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RENATO LÚCIO MENDES ALVARENGA

AURICULARIALES(BASIDIOMYCOTA: AGARICOMYCETES): DELIMITAÇÃO MORFOLÓGICA E MOLECULAR

Recife
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RENATO LÚCIO MENDES ALVARENGA

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Tese apresentada ao Programa de Pós-Graduação em Biologia de Fungos da Universidade Federal de Pernambuco, como requisito parcial para a obtenção do título de doutor em Biologia de Fungos.

Área de concentração: Ecologia e Taxonomia.

Orientadora: Profº. Dra. Tatiana Baptista Gibertoni

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Aprovada em: 19/02/2020

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RESUMO

Auriculariales é caracterizada macroscopicamente por apresentar espécies ressupinadas a pileadas, com variadas colorações e consistências, e microscopicamente por possuir hifas septadas, basídios com septos longitudinais, verticais ou transversais e basidiósporos não septados. Filogeneticamente, a monofilia da ordem não foi confirmada, principalmente devido à ausência de sequências de diferentes regiões do DNA da maioria das espécies de Auriculariales. No Brasil, a ordem é representada por 69 espécies, se destacando as do gênero *Auricularia* que apresentam o maior número de registros e ampla distribuição, possivelmente devido ao seu fácil reconhecimento em campo e abundância de basidiomas. Entretanto, espécies dos gêneros ressupinados apresentam poucos registros para o Brasil, algumas vezes únicos para a ciência. Assim, este trabalho tem como objetivo contribuir para a delimitação morfológica e molecular de espécies de Auriculariales neotropicais, com ênfase em amostras brasileiras. Espécimes coletados em 33 áreas distribuídas nos domínios morfoclimáticos da Mata Atlântica, Caatinga, Cerrado e Floresta Amazônica e espécimes depositados nos Herbário Padre Camille Torrend (URM), Herbário Maria Eneyda P. K. Fidalgo (SP) e Herbário Anchieta (PACA) foram utilizados para análises morfológicas e/ou molecular. Foram estudadas 252 amostras coletadas e 693 exsicatas depositadas nos herbários, das quais 247 (217 coletadas + 30 de herbário) foram consideradas em boas condições para realização das análises moleculares, resultando em 105 sequências: 53 da região ITS, 39 de LSU e 13 de *rpb2*. As análises morfológicas e moleculares possibilitaram a descrição de quatro novos gêneros: *Adustochaete*, *Crystallodon*, *Dendroexidiopsis* em prep. e *Metulochaete*; 9 novas espécies: *Adustochaete lenis* Alvarenga em prep., *A. nivea* Alvarenga, *A. rava* Alvarenga & K-H Larsson, *Dendroexidiopsis farinaceae* Alvarenga em prep., *Elmerina brasiliensis* Alvarenga & Westphalen em prep., *E. santanaensis* Alvarenga & Westphalen em prep., *Protomerulius pedratallhadensis* Alvarenga, *Tremellochaete atlantica* Alvarenga e *T. cerradensis* Alvarenga*;* cinco novas combinações: *Crystallodon subgelatinosum* (Bodman) Alvarenga & Gibertoni, *Eichleriella ubatubensis* (Viégas) Alvarenga, *E. ochracea* (Viégas) Alvarenga, *Metulochaete sanctae-catharinae* (Möller) Alvarenga e *Tremellochaete ciliata* (Möller) Spirin & Alvarenga. Além disso, foram registradas pela primeira vez *Eichleriella tenuicula* para Brasil; *Auricularia cornea*, *A.*

fuscosuccinea e *A. brasiliana* para Alagoas; *A. cornea* para o Ceará; *A. cornea* e *A. delicata* para o Maranhão; *A. fuscosuccinea, A. brasiliana e Eichleriella alliciens* para Pernambuco. Desse modo, o conhecimento sobre Auriculariales no Brasil foi ampliado de 18 para 22 gêneros e de 69 para 76 espécies. Entretanto, esse conhecimento pode ser expandido, uma vez que gêneros como *Basidiodendron* e *Stypella*, originalmente descritos para o Brasil, são delimitados apenas morfologicamente, sendo necessária a continuidade dos estudos sobre Auriculariales, principalmente ressupinados.

Palavras-chave: Agaricomycetes. Heterobasídio. Auriculariaceae. Filogenia. Neotrópico. Diversidade.

ABSTRACT

Auriculariales is macroscopically characterized by presenting resupinate to pileate species, with different textures and colors, and microscopically bye the presence of septate hyphae, basidia with longitudinal, vertical or transverset septa, and basidiospores without septa. Phylogenetically, the monophyly of the order has not been confirmed, mainly due to the lack of sequences from different DNA markers of most of species in Auriculariales. In Brazil, the order is represented by 69 species, especially those of the genus *Auricularia* that have the largest number of records and wide distribution, possibly due to their easy field recognition and abundance of basidiomata. However, species of the resupinate genera have few records in Brazil, sometimes unique to science. Thus, this work aims to contribute to the morphological and molecular delimitation of neotropical Auriculariales species, with emphasis on Brazilian specimens. Specimens collected in 33 areas in the morphoclimatic domains of the Atlantic Forest, Caatinga, Cerrado, Amazon Rainforest, and specimens deposited in Padre Camille Torrend Herbarium (URM), Maria Eneyda PK Fidalgo Herbarium (SP) and Herbarium Anchieta (PACA) were used for morphological and / or molecular analysis. 252 collected samples and 693 exsiccates deposited in the herbaria were studied, of which 247 were in good conditions be the molecular analyses, resulting in 105 sequences, only two for herbalized specimens: 53 from the ITS region, 39 from LSU and 13 from *rpb2*. The morphological and molecular analyses allowed the description of four new genera: *Adustochaete*, *Crystallodon*, *Dendroexidiopsis* in prep. and *Metulochaete*; 9 new species: *Adustochaete lenis* Alvarenga in prep., *A. nivea* Alvarenga, *A. rava* Alvarenga & KH Larsson, *Crystallodon umbrinus* Alvarenga, *Dendroexidiopsis farinaceae* Alvarenga in prep., *Elmerina brasiliensis* Alvarenga & Westphalen in prep., *E. santanaensis* Alvarenga & Westphalen in prep., *Protomerulius pedratallhadensis* Alvarenga, *Tremellochaete atlantica* Alvarenga e *T. cerradensis* Alvarenga; five new combinations: *Crystallodon subgelatinosum* (Bodman) Alvarenga & Gibertoni, *Eichleriella ubatubensis* (Viégas) Alvarenga, *E. ochracea* (Viégas) Alvarenga, *Metulochaete sanctae-catharinae* (Möller) Alvarenga e *Tremellochaete ciliata* (Möller) Spirin & Alvarenga. In addition, *Eichleriella tenuicula* was first recorded for Brazil; *Auricularia cornea*, *A. fuscosuccinea* and *A. brasiliana* for Alagoas; *A. cornea* to Ceará; *A. cornea* and *A. delicata* for Maranhão; *A. fuscosuccinea*, *A. brasiliana* and *Eichleriella alliciens* for

Pernambuco. Thus, knowledge about Auriculariales in Brazil was expanded from 18 to 22 genera and from 69 to 76 species. However, this knowledge can be improved, since genera such as *Basidiodendron* and *Stypella*, originally described for Brazil, are only morphologically delimited, requiring the continuation of studies in Auriculariales, especially resupinated ones.

Key-words: Agaricomycetes. Heterobasidium. Auriculariaceae. Phylogeny. Neotropic. Diversity..

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1 INTRODUÇÃO

Auriculariales J. Schröt. (1897) (Basidiomycota: Agaricomycetes) é caracterizada macroscopicamente por apresentar espécies variando de ressupinadas a pileadas, diferentes colorações e consistências variando de coriáceas a gelatinosas e/ou cartilaginosas quando frescas. Microscopicamente, as espécies são caracterizadas por possuírem hifas septadas, basídios com septos longitudinais, verticais ou transversais (heterobasídios) e basidiósporos não septados (Schröt 1897, Lowy 1971).

A monofilia da ordem foi inicialmente proposta por Weiss e Oberwinkler (2001). Em seguida, Hibbet e Binder (2002) e Binder et al. (2005) sugeriram que Auriculariales seria polifilética, apresentando dois ancestrais comuns recentes. Posteriormente, Hibbet et al. (2014) ressaltaram que, devido à ausência de sequências de diferentes regiões do DNA da maioria das espécies de Auriculariales, principalmente das espécies ressupinadas, a sua monofilia não pode ser confirmada.

As espécies que compõem a ordem são importantes biodegradadoras de madeira, causando podridão branca. Adicionalmente, espécies de *Auricularia* são comumente utilizadas na culinária e na medicina tradicional chinesa (Cheung 1996; Nguyen et al. 2012). A utilização alimentícia por diferentes comunidades tradicionais neotropicais já foi relatada. No Brasil, destaca-se *A. fuscosuccinea* (Mont.) Henn. (Fidalgo e Hirata 1979) utilizada pelos povos Txição e Tucarramãe; no Peru, a população rural comumente utiliza *A. nigricans* (Bardales 1997); na Venezuela, os Hotï consomem *A. delicata* (Mont.) Henn. e *A. nigricans* (Zent et al. 2004); as comunidades Uitoto, Muinane e Andoke, na Colômbia, utilizam *A. delicata* (Vasco-Palacios et al. 2008). Diferentes biomoléculas com atividades anti-tumorais e antioxidantes foram registradas em extratos de *Auricularia* (Dai e Yang 2008, Reza et al. 2012, Zeng et al. 2012, Song e Du 2010, 2012, Yu et al. 2014). Entretanto, as demais espécies que compõem a ordem não foram investigadas quanto ao seu potencial alimentício e biotecnológico.

No Brasil, a ordem é representada por 69 espécies (Alvarenga e Xavier-Santos 2015, Wu et al. 2015a, Alvarenga et al. 2019, Phookamsak et al. 2019). Dentre as espécies frequentemente coletadas no Brasil, as do gênero *Auricularia* se destacam por apresentar o maior número de registros, possivelmente devido ao seu fácil reconhecimento em campo e abundância de basidiomas (Alvarenga e Xavier-

Santos 2015). Por outro lado, espécies dos gêneros ressupinados (*Heterochaete*, *Bourdotia*, *Eichleriella*, *Patouillardina*) apresentam poucos registros para o Brasil, algumas vezes o único para a ciência.

Assim, a ampliação das áreas exploradas, inclusão de diferentes regiões do DNA, análises morfológicas, além de diferentes abordagens (ecológicas e biogeográficas), devem ser utilizadas como critério no estabelecimento e consequentemente organização taxonômica dos representantes da ordem.

1.1 OBJETIVOS

1.1.1 **Objetivo Geral**

Contribuir para a delimitação morfológica e molecular de espécies de Auriculariales neotropicais, com ênfase em amostras brasileiras.

1.1.2 Objetivos Específicos

- Reconhecer a diversidade de gêneros e espécies de Auriculariales coletados em regiões neotropicais, com ênfase em amostras brasileiras;
- Reconhecer a diversidade de gêneros e espécies de Auriculariales depositados no Herbário Anchieta (PACA), Herbário do Instituto de Botânica de São Paulo (SP-Fungi) e Herbário Padre Camille Torrend (URM);

2 REVISÃO DA LITERATURA

2.1 SISTEMÁTICA DE AURICULARIALES

Na classificação proposta por Fries (1874) para Hymenomycetes, utilizando as características macroscópicas e a configuração do himênio, representantes de Auriculariales foram distribuídos em diferentes grupos: "*Polyporei*", "*Hydnei*", "*Thelephorei*", "*Clavarei*" e "*Tremellinei*". Em seguida, Patouillard (1887) cunhou o termo "Hetérobasidiés" (equivalente a Heterobasidiomycetes R.T. Moore, classe de Basidiomycota) para os fungos que apresentassem basídios septados, basidiosporos formando conídios, esterigma inflado e basidioma gelatinizado, incluindo as atuais famílias Auriculariaceae Fr., Caloceraceae Rea, Tulasnellaceae Juel e Tremellaceae Fr.

Auriculariales foi então proposta por Schröter (1897) para agrupar espécies saprófitas ou parasitas, com basidioma ressupinado, pustulado, estipitado, clavado ou colaroides, com consistência gelatinosa, cartilaginosa, cerosa ou árida, himênio unilaterial ou bilaterial, hifídios presentes ou ausentes, basídio cilíndrico com 1 ― 3 septos transversais, basidiosporos lisos, inamiloides, asseptados, germinando por tubo ou por repetição (produção de conídios). A ordem incluiu espécies de vários gêneros, como *Auricularia* Bull., *Jola* Möller, *Helicogloea* Pat. e *Neotyphula* Wakef.

Anos após as publicações de Patouillard e Schröter, Lowy (1968) reavaliou os critérios utilizados por Patouillard para a classificação e redistribuiu as famílias em duas sub-classes: Heterobasidiomycetidae Alexop. e Metabasidiomycetediae Lowy. Em seu trabalho, Lowy não reconhece a ordem Auriculariales, sendo seus representantes agrupados na ordem Eutremellales Lowy, incluindo as famílias Auriculariaceae, Hyaloriaceae Lindau, Phleogenaceae Gäum., Sirobasidiaceae Lindau e Tremellaceae.

Bandoni (1984), utilizando análises de ultra-estrutura dos poros septais de representantes de Auriculariales, observou que não apenas os representantes com basídio "auricularioides", mas os com basídios "tremeloides" compartilhavam características suficientes para serem agrupados em Auriculariales. Incluiu nas famílias Aporpiaceae Bondartsev & Bondartseva, Exidiaceae R.T. Moore, Hyaloriaceae e Sebacinaceae K. Wells & Oberw. as espécies que apresentassem

basídio globoso com septo vertical (tremeloides) e em Auriculariaceae as que apresentassem septos transversais (auricularioides).

Wells (1994), analisando ainda a ultra-estrutura do doliporo para os representantes dos Heterobasiomycetes, agrupou os gêneros em seis famílias:

- Exidiaceae, com os gêneros *Basidiodendron* Rick, *Bourdotia* (Bres.) Bres. & Torrend, *Craterocolla* Bref., *Ductifera* Lloyd, *Efibulobasidium* K. Wells, *Eichleriella* Bres., *Exidia* Fr, *Exidiopsis* (Bref.) Möller, *Fibulosebacea* K. Wells & Raitv., *Heterochaete* Pat., *Pseudostypella* McNabb;
- Auriculariaceae, com *Auricularia* e *Mylittopsis* Pat.;
- Hyaloriaceae, com *Elmerina* Bres., *Heterochaetella* (Bourdot) Bourdot & Galzin, *Heteroscypha* Oberw. & Agerer, *Hyaloria* Möller, *Phlogiotis* Quél., *Protodaedalea* Imazeki, *Protodontia* Höhn., *Protohydnum* Möller, *Protomerulius* Möller, *Pseudohydnum* P. Karst, *Stypella* Möller;
- Sebacinaceae, com *Sebacina* Tul. & C. Tul., *Tremellodendron* G.F. Atk., *Tremelloscypha* D.A. Reid , *Tremellostereum* Ryvarden;
- Patouillardinaceae Jülich, com *Patouillardina* Bres.;
- Tremellodendropsidaceae, com *Tremellodendropsis* (Corner) D.A. Crawford;
- táxons incertos: *Heteroacanthella* Oberw. e *Monosporonella* Oberw. & Ryvarden.

Em seguida, Wells e Bandoni (2001), utilizando características morfológicas de macro, micro, ultra-estrutura, além do ciclo de vida para as espécies de Auriculariales, reconhecem as famílias Auriculariaceae, Exidiaceae, Hyaloriaceae, Sebacianaceae, Patouillardinaceae. Após Wells e Bandoni (2001), os trabalhos utilizando ferramentas moleculares começaram a ser amplamente difundidos e a sistemática da ordem passou a ser delimitada por meio de ferramentas morfológicas e moleculares, em especial as provenientes do gene codificante do ribossomo (*SSU —ITS1—5.8S—ITS2—LSU*).

2.2 **FILOGENIA DE AURICULARIALES**

Swan e Taylor (1993), utilizando dados moleculares da região SSU do rnDNA de representantes de Basidiomycota, dentre eles *Auricularia auricula* (L.) Underw., *A.*

polytricha (Mont.) Sacc. e *Pseudohydnum gelatinosum* (Scop.) P. Karst., apresentaram o primeiro filograma com representantes de Auriculariales. Os autores sugerem não só a monofilia de Auriculariales, como evidenciam a proximidade com os Homobasidiomycetes.

O primeiro estudo filogenético direcionado aos Auriculariales foi apresentado por Weiss e Oberwinkler (2001). Os autores utilizaram a região LSU rnDNA, sugerindo a monofilia desta ordem e a formação de cinco grupos de espécies: Grupo I – *Auricularia*, *Exidia*, *Exidiopsis*, *Heterochaete* e *Eichleriella*; Grupo II – *Bourdotia* e *Ductifera;* Grupo III – *Basidiodendron*; Grupo IV – *Myxarium* e *Hyaloria pilacre* Möller; Grupo V – *Protomerulius*, *Tremellodendropsis*, *Heterochaetella* e *Protodontia*. Entretanto, mesmo apresentando a formação de cinco "clados", estes não apresentaram suporte suficiente para o estabelecimento de famílias na ordem.

Posteriormente, Hibbet e Binder (2002) e Binder et al. (2005), utilizando as regiões do rnDNA (LSU e SSU) e do mDNA (mSSU), observaram a formação de dois clados, um com espécies de Auriculariales ressupinadas e outro com espécies pileadas e sugeriram que a ordem fosse polifilética, uma vez que espécies de himênio hidnoide (*Pseudohydnum gelatinosum*) e liso [ex.: *Auricularia auricula-judae* (Bull.) Quél. e *Basidiodendron* sp.] não apresentaram relações filogenéticas próximas. Entretanto, esses trabalhos, além de utilizarem poucas sequências de espécies de Auriculariales, não eram direcionados para a ordem. Assim, as reconstruções filogenéticas observadas poderiam não representar a verdadeira história evolutiva do grupo.

Os estudos posteriores sobre a filogenia de Auriculariales se limitaram a alguns gêneros ou complexo de espécies. Miettinen et al. (2012), Zhou e Dai (2013) e Sotome et al. (2014), utilizando as regiões ITS e/ou LSU do rnDNA, investigaram as relações filogenéticas dos gêneros poroides *Aporpium*, *Elmerina*, *Protodaedalea* e *Protomerulius*, confirmando a delimitação dos mesmos. Looney et al. (2013), Malysheva et al. (2014), Wu et al. (2014) e Bandara et al. (2015, 2017), utilizando a região ITS+rpb2 e/ou LSU do rnDNA, propuseram a nova combinação *Auricularia nigricans* (Fr.: Fr.) Birkebak, Looney, & Sánchez-García e descreveram *A. scissa* Looney, Birkebak & Matheny, *A. subglabra* Looney, Birkebak, & Matheny, *A. villosula* V. Malysheva, *A. heimuer* F. Wu, B.K. Cui & Y.C. Dai, *A. thailandica* Bandara & K.D. Hyde e *A. asiatica* Bandara & K.D. Hyde.

Utilizando as regiões ITS+LSU+rpb2 do rnDNA, Wu et al. (2015a, b) investigaram o complexo *Auricularia auricula-judae* (Wu et al. 2015b) e o complexo *A. mesenterica* (Wu et al. 2015a), delimitando filogenética, morfológica e geograficamente *A. auricula-judae* (Europa), *A. angiospermarum* Y.C. Dai, F. Wu & D.W. Li (Estados Unidos), *A. minutissima* Y.C. Dai, F. Wu & Malysheva (China) e *A. tibetica* Y.C. Dai & F. Wu (China) no primeiro complexo e *A. mesenterica* (Dicks.) Pers. (Europa), *A. brasiliana* (Brasil) e *A. orientalis* Y.C. Dai & F. Wu (China) no segundo complexo.

Malysheva e Spirin (2017) avaliaram espécimes com basidioma estereoides utilizando dados morfológicos e as regiões ITS+LSU, delimitando os gêneros *Heteroradulum* Lloyd ex Spirin & Malysheva e *Tremellochaete* Raitv., além de propor os gêneros *Amphistereum* Spirin & Malysheva e *Sclerotrema* Spirin & Malysheva.

Posteriormente, Spirin et al. (2018), utilizando os marcadores ITS+LSU e tef1 para revisar os gênero *Myxarium* e *Exidia*, delimitaram *M. cinnamomescens* (Raitv.) Raitv., *M. hyalinum* (Pers.) Donk, *M. nucleatum* Wallr., *M. populinum* (P. Karst.) Spirin & V. Malysheva, *E. candida* Lloyd, *E. candida* var. c*artilaginosa* (S. Lundell & Neuhoff) Spirin & V. Malysheva. Malysheva et al. (2018) reavaliaram o gênero *Protohydnum* Möller, selecionando o epitipo de *Protohydnum cartilagineum* Möller (SP467240) coletado em São Paulo, delimitaram o gênero *Elmerina* Bres. filogeneticamente e propuseram o gênero *Hyalodon* Malysheva & Spirin como gênero filogeneticamente próximo a *Protohydnum*.

O complexo de *Stypella vermiformis* (Berk. & Broome) D.A. Reid, espécie comumente relatada no Hemisfério Norte, foi avaliado em seguida por Spirin et al. (2019a). O gênero *Mycostilla* Spirin & Malysheva foi criado para acomodar *Stypella vermiformis* [= *M. vermiformis* (Berk. & Broome) Spirin & Malysheva] e o gênero *Stypellopsis* Spirin & Malysheva para acomodar duas espécies, *S. hyperborea* Spirin & Malysheva e *S. farlowii* (Burt) Spirin & K. H. Larss.

Spirin et al. (2019b) apresentaram em seguida a revisão sobre os gêneros *Protomerulius* e *Heterochaetella*. Esses gêneros foram melhor delimitados e *Psilochaete* V. Spirin & V. Malysheva e *Metulochaete* Alvarenga foram criados para abrigar espécies de *Protomerulius* e *Heterochaetella* que não se encaixavam filogeneticamente nesses gêneros.

Devido ao complexo de espécies morfologicamente agrupadas nos gêneros *Myxarium lato sensu* e *Protodontia* Höhn., Spirin et al. (2019c) revisaram amostras

de Auriculariales com basídio pedunculado (basídio mixarioide ou esfaeropedunculado). Utilizando características morfológicas e as regiões ITS+LSU, os autores propuseram os gêneros *Hydrophana* V. Malysheva & V. Spirin, *Protoacia* V. Spirin & V. Malysheva, *Gelacantha* V. Malysheva & V. Spirin, *Myxariellum* V. Spirin & V. Malysheva, *Ofella* V. Spirin & V. Malysheva, além de descreverem novas espécies em *Myxarium* e *Protodontia*.

Utilizando espécimes neotropicais e temperados, Alvarenga et al. (2019) propuseram dois novos gêneros, *Adustochaete* Alvarenga & K.H. Larss. para a região neotropical e *Proterochaete* Spirin & Malysheva para regiões temperadas. Além disso, novas espécies foram descritas e novas combinações propostas para esses gêneros e para *Tremellochaete* Raitv., *Eichleriella* Bres. Ainda em 2019, *Tremellochaete atlantica* Alvarenga foi descrita para o Nordeste do Brasil (Phookamsak et al. 2019), utilizando coleções recentes e caracteres morfológicos e as regiões ITS+LSU.

Desta forma, a inclusão de sequências de espécimes neotropicais tem evidenciado novas linhagens em Auriculariales, auxiliando no conhecimento sobre a diversidade dessa ordem.

2.3 DIVERSIDADE DE AURICULARIALES

No mundo, são registradas aproximadamente 288 espécies de Auriculariales, distribuídas em 39 gêneros, dos quais apenas nove estão posicionados nas duas famílias de ordem (Auriculariaceae e Oliveoniaceae). Os demais 30 gêneros, representando 44% das espécies, encontram-se em posição incerta (Kirk 2019). Entretanto, os gêneros registrados por Kirk (2019) devem ser revistos, uma vez que *Heteroacanthella* Oberw. e *Oliveonia* Donk apresentam posicionamento duvidoso em Auriculariales quando observado suas descrições morfológicas (Donk 1958, Oberwinkler et al. 1990), enquanto *Amphistereum* Spirin & Malysheva, *Heteroradulum* Lloyd ex Spirin & Malysheva, *Myxarium* Wallr. e *Sclerotrema* Spirin & Malysheva estão bem suportados em Auriculariales (Malysheva e Spirin 2017) e não pertencem à ordem segundo Kirk (2019).

No Brasil, são registrados 22 gêneros e 69 espécies (Tabela 1). O primeiro registro da ordem foi realizado por Möller (1895), relatando *Auricularia fuscosuccinea*

(como *A. auricula-judae*) e descrevendo quatro novos gêneros e 12 espécies coletas na região Sul do Brasil.

Tabela 1 — Registros de Auriculariales no Brasil (AC - Acre, AM - Amazonas, AP. Amapá, BA - Bahia, CE - Ceará, DF - Distrito Federal, GO - Goiás, MG - Minas Gerais MT - Mato Grosso, PA - Pará, PE - Pernambuco, PR - Paraná, RJ - Rio de Janeiro, RO - Rondônia, RR - Roraima, RS - Rio Grande do Sul, SC - Santa Catarina, SP - São Paulo, TO - Tocantins).

Espécies	**Estado**	**Referência**
Adustochaete rava Alvarenga & KH Larson	RO	Alvarenga et al. (2019)
Auricularia brasiliana Y.C. Dai & F. Wu	AM, RS, SP GO, TO	Rick (1903); Hennings (1904); Rick (1933); Teixeira (1945); Alvarenga et al. (2015) todos como *A. mesenterica* (Dicks.) Pers.; Wu et al. 2015;
A. cornea Ehrenb.	AM, AP, BA, CE, DF, GO, MG, MT, PA, RJ, RO, RR, RS, SC, SP	[Hennings (1902, 1904); Lloyd (1920); Teixeira (1945); Fidalgo (1968); Lowy (1971); Bononi (1984); Capelari & Maziero (1988); Jesus (1996); Sotão et al. (1991, 2002, 2003); Drechsler-Santos et al. (2008a); Gibertoni & Drechsler-Santos (2010); Abrahão et al. (2012); Drechsler-Santos et al. (2013) como *Auricularia polytricha* (Mont.) Sacc.]; Teixeira (1945) como *Auricularia porphyrea* (Lév.) Ribeiro Teixeira Alvarenga et al. (2015) como *Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García
A. dacryomycetospora Speg.*	RS	Rick (1933)
A. delicata (Mont.) Henn.	AM,GO, MT,RS, SC, SP	Hennings (1900); Teixeira (1945); Lowy (1971), Alvarenga et al. (2015)
A. discensa Lloyd	RS	Rick (1933)

Espécies	Estado	Referência
A. fuscosuccinea (Mont.) Henn.	AM,GO, MT, PA, PR, RJ, RO, RS, SC, SP	Teixeira (1945) como *Auricularia rosea* Burt. E *Auricularia fusco-succinea*; Lowy (1952, 1971); Dennis (1970); Fidalgo & Hirata (1979); Bononi (1984); Capelari & Maziero (1988); Sotão et al. (2003); Campos et al. (2005); Sobestiansky (2005); Meijer (2006); Drechsler-Santos et al. (2008b); Abrahão et al. (2012) e Alvarenga et al. (2015)
A. tenuis (Lév.) Farl.	RJ	Lowy (1971)
Basidiodendron cinereum (Bourdot & Galzin) Luck-Allen	RS, SP	Rick (1938) como *Basidiodendron luteogriseum* Rick; Lowy (1971)
B. eyrei (Wakef.) Luck-Allen	PR, RS	Lowy (1971)
*B. grandinioide*s (Bourdot & Galzin) Luck-Allen	AM	Lowy (1971)
Bourdotia burtii (Bres.) K. Wells	RS	Lowy (1971)
B. galzinii (Bres.) Trotter	RS, SC	Lowy (1971)
Ductifera elastica Lowy	AC	Lowy (1982)
D. pululahuana (Pat.) Wells	RS	Lowy (1971)
D. sucina (Möller) K. Wells	RS, SC	Rick (1933) e Möller (1985) como *Exidia sucina* Möller Lowy (1971)
Eichleriella alliciens (Berk. & Cooke) Burt	PR, RS, SP	Rick (1933) como *Hirneolina incarnata* (Bres.) Bres.; Lowy (1971)
E. ochracea (Viégas) Alvarenga	SP	Viégas (1945) como *Heterochaetella ochracea* Viégas
E. tenuicula (Lév.) Spirin & Malysheva	PE	Alvarenga et al. (2019)
E. leveilleana (Berk. & M.A. Curtis) Burt	PR, RS, SP	Lowy (1971)
Exidia alba (Lloyd) Burt var. *brasiliensis*	RS	Rick (1933)

Espécies	Estado	Referência
Rick*		
E. eglandulosa Lloyd*	RS	Rick (1933)
E. maracensis Lowy	RR	Lowy 1987
E. nucleata (Schwein.) Burt	AM, RS, SP	Lowy (1971)
E. cerina Möller	RS, SC	Möller (1985), Rick (1933)
E. glabra Möller	RS, SC	Möller (1985), Rick (1933)
E. moelleri Rick	RS	Rick (1933)
E. mucedinea (Pat.) K. Wells	SP	Lowy (1971) como *Exidiopsis manihoticola* Viégas
E. opalea (Bourdot & Galzin) D.A. Reid	SP	Lowy (1971)
E. sublivida (Pat.) K. Wells	RS	Lowy (1971)
Heterochaete albida Pat.	RS	Bodman (1952); Lowy (1971)
H. bodmanii Lowy	RR	Lowy 1987
H. delicatula Rick	RS	Rick (1933)
H. gelatinosa (Berk. & M.A. Curtis) Pat.	RS	Rick (1933); Bodman (1952); Lowy (1971)
H. hirneoloides (Pat.) K. Wells	RS	Lowy (1971)
H. hymenochaetoides Rick	RS	Rick (1933)
H. letendreana (Pat.) Rick	RS	Rick (1933)
H. livida Pat.	RS	Rick (1933); Bodman (1952); Lowy (1971)
H. ochracea Pat. var. *lanosa* Rick	RS	Rick (1933); Bodman (1952)
H. shearii (Burt) Burt	RS	Bodman (1952); Lowy (1971)
H. tremellispora (F.H. Møller) Bodman	RS, SC	Möller (1985) e Rick (1933) como *Exidiopsis tremellispora* Möller; Bodman (1952)
H. verruculosa (Möller) Bodman	RS, SC	Rick (1933) como *Exidiopsis verruculosa* Möller; Bodman (1952); Lowy (1971)
Heterochaetella chorisae Viégas	SP	Viégas (1945)

Espécies	Estado	Referência
Heteroradulum brasiliense (Bodman) Spirin & Malysheva	RS	Bodman (1952); Lowy (1971) como *Heterochaete brasiliensis* Bodman
H. lividofuscum (Pat.) Spirin & V. Malysheva	RS	Rick (1933); Bodman (1952); Lowy (1971) como *Heterochaete lividofusca* Pat.;
H. spinulosum (Berk. & M.A. Curtis) Spirin & Malysheva	RS	Bodman (1952); Lowy (1971) como *Heterochaete crassa* Bodman
Hirneolina amoena (Lew.) Bres.*	RS	Rick (1933)
H. ubatubensis Viégas	SP	Viégas (1945)
Hyaloria pilacre Möller	SC, RS, SP	Möller (1895), Lowy (1971)
H. trailii (Berk. & Cooke) G.W. Martin	AM	Lowy (1971)
Metulochaete sanctae-catharinae (Möller) Alvarenga	AC, RS, RJ, SC	Möller (1895) como *Heterochaete sanctae-catharinae* Möller Lowy (1971) como *Heterochaetella cystidiophora* (Lowy) Oberw.; Bodman (1952); Spirin et al. (2019)
Patouillardina cinerea Bres.	RS	Rick (1933); Lowy (1971)
Protograndinia cinerea Rick	RS	Rick (1933)
Protohydnum cartilagineum Möller	SP, SC, RS	Möller (1985); Rick (1933); Lowy (1971); Malysheva (2017)
Protomerulius minor (Möller)Spirin	RS, SC, PE	Möller (1895), Rick (1933) e Lowy (1971) como *Stypella minor* Möller Spirin (2019c)
P. richenii Rick	RS	Rick (1933); Lowy (1971)
P. substuppeus (Berk. & Cooke) Ryvarden	RS, SC	Möller (1985), Rick (1933) e Lowy (1971) como *Protomerulius brasiliensis* Möller
Protoradulum ceraceo-vitreum Rick	RS	Rick (1933)
Pseudohydnum gelatinosum (Scop.) P.	RS, PA	Rick (1933) como *Tremellodon*

Espécies	Estado	Referência
Karst		*gelatinosum* (Scop.) Fr.; Lowy (1971)
Stypella papillata Möller	SC	Möller (1985)
S. dubia (Bourdot & Galzin) P. Roberts	SC, SP	Lowy (1971)
S. grilletii (Boud.) P. Roberts,	RS	Lowy (1971)
S. robusta Lowy	SP	Lowy (1971)
S. vermiformis (Berk. & Broome) D.A. Reid	SC	Lowy (1971)
Tremellochaete atlantica Alvarenga	PE	Phookamsak et al. (2019)
T. cerradensis Alvarenga	GO	Alvarenga et al. (2019)
T. ciliata (Möller) Spirin & Alvarenga	RS, SP	Rick (1933) como *Exidiopsis ciliata* Möller Alvarenga et al. (2019)
T. nigerrima (Viégas) Spirin & Malysheva	SP	Viégas (1945) como *Heterochaete nigerrima* Viégas
*Tremiscus helvelloide*s (DC.) Donk	SP	Lowy (1971)

* Espécies não cadastradas no Index Fungorum e Mycobank

Hennings (1900) relatou *Auricularia delicata* para Mato Grosso; em seguida, *A. nigricans* (como *A. polytricha*) e *A. auricula-judae* (como *A. auricularis*) foram registradas para o Pará (Hennings, 1902). Posteriormente, *A. brasiliana* (como *A. mesenterica*) foi registrada por Rick (1903) e Hennings (1904) para o Rio Grande do Sul e Amazonas, respectivamente.

Rick (1933) relatou 33 espécies para o Rio Grande do Sul, distribuídas em 11 gêneros, sendo oito novas para ciência, além de três novas variedades, sendo algumas delas com apenas um registro para ciência. A ocorrência de espécies com um único registro para ciência e de espécies não cadastradas nos bancos taxonômicos (Index Fungorum e Mycobank) reforça a necessidade de revisões das coleções de Auriculariales no Brasil, além de coletas direcionadas a este grupo de fungos.

Em áreas de Mata Atlântica no estado de São Paulo, Teixeira (1945) relatou a ocorrência de quatro espécies de *Auricularia*, enquanto Viégas (1945), no mesmo ano, registrou a ocorrência de *Hirneolina ubatubensis* e descreveu quatro novas espécies. Das espécies descritas por Viégas (1945), *Heterochaete nigerrima* foi

recentemente combinada em *Tremellochaete nigerrima* por apresentar morfologia semelhante à *T. japonica* (Lloyd) Raitv. (espécie tipo do gênero), se diferindo apenas por apresentar basidiósporos maiores (Malysheva e Spirin 2017).

Bodman (1952) revisou espécimes de *Heterochaete* coletados em diferentes continentes e registrou 10 espécies do gênero coletadas no Rio Grande do Sul e Santa Catarina. Recentemente, *H. brasiliensis, H. lividofusca* e *H. crassa*, referidas por Bodman (1952), foram combinadas em *Heteroradulum brasiliense*, *H. lividofuscum* e *H. spinulosum*, respectivamente, por apresentar características semelhantes a *Heteroradulum kmetii* (espécie tipo do gênero) (Malysheva e Spirin 2017). Assim, a revisão dos espécimes tipo contribui na delimitação das espécies e possibilita um melhor entendimento da distribuição de um determinado táxon.

Lowy (1971) realizou o maior estudo sobre Auriculariales no Brasil, em diferentes regiões, registrando 43 espécies distribuídas em 16 gêneros. Posteriormente, descreveu *Ductifera elastica* a partir de material coletado no Acre (Lowy 1982) e *Exidia maracensis* e *Heterochaete bodmanii* coletadas em Roraima (Lowy 1987), sendo estes os únicos registros dessas espécies no mundo até o momento.

A maioria dos trabalhos posteriores tem registrado ocorrências de espécies de Auriculariales coletadas com outros grupos de macromicetos e refere-se principalmente às espécies mais facilmente reconhecíveis de *Auricularia* (Meijer 2006, Drechsler-Santos et al. 2008a, b, Trierveiler-Pereira et al. 2009, Gibertoni e Drechsler-Santos 2010, Drechsler-Santos et al. 2013).

Wu et al. (2015a), utilizando dados morfológicos e moleculares, elucidam o complexo de espécies de *A. mesenterica* e descrevem *A. brasiliana* para o Brasil. Alvarenga et al. (2015) registram quatro espécies de *Auricularia*, sendo *A. delicata lato sensu, A. fuscosuccinea* e *A. brasiliana* (como *A. mesenterica*) os primeiros registros para Goiás e Distrito Federal.

Recentemente, *Adustochaete rava, Tremellochaete atlantica* e *T. cerradensis* foram descritas (Alvarenga et al. 2019, Phookamsak et al. 2019).

2.4 **CARACTERIZAÇÃO MORFOLÓGICA**

2.4.1 Morfologia macroscópica

As espécies da ordem Auriculariales apresentam basidiomas variando do ressupinado, efuso-reflexo, cerebriforme, coralóide, díscoide, pileados e picnidial (Figura 1), com colorações em tons de rosa, amarelo, castanho, cinza e preto, podendo apresentar consistência gelatinosa, cartilaginosa ou coriácea (Schröt 1897, Martin 1952, Wells 1958, 1959, 1975, Crawford 1954, Lowy 1971, Agerer e Oberwinkler 1979; Kirschner et al. 2012). A superfície abhimenial pode variar de lisa a densamente pilosa e a superfície himenial é comumente lisa, mas pode apresentar-se poroide, reticulada, papilada, odontoide ou hidnoide (Lowy 1971).

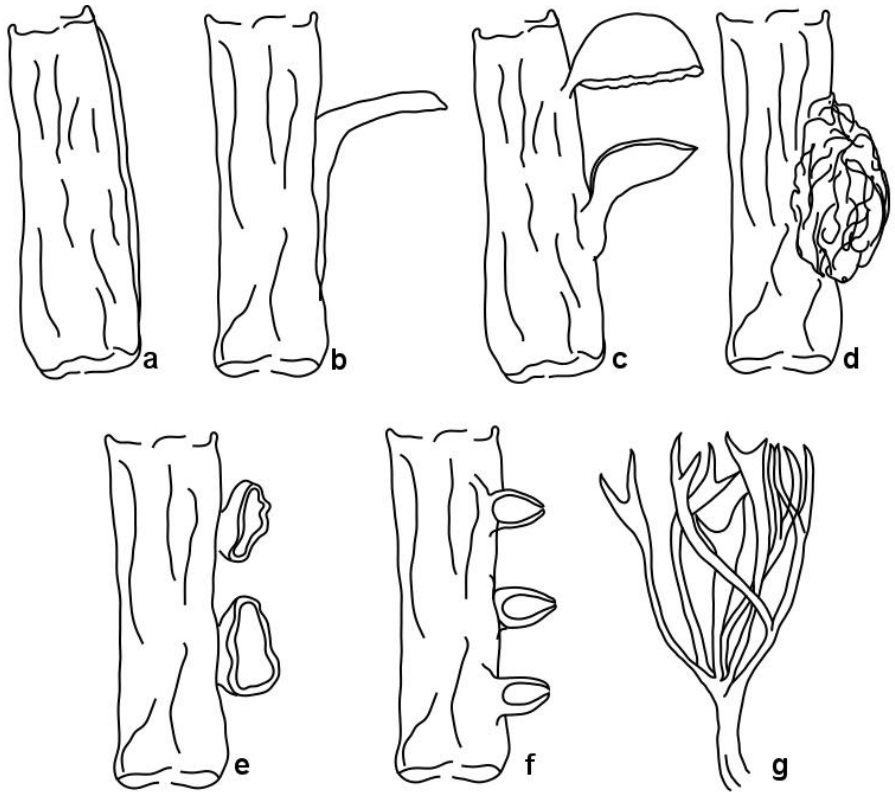

Figura 1 — Tipos de basidiomas encontrados em Auriculariales: a - ressupinado; b - efuso-reflexo; c - pileado e estipitado; d - cerebriforme; e - discoide; f - picnídial; g - coraloide. Ilustração Alvarenga 2017.

Os gêneros *Basidiodendron*, *Bourdotia*, *Ceratosebacina* P. Roberts, *Dendrogloeon* Spirin & Miettinen, *Eichleriella*, *Exidiopsis*, *Fibulosebacea* K. Wells & Raitv., *Hauerslevia* P. Roberts, *Heterochaete*, *Metabourdotia* L.S. Olive,

Microsebacina P. Roberts, *Oliveonia* Donk, *Patouillardina*, *Protohydnum*, *Protoradulum*, *Renatobasidium* Hauerslev e *Stypella* apresentam basidiomas ressupinados, enquanto *Exidia*, *Heterorepetobasidium* Chee J. Chen & Oberw., *Tremellochaete* apresentam basidiomas efuso-reflexo a cerebriforme.

Ductifera, *Gloeotromera* Ervin e *Pseudostypella* McNabb apresentam basidiomas cerebriformes, enquanto *Aporpium, Auricularia*, *Elmerina* Bres., *Protomerulius* Möller, *Pseudohydnum* e *Tremiscus* podem apresentar basidiomas pileados e/ou efuso-reflexos. Basidiomas clavarioides, discoides, picnidiais e inconspícuos podem ser encontrados na ordem, correspondendo aos gêneros, *Tremellodendropsis* (Corner) D.A. Crawford, *Heteroscypha* Oberw. & Agerer, *Porpopycnis* R. Kirschner e *Serendipita* P. Roberts, respectivamente.

2.4.2 Morfologia microscópica

Microscopicamente, as espécies da ordem apresentam hifas com grampos de conexão imersas em matriz gelatinosa; os septos têm parentossomo contínuo, visualizado apenas em microscopia eletrônica. Estruturas estéreis, como cistídios, gloeocistídios e dicariohífas podem ainda ser encontradas em diferentes gêneros (Martin 1952, Wells 1958, 1959, 1975, Lowy 1971).

Os cistídios (Figura 2a-f) podem apresentar formas cilíndricas a sub-clavadas, com ou sem incrustações ou ornamentação, e são frequentemente encontrados nos gêneros *Elmerina*, *Endoperplexa*, *Hauerslevia*, *Oliveonia* e *Stypella.* Gloeocistídios (Figura 2 h-j) são observados nos gêneros *Basidiodendron*, *Bourdotia*, *Dendrogloeon*, *Ductifera*, *Gloeotromera*, *Heterorepetobasidium*, *Metabourdotia*, *Renatobasidium* e *Stypella*, e podem ser clavado a globoso e com conteúdo ocráceo. Já as dicariohífas (Figura 3), hifas finas ramificadas podendo ou não apresentar pigmentação, estão frequentemente presente nos diferentes gêneros que compõem a ordem (Martin 1952, Wells 1958, 1959, 1975, Lowy 1971).

Os probasídios (basídios jovens) podem ser alongados, globosos a elipsoides, e os basídios apresentam três configurações de septos, longitudinais (*Auricularia*, *Elmerina*), verticais (*Exidia, Pseudohydnum*) ou transversais (*Patouillardina*). Os septos podem dividir o basídio completamente ou não (Figura 4). Os basidiósporos são alantoides, elipsoides, reniformes, alongados ou globosos, sem reação amiloide

ou dextrinóide, e germinam através de tubo germinativo ou balistoconídio (Figura 5) (Martin 1952, Wells 1958, 1959, 1975, Lowy 1971).

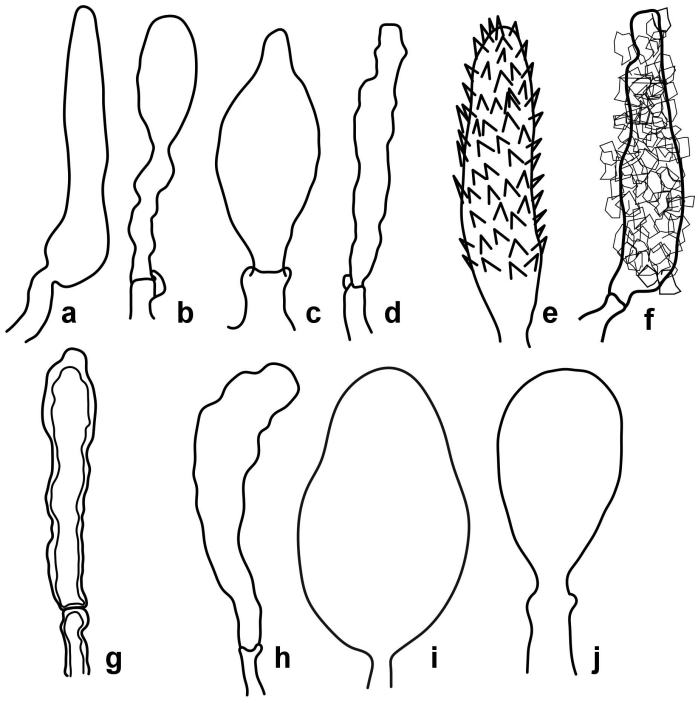

Figura 2— Tipos de cistídios (a-g) e gloeocistídios:(h-j): a-c: ventriculoso; d - moniliforme; e - clavado com ornamentação; f - atenulado com incrustações; g - clavado de parede espessa (esqueletocistídio); h - clavado; i - obpiriforme a ventriculoso; j - globoso. Ilustração Alvarenga 2017.

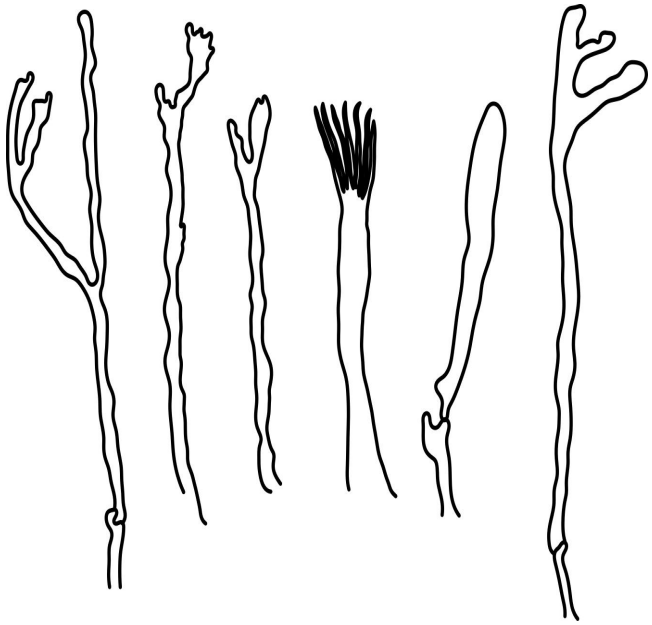

Figura 3— Tipos de dicariohífas. Ilustração Alvarenga 2017.

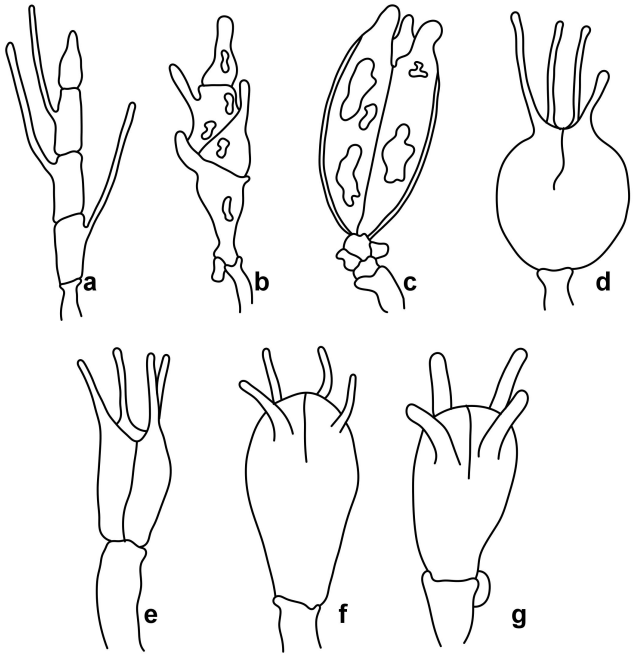

Figura 4— Tipos de basídios (metabasídios): a - septado horizontalmente; b - septado oblíquos; c-g: septado verticamente; c - elíptico com septo completo; d - globoso com septo incompleto; e- clavado com septo completo; f e g: clavado com septo incompleto. Ilustração Alvarenga 2017.

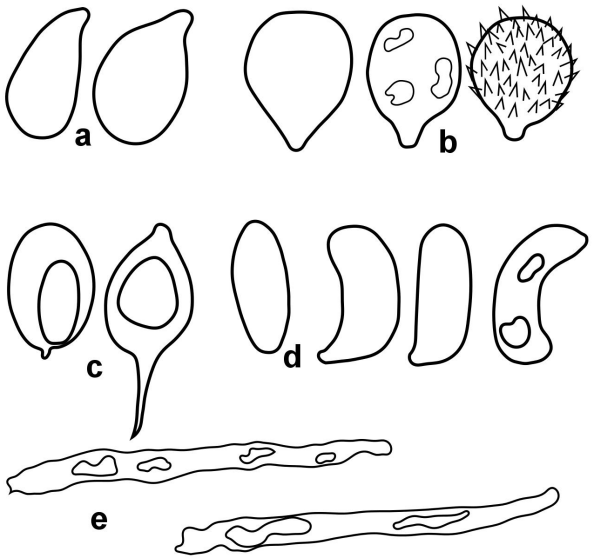

Figura 5— Tipos de basidiósporos: a - amidaliforme; b - lacrimoide com e sem ornamentação; c - napiforme; d - alantóide a reniforme e - anguiluliforme. Ilustração Alvarenga 2017.

3 MATERIAIS E MÉTODOS

3.1 ÁREA DE ESTUDOS

Foram utilizados espécimes coletados em 33 áreas distribuídas em 15 estados nos domínios morfoclimáticos da Amazônia, Caatinga, Cerrado e Mata Atlântica (Tabela 2).

De forma complementar, amostras de Auriculariales do Herbário Padre Camille Torrend, Departamento de Micologia (URM), Herbário Maria Eneyda P. K. Fidalgo, Instituto de Botânica de São Paulo (SP-Fungi) e Herbário Anchieta, Instituto Anchietano de Pesquisas/UNISINOS (PACA) foram solicitadas para análises morfológicas e as que apresentaram boas condições de preservação foram utilizadas para as análises moleculares, quando assim permitido pela curadoria dos herbários.

3.2 COLETAS E IDENTIFICAÇÃO MORFOLÓGICA

As coletas foram realizadas durante a estação chuvosa, priorizando áreas que apresentaram elevada umidade, sendo os basidiomas coletados de forma ativa, percorrendo a maior área possível. As amostras coletadas ou as solicitadas em herbário foram levadas para o Laboratório de Basidiomycota (LabB), Departamento de Micologia da Universidade Federal de Pernambuco, e identificadas.

Foram analisados os caracteres macroscópicos como: tamanho do basidioma (comprimento e largura), presença de pelos, coloração das superfícies abhimenial, himenial e da margem dos espécimes. Para as análises das estruturas microscópicas, o material foi seccionado transversalmente e, em seguida, o diâmetro das hifas, comprimento e largura dos basídios e basidiósporos (quando presentes) foram medidos na presença de KOH 3-5% ou azul de algodão.

As identificações foram realizadas utilizando bibliografia específica para os diferentes gêneros de Auriculariales (Bodman, 1949; Lowy, 1951, 1952, 1971; Roberts, 1998, 2001, 2003, 2006; Looney et al., 2013; Martin 1952, Alvarenga et al. 2019, Malysheva e Spirin 2017, Malysheva et al. 2018, Spirin et al. 2019a, b, Wu et al., 2015a,b). Os materiais coletados, incluindo tipos, foram depositados no Herbário URM e duplicatas foram enviadas para o herbário SP-Fungi.

Tabela 2— Áreas de origem dos espécimes de Auriculariales estudados. DM = Domínio morfoclimático.

Áreas	Cidade	Estado	DM	Coordenadas Geográficas
7°GAC - Sétimo Grupo de Artilharia de Campanha	Olinda	PE	MAt	8°00'06.4"S, 34°51'26.1"W
Cachoeira da Neblina	Presidente Figueiredo	AM	FA	2°03'56.3"S, 59°34'09.8"W
Cachoeira Indiana Jones	Presidente Figueiredo	AM	FA	2°02'11.2"S, 60°03'42.4"W
Fazenda São Pedro	Pilar	AL	MAt	9°33'30.5"S, 35°57'59.6"W
Floresta Nacional da Tijuca	Rio de Janeiro	RJ	MAt	22°57'15.0"S ,43°17'20.0" W
Floresta Nacional de Brasília	Taguatinga	DF	CE	15°47'11.6"S, 48°03'28.0"W
Floresta Nacional de São Francisco	Sena Madureira	AC	FA	9°54'11.0"S, 69°21'37.8"W
Floresta Nacional de Silvânia	Silvânia	GO	CE	16°38'26.7"S, 48°39'31.9"W
Floresta Nacional do Jamari	Itapuã do Oeste	RO	FA	11°25'60"S, 63°12'00"W
Floresta Nacional do Macauã	Macauã	AC	FA	9°55'16.4"S,

Áreas	Cidade	Estado	DM	Coordenadas Geográficas
				69°42'57.2"W
Instituto de Botânica de São Paulo	São Paulo	SP	MAt	24°04'59" S, 47°01'40"W
Jardim Botânico do Recife	Recife	PE	MAt	8°04'44"S, 34°58'07"W
Manguezal em Humberto de Campos	Humberto de Campos	MA	MAt	2°35'12.2"S, 43°27'49.8"W
Mata da Iracema Bacurituba	Bacurituba	MA	MAt	2°42'10.8"S, 44°44'13.7"W
Parque Ambiental Antônio Marmo Canedo Parque da Matinha	Anápolis	GO	CE	16°18'32.5"S, 48°57'23.1"W
Parque Areião	Goiânia	GO	CE	16°42'25.6"S, 49°15'21.7"W
Parque Botânico do Ceará	Fortaleza	CE	MAt	9°24'45"S, 36°43'03"W
Parque Estadual da Cantareira Núcleo Engordador Trilha da Cachoeira	São Paulo	SP	MAt	23°00'00"S, 46°00'00"W
Parque Estadual Dois Irmãos	Recife	PE	MAt	8°00'39.5"S, 34°56'48.7"W
Parque Nacional do Catimbau	Buíque	PE	CA	8°35'34.5"S, 37°14'58.6"W
Parque Nacional Monte Pascoal	Itamarajú	BA	MAt	16°52'31"S, 39°08'38"W

Áreas	Cidade	Estado	DM	Coordenadas Geográficas
Parque Nacional Serra de Itabaiana	Areia Branca	SE	MAt	10°45'00"S, 37°19'59"W
Parque Natural Municipal de Porto Velho	Porto Velho	RO	FA	8°41'12.1"S, 63°52'13.7"W
Refúgio Ecológico Charles Darwin	Igarassu	PE	MAt	7°49'39.1"S, 34°52'31.7"W
Região Metropolitana de Anápolis	Anápolis	GO	CE	16°19'34.1"S, 48°57'18.4"W
Reserva Biológica de Pedra Talhada	Quebrangulo	AL	MAt	9°15'00.7"S, 36°25'38.3"W
Reserva Biologica de Saltinho	Tamandaré	PE	MAt	9° 16'37"S, 35° 10'46"W
Reserva Biológica Guaribas	Mamanguape	PB	MAt	6° 42'12"S, 35° 10'57"W
Reserva Extrativista do Cazumbá-Iracema	Sena Madureira	AC	FA	9° 48'29"S, 69° 13'07"W
Reserva Particular do Patrimônio Natural Frei Caneca	Jaqueira	PE	MAt	9° 12'42"S, 36° 19'18"W
Reserva Particular do Patrimônio Natural Mata Estrela	Baía Formosa	RN	MAt	6°22'29.3"S, 35°01'14.5"W
Reserva Particular do Patrimônio Natural Vaga Fogo	Pirenópolis	GO	CE	15°49'27"S, 48°59'43"W
Universidade Federal de Pernambuco - Centro de Biociências	Recife	PE	MAt	8°03'00.6"S, 34°56'54.8"W

Legenda: Estados brasileiros (**AC** - Acre, **AL** - Alagoas, **AM** - Amazônas, **BA** - Bahia, **CE** - Ceará, **DF** - Distrito Federal, **GO** - Goiás, **MA** - Maranhão, **PB** - Paraíba, **PE** - Pernambuco, **RJ** - Rio de Janeiro, **RN** - Rio Grande do Norte, **RO** - Rondônia, **SE** - Sergipe, **SP** - São Paulo), Domínios Morfoclimáticos (**CE** - Cerrado, **FA**- Floresta Amazônica e **MAt** - Mata Atlântica)

3.3 IDENTIFICAÇÃO MOLECULAR

3.3.1 Extração de DNA, PCR e Sequenciamento

Fragmentos dos basidiomas frescos coletados, dos espécimes depositadas nos herbários ou dos depositados no Banco de Fragmentos de Basidiomas (BDNA) do Laboratório de Basidiomycota do Departamento de Micologia da Universidade Federal de Pernambuco foram utilizados nas extrações de DNA.

