Siccus*-type elements; *Stipitipellis* undifferentiated, but with both hyaline *Siccus*-type elements up to 30 µm long, and setae projecting up to >400 µm; *Contextual trama* monomitic, hyaline, regular, composed of non-inflated to slightly inflated hyphae, weakly to strongly dextrinoid; *Lamellar trama* regular, composed of parallel, hyaline, non-inflated hyphae, weakly to strongly dextrinoid; *Pleurocystidia* absent, but the tapering basidioles may be interpreted as cistidioles; *Cheilocystidia* both *Siccus*-type and globose elements, hyaline to brownish, IKI-; *Basidia* not seen; *Basidiospores* only 1 found, measuring 9.7 × 4.9 µm, hyaline, smooth, IKI-; Clamps present at all septa.

Distribution: Known from Argentina (Type locality), Brazil, Papua New Guinea and Thailand (Singer 1965, Desjardin and Horak 1997, Meijer 2008, Wannathes et al.

2009). If confirmed, would represent the first record of the species from Santa Catarina state and the Aparados da Serra region.

Habitat: Very decomposed branches, and apparently woody-fruits, on the ground.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 361; *ibidem, idem*, MIND.Funga 365.

Remarks: The combination of characters clearly puts this species in *Marasmius* sect. *Sicci* Singer (Singer 1986). *Marasmius araucariae* is a macro, micromorphological, and ecological similar species, originally described from areas with *Araucaria angustifolia* (referred to as *Araucaria brasiliensis* by Singer) in Argentina (Singer 1965). However, our specimens differ by having both *Siccus*-type and setose elements in the stipitipellis, while Singer cites no cystidia in the stipe. Meijer (2008) cites the presence of two types of caulocystidia in his description of materials from Paraná, but the pileocystidia in our materials differ from those described by him.

Mycena paranaensis Maas Geest. & de Meijer, Verh. K. ned. Akad. Wet., tweede sect. 97: 93 (1997). (Figure 11B)

Description: Meijer (2008), Niveiro et al. (2015).

Distribution: Known from the type locality in Paraná, Southern Brazil, and Argentina (Meijer 2008, Niveiro et al. 2015). First record from Rio Grande do Sul and the Aparados da Serra region.

Habitat: Found on a dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 724.

Remarks: This species can easily be confused with *Mycena leaiana* (Berk.) Sacc., and it possible that records of *M. leaiana* from Southern Brazil are actually *M. paranaensis*. For a discussion about the morphological differences between both species, check Niveiro et al. (2015).

In a Blast analysis of the ITS region, the closest match to our species were sequences of *M. leaiana* from the USA (JF908376.1), including soil isolates from Ohio (type locality of *M. leaiana*) (FM999566.1), both with a query cover of 98%, 0.0 e-value, and identity

of 84.59% and 84.45% respectively, meaning that our species is in fact distinct from *M. leaiana*. However, no sequences of *M. paranaensis* are available online. More sequeces from other Southern Brazilian and Argentinian materials are desired to understand the relationship between both species.

Mycena violacella (Speg.) Singer [as 'violaceella'], Sydowia 9(1-6): 395 (1955) (Figure 11C)

Description: Meijer (2008), Scheibler (2016).

Distribution: Neotropical, originally described from São Paulo, Brazil (Meijer 2008), apparently more commonly found in montane environments. First record from Santa Catarina state and the Aparados da Serra region.

Habitat: Growing on litter inside forests.

Material examined: : BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim - Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 479; *ibidem, idem,* MIND.Funga 482; *ibidem, idem*, MIND.Funga 487.

Remarks: Meijer (2008) presents this species as *Mycena* cf. *violacella*, and has found slightly larger spores [8.0–10.5 × 3.7–4.5(–4.8) µm] than Singer found in the type specimen [(6.6–)8.0–9.0 × (3.3–) 3.5–4.2 µm]. I could not review Singer's description, but the spores in our specimens [(6.6–) 6.9–8.4 (–8.8) × (3.0–) 3.3–4.0 (–4.6) µm] are very close to those described as found by Singer in Meijer (2008), and by Scheibler (2016).

***Mycena* sp.** (Pers.) Roussel, Fl. Calvados, Edn 2: 64 ['46'] (1806) (Figure 11D)

Description: Basidiomata gregarious, mycenoid; *Pileus* campanulate, up to 21 mm wide and 14 mm tall, surface viscid, center brown and even, then distinctly streaked, streaks initially little distinct then distinctly darker towards the margin, alternating with pale brown to milky coffee streaks, at times, darkening overall near the margin to a similar shade of brown from the center, surface drying dark brown throughout, with streaks almost disappearing; *Margin* straight, wavy, entire to very slightly split, looking striate due to the contrasting brown and pale brown lines; *Lamellae* broad, adnexed to subfree, separate from the stipe by a distinct disk concolorous to the stipe, subdecurrent over the disk, and slightly to not touching the stipe, subdistant, with 1-3 lamelullae, greyish-

white, edges nearly entire to slightly serrulate, concolorous to slightly darker that the faces, faces drying pale yellowish-grey, and edges drying lighter than faces close to the center, then concolorous to dark grey, especially towards the margin; *Stipe* central, up to 22 mm long and 2 mm wide, cylindrical, hollow, dark greyish near the pileus, then pale brown to blackish-brown towards the base, fibrillose with whitish fibrilla, insititious, without basal mycelium, drying flattened, blackish brown throughout, and distinctly grooved;

Pileipellis a strongly gelatinized ixotrichoderm, up to 150 µm thick, composed of thin-walled, hyaline, smooth, sinuous, filamentous hyphae, 2.5–5.0 µm wide, sometimes with brownish contents, arranjed anticlinally to interwoven, IKI-; *Subpellis* a compact tissue with inflated hyphae containing brownish pigments, appearing as a brownish zone ca. 50µm thick; *Stipitipellis* undifferentiated, IKI-; *Contextual trama* monomitic, composed of inflated, hyaline, thin-walled,hyphae, dextrinoid, reddish brown in Melzer; *Lamellar trama* at parts bilateral with a distinct compact mediostratum composed of elongate hyphae, and a loose lateral stratum, and at parts subregular composed mainly of slightly inflated hyphae, dextrinoid, reddish-brown in Melzer; *Pleurocystidia* absent; *Cheilocystidia* abundant, hyaline, diverticulate with 2 to many dactyloid projections, up to 40 × 12 µm, IKI-; *Basidia* clavate, 4-sterigmate, not measured; *Basidiospores* subglobose to ellipsoid, smooth, thin-walled, 6.8–8.6 × 5.1–6.8, Lmed = 7.8, Wmed = 5.8, Q = 1.1–1.4, Qmed = 1.3, amyloid, CB-; Clamps present at all septa.

Habitat: On a dead, standing trunk, causing an intermediary white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Parque Eólico Bom Jardim, woods behind Luar dos Cânions hotel, 31 October 2021, MIND.Funga 1344.

Remarks: *Mycena* is a huge genus containing over 1,000 species (Bánki et al. 2022), distributed in dozens of sections, which makes identifying species in the genus an almost insurmountable task. I have tried to fit this species in one of the sections of the genus presented by Singer (1986), and to identify it using the key to South American *Mycena* from Geesteranus and Meijer (1997), but could not get to any reasonably similar species.

Oudemansiella* cf. *platensis (Speg.) Speg., Anal. Soc. cient. argent. 12(1): 24 (1881) (Figure 11E)

Description: Petersen et al. (2008),

Distribution: Neotropical (Petersen et al. 2008). If confirmed, would represent the first record from Santa Catarina state and from the Aparados da Serra region.

Habitat: Growing on dead trunks and branches of both angiosperms and gymnosperms, causing a white rot.

Material examined: : BRAZIL. Santa Catarina. Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1463; *ibidem, idem*, MIND.Funga1468.

Remarks: There is great confusion about the identity and delimitation of *O. platensis* and *O. canarii* (Jungh.) Höhn. (Petersen et al. 2008, Yang et al. 2009). Corner (1994) states that *O. canarii* is restricted to Asia and the Pacific, and that *O.platensis* is restricted to the Americas, with slight differences in the pileipellis. Petersen et al. (2008), on the other hand, further discusses the morphological differences between both species, and concludes that specimens with morphological characters attributed to *O. canarii* and *O. platensis* are found in the Neotropics. Mueller et al. (2001) presents a phylogeny where specimens of *O. canarii* from Central America are present in a distinct clade of Asian ones. Alberti et al. (2020) presents a phylogeny with only American specimens, all identified as *O. canarii*, and threats *O. platensis* as a synonym of the first, but includes no Asian specimens of *O. canarii*. Due to the proximity with the type locality, I conservatively assume that our specimens represent *O. platensis*.

Panellus pusillus (Pers. ex Lév.) Burds. & O.K. Mill., Beih. Nova Hedwigia 51: 85 (1975) (Figure 11F)

Description: Burdsaw and Miller (1975), Ryvarden (2016).

Distribution: Pantropical (Ryvarden 2016).

Habitat: Dead hardwoods (branches, logs and trunks), causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Fortaleza Canyon Upper Trail, 27 May 2021, MIND.Funga 847; Santa Catarina, Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 1002; Bom Jardim da Serra, Parque Eólico Bom Jardim, woods behind Luar dos Cânions hotel, 31 October 2021, MIND.Funga 1339.

Radulomyces* cf. *rickii (Bres.) M.P. Christ., Dansk bot. Ark. 19(no. 2): 128 (1960) (Figure 11G)

Description: Ghobad-Nejhad and Kotiranta (2007).

Distribution: Originally described from Europe, but found worldwide, including in Brazil (although I could not find any Brazilian records identified as *R. rickii*) (Ghobad-Nejhad and Kotiranta 2007, Hjortstam and Ryvarden 2007a). If confirmed, would probably represent the first record of the species from Rio Grande do Sul and the Aparados da Serra region, as Baltazar (2014) has not recorded this species.

Habitat: Found on a dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 669.

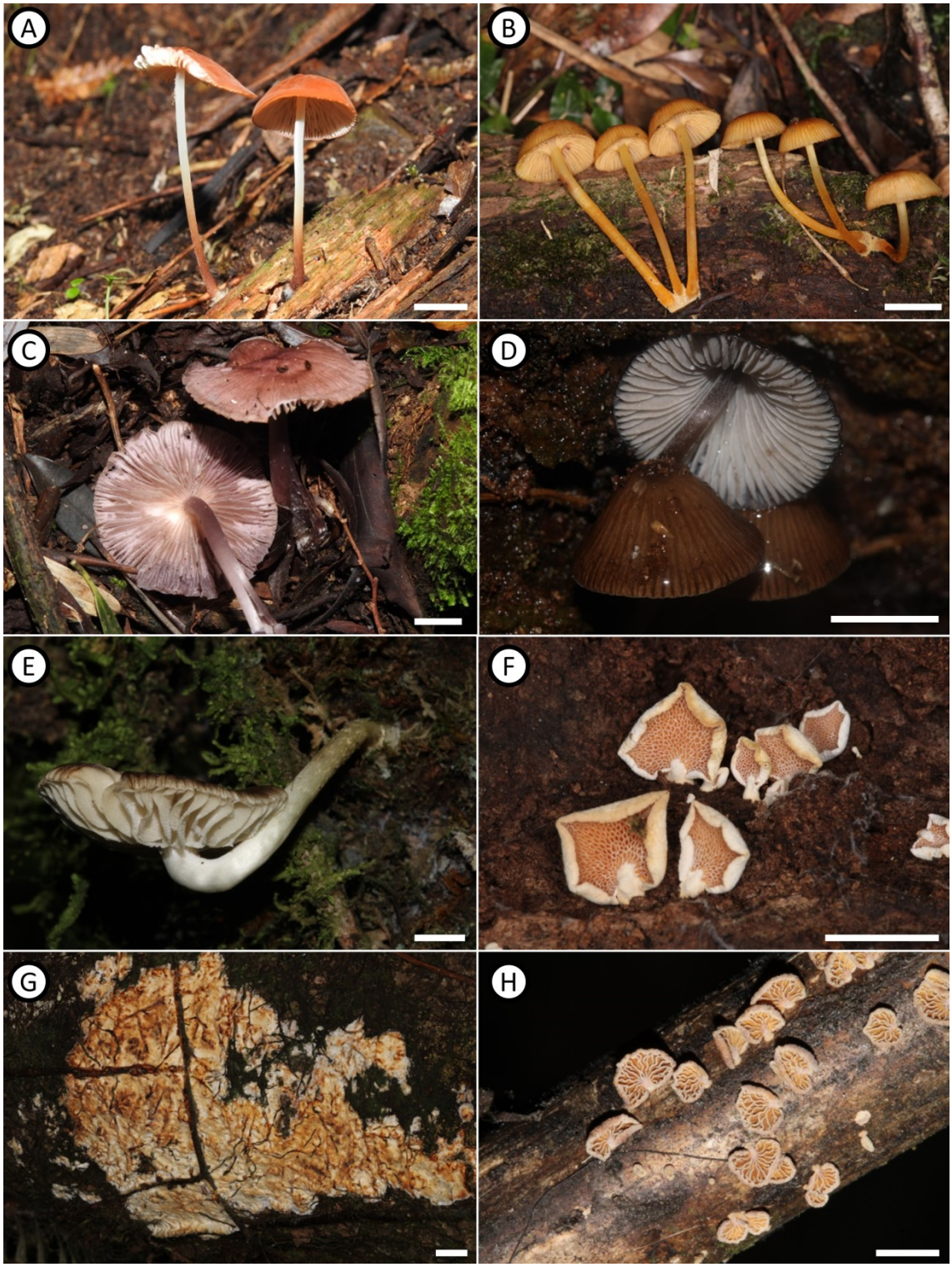
Remarks: Our specimen is morphologically similar to *R.rickii,* but differs by having perfectly smooth spores and longer basdidia (up to 80+ µm long).

***Resinomycena pleurotoides* nom. prov.** Kossmann G.M. Muell. & Drechsler-Santos (Figure 11H)

Etimology: *pleurotoides* – reffering to the pleurotoid habit of the species.

Description: Basidiomata pleurotoid, gregarious, short-stipitate, dimidiate to flabelliform, conchate, hard and brittle when dried; *pileus* up to 2.5 mm long and 3.5 mm wide, surface pulverulent, cream to pale yellowish-orange when fresh, slighlty darker when dried, granula whitish, *margin* entire to slighlty wavy, incurved; *lamellae* adnate to subdecurrent, subdistant, faces smooth, ceraceous, pale yellowish-orange, edges pulverulent, concolorous with pileus, both darker when dried; *stipe* up to 0.8 mm long and 0.3 mm wide, lateral to eccentric, pulverulent, concolorous with pileus, with a small, cottony, cream to pale-yellowish basal mycelium.

Figure 11. A- *Marasmius* cf. *araucariae*; B - *Mycena paranaensis*; C - *Mycena violacella*; D - *Mycena* sp.; E - *Oudemansiella* cf. *platensis*; F - *Panellus pusillus*; G - *Radulomyces* cf. *rickii*; H - *Resinomycena pleurotoides* nom. prov.



Bars: A, B, C, D, E, G = 1 cm, F, H = 0.5 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton

Basidiospores 7.7–10.5(–11.5) × (4.5–)5.0–5.8(–6.2) µm, Q = 1.6–2.0, Qmed = 1.8 (n = 20), elongate, smooth, thin to slightly thick-walled, with yellowish contents, faintly amyloid (observable in spore masses); *basidia* clavate, 4-sterigmate, not measured; *pleurocystidia* clavate, sometimes papillate, slightly thick-walled, with abundant yellowish and granular oily contents, not measured; *cheilocystidia* of two types, abundant broom-cells with long and richly ramified apices, thick-walled, hyaline to yellowish, oftenly with agglutinated spore-masses, and clavate, thick-walled, hyaline gloeocystidia, less abundant and sometimes difficult to observe; *Hymenophoral trama* apparently irregular, with two types of hyphae: hyaline, smooth, thin to thick-walled hyphae, and hyaline to yellowish, sometimes reddish in masses, and oftenly encrusted, thick-walled to almost solid hyphae; *Contextual trama* similar to hymenial trama, with predominance of thick-walled elements, with a distinct pseudoparenchimatose layer bellow the pilleipelis; *pilleipelis* a Rameales-structure, and with non-projecting clavate to flexuose, hyaline, thick-walled oleiferous pileocystidia; *stipitipellis* with a similar Rameales-structure, but without oleiferous cystidia; All *hyphae* clamped and apparently IKI-, but this is difficult to asses due to the pigmentation of the hyphae, which could at times be misinterpreted as a positive reaction; Both the pilleipelis and the lamellar edge releasing citric yellowish contents when exposed to KOH and NaOH, which may be an indicative of the presence of some resin soluble in caustic reagents;

Distribution: Known only from the Aparados da Serra in Bom Jardim da Serra municipality.

Habitat: On a dead, standing *Chusquea* sp. bamboo culm, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1393.

Remarks: The combination of weakly amyloid spores, a Rameales-structure pellis with oleiferous cystidia, and basal mycelium sugests this species belongs to *Resinomycena* Redhead & Singer (Redhead and Singer 1981). However, species in the genus are also characterized by having dextrinoid hyphae, no pleurocystidia and typical resinous substances, while in our specimen the dextrinoidity of the hyphae is dubious, and pleurocystidia are abundant. We believe the granula on the surfaces of the basidiomata may be remnants of dried resin, which in turn release a citric yellowsh pigment when

exposed to caustic subtances, such as KOH and NaOH. Currently, only one species in the genus is known from Brazil, *R. petarensis* Desjardin, B.A. Perry and Stevani, which presents a typical mycenoid habit, white basidiomata, dextrinoid hyphae and no pleurocystidia. Also, no currently known species in the genus present a pleurotoid habit (Redhead and Singer 1981, Singer 1986, Redhead and Nagasawa 1987, Desjardin et al 2016), although we could not review the descriptions of *R. capitata* T. Bau & L.N. Liu, R. ellipsoidea T. Bau & L.N. Liu and R. fulgens Har. Takah., Taneyama & Oba.

Panellus subgenus *Serotinia* (Pilat) Sing. is another genus in *Mycenaceae* Overeem sharing the pleurotoid habit, amyloid spores, inamyloid or weakly dextrinoid hyphae, and thick-walled resinous pleurocystidia (Singer 1986). However, species in the genus lack a Rameales-structure type of pellis, diverticulate cheilocystidia and oleiferous pileocystidia.

Furthermore, in a Blast analysis of a patial ITS sequence (215 bp), the closest match to our specimen was an unidentified *Resinomycena* sp. sequence from Japan (AB971702.1), with 100% cover, 5e-82 e-value and 93.15% identity, followed by an unidentified *Mycena* sp. sequence from Argentina (KY559350.1), with 98% cover, 1e-78 e-value and 92.98% identity, and then various *Resinomycena* sequences (MG663276.1, ON332046.1, ON332045.1, OM972553.1), with 96–100% cover, 7e-76 e value and 91.74–92.09% identity. Curiously, *R. petarensis*, the only other species of the genus known in South America, did not appear among the 100 best ranked matches, and in a Blast analysis of the ITS sequence from the species' type specimen, the best matches apart from *R. petarensis* sequences were several *Roridomyces* Rexer sequences (OM906876.1, FJ596761.1, MW540720.1, FJ596760.1, MW862275.1), with 93 – 100% cover, 0.0 e value and >90% identity.

Rhizomarasmius amylosetae **nom. prov.** Kossmann G.M. Muell. & Drechsler-Santos (Figure 12A)

Etimology: *amylo* + *setae* – reffering to the amyloid reaction of the setae.

Description: *Basidiomata* marasmioid, gregarious; *pileus* up to 2 mm wide and long,, parabolic, pulvinate to conchate, with a lateral groove due to the stipe insertion, sometimes slightly umbillicate, *surface* radially sulcate from the impression of the lamellae, sparsely villose, with long hairs visible under magnification, dark cinnamon to

pale cinnamon at the center, pale cinnamon to whitish towards the margin, fading to cinnamon to buff throughout when dred; *context* thin, pale buff when dry; *lamellae* adnate, sometimes anastomosing near the stipe, forming a fertile ring around it, distant, straight to sinuous, sometimes forking, edges entire, shallow intervenose lamellae present, white to cream when young, dark buff when old, buff to pale cinnamon when dried; *stipe* up to 6 mm long and 0.5 mm wide, attached at the substrate higher than the pileus, passing through a groove at the pileus and then laterally to most oftenly centrally attached, cylindrical, dark cream to pale buff near the lamellae, turning brown to blackish towards the base, villose due to the caulocystidia; *basal mycelium* mostly absent, when present, whitish, fibrillous, up to 1.5 mm wide.

Basidiospores 10–13.2 × 4.7–6.1 µm, Q = 1.8 – 2.6, Qmed = 2.2 (n = 30), elongate to cylindrical, navicular in dorsal view, hyaline, smooth, but sometimes with one to three lateral spiny projections up to 1 um long, with one flattened face, slightly thick-walled, with one to many guttula, IKI-; *Basidia* clavate, 4-sterigmate, not measured; *Pleurocystidia* thin to thick-walled, long-fusoid, capitate to sublecythiform with a flattened apex, up to 10 um wide, projecting up to 40 um (n < 10); *Cheilocystidia* the same as the pleurocystidia; *hymenophoral trama* subparallel, composed of both clamped and simple-septate, hyaline hyphae; *contextual trama* similar to hymenial-trama; *pileipellis* a hymenial layer, composed of thin to thick-walled, yellowish-brown, ventricose to subglobose and subutriform elements; *pileocystidia* metulloid, ventricose, subulate, , up to 18 um wide and 150 um long, hyaline, smooth, amyloid, some filled with a yellowish content; *trama of the stipe* composed of reddish-brown, densely packed parallel hyphae, apparently IKI-, but a reaction to Melzer's reagent is difficult to determine due to the dark reddish color of the hyphae; *caulocystidia* similar to the pileocystidia, but longer and more slender, hyaline to brown at the lower and darker portions of the stipe, amyloid.

Distribution: So far known only from Morro da Igreja, Parque Nacional de São Joaquim at ca. 1800 m.a.s.l.

Habitat: Growin on dead culms of *Chusquea* bamboos, causing a white rot.

Material examined: Santa Catarina. Urubici, Parque Nacional de São Joaquim - Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 509; *ibidem, idem*, MIND.Funga 510; *ibidem, idem*, MIND.Funga 511.

Remarks: The combination of a long stipe, darkening towards the bottom, the large thick-walled pileocystidia and caulocystidia, visible as hairs under a stereomicrscope, the pleurocystidia and cheilocystidia, and the inamyloid hyphae and spores rules this species as belonging to *Rhizomarasmius*.

In a Blast analysis of the LSU region, the closest matches were sequences of *R. pyrrocephalus* and *R. epidryas* with 97–100% cover, 0.0 e-value and 98.74–98.83% identity. It is morphologically similar to *R. setosus*, the only other known marasmioid species in the genus, for which I could not access any of the detailed descriptions available [(Kühner 1927, Breitenbach and Kränzlin 1991, Bon 1999, Antonín and Noordeloos 2010) apud Moreau et al. (2015)]. However, based on the pictures, drawings, and discussions from Moreau et al. (2015) and the key to species from Noordelos (1987), our species differs from *R. setosus* by having a darker pileal surface, the presence of metulloid pilleocystidia, the amiloidy of the dermatocystidia, the absence of bifurcate cheilocystidia, the absence of encrusted elements in the pilleipelis, and by growing on bamboos in Southern Brazil, while *R. setosus* grows on dicots in temperate regions of the Northern Hemisphere. More records of our species are desired to determine if the "inverse" growth habit, with the stipe insertion in the substrate higher than the pileus is a constant.

Schizophyllum commune Fr. [as 'Schizophyllus communis'], Observ. mycol. (Havniae) 1: 103 (1815) (Figure 12B)

Description: Cooke (1961).

Distribution: Cosmopolitan (Cooke 1961). First record from the Aparados da Serra region.

Habitat: Dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 732.

Stropharia rugosoannulata Farl. ex Murrill, Mycologia 14 (3): 139 (1922) (Figure 12C, D, E)

Description: Cortez and Silveira (2008).

Distribution: Cosmopolitan (GBIF 2022). First record from the Aparados da Serra region.

Habitat: On the ground/litter inside forests.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1091; *ibidem, idem*, MIND.Funga 1103.

Auriculariales Bromhead, Magaz. Nat. Hist., J. Zool. Bot. Miner. Geol. Meteorol., Ser. 2: 333 (1840)

Auricularia fuscosuccinea (Mont.) Henn. [as 'fusco-succinea'], Bot. Jb. 17: 19 (1893) (Figure 12F)

Description: Lowy (1952).

Distribution: Originally described from Cuba, widely distributed in tropical and subtropical America, also recorded in Southeast Asia and Oceania (Lowy 1952), but *Auricularia* species from different continents traditionally treated as a single species have been shown to represent multiple lineages (Looney et al. 2013). First record from the Aparados da Serra region.

Habitat: Dead logs and trunks of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 351; Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1071.

Eichleriella* cf. *alliciens (Berk. & Cooke) Burt, Ann. Missouri Bot. Garden 2: 746, 1915 (Figure 12G)

Description: Malysheva and Spirin (2017).

Distribution: Neotropics and Southeastern USA (Malysheva and Spirin 2017). In Brazil, recorded in Rio Grande do Sul, São Paulo, Minas Gerais and possibly Pará (herbarium record MG235880). If confirmed, would represent the first record of the species from Santa Catarina state and the Aparados da Serra region.

Habitat: Found on a dead, standing trunk, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1070.

Remarks: Our specimen differs from the description of *E. alliciens* by Malysheva and Spirin (2017), who analyzed the type specimens, by having larger spores (15.3–19.0 × 6.5–7.3 µm versus 10.2–15.8 × 4.8–6.4 µm), and by having large (up to 60+ µm wide) crystal glomerules in the subhymenium, distinct from the up to 10 µm crystals found among the hyphae.

Heteroradulum brasiliense (Bodman) Spirin & Malysheva, in Malysheva & Spirin, Fungal Biology 121(8): 710 (2017) (Figure 12H)

Description: Lowy (1971).

Distribution: Previously known only from the type locality in Rio Grande do Sul (Lowy 1971, Malysheva and Spirin 2017). First record from Santa Catarina state and the Aparados da Serra region.

Habitat: Dead branches of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1079.

Pseudohydnum gelatinosum (Scop.) P. Karst., Not. Sällsk. Fauna et Fl. Fenn. Förh. 9: 374 (1868) (Figure 12I)

Description: Lowy (1971), Bononi (1981).

Distribution: Widely distributed in the Neotropics, also recorded in Europe and in Asia. In Brazil, known from São Paulo and Pará (Bononi 1981). First records from the states of Santa Catarina and Rio Grande do Sul, and from the Aparados da Serra region.

Habitat: Dead branches and trunks of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 397; Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Fortaleza Canyon Upper Trail, 27 May 2021, MIND.Funga 893.

Boletales E.-J. Gilbert, Les Livres du Mycologue Tome I-IV, Tom. III: Les Bolets: 83 (1931)

Meiorganum curtisii (Berk.) Singer, J. García & L.D. Gómez, Beih. Nova Hedwigia 98: 63 (1990) (Figure 12J)

Description: Baldoni et al. (2012).

Distribution: Known from America, East Asia and Oceania (Badoni et al. 2012). In Brazil, known from Rio Grande do Sul and São Paulo, and possibly Minas Gerais. First record from the Aparados da Serra region.

Habitat: Fallen branches of *Araucaria angustifolia*, causing a moderate brown rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 812.

