Four new *Astrothelium* species and a *Mazaediothecium* from Várzea areas in Mato Grosso do Sul, Brazil

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Abstract: Five species of lichens are described as new from Várzea areas in Mato Grosso do Sul (Brazil): *Astrothelium fernandae, A. pseudodermatodes, A. septoconicum, A. xanthopseudocyphellatum,* and *Mazaediothecium serendipiticum,* the latter being deviating from all other species in its order by the at least morphologically chlorococcoid photobiont. Further, we found 226 identifiable species in the Várzea reserve near Jateí and 47 on a farm near Naviraí. Of these, 15 are new records for Brazil and a further 88 are first reports from the state.

Introduction

Várzeas are partly forested wetlands along lowland rivers in Brazil. It is not the most promising habitat for lichens, because the trees are relatively low, even in apparently undisturbed marsh forests. We visited two areas, one for a week and one for only a day, and collected and identified the lichens found.

Astrothelium is the most speciose lichen genus in the Amazon forest (Aptroot et al. 2016b; Cáceres & Aptroot 2017). In southern Brazil, there are fewer species known. To our surprise, we encountered four undescribed species in a small area of Váarzea in Mato Grosso do Sul.

Here we described the new *Astrothelium* species, and also a remarkable *Mazaediothecium* which deviates from all other species in its order by the at least morphologically chlorococcoid photobiont. It was found by chance when we spent some time along the road when the van broke down, on the margin of a burnt forest patch, where a big tree was toppled; hence the name.

Material and methods

During one week in September 2019, specimens were collected by the authors during the yearly botanical excursion from UFMS, using knife or hammer and chisel, examined by 10× hand lens (Leuchtlupe with UV) and air-dried. Specimens were often selected in the field as representative of a known species or a characteristic morphology; in addition, a selection of species that cannot be recognized in the field was collected. All specimens are preserved in herbarium CGMS, with some duplicates in ABL (mainly isotypes).

Specimens were observed with an Olympus SZX7 and pictures taken with Nikon Coolpix 995. Hand-made sections of ascomata and thallus were studied in water, 5% KOH (K) and/or Lugol's reagent (1% I_2) after pre-treatment with KOH (IKI). Microscopic photographs were prepared using an Olympus BX50 with Nomarski interference contrast and Nikon Coolpix 995. Chemical spot reactions are abbreviated as K (5% KOH), C (commercial bleach), KC (K followed by C), P (paraphenylenediamine), and UV refers to fluorescence at 366 nm. Thin-layer chromatography (Orange et al. 2001) has been undertaken by A. Aptroot in solvent A.

Results

In the location where we spent one week, the Parque Estadual das Várzeas do Rio Ivinhema near Jateí, we found 227 identifiable species (Table 1). On the Fazenda Três Irmãos near Naviraí, where we spent only one day, we collected 47 species. Of these, 16 are new records for Brazil and a further 88 are first reports from the state.

New species

Astrothelium fernandae Aptroot, sp. nov. **Fig. 1**

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Corticolous *Astrothelium* with thallus ochraceous, UV-negative, ascomata fused in low pseudostromata, ostioles black with whitish rim, hamathecium not inspersed, and ascospores 7(–8)-septate, (75–)85–95 × 23–27 µm, long-ellipsoid, lumina diamond-shaped, primary septum much thickened

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TYPE: BRAZIL. MATO GROSSO DO SUL: Jateí, Parque Estadual das Várzeas do Rio Ivinhema, on tree, alt. 230 m, 22°56′S, 53°43′W, 27 September 2019, A.Aptroot 80189 (holotype: CGMS; isotype: ABL).

Description. Thallus dull, pale ochraceous, rather smooth, surrounded by a 0.3 mm wide black prothallus line. Ascomata pyriform, 0.5–0.7 mm diam., mostly covered by the thallus, aggregated by c. 6–16 in slightly raised c. 2 mm diam. pseudostromata of thallus colour. Ostioles lateral, fused, black, c. 0.3 mm diam., surrounded by a c. 0.1 mm wide whitish rim. Hamathecium not inspersed. Ascospores 8/ascus, hyaline, 7(–8)-septate, (75–)85–95 × 23–27 µm, long-ellipsoid, lumina diamond-shaped, primary septum much thickened; surrounded by an up to 7 µm thick gelatinous sheath. Pycnidia not observed.

Chemistry. Thallus UV–, K–. TLC: nil.

Etymology. Named for Maria Fernanda de Souza, student of Brazilian lichens.

Ecology and distribution. On tree bark in Várzea forest; only known from Brazil.

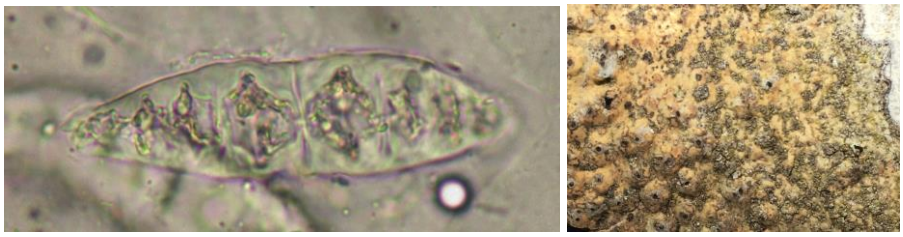

Fig. 1. *Astrothelium fernandae*, holotype. Left: ascospore; right: habitus. Width of left picture 100 µm, right picture 25 mm.

Discussion. This species would key out as follows in the world key by Aptroot & Lücking (2016): key 4, couplet 29: 7(–8)-septate, (75–)85–95 × 23–27 µm, primary septum much thickened.