As extrações de DNA total foram realizadas segundo as modificações propostas por Góes-Neto *et al.* (2002), pelas quais os fragmentos foram macerados em nitrogênio líquido em graal de porcelana com auxílio de um pistilo. Posteriormente, em tubos de 1,5 mL, foram adicionados 650 µL de tampão CTAB [100 mM Tris–HCl pH 8, 1,4 M NaCl, 2% CTAB, 20 mM EDTA, 1% PVP) Rogers e Bendich (1985)] ao fragmento pulverizado e incubado a 65°C por 60 minutos. Ao final do período de incubação, o extrato foi lavado com clorofórmio-álcool isoamílico (24:1) e as moléculas orgânicas precipitadas em isopropanol. Em seguida, elas foram lavada com 1 mL de etanol 70% e, então, ressuspendidas em 50 µL de água ultra pura.

Foram utilizados nas amplificações os pares de *primers* ITS5 – ITS4 para a região ITS (nrDNA); LR0R – LR5 para a região de nLSU (nrDNA) e, para as região *rpb2*, os pares de *primers* b6F - b7.1R e Aur-6F - Aur-7R. Os ciclos térmicos para as amplificações das regiões alvo seguiram Kaliyaperumal e Kalaichelvan (2008) para nrITS, Vilgalys e Hester (1990) para nrLSU e Looney et al. (2013) e Matheny (2005) para região da *rpb2* subunidades 6 e 7 (Tabela 3).

Tabela 3 — Ciclos térmicos utilizados para a amplificação das regiões nrITS, nrLSU e *rpb2*.

Ciclos térmicos	nrITS	nrLSU	*rpb2*
Desnaturação inicial	5 min - 94 °C	5 min - 94 °C	3 min - 95 °C
N° de ciclos	35x	35x	34x
Desnaturação	45s - 94°C	1min - 94°C	40s - 94°C
Anelamento	50s - 58°C	55s - 55°C	45s - 54°C
Extensão	1min - 72°C	1min - 72°C	1min - 72°C
Extensão Final	10min - 72°C	10min - 72°C	10min - 72°C

O sucesso dos procedimentos relativos à extração de DNA e das reações de PCR foi observado a partir de 3µL do produto final, corados com 2 µL de GelRed™ (SYBR, Molecular Probes, Inc)e 2µL de Gel Loading Buffer (GLB), os quais foram submetidos a eletroforese em gel de agarose 1%, sendo visualizado sob luz UV.

Em seguida, os produtos das PCR foram purificados utilizado o PureLink® PCR Purification Kit (Invitrogen) ou ExoSAP-IT (Thermo Fisher) e sequenciados na Platafoma Tecnológica de Genômica e Expressão Gênica do Centro de Biociências (UFPE) utilizando os mesmo pares de *primers* para cada região amplificadas.

3.3.1 Análises filogenéticas

Os cromatogramas foram analisados no programa Staden (Staden et al. 2003). Em seguida, as sequências obtidas foram utilizadas na busca de sequências similares depositadas no GenBank, utilizando a ferramenta BLASTn (https://blast.ncbi.nlm.nih.gov/Blast.cgi). O conjunto de sequências geradas acrescidas das sequencias depositas no GenBank foi alinhado utilizando o MAFFT *online version* (Katoh et al. 2017) e os ajustes nos alinhamentos foram realizados utilizando o programa MEGA 5 (Tamura *et al.,* 2011).

As reconstruções filogenéticas foram realizadas utilizando os métodos de Máxima Verosimilhança (MV) e Inferência Bayesiana (IB). As análises de MV foram realizadas utilizando o programa PhyML no programa TOPALi v2.5 (Guindon e Gascuel 2003), com 1000 reamostragens de *bootstrap*. Para a IB foram utilizadas duas corridas independentes com 2-10 x 10^6 gerações no programa MrBayes 3.1.2 (Ronquist e Huelsenbeck 2003) ou TOPALi v2.5 (Guindon e Gascuel 2003). O modelo de substituição nucleotídica foi estimado para cada conjuntos de dados (ITS, LSU, *rpb2,* ITS+LSU e ITS+LSU+*rpb2*) utilizando o ModelTest *oline version* (http://hiv.lanl.gov/content/sequence/findmodel/findmodel.html) ou Modeltest disponível no TOPALi v2.5 (Guindon & Gascuel 2003). *Sistotrema brinkmannii* (Bres.) J. Erikss. (JX535170\JX535169) foi uilizada como grupo externo das análises ML e IB, seguindo Malysheva et al. (2018).

4 RESULTADOS E DISCUSSÕES

4.1 AMOSTRAS ESTUDADAS

Foram estudadas 252 amostras coletadas nas regiões Centro-Oeste, Norte, Nordeste e Sudeste, representando quatro domínios morfoclimáticos (Caatinga, Cerrado, Floresta Amazônica e Mata Atlântica). Destas amostras, 217 foram consideradas em boas condições para realização das análises morfológicas e moleculares; as demais 35 foram descartadas (Apêndice A). Do material considerado viável para a realização das análises moleculares, foram obtidas 105 sequências, das quais 53 da região ITS, 39 de LSU e 13 de *rpb2* (Apêndice B, Figura 6). Essas amostras se posicionaram em oito gêneros, dos quais quatro são linhagens novas, representando 16 espécies, sendo seis novas e um novo registro para o Brasil (Apêndice C, Figura 6).

As análises morfológicas e moleculares possibilitaram a descrição de quatro novos gêneros: *Adustochaete*, *Crystallodon*, *Dendroexidiopsis* em prep. e *Metulochaete*; 9 novas espécies: *Adustochaete lenis* Alvarenga em prep., *A. nivea* Alvarenga, *A. rava* Alvarenga & K-H Larsson, *Dendroexidiopsis farinaceae* Alvarenga em prep., *Elmerina brasiliensis* Alvarenga & Westphalen em prep., *E. santanaensis* Alvarenga & Westphalen em prep., *Protomerulius pedratallhadensis* Alvarenga, *Tremellochaete atlantica* Alvarenga e *T. cerradensis* Alvarenga; cinco novas combinações: *Crystallodon subgelatinosum* Alvarenga & Gibertoni, *Eichleriella ubatubensis* (Viégas) Alvarenga, *E. ochracea* (Viégas) Alvarenga, *Metulochaete sanctae-catharinae* (Möller) Alvarenga e *Tremellochaete ciliata* (Möller) Spirin & Alvarenga.

Além disso, foram registradas pela primeira vez *Eichleriella tenuicula* para Brasil; *Auricularia cornea*, *A. fuscosuccinea* e *A. brasiliana* para Alagoas; *A. cornea* para o Ceará; *A. cornea* e *A. delicata* para o Maranhão; *A. fuscosuccinea, A. brasiliana* e *Eichleriella alliciens* para Pernambuco. Desse modo, o conhecimento sobre Auriculariales no Brasil foi ampliado de 18 para 22 gêneros e de 69 para 76 espécies. Entretanto, esse conhecimento pode ser expandido, uma vez que gêneros como *Basidiodendron* e *Stypella*, originalmente descritos para o Brasil, são delimitados apenas morfologicamente, sendo necessária a continuidade dos estudos sobre Auriculariales, principalmente ressupinados

Foram revisadas 397 amostras depositadas no herbário SP-Fungi, 165 no herbário URM e 131 no herbário PACA. De forma geral, o gênero *Auricularia* é o mais representativo nos herbário SP-Fungi e URM, com 331 e 126 amostras, respectivamente. O elevado número de amostras deve-se pelo fácil reconhecimento do gênero em campo e sua fácil preservação, ao contrário de gêneros como *Basidiodendron*, *Bourdotia*, *Stypella* que apresentam basidiomas frágeis sendo comumente degradados durante o processo de secagem (Apêndice D, https://docs.google.com/spreadsheets/d/1bu5YtE1fgBhhPxXHjlTGE6-mxVQBOgRTZtyac03YzVo/edit?usp=sharing). Em relação às amostras depositadas no herbário PACA, todas são representantes de espécies ressupinadas de Auriculariales coletadas pelo Pe. Rick, das quais 110 apresentam bom estado de conservação. Porém, para identificação dos espécimes e melhor delimitação das espécies, é necessário realizar análises moleculares para permitir o posicionamento desses espécimes nos clados já estabelecidos.

Desse material herborizado, foram realizadas tentativas de análises moleculares de 30 amostras, entretanto foi possível recuperar DNA de qualidade para a amplificação e sequenciamento para apenas uma amostra. A ausência de DNA íntegro nessas amostras deve-se provavelmente pelo tempo de coleta, sendo muitas coletadas há mais de 50 anos. Assim, são necessárias novas coletas, especialmente em São Leopoldo (RS), local de origem da coleção Fungi Rickiani.

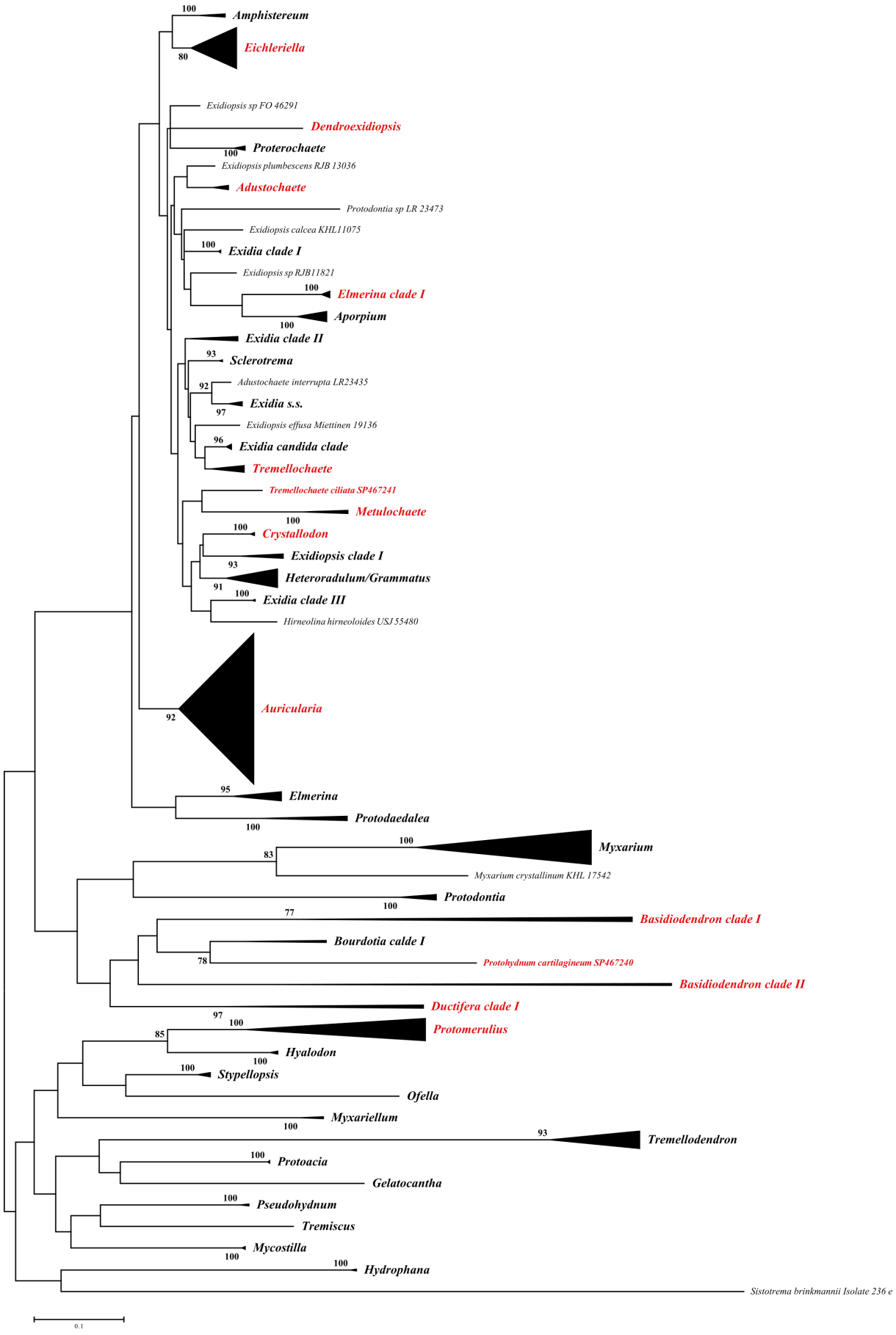
100
Amphistereum
Eichleriella
80
Exidiopsis sp FO 46291
Dendroexidiopsis
Proterochaete
100
Exidiopsis plumbescens RJB 13036
Adustochaete
Protodontia sp LR 23473
Exidiopsis calcea KHL11075
100
Exidia clade I
Exidiopsis sp RJB11821
100
Elmerina clade I
Aporpium
100
Exidia clade II
93
Sclerotrema
Adustochaete interrupta LR23435
92
Exidia s.s.
97
Exidiopsis effusa Miettinen 19136
96
Exidia candida clade
Tremellochaete
Tremellochaete ciliata SP467241
Metulochaete
100
100
Crystallodon
Exidiopsis clade I
93
Heteroradulum/Grammatus
91
100
Exidia clade III
Hirneolina hirneoloides USJ 55480
Auricularia
92
95
Elmerina
Protodaedalea
100
100
Myxarium
83
Myxarium crystallinum KHL 17542
Protodontia
100
77
Basidiodendron clade I
Bourdotia calde I
78
Protohydnum cartilagineum SP467240
Basidiodendron clade II
Ductifera clade I
97
100
Protomerulius
85
Hyalodon
100
100
Stypellopsis
Ofella
Myxariellum
100
93
Tremellodendron
100
Protoacia
Gelatocantha
100
Pseudohydnum
Tremiscus
Mycostilla
100
100
Hydrophana
Sistotrema brinkmannii Isolate 236 e
0.1

Figura 6— Filograma utilizando 368 sequências com 2082 sítios do rDNA (ITS + LSU). Topologia obtida pela análise MV com 1000 re-amostragens, evidenciando 29 linhagens equivalentes a gêneros descritos e possíveis novas linhagens de Auriculariales. Em vermelho, as linhagens que apresentam sequências de espécimes coletados no Brasil. Apenas valores de suporte acima de 75% de bootstrap e 0,95 de probabilidade posterior são indicados (MV/IB). A escala mostra a probabilidade de mudanças esperadas por sítio.

4.2 TRATAMENTO TAXONÔMICO

4.2.1 *Adustochaete* Alvarenga & K.H. Larsson

Em coletas realizadas entre 2016 e 2019, foram encontrados quatro espécimes de *Adustochaete* que representam três espécies: *A. rava*, *A. nivea* e *A. lenis* (Apêndices E, F e G).

Adustochaete foi recentemente descrito utilizando espécimes neotropicais, sendo *A. rava* a espécie tipo (Alvarenga et al. 2019). O gênero é caracterizado por apresentar basidioma ressupinado, himenóforo liso, tuberculado a hidnóide. Microscopicamente, é reconhecido por apresentar dendrohifídios incrustados e basídio com células basais ocasionais. Filogeneticamente, *Adustochaete* representa uma nova linhagem em Auriculariales, demonstrado pelo uso das regiões ITS e LSU do rDNA (Apêndice E). *Adustochaete* apresenta espécies anuais, crescendo em galhos em decomposição e tem distribuição conhecida para a Floresta Amazônica (*A. rava*), Mata Atlantica (*A. nivea* e *A. lenis*) e em floresta tropical mexicana (*A. interrupta*).

Como espécie tipo do gênero, *A. rava* apresenta as características acima, enquanto *A. nivea*, recentemente descrita (Apêndice F) apresenta basidioma branco, himenóforo hidnóide com espinhos não regulares, basídios e basidiosporos (14,7–16,2 × 9,7–10,1µm e 10,2–13,7 × 3,8–4,7 µm, respectivamente). *Adustochaete lenis* representa uma nova espécie com himenóforo liso e se diferencia das demais espécies do gênero por apresentar basidioma cinza, basídio 10.3–15,5 × 7,2–10,4µm e basidiosporos 9,5–11,3 × 3,7–5,3µm (Apêndice G).

4.2.2 *Auricularia* Bull.

Em coletas realizadas entre 2016 a 2019, foram encontrados 181 espécimes de *Auricularia*. Adicionalmente, foram revisados 331 e 126 espécimes depositados no Herbário SP-Fungi e URM, respectivamente. Desses materiais, foram obtidas 64 sequências, cujas amostras representam *A. brasiliana*, *A. cornea*, *A. delicata* e *A. fuscosuccinea* (Apêndice A e D, Figura 7).

Os espécimes depositados nos herbários como *A. mesenterica* tiveram sua determinação atualizada para *A. brasiliana,* uma vez que recentes trabalhos evidenciaram a segregação dessa espécie do complexo de *A. mesenterica* (Wu et al. 2015b).

Dos espécimes anteriormente determinadas como *A. cornea*, *A. polytricha* ou *A. nigricans*, foi possível evidenciar, utilizando dados morfológicos e moleculares, a ocorrência apenas de *A. cornea* no Brasil. Os espécimes determinados como *A. fuscosuccinea* e *A. delicata* foram confirmados como tais representando espécies com ampla distribuição no Brasil, encontradas em todos os domínios morfoclimáticos. Utilizando análises morfológicas, os espécimes determinados como *A. auricula-judae*, foram redeterminados como *A. fuscosuccinea*, corroborando sua distribuição restrita a ambientes temperados (Wu et al. 2015a).

Auricularia foi delimitada utilizando espécimes europeus, sendo *A. mesenterica* a espécie tipo. O gênero é caracterizado por apresentar basidioma ressupinado a estipitado, superfície abhimenial frequentemente pilosa, himenóforo liso, de consistência gelatinosa a cartilaginosa, de coloração variando do avermelhado ao castanho escuro. Microscopicamente, é reconhecido por apresentar sistema hifálico monomítico, com grampo de conexão, gloeocistídios ausentes, basídios cilíndricos com septos horizontais, e basidiosporos alantoides. Devido a sua importância econômica e medicinal em países orientais, o gênero tem sido constantemente estudado. O gênero apresenta espécies cosmopolitas como *A. cornea,* espécies neotropicais como *A. fuscosuccinea* e *A. delicata,* e espécies de distribuição restrita, como *A. brasiliana,* conhecida apenas para o Brasil.

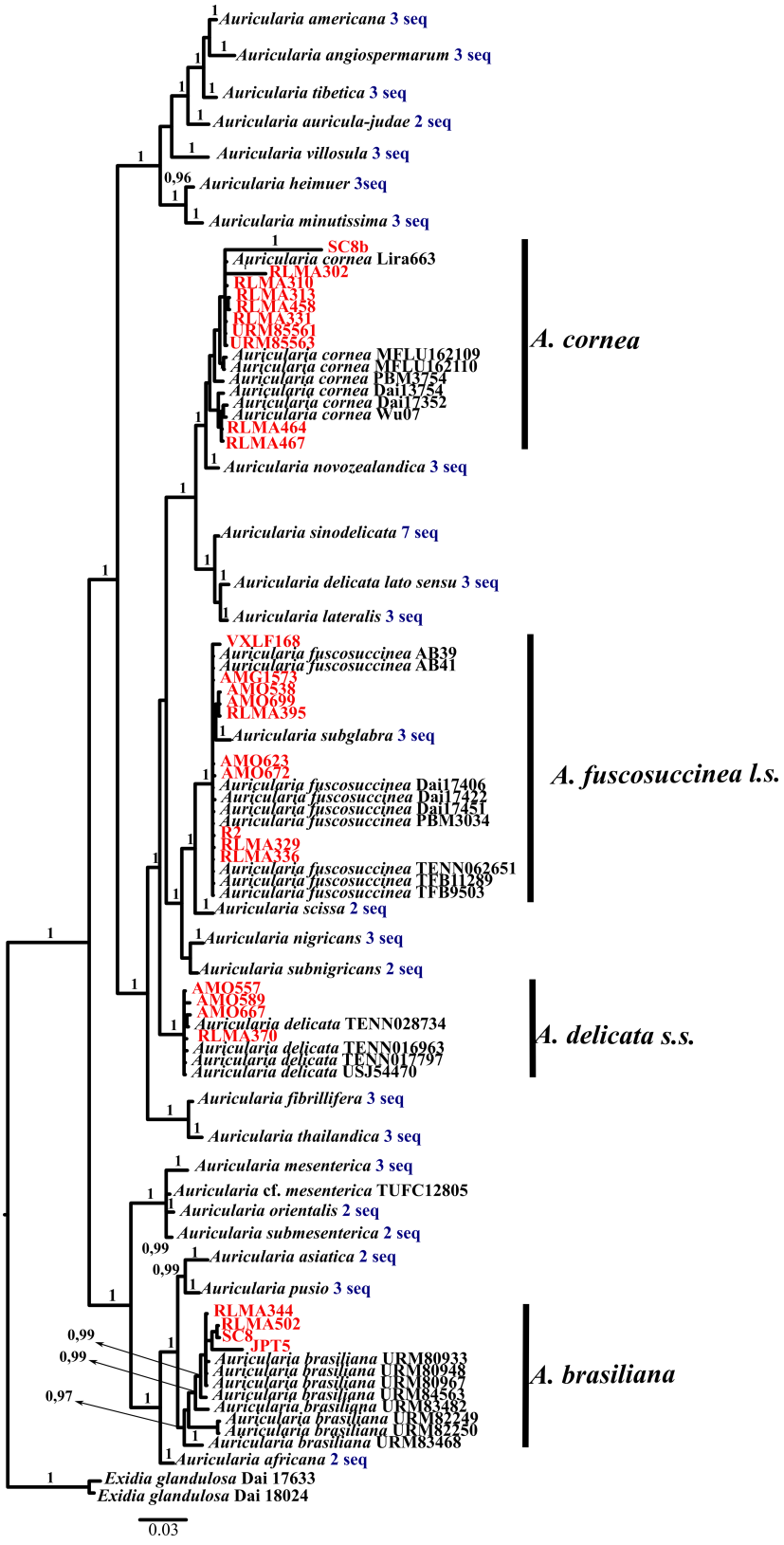

Figura 7— Filograma utilizando 125 sequências com 2519 sítios (ITS+LSU+rpb2). Topologia obtida pela análise IB com 10 milhões de gerações (GTR + G), evidenciando 26 linhagens de *Auricularia* equivalentes a espécies descritas e duas possíveis novas espécies (*A.* cf. *mesenterica* e *A. delicata* lato sensu). Em vermelho, as sequências de espécimes coletados no Brasil e obtidos durante a tese. Apenas

valores de suporte acima de 0,95 de probabilidade posterior são indicados. A escala mostra a probabilidade de mudanças esperadas por sítio.

4.2.3 *Basidiodendron* Rick

Em coletas realizadas entre 2016 a 2019, foi encontrado apenas um material de *Basidiodendron*, determinado como *B. luteogriseum* e coletado em São Paulo. Outros 9 espécimes também foram coletados e possivelmente representam *Basidiodendron*. Dos 10 espécimes, seis sequências foram geradas (3 de ITS e 3 de LSU) e se posicionaram em dois clados distintos (Fig. 6). Adicionalmente, foram revisados espécimes depositados no Herbário SP-Fungi, os quais haviam sido determinados como *B. eyrei, B. galzani* e *B. petiolata*. Entretanto, devido à ausência de dados moleculares e à presença de caracteres morfológicos dúbios, não foi possível confirmar essas identificações.

Basidiodendron foi delimitado utilizando espécimes coletados no Sul do Brasil, sendo *B. luteogriseum* a espécie tipo (Rick 1938). O gênero é caracterizado por apresentar basidioma ressupinado, himenóforo liso a tuberculado, poroide, de consistência gelatinosa. Microscopicamente, é reconhecido por apresentar sistema hifálico monomítico, com grampo de conexão, gloeocistídios com conteúdo dourado quando maduros, basídios urniformes a suburniformes, frequentemente colapsados, e basidiosporos globosos a sub-globosos, obovados a oblongos, comumente com constrição assimétrica. *Basidiodendron* apresenta espécies crescendo em madeira em decomposição e com distribuição conhecida para Mata Atlântica.

Dos espécimes sequenciados, nenhum foi coletado próxima à localidade tipo (São Leopoldo - RS). Assim, o gênero *Basidiodendron* permanece sem delimitação molecular, apresentando espécies em diferentes clados (Fig. 6).

4.2.4 *Crystallodon* Alvarenga

Em coletas realizadas em 2018, foram encontrados quatro espécimes de *Crystallodon*. O gênero é caracterizado por apresentar basidioma ressupinado, himenóforo marrom escuro, hidnóide, sendo os dentes formados por aglomerados de cristais angulares. Microscopicamente, é reconhecido por apresentar, hifa com 2–4 basídios no ápice e basidiosporos cilíndricos (Apêndice I).

Recentemente, dois novos gêneros com himenóforo hidnóide foram propostos para ciência, com base em espécimes coletados no Brasil, *Adustochaete* e *Metulochaete* (Alvarenga et al. 2019, Spirin et al. 2019b). *Crystallodon* se diferencia de *Adustochaete* pela ausência de dentes formados por uma grossa camada de hifas subiculares com dendrohifídias incrustadas, e de *Metulochaete* devido à ausência de dentes formados por metuloides.

Filogeneticamente, *Crystallodon* representa uma nova linhagem em Auriculariales, demonstrado pelo uso das regiões ITS e LSU do rDNA (Apêndice I). O gênero apresenta até o momento uma espécie, *C. subgelatinosum* (Bodman) Alvarenga & Gibertoni, crescendo em madeira em decomposição e com distribuição restrita à Mata Atlântica até o momento.

4.2.5 *Dendroexidiopsis* Alvarenga

Em amostras coletadas entre 2012 e 2013, foram encontrados três espécimes de *Dendroexidiopsis*. O gênero é caracterizado por apresentar basidioma ressupinado, himenóforo liso a tuberculado, margem adnata à fimbriata, de coloração creme a cinza. Microscopicamente, é reconhecido por apresentar sistema hifálico monomítico, dendrohifídios com cristais, basídios subglobosos a obcônicos com 4 células e basidiosporos cilíndricos (Apêndice G).

Dendroexidiopsis é morfologicamente similar a *Exidiopsis l.s.*, do qual difere pela presença de dendrohifídios densamente incrustados com cristais. *Adustochaete*, recentemente descrito para o Brasil, também apresenta dendrohifídios incrustados no himênio, entretanto os dois gêneros são filogeneticamente distantes e, morfologicamente, se diferenciam pela ausência de cistídios comumente encontrado nas espécies de *Adustochaete* (Alvarenga et al. 2019).

Filogeneticamente, *Dendroexidiopsis* representa uma nova linhagem de Auriculariales, demonstrado pelo uso das regiões ITS e LSU do rDNA (Apêndice G). O gênero apresenta até o momento uma espécie, *D. farinacea* Alvarenga, crescendo em madeira em decomposição e com distribuição conhecida para Mata Atlântica.

4.2.6 *Eichleriella* Bres.

Em coletas realizadas entre 2016 e 2019, foram encontrados dois espécimes de *Eichleriella*, os quais foram determinados como representantes de *E. tenuicula* (Lév.) Spirin & Malysheva e *E. alliciens* (Berk. & Cooke) Burt. Adicionalmente, foram revisados espécimes depositados no Herbário SP-Fungi, inicialmente determinados como *Heterochaetella ochracea* Viégas e *Hirneolina ubatubenis* Viégas, que foram transferidas para *Eichleriella* após análises filogenéticas (Apêndice E e G).

Eichleriella é caracterizado macroscopicamente por apresentar basidioma ressupinado, orbicular, himenóforo liso a hidnoide, margem desprendendo do substrato, coloração variando do branco ao alaranjado. Microscopicamente, é reconhecido por apresentar sistema hifálico monomítico a dimítico, presença de dendrohifídios e cistídios, basídios subglobosos a obcônicos com 2 - 4 células e basidiosporos cilíndricos a levemente curvados. No Brasil, o gênero é representado por *E. alliciens*, *E. ochracea* (Viégas) Alvarenga, *E. tenuicula*, *E. ubatubensis* (Viégas) Alvarenga e *E. leveilleana* (Berk. & M.A. Curtis) Burt.

4.2.7 *Elmerina* Bres.

Em coletas realizadas entre 2016 e 2019, nenhum espécime deste gênero foi encontrado. Entretanto, foram revisados três espécimes de *Elmerina s. l.* do Herbário SP-Fungi, dos quais foram obtidas duas sequencias de ITS e duas de LSU (Apêndice H).

Elmerina foi originalmente delimitado utilizando espécimes coletados nas Filipinas, sendo *E. cladophora* a espécie tipo. O gênero é caracterizado por apresentar espécies com himenóforo poroide a dedaloide, sistema hifálico dimítico, basídios globosos a subglobosos e basidiosporos reniformes a alantoides. Recentemente, o gênero foi delimitado filogeneticamente utilizando um espécime coletado na Indonésia (Malysheva et al. 2018).

O gênero é representando no Brasil por *E. brasiliensis* Alvarenga & Westphalen e *E. santanaensis* Alvarenga & Westphalen (Apêndice H). *Elmerina brasiliensis* é reconhecida por apresentar basidioma efuso-reflexo, himenóforo poroide com 6–7 poros/mm, contexto com 1–3 mm apresentando uma visível linha

escura, sistema hifálico dimítico, basídios globosos (7,4–)8,2–9,6(–10,3)×(5,2–)5–6,4(–6,6) µm e basidiosporos reniformes a alantoides (4,0–) 4,1–5,9 (–6,1) × (2,7–) 2,8–4,0 (–4,3) µm.

Elmerina santanensis pode macroscopicamente ser confundida com qualquer espécie ressupinada poroide em Agaricomycetes, entretanto, é microscopicamente reconhecida por apresentar basidiosporos reniformes a alantoides (4,2–) 4,3–5,6 (–5,7) × (2,0–) 2,1–2,8 (–3,0) µm. Filogeneticamente, a sequência de *E. santanensis* agrupou como grupo irmão de duas sequências de isolados endofíticos de folhas de *Hevea* sp. do Peru (Martin et al. 2015). Este é o primeiro registro de espécies de *Elmerina* em associação endofítica.

Elmerina dimidiata já foi registrada para o Sul do Brasil por Gerber e Loguercio-Leite (2000), entretanto, de acordo com a descrição dos espécimes coletados [basidiosporos variando de (4.0–)4.5–6.0 × 3.0–3.5(–4.0)], o material na verdade representar *E. santanaensis* (Gerber e Loguercio-Leite 2000).

Elmerina brasiliensis e *E. santanaensis* apresentam, até o momento, espécimes crescendo em madeira em decomposição e distribuição conhecida apenas para Mata Atlântica do Brasil.

4.2.8 *Metulochaete* Alvarenga

Em coletas realizadas entre 2016 e 2019, foram encontrados dois espécimes de *Metulochaete* os quais foram determinados como representantes de *Metulochaete sanctae-catharinae* (Apêndice J). Adicionalmente foram revisados espécimes depositados no Herbário SP-Fungi os quais, foram determinados morfologicamente e filogeneticamente como representantes do gênero *Metulochaete sanctae-catharinae*.

Metulochaete foi recente descrito utilizando espécimes tropicais, sendo *Metulochaete sanctae-catharinae* (Möller) Alvarenga (= *Heterochaete sanctae-catharinae* Möller) a espécie tipo. O gênero é caracterizado por apresentar basidioma ressupinado, himenóforo hidnóide, de consistência gelatinosa. Microscopicamente, é reconhecido por apresentar, dentes formados por metuloides não incrustados semelhantes a setas, sistema hifálico monomítico, dendrohifídios não incrustados, basídios ovoides e basidiosporos alantoides curvados.

Filogeneticamente, o gênero representa uma nova linhagem em Auriculariales, demonstrado pelo uso das regiões ITS e LSU do rDNA (Apêndice J). *Metulochaete* apresenta até o momento uma espécie, crescendo em madeira em decomposição e apresenta distribuição conhecida para a Floresta Amazônica e Mata Atlântica.

4.2.9 *Protomerulius* Möller

Em coletas realizadas entre 2016 e 2019, foi encontrado apenas um espécime de *Protomerulius*, sendo obtida uma sequência de ITS e uma de LSU. O gênero foi inicialmente estabelecido utilizado-se a espécies *P. brasiliensis* Möller (= *P. substuppeus* (Berk. & Cooke) Ryvarden), sendo caracterizado pela presença de basidioma ressupinado a efuso-reflexo, himenóforo poroide, gloeocistídios presentes e basídios globosos com septos verticais.

Recentemente, Spirin et al. (2019b) redefiniram o gênero para incluir espécies de himenóforo lisos, hidnoide e poroides. O gênero é atualmente caracterizado por apresentar hifas esquelétias nas espécies poroides e hidnoides e gloeocistídios nas espécies com himenóforo liso, basídio pedunculado, globoso a subgloboso com 2-4 células, e basidiósporos globosos a alantoides.

No Brasil, o gênero é representado pelas espécies *P. subtuppeus* (Berk. & Cooke) Ryvarden, *P. minor* (A. Møller) V. Spirin & O. Miettinen e a nova espécie *P. pedratalhadensis* Alvarenga, caracterizada por apresentar basidioma ressupinado, margem fimbriata, 1–2 poros/mm, gloeocistídios não abundantes, basídios com 4 células, 6–10×4–7.3 µm, e basidiosporos globosos, ovoide a alantoides (3.2–) 3.3–6.2 (–6.3) × (2.8–) 3.1–4.0 (–4.1) µm (Apêndice H). Essas espécies foram registradas até o momento apenas para área de Mata Atlântica crescendo em madeira em decomposição.

4.2.10 *Pseudohdynum* (Scop.) P. Karst.

Em coletas realizadas entre 2016 e 2019, foram encontrados dois espécimes de *Pseudohydnum* sp.. Adicionalmente, foram revisadas sete espécimes de *Pseudohydnum* no herbário SP-Fungi. Devido à ausência de dados moleculares, não foi possível confirmar o posicionamento dos espécimes brasileiros no gênero.

Pseudohydnum foi delimitado utilizando espécimes coletados na Nova Zelândia, sendo *P. gelatinosum* (Scop.) P. Kars (=*Hydnum gelatinosum* Scop) a espécie tipo. O gênero é caracterizado por apresentar basidioma estipitado, himenóforo hidnóide, de consistência gelatinosa. Microscopicamente, é reconhecido por apresentar, dentes férteis, sistema hifálico monomítico, basídios ovoides e basidiosporos alantoides curvados. O gênero apresenta espécies, crescendo em madeira em decomposição e distribuição conhecida para a Floresta Amazônica e Mata Atlântica.

4.2.11 *Tremellochaete* Raitv.

Em coletas realizadas entre 2016 e 2019, foram encontrados quatro espécimes de *Tremellochaete* que representam três espécies: *Tremellochaete atlantica* (Apêndice L), *T. cerradensis* (Apêndice E) e *Tremellochaete* sp. 1. Adicionalmente foi revisado um espécime depositado no herbário SP-Fungi, que após análises morfológicas e moleculares, foi determinado como *T. ciliata* (Apêndice E).

Tremellochaete foi inicialmente descrito utilizando espécimes de *T. japonica* coletados no Japão e recentemente reestabelecido utilizados análises morfológicas e moleculares (Malysheva e Spirin 2017). O gênero se caracteriza por apresentar basidioma ressupinado, cartilaginoso a gelatinoso, himenóforo com papilas incrustadas. Atualmente, é representado por cinco espécies sendo quatro (*T. atlantica*, *T. cerradensis*, *T. ciliata* e *T. nigerrima*) ocorrentes no Brasil e três delimitadas utilizados dados morfológicos e moleculares.

4.2.12 Possiveis Novo Táxons

Devido ao número restrito de espécimes disponíveis para análises morfológicas ou ausência de dados moleculares, 20 espécimes não foram passíveis de descrição, sendo tentativamente nomeados segundo seu grupo morfológico (Apêndice A). Novas coletas são necessárias para complementação dos dados e confirmação de suas identidades.

5 CONSIDERAÇÕES FINAIS

Esta tese fornece dados morfológicos e moleculares que possibilitam a atualização do conhecimento sobre a riqueza e distribuição geográfica de espécies da ordem Auriculariales no Brasil. Os dados foram obtidos mediante coletas em áreas representativas dos domínios morfoclimáticos da Mata Atlântica, Caatinga, Cerrado e Floresta Amazônica, além de revisões das coleções dos herbários URM, PACA e SP-Fungi.

Esses estudos possibilitaram o primeiro registro de *Eichleriella tenuicula* para Brasil; *Auricularia cornea*, *A. fuscosuccinea*, *A. brasiliana* para Alagoas; *A. cornea* para o Ceará; *A. cornea* e *A. delicata* para o Maranhão; *A. fuscosuccinea, A. brasiliana e Eichleriella alliciens* para Pernambuco.

Também permitiram novas combinações em *Eichleriella*: *E. ubatubensis* e *E. ochracea*; e em *Tremellochaete*: *T. ciliata*, enquanto o Crystallodon e *Metulochaete* foi estabelecidos para acomodar Crystallodon subgelatinosum (=Heterochaete subgelatinosa) e *M. sanctae-catharinae* (=*Heterochaete sanctae-catharinae*), repectivamente.

Adicionalmente, possibilitaram a descrição de 9 novas espécies: *Adustochaete lenis*, A. *nivea*, *A. rava*, *Dendroexidiopsis farinaceae, Elmerina brasiliensis, E. santanaensis, Protomerulius pedratallhadensis,Tremellochaete atlantica* e *T. cerradensis*.

Com isso, o conhecimento sobre Auriculariales no Brasil foi elevado de 18 para 22 gêneros e de 69 para 76 espécies. O presente trabalho apresenta ainda uma ampla revisão da literatura, evidenciando os principais trabalhos e as recentes adições ao conhecimento da ordem, descrições das novas espécies, e uma ampla reconstrução filogenética da ordem fornecendo um importante subsídio e incentivo para novos estudos abordando as espécies de Auriculariales. Promove, ainda, o incremento do acervo do URM, que contribui para elevar a representatividade do herbário frente à diversidade da ordem Auriculariales do Brasil.

Apesar dos avanços, lacunas ainda deverão ser preenchidas. Dentre os gêneros descritos para o Brasil, apenas dois (*Basidiodendron* e *Stypella*) não foram passíveis de delimitação tanto morfológica quanto molecular. *Basidiodendron* e *Stypella* foram descritos utilizando amostras do Sul do Brasil e novas coletas nos locais de origem (Blumenau - SC e São Leopoldo - RS) são necessárias para recuperar as espécies

de *Stypella* e *Basidiodendron* descritas por Möller e Rick, respectivamente, e, assim, melhor delimitar esses gêneros.

As dificuldades na coleta, conservação e análises dos espécimes de Auriculariales, em especial para os gêneros ressupinados e gelatinizados, evidenciam a necessidade de mais trabalhos focados nesse grupo, uma vez que, esses espécimes necessitam de atenção e demandam tempo de processamento elevado para, assim, garantir bons materiais para estudos morfológicos e moleculares. Desse modo, novas linhagens poderão vir a ser recuperadas e descritas com o aumento dos estudos do grupo.

A elevada variabilidade morfológica interespecífica encontrada em uma mesma linhagem (gênero) de Auriculariales reforça a necessidade da adição de informações biogeográficas e moleculares para a melhor delimitação. Como evidenciando ao longo da tese, um mesmo gênero pode apresentar distintos caracteres macroscópicos e serem filogeneticamente convergentes, como encontrado no gênero *Protomerulius*, que apresenta espécies com himenóforo liso, poroide e hidnoide.

Foi possível observar a dificuldade na amplificação das regiões codificantes de proteína no DNA como *rpb2*, quando comparado a outros grupos de Agaricomycetes. Deste modo, recomendamos futuros estudos focados no desenho de *primers* para cada região utilizando representantes de diferentes linhagens e gêneros de Auriculariales.

Devido aos relatos do potencial medicinal de espécies de *Auricularia*, estudos abordando as espécies recentemente descritas, além de linhagens brasileiras de *Auricularia* sp., permitirão o melhor entendimento sobre sua aplicabilidade, e agregando valor econômico a espécies dessa ordem.

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APÊNDICE A – LISTA DO MATERIAL COLETADO E DEPOSITADO NO HERBÁRIO URM

Espécie	DM	n° do Coletor	n° URM
Adustochaete nivea Alvarenga	MAt	Alvarenga, R.L.M. 531	93408
Adustochaete rava Alvarenga & K.H. Larss.	FA	Larsson, KH 15526	92997
Adustochaete rava Alvarenga & K.H. Larss.	FA	Chikowski, R.S. 841	80067
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Alvarenga, R.L.M. 344	93413
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Alvarenga, R.L.M. 346	93520
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Alvarenga, R.L.M. 502	93414
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Assis, S. 8a	93411
Auricularia brasiliana Y.C. Dai & F. Wu	CE	Gibertoni, T.B. 1408	93554
Auricularia brasiliana Y.C. Dai & F. Wu	FA	Gibertoni, T.B. 4	93495
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Lima, V.X. 178	93556
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Santos, D.C. 6	93498
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Alvarenga, R.L.M. 343	93570
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Filho, J.R.C.O. 095	93621
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Filho, J.R.C.O. 122	93622
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Lima, V.X. JPT4	93627
Auricularia brasiliana Y.C. Dai & F. Wu	CE	Gibertoni, T. B. 19-06	93634
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Lima, V.X. 235	93545
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Oliveira, V.R.T. 493	93549
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Oliveira, V.R.T. 226b	93562
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Oliveira, V.R.T. 296	93604
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	Alvarenga, R.L.M. 764	93625
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	MP02	93635
Auricularia cornea Ehrenb.	MAt	Gugliotta, A.M. 1576	93540
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A. 1022	93584
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 460	93455
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 302	93415
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 310	93419
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 311	93523

Espécie	DM	n° do Coletor	n° URM
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 313	93418
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 331	93420
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 446	93538
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 447	93506
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 448	93543
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 454	93537
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 456	93536
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 457	93541
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 458	93421
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 464	93422
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 466	93530
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 467	93423
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 469	93519
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 476	93493
Auricularia cornea Ehrenb.	MAt	Assis, S. 8b	93412
Auricularia cornea Ehrenb.	MAt	Chikowski, R.S. 1	93512
Auricularia cornea Ehrenb.	MAt	Chikowski, R.S. 2	93417
Auricularia cornea Ehrenb.	MAt	Filho, J.R.C.O. 125	93510
Auricularia cornea Ehrenb.	MAt	Filho, J.R.C.O. 131	93526
Auricularia cornea Ehrenb.	CE	Gibertoni, T.B. 1	93560
Auricularia cornea Ehrenb.	MAt	Gibertoni, T.B. 38	93492
Auricularia cornea Ehrenb.	MAt	Gugliotta, A.M. 1577	93521
Auricularia cornea Ehrenb.	MAt	Gugliotta, A.M. 1578	93527
Auricularia cornea Ehrenb.	MAt	Gugliotta, A.M. 1579	93470
Auricularia cornea Ehrenb.	MAt	Gugliotta, A.M. 1582	93472
Auricularia cornea Ehrenb.	MAt	Gugliotta, A.M. 1583	93473
Auricularia cornea Ehrenb.	MAt	Lima, V.X. 137	93546
Auricularia cornea Ehrenb.	MAt	Lima, V.X. 439	93525
Auricularia cornea Ehrenb.	MAt	Lima, V.X. 614	93551
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A. 573	93416
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A. 660	93532

Espécie	DM	n° do Coletor	n° URM
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A. 750	93535
Auricularia cornea Ehrenb.	MAt	Oliveira, V.R.T. 180	93524
Auricularia cornea Ehrenb.	MAt	Santos, D.C. 143	93503
Auricularia cornea Ehrenb.	MAt	Santos, D.C. 34	93497
Auricularia cornea Ehrenb.	MAt	Santos, D.C. 46	93494
Auricularia cornea Ehrenb.	MAt	Santos, D.C. 87	93502
Auricularia cornea Ehrenb.	CE	Alvarenga, R.L.M. 363	93574
Auricularia cornea Ehrenb.	MAt	Lima, V.X. 167	93575
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.1344	93577
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.910	93578
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 323	93580
Auricularia cornea Ehrenb.	MAt	Meiras-Ottoni, A.1127	93583
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.1352	93587
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.1036	93589
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.949	93591
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.935	93592
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.943	93593
Auricularia cornea Ehrenb.	FA	Meiras-Ottoni, A.903	93596
Auricularia cornea Ehrenb.	MAt	Alvarenga, R.L.M. 325	93597
Auricularia cornea Ehrenb.	MAt	Oliveira, V.R.T. 205	93601
Auricularia cornea Ehrenb.	MAt	Oliveira, V.R.T. 347	93603
Auricularia cornea Ehrenb.	Porto Rico	Gibertoni, T. B. 17-04	93608
Auricularia cornea Ehrenb.	Porto Rico	Gibertoni, T. B. 17-02	93609
Auricularia cornea Ehrenb.	Porto Rico	Gibertoni, T. B. 17-03	93610
Auricularia cornea Ehrenb.	MAt	Santos, D.C. 176	93619
Auricularia cornea Ehrenb.	MAt	Filho, J.R.C.O. 104	93623
Auricularia cornea Ehrenb.	Acre	Meiras-Ottoni, A. 976	93630
Auricularia cornea Ehrenb.	CE	Gibertoni, T. B. 19-05	93633
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 751	93507
Auricularia delicata (Mont. ex Fr.) Henn.	CE	Alvarenga, R.L.M. 352	93511
Auricularia delicata (Mont. ex Fr.) Henn.	CE	Alvarenga, R.L.M. 357	93514

Espécie	DM	n° do Coletor	n° URM
Auricularia delicata (Mont. ex Fr.) Henn.	CE	Alvarenga, R.L.M. 370	93427
Auricularia delicata (Mont. ex Fr.) Henn.	CE	Alvarenga, R.L.M. 396	93491
Auricularia delicata (Mont. ex Fr.) Henn.	MAt	Filho, J.R.C.O. 118	93509
Auricularia delicata (Mont. ex Fr.) Henn.	MAt	Filho, J.R.C.O. 120	93518
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Gibertoni, T.B. 1	93499
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Gibertoni, T.B. 5	93550
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 513	93487
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 557	93424
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 589	93425
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 654	93486
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 667	93426
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 670	93488
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 770	93489
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 790	93490
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 1075	93569
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 1341	93571
Auricularia delicata (Mont. ex Fr.) Henn.	MAt	Alvarenga, R.L.M. 599	93573
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 1416	93579
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 1349	93588
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 999	93594
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 966	93595
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 547	93598
Auricularia delicata (Mont. ex Fr.) Henn.	CE	NCC120	93600
Auricularia delicata (Mont. ex Fr.) Henn.	FA	Meiras-Ottoni, A. 1409	93620
Auricularia delicata (Mont. ex Fr.) Henn.	MAt	COM19-04	93632
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Wu, F. 6	93464
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Alvarenga, R.L.M. 329	93432
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Alvarenga, R.L.M. 330	93508
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Alvarenga, R.L.M. 336	93433
Auricularia fuscosuccinea (Mont.) Henn.	CE	Alvarenga, R.L.M. 353	93522
Auricularia fuscosuccinea (Mont.) Henn.	CE	Alvarenga, R.L.M. 354	93483

Espécie	DM	n° do Coletor	n° URM
Auricularia fuscosuccinea (Mont.) Henn.	CE	Alvarenga, R.L.M. 371	93475
Auricularia fuscosuccinea (Mont.) Henn.	CE	Alvarenga, R.L.M. 395	93434
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Alvarenga, R.L.M. 445	93531
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Alvarenga, R.L.M. 536	93559
Auricularia fuscosuccinea (Mont.) Henn.	FA	Gibertoni, T.B. 2	93501
Auricularia fuscosuccinea (Mont.) Henn.	FA	Gibertoni, T.B. 3	93500
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1569	93481
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1571	93542
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1572	93529
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1573	93428
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1574	93517
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1575	93528
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1580	93469
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1581	93456
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1584	93471
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1600	93474
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Lima, V.X. 138	93547
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Lima, V.X. 168	93409
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Lima, V.X. 237	93544
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Lima, V.X. 241	93558
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Lima, V.X. 322	93557
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 524	93480
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 538	93429
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 556	93476
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 574	93477
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 623	93435
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 653	93484
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 655	93539
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 658	93485
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 664	93478
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 672	93430

Espécie	DM	n° do Coletor	n° URM
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 689	93516
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 699	93431
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 749	93482
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 792	93533
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 794	93513
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Oliveira, V.R.T. 547	93548
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Oliveira, V.R.T. 588	93552
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Santos, D.C. 197	93496
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Santos, D.C. 43	93504
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Wu, F. 23	93555
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 987	93565
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 990	93566
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Alvarenga, R.L.M. 328	93568
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 1415	93572
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Alvarenga, R.L.M. 462	93576
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 1080	93582
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 950	93585
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Gugliotta, A.M. 1565	93586
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A.1032	93590
Auricularia fuscosuccinea (Mont.) Henn.	CE	NCC124	93599
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Oliveira, V.R.T. 621	93602
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Oliveira, V.R.T. 410	93605
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Oliveira, V.R.T. 422	93606
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Oliveira, V.R.T. 191	93607
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Meiras-Ottoni, A. 17-01	93611
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A.1018	93616
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 965	93617
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Lima, V.X. JPT8	93624
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Oliveira, V.R.T.621	93628
Auricularia fuscosuccinea (Mont.) Henn.	MAt	S27	93631
Auricularia fuscosuccinea (Mont.) Henn.	MAt	Santos, D.C. 108	93637

Espécie	DM	n° do Coletor	n° URM
Auricularia fuscosuccinea (Mont.) Henn.	FA	Meiras-Ottoni, A. 1020	93564
cf. *Basidiodendron*	MAt	Alvarenga, R.L.M. 529	93626
cf. *Basidiodendron*	MAt	Alvarenga, R.L.M. 19054	93462
cf. *Basidiodendron*	MAt	Alvarenga, R.L.M. 748	93454
Basidiodendron luteogriseum	MAt	Gugliotta, A.M. 1570	93463
cf. *Basidiodendron*	MAt	Lima, V.X. 202	93437
cf. *Basidiodendron*	MAt	Lima, V.X. 713	93458
cf. *Basidiodendron*	MAt	Lima, V.X. 717	93460
cf. *Basidiodendron*	MAt	Oliveira, V.R.T. 565	93563
cf. *Basidiodendron*	MAt	Lima, V.X.686	93614
cf. *Basidiodendron*	MAt	RS47	93615
cf. *Eichleriella*	CE	Alvarenga, R.L.M. 368	93442
cf. *Eichleriella*	MAt	Alvarenga, R.L.M. 494	93440
cf. *Eichleriella*	MAt	Chikowski, R.S. 1081-D510	93438
cf. *Eichleriella*	MAt	Lima, V.X. 593	93439
cf. *Eichleriella*	MAt	Matheus, A. 1	93441
cf. *Eichleriella*	CE	ANTO46	93613
cf. *Exidia*	CE	Alvarenga, R.L.M. 84GO	93436
cf. *Exidiopsis*	MAt	Chikowski, R.S. 1564	93447
cf. *Heterochaete*	MAt	Chikowski, R.S. 1169	93457
cf. *Myxarium*	MAt	Alvarenga, R.L.M. D19026	93465
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	Chikowski, R.S. 1609	93444
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	Gibertoni, T.B. 18001	93445
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	Gibertoni, T.B. 4b	93446
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	Lima, V.X. 166	93443
Dendroexidiopsis farinacea Alvarenga & Gibertoni	MAt	Chikowski, R.S. 86	93468

Espécie	DM	n° do Coletor	n° URM
Dendroexidiopsis sp.	MAt	Lima, V.X. 727	93612
Dendroexidiopsis sp.	MAt	MM669	93618
Eichleriella alliciens (Berk. & Cooke) Burt	FA	Alvarenga, R.L.M. 760	93581
Eichleriella tenuicula (Lév.) Spirin & Malysheva	MAt	ValCB1	87968
Metulochaete sanctae-catharinae (Möller) Alvarenga	FA	AMO 678	93055
Metulochaete sanctae-catharinae (Möller) Alvarenga	FA	AR22	93056
Protomerulius sp. 1	MAt	Oliveira, V.R.T. 733	93459
Pseudohydnum sp.	MAt	Santos, D.C. 65	93636
Tremellochaete atlantica Alvarenga	MAt	Alvarenga, R.L.M. 491	90199
Tremellochaete atlantica Alvarenga	MAt	Alvarenga, R.L.M. 477	90198
Tremellochaete atlantica Alvarenga	MAt	Alvarenga, R.L.M. 761	93567
Tremellochaete cerradensis Alvarenga	CE	Alvarenga, R.L.M. 398	90200
Tremellochaete sp.	CE	Gibertoni, T.B. 18056	93449

