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LARYSSA REIS SILVA

SAMAMBAIAS E LICÓFITAS DO PARQUE NACIONAL DA CHAPADA DAS MESAS E ARREDORES, ESTADO DO MARANHÃO, BRASIL

Chapadinha - MA
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Dissertação apresentada ao Programa de Pós-Graduação em Ciências Ambientais – PPGCAM, como requisito parcial para obtenção do grau de Mestre em Ciências Ambientais.

Orientador: Felipe Polivanov Ottoni
Coorientadora: Rozijane Fernandes Ottoni
Linha de pesquisa: Biodiversidade e Conservação.

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"[...] *Aprendi que os sonhos transformam a vida numa grande aventura. Eles não determinam o lugar aonde você vai chegar, mas produzem a força necessária para arrancá-lo do lugar em que você está."*

Augusto Cury

RESUMO

As Unidades de Conservação (UC's) são extremamente importantes para a conservação da biodiversidade em todo o mundo, além de serem importantes áreas de pesquisa que fornecem suporte a um grande número de estudos. Este trabalho teve como objetivo a realização de um inventário florístico de Samambaias e licófitas realizado no Parque Nacional da Chapada das Mesas (PNCM), uma importante UC criada em 2005, localizada na porção sul do estado do Maranhão, uma área de fitofisionomia típica de Cerrado incluindo matas de galeria, nascentes, riachos e cachoeiras. Estes ambientes são propícios para as espécies de samambaias e licófitas. Os estudos referentes ao grupo supracitado ainda são escassos e possuem áreas subamostradas no estado que merecem mais atenção. Como resultado deste trabalho foram registradas um total de 86 espécies de samambaias e licófitas para o PNCM, sendo 21 espécies novos registros para o Maranhão e 11 para o Cerrado brasileiro, representando 94% do número total de espécies de samambaias e licófitas conhecidas para o Maranhão. Ademais, esses novos registros para o estado, domínio Cerrado e região Nordeste corroboram a necessidade de realizar mais estudos nessas áreas de conservação biológica que são constantemente ameaçadas por atividades antrópicas.

Palavras-chave: Cerrado, Nordeste do Brasil, plantas vasculares.

ABSTRACT

Protected Areas (PAs) are extremely important for the biodiversity conservation worldwide, in addition to beand important research areas that support a large number of studies. This work aimed to carry out a floristic inventory on ferns and lychophyes conductedin the Chapada das Mesas National Park (PNCM), an important PA created in 2005, located in southern portion of the State of Maranhão, an area with a typical Cerrado phytophysiognomy, including riparian forest, springs, streams and waterfalls., These environments are favorable for fern and lycophyte species.. Studies referring to the aforementioned group are still scarce and there are subsampled areas in the state that deserve more attention. As a result of this work, a total of 86 species of ferns and lycophytes were recorded for PNCM, with 21 new records for the State of Maranhão and 11 for the Brazilian Cerrado, representing 94% of the total number of species of ferns and lycophytes known for Maranhão. Moreover, these new records for the state, Cerrado domain and Northeast region corroborate the need to carry out more studies in these biological protected areas that are constantly threatened by human activities.

Keywords: Cerrado, Northeastern Brazil, vascular plants.

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1. INTRODUÇÃO

As samambaias e licófitas foram as primeiras plantas vasculares a dominarem o ambiente terrestre. Possuindo ampla distribuição ao redor do mundo, esse grupo de plantas está representado por duas linhagens distintas: a classe Lycopodiopsida e a classe Polypodiopsida (PPGI, 2016). Essas duas linhagens possuem várias diferenças estruturais em comparação aos outros grupos de plantas: não apresentam flores, sementes ou frutos, ciclo de vida caracterizado por esporos livres com alternância de gerações, ou seja, duas fases independentes entre si, uma fase esporofítica e outra fase gametofítica (PRYER et al., 2004; HAUFLER et al., 2016).

A classe Lycopodiopsida, representada pelas licófitas, apresenta como principal característica a presença de microfilos, que são: folhas simples, inteiras, raramente denticuladas, com uma única nervura. Esta classe compreende três clados principais: Lycopodiales, Isoetales e Selaginellales. Já a classe Polypodiopsida, representada pelas samambaias, apresentam megafilos, também conhecidos como folhas verdadeiras, com ramificações, altamente modificadas, também presentes nas plantas com sementes (PPG I, 2016). Ambas as classes formam o clado Eufilófita, grupo irmão das Lycopodiopsida (PPG I, 2016).

As samambaias e licófitas representam um dos grupos vegetais mais bem sucedidos. Isto se deve ao seu sucesso da dispersão por esporos através do vento, bem como seu sucesso adaptativo nos mais variados ambientes - desde regiões bem úmidas a regiões de clima seco, semiárido, ou em áreas antropizadas - podendo crescer sobre troncos de árvores vivos e/ou em decomposição (epífita), sobre superfícies arenosas e/ou barrancos (terrestre), em pedras/rochas e paredões rochosos (rupícola) ou na água (aquática) (MADISON, 1977). Elas possuem grande importância para o ecossistema em que vivem, pois contribuem com a manutenção de florestas úmidas ao utilizar suas raízes para absorção de água e sua liberação por meio da evapotranspiração (BARROS et al., 2006).

Por dependerem da água para o processo de reprodução, normalmente essas espécies de plantas são encontradas em maior quantidade em ambientes de florestas úmidas e áreas pouco antropizadas (MATOS et al., 2010). Isso demonstra a importância da utilização de samambaias e licófitas como indicador biológico. O conhecimento desses grupos permite um grande avanço científico para as regiões onde estão sendo estudadas, visto que possibilita

avaliar o grau de perturbação de uma área ou a implementação de um plano de gestão de determinada Unidade de Conservação (UC), por exemplo.

As UC's - áreas naturais passíveis de proteção por suas características especiais (Lei nº 9.985, de 18 de julho de 2000) - são extremamente importantes para a conservação ambiental em todo o mundo (MARQUES & NUCCI, 2007). No Brasil existem cerca de 1,5 milhões de km² distribuídos entre as diversas categorias de UC's (BRASIL/MMA, 2012). Além de serem instrumentos para a conservação biológica, as UC's são também importantes áreas de pesquisa que fornecem suporte a um grande número de estudos (a exemplo alguns estudos mencionados na tabela 1 do artigo apresentado no capítulo II deste trabalho).

O estado do Maranhão, localizado na região Nordeste do país, predominantemente coberto pelo domínio Cerrado, com uma considerável porção coberta por fitofisionomia de Amazônia, e uma pequena porção por Caatinga, possui 15 Unidades de Conservação (UC's) estaduais (IMESC, 2020) em seu território. Destas UC's, apenas três (Reserva Florestal do Sacavém, Área de Proteção Ambiental do Inhamum e Parque Estadual do Mirador) foram alvo de estudos realizados com samambaias e licófitas (BASTOS & CUTRIM, 1999; FERNANDES et al., 2007; CONCEIÇÃO & RODRIGUES, 2010). Juntas, essas áreas registraram a ocorrência de um total de 35 espécies. Esse número reforça a necessidade de uma maior amostragem de dados no estado.

O Maranhão possui também 14 UC's federais e apresenta apenas dois estudos, nesta categoria de UC, relacionados à flora de samambaias e licófitas publicados. Trata-se de um inventário florístico realizado no Parque Nacional Chapada das Mesas (PNCM), onde foram catalogadas seis espécies de licófitas, sendo que uma dessas foi nova ocorrência para o estado (ALMEIDA et al., 2020); e um outro inventário florístico realizado em áreas de remanescentes de fitofisionomia Amazônica, incluindo a área da Reserva Biológica do Gurupi (SILVA-JUNIOR et al., 2020), registrando 64 espécies de samambaias e licófitas, sendo 24 novos registros para o Maranhão.

Apesar do baixo número de estudos com samambaias e licófitas comparado com outros estados brasileiros, nos últimos dez anos, houve um avanço no conhecimento e um crescente registro de novas ocorrências para o estado. Assim, este trabalho se propôs a inventariar as espécies de samambaias e licófitas do Parque Nacional Chapada das Mesas, ampliando sua área amostral para os arredores do PNCM a fim de compreender a diversidade desses grupos não apenas dentro da UC mas também na zona de amortecimento do parque.

