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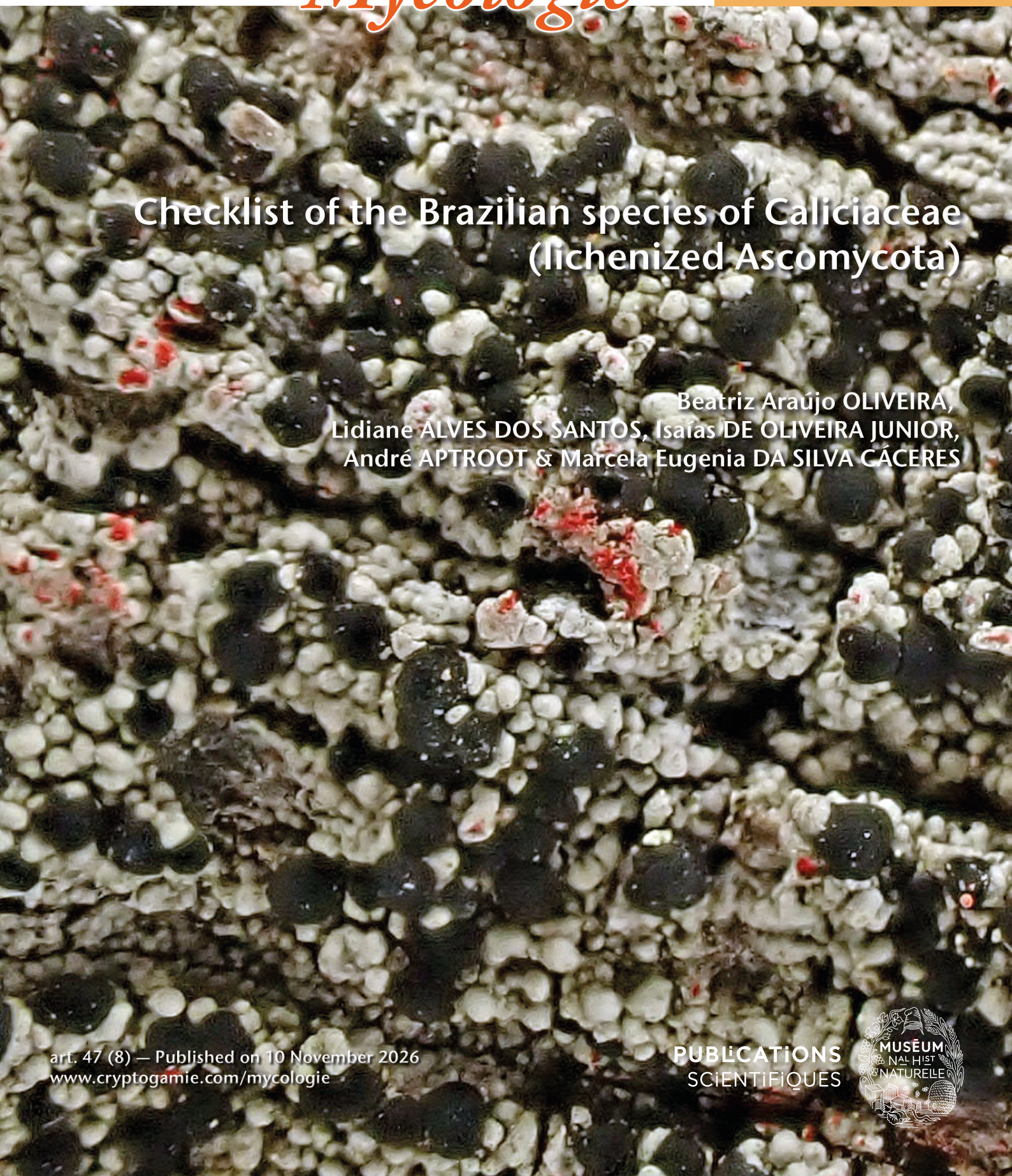

Checklist of the Brazilian species of Caliciaceae (lichenized Ascomycota)

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André APTROOT & Marcela Eugenia DA SILVA CÁCERES

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Checklist of the Brazilian species of Caliciaceae (lichenized Ascomycota)

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ABSTRACT
The Caliciaceae family is remarkable for its wide diversity of lichenized fungi. In the last decades, phylogenetic studies of this group have increased with descriptions of new species and records, expanding the understanding of their geographic distribution and taxonomic diversity. In this study, we present a complete checklist of the Caliciaceae family for Brazil.

KEY WORDS
Lichenized fungi, diversity, Caliciaceae, checklist.

RÉSUMÉ

Liste des espèces brésiliennes de Caliciaceae (Ascomycètes lichénisés).

La famille des Caliciaceae est remarquable par sa grande diversité de champignons lichénisés. Ces dernières décennies, les études phylogénétiques de ce groupe se sont multipliées, avec la description de nouvelles espèces et de nouvelles mentions, contribuant à une meilleure compréhension de leur répartition géographique et de leur diversité taxonomique. Dans cette étude, nous présentons une liste complète des Caliciaceae présentes au Brésil.

MOTS CLÉS
Champignon lichénisé, diversité, Caliciaceae, checklist.

INTRODUCTION

The family Caliciaceae Chevall., classified under the class Lecanoromycetes within Ascomycota, is notable for its broad diversity of lichen species. The lichens assigned to this family are known for typically forming carbonaceous apothecia and, in some species, for having a mazaedium, a characteristic structure for passive spore dispersal (Tibell 1984; Prieto & Wedin 2017). Species of this family are found in tropical and temperate regions, with wide occurrences on various substrates such as rocks, soils, and tree bark. Additionally, they play significant ecological roles as environmental indicators (Gaya *et al.* 2012; Marbach 2000).