Remarks: This species was first recorded in Brazil in 2012, growing on *Pinus* sp. plantations in Santa Maria, Rio Grande do Sul, ca. 350 Km away from where our specimen was collected (Baldoni et al. 2012). Since then, it has been observed in São Paulo (unknown host, SP-Fungi 498627, SP-Fungi 498630, SP-Fungi 498628) and Minas Gerais (on *Pinus* sp., unplubished data). This represents the first record of the species on *Araucaria angustifolia*, and is probably a case of a host-jump, which needs to be observed closely as it could be an initial sign of an invasive fungal species. We commonly find fallen brown rotten *Araucaria* branches in native forests, without any observable sporomata, or sporomata of fungi not known to produce a brown rot. Studies should be carried out to see if *Me. curtisii* is becoming prevalent on *Araucaria* and potentially outcompeting other fungi.

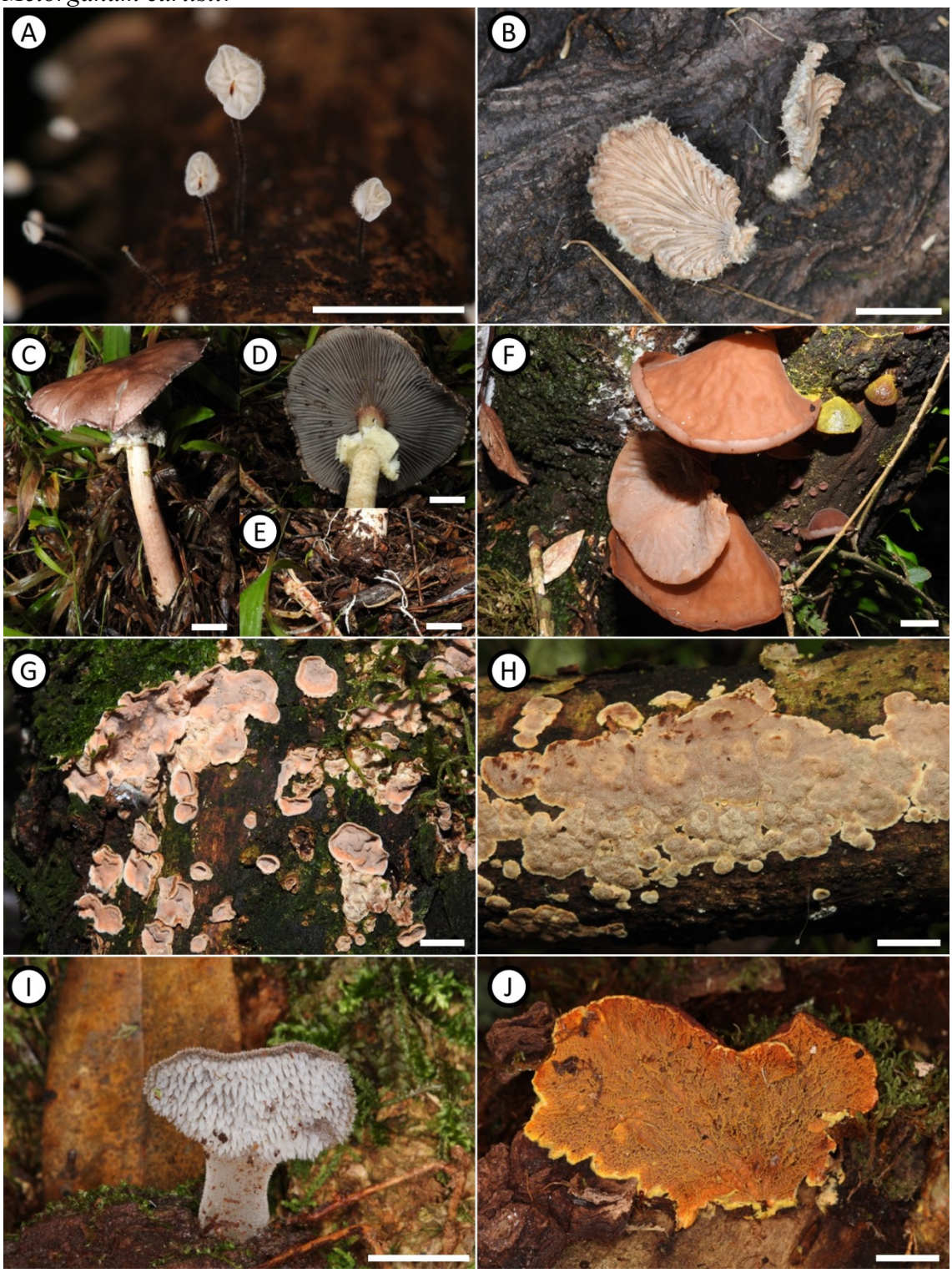
Corticiales K.H. Larss., in Hibbett et al., Mycol. Res. 111(5): 540 (2007)

***Vuilleminia* sp.** Maire, Bull. Soc. Mycol. Fr. 18(Suppl.): 81 (1902)

Description: *Basidiomata* resupinate, adnate, subceraceous, hymenophore smooth, white to whitish cream, margin irregular, thinning out.

Hyphal system monomitic, hyphae clamped; *Subiculum* very thin, hymenium indefinite, covered by long and abundantly branched dendrohyphidia, *Basidia* and *basidiospores*not seen.

Figure 12. A - *Rhizomarasmius amylosetae* nom. prov.; B - *Schizophyllum commune*; C, D, E – *Stropharia rugosoannulata*; F - *Auricularia fuscosuccinea*; G - *Eichleriella* cf. *alliciens*; H - *Heteroradulum brasiliense*; I - *Pseudohydnum gelatinosum*; J - *Meiorganum curtisii*.



Bars: A = 0.5 cm, B, C, D, E, F, G, H, I, J = 1 cm.. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton

Habitat: Dead branch of *Drymis angustifolia*, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1481.

Remarks: Our specimen did not have any spores or basidia, but the abundant dendrohyphidia, absence of a well organized hymenium and the thin subiculum are characteristic of the genus *Vuilleminia* (Gorjón 2020). Furthermore, in a Blast analysis of the ITS region, the closest match was an Uncultured air filter isolate sequence (GU053837.1) with 100% cover, 0.0 e-value and 96.58% identity, followed by several *Vuilleminia* spp. sequences with 98-100% cover, 0.0 e-value and 85-87% identity. This represents the first record of the genus in South America. More specimens are desired to further understand the morphological characters of this species.

Dacrymycetales Henn., in Engler & Prantl, Nat. Pflanzenfam., Teil. I (Leipzig) 1(1**): 96 (1897) [1900]

Calocera cornea (Batsch) Fr., Stirp. agri femsion. 5: 67 (1827) [1825-27] (Figure 13A)

Description: McNabb (1965a).

Distribution: Cosmopolitan (McNabb 1965a). First record from the Aparados da Serra region.

Habitat: Dead branches of *Araucaria* and angiosperms, causing a brown rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 1132; Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the “Novo Mundo” trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1433.

Calocera* cf. *viscosa (Pers.) Fr., Syst. mycol. (Lundae) 1: 486 (1821) (Figure 13B)

Description: McNabb (1965a).

Distribution: Recorded in all continents except Africa (GBIF 2022). In Brazil, known from Paraná (Herbarium record: LSU00173631, det. by Lowy). If confirmed, it would represent the first record from Santa Catarina and from the Aparados da Serra region.

Habitat: Dead, standing, trunks and stems of hardwoods, causing a brown rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 489; Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1500.

Remarks: *Calocera viscosa* was originally described from Europe, and is known mainly from the Northern Hemisphere, where it is associated with gymnosperms. *Calocera cornea* is a similar species, also described from Europe, but which grows more frequently on hardwoods (McNabb 1965). The two species' morphological characters are broadly overlapping, and they are mainly differentiated by the degree of ramification of the basidiomata. In that respect, our specimens agree with *C. viscosa*, despite growing on angiosperm wood. Further studies are needed to understand whether Brazilian specimens represent in fact *C. viscosa* or a different species.

Guepiniopsis buccina (Pers.) L.L. Kenn., Mycologia 50(6): 888 (1959) [1958] (Figure 13C)

Description: McNabb (1965b), Lowy (1971), Ellis et al. 1990.

Distribution: Widely distributed in the world (McNabb 1965b). In Brazil known from Paraná (Meijer 2006). First record fram Santa Catarina state and the Aparados da Serra region.

Habitat: Dead branches and trunks of dead and sometimes living angiosperms, causing a brown rot (although not obvious due to the initial decomposition stage).

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail", 10 January 2021, MIND.Funga 413; Bom Jardim da Serra, Parque Eólico Bom Jardim, woods behind Luar dos Cânions hotel, 31 October 2021, MIND.Funga 1347; *ibidem, idem*, MIND.Funga 1350; *ibidem, idem*, MIND.Funga 1364.

Hymenochaetales Oberw., in Frey, Hurka & Oberwinkler, Beitr. Biol. Pfl.: 89 (1977)

Coltricia stuckertiana (Speg.) Rajchenb. & J.E. Wright, Folia Cryptogamica Estonica 33: 119 (1998) (Figure 13D)

Description: Ryvarden (2004).

Distribution: Northern Argentina and Paraguay in the Chaco forests (Ryvarden 2004, Baltazar et al. 2010). In Brazil, recently reported in the Amazon (Silva 2021). First record from Santa Catarina state and from the Aparados da Serra region.

Habitat: Found on base of a dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1511.

Fomitiporella umbrinella (Bres.) Murrill, N. Amer.Fl. (New York) 9: 13. 1907 (Figure 13E)

Description: Salvador-Montoya et al. (2020).

Distribution: From Southern South America to Southern USA (Ryvarden 2004, Salvador-Montoya 2020).

Habitat: Dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga1431.

Fomitiporia apihayna (Speg.) Robledo, Decock & Rajchenb., Mycologia 102(6): 1315 (2010) (Figure 13F)

Description: Alves-Silva et al. (2020a).

Distribution: Previously tought to be widespread in the Neotropics, it has been shown that specimens identified as *F. apiahyna* represent many lineages, and that the species is probably restricted to montane and submontane environments of Southern and Southeastern Brazil (Alves-Silva et al. 2020a).

Habitat: On dead and living trunks of angiosperms, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 712; *ibidem*, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 902.

Fomitiporia bambusarum (Rick) Camp.-Sant. & Decock, in Campos-Santana, Robledo, Decock & Silveira, Cryptog. Mycol. 36(1): 48 (2015) (Figure 13G)

Description: Ryvarden [2004, as *Phellinus bambusarum* (Rick) Larsen], Alves-Silva et al. (2020b).

Distribution: Originally described from Southern Brazil, where it is also most abundant, also reported in the Brazilian Amazon, Northern Argentina and Colombia (Ryvarden 2004, Alves-Silva et al. 2020b, Calle et al. 2020a).

Habitat: Found growing on dead *Chusquea* sp. and *Merostachys* Spreng. bamboos, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail", 10 January 2021, MIND.Funga 462; ; *ibidem*, Parque Nacional de São Joaquim, Pedra Furada trail,11 January 2021 MIND.Funga 496; Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 714.

Fomitiporia impercepta Morera, Robledo & Urcelay, in Morera, Robledo, Ferreira-Lopes & Urcelay, Phytotaxa 321(3): 281 (2017) (Figure 13H)

Description: Morera et al. (2017).

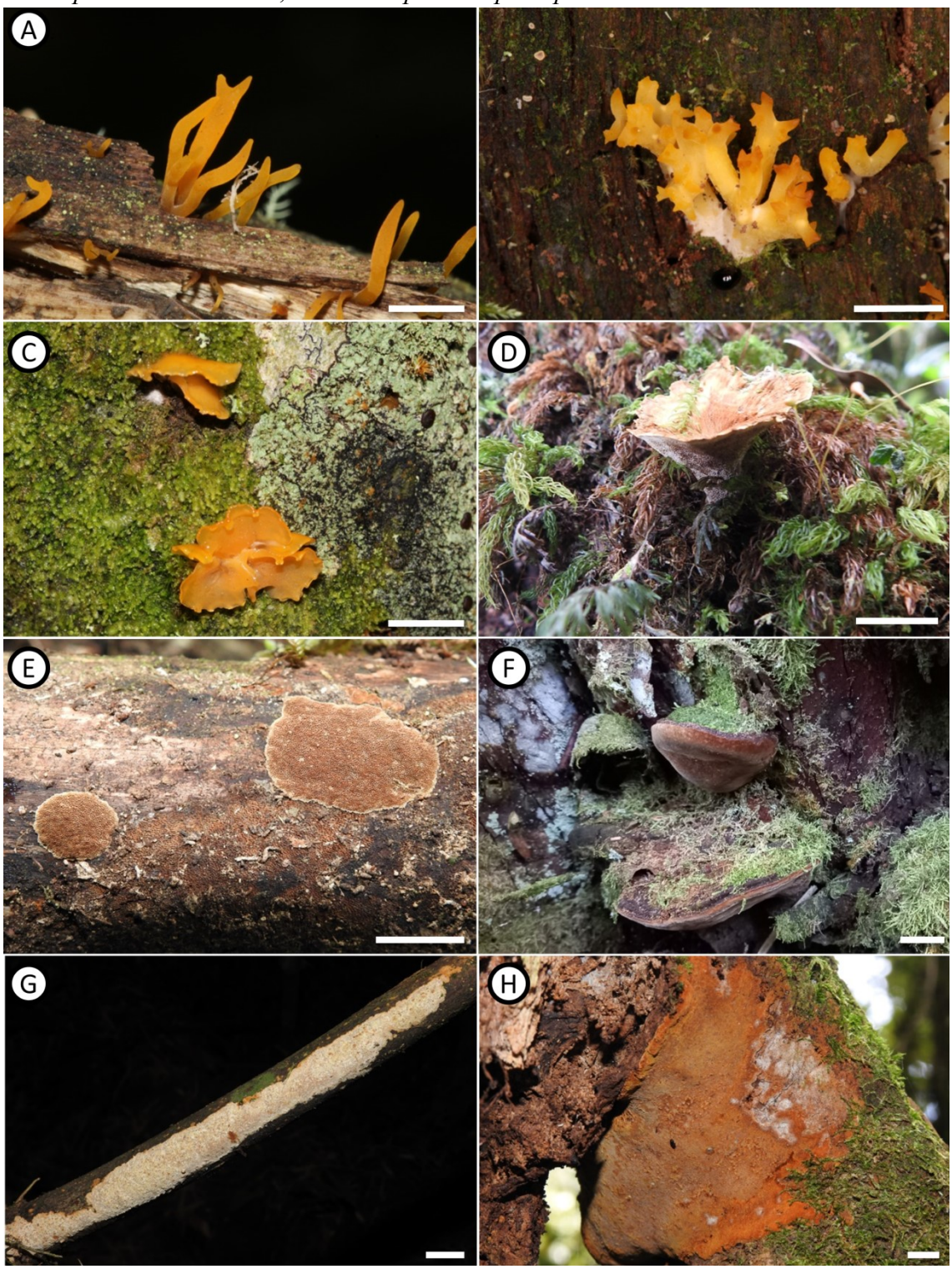
Distribution: Widespread in the Neotropics (Alves-Silva 2020).

Habitat: Fallen and standing dead trunks, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 725; *ibidem*, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 802; Santa Catarina, Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1456; *ibidem*, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1515.

Fomitiporia neotropica Camp.-Sant., Amalfi, R.M. Silveira, Robledo & Decock, in Campos Santana, Amalfi, Robledo, Borges da Silveira & Decock, Mycol. Progr. 13(3): 610 (2014)

Figure 13. A - *Calocera cornea*; B - *Calocera* cf. *viscosa*; C - *Guepiniopsis buccina*; D - *Coltricia stuckertiana*; E - *Fomitiporella umbrinella*; F - *Fomitiporia apihayna*; G - *Fomitiporia bambusarum*; H - *Fomitiporia impercepta*.



Bars: A = 0.5 cm, B, C, D, E, G, H = 1 cm, F = 2 cm.. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton/ Kelmer Martis da Cunha

Description: Santana et al. (2014).

Distribution: Neotropical (Alves-Silva 2020).

Habitat: Dead branches and trunks of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 339; Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 859.

Fomitiporia nubicola Alves-Silva, Bittencourt & Drechsler-Santos, in Alves-Silva, Reck, Silveira, Bittencourt, Robledo, Góes-Neto & Drechsler-Santos, Mycol. Progr. 19(8): 782 (2020) (Figure 14A)

Description: Alves-Silva et al. (2020).

Distribution: So far, known only from Santa Catarina state, almost exclusively from Parque Nacional de São Joaquim, the type locality, with only one record outside PNSJ (and the Aparados da Serra region).

Habitat: Growing on living and dead trunks of *Drymis angustifolia* Miers.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 1000.

Fuscoporia ferrea (Pers.) G. Cunn., Bull. N.Z. Dept. Sci. Industr. Res., Pl. Dis. Div. 73: 7 (1948) (Figure 14B)

Description: Ryvarden [2004, as *Phellinus ferreus* (Pers.) Bourd. et Galzin).

Distribution: Cosmopolitan (Ryvarden 2004).

Habitat: On a dead, standing, small stem of a hardwood tree, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1501.

Fuscoporia* aff. *septiseta Y.C. Dai, Q. Chen & J. Vlasák, in Chen, Wu, Ji, Si, Zhou, Tian, Vlasák & Dai, Mycologia 111(3): 438 (2019) (Figure 14C)

Description: Chen et al. (2019).

Habitat: On dead stems of the liana *Pentacalea desiderabilis* (Velloso) Cuatrec., causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1475; *ibidem, idem*, MIND.Funga 1484.

Remarks: Our specimens differ from *Fu. septisetae,* a North-American species growing on temperate deciduous trees, by having larger pores (1–2/mm vs 2–3/mm in *Fu. septisetae*), and by the absence of septate setae (Chen et al. 2019).

Fuscoporia wahlbergii (Fr.) T. Wagner & M. Fisch., Mycol. Res. 105(7): 780 (2001) (Figure 14D)

Description: Ryvarden (2004).

Distribution: Pantropical (Ryvarden 2004).

Habitat: Dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 833.

Hymenochaete* cf. *cruenta (Pers.) Donk, Persoonia 1(1): 51 (1959) (Figure14E)

Description: Parmasto (2001).

Distribution: Widely distributed through Europe, Temperate and Southeast Asia, and Southern Argentina in South America (Parmasto 2001). If confirmed, it would represent the first record of the species from Brazil.

Habitat: On a fallen branch of angiosperm, causing a white pocket rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 806.

Remarks: This species is widely distributed mainly in temperate zones of Eurasia, where it is associated with coniferous trees. The only other South American record of the species was also growing in an angiosperm wood (Parmasto 2001). Further studies

should be conducted to elucidate if those specimens are indeed *H. cruenta* or a different species.

Sidera araucariae **nom. prov.** Kossmann, G.M. Muell. & Drechsler-Santos (Figure 14F)

Etimology: *araucariae* – reffering to *Araucaria angustifolia*, the tree species in which the species is found growing.

Description: Basidiomata annual, resupinate, growing in patches up to 40 cm long and 10 cm wide, up to 1 mm thick, soft and light. *Pore surface* white to cream with age, drying cream to straw, bruising greyish fulvous to pale brown, *pores* round to more commonly angular, often split, regular to irregular at parts, (7–) 8–10/mm, dissepiments thin, entire. *Tubes* concolorous with pore surface, up to 0.8 mm thick. *Context* almost invisible to the naked eye, up to 100 µm thick, concolorous with the tubes. *Sterile margin* mostly absent, when present thinning out, cottony, whitish, up to 0.5 mm wide.

Hyphal system dimitic; *generative hyphae* hyaline, clamped; *skeletal hyphae* dominating, up to 2.5 µm wide, unchanged in KOH. *Cystidia* absent; *cystidioles* hyaline, thin-walled, fusoid to lageniform, sometimes with a slight apical incrustation; *crystal rosettes* abundant, 2 – 8 µm wide, often attached to richly branched generative hyphae, especially at older tubes. *Basidia* 4-sterigmate, small, not measured. *Basidiospores* hyaline, thin-walled, (2.8–) 3.1–3.8 × 1.1–1.5, allantoid, (Q = 2.0–3.3, Qmed = 2.7), IKI-.

Habitat: On fallen branches of *Araucaria angustifolia*, wood presenting both white and brown rot at moderately advanced stages of decomposition.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 754; *ibidem, idem*, MIND.Funga 810; Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1099; Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1357; *ibidem, idem*, MIND.Funga 1358.

Remarks: The resupinate basidiomata with small pores, the dimitic hyphal system, the presence of abundant crystal rosettes, and the small, allantoid basidiospores characterize

the genus *Sidera* Miettinen & K.H. Larss. Li et al. (2021) provides a worldwide synthesis of the genus, complemented by Liu et al. (2022), and none of the known species shares the character combination found in our specimens. Currently, three species of *Sidera* are known from the Neotropics: *Sidera lenis* (P. Karst.) Miettinen, *Sidera lowei* (Rajchenb.) Miettinen, and *Sidera vulgaris* (Fr.) Miettinen (Rajchenberg 1987, Ryvarden 2016, Pires et al. 2017). Bittencourt (2019) cites another unidentified species in the genus (collections E.R. Drechsler-Santos 628 and E.R. Drechsler-Santos 649), also in the Aparados da Serra Region, but which differs by having smaller pores (10–13/mm) and slightly longer spores (3.5–4.2 µm long).

Sidera lenis presents perennial basidiomata, larger pores (4–6/mm), swollen hyphae in KOH and larger spores (3.9–4.9 × 1.5–2.0). *S. lowei* presents larger pores (6–8/mm), a monomitic hyphal system, branched cystidioles, and longer spores (3.5 – 5.0 µm long). *S. vulgaris* presents perennial basidiomata, larger pores (6–8/mm), and branched cystidioles. Additionaly, all our specimens have been found growing in *Araucaria angustifolia* fallen branches, in different times and localities, suggesting a host-specificity relationship.

In a Blast analysis of the LSU region, the closest match was a *S. tibetica* Z.B. Liu, Jian Yu & F. Wu sequence (MW192009.1), with a 98% cover, 0.0 e-value, and 99.1% identity. This species differs by presenting smaller basidiomata (up to 10 cm) and smaller spores (2.8–3.3 × 1–1.2 µm), and by being so far known only from Tibet (Liu et al. 2022).

Trichaptum* aff. *sector (Ehrenb.) Kreisel, Monografias, Ciencias, Univ. Habana, Ser. 4 16: 84 (1971) (Figure 14G)

Description: Ryvarden (2016).

Habitat: Dead trunks of angiosperms, causing a white-pocket rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, “Side trail”, 10 January 2021, MIND.Funga 443; Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, “Faxinalzinho Trail”, 25 May 2021, MIND.Funga 688; *ibidem, idem*, MIND.Funga 720; *ibidem, idem*, MIND.Funga 723;

ibidem, Fortaleza Canyon Upper Trail, 27 May 2021, MIND.Funga 874; *ibidem, idem*, MIND.Funga 889.

Remarks: Our specimens differ from *T. sector* by having smaller spores (4.0–5.8 × 2.1–2.8 versus 6–7 × 2–2.5) (Ryvarden 2016), and by having two kinds of cystidia: the typical ventricose, apically encrusted cystidia, and bulbous to clavate skeletocystidia, not projecting, similar to those found in *T. griseofuscum* (Mont.) Ryvarden & Iturr and *T. fissile* Kossmann & Drechsler-Santos, while *T. sector* presents no skeletocystidia (Kossmann et al. 2021b). *Trichaptum sector* has been shown to be a species complex (Vlasák and Vlasák 2017, Kossmann et al. 2021b), and further taxonomic studies, including sequences from the type locality (Santa Catarina Island, Brazil) are needed to elucidate this species position.

The skeletocystidia presented in our specimens is also presented in the illustrations in Silveira and Guerrero (1991), from specimens collected at Parque Nacional dos Aparados da Serra, so it is reasonable to assume that their species represent the same as ours.

Phallales E. Fisch., in Engler & Prantl, Nat. Pflanzenfam., Teil. I (Leipzig) 1(1**): 276 (1898) [1900]

Aseroë rubra Labill., Bull. Murith. Soc. Valais. Sci. Nat. 1: 145 (1800) (Figure 14H)

Description: Dring (1980).

Distribution: Apparently Pantropical, but more common in subtropical zones (Dring 1980). First record from the Aparados da Serra region.

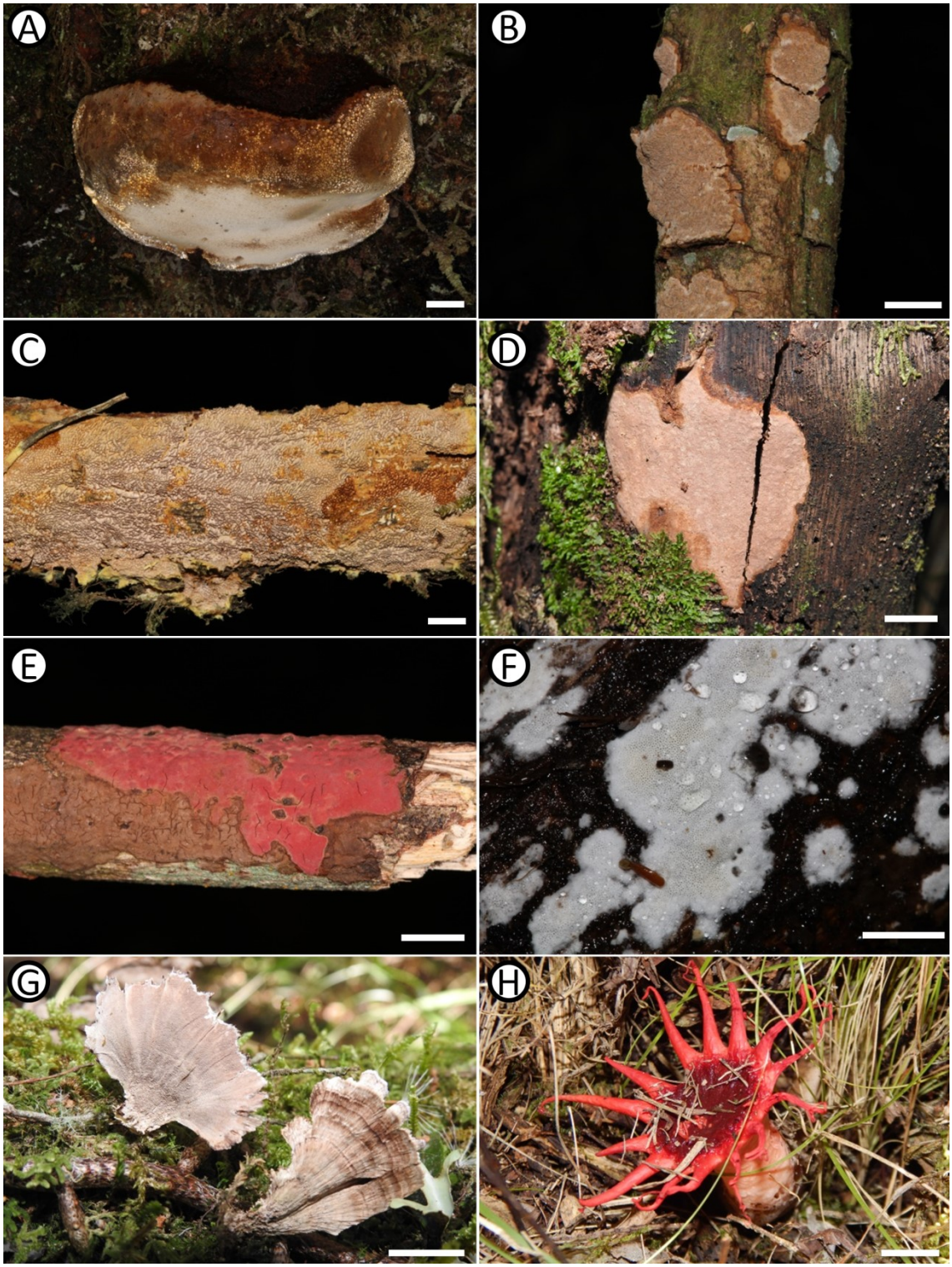
Habitat: On forest soil.