APÊNDICE B – LISTA DAS SEQUENCIAS GERADAS E DEPOSITADAS NO GENBANK DE ESPÉCIMES BRASILEIROS

Espécie	DM	n° URM	ITS	LSU	RPB2
Adustochaete nivea Alvarenga	MAt	93408	MN165954	MN165989	-
Adustochaete rava Alvarenga & K.H. Larss.	FA	92997	MK391517	MK391526	-
Adustochaete rava Alvarenga & K.H. Larss.	FA	80067	MK391516	-	-
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	93413	Submetido	-	-
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	93411	Submetido	Submetido	-
Auricularia brasiliana Y.C. Dai & F. Wu	MAt	93549	Submetido	Submetido	-
Auricularia cornea Ehrenb.	MAt	93455	Submetido	-	-
Auricularia cornea Ehrenb.	MAt	93415	Submetido	Submetido	-
Auricularia cornea Ehrenb.	MAt	93419	Submetido	Submetido	Submetido
Auricularia cornea Ehrenb.	MAt	93523	-	Submetido	-
Auricularia cornea Ehrenb.	MAt	93418	Submetido	Submetido	-
Auricularia cornea Ehrenb.	MAt	93420	Submetido	-	-
Auricularia cornea Ehrenb.	MAt	93537	Submetido	-	-
Auricularia cornea Ehrenb.	MAt	93421	Submetido	-	-
Auricularia cornea Ehrenb.	MAt	93422	Submetido	-	Submetido
Auricularia cornea Ehrenb.	MAt	93423	Submetido	-	Submetido
Auricularia cornea Ehrenb.	MAt	93412	Submetido	Submetido	-
Auricularia cornea Ehrenb.	MAt	93417	Submetido	Submetido	-
Auricularia cornea Ehrenb.	MAt	93526	-	-	-
Auricularia cornea Ehrenb.	FA	93416	Submetido	Submetido	Submetido
Auricularia delicata (Mont. ex Fr.) Henn.	FA	93424	Submetido	Submetido	-
Auricularia delicata (Mont. ex Fr.) Henn.	FA	93425	Submetido	-	-
Auricularia delicata (Mont. ex Fr.) Henn.	FA	93426	Submetido	-	-
Auricularia fuscosuccinea (Mont.) Henn.	MAt	93432	Submetido	Submetido	-
Auricularia fuscosuccinea (Mont.) Henn.	MAt	93433	Submetido	Submetido	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	CE	93434	Submetido	Submetido	-
Auricularia fuscosuccinea (Mont.) Henn.	MAt	93428	Submetido	-	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	MAt	93409	Submetido	Submetido	-
Auricularia fuscosuccinea (Mont.) Henn.	FA	93480	-	-	Submetido

Espécie	DM	n° URM	ITS	LSU	RPB2
Auricularia fuscosuccinea (Mont.) Henn.	FA	93429	Submetido	Submetido	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	FA	93477	Submetido	-	-
Auricularia fuscosuccinea (Mont.) Henn.	FA	93435	Submetido	-	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	FA	93484	Submetido	Submetido	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	FA	93539	Submetido	Submetido	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	FA	93485	Submetido	Submetido	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	FA	93430	Submetido	-	Submetido
Auricularia fuscosuccinea (Mont.) Henn.	FA	93431	Submetido	Submetido	-
cf. *Basidiodendron*	MAt	93462	Submetido	Submetido	-
cf. *Basidiodendron*	MAt	93454	Submetido	Submetido	-
cf. *Basidiodendron*	MAt	93437	Submetido	Submetido	-
cf. *Eichleriella*	CE	93442	Submetido	-	-
cf. *Eichleriella*	MAt	93440	-	Submetido	-
cf. *Eichleriella*	MAt	93438	Submetido		-
cf. *Eichleriella*	MAt	93439	Submetido	Submetido	-
cf. *Eichleriella*	MAt	93441	Submetido	Submetido	-
cf. *Eichleriella*	CE	93613	-	-	-
cf. *Exidia*	CE	93436	Submetido	Submetido	-
cf. *Exidiopsis*	MAt	93447	Submetido	Submetido	-
cf. *Myxarium*	MAt	93465	-	Submetido	-
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	93444	MN475884	MN475888	-
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	93445	MN475885	MN475889	-
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	93446	MN475886	MN475890	-
Cystallodon subgelatinosum (Bodman)Alvarenga & Gibertoni	MAt	93443	-	MN475887	-
Dendroexidiopsis farinacea Alvarenga & Gibertoni	MAt	93468	Submetido	Submetido	-
Eichleriella alliciens (Berk. & Cooke) Burt	FA	93581	Submetido	-	-

Eichleriella tenuicula (Lév.) Spirin & Malysheva	MAt	87968	MK391515	MK391525	-
Metulochaete sanctae-catharinae (Möller) Alvarenga	FA	93055	MK484065	MK480575	-
Protomerulius sp. 1	MAt	93459	Submetido	Submetido	-
Tremellochaete atlantica Alvarenga	MAt	90199	MG594381	MG594383	-
Tremellochaete atlantica Alvarenga	MAt	90198	MG594382	MG594384	-
Tremellochaete cerradensis Alvarenga	CE	90200	MK391524	MK391530	-
Tremellochaete sp.	CE	93449	Submetido	Submetido	-

APÊNDICE C – LISTA DAS SEQUÊNCIAS UTILIZADAS PARA AS RECONSTRUÇÕES FILOGENÉTICAS

Espécie	Voucher	País	LSU	ITS	RPB2	Citação
Amphistereum leveilleanum	KW Urcelay 38	-	AY509553	AY509553	-	Wells et al. (2004)
Amphistereum leveilleanum	Lentz FP 106715	EUA	KX262168	KX262119	-	Malysheva & Spirin (2017)
Amphistereum schrenkii	Burdsall 8476	EUA	KX262178	KX262130	-	Malysheva & Spirin (2017)
Aporpium canescens	Miettinen 7327.1	Finlândia		JX044141	-	Wu et al. (2017)
Aporpium canescens	Niemelä 7875	Finlândia		JX044151	-	Wu et al. (2017)
Aporpium canescens	Miettinen 13352 2	Noruega	-	JX044152	-	Miettinen et al. (2012)
Aporpium caryae	WD 2207	Japão	AB871730	AB871751	-	Sotome et al. (2014)
Aporpium caryae	Miettinen 14774	EUA	-	JX044145	-	Miettinen et al. (2012)
Aporpium dimidiatum	O 18238	Belize		JQ764663	-	Wu et al. (2017)
Aporpium dimidiatum	O 18261	Belize		JQ764664	-	Wu et al. (2017)
Aporpium efibulatum	Dai 9322	China		JQ764669	-	Wu et al. (2017)
Aporpium macroporum	Miettinen 1032	Finlândia		JX044142	-	Wu et al. (2017)
Aporpium macroporum	Niemelä 7933	Finlândia		JX044143	-	Wu et al. (2017)
Aporpium macroporum	Spirin 3302	Rússia		JX044146	-	Wu et al. (2017)
Aporpium miniporum	Dai 16118	China		KU296215	-	Wu et al. (2017)
Aporpium miniporum	Dai 16239	China		KU296216	-	Wu et al. (2017)
Aporpium strigosum	Cui 5461	China		JQ764658	-	Wu et al. (2017)

Espécie	Voucher	País	LSU	ITS	RPB2	Citação
Aporpium strigosum	TUFC 10589	Japão		AB871756	-	Wu et al. (2017)
Aporpium strigosum	WD 1710	Japão		AB871759	-	Wu et al. (2017)
Auricularia africana	T3	Quênia	-	MH213350	-	Wu et al. inpress
Auricularia africana	Ryvarden 44929	Uganda	-	MH213349	-	Wu et al. inpress
Auricularia americana	Dai 13636	China	KM396823	KM396765	KP729307	Wu et al. inpress
Auricularia americana	HHB 11370	EUA	-	KM396766	KP729308	Wu et al. inpress
Auricularia angiospermarum	TFB 4651	EUA	-	JX065151	JX065181	Wu et al. inpress
Auricularia angiospermarum	TJV 93 12 SP	EUA	KT152112	KT152096	KT152129	Wu et al. inpress
Auricularia angiospermarum	HHB 11037	EUA	KT152114	KT152098	KT152131	Wu et al. inpress
Auricularia asiatica	BBH895	Tailândia	-	KX621160	-	Bandara et al. (2017)
Auricularia asiatica	MFLU162103	Tailândia	-	KX621162	KX661339	Bandara et al. (2017)
Auricularia auricula judae	Dai 13549	França	KM396825	KM396770	KP729313	Wu et al. inpress
Auricularia auricula judae	MT 7	R. Checa	KM396826	KM396771	KP729314	Wu et al. inpress
Auricularia auricula judae	JT 14	Reino Unido	KT152117	KT152101	KT152134	Wu et al. inpress
Auricularia brasiliana	URM 83468	Brasil	KP729290	KP729272	-	Wu et al (2015b)
Auricularia brasiliana	URM 83482	Brasil	KP729291	KP729273	-	Wu et al (2015b)
Auricularia brasiliana	URM 84563	Brasil	KP729292	KP729274	-	Wu et al (2015b)
Auricularia cornea	PBM 3754	Austrália	-	JX065164	JX065185	Looney et al. (2013)
Auricularia cornea	URM 85561	Brasil	MH213402	MH213358	MH213432	Wu et al. inpress
Auricularia cornea	Lira 663	Brasil	MH213403	MH213359	MH213433	Wu et al. inpress

Espécie	Voucher	País	LSU	ITS	RPB2	Citação
Auricularia cornea	Wu 07	China	MH213398	MH213354	MH213430	Wu et al. inpress
Auricularia cornea	Dai 13754	China	MH213404	MH213361	MH213434	Wu et al. inpress
Auricularia cornea	Dai 17352	Gana	MH213399	MH213355	MH213431	Wu et al. inpress
Auricularia cornea	MFLU162109	Tailândia	-	KX621143	KX661342	Bandara et al. (2017)
Auricularia cornea	MFLU162110	Tailândia	-	KX621141	KX661343	Bandara et al. (2017)
Auricularia delicata	TENN067025	Austrália	-	JX065169	-	Looney et al. (2013)
Auricularia delicata	TENN067026	Austrália	-	JX065168	-	Looney et al. (2013)
Auricularia delicata	TENN067027	Austrália	-	JX065165	-	Looney et al. (2013)
Auricularia delicata	USJ54470	Costa Rica	-	JX065159	-	GenBank
Auricularia delicata	TENN016963	México	-	JX065158	-	Looney et al. (2013)
Auricularia delicata	TENN017797	México	-	JX065162	-	Looney et al. (2013)
Auricularia delicata	TENN028734	Peru	-	AF291269	-	Looney et al. (2013)
Auricularia delicata	MFLU162116	Tailândia	-	KX621156	KX661346	Bandara et al. (2017)
Auricularia delicata	MFLU162112	Tailândia	-	KX621149	KX661344	Bandara et al. (2017)
Auricularia delicata	O300860	Tailândia	-	KX621151	-	Bandara et al. (2017)
Auricularia delicata	MFLU162113	Tailândia	-	KX621152	KX661345	Bandara et al. (2017)
Auricularia fibrillifera	Dai 13598	China	KP765629	KP765615	KX022084	Wu et al. inpress
Auricularia fibrillifera	Cui 6704	China	KP765627	KP765613	MH213435	Wu et al. inpress
Auricularia fibrillifera	F 234519	Nova Guiné	KP765624	KP765610	KX022086	Wu et al. inpress
Auricularia fuscosuccinea	TFB 11289	Argentina	-	JX065153	JX065194	Looney et al. (2013)

Espécie	Voucher	País	LSU	ITS	RPB2	Citação
Auricularia fuscosuccinea	TENN058951	Argentina	-	JX065141	JX065193	Looney et al. (2013)
Auricularia fuscosuccinea	Dai 17406	Brasil	MH213407	MH213366	MH213436	Wu et al. inpress
Auricularia fuscosuccinea	Dai 17422	Brasil	MH213408	MH213367	MH213437	Wu et al. inpress
Auricularia fuscosuccinea	Dai 17451	Brasil	MH213409	MH213368	MH213438	Wu et al. inpress
Auricularia fuscosuccinea	TFB 9503	EUA	-	JX065157	JX065190	Looney et al. (2013)
Auricularia fuscosuccinea	PBM 3034	EUA	-	JX065140	JX065186	Looney et al. (2013)
Auricularia fuscosuccinea	TENN062651	EUA	-	JX065139	-	Looney et al. (2013)
Auricularia fuscosuccinea	AB39	EUA	-	KX621138	KX661332	Bandara et al. (2017)
Auricularia fuscosuccinea	AB41	EUA	-	KX621139	KX661333	Bandara et al. (2017)
Auricularia heimuer	Dai 2291	China	KM396838	KM396785	KP729315	Wu et al (2015a)
Auricularia heimuer	Dai 13503	China	KM396840	KM396789	KP729316	Wu et al (2015a)
Auricularia heimuer	Dai 13765	China	KM396844	KM396793	KP729317	Wu et al (2015a)
Auricularia lateralis	Dai 16420	China	KX022056	KX022025	KX022083	Wu et al. inpress
Auricularia lateralis	Dai 15670	China	KX022053	KX022022	-	Wu et al. inpress
Auricularia mesenterica	LYBR 5353	França	KM396849	KM396801	KP729318	Wu et al. inpress
Auricularia mesenterica	TUFC12805	Japão	AB915191	AB915192	-	Sotome et al. 2014
Auricularia mesenterica	BRNM 706955	R. Checa	KP729296	KP729278	KP729319	Wu et al. inpress
Auricularia mesenterica	Haikonen 11208	Reino Unido	KP729305	KP729287	KP729323	Wu et al. inpress
Auricularia mesenterica	Miettinen 12680	Suíça	KP729304	KP729286	KP729322	Wu et al. inpress
Auricularia minutissima	Dai 14880	China	KT152119	KT152103	KT152136	Wu et al. inpress

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Auricularia minutissima	Dai 14881	China	KT152120	KT152104	KT152137	Wu et al. inpress
Auricularia minutissima	LE 296424	Rússia	-	KJ698434	-	Wu et al. inpress
Auricularia nigricans	TENN059115	Argentina	-	JX065176	-	Looney et al. (2013)
Auricularia nigricans	Ahti36234	Costa Rica	-	KM396802	-	Looney et al. (2013)
Auricularia nigricans	TENN056825	EUA	-	JX065172	-	Looney et al. (2013)
Auricularia nigricans	TJY93242	EUA	-	KM396803	-	Wu et al. inpress
Auricularia novozealandica	PDD 88998	Nova Zelândia	KX022066	KX022035	-	Wu et al. inpress
Auricularia novozealandica	PDD 81195	Nova Zelândia	KX022064	KX022033	-	Wu et al. inpress
Auricularia novozealandica	PDD 83897	Nova Zelândia	KX022065	KX022034	-	Wu et al. inpress
Auricularia orientalis	Dai 14875	China	KP729288	KP729270	KP729310	Wu et al (2015b)
Auricularia orientalis	Dai 1831	China	KP729289	KP729271	KP729311	Wu et al (2015b)
Auricularia pusio	AK 174	Austrália	-	MH213373	-	Wu et al. inpress
Auricularia pusio	AK 547	Austrália	MH213414	MH213374	MH213443	Wu et al. inpress
Auricularia pusio	Smith 18	Zâmbia	-	MH213375	-	Wu et al. inpress
Auricularia scissa	Ahti 49388	R. Dominicana	KM396853	KM396805	KP729324	Looney et al. (2013)
Auricularia scissa	TFB 11193	R. Dominicana	-	JX065160	JX065183	Looney et al. (2013)
Auricularia sinodelicata	Dai 13927	China	MH213417	MH213380	MH213446	Wu et al. inpress
Auricularia sinodelicata	Dai 13758	China	MH213416	MH213378	MH213445	Wu et al. inpress
Auricularia sp	Dai 16417	China	MH213410	MH213369	MH213440	Wu et al. inpress
Auricularia sp	Dai 16418	China	MH213411	MH213370	MH213441	Wu et al. inpress

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Auricularia sp	Dai 15453	China	MH213412	MH213371	MH213442	Wu et al. inpress
Auricularia subglabra	TENN057615	Costa Rica	-	JX524199	-	Looney et al. (2013)
Auricularia subglabra	TENN053855	Costa Rica	-	JX065142	-	Looney et al. (2013)
Auricularia subglabra	TENN058607	Costa Rica	-	JX065155	-	Looney et al. (2013)
Auricularia submesenterica	Dai 15449	China	KX022070	KX022039	KX022096	Wu et al. inpress
Auricularia submesenterica	Dai 792	China	KX022068	KX022037	KX022094	Wu et al. inpress
Auricularia subnigricans	URM 76905	Brasil	MH213395	MH213351	MH213427	Wu et al. inpress
Auricularia thailandica	MFLU130410	Tailândia	-	KR336693	KX661338	Bandara et al. (2017)
Auricularia thailandica	MFLU130407	Tailândia	-	KR336694	-	Bandara et al. (2017)
Auricularia thailandica	MFLU130396	Tailândia	-	KR336690	-	Bandara et al. (2017)
Auricularia tibetica	Cui 12266	China	KT152121	KT152105	KT152138	Wu et al (2015a)
Auricularia tibetica	Cui 12267	China	KT152122	KT152106	KT152139	Wu et al (2015a)
Auricularia tibetica	Cui 12337	China	KT152124	KT152108	KT152141	Wu et al (2015a)
Auricularia tibetica	Cui 12268	China	KT152123	KT152107	KT152140	Wu et al (2015a)
Auricularia villosula	Cui 6760	China	KM396857	KM396809	KP729325	Wu et al (2015a)
Auricularia villosula	Dai 13450	China	KM396860	KM396812	KP729327	Wu et al. (2014)
Auricularia villosula	MFLU162126	Tailândia	-	KX621165	KX661349	Bandara et al. (2017)
Auricularia villosula	MFLU162127	Tailândia	-	KX621163	-	Bandara et al. (2017)
Bourdotia eyrei	TUFC 14484	Japão		AB871753	-	Wu et al. (2017)
Bourdotia galzinii	Miettinen 15900 4	Espanha	MG757511	MG757511	-	Malysheva el al. (2018)

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Bourdotia sp	GEL5065	-	AY635777	DQ200925	-	GenBank
Ductifera pululahuana	SD274	EUA	-	MK575224	-	GenBank
Ductifera sucina	KW3886	-	-	AY509551	-	GenBank
Eichleriella alliciens	Burdsall 7194	EUA	KX262169	KX262120	-	Malysheva & Spirin (2017)
Eichleriella bactriana	TAAM 55071	Turquemenistão	KX262170	KX262121	-	Malysheva & Spirin (2017)
Eichleriella bactriana	TAAM 104431	Uzbequistão	KX262186	KX262138	-	Malysheva & Spirin (2017)
Eichleriella crocata	TAAM 101077	Rússia	KX262147	KX262100	-	Malysheva & Spirin (2017)
Eichleriella crocata	TAAM 125909	Rússia	KX262167	KX262118	-	Malysheva & Spirin (2017)
Eichleriella desertorum	LR 49350	Namíbia	KX262190	KX262142	-	Malysheva & Spirin (2017)
Eichleriella flavida	Ryvarden 49412	Reino Unido	KX262185	KX262137	-	Malysheva & Spirin (2017)
Eichleriella leucophaea	Larsson 15277	Espanha	KX262164	KX262115	-	Malysheva & Spirin (2017)
Eichleriella leucophaea	LE 303261	Rússia	KX262161	KX262111	-	Malysheva & Spirin (2017)
Eichleriella leveilleana	SWFU 006473	China	-	MK809449	-	GenBank
Eichleriella shearii	SWFU 008251	China	-	MK809450	-	GenBank
Eichleriella shearii	USJ 54609	Costa Rica	AF291335	AF291284	-	Weiss & Oberwinkler (2001)
Eichleriella shearii	CLZhao 8251	China	-	MK795131	-	GenBank
Eichleriella sicca	Miettinen 17349	EUA	KX262191	KX262143	-	Malysheva & Spirin (2017)
Eichleriella tenuicula	SWFU 004606	China	-	MK809451	-	GenBank
Eichleriella tenuicula	CLZhao 4606	China	-	MK795132	-	GenBank
Eichleriella tenuicula	TUFC33717	Japão	AB871747	AB871766	-	Sotome et al. (2014)

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Eichleriella tenuicula	Ryvarden 17599	Tailândia	KX262189	KX262141	-	Malysheva & Spirin (2017)
Eichleriella xinpingensis	CL Zhao 812	China	MK560882	MK560878		Liu et al. (2019)
Eichleriella xinpingensis	CL Zhao 836	China	MK560883	MK560879		Liu et al. (2019)
Eichleriella xinpingensis	CL Zhao 842	China	MK560884	MK560880		Liu et al. (2019)
Eichleriella xinpingensis	CL Zhao 870	China	-	MK560881		Liu et al. (2019)
Elmerina cladophora	Miettinen 14314	Indonésia	MG757509	MG757509	-	Malysheva el al. (2018)
Elmerina hexagonoides	ML 297	Malásia	AB871735	AB871754	-	Sotome et al. (2014)
Elmerina hexagonoides	Wei 5584	China		JQ764667	-	Wu et al. (2017)
Elmerina hexagonoides	Wei 5680	China		JQ764668	-	Wu et al. (2017)
Elmerina hexagonoides	TFM F-27498	Malásia		AB871755	-	Wu et al. (2017)
Elmerina sclerodontia	Miettinen 16431	Malásia	MG757512	MG757512	-	Malysheva el al. (2018)
Exidia candida	LE 38198	Canadá	KY801896	KY801871	-	Spirin et al. (2018)
Exidia candida	Spirin 10012	Noruega	KY801890	KY801865	-	Spirin et al. (2018)
Exidia candida	Spirin 3921	Rússia	KY801892	KY801867	-	Spirin et al. (2018)
Exidia candida var cartilaginea	O F160269	Noruega	KY801897	KY801872	-	Spirin et al. (2018)
Exidia candida var cartilaginea	Spirin 10954	Rússia	KY801901	KY801876	-	Spirin et al. (2018)
Exidia glandulosa	MW355	Alemanha	AF291319	AF291273	-	Weiss & Oberwinkler (2001)
Exidia glandulosa	CLZhao 6051	China	-	MK795133	-	GenBank
Exidia glandulosa	TUFC34008	Japão	AB871742	AB871761	-	Sotome et al. (2014)

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Exidia pithya	MW 313	Alemanha	AF291321	AF291275	-	Weiss & Oberwinkler (2001)
Exidia recisa	MW 315	Alemanha	AF291322	AF291276	-	Weiss & Oberwinkler (2001)
Exidia saccharina	RoKi 88	Alemanha	AF291323	AF291277	-	Weiss & Oberwinkler (2001)
Exidia thuretiana	Spirin 9999	-	KY801905	KY801878	-	Spirin et al. (2018)
Exidia thuretiana	MW 373	Alemanha	AF291324	AF291278	-	Weiss & Oberwinkler (2001)
Exidia thuretiana	Spirin 11185	Noruega	KY801914	KY801889	-	Weiss & Oberwinkler (2001)
Exidia truncata	MW 365	Alemanha	AF291325	AF291279	-	Weiss & Oberwinkler (2001)
Exidia uvapassa	AFTOL ID 461	-	AY645056	DQ241776	-	GenBank
Exidia uvapassa	TUFC 34007	Japão	AB871744	AB871763	-	GenBank
Exidiopsis calcea	KHL11075	-	AY586654	AY463406	-	Larsson et al. (2004)
Exidiopsis calcea	MW 331	Alemanha	AF291326	AF291280	-	Weiss & Oberwinkler (2001)
Exidiopsis effusa	Miettinen 19136	Finlândia	KX262193	KX262145	-	Malysheva & Spirin (2017)
Exidiopsis grisea	RoKi 162	Alemanha	AF291328	AF291281	-	Weiss & Oberwinkler (2001)
Exidiopsis grisea	TUFC100049	Japão	AB871746	AB871765	-	Sotome et al. (2014)
Exidiopsis plumbescens	RJB 13036	-	-	AF395309	-	GenBank
Exidiopsis sp	RJB11821	-	-	AY509549	-	GenBank
Exidiopsis sp	FO 46291	Alemanha	AF291329	AF291282	-	Weiss & Oberwinkler (2001)
Exidiopsis sp	TUFC34333	Japão	-	AB871764	-	GenBank
Gelatocantha pura	LE 254018	Rússia	MK098930	MK098882	-	Spirin et al (2019b)
Grammatus labyrinthinus	Yuan1759	China	KM379138	KM379137	-	Yuan et al. (2018)

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Grammatus labyrinthinus	Yuan1600	China	KM379140	KM379139	-	Yuan et al. (2018)
Grammatus semis	CLZhao 8140	China		MK404347		GenBank
Grammatus semis	CLZhao 4596	China		MK795137		GenBank
Grammatus semis	CLZhao 618	China	-	MG231564	-	GenBank
Grammatus semis	OM 10618	Comores	KX262194	KX262146	-	Malysheva & Spirin (2017)
Heterochaete delicata	HE21070	-	-	KC505561	-	GenBank
Heterochaete sp	MG284	-	KU213578	KU213577	-	GenBank
Heterochaete sp	KUC20130403 03	Coreia do Sul	KJ668384	KJ668532	-	GenBank
Heterochaete sp	KUC20130725 37	Coreia do Sul	KJ668383	KJ668531	-	GenBank
Heterochaete sp	USJ 55639	Costa Rica	AF291336	AF291285	-	Weiss & Oberwinkler (2001)
Heteroradulum adnatum	LR 23453	México	KX262165	NR_154092	-	Malysheva & Spirin (2017)
Heteroradulum deglubens	LE 225523	Estônia	KX262163	KX262113	-	Malysheva & Spirin (2017)
Heteroradulum deglubens	TAAM 064782	Rússia	KX262148	KX262101		Malysheva & Spirin (2017)
Heteroradulum deglubens	LE 38182	Rússia	KX262162	KX262112	-	Malysheva & Spirin (2017)
Heteroradulum kmetii	H lectotype	Eslováquia	KX262173	KX262124	-	Malysheva & Spirin (2017)
Heteroradulum kmetii	OF-295639	Noruega	KX262177	KX262128		Malysheva & Spirin (2017)
Heteroradulum kmetii	TAAM 149179	Rússia	KX262149	KX262102		Malysheva & Spirin (2017)
Heteroradulum kmetii	LE 303456	Rússia	KX262151	KX262103		Malysheva & Spirin (2017)
Heteroradulum kmetii	CWU 4563	Ucrânia	KX262176	KX262127		Malysheva & Spirin (2017)
Hirneolina hirneoloides	USJ 55480	Costa Rica	AF291334	AF291283	-	Weiss & Oberwinkler (2001)

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Hyalodon piceicola	Spirin 11 063	Noruega	MG735423	MG735415	-	Malysheva el al. (2018)
Hyalodon piceicola	Spirin 6536	Rússia	MG735421	MG735413	-	Malysheva el al. (2018)
Hyalodon piceicola	Spirin 2689	Rússia	MG735422	MG735414	-	Malysheva el al. (2018)
Hydrophana sphaerospora	VS 11133	Noruega	MK098931	MK098883	-	Spirin et al (2019b)
Hydrophana sphaerospora	VS 11622	Noruega	MK098932	MK098884	-	Spirin et al (2019b)
Metulochaete santae chatarinae	AMO 678	Brasil	MK480575	MK484065	-	Spirin et al. (2019c)
Mycostilla vermiformis	Spirin 11621	Noruega	MG857098	MG857093	-	Spirin et al. (2018)
Mycostilla vermiformis	O F188059	Noruega	-	MG735418	-	Malysheva el al. (2018)
Mycostilla vermiformis	Spirin 11330	Rússia	MG735425	MG735417	-	Malysheva el al. (2018)
Myxariellum concinnum	VS 8393c	EUA	MK098933	MK098885	-	Spirin et al (2019b)
Myxariellum tenerum	VS 8685	EUA	MK098934	MK098886	-	Spirin et al (2019b)
Myxarium aff nucleatum	VS 11760	Noruega	-	MK098907	-	Spirin et al (2019b)
Myxarium cinnamomescens	VS 11317	Rússia	MK098935	MK098887	-	Spirin et al (2019b)
Myxarium cinnamomescens	VS 11350	Rússia	MK098936	MK098888	-	Spirin et al (2019b)
Myxarium cirratulum	AS 171126 1117	Quénia	-	MK098979	-	Spirin et al (2019b)
Myxarium crozalcii	VS 11334	Rússia	MK098938	MK098890	-	Spirin et al (2019b)
Myxarium crozalcii	CWU 4197	Ucrânia	MK098939	MK098891	-	Spirin et al (2019b)
Myxarium crystallinum	KHL 17542	Noruega	MK098940	MK098892	-	Spirin et al (2019b)
Myxarium evanidum	KHL 17642	Noruega	MK098941	MK098893	-	Spirin et al (2019b)
Myxarium evanidum	VS 11615	Noruega	-	MK098894	-	Spirin et al (2019b)

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Myxarium frumentaceum	AS 171126 1400	Quénia	MK098975	MK098981	-	Spirin et al (2019b)
Myxarium frumentaceum	AS 171126 1450B	Quênia	-	MK098980	-	Spirin et al (2019b)
Myxarium grilletii	VS9016	Canadá	MK098944	MK098896	-	Spirin et al (2019b)
Myxarium hyalinum	Miettinen 15436 2	-	KY801913	KY801887	-	Spirin et al. (2018)
Myxarium hyalinum	Geesteranus 15003	-	KY801908	KY801881	-	Spirin et al. (2018)
Myxarium legonii	VS 9511	Rússia	-	MK098900	-	Spirin et al (2019b)
Myxarium legonii	OM 15677	EUA	MK098948	MK098901	-	Spirin et al (2019b)
Myxarium mesomorphum	VS 11613	Noruega	-	MK098902	-	Spirin et al (2019b)
Myxarium mesomorphum	VS 11383	Rússia	MK098949	MK098903	-	Spirin et al (2019b)
Myxarium minutissimum	VS11103	Noruega	MK098950	MK098904	-	Spirin et al (2019b)
Myxarium minutissimum	VS11623	Noruega	MK098951	MK098905	-	Spirin et al (2019b)
Myxarium nucleatum	Spirin 10013	Noruega	KY801906	KY801879	-	Spirin et al. (2018)
Myxarium nucleatum	KW 3885	EUA	AY509554	AY509554	-	Wells et al. (2004)
Myxarium podlachicum	VS 8984	Canadá	MK098952	MK098908	-	Spirin et al (2019b)
Myxarium podlachicum	OM 19338	Finlândia	MK098953	MK098909	-	Spirin et al (2019b)
Myxarium podlachicum	VS 11105	Noruega	MK098954	MK098910	-	Spirin et al (2019b)
Myxarium populinum	Haikonen 24623	-	KY801910	KY801883	-	Spirin et al. (2018)
Myxarium populinum	O F90775	Noruega	-	KY801888	-	Spirin et al. (2018)
Myxarium rotundum	AS 171127 1025	Quênia	MK098976	MK098982	-	Spirin et al (2019b)
Myxarium simile	AS 171129 1120A	Quênia	MK098977	MK098983	-	Spirin et al (2019b)

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Myxarium varium	VS 11600	Noruega	MK098962	MK098918	-	Spirin et al (2019b)
Myxarium varium	VS 11323	Noruega	MK098963	MK098919	-	Spirin et al (2019b)
Ofella glaira	VS 11809	Noruega	MK098964	MK098920	-	Spirin et al (2019b)
Proterochaete adusta	VS9021	Canadá	MK391528	MK391520	-	Alvarenga et al. (2019)
Proterochaete adusta	CN OM10519	China	-	MK391519	-	Alvarenga et al. (2019)
Proterochaete adusta	KHL17537	Noruega	-	MK391522	-	Alvarenga et al. (2019)
Proterochaete adusta	VS4910	Rússia	-	MK391521	-	Alvarenga et al. (2019)
Protoacia delicata	JN 9568	Noruega	MK098965	MK098921	-	Spirin et al (2019b)
Protoacia delicata	VS 7824	Rússia	MK098966	MK098922	-	Spirin et al (2019b)
Protoacia delicata	VS 4615	Rússia	MK098967	MK098923	-	Spirin et al (2019b)
Protodaedalea foliacea	Miettinen 13 054	Indonésia	MG757507	MG757507	-	Malysheva el al. (2018)
Protodaedalea hispida	Yuan 5691	Comores	JQ764644	JQ764666	-	Zhou and Dai (2013)
Protodaedalea hispida	WD 548	Japão	AB871749	AB871768	-	Sotome et al. (2014)
Protodaedalea hispida	Spirin 5139	Rússia	MG757510	MG757510	-	Malysheva el al. (2018)
Protodontia africana	AS 171126 1104	Quênia	MK098973	MK098978	-	Spirin et al (2019b)
Protodontia insularis	LR 49417	Santa Helena	MK098968	MK098924	-	Spirin et al (2019b)
Protodontia subgelatinosa	OM 14934 1	Finlândia	-	MK098925	-	Spirin et al (2019b)
Protodontia subgelatinosa	VS 11038	Noruega	MK098969	MK098926	-	Spirin et al (2019b)
Protodontia subgelatinosa	Spirin 11079	Noruega	MG735420	MG735412	-	Malysheva el al. (2018)
Protodontia subgelatinosa	VS 5123	Rússia	MK098972	MK098929	-	Spirin et al (2019b)

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Protohydnum cartilagineum	SP467240	Brasil	MG735426	MG735419	-	Malysheva el al. (2018)
Protomerulius brachysporus	LR 23195	México	MK480548	MK484038	-	Spirin et al. (2019c)
Protomerulius brachysporus	O F293193	Noruega	MK480550	MK484036	-	Spirin et al. (2019c)
Protomerulius brachysporus	JN7643	Suécia	-	MK484035	-	Spirin et al. (2019c)
Protomerulius commotus	VS 11110	Noruega	MK480551	MK484040	-	Spirin et al. (2019c)
Protomerulius commotus	VS 11097	Noruega	MK480552	MK484039	-	Spirin et al. (2019c)
Protomerulius dubius	VS 3019	Rússia	MK480553	MK484041	-	Spirin et al. (2019c)
Protomerulius madidus	VS 11045	Noruega	MK480563	MK484049	-	Spirin et al. (2019c)
Protomerulius madidus	KHL 17664	Noruega	MK480559	MK484047	-	Spirin et al. (2019c)
Protomerulius microsporos	LR 23440	México	MK480564	MK484055	-	Spirin et al. (2019c)
Protomerulius minor	OM 15700	EUA	MK480567	MK484058	-	Spirin et al. (2019c)
Protomerulius minor	OM 15492	EUA	MK480566	MK484057	-	Spirin et al. (2019c)
Protomerulius pertusus	KHL 17572	Noruega	MK480573	MK484061	-	Spirin et al. (2019c)
Protomerulius pertusus	VS 3081	Rússia	MK480574	MK484062	-	Spirin et al. (2019c)
Protomerulius pertusus	VS 11947	EUA	MK480571	MK484064	-	Spirin et al. (2019c)
Protomerulius sp	Miettinen 14402 1	Indonésia	MG757508	MG757508	-	Malysheva el al. (2018)
Protomerulius subreflexus	Zhou 60	China	JQ764650	JX134481	-	Zhou and Dai (2013)
Protomerulius substuppeus	O F19171	-	JQ764649	JX134482	-	Zhou and Dai (2013)
Pseudohydnum gelatinosum	AFTOL ID1875	-	DQ520094	DQ520094	-	Lutzoni et al. (2004)
Pseudohydnum gelatinosum	-	-	AF384861	AF384861	-	Weiss & Oberwinkler (2001)

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Sclerotrema griseobrunneum	Niemela 2722	Canadá	KX262192	KX262144	-	Malysheva & Spirin (2017)
Sclerotrema griseobrunneum	Spirin 7674	Rússia	KX262188	KX262140	-	Malysheva & Spirin (2017)
Sistotrema brinkmannii	Isolate 236 e	Rússia	JX535170	JX535169	-	GenBank
Stypellopsis farlowii	Larsson 12337	EUA	MG857099	MG857095	-	Spirin et al. (2018)
Stypellopsis farlowii	Spirin 8254	EUA	MG857100	MG857094	-	Spirin et al. (2018)
Stypellopsis hyperborea	Larsson 11751	Finlândia	EU118672	EU118672	-	GenBank
Stypellopsis hyperborea	J Norden 9751	Noruega	MG857101	MG857097	-	Spirin et al. (2018)
Stypellopsis hyperborea	Spirin 11066	Noruega	MG857102	MG857096	-	Spirin et al. (2018)
Tremellochaete japonica	LE 303446	Rússia	KX262160	KX262110	-	Malysheva & Spirin (2017)
Tremellochaete japonica	TAA 42689	Rússia	AF291320	AF291274	-	Weiss & Oberwinkler (2001)
Tremellodendron cf pallidum	TUB 020331	EUA	-	KF061278	KF061305	Kiess et al. (2014)
Tremellodendron cf pallidum	TUB 020330	EUA	-	KF061277	KF061304	Kiess et al. (2014)
Tremellodendron ocreatum	isolate KM 116793	-	-	KF307632	-	GenBank
Tremellodendron ocreatum	TH8577	Guiana	-	KT339265	-	GenBank
Tremellodendron pallidum	JMP0087	-	-	EU819445	-	GenBank
Tremellodendron pallidum	Kwells 3859	-	-	AF384862	-	GenBank
Tremellodendron pallidum	F PRL4391	EUA	-	GQ166897	-	GenBank
Tremellodendron schweinitzii	DFMO 1600	-	-	AY296258	-	GenBank
Tremellodendron schweinitzii	isolate 13RBGF7	-	-	KF307633	-	GenBank
Tremellodendron schweinitzii	isolate 573	Rússia	-	KP783483	-	GenBank

Espécie	Voucher	País	LSU	ITS	RPB2	Citação
Tremellodendron schweinitzii	TENN 070479	EUA	-	KY744167	-	GenBank
Tremellodendron schweinitzii	TENN 070437	EUA	-	KY744166	-	GenBank
Tremellodendron sp	AFTOL ID 699	-	AY745701	DQ411526	DQ408132	GenBank
Tremellodendron sp	AMV1932	Colômbia	-	KT724200	-	GenBank
Tremellodendron tenax	323213	EUA	-	MK607600	-	GenBank
Tremiscus helvelloides	AFTOL ID1680	-	DQ520100	DQ520100	-	Lutzoni et al. (2004)

APÊNDICE D – LISTA DE ESPÉCIMES REVISADO DOS HERBÁRIOS PACA-FUNGI, URM E SP-FUNGI

Legenda: **α** - Espécime parcialmente degradado, não foi possível delimitação ao nível genérico; **β** - Nome inválido. Espécie não foi registrada no Index Fungorum ou Mycobank. Espécime parcialmente degradado, não foi possível delimitação ao nível genérico; **Ω** - Nome inválido. Espécie não foi registrada no Index Fungorum ou Mycobank. Possível espécie nova, necessária delimitação molecular.

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 115144	*Heterochaete delicatula* Rick	Brasil	-	α
PACA-FUNGI 12942	*Hirneolina cartilaginea?*	Brasil	-	Espécime degradado
PACA-FUNGI 13039	*Heterochaete sanctae-martae* Bodman	Brasil	-	Espécime degradado
PACA-FUNGI 13356	*Heterochaete glauca*	Uruguai	-	β
PACA-FUNGI 13544	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13545	*Eichleriella alliciens var pauciseta ?*	Brasil	*Eichleriella cf. ubatubensis* Viégas	Nomenclatura atualizada
PACA-FUNGI 13546	*Heterochaete minuta* Pat.	Brasil	-	Espécime degradado
PACA-FUNGI 13547	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 13548	*Heterochaete delicata* Bres.	Austrália	-	α

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 13549	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13551	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 13552	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13553	*Heterochaete sanctae-catharinae* Möller	Brasil	*Metulochaete cf. sanctae-catharinae* (Möller) Alvarenga	Necessária análise molecular
PACA-FUNGI 13554	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 13555	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13557	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 13558	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13558	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13559	*Heterochaete crassa* Bodman	Brasil	-	α
PACA-FUNGI 13560	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 13561	*Heterochaete*	Brasil	-	α
PACA-FUNGI 13561,1	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13562	*Exidiopsis sublivida* (Pat.) K. Wells	Brasil	*Eichleriella sp.2*	Necessária análise molecular
PACA-FUNGI 13563	*Heterochaete livida* Pat.	Brasil	-	α

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 13565	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13566	*Exidiopsis*	Brasil	*Exidiopsis* cf. *macroacantha* K. Wells	Necessária análise molecular
PACA-FUNGI 13567	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13568	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13570	*Eichleriella alliciens* (Berk. & Cooke) Burt	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 13571	*Heterochaete hymenochaetoides* Rick	Brasil	*cf. Heteroradulum*	Necessária análise molecular
PACA-FUNGI 13572	*Heterochaete hymenochaetoides* Rick	Brasil	*cf. Heteroradulum*	Necessária análise molecular
PACA-FUNGI 13573	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 13574	*Heterochaete crassa* Bodman	Brasil	*Heteroradulum sp.1*	Necessária análise molecular
PACA-FUNGI 13575	*Heterochaete crassa* Bodman	Brasil	-	α
PACA-FUNGI 13577	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 13578	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 13579	*Heterochaete*	Brasil	-	Espécime degradado
PACA-FUNGI 13580	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 13581	*Heterochaete crassa* Bodman	Brasil	-	α
PACA-FUNGI 13582	*Heterochaete sanctae-catharinae* Möller	Brasil	*Metulochaete cf. sanctae-catharinae* (Möller) Alvarenga	Necessária análise molecular
PACA-FUNGI 13583	*Heterochaete crassa* Bodman	Brasil	-	α
PACA-FUNGI 13585	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 13587	*Basidiodendron*	Brasil	*cf. Basidiodendron*	Necessária análise molecular
PACA-FUNGI 13588	*Heterochaete hymenochaetoides* Rick	Brasil	*cf. Heteroradulum*	Necessária análise molecular
PACA-FUNGI 13589	*Heterochaete sanctae-catharinae* Möller	Brasil	*Metulochaete cf. sanctae-catharinae* (Möller) Alvarenga	Necessária análise molecular
PACA-FUNGI 13590	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 13591	*Heterochaete sanctae-catharinae* Möller	Brasil	*Eichleriella shearii* complex	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 13592	*Heterochaete crassa* Bodman	Brasil	*Heteroradulum sp.1*	Necessária análise molecular
PACA-FUNGI 13593	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 13594	*Heterochaete crassa* Bodman	Brasil	-	α
PACA-FUNGI 13595	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 13596	*Heterochaete hymenochaetoides* Rick	Brasil	*cf. Heteroradulum*	Necessária análise molecular
PACA-FUNGI 13597	*Heterochaete*	Brasil	-	α
PACA-FUNGI 13598	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 13600	*Heterochaete crassa* Bodman	Brasil	-	α
PACA-FUNGI 13602	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 13602,1	*Heterochaete hymenochaetoides* Rick	Brasil	*cf. Heteroradulum*	Necessária análise molecular
PACA-FUNGI 13603	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 13604	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 13605	*Hirneolina lutea?*	Brasil	-	Espécime degradado

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 13606	*Hirneolina amoena?*	Brasil	*cf. Amphistereum*	Necessária análise molecular
PACA-FUNGI 13609	*Hirneolina incarnata var luteoflava* Rick	Brasil	*Eichleriella sp.1*	Necessária análise molecular
PACA-FUNGI 13610	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella sp.1*	Necessária análise molecular
PACA-FUNGI 13614	*Eichleriella alliciens* (Berk. & Cooke) Burt	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 13615	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 13616	*Hirneolina roseocarnea?*	Brasil	*Amphistereum leveilleanum* (Berk. & M.A. Curtis) Spirin & V. Malysheva	Necessária análise molecular
PACA-FUNGI 13617	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 13618	*Exidiopsis alliciens* (Berk. & Cooke) K. Wells	Brasil	*Eichleriella sp.1*	Necessária análise molecular
PACA-FUNGI 13619	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella sp.1*	Necessária análise molecular
PACA-FUNGI 13620	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella sp.1*	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 13654	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 15569	*Heterochaete sanctae-martae* Bodman	Brasil	-	Espécime degradado
PACA-FUNGI 19599,1	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 19641	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 19674	*Exidiopsis*	Brasil	-	Espécime degradado
PACA-FUNGI 19735	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 20094	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 20098	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 20102	*Basidiodendron cinereum* (Bres.) Luck-Allen	Brasil	*cf. Basidiodendron*	Necessária análise molecular
PACA-FUNGI 20106	*Basidiodendron cinereum* (Bres.) Luck-Allen	Brasil	*cf. Basidiodendron*	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 20129	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 20163	*Heterochaete grisea*	Brasil	-	β
PACA-FUNGI 20202	*Heterochaete crassa* Bodman	Brasil	-	α
PACA-FUNGI 20278	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 20332	*Heterochaete*	Brasil	-	α
PACA-FUNGI 20349	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 20359	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 20381	*Heterochaete*	Brasil	-	α
PACA-FUNGI 20415	*Exidiopsis sublivida* (Pat.) K. Wells	Brasil	-	α
PACA-FUNGI 20502	*Eichleriella leveilleana* (Berk. & M.A. Curtis) Burt	Brasil	*Amphistereum leveilleanum* (Berk. & M.A. Curtis) Spirin & V. Malysheva	Atualização taxonômica
PACA-FUNGI 20505	*Heterochaete sanctae-catharinae var delicatula* Rick	Brasil	*Metulochaete cf. sanctae-catharinae* (Möller) Alvarenga	Necessária análise molecular
PACA-FUNGI 20519	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 20562	*Hirneolina amoena?*	Brasil	*Amphistereum leveilleanum* (Berk. & M.A. Curtis) Spirin & V. Malysheva	Necessária análise molecular
PACA-FUNGI 20612	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 20618	*Hirneolina amoena?*	Brasil	*Amphistereum leveilleanum* (Berk. & M.A. Curtis) Spirin & V. Malysheva	Necessária análise molecular
PACA-FUNGI 20640	*Eichleriella leveilleana* (Berk. & M.A. Curtis) Burt	Brasil	*Amphistereum leveilleanum* (Berk. & M.A. Curtis) Spirin & V. Malysheva	Atualização taxonômica
PACA-FUNGI 20656,1	*Heterochaete delicatula var h. sta catharinae* Rick	Brasil	-	α
PACA-FUNGI 20656,2	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 20725	*Heterochaete sanctae-catharinae var delicatula* Rick	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 20725,1	*Hirneolina incarnata var luteoflava* Rick	Brasil	*cf. Amphistereum*	Ω

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 20749	*Heterochaete livida* Pat.	Brasil	-	Espécime degradado
PACA-FUNGI 20815	*Heterochaete sanctae-catharinae* Möller	Brasil	*Metulochaete cf. sanctae-catharinae* (Möller) Alvarenga	Necessária análise molecular
PACA-FUNGI 20816	*Basidiodendron cinereum* (Bres.) Luck-Allen	Brasil	-	Espécime degradado
PACA-FUNGI 20829	*Heterochaete sanctae-martae* Bodman	Brasil	-	Espécime degradado
PACA-FUNGI 20830	*Hymenochaete floriedea?*	Brasil	*cf. Amphistereum*	Ω
PACA-FUNGI 20841	*Exidiopsis alliciens* (Berk. & Cooke) K. Wells	Brasil	*Eichleriella ubatubensis* Viegas	Redeterminada
PACA-FUNGI 20842	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 20892	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 20952	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 20956	*Hirneolina amoena?*	Brasil	*cf. Amphistereum*	Necessária análise molecular
PACA-FUNGI 20975	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 21002	*Hirneolina incarnata* (Bres.) Bres.	Brasil	*Eichleriella cf. ubatubensis* Viégas	Redeterminada
PACA-FUNGI 21123	*Hirneolina amoena?*	Brasil	*cf. Amphistereum*	Ω
PACA-FUNGI 21151	*Polyporaceae*	Brasil	-	"Holobasidiomycetes"
PACA-FUNGI 21157	*Heterochaete livida* Pat.	Brasil	-	α

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 22560	*Heterochaete*	Brasil	-	α
PACA-FUNGI 22595	*Heterochaete minuta* Pat.	Brasil	*Adustochaete* aff. *nivea* Alvarenga	Necessária análise molecular
PACA-FUNGI 22597	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 22602	*Basidiodendron*	Brasil	*cf. Basidiodendron*	Necessária análise molecular
PACA-FUNGI 22697	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 22800	*Hirneolina incarnata var luteoflava* Rick	Brasil	*Eichleriella sp.1*	Necessária análise molecular
PACA-FUNGI 22835	*Heterochaete shearii* (Burt) Burt	Brasil	-	Espécime degradado
PACA-FUNGI 22854	*Heterochaete glauca*	Brasil	-	β
PACA-FUNGI 22872	*Exidiopsis*	Brasil	-	α
PACA-FUNGI 22916	*Heterochaete hymenochaetoides* Rick	Brasil	*cf. Heteroradulum*	Necessária análise molecular
PACA-FUNGI 22926	*Heterochaete sanctae-catharinae* Möller	Brasil	*Metulochaete cf. sanctae-catharinae* (Möller) Alvarenga	Necessária análise molecular
PACA-FUNGI 22939	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 22961	*Heterochaete sanctae-martae* Bodman	Brasil	-	Espécime degradado

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
PACA-FUNGI 23131	*Heterochaete livida* Pat.	Brasil	*Eichleriella shearii* complex	Necessária análise molecular
PACA-FUNGI 23163	*Heterochaete livida* Pat.	Brasil	-	α
PACA-FUNGI 23165	*Heterochaete livida* Pat.	Brasil	-	α
SP00011529	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00018660	*Auricularia polytricha* (Mont.) Sacc.	s.loc.	*Auricularia cornea* Ehrenb.	Redeterminada
SP00022609	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00022610	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00022611	*Auricularia polytricha* (Mont.) Sacc.	India	*Auricularia cornea* Ehrenb.	Redeterminada
SP00022612	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00022613	*Auricularia polytricha* (Mont.) Sacc.	"India Ingleza"	*Auricularia cornea* Ehrenb.	Redeterminada
SP00022900	*Heterochaete livida* Pat.	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00022901	*Exidia glandulosa* (Bull.) Fr.	Países Baixos	*Exidia glandulosa* (Bull.) Fr.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00029720	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00029904	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00031865	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00033704	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00033705	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00033706	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00033708	*Auricularia rosea* Burt	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
SP00033710	*Auricularia fuscosuccinea* (Mont.) Henn.	s.loc.	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00033711	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00033714	*Heterochaete livida* Pat.	Brasil	*cf. Exidiopsis*	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
			Heteroradulum lividofuscum (Pat.)	
SP00033715	*Heterochaete lividofusca* Pat.	Brasil	Spirin & Malysheva	Atualização taxonômica
	Exidiopsis alliciens (Berk. & Cooke) K.		*Eichleriella alliciens* (Berk. &	
SP00033716	Wells	Brasil	Cooke) Burt	Atualização taxonômica
SP00034462	*Heterochaete cheesmanii* Wakef.	Austrália	*Heterochaete cheesmanii* Wakef.	Atualização taxonômica
	Heterochaete discolor (Berk. &		*Heterochaete discolor* (Berk. &	
SP00034580	*Broome) Petch*	Austrália	Broome) Petch	Atualização taxonômica
SP00034843	*Auricularia polytricha* (Mont.) Sacc.	Austrália	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00035189	Henn.	Brasil	Henn.	Confirmada
	Eichleriella spinulosa (Berk. & M.A.		*Heteroradulum spinulosum* (Berk.	
SP00035545	Curtis) Burt	Austrália	& M.A. Curtis) Spirin & Malysheva	Atualização taxonômica
	Eichleriella macrospora (Ellis & Everh.)		*Eichleriella macrospora* (Ellis &	
SP00038460	G.W. Martin	EUA	Everh.) G.W. Martin	Confirmada
	Auricularia auricularis (Gray) G.W.		*Auricularia fuscosuccinea* (Mont.)	
SP00040078	Martin	s.loc.	Henn.	Redeterminada
SP00040703	*Exidia glandulosa* (Bull.) Fr.	EUA	*Exidia glandulosa* (Bull.) Fr.	Confirmada
SP00042754	*Exidia recisa* (Ditmar) Fr.	EUA	*Myxarium nucleatum* Wallr.	Atualização taxonômica
SP00043595	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00045205	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00045989	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00046414	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00047000	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00047460	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00047611	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00048296	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00049856	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00050203	*Auricularia rosea* Burt	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
SP00050341	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00055887	*Exidia saccharina* Fr.	EUA	*Myxarium nucleatum* Wallr.	Atualização taxonômica
SP00055891	*Exidia glandulosa* (Bull.) Fr.	EUA	*Exidia glandulosa* (Bull.) Fr.	Confirmada
SP00055897	*Exidia nucleata* (Schwein.) Burt	EUA	*Myxarium nucleatum* Wallr.	Atualização taxonômica
SP00056065	*Auricularia fuscosuccinea* (Mont.) Henn.	EUA	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00056280	*Auricularia mesenterica* (Dicks.) Pers.	Portugal	*Auricularia mesenterica* (Dicks.) Pers.	Confirmada
SP00060081	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00060104	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00060105	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00060264	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00061135	*Exidia*	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00061229	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00061359	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00061515	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00061549	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00061627	*Auricularia fuscosuccinea* (Mont.) Henn.	EUA	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00061633	*Exidiopsis grisea* (Bres.) Bourdot & Maire	EUA	*Exidiopsis grisea* (Bres.) Bourdot & Maire	Confirmada
SP00061634	*Exidiopsis grisea* (Bres.) Bourdot & Maire	EUA	*Exidiopsis grisea* (Bres.) Bourdot & Maire	Confirmada
SP00061643	*Exidiopsis laccata* (Bourdot & Galzin) Luck-Allen	EUA	*cf. Exidiopsis*	Necessária análise molecular
SP00061647	*Exidiopsis laccata* (Bourdot & Galzin) Luck-Allen	EUA	*cf. Exidiopsis*	Necessária análise molecular
SP00061668	*Auricularia polytricha* (Mont.) Sacc.	EUA	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Atualização taxonômica
SP00061673	*Exidiopsis molybdea* (McGuire) Ervin	EUA	*cf. Exidiopsis*	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00061838	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00061839	Henn.	Brasil	Henn.	Confirmada
SP00061846	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00061854	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00061860	Henn.	Brasil	Henn.	Confirmada
SP00061866	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00061904	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070662	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070824	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070850	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070856	Henn.	Brasil	Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00070860	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070861	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070863	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070898	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00070912	Henn.	Brasil	Henn.	Confirmada
SP00071068	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00071298	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00071347	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00071363	Henn.	s.loc.	Henn.	Confirmada
SP00071367	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00071407	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00071491	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00071505	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	-	Espécime degradado
SP00071507	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00071508	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00071512	*Heterochaete tremellispora* (Möller) Bodman	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00071513	*Heterochaete tremellispora* (Möller) Bodman	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00071531	*Exidiopsis alliciens* (Berk. & Cooke) K. Wells	Brasil	*Eichleriella alliciens* (Berk. & Cooke) Burt	Atualização taxonômica
SP00071532	*Exidiopsis alliciens* (Berk. & Cooke) K. Wells	Brasil	*Eichleriella alliciens* (Berk. & Cooke) Burt	Atualização taxonômica
SP00071533	*Exidiopsis alliciens* (Berk. & Cooke) K. Wells	Brasil	*Eichleriella alliciens* (Berk. & Cooke) Burt	Atualização taxonômica

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00071534	*Exidiopsis alliciens* (Berk. & Cooke) K. Wells	Brasil	*Eichleriella alliciens* (Berk. & Cooke) Burt	Atualização taxonômica
SP00071538	*Exidia nucleata* (Schwein.) Burt	Brasil	-	Espécime degradado
SP00071539	*Exidia nucleata* (Schwein.) Burt	Brasil	-	Espécime degradado
SP00071540	*Exidia nucleata* (Schwein.) Burt	Brasil	*cf. Myxarium*	Necessária análise molecular
SP00071541	*Exidia nucleata* (Schwein.) Burt	Brasil	-	Espécime degradado
SP00071552	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00071553	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00071554	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00083517	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00083518	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00083519	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00083520	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083522	*Heterochaete nigerrima* Viégas	Brasil	*Tremellochaete nigerima* (Viégas) Spirin & Malysheva	Momenclatura atualizada
SP00083525	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083526	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083528	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083529	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083530	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00083531	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00083532	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00083533	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00083534	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00083543	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083545	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083546	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083547	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00083548	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	-	Espécime degradado
SP00083549	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00083812	*Auricularia*	Brasil	-	Espécime degradado
SP00083817	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada
SP00083825	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada
SP00083826	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
			Auricularia fuscosuccinea (Mont.)	
SP00083828	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00083939	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00083975	Henn.	Brasil	Henn.	Confirmada
SP00084023	*Exidia glandulosa* (Bull.) Fr.	EUA	*Exidia glandulosa* (Bull.) Fr.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00091460	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00091467	Henn.	Brasil	Henn.	Confirmada
			Auricularia fuscosuccinea (Mont.)	
SP00091521	*Auricularia*	s.loc.	Henn.	Determinada
			Auricularia delicata (Mont. ex Fr.)	
SP00091537	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
				Necessária análise
SP00091540	*Auricularia cornea* Ehrenb.	s.loc.	*Auricularia cf. cornea* Ehrenb.	molecular
				Necessária análise
SP00092441	*Exidiopsis*	Brasil	*cf. Eichleriella*	molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00092471	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	-	Espécime degradado
SP00092530	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00092544	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00092545	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00092546	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00092553	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00092555	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00092593	*Exidia nucleata* (Schwein.) Burt	Brasil	*cf. Myxarium*	Necessária análise molecular
SP00092925	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00092944	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00094231	*Exidiopsis laccata* (Bourdot & Galzin) Luck-Allen	EUA	*cf. Exidiopsis*	Necessária análise molecular
SP00094352	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094353	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094354	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094355	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094356	*Exidia glandulosa* (Bull.) Fr.	EUA	*Exidia glandulosa* (Bull.) Fr.	Confirmada
SP00094359	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094360	*Heterochaete tremellispora* (Möller) Bodman	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00094361	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094362	*Exidia nucleata* (Schwein.) Burt	EUA	*Myxarium nucleatum* Wallr.	Atualização taxonômica

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00094363	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094364	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094366	*Exidia nucleata* (Schwein.) Burt	EUA	*Myxarium nucleatum* Wallr.	Atualização taxonômica
SP00094367	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094369	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094370	*Exidiopsis grisea* (Bres.) Bourdot & Maire	EUA	*Exidiopsis grisea* (Bres.) Bourdot & Maire	Confirmada
SP00094371	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094375	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094376	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular
SP00094383	*Exidiopsis candida* (L.S. Olive) K. Wells	Brasil	*cf. Exidiopsis*	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
			Auricularia fuscosuccinea (Mont.)	
SP00095426	*Auricularia*	Brasil	Henn.	Determinada
SP00095452	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00095510	Henn.	Brasil	Henn.	Confirmada
SP00095721	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00095761	Henn.	Brasil	Henn.	Confirmada
SP00097539	*Exidia*	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00097540	*Exidia*	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00097541	*Exidia*	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00097561	*Exidia*	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00097583	*Exidia*	Brasil	*cf. Tremellochaete*	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00097616	*Exidia*	Brasil	*cf. Tremellochaete*	Necessária análise molecular
SP00097668	*Exidia nucleata* (Schwein.) Burt	Brasil	*cf. Myxarium*	Necessária análise molecular
SP00097899	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00097965	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00097975	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00102029	*Exidia nucleata* (Schwein.) Burt	Brasil	*cf. Myxarium*	Necessária análise molecular
SP00102038	*Exidiopsis alliciens* (Berk. & Cooke) K. Wells	Brasil	*Eichleriella alliciens* (Berk. & Cooke) Burt	Atualização taxonômica
SP00102050	*Exidia nucleata* (Schwein.) Burt	Brasil	*cf. Myxarium*	Necessária análise molecular
SP00102054	*Exidia nucleata* (Schwein.) Burt	Brasil	*cf. Myxarium*	Necessária análise molecular

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00102063	*Exidia nucleata* (Schwein.) Burt	Brasil	*cf. Myxarium*	Necessária análise molecular
SP00102241	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00102261	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00102369	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00102410	*Auricularia peltata* Lloyd	Brasil	-	Espécime degradado
SP00102648	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00102665	*Auricularia*	Indonésia	*Auricularia thailandica* Bandara & K.D. Hyde	Atualização taxonômica
SP00102672	*Auricularia fuscosuccinea* (Mont.) Henn.	Indonésia	*Auricularia thailandica* Bandara & K.D. Hyde	Atualização taxonômica
SP00103098	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00103103	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00103114	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada

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SP00103132	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00103373	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00103379	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00103725	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada
SP00106753	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada
SP00106842	*Exidiopsis macroacantha* K. Wells	Brasil	-	Espécime não encontrado.
SP00106843	*Exidiopsis macroacantha* K. Wells	Brasil	-	Espécime não encontrado.
SP00106844	*Exidiopsis macroacantha* K. Wells	Brasil	-	Espécime não encontrado.
SP00106845	*Exidiopsis macroacantha* K. Wells	Brasil	-	Espécime não encontrado.