Phylogenetic studies on the Caliciaceae family have increased in recent decades, with descriptions of new species and records expanding the understanding of their geographic distribution and taxonomic diversity (Elix & Kantvilas 2013; Aptroot *et al.* 2017; Prieto & Wedin 2017).

Here, we present a comprehensive checklist of the Caliciaceae family for Brazil.

MATERIAL AND METHODS

The samples were analyzed using an Olympus SZX7 microscope equipped with a Nikon Coolpix 995 camera. Handmade sections of ascomata and thallus were prepared and examined in water, 5% KOH, and/or Lugol's reagent (1% I_2) after a pre-treatment with KOH. Microscopic observations were carried out using an Olympus BX50 microscope, equipped with Nomarski interference contrast and a Nikon Coolpix 995 camera. When needed, chemical spot tests were applied. References from bibliographic reviews and online databases, such as MycoBank, were used to complement this study. Brazilian states are abbreviated using their usual two uppercase letters.

Abbreviations

Al	Alagoas;
Am	Amazonas;
Ap	Amapá;
Ba	Bahia;
Ce	Ceará;
Es	Espírito Santo;
Ma	Maranhão;
Mg	Minas Gerais;
Ms	Mato Grosso do Sul;
Mt	Mato Grosso;
Pa	Pará;
Pb	Paraíba;
Pe	Pernambuco;
Pi	Piauí;
Pr	Paraná;
Se	Sergipe;
Sp	São Paulo;
Rj	Rio de Janeiro;
Ro	Rondônia;
Rr	Roraima;
Sc	Santa Catarina;
To	Tocantins.

RESULTS

Checklist of Caliciaceae species from Brazil

Family Caliciaceae Chevall.

Genus *Amandinea* M.Choisy ex Scheid. & H.Mayrhofer

Amandinea brugierae (Vain.) Marbach

Distribution in Brazil. — BA (Andrade 2020).

Amandinea diorista (Nyl.) Marbach

Distribution in Brazil. — CE (Menezes *et al.* 2013); SE (Mendonça 2014); BA, RN (Andrade 2020); MT (Aptroot *et al.* 2022b).

Amandinea efflorescens (Müll. Arg.) Marbach

Distribution in Brazil. — PE (Lima 2013); CE (Cáceres *et al.* 2017); AL (Oliveira Junior *et al.* 2020); BA (Andrade 2020); MS (Aptroot & Spielmann 2020a); PB (Cavalcante 2020); RN (Andrade 2020); RS, SC, SE (Aptroot *et al.* 2022a); PE (Aptroot *et al.* 2023).

Amandinea endachroa (Malme) Marbach

Distribution in Brazil. — RJ (Marcelli 1992); GO, RS, SC, SP, (Marbach 2000); PE (Lima 2013).

Amandinea errata Marbach

Distribution in Brazil. — MG, RJ, RS, SC (Marbach 2000); CE (Menezes *et al.* 2013).

Amandinea extenuata (Müll. Arg.) Marbach

Distribution in Brazil. — PA (Leighton 1866); DF (Mistry 1998); BA, MG, MS, MT, RS, (Marbach 2000); CE (Alves 2014); SE (Cáceres *et al.* 2014); PB (Xavier-Leite 2013); SC (Aptroot *et al.* 2022a).

Amandinea melaxanthella (Nyl.)

Distribution in Brazil. — GO (Marbach 2000); AL (Oliveira Junior *et al.* 2020); BA (Andrade 2020); PB (Cavalcante 2020); RN (Andrade 2020).

Amandinea microsticta (Meyen & Flot.) Marbach

Distribution in Brazil. — MS, RJ, SC, SP (Marbach 2000).

Amandinea multispora (Kalb & Vězda) Marbach

Distribution in Brazil. — BA, RS, SP (Marbach 2000); SE (Rodrigues 2012).

Amandinea pelidna (Ach.) Fryday & L. Arcadia

Distribution in Brazil. — SC (Aptroot *et al.* 2022a).

Amandinea polyspora (Willey) E. Lay & P.F. May

Distribution in Brazil. — MG, RJ (Vainio 1890); RS (Martins & Marcelli 2011).

Amandinea subduplicata (Vain.) Marbach

Distribution in Brazil. — MG, RJ, SP (Marbach 2000); CE (Menezes *et al.* 2013); PE (Lima 2013); SC (Aptroot *et al.* 2022a).

Amandinea submontana Marbach

Distribution in Brazil. — BA, RS (Marbach 2000); (Cáceres *et al.* 2016); MS (Aptroot & Spielmann 2020a).

Amandinea turgescens (Tuck.) Marbach

Distribution in Brazil. — RN (Andrade 2020).

Amandinea xylographella (Nyl.) Marbach

Distribution in Brazil. — SP (Marbach 2000); PE (Lima 2013); MS (Aptroot *et al.* 2022a).

Amandinea yaucoensis (Vain.) Elix & van den Boom

Distribution in Brazil. — AL (Cavalcante 2012); PB (Xavier-Leite 2013).

Genus *Baculifera* Marbach & Kalb

Baculifera cinereocincta (Müll. Arg.) Marbach

Distribution in Brazil. — RS (Marbach 2000); MS (Aptroot & Spielmann 2020b); BA (Aptroot *et al.* 2022a).

Baculifera entochlora (J. Steiner) Marbach

Distribution in Brazil. — MG, RJ, RS, SP (Marbach 2000); AL (Menezes *et al.* 2011); CE (Menezes *et al.* 2013); PE (Lima 2013).

Baculifera epiviolascens Marbach

Distribution in Brazil. — MG (Marbach 2000); PE (Cavalcante 2020).

Baculifera imshaugiana (R.C. Harris) Marbach

Distribution in Brazil. — SE (Cáceres *et al.* 2014).