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 709; Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN1500, 28 January 2019, Kossamnn, T. 344.

Polyporales Gäum., Vergl. Morph. Pilze (Jena): 503 (1926)

Abundisporus roseoalbus (Jungh.) Ryvarden, Belg. Jl Bot. 131(2): 154 (1999) [1998] (Figure 15A, B)

Figure 14. A - *Fomitiporia nubicola*; B - *Fuscoporia ferrea*; C - *Fuscoporia* aff. *septiseta*; D - *Fuscoporia wahlbergii*; E - *Hymenochaete* cf. *cruenta;* F - *Sidera araucariae* nom. prov.; G - *Trichaptum* aff. *sector*; H - *Aseroë rubra*.



Bars: 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

Description: Zhao et al. (2015).

Distribution: Pantropical (GBIF 2022). First record from Rio Grande do Sul and from the Aparados da Serra region.

Habitat: Dead branches, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 784, *ibidem, idem*, MIND.Funga 819.

Amauroderma schomburgkii (Mont. & Berk.) Torrend, Brotéria, sér. bot. 18(no. 2): 140 (1920) (Figure 15C, D)

Description: Ryvarden (2004).

Distribution: Known from the Neotropics from Southern Brazil to the Caribbean (Ryvarden 2004, Costa-Rezende 2014).

Habitat: Root parasite found on the ground, hosts unknown.

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 674; Santa Catarina, Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1495.

Antrodia neotropica Kaipper-Fig., Robledo & Drechsler-Santos, in Kaipper-Figueiró, Robledo, Reck, Góes-Neto & Drechsler-Santos, Nova Hedwigia 103(1-2): 131 (2016) (Figure 15E)

Description: Kaipper-Figueiró et al (2016).

Distribution: So far, known only from the Aparados da Serra region in Southern Brazil (Kaipper-Figueiró 2016).

Habitat: Trunks and branches of dead *Baccharis uncinella* shrubs and one specimen growing on an unidentified angiosperm inside the forest.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim - Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 499; Bom Jardim

da Serra, forest near the cliff past the “Trilha do Mundo Novo”, 24 November 2021, MIND.Funga 1442; Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, “Faxinalzinho Trail”, 25 May 2021, MIND.Funga 734.

Antrodiella trivialis Westph., Rajchenb. & Tomšovský, in Westphalen, Tomšovský, Gugliotta & Rajchenberg, Mycologia 111(5): 820 (2019) (Figure 15F)

Description: Westphalen et al. (2019).

Distribution: Known from Southeastern and Southern Brazil, in Rio Grande do Sul, Santa Catarina and São Paulo (Westphalen et al. 2019). First record from the Aparados da Serra region.

Habitat: Dead logs of angiosperms, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 782; *ibidem,* Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 834; *ibidem, idem*, MIND.Funga 877; *ibidem, idem*, MIND.Funga 880.

Aurantiopileus mayaensis Ginns, D.L. Lindner & T.J. Baroni [as 'mayanensis'], N. Amer. Fung. 5(4): 4 (2010) (Figure 15G)

Description: Ginns et al. (2010), Ryvarden (2015).

Distribution: Known from the type locality in Belize (Ryvarden 2016), Costa Rica, and montane environments of Southern and Southeastern Brazil (800 + m.a.s.l.) (Bittencourt 2018,GBIF 2022).

Habitat: Dead trunks, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici,, Parque Nacional de São Joaquim, 30 January 2019, Kossmann, T. 353; *ibidem*, RPPN Portal das Nascentes, 08 January 2021, MIND.Funga 301.

Byssomerulius incarnatus (Schwein.) Gilb., Fungi dec. Pond. Pine: 45 (1974) (Figure 15H)

Description: Ryvarden [2010, as *Phlebia incarnata* (Schw.) Nakasone], Westphalen et al. (2011, as *Ph. incarnata*).

Distribution: Known from the USA, Mexico, Costa Rica and Southern Brazil (Ryvarden 2010, Westphalen et al. 2011, Drechsler-Santos et al. 2014). In Brazil, it is so far known exclusively from the Aparados da Serra region.

Habitat: On dead trunks and branches of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 972; *ibidem*, Trail near the cemetery, 24 June 2021, MIND.Funga 1124.

Cerioporus scutellatus (Schwein.) Zmitr., Folia Cryptogamica Petropolitana (Sankt-Peterburg) 6: 47 (2018) (Figure 15I)

Descritpion: Ryvarden [2015, as *Datronia scutellata* (Schw.) Gilbn. & Ryvarden].

Distribution: Cosmopolitan (Ryvarden 2015).

Habitat: Dead branches and thin stems of hardwoods, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Parque Nacional de São Joaquim, TNR1300, 25 January 2019, Kossmann, T. 328; Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1462; *ibidem, idem*, MIND.Funga 1472.

Ceriporia straminea Ryvarden, Syn. Fung. (Oslo) 32: 58 (2014) (Figure 15J)

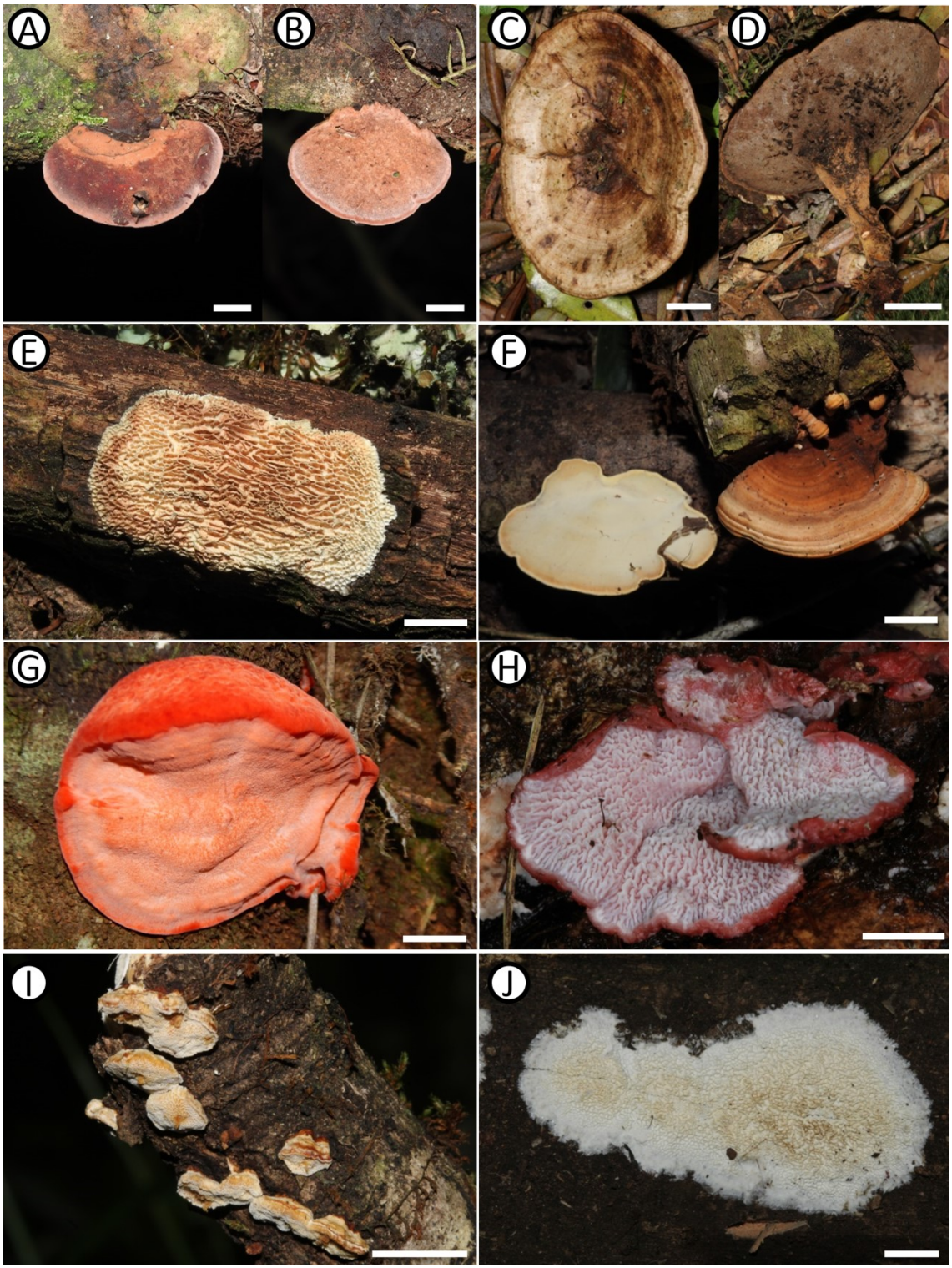
Description: Ryvarden (2014).

Distribution: Originally described from the Bolivian Yungas (1800-200 m.a.s.l.) (Ryvarden 2014). There is one herbarium record (O307192), identified by Ryvarden, from Costa Rica at ca. 1550 m.a.s.l. (GBIF 2022). This is the first records of the species from Brazil. According to the current records, this species seems restricted to montane environments from the Neotropics.

Habitat: On dead trunks and branches of angiosperms, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 825; Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 1011; Bom Jardim da Serra, forest near the cliff past the “Trilha do Mundo Novo”, 24 November 2021, MIND.Funga 1420.

Figure 15. A, B - *Abundisporus roseoalbus*; C, D - *Amauroderma schomburgkii*; E - *Antrodia neotropica*; F - *Antrodiella trivialis*; G - *Aurantiopileus mayaensis*; H - *Byssomerulius incarnatus*; I - *Cerioporus scutellatus*; J - *Ceriporia straminea*.



Bars: 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

Echinoporia aculeifera (Berk. & M.A. Curtis) Ryvarden, Mycotaxon 20(2): 330 (1984) (Figure 16A)

Description: Ryvarden (2015).

Distribution: Known from the Neotropics and Florida in the USA (Ryvarden 2015). First record from Santa Catarina state.

Habitat: Trunks and branches of dead angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail", 10 January 2021, MIND.Funga 417; Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Fortaleza Canyon Upper Trail, 27 May 2021, MIND.Funga 896.

Epithele* aff. *bambusae (Burt) Nakasone, Sydowia 65(1): 64 (2013) (Figure 16B)

Description: Nakasone (2013).

Habitat: Growing on culms of *Chusquea* sp. bamboos, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1391.

Remarks: This species is morphologically very similar to *E. bambusae*, sharing the same hyphal system, large basidia with oily contents, slighlty branched dendrohyphidia, and the smooth fusiform to biapiculate spores with thick walls, and was also found growing on bamboos (Nakasone 2013). However, it has significantly larger spores than *E. bambusae* (23.0-28.2 x 8.5-12.0 µm versus (14–) 16–20(–23) × (8–) 9–10.5 µm), and, in fresh specimens, has aculei that could be interpreted as hyphal pegs, which disappear upon drying. It is not clear if *E. bambusae* also has hyphal pegs that disappear upon drying.

Epithele. bambusina Rick is another species that grows in bamboos found in southern Brazil. This species, however, has smaller and ornamented spores, and has hyphal pegs that remain upon drying. (Baltazar et al. 2016).

Flaviporus tenuis Westphalen, Rajchenberg & Tomšovský, in Westphalen, Rajchenberg, Tomšovský & Gugliotta, Persoonia 41: 136 (2018) (Figure 16C)

Description: Westphalen et al. 2012, Ryvarden (2015, as *Junghuhnia minuta* 1. Lindblad &Ryvarden).

Distribution: Costa Rica (type locality), Puerto Rico, Ecuador, and Southern Brazil, where it is mostly found in montane ecosystems (Westphalen et al. 2012, Ryvarden 2015, Westphalen et al. 2018). First record from the Aparados da Serra region.

Habitat: Found on dead, standing, angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Fortaleza Canyon Upper Trail, 27 May 2021, MIND.Funga 867.

Flaviporus venustus A. David & Rajchenb., Mycotaxon 22(2): 295 (1985)

Description: David and Rajchenberg (1985), Ryvarden [2016, as *Tyromyces venustus* (David. & Rajchenb.) Ryvarden]. (Figure 16D)

Distribution: Known from Martinique, Colombia, Dominican Republic, and Brazil (Ryvarden 2016, Westphalen 2016). In Brazil, known from São Paulo and Rio Grande do Sul. First record from Santa Catarina State.

Habitat: On dead trunks, both fallen and standing, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail", 10 January 2021, MIND.Funga 468; Bom Jardim da Serra, Parque Eólico Bom Jardim, woods behind Luar dos Cânions hotel, 31 October 2021, MIND.Funga 1362, *ibidem*, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1502.

Fomitella supina (Sw.) Murrill, Bull. Torrey bot. Club 32(7): 365 (1905) (Figure 16E)

Description: Ryvarden (2015).

Distribution: Known from the Neotropics and Southeastern USA (Ryvarden 2015). First record from the Aparados da Serra region.

Habitat: Dead trunks of angiosperms, causing a white rot.

Material examined: : BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 774; *ibidem*, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 857.

Funalia floccosa (Jungh.) Zmitr. & Malysheva, Mikol. Fitopatol. 47(6): 375 (2013) (Figure 16F)

Description: Reck [2013, as *Funalia rigida* (Berk. and Mont.) Peck].

Distribution: Pantropical and Eastern USA (GBIF 2022).

Habitat: Dead trunk, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 792.

Ganoderma australe (Fr.) Pat., Bull. Soc. mycol. Fr. 5(2,3): 65 (1889) (Figure 16G)

Description: Ryvarden (2004).

Distribution: Cosmopolitan (GBIF 2022).

Habitat: Trunks and branches of various hardwoods, causing a white rot.

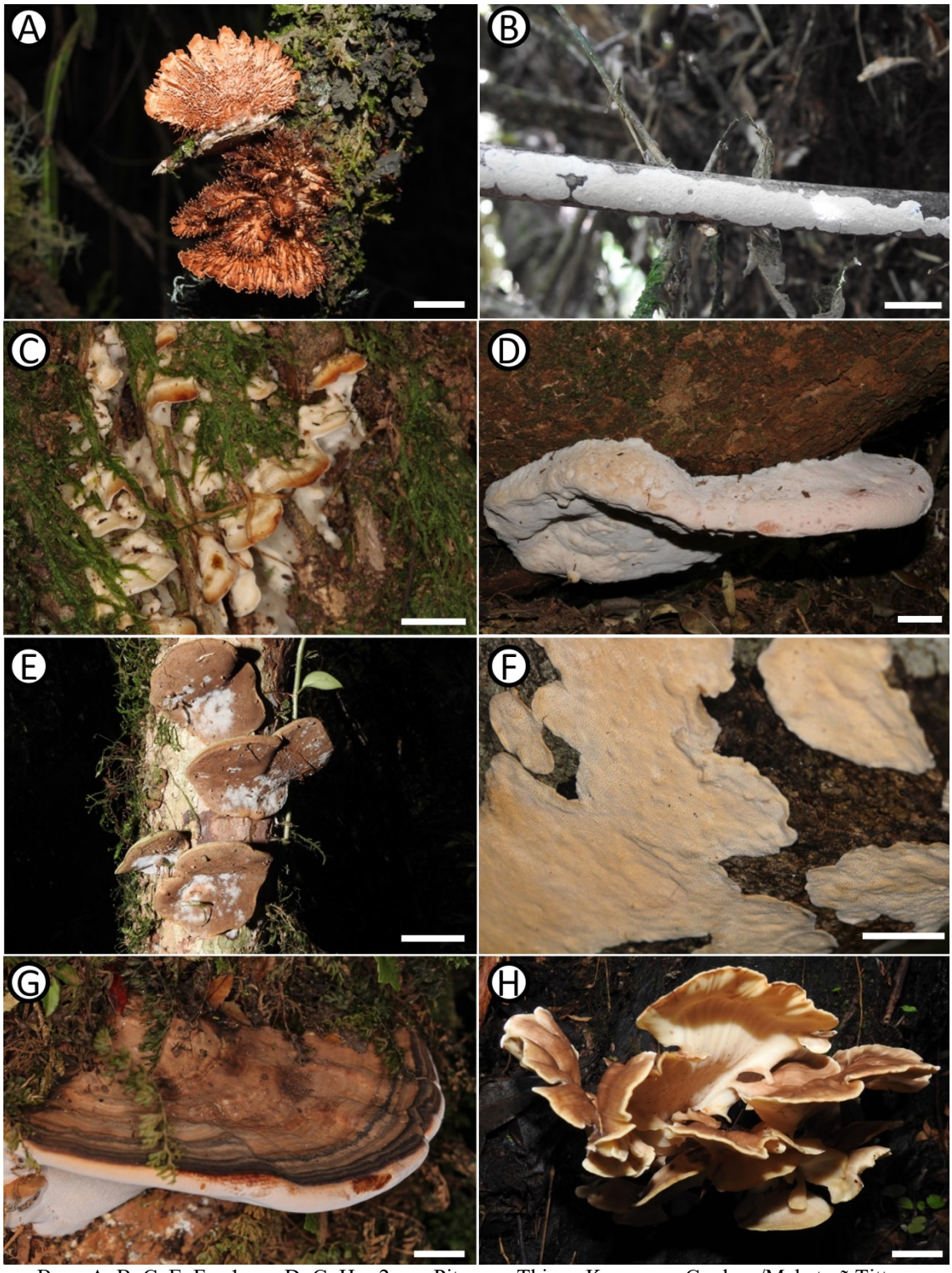
Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side Trail", 10 January 2021, MIND.Funga 422; *ibidem*, *idem,* MIND.Funga 447; *ibidem*, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 983; *ibidem,* Trail near the cemetery, 24 June 2021, MIND.Funga 1106; Bom Jardim da Serra, forest near the cliff past the "Trilha do Mundo Novo", 24 November 2021, MIND.Funga 1444; Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 715; *ibidem, idem*, MIND.Funga 717.

Henningsia brasiliensis (Speg.) Speg., Boln Acad. nac. Cienc. Córdoba 23(3-4): 411 (1918) (Figure 16H)

Description: Ryvarden (2015).

Distribution: Neotropical (Ryvarden 2015). First record from the Aparados da Serra Region.

Figure 16. A - *Echinoporia aculeifera*; B - *Epithele* aff. *bambusae*; C - *Flaviporus tenuis*; D - *Flaviporus venustus*; E - *Fomitella supine*; F - *Funalia floccosa*; G - *Ganoderma australe; H - Henningsia brasiliensis*.



Bars: A, B, C, E, F = 1 cm, D, G, H = 2 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton, Kelmer Martins da Cunha.

Habitat: Very humid branches and logs, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail",09 January 2021, MIND.Funga 341.

Irpex lacteus (Fr.) Fr., Elench. fung. (Greifswald) 1: 142 (1828) (Figure 17A)

Description: Ryvarden (2015).

Distribution: Cosmopolitan (Ryvarden 2015).

Habitat: Usually found in burnt *Baccharis uncinella* bushes, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 1013; *ibidem, idem*, MIND.Funga1014.

Lentinus crinitus (L.) Fr., Syst. orb. veg. (Lundae) 1: 77 (1825) (Figure 17B)

Description: Pegler (1983).

Distribution: Known from the Eastern USA to Argentina (Pegler 1983, Ryvarden 2015). GBIF (2022) presents records in Africa, Southeast Asia and Oceania as well, but these may be misidentifications [see Pegler (1983) for comments about commonly confused species].

Habitat: Dead wood (mainly thick branches, logs and trunks) on the ground, usually in places exposed to sunlight, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1432; *ibidem*, Woods down the Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1488.

Meruliopsis cystidiata (Ryvarden) P.E. Jung & Y.W. Lim, in Jung, Lee, Wu, Hattori, Tomšovský, Rajchenberg, Zhou & Lim, Mycol. Progr. 17(7): 861 (2017) (Figure 17C)

Description: Coelho et al. (2006, as *Gloeoporus guerreroanus* G. Coelho, R.M. Silveira & Rajchenb.), Ryvarden (1987 as *G. cystidiatus* Ryvarden), Ryvarden (2015, as *G. cystidiatus* and *G. guerreroanus*).

Distribution: So far known only from Brazil in the Amazon (Ryvarden 1987), and in the Southern Atlantic Forest in Rio Grande do Sul and Santa Catarina (Coelho et al. 2006, Calle et al. 2020b).

Habitat: Found on culms of dead *Chusquea* sp. bamboos, causing a white rot.

*Material examined:*BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, trail behind the park lodge, 29 January 2019, Kossmann, T. 349.

Microporellus brasiliensis Ryvarden & Decock, in Decock & Ryvarden, Czech Mycol. 54(1-2): 23 (2002) (Figure 17D, E)

Description: Decock and Ryvarden (2002).

Distribution: So far known only from Southern Brazil in Paraná (type locality) and Rio Grande do Sul (Decock and Ryvarden 2002, Meijer 2006, Westphalen et al. 2013). All known records from elevations of 900 m.a.s.l. and above. First record from the Aparados da Serra region.

Habitat: Found on soil near angiosperm trees, decomposing roots, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Faxinalzinho trail, 25 May 2021, MIND.Funga 686.

Pachykytospora papyracea (Cooke) Ryvarden, Norw. Jl Bot. 19: 233 (1972) (Figure 17F)

Description: Ryvarden (2016).

Distribution: Known from Southern United States to Argentina, also recorded from Africa (Ryvarden 2016).

Habitat: Dead branches of hardwoods, usually suspended, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, Trail behind the quarter past the river, 29 November 2018, Kossmann, T. 289; Bom Jardim da Serra, Parque Eólico Bom Jardim, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1485; Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, “Itaimbézinho Trail”, 26 May 2021, MIND.Funga 744; *ibidem, idem*, MIND.Funga 814.

Panus velutinus (Fr.) Sacc., Syll. fung. (Abellini) 5: 618 (1887) (Figure 17G)

Description: Pegler (1983), Guimarães (2018).

Distribution: Pantropical (Pegler 1983). First record from the Aparados da Serra region.

Habitat: Heavily decayed wood on the ground, usually buried, with only the pseudosclerotium remaining, causing a white rot.

Material examined: : BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1052; *ibidem, idem*, MIND.Funga 1054.

Phanerochaete sp. P. Karst., *Bidr. Känn. Finl. Nat. Folk* 48: 426 (1889) (Figure 17H)

Description: *Basidiomata* resupinate, closely attached, up to 0.5 mm thick. *Hymenial surface* smooth, white, at parts cracking upon drying. *Context* cream, homogenous. *Margin* indistinct.

Hyphal system monomitic; hyphae simple-septate; *subiculum* loose, with hyaline hyphae, mostly thick-walled, arranged horizontally; *context* compact, hyphae difficult to discern, mostly vertically arranged; *subhymenium* composed mostly of short-celled, thin-walled hyphae, vertically arranged. *Cystidia* thick-walled, hyaline, heavily encrusted metuloids present in the hymenium, not to slightly projecting, also in the subhymenium and context. *Basidia* clavate to capitate, 4-sterigmate; *Basidiospores* not seen.

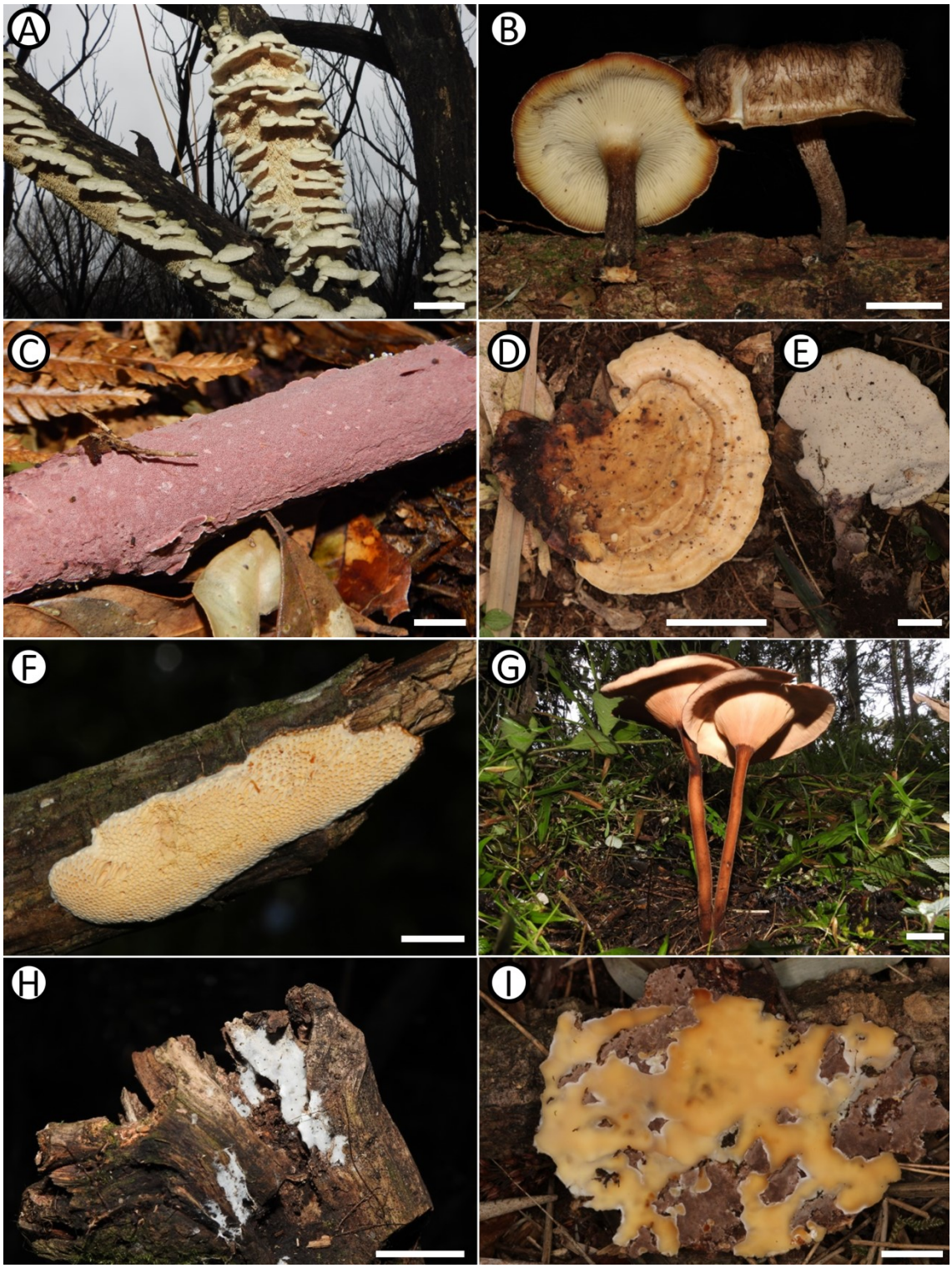
Habitat: Dead branch on the ground, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 835.

Remarks: The combination of resupinate basidiomata with a smooth hymenial surface, monomitic hyphal system with simple-septate hyphae, loose subiculum with thick-walled hyphae, and metuloids, characterize this species as belonging to *Phanerochaete* (Gorjon 2020, Chen et al. 2021). However, since we could not find any spores, the identity of the material cannot be determined.

***Physisporinus* sp.** P. Karst., Bidr. Känn. Finl. Nat. Folk 48: 324 (1889) (Figure 17I)

Figure 17. A - *Irpex lacteus*; B - *Lentinus crinitus*; C - *Meruliopsis cystidiata*; D, E - *Microporellus brasiliensis*; F - *Pachykytospora papyracea*; G - *Panus velutinus*; H - *Phanerochaete sp.*; I - *Physisporinus* sp.



Bars: A, B, G = 2 cm, C D, E, F, H, I = 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

Description: Basidiomata resupinate, growing in irregular patches up to ca. 15 cm wide and long. *Hymenial* surface cream to pale luteous, brusing dark reddish-orange to brown, drying darker. *Pores* initially round and with thick dissepiments, then angular, tipically with 5 angles and with thin dissepiments, (3)4–5/mm. *Tubes* concolorous with pore-surface, up to 0.5mm deep. *Context* soft, cottony, azonate, cream to yellowish-cream, up to 2mm thick. *Margin* cottony, white, drying cream.