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CAPÍTULO II

FERNS AND LYCOPHYTES IN CHAPADA DAS MESAS NATIONAL PARK AND SURROUNDINGS, MARANHÃO STATE, BRAZIL

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Ferns and lycophytes in Chapada das Mesas National Park and surroundings, Maranhão State, Brazil

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Ferns and lycophytes in Chapada das Mesas National Park and surroundings, Maranhão State, Brazil

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Abstract: In Brazil, the number of floristic inventories involving ferns and lycophytes in the Cerrado domain is considerable. However, most of the diversity is recorded for states in the Central-West Region. In addition to the Cerrado domain, Maranhão State contains part of Amazonia and a small portion of the Caatinga. However, for this state, ferns and lycophytes are poorly sampled in floristic studies and data related to the diversity of these species are insufficient. Due to the scarcity of data about these groups, conducting floristic inventories in the state is extremely important, mainly in protected areas that contain regional vegetation near primary vegetation. Thus, the objective of the present study was to conduct a floristic inventory of the fern and lycophyte species in Chapada das Mesas National Park. We identified 86 species: 69 species of ferns, distributed in 35 genera and 17 families; and 17 species of lycophytes, distributed in five genera and three families. Among the species identified, five are new records for the Northeast Region of Brazil, twenty-one are new records for Maranhão State and eleven are new records for the Cerrado; until now, these were only recorded for Amazonia and the Atlantic Forest. The most representative families were Pteridaceae with 14 species, Selaginellaceae with 12 species, Thelypteridaceae with 11 species, and Anemiaceae, Hymenophyllaceae and Dryopteridaceae with six species each. The rupicolous life form was predominant. The new occurrence records for the Cerrado, Northeast Region and Maranhão are evidence that floristic research of ferns and lycophytes is still insufficient in these areas, and a greater sampling effort is needed to increase what is known about the diversity of these plants.

Keywords: Cerrado; Riparian forest; Northeast; Vascular plants; Rupicolous.

Samambaias e licófitas do Parque Nacional da Chapada das Mesas e arredores, Estado do Maranhão, Brasil

Resumo: No Brasil o número de inventários florísticos envolvendo samambaias e licófitas no domínio Cerrado são consideráveis. Entretanto, a maior parte dessa diversidade é registrada para os estados da região Centro-Oeste. Além do domínio Cerrado, o território do estado do Maranhão inclui parte da Amazônia e uma pequena porção da Caatinga. No entanto, para este estado, samambaias e licófitas são pouco amostradas nos estudos florísticos e os dados relacionados à diversidade dessas espécies são insuficientes. Devido à escassez de dados sobre esses grupos, a realização de inventários florísticos no estado é de extrema importância, principalmente em unidades de conservação que contêm vegetação regional similar à vegetação primária. Assim, o objetivo do presente estudo foi realizar um inventário florístico das espécies de samambaias e licófitas no Parque Nacional da Chapada das Mesas. Nós identificamos 86 espécies: 69 espécies de samambaias, distribuídas em 35 gêneros e 17 famílias; e 17 espécies de licófitas, distribuídas em cinco gêneros e três famílias. Dentre as espécies identificadas, cinco são novos registros para a região Nordeste do Brasil, vinte e uma são novos registros para o Estado do Maranhão e onze são novos registros para o Cerrado; até agora, esses foram registrados apenas para a Amazônia e a Mata Atlântica. As famílias mais representativas foram Pteridaceae com 14 espécies, Selaginellaceae com 12 espécies, Thelypteridaceae com 11 espécies e Anemiaceae, Hymenophyllaceae e Dryopteridaceae com seis espécies cada. A forma de vida rupícola foi predominante. Os novos registros de ocorrência para o Cerrado, Nordeste e Maranhão evidenciam que a pesquisa florística de samambaias e licófitas ainda é insuficiente nessas áreas, sendo necessário um maior esforço amostral para aumentar o conhecimento em relação à diversidade dessas plantas.
Palavras-chave: Cerrado; Mata ciliar; Nordeste; Plantas vasculares; Rupícolas

Introduction

Ferns and lycophytes are seedless vascular plants that reproduce from spores (Schuettpelz & Pryer 2008). They occur as various life forms, of which the most common are terrestrial, epiphytic, rupicolous and aquatic, and this has allowed them to widely colonize environments worldwide, excepts for the poles (Mehltreter 2008, Zuquim et al. 2008).

For the world, the PPG I (2016) classified ferns and lycophytes into two classes, 14 orders, 51 families, 337 genera, and 11,916 species. In Brazil, it is estimated that there are 1,403 species, including 315 species in the Cerrado phytogeographic domain, which represents 22.45% of the species in Brazil (Samambaias e Licófitas in Flora do Brasil 2020). Floristic inventories of these groups in the Cerrado have mostly been conducted in the Southeast and Central-West regions of Brazil (e.g., Athayde Filho & Felizardo 2010, Forsthofer & Athayde Filho 2012, Miguez et al. 2013).

The Cerrado occupies 21% of Brazil and is the second largest biome in the country; only Amazonia is larger. It is a world biodiversity hotspot (Myers et al. 2000, Silva & Bates 2002) and widely used for agricultural activities (Borlaug 2002). Although a large part of the

Cerrado is extremely important to the conservation of biodiversity, only 5.5% of its original area consists of protected areas (PAs). Further, it is the world hotspot with the lowest percentage of areas that are completely protected (Brasil, Mittermeier et al. 2021).

In addition to the Cerrado domain, Maranhão contains other phytogeographic domains (i.e., a portion of Amazonia and a small part of the Caatinga) and extensive transition areas between them, resulting in high biodiversity in the state. However, the biodiversity in Maranhão, especially lycophytes and ferns, could be underestimated because not many areas have been sampled and studied (Table 1) (e.g., Bastos & Cutrim 1999, Azevedo & Silva 2001, Fernandes et al. 2007, 2010, Conceição & Ruggieri 2010, Conceição & Rodrigues 2010, Conceição et al. 2015, Santos-Silva 2016, Silva et al. 2017, Santos-Silva et al. 2018, Silva-Júnior et al. 2018, Santos-Silva et al. 2019a, b, c, Barbieri et al. 2020, Almeida et al. 2020, Silva-Junior et al. 2020). According to Samambaias e Licófitas in Flora do Brasil (2020), only 97 species of ferns and lycophytes have been recorded in Maranhão. However, based on a compilation of data published in floristic inventories about the state (mentioned above), there are 24 families and 130 species (Supplementary file 1). Among the studies cited above, most sampling was conducted in the Amazon domain (64 species) (e.g., Silva Junior et al. 2020), which includes an important federal protected area called the Gurupi Biological Reserve (Reserva Biológica do Gurupi) (Table 1). In Maranhão State, 12.5% of the Cerrado is within PAs, of which 5.7% is completely protected under the category National Park (Parque Nacional) and 6.8% is sustainably used and mainly environmental protection areas (Áreas de Proteção Ambiental) (Spinelli-Araújo et al.2016). In the Cerrado in the state, 74 species of ferns and lycophytes have been recorded (Fernandes et al. 2007, 2010, Conceição & Ruggieri 2010, Conceição & Rodrigues 2010, Conceição et al. 2015, Silva et al. 2017, Santos-Silva et al. 2019b, c, Almeida et al. 2020, Samambaias e Licófitas in Flora do Brasil 2020) (Supplementary file 1). Despite the considerable number of studies conducted, the greatest diversity recorded was 21 species for the municipality of Caxias, which includes the Inhamum Environmental Protection Area (Área de Proteção Ambiental do Inhamum) (Fernandes et al. 2007, 2010). Among the studies published, only two were conducted in completely protected PAs: an inventory of ferns and lycophytes in Mirador State Park (Parque Estadual do Mirador) (e.g., Conceição & Rodrigues 2010), which is the largest protected area in Maranhão State (437,000 ha); and an inventory of lycophytes conducted in Chapada das Mesas National Park (Parque Nacional da Chapada das Mesas) (e.g., Almeida et al. 2020).

Chapada das Mesas National Park (PNCM) is a protect area in Maranhão that is predominantly Cerrado, in an environment that transitions with the Caatinga and Amazon

biomes (ICMBio 2021). All stratifications associated with the Cerrado biome occur in this area, including humid and dry forests, cerradão, cerrado ralo, marshes and veredas. This PA is part of the Araguaia Bananal ecological corridor, which is an important ecotone between the Cerrado and Amazon biomes (MMA 2007).

Despite being created over 15 years ago and possessing diverse phytophysiognomies of the Cerrado domain, including large areas of field and savanna formations, the management plan of the park lacks data about the floristic diversity (MMA 2012, ICMBio 2021). Further, studies about the plant diversity of the area are recent (e.g., Silva et al. 2018, Oliveira et al. 2018, Fernandes et al. 2021, Silva et al. 2021) and only one is about vascular plants (e.g., Almeida et al. 2020).

Thus, the objective of this work was to conduct a floristic survey in PNCM, an extremely important region for the conservation of biodiversity in the Cerrado that is in a transition area, with the goal of providing new information about the ferns and lycophytes of the Cerrado domain and Brazil. This data will contribute to future works about ecology, conservation and environmental education in the area, as well as the management plan for the park.

Material and Methods

1. Study area

The Chapada das Mesas National Park, comprises approximately 160,000 ha of Cerrado divided into two polygons, one with around 120,000 ha and another with about 40,000 ha, which are distributed in the municipalities of Carolina, Riachão and Estreito in southeastern Maranhão State (Brasil 2006, ICMbio 2021).

