

cryptogamie

Mycologie

2021 • 42 • 10

New lichen species and records from
the Chapada dos Guimarães, Mato Grosso, Brazil

André APTROOT & Maria Fernanda SOUZA

art. 42 (10) — Published on 6 October 2021
www.cryptogamie.com/mycologie

PUBLICATIONS
SCIENTIFIQUES



DIRECTEUR DE LA PUBLICATION / PUBLICATION DIRECTOR: Bruno DAVID
Président du Muséum national d'Histoire naturelle

RÉDACTEUR EN CHEF / EDITOR-IN-CHIEF: Bart BUYCK

ASSISTANTE DE RÉDACTION / ASSISTANT EDITOR: Marianne SALAÛN (myco@cryptogamie.com)

MISE EN PAGE / PAGE LAYOUT: Marianne SALAÛN

RÉDACTEURS ASSOCIÉS / ASSOCIATE EDITORS:

Slavomír ADAMČÍK

Institute of Botany, Plant Science and Biodiversity Centre, Slovak Academy of Sciences, Dúbravská cesta 9, SK-84523, Bratislava (Slovakia)

André APTROOT

Laboratório de Botânica / Liquenologia, Instituto de Biociências, Universidade Federal de Mato Grosso do Sul, Avenida Costa e Silva s/n, Bairro Universitário, CEP 79070-900, Campo Grande, Mato Grosso do Sul (Brazil)

Cony DECOCK

Mycothèque de l'Université catholique de Louvain, Earth and Life Institute, Microbiology, Université catholique de Louvain, Croix du Sud 3, B-1348 Louvain-la-Neuve (Belgium)

André FRAITURE

Botanic Garden Meise, Domein van Bouchout, B-1860 Meise (Belgium)

Kevin D. HYDE

School of Science, Mae Fah Luang University, 333 M. 1 T.Tasud Muang District, Chiang Rai 57100 (Thailand)

Valérie HOFSTETTER

Station de recherche Agroscope Changins-Wädenswil, Dépt. Protection des plantes, Mycologie, CH-1260 Nyon 1 (Switzerland)

Sinang HONGSANAN

College of Life Science and Oceanography, Shenzhen University, 1068, Nantai Avenue, Nanshan, ShenZhen 518055 (China)

Egon HORAK

Schlossfeld 17, A-6020 Innsbruck (Austria)

Jing LUO

Department of Plant Biology & Pathology, Rutgers University New Brunswick, NJ 08901 (United States)

Ruvishika S. JAYAWARDENA

Center of Excellence in Fungal Research, Mae Fah Luang University, 333 M. 1 T.Tasud Muang District, Chiang Rai 57100 (Thailand)

Chen JIE

Instituto de Ecología, Xalapa 91070, Veracruz (México)

Sajeewa S.N. MAHARCHCHIKUMBURA

Department of Crop Sciences, College of Agricultural and Marine Sciences, Sultan Qaboos University (Oman)

Pierre-Arthur MOREAU

UE 7144. Faculté des Sciences pharmaceutiques et biologiques. Université Lille Nord de France. F-59006 Lille (France)

Tian QING

Center of Excellence in Fungal Research, Mae Fah Luang University 333 M. 1 T.Tasud Muang District, Chiang Rai 57100 (Thailand)

Sylvie RAPIOR

Laboratoire de Botanique, Phytochimie et Mycologie / UMR -CNRS 5175 CEFE, Faculté de Pharmacie, 15, avenue Charles-Flahault, Université Montpellier I, BP 14491, 34093 Montpellier Cedex 5 (France)

Franck RICHARD

Université de Montpellier II, CEFE/CNRS Campus du CNRS, 1919, route de Mende, 34293 Montpellier Cedex 5 (France)

Naritsada THONGKLANG

Center of Excellence in Fungal Research, Mae Fah Luang University, 333 M. 1 T.Tasud Muang District, Chiang Rai 57100 (Thailand)

Xiang-Hua WANG

CAS Key Laboratory for Plant Diversity and Biogeography of East Asia, Kunming Institute of Botany, Chinese Academy of Sciences, Lanhei Road 132, Kunming 650201, P. R. (China)

COUVERTURE / COVER:

Extraits d'éléments de la Figure 3 / Extracts of the Figure 3

Cryptogamie, Mycologie est indexé dans / *Cryptogamie, Mycologie is indexed in:*

- Biological Abstracts
- Current Contents
- Science Citation Index
- Publications bibliographiques du CNRS (Pascal).

Cryptogamie, Mycologie est distribué en version électronique par / *Cryptogamie, Mycologie is distributed electronically by:*

- BioOne® (<http://www.bioone.org/loi/crym>)

Cryptogamie, Mycologie est une revue en flux continu publiée par les Publications scientifiques du Muséum, Paris
Cryptogamie, Mycologie is a fast track journal published by the Museum Science Press, Paris

Les Publications scientifiques du Muséum publient aussi / *The Museum Science Press also publishes: Adansonia, Geodiversitas, Zoosystema, Anthropozoologica, European Journal of Taxonomy, Naturae, Cryptogamie sous-sections Algologie, Bryologie, Comptes Rendus Palevol.*

Diffusion - Publications scientifiques Muséum national d'Histoire naturelle

CP 41 - 57 rue Cuvier F-75231 Paris cedex 05 (France)

Tél. : 33 (0)1 40 79 48 05 / Fax : 33 (0)1 40 79 38 40

diff.pub@mnhn.fr / <http://sciencepress.mnhn.fr>

© Publications scientifiques du Muséum national d'Histoire naturelle, Paris, 2021

ISSN (imprimé / print): 0181-1584/ ISSN (électronique / electronic): 1776-100

New lichen species and records from the Chapada dos Guimarães, Mato Grosso, Brazil

André APTROOT
Maria Fernanda SOUZA

Laboratório de Botânica / Liquenologia, Instituto de Biociências,
Universidade Federal de Mato Grosso do Sul, Avenida Costa e Silva s/n,
Bairro Universitário, CEP 79070-900, Campo Grande, Mato Grosso do Sul (Brazil)
andreaptroot@gmail.com (corresponding author)

Submitted on 23 November 2020 | Accepted on 15 June 2021 | Published on 6 October 2021

Aptroot A. & Souza M. F. 2021. — New lichen species and records from the Chapada dos Guimarães, Mato Grosso, Brazil. *Cryptogamie, Mycologie* 42 (10): 171-180. <https://doi.org/10.5252/cryptogamie-mycologie2021v42a10>. <http://cryptogamie.com/mycologie/42/10>

ABSTRACT

Three species of lichens are described as new from the Chapada dos Guimarães in Mato Grosso (Brazil): *Astrothelium muriconicum* Aptroot & M.F.Souza, sp. nov. which is the first species in the core group of the genus, the *A. conicum*-group, with muriform ascospores; *Gassicurtia lopesiana* M.F.Souza & Aptroot, sp. nov. which is characterized by red apothecium margins and lichexanthone in the thallus; and *G. pruinosa* M.F.Souza & Aptroot, sp. nov. which has brown pruinose, UV+ green discs and less red pigmentation. A further 191 species are reported new to the state Mato Grosso, 14 of which are first reports from Brazil.