Hyphal system monomitic; *hyphae* simple-septate, hyaline, thin to thick-walled, in the trama compact and difficult to discern, in the context loose, wider and with thicker-walls. *Cystidia* thin-walled, hyaline, clavate to fusoid, abundant. *Basidia* not observed. *Basidiospores* thin-walled, hyaline, smooth, subglobose to broadly-ellipsoid, 3.5-5.5 x 3.0-5.0 (n<10), IKI-.

Habitat: Dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Faxinalzinho trail, 25 May 2021, MIND.Funga 689.

Remarks: The monomitic hyphal system with simple-septate hyphae and the small, subglobose and inamyloid basidiospores are characteristic of the genera *Physisporinus*, *Rigidoporus* Murrill and *Oxyporus* (Bourdot & Galzin) Donk (Ryvarden 2016). Ryvarden (2016) gives a strong emphasis in the cystidia presence, shape and origin to differentiate the genera, but recent multiloci phylogenies (Wu et al. 2017) have shown several species treated in these genera nesting in each other.

In a Blast analysis of the LSU region, the best match to our specimen was an unidentified “Polyporales sp.” sequence (AB470242.1), with 100% cover, 0.0 e-value and 99.05% identity, followed by a *P. sanguinolentus* (Alb. & Schwein.) Pilát sequence (JX109843.1) and a *P. vitreus* (Pers.) P. Karst. sequence (JQ031129.1), both with 100% cover, 0.0 e-value, and 98.96% and 98.88% respectively.

Physisporinus sanguinolentus differs from our specimen by presenting a whitish por surface, smaller pores (8–10/mm), and larger basidiospores (6.0–7.0 × 5.0–6.0 µm) (Ryvarden 2016). *P. vitreus* differs by having a white to bluish-white pore surface, larger basidiospores (5.0–6.0 × 4.0–5.0 µm), and by the distinct white pocket-rot (Nuñez and Ryvarden 2001).

In the genus *Rigidoporus*, the species is comparable with *Rigidoporus crocatus* (Pat.) Ryvarden and *R. undatus* (Pers.:Fr.) Donk. With the first, it shares the resupinate basidiomata, similarly sized and shaped basidiospores and only slightly smaller pores (5–7/mm), but *R. crocatus* differs by having a flesh colored to pinkish pore surface (Ryvarden 2016). With the latter, it shares the resupinate basidiomata, and the cream colored pore surface, but *R. crocatus* differs by having smaller pores (7–9/mm), larger globose spores (5.5–6.0 µm) and encrusted cystidia (Ryvarden 2016).

More specimens are desired to fully assess this species morphology, and phylogenetic studies should be carried out to understand its relationships and taxonomic position.

Phlebia* aff. *subochracea (Bres.) J. Erikss. & Ryvarden, Cortic. N. Eur., 4 (Oslo): 873 (1976) (Figure 18A)

Description: Eriksson et al. (1981).

Habitat: Dead branches of angiosperms, causing a white-rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail", 10 January 2021, MIND.Funga 412; *ibidem*, Parque Nacional de São Joaquim, Pedra Furada trail,11 January 2021 MIND.Funga 492; Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1506.

Remarks: Our specimens are morphologically very similar to *Ph. subochracea*, a species originally described from the Temperate Northern Hemisphere (Eriksson et al. 1981). However, our specimens differ by having smaller spores (4.0–5.2 × 2.2–2.9 µm versus 6.0–8.0 × 2.5–3.5 µm).

Phlebiopsis* cf. *crassa (Lév.) Floudas & Hibbett, Fungal Biology 119(7): 710 (2015) (Figure 18B)

Description: Hjortstam and Ryvarden [1990, as *Porostereum crissum* (Lév.) Hjortstam Ryvarden].

Distribution: Pantropical, originally described from Vietnam (Hjortstam and Ryvarden 1990, Hjortstam and Ryvarden 2007a). If confirmed, it will be the first record from the Aparados da Serra region.

Habitat: On dead branches and logs, one specimen collected on a living *Araucaria angustifolia* trunk, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1080; Bom Jardim da Serra, Bom Jardim Wind Farm, Woods behind the Luar dos Cânions hotel, 31 October 2021, MIND.Funga 1338.

Remarks: Phl. crassa has been shown to be a species complex (Zhao et al. 2021), with at least three distinct clades, two from Asia and one from the USA. However, no treatment has been given so far, and no sequences from Brazilian specimens are available, but it is likely that Brazilian specimens represent a different species from Asian ones, where the type specimen is from.

Podoscypha* cf. *cristata (Berk. & M.A. Curtis) D.A. Reid, Beih. Nova Hedwigia 18: 174 (1965) (Figure 18C)

Description: Reid (1965).

Distribution: Known from South Carolina in the USA (type locality), Venezuela, and Brazil, in São Paulo and Rio Grande do Sul states (Reid 1965). If confirmed, this would be the first record of the species from Santa Catarina State and from the Aparados da Serra region.

Habitat: Dead branches of angiosperms, causing a white rot.

Material examined: : BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021,MIND.Funga 369; *ibidem, idem*, MIND.Funga 371.

Remarks: Our specimens differ from *Po. cristata* by having wider spores (up to 3µm versus up to 2µm), but agree in all other aspects. *Po. ursina* Boidin & Berthet is a species similar to *Po. ursina* which presents similar spores to our specimens, but it differs by having a much more strigose upper surface, and by being so far known only from Africa (Reid 1965).

Postia* cf. *caesioflava (Pat.) V. Papp, Mycotaxon 129(2): 411 (2015) (Figure 18D, E)

Description: Ryvarden [2016, as *Tyromyces caesioflavus* (Pat.) Ryvarden]

Distribution: Originally described from Ecuador (Ryvarden 2016). There are herbarium records on GBIF (2022) for Brazil (Santa Catarina), Costa Rica, Guyana, USA, and Venezuela.

Habitat: On decorticated fallen logs, causing a moderate brown rot.

Material examined: *:* BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 752; *idem, ibidem,* MIND.Funga 796; *idem, ibidem*, MIND.Funga 807.

Remarks: Our materials differ from descriptions of *Ps. caesioflava* by having larger pores (6-7/mm versus 7-9/mm), and thicker basidiomata (up to 35 mm versus up to 10 mm).Bittencourt (2019) cites the occurrence of another *Postia* s.l. species in the Cloud Forests of Santa Catarina, which I have also collected before, but this species differs by having a pubescent upper surface and blueing basidiomata.

Polyporus* aff. *ciliatus Fr., Observ. mycol. (Havniae) 1: 123 (1815) (Figure 18F)

Description: Núñez and Ryvarden (1995), Ryvarden (2016).

Habitat: Dead branches on the ground, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, forest near the cliff past the "Trilha do Mundo Novo", 24 November 2021, MIND.Funga 1458.

Remarks: Our specimen differs from *Pl. ciliatus* by presenting a glabrous pilear margin, thinner basidiomata, smaller pores (6–9/mm versus 5–7/mm), and broader spores (2.3–2.7 µm versus up to 2.0 µm in *Pl. ciliatus*) (Ryvarden 2016).

Pycnoporus sanguineus (L.) Murrill, Bull. Torrey bot. Club 31(8): 421 (1904) (Figure 18G)

Description: Ryvarden (2016).

Distribution: Widely distributed in tropical and subtropical regions around the world (Ryvarden 2016).

Habitat: Dead wood, mainly exposed to direct sunlight, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Faxinalzinho trail, 25 May 2021, MIND.Funga 731; *ibidem,* Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 770; Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1021.

Rigidoporus concrescens (Mont.) Rajchenb., Boln Soc. argent. Bot. 28(1-4): 165 (1992) (Figure 18H)

Description: Rajchenberg (1987, as *Ri. umbonatipes* Rajchenb.).

Distribution: Originally described from Argentina (Rajchenberg 1987, as *Ri. umbonatipes*), also found in New Zealand (Rajchenberg 1992). In Brazil, known from Rio Grande do Sul (Silveira et al. 2008). First record from Santa Catarina state.

Habitat: On fallen logs/trunks, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR4000, 25 March 2019, Kossmann, T. 370. RPPN Portal das Nascentes, 21 June 2021, MIND.Funga 912.

Rigidoporus lineatus (Pers.) Ryvarden, Norw. Jl Bot. 19: 236 (1972) (Figure 18I)

Description: Ryvarden (2016).

Distribution: Pantropical and subtropical (Ryvarden 2016).

Habitat: Dead trunks and branches of angiosperms, causing a white rot.

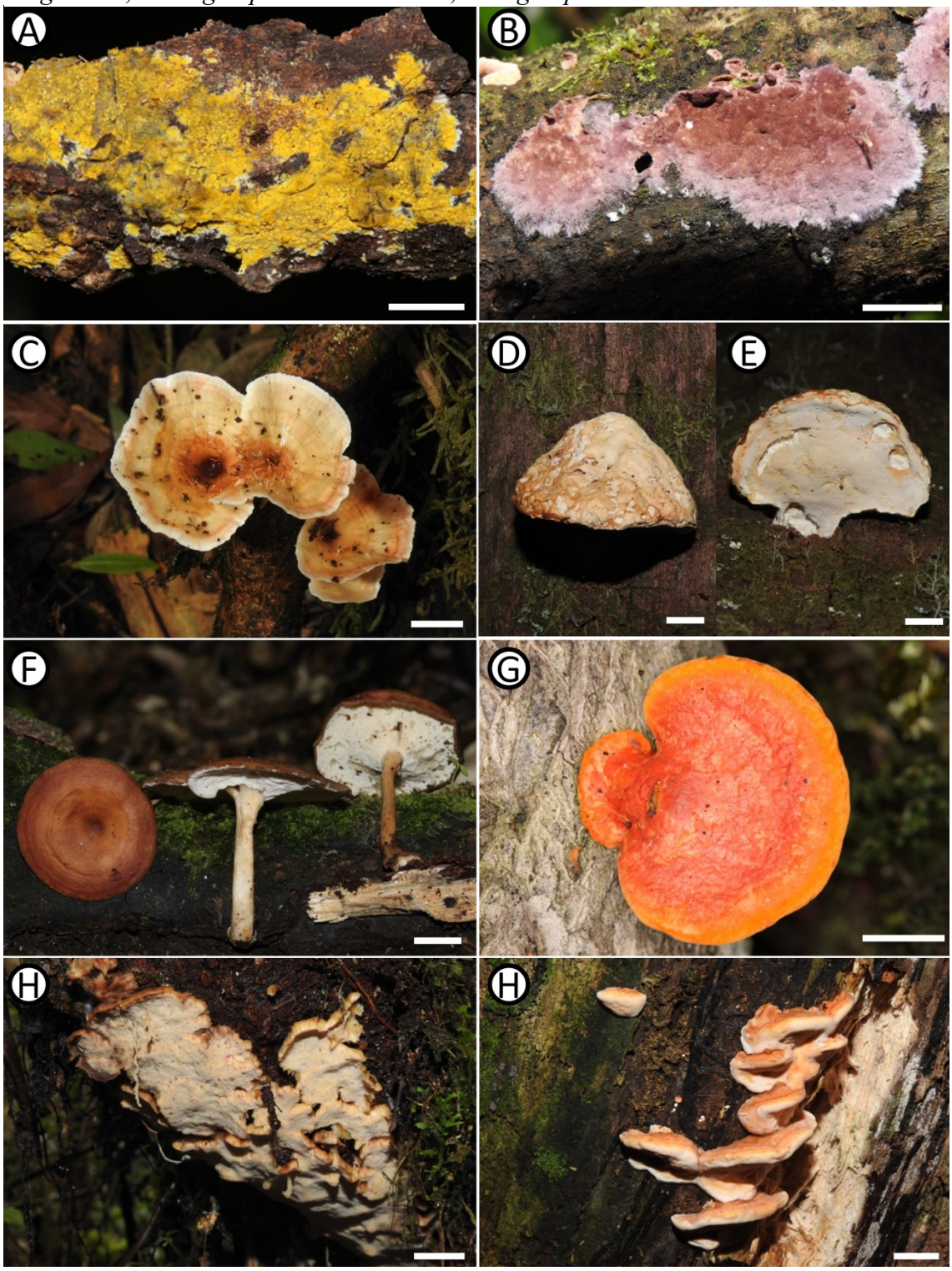
Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 407; *ibidem,* 10 January 2021, MIND.Funga 439.

Steccherinum ochraceum (Pers. ex J.F. Gmel.) Gray, Nat. Arr. Brit. Pl. (London) 1: 651 (1821) (Figure 19A)

Description: Bernicchia and Gorjón (2010).

Distribution: Cosmopolitan (Hjortstam and Ryvarden 2007a, GBIF 2022).

Figure 18. A - *Phlebia* aff. *subochracea*; B - *Phlebiopsis* cf. *crassa*; C - *Podoscypha* cf. *cristata*; D, E - *Postia* cf. *caesioflava*; F - *Polyporus* aff. *ciliatus*; G - *Pycnoporus sanguineus*; H - *Rigidoporus concrescens*; I - *Rigidoporus lineatus*



Bars = 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

Habitat: Dead branches of hardwoods, both suspended and on the ground, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR4000, 27 March 2019, Kossmann, T. 385; *ibidem, idem*, Kossmann, T. 387; *ibidem*, TN3500, 22 June 2021, MIND.Funga 954.

Steccherinum subochraceum Bononi & Hjortstam, in Hjortstam & Bononi, Mycotaxon 25(2): 467 (1986) (Figure 19B)

Description: Hjortstam and Bononi (1986), Hjortstam and Bononi (1987).

Distribution: Brazil, Colombia and Ecuador (Hjotstam and Ryvarden 2007). In Brazil, known from Paraná, Rio Grande do Sul, São Paulo (Hjortstam and Bononi 1987, Meijer 2006) and Amapá (Herbarium record SP-Fungi 233286, det. by Bononi, V.L.R.). First record from Santa Catarina and from the Aparados da Serra region.

Habitat: Dead suspended branches, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1459.

Steccherinum undigerum (Berk. & M.A. Curtis) Westphalen & Tomšovský, in Westphalen, Rajchenberg, Tomšovský & Gugliotta, Persoonia 41: 138 (2018) (Figure 19C)

Description: Ryvarden [2015, as *Junghuhnia undigenus* (Berk.) Ryvarden.]

Distribution: Known from Central America and Southern Brazil (Ryvarden 2015, Bittencourt 2016, Westphalen et al. 2018).

Habitat: Dead standing trunk, causing a white rot.

Material examined: : BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 402.

Trametes membranacea (Sw.) Kreisel, Monografias, Ciencias, Univ. Habana, Ser. 4 16: 83 (1971) (Figure 19D)

Description: Reck (2013), Ryvarden (2016).

Distribution: Widespread in Tropical and Subtropical America (Ryvarden 2016).

Habitat: Dead trunks and branches of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 516; *ibidem*, TNR1300, 23 June 2021, MIND.Funga 1102.

Trametes versicolor (L.) Lloyd, Mycol. Notes (Cincinnati) 65: 1045 (1921) [1920] (Figure 19E, F)

Description: Ryvarden (2016).

Distribution: Cosmopolitan (Ryvarden 2016).

Habitat: Fallen angiosperm branches, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1019.

Trametes* aff. *versicolor (Figure 19G)

Description: Ryvarden (2016).

Habitat: Dead, standing, hardwood trunk, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1095; Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1491.

Remarks: Our specimen differs from *T. versicolor* by having larger spores [5.0–7.0(–9.0) × 1.8–2.5 versus 5.0–6.0 × 1.5–2.0], smaller pores (5–6/mm versus 4–5/mm) and swollen hyphae in KOH. *T. ectypus* (Berk. & Curt) Gilbertson & Ryvarden has the same pores/mm and swollen hyphae in KOH, however, it has shorter spores and darker colors (Ryvarden 2016).

Trametes villosa (Sw.) Kreisel, Monografias, Ciencias, Univ. Habana, Ser. 4 16: 83 (1971) (Figure 19H)

Description: Reck (2013), Ryvarden (2016).

Distribution: Southeastern USA to Argentina (Ryvarden 2016).

Habitat: Dead branches of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TNR1300, 23 June 2021, MIND.Funga 1077; Bom Jardim da Serra, Bom Jardim Wind Farm, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1446.

Trullella* cf. *duracina (Pat.) Zmitr., Folia Cryptogamica Petropolitana (Sankt-Peterburg) 6: 104 (2018) (Figure 19I)

Description: Lindblad and Ryvarden (1999, as *Antrodiella duracina* (Pat.) I. Lindblad & Ryvarden), Ryvarden (2015, as *A. duracina*).

Distribution: Neotropical (Ryvarden 2015).

Habitat: Dead trunk in the ground, causing a moderate white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, 08 January 2021, MIND.Funga 334.

Remarks: Our specimen is very similar to the description of *T. duracina*, with a similar constitution of tubes and context, with skeletal hyphae dominating the first and generative hyphae dominating in the latter. But it differs by having darker colors, an inflexed margin when dried, and broader spores (up to 2 µm versus up to 1.3µm) (Lindblad and Ryvarden 1991, Ryvarden 2015).

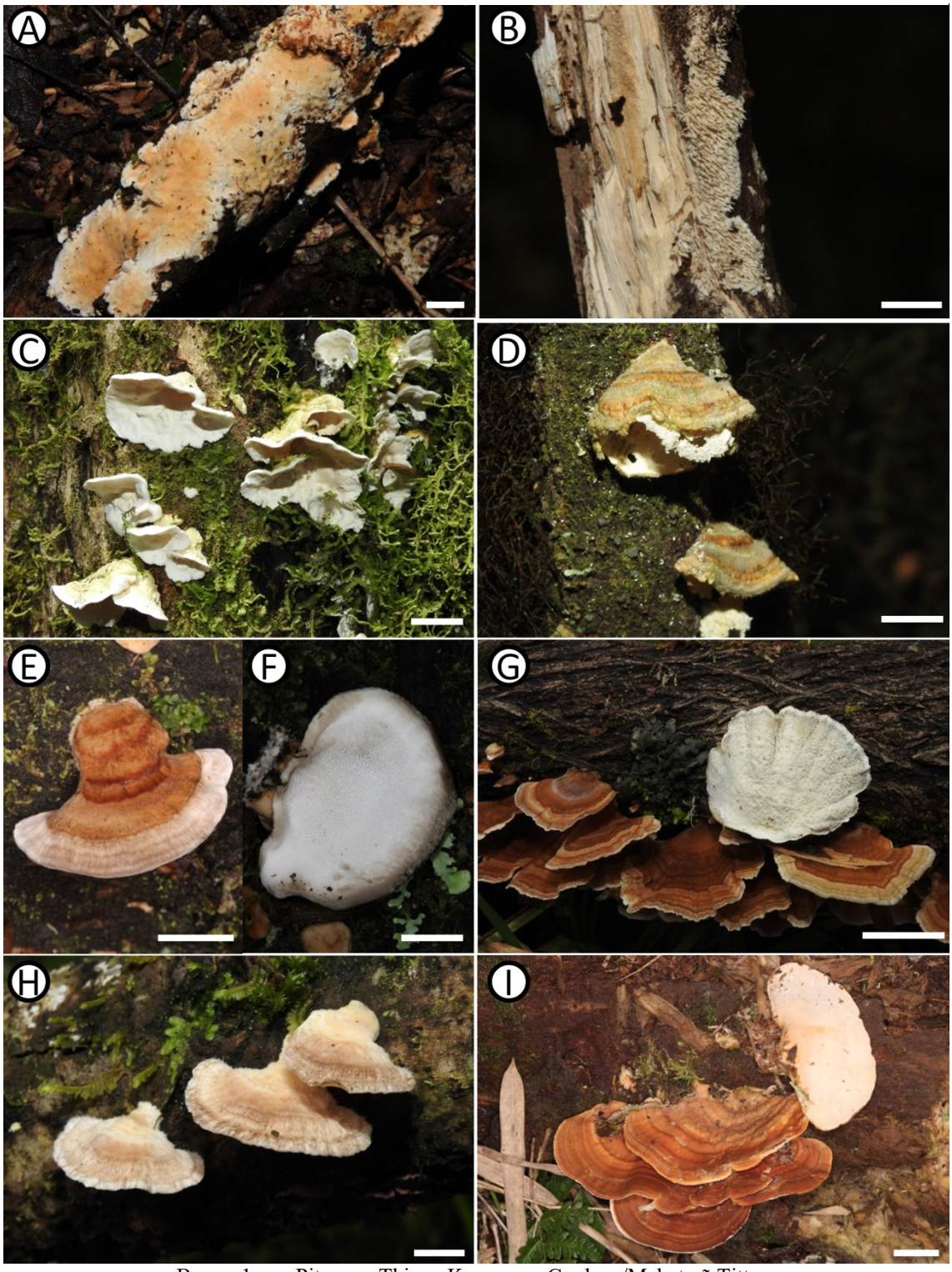
Russulales Kreisel ex P.M. Kirk, P.F. Cannon & J.C. David, in Kirk, Cannon, David & Stalpers, Ainsworth & Bisby's Dictionary of the Fungi, Edn 9 (Wallingford): xi (2001)

Aleurodiscus* aff. *aurantius (Pers.) J. Schröt., in Cohn, Krypt.-Fl. Schlesien (Breslau) 3.1(25–32): 429 (1888) [1889] (Figure 20A)

Description: Núñez and Ryvarden (1997).

Habitat: On dead-branches, still attached to the living tree, causing a white rot.

Figure 19. A - *Steccherinum ochraceum*; B - *Steccherinum subochraceum*; C - *Steccherinum undigerum*; D - *Trametes membranacea*; E, F - *Trametes versicolor*; G - *Trametes* aff. *versicolor*; H - *Trametes villosa*; I - *Trullella* cf. *duracina*.



Bars = 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1454.

Remarks: It is similar to *A. aurantius*, a known only from the Northern Hemisphere, in having pale yellowish/orange colors, a monomitic hyphal system with simple-septate hyphae, ellipsoid basidiospores, and moniliform to dendroid gloeocystidia. It differs, however, by the absence of encrusted dendrohyphidia, and by having much larger spores (30.0–34.5 × 18.5–22.0 µm versus 19.0–21.0 × 12.0–14.0) (Núñez and Ryvarden 1997). *A. exasperatus* Hjortstam & Ryvarden is another similar species described from São Paulo, Brazil, but differs by having cream to brownish basidiomata, encrusted dendrohyphidia with amyloid tips, no moniliform gloeocystidia, and smaller spores (20.0–23.0 × 9.0–12.0 µm) (Hjortstam and Ryvarden 1993, Núñez and Ryvarden 1997).

Gloeosoma mirabile (Berk. & M.A. Curtis) Rajchenb., Pildain & Riquelme, Mycologia [9 of 14] (2021) (Figure 20B)

Description: Núñez and Ryvarden (1997).

Distribution: Pantropical and subtropical, not known from Europe (Núñez and Ryvarden 1997). First record from Santa Catarina.

Habitat: On fallen and suspended dead branches, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, Morro da Igreja, Pedra Furada trail, 11 January 2021, MIND.Funga 501; Bom Jardim da Serra, Bom Jardim Wind Farm, forest near the cliff past the "Trilha do Mundo Novo", 24 November 2021, MIND.Funga 1422.

***Gloeosoma* aff. *mirabile* sp. 1** (Figure 20C)

Description: Núñez and Ryvarden (1997).

Habitat: On fallen branches, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1497.

Remarks: Our specimen differs from *G. mirabile* by having shorter and wider basidiospores (23.0-25.5 x 16.0-20.5 µm), predominantly simple-septate hyphae, and by the absence of acanthobasidia and tramal acanthophyses (Núñez and Ryvarden 1997).

***Gloeosoma* aff. *mirabile* sp. 2** (Figure 20D)

Description: Núñez and Ryvarden (1997).

Habitat: Dead branch on living tree, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1498.

Remarks: Our specimen differs from *G. mirabile* by having longer spores (up to 34.0 µm long) and acanthophyses with larger projections. Baltazar (2014) cites a species similar species (*"Alerodiscus* sp. 1"), differing from *G.mirabile* also by having larger spores and acanthophyses with larger projections, but with amyloid tips, which is not found in our specimen. A comparison with these specimens is desired to understand whether they are the same species.

Amylostereum ferreum (Berk. & M.A. Curtis) Boidin & Lanq., Bull. trimest. Soc. mycol. Fr. 100(2): 217 (1984) (Figure 20E)

Description: Ryvarden (2010).

Distribution: Known from Central America and the Caribbean (Costa Rica, Cuba, Guadeloupe, Jamaica), and South America (Venezuela and Brazil) (Hjortstam and Ryvarde 2007, Ryvarden 2010). In Brazil, so far known only from the southern region (Baltazar 2014). First record from Santa Catarina state and the Aparados da Serra region.

Habitat: Found on living trunks of *Podocarpus lambertii* Klotzsch ex Endl.

Material examined: : BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 789; Santa Catarina. Urubici, Parque Nacional de São Joaquim, Trail behind the quarter past the river, 29 November 2018, Kossmann, T. 290.

Bondarzewia guaitecasensis (Henn.) J.E. Wright, Sydowia 17: 12 (1964) (Figure 20F)

Description: Hennings (1900, as *Polyporus guaitecasensis* Henn.), Singer (1953, as *B. perniciosa* Singer), Rajchenberg (2006).

Distribution: In *Nothofagus* forests in Argentina and Chile (Rajchenberg 2006). In Brazil, found only in montane Cloud Forests in Southern Brazil (Bittencourt 2019). First record from Rio Grande do Sul state.

Habitat: In Brazil, on dead (usually standing) and living *Drimys angustifolia* Miers trunks, causing a white rot. In Argentina and Chile, it grows as a parasite of roots, and decomposer of *Nothofagus* spp. Blume (Rajchenberg 2006).

Material examined: BRAZIL. Rio Grande do Sul, Parque Nacional de Aparados da Serra, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 823; Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 958; *ibidem, idem*, MIND.Funga 960.

Dentipellicula* cf. *leptodon (Mont.) Y.C. Dai & L.W. Zhou, Mycologia 105(3): 641 (2013) (Figure 20G)

Description: Maas Geesteranus [1974, as *Dentipellis leptodon* (Mont.) Maas G.].

Distribution: Originally described from Juán Fernandez Islands (Chile) (Montagne 1843). The species has been reported from Australia, India, Sri Lanka, Canada and Brazil (Paraná state) (Meijer 2006, Hjortstam and Ryvarden 2007a, Chen et al. 2015). If confirmed, would represent the first record of the species from Santa Catarina state and the Aparados da Serra region.

Habitat: Found on a dead branch of angiosperm, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Side trail", 10 January 2021, MIND.Funga 434.

Remarks: Our species agree with the morphological descriptions of *De. leptodon* (Maas Geesteranus 1974). However, in a BLAST analysis of the ITS region from our specimen, the best matches were *De. guyanensis* Yuan Yuan, Meng Zhou, Jia J. Chen & Vlasák (MN547359.1), with 100% cover, 0.0 e-value and 87.87% identity, *De. taiwaniana* (Sheng H. Wu) Y.C. Dai & L.W. Zhou (MH085941.1), with 100% query cover, 0.0 e-value and 86.26% identity, and a *De. leptodon* from Uganda (EU118625.1),

with 93% query cover, 0.0 e-value and 88.07% identity, while other sequences of *De. leptodon* from Asia did not even appear among the 100 closest matches. This data indicates that *De. leptodon* is probably a species complex, and sequences from materials from the type locality are desired to understand the identity of specimens referred to as *De. leptodon* around the world.

Laxitextum bicolor (Pers.) Lentz, Agriculture Monograph 24: 19 (1956) ["1955"] (Figure 20H)

Desctiption: Lentz (1956).