Astrothelium pseudodermatodes Aptroot, sp. nov. **Fig. 2**

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Corticolous *Astrothelium* with thallus olivaceous, partly UV+ yellow, ascomata solitary, immersed in the bark, ostioles apical, with white rim, UV+ yellow, hamathecium not inspersed, and ascospores 9–11-septate, 125–150 × 23–27 µm.

TYPE: BRAZIL. MATO GROSSO DO SUL: Jateí, Parque Estadual das Várzeas do Rio Ivinhema, on tree, alt. 240 m, 22°54′S, 53°45′W, 24 September 2019, A.Aptroot 79967 (holotype: CGMS; isotype: ABL).

Description. Thallus somewhat shiny, olivaceous green, superficial, smooth, surrounded by a complex, up to 2 mm wide prothallus that is zoned, with a brown hyphal part at the perifery and a greyish brown internal part. Ascomata almost globose, 0.4–0.6 mm diam., totally immersed in the bark below the thallus, not in pseudostromata. Ostioles apical, single, black, c. 0.05 mm diam., surrounded by a c. 0.1 mm wide whitish rim. Hamathecium not inspersed. Ascospores 8/ascus, hyaline, 9–11-septate, 125–150 × 23–27 µm, long-ellipsoid, lumina becoming diamond-shaped, median septum somewhat thickened, not surrounded by a gelatinous sheath. Pycnidia not observed.

Chemistry. Thallus partly UV+ yellow, K–; ostioles UV+ yellow. TLC: lichexanthone.

Etymology. Named for the superficial similarity to *Pyrenula dermatodes* (Borrer) Schaer.

Ecology and distribution. On tree bark in Várzea forest; only known from Brazil.

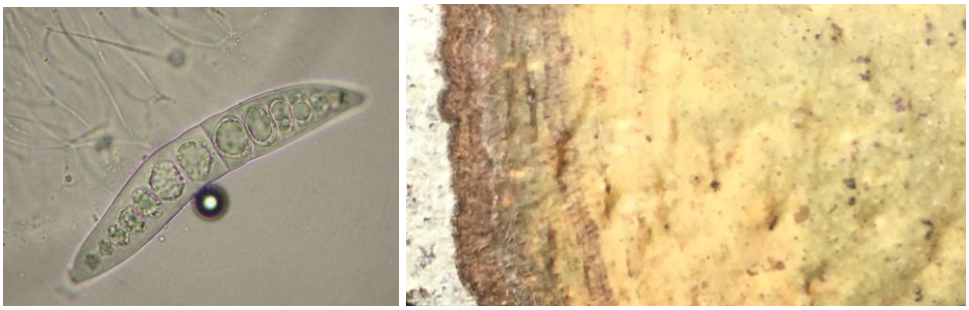

Fig. 2. *Astrothelium pseudodermatodes*, holotype. Left: ascospore; right: habitus. Width of left picture 200 µm, right picture 20 mm.

Discussion. This species would key out as follows in the world key by Aptroot & Lücking (2016): key 1, couplet 4: Ascospores 9–11-septate; hamathecium not inspersed; thallus partly UV+ yellow, ostioles UV+ yellow.

Astrothelium septoconicum Aptroot, sp. nov. **Fig. 3**

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Corticolous *Astrothelium* with thallus ochraceous, UV-negative, ascomata fused, in hemispherical pseudostromata, ostioles with yellow pruina, hamathecium not inspersed, and ascospores 7–9-septate, 85–102 × 22–26 µm.

TYPE: BRAZIL. MATO GROSSO DO SUL: Jateí, Parque Estadual das Várzeas do Rio Ivinhema, on tree, alt. 230 m, 22°56′S, 53°43′W, 27 September 2019, A.Aptroot 80180 (holotype: CGMS; isotype: ABL).

Description. Thallus dull, pale ochraceous, surrounded by a 0.2 mm wide black prothallus line. Ascomata pyriform, 0.4–0.6 mm diam., mostly covered by the thallus in hemispherical pseudostromata of c. 1 mm diam. Ostioles lateral, fused or often almost fused and in closed groups, black, surrounded by a hemispherical to conical area of c. 0.2–0.6 mm diam. with yellow pruina. Hamathecium not inspersed. Ascospores 8/ascus, hyaline, 7–9-septate, 85–102 × 22–26 µm, long-ellipsoid, lumina becoming diamond-shaped, primary septum somewhat thickened, not surrounded by a gelatinous sheath. Pycnidia not observed.

Chemistry. Thallus UV–, K–; ostiolar pruina K+ blood red. TLC: an anthraquinone.

Etymology. Named for the seven septa and the affinity within the *Astrothelium conicum*-group.

Ecology and distribution. On tree bark in Várzea forest; only known from Brazil.

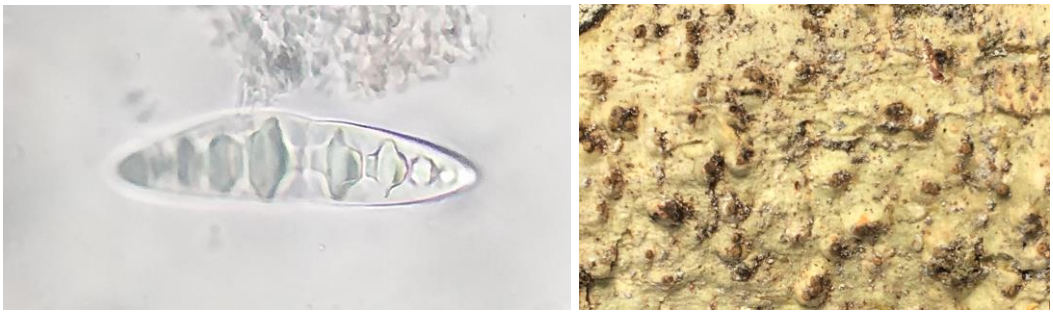

Fig. 3. *Astrothelium septoconicum*, holotype. Left: ascospore; right: habitus. Width of left picture 150 µm, right picture 30 mm.