The climate is predominantly seasonal tropical, type Aw (Köppen 1948), with a dry season for 3 to 5 months and a rainy season with average rainfall ranging from 1,250 to 1,500 mm, an average annual temperature between 20ºC and 27ºC and average relative air humidity of approximately 60% (Pereira et al. 2011).

Hydrologically, the area is very rich. The main watercourses are the Farinha River (norther portion) and Itapecuru River (southern portion), there are over 400 springs in the interior, and along the watercourses there are well-conserved riparian forests (ICMBio 2021).

The relief is characterized by the presence of sandstone and typical forms of paleokarst in sandstone (e.g., hilltop arches, small cavities, canyons, paleosinkholes, sinkholes

and river resurgences), which is closely related to the evolution of the subterranean drainage and river incision (Martins et al. 2017). The soil is predominantly sandy where there are Cerrado sensu stricto and campo sujo physiognomies. However, there are also places with richer soils, mainly on the tops of mountains that have patches of semideciduous forest (ICMBio 2021). In addition to the natural vegetation cover typical of the Cerrado biome that contains many phytophysiognomies, among which savanna and forest aspects are notable, there are also Caatinga and Amazonian species, which help characterize the high diversity of the area (ICMBio 2021).

These vegetation characteristics, including the presence of well-conserved riparian forests along watercourses, large patches of cerradão and other types of phytophysiognomies, are essential for maintaining the biodiversity in the region (Marques 2012).

2. Data collection

The species were collected during four expeditions, in March and October 2017, June 2018 and February 2020, which were three days each and included the dry and rainy seasons. Collecting was based on the methods proposed by Filgueiras et al. (1994). Microenvironments in the study area were selected and explored randomly, with the goal of visiting the greatest number of places where taxa might occur. The sampling points were mapped (Figure 1).

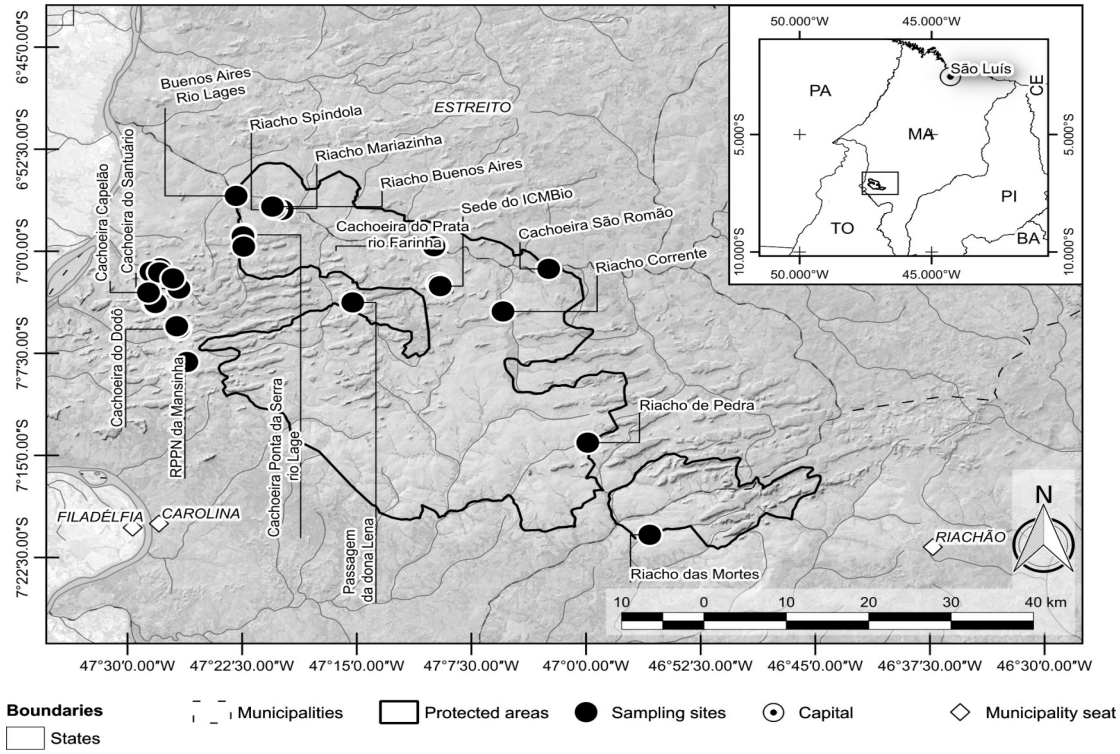

Figure 1. Localization map of the study area, showing samples sites inside and outside the Chapada das Mesas National Park (Modified from: Silva et al. 2021).

Table 1. Scientific studies of ferns and lycophytes conducted Maranhão State. Author(s), article title, species, genus and family numbers (Quant. spp./gen./fam.), new records, size of area and phytogeographic domain

Author(s)	Article title	Quant (spp.; gen.;fam.)	New records	Size of area	Phytogeographic domain
Bastos & Cutrim 1999	Pteridoflora da Reserva Florestal do Sacavém, São Luíz-Maranhão	15 ; 12 ; 9	15	-	Amazonia
Azevedo & Silva 2001	Ocorrência de Lycopodiella cernua (L.) Pichi-Sermolli (Pteridophyta: Lycopodiopsida: Lycopodiaceae) nas bordas de manguezal, São Luís – Maranhão – Brasil	1 ; 1 ; 1	-	-	Amazonia
Fernandes et al. 2007	Diversidade Florística de Pteridófitas da Área de Preservação Ambiental do Inhamum, Caxias, Maranhão, Brasil	13 ; 12 ; 9	7	4,500 ha	Cerrado
Fernandes et al. 2010	Samambaias e licófitas do município de Caxias, Maranhão, Brasil	21 ; 16 ; 11	6	531,350 ha	Cerrado
Conceição & Rodrigues 2010	Pteridófitas do Parque Estadual do Mirador, Maranhão, Brasil	7 ; 7 ; 6	-	450,838 ha	Cerrado
Conceição & Ruggieri 2010	Pteridófitas do município de Tufilândia, estado do Maranhão, Brasil	9 ; 9 ; 7	-	134,6 km²	Transition areas Cerrado and Amazonia
Conceição et al. 2015	Pteridoflora e seus aspectos ecológicos no município de Timon, Maranhão, Brasil	9 ; 7 ; 6	-	-	Cerrado
Santos-Silva 2016	Cyathea delgadii Sternb. (Cyatheaceae, Samambaia): Caracterização e ecologia populacional no domínio fitogeográfico do Cerrado	1 ; 1 ; 1	-	-	Cerrado
Silva et al. 2017	Licófitas e Samambaias no Cerrado do Leste do Maranhão, Brasil	19 ; 15 ;11	1	1.439,1 km²	Cerrado
Santos-Silva et al. 2018a	Nova ocorrência de Lycopodiaceae (Lycophyta) para o estado do Maranhão: Pseudolycopodiella carnosa (Silveira) Holub	1 ; 1 ; 1	1	-	Cerrado
Santos-Silva et al. 2018b	Association of Anuran to Cyathea delgadii Sternb. (Cyatheaceae) in Cerrado from Brazil	1 ; 1 ; 1	-	-	Cerrado

Silva-Junior et al. 2018	First record of the exotic fern Pteris tripartita Sw. (Pteridaceae) for the Maranhão state, northeastern Brazil	1 ; 1 ; 1	1	-	Amazonia
Santos-Silva et al. 2019a	Formigas associadas à Cyathea delgadii Sternb. (Cyatheaceae) em um fragmento de Cerrado maranhense, Nordeste, Brasil	1 ; 1 ; 1	-	-	Cerrado
Santos-Silva et al. 2019b	New occurrences of Schizaeaceae for the Maranhão and Brazilian Cerrado	3 ; 2 ; 1	1	-	Cerrado
Santos-Silva et al. 2019c	Structure and spatial distribution pattern of Cyathea delgadii Sternb. (Cyatheaceae) in two Cerrado areas, in the Northeast of Brazil	1 ; 1 ; 1	-	1.438,1 km ², and 2.107,403 km²	
Almeida et al. 2020	Lycophytes of the Chapada das Mesas National Park, Cerrado, Maranhão, Brazil	6 ; 3 ; 3	1	160,000 ha	Cerrado
Silva Junior et al. 2020	Ferns and lycophytes of remnants in Amazônia Maranhense, Brazil	64 ; 36 ; 18	24	81.208,4 km²	Amazonia
Barbieri et al. 2020	Distribuição, Morfologia e Anatomia de Monilófitas (Samambaias) Aquáticas de pequenas lagoas na área Itaqui-Bacanga, ilha de São Luís – Ma	3 ; 2 ; 2	-	-	Amazonia

Herbarium specimens were made based on standard techniques used for seedless vascular plants (Silva 1989). All the material was deposited in the CCAA herbarium (RBH 2019), at the Federal University of Maranhão, Campus Chapadinha. When available, duplicates were sent to the following institutions: MG, HBRA and BHCB (Thiers 2019).