RÉSUMÉ

Nouvelles espèces de lichens et nouveaux signalements de la Chapada dos Guimarães, Mato Grosso, Brésil. Trois espèces de lichens sont décrites comme nouvelles pour la Chapada dos Guimarães dans le Mato Grosso (Brésil) : *Astrothelium muriconicum* Aptroot & M.F.Souza, sp. nov. qui est la première espèce du groupe central du genre, le groupe *A. conicum*, avec des ascospores muriformes; *Gassicurtia lopesiana* M.F.Souza & Aptroot, sp. nov. qui est caractérisée par des marges rouges de l'apothécie et de la lichexanthone dans le thalle; et *G. pruinosa* M.F.Souza & Aptroot, sp. nov. qui a une pruine brune, des disques verts UV+ et moins de pigmentation rouge. 191 autres espèces sont signalées comme nouvelles dans l'état du Mato Grosso, dont 14 sont les premiers signalements au Brésil.

KEY WORDS

Cerrado,
Caliciaceae,
Trypetheliaceae,
new species,
new records.

MOTS CLÉS

Cerrado,
Caliciaceae,
Trypetheliaceae,
espèces nouvelles,
signalements nouveaux.

INTRODUCTION

The Chapada dos Guimarães is situated in Mato Grosso, at the margin of the pre-cambrian sandstone plateau that covers most of the state. Here, steep cliffs mark the transition to the Pantanal. Exposed parts of the cliffs are covered by lichens, predominantly *Xanthoparmelia* (Vain.) Hale. Trees and shrubs support additional species. The dominant climax vegetation is Cerrado, the rock invariably siliceous and precambrian (Malme 1897). Already Malme (1897) noted that the Cerrado in the Chapada dos Guimarães is often relatively open and low, resembling Caatinga vegetation. This is however good for a diverse lichen flora, and different from most Caatinga areas, the Chapada dos Guimarães has many smaller rivers and waterfalls, and the study area is often foggy part of the day. The combination of light, air humidity and geological stability (no volcanic activity) is proficient for a diverse lichen vegetation, including local endemics. In the study area, and in the Chapada dos Guimarães as a whole, there has been relatively little impact from man. Especially the rock outcrops are unchanged since Malme visited them in the 1890s. One major influence however is the incidence of fire. Fire is native to Cerrado, but too frequent or too intense fires can be harmful. In the study area, most places seem to be relatively infrequently or never burned, but unfortunately the oldest grove was burned just the month before our study.

The Chapada dos Guimarães area is one of the lichenologically best investigated regions of Brazil. Malme collected extensively in the region at the turn of the 20th century, and Kalb collected there towards the end of the last century. Specimens have been recorded by them (e.g. Malme 1897, 1924; Kalb 2020) and others (e.g. Redinger 1934; Nash *et al.* 1995; Elix & Nash 1998) in numerous publications, each dealing with either a taxonomic group or describing or reporting a more random set of species, for instance in exsiccatae schedae.

To date, 676 lichen species have been reported from the state of Mato Grosso (Aptroot *et al.* in prep.), mostly from the Chapada dos Guimarães. From other regions in the state, mainly some tropical foliicolous lichens have been reported (e.g. by Lücking & Kalb 2000).

During one week in September 2020, we visited a 500 hectares large private area of the Chapada, just outside the National Park. Most rocks and trees were found to be literally covered by lichens, and lichens also occur occasionally on other substrates like soil and living leaves (and glass, plastic, rubber, paint, iron). The study area borders on and partly overlaps with the areas where Malme and Kalb collected. An important aim was to collect topotypes for the numerous species originally described from this region, but we also collected other species. This paper reports on the surprisingly many novelties encountered.

Gassicurtia Fée is a small genus in the family Caliciaceae Chevall. (Lecanoromycetes) with currently 31 accepted species (see Santos Andrade *et al.* 2020 for a key to the Brazilian species). It is most speciose in Brazil, where half of the species (14) are occurring, nine of which are endemic to Brazil and unknown elsewhere.

Astrothelium Eschw. is a large genus in the family Trypetheliaceae Eschw. (Dothideomycetes), with currently over 250 accepted species (Aptroot & Lücking 2016, with some recent additions). Its global centre of distribution is also Brazil, with 154 species currently known (the last one being added by Aptroot & Spielmann 2020), and in the Amazonian basin it is even the most speciose lichen genus (Aptroot *et al.* in prep.).

MATERIAL AND METHODS

From September 12-19, 2020, 720 lichen specimens were collected by the authors, using Opinel knife or hammer and chisel, examined by 10× hand lens (365nm-UV-Lichen candelaris, Erich Zimmermann) and subsequently 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 could not 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 or AK3ST stereomicroscope 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% I₂) after pre-treatment with KOH (IKI). Microscopic photographs were prepared using an Olympus BX50 with Nomarski interference contrast and Nikon Coolpix 995 or Motic with iPhone. Chemical spot reactions are abbreviated as K (5% KOH), C (commercial bleach), KC (K followed by C), P (paraphenylenediamine, Steiner's solution), and UV refers to fluorescence at 365 nm.

RESULTS

To our surprise, in less than one week we managed to collect and identify no less than 350 species in the area we investigated, a private property of c. 500 hectares. It demonstrates that the area is very rich in lichen species; there are few if any areas that we know of where you can find (and identify!) so many different species in such a short period; the senior author (A.A.) only once experienced a similar number (389), in Caraça, Bahia state, Brazil (Aptroot 2002, only localities a–n in that paper). Lücking *et al.* (2011) state that 1 km² of tropical rain forest in the neotropics could yield an estimated number of 500–600 species, “half of which are foliicolous”, but they give detailed references only to lists of the foliicolous species. The highest number cited is 300 species for 100 trees and shrubs in the La Selva reserve in Costa Rica (Lücking 1999); if the corticolous species would have been investigated and added, this number would indeed go well over 400, but the reserve is quite large and the time spent to collect these lichens a lot longer than one week. To our knowledge, there does not exist any published lists of identified species in this order of magnitude from a single small tropical locality. Long lists of lichen species from excursions are regularly published (e.g. Hafellner *et al.* 2003), but usually refer to much larger areas (in that case 50 000 hectares, with