Distribution: Cosmopolitan (Lentz 1956). First record from the Aparados da Serra region.

Habitat: On dead angiosperm wood, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 30 January 2019, Kossmann, T. 354; *ibidem*, TNR1300, 23 June 2021, MIND.Funga 1016.

Pleurotopsis* aff. *subgrisea (G. Stev.) E. Horak, N.Z. Jl Bot. 9(3): 456 (1971) (Figure 21A)

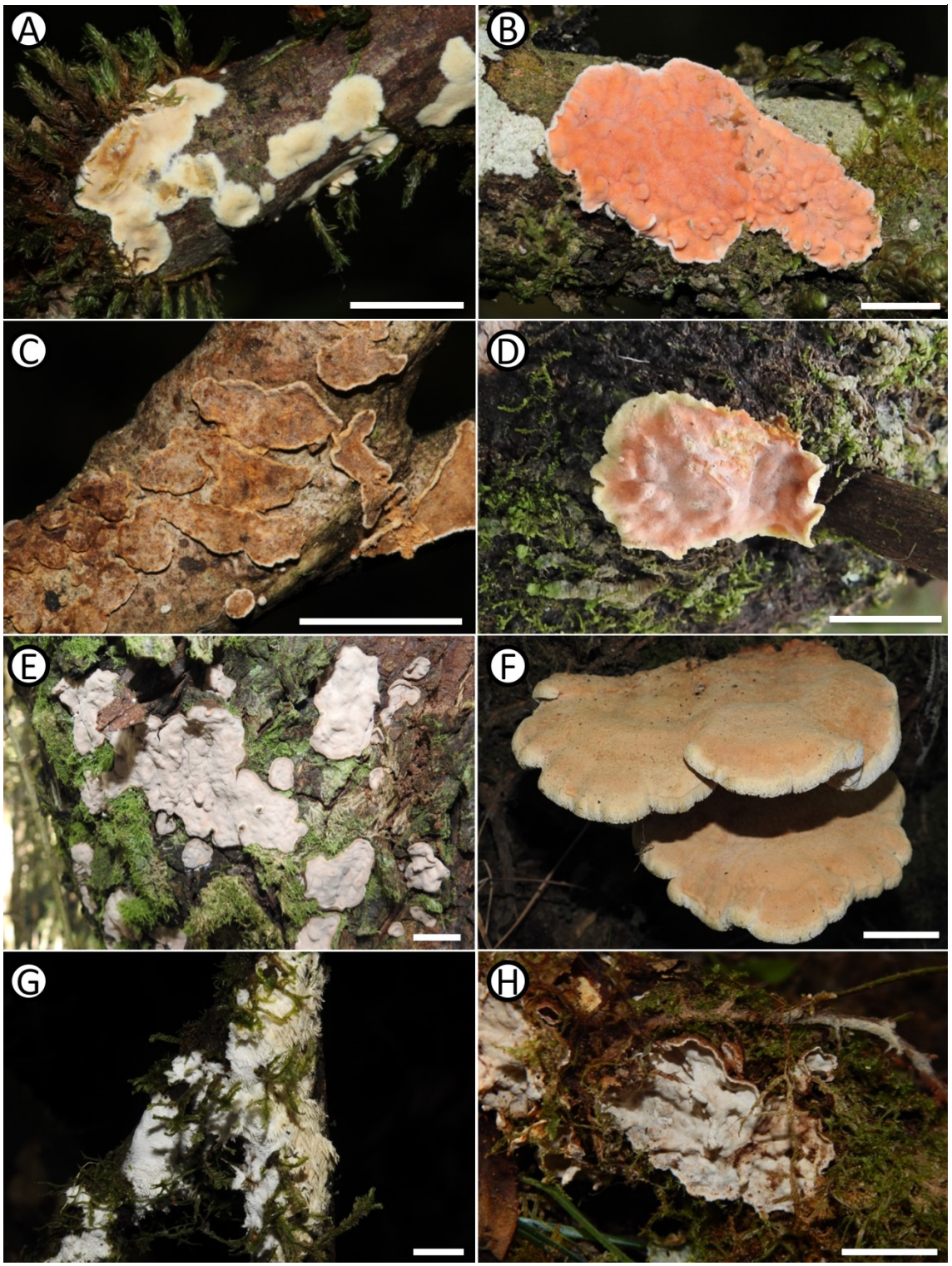
Description: Stevenson (1964), but see Horak (1971) for further measurements and illustrations.

Habitat: Dead hardwood trunks, causing a white rot.

Material examined: BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Faxinalzinho trail, 25 May 2021, MIND.Funga 718; Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 959; *ibidem*, TNR1300, 23 June 2021, MIND.Funga 1032; *ibidem, idem*, MIND.Funga 1057; Bom Jardim da Serra, Bom Jardim Wind Farm, Woods behind the Luar dos Cânions hotel, 31 October 2021, MIND.Funga 1351; *ibidem*, forest near the cliff past the "Trilha do Mundo Novo", 24 November 2021, MIND.Funga 1439.

Remarks: Our specimens differ from *Pl. subgrisea* by having smaller spores [(4.8–)5.0–6.2(–7.0) × 2.6–3.2 µm versus 7.5–10 × 3–4 µm] Horak (1971). *Pl. subgrisea* is a species so far known only from New Zealand. In a BLAST analysis of the

Figure 20. A - *Aleurodiscus* aff. *aurantius*; B - *Gloeosoma mirabile*; C - *Gloeosoma* aff. *mirabile* sp. 1*;* D - *Gloeosoma* aff. *mirabile* sp.; E - *Amylostereum ferreum*; F - *Bondarzewia guaitecasensis*; G - *Dentipellicula* cf. *leptodon*; H - *Laxitextum bicolor*.



Bars: A, B, C, D, E, H = 1 cm, F = 5 cm, G = 0.5 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

ITS region from our specimens, the closest matches was a *Pl. subgrisea* sequence (MN007025.1) with 99% cover, 0.0 e-value and 95.32% identity.

Licrostroma subgiganteum (Berk.) P.A. Lemke, Can. J. Bot. 42: 763 (1964) (Figure 21B)

Descritpion: Lemke (1964), Ryvarden (2010).

Distribution: USA, Cuba and Japan (Hjortstam and Ryvarden 2007a, Ryvarden 2010). In Brazil, known from Rio Grande do Sul (Baltazar 2014). First record from Santa Catarina state and the Aparados da Serra region.

Habitat: On dead fallen small branches and twigs of angiosperms, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TS3500, 28 November 2018, Kossmann, T. 273; *ibidem, idem*, Kossmann, T. 282; Bom Jardim da Serra, Bom Jardim Wind Farm, forest downwards east of the old park gate, 23 November 2021, MIND.Funga 1372; *ibidem, idem*, MIND.Funga 1394; *ibidem*, forest near the cliff past the "Trilha do Mundo Novo", 24 November 2021, MIND.Funga 1428; *ibidem*, Serra-Parque Viewpoint, 25 November 2021, MIND.Funga 1493.

Megalocystidium* aff. *chelidonium (Pat.) Boidin, Lanq. & Gilles Bull. trimest. Soc. mycol. Fr. 113(1): 62 (1997) (Figure 21C)

Description: Basidiomata resupinate, growing in circular patches <5 mm wide, soon anastomosing up to 70 mm, 400 – 700 µm thick; *Hymenial surface* slightly tuberculate, dark orange with light orange concentrical zonations, where previously was the margin of the anastomosed basidiomata, drying salmon to pale yellowish-cream; *Margin* strongly fimbriate, up to 1 mm wide, when fresh light orange to yellowish, and with whitish tints, drying pale yellowish-cream throughout;

Hyphal system monomitic, hyphae thin to more commonly thick-walled, hyaline, clamped; *Subhymenial* and contextual hyphae densely packed, almost pseudodimitic; Subicular hyphae looser than the context, sometimes seemingly with a gelatinous substance; *Gloeocystidia* thin walled, cylindrical to clavate, rarely branched before penetrating the hymenium, filled with strongly refringent yellowish lipids, abundant, often covering the entire hymenium, not projecting, up to 18 µm wide, arising from

gloeopleurous hyphae originating deep into the context and in the subiculum, over 500 µm long; *Basidia* hyaline, slightly thick-walled, clavate to flexuous, with 0–2 constrictions, sometimes with secondary simple-septa, up to 60 × 10 µm (n<10); Mature *basidiospores* not found, but the largest immature spore found measured 9.3 × 5.7 µm, apparently smooth, moderately amyloid, CB-.

Habitat: On stem of a standing dead tree, causing a white rot.

Material examined: : BRAZIL. Rio Grande do Sul. Cambará do Sul, Parque Nacional de Aparados da Serra, Itaimbézinho Canyon Upper Trail, 26 May 2021, MIND.Funga 798.

Remarks: The combination of a monomitic hyphal system with clamped hyphae, smooth or nearly smooth amyloid basidiospores, and the large basidia and gloeocystidia rule this species as belonging to *Megalocystidium* Jülich (Wu 1996). In a BLAST analysis of the LSU region, the closest match was a *Me. chelidonium* from the USA (AF506441.1), with 100% cover, 0.0 e-value and 98.68% identity, followed closely by other species of *Gloeocystidiellum* s.l. Donk. Currently only two *Megalocystidium* species are known from Brazil: *Me. chelidonius*, which was described from Central America, and *Me. luteocystidiatum* (P.H.B. Talbot) Sheng H. Wu, an African species. Baltazar (2014) discusses that these two species are very similar, only differentiated by the nuclear behavior, and that Brazilian records of *Me. luteocystidiatum* probably represent *Me. chelidonius*. Based on the description of *Me. chelidonius* by Hjortstam and Ryvarden (2007b), our species differs by having thicker basidiomata (400 – 700 µm versus 200 – 300 µm), more vivid colors (orange versus ochraceous), larger basidia (up to 60 × 10 µm against up to 35 × 9 µm), and no projecting cystidia.

***Stereaceae* sp.** Pilát, Hedwigia 70: 34 (1930) (Figure 21D)

Description: Basiodiomata resupinate, patches up to >20 cm wide, up to 500 µm thick in the center, thinning towards the margin; Hymenial surface smooth, off-white, at parts with ochraceous tints, cracking frequently; Context with inconspicuous zonations of cream and slightly darker cream colors; Margin thinning out abruptly, dark ochraceous;

Hyphal system dimitic, hyphae very compact and difficult to discern, generative hyphae simple-septate, thin to thick-walled, binding hyphae thick-walled to solid, with thin, straight to curved branches <1 µm wide; Subiculum, context and subhymenium with a

pseudoparenchymatous aspect, making it almost impossible to discern any structures, mostly composed (apparently) of dextrinoid acanthophyses, only visible in the hymenium, ventricose, fusoid to clavate, thick-walled, apically spiked; Basidia not seen; Basidiospores mostly collapsed at the hymenium, the few observed thin walled, smooth, measuring 2.5–4.2 × 2.5–3.0 (n<10), broadly ellipsoid to ovoid, amyloid.

Habitat: On a decorticated fallen log, with an initial white rot.

Material examined: BRAZIL. Rio Grande do Sul, Parque Nacional de Aparados da Serra, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 851.

Remarks: In our BLAST analysis of the ITS region, the closest match to our species was a sequence of *Aleurodiscus persicus* Ghobad-Nejhad, identified as *Acanthophysellum* sp., which differs by having a monomitic hyphal system with clamped hyphae, gloeocystidia, and larger spores (up to 10 × 6) (Ghobad-Nejhad and Langer 2018). *Aleurodiscus dextrinoideocerussatus* is a macromorphologically similar species, which also has smooth amyloid basidiospores, and dextrinoid acanthophyses. However, it differs by having a monotimic hyphael system with clamped hyphae, gloeocystidia and larger spores (7–10 × 4–7 μm) (Moreno et al. 1990). Furthermore, ITS sequences of *A. dextrinoideocerussatus* had a cover of 93% and a match of 93.7% with our species. The characters found in *A. persicus* and *A. dextrinoideocerussatus* are typical of *Acanthophysellum* (Gorjon 2020), and it is likely that these species actually belong in that genus. Given the unique characters found in our species, such as a pseudoparenchymatous construction, and the dimitic hyphal system with binding hyphae, it is possible that a new genus will be needed to be erected to accommodate it. Further phylogenetic studies and more specimens are desired to clarify its identity and position.

Stereum hirsutum (Willd.) Pers., Observ. mycol. (Lipsiae) 2: 90 (1800) [1799] (Figure 21E)

Description: Ryvarden (2010).

Distribution: Cosmopolitan (Ryvarden 2010).

Habitat: Fallen branches and trunks of hardwoods, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 27 November 2018, Kossmann, T. 258; Bom Jardim da Serra, Woods behind the Luar do Cânions hotel, 31 October 2021, MIND.Funga 1346; *ibidem*, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1435; Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 693; *idem*, Fortaleza Canyon Trail, 27 May 2021, MIND.Funga 888.

Stereum striatum (Fr.) Fr., Epicrisis Systematis Mycologici: 548 (1838) (Figure 21F)

Description: Ryvarden (2010).

Distribution: Known from eastern and southern USA, and the Neotropics (Ryvarden 2010). In Brazil, known from Rio Grande do Sul (Baltazar 2014). First record from Santa Catarina state and from the Aparados da Serra region.

Habitat: On dead branches of hardwoods, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 27 November 2018, Kossmann, T. 241; *ibidem*, TNR400, 27 March 2019, Kossmann, T. 384; *ibidem*, Pedra Furada trail,11 January 2021, MIND.Funga 494; Bom Jardim da Serra, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1438.

Stereum gloeocystidiatum **nom. prov.** Kossmann G.M. Muell. & Drechsler-Santos (Figure 21G)

Description: *Basidiomata* resupinate, consistency soft, adnate, up to 400 µm thick. *Hymenial* surface smooth to minutely radiately folded, light greyish-white, fading to white towards the margin. *Context* and *subiculum* white. *Margin* slightly fimbriate and fibrillose, white.

Hyphal system dimitic; *generative hyphae* simple-septate, hyaline, thin-walled; *skeletal hyphae* hyaline, thick-walled, straight to tortuous, mostly restricted to the subiculum, not projecting into the hymenium. *Subiculum* hyaline, dominated by skeletal hyphae, hyphae interwoven. *Context* composed of tightly packed and difficult to discern hyphae, mostly horizontally oriented, resembling the hyphal construction of *Phlebia* species. *Subhymenium* looser than context but more compact than the subiculum, composed of

generative hyphae mostly vertically or diagonally oriented, with abundant, large crystal glomeruli. *Acutocystidia* present but inconspicuous and thin, *gloeocystidia* present, rare to abundant, not projecting beyond the hymenium, with refractive brownish contents. *Basidia* clavate, 4-sterigmate. *Basidiospores* hyaline, smooth, thin-walled, elongate to cylindrical, 6.5–7.8 × 2.9–3.8, Q = 1.7–2.5, amyloid.

Habitat: Growing on a suspended, hardwood dead branch, causing a moderate white rot.

Material examined: BRAZIL. Rio Grande do Sul, Parque Nacional de Aparados da Serra, Upper Fortaleza Canyon trail, 27 May 2021, MIND.Funga 831.

Remarks: The smooth hymenial surface, dimitic hyphal system, simple-septate generative hyphae, smooth, thin-walled, amyloid basidiospores, and the acutocystidia characterize this species as belonging to *Stereum* Hill ex Pers. (Gorjon 2020). This is corroborated by our BLAST analysis of the LSU region, where the closest matches were several *Stereum* species sequences (AF506483.1, AF506482.1, AF506479.1, MW263967.1, MW263965.1, etc.) with 100% cover, 0.0 e-value and >99% identity. However, it differs from all other species in the genus by having gloeocystidia, which are absent in the generic concept of *Stereum*, and unknown in any of the known species in the genus (Gorjon 2020).

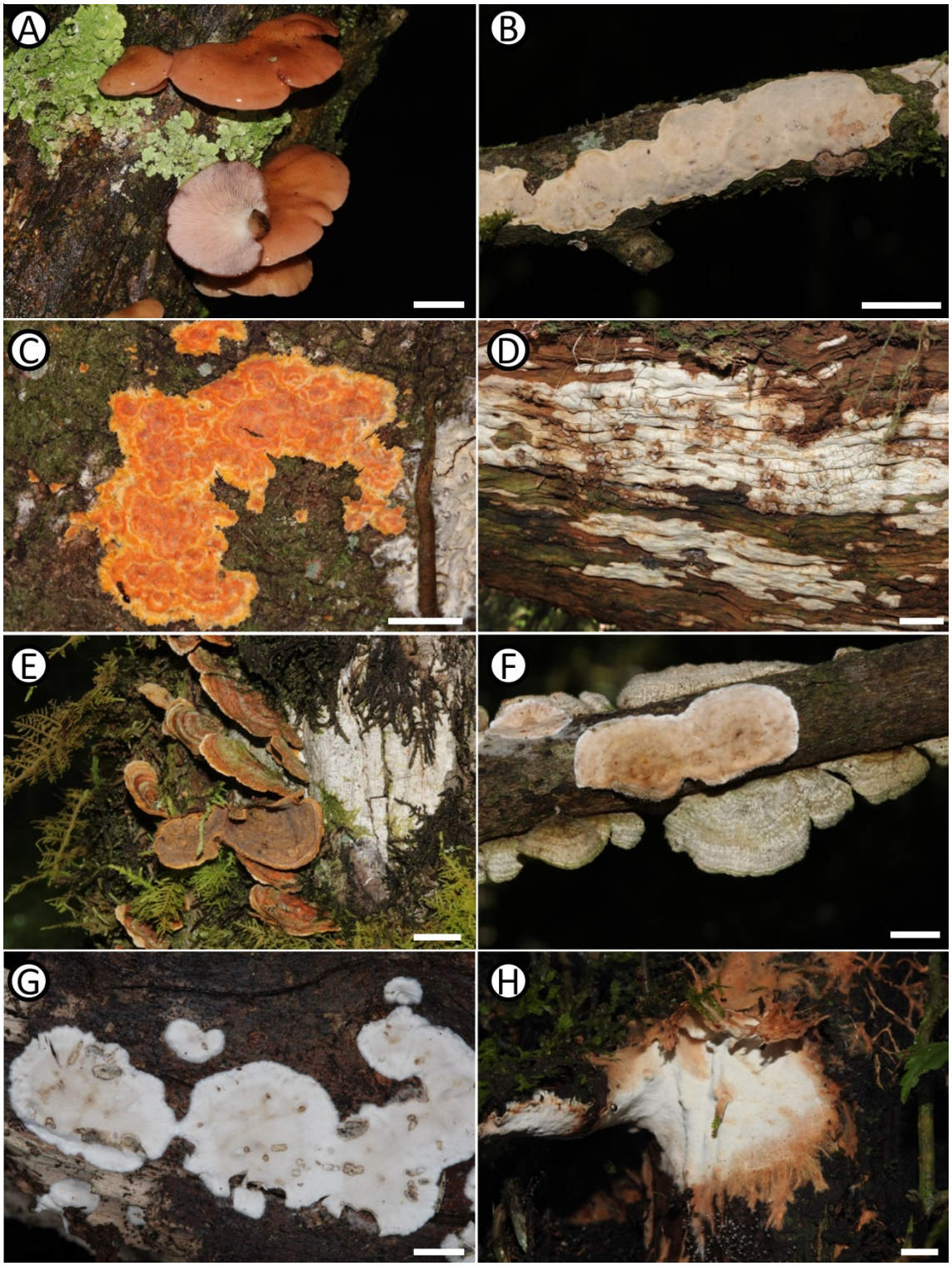
***Wrightoporia* sp.** Pouzar, Česká Mykol. 20(3): 173 (1966) (Figure 21H)

Description: Basidiomata resupinate. *Pore surface* whitish with isabelline to ochraceous tinges, especially towards the margin. *Pores* very shallow, regular, but elongated at sloped parts, angular, with thin dissepiments, 9-10/mm. *Margin* rhizomorphic, cottony, ochraceous; Context very light and soft, brown;

Hyphal system dimitic; *generative* hyphae hyaline, thin to slightly thick-walled, with conspicuous clamps, in the dissepiments and in the subiculum ending as dendrohyphidia; *skeletal hyphae* in the tubes hyaline to yellowish, straight, thick-walled, in the context brown, relatively thin-walled and with a wide lumen, unbranched, weakly dextrinoid. *Cystidia* absent. *Basidia* not seen. *Basidiospores* broadly-ellipsoid to ellipsoid, smooth, thick-walled, 3.2–3.9 × 2.4–3.0, Q = 1.2 –1.5, strongly amyloid.

Habitat: Dead branches, causing and advanced white rot.

Figure 21. A - *Pleurotopsis* aff. *subgrisea*; B - *Licrostroma subgiganteum*; C - *Megalocystidium* aff. *chelidonium*; D - *Stereaceae* sp.; E - *Stereum hirsutum*; F - *Stereum striatum*; G - *Stereum gloeocystidiatum* nom. prov.; H - *Wrightoporia* sp.



Bars = 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 349.

Remarks: The combination of amyloid spores and a dimitic hyphal system with dextrinoid is characteristic of *Wrightoporia* (Ryvarden 2016). Westphalen et al. (2014) provided a synopsis of the genus is Southern Brazil, describing *W. araucariae* Westphalen & Reck, from a similar ecosystem and which shares the resupinate basidiomata, rhizomorphic margin, and spores that look smooth under optical microscopy (but are ornamented in SEM). Our species differs from *W. araucariae* by having smaller pores (4–6/mm in *W. araucariae*), ochraceous colors (all white in *W. araucariae*), no gloeoplerous hyphae, and brown skeletal hyphae in the context. Ryvarden (2016) cites no other closely similar species of *Wrightoporia* in the Neotropics. Scanning electron microscopy of the spores is necessary to rule out if the spores are indeed smooth or minutely ornamented. *Anomoloma* Niemelä & K.H. Larss is another genus of polypores with resunipate basidiomata, rhizomorphic margin, and small, thick-walled, smooth, amyloid spores (Song et al. 2015, Gorjon 2020). However, it differs by having a monomitic hyphal system.

Additional studies, with more specimens and DNA sequences are need to better understand and circumscribe this species.

Xenasmatella vaga (Fr.) Stalpers, Stud. Mycol. 40: 37 (1996) (Figure 22A)

Description: Hjortstam et al. (1988), Bernicchia and Gorjón (2010).

Distribution: Cosmopolitan (Hjortstam and Ryvarden 2007a). In Brazil, known from Rio Grande do Sul (Nietiedt and Guerrero 2000, Baltazar 2014). First record from Santa Catarina.

Habitat: Fallen logs and trunks, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, Trail near the cemetery, 24 June 2021, MIND.Funga 1118; Bom Jardim da Serra, forest near the cliff past the "Trilha do Mundo Novo", 24 November 2021, MIND.Funga 1440.

Trechisporales K.H. Larss., in Hibbett et al., Mycol. Res. 111(5): 541 (2007)

Trechispora farinacea (Pers.) Liberta, Taxon 15(8): 318 (1966) (Figure 22B)

Description: Hjortstam et al. (1988).

Distribution: Cosmopolitan (Hjortstam and Ryvarden 2007a). First record from the Aparados da Serra region.

Habitat: Dead angiosperm trunk, causing a white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, TN3500, 27 November 2018, Kossmann, T. 243.

Trechispora regularis (Murrill) Liberta, Can. J. Bot. 51(10): 1878, 1974 [“1973”] (Figure 22C)

Description: Ryvarden and Johansen (1980) and Larsson (1994).

Distribution: Tropical and subtropical Americas and Africa (Ryvarden and Johansen 1980; Hjortstam and Ryvarden 2007a); In Brazil, known from Rio Grande do Sul (Silveira and Guerreiro 1991, Baltazar and Gibertoni 2009), Paraná (Baltazar 2014), and Santa Catarina (Bittencourt 2016).

Habitat: Dead branch on the ground, moderate white rot.

Material examined: BRAZIL. Santa Catarina. Urubici, Parque Nacional de São Joaquim, Trail near the cemetery, 24 June 2021, MIND.Funga 1123.

Tremellales Fr. [as 'Tremellinae'], Syst. mycol. (Lundae) 1: 2 (1821)

Sirobasidium sanguineum Lagerh. & Pat., J. Bot., Paris 6: 469 (1892) (Figure 22D)

Description: Lowy (1956), Lowy (1971).

Distribution: Reported from Australia, Brazil, Ecuador (type locality), India, and the USA (Dämon and Hausknecht 2002). In Brazil, known from Rio Grande do Sul, Minas Gerais and Bahia (Lowy 1971, Alvarenga 2016). First record from Santa Catarina state and the Aparados da Serra region.

Habitat: Dead angiosperm branch.

Material examined: BRAZIL. Santa Catarina. Bom Jardim da Serra, Parque Eólico Bom Jardim, Forest at the edge of the cliff, past the "Novo Mundo" trail and down the slope with the 5 wind turbines, 24 November 2021, MIND.Funga 1441.

Tremella mesenterica (Schaeff.) Pers., Syn. meth. fung. (Göttingen) 2: 622 (1801) (Figure 22E)

Description: Lowy (1971, as *T. lutescens* Fr.).

Distribution: Cosmopolitan (GBIF 2022). First record from the Aparados da Serra region.

Habitat: Growing on branches, parasitizing a corticiaceous fungus (cf. *Peniophora*).

Material examined: BRAZIL. Rio Grande do Sul, Cambará do Sul, Parque Nacional de Aparados da Serra, "Faxinalzinho Trail", 25 May 2021, MIND.Funga 730.

Tremella* aff. *mesenterica (Figure 22F)

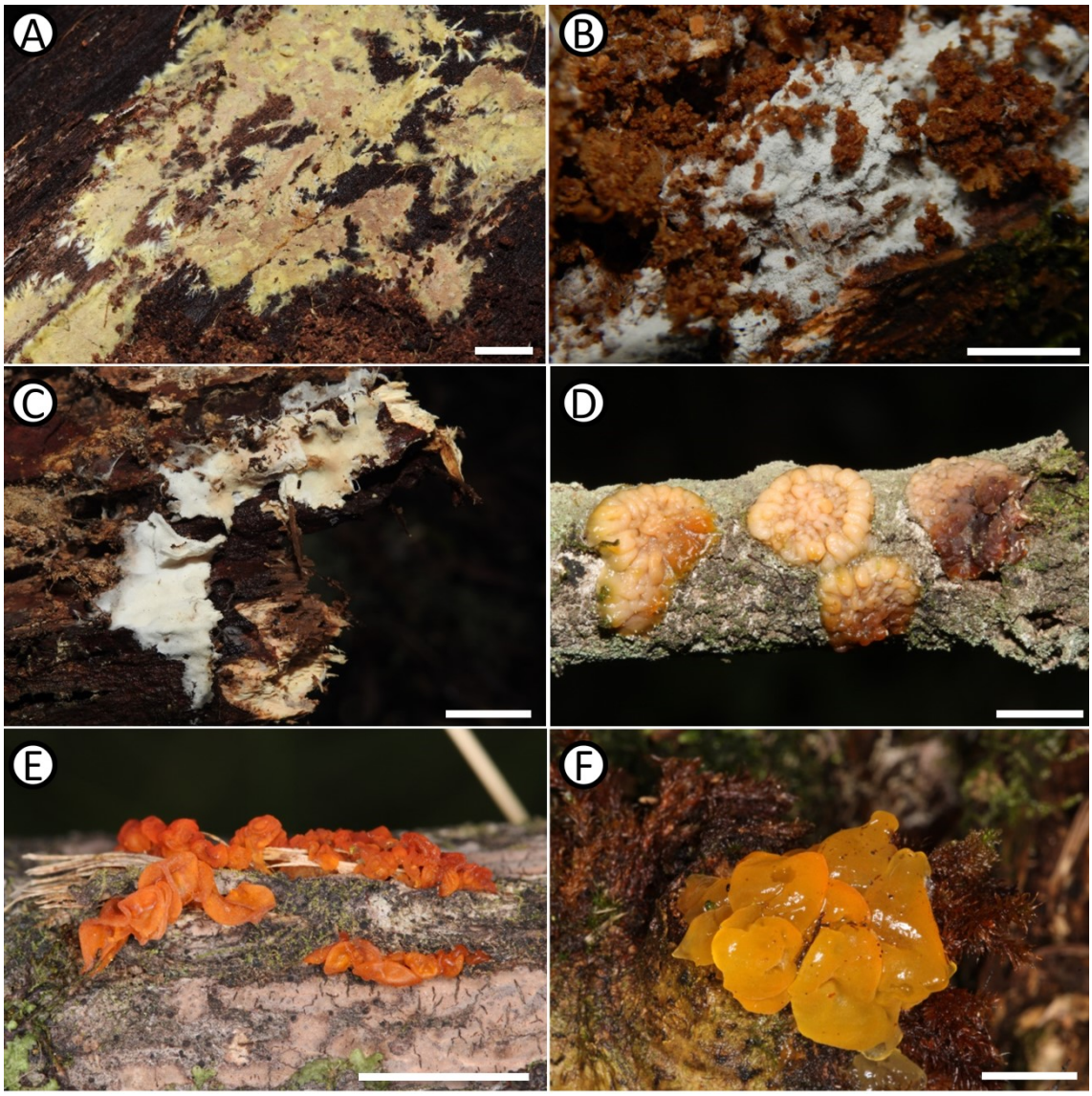
Description: Lowy (1971, as *T. lutescens* Fr.).