Discussion. This is a species of the *Astrothelium conicum*-group, i.e. the core goup of the genus *Astrothelium*. The species would key out as follows in the world key by Aptroot & Lücking (2016): key 3, couplet 34: Ascospores 7–9-septate, 85–102 × 22–26 µm; yellow pigment only in ostiolar region.

Astrothelium xanthopseudocyphellatum Aptroot, sp. nov. **Fig. 4**

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Corticolous *Astrothelium* with thallus olivaceous, UV-negative but with whitish, UV+ yellow pseudocyphellae, ascomata solitary, ostioles apical, hamathecium not inspersed, and ascospores 3-septate, 34–38 × 8.5–10.5 µm.

Type: BRAZIL. Mato Grosso do Sul: Jateí, Parque Estadual das Várzeas do Rio Ivinhema, on tree, alt. 230 m, 22°54′S, 53°40′W, 26 September 2019, A.Aptroot 80107 (holotype: CGMS; isotype: ABL).

Description. Thallus dull, olivaceous green, smooth to somewhat bullate, with whitish pseudocyphellae (consisting of pockets of calcium oxalate crystals) of up to 0.1 mm diam., not surrounded by a prothallus. Ascomata globose to pyriform, 0.3–0.5 mm diam., mostly immersed in the thallus, partly singly in hemispherical, thallus-covered pseudostromata of c. 0.5–0.8 mm diam. Ostioles apical, single, black. Hamathecium not inspersed. Ascospores 8/ascus, hyaline, 3-septate, 34–38 × 8.5–10.5 µm, long-ellipsoid, lumina diamond-shaped, not surrounded by a gelatinous sheath. Pycnidia not observed.

Chemistry. Thallus UV–, K–; pseudocyphellae UV+ yellow. TLC: lichexanthone.

Etymology. Named for the pseudocyphellae that are UV+ yellow.

Ecology and distribution. On tree bark in Várzea forest; only known from Brazil.

Fig. 4. *Astrothelium xanthopseudocyphellatum*, holotype. Left: ascospore; middle: habitus; right: thallus under UV. Width of left picture 30 µm, middle picture 0 mm, right picture 7 mm.

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Discussion. This species would key out as follows in the world key by Aptroot & Lücking (2016): key 1, couplet 14: Ascospores 34–38 × 8.5–10.5 µm; ascomata immersed in thallus or singly in thallus-covered pseudostromata; thallus with UV+ yellow pseudocyphellae.

Mazaediothecium serendipiticum Aptroot, sp. nov. **Fig. 5**

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Corticolous *Mazaediothecium* with photobiont green, globose, 9–13 µm diam., probably chlorococcoid, exciple hyaline throughout, and ascospores brown, distoseptate, thick-walled, initially simple, soon 1-septate (eventually both euseptate and distoseptate), 15–21 × 9.5–12.5 µm, ellipsoid with somewhat pointed ends, not ornamented.

Type: BRAZIL. Mato Grosso do Sul: Rio Brilhante, alt. 300 m, 21°49′25”S, 54°31′51”W, on bark in cerrado forest, 23 September 2018, A.Aptroot 79878 (holotype: CGMS; isotype: ABL).

Description. Thallus crustose, corticolous, occupying areas of up to 10 cm diam., superficial, pale greenish grey, slightly uneven, with paler, somewhat linear spots that may be pseodocyphellae, without prothallus. Upper cortex parenchymatous, 5–10 µm thick, hyaline; walls thin. Photobiont green, globose, 9–13 µm diam., probably chlorococcoid. Ascomata initially perithecioid and hemispherical, soon mazaedioid and turbinate, erumpent, round in outline, 0.4–1.1 mm diam.; surface black because of the ascospores amassing; margin thin, of thallus colour, smooth; sides steep. Exciple hyaline throughout, in most places with algae. Paraphyses and asci not observed. Ascospores brown, distoseptate, thick-walled, initially simple, soon 1-septate, eventually both distoseptate and incompletely euseptate, 15–21 × 9.5–12.5 µm, ellipsoid with somewhat pointed ends, not ornamented, without gelatinous sheath, lumina somewhat angular to rounded, relatively small (thus wall much thickened). Pycnidia not observed.

Chemistry. Thallus UV–, C–, P–, K–. TLC: nil.

Etymology. This remarkable species was found by chance when we spent some time along the road when the van broke down, on the margin of a burnt forest patch, on a big tree that was toppled; hence the name.