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00106846	*Exidiopsis macroacantha* K. Wells	Brasil	-	Espécime não encontrado.
SP00107004	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00107005	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00107009	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00107520	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00107522	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00107523	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00108855	*Auricularia polytricha* (Mont.) Sacc.	Guatemala	*Auricularia cornea* Ehrenb.	Redeterminada
SP00109039	*Auricularia auricula-judae* (Bull.) Quél.	EUA	*Auricularia auricula-judae* (Bull.) Quél.	Confirmada
SP00109061	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00109062	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00109063	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00109194	Henn.	Brasil	Henn.	Confirmada
SP00109253	*Exidia glandulosa* (Bull.) Fr.	EUA	*Exidia glandulosa* (Bull.) Fr.	Confirmada
SP00112219	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
			Auricularia brasiliana Y.C. Dai & F.	
SP00112296	*Auricularia mesenterica* (Dicks.) Pers.	Cuba	Wu	Redeterminada
SP00112700	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
			Auricularia fuscosuccinea (Mont.)	
SP00124006	*Auricularia*	Brasil	Henn.	Determinada
			Auricularia delicata (Mont. ex Fr.)	
SP00124011	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00124019	Henn.	Brasil	Henn.	Confirmada
			Auricularia fuscosuccinea (Mont.)	
SP00124020	*Auricularia*	Brasil	Henn.	Determinada
			Auricularia fuscosuccinea (Mont.)	
SP00124062	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00124602	Henn.	Brasil	Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00124605	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00124608	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00127909	Henn.	Brasil	Henn.	Confirmada
SP00127911	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00127926	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00127931	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00127938	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00128064	Henn.	Brasil	Henn.	Confirmada
			Auricularia fuscosuccinea (Mont.)	
SP00141401	*Auricularia*	Brasil	Henn.	Determinada
			Auricularia fuscosuccinea (Mont.)	
SP00141403	*Auricularia*	Brasil	Henn.	Determinada
			Auricularia fuscosuccinea (Mont.)	
SP00141444	*Auricularia auricula-judae* (Bull.) Quél.	Brasil	Henn.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00141539	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00141894	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00141958	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00141975	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00142100	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00142158	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00142174	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00142311	*Exidia alba* (Lloyd) Burt	EUA	*Ductifera pululahuana* (Pat.) Donk	Atualização taxonômica
SP00156749	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00156754	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00156756	Henn.	Brasil	Henn.	Confirmada
		Venezuel		
SP00156834	*Auricularia polytricha* (Mont.) Sacc.	a	*Auricularia cornea* Ehrenb.	Redeterminada
SP00156876	*Auricularia*	Brasil	-	Espécime degradado
			Auricularia fuscosuccinea (Mont.)	
SP00156926	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00157043	Henn.	Brasil	Henn.	Confirmada
SP00157205	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00157226	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
			Auricularia fuscosuccinea (Mont.)	
SP00157264	*Auricularia*	Brasil	Henn.	Determinada
			Auricularia fuscosuccinea (Mont.)	
SP00157275	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00157311	Henn.	Brasil	Henn.	Confirmada
			Auricularia fuscosuccinea (Mont.)	
SP00157334	*Auricularia*	Brasil	Henn.	Determinada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00157342	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada
SP00157343	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada
SP00157433	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00157436	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00157537	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00157566	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00157579	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00157583	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00157590	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00157591	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00157683	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177330	Henn.	Brasil	Henn.	Confirmada
SP00177335	*Auricularia*	Brasil	-	Espécime degradado
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177365	Henn.	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00177415	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177416	Henn.	Brasil	Henn.	Confirmada
SP00177424	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177437	Henn.	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00177468	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00177506	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
SP00177509	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00177524	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00177532	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177534	Henn.	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00177545	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177559	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177586	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177597	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177602	Henn.	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00177634	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177652	Henn.	Brasil	Henn.	Confirmada
SP00177658	*Auricularia*	Brasil	*Auricularia cornea* Ehrenb.	Determinada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177666	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177773	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177784	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00177814	Henn.	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00177930	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
SP00178089	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
			Auricularia delicata (Mont. ex Fr.)	
SP00178107	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00178151	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00178155	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00178184	Henn.	Brasil	Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00193414	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
			Auricularia fuscosuccinea (Mont.)	
SP00193462	*Auricularia*	Brasil	Henn.	Determinada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00193469	Henn.	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00193519	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
SP00193524	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00193539	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00193569	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
			Auricularia delicata (Mont. ex Fr.)	
SP00193602	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00193640	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
SP00193907	*Auricularia*	Brasil	-	Espécime degradado
SP00193968	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00194045	Henn.	Brasil	Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
			Auricularia fuscosuccinea (Mont.)	
SP00194181	*Auricularia auricula* (L.) Underw.	Brasil	Henn.	Redeterminada
SP00194258	*Auricularia*	Brasil	*Auricularia cornea* Ehrenb.	Determinada
SP00194358	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
			Auricularia delicata (Mont. ex Fr.)	
SP00211225	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00211232	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00211236	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00211241	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
			Auricularia delicata (Mont. ex Fr.)	
SP00211242	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	Henn.	Confirmada
SP00211243	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00211253	Henn.	Brasil	Henn.	Confirmada
SP00211268	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00211281	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00211304	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00211323	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00211324	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00211325	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00211326	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211327	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211328	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211329	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211330	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00211331	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00211332	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211334	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00211336	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00211645	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211646	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211816	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00211894	*Heterochaete*	Brasil	*cf. Eichleriella*	Necessária análise molecular
SP00211950	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00211985	*Auricularia mesenterica* (Dicks.) Pers.	Roménia	*Auricularia mesenterica* (Dicks.) Pers.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
SP00212037	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00212038	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00212039	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00212205	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00214591	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00214592	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00214598	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00214650	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00214658	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
SP00214700	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada
SP00214782	*Auricularia*	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Determinada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
			Auricularia fuscosuccinea (Mont.)	
SP00214786	*Auricularia*	Brasil	Henn.	Determinada
SP00233294	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00233300	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00250515	Henn.	Brasil	Henn.	Confirmada
			Auricularia brasiliana Y.C. Dai & F.	
SP00250638	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	Wu	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00250770	Henn.	Brasil	Henn.	Confirmada
			Auricularia fuscosuccinea (Mont.)	
SP00250796	*Auricularia auricula* (L.) Underw.	Brasil	Henn.	Redeterminada
SP00250798	*Auricularia auricula* (L.) Underw.	Brasil	-	Espécime degradado
			Auricularia fuscosuccinea (Mont.)	
SP00250984	*Auricularia auricula* (L.) Underw.	Brasil	Henn.	Redeterminada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00251235	Henn.	Brasil	Henn.	Confirmada
	Auricularia fuscosuccinea (Mont.)		*Auricularia fuscosuccinea* (Mont.)	
SP00307272	Henn.	Brasil	Henn.	Confirmada

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SP00375900	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00394166	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00394167	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00394168	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00394169	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00394170	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
SP00394171	Henn.	Brasil	Henn.	Confirmada
SP00394205	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00394206	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00445757	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00465949	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00465951	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00465956	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
SP00466293	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada

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SP00466293	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
SP00466294	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466294	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466295	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466295	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466296	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466296	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466297	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466297	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00466297	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
SP00467257	*Auricularia brasiliana* Y.C. Dai & F. Wu	China	*Auricularia orientalis* Y.C. Dai & F. Wu	Atualização taxonômica
SP00467266	*Auricularia polytricha* (Mont.) Sacc.	China	*Auricularia cornea* Ehrenb.	Redeterminada
SP00467303	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
SP00467304	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
SP00467305	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
SP00467306	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada

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SP00467307	*Auricularia orientalis* Y.C. Dai & F. Wu	China	*Auricularia orientalis* Y.C. Dai & F. Wu	Confirmada
URM10309	*Auricularia mesenterica* (Dicks.) Pers.	Venezuela	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM10417	*Exidia glandulosa* (Bull.) Fr.	EUA	*Exidia glandulosa* (Bull.) Fr.	α
URM10516	*Exidia saccharina* Fr.	Alemanha	*Exidia saccharina* Fr.	α
URM10543	*Auricularia auricula* (L.) Underw.	EUA	*Auricularia americana* Parm. & I. Parm. ex Audet, Boulet & Sirard	Atualização taxonômica
URM10723	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	s.loc.	*Auricularia cornea* Ehrenb.	Redeterminada
URM1095	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM1197	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM12374	*Auricularia emini* Henn.	Uganda	*Auricularia emini* Henn.	α
URM12619	*Auricularia mesenterica* (Dicks.) Pers.	Países Baixos	*Auricularia mesenterica* (Dicks.) Pers.	Confirmada

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URM13220	*Exidia repanda* Fr.	EUA	*Exidia repanda* Fr.	α
URM13243	*Heterochaete sublivida* Pat.	EUA	*Heterochaete sublivida* Pat.	Confirmada
URM13268	*Heterochaete sublivida* Pat.	EUA	*Heterochaete sublivida* Pat.	Confirmada
URM13633	*Auricularia fuscosuccinea* (Mont.) Henn.	EUA	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
URM17219	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM17716	*Exidia repanda* Fr.	EUA	*Exidia repanda* Fr.	α
URM20144	*Auricularia auricula* (L.) Underw.	s.loc.	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM20144A	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM2422	*Auricularia auricula-judae* (Bull.) Quél.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM2454	*Exidia recisa* (Ditmar) Fr.	Brasil	*Exidia recisa* (Ditmar) Fr.	α
URM25119	*Auricularia auricula* (L.) Underw.	EUA	*Auricularia americana* Parm. & I. Parm. ex Audet, Boulet & Sirard	Atualização taxonômica

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM25119A	*Auricularia auricula* (L.) Underw.	s.loc.	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM2957	*Auricularia lobata* Sommerf.	Portugal	*Auricularia mesenterica* (Dicks.) Pers.	Atualização taxonômica
URM29827	*Auricularia mesenterica* (Dicks.) Pers.	EUA	*Auricularia mesenterica* (Dicks.) Pers.	Confirmada
URM30663	*Auricularia polytricha* (Mont.) Sacc.	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM33122	*Patouillardina cinerea* Bres.	Brasil	*Patouillardina cinerea* Bres.	Confirmada
URM36325	*Auricularia auricularis* (Gray) G.W. Martin	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM4616	*Auricularia mesenterica* (Dicks.) Pers.	Alemanha	*Auricularia mesenterica* (Dicks.) Pers.	Confirmada
URM47649	*Auricularia*	Brasil	*Auricularia cf. fuscossucinea* (Mont.) Henn.	α
URM47776	*Auricularia*	Brasil	*Auricularia cf. fuscossucinea* (Mont.) Henn.	α
URM48753	*Auricularia delicata* (Mont. ex Fr.) Henn	Brasil	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada

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URM48779	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM505	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM5330	*Auricularia delicata* (Mont. ex Fr.) Henn	EUA	*Auricularia delicata* (Mont. ex Fr.) Henn.	Confirmada
URM629	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM633	*Auricularia nobilis?*	Brasil	*cf. Auricularia*	Ω
URM73906	*Auricularia*	Brasil	*Auricularia cf. fuscossucinea* (Mont.) Henn.	α
URM745	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM75707	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM75710	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM75748	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM75769	*Auricularia*	Brasil	*Auricularia cf. fuscossucinea* (Mont.) Henn.	α
URM75778	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
URM76905	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76906	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76907	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76908	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76909	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76910	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76911	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM76912	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76913	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76914	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76915	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76916	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM76917	*Auricularia fuscosuccinea* (Mont.) Henn.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Confirmada
URM80338	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80489	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80514	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM80537	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80605	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80606	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80607	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80652	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80763	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80832	*Auricularia*	Brasil	*Auricularia cf. fuscossucinea* (Mont.) Henn.	α
URM80836	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM8086	*Auricularia*	s.loc.	*Auricularia cf. fuscossucinea* (Mont.) Henn.	α

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM80887	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80919	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80926	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80933	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM80944	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80947	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM80948	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM80956	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80967	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada

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URM80970	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80978	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM80979	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80984	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM80994	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM82249	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM82250	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM82251	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82951	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM82976	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82978	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82979	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82980	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82981	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82982	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82983	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM82984	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM83090	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

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URM83464	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM83465	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM83466	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM83467	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM83468	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM83469	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM83482	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM83696	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM83702	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM83887	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM83954	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM84563	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM84565	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM84566	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM84567	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM84568	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM85090	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM85560	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

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URM85561	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM85563	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM85567	*Auricularia mesenterica* (Dicks.) Pers.	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Redeterminada
URM87670	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada
URM87671	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada
URM87853	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM87854	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88091	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada
URM88092	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM88093	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88094	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88095	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88096	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88097	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88098	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88099	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88100	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88101	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM88102	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88103	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88104	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88105	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88106	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88107	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88225	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada
URM88226	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada
URM88227	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM88228	*Auricularia brasiliana* Y.C. Dai & F. Wu	Brasil	*Auricularia brasiliana* Y.C. Dai & F. Wu	Confirmada
URM88229	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM88235	*Heterochaete shearii* (Burt) Burt	Brasil	*Eichleriella shearii* complex	Redeterminada
URM88236	*Heterochaete shearii* (Burt) Burt	Argentina	*Eichleriella shearii* complex	Redeterminada
URM88237	*Heterochaete shearii* (Burt) Burt	Brasil	*Eichleriella shearii* complex	Redeterminada
URM88265	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM89984	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM89991	*Auricularia nigricans* (Sw.) Birkebak, Looney & Sánchez-García	Brasil	*Auricularia cornea* Ehrenb.	Redeterminada
URM90198	*Tremellochaete atlantica* Alvarenga	Brasil	*Tremellochaete atlantica* Alvarenga	Confirmada
URM90199	*Tremellochaete atlantica* Alvarenga	Brasil	*Tremellochaete atlantica* Alvarenga	Confirmada
URM90200	*Tremellochaete cerradensis* Alvarenga	Brasil	*Tremellochaete cerradensis* Alvarenga	Confirmada

Número do Catálogo	Espécie	Pais	Revisão Taxonômica	Comentários
URM90503	*Auricularia brasiliana* Y.C. Dai & F. Wu	China	*Auricularia orientalis* Y.C. Dai & F. Wu	Atualização taxonômica
URM90533	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
URM90540	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
URM90547	*Auricularia polytricha* (Mont.) Sacc.	China	*Auricularia cornea* Ehrenb.	Redeterminada
URM90551	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
URM90570	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
URM90571	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
URM90587	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
URM90589	*Auricularia cornea* Ehrenb.	China	*Auricularia cornea* Ehrenb.	Confirmada
URM90600	*Auricularia brasiliana* Y.C. Dai & F. Wu	China	*Auricularia orientalis* Y.C. Dai & F. Wu	Atualização taxonômica
URM9358	*Heterochaete sebacinus*	Brasil	*cf. Amphistereum*	Ω
URM954	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM963	*Auricularia auricula* (L.) Underw.	Brasil	*Auricularia fuscosuccinea* (Mont.) Henn.	Redeterminada
URM969	*Auricularia*	Brasil	*Auricularia cf. fuscossucinea* (Mont.) Henn.	α

APÊNDICE E – TWO NEW GENERA AND SIX OTHER NOVELTIES IN HETEROCHAETE SENSU LATO (AURICULARIALES, BASIDIOMYCOTA) - PUBLICADO NA BOTANY, 97(8): 439-451. DOI: 10.1139/CJB-2019-0046

Title: Two new genera and six other novelties in *Heterochaete sensu lato* (Auriculariales, Basidiomycota)

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ABSTRACT

The genus *Heterochaete* (Auriculariales, Basidiomycota) is traditionally defined to comprise resupinate fungal species with sterile spines (hyphal pegs) that are distributed on hymenial surface. Recent DNA-based studies indicated that *Heterochaete* is polyphyletic, although the correct taxonomic positions of many species under this genus remains unresolved. In the present study, we revised the taxonomic assignments of some representatives of *Heterochaete s.l.*, with special emphasis on neotropical taxa. Based on our results, two new genera, three new species, and three new combinations were proposed. *Adustochaete* is a new genus comprising two newly described species collected from dry hardwood twigs in the Neotropics; these two species are *A. rava* (the genus type) from Brazil and *A. interrupta* from Mexico. To date, the second genus, *Proterochaete*, comprises a single species, *P. adusta* comb. nov., which is widely distributed in the temperate Northern hemisphere. In addition, one new species,*T. cerradensis* sp. nov., is described and one new combination, *T. ciliata* comb. nov., is proposed in *Tremellochaete*, both recorded in Brazil. A neotype is selected for *Heterochaetella ochracea*, and this species was moved to *Eichleriella* based on morphological evidence and DNA analyses.

KEYWORDS: Agaricomycetes; Auriculariales; Phylogeny; Taxonomy

INTRODUCTION

The genus *Heterochaete* Pat. (1892) (Auriculariales, Basidiomycota) was introduced with two species and was typified by *H. andina* Pat. (Bodman 1952). *Heterochaete* is macroscopically characterized by resupinate, adnate basidiomata, coriaceous to gelatinous texture, and the presence of sterile spines (hyphal pegs), which can be irregularly or evenly distributed on the hymenial surface. The hyphal structure is usually monomitic, although rare dimitic and trimitic species have been reported as well. The hymenium is composed of basidia, hyphidia, cystida, and/or gloeocystidia. The basidia are frequently globose-subglobose or ovoid, and 2-4-celled; the basidiospores are hyaline and broadly ellipsoid to allantoid (Bodman 1952). The salient feature of the genus is the presence of hyphal pegs, which are defined as columns of skeletal or generative hyphae projecting above the hymenial layer but not covered with basidia or other hymenial cells. Such sterile spines are not unique to *Heterochaete* and can also occur in some other genera of the Agaricomycetes, such as *Epithele* (Pat.) Pat. (Polyporales) and *Pteridomyces* Jülich (Trechisporales).

In a genus study, Bodman (1952) accepted 29 species and reported two major problems in the genus. One problem was the mostly brief and general descriptions of old species, which caused difficulties in identification of these species, unless authentic material was available for analysis. The second problem was the high morphological diversity among species in the genus, since they have only one common feature, namely, the presence of hyphal pegs. Bodman (1952) concluded that the genus as defined by Patouillard was heterogeneous, and a stricter delimitation of *Heterochaete* was required. Since the findings of Bodman, 19 additional species from different geographic regions have been described (Kobayasi 1954; Rick 1958;Talbot 1958; Lowy 1977, 1987; Paéz 1982, 1983; Peng 1989; Hu and Peng 1990; Deng 1993; Hu and Jian 1993; Kisimova-Horovitz et al. 2000; Roberts 2008). Currently, the

genus comprises 54 species listed as belonging to *Heterochaete* in the Mycobank Database (www.mycobank.org).

Heterochaete currently remains polyphyletic (Weiss and Oberwinkler 2001; Malysheva and Spirin 2017). In a recent DNA-based study (Malysheva and Spirin 2017), several genera, including *Eichleriella*, *Hirneolina*, *Heteroradulum*, and *Tremellochaete* were redefined and broadened to include some *Heterochaete* species with hyphal pegs. The genus was limited to the type species recovered as a close relative of *Exidiopsis effusa* (Bref.) A. Möller based on phylogenetic analyses, although this result was determined using an rDNA *28S* sequence of the type specimen (Malysheva and Spirin 2017). The identification of most of the other *Heterochaete* species remain obscure because of the lack of DNA sequence data and the absence of samples from the type localities. In the present study, we continued the revision of the resupinate Auriculariales, wherein we investigated four types and newly collected material with hyphal pegs, which were mainly obtained from Neotropical localities.

MATERIALS AND METHODS

Type specimens and samples from the BPI, H, HBG, LSUM, NY, O, SP, TAAM, and URM herbaria were studied. Herbarium acronyms were given according to Thiers (2018). Microscopical studies were conducted using preparations mounted in KOH, Congo Red, and Cotton Blue. Morphological measurements were conducted according to Miettinen et al. (2012), and color properties were evaluated according to Kornerup and Wanscher (1978). The following abbreviations were used in morphological descriptions and tables: L = mean spore length, W = mean spore width, Q' = length/width ratio, Q = mean length/width ratio, n = number of measurements per specimen.

DNA extraction, sequence alignment, and phylogenetic analyses. Eleven specimens were utilized for DNA extraction and amplification. DNA extraction was conducted with the

NucleoSpin Plant II kit (Macherey-Nagel GmbH & Co. KG) or DNeasy Plant Mini Kit (Qiagen) following the manufacturer's protocol. Polymerase chain reaction (PCR) was performed using primers targeting the nuc rDNA internal transcribed spacers *(ITS1-5.8S-ITS2* = *ITS*) and nuc rDNA *28S* (*28S*). For the *ITS* region, we used the primers ITS1F-ITS4 (White et al. 1990; Gardes and Bruns 1993), while the primers JS1 (Landvik 1996) or LR0R and LR5 (Vilgalys and Hester 1990) were used for the D1/D2 domains of the nuc *28S* rDNA. PCR products were purified using the GeneJET Gel Extraction Kit (Thermo Scientific, Thermo Fisher Scientific Inc., Waltham, MA, USA).

The assembly and editing of sequences were performed in Sequencher 5.3 (Gene Codes, Ann Arbor, MI, USA) and MEGA 6 (Tamura et al. 2013). Sequences were compared to the sequences deposited in GenBank (https://www.ncbi.nlm.nih.gov/genbank/). The sequences generated in this study were deposited in GenBank under the accession numbers provided in Table 1.

Eleven rDNA *ITS* and six *28S* sequences were generated in the present study . We added 71 28S sequences and 66 ITS sequences retrieved from GenBank (Table 1) and combined all the sequences into one dataset. *Sistotrema brinkmannii* (Bres.) J. Erikss. (JX535170\JX535169) was used as outgroup for the analyses following Malysheva et al. (2018). Sequence alignments were constructed using the online version of MAFFT (Katoh and Toh 2008) using the Q-INS-I option with default parameters.

The final alignment comprised 1,619 characters and included representatives for 22 genera in Auriculariales. Phylogenetic reconstructions were inferred by maximum likelihood (ML) and Bayesian inference (BI). The best evolutionary model for each dataset was estimated based on Akaike Information Criterion (AIC) using ModelTest on TOPALi 2.5. The GTR + G + I model was employed for ML analyses of the *ITS+28S* datasets.

ML analysis was run with PhyML (Guindon and Gascuel 2003) using the software TOPALi 2.5, with one hundred rapid bootstrap replicates. BI analysis was performed using MrBayes 3.1 (Ronquist and Huelsenbeck 2003) software. Two independent runs were performed, each with four chains and run for 2 million generations with sampling every 10,000 generations, under the described model.

RESULTS

ML and BI analyses returned trees with nearly congruent topologies. Therefore, only the ML tree is shown in Fig. 1. Sequences from the studied specimens are recovered within four separate clades, which we interpreted to be equivalent to genera, viz. *Eichleriella*, *Tremellochaete*, *Adustochaete*, and *Proterochaete*, the latter two introduced here as new genera (Fig. 1).

The *Eichleriella* clade (bp = 99, pp = 1) comprises eight species, including the generic type *E. leucophaea* and two newly generated sequences, wherein one represents the first record of *E. tenuicula* in Brazil, while the other is a specimen fitting to the protologue of *Heterochaetella ochracea* Viégas. There is no type material for *H. ochracea*; therefore, the newly collected specimen was selected as a neotype for the newly proposed combination, *Eichleriella ochracea*. The *Adustochaete* clade (bp = 78, pp = 1) represents a new neotropical genus comprising two species. The *Proterochaete* clade (bp = 83, pp = 1) represents a new genus comprising a single species formerly named *Sebacina adusta* Burt. The *Tremellochaete* clade (bp = --, pp = 1) is composed of four species, including the generic type *T. japonica*, and could be polyphyletic. *Exidiopsis ciliata* A. Möller was recovered and combined with *Tremellochaete*, while *T. cerradensis* was described as a new species.

Our phylogenetic results were consistent with those reported by Malysheva and Spirin (2017). The recently introduced genus *Grammatus* was recovered as a sister genus of *Heteroradulum*.

TAXONOMY

Adustochaete Alvarenga & K.H. Larss., gen. nov.

MycoBank MB 829295

Etymology: from 'adustus' (Lat., adj.) – gray and '-chaete' – a reference to *Heterochaete*.

Basidiomata resupinate, arid, soft, small-sized, grayish to brownish; hymenophore spiny or tuberculate. Hyphal structure monomitic; generative hyphae thin-walled, clamped. Hyphidia and cystidia present. Basidia ellipsoid-ovoid to obconical, longitudinally septate, 4-celled, occasionally tapering to the stalk-like base, sterigmata thick. Basidiospores hyaline, thin-walled, cylindrical to broadly cylindrical, straight or curved, with oil droplets in the cytoplasm. On dead hardwood branches.

Type. *Adustochaete rava* Alvarenga & K.H. Larss.

Adustochaete comprises two neotropical species that form minute, grayish basidiomata with spiny or tuberculate hymenophores , and the basidia have thick sterigmata and occasionally bear a short basal stalk. These features are similar to those of *Heteroradulum*. However, the latter genus differs from *Adustochaete* based on the reddish or pinkish basidiomata and irregularly inflated hyphae with variably thickened walls. *Heterochaete maculata* is morphologically similar to *Adustochaete* species, and this species can be transferred to this genus when DNA sequences of reference material become available.

Adustochaete rava Alvarenga & K.H. Larss., sp. nov. Figs. 2-3.

MycoBank MB 829296

Typification: Brazil. Rondônia: Porto Velho, São Francisco Farm, on deciduous wood in rainforest, 15.III.2012 *Larsson 15526** (URM 92997, isotype – O). Genbank: ITS = MK391517; 28S = MK391526.

Etymology: 'ravus' (Lat., adj.) – grayish-brown.

Basidiomata annual, resupinate, orbicular, waxy, first up to 0.5 cm in diam., later fusing together and up 3 cm in widest dimension, 0.1–0.2 mm thick. Margin adnate or slightly detaching, arachnoid to fimbriate, white, up to 1 mm wide. Hymenophore pale to dark gray, often with darker brownish stains (6E3–6E2), covered by sharp-tipped, rather regularly arranged spines 75–185 × 35–40 μm, 7–8 per mm.

Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline, very thin-walled, loosely arranged, interwoven or in subparallel bundles, 3–4 μm in diam. Subhymenial hyphae hyaline, thin-walled, ascending, 2–3 μm in diam. Cystidia abundant, clavate to fusiform, 27–52 × 4–8 μm, some with refractive content (gloeocystidia). Hyphidia abundant, variably branched, 2–2.5 μm in diam. at the apex, in sterile spines very densely arranged and cemented by brownish amorphous matter. Basidia embedded, narrowly ovoid to obconical, 4-celled, (9.7–) 10.8–15.2 (–16.7) × (7.2–) 7.3–10.0 (–10.5) μm (n = 20/1), mostly sessile but occasionally bearing an enucleate stalk up to 5 × 2–2.5 μm. Basidiospores thin-walled, cylindrical, slightly or distinctly curved, (10.1–) 10.2–13.7 (–13.8) × (3.7–) 3.8–4.7 (–5.1) μm (n = 30/1), L = 12.01, W = 4.13, Q' = (2.4–) 2.6–3.7 (–4.1), Q = 2.91.

Specimens examined. Adustochaete rava. Brazil. Rondônia: Porto Velho, Parque Natural Ecológico, dead wood, 6.XI.2014 *Chikowski 841** (URM 80067). *Heterochaete maculata*. Venezuela. Capital Dist.: Caracas, unidentified wood, 22.VII.1972 *Dumont VE5672* (NY 01048552, holotype).

Remarks: To date, *A. rava* has been documented only in the Porto Velho municipality (Brazil). *Adustochaete rava* differs from *A. interrupta* based on the presence of spiny hymenophores and distinctly narrower basidiospores.

Adustochaete interrupta Spirin & V. Malysheva, sp. nov. Figs. 2 - 4.

MycoBank MB 829297

Typification: Mexico. Vera Cruz: Barranca de Pescado, Road Xalapa – Huatusco, road fork to Jalcomulco on thin hardwood branch, 26.IX.1985 *Ryvarden 23435** (O). Genbank: ITS = MK391518; 28S = MK391527.

Etymology: 'interruptus' (Lat., adj.) – patchy, interrupted.

Basidiomata annual, resupinate, orbicular, waxy, first 1–2 mm in diam., later fusing to gregarious groups and then up to 5 mm in widest dimension, 0.04–0.1 mm thick. Margin adnate, pruinose, white. Hymenophore light ochraceous-gray to brownish (2C3–5C2), first smooth then covered by irregularly arranged tubercles up to 100 × 70 μm.

Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline, thin-walled, homogeneous throughout, interwoven or in subparallel, 2–3 μm in diam. Subhymenial in older parts cemented by amorphous brownish matter, (1.5–) 2–3 μm in diam., producing tufts at the apical part of tubercles. Cystidia abundant, clavate to fusiform, 45–96 × 6–13.5 μm, some with refractive content (gloeocystidia). Hyphidia abundant, covering hymenial surface, variably branched, 2–4 μm in diam. at the apex, in senescent hymenium covered by hyaline or brownish grainy matter. Basidia embedded, narrowly ovoid to obconical, 4-celled, (14.3–) 15.1–24.0 (–24.3) × (8.7–) 9.1–11.8 (–12.2) μm (n = 20/1), mostly sessile but occasionally bearing an enucleate stalk up to 9 × 4–4.5 μm. Basidiospores broadly cylindrical, slightly to distinctly curved, (10.1–) 11.3–14.3 (–16.8) × (5.2–) 5.7–6.2 (–6.3) μm (n = 21/1), L = 12.69, W = 5.99, Q' = (1.9–) 2.0–2.3 (–2.9), Q = 2.12.

Remarks: To date, *A. interrupta* has been documented only from the type locality in Mexico. The species appears to be overlooked because of its very small and obscurely colored basidiomata.

Eichleriella Bres., Ann. Mycol. 1: 115, 1903.

Eichleriella was recently redefined by Malysheva and Spirin (2017). The genus is characterized by resupinate to cupulate basidiomata, monomitic hyphal structure (except for *E. tenuicula*), and ovoid or subglobose with 2-4-celled basidia.

Eichleriella ochracea (Viégas) Alvarenga, comb. nov. Figs. 2 - 5.

MycoBank MB 829298

Basionym: *Heterochaetella ochracea* Viégas, Bragantia 5(4): 241, 1945.

Neotype: (designated here). Brazil. Rio de Janeiro: Itatiaia Nat. Park on dry hardwood branch, 27.XI.2015 *Motato-Vásquez 597* (SP 467242*, duplicate in H). Genbank: ITS = K391514.

Basidiomata annual or biennial, resupinate, arid, orbicular or irregular, eventually becoming confluent and covering up to 3 cm in widest dimension, 0.15–0.2 mm thick. Margin abrupt, adnate, whitish or pale gray, always paler than hymenial surface. Hymenophore cream-colored or grayish (1C2–1C3), covered by sharp-pointed sterile spines 100–200 × 20–40 µm, 5–8 per mm.

Hyphal structure monomitic; hyphae clamped.Subiculum compact, dark reddish-brown, 20–40 µm thick, well visible in transversal sections.. Subicular hyphae golden-yellow to brownish, slightly to distinctly thick-walled, 2–3 µm in diam., some arranged in subparallel bundles. Subhymenial hyphae hyaline, thin-walled, 2–2.5 µm in diam., loosely interwoven, in hymenial spines brownish, slightly thick-walled, 2–3 µm in diam., rather densely arranged. Hyphidia abundant, thin-walled, 2–2.5 µm at the apex. Cystidia (gloeocystidia) thin-walled,

narrowly clavate to fusiform, 21–35 × 5–7 µm. Basidia embedded, ellipsoid-ovoid, 2-celled, (10.2–) 10.3–14.3 (–15.2) × (8.0–) 8.2–10.9 (–11.2) µm (n = 20/1), sessile or rarely with a strongly reduced stalk 3 × 3 µm. Basidiospores thin-walled, cylindrical to broadly cylindrical, often slightly curved, (10.1–) 10.2–15.7 (–17.8) × (5.0–) 5.1–6.7 (–7.0) µm (n = 30/1), L = 12.97, W = 5.85, Q' = (1.7–) 1.8–2.5 (–2.9), Q = 2.22.

Remarks: *Heterochaetella ochracea* was first described by Viégas (1945) from southern Brazil and was subsequently redefined by Bodman (1952) to be synonymous with *Heterochaete shearii* (Burt) Burt [now *Eichleriella shearii* (Burt) Spirin & V. Malysheva]. Morphologically, H. *ochracea* is very similar to *E. shearii* and *E. flavida* (Pat.) Spirin & V. Malysheva because of arid, spiny basidiomata, well-developed cystidia, and 2-celled basidia. The high degree of morphological similarities is in good accordance with the DNA results (Fig. 1). Therefore, we grouped *H. ochracea* under *Eichleriella*. *Eichleriella. ochracea* can be distinguished from *E. shearii* and *E. flavida* by its distinct, compact, dark-colored subicular layer (Viégas 1945). Given that the type of *H. ochracea* could not be traced, we select the sequenced specimen as a neotype, which was collected from the same geographic area as the original type.

Eichleriella tenuicula (Lév.) Spirin & V. Malysheva, Fungal Biology 121(8): 709, 2017. Fig. 2.

= *Hydnum tenuiculum* Durieu & Lév., Ann. Sci. Nat., Bot., ser. 3,5: 145, 1846

Basidiomata annual or short-lived perennial, resupinate, arid, orbicular, occasionally confluent and then covering up to 2 cm in widest dimension. Margin abrupt, loosening from the substrate, sometimes elevated or involute, slightly paler than hymenial surface. Hymenophore whitish to pale gray (1B1–1C3), covered by sharp-pointed brownish spines up to 100–225 × 50–75 µm, 5–6 per mm.

Hyphal structure dimitic; clamps not observed. Skeletal hyphae brownish, thick-walled, 2–4 µm in diam., dominating in the basidioma. Generative hyphae hyaline, thin-walled, hyphae in spines brownish, with thickened walls, 2–3 µm in diam. Hyphidia abundant, hyaline, thin-walled, branched, 1–2 µm in diam. at the apex. Gloeocystidia fusiform, 60–80 × 9–10 µm. Basidia ellipsoid-ovoid, 2-celled, 18–20 × 8–10 µm. Basidiospores not observed in the material from Brazil.

Specimens examined: Brazil. Recife: Campus da Universidade Federal de Pernambuco, dead hardwood, IV.2003 *Gibertoni 04* (O); V.2017 *Silva, V** (URM 87968). Genbank: ITS = MK391515, 28S = MK391525.

Remarks: *Eichleriella tenuicula* is easily recognizable because of its dimitic structure and consistently 2-celled basidia. The species was first reported from the Neotropics (Guyana) by Roberts (2008). This is the first record of the species in Brazil.

Proterochaete Spirin & V. Malysheva, gen. nov.

MycoBank MB829343

Etymology: from ‘próteros’ (Greek, adj.) – primeval, ancient, and ‘-chaete’ – a reference to *Heterochaete*.

Type. *Sebacina adusta* Burt.

Basidiomata resupinate, arid, soft, medium-sized, cream-colored to grayish or pale ochraceous; hymenophore smooth or irregularly spiny. Hyphal structure monomitic; generative hyphae thin-walled, clamped. Hyphidia and cystidia present. Basidia ovoid, longitudinally septate, 4-celled, occasionally tapering to the stalk-like base. Basidiospores hyaline, thin-walled, cylindrical to broadly cylindrical, slightly curved, with oil droplets in the cytoplasm. On rotten wood of deciduous trees.

Proterochaete adusta (Burt) Spirin & V. Malysheva, comb. nov. Figs. 2 - 6.

MycoBank MB829344

Basionym: *Sebacina adusta* Burt, Ann. Missouri Bot. Garden 2: 764, 1915. Lectotype (selected here). USA. Idaho: Coolin, *Populus trichocarpa*, IX.1915 *Weir 3118* (BPI 723685, studied)

= *Protodontia oligacantha* G.W. Martin, J. Washington Acad. Sci. 43: 16, 1953.

= *Exidiopsis pallida* K. Wells & Raitv., Eesti Tead. Akad. Toim. 15: 208, 1966. Holotype. Russia. Primorie: Ussuriysk Dist., Ussuri Nat. Res., fallen log (deciduous tree), 24.IX.1961 *Parmasto* (TAAM 014595, studied).

Basidiomata annual, resupinate, arid, orbicular, first about 0.5–1 cm in diam., then fusing together and reaching up to 7 cm in widest dimension, 0.1–0.3 mm thick. Margin floccose to fimbriate, adnate or partly detaching, white to cream-colored or pale ochraceous, up to 0.5–1 mm wide. Hymenophore first pale cream-colored or grayish, then pale ochraceous, with occasional reddish dots or indistinctly striate (1B4, 1C4, 4A4), smooth or covered by irregularly arranged spines 50–70 × 20–30 μm, 3–4 per mm. White, floccose hyphal cords or films often present in wood crevices.

Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline to yellowish, thin- or only slightly thick-walled, rather densely arranged and partly glued together, interwoven or in subparallel bundles, 2.5–5 μm in diam. Subhymenial hyphae hyaline, in older parts sometimes pale yellowish, thin-walled, ascending, 2–3.5 (–4) μm in diam. Angular crystal agglomerations abundant in all parts of basidiomata, especially in senescent ones, 3–10 μm in diam. Hyphidia present in sterile outgrowths on hymenial surface, rarely also in hymenium, richly or sparsely branched, 1–4 μm in diam. Cystidia-like cells occurring in senescent hymenium, sinuous, tapering to the apex, accidentally dichotomously branched, 18–27 × 3.5–4.5 μm. Basidia openly arranged, 4-celled, ovoid, (10.8–) 11.3–17.7 (–17.8) × (8.7–)

8.8–12.3 (–12.6) µm (n = 40/4), sometimes tapering to the stalk-like, up to 5 µm long base. Basidiospores thin-walled, cylindrical to broadly cylindrical, often slightly curved, (8.2–) 8.3–13.4 (–13.6) × (4.1–) 4.2–5.9 (–6.0) µm (n = 140/5), L = 9.66–11.04, W = 4.63–5.15, Q' = (1.7–) 1.8–2.6 (–2.7), Q = 1.95–2.26, with abundant oil droplets in the cytoplasm.

Specimens examined. *Proterochaete adusta*. Canada. Alberta: Edmonton, Henrietta Louise Edwards Park, *Acer negundo*, 28.VII.2015 Spirin 9021* (H). Genbank: ITS = MK391520, 28S = MK391528. China. Jilin: Antu, Changbai, Erdao Bai He, *Acer pseudosieboldianum*, 26.VIII.2005 Miettinen 10519.2* (H). Genbank: ITS = MK391519. Norway. Møre og Romsdal: Nesset, Eikesdalen, hardwood log, 27.IX.2017 Larsson 17537* (O). Genbank: ITS = MK391521. Russia. Khabarovsk Reg.: Khabarovsk Dist., Malyi Niran, *Betula platyphylla*, 6.VIII.2012 Spirin 4910* (H). Primorie: Ussuriysk Dist. (TAAM, holotype of *Exidiopsis pallida*). USA. Idaho: Coolin (BPI, lectotype of *Sebacina adusta*). *Exidiopsis fuliginea*. Brazil. Rio Grande do Sul: São Leopoldo, 1905 *Rick 177* (BPI 724365, isolectotype of *Exidiopsis fuliginea*), the same locality, 1930 *Rick* (BPI 724366).

Remarks: *Proterochaete adusta* is a variable species, which could explain why it has been assigned at least three names. *Proterochaete adusta* was first described by Burt (1915) as *Sebacina adusta* based on several collections from Idaho (USA). Wells (1961) concluded that Burt's species was identical to *Exidiopsis fuliginea* Rick introduced a few years earlier from Brazil. We studied authentic specimens from both taxa and concluded that Wells' opinion was a mistake. *Exidiopsis fuliginea* is a species characterized by dull-brown, completely smooth hymenium, and strongly encrusted hyphae with smaller basidiospores, (8.0–) 8.3–11.3 (–12.2) × (3.7–) 3.8–5.0 (–5.1) µm (n = 40/2), L = 9.26–10.14, W = 4.19–4.73, Q' = (1.7–) 1.9–2.4 (–2.6), Q = 2.15–2.21. The description and illustrations of *Protodontia oligacantha* (Martin 1953) were undoubtedly very similar as those for *P. adusta*. The type

specimen of *Exidiopsis pallida* described from the Russian Far East (Wells and Raitviir 1966) also belongs to this species.

Soft, partly detaching basidiomata, fimbriate margin, and extensive, white mycelial films in the underlying substrate are unique macroscopic features of *P. adusta* when compared to other resupinate genera in Auriculariales. The presence of spiny outgrowths on the hymenial surface of *P. adusta* is inconsistent; some basidiomata in our analysis were almost smooth. Unlike other *Heterochaete*, *P. adusta* have fertile spines, except for those in the very tip, which are composed of extensively branched hyphidia (see microphotographs in Martin 1953).

Proterochaete adusta occurs on fallen, normally rather rotten logs of deciduous trees in the temperate Northern hemisphere. *Proterochaete adusta* has been documented in Eurasia and North America, although the species does not appear to be widely distributed. The Norwegian collection of *P. adusta* (*Larsson 17537*) differs from other specimens based on the regularly arranged spines and the 4-bp differences in the ITS region. Herein, we temporarily considered these differences as intraspecific variation until additional materials are collected in future studies.

Tremellochaete Raitv., Eesti Tead. Akad. Toim. 13: 29, 1964.

Recently re-established by Malysheva and Spirin (2017), the *Tremellochaete* genus is recognized based on resupinate, cartilaginous to gelatinous basidiomata, normally detaching margin, and blunt, often encrusted spines on the hymenial surface. *Tremellochaete* is represented by *T. japonica* as the generic type, *T. nigerrima* that was recently transferred to the genus, and *T. atlantica* (Malysheva and Spirin 2017, Phookamsak et al. 2019). In the present study, *Tremellochaete* is expanded to five species, four of which were delimited based on molecular and morphological data.

Tremellochaete cerradensis, sp. nov. Figs.2-7.

MycoBank MB 829345

Typification: Brazil. Goiás: Silvânia, Floresta Nacional de Silvânia, I.2017, *Alvarenga 398** (URM 90200, isotype in O. Genbank: ITS = MK391524, 28S= MK391530)

Etymology: *'cerradensis'* (Lat., adj.) – refers to 'cerrado', the biome where the species occurs.

Basidiomata annual, resupinate, cartilagineous, up to 5–10 cm in widest dimension, 0.5–1 mm thick. Margin fimbriate, detaching, concolorous with hymenial surface. Hymenophore dark brown (6F4) to dark, covered by acute or rather blunt spines 0.5–0.8 mm long, 3–4 per mm.

Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline, thin-walled, densely interwoven, 1–3 μm in diam. Subhymenial hyphae thin- to slightly thick-walled, densely glued together, interwoven to ascending, 2–3 μm in diam. Cystidia absent; hyphidia present, richly branched, with ochraceous granular contents, covering hymenial surface and sterile spines, 0.1–0.5 μm in diam. at the apical part. Crystal agglomerations present on subhymenial hyphae, up to 20 μm in diam. Basidia 4-celled, ellipsoid-ovoid, sessile, (13.2–) 13.3–17.8 (–18.0) × (9.2–) 10.3–14.2 (–14.7) μm (n = 27/3). Basidiospores broadly cylindrical, often slightly curved, (8.3–) 9.0–11.5 (–12.4) × (3.5–) 3.8–4.9 (–5.2) μm (n = 28/1), L = 10.1, W = 4.3, Q' = (1.9–) 2.0–2.4 (–3.2), Q = 2.3.

Remarks: *Tremellochaete cerradensis* differs from other *Tremellochaete* species based on the presence of robust sterile spines and distinctly smaller basidiospores. So far, *T.cerradensis* has been documented only from the type locality in central Brazil.

Tremellochaete ciliata (Möller) Spirin & Alvarenga, comb. nov. Figs. 2 - 8.

MycoBank MB829348

Basionym: *Exidiopsis ciliata* Möller, Botanische Mittheilungen aus den Tropen 8: 91, 1895. Lectotype (selected here). Brazil. Santa Catarina: Blumenau, bark, 1891 *Möller 10 (91)* (HBG).

= *Exidia richenii* Rick ex Lloyd, Mycol. Writings 7: 1229, 1923. Lectotype (selected here). Brazil. Rio Grande do Sul: São Leopoldo, hardwood, 1908 *Rick* (#219 in Fungi Austro-Americani, as *Protomerulius richenii* Rick sp. n.) (HBG).

= *Exidia pergamea* Lowy, Mycologia 67(5): 991, 1975. Holotype. Brazil. São Paulo: São Paulo, Parque Estadual das Fontes do Ipiranga, on dead wood, 1974 *Milanez* (LSU 135970 – isotype, studied).

Basidiomata annual, resupinate, cartilagineous, first orbicular, then fusing together and reaching up to 5 cm in widest dimension, 0.5–1 mm thick, drying to perceptible tough crust. Margin fimbriate, adnate or partly detaching, concolorous with hymenial surface. Hymenophore semi-transluscent, first almost white, then with yellowish or orange tints (2A3–4A4), covered by acute or rather blunt spines, solitary or in groups of two to four, 0.1–0.2 mm long, 4–6 per mm. .

Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline, slightly to distinctly thick-walled, densely interwoven, 3–5 µm in diam. Subhymenial hyphae thin- to slightly thick-walled, densely glued together, interwoven to ascending, (1.5) 2–3 µm in diam.. Cystidia absent; hyphidia present, richly branched, covering hymenial surface and sterile spines, 1–2 µm in diam. at the apical part. Crystals abundant, in rosette-like agglomerations up to 30 µm in diam., encrusting subhymenial hyphae; irregular crystal agglomerations present in senescent basidiomata, covering sterile spines. Basidia 4-celled, ellipsoid-ovoid, sessile, (13.2–) 13.3–17.8 (–18.0) × (9.2–) 10.3–14.2 (–14.7) µm (n = 27/3). Basidiospores broadly cylindrical, often slightly curved, (10.1–) 10.2–14.1 (–14.4) × (4.8–) 5.2–7.3 (–7.7) µm (n = 90/3), L = 11.79–12.77, W = 5.90–6.59, Q’ = (1.5–) 1.6–2.3 (–2.4), Q = 1.87–2.00.

Specimens examined. Brazil. Rio Grande do Sul (lectotype of *Protomerulius richenii*, see above). Santa Catarina (lectotype of *Exidiopsis ciliata*, see above). São Paulo: Parque Estadual de Campos do Jordão, hardwood, 14.X.2015 *Motato-Vásquez 507* (SP467241*, H. Genbank: ITS = MK391523, 28S= MK391529); São Paulo, Parque Estadual das Fontes do Ipiranga (isotype of *Exidia pergamea*, see above).

Remarks: We studied an authentic *Exidiopsis ciliata* Möller specimen preserved in alcohol in HBG (selected above as a lectotype) and compared the sample with Rick's exsiccate of *Protomerulius richenii* (validly published as *Exidia richenii* by Lloyd in 1923) and the isotype of *Exidia pergamea* (Lowy 1975). In our opinion, all these samples are conspecific. *Tremellochaete ciliata* is similar to *T. atlantica* Alvarenga (Phookamsak et al. 2019) but can be distinguished from the latter by the larger basidia and basidiospores [9–12(13) × 6–9 (–10) μm and 7.75 – 10 (–12) × 2–5 μm, respectively], as well as the lack of marginal hairs. The third *Tremellochaete* species occurring in Brazil, *T. nigerrima* (Viégas) Spirin & V. Malysheva, has black basidiomata and larger basidia (20–25 × 10–15 μm) and basidiospores (17–20 × 7–8 μm).

DISCUSSION

Malysheva and Spirin (2017) studied the type of *Heterochaete andina*, the generic type for *Heterochaete*. In addition, they generated a partial rDNA *28S* sequence from the type and showed that this sequence clustered with *Exidiopsis effusa*, the generic type of *Exidiopsis*. In the present study, we included *E. effusa* to infer the relationships between *Exidiopsis*/*Heterochaete* and specimens of *Heterochaete*-like taxa, which is the focus of the current investigation. Morphologically, all these specimens have been classified under *Heterochaete*, in accordance with the original definition of this genus (Patouillard and Lagerheim 1892). However, molecular phylogenetic analyses grouped the sequenced

specimens into four different clades that were well separated from *Exidiopsis*/*Heterochaete* (Fig. 1).

