Article

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Checklist of the agaricoid and similar morphology mycobiota of Paraíba State, Brazil

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ABSTRACT - (Checklist of the agaric mycobiota and similar morphology of Paraíba State, Brazil). Brazil has a rich biodiversity, but many species remain to be discovered, studied and cataloged. In the Paraíba State, taxonomy studies on agaric fungi are still infrequent. Thus, this present work carried out a bibliographic review of fungal species belonging to orders Agaricales, Boletales, Cantharellales, Gomphales and Russulales from the Paraíba State previously described or mentioned, because the knowledge about the fungal diversity in the region still remain disaggregated and poorly known. Thus, we organize and present information about the geographic distribution of the taxa in this checklist format. For the compilation of the results, for each species we present the published herbarium numbers and their respective citations. As results, we found 79 taxa belonging 41 genera, 22 families and five orders occurring in areas of the Atlantic Forest and Caatinga. So, this review is extremely important for the dissemination of the valuation of the State's biodiversity providing information about our Brazilian biomes.
Keywords: Agaricomycetes, basidiomycota, neotropics, voucher

RESUMO - (Checklist da micota agaricoide e de morfologia similar do Estado da Paraíba, Brasil). O Brasil possui uma rica biodiversidade, por isso existem muitas espécies a serem descobertas, estudadas e catalogadas. No Estado da Paraíba, ainda são poucos os estudos envolvendo taxonomia. Com isso, o trabalho realizou um levantamento bibliográfico das espécies fúngicas do Estado da Paraíba já descritas ou citadas, pois o conhecimento sobre a diversidade de fungos que possuímos ainda é muito desagregado e pouco conhecido. Dessa forma, organizamos e apresentamos informações sobre a distribuição geográfica dos táxons em formato de check list. Para a compilação dos resultados, para cada espécie apresentamos os números de tombamento do herbário publicados e suas citações. Como resultado, listamos 79 táxons pertencendo a 41 gêneros, 22 famílias e cinco ordens ocorrendo em áreas de Mata Atlântica e Caatinga. Sendo assim, este trabalho é de extrema importância para a avaliação da biodiversidade do Estado providenciando informação acerca os biomas brasileiros.
Palavras-chave: Agaricomycetes, basidiomycota, neotrópicos, voucher

Introduction

It is known that Brazil has a rich biodiversity, with Cerrado and Mata Atlântica biomes considered as hotspots for biodiversity conservation, and the Pantanal biome as the largest swamped area of the world (Brandon *et al.* 2005). The recognition of the tropical fungal biodiversity, on which many taxa remain undescribed and also in risk of extinction, is very important but, due of their magnitude, too many species remain to be discovered basing in taxonomic, systematic, ecological, morphological, studies on biological conservation and biodiversity as well palaeobiology, improving the knowledge about these organisms (Hawksworth 1991, Funk *et al.* 2002).

Among Basidiomycota the fungi with agaricoid habit, formally called mushrooms, were formerly grouped in 16 families among the suborders Agaricineae, Boletineae and Russulineae, according to most known classification of the order Agaricales (Singer 1986). During phylogenetic systematic studies, Matheny *et al.* (2006) divided the euagarics in six clades: 1) Plicaturopsidoid; 2) Pluteoid encompassing the families Pluteaceae (*Pluteus* Fr. and *Volvariella* Speg.), Amanitaceae (*Amanita* Pers. and *Limacella* Earle) and *Hohenbuehelia* Schulzer; 3) Hygrophoroid with Hygrophoraceae and some members previously belonging to Tricholomataceae; 4) Marasmioid, with Marasmiaceae, Omphalotaceae, Cyphellaceae, Physalacriaceae and Schizophyllaceae; 5) Tricholomatoide, with members Tricholomataceae sensu stricto, Lyophyllaceae, Entolomataceae and Mycenaceae; and 6) Agaricoid including Cystodermataceae, Nidulariaceae, Agaricaceae, Inocybaceae, Bolbitiaceae, Cortinariaceae, Psathyrellaceae, Crepidotaceae among other.

Recent studies by Dentinger *et al.* (2016) described Agaricales divided into the suborders Hygrophorineae (containing Clavariaceae and Hygrophoraceae), Pleurotineae (Pleurotaceae and Pterulaceae), Schizophyllineae (Fistulinaceae and Schizophyllaceae), Marasmiineae (Cyphellaceae, Mararmiaceae, Mycenaceae, Omphalotaceae and Physalacriaceae), Tricholomatineae (Entolomataceae, Lyophyllaceae, Macrocystidiaceae and Tricholomataceae),

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Pluteineae (Amanitaceae and Pluteaceae), and Agaricineae (Agaricaceae, Psathyrellaceae, Strophariaceae, Crepidotaceae, Hymenogastraceae and Inocybaceae). The families previously considered in Agaricales, as Boletaceae (habit boletoid) and Russulaceae (russuloid), were separated in the orders Boletales e Russulales (Binder & Hibbett 2006, Miller *et al.* 2006).

Taxonomic studies on agaric fungi in Paraíba State were infrequent in the last century, with species described or cited by Singer (1961, 1965, 1966, 1973a, 1973b, 1976, 1977), Horak (1977) and Oliveira & Sousa (1995, 1996, 2002). Only recently the studies in systematic and taxonomy of agaricoid fungi in the state were intensified with Wartchow *et al.* (2012, 2015, 2017), Magnago *et al.* (2013, 2015, 2017, 2019), Pinheiro & Wartchow (2013), Pinheiro *et al.* (2013), Gomes & Wartchow (2014), Henkel et al. (2014), Coimbra et al. (2015), Silva-Junior & Wartchow (2015), Sá & Wartchow (2016), Barbosa-Silva *et al.* (2017, 2020), Nascimento & Wartchow (2018), Silva-Filho *et al.* (2019, 2020, 2021), Barbosa-Silva & Wartchow (2020) and Sulzbacher *et al.* (2020). They described or reported more taxa for the region.

The objective of this work is to perform a bibliographic overview of agaric fungi of Paraíba State, for improve the current status of knowledge of this group of fungi in this region. This knowledge is essential for instruct and raise awareness about the importance of the biological conservation in ecosystems and the self-sustainability (Lodge *et al.* 1995, Straatsma *et al.* 2001).

Materials & Methods

The Paraíba State (figure 1) is localized at the Northeastern region of Brazil and occupies an area of 56,372 km², corresponding to less than 1% of the national territory (Francisco *et al.* 2015). The geographical relief is diversified, with parts with humid, subhumid and semiarid climates. Regarding to vegetation, the state has forests formation as restinga, mangrove, ombrophilous and semideciduous forests, humid forests, tabuleiros costeiros, arbustive-arborous caatinga, open arbustive caatinga and other (Governo do Estado Paraíba 2006). The names of the biomes are according to IBGE (2004).

