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New records of *Polymeridium* (Müll.Arg.) R.C.Harris
from Brazil with description
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and a checklist of the Brazilian species

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New records of *Polymeridium* (Müll.Arg.) R.C.Harris from Brazil with description of a new species from the Caatinga, and a checklist of the Brazilian species

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ABSTRACT

A new species is described, *Polymeridium stromatocorticatum* B.Barbosa, Aptroot, L.A.Santos & M.Cáceres, sp. nov. found in the Caatinga Biome, collected at Raso da Catarina Ecological Station (Bahia, Brazil). The new species is characterized by the combination of a corticated thallus and aggregated ascomata, while the ascospores exhibit the typical characteristics of a *Polymeridium* (Müll.Arg.) R.C.Harris. The genus has its greatest absolute world diversity in this region of NE Brazil, especially in areas of the Caatinga. Most of the species found in this region express peculiar characteristics related to the chemistry of the thallus, due to the presence of lichexanthone and the lack of inspersion of hamathecium. In addition, an updated checklist of Brazilian species is provided.

KEY WORDS

Lichenized fungi,
Trypetheliales,
pyrenocarpous lichens,
new records,
new species.

RÉSUMÉ

Nouveaux signalements de Polymeridium (Müll.Arg.) R.C.Harris au Brésil avec la description d'une espèce nouvelle de la Caatinga, et une liste de contrôle des espèces brésiliennes.

Une nouvelle espèce est décrite, *Polymeridium stromatocorticatum* B.Barbosa, Aptroot, L.A.Santos & M.Cáceres, sp. nov. trouvée dans le biome de Caatinga, collectée à la station écologique de Raso da Catarina (Bahia, Brésil). La nouvelle espèce est caractérisée par la combinaison d'un thalle cortiqué et d'ascomés agrégés, tandis que les ascospores présentent les caractéristiques typiques d'un *Polymeridium* (Müll.Arg.) R.C.Harris. Le genre a sa plus grande diversité mondiale absolue dans cette région du nord-est du Brésil, en particulier dans les zones de la Caatinga. La plupart des espèces trouvées dans cette région expriment des caractéristiques particulières liées à la chimie du thalle, dues à la présence de lichexanthone et à l'absence d'inspersion d'hamatecium. En outre, une liste de contrôle mise à jour des espèces brésiliennes est fournie.

MOTS CLÉS

Champignons lichénisés,
Trypetheliales,
lichens pyrénocarpes,
signalements nouveaux,
espèce nouvelle.

INTRODUCTION

The genus *Polymeridium* (Müll.Arg.) R.C.Harris belongs to the Trypetheliaceae Eschw., and it is distinguished by common features such as black perithecia, anastomosing interthelial filaments (= hyphae lying between asci), and trentepohlioid algae as the photobiont, while the thallus is thin and whitish (Aptroot *et al.* 2013). Three distinct groups are found in the same genus, viz. the *P. sulphurescens* group with relatively broadly ellipsoid ascospores, the tendency to have a white ring around the ostiole and the often exerted to superficial, somewhat barrel-shaped ascomata; the *P. proponens* group, which is characterized by muriform ascospores and usually eccentric and often fused ostioles; and the core group of the genus, comprising the remaining species with transversely septate or submuriform ascospores (Aptroot & Cáceres 2013). Several species that previously belonged to this genus are now assigned to *Dictyomeridium* (Nyl.) Aptroot, M.P.Nelsen & Lücking, as they are not closely related to the remainder of *Polymeridium* (Aptroot & Lücking 2016; Ingle *et al.* 2017).

In the review by Harris (1993), he had already identified that at least some areas of Brazil, such as the Caatinga, were rich in species of the genus *Polymeridium*. Brazil is known as the most expressive country when it comes to the Trypetheliaceae family, some works carried out in the last decade have demonstrated a high diversity of species for the same biome (Aptroot & Cáceres 2013; Aptroot *et al.* 2013). In view of this, Northeast Brazil is considered the world center of distribution of the genus *Polymeridium*, and a peculiar characteristic of most species that occur in this region is the presence of lichexanthone in the thallus and the lack of inspersion of the hamatecium, which means the absence of minute, scattered oil droplets or granules (Aptroot & Cáceres 2013; Aptroot *et al.* 2016b). A worldwide survey of this genus including an identification key for all accepted species has been carried out previously (Aptroot & Cáceres 2013), citing 53 species, with 34 records for Brazil (still including species that are now in *Dictyomeridium*). The most recent world key is provided by Aptroot (2021) and accepts 51 species. Recently, one further species was published in the genus, viz. *P. megalosporum* H.Harada (Harada 2022). However, based on the description