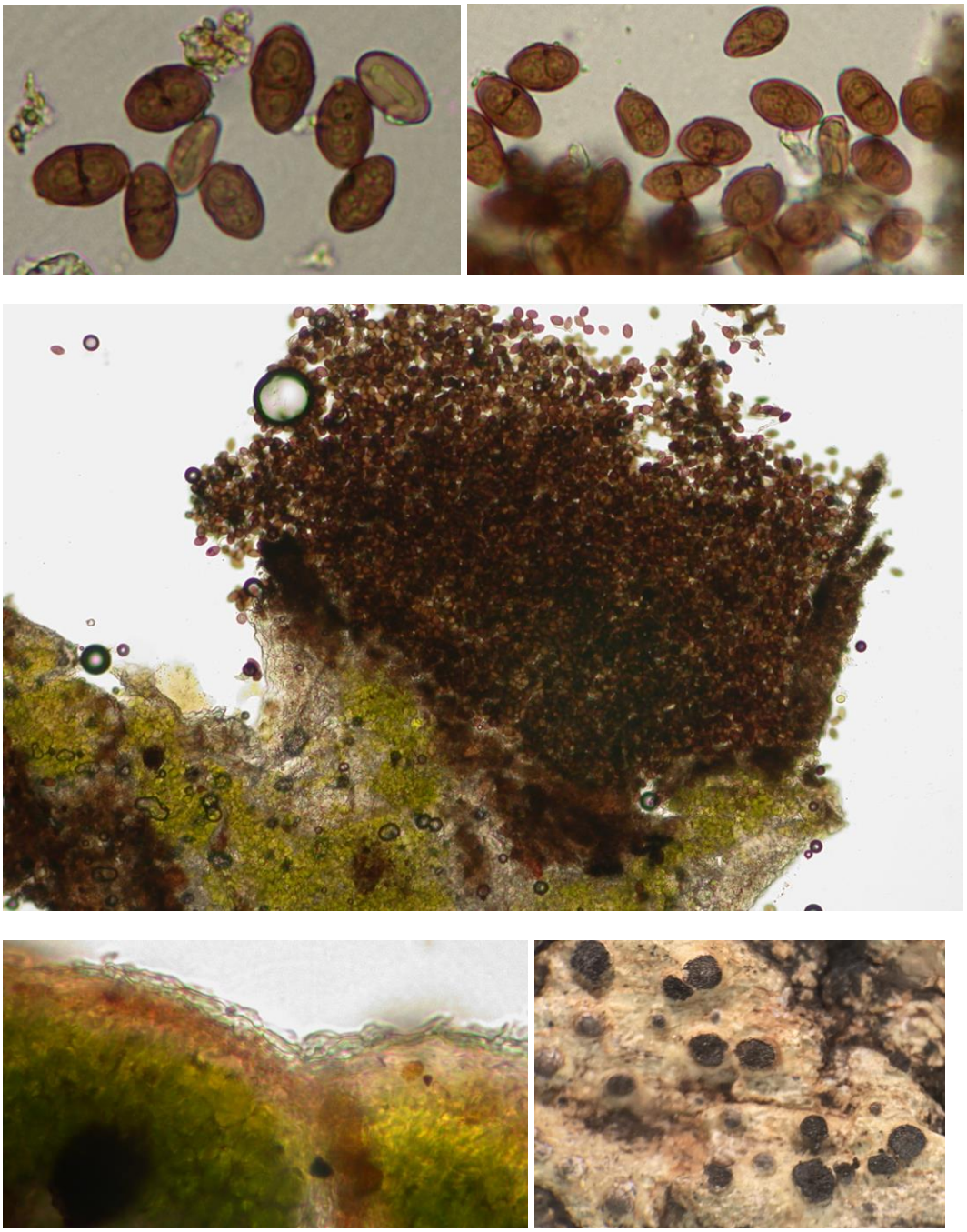

Fig. 5. *Mazaediothecium serendipiticum*, holotype. Upper: Ascospores. Middle: Section through ascoma. Lower left: Cortex. Lower right: Habitus. Width of pictures: Upper left 80 µm, upper right 150 µm, middle 1.2 mm, lower left 100 µm, lower right 10 mm.

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Ecology and Distribution. On tree in cerrado forest, growing together with e.g. *Pyrenula schiffneri* (Zahlbr.) Aptroot, which is here reported for the first time from the state; the new species is only known from Brazil.

Discussion. This genus so far contains four species (Aptroot et al. 2016a). The new species has similar ascospores to *M. uniseptatum* Aptroot, but differs markedly by the absence of pigmented pruina and the presence of globose green algae, that are morphologically chlorococcoid rather than trentepohlioid as is the rule in the genus, family and order.

Acknowledgements
We thank the colleagues at the Botanical Laboratory of the UFMS for organizing the excursion. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001who provided a visiting professorship to the first author.

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Table 1. Lichen species encountered, with status of report (MS is new to Mato Grosso; BR is new to Brazil), name, Aptroot collection number, substratum and locality (J is Jateí, Parque Estadual das Várzeas do Rio Ivinhema, different localities, but all within a few km distance; N is Naviraí, Fazenda Três Irmãos).

	Acanthotrema brasilianum (Hale) Frisch	80047	bark of tree	J
	Agonimia opuntiella (Poelt & Buschardt) Vězda	80332	bark of tree	N
	Allographa angustata (Eschw.) Lücking & Kalb	80108	bark of tree	J
	Allographa angustata (Eschw.) Lücking & Kalb	80343	bark of tree	N
BR	Allographa argentea (Lücking & Umaña) Lücking & Kalb	79953	bark of tree	J
	Allographa ingarum (Vain.) Lücking & Kalb	80216	Cecropia bark	J
MS	Allographa obtectostriata (Käffer & Aptroot) Lücking & Kalb	79948	bark of tree	J
	Amandinea efflorescens (Müll. Arg.) Marbach	80263	bark of tree	J
	Amandinea extenuata (Müll. Arg.) Marbach	80277	wood	J
MS	Anthracothecium prasinum (Eschw.) R.C. Harris	80023	bark of tree	J
MS	Arthonia antillarum (Fée) Nyl.	79936	wood	J
MS	Arthonia cyanea Müll. Arg.	80112l	living leaves	J
MS	Arthonia meissneri Müll. Arg.	80043	bark of tree	J
BR	Arthonia spadicea Leight.	80159c	termitarium	J
MS	Aspidothelium glabrum Lücking, Aptroot & Sipman	80340	bark of tree	N
	Asterothyrium microsporum R. Sant.	80112p	living leaves	J
MS	Astrothelium inspersaeneum Aptroot & M. Cáceres	79993	bark of tree	J
	Astrothelium kunzei (Fée) Aptroot & Lücking	80140	bark of tree	J
MS	Astrothelium macrocarpum (Fée) Aptroot & Lücking	79994	bark of tree	J
MS	Astrothelium neoinspersum Aptroot	80238	Cecropia bark	J
	Astrothelium rufescens (Müll. Arg.) Aptroot & Lücking	80085	bark of tree	J
	Astrothelium scoria (Fée) Aptroot & Lücking	80202	bark of tree	J
MS	Astrothelium subclandestinum Leight.	80163	bark of tree	J
MS	Astrothelium variolosum (Ach.) Müll. Arg.	80055	bark of tree	J
MS	Aulaxina intermedia Lücking	80014e	living leaves	J
	Bacidia arceutina (Müll. Arg.) Zahlbr.	80297	bark of tree	J
BR	Bacidia polychroa (Th. Fr.) Körb.	80144	bark of tree	J
	Bacidina apiahica (Müll. Arg.) Vězda	80347e	living leaves	N
	Bacidina neotropica Lücking	80123	wood	J
MS	Baculifera cinereocincta (Müll. Arg.) Marbach	80279	wood	J
	Bapalmuia confusa Kalb & Lücking	79945	bark of tree	J