The identification and distribution of the species and genera were based on specialized literature, such as PPG I (2016), IPNI (2019) the Flora do Brasil 2020 monographs, as well as revisions and regional floras (e.g., Tryon & Stolze 1994, Moran & Riba 1995, Mickel & Smith 2004). When needed, some species were sent to specialists to confirm the identification.

The terminology follows Lellinger (2002). Family and genus delimitations are based on PPG I (2016). Nomenclature and authors of the species follow the International Plant Names

Index (IPNI 2019) and Tropicos (2019). The images of species were taken with a digital camera in the field or from herbarium specimens (fertile parts). The photographic plates, preferentially of new records for Maranhão State, were made with Photoshop® CS6 v.13.0 (Adobe Systems 2012). Comments about the environment of occurrence are based on the area where the material was collected. Life forms were determined based on Lellinger (2002), Zuquim et al. (2008) and Irgang et al. (1984). For floating aquatic plants that grow exclusively in aquatic environments (e.g., lakes, ponds), without connection to the soil, we follow Pedralli et al. (1985) apud Pott et al. (1989).

The types of **phytophysiognomies** (or habitat of occurrence) of the species were based on field observations and follow the classification of Flora do Brasil (2020). The

following categories were considered: **- Open riparian forest**: forest vegetation associated with watercourses that is wide with trees spaced apart; **- Closed riparian forest**: forest vegetation associated with watercourses that is narrower with trees closer together and a canopy; **- Cerrado sensu stricto**: presence of short, inclined, tortuous trees with thin trunks and irregular, twisted branches, generally with signs of past fires, and the presence of a lot of grass in the understory; **- Anthropogenic area (pasture)**: environment where the original vegetation was destroyed in relation to the primary phytophysiognomy and transformed into pasture with babaçu palms; **- Vereda**: area of open marsh with grasses, buriti palms and a few shrubs, which is associated with nearby forest with watercourses.

The **microenvironments** preferred by the species were defined based on field observations, such as the following: **- Rocky banks**: located along the margins of watercourses inside forests, formed by rocks that are bare or only have a thin layer of humus, with a slight to vertical (90°) incline; **- Non-rocky banks**: located along the margins of watercourses inside forests, formed by various soil types (non-rocky), with a slight to vertical incline (90°); **- Waterfall areas**: locations near a waterfall and formed by vertical (90°) rock faces with constant water vapor; **- Rock walls**: blocks of continuous rock forming vertical (90°) rock extensions (taller than the banks), with bare rock or only a thin layer of humus, located along the margins of watercourses inside riparian forest or between Cerrado sensu stricto vegetation; **- Marshy areas with buriti palms**: locations with wet soil that are associated with watercourses inside forest where buriti palms predominate; **-Marshy areas with grasses**: locations with wet soil that are associated with watercourses in open areas where there are a few shrubs and grasses predominate; **- Pasture with babaçu palms; - Forest interior in flat area; - Open flooded area.**

Results

1. Ferns and lycophytes diversity

We identified 86 species of ferns and lycophytes: 69 species of ferns, distributed in 35 genera and 17 families; and 17 species of lycophytes, distributed in five genera and three families (Table 2 and Supplementary file 2).

Among the species identified, five are new records for the Northeast Region of Brazil, twenty-one are new records for Maranhão State and eleven are new records for the Cerrado of Brazil that, until now, were only recorded for Amazonia and the Atlantic Forest

(Table 2 and Supplementary file 2). The most representative families were Pteridaceae with 14 species,Selaginellaceae with 12 species, Thelypteridaceae with 11 species, and Anemiaceae, Hymenophyllaceae and Dryopteridaceae with six species each (Table 2).

Seven species were identified to the genus level, and all other species were identified to the species level. Elaphoglossum sp. was identified to the genus level since only sterile material was collected. The other six species (*Selaginella sp.1, Selaginella sp.2, Selaginella sp.3, Blechnum cf. occidentale, Blechnum sp.*, and *Adiantum sp*.) were identified to the genus level due to the confusing taxonomy or probably hybrid (pers. com., Vinicius Dittrich, Luis Armando Góes Neto and Jefferson Prado).

The rupicolous life form had the highest number of species, with 22 species (58% of the total number of species), followed by terrestrial with 15 species (22% of the total), epiphytic with three species, terrestrial climber with three species, fixed aquatic with two species, and floating aquatic with one species. Forty species had more than one life form: 32 terrestrial and rupicolous; seven epiphytic and rupicolous; and one terrestrial, epiphytic and rupicolous (Table 2).

Table 2. List of fern and lycophyte species in Chapada das Mesas National Park, Maranhão State, Brazil. New records for Maranhão, the Northeast Region and the Cerrado are in bold. Life form/growth, Habitat, Microenvironments.

CLASS, FAMILY,SPECIES	Life forms/growth	Habitat	Microenvironments
LYCOPODIOPSIDA			
ISOETACEAE			
Isoetes panamensis Maxon & C.V. Morton	Fixed aquatic	Open riparian forest	Waterfall areas
SELAGINELLACEAE			
Selaginella conduplicata Spring	Terrestrial/Rupicolous	Open riparian forest	Rocky banks/Waterfall areas
Selaginella convoluta (Arn.) Spring	Rupicolous	Open riparian forest	Rocky banks/Waterfall areas
Seleginella erythropus (Mart.) Spring	Terrestrial/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella flagellata Spring	Terrestrial	Closed riparian forest	Non-rocky banks
Selaginella marginata (Humb. & Bonpl. ex Willd.) Spring	Terrestrial/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella minima Spring	Terrestrial/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella radiata (Aubl.) Spring	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Non-rocky banks/Rock walls/Waterfall areas
Selaginella simplex Baker	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Non-rocky banks/Waterfall areass
Selaginella sulcata (Desv. ex Poir.) Spring ex Mart.	Rupicolous	Open riparian forest/Closed riparian forest	Rocky banks
Selaginella sp.1	Epiphytic	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella sp.2	Epiphytic	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella sp.3	Epiphytic/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
LYCOPODIACEAE			
Lycopodiella longipes (Grev. & Hook.) Holub	Terrestrial	Vereda	Marshy areas with grasses
Palhinhaea camporum (B. Øllg. & Windisch) Holub	Terrestrial	Vereda	Marshy areas with grasses
Palhinhaea cernua (L.) Franco & Vasc.	Terrestrial	Vereda	Marshy areas with grasses
Pseudolycopodiella meridionalis (Underw. & Loyd) Holub	Terrestrial	Vereda	Marshy areas with grasses
ANEMIACEAE			
Anemia buniifolia (Gardner) T.Moore	Rupicolous	Open riparian forest	Rocky banks; Waterfall areas
Anemia elegans (Gardner) C.Presl	Rupicolous	Cerrado sensu stricto	Rock walls
Anemia ferruginea Humb. & Bonpl. ex Kunth	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks
Anemia hirsuta (L.) Sw.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks

CLASS, FAMILY,SPECIES	Life forms/growth	Habitat	Microenvironments
Anemia oblongifolia (Cav.) Sw.	Terrestrial/Rupicolous	Closed riparian forest/Open riparian forest/ Cerrado sensu stricto	Rocky banks/Non-rocky banks/Rock walls
Anemia trichorhiza Gardner	Rupicolous	Cerrado sensu stricto	Rock walls
BLECHNACEAE			
Blechnum cf. *occidentale*	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Blechnum sp.	Rupicolous	Closed riparian forest/Cerrado sensu stricto	Rock walls
Salpichlaena hookeriana (Kuntze) Alston	Terrestrial climber	Closed riparian forest	Rocky banks/Waterfall areas
Telmatoblechnum serrulatum (Rich.) Perrie, D.J. Ohlsen & Brownsey	Closed riparian forest	Rocky banks/Waterfall areas	
CYATHEACEAE			
Cyathea delgadii Sternb.	Terrestrial	Closed riparian forest	Marshy areas with buriti palms
Cyathea microdonta (Desv.) Domin	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
DENNSTAEDTIACEAE			
Pteridium esculentum (G.Forst.) Cockayne subsp. *gryphus* Schwartsb. var. *harpianum* Schwartsb. & a.Yanez	Terrestrial	Closed riparian forest	Rock walls/Waterfall areas
DRYOPTERIDACEAE			
Bolbitis serratifolia Schott	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Cyclodium meniscioides (Willd.) C. Presl	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Dryopteris patula (Sw.) Underw	Terrestrial/Rupicolous	Closed riparian forest	Marshy areas with buriti palms/Waterfall areas
Elaphoglossum scalpellum (Mart.) T. Moore	Rupicolous	Closed riparian forest	Rock walls
Elaphoglossum sp.	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Polybotrya sorbifolia Mett. ex Kuhn	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
GLEICHENIACEAE			
Dicranopteris flexuosa (Schrad.) Underw.	Rupicolous	Closed riparian forest	Waterfall areas
HYMENOPHYLLACEAE			
Didymoglossum angustifrons Fée	Terrestrial/Rupicolous	Closed riparian forest/ Cerrado sensu stricto/Vereda with grasses	Margin of riparian forest/Waterfall areas
Didymoglossum pinnatinervium (Jenman) Pic.Serm.	Epiphytic/Rupicolous	Closed riparian forest	Rocky banks/ Waterfall areas
Trichomanes arbuscula Desv.	Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Trichomanes cristatum Kaulf.	Rupicolous	Closed riparian forest	Rocky banks
Trichomanes hostmannianum (Klotzsch) Kunze	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Trichomanes pinnatum Hedw.	Rupicolous	Closed riparian forest	Rocky banks