Habitat: Dead branches of angiosperms, fungal host not known.

Material examined: BRAZIL. Santa Catarina. Urubici, RPPN Portal das Nascentes, "Water trail", 09 January 2021, MIND.Funga 408; *ibidem*, Parque Nacional de São Joaquim, TN3500, 22 June 2021, MIND.Funga 977.

Remarks: Our specimens differ from *T. mesenterica* by having smaller basidiospores (8.0–9.5 × 5.5–6.5 µm versus 10–14.5 × 8.5–12 µm) (Lowy 1971). *T. brasiliensis* (A. Möller) Lloyd is another species in the *T. mesenterica* group originally described from Santa Catarina, but which differs by having much larger spores [15–21(–24) × 14–19(–21) µm] (Lowy 1971). *T. erythrina* X.Z. Liu & F.Y. Bai is a similar species from China, but which differs by having smaller and more effused basidiomata (Zhao et al. 2019).

Figure 22. A - *Xenasmatella vaga*; B - *Trechispora farinacea* ; C - *Trechispora regularis*; D - *Sirobasidium sanguineum*; E - *Tremella mesenterica*; F - *Tremella* aff. *mesenterica*.



Bars = 1 cm. Pitcures: Thiago Kossmann Cardoso/Mahatmã Titton.

4.2. Preliminary global conservation status assessment of fungal species found in the Aparados da Serra region

***Aegis luteocontexta* –** Vulnerable C1 (Bittencourt et al. 2021)

***Agrocybe perfecta* –** Vulnerable C1+2a(ii)

Justification: This is a rare species known only from Montane and Submontane environments of Southern Brazil, Argentina and Bolivia, in the Araucaria forests and the Yungas (Rick 1938,Meijer 2006, Melgarejo-Estrada 2020, Niveiro et al. 2020). Total population is estimated at 5,000 to 10,000 mature individuals, distributed in 500

sites with up to 20 mature individuals per site, where each functional individual accounts for 2 mature individuals. A population decline of 10−15% is projected to occur in the next 20 years (3 generations length) due to deforestation, impact of introduced species (mainly cattle), and climate change (Mulligan et al. 2011,Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable under criteria C1+2a(ii)

***Antrodia neotropica* –** Vulnerable C1(Drechsler-Santos et al. 2020a)

***Antrodiella trivialis* –** VU C2a(ii)

Justification: This is a rare species, so far known only from Southern Brazil in Santa Catarina and Rio Grande do Sul states, and in Southeastern Brazil in São Paulo state (Westphalen et al. 2019). It is mostly found in montane environments, but has also been recorded in lowland forests (Westphalen et al. 2019). It is expected to be found in the Subtropical Atlantic forest, including the Araucaria and Coastal forests. Total population is estimated at 5,000 to 10,000, distributed in around 1,000 sites with an average of up to 10 mature individuals per site, with each functional individual accounting for 2 mature individuals. A population decline of ca. 7.5% is projected in the future, mainly in montane environments, due to deforestation, impact of introduced species (mainly cattle), and climate change (Mulligan et al. 2011,Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C2a(ii).

***Aurantiopileus mayaensis* –** Near Threatened A3c; C1

Justification: *A. mayaensis* is a rare species, so far known only from montane and upper-montane ecosystems (mostly Cloud Forests) in Belize (type locality) and in Southern (Rio Grande do Sul and Santa Catarina) and Southeastern (São Paulo and Rio de Janeiro) Brazil (Ginns 2010, Bittencourt 2019, GBIF 2022). Total population is estimated at 10,000 to 16,000 mature individuals, distributed in around 2,000 sites, with an average of up to 8 mature individuals per site, and each functional individual accounting for 2 mature individuals. A projected population reduction of 15−25% is projected in the next 30 years (3 generations length) due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Mulligan et al.

2011,Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Near Threatened A3c; C1.

Ceriporia straminea – Near Threatened C1

Justification: This is a rare species, so far known only from montane/cloud forests (>1,000 m.a.s.l.) in the Bolivian Yungas, Costa Rica and Southern Brazil. Total population is estimated at 15,000 to 20,000 mature individuals, distributed in around 2,000 sites with an average of up to 10 mature individuals per site, with each functional individual accounting for 2 mature individuals. A projected population reduction of 10–15% is projected in the next 20 years (3 generations length) due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Mulligan et al. 2011,Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Near Threatened C1.

***Cinereomyces dilutabilis* –** Vulnerable A2+4c; C1 (Martins da Cunha et al 2021a)

Coltricia stuckertiana – Vulnerable A2c+3c+4c

Justification: Coltricia stuckertiana is a root parasite species known from the Chaco Forests of Argentina and Paraguay, and recently reported from the Amazon and Upper-Montane forests in Southern Brazil (Ryvarden 2004, Baltazar et al. 2010, Silva 2021, This study). In Brazil, it seems to be a rare species, while in the Chaco it is relatively common. However, the Chaco is one of the deforestation hotspots in South America, having lost 11.5% of forest areas in the last 20 years, with some ecosystems having a loss of over 20% in the same period (Sancha 2021, MapBiomas Chaco Project 2022). Taking in account also the deforestation in the Amazon and habitat loss in Southern Brazil, the species has suffered and will suffer in the future a projected population decline of 30%. It is preliminarily assessed as Vulnerable A2c+3c+4c.

***Etheirodon purpureum* –** Near Threatened C1

Justification: *Etheirodon purpureum* is a rare species, so far known only from montane environments of Southern Brazil and from one locality in a Cloud Forest in Venezuela (Westphalen et al. 2021). It is expected to be found in other montane environments across its distributional gap, but to be rare throughout. Total population is estimated at 10,000 to 20,000 mature individuals, distributed in around 2,000 sites with an average

of up to 10 mature individuals per site, where each functional individual accounts for 2 mature individuals. A population loss of 10–15% is estimated over the next 20 years (3 generations length), driven mainly by deforestation and impacts of climate change (Mulligan et al. 2011, IPCC 2022). It is preliminarily assessed as Near Threatened C1.

Fomitiporia apiahyna – Vulnerable A3c

Justification: This species was previously thought to be widespread through the Neotropics, but was recently proven to be likely restricted to montane environments of the Atlantic Forest (Alves-Silva et al. 2020a). Total population is estimated at 10,000 to 15,000 mature individuals, distributed in ca. 500 sites throughout the Serra do Mar mountain range and the Southern Brazilian Plateau, with each site containing an average of up to 30 mature individuals. A population decline of 35–45% is estimated to occur in the next 50 years (3 generations length), due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Mulligan et al. 2011,Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable A3c.

***Fomitiporia nubicola* –** Endangered C2a(ii)

Justification: This species was previously listed as Vulnerable C2a(ii) in the IUCN Red List (Drechsler-Santos et al. 2020b). Its population was estimated at up to 10,000 mature individuals, as it was expected to follow its host's distribution throughout montane environments in Southern and Southeastern Brazil. However, in our extensive surveys throughout a good part of the host's distribution, as well as Alves-Silvas' surveys through the potential distribution of the species in his Mohamed bin Zayed Species Conservation Fund approved project to identify new sites of the species (Alves-Silva personal comments), it could not be found outside of its type locality. This is an indication that it is either much rare than previously thought, or that it has a much more restricted range. This has led us to decrease the number of pontential sites to 50, and population estimates to up to 2,500 mature individuals. It is therefore preliminarily reassessed as Endangered C2a(ii).

***Heteroradulum brasiliense* –** Vulnerable C2a(ii)

Justification: This is a very rare species, so far known only from Southern Brazil, and previously to this study, known only from the type specimens (Lowy 1971, Malysheva

and Spirin 2017). It is probably restricted to the colder areas in the Atlantic Forest in Southern Brazil. Total population is estimated at 2,500 to 5,000 mature individuals, distributed in 500 sites in Southern Brazil, each with an average of up to 10 mature individuals, where each functional individual accounts for 2 mature individuals. An estimated population loss of 7.5–10% is estimated to occur in the next 20 years, in lower areas mainly due to habitat loss for urban and agricultural expansion, and in montane areas mainly due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Brooks and Balmford 1996, Pinto et al. 2006, Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C2a(ii).

***Hyphodontia corticioidea* –** Vulnerable C1+2a(ii)

Justification: This is a very rare species, known from only three localities in Southeastern Brazil (São Paulo) and Southern Brazil (Rio Grande do Sul) (Hjortstam 1999, Baltazar 2014). All known records are from montane and submontane ecosystems (>600 m.a.s.l.). It is expected to be found in other localities with similar environments with subtropical climates in the Atlantic Forest. Total population is estimated at 5,000 to 7,500 mature individuals, distributed in 750 sites, each holding an average of up to 10 mature individuals, with each functional individuals counting as 2 mature individuals. An estimated population decline of 10% is estimated in the next 20 years (3 generations length), in lower areas mainly due to habitat loss for urban and agricultural expansion, and in montane areas mainly due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Brooks and Balmford 1996, Pinto et al. 2006, Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C1+2a(ii).

Hypochnicium horridulum – Data Deficient

Justification: This is an apparently rare species, so far known only from its type locality in Argentina (near Buenos Aires) and Southern Brazil (Rio Grande do Sul, Paraná) (Hjortstam and Ryvarden 2004, Baltazar et al. 2016).). It was originally described from a *Eucalyptus* tree in Argentina, but has subsequently been found on various substrates, including palm trees in Brazil (Hjortstam and Ryvarden 2004). For this reason, estimating its population size, distribution and population decline is too elusive. For this reason, it is preliminarily assessed as Data Deficient.

Laetiporus squalidus – Vulnerable C1+2a(ii)

Justification: This species is listed in the IUCN Red List as Vulnerable C2a(ii) (Drechsler-Santos et al. 2020c). However, in the original assessment of the species, as well is in our projections, a population decline of 10–15% is estimated in the next 30 years (3 generations length). For this reason, it is reassessed as Vulnerable C1+2a(ii).

Meruliopsis cystidiata – Vulnerable C2a(ii)

Justification: This species is listed in the IUCN Red List as Vulnerable under criteria B2ab(ii,iii,v); C2a(i); D1 (Calle et al. 2020b). However, in the original assessment, the population size and area of occupancy are likely extremely underestimated. In our estimates, total population size of this species can range from 7,500 to 10,000 mature individuals, and its area of occupancy would largely exceed the thresholds for threatened categories established by IUCN. It is preliminarily reassessed as Vulnerable C2a(ii).

***Microporellus brasiliensis* –** Vulnerable C1+2a(ii)

Justification: This is rare species, so far known only from montane ecosystems (>900 m.a.s.l.) in Southern Brazil (Decock and Ryvarden 2002, Meijer 2006, Westphalen et al. 2013, this study). Total population is estimated at up to 5,000 mature individuals, distributed in 500 sites throughout the Araucaria forests in Southern Brazil, with each site supporting an average of up to 10 mature individuals, where each functional individual accounts for 2 mature individuals. A population decline of 15–20% is estimated in the next 30 years (3 generations length), due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C1+2a(ii).

***Morganella austromontana* –** Vulnerable C1+2a(ii)

Justification: This is a rare species currently known only from montane and submontane Araucaria Forests in Southern Brazil (Alvez et al. 2017). Total population is estimated at 8,000 to 10,000 mature individuals, distributed in ca. 500 sites throughout the Araucaria Forests in Southern Brazil, with each site supporting an average of up to 20 mature individuals, with each functional individual counting as 4 mature individuals on

average. A population decline of 10–15% is estimated in the next 20 years (3 generations length), due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C1+2a(ii).

Mycena paranaensis – Data Deficient

Justification: This species is currently known from Parana, Rio Grande do Sul and Argentina (Meijer 2008, Niveiro et al. 2015, This study). It is very similar to *M. leaiana*, and Niveiro et al. (2015) concluded that specimens from Argentina identified as *M. leaiana* probably represent *M. paranaensis*. This could also be the case for sightings of *M. leaiana* found in Southern Brazil. Molecular data from our study conclude that *M. paranaensis* and *M. leaiana* are distinct species, but a broad revision of *M. paranaensis* and *M. leaiana* in Brazil is needed before it can be assessed as threatened or not. For this reason, it is preliminarily assessed as Data Deficient.

***Mycorrhaphium hispidum* –** Vulnerable C1+2a(ii)

Justification: This species is so far known only from montane environments of Southern (Rio Grande do Sul and Santa Catarina) and Southeastern (São Paulo) Brazil (Westphalen et al. 2019). It probably occurs also in other areas with similar climate and vegetation along the Atlantic Forest. Total population is estimated at 5,000 to 7,500 mature individuals, distributed in ca. 750 sites, with each site holding an average of up to 10 mature individuals, with each functional individual counting as 2 mature individuals. A population decline of 10–15% is estimated in the next 20 years (3 generations length), due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C1+2a(ii).

***Peniophora carneorosea* –** Data Deficient

Justification: This is an uncommon species, so far known from Southern Brazil and Argentina (Buenos Aires region) (Baltazar 2016). Its exact habitat and potential distribution are still unclear, thus, its population size and trends cannot be estimated. It is preliminarily assessed as Data Deficient.

***Perenniporia piperis* –** Vulnerable C2a(ii)

Justification: This is a relatively rare species, so far known only from Southern Brazil and Argentina (Misiones Province) (Rajchenberg and Wirght 1982, Guerrero and Silveira 1991, Gerber et al. 1999). It is likely restricted to subtropical environments of the Atlantic Forest. Total population is estimated at up to 9,000 mature individuals, distributed in around 600 sites, with each site supporting an average of up to 15 mature individuals, where each functional individual accounts for 2 mature individuals. A population decline of 7.5% is projected in the next 20 years (3 generations length), due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Brooks and Balmford 1996, Pinto et al. 2006, Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is assessed as Vulnerable C2a(ii).

Skeletocutis roseola – Vulnerable C2a(ii) (Martins da Cunha 2021).

***Steccherinum neonitidum* –** Vulnerable C1+2a(ii)

Justification: This is a rare species, so far known only from montane environments Southern (Rio Grande do Sul) and Southeastern (São Paulo) Brazil (Silveira and Guerrero 1991, Westphalen et al. 2018). It is expected to be found throughout other areas with similar characteristics in Southern Brazil and Southeastern Brazil. Total population is estimated at 5,000 to 7,500 mature individuals, distributed in 750 sites, each holding an average of up to 10 mature individuals, with each functional individuals counting as 2 mature individuals. An estimated population decline of 10% is estimated in the next 20 years (3 generations length), in lower areas mainly due to habitat loss for urban and agricultural expansion, and in montane areas mainly due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Brooks and Balmford 1996, Pinto et al. 2006, Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C1+2a(ii).

***Stropharia venusta* –** Vulnerable C2a(ii) (Kosmann et al. 2021a)

Wrightoporia araucariae – Critically Endangered A3c (Robledo et al. 2020a)

***Wrightoporia porilacerata* –** VulnerableC2a(ii) (Robledo et al. 2020b)

***Wynnea gigantea* –** Vulnerable A3c

Justification: *Wynnea gigantea* is a very rare species found in Central America, Peru, and Southern Brazil (Pfizer 1979, Xu et al. 2019, This study). It seems to be restricted to colder climates, as in Brazil it is only found in montane environments and in the coldest regions of the country, and in Central America, it is only known from montane ecosystems. It grows in association with *Armillaria* species, but the exact relationship is still unknown (Xu et al. 2019). The species can be expected to be found in other cold and montane environments in its distributional gap (i.e. the Yungas forming a bridge between the Atlantic Forest and the Andes), but it is likely extremely rare. Total population is estimated at 15,000 to 20,000 mature individuals distributed in around 2,000 sites with an average of up to 10 mature individuals per site, with each functional individual accounting for 2 mature individuals. A projected population reduction of 30–40% is projected in the next 50 years (3 generations length) due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable A3c.

Xylaria pseudoapiculata **–** Vulnerable C2a(ii)

Justification: This is a very rare species, so far known only from two localities in Southern Brazil, the type locality in Rio Grande do Sul, and Parque Nacional de São Joaquim in Santa Catarina. It is expected to occur along the Araucaria Forests in Southern Brazil, but to be very rare throughout. Total population is estimated at up to 10,000 mature individuals, distributed in around 500 sites, with each site supporting an average of up to 20 mature individuals, where each functional individual accounts for 2 mature individuals. A population decline of 7.5–10% is estimated in the next 20 years (3 generations length) due to deforestation, impacts of introduced species (mainly cattle), and impacts of climate change (Mulligan et al. 2011, Carlucci et al. 2016, Castro et al. 2020, IPCC 2022). It is preliminarily assessed as Vulnerable C2a(ii).

5. Conclusions

This study is a pioneering and herculean work, being the first to sample, identify and synthetize the information about diversity and conservation of all groups of macrofungi from the Aparados da Serra region. Through it, it was possible to sample never before survey areas for fungi in Santa Catarina state, and greatly increase the number of known species in the region, as well as recognizing the threats and potential extinction risks of many species.

Scientific papers are already being elaborated to describe some of the many potential new taxa found during this study, and the results found here can be used to substantiate countless other studies. Our results have shown that over 1/6 of the species found are probable taxonomic novelties, with even more to be investigated. At least other 120 specimens, representing 80 species were analyzed but left out of this study for lack of time of a proper discussion. Most of these were from understudied groups in the region and are likely new species and even genera that need further studies in the future.

The recognition of the extinction risk of fungal species is a recent movement in Brazil, and the publication of threatened species in the IUCN Red List is crucial for the effective recognition of the need for protection for these species. Also, a paper is being written with several other mycologists from Brazil, with a demand for the inclusion of fungi in official red lists and in the legislation.

Collections identified during this study are also being used to feed an artificial intelligence designed to be used in a Citizen Science program by the MIND.Funga research group and will be the first Citizen Science program focused on macrofungi from Brazil.

Finally, it worth mentioning that due to the short time available for the conduction of this study, which was especially affected by the Covid-19 pandemic, only a fraction of the more than 900 specimens collected in the Aparados da Serra region were analyzed. Considering the current rate of species discovery, that would represent over 400 species additional species. Most of these collections represent understudied groups in the region, such as Ascomycetes, agaricoid and jelly fungi. All collections are preserved, will be deposited into FLOR Fungarium and have high-quality associated data, and will serve to back-up innumerable other studies in the future.

6. Communication and publication plan

The outcomes of this study will result in many publications, both aimed at the general public, as a form of science communication, as well as scientific papers, to officially publish the novelties found in this study's scope.

As a tool of science communication, to increase the awareness of the local people about the Funga of the Aparados region, a book will be prepared, presenting pictures, scientific names and data, such as habitat and ecology, of the fungal species found in the region. The book will be distributed free of charge to public schools in the Aparados region. Additionaly, field guides will be prepared and distributed both to public schools and outdoor tour guides.

Taxonomic novelties from this study will be published in papers in scientific journals with a B2 or above Qualis classification and >1.0 Impact Factor. Currently, three papers are in preparation: "Two new species of *Resinomycena* and *Rhizomarasmius* (Agaricales, Basidiomycota) from Southern Brazil", "*Sidera araucariae* (Hymenochaetales, Basidiomycota), a new species associated with *Araucaria angustifolia*", and "*Stereum gloeocystidiatum* sp. nov. (Russulales, Basidiomycota), the first known species of *Stereum* with gloeocystidia".

7. Bibliography

Aime, M.C., Brearley, F.Q. 2012. *Tropical fungal diversity: closing the gap between species estimates and species discovery*, Biodivers Conserv 21**:** 2177–2180. https://doi.org/10.1007/s10531-012-0338-7

Alberti, M., Niveiro, N., Zied, D.C., Albertó, E. 2020. *Identification of Oudemansiella canarii and O. cubensis (Basidiomycota, Physalacraceae) in Argentina using morphological, culture and molecular analysis*, Harvard Papers in Botany 25(2): 131–143.

Alvarenga, R.L.M. 2016. *Fungos Gelatinosos: Aspectos Taxonômicos e Biogeográficos*, Master's Dissertation, Universidade Estadual de Goiás, Anápolis, Brazil.

Alves, C.R., Cortez, V.G., Silveira, R.M.B. 2017. *Morganella austromontana sp. nov. from the South Brazilian Plateau*, Mycotaxon 132(2): 281-287. doi:10.5248/132.281.

Alves-Silva, G. 2020. *Taxonomia e Filogenia de Fomitiporia (Hymenochaetales, Basidiomycota) no Brasil*, Ph.D Thesis, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil.

Alves-Silva, G., Reck, M.A., da Silveira, R.M.B., Robledo, G.L., Góes-Neto, A., Drechsler-Santos, E.R. 2020a. *The Neotropical Fomitiporia (Hymenochaetales, Basidiomycota): the redefinition of F. apiahyna s.s. allows revealing a high hidden species diversity*, Mycol Progress 19**:** 769-790. https://doi.org/10.1007/s11557-020-01593-5.

Alves-Silva, G., Drechsler-Santos, E.R., da Silveira, R.M.B. 2020b. *Bambusicolous Fomitiporia revisited: multilocus phylogeny reveals a clade of host-exclusive species*, Mycologia: 1-16. https://doi.org/10.1080/00275514.2020.1741316.

Antonín, V., Noordeloos, M.E. 2010. *A Monograph of Marasmioid and Collybioid fungi in Europe*. Koeltz, Königstein, Germany.

Baldoni D.B., Coelho G., Jacques R.J.S., Silveira R.M.B., Grebenc T., Antoniolli Z.I. 2012. *Brown rottingfungus closely related to Pseudomerulius curtisii (Boletales) recorded for the first time in SouthAmerica*, Mycosphere 3(5), 533–541. doi 10.5943 /mycosphere/3/5/1 .

Baltazar, J.M. 2014. *Estudo taxonômico de homobasidiomicetos corticióides (Agaricomycetes, Basidiomycota) na Região Sul do Brasil*, Ph.D Thesis, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil.

Baltazar J.M., Gibertoni T.B. 2009. *A checklist of the aphyllophoroid fungi (Basidiomycota) recorded from the Brazilian Atlantic Forest*, Mycotaxon 109: 439–442. doi:10.5248/109.439.

Baltazar, J.M., Ryvarden, L., Gibertoni, T.B. 2010. *The genus Coltricia in Brazil: new records and two new species,* Mycologia, 102(6): 1253–1262. doi:10.3852/09-227.

Baltazar, J.M., Silveira, R.M.B.D., Rajchenberg, M. 2016. *Type studies of J. Rick's corticioid homobasidiomycetes (Agaricomycetes, Basidiomycota) housed in the Herbarium Anchieta (PACA),* Phytotaxa, 255(2): 101-132. doi:10.11646/phytotaxa.255.2.1.

Bánki, O., Roskov, Y., Döring, M., Ower, G., Vandepitte, L., Hobern, D., Remsen, D., Schalk, P., DeWalt, R. E., Keping, M., Miller, J., Orrell, T., Aalbu, R., Adlard, R., Adriaenssens, E., Aedo, C., Aescht, E., Akkari, N., Alonso-Zarazaga, M. A., et al. 2022. *Catalogue of Life Checklist* (Version 2022-01-14). Catalogue of Life. https://doi.org/10.48580/d4tp.

Baral, H.O. 2009. *Iodine reaction in Ascomycetes: why is Lugol's solution superior to Melzer's reagent?*, In Vivo Veritas, published online Jan. 2009. Available at <http://www.in-vivo-veritas.de/articles/iodine-reaction-in-ascomycetes-why-is-lugols-solution-superior-to-melzers-reagent/>. Consulted 21 June 2022.

Bernicchia A., Gorjón S.P. 2010. *Corticiaceae s.l.,* Fungi Europaei 12. Candusso, Italy.

Bischoff, J. F., Chaverri, P., White, J. F. 2005. *Clarification of the host substrate of Ascopolyporus and description of Ascopolyporus philodendrus sp. nov.,* Mycologia, 97(3): 710–717. doi:10.1080/15572536.2006.1183280.

Bittencourt F. 2016. *Diversidade Taxonômica e Funcional de Fungos Poliporóides em Duas Unidades de Conservação em Blumenau/SC*, Undergraduate Monography, Universidade Regional de Blumenau.

Bittencourt F. 2019. *Fungos Poliporoides das Vegetações de Altitude do Parque Nacional de São Joaquim, Urubici/Sc*, M.Sc Dissertation, Universidade Federal de Santa Catarina, Florianópolis, Brazil.

Bittencourt, F., Calle, A., Drechsler-Santos, E.R., da Cunha, K.M., Kossmann, T., Sandoval-Leiva, P. & Vasco-Palacios, A. 2020. *Aegis luteocontexta*. *The IUCN Red List of Threatened Species* 2020: e.T172817975A172861292. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T172817975A172861292.en. Accessed on 18 May 2022.

Bon, M. 1999. *Les Collybio-Marasmioides et ressemblants*, Documents Mycologiques - Flore Mycologique d'Europe 5: 1-171.

Bononi V.L.R. 1981. *Alguns Basidiomicetos hidnóides da região amazônica*, Ricki 9: 17-30.

Breitenbach, J., Kränzlin. F. 1991. *Champignons de Suisse, Tome 3: Bolets et Champignons à lames, 1ère partie: Strobilomycetaceae, Boletaceae, Paxillaceae, Gomphidiaceae, Hygrophoraceae, Tricholomataceae, Polyporaceae*. Mycologia, Lucerne, Switzerland.

Brooks, T., Balmford, A. 1996. *Atlantic forest extinctions*, Nature 380: 115.

Bruijnzeel, L.A., Hamilton, L.S. 2000. *Decision time for cloud forests*. IHP Humid Tropics Programme Series no. 13. Paris: IHP-UNESCO, Amsterdam: IUCN-NL, and Gland: WWF International.

Burdsall, H.H., Miller, O.K. 1975. *A reevaluation of Panellus and Dictyopanus (Agaricales)*, Beihefte zur Nova Hedwigia 51: 79-91.

Callan, B.E., Rogers, J.D. 1990. *Teleomorph-anamorph conncetions and correlations in some Xylaria species*, Mycotaxon 36(2): 343-369.

Calle, A., Drechsler-Santos, E.R., Kossmann, T., da Cunha, K.M., Sandoval-Leiva, P., Torres, D., Vasco-Palacios, A. 2020a. *Fomitiporia bambusarum. The IUCN Red List of Threatened Species 2020: e.T172742034A172861252.* https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T172742034A172861252.en. Accessed on 12 May 2022.