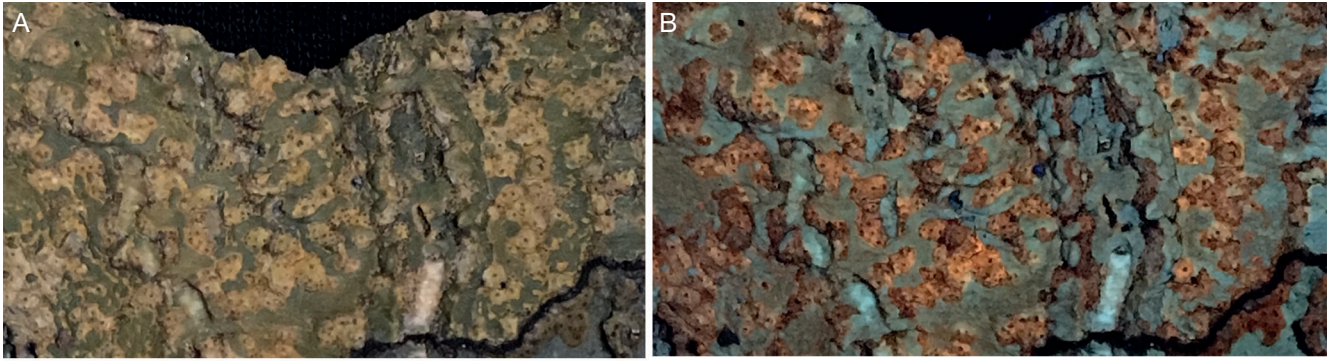


FIG. 1. — *Astrothelium muriconicum* sp. nov., holotype, habitus. **A**, in daylight; **B**, under 365 nm UV light. Width of pictures 30 mm.

525 species). A recently published high species number, just to compare yet another climatic zone, is from Glacier Bay in Alaska (Spribille *et al.* 2020). In total, 760 species were identified (or newly described), but this was from 1 100 000 hectares and the fieldwork was carried out during several months over several years, in over 100 different localities.

Even more surprisingly, the identified species were only for a small part (22 species) topotypes and for a larger part (130 species) species that were known from the state but not originally described from the Chapada. However, the largest proportion (191 species) are new reports for the state of Mato Grosso (*c.* 1 million km², roughly the size of France). They must in part have been missed by previously collectors and partly not previously been identified and/or published. Of these, 14 are first reports from Brazil (or even the neotropics). Here we list only the new reports, citing only one specimen per species (Table 1). Several additional specimens seem to belong to undescribed species though. Here we describe three new species to science from this collection.

Family TRYPETHELIACEAE Spreng.
Genus *Astrothelium* Eschw.

Astrothelium muriconicum Aptroot & M.F.Souza, sp. nov.
(Fig. 1)

Corticolous *Astrothelium* similar to *A. cinnamomeum* (Eschw.) Müll. Arg. in the ascomata with fused ostioles, pseudostroma orange, K+ red, but differing by the muriform ascospores of 50–55 × 12–14 µm.

MYCOBANK. — MB 839652.

TYPE. — **Brazil**, Mato Grosso, Cuiabá, Chapada dos Guimarães, Pousada do Parque private area, alt. 700 m, 15°26'50"S, 55°49'50"W, on bark, 12-19.IX.2020, *A.Aptroot & M.F.Souza 81980* (holo-, CGMS; iso-, ABL).

DESCRIPTION

Thallus smooth, somewhat glossy, bullate, olivaceous green, surrounded by a 0.3 mm wide, firm and thick, black prothallus. Pseudostromata dull, pale orange yellow, irregular in shape, starting as angular areas of up to *c.* 1.5 mm, but partly laterally fusing, only slightly raised above the bullate

thallus, between the thallus bullae, occupying about half of the thallus. Ascomata pyriform, *c.* 0.4–0.6 mm diam., immersed in pseudostromata, in groups of 2–6. Ostioles apical, fused, brown to black, 0.1–0.2 mm diam. Hamathecium not interspersed. Ascospores 8/ascus, hyaline, regularly muriform, 50–55 × 12–14 µm, fusiform, not constricted at the primary septum which is not markedly thickened, not surrounded by a gelatinous sheath. Pycnidia copious, black, *c.* 0.2 mm diam., erumpent from the pseudostromata, without conidia.

CHEMISTRY. — Thallus UV-, K-; pseudostromata UV+ red. With anthraquinone.

ETYMOLOGY. — Named after the muriform ascospores and belonging to the *conicum*-group.

ECOLOGY AND DISTRIBUTION. — On tree bark in Cerrado forest; only known from Brazil.

DISCUSSION

This is the first species in the *Astrothelium conicum* Eschw. group (the core group of the genus, characterized by fused eccentric ostioles and yellow to orange pigments externally on the pseudostromata) with muriform ascospores; it would key out in the world key by Aptroot & Lücking (2016) in group 7 at couplet 15: Ascomata with fused ostioles (astrothelioid), orange pigment on the pseudostromata only.

Family CALICIACEAE Chevall.
Genus *Gassicurtia* Fée

Gassicurtia lopesiana M.F.Souza & Aptroot, sp. nov.
(Figs 2, 3)

Corticolous *Gassicurtia* similar to *G. rufofuscescens* (Vain.) Marbach, but differing by the thallus UV+ yellow due to lichexanthone, apothecia similarly with red anthraquinone in the excipulum, ascospores 10–12 × 2.5–3.5 µm.

MYCOBANK. — MB 839653.

TYPE. — **Brazil**, Mato Grosso, Cuiabá, Chapada dos Guimarães, Pousada do Parque private area, alt. 700 m, 15°26'50"S, 55°49'50"W, on bark, 12-19.IX.2020, *M.F.Souza & A.Aptroot 13* (holo-, CGMS [CGMS]; iso-, ABL[ABL]).

TABLE 1. — Lichen species encountered new to Mato Grosso, with status of report and Aptroot & Souza collections (collecting numbers >80000) and Souza and Aptroot collections (collecting numbers <1000). Abbreviations: **MT**, Mato Grosso state.