The descriptions of these two new genera confirm the heterogeneity of *Heterochaete* previously reported by Bodman almost 70 years ago (Bodman 1952). Species with hyphal pegs are now documented from seven genera within Auriculariales, and *Heterochaete* will eventually become a smaller genus and can even be subsumed under *Exidiopsis* (Malysheva and Spirin 2017) when new collections and sequencing of fresh material can serve as references for re-descriptions and neo/epitypification of old names.

After incorporation of molecular data, the genus and species diversity within Auriculariales was found to be higher than expected. The majority of publicly available sequences are either from the *ITS* or *28S* region, and analyses based on these markers have initially returned reliable results. However, with increasing phylogenetic complexity, the limitations of using only a few markers have become evident. Recently, the *RPB2* region has been used to delimit *Auricularia* species (Wu et al. 2015*a*, *b*), and *tef1*-α sequences were recently included in a study investigating *Exidia* and *Myxarium* species (Spirin et al. 2018). In both these examples, the addition of non-ribosomal markers has been demonstrated to be important for resolving the questions under study. Future reconstructions of generic relationships within the Auriculariales taxon should utilize a broader selection of markers.

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TABLE 1. Collection information and GenBank accession numbers used in the present phylogenetic study

Species	Collector/herbarium	ISO code	28S GenBank n°.	ITS GenBank n°.	Source
Adustochaete interrupta	LR23435(O)	MX	MK391527	MK391518	**This study**
Adustochaete rava	RC841 (URM)	BR	-	MK391516	**This study**
Adustochaete rava	KHL15526 (O)	BR	MK391526	MK391517	**This study**
Amphistereum leveilleanum	Lentz FP-106715 (CFMR)	US-MS	KX262168	KX262119	Malysheva and Spirin (2017)
Amphistereum schrenkii	Burdsall 8476 (CFMR)	US-AZ	KX262178	KX262130	Malysheva and Spirin (2017)
Aporpium caryae	Miettinen 14774 (H)	US-MA	JX044145	JX044145	Miettinen et al. (2012)
Aporpium caryae	WD 2207	JP	AB871730	AB871751	Sotome et al. (2014)
Aporpium macroporum	Niemelä 8488 (H)	PL	JX044148	JX044148	Miettinen et al. (2012)
Aporpium canescens	Miettinen 13352.2 (H)	NO	JX044152	JX044152	Miettinen et al. (2012)
Auricularia mesenterica	Oberwinkler 25132	DE	AF291292	AF291271	Weiss and Oberwinkler (2001)
Auricularia polytricha	TUFC12920	JP	AB871733	AB871752	Sotome et al. (2014)
Bourdotia galzinii	Miettinen 15900.4 (H)	ES	MG757511	MG757511	Malysheva el al. (2018)
Bourdotia sp	GEL5065	-	AY635777	DQ200925	GenBank
Ductifera sucina	Wells 2155	US-CA	AY509551	AY509551	Weiss and Oberwinkler (2001)
Eichleriella bactriana	E. Parmasto (TAAM 55071)	TM	KX262170	KX262121	Malysheva and Spirin (2017)
Eichleriella bactriana	I. Parmasto (TAAM 96698)	TJ	KX262172	KX262123	Malysheva and Spirin (2017)
Eichleriella crocata	E. Parmasto (TAAM 101077)	RU-PRI	KX262147	KX262100	Malysheva and Spirin (2017)

Species	Collector/herbarium	ISO code	28S GenBank n°.	ITS GenBank n°.	Source
Eichleriella crocata	E. Parmasto (TAAM 125909)	RU-PRI	KX262167	KX262118	Malysheva and Spirin (2017)
Eichleriella flavida	Ryvarden 49412 (H)	SH-HL	KX262185	KX262137	Malysheva and Spirin (2017)
Eichleriella leucophaea	Barsukova (LE 303261)	RU-KRS	KX262161	KX262111	Malysheva and Spirin (2017)
Eichleriella leucophaea	Larsson 15277 (O)	ES	KX262164	KX262115	Malysheva and Spirin (2017)
Eichleriella macrosporosa	Nakasone FP-101769 (CFMR)	US-WI	-	KX262129	Malysheva and Spirin (2017)
Eichleriella ochracea	SP467242 (SP-Fungi)	BR	-	MK391514	**This study**
Eichleriella shearii	USJ 54609	CR	AF291335	AF291284	Weiss and Oberwinkler (2001)
Eichleriella shearii	Larsson 13785	FR	-	KY264026	Malysheva and Spirin (2017)
Eichleriella sicca	Miettinen 17349 (H)	US-AR	KX262191	KX262143	Malysheva and Spirin (2017)
Eichleriella tenuicula	Ryvarden 17599 (O)	TH	KX262147	KX262100	Malysheva and Spirin (2017)
Eichleriella tenuicula	ValCB1 (URM)	BR	MK391525	MK391515	**This study**
Elmerina hexagonoides	ML 297	MY	AB871735	AB871754	Sotome et al. (2014)
Elmerina sclerodontia	Miettinen 16431 (SNP, H)	MY	MG757512	MG757512	Malysheva el al. (2018)
Elmerina cladophora	Miettinen 14314 (ANDA, MAN, H)	ID	MG757509	MG757509	Malysheva el al. (2018)
Exidiopsis effusa	Miettinen 19136 (H)	FI	KX262193	KX262145	Malysheva and Spirin 2017
Exidiopsis grisea	-	DE	AF291328	AF291281	Weiss and Oberwinkler (2001)
Grammatus labyrinthinus	Yuan1759	CN	KM379138	KM379137	Yuan et al. 2018
Grammatus labyrinthinus	Yuan1600	CN	KM379140	KM379139	Yuan et al. 2018

Species	Collector/herbarium	ISO code	28S GenBank n°.	ITS GenBank n°.	Source
Grammatus semis	OM 10618	CN	KX262194	KX262146	Malysheva and Spirin (2017)
Heterochaetella brachyspora	-	DE	AY509552	AY509552	Weiss and Oberwinkler (2001)
Heteroradulum deglubens	Solheim 1864 (O)	NO	KX262181	KX262133	Malysheva and Spirin (2017)
Heteroradulum deglubens	LE 38182	SE	KX262162	KX262112	Malysheva and Spirin (2017)
Heteroradulum kmetii	Ginns 2529	CA-ON	KX262183	KX262135	Malysheva and Spirin (2017)
Heteroradulum kmetii	Spirin 6466 (H)	RU-PRI	KX262152	KX262104	Malysheva and Spirin (2017)
Hirneolina hirneoloides	-	CR	AF291334	AF291283	Weiss and Oberwinkler (2001)
Hyalodon piceicola	Spirin 2689 (H)	RU-NIZ	MG735422	MG735414	Malysheva el al. (2018)
Hyalodon piceicola	Spirin 6536 (H)	RU-KHA	MG735421	MG735413	Malysheva el al. (2018)
Hyalodon piceicola	Spirin 11,063 (O)	NO	MG735423	MG735415	Malysheva el al. (2018)
Hyalodon antui	Niemelä 6389 (H)	CN	MG735424	MG735416	Malysheva el al. (2018)
Proterochaete adusta	CN OM10519	CH	-	MK391519	**This study**
Proterochaete adusta	VS9021	CA	MK391528	MK391520	**This study**
Proterochaete adusta	VS4910	RU	-	MK391521	**This study**
Proterochaete adusta	KHL17537 (O)	NO	-	MK391522	**This study**
Protodaedalea hispida	Spirin 5139 (H)	RU-KHA	MG757510	MG757510	Malysheva el al. (2018)
Protodaedalea hispida	WD 548	JP	AB871749	AB871749	Sotome et al. (2014)
Protodaedalea foliacea	Miettinen 13,054	ID	MG757507	MG757507	Malysheva el al. (2018)

Species	Collector/herbarium	ISO code	28S GenBank n°.	ITS GenBank n°.	Source
Protodaedalea hispida	Yuan 5691	CN	JQ764644	JQ764666	Zhou and Dai (2013)
Protodontia subgelatinosa	Spirin 11079 (O)	NO	MG735420	MG735412	Malysheva el al. (2018)
Protohydnum cartilagineum	SP467240 (SP-Fungi)	BR	MG735426	MG735419	Malysheva el al. (2018)
Protomerulius sp.	O F19171	CR	JQ764649	JX134482	Zhou and Dai (2013)
Protomerulius sp.	Miettinen 14402.1	ID	MG757508	MG757508	Malysheva el al. (2018)
Pseudohydnum gelatinosum	-	DE	AF384861	AF384861	Weiss and Oberwinkler (2001)
Pseudohydnum gelatinosum	AFTOL-ID1875	-	DQ520094	DQ520094	Lutzoni et al. (2004)
Sclerotrema griseobrunneum	Spirin 7674 (H)	RU-KHA	KX262188	KX262140	Malysheva and Spirin (2017)
Sclerotrema griseobrunneum	Niemelä 2722 (H)	CA-QC	KX262192	KX262144	Malysheva and Spirin (2017)
Sistotrema brinkmannii	-	RU-MUR	JX535170	JX535169	GenBank
Stypella vermiformis	Spirin 11330 (H)	RU-NIZ	MG735425	MG735417	Malysheva el al. (2018)
Stypella vermiformis	O F188059	NOR	-	MG735418	Malysheva el al. (2018)
Tremellochaete atlantica	URM90199 (URM)	BR	MG594383	MG594381	Phookamsak et al. (2019)
Tremellochaete atlantica	URM90198 (URM)	BR	MG594384	MG594382	Phookamsak et al. (2019)
Tremellochaete cerradensis	URM90200 (URM)	BR	MK391530	MK391524	**This study**
Tremellochaete cilliata	SP467241 (SP-Fungi)	BR	MK391529	MK391523	**This study**
Tremellochaete japonica	LE 303446	RU-PRI	KX262160	KX262110	Malysheva and Spirin 2017
Tremellochaete japonica	TAA 42689	RUS	AF291320	AF291274	Weiss and Oberwinkler (2001)

Species	Collector/herbarium	ISO code	28S GenBank n°.	ITS GenBank n°.	Source
Tremiscus helvelloides	AFTOL-ID1680	-	DQ520100	DQ520100	Lutzoni et al. (2004)

2

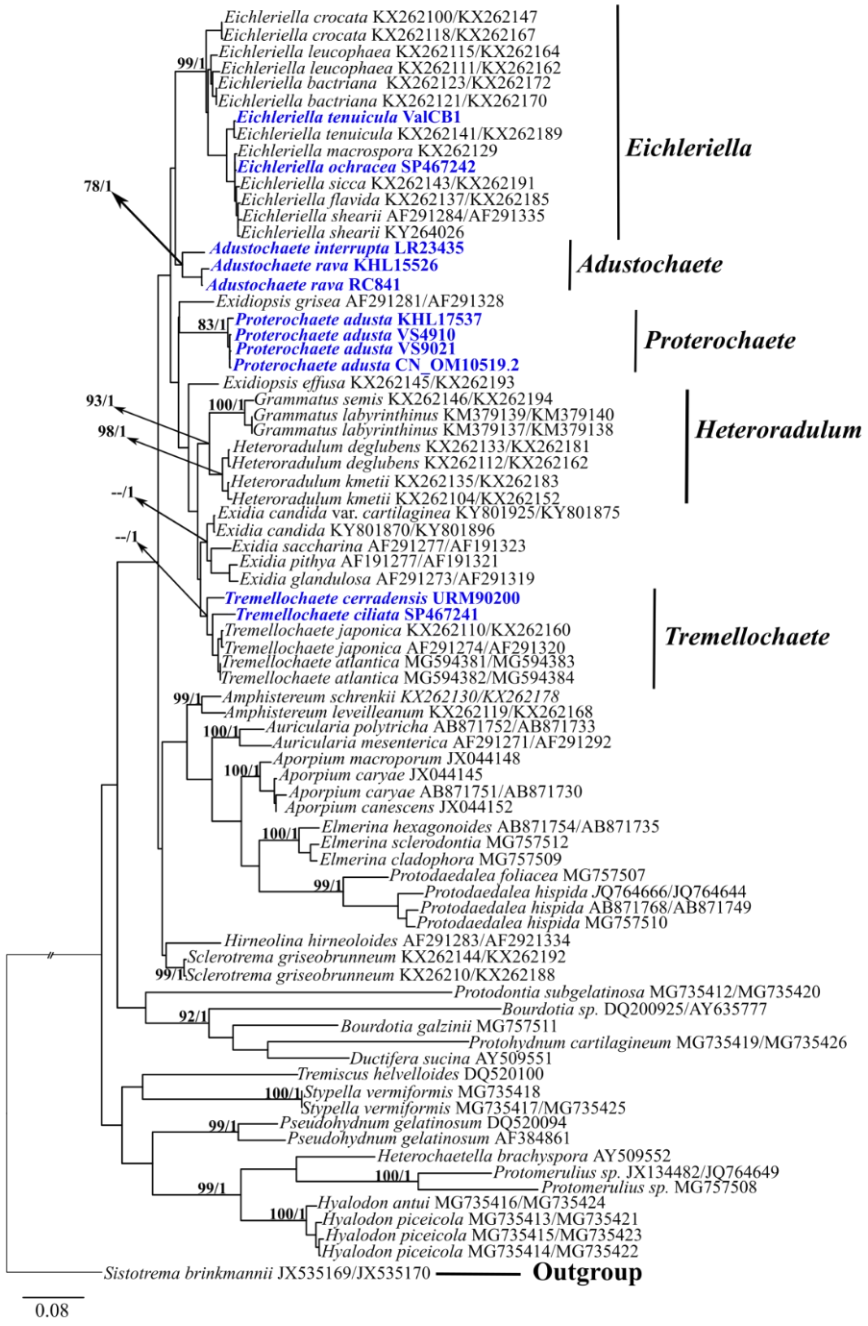

Figure 1. Phylogenetic reconstruction using ITS+28S rDNA topology from ML analysis showing the Auriculariales lineages. All sequences generated for this study are indicated in blue faces. The GenBank number is given for each specimen. Support values (ML/BI) are given above the branches. Scale bar shows expected changes per site.

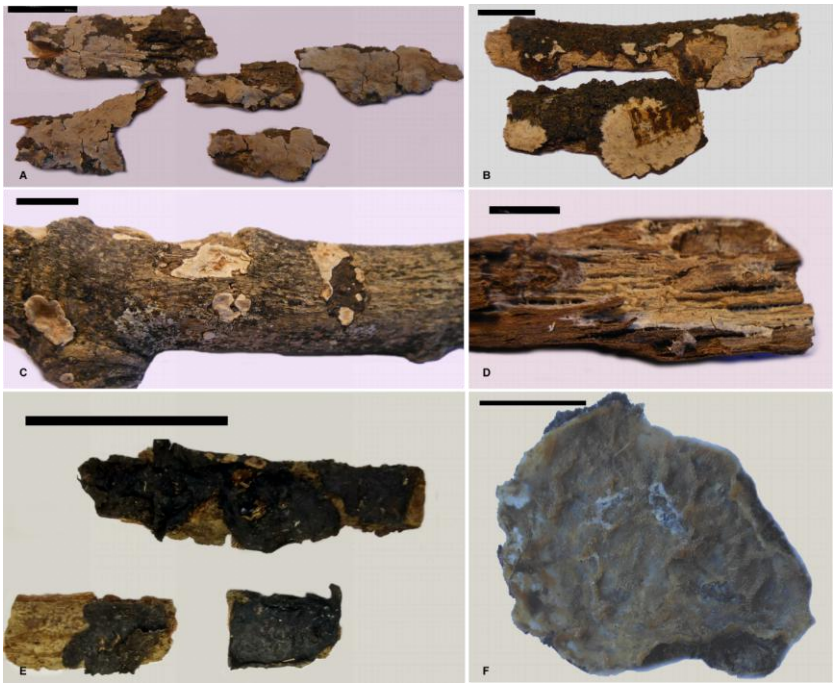

Figure 2. Basidiomata of: A. *Adustochaete rava* (KHL 15526). B. *Eichleriella ochracea* (SP 467542). C. *Eichleriella tenuicula* (VALCB1). D. *Proterochaete adusta* (KHL 175371). E. *Tremellochaete cerradensis* (URM90200). F. *Tremellochaete ciliata* (SP467241)

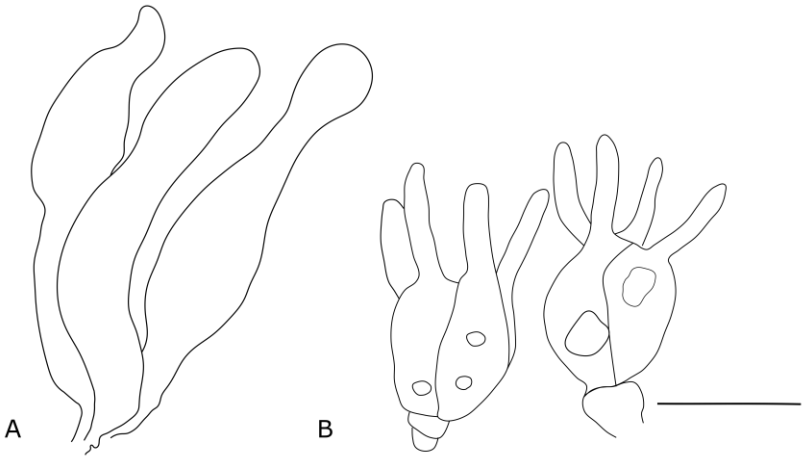

Figure 3. Microscopic structures of *Adustochaete rava* (KHL 15526). A. Cystidia. B. Basidia. Bars =10µm.

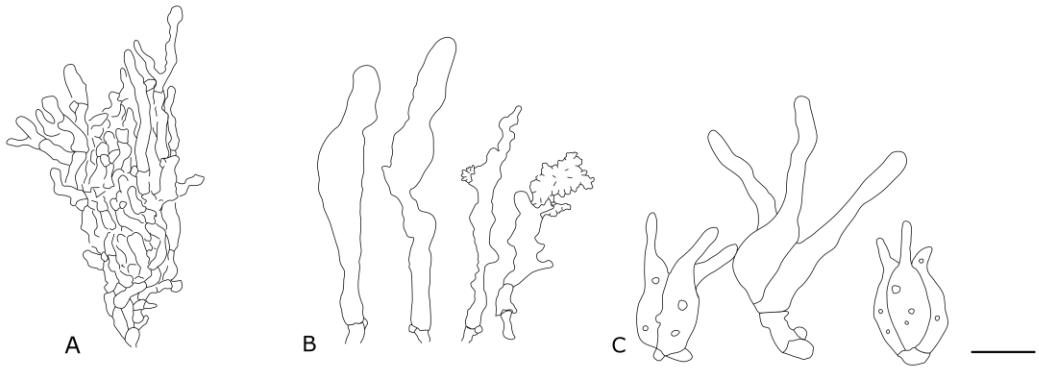

Figure 4. Microscopic structures of *Adustochaete interrupta* (LR 23435). A. Trama. B. Cystidia. C. Basidia. Bars = 10µm.

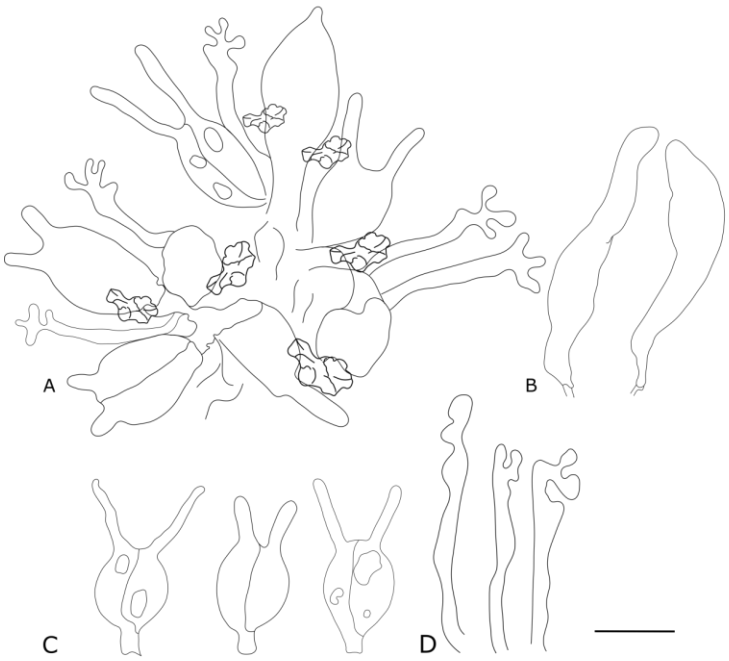

Figure 5. Microscopic structures of *Eichleriella ochracea* (SP 467542). A. Hymenium. B. Cystidia. C. Basidia. D. Dendrohyphidia. Bars = 10µm.

Figure 6. Microscopic structures of *Proterochaete adusta* (KHL 175371). A. Trama. B. Hymenium. C. Basidia. Bars = 10µm.

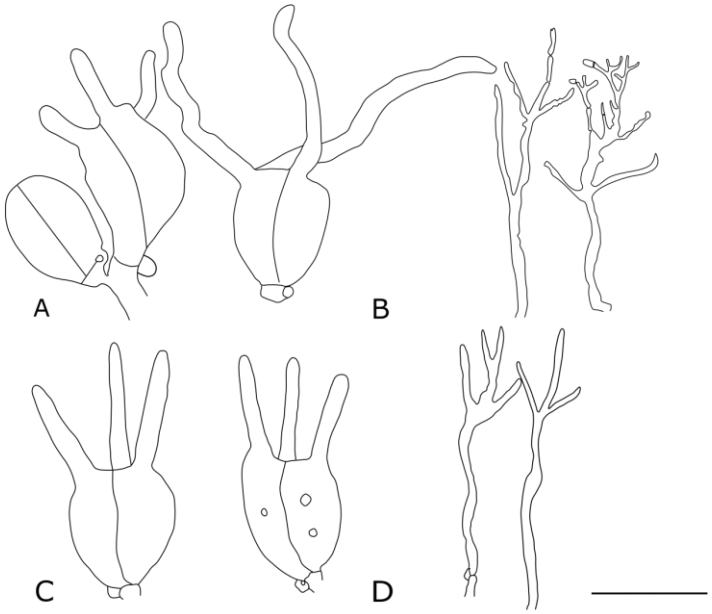

Figure 7. Microscopic structures of *Tremellochaete cerradensis* (URM 90200) e *Tremellochaete ciliata* (SP 467241). A. Basidia. B. Dendrohyphidia. Bars = 10µm

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APÊNDICE F – *ADUSTOCHAETE NIVEA* ALVARENGA SP. NOV. FROM BRAZIL - ACEITO NA FUNGAL DIVERSITY NOTES 12

***Adustochaete nivea* Alvarenga sp. nov. from Brazil**

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Material and Methods

Morphological studies

The specimen was collected in the Centro de Biociências, Universidade Federal de Pernambuco, during the rainy season of 2018. Microscopical studies were made with preparations mounted in KOH and Cotton Blue. Methods for measuring follow Miettinen et al. (2012). The following abbreviations are used in morphological descriptions and tables: L = mean spore length, W = mean spore width, Q' = length/width ratio, Q = mean length/width ratio, n = number of measurements per specimens. Colour followed Kornerup & Wanscher (1978) and the literature used for identification was Bodman (1952), Viégas (1945), Lowy (1971, 1976), Martin (1952) and Roberts (2003, 2006). The specimen was deposited in URM Thiers (2018).

DNA extraction, sequence alignment and phylogenetic analyses.—DNA extraction was performed with the DNeasy Plant Mini Kit (Qiagen), following the manufacturer's protocol. Polymerase chain reaction (PCR) was performed with DNA extracted targeting the nuc rDNA internal transcribed spacers (ITS1-5.8S-ITS2 = ITS) and nuc rDNA 28S (28S): for ITS region we used the primers ITS1F-ITS4 (White et al. 1990; Gardes and Bruns 1993), LR0R and LR5 (Vilgalys and Hester 1990) for the D1/D2 domains of the nuc 28S rDNA. Polymerase chain reaction (PCR) products

were purified applying the ExoSAP-IT (Thermo Fisher Scientifc). The sequences were provided by the Platafoma Tecnológica de Genômica e Expressão Gênica do Centro de Biociências (Recife, UFPE). Sequence data were compared to those deposited in GenBank using BLASTn.

The assembly and editing of sequences were performed in Staden Package 2.0 software (Staden et al. 1998) and MEGA 6 (Tamura et al. 2013). Sequences were compared with sequences deposited in GenBank (https://www.ncbi.nlm.nih.gov/genbank/). Sequences generated for this study were deposited in GenBank.

Phylogenetic analyses — Following Malysheva et al. (2018), we used *Sistotrema brinkmannii* (Bres.) J. Erikss. (JX535170\JX535169) as out-group for the analyses. Sequence alignments were constructed using the online version of MAFFT (Katoh and Toh 2008), using the Q-INS-I option with default parameters.

The final alignment contained 1522 characters (with gaps) and includes representatives for mostly of the genera in Auriculariales. Phylogenetic reconstructions were inferred by Maximum Likelihood (ML) and Bayesian Inference (BI). The best evolutionary model was estimated for each dataset based on Akaike Information Criterion (AIC) using ModelTest on TOPALi 2.5. In ML analyses for ITS+28S datasets the model employed was GTR + G.

ML analysis was run with PhyML (Guindon and Gascuel 2003) using the software TOPALi 2.5, with one hundred rapid bootstrap replicates. BI analysis was performed using MrBayes 3.1 (Ronquist and Huelsenbeck 2003) software for two independent runs, each with four chains and run for 4 million generations with sampling every 10.000 generations, with undercribed model.

Results

Auriculariales J. Schröt.

Notes:

Auriculariales has the largest number of species with resupinate basidiomata, but effused-reflexed, pileate, coralloid and cerebriform may occur. The order shares with Sebacinales the presence of septal dolipores with continuous parenthesomes, septate basidia (heterobasidia) and basidiospores forming secondary spores (ballistoconidia).

However, the Auriculariales species are normally clamped and saprobic life style, while Sebacinales species does not have clamps and are often ectomycorrhizae, ericoid and orchid mycorrhiza (Bandoni 1984, Weiß e Oberwinkler, 2001; Oberwinkler et al. 2013, Hibbet et al., 2014). The classification of this order has recently been amended through the revisions of types and newly collected material of species earlier unavailable for morphological and phylogenetic analysis (Malysheva & Spirin 2017; Spirin et al., 2017; Malysheva et al., 2018).

Auriculariaceae, typified by *Auricularia mesenterica* (Dicks.) Pers., belongs to Auriculariales. The family includes species with resupinate, effused-reflexed, hydnoid, cerebriform and pileate basidiomata; thin or thick-walled basidia globose to cylindrical, cystida present or absent, and thin-walled basidiospores that germinate by tubes or producing conidia (Lowy 1971; Martin 1952). The most common genera of Auriculariaceae are *Auricularia* Bull., *Heterochaete* Pat., Exidia Fr., *Eichleriella* Bres., and *Exidiopsis* (Bref.) A. Møller. Recently, several genera have been described or delimited using morphological and DNA analyses, viz. *Adustochaete* Alvarenga & K.H. Larsson, *Amphistereum* Spirin & Malysheva, *Heteroradulum* Lloyd ex Spirin & V. Malysheva, *Myxariellum* Spirin & V. Malysheva, *Proterochaete* Spirin & V. Malysheva and *Sclerotrema* Spirin & Malysheva (Alvarenga et al. 2019, Malysheva & Spirin 2017, Spirin et al. 2019)

Adustochaete Alvarenga & K.H. Larsson was described by Alvarenga et al. (2019) with *Adustochaete rava* Alvarenga & K.H. Larsson as the type species, and currently comprises two species *A. rava* and *A. interrupta* Spirin & V. Malysheva. The genus is characterized by resupinate, arid, soft basidiomata; spiny or tuberculate hymenophore; monomitic hyphal structure; hyphidia with crystal and cystidia-like cells present or absent; 4-celled basidia; hyaline, thin-walled, cylindrical to broadly cylindrical basidiospores. So far, the genus is found on dead hard wood branches in the Neotropics (Brazil and Mexico).

Adustochaete nivea Alvarenga sp. nov.
MycoBank MB 831902; Facesoffungi number: FoF: xxx;
Etymology: ‘nivea’ (Lat., adj.) – snow-white.

Holotypus: RLMA 531* (URM 93408). Genbank: ITS = MN165954; 28S =MN165989

Basidiomata annual, resupinate, farinaceous, first up to 0.2 cm in diam., later fusing, 0.1–0.2 mm thick, white 1A1 (Kornerup & Wanscher, 1978). Margin adnate or slightly detaching, arachnoid to fimbriate. Hymenial surface covered by sharp-tipped, rather regularly arranged spines 45–200 × 35–45 µm, 4–6 per mm. Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline, thin-walled, loosely arranged, interwoven or in subparallel bundles, 3–4 µm in diam. Subhymenial hyphae hyaline, thin-walled, ascending, 2–3 µm in diam.

Basidiospores thin-walled, cylindrical, slightly or distinctly curved, (8.4–) 10.2–13.6 (–14.6) × (4.3–) 4.6–5.9 (–6.2) µm (n = 21/1), L =11.8, W =5.09, Q' = (1.86–) 2.1–2.5 (–2.8), Q =2.31. **Basidia** embedded, narrowly ovoid to obconical, 4-celled, (14.4–) 14.9–16.2 (–17.2) × (9.3–) 9.7–10.1 (–10.3) µm, mostly sessile but occasionally bearing an enucleate stalk up to 2–4 × 2–2.5 µm. **Cystidia-like structures** not observed. **Hyphidia** abundant in sterile spines and hymenial layer, variably branched, 1–1.5 µm in diam. at the apex, thick-walled, densely arranged and cemented by colourless amorphous matter.

Specimens examined: BRAZIL Pernambuco: Recife, Universidade Federal de Pernambuco - Centro de Ciências Biológica, 2018 RLMA 531(URM 93408). Genbank: ITS = MN165954; 28S =MN165989

Remarks: *Adustochaete nivea* is easily recognized the white and farinaceous basidiomata covering up to 5 cm. It differs from *A. rava*, the only species of the genus reported to Brazil, by the larger basidia and smaller basidiospores [(9.7–) 10.8–15.2 (–16.7) × (7.2–) 7.3–10.0 (–10.5) µm and, (10.1–) 10.2–13.7 (–13.8) × (3.7–) 3.8–4.7 (–5.1) µm, respectly in *A. rava*]. *Adustochaete interrupta*, the other species of the genus, also has white basidiomata, but differs by the tuberculate hymenophore, presence of cystidia-like structures, smaller basidia and basidiospores [(14.3–) 15.1–24.0 (–24.3) × (8.7–) 9.1–11.8 (–12.2) µm and (10.1–) 11.3–14.3 (–16.8) × (5.2–) 5.7–6.2 (–6.3) µm, respectly] (Alvarenga et al. 2019). *Adustohaete nivea* clustered in the *Adustochaete* clade with strong support (Fig. 2). ML and BI analyses returned trees with nearly congruent topologies, and our phylogenetic results were consistent with the recent work introducing the genus (Alvarenga et al. 2019).

Acknowledgments

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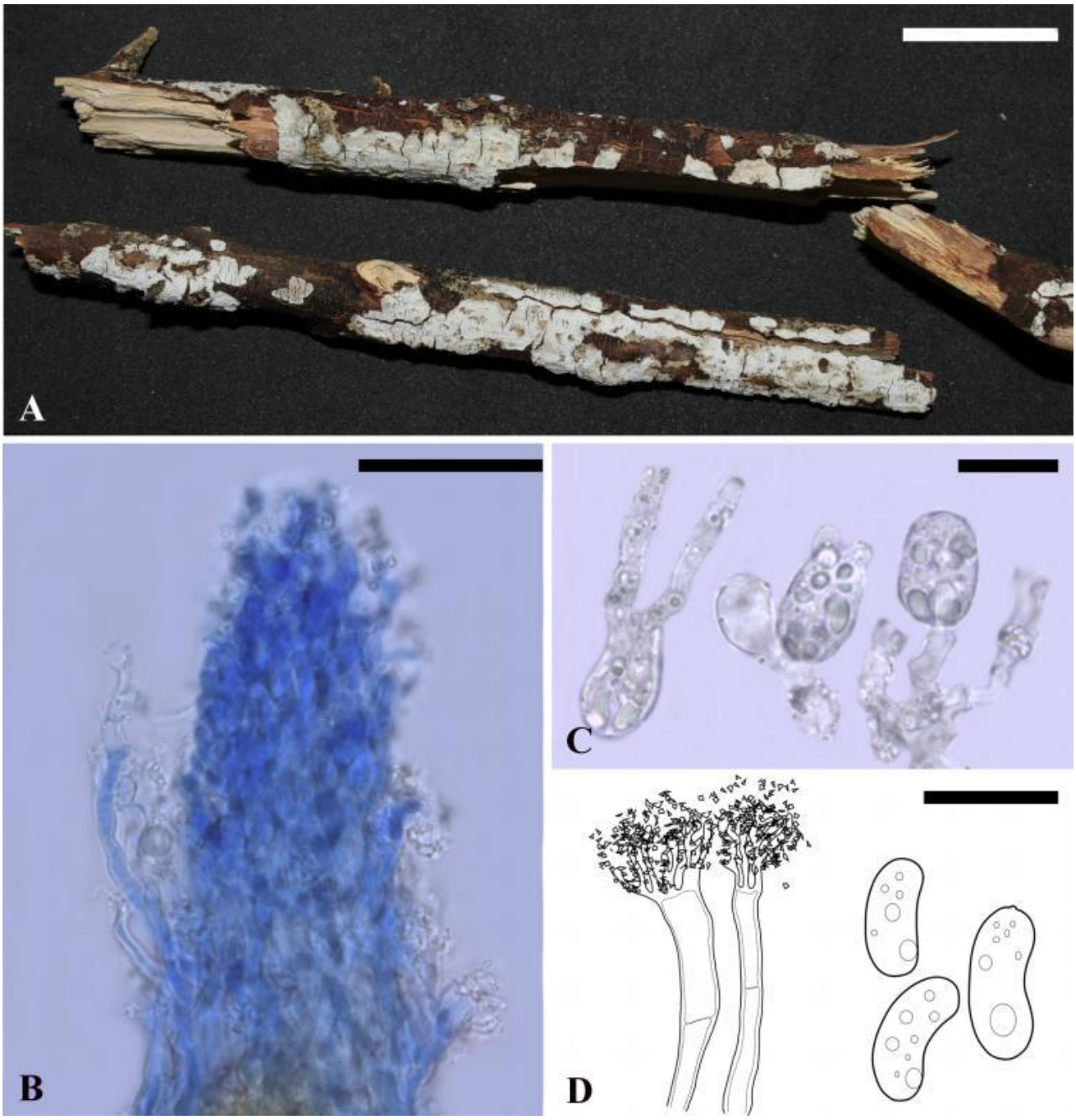

Fig. 1. *Adustochaete nivea* (type, RLMA531) a Basidioma; b Spine with dendrohyphidia; c 4-celled basidia; d dendrohyphidia and basidiospores. Photos: R.L. Alvarenga. Scale bars a = 2 cm, b= 50µm and c - d= 10µm.

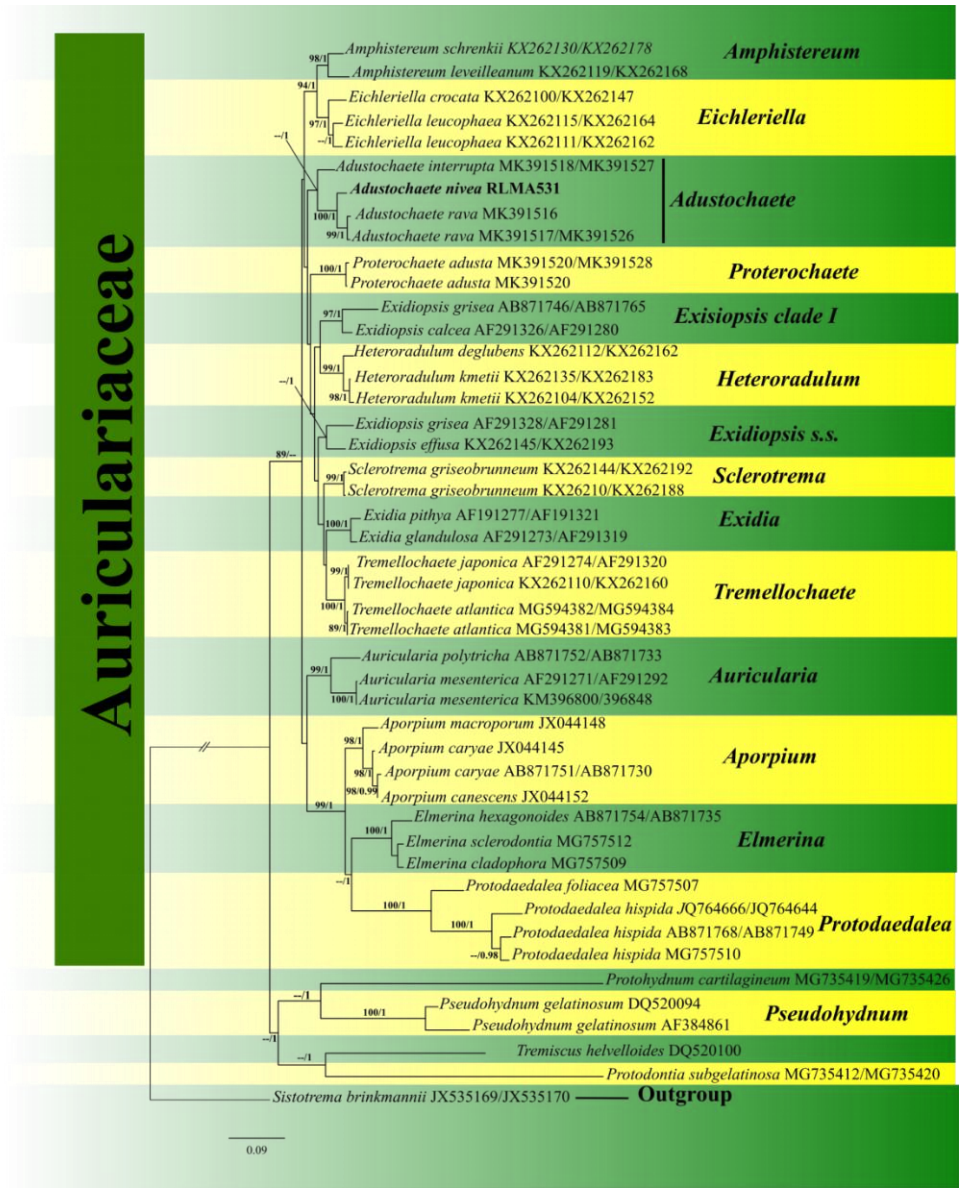

Fig. 2. Phylogenetic tree of the *Adustochaete* obtained by analyses of rDNA sequences. Sequences obtained in this study are in bold. Support values are Maximum Likelihood (ML) and Bayesian analyses. Only support values of at least 50% are shown. The tree was rooted with *Sistorema brinkmannii*.

APÊNDICE G – NEW TAXA SEGREGATED FROM EXIDIOPSIS-LIKE SPECIMENS COLLECTED IN AFRICA AND AMERICAS EM PREPARAÇÃO

Titule - New taxa segregated from *Exidiopsis*-like specimens collected in Africa and Americas

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Abstract

The genus *Exidiopsis* is traditionally defined to comprise resupinate species with smooth hymenophore. Recent DNA-based studies indicated that *Exidiopsis* is polyphyletic, and the taxonomic position of many species under this genus remains unresolved. In the present study, we revised the taxonomic assignments of some representatives of *Exidiopsis* s.l. Based on our results, three new genera, four new species, and one new combination are proposed. *Dendroexidiopsis* gen. nov.is a new genus comprising one newly described species, *D. farinacea* sp. nov., from Brazil. In addition, one new species from Madagascar, *E. madagascariensis* sp. nov., is described in *Eichleriella*, and *E. alliciens* is reported to Northeast Brazil. A neotype is selected for *Hirneolina ubatubensis*, and this species was transferred to *Eichleriella* based on morphological evidence and DNA analyses.

Introduction

Exidiopsis (Bref.) Möller was first introduced as a subgenus of *Exidia* Fr., with one single species, *Exidiopsis effusa* Bref. (=*Thelephora effusa* Bref. ex. Sacc.), due to the similarity found in the hymenial cells and basidiospores development (Brefeld 1888). Later, Möller (1895) elevated the subgenus to genus, and added five new species collected in Brazil (*E. cerina* Möller, *E. verruculosa* Möller, *E. tremellispora* Möller, *E. glabra* Möller and *E. ciliata* Möller), however only the types of *E. cerina*, *E. ciliata*, *E. glabra* and *E. tremellispora* are still preserved in Herbarium Hamburgense (HBG).

Exidiopsis lato sensu are macroscopically characterized by the resupinate, effused, gelatinous to arid-waxy or coriaceous basidioma, smooth hymenial surface, adnate to abrupt margin, formed by horizontal hyphal layer often thin (Möller 1895), although these characteristics are not exclusive to *Exidiopsis*. Wells (1961) was the last researcher to study the genus, describing two new species, and reporting eight species, mostly from temperate localities.

After Wells' study, several species were described using Möller's concept and 43 names are listed in MycoBank (www.mycobank.org). However, the description of these species was based in scarce collections (Wells and Raitviir 1966; Peng 1984;

Hauerslev 1993; Roberts 2003, 2006); only five present DNA data, while others are determined to generic level (https://www.ncbi.nlm.nih.gov/genbank/).

In a recent study (Malysheva & Spirin 2017), the genus was limited to the type based in nrDNA data for a specimen collected in Finland, while *E. griseobrune*a K. Wells & Raitv. was moved to the new genus *Sclerotrema* (K. Wells & Raitv.) Spirin & Malysheva. Other *Exidiopsis* sequences included in their phylogeny were distantly related to the type. Thus, the morphological concept of *Exidiopsis* represents different lineages in Auriculariales. In the present study, we revise specimens with smooth basidiomata collected in the Neotropics and in Africa and taxonomical novelties are proposed.

Material and Methods

Collections from herbaria H, O, SP and URM were studied. Herbarium acronyms are given according to Thiers (2019). Microscopical studies were made with preparations mounted in KOH and Cotton Blue. Methods for measuring follow Miettinen et al. (2012). The following abbreviations are used in morphological descriptions and tables: L = mean spore length, W = mean spore width, Q' = length/width ratio, Q = mean length/width ratio, n = number of measurements per specimens.

DNA extraction, sequence alignment and phylogenetic analyses.—Nine specimens were utilized for DNA extraction and amplification. DNA extraction was done with the NucleoSpin Plant II kit (Macherey-Nagel GmbH & Co. KG) or DNeasy Plant Mini Kit (Qiagen), following the manufacturer's protocol. Polymerase chain reaction (PCR) was performed with DNA extracted targeting the nuc rDNA internal transcribed spacers (ITS1-5.8S-ITS2 = ITS) and nuc rDNA 28S (28S): for ITS region we used the primers ITS1F-ITS4 (White et al. 1990; Gardes and Bruns 1993), and JS1 (Landvik 1996) or LR0R and LR5 (Vilgalys and Hester 1990) for the D1/D2 domains of the nuc 28S rDNA. The attempts to amplify TEF and RBP2 of the specimens were not successful. Polymerase chain reaction (PCR) products were purified applying the GeneJET Gel Extraction Kit (Thermo Scientific, Thermo Fisher Scientific Inc., Waltham, MA, USA).

The assembly and editing of sequences were performed in Sequencher 5.3 (Gene Codes, Ann Arbor, MI, USA) and MEGA 6 (Tamura et al. 2013). Sequences were

compared with sequences deposited in GenBank (https://www.ncbi.nlm.nih.gov/genbank/). Sequences generated for this study were deposited in GenBank under the accession numbers provided in (TABLE 1).

Phylogenetic analyses — Following Malysheva et al. (2018), we used *Sistotrema brinkmannii* (Bres.) J. Erikss. (JX535170\JX535169) as outgroup for the analyses. Sequence alignments were constructed using the online version of MAFFT (Katoh and Toh 2008), using the Q-INS-I option with default parameters.

The final alignment contained 1527 characters (with gaps) and includes representatives for mostly of the genera in Auriculariales. Phylogenetic reconstructions were inferred by Maximum Likelihood (ML) and Bayesian Inference (BI). The best evolutionary model was estimated for each dataset based on Akaike Information Criterion (AIC) using ModelTest on TOPALi 2.5. In ML and BI analyses for ITS+28S datasets the model employed was GTR + G + I. ML analysis was run with PhyML (Guindon and Gascuel 2003) using the software TOPALi 2.5, with one hundred rapid bootstrap replicates. BI analysis was performed using MrBayes 3.1 (Ronquist and Huelsenbeck 2003) software for two independent runs, each with four chains and run for 5 million generations (split frequencies=0.141). with sampling every 10.000 generations.

Results

ML and BI analyses returned trees with nearly congruent topologies, and therefore only the BI tree is shown here (FIG. 1). The sequences from the studied specimens are recovered within three separate clades that we interpret as equivalent to genera, viz. *Eichleriella*, *Adustochaete*, *Dendroexidiopsis*, ***New genus*** (LR23473) and ***New genus*** (LR41130) (FIG. 1).

Adustochaete clade (bp = --, pp = 0.93) comprises four species, among which the generic type *A. rava* Alvarenga & K.H. Larss, recently described by Alvarenga et al. (2019) and the new species described below.

Eichleriella clade (bp = 96, pp = 1) includes 13 species, among which the generic type *E. leucophaea* Bres. as well as the sequences determined as *Hirneolina ubatubensis* Viégas using morphological analysis. Thus, one new combination in

Eichleriella is proposed. A new sequence generated from *E. alliciens* collected in Brazil and this species represents the first record to Northeast. In addition, a specimen collected in Madagascar clustered with *E. tenuicula* (Lév.) Spirin & Malysheva and *E. xinpingensis* C.L. Zhao clade, and we interpreted as new species, described below.

Dendroexidiopsis clade (bp = 98, pp = 1) represents a new genus with one single new species with three specimens, showing a new lineage in Auriculariales.

iv - ***New genus*** (LR23473) (bp = --, pp = 1).

v - ***New genus*** (LR41130) (bp = --, pp = 1).

Taxonomy

Adustochaete Alvarenga & K.H. Larss.

MB 829295

Adustochaete lenis Alvarenga. **sp nov**. Fig.1,2,

MycoBank MB XX

Typification: Brazil. Rondonia, Porto Velho, in the garden at Rua Rio Madeira 7014, 11 Mar. 2012. Leg. K.-H. Larsson 15321* (URM, O, H). Genbank: ITS = XX ; 28S =XX.

Etymology: ‘lenis’ (Lat., adj.) – smooth.

Basidiomata annual, resupinate, orbicular, farinaceous, first up to 0.5 cm in diam., later fusing together, 0.1–0.2 mm thick. Margin adnate, arachnoid to fimbriate, white, up to 1 mm wide. Hymenophore white to brownish-gray, smooth.

Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline, very thin-walled, loosely arranged. Subhymenial hyphae hyaline, thin-walled, ascending, 2–3 µm in diam. Cystidia abundant, clavate to fusiform, 24–30 × 4–6 µm. Hyphidia abundant, variably branched, 0.2–0.5 µm in diam. at the apex, cemented by crystal. Basidia embedded, narrowly ovoid to obconical, 4-celled, (10.3–) 11.2–13.2 (–14.3) × (6.2–) 6.7–8.9.0 (–9.7) µm (n = 20/1), mostly sessile but occasionally bearing an

enucleate stalk. Basidiospores thin-walled, cylindrical, slightly or distinctly curved, (9.1–) 10.2–12.4 (–12.8) × (3.5–) 3.8–4.8 (–4.9) µm (n = 20/1), L =11.45, W =4.39, Q' = (2.1–) 2.4–3.2 (–3.4), Q =2.6.

Remarks:

Adustochaete lenis is easily recognized by the smooth and brownish-gray hymenophore. *Adustochaete* originally included two species (*A. rava* as generic type, and *A. interrupta* Spirin & V. Malysheva), however only the latter has smooth basidioma. *Adustochaete interrupta* differs from the new species by the white basidiomata, smaller basidia [(14.3–) 15.1–24.0 (–24.3) × (8.7–) 9.1–11.8 (–12.2) µm] and basidiospores [(10.1–) 11.3–14.3 (–16.8) × (5.2–) 5.7–6.2 (–6.3) µm] (Alvarenga et al. 2019)].

Eichleriella

Eichleriella alliciens (Berk. & Cooke) Burt, Annals of the Missouri Botanical Garden 2: 746 (1915). Fig.1,3,

Basionym: *Stereum alliciens* Berk. & Cooke, Botanical Journal of the Linnean Society 15: 389 (1877)

MB451610

Basidiomata resupinate, widely effused, texture soft-leathery; margin abrupt, lighter than hymenial surface; hymenophore pinkish, smooth to pruinose with crystal agglomeration; trama lighter than the hymenium. Crystal agglomerations in the basidiomata, 7–50 µm in diam.

Hyphal structure monomitc, encrusted; subiculum with hyphae, golden brownish, thick-walled, 3–4µm in diam. with clamps, subhymenium with hyphae, hyaline, thin-walled, 1–2.5 µm in diam. with clamps. Hyphidia abundant, projecting up the hymenium, hyaline, thin-walled, 1–2 µm at the apex. Cystidia abundant, fusiform often sinuous, projecting up the hymenium, hyaline, thin-walled, 20–90 × 7–9 µm. Basidia subglobose to obconical, 4-celled, (12.5–)14.2–19.3(–20.2) × (7.7–)8.7–9.8(–

10.4) µm, basidiospores cylindrical slightly curved, (10–)10.2–14.2(–15.2) × (4.1–)4.2–5.1 (–5.3) (n = 21/1), L =12.09, W =4.42, Q' = (2.1–) 2.4–3.2 (–3.4), Q =2.73.

Specimens examined: Brazil. Pernambuco, Recife: Universidade Federal de Pernambuco, Centro de Biociências, Departamento de Micologia, dead hardwood, VIII.2019, *Alvarenga, RLM* 761 (URM) Genbank: ITS = XXX, 28S = XXX.

Remarks. *Eichleriella alliciens* is easily recognizable by the smooth, pinkish to pale ochraceous basidiomata, smooth to pruinose hymenophore, the abundant cystidia-like elements and the consistently 4-celled basidia both in the hymenium. The species was described from Cerrado (Brazilian Savannah) as *Stereum alliciens* Berk. & Cooke. Recently, Malysheva & Spirin (2017) studied the lectotype of *E. alliciens*, provided the sequence of the specimen Burdsall 7194 collected in USA (Florida) and concluded that there were no morphological dissimilarities between these specimens. Here we generated a sequence from a Brazilian *E. alliciens* and report it for the first time in Northeast Brazil.

Eichleriella madagascariensis **sp nov**. Fig.1,4,

MycoBank

Typification: Madagascar,.SE Madagascar, Anosy, Petriky, 14 Mar. 2010. Leg. K.-H. Larsson14491 * (URM, O, H). Genbank: ITS = XX ; 28S =XX.

Etymology: madagascar-iensis – occurring in Madagascar

Basidiomata annual, resupinate, arid, orbicular, eventually becoming confluent and covering up to 5 cm in widest dimension, 0.2–0.3 mm thick. Margin abrupt, adnate to fimbriate, whitish or pale gray. Hymenophore cream-colored or grayish (1C2–1C3), covered by sharp-pointed sterile spines 120–150 × 20–40 µm, 10–12 per mm., often grouped in 2-3 spines

Hyphal structure monomitic; hyphae clamped. Subiculum compact, golden-wish up to 50 µm thick, visible in transversal sections. Subicular hyphae golden-yellowish, slightly to distinctly thick-walled, 2–3 µm in diam., some arranged in subparallel

bundles. Subhymenial hyphae hyaline, thin-walled, 2–2.5 µm in diam., loosely interwoven, in hymenial spines brownish, slightly thick-walled, 2–3 µm in diam., densely arranged. Hyphidia abundant, thin-walled, 1–2 µm at the apex. Cystidia, when present, thin-walled, narrowly clavate to fusiform, 21–35 × 5–7 µm. Basidia ellipsoid-ovoid, often with 4 celled, (11.2–) 11.3–14.3 (–14.9) × (7.9–) 8.2–9.9 (–10.2) µm. Basidiospores thin-walled, cylindrical to broadly cylindrical, often slightly curved, (8.4–) 9.8–12.1 (–13) × (4.1–) 4.2–5.6 (–5.80) µm (n = 27/1), L = 10.69, W = 4.93, Q' = (1.82–) 1.83–2.46 (–2.53), Q = 2.16.

Remarks.

Eichleriella madagascariensis is closely related to *E. tenuicula* and *E. xinpingensis* in the morphology and rDNA phylogeny (FIG 1). *Eichleriella tenuicula* differs by the presence of 2-celled basidia and larger basidiospores (16–21 × 5.5–6 µm, Roberts 2008), while *E. xinpingensis* also by the presence of 2-celled basidia and smaller basidiospores [(6–)6.5–10(–11) × (3–)3.5–4.5(–5) µm, Liu et al. 2019). The species here represent the first record of *Eichleriella* to Madagascar.

Eichleriella ubatubensis (Viégas) Alvarenga & Spirin ***nov comb.***Fig.1,5,

MBT

Basionym: *Hirneolina ubatubensis* Viégas, Bragantia 5(4): 242 (1945)

?Epitype: (designated here). Brazil. São Paulo, Ribeirão Grande: Parque Estadual Intervales, on dry hardwood branch. 4.VI.206, Motato-Vásquez, V. 691 (SP467243, duplicate in H, URM). Genbank: ITS = K391514.

Basidiomata resupinate, widely effused, texture soft-leathery; margin abrupt, lighter than hymenial surface; hymenophore grayish orange to light brown, smooth to tuberculate with crystal agglomerations; trama lighter than the hymenium. Angular crystal agglomerations in basidiomata, 7–10 µm in diam.

Hyphal structure monomitc with crystals; subiculum with hyphae, golden brownish, thick-walled, 3–4µm in diam. with clamps, subhymenium with hyphae, hyaline, thin-

walled, 1–2.5 µm in diam. with clamps. Hyphidia abundant, projecting up the hymenium, hyaline, thin-walled, 1–2 µm at the apex. Cystidia-like not abundant, fusiform often sinuous, hyaline, thin-walled, 20–40 × 7–9 µm. Basidia subglobose to elliptical , 4 celled, (12.8–)13.2–16.8(–17.2) × (8.2-)9-10(-10.7) µm, basidiospores cylindrical slightly curved, (9.4–)10–11(–11.3) × (4.2–)4.3–5.4 (–5.7) (n = 30/1) L =11.45, W =4.39, Q' = (2.1–) 2.4–3.2 (–3.4), Q =2.6..

Remarks.