CLASS, FAMILY,SPECIES	Life forms/growth	Habitat	Microenvironments
LINDSAEACEAE			
Lindsaea divaricata Klotzsch	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Rocky banks/Waterfall areas
Lindsaea guianensis subps. ssp. *lanceastrum* K.U.Kramer	Terrestrial/Rupicolous/Epiphytic	Closed riparian forest	Marshy areas with buriti palms/Waterfall areas/ Rock walls
Lindsaea lancea (L.) Bedd.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks
Lindsaea pallida Klotzsch	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks
LYGODIACEAE			
Lygodium venustum Sw.	Terrestrial	Closed riparian forest	Non-rocky banks
Lygodium volubile Sw.	Terrestrial climber	Open riparian forest	Rocky banks/Non-rocky banks
METAXYACEAE			
Metaxya parkeri (Hook. & Grev.) J. Sm.	Terrestrial climber	Open riparian forest	Rocky banks/Non-rocky banks
NEPHROLEPIDACEAE	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Marshy areas with buriti palms/Waterfall areas/ Rocky banks/Non-rocky banks
Nephrolepis biserrata (Sw.) Schott			
Nephrolepis pectinata (Willd.) Schott	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Marshy areas with buriti palms
POLYPODIACEAE			
Microgramma persicariifolia (Schrad.) C.Presl	Epiphytic	Anthropogenic area	Pasture with babaçu palms
Phlebodium aureum (L.) J. Sm.	Epiphytic/Rupicolous	Closed riparian forest	Shaded riparian forest/ Rock walls/Waterfall areas
Pleopeltis burchellii (Baker) Hickey & Sprunt ex A.R. Sm.	Epiphytic/Rupicolous	Anthropogenic area/Open riparian forest	Pasture with babaçu palms; Rocky banks
Serpocaulon triseriale (Sw.) A.R.Sm.	Epiphytic/Rupicolous	Closed riparian forest	Rock walls
PTERIDACEAE			
Adiantum deflectens Mart.	Terrestrial/Rupicolous	Open riparian forest	Rocky banks/Non-rocky banks
Adiantum intermedium Sw.	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Rocky banks/Non-rocky banks/Waterfall areas
Adiantum latifolium Lam.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks/Waterfall areas
Adiantum petiolatum Desv.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks
Adiantum pulverulentum L.	Rupicolous	Closed riparian forest	Rocky banks
Adiantum serratodentatum Willd.	Rupicolous	Closed riparian forest	Rocky banks
Adiantum sinuosum Gardner	Terrestrial	Open riparian forest	Non-rocky banks
Adiantum terminatum Kunze ex Miq.	Rupicolous	Cerrado sensu stricto	Rock walls
Adiantum tetraphyllum Willd.	Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Adiantum sp. (hibrido)	Terrestrial	Open riparian forest	Forest interior in flat area
Ceratopteris thalictroides (L.) Brongn.	Terrestrial	Open riparian forest	Forest interior in flat area
Cheilanthes pohliana Mett.	Fixed aquatic	Open riparian forest	Open flooded area
Pityrogramma calomelanos (L.) Link	Rupicolous	Cerrado sensu stricto	Rock walls

CLASS, FAMILY,SPECIES	Life forms/growth	Habitat	Microenvironments
Vittaria lineata (L.)	Terrestrial/Rupicolous	Closed riparian forest	Marshy areas with buriti palms/Rock walls/Non-rocky banks
SALVINIACEAE			
Azolla microphylla Kaulf.	Epiphytic/Rupicolous	Open riparian forest/Closed riparian forest	Rock walls
SCHIZAEACEAE	Floating aquatic	Open riparian forest	Open flooded area
Actinostachys pennula (Sw.) Hook.			
Schizaea elegans (Vahl) Sw.	Terrestrial	Cerrado sensu stricto	Forest interior in flat area
Schizaea incurvata Schkuhr	Terrestrial/Rupicolous	Closed riparian forest/Cerrado sensu stricto	Non-rocky banks/Forest interior in flat area
TECTARIACEAE			
Tectaria incisa Cav.	Terrestrial	Cerrado sensu stricto	Forest interior in flat area
THELYPTERIDACEAE	Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Christella conspersa (Schrad.) Á.Löve & D.Löve			
Christella hispidula (Decne.) Holttum	Terrestrial/Rupicolous	Closed riparian forest	Marshy areas with buriti palms/Rock walls/Non-rocky banks
Goniopteris biformata (Rosenst) Salino & T.E. Almeida	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Non-rocky banks
Macrothelypteris torresiana (Gaudich.) Ching	Terrestrial/Rupicolous	Open riparian forest	Rock walls/Waterfall areas
Meniscium angustifolium Willd	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Meniscium arborescens Humbl & Bonpl. ex Willd.	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Meniscium chrysodioides Fée.	Terrestrial	Open riparian forest/Closed riparian forest	Marshy areas with buriti palms; paredão rochoso; barranco não rochoso
Meniscium delicatum R.S. Fernandes & Salino	Terrestrial	Open riparian forest/Closed riparian forest	Marshy areas with buriti palms/Rock walls/Non-rocky banks/Waterfall areas
Meniscium hostmannii (Klotzsch) R.S. Fernandes & Salino	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Meniscium maxonianum (A.R. Sm.) R.S. Fernandes & Salino	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Non-rocky banks
Meniscium serratum Cav.	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Non-rocky banks

2. New records: Northeast Region, Maranhão and the Cerrado domain

Selaginella convoluta (Arn.) Spring. (Figure 2A)

Rupicolous on a rocky bank in a waterfall area. **Habitat**: open riparian forest. **Geographic distribution**: AL, BA, CE, MA, PB, PE, PI, RN, SE, GO, MS, MT, ES, MG, RJ, SP, PR (Caatinga, Cerrado and Atlantic Forest). **New record**: Maranhão.

Selaginella minima Spring. (Figure 2C)

Terrestrial on a non-rocky bank and rupicolous plant collected on a rocky bank in a waterfall area, near the margin of a trail. **Habitat:** closed riparian forest. **Geographic distribution**: AM, AP, PA, RO, MA, PI, GO, MT (Amazonia and Cerrado). New record: Maranhão.

Selaginella sulcata (Desv. ex Poir.) Spring ex Mart. (Figure 2F)

Rupicolous on a rocky bank on the top of a hill, near a watercourse. **Habitat:** open riparian forest, closed riparian forest. **Geographic distribution**: AC, AM, PA, BA, CE, MA, PB, PE, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão and Cerrado.

Lycopodiella longipes (Grev. & Hook.) Holub. (Figure 3A)

Terrestrial in an open marshy area with grasses. **Habitat**: vereda. **Geographic distribution:** AC, AM, RR, BA, MA, DF, GO, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado, Atlantic Forest and Pampa). **New record**: Maranhão and Cerrado.

Palhinhaea camporum (B. Øllg. & Windisch) Holub. (Figure 3B)

Terrestrial in an open marshy area with grasses. **Habitat**: vereda. **Geographic distribution:** AC, AM, AP, PA, RO, RR, TO, BA, MA, PE, PI, DF, GO, MS, MT, MG, SP, PR, SC (Amazonia, Cerrado and Atlantic Forest). **New record:** Maranhão.

Anemia buniifolia (Gardner) T.Moore.(Figure 4A)

Rupicolous near the margin of a trail on a rocky bank in a waterfall area. **Habitat:** open riparian forest. **Geographic distribution**: AM, PA, TO, BA, MA, DF, GO, MT, MG (Amazonia and Cerrado). **New record**: Maranhão.

Anemia elegans (Gardner) C.Presl. (Figure 4B)

Rupicolous on a rock wall and in rock cracks on the margin of a trail. **Habitat**: Cerrado sensu stricto. **Geographic distribution:** TO, BA, MA, DF, GO, MT, MG (Cerrado). **New record:** Maranhão.

Anemia trichorhiza Gardner llustration. Mickel (2016: 126, fig. 13A–C).

Rupicolous on a rock wall on the margin of a trail. **Habitat:** Cerrado sensu stricto.

Geographic distribution: MA, DF, GO, MS, MT, MG, SP, PR (Cerrado and Pantanal). **New record**: Northeast Region.

Salpichlaena hookeriana (Kuntze) Alston (Figure 4G)

Terrestrial climber growing on a rocky bank near a waterfall area. **Habitat**: closed riparian forest. Geographic distribution: AC, AM, PA, MA, RO, MS, MT (Amazonia and Cerrado). **New record**: Northeast Region and Cerrado.