new to	name	coll. no	substratum
Brazil	<i>Acarospora moenium</i> (Vain.) Räsänen	81692	sandstone
MT	<i>Acarospora oligyrophorica</i> Aptroot	81881a	sandstone
MT	<i>Aggregatorygma triseptatum</i> M. Cáceres, Aptroot & Lücking	81925	bark
MT	<i>Allographa angustata</i> (Eschw.) Lücking & Kalb	81923	bark
MT	<i>Allographa sauroidea</i> (Leight.) Lücking & Kalb	81564	bark
MT	<i>Anisomeridium subprostans</i> (Nyl.) R.C.Harris	81772	bark
MT	<i>Astrothelium cartilagineum</i> (Fée) Aptroot & Lücking	81777	bark
MT	<i>Astrothelium cinnamomeum</i> (Eschw.) Müll. Arg.	68	bark
MT	<i>Astrothelium duplicatum</i> Aptroot & M. Cáceres	81938	bark
Brazil	<i>Astrothelium elixii</i> Flakus & Aptroot	81623	bark
MT	<i>Astrothelium kunzei</i> (Fée) Aptroot & Lücking	55	bark
MT	<i>Astrothelium macrocarpum</i> (Fée) Aptroot & Lücking	81771	bark
MT	<i>Astrothelium nigratum</i> (Müll. Arg.) Aptroot & Lücking	51	bark
MT	<i>Astrothelium nitidiusculum</i> (Nyl.) Aptroot & Lücking	81770	bark
MT	<i>Astrothelium phlyctaena</i> (Fée) Aptroot & Lücking	54	bark
MT	<i>Astrothelium simplex</i> Aptroot & S.M.A. Martins	153	bark
MT	<i>Astrothelium subscoria</i> Flakus & Aptroot	81986	bark
MT	<i>Bacidia arceutina</i> (Müll. Arg.) Zahlbr.	81918	bark
MT	<i>Bacidina neotropica</i> Lücking	81829	wood
MT	<i>Bathelium lineare</i> (C.W. Dodge) R.C. Harris	81946	bark
Brazil	<i>Bathelium mirabile</i> Flakus, Kukwa & Aptroot	81778	bark
MT	<i>Buellia aethalea</i> (Ach.) Th. Fr.	81855	sandstone
MT	<i>Buellia griseovirens</i> (Turner & Borrer ex Sm.) Almb.	81672a	wood
MT	<i>Buellia mamillana</i> (Tuck.) W.A. Weber	134	sandstone
MT	<i>Buellia subdisciformis</i> (Leight.) Vain.	81881	sandstone
MT	<i>Bulbothrix cinerea</i> Marcelli & Kalb	81803	sandstone
MT	<i>Byssoloma guttiferæ</i> (Bat. & Peres) Lücking & Sérus.	81688	sandstone
MT	<i>Calicium salicinum</i> Pers.	81672	wood
MT	<i>Calopadia pruinosa</i> Lücking & Chaves	81934	bark
MT	<i>Calopadia subcoerulescens</i> (Zahlbr.) Vězda	81782	bark
MT	<i>Caloplaca conversa</i> (Kremp.) Jatta	81905	sandstone
MT	<i>Caloplaca erythrantha</i> (Tuck.) Zahlbr.	81643	bark
MT	<i>Caloplaca granularis</i> (Müll. Arg.) Zahlbr.	81686	bark
MT	<i>Caloplaca leptozona</i> (Nyl.) Zahlbr.	81877	sandstone
MT	<i>Canoparmelia cryptochlorophaea</i> (Hale) Elix & Hale	81578	bark
MT	<i>Canoparmelia texana</i> (Tuck.) Elix & Hale	81571	sandstone
MT	<i>Chrysothrix chlorina</i> (Ach.) J.R. Laundon	81519	sandstone
MT	<i>Chrysothrix citrinella</i> Aptroot & M. Cáceres	81721	sandstone
MT	<i>Cladonia ceratophylla</i> (Sw.) Sprengel	193	soil
MT	<i>Cladonia furfuracea</i> Vain.	70	bark
MT	<i>Cladonia hypoxanthoides</i> Vain.	125	bark
MT	<i>Cladonia macilenta</i> Hoffm.	84	bark
MT	<i>Cladonia signata</i> (Eschw.) Vain.	81949	soil
MT	<i>Coenogonium strigosum</i> Rivas Plata, Lücking & Chaves	81743	bark
MT	<i>Coenogonium subdentatum</i> (Vězda & G. Thor) Rivas Plata, Lücking, Umaña & Chaves	160	bark
MT	<i>Coenogonium subluteum</i> (Rehm) Kalb & Lücking	81518	living leaves
MT	<i>Coenogonium upretianum</i> M.Cáceres & Aptroot	81722	sandstone
MT	<i>Constrictolumina cinchonae</i> (Ach.) Lücking, M.P.Nelsen & Aptroot	102	bark
MT	<i>Cratiria vioxanthina</i> (Elix) Kalb & Elix	81729	sandstone
MT	<i>Crespoa carneopruinata</i> (Zahlbr.) Lendemer & B.P.Hodk.	81545	bark
MT	<i>Crypthonia albida</i> (Fée) Frisch & G.Thor	81736	bark
MT	<i>Crypthonia submuriformis</i> A.A.Menezes, M.Cáceres & Aptroot	81809	bark
MT	<i>Cryptothecia aleurocarpa</i> (Nyl.) Makhija & Patw.	81944	bark
MT	<i>Cryptothecia lichexanthonica</i> E.L.Lima, Aptroot & M.Cáceres	81753	bark
MT	<i>Dendrographa austrosorediata</i> Aptroot & Gumboski	179	sandstone
MT	<i>Dictyomeridium amylosporum</i> (Vain.) Aptroot, M.P.Nelsen & Lücking	127	bark
MT	<i>Dictyomeridium proponens</i> (Nyl.) Aptroot, M.P.Nelsen & Lücking	81817	bark
MT	<i>Diorygma antillarum</i> (Vain.) Nelsen, Lücking & Rivas Plata	144	bark
MT	<i>Dirinaria aegialita</i> (Afzelius) Moore	81641	bark
Brazil	<i>Fellhanera montana</i> Lücking	81850	wood
MT	<i>Fellhanera substanhopeae</i> Lücking	81757e	living leaves
MT	<i>Fellhanera subternella</i> (Nyl.) Vězda	81757c	living leaves
MT	<i>Fellhanera termitophila</i> Aptroot & M.Cáceres	81827	sandstone
MT	<i>Fissurina instabilis</i> (Nyl.) Nyl.	81531	bark
MT	<i>Fissurina pseudostromatica</i> Lücking & Rivas Plata	81500	bark
MT	<i>Gassicurtia rhizocarpoidea</i> Aptroot & M.Cáceres	81854	sandstone
MT	<i>Graphis antillarum</i> Vain.	81764	bark
MT	<i>Graphis argentata</i> Lücking & Umana	81609	bark
MT	<i>Graphis caesiella</i> Vain.	81819	bark

TABLE 1. — Continuation.