Baculifera intermedioides Marbach

Distribution in Brazil. — GO, MS, MT, RS, SP (Marbach 2000; PB (Cavalcante 2020); BA (Andrade 2020).

Baculifera longispora Marbach

Distribution in Brazil. — SE (Cáceres *et al.* 2014).

Baculifera micromera (Vain.) Marbach

Distribution in Brazil. — BA, MG, MS, RS (Marbach 2000); CE (Menezes *et al.* 2013); PE (Lima 2013).

Baculifera pseudomicromera Marbach

Distribution in Brazil. — BA, GO, MG, SE, SP (Marbach 2000); PE (Cáceres 2007); AL (Menezes *et al.* 2011).

Baculifera remensa (Stirt.) Marbach

Distribution in Brazil. — MG (Marbach 2000); PE (Lima 2013); SE (Cáceres *et al.* 2014).

Baculifera tobleri (Zahlbr.) Marbach

Distribution in Brazil. — MG (Marbach 2000).

Baculifera xylophila (Malme) Marbach

Distribution in Brazil. — MG, MT, SP (Marbach 2000); AL (Menezes *et al.* 2011).

Buellia aeruginascens (Nyl.) Zahlbr

Distribution in Brazil. — MG (Vainio 1890); SC, SP (Kalb 1982b).

Genus *Buellia* De Not.

Buellia aethalea (Ach.) Th. Fr.

Distribution in Brazil. — MG (Aptroot *et al.* 2002); MA (Aptroot *et al.* 2017); AL (Oliveira Junior *et al.* 2020); MT (Aptroot & Souza 2021a); SC (Aptroot *et al.* 2021a).

Buellia alboatrior (Nyl.) Zahlbr

Distribution in Brazil. — MT (Nordin 2000).

Buellia anatolodia A. Massal.

Distribution in Brazil. — RJ (Magnusson 1955).

Buellia anatolodioides Vain.

Distribution in Brazil. — MT (Malme 1927); RS (Spielmann 2006).

Buellia auriculata Malme

Distribution in Brazil. — MG (Malme 1927).

Buellia bahiana Malme

Distribution in Brazil. — AL, BA, MS, MT, SP (Marbach 2000); SE (Rodrigues 2012); PE (Lima 2013); RS (Käffer *et al.* 2014a); PB (Xavier-Leite 2013); RN (Cavalcante 2020); SC (Aptroot *et al.* 2021a).

Buellia chapadensis Malme

Distribution in Brazil. — MT (Malme 1927).

Buellia concava Müll. Arg.

Distribution in Brazil. — MG (Magnusson 1955).

Buellia contiguella (Vain.)

Distribution in Brazil. — RJ (Vainio 1890); MT (Malme 1927); RS (Spielmann 2006).

Buellia curatellae (Malme) Marbach

Distribution in Brazil. — BA, MG, MS, MT, PI, SP (Marbach 2000); AL (Menezes *et al.* 2011); SE (Rodrigues 2012); PE (Lima 2013); MA, TO (Aptroot *et al.* 2017).

Buellia dejungens (Nyl.) Vain.

Distribution in Brazil. — CE (Aptroot & Cáceres 2016); BA (Aptroot & Cáceres 2018); RS (Aptroot *et al.* 2021a); MG (Aptroot *et al.* 2022a).

Buellia demutans (Stirt.) Zahlbr.

Distribution in Brazil. — RS, SC (Marbach 2000); AL (Menezes *et al.* 2011); SE (Rodrigues 2012); PE (Lima 2013).

Buellia deplanata Müll. Arg.

Distribution in Brazil. — RJ (Magnusson 1955).

Buellia desertica (Marbach) Bungartz

Distribution in Brazil. — AL (Menezes *et al.* 2011); CE (Menezes *et al.* 2013); PB (Xavier-Leite 2013).

Buellia diploloma Müll. Arg.

Distribution in Brazil. — RJ (Magnusson 1955).

Buellia diplotommoides Müll. Arg.

Distribution in Brazil. — RS (Malme 1927).

Buellia dispersa A. Massal.

Distribution in Brazil. — MG (Aptroot *et al.* 2022a)

Buellia dissa (Stirt.) Zahlbr.

Distribution in Brazil. — RS (Wietzke-Beckenkamp & Pereira 1997); PB (Xavier-Leite 2013).

Buellia endococcinea f. coralloidea Malme

Distribution in Brazil. — MT (Malme 1927).

Buellia epiphaeoides Vain.

Distribution in Brazil. — RJ (Vainio 1890).

Buellia flavovirens Müll. Arg.

Distribution in Brazil. — SP (Magnusson 1955).

Buellia fraudans (Starbäck) Elix

Distribution in Brazil. — RS (Marbach 2000); BA (Andrade 2020).

Buellia fuscella Müll. Arg.

Distribution in Brazil. — SP (Magnusson 1955).

Buellia glaucescens Malme

Distribution in Brazil. — MT (Malme 1927).

Buellia glomerulosa Malme

Distribution in Brazil. — MT (Malme 1927).

Buellia griseovirens (Turner & Borrer ex Sm.) Almb.

Distribution in Brazil. — SE (Cáceres *et al.* 2014); MS (Aptroot & Spielmann 2020a); MT (Aptroot & Souza 2021a); PR (Aptroot & Souza 2021b); RS, SC (Aptroot *et al.* 2022a).

Buellia halonia (Ach.) Tuck.

Distribution in Brazil. — SE (Cáceres *et al.* 2014); CE (Aptroot & Cáceres 2016); BA (Aptroot & Cáceres 2018); MS (Aptroot & Spielmann 2020a); SC (Aptroot *et al.* 2021a); MG (Aptroot *et al.* 2022b); PE (Aptroot *et al.* 2023).