Bolbitis serratifolia Schott. (Figure 5A)

Rupicolous on a rock wall near a waterfall area. **Habitat**: closed riparian forest. **Geographic distribution:** AC, AM, PA, RO, CE, MA, GO, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão and Cerrado.

Cyclodium meniscioides (Willd.) C. Presl (Figure 5B)

Terrestrial in a marshy area with buriti palms and rupicolous plant in a waterfall area. **Habitat**: closed riparian forest. **Geographic distribution**: AC, AM, AP, PA, RO, TO, BA, CE, MA, PB, PE, PI,RN, DF, GO, MS, MT, ES, MG, SP (Cerrado and Atlantic Forest). **New record**: Maranhão.

Dryopteris patula (Sw.) Underw. (Figure 5C)

Rupicolous on a rock wall on the margin of a watercourse. Habitat: closed riparian forest. Geographic distribution: AC, AM, AP, PA, RO, BA, MA, PI, GO, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão.

Elaphoglossum scalpellum (Mart.) T. Moore.(Figure 5D)

Rupicolous on a rock wall and near a waterfall area. Habitat: closed riparian forest. Geographic distribution: AM, RO, TO, BA, MA, PI, DF, GO, MT, MG, SP (Cerrado). New record: Maranhão.

Polybotrya sorbifolia Mett. ex Kuhn. (Figure 5E)

Rupicolous on a rock wall. **Habitat**: closed riparian forest. **Geographic distribution**: PA, RO, AL, MA, PE, GO, MT, MG, SP (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão.

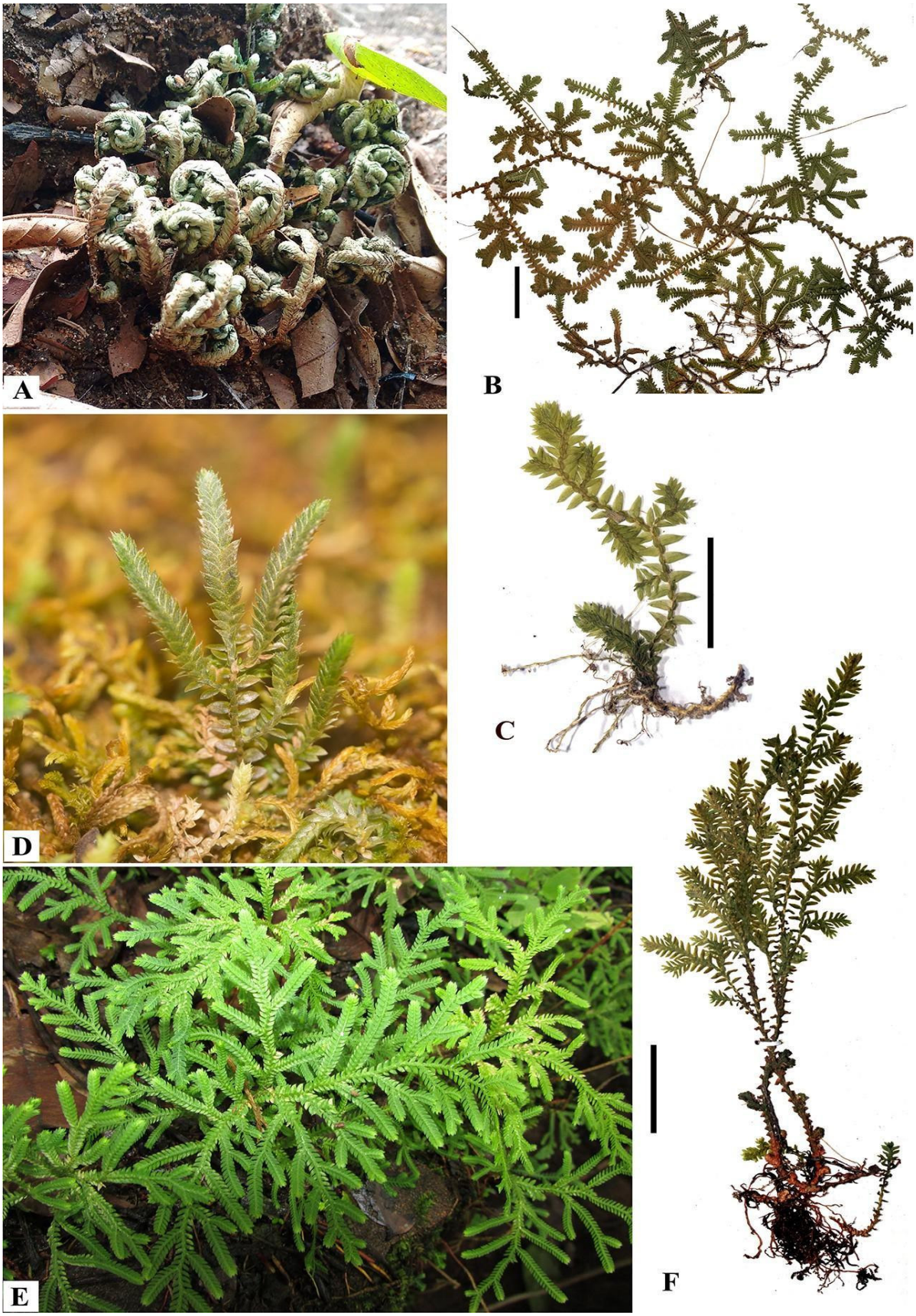

Figure 2. Habit. A. *Selaginella convoluta* (Arn.) Spring. B. *Selaginella marginata* (Humb. & Bonpl. ex Willd.) Spring. C. *Selaginella minima* Spring. D. *Selaginella simplex* Baker. Habit. E. *Seleginella erythropus* (Mart.) Spring. F. *Selaginella sulcata* (Desv. ex Poir.) Spring ex Mart. Scale bar: B; F = 2cm; C=1cm.

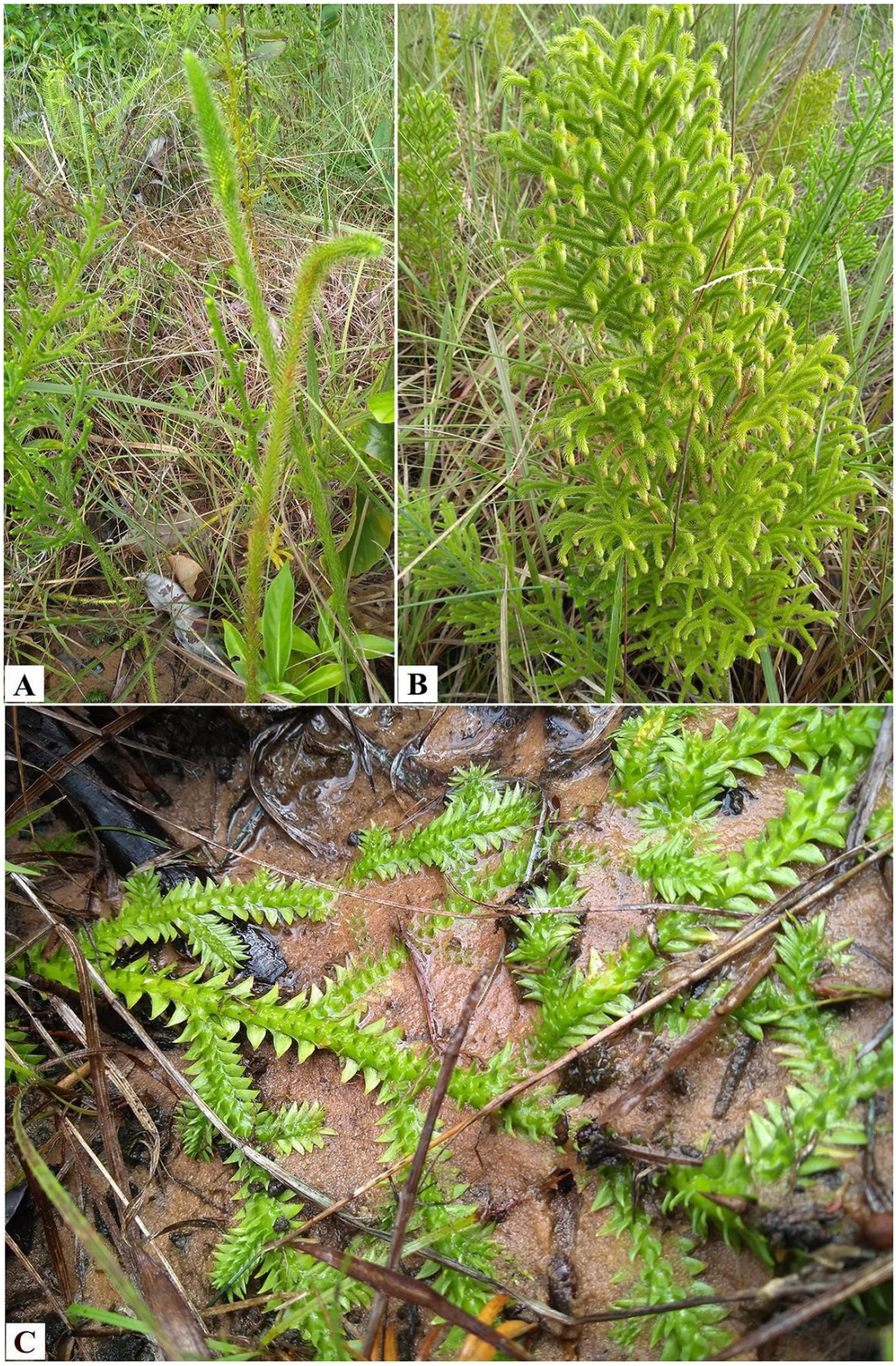

Figure 3. Habit. A. *Lycopodiella longipes* (Grev. & Hook.) Holub. B. *Palhinhaea camporum* (B. Øllg. & Windisch) Holub. C. *Pseudolycopodiella meridionalis* (Underw. & Loyd) Holub.