Hirneolina ubatubensis was described by Viégas (1945) from the southern part of Brazil and then placed by Wells (1961) among the synonyms of *Eichleriella alliciens*. Morphologically, it is very similar to *E. alliciens* in having soft, smooth to pruinose basidiomata and 4-celled basidia. In addition, *E. ubatubensis* is phylogenetic close to *E. alliciens* (FIG1). However, they present only 97% similarity in the ITS region, and morphologically *E. ubatubensis* can be distinguished from *E. alliciens* by its distinct, tuberculate basidiomata, golden brown subicular layer, a character also emphatic in the protologue (Viégas 1945). The studied specimen showed a clear layer of hyphidia and not abundant cystidia, characteristics not mentioned in the original description (Viégas 1945). Thus we expand the morphological concept of this species to include those features. Now two similar species are reported to Brazil *E. alliciens* and *E. ubatubensis*, being the first reported in Atlantic forest and Cerrado and the second reported so far only to the Atlantic forest.

Dendroexidiopsis Alvarenga **gen. nov.**

MycoBank

Etymology: "Dendro" - refers a hyphidia branched in hymenium; *exidiopsis* - similar developed of basidioma

Basidiomata annual, resupinate, at first orbicular becoming confluent and then widely effused, undulate, or nearly tuberculate, texture soft-crustaceous. Margin adnate, fimbriate lighter or paler than hymenial surface. Hymenial surface arid, grey to brownish grey, smooth with white crystal. Hyphal structure monomitc, hyphae clamped, immersed in gelatinous matrix. Cystidia fusiform to clavate often sinuous,

hyaline. Hyphidia abundant in hymenium, hyaline, thin-walled, densely encrusted. Basidia subglobose to obconical, 4-celled, hyaline, thin-walled, with clamps and guttulate. Basidiospores cylindrical, slightly curved, hyaline, with short apiculus and guttulate.

Type. *Dendroexidiopsis farinacea* Alvarenga

Remarks. The new lineage in Auriculariales recovered here is morphologically similar to *Exidiopsis l.s.*, however phylogenetically distant. *Dendroexidiopsis* differs from *Exidiopsis s. s.* by the presence of abundant, branched and densely encrusted hyphidia in the hymenium. *Adustochaete* also has branched and encrusted hyphidia but differs from the new genus the presence of abundant cystidia in the hymenium. Besides, theses genera are phylogenetically distant in Auriculariales reconstructions (Alvarenga et al. 2019).

Dendroexidiopsis farinacea Alvarenga *sp. nov.*Fig.1,6.

MycoBank

Typification: Brazil. Pernambuco, Jaqueira, Reserva Particular do Patrimônio Natural Frei Caneca, Mata da Serra do Quengo. 21 Apr. 2013. Leg. K.-H. Larsson 16038.

Etymology: “farinacea” (Lat., adj.) - Basidioma arid, pruinose with white crystals.

Basidiomata annual, resupinate, effused, undulate, or nearly tuberculate, texture soft-crustaceous. Margin adnate, fimbriate lighter or paler than hymenial surface. Hymenial surface arid, grey to brownish grey, smooth with white crystal.

Hyphal structure monomitc, hyphae clamped. Subiculum not clearly differentiated, subhymenium with hyaline, thin-walled hyphae, 1-2 µm, clamped, immersed in gelatinous matrix. Cystidia fusiform to clavate often sinuous, rarely, hyaline, thin-walled, 25–35 × 8–10 µm. Hyphidia abundant in hymenium, hyaline, thin-walled, usually collapsed, densely encrusted. Basidia subglobose to obconical, 4-celled, hyaline, thin-walled, 10–15(–17) × 7–10 µm, with clamps and guttulate. Basidiospores cylindrical, slightly curved, hyaline, thin-walled, (7.2–)8.1–12.3 ×

(3.1–)3.7–5(–5.3) µm, (n = 42/2), L =10.22, W =4.26, Q' = (1.7–) 2–2.46(–3), Q =2.45, with short apiculus and guttulate.

Specimens examined. Brazil. Paraiba, Areia, Reserva Estadual Mata do Pau-Ferro. 28 Apr. 2013. Leg. K.-H. Larsson 16094, Pernambuco, Jaqueira, Reserva Particular do Patrimônio Natural Frei Caneca, Mata do Quengo, 10.III.2012, Chikowski, R.S. (MQ2_86 – URM 93468). Genbank (ITS.– XX, LSU.–XX)

Remarks.

Dendroexidiopsis farinacea is morphologically similar to four species placed so far in *Exidiopsis* and registered in Brazil: *E. mucedinea* (Pat.) K. Wells, *E. fuliginea* Rick, *E. manihoticola* Viégas and *E. opalea* (Bourdot & Galzin) D.A. Reid (Alvarenga & Xavier 2016), however they differ in basidia and basidiospores size (Table 2). These species are not yet sequenced, thus we keep them in *Exidiopsis lato sensu*.

The specimen MQ2_86 of *D. farinacea* may represent a different species, however it was not possible to observe morphological differences to describe it as new. The specimen was collected in Atlantic forest and has 14-bp differences from the ITS type sequence. Herein, we temporarily considered these differences as intraspecific variation until additional materials are collected and sequenced.

Table 2 - *Exidiopsis* species with records to Brazil, based on protologue description: *Exidiopsis mucedinea* (Patouillard and Lagerheim 1895), *E. fuliginea* (Rick 1906), *E. manihoticola* (Viegas 1943) and *E. opalea* (Reid 1970).

	Basidia	**Basidiospores**	**Hyphidia**	**Type**
E. fuliginea	(9–) 10–16.5 (–18) × 8.5–12	(8–)9–13.5 × (3.5–)4–6(–7)	Present, pigmented	Brazil
E. manihoticola	12–16×9–10	12-1 4 × 5–6	Absent	Brazil
E. mucedinea	15–18 × 10–12	10 x 5	Present, not pigmented	Ecuador
E. opalea	10–13 × 9.5–12	(8–) 10–12 × 5–7.2	Absent	France
D. farinacea	10–15(–17) × 7–10	(7.2–)8.1–12.3 × (3.1–)3.7–5(–5.3)	Present, not pigmented	Brazil

(LR 23473)

MycoBank

Basionym:

Typification:Mexico. Veracruz: Barranca de Pescado, Jalcomulo, hardwood branch, 26.IX.1985 *Ryvarden 23473* (O).

Etymology:

Remarks.

Basidiocarps annual, effused, 2 – 3 cm in widest dimension. Margin arachnoid, white, up to 0.5 mm wide. Hymenial surface pale cream-coloured, with indistinct brownish flecks, smooth or indistinctly tuberculate. Section: subiculum white, loose, arachnoid, up to 0.05 mm thick; hymenophore soft waxy, concolorous with hymenial surface, 0.1–0.2 mm thick.

Hyphal structure monomitic; hyphae clamped. Subicular hyphae hyaline, very thin-walled, loosely arranged, interwoven or in subparallel bundles, 2–4 μm in diam., occasionally inflated up to 7 μm in diam. Subhymenial hyphae hyaline, thin-walled, ascending, 2–3 μm in diam. Angular crystal agglomerations occasionally present in subhymenium, 3–10 μm in diam. Dendrohyphidia and hymenial hyphidia absent. Cystidia rare, flexuous, tapering to the apex, 15–29 × 4–5 μm. Basidia openly arranged, 4-celled, ovoid, (7.2–) 7.3–10.2 (–10.7) × (5.0–) 5.6–7.1 (–7.2) μm (n = 30/1), sometimes tapering to the stalk-like, up to 7 μm long base; sterigmata up to 15 × 2.5 μm. Basidiospores thin-walled, cylindrical to broadly cylindrical, straight to slightly curved, (4.8–) 5.0–6.7 (–6.8) × (2.7–) 2.8–3.5 (–3.6) μm (n = 30/1), L = 5.81, W = 3.01, Q’ = (1.6–) 1.7–2.3 (–2.4), Q = 1.94, occasionally with oil droplets in the cytoplasm.

(LR41130)

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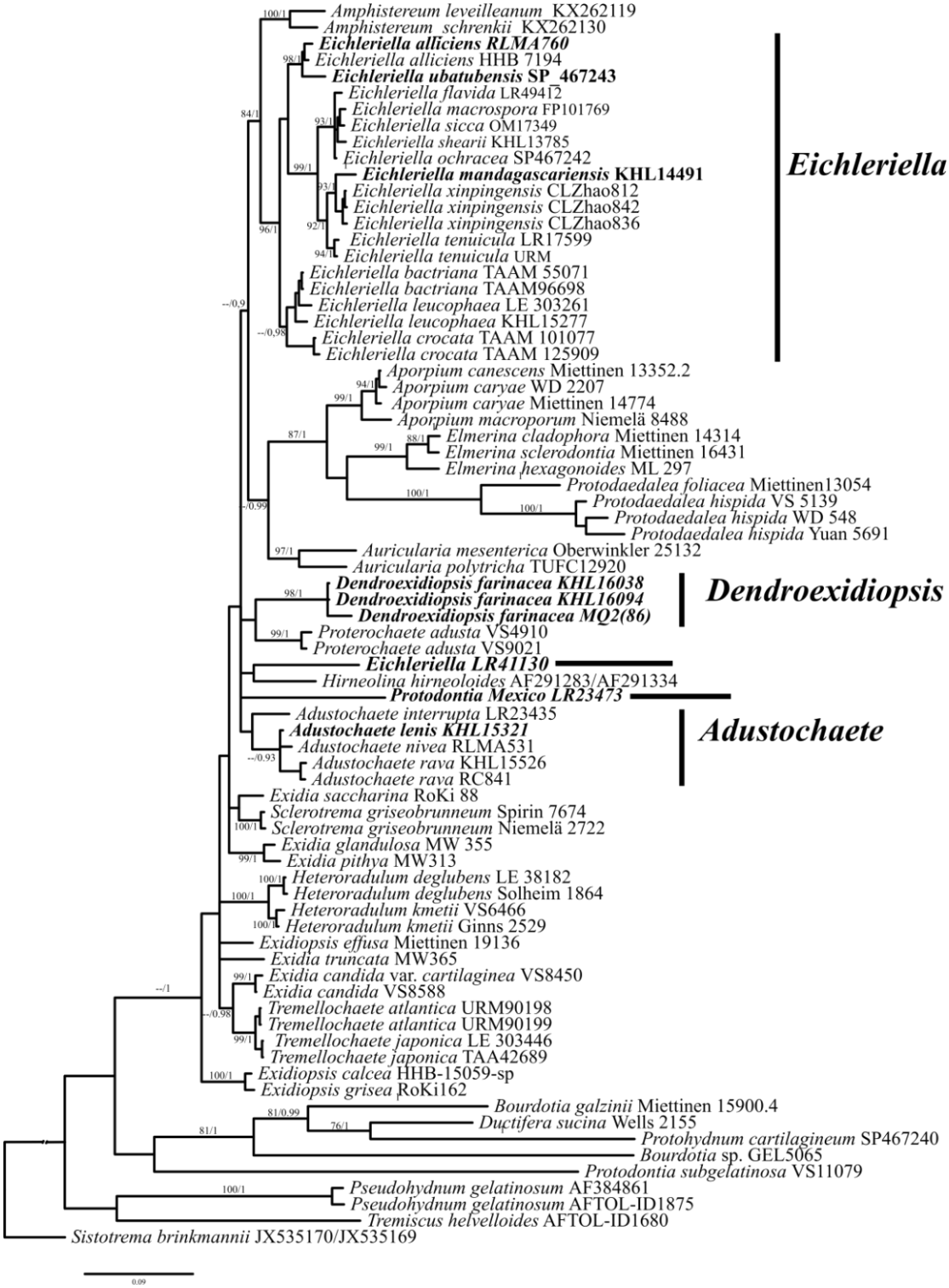

Fig. 1. Phylogenetic tree of the *Auriculariales* obtained by analyses of rDNA sequences. Sequences obtained in this study are in bold. Support values are Maximum Likelihood (ML) and Bayesian analyses. Only support values of at least 50% are shown. The tree was rooted with *Sistorema brinkmannii*.

Fig. 2. *Adustochaete lenis* Alvarenga. sp nov. (K.-H. Larsson 15321) A Basidioma; B Smooth hymenophore. Photos: R.L. Alvarenga. Scale bars A = 1 cm, B= 10 mm.

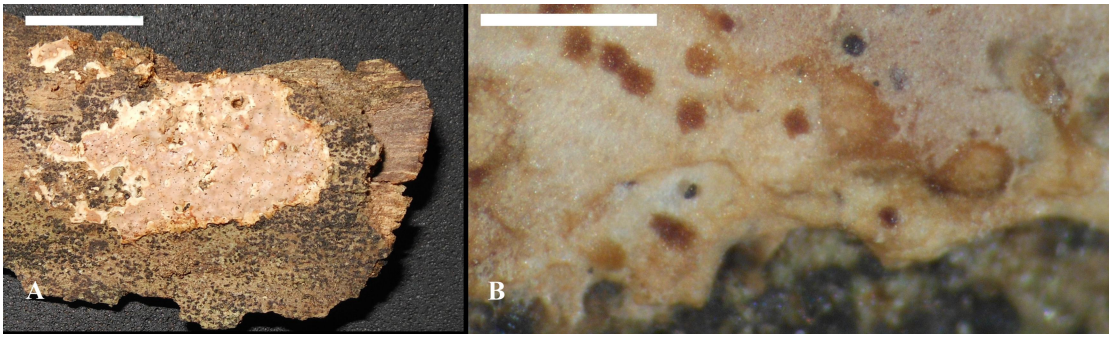

Fig. 3. *Eichleriella alliciens* (*RLM* 761) A Basidioma; B Smooth hymenofore. Photos: R.L. Alvarenga. Scale bars A = 1 cm, B= 10 mm.

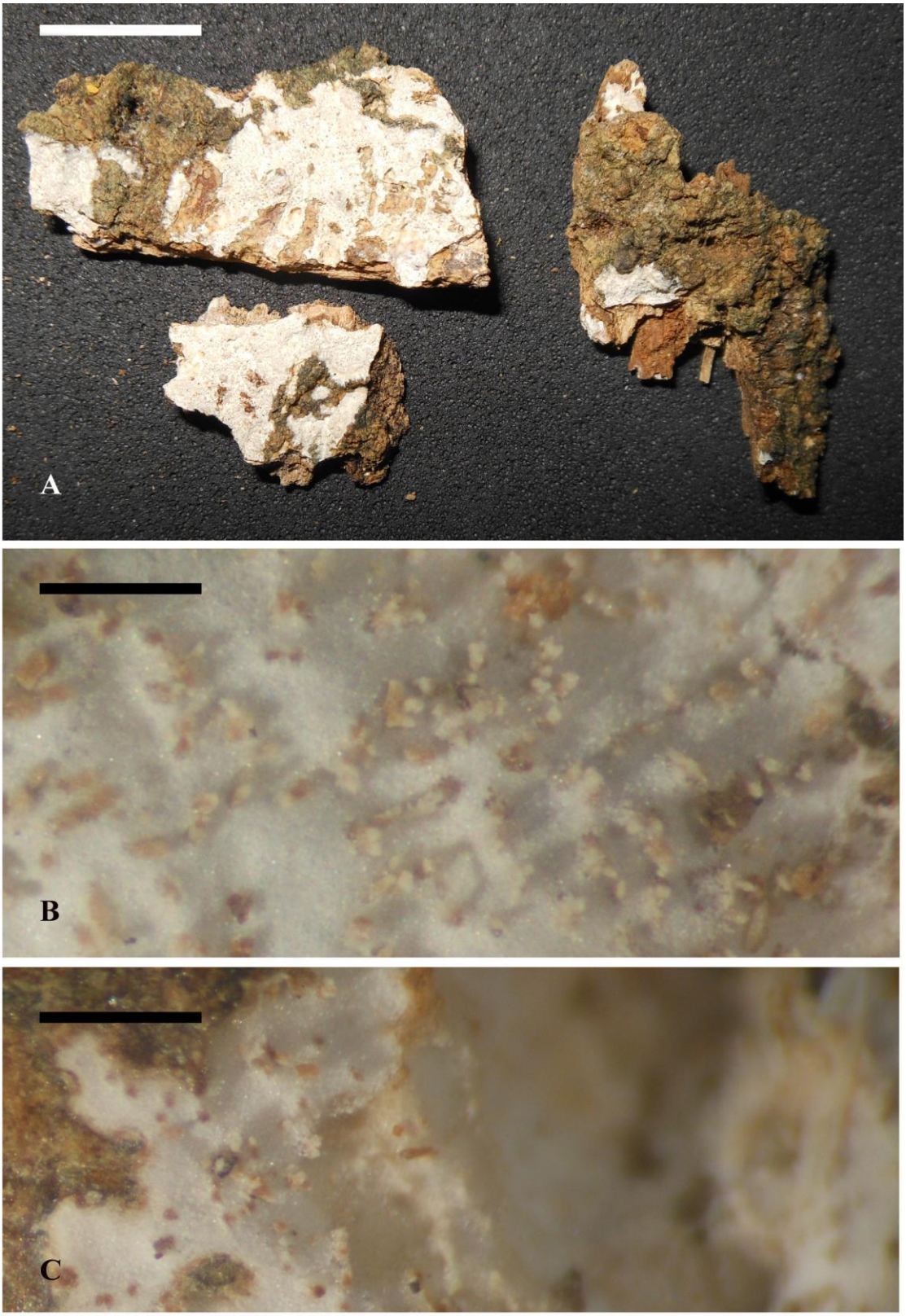

Fig. 4. *Eichleriella madagascariensis* **sp nov**. (K.-H. Larsson 14491) A Basidioma; B. Hymenophore covered by sharp-pointed sterile spine; C. Margin. Photos: R.L. Alvarenga. Scale bars A = 1 cm, B-C= 10 mm.

Fig. 5. *Eichleriella ubatubensis* (Viégas) Alvarenga & Spirin nov comb (SP467243) A Basidioma; B. Smooth to tuberculate hymenophore ; C. Margin. Photos: R.L. Alvarenga. Scale bars A-B= 1 cm, C= 10 mm.

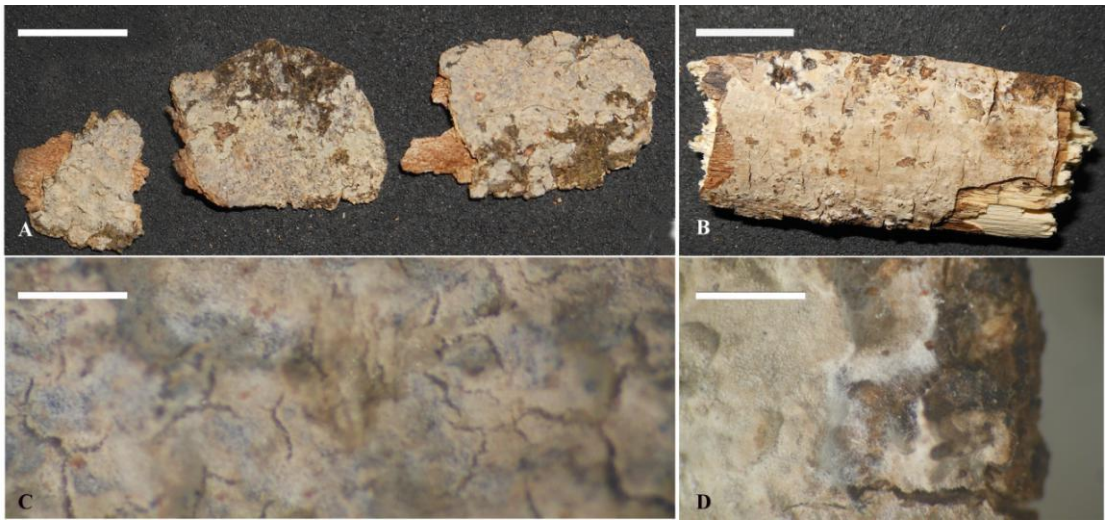

Fig. 6. *Dendroexidiopsis farinacea Alvarenga* (K.-H. Larsson 16038) A Basidioma; B. Smooth to tuberculate hymenophore ; C. Margin. Photos: R.L. Alvarenga. Scale bars A-B= 1 cm, C= 10 mm.

APÊNDICE H – ON POROID AURICULARIALES *ELMERINA* AND *PROTOMERULIUS* MORPHOLOGICAL AND MOLECULAR IDENTIFICATION - EM PREPARAÇÃO

Short Title: Neotropical poroid Auriculariales

Title: On poroid Auriculariales *Elmerina* and *Protomerulius* morphological and molecular identification

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ABSTRACT

The poroid species of Auriculariales have been placed in *Aporpium* Bondartsev & Singer, *Elmerina* Bres., *Protodaedalea* Imazeki and *Protomerulius* Möller and include resupinate, effused-reflexed or pilaete basidiomata. According to recent DNA-based studies, those genera have good support in the Auriculariales, but many species remain in uncertain taxonomic position especially from the neotropics. In the present paper, specimens with poroid hymenophore and septate basidia collected in Brazil are morphologically and molecularly studied. For the molecular analyses, we used ITS and LSU regions. Three new species (*Elmerina brasiliensis, E. santanaensis* and *Protomerulis pedratalhadensis*) and combinations (*Elmerina minipora*, *E. strigosa* and *E. obtusispora*) are proposed based on morphological and molecular data obtained .delimit those genera.

KEY WORDS: Auriculariaceae; Jelly-Fungi; Heterobasidiomycetes; Atlantic Forest

INTRODUCTION

Over time, several species of *Aporpium* Bondartsev & Singer, *Elmerina* Bres. and poroid species of *Protodaedalea* Imazeki and *Protomerulius* Möller have been mistaken with each other and and constantly transferred from one genus to another (Teixeira & Rogers 1955, Bononi & al., 1982, Setliff & Ryvarden 1982, Reid 1992, Ryvarden 2016). The placement of these poroid genera at higher levels was also problematic. Using morphological analyses, Teixeira & Rogers (1955), Bononi & al., (1982), Setliff & Ryvarden (198) and Reid (1992) placed them in the Tremellaceae, due to the globose septate basidia, a typical feature of *Tremella* Pers.. However, more recent studies using molecular data (Weiss & Oberwinkler 2001, Miettinen & al., 2012, Zhou & Dai 2013 and Sotome & al., 2014) showed that *Protomerulius*, *Aporpium*, *Elmerina* and *Protodaedalea* are in fact nested in the Auriculariales.

Protomerulius Möller (1895) was typified by *P. brasiliensis* Möller [= *P. substuppeus* (Berk. & Cooke) Ryvarden], a poroid species with septate basidia and cystidial cell, and was the first genus in Auriculariales to include poroid species. Recently, *Protomerulius* was redefined by Spirin & al., (2019) to include also species with hydnoid or smooth hymenophore. This worldwide genus has, so far, 13 species and is characterized by sphaeropedunculate, more or less globose, two- or four-celled basidia; skeletal hyphae in poroid and in hydnoid species; and fasciculate tramal gloeocystidia occurring in effused, non-poroid species, which may not be easily differentiated and be interpreted as thin-walled apices of skeletal hyphae in hydnoid species (Spirin & al., 2019).

Elmerina Bres., with *E. cladophora* (Berk.) Bres. as type, was the second genus to include poroid species (Bresadola, 1912). *Elmerina* has, currently, nine tropical species described, six of them using morphological and molecular data. The genus is characterized by the dimidiate and tough fleshy basidiomata, daedaleoid hymenophore, clamps in generative hypha, dimitic and septate basidia (Bresadola, 1912). Malysheva & al. (2018) studied a specimen of *E. cladophora* collected in Indonesia, and confirmed the *Elmerina* clade proposed by Zhou & Dai (2013).

Aporpium Bondartsev & Singer was described to include species with small pores, without clamps or cystidial cell and with *A. canescens* (P. Karst.) Bondartsev & Singer as generic type (Singer, 1944). Later, Teixeira & Rogers (1955) studied the type and found clamps in the generative hyphae. Miettinen & al. (2012), using morphological and molecular data, delimited the genus to specimens with dimitic

hyphal structure, robust and often encrusted skeletal hyphae, cylindrical spores with mostly concave ventral side, resupinate or effused-reflexed basidiomata. *Aporpium* has, so far, three Northern temperate species.

Protodaedalea Imazeki includes either poroid or lamellate Auriculariales, with *P. hispida* Imazeki as generic type (Imazeki, 1955). Based on morphological similarity, Núñez (1998) placed this genus under *Elmerina*, but more recent studies using molecular and morhpological data reestablished *Protodaedalea* to include the generic type and *P. foliacea* (Pat.) Sotome & T. Hatt., both Asian species and the only currently accepted in the genus (Malysheva & al., 2018). Despite the basidioma being similar to *Elmerina* or *Aporpium* species, *Protodaedalea* has monomitic hyphal system and dendrohyphidia occurring in sterile pegs.

Specimens with poroid hymenophore and septate basidia have been collected in the Brazil and showed to represent new taxa. In addition, new combinations are proposed to better delimit these genera.

MATERIAL AND METHODS

Fungal Sample.— Specimens studied were deposited in SP and URM herbaria [acronyms according to Thiers (2018)]. For microscopical studies, fungal samples were mounted in separate slides with 3% KOH and with Cotton Blue. Measures followed Miettinen & al., (2012). The following abbreviations were used in morphological descriptions and tables: L = mean spore length, W = mean spore width, Q' = length/width ratio, Q = mean length/width ratio, n = number of measurements per specimens. Color followed Kornerup & Wanscher (1978) and the literature used for identification was Teixeira and Rogers (1955), Bononi & al., (1982), Reid (1992), Miettinen & al., (2012), Zhou & Dai (2013), Sotome & al. (2014), Wu & al. (2015; 2017) and Spirin & al. (2019).

DNA isolation and sequencing.— Four specimens were utilized for DNA extraction and amplification. DNA extractions were performed with the DNeasy Plant Mini Kit (Qiagen) or manually using CTAB 3%. Polymerase chain reaction (PCR) was performed with DNA extracted targeting the nuc rDNA internal transcribed spacers (ITS1-5.8S-ITS2 = ITS) and nuc rDNA LSU (28S): for ITS region we used the primers ITS1 or 1F-ITS4 (White & al., 1990; Gardes & Bruns, 1993), LR0R and LR5 (Vilgalys & Hester, 1990) for the D1/D2 domains of the nuc 28S rDNA. The attempts to amplify TEF and RBP2 of the four samples were not successful.

Polymerase chain reaction (PCR) products were purified applying the ExoSAP-IT (Thermo Fisher Scientifc). The sequences were provided by the Platafoma Tecnológica de Genômica e Expressão Gênica do Centro de Biociências (UFPE) and Macrogen (Korea).

The assembly and editing of sequences were performed in Staden Package 2.0 software (Staden & al., 1998) and MEGA 6 (Tamura & al., 2013). Sequences were compared with sequences deposited in GenBank (https://www.ncbi.nlm.nih.gov/genbank/). Sequences generated in this study were deposited in GenBank.

Following Malysheva & al. (2018), *Sistotrema brinkmannii* (Bres.) J. Erikss. (JX535170\JX535169) was used as out-group for the analyses. Sequence alignments were constructed using the online version of MAFFT (Katoh & Toh 2008), using the Q-INS-I option with default parameters includes representatives of the genera in Auriculariales (Table 1).

Phylogenetic analyses of DNA sequences.— Phylogenetic reconstructions were inferred by Maximum Likelihood (ML) and Bayesian Inference (BI). The best evolutionary model was estimated for each dataset based on Akaike Information Criterion (AIC) using ModelTest on TOPALi 2.5. In ML and BI analyses for ITS+28S datasets, the model employed was GTR + G + I. ML analysis was run with PhyML (Guindon & Gascuel, 2003) using the software TOPALi 2.5, with one hundred rapid bootstrap replicates, BI analysis was performed using MrBayes (Ronquist & Huelsenbeck, 2003) for two independent runs, each with four chains and run for 5 million generations (split frequencies=0.005).

RESULTS

Phylogenetic analyses of DNA sequences.— The final alignment comprised 1,604 characters including gaps and representatives of 16 genera in Auriculariales. ML and BI analyses returned trees with nearly congruent topologies. Therefore, only the BI tree is shown (Fig. 1). Sequences from the studied specimens were recovered within two separate clades, equivalent to *Elmerina* and *Protomerulius* (Fig. 1).

The *Elmerina* clade (bp = --, pp = 1) comprises 11 species, including the two new species *E. brasiliensis* (bp = 97, pp = 1) and *E. santanensis* (bp = 100, pp = 1). In addition, three *Aporpium* species (A. *miniporum, A. obtusisporum* and A. *strigosum)* were clustered with well support in this clade, thus, new combinations are proposed.

The *Protomerulius* clade (bp = 99, pp = 1) is composed of 10 species, including the new species *P. pedratalhadensis* (bp = 90, pp = 1).

TAXONOMY TREATMENT

Elmerina Bres.

Elmerina santanensis Alvarenga & Westphalen **sp. nov**. Fig. 1–2

Mycobank number. –

Holotype.– Brazil. Rio Grande do Sul, Porto Alegre, Morro Santana, Westphalen, MC 538/17, 13.IV.2017 (SP512478 – SP). Genbank (ITS.– Submitted, LSU.–Submitted)

Etymology.– refers to the location where the sample was collected.

Description.– Basidiomata annual, resupinate, soft to coriaceous when fresh; margin detaching from the substrate, dark yellowish brown (5D5). Pore surface yellowish pale-gray (2A2–2B2); pores round to angular, 6–7 per mm, dissepiments thin, tubes firm, 1–1.3mm thick, concolorous with pore surface. Context often absent or up to 0.1 mm thick, pale yellowish (2A2) Hyphal structure dimitic; generative hyphae clamped. Skeletal hyphae hyaline to brownish, dominating, flexuous, covered by amorphous grainy matter, (2.7–) 3.2–5.0 (–5.5) µm in diam.; Generative hyphae collapsed or, slightly thick-walled, 1.5–2 µm in diam., often clampless. Basidia 4-celled, globose to subglobose, 5–7×4–5.3 µm; Basidiospores reniform to allantoid (4.2–) 4.3–5.6 (–5.7) × (2.0–) 2.1–2.8 (–3.0) µm (n = 23/1), L = 5.04, W = 2.34, Q' = (1.5–) 1.7–2.57 (–2.66), Q = 2.15.

Notes.– Macroscopically, the new species is easily confused with any resupinate, brownish poroid species of Agaricomycetes as *Diplomitoporus* Domański and *Cinereomyces* Jülich.. However, microscopical analyses will show the septate basidia. *Elmerina santanensis* differs from other species of the genus by the thin, resupinate basidiomata, often without context, and margin detaching from the substrate. Phylogenetically, the sequence generated here cluster as sister group with two sequences of material isolated as endophytic from leaves of *Hevea* sp. in Peru (Martin & al., 2015), while, the specimen from Brazil was collected in decaying wood. This is, thus, the first record of an *Elmerina* species in endophytic association, due to those sequences being grouped among *Elmerina* species.

Elmerina brasiliensis Alvarenga & Westphalen **sp. nov**. Fig. 1–3.

Mycobank number. –

Holotype.– Brazil. Paraná, Paranaguá, PR508, Kaipper, GK & Westphalen, MC GKF11, 02.IX.2013 (SP446226 – SP). Genbank (ITS.– Submitted, LSU.–Submitted)

Etymology.– refers to the country where the sample was collected.

Description.– Basidiomata annual, resupinate to effused-reflexed, imbricate, margin close adnate, abrupt on the substrate pale yellow (4A3). Pileal surface smooth to uneven with hyphal pegs projections, distinctly zonate yellowish gray (3B2). Pileal margin sharp to rather blunt, even, concolorous with pileal surface; margin of resupinate part close adnate, abrupt on the substrate, grayish yellow (2B3), first, up to 1 mm wide. Pore surface grayish yellow (2B3) to pale yellow (4A3); pores decurrent, round to angular, 6–7 per mm. Section: context grayish yellow (2B3), often with brown line, up to 1-3 mm thick; tubes firm, 1–1.8mm thick, concolorous with pore surface. Hyphal structure dimitic. Skeletal hyphae hyaline to golden dominating, brownish in pileal surface and context line, flexuous, often covered by amorphous grainy matter, (3–) 3.4–5.4 (–5.8) µm in diam.; Generative hyphae collapsed. Basidia often 4-celled, globose to subglobose, (7.4–)8.2–9.6(–10.3)×(5.2–)5–6.4(–6.6) µm, n = 30/1; Basidiospores reniform to allantoid (4.0–) 4.1–5.9 (–6.1) × (2.7–) 2.8–4.0 (–4.3) µm (n = 23/1), L = 4.91, W = 3.33, Q' = (1.2–) 1.32–1.84 (–2.03), Q = 1.47.

Notes.– Among the Neotropical species of *Elmerina*, *E. dimidiata* differs from the new species by effused nodulose pileate basidiomata, often in imbricate clusters, and basidia 7–12 × 5–8 µm (Ryvarden, 2016), while *E. santanensis* presents resupinate basidiomata and smaller basidiospores (4.2–) 4.3–5.6 (–5.7) × (2.0–) 2.1–2.8 (–3.0) µm. *Elmerina dimidiata* was described from Guadaloupe as *Aporpium dimidiatum* A. David. Later, it was combined in *Elmerina* by Reid (1992) and *Protomerulius* by Ryvarden (2016). However, the combination in *Elmerina* was confirmed by Zhou & Dai (2013), Sotome & al. (2014) and in the current work.

Synonymy and accepted species of *Elmerina* Bres.

Elmerina unguliformis Corner, Beih. Nova Hedwigia 96: 30 (1989)

Elmerina berkeleyi (Sacc. & Cub.) Petch, Ann. R. bot. Gdns Peradeniya 9: 129 (1924)

≡*Panus berkeleyi* Sacc. & Cub., Syll. fung. (Abellini) 5: 628 (1887)

Elmerina dimidiata (A. David) D.A. Reid, Persoonia 14(4): 472 (1992)

≡*Aporpium dimidiatum* A. David, Bull. trimest. Soc. mycol. Fr. 90(3): 179 (1974)

=*Protomerulius dimidiatum* (A. David) Ryvarden, Syn. Fung. (Oslo) 46: 507 (2016)

Elmerina minipora (F. Wu, Y.C. Dai & L.W. Zhou) Alvarenga & Gibertoni **comb. nov.** MBT =

≡*Aporpium miniporum* F. Wu, Y.C. Dai & L.W. Zhou, Phytotaxa 317(2): 141 (2017)

Elmerina efibulata (Y.C. Dai & Y.L. Wei) Y.C. Dai & L.W. Zhou, Mycologia 105(5): 1224 (2013)

≡*Aporpium efibulatum* (Y.C. Dai & Y.L. Wei) Sotome & T. Hatt., in Sotome, Maekawa, Nakagiri & Lee, Mycol. Progr. 13(3): 992 (2014)

=*Protomerulius efibulatus* Y.C. Dai & Y.L. Wei, Mycotaxon 105: 350 (2008)

Elmerina obtusispora (F.C. Huang & Bin Liu) Alvarenga & Gibertoni **comb**. **nov** MTB=

≡*Aporpium obtusisporum* F.C. Huang & Bin Liu, in Huang, Liu, Wu, Shao, Qin & Li, Mycosphere 8(6): 1276 (2017)

Elmerina strigosa (Sotome & T. Hatt) Alvarenga & Gibertoni **comb. nov**
MTB=

≡*Aporpium strigosum* Sotome & T. Hatt, in Sotome, Maekawa, Nakagiri & Lee, Mycol. Progr. 13(3): 992 (2014)

Elmerina fragilis F. Wu & Hai J. Li, Mycotaxon 130(3): 684 (2015)

Elmerina borneensis (Jülich) D.A. Reid, Persoonia 14(4): 469 (1992

≡*Aporpium borneense* Jülich, in Jermy, Bot. J. Linn. Soc. 81(1): 45 (1980)

Elmerina sclerodontia (Mont. & Berk.) Miettinen & Spirin, Mycol. Progr. 17(7): 812 (2018)

≡*Hydnum sclerodontium* Mont. & Berk., London J. Bot. 3: 333 (1844)

=*Hydnum cesatii* Berk., in Cesati, Atti Accad. Sci. fis. mat. Napoli 8(no. 3): 9 (1879)

=*Odontia cesatii* (Berk.) Rick, Egatea 18: 43 (1933)

=*Protohydnum sclerodontium* (Mont. & Berk.) Hjortstam & Spooner, in Hjortstam, Spooner & Oldridge, Kew Bull. 45(2): 319 (1990)

=*Pterula sclerodontium* (Mont. & Berk.) Lloyd, Mycol. Writ. 7(Letter 67): 1153 (1922)

=*Tremellacantha sclerodontia* (Mont. & Berk.) Jülich, in Jermy, J. Linn. Soc., Bot. 81(1): 44 (1980)

Elmerina hexagonoides (A. David & Jaq.) Núñez, Folia cryptog. Estonica 33: 100 (1998)

≡*Aporpium hexagonoides* A. David & Jaq., Gdns' Bull., Singapore 29: 151 (1977)

Elmerina cladophora (Berk.) Bres., Hedwigia 53(1-2): 71 (1912)

≡*Hexagonia cladophora* Berk., J. Linn. Soc., Bot. 16(no. 89): 47 (1877)

=*Elmeria cladophora* (Berk.) Bres., Hedwigia 51(4): 319 (1912)

=*Favolus eberhardtii* Pat. [as 'eberhardti'], Bull. Soc. mycol. Fr. 23(2): 77 (1907)

=*Hexagonia flabelliformis* Berk., J. Linn. Soc., Bot. 16(no. 89): 47 (1878) [1877]

=*Polystictus cladophorus* (Berk.) Lloyd, Mycol. Writ. 5: 790 (1918)

=*Scenidium cladophorum* (Berk.) Kuntze, Revis. gen. pl. (Leipzig) 3(3): 516 (1898)

=*Scenidium flabelliforme* (Berk.) Kuntze, Revis. gen. pl. (Leipzig) 3(3): 516 (1898)

Protomerulius Möller

Protomerulius pedratalhadensis Alvarenga **sp. nov**.Fig 1–4

Mycobank number. –

Holotype.– Brazil. Alagoas, Reserva Biológica de Pedra Talhada. Oliveira, VRT 733 (URM93459-URM). Genbank (ITS.– Submitted, LSU.–Submitted)

Etymology.– refers to the location where the sample was collected.

Description.– Basidiomata annual, resupinate; margin fimbriate, first almost white, then pale cream (5A2) to brownish (5D6–6F6), up to 1 mm wide. Pore surface, pale cream to brownish, in older basidioma with reddish-brown; pores very lacerated, 1–2 per mm, dissepiments uneven to with hyphal projection. Section: context absent or 0.1–0.2 mm thick, pale cream; tubes soft, slightly agglutinated, concolorous with pore surface. Hyphal structure dimitic; hyphae clamped. Skeletal hyphae hyaline to golden, dominating, flexuous, 0.6– 1 µm of walls, (2.8–) 3.1–5.7 (–6.1) µm in diam. apices of skeletals at dissepiment edges thick-walled, 4–5.7 µm in diam. Hyphal projection in the tube formed by thin-walled, 2–3 µm in diam. Generative hyphae hyaline, thin-walled, short-celled in subhymenium, 1.3–2 µm in diam. Gloeocystidia not abundant, when present, clavated to broadly fusiform, thin-walled, 23–40 × 4– 8 µm. Crystals not observed. Basidia 4-celled, sphaeropedunculate, 6–10 × 4–7.3 µm; stipe up to 5 × 3–4 µm, basidiospores globose, ovoid to allantoid, (3.2–) 3.3–6.2 (–6.3) × (2.8–) 3.1–4.0 (–4.1) µm (n = 29/1), L = 5.00, W = 3.55, Q’ = (1.03–) 1.06–1.8 (–2.03), Q = 1.49.

Notes.– Two other species of *Protomerulius* were recorded in Brazil: *P. minor* (Möller) Spirin & Miettinen and *P. substuppeus*, both in the Atlantic Forest in the Northeast and South Brazil, respectively. *Protomerulius pedratalhadensis* is phylogenetically close to *P. substuppeus*, but the later differs by the sessile-pileate to effused-reflexed basidiomata, hyphal projection in the tubes absent, presence of context and crystal, basidia 7–9 × 6–7.5 µm and basidiospores (4.1–) 4.2–8.2 (–8.9) × (3.0–) 3.2–4.9 (–5.0) µm (Spirin & al., 2019). *Protomerulius minor* differs from *P. pedratalhadensis* by the hydnoid hymenophore, basidiospores broadly cylindrical to broadly ellipsoid, more rarely lacrymoid, (4.9–) 5.0–8.0 (–8.2) × (3.0–) 3.2–5.0 (–5.2) µm (Spirin & al., 2019).

DISCUSSION

In the present work, *Elmerina* has currently 14 species, with 11 of them having molecular data available. *Elmerina fragilis* F. Wu & Hai J. Li from China, *E. unguliformis* Corner from Malaysia, and *E. berkeleyi* (Sacc. & Cub.) Petch from Sri Lanka are the only species so far without molecular data (Petch, 1924, Corner, 1989, Wu & al. 2015 a) and their taxonomic position still need to be verified to confirm their placement in the genus.

Elmerina minipora, E. strigosa and *E. obtusispora* were originally described in *Aporpium*, using specimens collected in China and Japan (Sotome & al., 2014; Huang & al., 2017; Wu & al. 2017). Based in the original descriptions, all the species are similar to *Elmerina.* Furthermore, phylogenetic analyses provided in the mentioned studies already placed the three species close to other *Elmerina*.Using the definition of the *Elmerina* clade provided by Malysheva & al. (2018), here we confirm their correct systematic position and provide the new combinations.

Only three species of *Elmerina* are reported to Neotropics: *E. dimidiata*, originally from Guadeloupe and also recorded to Belize, and the new species *E. santanaensis* and *E. brasiliensis*. *Elmerina dimidiata* was reported to South Brazil by Gerber & Loguercio - Leite (2000). However, based in the basidiospores measures given by the authors [(4.0–)4.5–6.0 × 3.0–3.5(–4.0)], it may actually represent *E. santanaensis* .

Protomerulius was described using poroid specimens collected in South Brazil (Möller 1895).Later, Spirin & al. (2019) have redefined the genus to also include hydnoid and smooth species.Currently, 12 species are confirmed in the genus based in

morphological and molecular data. So far, *P. javensis* Burt from Indonesia is the only species without molecular data available and its position in the genus still must be confirmed. Three species are recorded to the Neotropics: *P. substuppeus*, *P. minor* and *P. pedratalhadensis*, well delimited by morphological and molecular data.

CONCLUSION

Morphological features and phylogenetic analyses of the present work are in concordance to previous studies on the same genera, showing them as distinct lineages of poroid fungi in Auriculariales (Weiss & Oberwinkler 2001, Miettinen & al. 2012, Zhou & Dai 2013 and Sotome & al. 2014). In addition, based on the news species proposed to *Elmerina* and *Protomerulius*, some new unknown species should be recovered in the Neotropics when more collections are done. Recent studies about the Auriculariales haveused protein markers to improve resolution of some species complexes (Wu & al. 2015b, Spirin & al. 2018, 2019). Our results show that no additional marker is needed to delimit new species in *Elmerina* and *Protomerulius*, when allied to morphological data. However, support is only achieved in analyses of combined regions of ribossomal DNA, and the addition of other markers may contribute to a better Family delimitation.

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Table 1 — Collection information and GenBank accession numbers used in the present phylogenetic study. Newly generated sequences are written in bold

Legends Figures

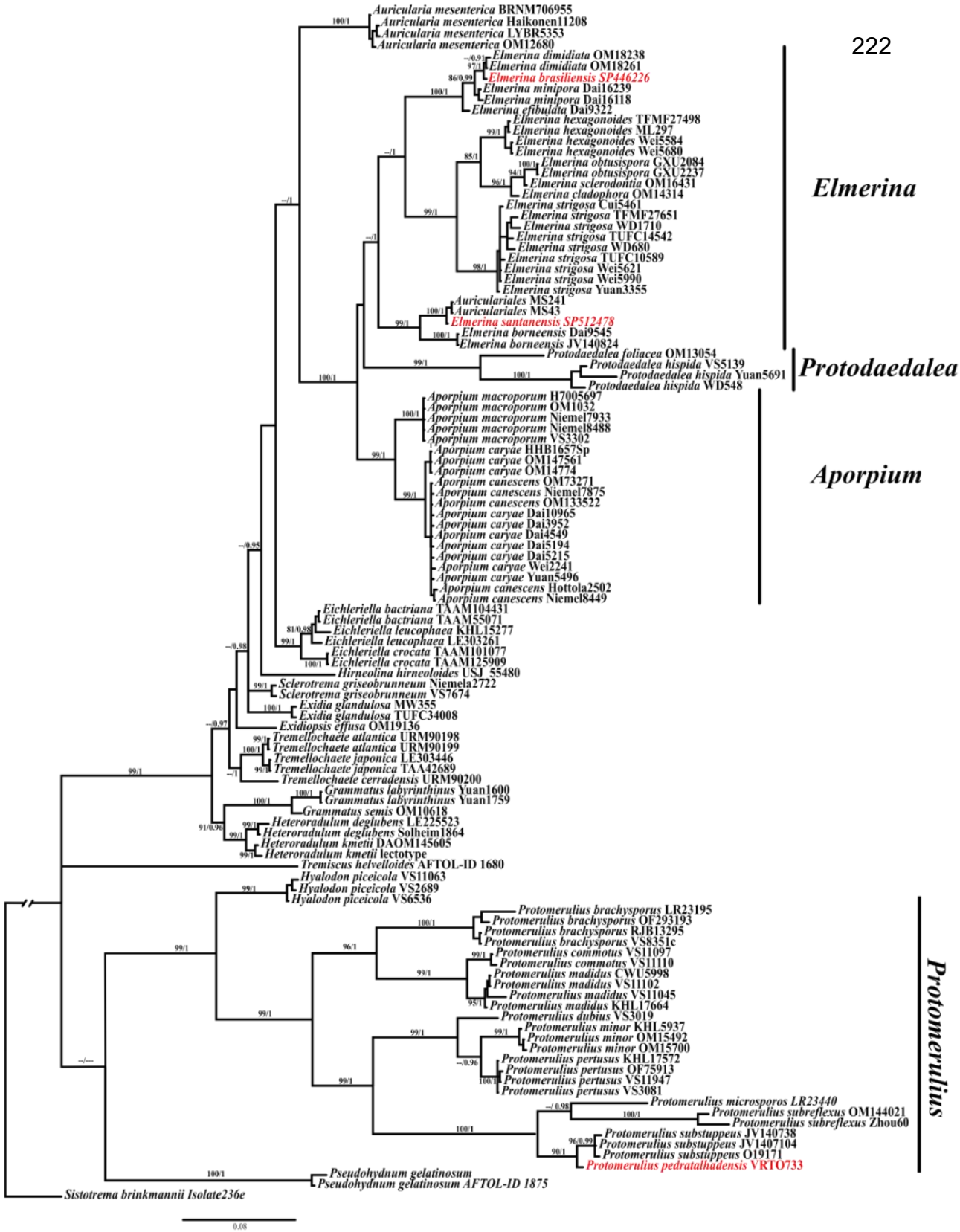

Fig. 1. — Phylogenetic reconstruction using ITS+28S rDNA topology from BI analysis showing the Auriculariales lineages. All sequences generated in this study are indicated in blue bold. The voucher or GenBank number is given for each specimen.

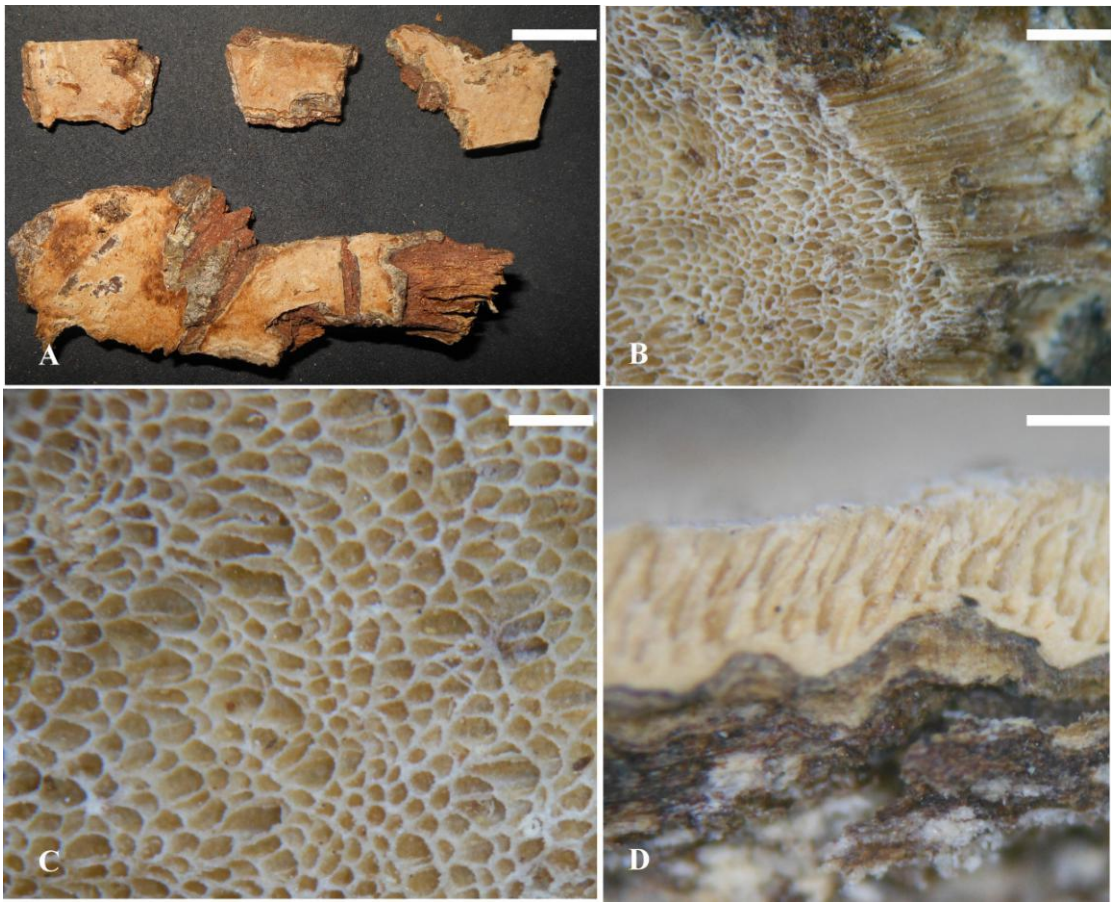

Fig. 2. — *Elmerina santanensis* Alvarenga & Westphalen **sp. nov.** SP512478 (holotype). A, Basidiomata; B, Hymenophore; C, Angular tubes; D, Context absent. Scale bars: A, 1 cm; B-D 10 mm;

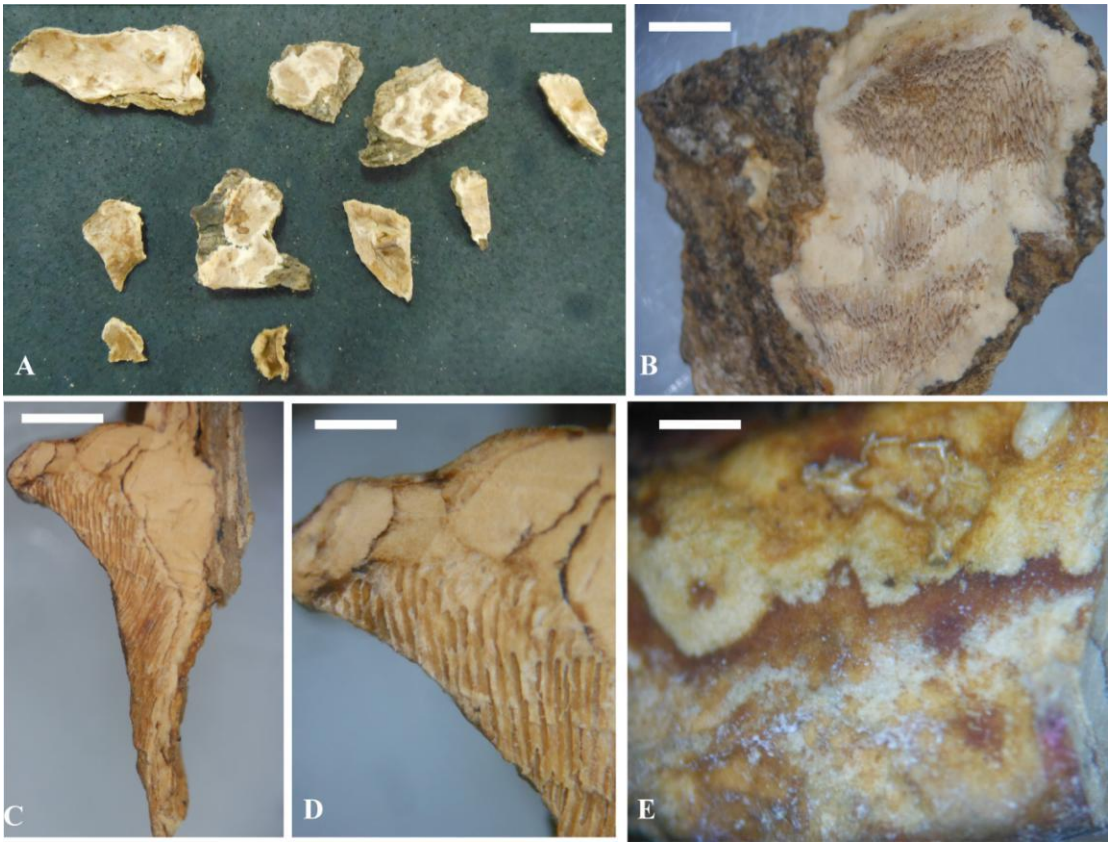

Fig. 3. — *Elmerina brasiliensis* Alvarenga & Westphalen **sp. nov.** SP446226 (holotype). A, Basidiomata; B, Hymenophore; C, Context and tubes ; D, Context with dark line; E, Pileal surface. Scale bars: A, 1 cm; B, 1 cm; C, 10 mm; D-E, 20 mm

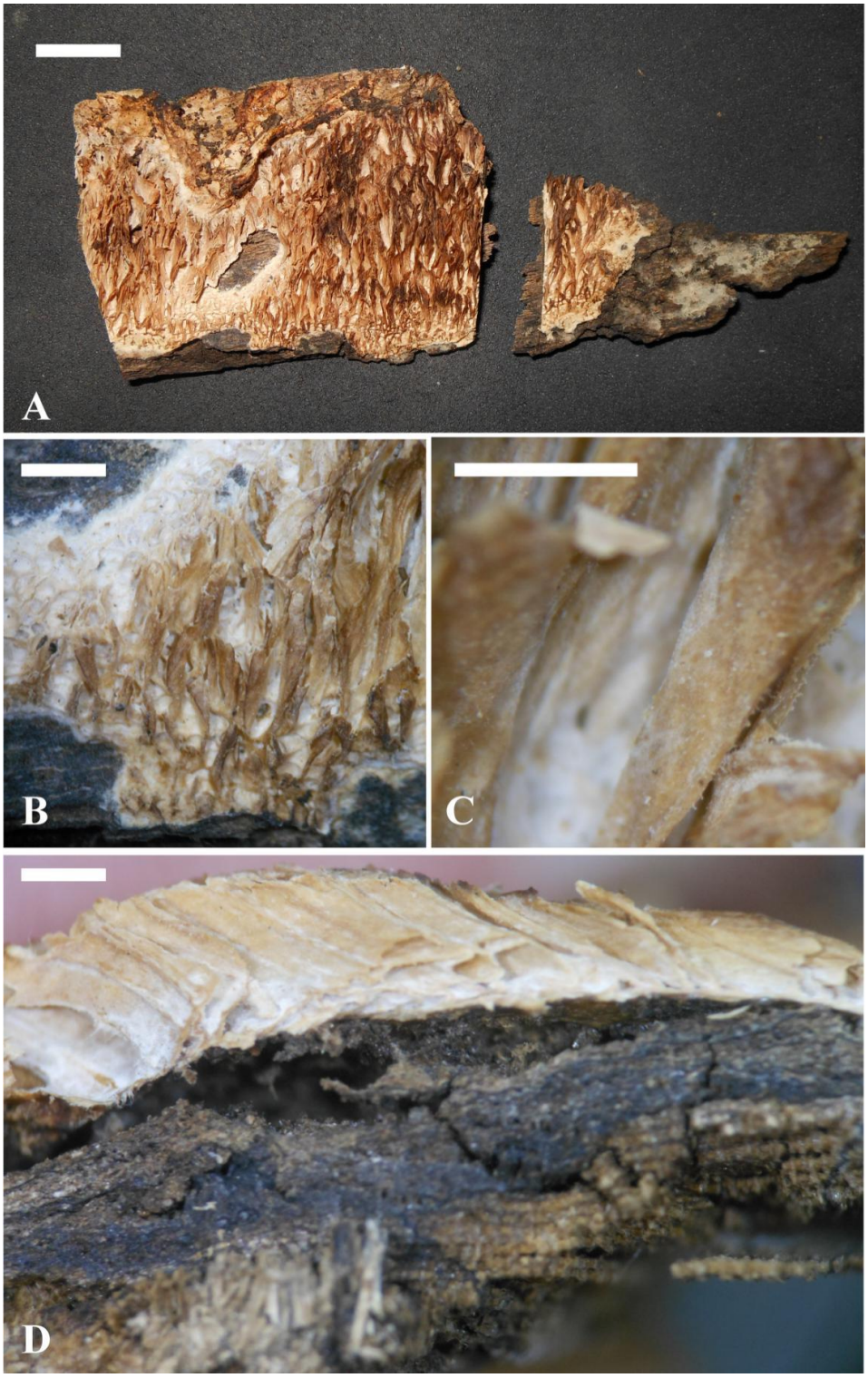

Fig. 4. — *Protomerulius pedratalhadensis* Alvarenga **sp. nov**. URM93459 (holotype). A, Basidiomata; B, Hymenophore; C, Tubes with hyphal projection D, Context absent. Scale bars: A, B, D, 1 cm; C, 10 mm;

APÊNDICE I – *CRYSTALLODON UMBRINUS* ALVARENGA & GIBERTONI GEN. ET SP. NOV., A RESUPINATE AURICULARIALES FROM BRAZIL SUBMETIDO À CRYPTOGAMIE MYCOLOGIE.