Buellia homocarpa Müll. Arg.

Distribution in Brazil. — SP (Magnusson 1955).

Buellia hypomelaena Müll. Arg.

Distribution in Brazil. — MG (Malme 1927); RJ (Magnusson 1955).

Buellia insulina Müll. Arg.

Distribution in Brazil. — SP (Magnusson 1955).

Buellia jaraguensis Zahlbr.

Distribution in Brazil. — RJ (Magnusson 1955).

Buellia lactea (Schaer.) Körb.

Distribution in Brazil. — RS (Malme (1927).

Buellia lichexanthonica Aptroot & M. Cáceres

Distribution in Brazil. — MA (Aptroot *et al.* 2017); MG (Aptroot *et al.* 2022b).

Buellia mamillana (Tuck.) W.A. Weber

Distribution in Brazil. — RJ (Malme 1927); SP (Kalb 1982a); MG (Aptroot *et al.* 2002); SE (Cáceres *et al.* 2014); CE (Aptroot & Cáceres 2016); BA (Aptroot & Cáceres 2018); AL (Oliveira Junior *et al.* 2020); MS (Aptroot & Spielmann 2020a); MT (Aptroot & Souza 2021a); RS, SC (Aptroot *et al.* 2021a); PE (Aptroot *et al.* 2023).

Buellia mattogrossensis Malme

Distribution in Brazil. — MT (Malme 1927).

Buellia minima Malme

Distribution in Brazil. — MT (Malme 1927).

Buellia mutata Malme

Distribution in Brazil. — RS (Malme 1927).

Buellia ocellata (Flörke ex Flot.) Körb.

Distribution in Brazil. — SE (Cáceres *et al.* 2014); SC (Aptroot *et al.* 2022a).

Buellia papillosa Müll. Arg.

Distribution in Brazil. — SP (Magnusson 1955)

Buellia parachroa Vain.

Distribution in Brazil. — RJ (Vainio 1890).

Buellia parastata (Nyl.) Zahlbr.

Distribution in Brazil. — PE (Cáceres 2007); SE (Cáceres *et al.* 2014); PB (Xavier-Leite 2013).

Buellia paulensis Zahlbr.

Distribution in Brazil. — SP (Magnusson 1955).

Buellia pleiotera (Malme) Marbach

Distribution in Brazil. — MT (Marbach 2000); PB (Xavier-Leite 2013); AL (Oliveira Junior *et al.* 2020).

Buellia pruinocalcarea
Aptroot, M.F. Souza & A.A. Spielm.

Distribution in Brazil. — MS (Jayawardena *et al.* 2022).

Buellia punctatula Malme

Distribution in Brazil. — RS (Malme 1927).

Buellia recepta (Kremp.) Müll. Arg.

Distribution in Brazil. — RJ (Magnusson 1955); SP (Kalb 1986).

Buellia recipienda Vain.

Distribution in Brazil. — MG (Aptroot *et al.* 2002).

Buellia rhombispora Marbach

Distribution in Brazil. — MG (Marbach 2000); AL (Cavalcante 2012).

Buellia rimulosa Müll. Arg.

Distribution in Brazil. — SP (Magnusson 1955).

Buellia rubroreagens A. Nordin

Distribution in Brazil. — GO, MS, SP (Nordin 2000).

Buellia sequax (Nyl.) Zahlbr.

Distribution in Brazil. — SE (Aptroot *et al.* 2021c); CE (Aptroot *et al.* 2022a).

Buellia serotina (Malme) Marbach

Distribution in Brazil. — MT (Malme 1927).

Buellia stellulata (Taylor) Mudd

Distribution in Brazil. — MG (Vainio 1890); CE (Cáceres *et al.* 2017); MS (Aptroot & Spielmann 2020a); RS, SC (Aptroot *et al.* 2021a).

Buellia subareolata Müll. Arg.

Distribution in Brazil. — RJ (Zahlbruckner 1902); MS (Malme 1927).

Buellia subdisciformis (Leight.) Vain.

Distribution in Brazil. — MG, RJ (Vainio 1890); SE (Cáceres *et al.* 2014); MT, SC (Aptroot & Souza 2021a).

Buellia subisabellina Zahlbr.

Distribution in Brazil. — RS (Spielmann 2006).

Buellia subnexa Vain. (Stirt.) Kantvilas & Elix

Distribution in Brazil. — SE (Mendonça 2014).

Buellia subtabacina Malme

Distribution in Brazil. — MT (Malme 1927); MA (Aptroot *et al.* 2017); BA (Aptroot & Cáceres 2018); MS (Aptroot & Spielmann 2020a); MG, PR (Aptroot *et al.* 2022a); PE (Aptroot *et al.* 2023).

Buellia sulphurea Malme

Distribution in Brazil. — MT (Malme 1927); SC (Kalb 1983).

Buellia tabacina (Müll. Arg.) Malme

Distribution in Brazil. — RS (Malme 1927).

Buellia termitophila Malme

Distribution in Brazil. — MT, RS (Malme 1927).

Buellia termitum Vain.

Distribution in Brazil. — MG (Vainio 1890).

Buellia testacea Müll. Arg.

Distribution in Brazil. — RS (Spielmann 2006).

Buellia tetrapla (Nyl.) Müll. Arg.

Distribution in Brazil. — RS, SC (Marbach 2000).

Buellia tombadorensis A. Nordin

Distribution in Brazil. — BA (Nordin 2000).

Buellia trachyspora Vain.

Buellia umbrina Malme

Distribution in Brazil. — MT (Malme 1927).

Buellia violascens Vain.

Distribution in Brazil. — MG, SP (Marbach 2000).