and illustration, it certainly does not belong to the genus *Polymeridium* or even the family Trypetheliaceae, but to the genus *Thelenella* Nyl. It is most probably a synonym of the almost cosmopolitan species *Thelenella muscorum* (Fr.) Vain.

Here we present the description of a new species found at Estação Ecológica Raso da Catarina, Paulo Afonso, from Bahia state in Northeast Brazil, together with a complete checklist of the genus *Polymeridium* for the country.

MATERIAL AND METHODS

Specimens were observed with an Olympus SZX7 with an attached Nikon Coolpix 995. Hand-made sections of ascomata and thallus were studied in water, 5% KOH and/or Lugol's reagent (1% I₂) after pre-treatment with KOH. Microscopic observations were made using an Olympus BX50 with Nomarski interference contrast and an attached Nikon Coolpix 995. The new species of *Polymeridium* is preserved in the ISE herbarium (Universidade Federal de Sergipe, Campus Professor Alberto Carvalho). Our study is based on material collected mainly by the second author, with references based on literature reviews and online database such as MycoBank. Brazilian states are abbreviated by their usual two capital abbreviations.

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;

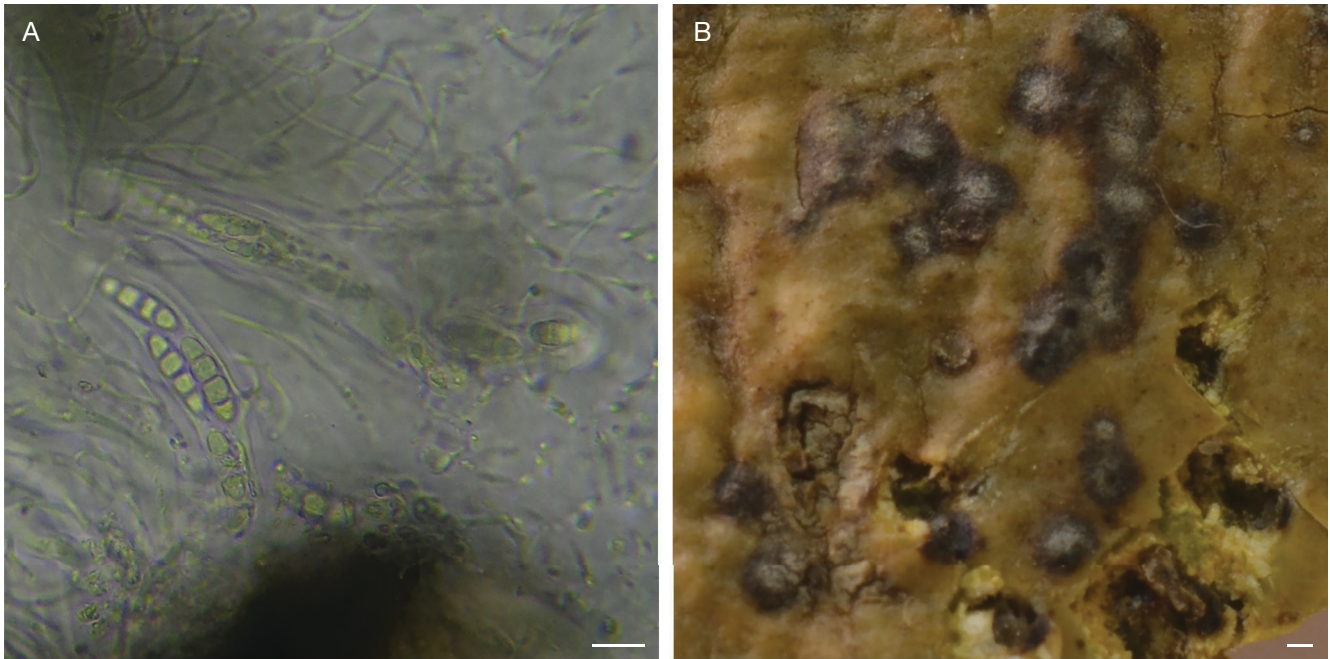


FIG. 1. — *Polymeridium stromatocorticatum* B.Barbosa, Aptroot, L.A.Santos & M.Cáceres, sp. nov.: **A, B**, ascospores and habitus of holotype. Scale bars: 2 μ m.