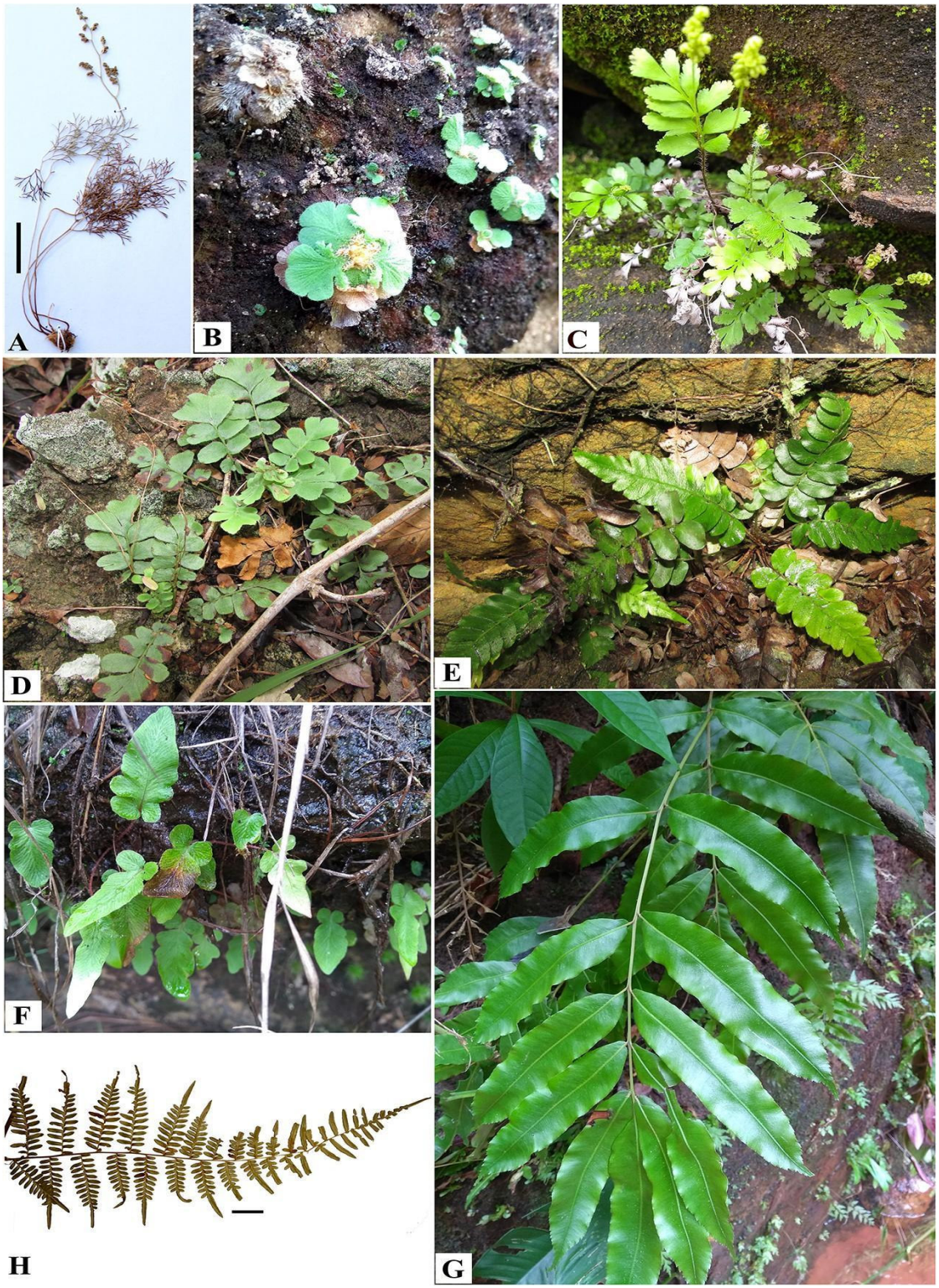

Figure 4. A. *Anemia buniifolia* (Gardner) T.Moore. Habit. B. *Anemia elegans* (Gardner) C.Presl. Habit. C. *Anemia hirsuta* (L.) Sw. Habit. D. *Anemia oblongifolia* (Cav.) Sw. Habit. E. *Blechnum* cf. *occidentale*. Habit. F. *Blechnum sp.* Habit. G. *Salpichlaena hookeriana* (Kuntze) Alston. Habit. H. *Pteridium esculentum* (G.Forst.) Cockayne subsp. *gryphus* Schwartsb. var. *harpianum* Schwartsb. & A.Yanez. Sterile Pinnae. Scale bar: A; H =2cm.

Figure 5. A. *Bolbitis serratifolia* Schott. Habit. B. *Cyclodium meniscioides* (Willd.) C. Presl. Habit. C. *Dryopteris patula* (Sw.) Underw. Habit. D. *Elaphoglossum scalpellum* (Mart.) T. Moore. Sterile fronds. E. *Polybotrya sorbifolia* Mett. ex Kuhn. F-G. *Didymoglossum angustifrons* Fée. F. Habit. G. Fertile frond. H. *Didymoglossum pinnatinervium* (Jenman) Pic.Serm. Fertile frond I. *Trichomanes arbuscula* Desv. Habit. Scale bar: D = 2cm.

Didymoglossum angustifrons Fée (Figure 5F-G)

Epiphytic from the base of a trunk of a live tree and rupicolous plant on a rocky bank in a waterfall area. **Habitat**: closed riparian forest. **Geographic distribution**: AM, AP, PA, RO, BA, MA, CE, MT, MG, RJ, SP, PR (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão.

Didymoglossum pinnatinervium (Jenman) Pic.Serm. (Figure 5H)

Rupicolous on a rocky bank in a waterfall area. **Habitat**: closed riparian forest. **Geographic distribution**: MA (Cerrado). **New record**: Northeast Region and Cerrado.

Trichomanes arbuscula Desv. (Figure 5I)

Rupicolous on a rocky bank. **Habitat**: closed riparian forest**. Geographic distribution**: AC, AM, AP, PA, BA, MA, PE, MT, ES (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão and Cerrado.

Lindsaea pallida Klotzsch (Figure 6B)

Terrestrial on a sandy bank near the margin of a river. **Habitat**: closed riparian forest. **Geographic distribution**: AC, AM, AP, PA, BA, MA, PE, MT (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão.

Metaxya parkeri (Hook. & Grev.) J. Sm. (Figure 6D)

Terrestrial on a sandy bank with litter and rupicolous plant on rock walls near watercourses, such as creek banks and waterfalls. Habitat: closed riparian forest. Geographic distribution: AC, AM, AP, PA, BA, MA, PE, MT (Amazonia, Cerrado and Atlantic Forest). New record: Cerrado.

Nephrolepis pectinata (Willd.) Schott. Illustration. Maciel (2016: 80, fig. 1h-k).

Epiphytic in the upper part of a babaçu palm in an area of pasture. **Habitat**: anthropogenic area. Geographic distribution: AC, AM, AP, PA, BA, MA, PE, MT Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Serpocaulon triseriale (Sw.) A.R.Sm. (Figure 6C).