Buellia xanthinula (Müll. Arg.) Malme

Distribution in Brazil. — MT, RS (Malme 1927); MG (Aptroot *et al.* 2002); SC (Kalb & Aptroot 2017); MA (Aptroot *et al.* 2017); BA (Aptroot & Cáceres 2018); MS (Aptroot *et al.* 2022a); PE (Aptroot *et al.* 2023).

Buellia xantholepis (Stizenb.) Müll. Arg.

Distribution in Brazil. — SP (Magnusson 1955).

Genus *Calicium* Pers.

Calicium hyperelloides Nyl.

Distribution in Brazil. — BA, MG, MS, MT, RJ, RS, SC, SP (Tibell 1996); AL (Oliveira Junior *et al.* 2020); PR (Aptroot & Souza 2021b).

Calicium lenticulare Ach.

Distribution in Brazil. — MG, RJ, RS, SP (Tibell 1996); SC (Marcelli 1992).

Calicium leucochlorum Tuck.

Distribution in Brazil. — SP (Tibell 1996).

Calicium lutescens Tibell

Distribution in Brazil. — SP (Kalb 2001b).

Calicium salicinum Pers.

Distribution in Brazil. — GO, MG, MS, MT, RS, SP (Tibell 1996); SC (Aptroot *et al.* 2021a); AC (Aptroot *et al.* 2021a).

Calicium tricolor F. Wilson

Distribution in Brazil. — MG (Tibell 1996).

Genus *Cratiria* Marbach

Cratiria aggrediens (Stirt.) Marbach

Distribution in Brazil. — BA, MG, RJ, SP (Marbach 2000); SC (Aptroot *et al.* 2021a).

Cratiria americana (Fée) Kalb & Marbach

Distribution in Brazil. — MG, MS, MT, RJ, RS (Malme 1927); SP (Kalb 1982c); CE (Alves 2014); AL (Oliveira Junior *et al.* 2020).

Cratiria amphorea (Eckfeldt) Marbach

Distribution in Brazil. — RS, SP (Marbach 2000); AL (Cavalcante 2012); PE (Lima 2013).

Cratiria lauricassiae (Fée) Marbach

Distribution in Brazil. — AM (Leighton 1866); BA, MT, PR, RJ, RS, SP (Nordin 2000); PE (Lima 2013); SE (Cáceres *et al.* 2014); MS (Aptroot & Spielmann 2020a).

Cratiria megaobscurior Marbach

Distribution in Brazil. — SE (Cáceres *et al.* 2014).

Cratiria melanochlora (Kremp.) Marbach

Distribution in Brazil. — RJ, RS, SC, SP (Marbach 2000); MS (Aptroot & Spielmann 2020a).

Cratiria obscurior (Stirt.) Marbach & Kalb

Distribution in Brazil. — BA, GO, MG, MS, MT, RJ, SC, SP (Marbach 2000); RS (Spielmann 2006); AL (Menezes *et al.* 2011); SE (Rodrigues 2012); CE (Menezes *et al.* 2013); PE (Lima 2013); PB (Xavier-Leite 2013); MA (Aptroot *et al.* 2017).

Cratiria rutilans Marbach & Kalb

Distribution in Brazil. — MG, RJ, SP (Marbach 2000).

Cratiria saltensis (H. Magn.) Marbach

Distribution in Brazil. — MS, RS (Marbach 2000).

Cratiria violoxanthina (Elix) Kalb & Elix

Distribution in Brazil. — SE, SP (Kalb *et al.* 2012); MA (Aptroot *et al.* 2017); AL (Oliveira Junior *et al.* 2020); MT (Aptroot & Souza 2021a); MS, SC (Aptroot *et al.* 2022a).

Genus *Chrismofulvea* Marbach

Chrismofulvea rubifaciens (R.C. Harris) Marbach

Distribution in Brazil. — SP (Marbach 2000).

Genus *Dimelaena* Norman

Dimelaena mayrhoferiana Aptroot & M. Cáceres

Distribution in Brazil. — BA (Aptroot & Cáceres 2018); MT (Aptroot *et al.* 2022b).

Dimelaena oreina (Ach.) Norman

Distribution in Brazil. — SE (Cáceres *et al.* 2014).

Dimelaena tenuis (Müll. Arg.) H. Mayrhofer & Wippel

Distribution in Brazil. — BA, MT, MS, SP, RS (Mayrhofer *et al.* 1996); SE (Cáceres *et al.* 2014); MA (Aptroot *et al.* 2017); AL (Oliveira Junior *et al.* 2020); MG (Aptroot *et al.* 2022a).

Genus *Dirinaria* (Tuck.) Clem.

Dirinaria aegialita (Afzel. ex Ach.) B.J. Moore

Distribution in Brazil. — RJ (Awasthi 1975); SC (Kalb 1982a); PA (Brako *et al.* 1985); SP (Marcelli 1991); MS (Fleig & Riquelme 1991); MG (Aptroot *et al.* 2002); RS (Spielmann 2006); RO (Aptroot & Cáceres 2014); TO, MA (Aptroot *et al.* 2017); MT (Aptroot & Souza 2021a).

Dirinaria africana (Müll. Arg.) D.D. Awasthi

Distribution in Brazil. — MS (Barbosa 2019).

Dirinaria applanata (Fée) D.D. Awasthi

Distribution in Brazil. — MG, MT, RJ, RS (Awasthi 1975); PR (Osorio 1977); PA (Brako *et al.* 1985); MS (Osorio 1992); AL (Cáceres (2007); RO (Aptroot & Cáceres 2014); TO, MA (Aptroot *et al.* 2017); CE (Cáceres *et al.* 2017); RN (Cavalcante 2020); BA (Barbosa & Vitória 2021); SC (Aptroot *et al.* 2021a).