RO Rondônia;
 RR Roraima;
 SC Santa Catarina;
 TO Tocantins.

RESULTS

NEW SPECIES

Family TRYPETHELIACEAE Eschw.
 Genus *Polymeridium* (Müll.Arg.) R.C.Harris

Polymeridium stromatocorticatum

B.Barbosa, Aptroot, L.A.Santos & M.Cáceres, sp. nov.
 (Fig. 1)

Polymeridium differing from all known species in the genus by a corticate thallus and aggregated ascomata; ascospores 3-septate, 23-26 \times 5.5-6.5 μ m.

TYPE MATERIAL. — **Brazil** • Bahia, Raso de Catarina; on tree bark; 10.X.2021; leg. L.A. Santos; holotype: ISE[ISE 54094]; isotype: ABL.

ETYMOLOGY. — Named after the stromatic ascomata and the corticate thallus, both unique characters within the genus.

MYCOBANK. — MB852549.

DESCRIPTION

Thallus crustose, up to 3 cm diam., corticate, ochraceous, surrounded by a 0.2 mm wide brown prothallus line. Ascomata closed, 0.3-0.4 mm diam., aggregated in groups of 2-10, black, fused with walls sideways, without crystals; walls c. 30 μ m thick. Ostioles apical, with a whitish grey pruina.

Hamathecium not inspersed. Ascospores 8/ascus, 3-septate, hyaline, 23-26 \times 5.5-6.5 μ m, lumina rectangular; surrounded by a c. 1 μ m thick gelatinous sheath.

This species is characterized by the combination of a corticate thallus and aggregated ascomata, while the ascospores display the typical features of a *Polymeridium*.

Chemistry: thallus KOH-negative, UV-negative; no substances found.

CHECKLIST OF *POLYMERIDIUM* SPECIES FROM BRAZIL

Polymeridium albidoreagens
 Aptroot, A.A.Menezes & M.Cáceres

Nova Hedwigia 98 (1): 7 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802982.

DISTRIBUTION IN BRAZIL. — BA (Harris 1993); CE (Aptroot & Cáceres 2013); PA (Aptroot *et al.* 2017); SE (Menezes *et al.* 2018).

Polymeridium albidovarians Aptroot

Nova Hedwigia 98 (1): 7 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802983.

DISTRIBUTION IN BRAZIL. — BA (Harris 1993).

Polymeridium albidum (Müll.Arg.) R.C.Harris

Acta Amazonica 14 (1-2): 69 (Harris 1986).

MYCOBANK. — MB102982.

DISTRIBUTION IN BRAZIL. — AM, RR, BA (Harris 1986); CE (Menezes *et al.* 2013); SE (Cáceres *et al.* 2014); MA (Aptroot *et al.* 2017); PR (Menezes *et al.* 2018).

Polymeridium albocinereum (Kremp.) R.C.Harris

Boletim do Museu Para Emilio Goeldi 7 (2): 625 (Harris 1993).

MYCOBANK. — MB360033.

DISTRIBUTION IN BRAZIL. — RJ (Harris 1993); CE (Menezes *et al.* 2013); PE (Lima 2013); SE (Cáceres *et al.* 2014); MA (Aptroot *et al.* 2017); AL (Andrade 2020); MT (Aptroot & Souza 2021); SC (Aptroot *et al.* 2022).

Polymeridium alboflavescens Aptroot

Nova Hedwigia 98 (1): 8 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802984.

DISTRIBUTION IN BRAZIL. — BA, MT (Harris 1993); RO, CE (Aptroot & Cáceres 2013); TO (Aptroot *et al.* 2017); MS (Torres *et al.* 2021).

Polymeridium albopruinosum
(Makhija & Patwardhan) Aptroot

Nova Hedwigia 98 (1): 8 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802985.