For the elaboration of the map, we use Google Earth™. For the species compilation we performed a bibliographic survey in which the species are presented with their citation and region of the State where the materials were collected, including respective herbarium voucher's deposit. When the authors did not inform herbarium number, we consulted the INCT-Virtual Herbarium of Flora and Fungi website (https://specieslink.net/). If we do not find the herbarium code and number, we inform the collection number and the herbarium acronym where supposedly the material is deposited [e.g., Singer B 3341 (BAFC, LIL), M.A. Neves 412 (FLOR), A.N.M. Furtado 32 (FLOR) and other]. Taxonomic position of the generic names is based in He *et al.* (2019), Kalichman *et al.* (2020) and Wijayawardene *et al.* (2020). Epithets and species authority are based in Mycobank (Crous et al. 2004, Robert et al. 2113). Herbaria codes follow Thiers (continuously updated), except for UFRN-Fungos (Departamento de Botânica e Zoologia, Universidade Federal do Rio Grande do Norte).

Results and discussion

In this study we are considering only taxa with agaricoid and also similar habit as boletoid, russuloid, cantharelloid (Cantharellales, Moncalvo *et al.* 2006) and gomphoid (Gomphales, Hosaka *et al.* 2006).

After survey of 30 works (including article, books and books chapters) we found 79 taxa belonging to 41 genera, 22 families and five orders (figure 2, table 1), collected from eight areas belonging six municipalities:

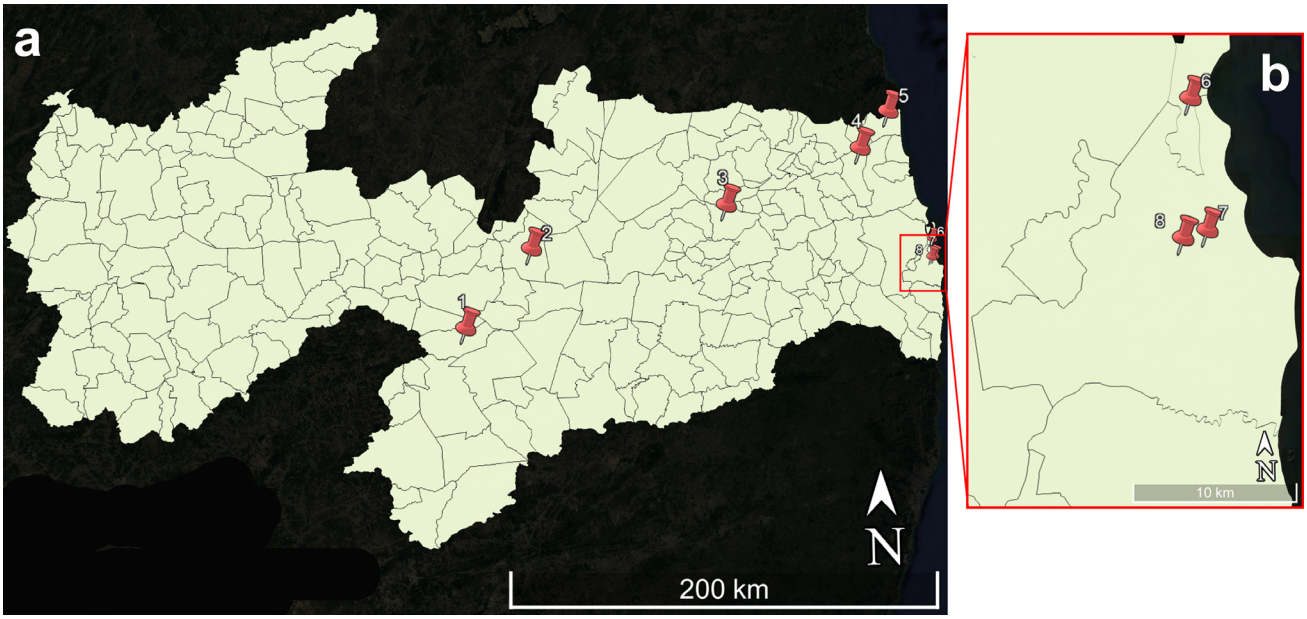

Figure 1. Collection sites of agaricoid fungi in the Paraíba State, Brazil. a. Map with its respective municipalities. 1. São José dos Cordeiros. 2. Juazeirinho. 3. Areia. 4. Mamanguape. 5. Mataraca. 6. Cabedelo. b. Magnification of collection sites in the city of João Pessoa. 7. Jardim Botânico Benjamin Maranhão. 8. Universidade Federal da Paraíba. Source: modified fom Google Earth.

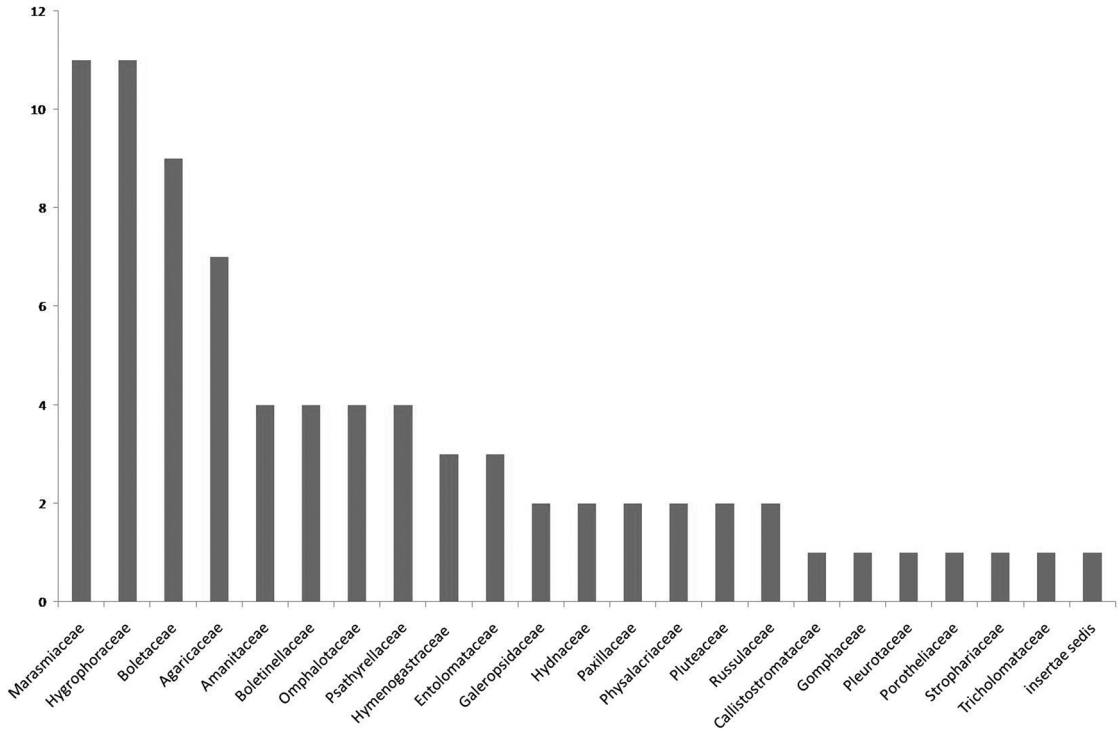

Figure 2. Graphic showing the number of taxa of agaricoid fungi per family recorded from the Paraíba State, Brazil.