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	Bathelium mastoideum Afzel. ex. Ach.	80195	bark of tree	J
	Buellia stellulata (Tayl.) Br. & Rostr.	79973	tile	J
	Byssoloma chlorinum (Vain.) Zahlbr.	80112d	living leaves	J
	Calicium salicinum Pers.	79934	wood	J
	Calopadia puiggarii (Müll. Arg.) Vězda	80014f	living leaves	J
	Calopadia subcoerulescens (Zahlbr.) Vězda	80014	living leaves	J
	Caloplaca bassiae (Ach.) Zahlbr.	79988	palm bark of tree	J
	Caloplaca bassiae (Ach.) Zahlbr.	80373	bark of tree	N
	Caloplaca granularis (Müll. Arg.) Zahlbr.	80319	wood	N
	Caloplaca subsoluta (Nyl.) Zahlbr.	79983	eternite roof	J
	Candelaria concolor (Dicks.) Stein	79902	wood	J
	Canoparmelia cryptochlorophaea (Hale) Elix & Hale	80049	bark of tree	J
	Canoparmelia texana (Tuck.) Elix & Hale	79928	wood	J
MS	Chapsa leprocarpa (Nyl.) Frisch	79923	bark of tree	J
MS	Chroodiscus coccineus (Leight.) Müll. Arg.	80112a	living leaves	J
BR	Chrysothrix granulosa G. Thor	79901	wood	J
	Chrysothrix xanthina (Vain.) Kalb	79984	bark of tree	J
MS	Coccocarpia microphyllina Lücking & Aptroot	80083	bark of tree	J
MS	Coccocarpia palmicola (Spreng.) L. Arvidss. & D.J. Galloway	80133	bark of tree	J
MS	Coccocarpia prostrata Lücking, Aptroot & Sipman	80022	bark of tree	J
MS	Coenogonium barbatum Lücking, Aptroot & Umaña	80112n	living leaves	J
MS	Coenogonium coppinsii Aptroot & M. Cáceres	80159b	termitarium	J
MS	Coenogonium isidiosum (Breuss) Rivas Plata et al.	79980	bark of tree	J
MS	Coenogonium moniliforme Tuck.	80159	termitarium	J
	Coenogonium pyrophthalmum (Mont.) Lücking, Aptroot & Sipman	80143	bark of tree	J
	Coenogonium strigosum Rivas Plata, Lücking & Chaves	80355	bark of tree	N
	Coenogonium subdilutum (Malme) Lücking, Aptroot & Sipman	80278	wood	J
	Coenogonium subdilutum (Malme) Lücking, Aptroot & Sipman	80331	bark of tree	N
	Coenogonium subluteum (Rehm) Kalb & Lücking	80154	living leaves	J
MS	Coenogonium zonatum (Müll. Arg.) Kalb & Lücking	80116	bark of tree	J
	Collema glaucophthalmum Nyl.	80094	bark of tree	J
	Coniocarpon cinnabarinum DC.	79961	bark of tree	J
	Coniocarpon cinnabarinum DC.	80362	bark of tree	N
	Constrictolumina cinchonae (Ach.) Lücking, M.P. Nelsen & Aptroot	79918	bark of tree	J
	Cratiria obscurior (Stirt.) Marbach & Kalb	80244	Cecropia bark	J