Calle, A., Drechsler-Santos, E.R., Kossmann, T., da Cunha, K.M., Vasco-Palacios, A. 2020b. *Meruliopsis cystidiata*, The IUCN Red List of Threatened Species 2020: e.T172818155A172861312. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T172818155A172861312.en. Accessed on 11 May 2022.

Cannon, P., Aguirre-Hudson, B., Aime, M.C., Ainsworth, A.M., Bidartondo, M.I., Gaya, E., Hawksworth, D., Kirk, P., Leitch, I.J., Lücking, R. 2018. *State of the World's Fungi 2018 1. Definition and diversity.* In: K. J. Willis (ed.), State of the World's Fungi. Report. Royal Botanic Gardens, Kew. pp. 4-11.

Capelari, M., Gugliotta, A.M. 2005. *Dactylosporina e Oudemansiella (Tricholomataceae, Oudemansiellinae) do Parque Estadual das Fontes do Ipiranga (PEFI), Sao Paulo, SP*, Hoehnea 32(3): 381-38.

Carbone, M., Agnello, C. 2015. *Studies in Galiella (Ascomycota, Pezizales). IV. Typification and identity of Rhizina spongiosa*, Ascomycete.org, 7 (6) : 289-293. doi: 10.25664/art-0149

Carlucci. M.B., Luza, A.L., Hartz, S.M., Duarte, L.D.S. 2016. *Forests, shrublands and grasslands in southern Brazil are neglected and have specific needs for their conservation. Reply to Overbeck et al*., Natureza & Conservação 14(2): 155-157. https://doi.org/10.1016/j.ncon.2016.08.001.

Castro, M.B., Barbosa, A.C.M.C., Pompeu, P.V., Eisenlohr, P.V., Pereira, G.A., Apgaua, D.M.G., Pires-Oliveira, J.C., Barbosa, J.P.R.A.D., Fontes, M.A.L., Santos, R.M., Tng, D.Y.P. 2020. *Will the emblematic southern conifer Araucaria angustifolia survive to climate change in Brazil?,* Biodiversity Conservation 29: 591-607.

Chao, A., Shen, T.J. 2004. *Nonparametric prediction in species sampling*, Journal of Agricultural, Biological, and Environmental Statistics, 9: 253-269.

Chardón, C.E., Miller, J.H., Müller, A.S. 1940. *Ascomycetes from the state of Minas Geraes, Brazil*, Mycologia 32: 172-204.

Chaverri, P., Bischoff, J. F., Evans, H. C., Hodge, K. T. 2005. *Regiocrella, a new entomopathogenic genus with a pycnidial anamorph and its phylogenetic placement in the Clavicipitaceae,* Mycologia, 97(6), 1225–1237. doi:10.3852/mycologia.97.6.1225

Chen, J.J., Shen, L.L., Dai, Y.C. 2015. *Dentipellicula austroafricana sp. nov. supported by morphological and phylogenetic analyses,* Mycotaxon 130(1): 17-25. doi:10.5248/130.17

Chen, Q., Wu, F., Ji, X.H., Si, J., Zhou, L.W., Tian, X.M., Vlasák, J., Dai, Y.C. 2019. *Phylogeny of the genus Fuscoporia and taxonomic assessment of the F. contigua group,* Mycologia: 1–22. doi:10.1080/00275514.2019.1570749

Chen, C.C., Chen, C.Y., Wu, S,H. 2021. *Species diversity, taxonomy and multi-gene phylogeny of phlebioid clade (Phanerochaetaceae, Irpicaceae, Meruliaceae) of Polyporales*, Fungal Diversity 111:337-442. https://doi.org/10.1007/s13225-021-00490-w

Coelho, G., Borges da Silveira, R.M., Rajchenberg, M. 2006. *A new Gloeoporus species growing on bamboo from southern Brazil*, Mycologia. 98(5): 821-827.

Cooke, W.B. 1961. *The genus Schizophyllum*, Mycologia, 53(6): 575–599

Corner, E.J.H. 1950. *A monograph of Clavaria and allied genera*, Oxford Univ. Press. London, UK, 740 pp.

Corner, E.J.H. 1994. *On the agaric genera Hohenbuehelia and Oudemansiella. Part. II: Oudemansiella Speg*., Garden's Bull, Singapore. 46: 49-75.

Cortez, V.G., Silveira, R.M. 2007. *Species of Hypholoma (Fr.) P. Kumm. (Strophariaceae, Agaricales) in Rio Grande do Sul State, Brazil*, Acta bot. bras. 21(3): 609-621. 200. https://doi.org/10.1590/S0102-33062007000300008

Cortez, V.G., Silveira, R.M. 2008. *The agaric genus Stropharia (Strophariaceae, Agaricales) in Rio Grande do Sul State, Brazil,* Fungal Diversity 32: 31-57.

Cortez, V.G., Baseia, I.G., Silveira, R.M.B. 2013. *Gasteroid mycobiota of Rio Grande do Sul, Brazil: Lycoperdon and Vascellum*, Mycosphere 4(4): 745-758. doi:10.5943/mycosphere/4/4/11.

Costa-Rezende, D.H. 2014. *Taxonomia e filogenia preliminar de Amauroderma (Ganodermataceae, Polyporales)*, Master's dissertation, Universidade Federal de Santa Catarina, Florianópolis, Brazil.

Crevel, R. 1995. *Flora Agaricina Neerlandica vol. 3*, CRC Press, Boca Raton, USA.

Cruz, K. S., Cortez, V. G. 2015. *Hypoxylon (Xylariaceae, Ascomycota) from Western Paraná, Brazil,* Brazilian Journal of Botany 38(4): 889–901. doi:10.1007/s40415-015-0189-z.

Cruz, K.S., Cortez, V.G. 2015. *Xylaria (Xylariaceae, Ascomycota) in the Parque Estadual de São Camilo, Paraná, Brazil*, Acta Biol. Par., Curitiba, 44 (3-4): 129-144.

Dahlberg, A., Mueller, G. M. 2011. *Applying IUCN red-listing criteria for assessing and reporting on the conservation status of fungal species,* Fungal Ecology, 4(2), 147-162. doi:10.1016/j.funeco.2010.11.00

Dämon, W., Hausknecht, A. 2002. *First report of a Sirobasidium species in Austria, and a survey of the Sirobasidiaceae*, Osterr Z Pilzkd 11: 133-151.

David, A., Rajchenberg, M. 1985. *Pore fungi from French Antilles and Guiana*, Mycotaxon 22(2): 285-325.

Decock, C., Ryvarden, L. 2002. *Two undescribed Microporellus species and notes on M. clemensiae, M. setigerus and M. subincarnatus*, Czech Mycology 54: 19-30.

Delaux, P., Radhakrishnanb, G.V., Jayaramanac, D., Cheemab, J., Malbreilde M., Volkeningf, J.D., Sekimoto, H., Nishiyama, T., Melkonian, M., Pokorny, L., Rothfels, C. J., Sederoff, H.W., Stevenson, D.W., Surek, B., Zhang, Y., Sussman M.R., Dunand, C., Morris, R.J., Roux, C., Wong, G. K., Oldroyd, G.E.D., Ané, J. 2015. *Algal ancestor of land plants was preadapted for symbiosis*, Proceedings of the National Academy of Sciences, 112(43): 13390-13395; https://doi.org/10.1073/pnas.1515426112.

Dennis, R.W.G. 1956. *Some Xylarias of tropical America*, Kew Bull. 3: 401–444.]

Dentinger, B.T.M., Margaritescu, S., Moncalvo, J.M. 2010. *Rapid and reliable high-throughput methods of DNA extraction for use in barcoding and molecular systematics of mushrooms,* Molecular Ecology Resources 10: 628-633.

Desjardin, D.E. Horak, E. 1997. *Marasmius and Gloiocephala in the South Pacific Region: Papua New Guinea, New Caledonia, and New Zealand taxa,* Bibliotheca Mycologica 168: 1-152.

Desjardin D.E., Perry, B.A., Stevani, C.V. 2016. *New luminescent mycenoid fungi (Basidiomycota, Agaricales) from São Paulo State, Brazil*, Mycologia 108(6): 1165-1174. doi: 10.3852/16-077.

Dixon, J.R. 1975. *Chlorosplenium and its segregates. II. The genera Chlorociboria and Chlorencoelia*, Mycotaxon. 1(3): 193-237.

Drechsler-Santos, E.R., Demetrio, A.M., Salvador-Montoya, C., Souza-Aguiar, C., Costa-Rezende, D.H., Mafalda-Freire, F., Kaipper, G., Souza, J.F., Friedrich, R.C.S., Ferreira-Lopes, V. 2014. *Macrofungos do Parque Nacional de São Joaquim: Aspectos preliminares sobre a micodiversidade,* in: Castilho, P.V., Omena, M.T.R.N., Taniwaki, M.H. (Eds.). *Parque Nacional de São Joaquim: Portal do conhecimento*. p. 23-44. Santaré, São Paulo, Brazil.

Drechsler-Santos, E.R., Kossmann, T., da Cunha, K.M., Torres, D. Vasco-Palacios, A. 2020a. *Antrodia neotropica. The IUCN Red List of Threatened Species 2020: e.T172817995A172861297*. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T172817995A172861297.en. Accessed on 13 May 2022.

Drechsler-Santos, E.R., Alves-Silva, G., Kossmann, T., Bittencourt, F., da Cunha, K.M. 2020b. *Fomitiporia nubicola. The IUCN Red List of Threatened Species 2020: e.T187001148A187004600*. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T187001148A187004600.en. Accessed on 12 May 2022.

Drechsler-Santos, E.R., Kossmann, T., Bittencourt, F., Oliveira, C. & da Cunha, K.M. 2020c. *Laetiporus squalidus*. *The IUCN Red List of Threatened Species* 2020: e.T187000831A187004590. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T187000831A187004590.en. Accessed on 18 May 2022.

Dring, D.M. 1980. *Contributions towards a rational arrangement of the Clathraceae*, Kew Bulletin 35: 1-96.

Drummond, A.J., Ashton, B., Buxton, S., Cheung, M., Cooper, A., Heled, J., Kearse, M., Moir, R., Stones-Havas, S., Sturrock, S., Thierer, T., Wilson, A. 2010. *Geneious*

v.4.8.5, developed by Biomatters. Available on http://www.geneious.com/ (consulted 25 May 2022).

Dumont, K.P. 1980. *Sclerotiniaceae XVI. On Helotium rufocorneum and Helotium fraternum*, Mycotaxon 12(1): 255-277.

Ellis, M.B., Ellis, H., Ellis, J.P. 1990. *Fungi without gills (Hymenomycetes and Gasteromycetes): an identification handbook*. Springer Science & Business Media, New York, USA.

Eriksson, J., Ryvarden, L. 1975. *The Corticiaceae of North Europe, Vol. 3, Coronicium – Hyphoderma*. Fungiflora, Oslo, Norway.

Eriksson, J., Ryvarden, L. 1976. *The Corticiaceae of North Europe, Vol. 4, Hyphodermella – Mycoacia*. Fungiflora, Oslo, Norway.

Eriksson, J., Hjortstam, K. Ryvarden, L. 1981. *The Corticiaceae of North Europe, Vol. 6, Phlebia – Sarcodontia*. Fungiflora, Oslo, Norway.

Falkenberg, D.B. 2003. *Matinhas nebulares e vegetação rupícula dos Aparados da Serra Geral (SC/RS), sul do Brasil,* Ph.D. Thesis, Universidade Estadual de Campinas, Campinas, São Paulo, Brasil.

Falkenberg, D.B., Voltolini, J.C. 1995. *The montane cloud forest in southern Brazil*. In: Hamilton, L.S., Juvik, J.O. & Scatena, F.N. (Eds.). Tropical montane cloud forests. New York, Springer; https://doi.org/10.1007/978-1-4612-2500-3_23.

FAO. 1993. *Summary of the final report of forest resources assessment 1990 for the tropical world*. Paper prepared for the 11 th COFO meeting, Rome.

Foster, P. 2001. *The potential negative impacts of global climate change on tropical montane cloud forests,* Earth-Science Reviews 55(12): 73-106. https://doi.org/10.1016/S0012-8252(01)00056-3.

Fidalgo O. 1962. *Rick, o pai da micologia brasileira*, Rickia. 1: 3-11.

Fidalgo, O. 1968. *Introdução à história da micologia brasileira*, Rickia 3: 1-44.

Fidalgo, O. 1985. *A história da micologia brasileira*: *Brasil Colônia*, Revista da HSBC 2: 47-51.

Flora e Funga do Brasil. 2022. Jardim Botânico do Rio de Janeiro. Available at: < http://floradobrasil.jbrj.gov.br/ >. Acessed 10 June 2022.

Fournier, J., Lechat, C. 2015. New, rarely recorded and unsettled species of Hypoxylon (Xylariaceae) from French Guiana, Ascomycete.org 7(2): 63-96.

Fournier, J., Lechat, C., Courtecuisse, R. 2015. *The genus Hypoxylon (Xylariaceae) in Guadeloupe and Martinique (French West Indies)*, Ascomycete.org 7(5): 145-212.

Furtado, A.N.M., Daniels, P.P., Neves, M.A. 2016. *New species and new records of Clavariaceae (Agaricales) from Brazil*, Phytotaxa 253(1): 1-26. doi.org/10.11646/phytotaxa.253.1.1.

Gerber, A.L., Neves, M.A., Loguercio-Leite, C. 1999. *Some species of Perenniporia Murrill (Poriales, Basidiomycotina) from Southern Brazil*, Revta brasil. Bot. 22(2): 185-193.

Ghobad-Nejhad, M., Langer, E. 2018. *A new species in Aleurodiscus s.l. (Stereaceae, Russulales) from Iran,* Phytotaxa: 351(4), 264. doi:10.11646/phytotaxa.351.4.2

Gilbertson, R.L., Hemmes, D.E. 2004. *New species of lignicolous basidiomycetes from Hawaii*, Memoirs of the New York Botanical Garden 89:81-92.

Gillen, K., Læssøe, T., Kirschner, R., Piepenbring, M. 2012. *Favolaschia species (Agaricales, Basidiomycota) from Panama and Ecuador,* Nova Hedwigia 96: 117-165.

Ginns, J., Lindner, D.L., Baronia, T.J. Ryvarden, L. 2010. *Aurantiopileus mayanensis a new genus and species of polypore (Polyporales, Basidiomycota) from Belize with connections to existing Asian species,* North American Fungi 5: 1-10.

Ghobad-Nejhad, M., Kotiranta, H. 2007. Re-evaluation of Radulomyces rickii and notes on Radulomyces and Phlebiella (Basidiomycota), Mycotaxon 102: 101-11.

Góes-Neto, A., Loguercio-Leite, C., Guerrero, R.T. 2005. *DNA extraction from frozen field-collected and dehydrated herbarium fungal basidiomata: performance of SDS and CTAB-based methods,* Biotemas 18(2): 19-32. doi.org/10.5007/%25x.

Gorjón, S.P. 2020. *Genera of corticioid fungi: keys, nomenclature and taxonomy,* Studies in Fungi 5(1): 125–309. doi 10.5943/sif/5/1/12.

Gryzenhout, M., Jefwa, J.M., Yorou, N.S. 2012. *The status of mycology in Africa: A document to promote awareness,* IMA Fungus 3**:** 99-102. https://doi.org/10.5598/imafungus.2012.03.01.11

Guerra, M.P., Silveira, V., Reis, M.S., Schneider, L. 2002. *Exploração, manejo e conservação da araucária (Araucaria angustifolia)*. In: Simões, L.L., Lino, C.F. (eds.) Sustenável mata atlântica: a exploração de seus recursos florestais. Editora SENAC, São Paulo.

Guimarães, D.K.S. 2018. *Estudo sistemático de espécies de Panus FR. (Panaceae, Basidiomycota) que ocorrem no território brasileiro*, Master's dissertation, Universidade Federal de Santa Catarina, Florianópolis, Brazil.

Gutch, K.V.D., Veken, P.V.D. 1992. *Contribution towards a revision of the genus Hypoxylon s. str. (Xylariaceae, Ascomycetes) from Papua New Guinea*, Mycotaxon 44(2): 275-299.

Haines, J.H., Dumont, K.P. 1984. *Studies in the Hyalosciphaceae III: the long-spored, lignicolous species of Lachnum,* Mycotaxon 19: 1-39

Hallenber N., Ryvarden, L. 1975. *Studies in the Aphyllophorales of Africa 5: Cystostereum artocreas, new to Africa*, Mycotaxon 2: 132-141.

Hamme, M.S., Guerrero, R.T. 1997. *Xylaria pseudoapiculata and Xylaria montagnei: two new taxa from South Brazil*, Mycotaxon 64: 195-202.

Hayward, M.W. 2011. *Using the IUCN Red List to determine effective conservation strategies*, Biodiversity Conservation 20: 2563–2573. https://doi.org/10.1007/s10531-011-0091-3.

Heckman, D.S., Geiser, D.M., Eidell, B.R., Stauffer, R.L., Kardos, N.L., Hedges, S.B. 2001. *Molecular Evidence for the Early Colonization of Land by Fungi and Plants*, Science, 293(5532): 1129-1133; https://doi.org/10.1126/science.1061457.

Hennings, P. 1900. *Fungi austro-americani a P. Dusén collecti*, Öfvers. K. VetenskAkad. Förh. 57: 317-330.

Hjortstam, K. 1990. *Corticioid fungi described by M. J. Berkeley II. Species from Cuba*, Mycotaxon 33: 415-424.

Hjortstam, K. 1999. *New corticioid taxa from Brazil, with a brief discussion on Hydnum setulosum (Basidiomycotina)*, Kew Bull 54(3) :755-761. doi:10.2307/4110872.

Hjortstam K., Bononi V.L.R. 1986. *Studies in tropical Corticiaceae (Basidiomycetes) VI. A new species of Steccherinum from Brazil*, Mycotaxon 25(2): 467-468

Hjortstam K., Bononi V.L.R. 1987. *A contribution to the knowledge of Corticiaceae s.l. (Aphyllophorales) in Brazil,* Mycotaxon 28(1): 1-15.

Hjortstam, K., Larsson, K.H., Ryvarden, L. 1973. *The Corticiaceae of North Europe, Vol. 1*, *Introduction and keys*. Fungiflora, Oslo, Norway.

Hjortstam K., Larson, K.H., Ryvarden, L. 1988. *The Corticiaceae of North Europe, Vol. 8, Phlebiella, Thanatephorus – Ypsilonidium*. Fungiflora, Oslo, Norway.

Hjortstam, K., Ryvarden, L. 1986. *Some new and noteworthy fungi (Aphyllophorales, Basidiomycetes) from Iguazu, Argentina*, Mycotaxon 25(2): 539-568.

Hjortstam K., Ryvarden L. 1990. *Lopharia* and *Porostereum* (*Corticiaceae*), Synopsis Fungorum 4:1-68.

Hjortstam, K., Ryvarden, L. 1993. *Two new South American species of Corticiaceae (Basidiomycetes) with amyloid spores*, Mycotaxon 47: 81-85.

Hjortstam, K., Ryvarden, L. 2004. *Reevaluation of Nodotia Hjortstam (Corticioid fungi, Basidiomycotina, Aphyllophorales)*, Synop Fungorum 18: 17-19.

Hjortstam K., Ryvarden L. 2007a. *Checklist of corticioid fungi (Basidiomycotina) from the tropics, subtropics and the southern hemisphere*, Synopsis Fungorum 22: 27–146.

Hjortstam, K., Ryvarden, L. 2007b. *Studies in corticioid fungi from Venezuela III (Basidiomycotina, Aphyllophorales),* Synopsis Fungorum 23: 56-107.

Hladki, A.I. 2001. *Xylaria enteroleuca (Xylariaceae), nuevo registro para el Noroeste de la Argentina*, Lilloa 40(2): 209-214.

Horak, E. 1971. *A contribution towards the revision of the Agaricales (fungi) from New Zealand,* New Zealand Journal of Botany 9(3): 402-462. doi:10.1080/0028825x.1971.104301

IPCC. 2022. *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. In Press.

Iturriaga, T.1994. *Discomycetes of the Guayanas. I. Introduction and some Encoelia species*, Mycotaxon 52(1): 271-288.

IUCN. 2021. *The IUCN Red List of Threatened Species*. Version 2021-3. https://www.iucnredlist.org. Downloaded on 18 May 2022.

IUCN. 2022. *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 15. Prepared by the Standards and Petitions Committee. Downloadable from <https://www.iucnredlist.org/documents/RedListGuidelines.pdf> Accessed 15 May 2022.

Jordal, J. 2019. *Entoloma bloxamii*. *The IUCN Red List of Threatened Species* 2019: e.T147245319A147869057. https://dx.doi.org/10.2305/IUCN.UK.2019-2.RLTS.T147245319A147869057.en. Accessed on 05 May 2022.

Ju, Y.M., Rogers, J.D., Hsieh,H.M. 2005. *New Hypoxylon and Nemania species from Costa Rica and Taiwan*, Mycologia 97:2, 562-567. doi:10.1080/15572536.2006.11832831

Jülich, W. 1975. *Studies in resupinate basidiomycetes – III*, Persoonia 8(3):291-305.

Kaipper-Figueiró, G., Robledo, G,L,, Reck, M.A., Góes-Neto, A., Drechsler-Santos, E.R. 2016. *Antrodia neotropica sp. nov. (Polyporales, Basidiomycota): a new South American species of Antrodia s.s. from Brazil based on morphological, molecular and ecological data*, Nova Hedwigia. 103(1-2):125-143.

Keith, D.A., Ferrer-Paris, J.R., Nicholson, E., Kingsford, R.T. (eds.) 2020. *The IUCN Global Ecosystem Typology 2.0: Descriptive profiles for biomes and ecosystem*

functional groups, Gland, Switzerland: IUCN. ISBN: 978-2-8317-2077-7. DOI:10.2305/IUCN.CH.2020.13.en.

Kilka, R.V., Higuchi, P., Silva, A.C. 2020. *Impacto do pastoreio bovino em florestas nebulares no Parque Nacional de São Joaquim, Santa Catarina*, Ciência Florestal 30(1): 1-17.

Kimbrough, J.W. 1970. *Current Trends in the Classification of Discomycetes*, Botanical Review 36(2): 91-161.

Kossmann, T., Martins da Cunha, K., Santos, P. & Drechsler-Santos, E. 2021a. *Stropharia venusta*. *The IUCN Red List of Threatened Species* 2021: e.T196136132A196845821. https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T196136132A196845821.en. Accessed on 18 May 2022.

Kossmann, T., Costa-Rezende, D.H., Góes-Neto, A., Drechsler-Santos, E. 2021b. *A new and threatened species of Trichaptum (Basidiomycota, Hymenochaetales) from urban mangroves of Santa Catarina Island, Southern Brazil*, Phytotaxa 482(2): 197-207. https://doi.org/10.11646/phytotaxa.482.2.8

Kühner, R. 1927. *Notes mycologiques*, Bull. Trimest. Soc. Mycol. Fr. 43(2): 107–116.

Largent, D.L. Johson, D. Watling, R. 1977. *How to identify mushrooms to genus III: Microscopic Features*, Eureka, Mad River Press. 148p.

Largent, D.L. 1986. *How to identify mushrooms to genus I: Macroscopic Features*, Eureka, Mad River Press. 166p.

Larsson K.H. 1994. Poroid species in *Trechispora* and the use of calcium oxalate crystals for species identification. Mycol Res 98 (10):1153–1172. doi:10.1016/S0953-7562(09)80200-1

Lemke, P.A. 1964. *The genus Aleurodiscus (sensu lato) in North America*, Can J Bot 42 (6):723–768. doi:10.1139/b64-066

Lentz, P.L. 1956. *Stereum and allied genera of fungi in the Upper Mississippi Valley*, US Dep. Agric. Monogr., 24: 1-74. doi:10.5962/bhl.title.63676

Liebsch, D., Velazco, S.J.E., Mikich, S.B., Marques, M.C M., Galvão, F. 2021. *Effects of selective logging, fragmentation, and dominance of bamboos on the structure and diversity of Araucaria Forest fragments*, Forest Ecology and Management 487, 118961. doi:10.1016/j.foreco.2021.118961

Lindbald, I., Ryvarden, L. 1999. *Studies in Neotropical polypores 3* New and interesting Basidiomycetes (Polyporales) from Costa Rica*, Mycotaxon 71: 335-359.

Liu, Z.B., Zhou, M., Yuan, Y., Dai, Y.C. 2021. *Global Diversity and Taxonomy of Sidera (Hymenochaetales, Basidiomycota): Four New Species and Keys to Species of the Genus*, J. Fungi 7(4): 251. https://doi.org/ 10.3390/jof7040251

Liu, Z.-B., Zhou, M., Wu, F., Yu, J. 2022. *Two New Species of Sidera (Hymenochaetales, Basidiomycota) from Southwest China*, J. Fungi 8(4): 385. https://doi.org/10.3390/jof8040385

Lodge, D.J. 1997. *Factors related to diversity of decomposer fungi in tropical forests*, Biodiversity and Conservation 6: 681-688.

Looney, B.P., Birkebak, J.M., Matheny, P.B. 2013. *Systematics of the genus Auricularia with an emphasis on species from the southeastern United States*, North American Fungi 8(6): 1-25. doi: http://dx.doi: 10.2509/naf2013.008.006

Lowy, B. 1952. *The Genus Auricularia*, Mycologia, 44(5): 656-692. doi:10.1080/00275514.1952.1202422.

Lowy, B. 1956. *A Note on Sirobasidium*, Mycologia 48(2): 324-327.

Lowy, B. 1971. *Tremellales*, Flora Neotropica 6: 1-153.

Maas Geesteranus, R.A. 1974. *Studies in the genera Irpex and Steccherinum*, Persoonia - Molecular Phylogeny and Evolution of Fungi 7(4): 443-581.

Malysheva, V., Spirin, V. 2017. *Taxonomy and phylogeny of the Auriculariales (Agaricomycetes, Basidiomycota) with stereoid basidiocarps,* Fungal Biology 121(8): 689-715. doi:10.1016/j.funbio.2017.05.001

Magnago, A.C., Trierveiler-Pereira, L., Neves, M.A. 2013. *Contributions towards the Knowledge of Favolaschia (Mycenaceae, Agaricomycetes) from Brazil,* Mycosphere 4(6): 1071–1078. doi:10.5943/mycosphere/4/6/5.

MapBiomas Chaco Project. 2022. Collection 2.0 of the Annual Chaco Coverage and Land Use Series. Accessed on 20 May 2022 < https://chaco.mapbiomas.org/en>

Marchioro, C.A., Santos, K.L., & Siminski, A. 2019. *Present and future of the critically endangered Araucaria angustifolia due to climate change and habitat loss*. Forestry: An International Journal of Forest Research. doi:10.1093/forestry/cpz066

Martin, P. 1970. *Studies in the Xylariaceae: VIII. Xylaria and its allies*, South African Journal of Botany 36(2): 73-138.

Martins da Cunha, K., Kossmann, T., Drechsler-Santos, E., Leopoldo, E. 2021a. *Cinereomyces dilutabilis.* The IUCN Red List of Threatened Species 2021: e.T196135662A196845697. https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T196135662A196845697.en. Accessed on 18 May 2022.

Martins da Cunha, K., Kossmann, T. & Drechsler-Santos, E. 2021b. *Skeletocutis roseola*. The IUCN Red List of Threatened Species 2021: e.T196135960A196846291. https://dx.doi.org/10.2305/IUCN.UK.2021-1.RLTS.T196135960A196846291.en. Accessed on 18 May 2022.

McNabb. R.F.R. 1965a. *Taxonomic studies in the Dacrymycetaceae II. Calocera (Fries) Fries*, New Zealand Journal of Botany, 3(1): 31-58. doi:10.1080/0028825X.1965.10428712

McNabb. R.F.R. .1965b. *Taxonomic Studies in the Dacrymycetaceae IV. Guepiniopsis Patouillard*, New Zealand Journal of Botany, 3(2): 159-167. doi: 10.1080/0028825X.1965.10876992

Meijer, A.A.R. 2006. *Preliminary list of the Macromycetes from the Brazilian state of Paraná*, Boletim do Museu Botânico Municipal 68: 1-55.