Crystallodon umbrinus Alvarenga & Gibertoni *gen. et sp. nov*., a resupinate Auriculariales from Brazil

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ABSTRACT

Samples recently collected in the Atlantic forest in Northeast Brazil were morphologically and genetically studied and could not be placed in already described species and genera of Auriculariales. The genus here proposed as *Crystallodon* Alvarenga includes, so far, the new species *C. umbrinus* Alvarenga & Gibertoni, both characterised by the presence of hyphal pegs surrounded by crystals. Detailed morphological description with illustrations and phylogenetic estimations based on combined analyses of nrITS and nrLSU (28S) sequences are provided.

KEY WORDS

Basidiomycota, Agaricomycetes, tropical forest, diversity, rDNA

RÉSUMÉ

Échantillons récemments collectés dans la Forêt Atlantique du Nord-Est du Brésil ont été étudiés morphologiquement et génétiquement et n'ont pas pu être placés dans des espèces et des genres déjà décrites d'Auriculariales. Le genre proposé ici come *Crystallodon* Alvarenga comprend, à ce jour là, la nouvelle espèce *C. umbrinus* Alvarenga & Gibertoni, toutes deux caractérisés par la présence des émergences entourées de cristaux. Une description morphologique détaillée avec des illustrations et des estimations phylogénétiques basées sur l'analyse combinée des séquences de nrITS et nrLSU (28S) sont fournies.

MOTS CLÉS

Basidiomycota, Agaricomycetes, forêts tropicaux, diversité, rDNA

INTRODUCTION

Auriculariales includes species with resupinate, effused-reflexed, hydnoid, cerebriform, coraloid and pileate basidiomata; thin or thick-walled basidia globose to cylindrical, cystida present or absent, and thin-walled basidiospores that germinate by tubes or producing conidia (Bodman 1952; Lowy 1971; Martin 1952). The common genera studied in Auriculariales are *Auricularia* Bull., *Heterochaete* Pat., *Exidia* Fr., *Eichleriella* Bres., and *Exidiopsis* (Bref.) A. Møller (Bodman 1952; Lowy 1971; Martin 1952; Wu *et al.* 2015; Malysheva & Spirin 2017; Spirin *et al.* 2019a, b).

The group of resupinate Auriculariales may have a smooth, tuberculate, hydnoid (in this case with sterile spines) or papillate hymenophore. This feature does not

represent a single lineage in Auriculariales, as genera may have species with different hymenophores (eg., *Adustochaete*, *Eichleriella*, *Protomerulius* Möller) (Alvarenga *et al.* 2019; Malysheva & Spirin 2017; Spirin *et al.* 2019b). The genera with sterile spines (hyphal pegs) are so far in *Eichleriella*, *Heterochaete*, *Heteroradulum* Lloyd ex Spirin & Malysheva, *Protomerulius*, *Protodontia* Höhn., *Proterochaete* Spirin & V. Malysheva, *Adustochaete* Alvarenga & K.H. Larss., and *Metulochaete* Alvarenga (Bodman 1952; Malysheva & Spirin 2017; Alvarenga *et al.* 2019, Spirin *et al.* 2019a, b).

Recently, several genera and species of resupinate Auriculariales with hyphal pegs have been described or better delimited using morphological and DNA analyses, showing the hidden diversity of this group (Alvarenga *et al.* 2019, Malysheva & Spirin 2017, Spirin *et al.* 2019a, b). During a survey in fragments of the Atlantic Rain Forest, interesting specimens of resupinate Auriculariales with hyphal pegs covered by crystals were collected and found to be a new species of an undescribed genus.

MATERIAL AND METHODS

Sampling and morphology

The specimens were collected during the rainy season of 2018, in two fragments of the Atlantic Rain Forest in the state of Pernambuco: Reserva Biológica de Saltinho (9° 16' 37"S, 35° 10' 46"W), and an urban, secondary forest belonging to the Army (8°00'06.4"S, 34°51'26.1"W). Microscopical studies were made with preparations mounted in 3% KOH + 1% phloxine and Cotton Blue. Measures followed Miettinen *et al.* (2012). The following abbreviations were used in morphological descriptions and tables: L = mean spore length, W = mean spore width, Q' = length/width ratio, Q = mean length/width ratio, n = number of measurements per specimens. Colour followed Kornerup & Wanscher (1978) and the literature used for identification was

Bodman (1952), Viégas (1945), Lowy (1971, 1976, 1977, 1987) and Roberts (2003, 2006, 2008). The holotype and paratypes were deposited in the Herbarium of Departamento de Micologia, UFPE (URM), and the isotype in the Instituto de Botânica de São Paulo (SP) (Thiers 2018).

DNA extraction, PCR, sequencing and phylogenetic analyses

DNA extraction was performed with the DNeasy Plant Mini Kit (Qiagen), following the manufacturer's protocol. Polymerase chain reaction (PCR) was performed with DNA extracted targeting the nuc rDNA internal transcribed spacers (ITS1-5.8S-ITS2 = ITS) and nuc rDNA LSU (28S): for ITS region we used the primers ITS1F-ITS4 (White *et al.* 1990; Gardes and Bruns 1993), LR0R and LR5 (Vilgalys and Hester 1990) for the D1/D2 domains of the nuc 28S rDNA. The attempts to amplify TEF and RBP2 of the four samples were not successful. The attempts to amplify TEF and RBP2 of the four samples were not successful.

Polymerase chain reaction (PCR) products were purified applying the ExoSAP-IT (Thermo Fisher Scientifc). The sequences were provided by the Platafoma Tecnológica de Genômica e Expressão Gênica do Centro de Biociências (UFPE).

The assembly and editing of sequences were performed in Staden Package 2.0 software (Staden *et al.* 1998) and MEGA 6 (Tamura *et al.* 2013). Sequences were compared with sequences deposited in GenBank (https://www.ncbi.nlm.nih.gov/genbank/). Sequences generated for this study were deposited in GenBank.

Following Malysheva *et al.* (2018), we used *Sistotrema brinkmannii* (Bres.) J. Erikss. (JX535170\JX535169) as out-group for the analyses. Sequence alignments were constructed using the online version of MAFFT (Katoh and Toh 2008), using the Q-

INS-I option with default parameters includes representatives of the genera in Auriculariales (Table 1).

Phylogenetic reconstructions were inferred by Maximum Likelihood (ML) and Bayesian Inference (BI). The best evolutionary model was estimated for each dataset based on Akaike Information Criterion (AIC) using ModelTest on TOPALi 2.5. In ML and BI analyses for ITS+28S datasets, the model employed was GTR + G+I.

ML analysis was run with PhyML (Guindon and Gascuel 2003), with one hundred rapid bootstrap replicates, BI analysis was performed using MrBayes (Ronquist and Huelsenbeck 2003) for two independent runs, each with four chains and run for 6 million generations, both analysis using the software TOPALi 2.5.

RESULTS

Phylogenetic analyses

Phylogenetic reconstruction using the nLSU+nITS combination produced an alignment with 1808 characters, including gaps, representing 26 genera already described in Auriculariales. ML and BI analyses returned trees with nearly congruent topologies and therefore only the BI tree is shown here (FIG. 1). The sequences from the studied specimens are recovered within one clade (bp = 93, pp = 1) that we interpret as a new lineage in Auriculariales. The new genus *Crystallodon* is represented so far by the generic type *Crystallodon umbrinus*.

TAXONOMY

Crystallodon Alvarenga **gen. nov.** (Figs 1, 2)

Mycobank number. – MB 832484

Systematic position.– Basidiomycota, Agaricomycetes, Auriculariales

Diagnosis.– Basidiomata annual, resupinate, effused, closely adnate, gelatinous to crustaceous. Margin adnate, fimbriate. Hymenial surface covered by sharp-pointed sterile spines (hyphal pegs) formed by a thin hyphal core and abundant crystals. Hyphal structure monomitc, hyphae clamped. Cystidia fusiform, cylindrical to often sinuous, some with refractive content. Hyphidia in hymenium, hyaline, thin-walled. Fertile hyphae, tortuous, forming 2–4 basidia at the apex, collapsed basidia often present. Basidia ellipsoid-ovoid, 4 celled, basidiospores cylindrical, slightly curved, with oil droplets in the cytoplasm. Phylogenetically, the genus represents a new lineage in Auriculariales and it is well delimited by three sequences of internal transcribed spacers (nITS) and four sequences of large subunit (nLSU-28S).

Type species.– *Crystallodon umbrinus* Alvarenga & Gibertoni

Etymology.– From '*crystallum'* (Lat., noun.) – crystal, and '*odon'* (Greek, noun) – teeth.

Notes.– Recently two new genera with hyphal pegs were proposed to Brazil, *Adustochaete* and *Metulochaete* (Alvarenga *et al.* 2019, Spirin *et al.* 2019b). *Crystallodon* differs from *Adustochaete* by the absence of hyphal pegs formed by a thick layer of subicular hypha and encrusted dendrohyphidia, and from *Metulochaete* due to the absence of hyphal pegs formed by metuloids. So far, *Crystallodon* is the only genus among the resupinate Auriculariales that has hyphal pegs formed by a thin core of hyphae covered by angular crystals.

Crystallodon umbrinus Alvarenga & Gibertoni **sp nov.** Figs (1, 2)

Mycobank number. – MB 832485

Systematic position.– Basidiomycota, Agaricomycetes, Auriculariales, *Crystallodon*

Holotype.– Brazil. Pernambuco, Olinda, Sétimo Grupo de Artilharia de Campanha (7° GAC), 16.VI.2018, Chikowski, R.S. (RC1609 – URM, isotype in SP). Genbank (ITS.– Submitted, LSU.–Submitted)

Etymology.– Umbrinus (Lat., adj.) – umber, dark-brown.

Additional Specimens Examined.– Brazil. Pernambuco, Olinda, Sétimo Grupo de Artilharia de Campanha (7° GAC), 16.VI.2018, Gibertoni, TB (TBG 4b, TBG BF-18001); Tamandaré, Reserva Biológica de Saltinho, 25.VI.2018, Xavier-Lima, V (VXLF166 – URM).

Diagnosis.– *Crystallodon umbrinus* is mainly morphologicaly characterized by resupinate, effused basidiomata, dark brown in the centre, brown-greyish towards the margin, margin adnate, fimbriate, hymenophore densely covered by sharp-pointed sterile spines (hyphal pegs) formed a thin hyphal core and abundant, angular crystals. Phylogenetically, the species is well delimited by internal transcribed spacers (ITS) and large subunit (LSU-28S).

Description.– Basidiomata annual, resupinate, effused, closely adnate, later fusing with close basidiomata, gelatinous when fresh, crustaceous when dried. Margin adnate, fimbriate, paler than hymenial surface (5C4). Hymenial surface gelatinized when fresh, light brown (5D5), densely covered by sharp-pointed sterile spines formed by hyphae and crystals, spines 75–355 × 35–40 μm, 5–6 per mm. Hyphal structure monomitc, hyphae clamped. Subiculum not clearly differentiable, subhymenium with hyphae hyaline, thin-walled, 1-2,5 μm, clamped. Cystidia fusiform, cylindrical to often sinuous, 45-50 × 4-7 μm, some with refractive content. Hyphidia abundant in hymenium, hyaline, thin-walled, 0.5-1 μm at apex. Fertile hyphae 1–3 μm, tortuous, forming 2–4 basida at the apex. Basidia ellipsoid-ovoid, 4 celled 10.7-18.6 × 4.8-8.2. Basidiospores cylindrical, slightly curved, (8–) 8.0–11.7 (–

12) × (3.7–) 4–6.1 (–6.6) µm, (n = 24/1), L =10,4, W =5.21, Q' = (2.4–) 1.64–2.65, Q =2.26, with oil droplets in the cytoplasm.

Notes.– *Crystallodon umbrinus* is easily recognized by the hyphal pegs formed by angular crystal and dark brown hymenophore. The presence of hyphal pegs covered by crystals may occur in different genera in Auriculariales (eg. *Adustochaete*, *Eichleriella*) (Alvarenga *et al.* 2019; Malysheva & Spirin 2017). Commonly, hyphal pegs are formed by thick-walled hyphae from subiculum, however, in *Crystallodon* they are formed by few subicular hyphae, covered by a dense crystal layer often apically branched.

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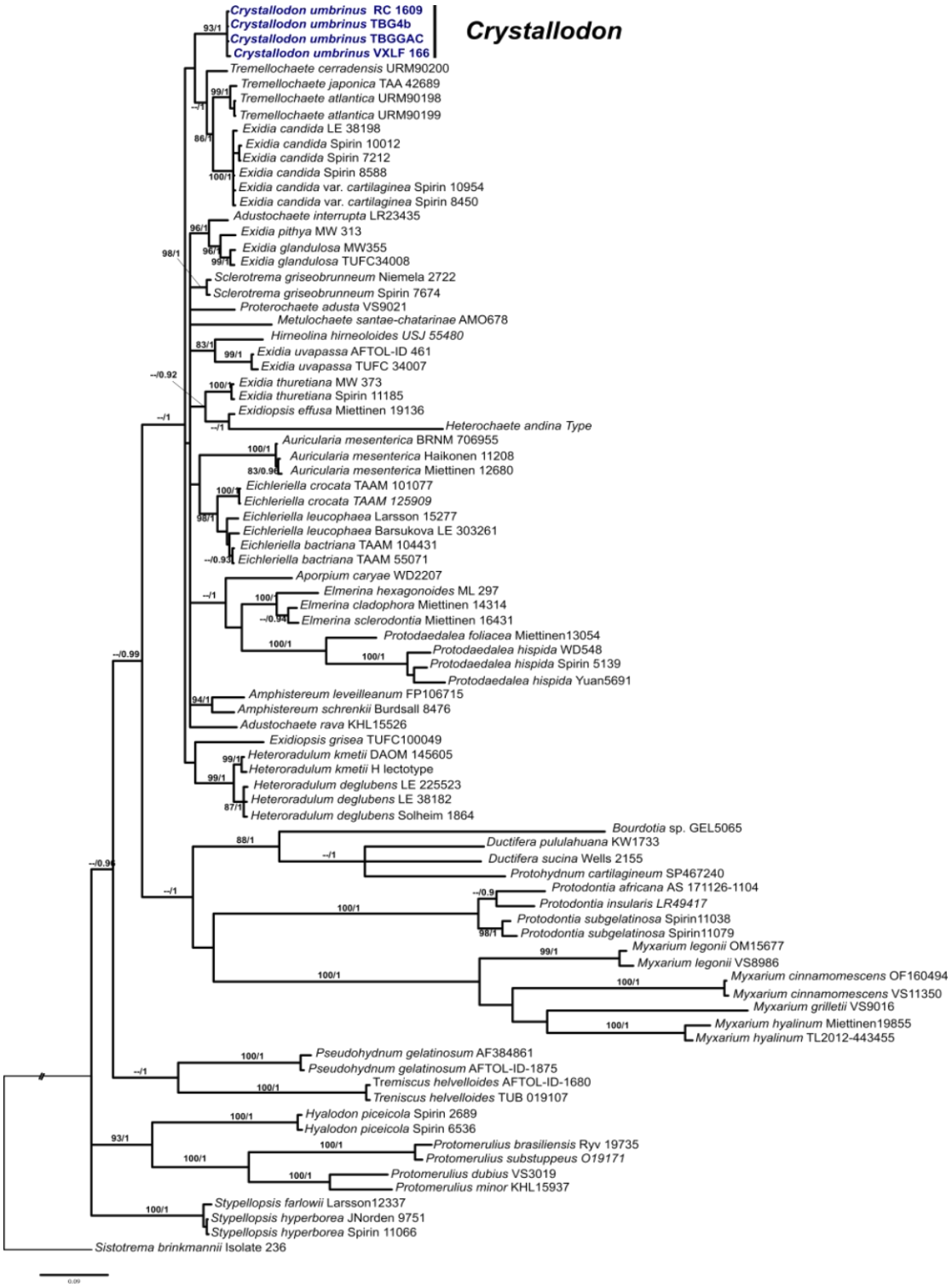

Fig. 1. — Phylogenetic reconstruction using ITS+28S rDNA topology from BI analysis showing the Auriculariales lineages. All sequences generated in this study are indicated in blue bold. The voucher or GenBank number is given for each specimen.

Support values (ML/BI) are given above the branches. Scale bar shows expected changes per site.

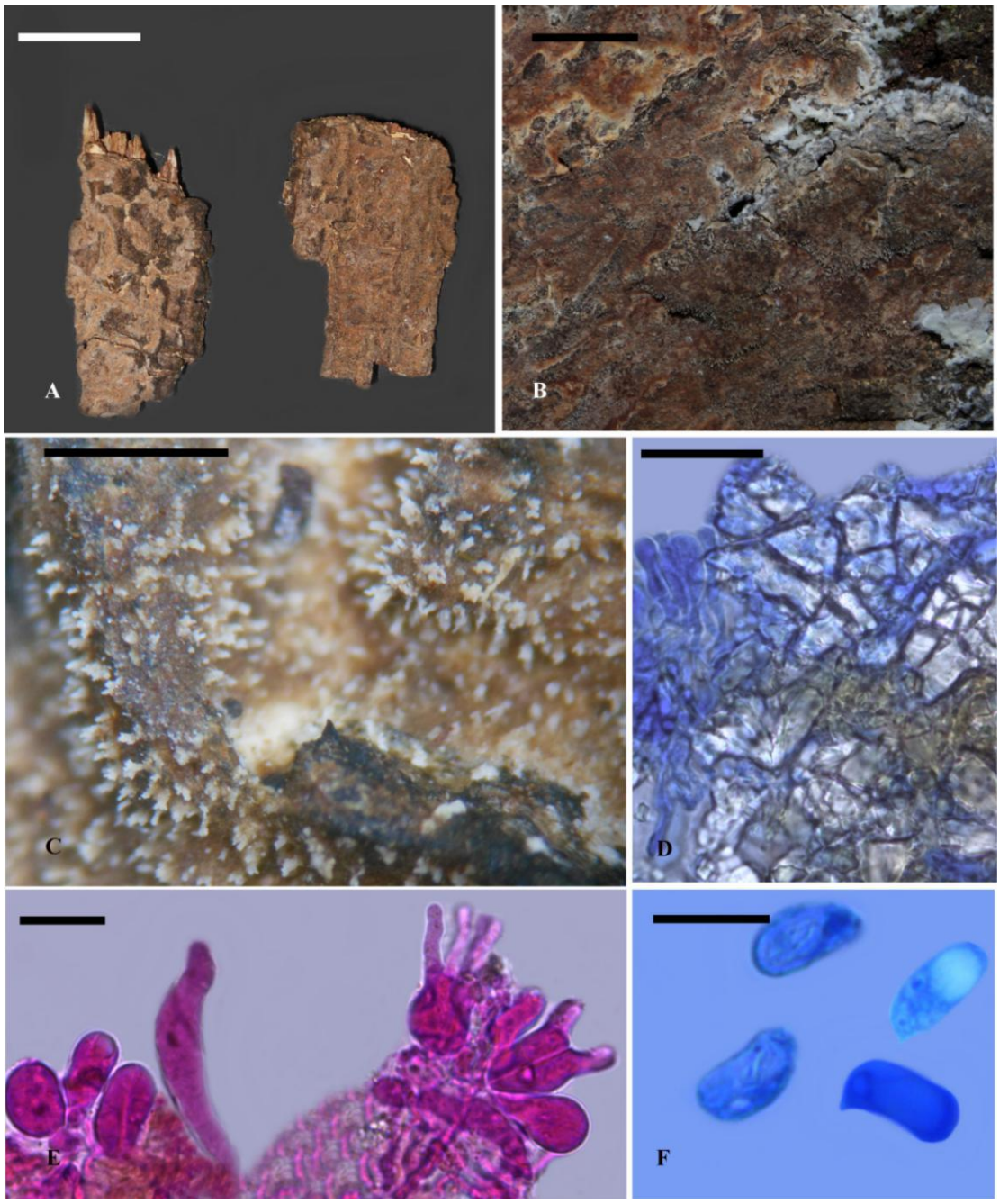

Fig. 2. — *Crystallodon umbrinus* Alvarenga & Gibertoni sp. nov. RC1609 (URM, holotype). A, Basidiomata; B, Hymenophore when fresh (VXL166); C, Hymenophore when dried (holotype); D, Crystal agglomeration; E, Basidia; F, Basidiospores.Scale bars: A, 2 cm; B, 1 cm; C, 10 mm; D, 50 µm; E-F, 10 µm.

Table 1 — Collection information and GenBank accession numbers used in the present phylogenetic study. Newly generated sequences are written in bold.

Taxa	Voucher	Country	GenBank accecion numbers		References
			nLSU	nITS	
Adustochaete interrupta	LR23435	Mexico	MK391527	MK391518	Alvarenga et al. (2019)
Adustochaete rava	KHL15526	Brazil	MK391526	MK391517	Alvarenga et al. (2019)
Amphistereum leveilleanum	Lentz FP 106715	USA	KX262168	KX262119	Malysheva & Spirin (2017)
Amphistereum schrenkii	Burdsall 8476	USA	KX262178	KX262130	Malysheva & Spirin (2017)
Aporpium caryae	WD 2207	Japan	AB871730	AB871751	Sotome et al. (2014)
Auricularia mesenterica	BRNM 706955	Czech Republic	KP729296	KP729278	Wu et al. (2015)
Auricularia mesenterica	Miettinen 12680	Switzerland	KP729304	KP729286	Wu et al. (2015)
Auricularia mesenterica	Haikonen 11208	United Kingdom	KP729305	KP729287	Wu et al. (2015)
Bourdotia sp.	GEL5065	-	AY635777	DQ200925	GenBank
Crystallodon umbrinus	**VXLF 166-URM93443**	Brazil	**MN475887**	**-**	**This study**
Crystallodon umbrinus	**RC 1609 - URM93444**	Brazil	**MN475888**	**MN475884**	**This study**
Crystallodon umbrinus	**TBG BF-18001- URM93445**	Brazil	**MN475889**	**MN475885**	**This study**

Taxa	Voucher	Country	GenBank accecion numbers		References
			nLSU	nITS	
Crystallodon umbrinus	**TBG 4b - URM93446**	Brazil	**MN475890**	**MN475886**	**This study**
Ductifera pululahuana	KW 1733	USA	AF291315	-	Weiss & Oberwinkler (2001)
Ductifera sucina	Wells 2155	USA	AF291316	-	Weiss & Oberwinkler (2001)
Eichleriella bactriana	TAAM 55071	Turkmenistan	KX262170	KX262121	Malysheva & Spirin (2017)
Eichleriella bactriana	TAAM 104431	Uzbekistan	KX262186	KX262138	Malysheva & Spirin (2017)
Eichleriella crocata	TAAM 101077	Russia	KX262147	KX262100	Malysheva & Spirin (2017)
Eichleriella crocata	TAAM 125909	Russia	KX262167	KX262118	Malysheva & Spirin (2017)
Eichleriella leucophaea	Barsukova LE 303261	Russia	KX262161	KX262111	Malysheva & Spirin (2017)
Eichleriella leucophaea	Larsson 15277	Spain	KX262164	KX262115	Malysheva & Spirin (2017)
Elmerina cladophora	Miettinen 14314	Indonesia	MG757509	MG757509	Malysheva el al. (2018)
Elmerina hexagonoides	ML 297	Malaysia	AB871735	AB871754	Sotome et al. (2014)
Elmerina sclerodontia	Miettinen 16431	Malaysia	MG757512	MG757512	Malysheva el al. (2018)
Exidia candida	LE 38198	Canada	KY801896	KY801871	Spirin et al (2018)
Exidia candida	Spirin 8588	USA	KY801895	KY801870	Spirin et al (2018)
Exidia candida	Spirin 10012	USA	KY801890	KY801865	Spirin et al (2018)
Exidia candida	Spirin 7212	Russia	KY801891	KY801866	Spirin et al (2018)

Taxa	Voucher	Country	GenBank accecion numbers		References
			nLSU	nITS	
Exidia candida var. cartilaginea	Spirin 8450	USA	KY801900	KY801875	Spirin et al (2018)
Exidia candida var. cartilaginea	Spirin 10954	Russia	KY801901	KY801876	Spirin et al (2018)
Exidia glandulosa	MW355	Germany	AF291319	AF291273	Weiss & Oberwinkler (2001)
Exidia glandulosa	TUFC34008	Japan	AB871742	AB871761	Sotome et al. (2014)
Exidia pithya	MW 313	Germany	AF291321	AF291275	Weiss & Oberwinkler (2001)
Exidia thuretiana	Spirin 11185	Norway	KY801914	KY801889	Weiss & Oberwinkler (2001)
Exidia thuretiana	MW 373	Germany	AF291324	AF291278	Weiss & Oberwinkler (2001)
Exidia uvapassa	AFTOL ID 461	JAPAN	AY645056	DQ241776	GenBank
Exidia uvapassa	TUFC 34007	Japan	AB871744	AB871763	GenBank
Exidiopsis effusa	Miettinen 19136	Finland	KX262193	KX262145	Malysheva and Spirin (2017)
Exidiopsis grisea	TUFC100049	Japan	AB871746	AB871765	Sotome et al. (2014)
Heterochaete andina	Lagerheim FH	Ecuador	KX262187	-	Malysheva and Spirin (2017)
Heteroradulum deglubens	LE 38182	Sweden	KX262162	KX262112	Malysheva & Spirin (2017)
Heteroradulum deglubens	LE 225523	Estonia	KX262163	KX262113	Malysheva & Spirin (2017)

Taxa	Voucher	Country	GenBank accecion numbers		References
			nLSU	nITS	
Heteroradulum deglubens	Solheim 1864	Norway	KX262181	KX262133	Malysheva & Spirin (2017)
Heteroradulum kmetii	H lectotype	Slovakia	KX262173	KX262124	Malysheva & Spirin (2017)
Heteroradulum kmetii	DAOM 145605	Canada	KX262183	KX262135	Malysheva & Spirin (2017)
Hirneolina hirneoloides	USJ 55480	Costa Rica	AF291334	AF291283	Weiss & Oberwinkler (2001)
Hyalodon piceicola	Spirin 2689	Russia	MG735422	MG735414	Malysheva el al. (2018)
Hyalodon piceicola	Spirin 6536	Russia	MG735421	MG735413	Malysheva el al. (2018)
Metulochaete santae-chatarinae	AMO 678	Brazil	MK480575	MK484065	Spirin et al. (2019b)
Myxarium cinnamomescens	O F160494	Norway	KY801909	KY801882	Spirin et al. (2018)
Myxarium cinnamomescens	VS 11350	Russia	MK098936	MK098888	Spirin et al. (2019)
Myxarium grilletii	VS9016	Canada	MK098944	MK098896	Spirin et al. (2020)
Myxarium hyalinum	TL2012 443455	Denmark	KY801907	KY801880	Spirin et al. (2021)
Myxarium hyalinum	Miettinen 19855	Germany	KY801915	-	Spirin et al. (2022)
Myxarium legonii	VS 8986	Canada	MK098947	MK098899	Spirin et al. (2023)
Myxarium legonii	OM 15677	USA	MK098948	MK098901	Spirin et al. (2024)
Proterochaete adusta	VS9021	Canada	MK391528	MK391520	Alvarenga et al. (2019)

Taxa	Voucher	Country	GenBank accecion numbers		References
			nLSU	nITS	
Protodaedalea foliacea	Miettinen 13 054	Indonesia	MG757507	MG757507	Malysheva et al. (2018)
Protodaedalea hispida	Spirin 5139	Russia	MG757510	MG757510	Malysheva et al. (2018)
Protodaedalea hispida	WD 548	Japan	AB871749	AB871768	Sotome et al. (2014)
Protodaedalea hispida	Yuan 5691	China	JQ764644	JQ764666	Zhou & Dai (2013)
Protodontia africana	AS 171126 1104	Kenya	MK098973	MK098978	Spirin et al. (2019a)
Protodontia insularis	LR 49417	Saint Helena	MK098968	MK098924	Spirin et al. (2019a)
Protodontia subgelatinosa	VS 11038	Norway	MK098969	MK098926	Spirin et al. (2019a)
Protodontia subgelatinosa	Spirin 11079	Norway	MG735420	MG735412	Malysheva et al. (2018)
Protohydnum cartilagineum	SP467240	Brazil	MG735426	MG735419	Malysheva et al. (2018)
Protomerulius brasiliensis	Ryv 19735	Argentina	AF291359	-	Spirin et al. (2019b)
Protomerulius dubius	VS 3019	Russia	MK480553	MK484041	Spirin et al. (2019b)
Protomerulius minor	KHL 15937	Brazil	MK480569	MK484060	Spirin et al. (2019b)
Protomerulius substuppeus	O 19171	-	JQ764649	JX134482	Spirin et al. (2019b)
Pseudohydnum gelatinosum	F14063	-	AF384861	AF384861	Weiss & Oberwinkler (2001)
Pseudohydnum gelatinosum	AFTOL ID1875	-	DQ520094	DQ520094	Lutzoni et al. (2004)
Sclerotrema griseobrunneum	Niemela 2722	Canada	KX262192	KX262144	Malysheva & Spirin (2017)

Taxa	Voucher	Country	GenBank accecion numbers		References
			nLSU	nITS	
Sclerotrema griseobrunneum	Spirin 7674	Russia	KX262188	KX262140	Malysheva & Spirin (2017)
Sistotrema brinkmannii	Isolate 236 e	Russia	JX535170	JX535169	GenBank
Stypellopsis farlowii	Larsson 12337	USA	MG857099	MG857095	Spirin et al. (2018)
Stypellopsis hyperborea	J Norden 9751	Norway	MG857101	MG857097	Spirin et al. (2018)
Stypellopsis hyperborea	Spirin 11066	Norway	MG857102	MG857096	Spirin et al. (2018)
Tremellochaete atlantica	URM90199	Brazil	MG594383	MG594381	Phookamsak R. et al. (2019)
Tremellochaete atlantica	URM90198	Brazil	MG594384	MG594382	Phookamsak R. et al. (2019)
Tremellochaete cerradensis	URM90200	Brazil	URM90200	URM90200	Alvarenga et al. (2019)
Tremellochaete japonica	TAA 42689	Russia	AF291320	AF291274	Weiss & Oberwinkler (2001)
Tremiscus helvelloides	AFTOL ID1680	-	DQ520100	DQ520100	Lutzoni et al. (2004)
Treniscus helvelloides	TUB 019107	-	FJ644523	-	Weiss & Oberwinkler (2001)

APÊNDICE J – ON PROTOMERULIUS AND HETEROCHAETELLA (AURICULARIALES, BASIDIOMYCOTA) PULICADO NA MYCOLOGICAL PROGRESS, 18, (9): 1079–1099 DOI:10.1007/S11557-019-01507-0

On *Protomerulius* and *Heterochaetella* (Auriculariales, Basidiomycota)

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Abstract

Taxonomy of *Protomerulius* and *Heterochaetella* is revised based on DNA data and morphological evidence, and their type species, *P. brasiliensis* and *H. dubia*, are proved to be congeneric. As a consequence, *H. dubia* and the sibling species, of which four are described as new, are placed in *Protomerulius*. *Heterochaete microspora* is also combined in *Protomerulius*, and the genus concept is redefined to encompass effused species with smooth or spiny hymenophore and monomitic hyphal structure. *Psilochaete multifora*, gen. and spec. nov., is a distant relative of *Protomerulius* spp. found in Norway. *Heterochaetella cystidiophora* re-collected in Brazil does not belong to the *Protomerulius – Heterochaetella* lineage, and it is separated in *Metulochaete*, gen. nov.

Key words: heterobasidiomycetes, phylogeny, polypores, taxonomy

Introduction

Protomerulis brasiliensis Möller was described from Brazil as a poroid fungus with septate basidia (Möller 1895). This was the first record of taxa with tubular hymenophore among the so-called jelly fungi (heterobasidiomycetes). Möller's genus and species remained almost forgotten until Friedrichsen (1977) published a list of his collections survived? in Hamburg. Afterwards, Bandoni et al. (1982) studied one of the authentic collections labeled as *P. brasiliensis* and published its detailed description as well as microscopic drawings. Thus *Protomerulius* appeared at the hotspot of discussion concerning generic rearrangement of the poroid heterobasidiomycetes (Setliff & Ryvarden 1982, Ryvarden 1991, Reid 1992) because it turned out to be much older than other generic names in this group (i.e. *Elmerina* Bres., *Aporpium* Bondartsev & Singer and *Protodaedalea* Imazeki). However, no satisfactory solution for splitting this complex had been proposed on the basis of morphological methods.

Weiss and Oberwinkler (2001) included some modern collections of *Protomerulius* spp. in the phylogenetic study of the *Auriculariales*. According to their results, *Protomerulius* forms a strongly supported clade together with corticioid (*Heterochaetella brachyspora* Luck-Allen), hydnoid (*Protohydnum piceicola* Kühner) and clavarioid (*Tremellodendropsis* spp.) taxa, and it is not closely related to the other poroid representatives of the order. While the latter ones (i.e. *Aporpium*, *Elmerina* and *Protodaedalea*), as well as *Protohydnum* were rather extensively studied in the last years (Miettinen et al. 2012, Zhou & Dai 2013, Sotome et al. 2014, Vlasák et al. 2016, Malysheva et al. 2018), only a few new sequences were generated for *Protomerulius* and *Heterochaetella*, and therefore they stayed unresolved. In the present study, we revise generic and species-level taxonomy of *Protomerulius* and related taxa, and provide new information about *Heterochaetella cystidiophora* Lowy.

Material and methods

Morphological study. Type specimens and collections from herbaria H, O, HBG, PC, TAAM, NY, K, BPI, URM, LE, GB, CWU, MAN, as well as from private herbarium of the author JV were studied. Herbarium acronyms are given according to Thiers (2019). Microscopic routine follows Miettinen et al. (2018). All measurements were made from microscopic slides mounted in Cotton Blue, using phase contrast and oil immersion lens (Leitz Diaplan microscope, × 1250 amplification). The following abbreviations are used in morphological descriptions: L – mean basidiospore length, W – mean basidiospore width, Q' – length / width ratio, Q – mean length / width ratio, n – number of measurements per specimens measured.

Molecular techniques. In total, 44 specimens were selected for molecular sampling (Table 1). DNA was extracted from small fragments of dried basidiomata using the NucleoSpin Plant II Kit (Macherey-Nagel GmbH & Co. KG) according to the manufacturer's protocols, without modification. The following primers were used for amplification and sequencing: ITS1-ITS4 (White et al. 1990; Gardes & Bruns 1993) for the ITS1-5.8S-ITS2 fragment; JS1-LR5 (Vilgalys & Hester 1990; Landvik 1996) for part of nrLSU region; EF1-983F and EF1-1567R for approximately 500-600bp of *tef1* (Rehner & Buckley 2005). PCR products were purified applying the GeneJET Gel Extraction Kit (Thermo Scientific, Thermo Fisher Scientific Inc., MA, USA). Sequencing was performed with an ABI model 3130 Genetic Analyzer (Applied Biosystems, CA, USA). Raw data were edited and assembled in MEGA X (Kumar et al. 2018).
Molecular studies of some specimens were carried out at the Center for collective use of scientific equipment "Cellular and molecular technology of studying plants and fungi" (Komarov Botanical Institute, Russian Academy of Sciences, St. Petersburg).

Phylogenetic analyses. For this study, 35 nrITS, 30 nrLSU and 11*tef1* sequences were generated (Table 1). In addition to the newly generated sequences, 47 nrITS and 45 nrLSU were retrieved from the GenBank database (www.ncbi.nlm.nih.gov/genbank/). Sequences were aligned with the MAFFT version 7 web tool (http://mafft.cbrc.jp/alignment/server/) using the Q-INS-i option for nrITS anf nrITS+nrLSU datasets.
Phylogenetic reconstructions were performed with Maximum Likelihood (ML) and Bayesian Inference (BI) analyses. Before the analyses, the best-fit substitution model was estimated separately for all alignments based on the Akaike Information Criterion (AIC) using FindModel web server (http://www.hiv.lanl.gov/content/sequence/findmodel/findmodel.html). GTR model was chosen for all datasets. Maximum likelihood analysis was run on RAxML servers, v.0.6.0 (http://raxml-ng.vital-it.ch/#/) with one hundred rapid bootstrap replicates. BI analysis was performed with MrBayes 3.2.5 software (Ronquist et al. 2012), for two independent runs, each with 5 million generations for concatenated dataset (nrITS+nrLSU) and 10 million generations for nrITS and *tef1* datasets, under described model and four chains with sampling every 100 generations. To check for convergence of MCMC analyses and to get estimates of the posterior distribution of parameter values, Tracer v1.7.1 was used (Rambaut et al. 2018). We accepted the result where the ESS (Effective Sample Size) was above 200 and the PSRF (Potential Scale Reduction Factor) was close to 1. Newly generated sequences have been deposited in GenBank with corresponding accession numbers (Table 1). The alignments have been deposited in TreeBASE (S23966, S23967).

Specimens examined (sequenced collections are marked by asterisk)
Metulochaete sanctae-catharinae. Brazil. Acre: Cazumbá-Iracema Resex, hardwood, 30.I.2016 *Meiras-Ottoni AMO 0678** (URM 93055, H); Floresta Nacional Macauã, Amazon Forest, dead wood, I.2016 *Meiras-Ottoni A R22* (URM 93056, H).
Protomerulius brachysporus. Finland. Varsinaissuomi: Lohja, Osuniemi, *Picea abies*, 1.X.1937 *Laurila* (H ex HPP 1974). Uusimaa: Espoo, Glimsån, *P. abies*, 21.IX.1999 *Vehmaa 2600** (H). France. Aveyron: Causse Noir, *Juniperus* sp., 30.XI.1913 *Galzin 14648* (herb. Bourdot 13712) (PC), *Pinus* sp. (lectotypes of *H. dubia* f. *crassior* and f. *sphaerospora*, see below). Var: Toulon (holotype, see below). Kyrgyzstan. Naryn: Moldo Too, *Picea schrenkiana*, 31.VII.1967 *Raitviir* (TAAM 044584). Mexico. Tlaxcala: Parada don Conejo, coniferous wood, 21.IX.1985 *Ryvarden 23195** (O). Norway. Oslo: Bygdøy, Holsts veg, 19.XI.1972 *Høiland* (O F165304). Buskerud: Modum, Askerrudbekken, *P. abies*, 13.X.2008 *Hofton 08896** (O F293193). Hedmark: Ringsaker, Helgøya, softwood, 17.X.1981

Høgholen 409/81 (O F102104). Russia. Krasnoyarsk Reg.: Yermakovsky Dist., Lobanova, *Abies sibirica*, 26.VIII.1958 *Parmasto* (TAAM 009126). Primorie: Terney Dist., Sikhote-Alin Nat. Res., *Abies nephrolepis*, 30.IX.1979 *Parmasto* (TAAM 102746*). Slovenia: Prekmurje, Boreča, *Pinus nigra*, 23.III.1939 *Lindtner 4861* (H ex O). Sweden. Norrbotten: Boden, Blåkölen, *P. abies*, 18.IX.2010 *J. Nordén 6743** (O). USA. Washington: Pierce Co., Pack Forest, *Thuja plicata* (bark of living branch), 10.X.2014 *Spirin 8351c** (H).

Protomerulius commotus. Norway. Vestfold: Larvik, Jordstøyp i Kvelde, *Ulmus glabra*, 15.IX.2016 *Spirin 11097** (O, holotype), *Spirin 11110** (O).

Protomerulius dubius. Estonia. Pärnumaa: Lääneranna, Hanila, very rotten log, 28.VI.1963 *Parmasto* (TAAM 016488). Finland. Sipoo: Östersundom, *Alnus glutinosa*, 2.VIII.1996 *Saarenoksa 14396** (H). France. Aveyron (lectotype, see below). Russia. Adygea: Maykop Dist., Guzeripl, *Fagus sylvatica*, 17.IX.2003 *Kotiranta 22589* (H). Nizhny Novgorod Reg.: Lukoyanov Dist., Razino, *Populus tremula*, 18.VIII.2009 *Spirin 3019** (H).

Protomerulius hebes. Ethiopia. Oromia: Arssi, Munessa Forest, hardwood, 15.VII.1990 *Ryvarden 28406** (O, holotype).

Protomerulius madidus. Estonia. Valgamaa: Urgemägi, *Fraxinus excelsior*, 14.IX.2015 *Spirin 9845** (H). Norway. Vestfold: Larvik, Jordstøyp i Kvelde, *Ulmus glabra*, 15.IX.2016 *Spirin 11094**, *11102**, *11108** (O), 30.IX.2018 *Spirin 12537* (O). Akershus: Asker, Esvika, rotten wood, 30.IX.2017 *Larsson 17664** (O), *U. glabra*, 30.IX.2017 *Spirin 11671** (O), Stokkerelva at Åstaddammen, *U. glabra*, 28.IX.2018 *Spirin 12434* (O). Oslo. Bygdøy, Dronningberget, rotten wood, 30.IX.2017 *Larsson 17673* (O). Buskerud: Lier, Stokkerinden, *U. glabra*, 29.IX.2018 *Spirin 12492** (holotype, see below), *Spirin 12482*, *12494* (O), *Fraxinus excelsior*, 29.IX.2018 *Spirin 12485* (O). Hedmark: Stange, Rotlia, *F. excelsior*, 26.IX.2018 *Spirin 12422, 12425** (O). Oppland: Nord-Fron, Liadalane Nat. Res., *Alnus incana*, 12.IX.2016 *Spirin 11045** (O), *Spirin 11052* (O), 29.IX.2017 *Spirin 11641** (O), *Betula pubescens*, 12.IX.2016 *Spirin 11053** (O). Sogn og Fjordane: Luster, Loi, hardwood, 8.IX.2000 *Roberts* (O F146398). Møre og Romsdal: Nesset, Eikesdalen, *U. glabra*, 11.X.2011 *B. Nordén 14-5663* (O F251651), 27.IX.2017 *Spirin 11588**, *11589, 11599, 11604* (O), *11590*, *11591* (infected by *Achroomyces arachidispora*) (O), 28.IX.2017 *Spirin 11632* (O); Sunndal, Knutsliøyan, *U. glabra*, 15.IX.2014 *Svantesson* (O F75904). Ukraine. Kharkov Reg.: Izyum Dist., Spivakivka, *A. glutinosa*, 6.XI.2010 *Akulov & Ordynets* (CWU 5998*).

Protomerulius microsporus. Mexico. Veracruz: Córdoba, Motzorongo, 15.I.1910 *Murrill 990* (NY 00738344, holotype), *Murrill 995* (NY 00738343, paratype); Barranca de Pescado, hardwood, 26.IX.1985 *Ryvarden 23440** (O).

Protomerulius minor. Brazil. Pernambuco: Jaqueira, Frei Caneca, hardwood, 19.IV.2013 *Larsson 15937** (O, epitype of *Stypella minor*). USA. Arkansas: Marion Co., Buffalo Point, 25.X.2013 *Miettinen 17461** (H). Massachusetts: Worcester Co., Worcester, 1.XI.2014 *Miettinen 19093.1* (H). New York: Catlin Co., Arbutus Lake, 14.VIII.2012 *Miettinen 15492** (H), 18.VIII.2012 *Miettinen 15700** (H). North Carolina: Blue Ridge Assembly, 30.IX.2015 *Miettinen 19586** (H). Tennessee: Sevier Co., Gatlinburg, Ramsey Cascades trail, decayed wood, 13.VII.2004 *Larsson 12173, 12185* (GB), 30.IX.2015 *Miettinen 19584.6* (H). Virginia: Alleghany Co., George Washington Nat. Forest, 5.IX.1940 *Martin 5096* (NY 00738341).

Protomerulius pertusus. Norway. Møre og Romsdal: Nesset, Eikesdalen, *Ulmus glabra*, 16.IX.2014 *Svantesson* (O F75913*, holotype), decayed wood, 28.IX.2017 *Larsson 17572** (O). Russia. Nizhny Novgorod Reg.: Lukoyanov Dist., Sanki, *Quercus robur*, 19–21.VIII.2009 *Spirin 3081**, *3149** (H), *Corylus avellana*, 21.VII.2018 *Spirin 11947** (H).

Protomerulius subreflexus. Indonesia. Papua Barat: Manokwari, Saukorem, fallen hardwood branch, 4.XI.2010 *Miettinen 14402.1** (MAN, H). Philippines. Luzon (lectotype of *Polystictus subreflexus*, see below). OM 5642*, 14392, 9144, 13695*, 14379

Protomerulius substuppeus. Argentina. Missiones: Iguazu Nat. Park, hardwood, 1.III.1982 *Ryvarden 19711* (O, H). Brazil. Paraná: Curitiba, Colégio Medianeira, hardwood, 13.V.1989 *de Meijer 1247* (O, H). Santa Catarina: Blumenau, *Jacaratia dodecaphylla* (recently fallen branches), 1891–1893 *Möller 23* (HBG, lectotype of *P. brasiliensis*), *Möller 91* (HBG, as *P. brasiliensis*); without exact locality, 1874, *Trail 123* (lectotype of *Polyporus substuppeus*, see below). Costa Rica. Alajuela: Carara Nat. Park, hardwood, 26–27.VII.2014 *Vlasák 1407/20, 1407/38*, 1407/41* (H, JV). Guanacaste: Río Tempisque, hardwood, 31.VII.2014 *Vlasák 1407/104** (H, JV); Santa Rosa, hardwood, 18.X.1996

Lindblad 2105-B (O, H), 1.VII.1997 *Lindblad 3269-A** (O, H). Puntarenas: Monteverde, Santa Elena, 29.VII.2014 *Vlasák 1407/53* (H, JV). Jamaica. Trewlany: Windsor Cave, dead wood, 12.VI.1999 *Ryvarden 41683** (O, H). Puerto Rico. San Sebastián: Guajataca State Forest, hardwood, 26.VI.1996 *Ryvarden 39093** (O, H). Uganda. Kabarole: Kibale Forest Nat. Park, rotten log, 9.IX.2002 *Ipulet F483** (O, H). USA. US Virgin Islands: St. John, hardwood, IX.2004 *Vlasák 0409/10* (JV). *Psilochaete multifora*. Norway. Møre og Romsdal: Nesset, Eikesdalen, *U. glabra*, 27.IX.2017 *Spirin 11596** (O, holotype).

Results

Three datasets were prepared for the present study: (1) nrITS + nrLSU dataset used to reconstruct a general topology of the *Auriculariales*, with special emphasis on *Protomerulius* and *Heterochaetella* spp., (2) nrITS and (3) *tef1* datasets supporting species concepts in the genus *Protomerulius* as redefined below.

1. nrITS + nrLSU dataset. The final alignment contained 1646 characters (including gaps). The overall topologies of the ML and BI trees were identical and confirmed that *Protomerulius* and most *Heterochaetella* spp. [including the genus type, *Heterochaetella dubia* (Bourdot & Galzin) Bourdot & Galzin] belong to one strongly supported clade, while *H. cystidiophora* and a still unnamed taxon with some morphological similarity to the *H. dubia* complex form their own lineages within the order (Fig. 1).
A) *Protomerulius* / *Heterochaetella* lineage (pp = 1, bs = 95) is uncovered as a sister clade of *Hyalodon* V. Malysheva & Spirin (typified with *Protohydnum piceicola* Kuehner ex Bourdot). This outcome agrees with the earlier studies of the *Auriculariales* (Weiss & Oberwinkler 2001, Zhou & Dai 2013, Malysheva et al. 2018). Two poroid species with effused-reflexed basidiomata, *Protomerulius substuppeus* (Berk. & Cooke) Ryvarden (= *P. brasiliensis*, the generic type – see below) and *P. subreflexus* (Lloyd) Miettinen & Ryvarden are nested in a strongly supported subclade (pp = 1, bs = 100) with the effused, hydnoid species *Heterochaete microspora* Burt. The rest of sequences ended up in the *Protomerulius* / *Heterochaetella* clade were obtained from effused, smooth or hydnoid specimens encompassed by the current concept of *Heterochaetella dubia* (as understood by Reid 1990 and Roberts 1998). These sequences form seven terminal branches interpreted as separate species. Macroscopically, the two poroid *Protomerulius* species look strikingly different from the effused, smooth or hydnoid taxa. However, retaining *Protomerulius* for poroid taxa only is eventually impossible because at least the hydnoid *H. microspora* should have been included in the genus so redefined. Therefore, we consider the whole *Protomerulius* / *Heterochaetella* clade as one genus for which *Protomerulius* is the oldest available name. Morphological evidences for this solution are discussed in the taxonomic part of this paper.
B) An unnamed taxon with effused, smooth basidiomata clusters with *Hyalodon* and *Protomerulius* (incl. *Heterochaetella*) (pp = 0.92, bs = 65). Considering its sound morphological differences from the two latter genera, it is introduced below as *Psilochaete multifora*, gen. and sp. nov.
C) *Heterochaetella cystidiophora* Lowy is not related to the previous taxa and detected among the 'core' *Auriculariales* genera (e.g., *Auricularia*, *Exidia*, *Exidiopsis* etc.). This result agrees with morphological data because the only similarity shared by *H. cystidiophora* with some members of *Heterochaetella dubia* (=*Protomerulius dubius*) complex is a hydnoid hymenophore while all essential microscopic characters (hyphal structure, shape and size of basidia and basidiospores) are widely different. No older generic names are available for *H. cystidiophora*, and therefore it is placed in a new genus, *Metulochaete*.

2. nrITS dataset. The final alignment contained 692 characters (including gaps). The overall topologies of the ML and BI trees were identical and corresponded to nrITS + nrLSU phylogeny of *Protomerulius* (incl. *Heterochaetella*) although with much broader set of sequences (Fig. 2).

3. *tef1* dataset. The final alignment contained 600 characters (including gaps). The topology reveals no contradictions against nrITS + nr LSU and nrITS phylogenies albeit *tef1* sequences were available for five *Protomerulius* species only (Fig. 3).
Here we present our taxonomic conclusions, with taxa treated in the alphabetic order.

Taxonomy

Metulochaete Alvarenga, gen. nov.
MB
Etymology. *Metulochaete* (Lat., noun) – the name refers to metuloid cystidia covering hymenophoral spines.
Basidiomata effused, continuous, pale-colored, gelatinous to waxy-arid, smooth or covered by sterile spines. Hyphal structure monomitic; hyphae clamped, hyaline. Hyphidia present, branched. Cystidia metuloid, covering hymenial spines. Basidia 4-celled, sessile, ovoid. Basidiospores thin-walled, allantoid, straight to slightly curved. On wood remnants.

Type species. Heterochaete *sanctae-catharinae* Möller .

The effused basidiomata and sterile spines densely distributed on hymenial surface make *H. sanctae-catharinae* similar to *Heterochaete* s.l. However, the latter genus is polyphyletic (Malysheva & Spirin 2017, Alvarenga et al. 2019), and none of the species addressed to it possesses heavily encrusted, thick-walled (metuloid) cystidia covering sterile hymenial outgrowths.

Metulochaete sanctae-catharinae (Möller) Alvarenga, comb. nov. . – Fig. X.
MB
≡ *Heterochaete sanctae-catharinae* Möller, Bot. Mitt. Trop. 8: 165, 1895
= *Heterochaetalla cystidiophora* Lowy, Flora Neotropica 6: 82, 1971.
Basidiomata effused, orbicular or fusing together, continuous, yellowish-white, gelatinous when fresh, waxy-arid when dried, smooth or covered by more or less regularly distributed, rather blunt spines 125–150 × 35–45 µm, 7–8 per mm, margin adnate, compact, white or very pale cream-colored.
Hyphal structure monomitic; hyphae clamped, hyaline, slightly thick-walled, 2–4 µm in diam. in subiculum, thin-walled, 1.5–2 µm in diam. in subhymenium. Hyphidia present, branched, 1–2 µm in diam. at the apex. Cystidia heavily encrusted, sharp, ventricose, thick-walled, 15–20 × 5–8.5 µm, covering hymenial spines. Basidia 4-celled, sessile, ovoid, 17–20 × 11–14 µm. Basidiospores thin-walled, allantoid, straight to slightly curved, (10.1–) 11.5–15.6 (–16.2) × (4.5–) 4.7–6.4 (–7.1) µm (n = 46/2), L = 14.06–14.23, W = 5.14–5.80, Q = 2.42–2.76.