	Crespoa crozalsiana (B. de Lesd.) Lendemer & B.P. Hodk.	80326	bark of tree	N
MS	Crypthonia albida (Fée) Frisch & G. Thor	80029	bark of tree	J
BR	Cryptothecia faveolata Makhija & Patw.	80114	bark of tree	J
MS	Cryptothecia punctosorediata Sparrius & Saipunkaew	80028	bark of tree	J
	Dictyomeridium proponens (Nyl.) Aptroot, M.P. Nelsen & Lücking	80198	bark of tree	J
	Diorygma antillarum (Vain.) Nelsen, Lücking & Rivas Plata	80073	bark of tree	J
MS	Diorygma confluens (Fée) Kalb, Staiger & Elix	80009	bark of tree	J
	Dirinaria aegialita (Afzelius) Moore	80064	bark of tree	J
	Dirinaria melanocarpa (Müll. Arg.) C.W. Dodge	79927	wood	J
	Dirinaria purpurascens (Vain.) B.J. Moore	79950	bark of tree	J
	Dyplolabia afzelii (Ach.) A. Massal.	80042	bark of tree	J
	Echinoplaca leucotrichoides (Vain.) R. Sant.	80014d	living leaves	J
	Echinoplaca leucotrichoides (Vain.) R. Sant.	80347c	living leaves	N
	Echinoplaca pellicula (Müll. Arg.) R. Sant.	80014h	living leaves	J
	Emmanuelia tenuis (Vain.) Lücking, Moncada & Gumboski	80005	bark of tree	J
MS	Endocarpon pallidulum (Nyl.) Nyl.	79897	eternite roof	J
MS	Endocarpon pallidulum (Nyl.) Nyl.	80318	concrete	N
BR	Enterographa tropica Sparrius	79892	bark of tree	J
MS	Eschatogonia dissecta Timdal & R. Sant.	80139	bark of tree	J
MS	Eugeniella leucocheila (Tuck.) Lücking, Sérus. & Kalb	80215	Cecropia bark	J
MS	Fellhanera fuscatula (Müll. Arg.) Vězda	80347f	living leaves	N
BR	Fellhanera pilomarginata Lücking	80347b	living leaves	N
	Fellhanera rhaphidophylli (Rehm) Vězda	80112h	living leaves	J
MS	Fellhanera termitophila Aptroot & M. Cáceres	80159a	termitarium	J
MS	Fissurina comparimuralis Staiger	80201	bark of tree	J
MS	Fissurina dumastii Fée	80147	bark of tree	J
	Fissurina pseudostromatica Lücking & Rivas Plata	80135	bark of tree	J
	Fissurina pseudostromatica Lücking & Rivas Plata	80348	bark of tree	N
	Flakea papillata O.E. Erikss.	80006	bark of tree	J
	Flakea papillata O.E. Erikss.	80353	bark of tree	N
MS	Flegographa leprieurii (Mont.) A. Massal.	80196	bark of tree	J
MS	Glaucotrema glaucophaenum (Kremp.) Rivas Plata & Lumbsch	80024	bark of tree	J
	Glyphis cicatricosa Ach.	80243	Cecropia bark	J
	Glyphis scyphulifera (Ach.) Staiger	80204	bark of tree	J
BR	Graphis adscripturiens Nyl.	80091	bark of tree	J

MS	Graphis cincta (Pers.) Aptroot	80262	bark of tree	J
BR	Graphis geraensis Redinger	79940	bark of tree	J
MS	Graphis oxyclada Müll. Arg.	80149	living Cereus	J
MS	Graphis plumierae Vain.	80291	bark of tree	J
BR	Graphis tectigera Eschw.	79912	bark of tree	J
MS	Gyalectidium catenulatum (Cavalc. & A. A. Silva) L.I. Ferraro, Lücking & Sérus.	80112o	living leaves	J
	Gyalectidium filicinum Müll. Arg.	80347g	living leaves	N
MS	Gyalideopsis haliotidiformis Kalb & Vězda	80038	bark of tree	J
	Gyalideopsis vulgaris (Müll. Arg.) Lücking	80112m	living leaves	J
	Haematomma flexuosum Hillm.	79966	bark of tree	J
	Hafellia curatellae (Malme) Marbach	80228	Cecropia bark	J
	Heterocyphelium leucampyx (Tuck.) Vain.	80365	bark of tree	N
	Heterodermia albicans (Pers.) Swinscow & Krog	80110	bark of tree	J
MS	Heterodermia obscurata (Nyl.) Trevis.	80065	bark of tree	J
	Hyperphyscia adglutinata (Flörke) H. Mayrhofer & Poelt	80275	bark of tree	J
MS	Hyperphyscia cochlearis Scutari	79894	bark of tree	J
MS	Hyperphyscia cochlearis Scutari	80313	bark of tree	N
	Hyperphyscia granulata (Poelt) Moberg	79989	bark of tree	J
	Hyperphyscia granulata (Poelt) Moberg	80314	bark of tree	N
MS	Hyperphyscia isidiata Moberg	80315	bark of tree	N
	Hyperphyscia minor (Fée) Awasthi	80076	bark of tree	J
	Hyperphyscia viridissima (Müll. Arg.) Scutari	80253	bark of tree	J
BR	Lecanora albellula (Nyl.) Th. Fr.	79926	wood	J
	Lecanora caesiorubella Ach.	80246	Cecropia bark	J
MS	Lecanora flavidomarginata B. de Lesd.	79962	bark of tree	J
	Lecanora helva Stizenb.	80240	Cecropia bark	J
	Lecanora leprosa Fée	79929	wood	J
	Lecanora leprosa Fée	80339	bark of tree	N
	Lecanora lichexanthoxylina Aptroot & M.F. Souza ined	80311	wood	N
	Lecanora subcrenulata Müll. Arg.	80320	wood	N
	Lecanora tropica Zahlbr.	79947	bark of tree	J
MS	Lecidella punctuliformis (Nyl.) Kalb	80292	bark of tree	J
	Leptogium austroamericanum (Malme) C.W. Dodge	80151	living Cereus	J
	Letrouitia domingensis (Pers.) Hafellner & Bellemère	80007	bark of tree	J
	Letrouitia domingensis (Pers.) Hafellner & Bellemère	80356	bark of tree	N
MS	Letrouitia vulpina (Tuck.) Hafellner & Bellemère	80036	bark of tree	J