Table 1. Checklist of agaricoid and similar morphology fungi from the State of Paraíba, Brazil and their respective localities, authorities and references.

Order / Family / Taxon's name	Voucher, Herbaria or Collector number	Locality	Reference
Agaricales			
Agaricaceae	JPB 46270	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Agaricus moelleri Wasser			
Chlorophyllum molybdites (G. Mey.) Massee	JPB 47307	Juazeirinho, Fazenda Unha-de-Gato	Magnago *et al*. (2013)
Coprinus calyptratus Peck	JPB 46272	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013 as '*Coprinus xerophilus* Bogart'), Gomes & Wartchow (2018)
Lepiota erythrosticta (Berk. & Broome) Sacc.	A.N.M. Furtado 32 (FLOR)	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013 as '*Lepiota erythosticta*')
Leucoagaricus americanus (Peck) Vellinga	JPB 46277	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Leucocoprinus birnbaumii (Corda) Singer	M.A. Neves 412 (FLOR)	Juazeirinho, Fazenda Unha de Gato; São José dos Cordeiros, RPPN Fazenda	Magnago *et al*. (2013)
Leucocoprinus fragilissimus (Berk &. M.A. Curtis) Pat.	JPB 50674	João Pessoa, Jardim Botânico Bejamin Maranhão	Magnago *et al*. (2015)
Amanitaceae	JPB 50676	João Pessoa, Campus I UFPB	Magnago *et al*. (2015)
Amanita crebresulcata Bas			
Amanita viscidolutea Menolli, Capelari & Baseia	URM 82095	Mataraca, Millenium Inorganic Chemicals Minning a Crystal Company	Wartchow *et al*. (2012)
Limacella brunneovenosa C.C. Nacimento & Wartchow	JPB 62772	Cabedelo, FLONA Restinga de Cabedelo	Nacimento & Wartchow (2018)
Limacella sp.	JPB 47308	Juazeirinho, Fazenda Unha de Gato	Magnago *et al*. (2013)

continue

Table 1 (continued)

Order / Family / Taxon's name	Voucher, Herbaria or Collector number	Locality	Reference
Callistostromataceae			
Macrocybe praegrandis (Berk.) Pegler & Lodge	Singer B 3341 (BAFC, LIL)	João Pessoa	Singer [1966, as *Tricholoma praegrande* (Berk.) Sacc.]
Entolomataceae			
Entoloma bloxamii (Berk. & Broome) Sacc.	JPB 50671	João Pessoa, Campus I UFPB	Magnago *et al*. (2015)
Entoloma cantharelluloides (Singer) E. Horak	Singer B 3360 (BAFC)	João Pessoa	Singer (1965 as *Rhodophyllus)*, Horak (1977)
Rhodocybe crepidotoides Singer	Singer B 3333 (BAFC)	João Pessoa	Singer (1973a)
Galeropsidaceae			
Panaeolus antillarum (Fr.) Dennis	JPB 43133	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Panaeolus papilionaceus Ew. Gerhardt	M.A. Neves 421 (FLOR)	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al.* (2013)
Hygrophoraceae			
Camarophyllus paraiboensis Singer	Singer B 3334 (BAFC)	João Pessoa	Singer (1977)
Cuphophyllus buccinulus (Speg.) Courtec.	A.C. Magnago 27 (FLOR)	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. [2013 as '*Camarophyllus buccinulus* (Speg.) Pegler']
Hygrocybe aurantiomagnifica Silva-Filho & Wartchow	JPB 62773	Areia, Parque Estadual Mata do Pau-Ferro	Silva-Filho *et al*. (2019)
Hygrocybe batistae Singer	JPB 44297	Mamanguape, REBio Guaribas	Magnago *et al*. (2015)
Hygrocybe hypohaemacta (Corner) Pegler	M.A. Neves 413 (FLOR)	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Hygrocybe occidentalis var. scarletina Pegler	JPB 44272, JPB 44273, JPB 44274	Mamanguape, REBio Guaribas	Magnago *et al*. (2015)
Hygrocybe paraibensis Singer	Singer B 3320 (LIL)	João Pessoa	Singer (1965)
Hygrocybe rhodoleuca Singer	Singer B 3345 (BAFC, LIL)	João Pessoa	Singer (1973a)
Hygrocybe subcaespitosa (Murrill) Lodge & Pegler	JPB 44265, JPB 44266, JPB 44271, JPB 44275, JPB 44279, JPB 44280, JPB 44283	Mamanguape, REBio Guaribas	Magnago *et al*. (2015)
Hygrocybe trinitensis (Dennis) Pegler	JPB 44285	Mamanguape, REBio Guaribas	Magnago *et al*. (2015)
Hygrotrama leucopus Singer	Singer B 3344 (BAFC)	João Pessoa	Singer (1973a)
Hymenogastraceae			
Gymnopilus purpureogramminicola Silva-Junior & Wartchow	JPB 58545	João Pessoa, UFPB Campus I	Silva-Junior & Wartchow (2015)
Gymnopilus purpureosquamulosus Høil.	JPB 46297	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. [2013, as 'G. purpureosquamulosus (Peck) Singer' sic.]
Gymnopilus subtropicus Hesler	JPB 50672	João Pessoa, Jardim Botânico Bejamin Maranhão	Magnago *et al*. (2015)
Marasmiaceae			
Crinipellis sapindacearum Singer	Singer 3377 (F 3640)	João Pessoa	Singer (1976)
Marasmius crinis-equi F. Muell. ex Kalchbr.	JPB 48125, JPB 48129, JPB 48149, JPB 48186, JPB 48163, JPB 48125	João Pessoa, UFPB Campus I, Jardim Botânico Bejamin Maranhão	Magnago *et al*. (2015)

continue

Table 1 (continued)