Dirinaria confluens (Fr.) D.D. Awasthi

Distribution in Brazil. — AM, MG, MT, PA, RJ, RS (Awasthi 1975); MS (Fleig & Riquelme 1991); PE (Cáceres 2007); AL (Menezes *et al.* 2011); CE (Menezes *et al.* 2013); SE (Mendonça (2014); PB (Xavier-Leite 2013); BA (Cáceres *et al.* 2016); MA (Aptroot *et al.* 2017).

Dirinaria confusa D.D. Awasthi

Distribution in Brazil. — MT, RJ (Awasthi 1975); PE (Cáceres 2007); MG (Costa & Mineo 2013); BA (Vitória *et al.* 2024).

Dirinaria consimilis (Stirt.) D.D. Awasthi

Distribution in Brazil. — GO, MS, MT, RJ, SP (Kalb 2009); BA (Oliveira Junior *et al.* 2021).

Dirinaria endocrocea (D.D. Awasthi) Kalb, Schumm & Elix

Distribution in Brazil. — RJ (Awasthi 1975).

Dirinaria leopoldii (J. Steiner) D.D. Awasthi

Distribution in Brazil. — BA (Kalb 1982a); CE (Menezes *et al.* 2013); PE (Lima 2013); SE (Cáceres *et al.* 2014); PB (Xavier-Leite 2013); TO (Aptroot *et al.* 2017); MS (Barbosa 2019); AL (Oliveira Junior *et al.* 2020).

Dirinaria melanocarpa (Müll. Arg.) C.W. Dodge

Distribution in Brazil. — AM, MT (Awasthi 1975); PA (Brako *et al.* 1985); MS (Fleig & Riquelme 1991); PR (Aptroot & Souza 2021b); BA (Vitória *et al.* 2024).

Dirinaria papillulifera (Nyl.) D.D. Awasthi

Distribution in Brazil. — AM (Awasthi 1975); RO (Aptroot & Cáceres 2014); MS (Barbosa 2019).

Dirinaria picta (Sw.) Clem. & Shear

Distribution in Brazil. — MT (Lynge 1924); BA, MG, RJ, RS (Awasthi 1975); SP (Marcelli 1991); DF (Mistry 1998); PE, AL (Cáceres 2007); SE (Cáceres *et al.* 2014); RO (Aptroot & Cáceres 2014); CE (Alves 2014); AP (Cáceres & Aptroot 2016); MA, TO (Aptroot *et al.* 2017); MS (Barbosa 2019); RN (Cavalcante 2020); PR (Aptroot & Souza 2021b).

Dirinaria pruinosa Kalb

Distribution in Brazil. — PI (Kalb 2001a); MS (Barbosa 2019).

Dirinaria purpurascens (Vain.) B.J. Moore

Distribution in Brazil. — MT (Awasthi 1975); PE (Cáceres 2007); CE (Menezes *et al.* 2013); SP (Aptroot *et al.* 2014c); RO

(Aptroot & Cáceres 2014); TO (Aptroot *et al.* 2017); MS (Barbosa 2019); BA (Oliveira Junior *et al.* 2021); RS (Aptroot *et al.* 2021a).

Dirinaria sekikaica Elix

Distribution in Brazil. — BA, GO, MS, MT, PE, RJ, SP (Kalb 2009).

Genus *Endohyalina* Marbach

Endohyalina circumpallida (H. Magn.) Marbach

Distribution in Brazil. — MT, SP (Marbach 2000); AL (Cavalcante 2012); MS (Aptroot *et al.* 2022a).

Endohyalina rappii (Imshaug ex R.C. Harris) Marbach

Distribution in Brazil. — SP (Marbach 2000).

Genus *Fluctua* Marbach

Fluctua megapotamica (Malme in J. Steiner) Marbach

Distribution in Brazil. — BA, MT, RJ, SP, PR, SC, RS (Marbach 2000).

Genus *Gassicurtia* Fée

Gassicurtia acidobaeomyceta Marbach

Distribution in Brazil. — BA, SC, SP (Marbach 2000).

Gassicurtia caririensis
M.M.E. Alves, Aptroot & M. Cáceres

Distribution in Brazil. — CE (Alves *et al.* 2014); SE (Alves *et al.* 2014); TO (Aptroot *et al.* 2017); BA (Aptroot & Cáceres 2018).

Gassicurtia catasema (Tuck.) Marbach

Distribution in Brazil. — RJ, SC (Marcelli 1992); GO, MT, SP (Marbach 2000); CE (Alves 2014); BA, RN, SE (Andrade 2020); AL (Oliveira Junior *et al.* 2020).

Gassicurtia coccifera Marbach & Kalb

Distribution in Brazil. — MT (Marbach 2000).

Gassicurtia coccinea Fée

Distribution in Brazil. — BA, MG, MT, SP (Marbach 2000); RS (Spielmann 2006); CE (Menezes *et al.* 2013); SE (Cáceres *et al.* 2014); RO (Aptroot & Cáceres 2014); AM (Cáceres *et al.* 2017); MA (Aptroot *et al.* 2017); RN (Andrade 2020); AL (Oliveira Junior *et al.* 2020); AC (Aptroot *et al.* 2021a); MS (Aptroot *et al.* 2021b).

Gassicurtia coccinoides Marbach

Distribution in Brazil. — GO, MT (Marbach 2000).

Gassicurtia elizae (Tuck.) Marbach

Distribution in Brazil. — SE (Dantas 2016).

Gassicurtia endococcinea (Vain.) Aptroot

Distribution in Brazil. — MG (Aptroot *et al.* 2002); MA (Aptroot *et al.* 2017).

Gassicurtia ferruginascens (Malme) Marbach & Kalb

Distribution in Brazil. — MT (Marbach 2000); CE (Alves 2014); AL (Oliveira Junior *et al.* 2020).