new to	name	coll. no	substratum
MT	<i>Graphis crebra</i> Vain.	41	bark
MT	<i>Graphis duplicata</i> Ach.	80	bark
Brazil	<i>Graphis farinulenta</i> Müll. Arg.	81815	bark
MT	<i>Graphis lineola</i> Ach.	29	bark
MT	<i>Graphis paralleloides</i> M.Cáceres & Lücking	81501	bark
MT	<i>Graphis pernambucoradians</i> M.Cáceres & Lücking	165	bark
MT	<i>Graphis symplecta</i> Nyl.	81502	bark
Brazil	<i>Gyalideopsis giganteoides</i> S'erus.	81828	wood
MT	<i>Gyalideopsis palmata</i> Kalb & Vězda	81497	bark
MT	<i>Haematomma solediatum</i> R.W.Rogers	81625	wood
MT	<i>Hyperphyscia adglutinata</i> (Flörke) H.Mayrhofer & Poelt	81640	bark
MT	<i>Hyperphyscia cochlearis</i> Scutari	81661	bark
MT	<i>Hyperphyscia viridissima</i> (Müll. Arg.) Scutari	81644	bark
Brazil	<i>Hypotrachyna exsplendens</i> (Hale) Hale	81504	bark
MT	<i>Hypotrachyna osteoleuca</i> (Nyl.) Hale	81971	bark
MT	<i>Hypotrachyna protenta</i> Hale	81534	bark
MT	<i>Hypotrachyna protoformosana</i> Elix, Nash & Sipman	157	bark
MT	<i>Karoowia saxeti</i> (Stizenb.) Hale	81866	sandstone
MT	<i>Lecanora brasiliiana</i> Zahlbr.	81733	bark
MT	<i>Lecanora caesiorubella</i> Ach.	81630	wood
MT	<i>Lecanora coronulans</i> Nyl.	81667	bark
MT	<i>Lecanora helva</i> Stizenb.	81672d	wood
MT	<i>Lecanora hypofusca</i> Aptroot & M.Cáceres	81839	sandstone
MT	<i>Lecanora leprosa</i> Fée	81671	wood
MT	<i>Lecanora lichexanthona</i> Guderley	81867	sandstone
Brazil	<i>Lecanora polytropia</i> (Ehrh.) Rabenh.	81903	sandstone
MT	<i>Lecanora pseudistera</i> Nyl.	81897	sandstone
MT	<i>Lecanora stramineoalbida</i> Vain.	81536	bark
MT	<i>Lecanora subcrenulata</i> Müll. Arg.	194	sandstone
MT	<i>Lecanora subimmersa</i> (Fée) Vain.	81840	sandstone
MT	<i>Lecanora sulfurescens</i> Fée	180	sandstone
MT	<i>Lecanora thysanophora</i> R.C. Harris	81752	bark
MT	<i>Lecanora tropica</i> Zahlbr.	81672c	wood
MT	<i>Lepra tropica</i> (Vain.) Lendemmer & R.C.Harris	156	bark
MT	<i>Lepraria sipmaniana</i> (Kümmerl. & Leuckert) Kukwa	81724	sandstone
MT	<i>Leptogidium dendriscum</i> (Nyl.) Nyl.	81940a	bark
MT	<i>Leptogium isidiosellum</i> (Riddle) Sierk	81960	bark
MT	<i>Leptogium milligranum</i> Sierk	81663	bark
MT	<i>Malmidea polycampia</i> (Tuck.) Kalb & Lücking	110	sandstone
MT	<i>Malmidea psychotrioides</i> (Kalb & Lücking) Kalb, Rivas Plata & Lumbsch	81919	bark
MT	<i>Malmidea vinosa</i> (Eschw.) Kalb, Rivas Plata & Lumbsch	147	bark
MT	<i>Maronora cyanosora</i> Kalb & Aptroot	81672e	wood
MT	<i>Megalaria bengalensis</i> Jagadeesh, Aptroot, G.P.Sinha & Singh	81627	wood
MT	<i>Micarea squamulosa</i> Aptroot, Lücking & M.Cáceres	81895	sandstone
MT	<i>Mycoporum acervatum</i> R.C.Harris	12	bark
MT	<i>Mycoporum compositum</i> (A.Massal.) R.C.Harris	94	bark
MT	<i>Neoprotoparmelia paramultifera</i> L.A.Santos, Lücking & Aptroot	76	bark
MT	<i>Neoprotoparmelia saxicola</i> (Aptroot & M.Cáceres) L.A. Santos, M.Cáceres & Aptroot	81870	sandstone
MT	<i>Nigrothelium inspersotropicum</i> Aptroot & Diederich	81783	bark
MT	<i>Normandina pulchella</i> (Borrer) Nyl.	81959	bark
Brazil	<i>Ocellularia protoinspersa</i> Rivas Plata & Lücking	81527	bark
Brazil	<i>Ocellularia subpyrenuloides</i> Lücking	81617	bark
Brazil	<i>Ocellularia thryptica</i> Hale	163	bark
MT	<i>Opegrapha cylindrica</i> Raddi	154	bark
MT	<i>Parallopsora labriformis</i> (Timdal) Kistenich, Timdal, Bendiksby & S.Ekman	81933	bark
MT	<i>Parmelinopsis horrescens</i> (Taylor) Elix & Hale	42	bark
MT	<i>Parmelinopsis subfaticens</i> (Kurok.) Elix & Hale	81786a	bark
MT	<i>Parmotrema blanchetianum</i> (Müll. Arg.) Kalb	108	sandstone
MT	<i>Parmotrema clavuliferum</i> (Räs.) Streimann	107	bark
MT	<i>Parmotrema conformatum</i> (Vain.) Hale	81604	bark
MT	<i>Parmotrema gardneri</i> (C.W.Dodge) Serus.	120	sandstone
MT	<i>Parmotrema lichexanthonicum</i> Eliasaro & Adler	81848	sandstone
MT	<i>Parmotrema masonii</i> Ferraro	81879	sandstone
MT	<i>Parmotrema mellissii</i> (C.W.Dodge) Hale	117	bark
MT	<i>Parmotrema mesotropum</i> (Müll. Arg.) Hale	81509	bark
MT	<i>Parmotrema mordenii</i> (Hale) Hale	186	sandstone
MT	<i>Parmotrema praesorediosum</i> (Nyl.) Hale	81967	bark
MT	<i>Parmotrema reticulatum</i> (Taylor) M.Choisy	81651	bark
MT	<i>Parmotrema subsumptum</i> (Nyl.) Hale	81493	bark
MT	<i>Parmotrema subtinctorium</i> (Zahlbr.) Hale	198	sandstone

TABLE 1. — Continuation.