Order / Family / Taxon's name	Voucher, Herbaria or Collector number	Locality	Reference
Marasmius ferrugineus var. *gardneri Singer*	JPB 48193, JPB 48142, JPB 48162, JPB 48164	João Pessoa, UFPB Campus I, Jardim Botânico Bejamin Maranhão	Magnago *et al*. (2015)
Marasmius haematocephalus (Mont.) Fr.	M.A. Neves 680 (FLOR)	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Marasmius hakgalensis Petch	Singer B 3342 (BAFC)	João Pessoa	Singer (1976)
Marasmius helvolus Berk.	JPB 48159, JPB 48161, JPB 48170	João Pessoa, UFPB Campus I, Jardim Botânico Bejamin Maranhão	Magnago *et al*. (2015)
Marasmius leoninus Berk.	JPB 48158, JPB 48135, JPB 48150	João Pessoa, UFPB Campus I, Jardim Botânico Bejamin Maranhão	Magnago *et al*. (2015)
Marasmius phaeus Berk. & M.A. Curtis	JPB 48154, JPB 48166, JPB 48168, JPB 48185, JPB 48143, JPB 48123, JPB 48188, JPB 48189	João Pessoa, UFPB Campus I, Jardim Botânico Bejamin Maranhão	Magnago *et al*. (2015)
Marasmius rubromarginatus Dennis	JPB 46286	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Marasmius similis Berk. & M.A. Curtis	JPB 48153, JPB 48 171, JPB 48172, JPB 48176	João Pessoa, Jardim Botânico Benjamim Maranhão	Magnago *et al*. (2015)
Marasmius trinitatis Dennis	JPB 48131, JPB 48133, JPB 48137	João Pessoa, UFPB Campus I	Magnago *et al*. (2015)
Omphalotaceae			
Gymnopus atlanticus V. Coimbra & Wartchow	URM 87729	João Pessoa; Cabedelo, FLONA Restinga de Cabedelo	Coimbra *et al*. (2015)
Gymnopus montagnei (Berk.) Redhead	URM 87726	João Pessoa; Cabedelo, FLONA Restinga de Cabedelo	Coimbra *et al*. (2015)
Gymnopus talisiae V. Coimbra & Wartchow	URM 87730	João Pessoa; Cabedelo, FLONA Restinga de Cabedelo	Coimbra *et al*. (2015)
Marasmiellus defibulatus Singer	Singer B 3356 (F)	João Pessoa	Singer (1973b)
Physalacriaceae			
Oudemansiella cubensis (Berk. & M.A. Curtis) R.H. Petersen	JPB 46287	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. [2013 as '*Oudemansiella cubensis* (Speg.) Speg.' sic.]
Oudemansiella steffenii (Rick) Singer	JPB 50651, JPB 50667	João Pessoa, UFPB Campus I	Magnago *et al*. [2015 as *Dactylosporina steffenii* (Rick) Dörfelt]
Pleurotaceae			
Pleurotus djamor (Rump.: Fr.) Boedjin	Singer B 3313 (LIL)	João Pessoa	Singer (1961, as P. *ostreatoroseus* Singer)
Pluteaceae			
Volvariella leucocalix Sá & Wartchow	JPB 61264	Areia, Parque Estadual Mata do Pau-Ferro	Sá & Wartchow (2016)
Volvopluteus earlei (Murrill) Vizzini, Contu & Justo	A.N.M. Furtado 91 (FLOR)	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Porotheliaceae			
Hydropus grizeolazulinus F.G.B. Pinheiro, Sá & Wartchow	JPB 51899	Cabedelo, FLONA Restinga de Cabedelo	Pinheiro *et al*. (2013)

continue

Table 1 (continued)

Order / Family / Taxon's name	Voucher, Herbaria or Collector number	Locality	Reference
Psathyrellaceae			
Coprinellus arenicola Wartchow & A.R. Gomes	JPB 56051	Cabedelo, FLONA Restinga de Cabedelo	Gomes & Wartchow (2014)
Coprinellus disseminatus (Pers.) J.E. Lange	JPB 50668	João Pessoa, Jardim Botânico Benjamim Maranhão	Magnago *et al*. (2015)
Parasola leiocephala (P.D. Orton) Redhead, Vilgalys & Hopple	JPB 46290	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Psathyrella tuberculata (Pat.) A.H. Sm.	JPB 46291	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. [2013 as '*Psathyrella tuberculata* (Berk. & Broome) P.D. Orton' sic.]
Strophariaceae			
Agrocybe retigera (Speg.) Singer	JPB 46293	São José dos Cordeiros, RPPN Fazenda Almas	Magnago *et al*. (2013)
Tricholomataceae			
Leucopaxillus gracilimus Singer & A.H. Sm.	JPB 50662	João Pessoa, UFPB Campus I	Magnago *et al*. (2015)
Agaricales			
Incertae sedis			
Trogia cantharelloides (Mont.) Singer	Singer B 3358 (LIL)	João Pessoa	Singer (1961)
Boletales			
Boletaceae			
Boletellus lepidospora E.-J. Gilbert	JPB 6891	João Pessoa, UFPB Campus I	Oliveira & Sousa (1995)
Boletellus nordestinus A.C. Magnago	FLOR 51603, FLOR 51604	Mamanguape, REBio Guaribas	Magnago *et al*. (2019)
Boletellus pustulatus (Beeli) E.-J. Gilbert	JPB 6896, JPB 6893, JPB 6894, JPB 6595, JPB 6900, JPB 6897, JPB 6898, JPB 6899, JPB 6902, JPB 6901, JPB 6903, JPB 6904, JPB 6907, JPB 6906, JPB 6905, JPB 9277, JPB 6892, JPB 17503, JPB 17548, JPB 18626	João Pessoa, Campus I UFPB	Oliveira & Sousa (1995)
Chalciporus piperatus (Bull.: Fr.) Batt.	JPB 6909, JPB 6908, JPB 6910, JPB 9420, JPB 9573, JPB 9276, JPB 8365, JPB 17522, JPB 17504, JPB 17551, JPB 17500, JPB 5914, JPB 18602, JPB 14734	João Pessoa, Campus I UFPB	Oliveira & Sousa (2002)
Fistulinela ruschii A.C. Magnago	ICN 192820	João Pessoa, Campus I UFPB	Magnago *et al*. (2018)
Fistulinella violaceospora (G. Stev.) Pegler & T.W.K Young	JPB 6912, JPB 6911, JPB 6914, JPB 9429, JPB 9437, JPB 9438, JPB 6988, JPB 6990, JPB 17558, JPB 17550, JPB 17595	João Pessoa, Campus I UFPB	Oliveira & Sousa (2002)
Tylopilus aquarius var. megistus Wartchow, Barbosa-Silva, B. Ortiz & Ovrebo	JPB 61780, JPB 61781, JPB 51100, UFRN-Fungos 2676, UFRN-Fungos 2493, URM 89205	Mamanguape, REBio Guaribas	Barbosa-Silva *et al*. (2017)
Tylopilus nigripes Barbosa-Silva & Wartchow	JPB 63855	Mamanguape, REBio Guaribas	Barbosa-Silva *et al*. (2020)
Xerocomus amazonicus Singer	JPB 6973	João Pessoa, Campus I UFPB	Oliveira & Sousa (1995)
Boletinellaceae			
Phlebopus beniensis (Singer & Digilio) Heinem. & Rammeloo	JPB 6968, JPB 6969, JPB 6972, JPB 6986, JPB 9417, JPB 17563, JPB 17577, JPB 18627	João Pessoa, Campus I UFPB	Oliveira & Sousa (1996)

continue

Table 1 (continued)