Meijer, A.A.R. 2008. *Notable Macrofungi from Brazil's Paraná Pine Forest/Macrofungos Notáveis das Florestas de Pinheiro-do-Paraná*. Colombo, Embrapa Florestas.

Melgarejo-Estrada, E., Suárez, M.E., Lechner, B.E. 2020. *Nuevos Registros De Hongos Agaricales (Basidiomycota) Para Las Yungas Bolivianas*, Darwiniana nueva serie 8(1): 309-317. https://doi.org/10.14522/darwiniana.2020.81.890

Miller J.H. 1961. *A monograph of the world species of Hypoxylon*. Univ. Georgia Press, 158 pp, Athens, Georgia, USA.

Möller, A. 1901. *Phycomyceten und Ascomyceten. Untersuchungen aus Brasilien*, Botanische Mittheilungen aus den Tropen. 9:1-319

Montagne, J.P.F.C. 1843. *Quatrième Centurie de plantes cellulaires exotiques nouvelles, Décades VIII, IX et X*, Annales des Sciences Naturelles Botanique 20: 352-379.

Monteiro, M. 2020. *Sistemática de Hymenochaete Lév. (Hymenochaetaceae, Basidiomycota): Análises Morfológicas e Relações Filogenéticas de Espécies Ocorrentes no Sul da Mata Atlântica*, Master's Dissertation, Universidade Federal de Santa Catarina, Florianópolis, Brazil.

Moreau, P.A., Vila, J., Aime, M.C., Antonín, V., Horak, E., Pérez-Butrón, J.L., Richard, F., Urban, A., Welti, S., Vizzini, A. 2015. *Cibaomyces and Cyptotrama, two new genera for Europe, and an emendation of Rhizomarasmius (Basidiomycota, Physalacriaceae),* Mycological Progress, 14(4). doi:10.1007/s11557-015-1024-4

Morera, G., Robledo, G., Ferreira-Lopes, V., Urcelay, C. 2017. *South American Fomitiporia (Hymenochaetaceae, Basidiomycota) "jump on" exotic living trees revealed by multi-gene phylogenetic analysis*, Phytotaxa 321(3): 277-286. doi:10.11646/phytotaxa.321.3.5

Moreno G., Blanco, M.N., Manjón, J.L. 1990. *Mycological studies from the Natural Park of Monfragüe (Extremadura, Spain) VI. Aphyllophorales*, Mycotaxon 39: 351-360.

Morgado, L.N., Noordeloos, M.E., Lamoureux, Y., Gelm, J. 2013. *Multi-gene phylogenetic analyses reveal species limits, phylogeographic patterns, and evolutionary histories of key morphological traits in Entoloma (Agaricales, Basidiomycota)*, Persoonia 31: 159-178. http://dx.doi.org/10.3767/003158513X673521.

Mueller, G.M., Wu, Q.X., Huang, Y.Q., Guo, S.Y., Aldana-Gomez, R., Vilgalys, R. 2001. *Assessing Biogeographic Relationships between North American and Chinese Macrofungi*, Journal of Biogeography 28(2): 271-281.

Mueller, G.M., Schmit, J.P., Huhndorf, S.M., Ryvarden, L., O'Dell, T.E., Lodge, D.J., Leacock, P.R., Mata, M., Umania, L. Czederpiltz, D.L., 2004. *Recommended protocols for sampling macrofungi*, in Biodiversity of fungi: inventory and monitoring methods. Amsterdam, Boston: Elsevier Academic Press, pages 168-172.

Mueller, G.M., Schmit, J.P., Leacock, P.R., Buyck, B., Cifuentes, J., Desjardin, D.E., Halling, R.E., Hjortstam, K., Iturriaga, T., Larsson, K.H., Losjed, D.J., May, T.W., Minter, D., Rajchenberg, M., Redhead, S.A., Ryvarden, L., Trappe, J.M., Watling, R., Wu, Qiuxin. 2007. *Global diversity and distribution of macrofungi,* Biodivers Conserv 16**:** 37-48. https://doi.org/10.1007/s10531-006-9108-8

Mulligan, M., Bruijnzeel, L.A., Scatena, F.N., Hamilton, L.S. 2011. *Modeling the tropics-wide extent and distribution of cloud forest and cloud forest loss, with implications for conservation priority*. In: M., Bruijnzeel, L.A., Scatena, F.N., Hamilton (eds.). Tropical Montane Cloud Forests, 14–38. doi:10.1017/cbo9780511778384.0

Myers, N., Mittermeier, R., Mittermeier, C., Fonseca, G.A.B., Kent, J. 2000. *Biodiversity hotspots for conservation priorities*, Nature 403: 853-858. https://doi.org/10.1038/35002501.

Nakasone, K.K. 2013. *Taxonomy of Epithele (Polyporales, Basidiomycota)*, Sydowia 65 (1): 59–112.

Nietiedt S.A., Guerrero R.T. 2000. *Família Corticiaceae (s.l.) – Novas citações para o Brasil*, Iheringia, Bot. 54: 45-56.

Niveiro, N., Popoff, O.F., Albertó, E.O. 2015. *Presencia de Mycena Paranaensis para la Micobiota Argentina y reconsideración de Mycena Leaiana (Agaricales, Mycenaceae)*, Darwiniana, nueva serie 3(1): 89-95.

Niveiro, N., Uhart, M., Albertó, E. 2020. *Revision of the genera Agrocybe and Cyclocybe (Strophariaceae, Agaricales, Basidiomycota) in Argentina*, Rodriguésia 71: e02272018.2020. https://doi.org/10.1590/2175-7860202071038.

Noordeloos, M.E. 1987. *Notulae ad floram agaricinam neerlandicam—XV. Marasmius, Marasmiellus, Micromphale, and Hohenbuehelia*, Persoonia 13(3): 237-262.

Núñez M., Ryvarden L. 1995. *Polyporus (Basidiomcotina) and related genera*, Synopsis Fungorum 10: 1-85.

Núñez M., Ryvarden L. 1997. *The genus Aleurodiscus (Basidiomycotina)*, Synopsis Fungorum 12: 1-164.

Nuñez, M., Ryvarden, L. *East Asian Polypores Volume 2 – Polyporaceae s. lato*, Synopsis Fungorum 14: 166-467.

Palmer, M.A., Hodgetts, N.G., Wigginton, M.J., Ing, B., Stewart, N.F. 1997. *The application to the British flora of the World Conservation Union's revised red list criteria and the significance of red lists for species conservation*, Biological Conservation 82(2): 219-226; https://doi.org/10.1016/s0006-3207(97)00018-9.

Pandolfo, C., Braga, H.J., Silva Júnior, V.P., Massignan, A.M., Pereira, E.S., Thomé, V.M.R, Valci, F.V. 2002. *Atlas climatológico do Estado de Santa Catarina*., Florianópolis, Epagri.

Parmasto, E. 2001. *Hymenochaete cruenta and H. sphaericola, two sibling species of Hymenochaetales (Hymenomycetes, Basidiomycota)*, Czech Mycol. 52(1): 307-315.

Pegler, D.N. 1983. *The Genus Lentinus: A World Monograph*, Kew Bulletin Additional Series X, Royal Botanical Gardens, Kew, 281 pp. London, United Kingdom.

Peel, M.C., Finlayson, B.L. McMahon, T.A. 2007. Updated world map of the Köppen-Geiger climate classification, Hydrology and Earth System Sciences Discussions 4(2): 439-473.

Pereira, J. 2015. *Xylariales in Lista de Espécies da Flora do Brasil*, Jardim Botânico do Rio de Janeiro. (http://floradobrasil2015.jbrj.gov.br/FB95528).

Petersen, R.H., Desjardin, D.E. and Krüger, D. 2008. *Three type specimens designated in Oudemansiella*, Fungal Diversity 32: 81-96.

Pinto, L., Bede, L., Paese, A., Fonseca, M., Paglia, A., Lamas, I. 2006. *Mata Atlântica brasileira: Os desafios para a conservação da biodiversidade de um hotspot mundial*.

In: Rocha, C.F.D., Bergallo, H.G., Van Sluys, M. and Alves, M.A.S. (eds), Biologia da conservação: Essências, 1st edition, pp. 91-118. Rima Editora.

Pfister, D.H. 1979. A Monograph of the Genus *Wynnea* (Pezizales, Sarcoscyphaceae), Mycologia 71(1): 144-159. doi: 10.1080/00275514.1979.12020994

Pires, R.M., Motato-Vásquez, V., Westphalen, M.C., Gugliotta, A.M. 2017. *Polyporales and similar poroid genera (Basidiomycota) from Parque Estadual da Serra do Mar, São Paulo State, Brazil,* Hoehnea 44(1): 145-157. doi:10.1590/2236-8906-93/2016

Putzke, J., Putzke, M.T.L. 2018. *Cogumelo no Brasil – Fungos Agaricales s.l. Volume 1*, 558 pp. LupaGraf, Santa Cruz do Sul, Brazil.

Rajchenberg, M. 1987. *New South American polypores*, Mycotaxon 28: 111-118.

Rajchenberg, M. 1987. *Type studies of Polyporaceae (Aphyllophorales) described by J. Rick,* Nordic Journal of Botany 7(5): 553-568. doi:10.1111/j.1756-1051.1987.tb.

Rajchenberg, M. 1992. *Notas de Polyporaceae de Nueva Zelanda. 1. Acerca de Tyromyces catervatus y Poria hyalina*, Boletín de la Sociedad Argentina de Botánica 28(1-4):165-168

Rajchenberg, M. 2006. *Los Políporos (Basidiomycetes) de los Bosques Andino Patagónicos de Argentina*, Bibliotheca Mycologica 201: 1-300.

Rajchenberg, M., Wright, J.E. 1982. *Two new South American species of Perenniporia (Polyporaceae)*, Mycotaxon 15: 306-310.

Rambo, B. 1956. *A flora fanerogâmica dos Aparados riograndenses*, Anais Botânicos do Herbário Barbosa Rodrigues 5(5): 185-232.

Reck, M.A. 2013. *Estudos Taxonômicos em Políporos Trametóides (Polyporales, Basidiomycota) no Sul do Brasil*, Ph.D. Thesis, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil.

Redhead, S.A., Singer, R. 1981. *Resinomycena gen. nov. (Agaricales), an ally of Hydropus, Mycena and Baeospora*, Mycotaxon 13(1): 150-170.

Redhead, S.A., Nagasawa, E. 1987. *Resinomycena japonica and Resupinatus merulioides, new species of Agaricales from Japan*, Canadian Journal of Botany 65(5): 972–976. doi:10.1139/b87-134.

Reid, D.A. 1965. *A monograph of the stipitate stereoid fungi*, Beih Nova Hedwig 18: 1-382.

Rezende, C.L., Scarano, F.R., Assad, E.D., Joly, C.A., Metzger, J.P., Strassburg, B.B.N., Tabarelli, M., Fonesca, G.A. Mittermeier, R.A. 2018. *From hotspot to hopespot: An opportunity for the Brazilian Atlantic Forest*, Perspectives in ecology and conservation 16: 208-214.

Ribeiro, M. C., Metzger, J. P., Martensen, A. C., Ponzoni, F. J., Hirota, M. M. 2009. *The Brazilian Atlantic Forest: How much is left, and how is the remaining forest distributed? Implications for conservation*, Biological Conservation 142(6): 1141-1153. doi:10.1016/j.biocon.2009.02.02

Rick, J.E. 1938. *Agarici Riograndenses*, Lilloa 3: 399-455.

Rifai, M. A. 1977. *Two Little-Known Fungi Parasitizing Ustulina deusta,* Kew Bulletin, 31(3): 723. doi:10.2307/4119425

Robledo, G., Drechsler-Santos, E.R., Kossmann, T., Bittencourt, F., Cunha, K.M. 2020a. *Wrightoporia araucariae*. *The IUCN Red List of Threatened Species* 2020a: e.T187000299A187004575. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T187000299A187004575.en. Accessed on 18 May 2022.

Robledo, G., Drechsler-Santos, E.R., Kossmann, T., Bittencourt, F., Rezende, D., Cunha, K.M. 2020b. *Wrightoporia porilacerata*. *The IUCN Red List of Threatened Species* 2020: e.T187000458A187004580. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T187000458A187004580.en. Accessed on 18 May 2022.

Rodrigues, A., Pilgrim, J., Lamoreux, J., Hoffmann, M., Brooks, T. 2006. *The value of the IUCN Red List for conservation;* Trends in Ecology & Evolution 21(2): 71–76. https://doi.org/10.1016/j.tree.2005.10.010.

Rogers, J.D. 1979. *The Xylariaceae: Systematic, Biological and Evolutionary Aspects*, Mycologia, 71(1): 1-42. doi.10.1080/00275514.1979.12020984

Rogers, J.D., Samuels, G.J. 1986. *Ascomycetes of New Zealand 8.Xylaria*, New Zealand Journal of Botany, 24(4): 615-650. doi:10.1080/0028825x.1986.10409

Rubio, E. 2019. *First European records of Xylaria apiculata (Xylariales) from Spain*, Ascomycete.org 11(6): 291-295.

Ryvarden, L. 1987. *New and noteworthy polypores from tropical America*, Mycotaxon 28(2): 525-541.

Ryvarden, L. 2004. *Neotropical polypores part I: Introduction, Hymenochaetaceae and Ganodermataceae*, Synopsis Fungorum 19: 1-227.

Ryvarden, L. 2010. *Stereoid fungi of America*, Synopsis Fungorum 28: 1–209.

Ryvarden, L. 2014. *Studies in Neotropical polypores 37. Some new and interesting species from tropical America,* Synopsis Fungorum 32: 58-67.

Ryvarden, L. 2015. *Neotropical Polypores Part 2: Polyporaceae, Abortiporus – Nigroporus*, Synopsis Fungorum 34: 1-443.

Ryvarden, L. 2016. *Neotropical Polypores Part 3: Polyporaceae, Obba-Wrightoporia*, Synopsis Fungorum 36: 1-613.

Ryvarden L., Johansen I. 1980. *A preliminary polypore flora of East Africa*, Fungiflora, Oslo, Norway.

Sambrook, J., Fritsch, E.F., Maniatis, T. 1989. *Molecular cloning: a laboratory manual*, 2 ed. New York, Cold Spring Harbor, 1546 pp.

Salvador-Montoya, C.A., Popoff, O.F., Góes-Neto, A., Drechsler-Santos, E.R. 2020. *Global phylogenetic and morphological reassessment of Fomitiporella s.l. (Hymenochaetales, Basidiomycota): taxonomic delimitation of Fomitiporella s.s. and segregation of Rajchenbergia, gen. nov,* Plant Systematics and Evolution 306(2). doi:10.1007/s00606-020-01648-w

Sancha, N.U., Boyle, S.A., McIntyre, N.E., Brooks, D.M., Yanosky, A., Soto, E.C., Mereles, F., Camino, M., Stevens, R.D. 2021. *The disappearing Dry Chaco, one of the last dry forest systems on earth*, Landscape Ecol 36**,** 2997–3012. https://doi.org/10.1007/s10980-021-01291-x

Santana M.C, Amalfi M., Robledo G., da Silveira R.B., Decock C. 2014. *Fomitiporia neotropica, a new species from South America evidenced by multilocus phylogenetic analyses*, Mycological Progress 13: 601-615. doi:10.1007/s11557-013-0943-1.

Scheibler, G. 2016. *Diversidade de fungos agaricoides (Basidiomycota) no Rio Grande do Sul*, Undergraduate Monography, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil.

Schmitt, C.L., Tatum, M.L. 2008. *The Malheur National Forest, Location of the World's Largest Living Organism [The Humongous Fungus]*, United States Department of Agriculture report, 8 pp.

Schneider, C.A., Rasband, W.S., Eliceiri, K.W. 2012. *Nih Image To Imagej: 25 years of image analysis*, Nature methods 9(7): 671-675.

Seger, C. 2016. *Revisão Taxonômica do gênero Stropharia sensu lato (Agaricales) no Sul do Brasil*, Master's Dissertation, Universidade Federal do Paraná, Curitiba, Brazil.

Silva, M.A. 2021. *Diversidade da família Hymenochaetaceae Donk da Amazônia brasileira e avaliação da bioatividade de extratos de Phellinus crystallis, uma nova espécie com pespectiva futura de potencial biotecnológico*, Ph.D. Thesis, Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil.

Silveira, R.M.B., Reck, M.A., Graf, L.V., Sá, F.N. 2008. *Polypores from a Brazilian pine forest in Southern Brazil: pileate species*, Hoehnea 35(4): 619-630.

Silveira, R M.B., Guerrero, R.T. 1989. *Os gêneros Rigidoporus Murr. e Flaviporus Murr. (Basiciomycetes) no Parque Nacional de Aparados da Serra, RS*, Acta Botanica Brasilica 3(2 suppl 1): 29-45. doi:10.1590/s0102-3306198900030.

Silveira, R.M.B., guerrero, R.T. 1991. *Aphyllophorales poliporoides (Basidiomycetes) do Parque Nacional de Aparados da Serra, Rio Grande do Sul*, B. Inst. Bioc.48: 1-127.

Singer R. 1953. *Four years of mycological work in southern South America*, Mycologia 45: 865-891.

Singer, R. 1965. *Monographic studies on South American Basidiomycetes, especially those of the east slope of Andes and Brazil. 2) The genus Marasmius in South America*, Sydowia 18: 106-358.

Singer, R. 1976. *Marasmieae (Basidiomycetes – Tricholomataceae),* Flora Neotropica Monograph 17: 1-347.

Singer, R. 1986. *The Agaricales in Modern Taxonomy*. 4th ed. Koeltz, Koenigstein.

Song, J., Liu, X.-Y., Wang, M., Cui, B.-K. 2016. *Phylogeny and taxonomy of the genus Anomoloma (Amylocorticiales, Basidiomycota),* Mycological Progress, 15(1). doi:10.1007/s11557-015-1155-7

Spegazzini, C. 1898. *Fungi Argentini novi vel critici*, Anales del Museo Nacional de Historia Natural Buenos Aires 6: 81-288.

Spooner, B.B. 1987. Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae, 711 pp. J. Cramer, Berlin, Germany.

Subramanian, C.V. 1982. *Tropical Mycology: Future Needs and Development,* Current Science 51(7): 321-325.

Suija A. University of Tartu Natural History Museum and Botanical Garden Mycological Collections. University of Tartu, Natural History Museum and Botanical Garden. Occurrence dataset https://doi.org/10.15468/d59dmk accessed via GBIF.org on 2022-03-16. https://www.gbif.org/occurrence/3024226878

Stevenson, G. 1964. *The Agaricales of New Zealand: V*, Kew Bulletin 19(1): 1-59.

Tagliari, M.M., Vieilledent, G., Alves, J., Silveira, T.C.L., & Peroni, N. 2021a. *Relict populations of Araucaria angustifolia will be isolated, poorly protected, and unconnected under climate and land-use change in Brazil*, Biodiversity and Conservation. doi:10.1007/s10531-021-02270-z

Tagliari, M.M., Levis, C., Flores, B.M., Blanco, G.D., Freitas, C.T., Bogoni, J.A., Vieilledent, G., Peroni, N. 2021b. *Collaborative management as a way to enhance Araucaria Forest resilience*, Perspectives in Ecology and Conservation 19(2): 131-142. doi:10.1016/j.pecon.2021.03.002

Theissen, F. 1908. *Novitates riograndenses*, Annales Mycologici 6(4): 341-352.

Trierveiler-Pereira, L., Romero, A.I., Baltazar, J.M., Loguercio-Leite, C. 2009. *Addition to the knowledge of* Xylaria *(Xylariaceae, Ascomycota) in Santa Catarina, Southern Brazil,* Mycotaxon 107: 139-156.

Trierveiler-Pereira, L. 2014. Ascomycetes (Pezizomycotina, Ascomycota) from Brazil: New records and contributions to distributional data, Lilloa 51(1): 108-115.

Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.H., Li, D.Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J., Smith, G. F. (eds.) 2018: *International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. Regnum Vegetabile 159. Glashütten: Koeltz Botanical Books. DOI https://doi.org/10.12705/Code.2018.

Van de Gutch, K. 1995. *Illustrations and Descriptions of Xylariaceous Fungi Collected in Papua New Guinea*, Bulletin du Jardin botanique National de Belgique 64: 219-403.

Vandergrift, R. 2017. Xylaria apiculata, in Xylariaphilia. (https://xylaria.net/2017/02/15/xylaria-apiculata/). Accessed 15 May 2022.

Vasilyeva, L.N., Stephenson, S.L. 2014. *Biogeographical patterns in pyrenomycetous fungi and their taxonomy. 4. Hypoxylon and the southern United States*, Mycotaxon 129(1): 85-95. http://dx.doi.org/10.5248/129.85

Vibrans, A.C., Sevegnani, L., Gasper, A.L., Lingner, D.V. (Eds.). 2012. *Inventário Florístico Florestal de Santa Catarina Volume I: Diversidade e Conservação de Remanescentes Florestais*. Edifurb, Blumenau, 342 pp.

Vibrans, A.C., Sevegnani, L., Gasper, A.L., Lingner, D.V. (Eds.). 2013. *Inventário Florístico Florestal de Santa Catarina Volume III: Floresta Ombrófila Mista*. Edifurb, Blumenau, 435 pp.

Vlasák, J. Vlasák Jr., J. (2017) *Trichaptum* (Basidiomycota) in tropical America: a sequence study. *Mycosphere* 8 (6): 1217–1227. https://doi.org/10.5943/mycosphere/8/6/8

Wang, B., Yeun, L.H., Xue, J., Liu, Y., Ané, J., Qiu, Y. 2010. *Presence of three mycorrhizal genes in the common ancestor of land plants suggests a key role of*

mycorrhizas in the colonization of land by plants, New Phytologist, 186(2), 514–525; https://doi.org/10.1111/j.1469-8137.2009.03137.x.

Wannathes, N., Desjardin, D.E., Hyde, K.D., Perry, B.A. Lumyong, S. 2009. *A monograph of Marasmius (Basidiomycota) from Northern Thailand based on morphological and molecular (ITS sequences) data*, Fungal Diversity 37: 209-306.

Wartchow, F., Pereira, J., Drechsler-Santos, E.R., Gomes-Silva, A.C., Tiago, P.V., Putzke, J., Cavalcanti, M.A.Q. 2010. *Two Oudemansiella species with echinulate basidiospores from South America with O. macracantha lectotypified*, Mycotaxon 113: 119-127. doi:10.5248/113.119

Westphalen, M.C., Reck, M.A., Silveira, R.M.B. 2011. *First record of Phlebia incarnata from the southern hemisphere*, Mycotaxon 114(1): 305-310. doi:10.5248/114.305

Westphalen, M.C., Reck, M.A., Silveira, R.M.B. 2012. *The genus Junghuhnia in Brazil,* Nova Hedwigia, 94(1), 209–220. doi:10.1127/0029-5035/2012/0094-0209.

Westphalen, M.C., Silveira, R.M.B. 2013. *Pileate polypores from Araucaria Forests in Southern Brazil*, Hoehnea 40(1): 77-86.

Westphalen, M.C., Reck, M.A., Silveira, R.M.B. 2014. *Studies on Wrightoporia (Basidiomycota) from southern Brazil,* Phytotaxa, 166(1): 94-100. doi:10.11646/phytotaxa.166.1.7

Westphalen, M.C. 2016. *Sistemática e Biologia de Políporos do Sul do Brasil: gêneros Antrodiella, Flaviporus, Junghuhnia e Tyromyces*, Ph.D. Thesis, Instituto de Botânica, São Paulo, Brazil.

Westphalen, M.C., Rajchenberg, M., Tomšovský, M., Gugliotta, A. M. 2018. *A re-evaluation of Neotropical Junghuhnia s.lat. (Polyporales, Basidiomycota) based on morphological and multigene analyses*, Persoonia - Molecular Phylogeny and Evolution of Fungi 41(1): 130-141. doi:10.3767/persoonia.2018.41.07

Westphalen, M.C., Tomšovský, M., Gugliotta, A.M., Rajchenberg, M. 2019. *An overview of Antrodiella and related genera of Polyporales from the Neotropics,* Mycologia 111(5): 813-831. doi:10.1080/00275514.2019.163389.

Westphalen, M.C., Motato-Vásquez, V., Tomšovský, M., Gugliotta, A.M. 2021. *Additions to the knowledge of hydnoid Steccherinaceae: Cabalodontia, Etheirodon, Metuloidea, and Steccherinum*, Mycologia 113(4): 791-806. doi:10.1080/00275514.2021.1894536.

White, T.J., Bruns, T., Lee, S., Taylor, J.W. 1990. *Amplification and direct sequencing of fungal ribosomal RNA genesfor phylogenetics*. In: Innis MA, Gelfand DH, SninskyJJ, White TJ, eds. PCR protocols: a guide to methodsand applications. New York: Academic Press. pp 315-322.

Wu, S.H. 1996. *Studies on Gloeocystidiellum sensu lato (Basidiomycota) in Taiwan*, Mycotaxon 58: 1-68.

Wu, F., Chen, J.J., Ji, X.H., Vlasák, J., Dai, Y.C. 2017. *Phylogeny and diversity of the morphologically similar polypore genera Rigidoporus, Physisporinus, Oxyporus, and Leucophellinus*, Mycologia 109(5): 749-765. doi: 10.1080/00275514.2017.1405215

Xu, F., LoBuglio, K.F., Pfister, D.H. 2019. *On the co-occurrence of species of Wynnea (Ascomycota, Pezizales, Sarcoscyphaceae) and Armillaria (Basidiomycota, Agaricales, Physalacriaceae)*, Fungal Systematics and Evolution 4: 1-12.

Yand, Z.L., Zhang, L.F., Mueller, G.M., Kost, G.W., Rexer, K.H. 2009. *A new Systematic arrangement of the genus Oudemansiella s. str. (Physalacriaceae, Agaricales)*, Mycosistema, 29(1): 1-13.

Zhang, N., Castlebury, L. A., Miller, A. N., Huhndorf, S. M., Schoch, C. L., Seifert, K. A. Rossmann, A.Y., Rogers, J.D., Kohlmeyer, J., Sung, G.-H. 2006. *An overview of the systematics of the Sordariomycetes based on a four-gene phylogeny,* Mycologia 98(6): 1076-1087. doi:10.3852/mycologia.98.6.1076

Zhao, C.L., Chen, H., Song, J., Cui, B.K. 2015. *Phylogeny and taxonomy of the genus Abundisporus (Polyporales, Basidiomycota),* Mycological Progress 14: 38. doi:10.1007/s11557-015-1062-y

Zhao, Y., Liu, X.Z., Bai, F.Y. 2019. *Four new species of Tremella (Tremellales, Basidiomycota) based on morphology and DNA sequence data*, MycoKeys 47: 75-95. https://doi.org/10.3897/mycokeys.47.29180

Zhao, Y.N., He, S.H., Nakasone, K.K., Kumara, K.L.W., Chen, C,C,, Liu, S.L., Ma, H.X., Huang, M.R. 2021. *Global Phylogeny and Taxonomy of the Wood-Decaying Fungal Genus Phlebiopsis (Polyporales, Basidiomycota)*, Front. Microbiol. 12:622460. doi: 10.3389/fmicb.2021.622460

Zheng, H.D., Zhuang, W.Y. 2019. *Three new species of Dicephalospora from China as revealed by morphological and molecular evidences*, Mycokeys 55: 87-99. https://doi.org/10.3897/mycokeys.55.33859.

Zhuang, W.Y. 2003. *Notes on Wynnea (Pezizales) from Asia,* Mycotaxon, 87: 131-136.