DISTRIBUTION IN BRAZIL. — PA (Harris 1993); PE (Lima 2013); CE (Aptroot & Cáceres 2013); AM (Cáceres & Aptroot 2017).

Polymeridium amylosporum (Vain.) Aptroot

Nova Hedwigia 98 (1): 10 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802986.

DISTRIBUTION IN BRAZIL. — PE (Lima 2013); SE (Cáceres *et al.* 2014).

Polymeridium bengoanum (Vain.) Aptroot

Nova Hedwigia 98 (1): 11 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802987.

DISTRIBUTION IN BRAZIL. — CE (Menezes *et al.* 2013); PE (Lima 2013).

Polymeridium biloculare R.C.Harris

Acta Amazonica 14 (1-2): 70 (Harris 1986).

MYCOBANK. — MB103720.

DISTRIBUTION IN BRAZIL. — RR (Harris 1986).

Polymeridium brachysporum (Malme) Aptroot

Nova Hedwigia 98 (1): 11 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802988.

DISTRIBUTION IN BRAZIL. — CE (Menezes *et al.* 2013); MT (Aptroot & Cáceres 2013).

Polymeridium catapastoides Aptroot

Nova Hedwigia 98 (1): 12 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802989.

DISTRIBUTION IN BRAZIL. — CE (Aptroot & Cáceres 2013); BA (Aptroot & Cáceres 2018).

Polymeridium catapastum (Nyl.) R.C.Harris

Acta Amazonica 14 (1-2): 70 (Harris 1986).

MYCOBANK. — MB103721.

DISTRIBUTION IN BRAZIL. — RR, BA (Harris 1986); PA, MG (Harris 1993); CE (Menezes *et al.* 2013); PE (Lima 2013); SE (Cáceres *et al.* 2014); MA (Aptroot *et al.* 2017); PB (Menezes *et al.* 2018); BA (Oliveira Junior *et al.* 2021); MT (Aptroot & Souza 2021); SE, SP (Aptroot *et al.* 2022).

Polymeridium chioneum (Mont.) R.C.Harris

Lichenographia Thomsoniana, North American Lichenology in Honor of John W. Thomson (Ithaca): 141 (Glenn *et al.* 1998).

MYCOBANK. — MB446204.

DISTRIBUTION IN BRAZIL. — AM (Harris 1986); CE (Menezes *et al.* 2013).

Polymeridium cinereonigricans (Vain.) R.C.Harris

Boletim do Museu Para Emilio Goeldi 7 (2): 631 (Harris 1993).

MYCOBANK. — MB360035.

DISTRIBUTION IN BRAZIL. — MG (Harris 1993); PE (Nascimento 2017); SE (Andrade 2020); MT (Aptroot & Souza 2021); MS (Aptroot *et al.* 2022).

Polymeridium contendens (Nyl.) R.C.Harris

The Bryologist 83 (1): 12 (Tucker & Harris 1980).

MYCOBANK. — MB112732.

DISTRIBUTION IN BRAZIL. — MG (Harris 1993); CE (Menezes *et al.* 2013); SE (Cáceres *et al.* 2014).

Polymeridium corticatum

A.A.Menezes, M.Cáceres & Aptroot

The Lichenologist 45 (4): 546 (Aptroot *et al.* 2013).

MYCOBANK. — MB801913.

EXAMINED MATERIAL. — **Brazil** • Pernambuco, Vale do Catimbau National Park, Buíque; alt. 900 m; on the bark of a tree in the Caatinga area; ISE[ISE54424, ISE54425, ISE54485].

DISTRIBUTION IN BRAZIL. — CE (Menezes *et al.* 2013); PE (this paper).

NOTE

Polymeridium corticatum is reported for the first time for Pernambuco, in the Vale do Catimbau National Park, Buíque.

Polymeridium costaricense Aptroot

Nova Hedwigia 98 (1): 14 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802990.

DISTRIBUTION IN BRAZIL. — CE (Aptroot & Cáceres 2013); TO (Aptroot *et al.* 2017); MT (Aptroot & Souza 2021).

Polymeridium dithecium R.C.Harris

Boletim do Museu Para Emilio Goeldi 7 (2): 632 (Harris 1993).

MYCOBANK. — MB360036.