	Lithothelium obtectum (Müll. Arg.) Aptroot	80357	bark of tree	N
	Malmidea fuscella (Müll. Arg.) Kalb & Lücking	80295	bark of tree	J
MS	Malmidea piperina (Zahlbr.) Breuss & Aptroot	80072	bark of tree	J
	Malmidea vinosa (Eschw.) Kalb, Rivas Plata & Lumbsch	80062	bark of tree	J
	Malmidea vinosa (Eschw.) Kalb, Rivas Plata & Lumbsch	80360	bark of tree	N
MS	Maronora cyanosora Kalb & Aptroot	79903	wood	J
	Mazosia melanophthalma (Müll. Arg.) R. Sant.	80112b	living leaves	J
MS	Mazosia phyllosema (Nyl.) Zahlbr.	80112f	living leaves	J
MS	Megalospora tuberculosa (Fée) Sipman	80070	bark of tree	J
	Microtheliopsis uleana Müll. Arg.	80112c	living leaves	J
MS	Mycocalicium enterographicola Aptroot & M. Cáceres	80162	bark of tree	J
MS	Mycoporum acervatum R.C. Harris	80178	bark of tree	J
	Mycoporum compositum (A. Massal.) R.C. Harris	79995	bark of tree	J
MS	Mycoporum lacteum (Ach.) R.C. Harris	79951	bark of tree	J
MS	Mycoporum sparsellum Nyl.	80225	Cecropia bark	J
	Myelochroa lindmanii (Lynge) Elix & Hale	79985	bark of tree	J
	Myriostigma miniatum (Lücking) Aptroot, Ertz, Grube & M. Cáceres	79968	bark of tree	J
MS	Myriotrema pulverulentum (Hale) Hale	80115	bark of tree	J
	Neoprotoparmelia capitata (Lendemer) Garima Singh, Lumbsch & I. Schmitt	80191	bark of tree	J
	Neoprotoparmelia multifera (Nyl.) Garima Singh, Lumbsch & I. Schmitt	79907	wood	J
	Nigrovothelium inspersotropicum Aptroot & Diederich	80146	living Cereus	J
	Ocellularia auberianoides (Nyl.) Müll. Arg.	80025	bark of tree	J
	Ocellularia auberianoides (Nyl.) Müll. Arg.	80363	bark of tree	N
BR	Ocellularia garoana Patw. & Nagarkar	80192	bark of tree	J
MS	Ocellularia percolumellata Sipman	80031	bark of tree	J
BR	Ocellularia thryptica Hale	80068	bark of tree	J
MS	Parallopsora leucophyllina (Nyl.) Kistenich et al.	80044	bark of tree	J
MS	Parallopsora leucophyllina (Nyl.) Kistenich et al.	80352	bark of tree	N
MS	Parmelinopsis subfatiscens (Kurok.) Elix & Hale	80141	bark of tree	J
	Parmotrema argentinum (Kremp.) Hale	79971	bark of tree	J
MS	Parmotrema clavuliferum (Räs.) Streimann	80199	bark of tree	J
	Parmotrema melanochaetum (Kurok.) O. Blanco et al.	79974	bark of tree	J
	Parmotrema melanochaetum (Kurok.) O. Blanco et al.	80325	bark of tree	N
	Parmotrema rampoddense (Nyl.) Hale	80186	bark of tree	J
	Parmotrema subcaperatum (Kurokawa) Hale	79976	bark of tree	J
	Parmotrema tinctorum (Nyl.) Hale	80328	bark of tree	N

BR	Peltula patellata (Bagl.) Swinscow & Krog	79896	concrete	J
	Phaeographis brasiliensis (A. Massal.) Kalb & Matthes-Leicht	79938	bark of tree	J
	Phaeographis caesiodisca Staiger	79893	bark of tree	J
MS	Phaeographis haematites (Fée) Müll. Arg.	80169	bark of tree	J
MS	Phaeographis inconspicua (Fée) Müll. Arg.	80206	bark of tree	J
	Phaeographis intricans (Nyl.) Staiger	80229	Cecropia bark	J
	Phaeographis leiogrammodes (Kremp.) Müll. Arg.	80231	Cecropia bark	J
MS	Phaeographis medusiformis (Kremp.) Müll. Arg.	80233	Cecropia bark	J
	Phaeographis neotricosa Redinger	79997	bark of tree	J
MS	Phaeographis platycarpa Müll. Arg.	79944	bark of tree	J
MS	Phaeographis punctiformis (Eschw.) Müll. Arg.	79978	bark of tree	J
MS	Phaeographis scalpturata (Ach.) Staiger	80203	bark of tree	J
MS	Phyllobathelium thaxteri (Vain.) Zahlbr.	80104	bark of tree	J
MS	Phylloporis platypoda (Müll. Arg.) Vězda	80154a	living leaves	J
	Phyllopsora buettneri (Müll. Arg.) Zahlbr.	80020	bark of tree	J
	Phyllopsora buettneri (Müll. Arg.) Zahlbr.	80350	bark of tree	N
	Phyllopsora cinchonarum (Fée) Timdal	80282	bark of tree	J
MS	Phyllopsora furfuracea (Pers.) Zahlbr.	80079	bark of tree	J
	Phyllopsora pyxinoides (Nyl.) Kistenich et al.	80016	bark of tree	J
	Physcia aipolia (Ehrenb. ex Humb.) Fürnrohr	79975	bark of tree	J
	Physcia aipolia (Ehrenb. ex Humb.) Fürnrohr	80323	bark of tree	N
	Physcia alba (Fée) Müll. Arg.	80111	bark of tree	J
	Physcia crispa Nyl.	79970	bark of tree	J
	Physcia crispa Nyl.	80335	bark of tree	N
MS	Physcia krogiae Moberg	80164	bark of tree	J
MS	Physcia krogiae Moberg	80327	bark of tree	N
	Physcia microphylla Aptroot & M.F. Souza	80284	bark of tree	J
	Physcia phaeocarpa (Nyl.) Hue	80127	bark of tree	J
	Physcia phaeocarpa (Nyl.) Hue	80321	bark of tree	N
	Physcia sinuosa Moberg	79895	bark of tree	J
	Physcia sinuosa Moberg	80317	bark of tree	N
	Physcia sorediosa (Vain.) Lynge	79891	bark of tree	J
	Platygramme caesiopruinosa (Fée) Fée	80241	Cecropia bark	J
MS	Platythecium leiogramma (Nyl.) Staiger	80174	bark of tree	J
MS	Polymeridium julelloides E.L. Lima, M. Cáceres & Aptroot	80269	bark of tree	J
MS	Porina africana Aptroot & Sipman	80349	bark of tree	N
	Porina cubana Vězda	80347d	living leaves	N