new to	name	coll. no	substratum
MT	<i>Parmotrema wainii</i> (Sm.) Hale	129	sandstone
MT	<i>Pertusaria flavens</i> Nyl.	81726	bark
MT	<i>Phlyctis brasiliensis</i> Nyl.	81814	bark
MT	<i>Phyllopsora soralifera</i> Timdal	81588	bark
MT	<i>Physcia atrostriata</i> Moberg	81964	bark
MT	<i>Physcia krogiae</i> Moberg	81962	bark
MT	<i>Physcia sinuosa</i> Moberg	81648	bark
MT	<i>Physcia solediosa</i> (Vain.) Lynge	74	bark
MT	<i>Placidiopsis hypothallina</i> Aptroot	81691	sandstone
MT	<i>Platythecium leiogramma</i> (Nyl.) Staiger	81683	bark
MT	<i>Polymeridium albocinereum</i> (Kremp.) R.C. Harris	81704	bark
MT	<i>Polymeridium catapastum</i> (Nyl.) R.C. Harris	81707	bark
MT	<i>Polymeridium cinereonigricans</i> (Vain.) R.C. Harris	81825	bark
MT	<i>Polymeridium costaricense</i> Aptroot	140	bark
MT	<i>Polymeridium julelloides</i> E.L.Lima, M. Cáceres & Aptroot	75	bark
MT	<i>Porina distans</i> Vězda & Vivant	81593	bark
MT	<i>Porina internigrans</i> (Nyl.) Müll. Arg.	81930	bark
MT	<i>Porina tetracerae</i> (Afz. in Ach.) Müll. Arg.	81916	bark
MT	<i>Pseudopyrenula subgregaria</i> Müll. Arg.	57	bark
MT	<i>Pyrenula aggregata</i> (Fée) Fée	81926	bark
MT	<i>Pyrenula infraleucotrypa</i> Aptroot & M.Cáceres	81951	bark
MT	<i>Pyrenula paraminarum</i> Aptroot & M. Cáceres	81592	bark
MT	<i>Pyrenula rubromamillana</i> E.L. Lima, Aptroot & M. Cáceres	23	bark
Brazil	<i>Pyrrhospora palmicola</i> Aptroot	106	bark
MT	<i>Pyxine fallax</i> (Zahlbr.) Kalb	81786	bark
MT	<i>Pyxine microspora</i> Vain.	184	sandstone
MT	<i>Pyxine schechingeri</i> Kalb	81841	sandstone
MT	<i>Pyxine subcinerea</i> Stirt.	81669	bark
MT	<i>Ramalina laevigata</i> Fr.	168	sandstone
MT	<i>Ramboldia heterocarpa</i> (Fée) Kalb, Lumbsch & Elix	81723	sandstone
neotropics	<i>Relicina amphithrix</i> Hale	139	bark
MT	<i>Remototrachyna costaricensis</i> (Nyl.) Divakar & A. Crespo	81847	sandstone
MT	<i>Scoliciosporum campptosporum</i> (Vain.) Aptroot	190	bark
MT	<i>Scoliciosporum intrusum</i> (Th. Fr.) Hafellner	81689	sandstone
MT	<i>Septotrapelia usnica</i> (Sipman) Lendemmer & Bungartz	60	sandstone
MT	<i>Stigmatochroma metaleptodes</i> (Nyl.) Marbach	81674	bark
MT	<i>Strigula melanobapha</i> (Kremp.) R. Sant.	81757n	living leaves
MT	<i>Synarthonia inconspicua</i> (Stirt.) Van den Broeck & Ertz	81608	bark
MT	<i>Synarthonia xanthosarcographoides</i> Aptroot	81631	wood
MT	<i>Tephromela alectoronica</i> Kalb	81632	bark
MT	<i>Tephromela americana</i> (Fée) Kalb	81958	bark
MT	<i>Tephromela atra</i> (Huds.) Hafellner ex Kalb	81843	sandstone
MT	<i>Thelenella luridella</i> (Nyl.) Mayrh.	81887	sandstone
Brazil	<i>Toninia cinereovirens</i> (Schaer.) A. Massal.	81696	sandstone
MT	<i>Traponora asterella</i> Aptroot	81672b	wood
MT	<i>Trypethelium foveolatum</i> Müll. Arg.	81929	bark
MT	<i>Trypethelium subeluteriae</i> Makhija & Patw.	81551	bark
Brazil	<i>Trypethelium tolimense</i> Lücking, Moncada & M.C. Gut.	81988	bark
MT	<i>Tylophoron hibernicum</i> (D. Hawksw., Coppins & P. James) Ertz, Diederich, Bungartz & Tibell	81522	sandstone
MT	<i>Usnea dasaea</i> Stirt.	1	bark
MT	<i>Xanthoparmelia brasiliensis</i> Nash & Elix	187	sandstone
MT	<i>Xanthoparmelia neocumberlandia</i> Nash & Elix	81898	sandstone
MT	<i>Xanthoparmelia neopropagulooides</i> Hale	81853	sandstone
MT	<i>Xanthoparmelia plittii</i> (Gyeln.) Hale	189	sandstone
MT	<i>Xanthoparmelia subplittii</i> Hale	81893	sandstone

ADDITIONAL MATERIAL EXAMINED. — **Brazil.** Mato Grosso: Same details as the holotype, *A.Aptroot & M.F.Souza 81496* (para-, CGMS).

DESCRIPTION

Thallus crustose, greenish grey, areolate, very variable in thickness, partly almost immersed, areoles irregular, *c.* 0.1 mm diam., thallus surrounded by a *c.* 0.2 mm wide, black hyphal prothallus line. Isidia and soredia absent. Apothecia sessile, solitary, 0.2-0.6 mm diam.; disc black, not pruinose; margin prominent, persistent, *c.* 0.05 mm wide, glossy, dark brown

to vermilion red. Hymenium not interspersed. Paraphyses unbranched. Epithecium with black caps. Hypothecium dark brown. Excipulum bright red in section. Ascospores 8/ascus, 10-12 × 2.5-3.5 μm, dark brown, smooth, long ellipsoid. Pycnidia not observed.

CHEMISTRY. — Thallus UV+ yellow, K-; ascomata inside K+ red. With anthraquinone and lichexanthone.

ETYMOLOGY. — Named after the grandmother of Fernanda, Maria Lopes de Souza, in recognition of her constant support to Fernanda's studies.



FIG. 2. — *Gassicurtia lopesiana* sp. nov., holotype, habitus. Width of picture 15 mm.

ECOLOGY AND DISTRIBUTION. — On tree bark in Cerrado forest; only known from Brazil.

DISCUSSION

The new species is close to *Gassicurtia catasema* (Tuck.) Marbach, which up to recently (Santos Andrade *et al.* 2020). It shares the presence of lichexanthone, but differs by the red pigment inside the apothecium margin. In the key to Brazilian species of *Gassicurtia* by Santos Andrade *et al.* (2020) it would key out at couplet 5a, differing from *G. rufofuscenscens* by the thallus UV+ yellow due to the presence of lichexanthone. It grows side-by-side with the next species.

Gassicurtia pruinosa M.F.Souza & Aptroot, sp. nov.
(Figs 3, 4)

MYCOBANK. — MB 839654.

Corticolous *Gassicurtia* without anthraquinone, differing from *G. catasema* (Tuck.) Marbach by the UV-negative thallus, apothecia brown pruinose, UV+ green, probably due to a xanthone, and ascospores 10-12 × 2.5-3.5 μm.

TYPE. — Brazil, Mato Grosso, Cuiabá, Chapada dos Guimarães, Pousada do Parque private area, alt. 700 m, 15°26'50"S, 55°49'50"W, on bark, 12-19.IX.2020, A.Aptroot & M.F.Souza 81917 (holo-, CGMS [CGMS]; iso-, ABL[ABL]).