DISTRIBUTION IN BRAZIL. — AM (Harris 1993); CE (Menezes *et al.* 2013); PE (Lima 2013).

Polymeridium endocrocinum R.C.Harris

Boletim do Museu Para Emilio Goeldi 7 (2): 633 (Harris 1993).

MYCOBANK. — MB360037.

DISTRIBUTION IN BRAZIL. — AM (Harris 1993).

Polymeridium endoflavens

Aptroot, D.S.Andrade & M.Cáceres

The Lichenologist 48 (6): 721 (Aptroot *et al.* 2016b).

MYCOBANK. — MB815155.

DISTRIBUTION IN BRAZIL. — SE (Aptroot *et al.* 2016b).

Polymeridium immersum

Aptroot, A.A.Menezes & M.Cáceres

The Lichenologist 45 (4): 546 (Aptroot *et al.* 2013).

MYCOBANK. — MB801914.

DISTRIBUTION IN BRAZIL. — RO (Aptroot *et al.* 2013).

Polymeridium inspersum Aptroot

Nova Hedwigia 98 (1): 16 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802991.

DISTRIBUTION IN BRAZIL. — BA (Harris 1993); CE (Aptroot & Cáceres 2013); SE (Menezes *et al.* 2018).

Polymeridium jordanii (C.W.Dodge) Aptroot

Nova Hedwigia 98 (1): 18 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802992.

DISTRIBUTION IN BRAZIL. — CE (Menezes *et al.* 2013); PE (Lima 2013); SE (Mendonça 2014); AM (Cáceres & Aptroot 2017); AL (Cavalcante 2020); BA (Aptroot *et al.* 2022).

Polymeridium julelloides

E.L.Lima, M.Cáceres & Aptroot

The Lichenologist 45 (4): 548 (Aptroot *et al.* 2013).

MYCOBANK. — MB801916.

DISTRIBUTION IN BRAZIL. — PE (Lima 2013); CE (Alves 2014); PI (Cavalcante 2020); MS (Aptroot & Spielmann 2020); MT (Aptroot & Souza 2021); BA (Vitória *et al.* 2022).

Polymeridium longiflavens

Aptroot, Mendonça & M.Cáceres

The Lichenologist 48 (6): 723 (Aptroot *et al.* 2016b).

MYCOBANK. — MB815156.

DISTRIBUTION IN BRAZIL. — SE, BA (Aptroot *et al.* 2016b).

Polymeridium microsporum

(Makhija & Patw.) Aptroot

Nova Hedwigia 98 (1): 18 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802993.

DISTRIBUTION IN BRAZIL. — CE (Menezes *et al.* 2013); BA (Oliveira Junior *et al.* 2021).

Polymeridium multiforme Aptroot

Nova Hedwigia 98 (1): 18 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802994.

DISTRIBUTION IN BRAZIL. — PA (Harris 1993); CE (Aptroot & Cáceres 2013); AM (Cáceres & Aptroot 2017); BA (Aptroot & Cáceres 2018).

Polymeridium multiseptatum

Aptroot, A.A.Menezes & M.Cáceres

Nova Hedwigia 98 (1): 19 (Aptroot & Cáceres 2013).

MYCOBANK. — MB802995.

DISTRIBUTION IN BRAZIL. — CE (Aptroot & Cáceres 2013).

Polymeridium neblinae R.C.Harris

Boletim do Museu Para Emilio Goeldi 7 (2): 635 (Harris 1993).

MYCOBANK. — MB360040.

DISTRIBUTION IN BRAZIL. — SE (Cáceres *et al.* 2014); PB (Menezes *et al.* 2018).

Polymeridium pleiomerellum (Müll.Arg.) R.C.Harris

The Bryologist 90 (2): 164 (Egan 1987).

MYCOBANK. — MB132234.

DISTRIBUTION IN BRAZIL. — BA, MT, MS (Harris 1993); CE (Menezes *et al.* 2013); PE (Lima 2013); MA (Aptroot *et al.* 2017); SE (Andrade 2020).

Polymeridium pyrenuloides (Müll.Arg.) Aptroot

Nova Hedwigia 98 (1): 22 (Aptroot & Cáceres 2013).

MYCOBANK. — MB803007.

DISTRIBUTION IN BRAZIL. — SP (Harris 1993); CE (Menezes *et al.* 2013).