Gassicurtia lopesiana M.F. Souza & Aptroot

Distribution in Brazil. — MT (Aptroot & Souza 2021a).

Gassicurtia manguensia Marbach

Distribution in Brazil. — SP (Marbach 2000).

Gassicurtia pruinosa M.F. Souza & Aptroot

Distribution in Brazil. — MT (Aptroot & Souza 2021a).

Gassicurtia restingiana
D.S. Andrade, M. Cáceres & Aptroot

Distribution in Brazil. — BA (Andrade 2020).

Gassicurtia rhizocarpoides Aptroot & M. Cáceres

Distribution in Brazil. — BA (Aptroot & Cáceres 2018); MT (Aptroot & Souza 2021a).

Gassicurtia rubromarginata
M.M.E. Alves, Aptroot & M. Cáceres

Distribution in Brazil. — CE (Alves *et al.* 2014).

Gassicurtia rufofuscescens (Vain.) Marbach

Distribution in Brazil. — MG, SP (Marbach 2000); CE (Alves 2014); AL (Oliveira Junior *et al.* 2020).

Gassicurtia subpulchella (Vain.) Marbach

Distribution in Brazil. — SP (Marbach 2000); BA, SE (Andrade 2020); MS (Aptroot & Spielmann 2020a).

Gassicurtia vernicoma Marbach

Distribution in Brazil. — AL (Oliveira Junior *et al.* 2020).

Genus *Hypoflavia* Marbach

Hypoflavia velloziae (Kalb) Marbach

Distribution in Brazil. — BA, MG (Marbach 2000); PE (Lima 2013).

Genus *Orcularia* (Malme) Kalb & Giralt

Orcularia insperata (Nyl.) Kalb & Giralt

Distribution in Brazil. — RS, SP (Marbach 2000); CE (Alves 2014); MG, MS (Aptroot *et al.* 2022a).

Orcularia placodiomorpha (Vain.) Kalb & Giralt

Distribution in Brazil. — RJ (Vainio 1890); RS, SP (Marbach 2000); MS (Aptroot *et al.* 2022a).

Genus *Pyxine* Fr.

Pyxine albovirens (G. Mey.) Aptroot

Distribution in Brazil. — MG (Aptroot *et al.* 2002); RJ, SC (Kalb 2004); RS (Spielmann 2006); PR (Eliasaro *et al.* 2012); SE (Cáceres *et al.* 2014); BA (Aptroot & Cáceres 2018); MS (Aptroot & Spielmann 2020b); AL (Oliveira Junior *et al.* 2020).

Pyxine astipitata Jungbluth & Marcelli

Distribution in Brazil. — SP (Jungbluth & Marcelli 2011); MS (Barbosa 2019).

Pyxine astridiana Kalb

Distribution in Brazil. — SP (Kalb 1987).

Pyxine berteriana (Fée) Imshaug

Distribution in Brazil. — PA (Leighton 1866); MT, MS, GO, MG, RJ, SP, PR, RS (Kalb 1987); PE, SE (Cáceres 2007); AL (Menezes *et al.* 2011); PB (Xavier-Leite (2013) & *et al.* 2015).

Pyxine caesiopruinosa (Nyl.) Imshaug

Distribution in Brazil. — MG (Vainio 1890); SP, SC (Kalb 1987); RS (Spielmann 2006); SE (Cáceres *et al.* 2014).

Pyxine coccifera (Fée) Nyl.

Distribution in Brazil. — PA (Leighton 1866); MT, MS (Kalb 1987); MA (Aptroot *et al.* 2017).

Pyxine cocoes (Sw.) Nyl.

Distribution in Brazil. — MT, RJ, RS (Malme 1897); BA, SC, SP (Kalb 1987); MG (Aptroot *et al.* 2002); SE (Cáceres *et al.* 2014); RO (Aptroot & Cáceres 2014); AP (Cáceres & Aptroot 2016); CE (Cáceres *et al.* 2017b); MS (Barbosa 2019); RN, PI, PB (Cavalcante 2020); AM, PE (Aptroot *et al.* 2022a).

Pyxine cognata Stirt.

Distribution in Brazil. — MT, MS, SP (Kalb 1987); RS (Spielmann 2006); SE (Mendonça 2014).

Pyxine convexior (Müll. Arg.) Swinscow & Krog

Distribution in Brazil. — SC (Aptroot *et al.* 2022a).

Pyxine coralligera Malme

Distribution in Brazil. — PA (Brako *et al.* 1985); MT, MS, MG, SP, PR (Kalb 1987); RS (Spielmann 2006); BA (Aptroot & Cáceres 2018); SC (Aptroot *et al.* 2021a); AC (Aptroot *et al.* 2021a).

Pyxine daedalea Krog & R. Sant.

Distribution in Brazil. — PI, MT, MG, SP, PR (Kalb 1987); MS (Fleig & Riqeulme 1991); DF (Mistry 1998); RS (Spielmann 2006); MA (Aptroot *et al.* 2017); SC (Aptroot *et al.* 2021a).

Pyxine endolutea Kalb

Distribution in Brazil. — BA, MG (Kalb 1987); CE (Menezes *et al.* 2013); SE (Cáceres *et al.* 2014).

Pyxine eschweileri (Tuck.) Vain.

Distribution in Brazil. — MT, MS, MG, SP, PR (Kalb 1987), CE (Alves 2014); SE (Cáceres *et al.* 2014); TO (Aptroot *et al.* 2017); AL (Oliveira Junior *et al.* 2020); RS (Aptroot *et al.* 2021a); AC (Aptroot *et al.* 2021a).