Order / Family / Taxon's name	Voucher, Herbaria or Collector number	Locality	Reference
Phlebopus brasiliensis Singer	Singer B 3312 (BAFC, LIL), JPB 64077	João Pessoa; Cabedelo, FLONA Restinga de Cabedelo	Singer *et al*. (1983), Barbosa-Silva & Wartchow (2020)
Phlebopus harleyi Heinem. & Rammeloo	JPB 3789, JPB 6949, JPB 6951, JPB 6952, JPB 6953, JPB 6954, JPB 6955, JPB 6956, JPB 6957, JPB 6958, JPB 6959, JPB 6961, JPB 6962, JPB 6963, JPB 6964, JPB 6907, JPB 6965, JPB 6967, JPB 6966, JPB 6915, JPB 6977, JPB 5874, JPB 17576, JPB 18625	João Pessoa, Campus I UFPB	Oliveira & Sousa (1996)
Phlebopus portenosus (Berk. & Broome) Boidjin	JPB 3790, JPB 6916, JPB 6919, JPB 6920, JPB 6917, JPB 6921, JPB 6922, JPB 6923, JPB 6924, JPB 6925, JPB 6926, JPB 6928, JPB 6931, JPB 6923, JPB 6929, JPB 6930, JPB 6987, JPB 6933, JPB 6934, JPB 6935, JPB 6936, JPB 6937, JPB 6938, JPB 6939, JPB 6940, JPB 6942, JPB 6943, JPB 17565, JPB 18628	João Pessoa, Campus I UFPB	Oliveira & Sousa (1996)
Paxilaceae *Gyrodon proximus* Singer	JPB 6944, JPB 6945, JPB 6946, JPB 6947, JPB 17523, JPB 17578, JPB 17588, JPB 17591	João Pessoa, Campus I UFPB	Oliveira & Sousa (1996)
Paxillus guttatus Singer	Singer B 3378 (LIL)	João Pessoa	Singer (1961)
Cantharellales			
Hydnaceae *Cantharellus guyanensis* Mont.	JPB 46806	Areia, Parque Estadual Mata do Pau-Ferro	Henkel *et al*. (2014)
Cantharellus protectus Wartchow & F.G.B. Pinheiro	JPB 18541, JPB 51317	Mamanguape, REBio Guaribas	Pinheiro & Wartchow (2013)
Gomphales			
Gomphaceae *Gloeocantharellus substramineus* Wartchow	JPB 60533	João Pessoa; Cabedelo, FLONA Restinga de Cabedelo	Wartchow *et al*. (2017)
Russulales			
Russulaceae *Lactifluus piperogalactus* Silva-Filho, Sá & Wartchow	JPB 64495, JPB 64502	Areia, Parque Estadual Mata do Pau-Ferro	Silva-Filho *et al*. (2021)
Lactifluus venosellus Silva-Filho, Sá & Wartchow	UFRN-Fungos 2197	Mamanguape, REBio Guaribas	Silva-Filho *et al*. (2020)

Cabedelo (FLONA Restinga de Cabedelo), João Pessoa (Jardim Botânico Benjamin Maranhão and UFPB Campus I), Mataraca (Millenium Inorganic Chemicals Minning a Crystal Company - now Tronox) and Mamanguape (REBio Guaribas) in the Atlantic Forest biome; and Areia (Parque Estadual Mata do Pau-Ferro), Juazeirinho (Fazenda Unha de Gato), and São José dos Cordeiros (RPPN Fazenda Almas) in the Caatinga biome (figure 1). Most of these specimens are deposited at JPB, but also in the herbaria of BAFC, F, FLOR, LIL, UFRN-Fungos and URM.

In João Pessoa were recorded at least two well delimited areas, UFPB Campus I and Jardim Botânico Benjamin Maranhão. All species published by Singer (1961, 1965, 1966, 1973a, 1973b, 1976, 1977) were delimited only with the city's name (table 1), and no exact locality was able to be informed. In Mataraca, it was recorded a mining currently named 'Tronox'.

Regarding to genera, *Marasmius* was the genus with the most species recorded for the state. We found 10 species cited or described (table 1). The genus comprises about 600 worldwide known species, most of them saprophytic (He *et al.* 2019, Wijayawardene *et al.* 2020), and recent studies referred 49 taxa, mostly from Atlantic Forest of Southeastern Brazil (e.g. Oliveira *et al.* 2014, 2020a, 2020b). The genus is considered a key component in the tropical mycobiota, due to the importance in decomposing leaf litter in forest by the networks of rhizomorphs that facilitate the trap litter (Lodge & Cantrell 1995), and plays an important role in the nutrient cycle (Braga-Neto *et al.* 2008).

We also noted 15 species with putative Ectomycorrhizal (ECM) habit belonging to families Amanitaceae (*Amanita*), Boletaceae (*Boletellus Murrill*, *Chalciporus* Bataille, *Fistulinella* Henn. and *Tylopilus* P. Karst.), Hydnaceae (*Cantharellus* Juss.) and Russulaceae [*Lactifluus* (Pers.) Roussel] (Smith & Read 2008).

Some of them were found in the REBio Guaribas, an area with tableland vegetation with white sandy soil (Thomas & Barbosa 2008). Interestedly, ECM macrofungi are much diverse in this kind of substrate (Roy *et al.* 2016) and are important to help their plant hosts to uptake nutrients from this poor-nutrient substrate (Smith & Read 2008).

General remarks and conclusion

In Paraíba State, Magnago *et al.* (2013) cited 22 names of agaricoid species from the semiarid and Magnago *et al.* (2015) 18 species from the Atlantic Forest. However, some names published by them need to be re-analyzed for a more accurate identification. As an example, we can mention the material identified as *Coprinus xerophilus* Bogart by Magnago *et al.* (2013) which currently corresponds to *C. calyptratus* Peck (Gomes & Wartchow 2018). Thus, most of the names reported may be a misapplication of European species names and need to be revised. For this reason, we have included all information as possible of the collection data for each name.

Taxonomic knowledge about agaricoid fungi in Brazil is still little understood, requiring more specific researches and focus in this group of macrofungi, and also among other diverse groups of the Kingdom Fungi.

In order to increase the knowledge about the high biodiversity of macrofungi belonging to this group in the Paraíba State, it is essential to have as a basis the research and revision of information on studies already carried out, making a survey of species already found and cataloged. We did not find studies published on ecological aspects of agaricoid fungi from Paraíba State. This is due to the lack of investment in research in the state, resulting in the scarcity of information of fungal species in the region.

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Author Contributions

Juliane C. Valões-Araújo: Substantial contribution in the concept and design of the study; Contribution to data collection; Contribution to data analysis and interpretation; Contribution to manuscript preparation.