Distribution and ecology. Brazil (Acre, Santa Catarina); wood remnants of angiosperms.

Remarks. Möller (1895) described and illustrated *Heterochaete sanctae-catharinae* based on specimens from southern Brazil (Blumenau - Santa Catarina). After almost 8 decades, Lowy (1971) studied specimens with sterile spines coverted by metuloids from the same area of Brazil and described *Heterochaetella cystidiophora* . However, the illustration of *Heterochaete sanctae-catharinae* indicates that it is identical with *Heterochaetella cystidiophora*.
In the protologue, *H. cystidiophora* was described as clampless, but Roberts (1998) studied the type specimen and found regular clamp connections, which agrees with our observations. He thus transferred *H. cystidiophora* to the artificial genus *Heterochaete*, but the same combination was proposed a few months earlier by Kisimova-Horovitz et al. (1997), based on *H. cystidiophora* from Costa Rica. Judging from the basidiospore measurements, the Costa Rican collections may well represent another species of *Metulochaete*.

Protomerulius Möller, Bot. Mitth. Tropen 8: 129, 1895.

Basidiomata annual, resupinate to effused-reflexed or rarely sessile-pileate, smooth or irregularly warted to hydnoid or regularly poroid, soft, waxy-gelatinized to floccose. Hyphal structure mono- or dimitic; skeletal hyphae thick-walled, normally with a rather wide lumen, CB (+), generative hyphae clamped. Thick-walled tramal cystidia present in effused species, deeply rooted, often in fascicles. Hyphidia present. Gloeocystidia and hymenial cystidia occurring in some species. Rosette-like or stellate crystals present among hyphae or on sterile hymenial cells. Basidia (2–) 4-celled, stipitate, with rather short and thick sterigmata. Basidiospores thin-walled (although the spore wall distinct), broadly cylindrical to subglobose, 4–9.5 × 3–6 μm, repetitive. On various wood remnants.

Type species. *Protomerulius brasiliensis* Möller.

The genus is redefined here to embrace two poroid species (*P. subreflexus* and *P. substuppeus*), *Heterochaete microspora* and members of the *Heterochaetella dubia* complex. Despite dissimilar macroscopic habit of poroid and hydnoid / smooth taxa included in *Protomerulius* in this study, they share several important anatomical features. First, basidia of all aforementioned taxa are sphaeropedunculate, i.e. divided in a more or less globose, two- or four-celled, apical part and a pronounced stalk. Basidia of this kind were detected in several other genera of the *Auriculariales* (Spirin et al. 2019); however, none of them possesses long, thick-walled, fasciculate tramal cystidia as occurring in effused, non-poroid members of *Protomerulius*. Those cystidia are evidently homologous to skeletal hyphae of the poroid *Protomerulius* spp., which originate deep in tube trama and enter in dissepiment edges as slightly swollen and almost thin-walled emergences. In this respect, *P. microsporus* and *P. minor* represent a transitional case – they both are effused, hydnoid species but their tramal cystidia are not well-differentiated and can be interpreted as thin-walled apices of skeletal hyphae. Stellate crystals occurring among hyphae and sometimes encrusting hymenial cells were found in all *Protomerulius* species treated below; therefore, their presence is another morphological feature of the genus.

The closely related genus *Hyalodon* differs from *Protomerulius* in having poorly developed subiculum and distinctly hydnoid, gelatinized hymenophore. Tramal hyphae of *Hyalodon* spp. are more or less strictly parallel, tightly arranged and often densely encrusted by angular crystals. These features as well as absence of cystidia differentiate *Hyalodon* spp. from *Protomerulius*.

Protomerulius brachysporus (Luck-Allen) Spirin & V. Malysheva, comb. nov. – Fig. 4a, 5b, 5c, 5d, 6. MB
≡ *Heterochaetella brachyspora* Luck-Allen, Canadian J. Bot. 38: 566, 1960. Holotype. France: Var, Toulon, on wood in a dike, VI.1925 *Crozalc 70* (herb. Bourdot 39164) (PC – isotype, studied).
= *Heterochaetella dubia* f. *crassior* Bourdot & Galzin, Hymén. France: 52, 1928. Lectotype. France. Aveyron: Causse Noir, *Pinus* sp., XII.1910 *Galzin 7858* (herb. Bourdot 7606) (PC, studied) (selected here, MBT).
= *Heterochaetella dubia* f. *sphaerospora* Bourdot & Galzin, Hymén. France: 52, 1928. Lectotype. France. Aveyron: Causse Noir, *Pinus* sp., 20.XI.1913 *Galzin 14489* (herb. Bourdot 14496) (PC, studied) (selected here, MBT).
Basidiomata effused, first smooth or covered by minute, irregularly arranged warts, floccose, reticulate, white or greyish, with craters or holes, then continuous, grayish or ochraceous, waxy, old basidiomata brownish, strongly gelatinized, some producing irregularly distributed spine-like outgrowths, up to 5 cm in widest dimension, 0.05–0.5 (1) mm thick, margin narrow, pruinose, whitish to cream-coloured. Hyphal structure monomitic or occasionally dimitic; skeletal hyphae occurring in subiculum of mature specimens, hyaline to brownish, distinctly thick-walled, 1.8–2.5 μm in diam., generative hyphae dominating, clamped, thin- or only slightly thick-walled, 1.5–3 (3.5) μm in diam., occasionally inflated up to 4.5 μm in diam. in subiculum. Tramal cystidia abundant, hyaline to brownish, tubular-clavate, flexuous, slightly or moderately thick-walled (wall up to 2 μm thick) ,gradually thinning-out to the apex (thin-walled apical parts often collapsing), (54–) 56–123 (–132) × (3.2–) 3.7–7.3 (–8.3) μm (n = 87/8), solitary or in groups of 2–8 (smooth parts) or up to 20 and more (spines if present), easily breaking apart in microscopic slides; hymenial cystidia abundant in young basidiomata, thin-walled,

tubular-clavate to barrel- or bullet-shaped, 18–32 × 4–8 µm. Hyphidia present, associated with cystidia, simple or sparsely branched, often with thickened walls at the basal part, 2–2.5 µm in diam. at the apex, or distributed among basidia and basidioles, variably branched, mostly embedded, 1–2.5 µm in diam. at the apex. Crystals abundant in young basidiomata, rare in older ones, acicular or in variably shaped agglomerations, up to 10 µm in widest dimension. Basidia 2–4-celled, sphaeropedunculate, 7.5–11.5 × 6–9 µm; stipe up to 9 × 3.5 µm, sterigmata up to 12 × 2–3 µm. Basidiospores broadly cylindrical to broadly ellipsoid, more rarely lacrymoid or pyriform, in exceptional cases subglobose, (4.1–) 4.2–9.3 (–9.8) × (3.5–) 3.8–5.8 (–6.0) µm (n = 380/13), L = 5.09–7.83, W = 4.13–5.02, Q' = (1.1–) 1.2–2.2 (–2.6), Q = 1.24–1.74.

Distribution and ecology. Europe (Finland, France, Norway, Slovenia, Sweden), North America (Canada – British Columbia, USA – Washington, Mexico – Vera Cruz), Asia (Kyrgyzstan, Siberia, Russian Far East); fallen logs and dead branches of conifers (*Abies, Picea, Pinus, Thuja*).

Remarks. The species was introduced as *Heterochaetella brachyspora* by Luck-Allen (1960) with the type specimen collected in France and labeled by Bourdot as *Heterochaetella dubia* var. *mesochaeta* f. *brachyspora*. However, her idea about spore shape and size as the main diagnostic features of this species cannot be maintained. After re-studying the isotype of *H. brachyspora*, we concluded that it is identical with specimens collected from coniferous wood throughout the northern hemisphere. Those collections (of which six were sequenced) show the widest spore variation range within the genus. However, they can undoubtedly be addressed to this species due to other morphological features, i.e. clearly gelatinized and rather thick basidiomata and apically very thin-walled and often collapsing, fragile tramal cystidia. *Protomerulius brachysporus* is the only conifer-dwelling species so far recognized in the genus. This host preference helps in identification of its juvenile specimens possessing thinner basidiomata and smaller basidiospores which otherwise can be mixed up with other effused non-poroid represetatives of the genus.

Protomerulius commotus Spirin & V. Malysheva, sp. nov. – Fig. 5f, 7.
MB
Holotype. Norway. Vestfold: Larvik, Jordstøyp i Kvelde, *Ulmus glabra*, 15.IX.2016 *Spirin 11097* (O).
Etymology. Commotus (Lat., adj.) – unsteady, dubious.
Basidiomata effused, smooth, first reticulate, semitranslucent, grayish in fresh condition, then at least partly continuous, dirty-brownish when old or dry, gelatinized, up to 2 cm in widest dimension, 0.05–0.1 mm thick, margin concolorous with hymenium, gradually thinning-out.
Hyphal structure monomitic; hyphae clamped, subicular hyphae with distinct walls, subparallel and densely packed, 1–2 µm in diam., subhymenial hyphae thin-walled, 2–3 µm in diam., often short-celled, densely glued together. Tramal cystidia abundant, hyaline or very pale brownish, tubular-clavate, sturdy, with thickened (up to 2.5 µm) walls gradually thinning-out towards the apical part, longest cystidia slightly tapering to or widened at the apex (thin-walled apical parts often collapsing), (64.5–) 65–149 (–154) × (5.1–) 5.2–7.7 (–7.8) µm (n = 24/2), solitary or more often in groups of 2–8, often biradicate; hymenial cystidia hyaline, broadly clavate, thin- or slightly thick-walled, 16.5–50 × 4.2–8.2 µm, distributed mostly solitary or rarely associated with tramal cystidia. Hyphidia present, normally associated with cystidia, 1–1.5 µm in diam. at the apex, thin-walled. Crystals occasionally present on hyphidia and cystidia, acicular or arranged in stellate agglomerations. Basidia 4-celled, sphaeropedunculate, 7–9 × 6–7.5 µm; stipe up to 6 × 2.5 µm, sterigmata up to 8 × 2–2.5 µm. Basidiospores broadly cylindrical to broadly ellipsoid, more rarely lacrymoid, (4.3–) 4.4–6.2 (–6.3) × (3.0–) 3.2–4.1 (–4.2) µm (n = 60/2), L = 5.24–5.51, W = 3.45–3.51, Q' = (1.3–) 1.4–1.7 (–1.9), Q = 1.50–1.61.

Distribution and ecology. Europe (Norway); rotten wood of *Ulmus glabra*. So far known from the type locality.

Remarks. *Protomerulius commotus* produces thin, smooth, gelatinized basidiomata almost invisible in dry condition. Both morphologically and phylogenetically, it is close to *P. madidus* (introduced below).

Basidiospores of *P. commotus* are smaller than in most collections of *P. madidus* studied by us albeit their variation ranges are overlapping. The best microscopic character for separating the two species is a presence of thin-walled, broadly clavate hymenial cystidia in *P. commotus*. In senecent hymenium, they often collapse and leave large empty cavities among hymenial cells; this feature has never been observed in *P. madidus*.

Protomerulius dubius (Bourdot & Galzin) Spirin & V. Malysheva, comb. nov. – Fig. 5a.
MB
≡ *Heterochaete dubia* Bourdot & Galzin, Bull. Soc. Mycol. France 25: 30, 1909. Lectotype. France. Aveyron: Millau, Trou d'Enfer, *Fraxinus excelsior*, 18.IV.1907 *Galzin 2022* (herb. Bourdot 4579) (PC, studied) (selected by Roberts 1998: 216).
Basidiomata effused, smooth or covered by minute, irregularly arranged warts, first floccose, reticulate, white or cream-colored, then continuous, pale ochraceous to brownish, with darker gelatinized spots on hymenial surface, older basidiomata gelatinized, waxy, dirty-brownish but exposing irregularly distributed whitish floccose patches, up to 3 cm in widest dimension, 0.05–0.1 mm thick, margin narrow, concolorous with or slightly paler than hymenial surface, pruinose.
Hyphal structure monomitic; hyphae clamped, subicular hyphae with distinct walls, 1–2 μm in diam., subhymenial hyphae thin- or only slightly thick-walled, 2–3 μm in diam. Tramal cystidia abundant, brownish, tubular-clavate, flexuous, easily breaking apart, with thickened (up to 1–2.5 μm) walls gradually thinning-out to the apex, (63–) 70–94 (–112) × (3.8–) 4.1–8.7 (–8.8) μm (n = 20/2), normally glued in fascicles of 2–8; hymenial cystidia absent. Hyphidia occasionally present, 1–2 μm in diam. at the apex, thin-walled, simple or sparsely branched. Crystals abundant, encrusting hyphae and hyphidia, acicular or more often arranged in stellate agglomerations up to 12 μm in diam. Basidia 4-celled, sphaeropedunculate, 8–9 × 6–8 μm; stipe up to 6 × 3 μm, sterigmata up to 7.5 × 2–2.5 μm. Basidiospores broadly cylindrical to ellipsoid, more rarely lacrymoid, (5.1–) 5.2–8.0 (–8.2) × (3.3–) 3.7–4.7 (–4.8) μm (n = 150/5), L = 5.85–6.37, W = 3.98–4.20, Q' = (1.1–) 1.2–2.0 (–2.1), Q = 1.46–1.55.

Distribution and ecology. Europe (Estonia, Finland, France, Russia); rotten wood of deciduous trees (*Alnus, Fagus, Fraxinus, Populus*).

Remarks. The species was described by Bourdot & Galzin (1909) from the southern part of France and then reintroduced with a number of varieties and forms (Bourdot & Galzin 1928). Of them, only *H. dubia* var. *dasychaeta* represents *H. dubia* sensu orig. (Reid 1990), and it was typified by Roberts (1998). In turn, *Heterochaetella dubia* var. *dasychaeta* f. *sphaerospora*, as well as two forms of var. *mesochaeta* (f. *brachyspora* and f. *crassior*) belong to *Protomerulius brachysporus* (see above) while var. *psilochaeta* is *Mycostilla vermiformis* (Berk. & Broome) Spirin & V. Malysheva (Spirin et al. 2018).

Protomerulius dubius is most similar to *P. pertusus* but it differs in having slightly wider basidiospores and clearly broader cystidia. Macroscopically, juvenile basidiomata of these species are confusingly similar, being floccose and almost white. However, they become certainly differently looking in maturity: obtaining strongly gelatinized and darker colored areas in *P. dubius* and remaining almost unchanged in *P. pertusus*.

Protomerulius hebes Spirin & Ryvarden, sp. nov. – Fig. 5e.
MB
Holotype. Ethiopia. Oromia: Arssi, Munessa Forest, hardwood, 15.VII.1990 *Ryvarden 28406* (O F-903270, isotype H).
Etymology. Hebes (Lat., adj.) – faded.
Basidiomata effused, smooth or covered by minute, irregularly arranged warts, floccose, reticulate, white to pale cream-colored or greyish, only partly slightly gelatinized, up to 2 cm in widest

dimension, 0.05–0.1 mm thick, margin narrow, concolorous with hymenial surface, gradually thinning-out.
Hyphal structure monomitic; hyphae clamped, subicular thin- or slightly thick-walled, subparallel, 1.5–2 μm in diam., subhymenial hyphae thin-walled, short-celled, 1.5–3 μm in diam. Tramal cystidia abundant, hyaline to brownish, tubular-clavate, with thickened (up to 1 μm) walls gradually thinning-out to the apex, (58–) 69–90 (–111) × (3.2–) 3.3–4.3 (–4.8) μm (n = 14/1), normally in fascicles of 3–15; hymenial cystidia thin-walled, tubular-clavate, somewhat tapering to the apex, some with refractive cyanophilous content (gloeocystidia), 20–36 × 4–7.5 μm, distributed mostly solitary or rarely associated with tramal cystidia. Hyphidia occasionally present, 1–1.5 μm in diam. at the apex, thin-walled, mostly associated with cystidia. Crystals abundant, encrusting hyphae and hyphidia, arranged in stellate agglomerations up to 20 μm in diam. Basidia 4-celled, sphaeropedunculate, 9–10 × 7–8 μm; stipe up to 6 × 3 μm, sterigmata up to 7 × 2.5–3 μm. Basidiospores broadly cylindrical to narrowly ellipsoid, more rarely lacrymoid, (5.5–) 5.6–7.0 (–7.1) × (3.1–) 3.2–4.1 (–4.2) μm (n = 30/1), L = 6.21, W = 3.68, Q' = (1.5–) 1.6–1.9 (–2.2), Q = 1.69.

Distribution and ecology. Africa (Ethiopia); rotten wood of deciduous trees. So far known from the type locality.

Remarks. Due to soft, floccose basidiomata, *P. hebes* is reminiscent of *P. pertusus*. However, it produces abundant hymenial cystidia similar to those of *P. commotus*, and its tramal cystidia are shorter and somewhat narrower than in *P. pertusus*.

Protomerulius madidus Spirin & K.H. Larss., sp. nov. – Fig. 4c, 4d, 5g, 8.
MB
Holotype. Norway. Buskerud: Lier, Stokkerinden, *Ulmus glabra*, 29.IX.2018 *Spirin 12492* (O, isotypes – H, LE).
Etymology. Madidus (Lat., adj.) – humid.
Basidiomata effused, smooth, first reticulate but quickly turning to continuous, semitranslucent, bluish-greyish in fresh condition, dirty-brownish when old or dry, with occasional craters, gelatinized, though, up to 5 cm in widest dimension, 0.07–0.2 mm thick, margin concolorous with hymenium, gradually thinning-out; tiny white spots often present in mature basidiomata, irregularly spread on hymenial surface.
Hyphal structure monomitic; hyphae clamped, thin-walled, 1.5–3 μm in diam., in subhymenium often short-celled and densely glued together. Tramal cystidia abundant, hyaline or very pale brownish, tubular-clavate, sturdy, with thickened (up to 4 μm) walls gradually thinning-out towards the apical part, longest cystidia slightly tapering to the apex, (62–) 67–184 (–208) × (4.2–) 4.8–10.4 (–12.0) μm (n = 168/15), solitary or in groups of 2–6, occasionally bi- or multiradicate; hymenial cystidia absent. Hyphidia present, normally associated with cystidia, 1–2 μm in diam. at the apex, thin-walled, occasionally producing hyphal pegs up to 70 × 20 μm. Crystals present, encrusting basal hyphae but sometimes occurring on hyphidia and cystidia, acicular or arranged in stellate agglomerations, in some collections rare or evidently absent. Basidia 4-celled, sphaeropedunculate, 7.5–10 × 6.5–8 μm; stipe up to 6 × 3.5 μm, sterigmata up to 7 × 2–2.5 μm. Basidiospores broadly cylindrical to ellipsoid, more rarely lacrymoid, (4.3–) 4.8–8.2 (–8.8) × (2.9–) 3.1–4.3 (–4.6) μm (n = 570/19), L = 5.32–7.15, W = 3.45–3.96, Q' = (1.3–) 1.4–2.3 (–2.4), Q = 1.48–2.04.

Distribution and ecology. Europe (Estonia, Norway, Ukraine); rotten wood of deciduous trees (*Alnus, Betula, Fraxinus, Ulmus*).

Remarks. *Protomerulius madidus* is characterized by thin, hygroscopic basidiomata becoming tough and almost invisible in dry condition. Macroscopically, it is indistinguishable from the closely related *P. commotus*; their microscopic differences are discussed under the latter species. *Protomerulius brachysporus* also possesses gelatinized basidiomata but they are thicker and well-visible when dry. Additionally, *P. brachysporus* is restricted to coniferous hosts, and it has fragile, apically collapsing cystidia, as well as wider basidiospores. Senescent basidiomata of *P. dubius* are often partly

gelatinized and thus can be mixed up with *P. madidus* but they are essentially softer, waxy. Moreover, cystidia of *P. dubius* easily break apart in microscopic slides and its basidiospores are on average slightly wider than in *P. madidus*.

Protomerulius microsporus (Burt) Spirin & V. Malysheva, comb. nov. – Fig. 9.
MB
≡ *Heterochaete microspora* Burt, Ann. Missouri Bot. Gdn 8: 376, 1921. Holotype. Mexico. Veracruz: Córdoba, Motzorongo, 15.I.1910 *Murrill 990* (NY 00738344, studied).
Basidiomata effused, first warted, floccose, pale cream-colored, then continuous, distinctly hydnoid, covered by spine-like projections up to 400 µm long, 3–5 per mm, ceraceous, pale ochraceous to grayish, slightly gelatinized, up to 4 cm in widest dimension, 0.1–0.3 mm thick, margin narrow, concolorous with hymenial surface, floccose or compact, partly detaching.
Hyphal structure dimitic; hyphae clamped. Skeletal hyphae hyaline to brownish, slightly to distinctly thick-walled (wall up to 2 µm thick), flexuous, (1.8–) 1.9–3.8 (–3.9) µm in diam. (n = 20/1); generative hyphae dominating, thin- or only slightly thick-walled, 1.5–3 µm in diam., subparallel in subiculum, ascending in subhymenium. Tramal cystidia present as endings of skeletal hyphae at the apices of spines, with thickened, gradually thinning-out walls, 4–7 µm in diam., accidentally branched at the top, intermixed with generative hyphae in large fascicles; gloeocystidia abundant in senescent hymenium, clavate to somewhat moniliform, yellowish, 12–23 × 3–6.5 µm. Hyphidia occasionally present, 1.5–2.5 µm in diam. at the apex, thin-walled, embedded or slightly projecting. Crystals abundant, encrusting hyphae and hyphidia, acicular or arranged in stellate agglomerations. Basidia 4-celled, sphaeropedunculate, 8.5–10 × 7–9 µm; stipe up to 9 × 3 µm, sterigmata up to 8.5 × 1.5–3 µm. Basidiospores narrowly to broadly ellipsoid, rarely subglobose, (4.4–) 4.7–6.7 (–6.8) × (3.7–) 3.8–5.0 (–5.1) µm (n = 60/2), L = 5.41–6.10, W = 4.14–4.39, Q’ = (1.1–) 1.2–1.6 (–1.7), Q = 1.24–1.48.

Distribution and ecology. North America (Mexico – Vera Cruz); rotten wood.

Remarks. Distinctly dimitic basidiomata with pronounced spines differentiate *P. microsporus* from other effused members of the genus. The species is so far known from the central part of Mexico but its actual distribution area can be much wider.

Protomerulius minor (Möller) Spirin & Miettinen, comb. nov. – Fig. 4b, 10.
MB
≡ *Stypella minor* Möller, Bot. Mitth. Tropen 8: 77, 1895. Lectotype. Table 4, fig. 7 in A. Möller, Bot. Mitth. Tropen 8, 1895 (selected here, MBT). Epitype. Brazil. Pernambuco: Jaqueira, RPPN Frei Caneca, hardwood, 19.IV.2013 *Larsson 15937* (O) (selected here, MBT).
Basidiomata effused, more or less regularly hydnoid, covered by spine-like projections up to 150 µm long, 3–5 per mm, first floccose, reticulate, pale cream-colored, then more compact but with craters or holes, pale ochraceous to grayish, partly gelatinized, up to 7 cm in widest dimension, 0.05–0.15 mm thick, margin narrow, concolorous with or slightly paler than hymenial surface, gradually thinning-out.
Hyphal structure dimitic; hyphae clamped. Skeletal hyphae hyaline to brownish, slightly to distinctly thick-walled (wall up to 2 µm thick), flexuous, (2.2–) 2.3–3.8 (–3.9) µm in diam. (n = 20/2); generative hyphae dominating, thin- or only slightly thick-walled, 1.5–2 µm in diam., more or less subparallel in subiculum, interwoven in subhymenium. Tramal cystidia present as endings of skeletal hyphae at the apices of spines, with thickened, gradually thinning-out walls, projecting up to 50 µm, 4–6 µm in diam., in groups of 5–25; hymenial cystidia absent. Hyphidia occasionally present, 1–1.5 µm in diam. at the apex, thin-walled, scattered among basidia. Crystals abundant, encrusting hyphae and hyphidia, acicular or arranged in large stellate agglomerations up to 15 µm in diam. Basidia 4-celled, sphaeropedunculate, 8–11 × 7–9 µm; stipe up to 5 × 3 µm, sterigmata up to 10 × 2.5–3 µm. Basidiospores broadly cylindrical to broadly ellipsoid, more rarely lacrymoid, (4.9–) 5.0–8.0 (–8.2) × (3.0–) 3.2–5.0 (–5.2) µm (n = 170/6), L = 5.87–7.06, W = 3.88–4.30, Q’ = (1.2–) 1.3–2.2 (–2.3), Q = 1.49–1.83.

Distribution and ecology. North America (USA – Arkansas, New York, North Carolina, Massachusetts, Tennessee, Virginia), South America (Brazil – Pernambuco, Santa Catarina); dead wood of deciduous trees at various decomposition stages.

Remarks. Möller (1895) described *Stypella minor* from Brazil but the authentic material did not survive in Hamburg where some of his types were preserved (Friedrichsen 1977). His description refers to a resupinate fungus with papillose (under lens) hymenial surface and dimitic hyphal system ("aus sehr feinen, locker verwirrten Fäden gebildet, zwishen denen bündelartig angeordnet … starke Fäden verlaufen"); the hymenophoral projections consist of cystidia-like endings of skeletal hyphae (Möller 1895: 77, Table 4, fig. 7). These features, as well as basidia and basidiospores of *S. minor* as described in the protologue, well correspond to the hydnoid *Protomerulius* species widely distributed in North America and occurring also in Brazil. Therefore, we decided to use Möller's binomial for naming it. Here we combine *S. minor* in *Protomerulius*, designate the original illustration as a lectotype of this species and provide it with an epitype.

Protomerulius pertusus V. Malysheva & Spirin, sp. nov. – Fig. 5h, 11.
MB
Holotype. Norway. Møre og Romsdal: Nesset, Eikesdalen, *Ulmus glabra*, 16.IX.2014 *Svantesson* (O F75913).
Etymology. Pertusus (Lat., adj.) – pertusate.
Basidiomata effused, smooth or covered by minute, irregularly arranged warts, first floccose, reticulate, white or pale cream-colored, then more compact but with craters or holes, pale ochraceous to greyish, in some parts only slightly gelatinized, up to 7 cm in widest dimension, 0.07–0.15 mm thick, margin narrow, concolorous with hymenial surface, gradually thinning-out.
Hyphal structure monomitic; hyphae clamped, thin- or only slightly thick-walled, 1.5–2.5 (3) μm in diam., subparallel in subiculum, ascending in subhymenium. Tramal cystidia abundant, hyaline to brownish, tubular-clavate, flexuous, with thickened (up to 1–1.5 μm) walls gradually thinning-out to the apex, (59–) 60–113 (–140) × (3.7–) 3.8–5.2 (–5.3) μm (n = 20/2), normally in groups of 3–10; hymenial cystidia absent. Hyphidia occasionally present, 1.5–2 μm in diam. at the apex, thin-walled, simple or sparsely branched. Crystals abundant, encrusting hyphae and hyphidia, acicular or arranged in stellate agglomerations up to 15 μm in diam. Basidia 4-celled, sphaeropedunculate, 8–10 × 7–9 μm; stipe up to 6 × 3 μm, sterigmata up to 8.5 × 2–2.5 μm. Basidiospores broadly cylindrical to narrowly ellipsoid, more rarely lacrymoid, (5.0–) 5.1–8.1 (–8.2) × (3.1–) 3.2–4.5 (–4.6) μm (n = 150/5), L = 5.95–6.96, W = 3.49–3.89, Q' = (1.2–) 1.3–2.2 (–2.5), Q = 1.56–1.94.

Distribution and ecology. Europe (Norway, Russia); rotten wood of deciduous trees (*Corylus, Quercus, Ulmus*).

Remarks. Soft, pale, arid basidiomata of *P. pertusus* make it different from other species occurring in Europe. So far *P. pertusus* has been detected in two localities – both are rich forests dominated by broad-leaved trees and famous for a high diversity of the wood-inhabiting basidiomycetes.

Protomerulius subreflexus (Lloyd) Miettinen & Ryvarden, comb. nov. – Fig. 4e, 5i.
MB
≡ *Polystictus subreflexus* Lloyd, Mycol. Writings 6: 884, 1919. Lectotype. Philippines. Luzon: Mt. Maquiling, dead wood, 23.IX.1917 *Marquez & Reinking* (BPI 306707, studied) (selected by Stevenson & Cash 1936: 139).
Basidiomata sessile-pileate to effused-reflexed (projecting part 0.3–1 cm) or totally resupinate, often partly fusing together. Pileal surface floccose, pale cream-coloured to pale ochraceous, rarely indistinctly zonate. Pileal margin sharp to rather blunt, even, concolorous with pileal surface; margin of resupinate part pellicular-floccose, first almost white, then pale cream-colored to pale ochraceous, up to 1 mm wide. Pore surface even, pale cream-coloured or yellowish to pale ochraceous, in older basidiomata with scattered brownish sports; pores angular to lacerate, 2–4 per mm, dissepiments even

to somewhat serrate. Section: context 0.5–1 mm thick, homogeneous, pale cream-colored to pale ochraceous, cottony; tubes soft, 1–3 mm thick, concolorous with pore surface.
Hyphal structure dimitic; hyphae clamped. Skeletal hyphae hyaline to yellowish, dominating, flexuous, interwoven throughout, in context sometimes arranged in subparallel bundles, with distinctly thickened (up to 1–1.5 µm) walls, as a rule not encrusted, (2.7–) 2.8–4.2 (–4.3) µm in diam. in context (n = 20/2), (2.0–) 2.2–3.7 (–3.8) µm in diam. in tube trama (n = 120/4); apices of skeletals at dissepiment edges thin-walled, 5–5.5 µm in diam. Generative hyphae hyaline, thin- or slightly thick-walled, short-celled in subhymenium, 1.5–3.5 µm in diam., in context accidentally inflated up to 6 µm in diam. Gloecystidia present, thin-walled, tapering, 20–26 × 3.5–5.5 µm. Crystals abundant, encrusting hyphae and hymenial cells, acicular or arranged in stellate agglomerations, up to 20 µm in widest dimension. Basidia 4-celled, sphaeropedunculate, 6.5–8.5 × 5–7.5 µm; stipe up to 7 × 2.5 µm, sterigmata up to 4 × 1.5–2 µm. Basidiospores ellipsoid to cylindrical, more rarely lacrymoid or almost subglobose, (4.7–) 4.8–7.1 (–7.2) × (3.2–) 3.5–4.9 (–5.0) µm (n = 120/4), L = 5.62–6.29, W = 3.96–4.20, Q’ = (1.1–) 1.2–1.8 (–1.9), Q = 1.40–1.51.

Distribution and ecology. South-East Asia (China, Philippines, Indonesia); fallen branches and logs of deciduous trees.

Remarks. *Protomerulius subreflexus* is the Asian sibling of *P. substuppeus* reintroduced here based on the type material and several recent collections used for DNA study. These species are morphologically almost indistinguishable, except that contextual and tramal hyphae of *P. subreflexus* are narrower than in *P. substuppeus*.

Protomerulius substuppeus (Berk. & Cooke) Ryvarden, Syn. Fung. 5: 212, 1991. – Fig. 4f, 5j, 5k, 12.
≡ *Polyporus substuppeus* Berk. & Cooke, Bot. J. Linnean Soc. 15: 380, 1876. Lectotype. Brazil, (no exact locality indicated), dead wood, 1874, *Trail 123* (K(M) 35121, studied) (selected by Ryvarden 1984: 358).
= *Protomerulius brasiliensis* Möller, Bot. Mitth. Tropen 8: 129, 1895. Lectotype. Brazil. Santa Catarina: Blumenau, *Jacaratia dodecaphylla* (recently fallen branches), 1891–1893 *Möller 23* (HBG, studied) (selected by Bandoni et al. 1982: 1003).
Basidiomata sessile-pileate to effused-reflexed (projecting part 0.5–3 cm) or totally resupinate, often in gregarious groups and partly fusing together. Pileal surface indistinctly striate or radially fibrillose, first pale cream-coloured to pale ochraceous, later darkening to brownish. Pileal margin sharp to rather blunt, even or slightly undulating, concolorous with pileal surface; margin of resupinate part pellicular-floccose, first almost white, then pale cream-colored to ochraceous or brownish, up to 2 mm wide. Pore surface even, pale cream-colored to ochraceous, in older or bruised basidiomata with reddish-brown tints, in older basidiomata uniformly brownish; pores angular to lacerate, first 3–5 per mm, then fusing together and reaching 1–3 per mm, dissepiments uneven to serrate. Section: context 1–5 mm thick, duplex, pale cream-colored to brownish, upper layer rather loose and more intensively colored than firmer lower layer, resinous zone occasionally present close to the tube layer; tubes soft, slightly agglutinated, 1–5 mm thick, concolorous with pore surface.
Hyphal structure dimitic; hyphae clamped. Skeletal hyphae hyaline to brownish, dominating, flexuous, interwoven or arranged in subparallel bundles in context, more or less strictly subparallel in tubes, with distinctly thickened (up to 1–1.5 µm) walls, sometimes covered by amorphous grainy matter, (3.8–) 3.9–5.8 (–6.8) µm in diam. in context (n = 20/1), (2.2–) 2.4–5.6 (–5.8) µm in diam. in tube trama (n = 80/4); apices of skeletals at dissepiment edges thin-walled, 5–6.5 µm in diam., sometimes with refractive content. Generative hyphae hyaline, thin- or slightly thick-walled, short-celled in subhymenium, 1.5–3 µm in diam. Gloecystidia present, thin-walled, tapering or somewhat moniliform, 20–46 × 4–7 µm. Crystals abundant, encrusting hyphae and hymenial cells, acicular or arranged in stellate agglomerations, up to 10 µm in widest dimension. Basidia 4-celled, sphaeropedunculate, 7–9 × 6–7.5 µm; stipe up to 7 × 3.5 µm, sterigmata up to 7 × 2.5–3 µm. Basidiospores narrowly ellipsoid to cylindrical, more rarely lacrymoid or ovoid, (4.1–) 4.2–8.2 (–8.9) × (3.0–) 3.2–4.9 (–5.0) µm (n = 210/7), L = 5.05–7.15, W = 3.62–4.42, Q’ = (1.2–) 1.3–2.1 (–2.2), Q = 1.34–1.76.

Distribution and ecology. Africa (Uganda), North America (Costa Rica, Jamaica, Puerto Rico, US Virgin Islands), South America (Argentina – Missiones, Brazil – Paraná, Santa Catarina); fallen branches and logs of deciduous trees.

Remarks. Bandoni et al. (1982) re-established *P. brasiliensis* as a resupinate fungus. Their opinion evidently originated from the photographs published by Möller (1895). An absence of caps is the only difference between *P. brasiliensis* and *P. substuppeus* treated in the current literature (cf. Ryvarden 2016). However, Möller himself described *P. brasiliensis* as producing caps ("consolenförmig abstehende" – Möller 1895: 131), and his two authentic collections in HBG contain several well-developed effused-reflexed or even sessile basidiomata. Since no other morphological characters have been found to separate *P. brasiliensis* and *P. substuppeus*, we consider them as taxonomic synonyms. *Protomerulius substuppeus* was also described from Brazil, and it has priority over *P. brasiliensis*. Identity of *P. substuppeus* versus *P. africanus* (described from Kenya) deserves further study. The only African collection used in the present study came from Uganda, and it is certainly conspecific with *P. substuppeus*.

Psilochaete Spirin & V. Malysheva, gen. nov.
MB
Etymology. From 'psilos' (Greek, adj.) – eminent, and '-chaete'.
Basidiomata effused, smooth, reticulate, semitranslucent, thin. Hyphal structure monomitic; hyphae clamped, thin-walled. Cystidia abundant, clavate to skittle-like, thin-walled. Hyphidia present, crystal aggregations absent. Basidia 4-celled, globose, sessile or with a strongly reduced stipe. Basidiospores broadly cylindrical to narrowly ellipsoid. On rotten wood.

Type species. *Psilochaete multifora*.

Psilochaete multifora Spirin & V. Malysheva, sp. nov. – Fig. 13.
MB
Holotype. Norway. Møre og Romsdal: Nesset, Eikesdalen, *Ulmus glabra*, 27.IX.2017 *Spirin 11596* (O).
Etymology. Multiforus (Lat., adj.) – perforated.
Basidiomata effused, smooth, reticulate, semitranslucent, bluish-grayish in fresh condition, grayish-brownish when old or dry, gelatinized, up to 1 cm in widest dimension, 0.03–0.05 mm thick, margin concolorous with hymenium, gradually thinning-out.
Hyphal structure monomitic; hyphae clamped, thin-walled, 1–1.5 µm in diam., densely arranged. Cystidia abundant, clavate to skittle-like, thin-walled, 32–48 × 4.5–7.5 µm, solitary or in groups of 2–5. Hyphidia present, normally associated with cystidia, 0.5–0.8 µm in diam. at the apex, thin-walled. Crystals absent. Basidia 4-celled, globose, 7–8 µm in diam., sessile or with a strongly reduced stipe up to 1 × 1 µm, sterigmata up to 3.5 × 1.5 µm. Basidiospores broadly cylindrical to narrowly ellipsoid, (4.8–) 5.1–6.2 × (2.9–) 3.0–3.8 (–3.9) µm (n = 30/1), L = 5.62, W = 3.36, Q' = (1.4–) 1.5–1.9 (–2.0), Q = 1.68.

Distribution and ecology. Europe (Norway); rotten wood of *Ulmus glabra*. So far known from the type locality.

Remarks. From the similar-looking effused *Protomerulius* spp., *P. multifora* differs by considerably shorter, thin-walled cystidia and predominantly sessile basidia.

Excluded taxa

Heterochaetella alba Rick, Iheringia Botanica 2: 42, 1958.
Invalidly published species, no type indicated.

Heterochaetella bispora Luck-Allen, Canadian J. Bot. 38: 563, 1960.
Roberts (1998) studied the type specimen of *H. bispora* and concluded that it is unidentifiable.

Heterochaetella crystallina Bourdot, Trans. British Mycol. Soc. 7: 53, 1921.
A synonym of *Mycostilla vermiformis* (Berk. & Broome) Spirin & V. Malysheva (Spirin et al. 2018).

Heterochaetella ochracea Viégas, Bragantia 5: 241, 1945.
Accepted as a member of *Eichleriella* (Alvarenga et al. 2019).

Protohydnum piceicola Kühner ex Bourdot, Bull. Soc. Mycol. France 48: 205, 1932.
The type species of *Hyalodon* (Malysheva et al. 2018). The single collection located in Bourdot's herbarium and labelled by him as *P. piceicola* is selected here as a lectotype: Sweden. Uppland: Uppsala, Storvreta, *Picea abies*, 4.X.1927 *Lundell 13* (herb. Bourdot 41808) (PC) (MBT).

Protomerulius farlowii Burt, Annals Missouri Bot. Gdn. 6: 176, 1919.
Accepted as a member of *Stypellopsis* (Spirin et al. 2018).

Protomerulius javensis Burt, Annals Missouri Bot. Gdn. 11: 41, 1924.
Coriaceous, dark-colored, semiporoid basidiomata, large basidia and long cylindrical basidiospores described in the protologue (Burt 1924) preclude affinities of *P. javensis* with taxa included in the present study.

Sebacina pruinosa McNabb, New Zealand J. Bot. 7: 243, 1969.
According to the protologue (McNabb 1969), *S. pruinosa* may be related to *P. commotus* and *P. madidus*. Newly collected and sequenced specimens from New Zealand are needed to re-establish this species.

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Legends

Fig. 1. Combined phylogenetic nrITS+nrLSU topology from Bayesian Inference analysis showing main lineages within *Auriculariales*. All sequences generated for this study are indicated in bold faces. Collection numbers are given for all sequences. Support values (BA/ML) are given above the branches. Scale bar shows expected changes per site.

Fig. 2. Best tree from Maximum likelihood analysis for the nrITS dataset showing phylogenetic relationships of *Protomerulius* species. All sequences generated for this study are indicated in bold faces. Collection numbers are given for all sequences. Support values (ML/BA) are given on the branches. Scale bar shows expected changes per site.

Fig. 3. Bayesian phylogram for the *tef1* dataset showing major lineages of the *Protomerulius*. Collection numbers are given for all sequences. Support values (BA/ML) are given on the branches. Scale bar shows expected changes per site.

Fig. 4. Basidiomata of *Protomerulius* spp.: a – *P. brachysporus* (isotype); b – *P. minor* (Miettinen 15700); c – *P. madidus* (Spirin 11588, senescent basidioma with characteristic white inclusions); d – *P. madidus* (holotype); e – *P. subreflexus* (Miettinen 14392); f – *P. substuppeus* (Vlasák 0409/10). Scale bar = 10 mm.

Fig. 5. Basidiospores of *Protomerulius* spp.: a – *Protomerulius dubius* (lectotype); b – *H. dubia* f. *crassior* (lectotype); c – *P. brachysporus* (isotype); d – *H. dubia* f. *sphaerospora* (lectotype); e – *P. hebes* (holotype); f – *P. commotus* (holotype); g – *P. madidus* (holotype); h – *P. pertusus* (holotype); i – *P. subreflexus* (Miettinen 14402.1); j – *P. substuppeus* (Vlasák 1407/38); k – *P. brasiliensis* (lectotype). Scale bar = 10 μm.

Fig. 6. *Protomerulius brachysporus* (Vehmaa 2600): a – basidiospores; b – cystidia.

Fig. 7. *Protomerulius commotus* (holotype): a – hymenial cystidia; b – tramal cystidia; c – basidiospores.

Fig. 8. *Protomerulius madidus* (Larsson 17664): a – basidiospores; b – cystidia and crystals; c – basidium.

Fig. 9. *Protomerulius microsporus* (Ryvarden 23440): a – gloeocystidia; b – basidia; c – tramal cystidia and crystals; d – basidiospores.

Fig. 10. *Protomerulius minor* (Miettinen 19586): a – basidium; b – cystidia; c – basidiospores.

Fig. 11. *Protomerulius pertusus* (holotype): a – basidia; b – cystidia; c – basidiospores.

Fig. 12. *Protomerulius brasiliensis* (syntype): a – generative hyphae; b – basidia; c – tramal skeletal hyphae; d – gloeocystidia.

Fig. 13. *Psilochaete multifora* (holotype): a – basidia; b – basidiospores; c – cystidia and hyphidia.

Fig. X. *Metulochaete sanctae-catharinae*: a –heavily encrusted cystidia, covering hymenial spine; b – ventricose cystidia; c – fertile hyphae with basidia; d – basidiospores. Scale bar = a – 50 μm, b-d – 10 μm

APÊNDICE L – *TREMELLOCHAETE ATLANTICA* ALVARENGA SP. NOV.- PUBLICADO FUNGAL DIVERSITY NOTES 929–1035: TAXONOMIC AND PHYLOGENETIC CONTRIBUTIONS ON GENERA AND SPECIES OF FUNGI. FUNGAL DIVERSITY 95:1–273. DOI: 10.1007/S13225-019-00421-W

Tremellochaete atlantica Alvarenga sp. nov.

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Auriculariaceae

Auriculariaceae, typified by *Auricularia mesenterica* (Dicks.) Pers. (= *Helvella mesenterica* Dicks.), belongs to Auriculariales and currently comprises nine genera and 155 species (Kirk et al 2017). The family includes species with resupinate, effused-reflexed, hydnoid, cerebriform and pileate basidiomata; thin or thick-walled probasidia and metabasidia, both varying from globose to cylindrical; and thin-walled basidiospores that germinate by tubes or producing conidia (Lowy 1971; Martin 1952). The most common genera of Auriculariaceae are *Auricularia* Bull., *Heterochaete* Pat., *Exidia* Fr., *Eichleriella* Bres., *Exidiopsis* (Bref.) A. Møller and *Hirneolina* (Pat.) Bres.

Tremellochaete was described by Raitviir (1964) with *T. japonica* (Lloyd) Raitv. 1964 (= *Exidia japonica* Lloyd) as the type species and currently comprises two legitimate species (Kirk et al. 2017). The genera is characterized by tough-gelatinous basidiomata, often becoming softer with age, varying from tuberculate-erumpent and effused-tuberculate; papillate hymenium, papillae heavily encrusted with irregular, hyaline crystals; metabasidia with 2 cells; and allantoid-suballantoid, hyaline, aseptated basidiospores. This genus is similar to *Exidia*, which has fewer papillae (Raitviir 1964), and *Tremellochaete* was considered its synonym. Recently, however, *Tremellochaete* was reinstated after morphological and phylogenetic analyses (Malysheva & Spirin 2017).

Tremellochaete atlantica Alvarenga, ***sp. nov*.**

MycoBank MB 823716; *Facesoffungi number*: FoF: xxx; Fig 1
Etymology: The name refers to the phytophysiognomy where it was collected.
Holotypus: URM 90199

Basidiomata yellowish to greyish or brown (1B, 2A, 5E, 4D) when fresh, greyish brown to yellowish brown (3F, 8E) when dry, foliose, 2.5–3 × 3.5 cm, gelatinous, densely papillate, papillae 50–107.5 × 40 µm, encrusted with irregular, hyaline crystals not dissolving in KOH, margin detaching from the substrate, marginal hairs present in tufts, 50–212 µm or absent, sub-hymenial hyphae with ochraceus, granular content.

Basidiospores allantoid to reniform, 7.75–10(–12) × 2–5 µm, thin-walled, IKI-. ***Basidia*** with complete septum, 2-celled, hyaline, ovoid, 9–12(13) × 6–9(–10) µm, clamped at the base. ***Hyphal system*** monomitic, hyphae clamped, thin-walled, hyaline, 1.0–2.0 µm in diam. ***Cystidia*** absent.

Specimens examined: BRAZIL, Pernambuco: Igarassu, Refúgio Ecológico Charles Darwin, May 2017, R.L.M. Alvarenga, RLMA 491 (URM 90198); BRAZIL, Pernambuco: Recife, Centro de Biociências, near the Departamento de Zoologia, Universidade Federal de Pernambuco, June 2017, R.L.M. Alvarenga, RLMA 477 (URM 90199 **holotypus, isotype** in O).

GenBank numbers: URM 90198 LSU/ITS-MG594384/MG594382; URM 90199 LSU/ITS-MG594383/MG594381

Notes: *Tremellochaete atlantica* is easily recognized by the marginal hairs ranging from 50 to 212 µm and the heavily encrusted papillae with hyaline, irregular crystals. The new species is similar to *T. japonica* and *T. nigerima* (Viégas) Spirin & V. Malysheva*. Tremellochaete japonica* (type locality Japan) differs by the darker basidiomata, fewer dark hyphae, smaller papillae (60–75 µm), absence of marginal hairs and slightly smaller basidiospores (9.5–12 × 4–4.5 µm) (Roberts 2006), while *T. nigerima* (type locality Brazil) has larger metabasidia and basidiospores (20–25 × 10–15 µm and 17–20 × 7–8 µm, respectively) (Viégas 1945).

*Tremellochaete hispidula (*Lowy) Raitv. (= *Exidia hispidula* Lowy, from the USA) also have marginal hairs (up to 125 µm), but differs by the lack of clamps, larger metabasidia [(7–)8–10 × (10–)12–16] and ovoid to allantoid basidiospores [(9–13(–14.5) × 5–7)] (Lowy 1957). This species, however, is illegitimate, because *E. hispidula* Berk. has priority over *E. hispidula* Lowy.

The specimens of *T. atlantica* clustered in the well-supported *Tremellochaete* clade as a sister group of *T. japonica* collected in Russia (Fig. 2).

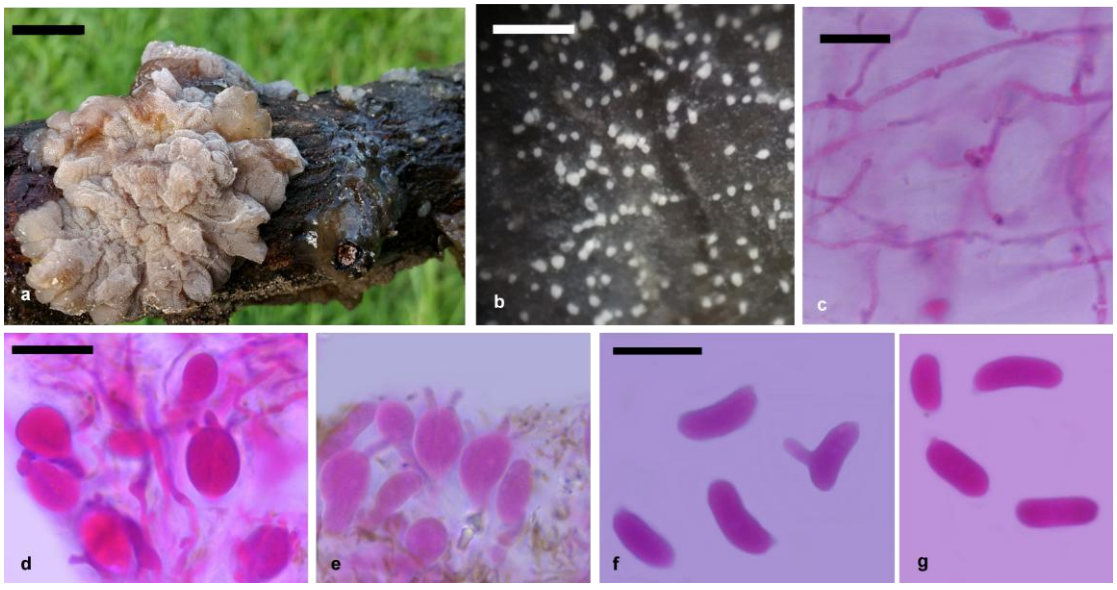

Fig. 1. ***Tremellochaete atlantica*** (type, URM 90199) **a** Basidioma when fresh **b** papillae encrusted with crystals **c** clamped hyphae of the context **d-e** 2-celled, metabasidia, hyphae with ochraceus, granular content **f-g** basidiospores. Photos: R.L. Alvarenga. Scale bars a = 1 cm, b = 1 mm, c-g =10 µm.

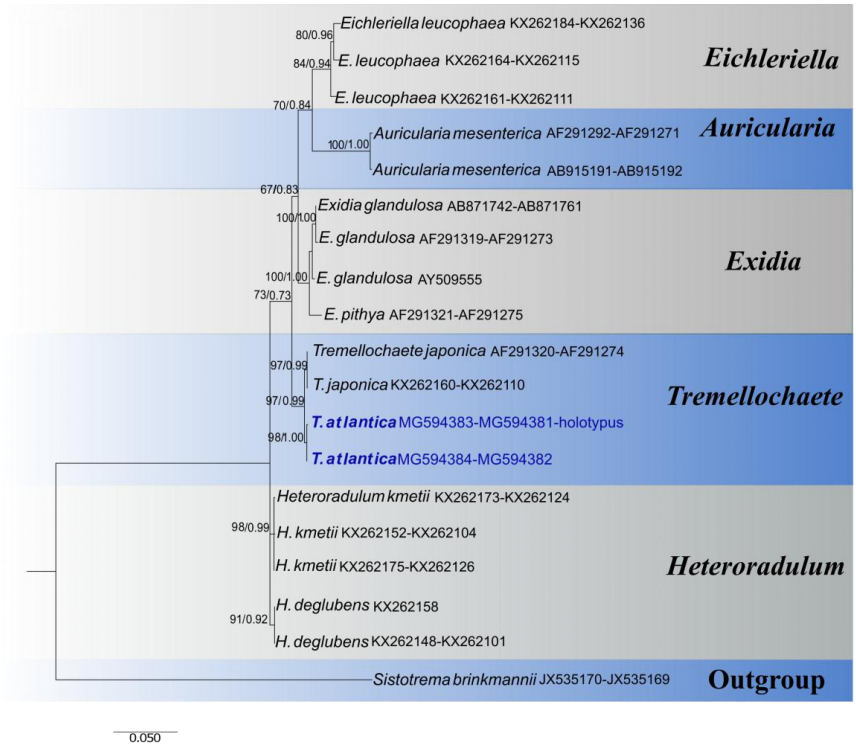

Fig. 2. Phylogenetic tree of the *Tremellochaete* obtained by analyses of rDNA sequences. Sequences obtained in this study are in bold. Support values are Maximum Likelihood (ML) and Bayesian analyses. Only support values of at least 50% are shown. The tree was rooted with *Sistorema brinkmannii*.

Material and Methods

Morphological studies

The specimens were collected in areas the Brazilian Atlantic Forest and in the Centro de Biociências, near the Departamento de Zoologia, Universidade Federal de Pernambuco, during the rainy season of 2017. Macro and microscopic features of two samples were analyzed, including the general aspect of the basidioma, hymenial surface, hyphae, hairs, basidia, and basidiopores. Freehand cuts were made with razor blades and sections were mounted in 3% KOH with or without 1% aqueous phloxine solution. Colour followed Kornerup & Wanscher (1978) and the literature used for identification was Viégas (1945), Lowy (1957, 1971, 1976), Martin (1952), Olive (1951) and Roberts (2003, 2006). The specimens were deposited in URM (Padre Camille Torrend, Brazil) and Herbarium O of the University of Oslo.

DNA extraction, PCR amplification and sequencing

Genomic DNA extraction followed the protocols of Gardes and Bruns (1993) and Góes-Neto et al. (2005) by which DNA was under incubation with 2% cetyl trimethylammonium bromide (CTAB). The DNA pellets were re-suspended in 50 µl sterile water. The ITS region and partial LSU rDNA were amplified by PCR according to Góes-Neto et al. (2005), using the primers ITS4 and ITS5 for ITS rDNA region (White et al. 1990) and LR0R and LR5 for the LSU rDNA region (Moncalvo et al. 2000). Subsequently, purification was performed by PureLink PCR purification kit (Invitrogen). The sequences were provided by the Technological Platform of Genomics and Gene Expression of the Bioscience Centre (CB) (Recife, UFPE). Sequence data were compared to those deposited in GenBank using BLASTn.

Sequence alignment and phylogenetic analyses

The phylogenetic tree was generated by partial concatenated analyses of the ITS and partial LSU sequences. Only species with at least the LSU sequences were considered for the phylogeny. The sequences obtained in this study were aligned with other from GenBank in MEGA6 (Tamura et al. 2013) and edited using the Staden Package 2.0 software (Staden et al. 1998). Sequences from *Sistotrema brinkmannii* (Bres.) J. Erikss. were used as outgroup. Prior to phylogenetic analyses, the model of nucleotide substitution was estimated using Topali 2.5 (Milne et al. 2004). Bayesian (two runs over 2×10^6 generations with a burn in value of 25% and maximum likelihood (1000 bootstrap) analyses were performed, respectively, in MrBayes 3.1.2 (Ronquist et al. 2012) and PhyML (Guindon & Gascuel 2003) launched from Topali 2.5, using the GTR + G model.

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