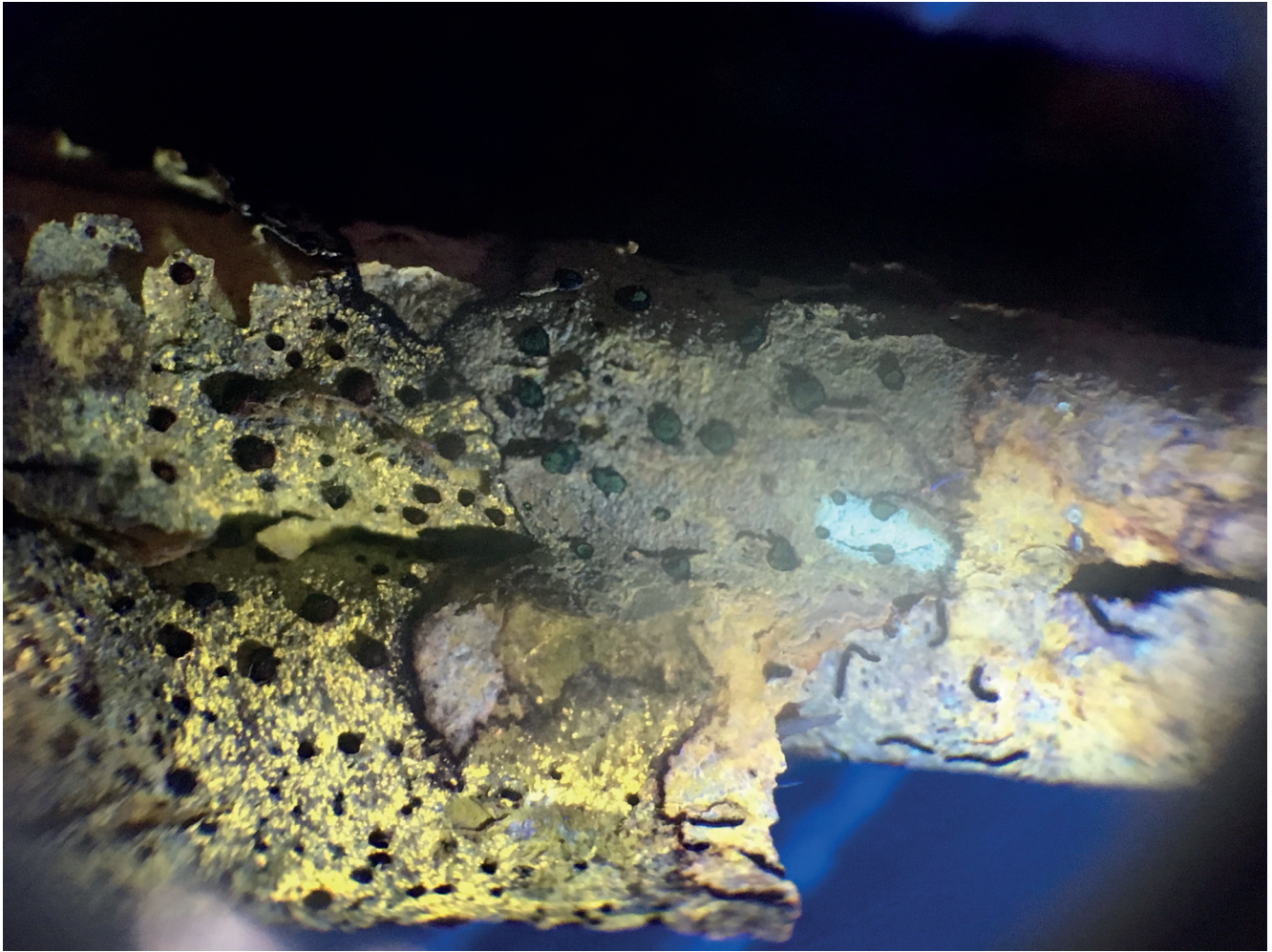


FIG. 3. — *Gassicurtia lopesiana* sp. nov., (left) and *Gassicurtia pruinosa* sp. nov. (right) under 365 nm UV light, A. Aptroot & M. F. Souza 81496. Width of picture 20 mm.

ADDITIONAL MATERIAL EXAMINED. — **Brazil.** Mato Grosso: Same details as the holotype, A. Aptroot & M. F. Souza 81496 (para-, CGMS).

DESCRIPTION

Thallus crustose, greenish grey, areolate, very variable in thickness, partly almost immersed, areoles irregular, *c.* 0.1 mm diam., thallus surrounded by a *c.* 0.3 mm wide, brown hyphal prothallus line. Isidia and soredia absent. Apothecia sessile, solitary, angular, rather irregular in shape, not round, 0.2–0.6 mm diam.; disc black, densely brown pruinose; margin prominent, persistent, *c.* 0.05 mm wide, glossy, black. Hymenium not interspersed. Paraphyses unbranched. Epithecium with black caps. Hypothecium dark brown. Excipulum brown in section. Ascospores 8/ascus, 10–12 × 2.5–3.5 μm, dark brown, smooth, long ellipsoid. Pycnidia not observed.

CHEMISTRY. — Thallus UV⁻, K⁻, apothecium disc UV⁺ green, probably due to an unidentified xanthone (Rf 6 in solvent A[TDA]).

ETYMOLOGY. — Named after the pruinose apothecia.

ECOLOGY AND DISTRIBUTION. — On tree bark in Cerrado forest; only known from Brazil.

DISCUSSION

The new species is close to *Gassicurtia catasema*, which up to recently was the only species accepted in the genus without red pigment, but which contains lichexanthone in the thallus. The second species in this genus that is lacking any red pigment, *G. restingiana* D.S. Andrade, M. Cáceres & Aptroot (Santos Andrade *et al.* 2020), differs by the absence of any pruina on the disc, the K⁺ yellow thallus reaction (atranorin) and the presence of isidia. In the key to Brazilian species of *Gassicurtia* by Santos Andrade *et al.* 2020) it would key out at couplet 7, differing from the other two options (no pruina or white pruina) by the brown pruina on the disc. Brown pruinose discs are also known in this family in the genus *Stigmatochroma* Marbach, viz. *S. epimarta* (Nyl.) Marbach. Species of this genus however differ e.g. by the much less carbonized excipulum (Marbach 2000).