Felipe Wartchow: Substantial contribution in the concept and design of the study; Contribution to critical revision. Contribution in supervising the lead author.

Conflicts of interest

There is no conflict of interest.

Literature cited

Barbosa-Silva, A. & Wartchow, F. 2020. Considerations on the rare species *Phlebopus brasiliensis* (Fungi, Basidiomycota, Boletinellaceae) from Atlantic Forest of Northeast Brazil. Proceedings of the Biological Society of Washington 133: 109-119.

Barbosa-Silva, A., Ovrebo, C.L., Ortiz-Santana, B., Sá, M.C.A., Sulzbacher, M.A., Roy, M. & Wartchow, F. 2017. *Tylopilus aquarius*, comb. et stat. nov., and its new variety from Brazil. Sydowia 69: 115-122.

Barbosa-Silva, A., Sulzbacher, M.A. & Wartchow, F. 2020. *Tylopilus nigripes* sp. nov. (Boletaceae, Basidiomycota) from the Atlantic Forest of Brazil. Feddes Repertorium 131: 244-250.

Binder, M. & Hibbett, D.S. 2006. Molecular systematic and biological diversification of Boletales. Mycologia 98: 971-981.

Braga-Neto, R., Luizão, R.C.C., Magnusson, W.E., Zuquim, G. & Castilho, C.V. 2008. Leaf litter fungi in a Central Amazonian Forest: the influence of Rainfall, soil and topography on the distribution of fruiting bodies. Biodiversity and Conservation 17: 2701-2712.

Brandon, K., Fonseca, G.A.B., Rylands, A.B. & da Silva, J.M.C. 2005. Conservação brasileira: desafios e oportunidades. Megadiversidade 1: 7-13.

Coimbra, V.R.M., Pinheiro, F.G.B., Wartchow, F. & Gibertoni, T.B. 2015. Studies on *Gymnopus* sect. *Impudicae* (Omphalotaceae, Agaricales) from Northern Brazil: two new species and notes on G. montagnei. Mycological Progress 14: 110.

Crous, P.W., Gams, W., Stalpers, J.A., Robert, V. & Stegehuis, G. 2004. MycoBank: an online initiative to launch mycology into 21st century. Studies in Mycology 50: 19-22.

Dentinger, B.T.M., Gaya, E., O'Brien, H., Suz, L.M., Lachlan, R., Díaz-Valderrama, J.R., Koch, R.A. & Aime, M.C. 2016. Tales from the crypt: genome mining from fungarium specierns improves resolution of the mushroom tree of life. Biological Journal of the Linnean Society 117: 11-32.

Francisco, P.R.M., Medeiros, R.M., Santos, D. & Matos, R.M. 2015. Classificação climática de Köppen e Thornthwaite para o Estado da Paraíba. Revista Brasileira de Geografia Física 8: 1006-1016.

Funk, V.A., Sakai, A.K. & Richardson, K. 2002 Biodiversity: the interface between systematics and conservation. Systematic biology 51: 235-237.

Gomes, A.R.P. & Wartchow, F. 2014. *Coprinellus arenicola*, a new species from Paraíba, Brazil. Sydowia 66: 249-256.

Gomes, A.R.P. & Wartchow, F. 2018. Notes on two coprinoid fungi (Basidiomycota, Agaricales) from the Brazilian semiarid region. Edinburgh Journal of Botany 75: 285-295.

Governo do Estado Paraíba. 2006. PERH-PB. Plano estadual de recursos hídricos: Resumo Executivo & Atlas. Consórcio TC/BR Concremat, Brasilia.

Hawksworth, D.L. 1991. The fungal dimension of biodiversity: magnitude, significance, and conservation. Mycological Research 95: 641-655.

He, M.Q., Zhao, R.L., Hyde, K.D., Begerow D., Kemler, M., Yurkov A., McKenzie E.H.C., Raspé, O., Kakishima M., Sánchez-Ramírez, S., Vellinga E.C., Halling, R.E., Papp. V., Zmitrovich, I.V., Buyck, B., Ertz, D., Wijayawardene, N.N., Cui, B.K., Schoutteten, N., Liu, X.Z., Li, T.H., Yao, Y.J., Zhu, X.Y., Liu, A.Q., Li, G.J., Zhang M.Z., Ling, Z.L., Cao, B., Antonín, V., Boekhout, T., da Silva, B.D.B., De Crop, E., Decock, C., Dima, B., Dutta, A.K., Fell, J.W., Geml, J., Ghobad-Nejhad, M., Giachini A.J., Gibertoni, T.B., Gorjón, S.P., Haelewaters, D., He, S.H., Hodkinson, B.P., Horak, E., Hoshino, T., Justo, A., Lim, Y.W., Menolli Jr., N., Mešić, A., Moncalvo, J.-M., Mueller, G.M., Nagy, L.G., Nilsson, R.H., Noordeloos, M., Nuytinck, J., Orihara, T., Ratchadawan, C., Rajchenberg, M., Silva-Filho, A.G.S., Sulzbacher, M.A., Tkalčec, Z., Valenzuela, R., Verbeken, A., Vizzini, A., Wartchow, F., Wei, T.Z., Weiß, M., Zhao, C.L. & Kirk, P.M. 2019. Notes, outline and divergence times of Basidiomycota. Fungal Diversity 99: 105-367.

Henkel, T.W., Wilson, A.W., Aime, M.C., Dierks, J., Uehling, J.K., Roy, M., Schimann, H., Wartchow, F. & Mueller, G.M. 2017. Cantharellaceae of Guyana II: New species of Craterellus, new South American distribution records for *Cantharellus guyanensis* and Craterellus excelsus, and a key to the Neotropical taxa. Mycologia 106: 307-322.

Horak, E. 1977. *Entoloma* in South America. I. Sydowia 30: 40-111.

Hosaka, K., Bates, S.T., Beever, R.E., Castellano, M.A., Colgan II, W., Domínguez, L.S., Nouhra, E.R., Geml, J., Giachini, A.J., Kenney, S.R., Simpson, N.B., Spatafora, J.W. & Trappe, J. 2006. Molecular phylogenetics of the gomphoid-phalloid fungi with an establishment of the new subclass Phallomycetidae and two new orders. Mycologia 98: 949-959.

IBGE. 2004. Mapas de Cobertura Vegetal dos Biomas Brasileiros. Ministério do Meio Ambiente, Ministério do Planejamento, Orçamento e Gestão Instituto Brasileiro de Geografia e Estatística, Diretoria de Geociências Brasilia.

Kalichman, J., Kirk, P.M. & Matheny, P.B. 2020. A compendium of generic names of agarics and Agaricales. Taxon 69: 425-447.

Lodge, D.J. & Cantrell, S. 1995. Fungal communities in wet tropical forests: variation in time and space. Canadian Journal of Botany 73: S1391-S1398.