Polymeridium quinqueseptatum (Nyl.) R.C.Harris

The Bryologist 83 (1): 12 (Tucker & Harris 1980).

MYCOBANK. — MB113048.

DISTRIBUTION IN BRAZIL. — PA (Harris 1993); AL (Cavalcante 2012); PE (Lima 2013); PB (Xavier-Leite *et al.* 2015); BA (Barbosa & Vitória 2021).

Polymeridium rhodopruinosum
Aptroot & Mercado Diaz

The Lichenologist 48 (6): 633 (Aptroot *et al.* 2016a).

MYCOBANK. — MB815243.

DISTRIBUTION IN BRAZIL. — SE (Aptroot *et al.* 2016a).

Polymeridium siamense (Vain.) Aptroot

Nova Hedwigia 98 (1): 24 (Aptroot & Cáceres 2013).

MYCOBANK. — MB803000.

DISTRIBUTION IN BRAZIL. — CE (Menezes *et al.* 2013); AP (Cáceres & Aptroot 2016); PB (Menezes *et al.* 2018); SE (Andrade 2020).

Polymeridium simulans R.C.Harris

Boletim do Museu Para Emilio Goeldi 7 (2): 641 (Harris 1993).

MYCOBANK. — MB360044.

DISTRIBUTION IN BRAZIL. — AM (Harris 1993); CE (Alves 2014); BA (Oliveira Junior *et al.* 2021).

Polymeridium stramineoatrum (Vain.) Aptroot

Nova Hedwigia 98 (1): 24 (Aptroot & Cáceres 2013).

MYCOBANK. — MB803001.

DISTRIBUTION IN BRAZIL. — MG (Aptroot & Cáceres 2013); PB (Menezes *et al.* 2018); PE (Aptroot *et al.* 2022).

Polymeridium subcinereum (Nyl.) R.C.Harris

The Bryologist 83 (1): 12 (Tucker & Harris 1980).

MYCOBANK. — MB113049.

DISTRIBUTION IN BRAZIL. — SP (Müller 1883); PA (Harris 1993); CE (Menezes *et al.* 2013); PE (Lima 2013); MA (Aptroot *et al.* 2017); PB, SE (Menezes *et al.* 2018); AL (Oliveira Junior *et al.* 2020); BA (Aptroot *et al.* 2022).

Polymeridium subvirescens (Leight.) Aptroot

Nova Hedwigia 98 (1): 25 (Aptroot & Cáceres 2013).

MYCOBANK. — MB803003.

DISTRIBUTION IN BRAZIL. — PA, MT, MS (Harris 1993); AM (Aptroot & Cáceres 2013); CE (Alves 2014); MA (Aptroot *et al.* 2017).

Polymeridium suffusum (C.Knight) Aptroot

Nova Hedwigia 98 (1): 26 (Aptroot & Cáceres 2013).

MYCOBANK. — MB803004.

DISTRIBUTION IN BRAZIL. — CE (Lima 2013); RO (Cáceres *et al.* 2014); PB, SE (Menezes *et al.* 2018).

Polymeridium tribulationis Aptroot

Nova Hedwigia 98 (1): 26 (Aptroot & Cáceres 2013).

MYCOBANK. — MB803005.

DISTRIBUTION IN BRAZIL. — CE (Alves 2014).

Polymeridium xanthoreagens Aptroot

Nova Hedwigia 98 (1): 27 (Aptroot & Cáceres 2013).

MYCOBANK. — MB803006.

EXAMINED MATERIAL. — **Brazil** • Bahia, Fazenda Oiteiro, Araci; alt. 271 m; on the bark of a tree in the Caatinga area; ISE.

DISTRIBUTION IN BRAZIL. — SE (Cáceres *et al.* 2014); BA (this paper).

NOTE

Polymeridium xanthoreagens is being registered for the first time in the state of Bahia, in the Fazenda Oiteiro, Araci.

CONCLUSION

The genus *Polymeridium* was known to be most diverse in Brazil (Aptroot *et al.* 2016b), notably in the relatively dry northeastern part of the country. In 2013, this could still have been mostly an artifact of unequal sampling, but the recent surge in the study of these lichens has confirmed that NE Brazil is really the center of speciation of the genus.

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