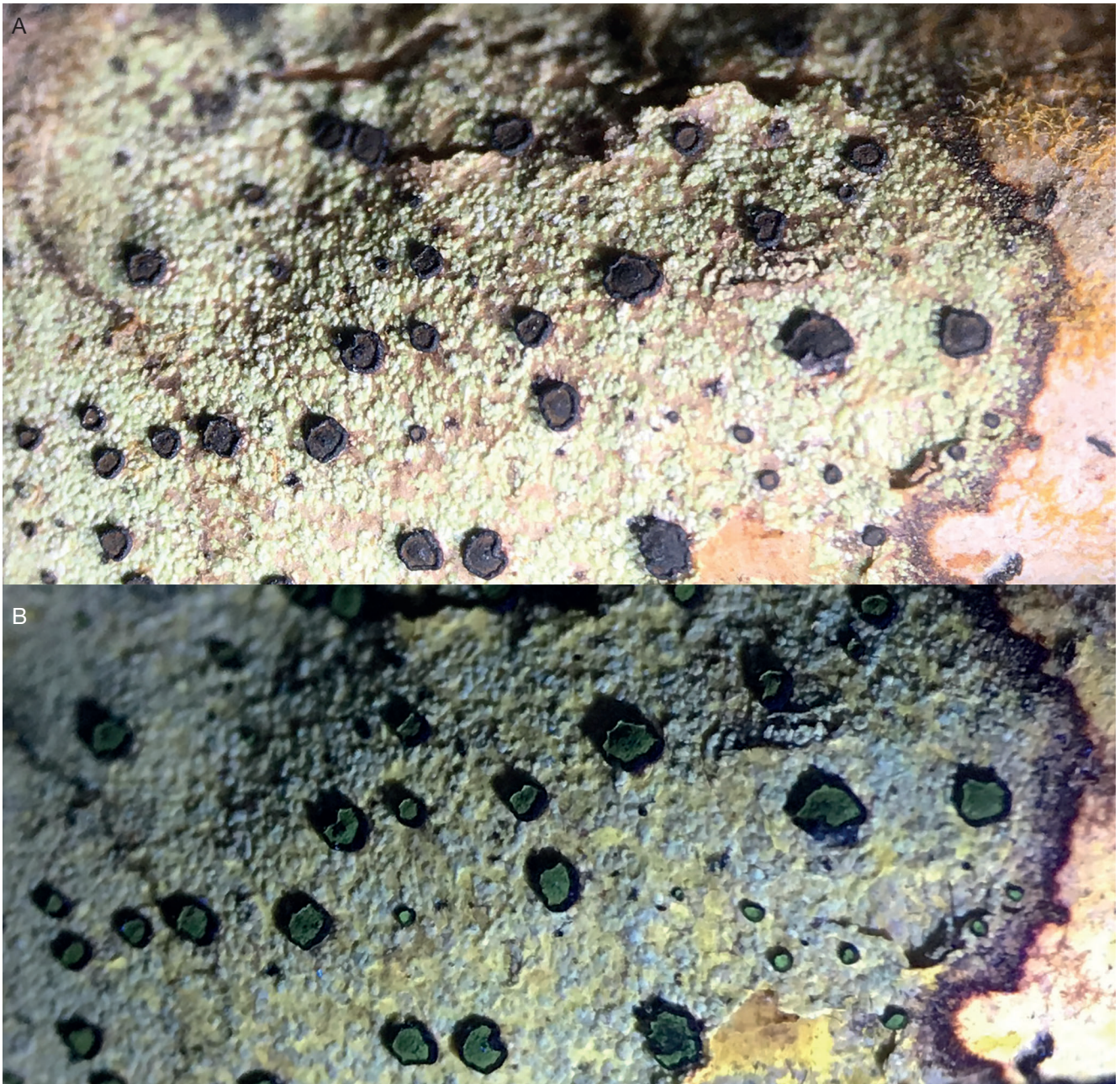


FIG. 4. — *Gassicurtia pruinososa* sp. nov., holotype, habitus. **A**, in daylight; **B**, under 365 nm UV light. Width of pictures 12 mm.

Acknowledgements

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001 who provided a visiting professorship to the first author. The reviewers are thanked for their constructive comments.

REFERENCES

- APTROOT A. 2002. — New and interesting lichens and lichenicolous fungi in Brazil. *Fungal diversity* 9: 15-45.
- APTROOT A. & LÜCKING R. 2016. — A revisionary synopsis of the Trypetheliaceae. (Ascomycota: Trypetheliales). *Lichenologist* 48: 763-982. <https://doi.org/10.1017/S0024282916000487>
- APTROOT A. & SPIELMANN A. A. 2020. — New lichen species and records from the Serra da Bodoquena, Mato Grosso do Sul, Brazil, the westernmost Atlantic rain forest. *Archive for Lichenology* 17: 1-25.
- ELIX J. A. & NASH T. H. III 1998. — A monograph of the lichen genus *Pseudoparmelia* (Ascomycotina, Parmeliaceae). *The Bryologist* 100: 482-498. [https://doi.org/10.1639/0007-2745\(1997\)100\[482:AMOTLG\]2.0.CO;2](https://doi.org/10.1639/0007-2745(1997)100[482:AMOTLG]2.0.CO;2)
- HAFELLNER J., OBERMAYER W., BREUSS O. & TÜRK R. 2003. — Flechtenfunde in den Schladminger Tauern in der Steiermark (BLAM-Exkursion 2001). *Herzogia* 16: 187-206.
- KALB K. 2020. — New or otherwise interesting lichens. VIII. Eight new species, mainly from the family Graphidaceae, and two new

- records. *Archive for Lichenology* 18: 1-14.
- LÜCKING R. 1999. — Líquenes foliícolas de la Estación Biológica La Selva, Costa Rica: Inventario, comunidades y comparación florística de tipos de vegetación. *Revista de Biología Tropical* 47: 287-308.
- LÜCKING R. & KALB K. 2000. — Foliikole Flechten aus Brasilien (vornehmlich Amazonien), inklusive einer Checkliste und Bemerkungen zu *Coenogonium* und *Dimerella* (Gyalectaceae). *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 122 (1): 1-61.
- LÜCKING R., SEAVEY F., COMMON R. S., BEECHING S. Q., BREUSS O., BUCK W. R., CRANE L., HODGES M., HODKINSON B. P., LAY E. & LENDEMER J. C. 2011. — The lichens of Fakahatchee Strand Preserve State Park, Florida: Proceedings from the 18th Tuckerman Workshop. *Bulletin of the Florida Museum of Natural History* 49: 127-186.
- MALME G. O. A. 1897. — Die Flechten der ersten Regnellschen Expedition. I. Einleitung. Die Gattung *Pyxine* (Fr.) Nyl. *Bihang till Kongliga Svenska vetenskaps-akademiens handlingar* 23(III,13): 1-52.
- MALME G. O. A. 1924. — Die Flechten der ersten Regnellschen Expedition. 2. Astrotheliaceae, Paratheliaceae und Trypetheliaceae. *Arkiv för Botanik* 19 (1): 1-34.
- MARBACH B. 2000. — Corticole und lignicole Arten der Flechtengattung *Buellia* sensu lato in den Subtropen und Tropen. *Bibliotheca Lichenologica* 74: 1-384.
- NASH T. H. III, GRIES C. & ELIX J. A. 1995. — A revision of the lichen genus *Xanthoparmelia* in South America. *Bibliotheca Lichenologica* 56: 1-157.
- REDINGER K. 1934. — Die Graphidineen der ersten Regnell'schen Expedition nach Brasilien 1892-94 II. *Graphina* und *Phaeographina*. *Arkiv för Botanik* 26A (1): 1-105.
- SANTOS ANDRADE A., APTROOT A., LÜCKING R., BARBOSA B. M. C., CAVALCANTE J. G. & CÁCERES M. E. S. 2020. — Crustose Caliciaceae in Restinga vegetation in Brazil with a new species of *Gassicurtia* and two identification keys. *The Bryologist* 123: 75-89. <https://doi.org/10.1639/0007-2745-123.1.075>
- SPRIBILLE T., FRYDAY A. M., PÉREZ-ORTEGA S., SVENSSON M., TØNSBERG T., EKMAN S., HOLIEN H., RESL P., SCHNEIDER K., STABENTHEINER E., THÜS H., VONDRÁK J. & SHARMAN L. 2020. — Lichens and associated fungi from Glacier Bay National Park, Alaska. *Lichenologist* 52: 61-181. <https://doi.org/10.1017/S0024282920000079>

Submitted on 23 November 2020;
accepted on 15 June 2021;
published on 6 October 2021.