Lodge, D.J., Chapela, I., Samuels, G., Uecker, F.A., Desjardin, D., Horak, E., Miller Junior, O.K., Hennebert, G.L., Decock, C.A., Ammirati, J., Burdsall Junior, H.H., Kirk, P.M., Minter, D.W., Halling, R., Læssøe, T., Mueller, G.M., Huhnmdorf, S., Oberwinkler, F., Pegler, D.N., Spooner, B., Petersen, R.H., Rogers, J.D., Ryvarden, L., Watling, R., Turnbull, E. & Whalley, A.J.S. 1995. A survey of patters of Diversity in non-lichenized fungi. Mitteilungen der Eidgenössischen Forschungsanstalt für Wald, Schnee und Landschaft 70: 157-173.

Magnago, A.C., Oliveira, J.J.S., Furtado, A.N.M., Urrea-Valencia, S. & Neves, M.A. 2013. Mushrooms-cogumelos. *In*: Neves, M.A., Baseia, I.G., Drechsler-Santos, E.R. & Góes-Neto, A. Guide to the common fungi of the semiarid region of Brazil, TECC Editora, Florianópolis, pp. 24-49.

Magnago, A.C., Furtado, A.N.M., Urrea-Valencia, S., Freitas, A.F. & Neves, M.A. 2015. New records of agaricoid fungi (Basidiomycota) from Paraíba, Brazil. Biotemas 28: 9-21.

Magnago, A.C., Neves, M.A. & Silveira, R.M.B. 2017. *Fistulinella ruschii* sp. nov., and a new record of *Fistulinella campinaranae* var. *scrobiculata* for the Atlantic Forest, Brazil. Mycologia 109: 1003-1013.

Magnago, A.C., Neves, M.A. & Silveira, R.M.B. 2019. *Boletellus nordestinus* (Boletaceae, Boletales), a new species from Northeastern Atlantic Forest, Brazil. Studies in Fungi 4: 47-53.

Matheny, P.B., Curtis, J.M., Hofstetter, V., Aime, M.C., Moncalvo, J.-M., Ge, Z.-W., Yang, Z.-L., Slot, J.G., Ammirati, J.F., Baroni, T.J., Bougher, N.L., Hughes, K.W., Lodge, D.J., Kerrigan, R.W., Seidl, M.T., Aanen, D.K., DeNitis, M., Daniele, G.M., Desjardin, D.E., Kropp, B.R., Norvell, L.L., Parker, A., Vellinga, E.C., Vilgalys, R. & Hibbett, D.S. 2006. Major clades of Agaricales: a multilocus phylogenetic overview. Mycologia 98: 982-995.

Miller, S.L., Larsson, E., Larsson, K.-H., Verbeken, A. & Nuytinck, J. 2006. Perspectives in the new Russulales. Mycologia 98: 960-970.

Moncalvo, J.-M., Nilsson, R.H., Koster, B., Dunham, S.M., Bernauer, T., Matheny, P.B., Porter, T.M., Margaritescu, S., Weiß, M., Garnica, S., Danell, E., Langer, G., Langer, E., Larsson, E., Larsson, K.-H. 2006. The cantharelloid clade: dealing with incongruent trees and phylogenetic reconstruction methods. Mycologia 98: 937-948.

Nascimento, C.C. & Wartchow, F. 2018. *Limacella brunneovenosa* (Amanitaceae: Agaricomycetidae: Basidiomycota), a new species of *Limacella* sect. *Amanitella* from Brazilian Atlantic Forest. Current Research in Environmental & Applied Mycology 8: 372-379.

Oliveira, I.C. & Sousa, M.A. 1995. Boletales (Hymenomycetes) no Campus I da Universidade Federal da Paraíba, João Pessoa: I - Xerocomatae. Revista Nordestina de Biologia 10: 85-99.

Oliveira, I.C. & Sousa, M.A. 1996 - Boletales (Hymenomycetes) no Campus I da Universidade Federal da Paraíba, João Pessoa: II - Gyrodontae. Revista Nordestina de Biologia 11: 97-117.

Oliveira, I.C. & Sousa, M.A. 2002 - Boletales (Hymenomycetes) no Campus I da Universidade Federal da Paraíba, João Pessoa: III - Strobilomycetaceae. Revista Nordestina de Biologia 16: 43-53.

Oliveira, J.J.S., Sanchez-Ramirez, S. & Capelari, M. 2014. Some new species and new varieties of *Marasmius* (Marasmiaceae, Basidiomycota) from Atlantic Rainforest areas of São Paulo state, Brazil. Mycological Progress 13: 923-949.

Oliveira, J.J.S., Moncalvo, J.-M., Margaritescu, S. & Capelari, M. 2020a. Phylogenetic and morphological analyses of species of *Marasmius* sect. *Marasmius* from the Atlantic Rainforest, Brazil. Plant Systematic and Evolution 306: 31.

Oliveira, J.J.S., Moncalvo, J.-M., Margaritescu, S. & Capelari, M. 2020b. A morphological and phylogenetic evaluation of *Marasmius* sect. *Globulares* (*Globulares-Sicci* complex) with nine new taxa from the Neotropical Atlantic Forest. Persoonia 44: 240-277.

Robert, V., Stegehuis, G. & Stalpers, J.A. 2005. The MycoBank engine and related databases. Available at https://www.mycobank.org/ (access on 29-I-2021).

Sá, M.C.A. & Wartchow, F. 2016. *Volvariella leucocalix* (Pluteaceae), a new species from Brazilian semiarid region. Mycosphere 7: 30-35.

Silva-Filho, A.G.S., Meiras-Ottoni, A. & Wartchow, F. 2019. *Hygrocybe aurantiomagnifica*: a new species of section *Firmae* (Hygrophoraceae, Basidiomycota) from Brazil. Kew Bulletin 74: 63.

Silva-Filho, A.G.S., Sá, M.C.A., Komura, D.L., Moncalvo, J.-M., Margaritescu, S., Roy, M. & Wartchow, F. 2020. Two novel species of *Lactifluus* subg. *Pseudogymnocarpi* (Russulaceae) from Brazil. Phytotaxa 436: 222-236.

Silva-Filho, A.G.S., Sá, M.C.A., Komura, D.L., Baseia, I.G., Marinho, P., Moncalvo, J.-M., Roy, M. & Wartchow, F. 2021. Novelties in *Lactifluus* subg. *Gymnocarpi* (Russulales, Basidiomycota) from Brazilian tropical forests. Mycological Progress 20: 549-565.

Silva-Junior, F.C.S. & Wartchow, F. 2015. *Gymnopilus purpureograminicola* (Strophariaceae, Agaricomycetidae), a new species from Paraíba, Brasil. Nova Hedwigia 101: 395-402.

Singer, R. 1961. Fungi of Northern Brazil. Publicação do Instituto de Micologia da Universidade do Recife 304: 1-26.