Pyxine exoalbida Jungbluth & Marcelli

Distribution in Brazil. — SP (Jungbluth & Marcelli 2011); MS (Aptroot & Spielmann 2020a).

Pyxine fallax (Zahlbr.) Kalb

Distribution in Brazil. — SP (Jungbluth *et al.* 2011); MT (Aptroot & Souza 2021a); RS (Aptroot *et al.* 2021a); MS (Aptroot *et al.* 2022a).

Pyxine jolyana Jungbluth, Kalb & Marcelli

Distribution in Brazil. — SP (Jungbluth *et al.* 2011); MG (Aptroot *et al.* 2022a).

Pyxine katendei Swinscow & Krog

Distribution in Brazil. — SP (Jungbluth 2010); SC (Aptroot *et al.* 2021a).

Pyxine mantiqueirensis Marcelli & Jungbluth

Distribution in Brazil. — MG, SP (Jungbluth & Marcelli 2011); MS (Barbosa 2019).

Pyxine microspora Vain.

Distribution in Brazil. — SC (Kalb 1987); RS (Spielmann 2006); CE (Cáceres *et al.* 2017b); MT (Aptroot & Souza 2021a).

Pyxine nana Kalb

Distribution in Brazil. — SP (Kalb 1987); MS (Barbosa 2019).

Pyxine obscurascens Malme

Distribution in Brazil. — BA, MT, MS, MG (Kalb 1987); PR (Eliasaro *et al.* 2012); SE (Cáceres *et al.* 2014); MA (Aptroot *et al.* 2017).

Pyxine petricola Nyl.

Distribution in Brazil. — MT, MS, MG, SP (Kalb 1987); RS (Spielmann 2006); BA (Aptroot & Cáceres 2018); CE (Aptroot & Cáceres 2016); PB (Cavalcante 2020).

Pyxine physciiformis (Malme) Imshaug

Distribution in Brazil. — MT, MS, SP (Kalb 1987); DF (Mistry 1998); RS (Spielmann 2006).

Pyxine primaria Kalb

Distribution in Brazil. — MT, MS (Kalb 1987); SC (Aptroot *et al.* 2021a).

Pyxine pungens Zahlbr.

Distribution in Brazil. — PA (Brako *et al.* 1985); BA, MT, MS, MG, SP (Kalb 1987); DF (Mistry 1998).

Pyxine pustulata Aptroot & Jungbluth

Distribution in Brazil. — SP (Aptroot *et al.* 2014c); MS (Barbosa 2019).

Pyxine pyxinoides (Müll. Arg.) Kalb

Distribution in Brazil. — MT, RJ, SP, SC (Kalb 1987); RS (Spielmann 2006); CE (Aptroot & Cáceres 2016); MS (Aptroot & Spielmann 2020a).

Pyxine retirugella Nyl.

Distribution in Brazil. — MG (Vainio 1890); MA (Aptroot *et al.* 2017); AC (Aptroot *et al.* 2022a).

Pyxine rhizophorae Kalb

Distribution in Brazil. — RJ, RS (Kalb 1987); SC, SP (Marcelli 1992).

Pyxine rhodesiaca Vain. ex Lynge

Distribution in Brazil. — MT, MS, SP (Kalb 1987); DF (Jungbluth & Marcelli 2011).

Pyxine schechingeri Kalb

Distribution in Brazil. — BA (Kalb 1987); MS (Aptroot & Spielmann 2020b); MT (Aptroot & Souza 2021a); MG (Aptroot *et al.* 2022a).

Pyxine simulans Kalb

Distribution in Brazil. — MS (Kalb 1987); SP (Aptroot *et al.* 2014c).

Pyxine subcinerea Stirt.

Distribution in Brazil. — DF (Mistry 1998); MG (Aptroot *et al.* 2002); MS, RJ, SP, RS (Spielmann 2006); SE (Dantas 2016); BA (Aptroot & Cáceres 2018); AL (Oliveira Junior *et al.* 2020); RN (Cavalcante 2020); MT (Aptroot & Souza 2021a).

Genus *Stigmatochroma* Marbach

Stigmatochroma adauctum (Malme) Marbach

Distribution in Brazil. — MS, MT (Marbach 2000).

Stigmatochroma epiflavium Marbach

Distribution in Brazil. — MS, SP (Marbach 2000).

Stigmatochroma epimartum (Nyl.) Marbach

Distribution in Brazil. — MG (Malme 1927); MS, MT, SP (Marbach 2000); CE (Menezes *et al.* 2013); TO (Aptroot *et al.* 2017); RN (Andrade 2020); AL (Oliveira Junior *et al.* 2020).

Stigmatochroma gerontoides (Stirt.) Marbach

Distribution in Brazil. — RJ (Malme 1927); BA, MS, MT, PI, SC, SP (Marbach 2000); SE (Cáceres 2007); AL (Menezes *et al.* 2011); CE (Menezes *et al.* 2013); PE (Lima 2013); TO (Aptroot *et al.* 2017); RN (Andrade 2020).

Stigmatochroma glaucothecum (Fée) Kalb

Distribution in Brazil. — MT (Malme 1927).

Stigmatochroma kryptoviolascens Marbach

Distribution in Brazil. — GO, MG, MS, MT, SP (Marbach 2000).

Stigmatochroma metaleptodes (Nyl.) Marbach

Distribution in Brazil. — BA, MG, RR (Marbach 2000); PE (Lima 2013); CE (Alves 2014); MA (Aptroot *et al.* 2017); AL (Oliveira Junior *et al.* 2020); MS (Aptroot & Spielmann 2020a); MT (Aptroot & Souza 2021a).

CONCLUSION

The Caliciaceae family has a wide distribution in Brazil, with records of new species for science in various regions. Recent studies have highlighted the importance of Brazil in the conservation and study of this family.

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