	Porina distans Vězda & Vivant	80172	bark of tree	J
	Porina epiphylla (Fée) Fée	80134	living Cereus	J
MS	Porina mastoidea (Ach.) Müll. Arg.	80136	bark of tree	J
	Porina nitidula Müll. Arg.	80112	living leaves	J
	Porina nitidula Müll. Arg.	80347	living leaves	N
MS	Porina simulans Müll. Arg.	80033	bark of tree	J
	Pseudobogoriella captiosa (Kremp.) Lücking, R. Miranda & Aptroot	80274	bark of tree	J
	Pseudoparmelia hypomilta (Fée) Hale	80089	bark of tree	J
	Pseudoparmelia uleana (Müll. Arg.) Elix & Nash	80054	bark of tree	J
	Puiggariella nemathora (Mont.) S.H. Jiang, Lücking & J.C. Wei	80014a	living leaves	J
	Pyrenula acutispora Kalb & Hafellner	80122	bark of tree	J
	Pyrenula anomala (Ach.) A. Massal.	79915	bark of tree	J
	Pyrenula cubana (Müll. Arg.) R.C. Harris	80119	bark of tree	J
	Pyrenula cubana (Müll. Arg.) R.C. Harris	80345	bark of tree	N
	Pyrenula globifera (Eschw.) Aptroot	79914	bark of tree	J
	Pyrenula globifera (Eschw.) Aptroot	80369	bark of tree	N
	Pyrenula infraleucotrypa Aptroot & M. Cáceres	80300	bark of tree	J
MS	Pyrenula inframamillana Aptroot & M. Cáceres	79924	bark of tree	J
	Pyrenula mamillana (Ach.) Trevis.	80185	bark of tree	J
	Pyrenula pyrenuloides (Mont.) R.C. Harris	80289	bark of tree	J
	Pyrenula quassiicola (Fée) Fée	79913	bark of tree	J
MS	Pyrenula rubrostigma Aptroot & M. Cáceres	80011	bark of tree	J
MS	Pyxine albovirens (G. Mey.) Aptroot	80211	bark of tree	J
	Pyxine berteriana (Fée) Imsh.	80212	bark of tree	J
	Pyxine cocoes (Sw.) Nyl.	80210	bark of tree	J
	Pyxine daedalea Krog & R. Sant.	79972	bark of tree	J
	Pyxine eschweileri (Tuck.) Vain.	80063	bark of tree	J
	Pyxine fallax (Zahlbr.) Kalb	80188	bark of tree	J
MS	Pyxine schechingeri Kalb	80187	bark of tree	J
	Pyxine simulans Kalb	80272	bark of tree	J
	Pyxine subcinerea Stirt.	79890	bark of tree	J
MS	Raciborskiella janeirensis (Müll. Arg.) R. Sant.	80154c	living leaves	J
	Ramalina aspera Räsänen	79900	wood	J
	Ramalina celastri (Spreng.) Krog & Swinscow	80276	bark of tree	J
	Ramalina celastri (Spreng.) Krog & Swinscow	80376	bark of tree	N
MS	Ramalina peruviana Ach.	79899	wood	J

MS	Ramonia intermedia Kalb	80137	bark of tree	J
	Reimnitzia santensis (Tuck.) Kalb	80118	bark of tree	J
	Relicina abstrusa (Vain.) Hale	79959	bark of tree	J
BR	Rinodina colobinoides (Nyl.) Müll. Arg.	80266	bark of tree	J
	Rinodina guianensis Aptroot	79942	bark of tree	J
MS	Stegobolus anamorphus (Nyl.) Frisch & Kalb	80194	bark of tree	J
	Sticta xanthotropa (Kremp.) D.J. Galloway	80176	bark of tree	J
MS	Strigula prasina Müll. Arg.	80112i	living leaves	J
	Strigula smaragdula Fr.	80014b	living leaves	J
MS	Synarthonia inconspicua (Stirt.) Van den Broeck & Ertz	80361	bark of tree	N
	Synarthonia xanthosarcographoides Aptroot	80235	Cecropia bark	J
	Synarthonia xanthosarcographoides Aptroot	80341	bark of tree	N
	Synarthothelium cerebriforme Sparrius	79956	bark of tree	J
MS	Thelenella paraguayensis Malme	80002	bark of tree	J
	Thelopsis spinulosa Aptroot	80268	bark of tree	J
	Trapeliopsis flexuosa (Fr.) P. James & Coppins	79935	wood	J
	Traponora asterella Aptroot	79943	bark of tree	J
	Tricharia carnea (Müll. Arg.) R. Sant.	80112k	living leaves	J
	Trypethelium eluteriae Spreng.	79916	bark of tree	J
MS	Trypethelium foveolatum Müll. Arg.	80086	bark of tree	J
MS	Trypethelium krempelhuberi Makhija & Patw.	80132	bark of tree	J
MS	Trypethelium regnellii Malme	79957	bark of tree	J
	Trypethelium subeluteriae Makhija & Patw.	79917	bark of tree	J
	Trypethelium xanthostiolornatum Aptroot	79946	bark of tree	J
	Usnea subparvula A. Gerlach & P. Clerc	79887	tile	J
	Verrucaria nigrescens Pers.	79898	tile	J
	Xanthoparmelia plittii (Gyeln.) Hale	80329	roof tile	N