Singer, R. 1965. Interesting and new Agaricales from Brazil. Atas do Instituto de Micologia da Universidade do Recife 2: 15-59.

Singer, R. 1966. Monographs of South American Basidiomycetes, especially those of the east slope of the Andes and Brazil. IX. *Tricholoma* in Brazil and Argentina. Darwiniana 14: 19-35.

Singer, R. 1973a. Diagnoses Fungorum Novorum Agaricalium III. Beihefte zur Sydowia 7: 1-106.

Singer, R. 1973b. The genera *Marasmiellus*, *Crepidotus* and *Simocybe* in the neotropics. Beihefte zur Nova Hedwigia 44: 1-517.

Singer, R. 1976. Marasmieae (Basidiomycetes - Tricholomataceae). Flora Neotropica 17: 1-347.

Singer, R. 1977. Keys for identification of the species of Agaricales I. Sydowia 30: 192-279.

Singer, R. 1986. The Agaricales in Modern Taxonomy. 4th ed., Koeltz Scientific Books, Stuttgart.

Singer, R., Araujo, I.J.A. & Ivory, M.H. 1983. The ectotrophically mycorrhizal fungi of the neotropical lowlands, especially Central Amazonia. Beihefte zur Nova Hedwigia 77: 1-339.

Smith, S.E. & Read, D.J. 2008. Mycorrhizal Symbiosis. 3rd ed. Academic Press, New York.

Straatsma, G., Ayer, F. & Egli, S. 2001. Species richness, abundance, and phenology of fungal fruit bodies over 21 years in a Swiss forest plot. Mycological Research 105: 515-523.

Sulzbacher, M.A., Orihara, T., Grebenc, T., Wartchow, F., Smith, M.E., Martín, M.P., Giachini, A.J. & Baseia, I.G. 2020. *Longistriata flava* (Boletaceae, Basidiomycota) - a new monotypic sequestrate genus and species from Brazilian Atlantic Forest. MycoKeys 62: 53-73.

Thiers, B. 2020 [continuously updated] Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at http://sweetgum.nybg.org/ih/ (access on 15 December 2020).

Thomas, W.W. & Barbosa, M.R.V. 2008. Natural vegetation types in the Atlantic Coastal Forest of Hortheastern brazil. Memoirs of the New York Botanic Garden 100: 6-20.

Wartchow, F., Maia, L.C. & Cavalcanti, M.A.Q. 2012. Studies on *Amanita* (Agaricomycetidae, Amanitaceae) in Brazil: two yellow gemmatoid taxa. Nova Hedwigia 96: 61-71.

Wartchow, F., Sulzbacher, M.A., Selosse, M.-A., Grebenc, T., Aime, M.C., Sá, M.C.A., Pinheiro, F.G.B., Baseia, I.G. & Ovrebo, C.L. 2015. *Sebacina aureomagnifica*, a new heterobasidiomycete from the Atlantic Forest of Northeast Brazil. Mycological Progress 14: 109.

Wartchow, F., Sá, M.C.A. & Coimbra, V.R.M. 2017. A new species of *Gloeocantharellus* from the Atlantic Forest of Paraíba, Brazil. Current Research in Environmental & Applied Mycology 7: 183-186.

Wijayawardene, N.N., Hyde, K.D., Al-Ani, L.K.T., Tedersoo, L., Haelewaters, D., Rajeshkumar, K.C., Zhao, R.L., Aptroot, A., Leontyev, D.V., Saxena, R.K., Tokarev, Y.S., Dai, D.Q., Letcher, P.M., Stephenson, S.L., Ertz, D., Lumbsch, H.T., Kukwa, M., Issi, I.V., Madrid, H., Phillips, A.J.L., Selbmann, L., Pfliegler, W.P., Horváth, E., Bensch, K., Kirk, P.M., Kolaříková, K., Raja, H.A., Radek, R., Papp, V., Dima, V., Ma, J., Malosso, E., Takamatsu, S., Rambold, G., Gannibal, P.B., Triebel, D., Gautam, A.K., Avasthi, S., Suetrong, S., Timdal, E., Fryar, S.C., Delgado, G., Réblová, M., Doilom, M., Dolatabadi, S., Pawłowska, J.Z., Humber, R.A., Kodsueb, R., Sánchez-Castro, I., Goto, B.T., Silva, D.K.A., de Souza, F.A., Oehl, F., da Silva, G.A., Silva, I.R., Błaszkowski, J., Jobim, K., Maia, L.C., Barbosa, F.R., Fiuza, P.O., Divakar, P.K., Shenoy, B.D., Castañeda-Ruiz, R.F., Somrithipol, S., Lateef, A.A., Karunarathna, S.C., Tibpromma, S., Mortimer, P.E., Wanasinghe, D.N., Phookamsak, R., Xu, J., Wang, Y., Tian, F., Alvarado, P., Li, D.W., Kušan, I., Matočec, N., Mešic, A., Tkalčec, Z., Maharachchikumbura, S.S.N., Papizadeh, M., Heredia, G., Wartchow, F., Bakhshi, M., Boehm, E., Youssef, N., Hustad, V.P., Lawrey, J.D., Santiago,

A.L.C.M.A., Bezerra, J.D.P., Souza-Motta, C.M., Firmino, A.L., Tian, Q., Houbraken, J., Hongsanan, S., Tanaka, K., Dissanayake, A.J., Monteiro, J.S., Grossart, H.P., Suija, A., Weerakoon, G., Etayo, J., Tsurykau, A., Vázquez, V., Mungai, P., Damm, U., Li, Q.R., Zhang, H., Boonmee, S., Lu, Y.Z., Becerra, A.G., Kendrick, B., Brearley, F.Q., Motiejūnaitė, J., Sharma, B., Khare, R., Gaikwad, S., Wijesundara, D.S.A., Tang, L.Z., He, M.Q., Flakus, A., Rodriguez-Flakus, P., Zhurbenko, M.P., McKenzie, E.H.C., Stadler, M., Bhat, D.J., Liu, J.K., Raza, M., Jeewon, R., Nassonova, E.S., Prieto, M., Jayalal, R.G.U., Erdoğdu, M., Yurkov, A., Schnittler, M., Shchepin, O.N., Novozhilov, Y.K., Silva-Filho, A.G.S., Gentekaki, E., Liu, P., Cavender, J.C., Kang, Y., Mohammad, S., Zhang, L.F., Xu, R.F., Li, Y.M., Dayarathne, M.C., Ekanayaka, A.H., Wen, T.C., Deng, C.Y., Pereira, O.L., Navathe, S., Hawksworth, D.L., Fan, X.L., Dissanayake, L.S., Kuhnert, E., Grossart, H.P. & Thines, M. 2020. Outline of Fungi and fungus-like taxa. Mycosphere 11: 1060-1456.

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