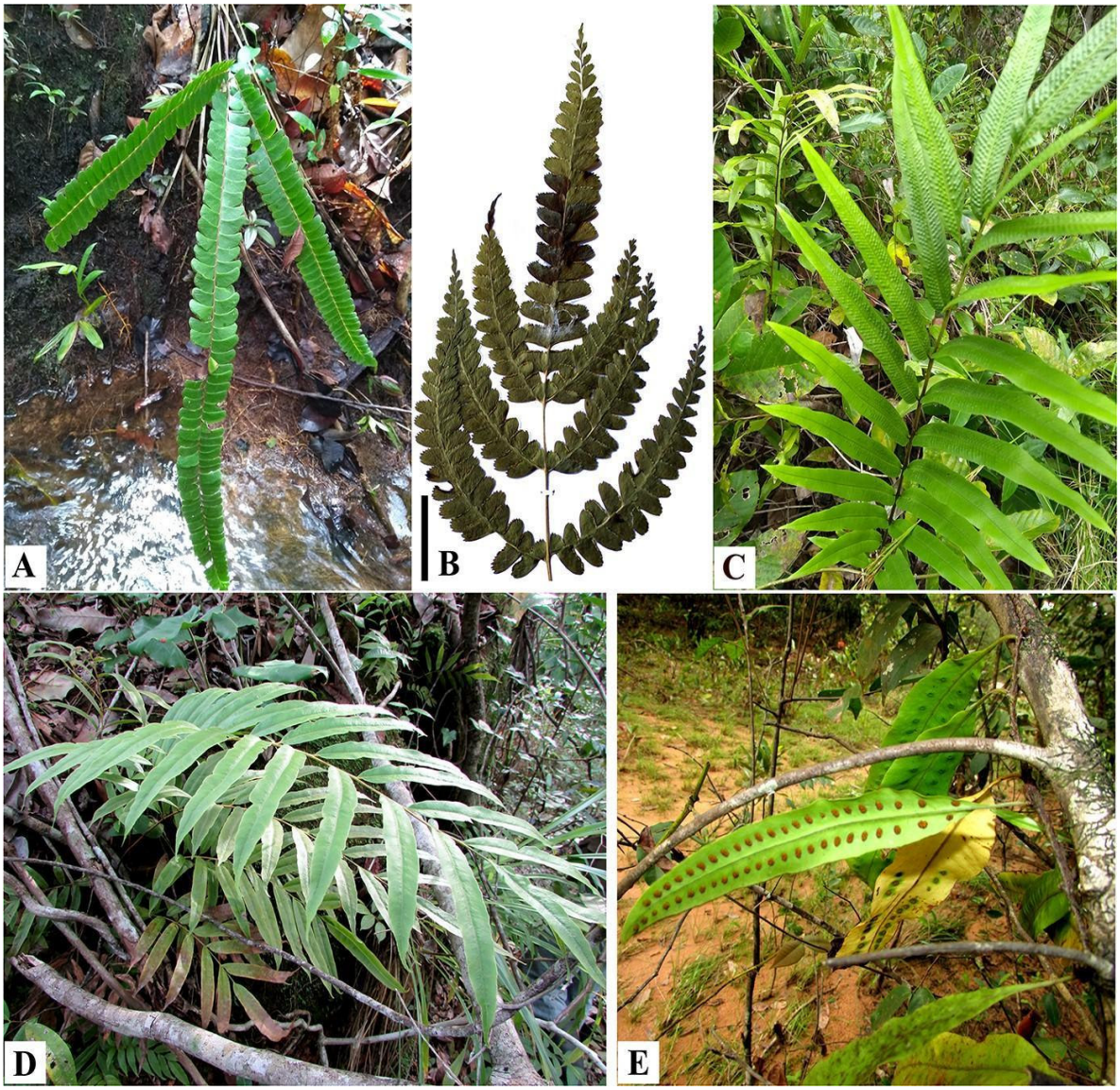

Figure 6. A. *Lindsaea guianensis* subsp. *lanceastrum* K.U.Kramer. Habit. B. *Lindsaea pallida* Klotzsch. Fertile frond. C. *Serpocaulon triseriale* (Sw.) A.R.Sm. Habit. D. *Metaxya parkeri* (Hook. & Grev.) J. Sm.. Habit. E. *Microgramma persicariifolia* (Schrad.) C.Presl. Habit. Scale bar: B = 2cm.

Terrestrial on a non-rocky bank near an area with buriti palms and rupicolous plant collected on a rocky bank. **Habitat:** open riparian forest. **Geographic distribution**: AC, AM, PA, TO, AL, BA, CE, MA, PE, DF, GO, MS, MT, ES, MG, RJ, SP, PR, RS, SC. (Amazonia, Caatinga, Cerrado, Atlantic Forest, Pampa and Pantanal). **New record**: Maranhão.

Adiantum intermedium Sw. (Figure 7A)

Rupicolous on a rocky bank and terrestrial plant collected on a non-rocky bank in a waterfall area. **Habitat**: closed riparian forest. **Geographic distribution**: MA, DF, GO, MS, MT, MG, RJ, SP, PR, SC (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão.

Adiantum tetraphyllum Humb. Bonpl. ex Willd.. Illustration. Prado et al. (2017: 45, fig. 46E, F).

Terrestrial in capoeira in terra firme forest near a watercourse. **Habitat**: closed riparian forest. **Geographic distribution**: AC, AM, AP, PA, RO, RR, TO, BA, CE, MA, PE, DF, GO, MS, MT, ES, MG, RJ, SP, PR, SC (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão.

Azolla microphylla Kaulf. (Figure 7G)

Floating aquatic in open flooded area above a waterfall. **Habitat:** open riparian forest. **Geographic distribution:** AM, BA, CE, MA, PE, SE, MG, PR, SC. (Amazonia, Caatinga, Cerrado and Atlantic Forest). **New record**: Cerrado.

Schizaea incurvata Schkuhr.

Terrestrial on a non-rocky bank inside a forest in a flat area with litter. **Habitat:** Cerrado sensu stricto. **Geographic distribution**: AM, AP, PA, RO, MA (Amazonia and Cerrado). New record: Northeast Region and Cerrado.

Tectaria incisa Cav. (Figure 8A)

Rupicolous on a rocky bank in a waterfall area. Habitat: closed riparian forest. Geographic distribution: AC, AM, AP, PA, RO, RR, AL, BA, CE, MA, PE, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). New record: Cerrado.

Goniopteris biformata (Rosenst) Salino & T.E. Almeida (Figure 8D)

Terrestrial on the margin of a waterfall and rupicolous plant collected on a rock wall. ***Habitat***: open riparian forest. ***Geographic distribution***: AC, PA, GO, MS, MT, MG, SP (Amazonia, Cerrado and Atlantic Forest). ***New record***: Cerrado.

Macrothelypteris torresiana (Gaudich.) Ching. Illustration. Smith (1992: 4, fig. 1a-d).

Rupicolous on a rock wall near a waterfall. Habitat: closed riparian forest. Geographic distribution: RO, AL, BA, CE, MA, PB, PE, RN, DF, GO, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Cerrado, Atlantic Forest and Pampa). New record: Maranhão.

Meniscium chrysodioides Fée. (Figure 8E)

Terrestrial on a non-rocky bank, in a marshy area with buriti palms, and rupicolous plant collected on a rock wall in a waterfall area. **Habitat**: open riparian forest; closed riparian forest. **Geographic distribution**: AC, PA, AL, MA, PE, GO, MS, MG, SP (Amazonia, Cerrado and Atlantic Forest). **New record**: Maranhão.

Figure 7. Habit. A. *Adiantum intermedium* Sw. B. *Adiantum latifolium* Lam. C. *Adiantum serratodentatum* Willd. D. *Adiantum terminatum* Kunze ex Miq. E. *Cheilanthes pohliana* Mett. F. *Vittaria lineata* (L.) Sm. G. *Azolla microphylla* Kaulf.

Discussion

Based on the present study, PNCM is the area (protected or not) with the greatest diversity of ferns and lycophytes (86 species) in Maranhão State. Mirador State Park is another protected area of Cerrado in the state. Despite its large size (450,838 hectares), only seven species of lycophytes and ferns have been recorded in the area (Conceição & Rodrigues 2010). However, this low diversity could be related to insufficient sampling, since it is a preserved area of Cerrado that probably has a diversity similar to PNCM. The Cerrado in Maranhão is strongly influenced by other domains (e.g., Amazonia and Caatinga) that, in general, favors a higher diversity of plant species (e.g., Ribeiro et al. 2020, Silva et al. 2021, Fernandes et al. 2021).

The species collected in the present study represent around 27.30% of the species recorded for the Brazilian Cerrado and increase the known diversity in this domain by 11 species that, until now, were only recorded for Amazonia and the Atlantic Forest (Flora do Brasil 2020). Additionally, this inventory resulted in 26 new records for Maranhão and five new records for the Northeast Region of Brazil. This shows the importance of this protected area for the conservation of the species of the groups studied. The number of new records in this study is probably a reflection of low sampling and local inventories (e.g., Fernandes et al. 2007, Conceição & Ruggieri 2010, Conceição & Rodrigues 2010, Fernandes et al. 2010, Conceição et al. 2015, Silva et al. 2017, Silva Júnior et al. 2018) that underestimated the diversity of lycophytes and ferns in the state.

The fern family with the most species is Pteridaceae (14 species). This can be explained by the wide distribution of the family in tropical regions and arid regions (Smith et al. 2006), and due to in Brazil the family is most diverse in Southeast (141 spp) and Northeast (104 spp) regions (Prado et al. 2020). Other studies in Cerrado (e.g., Fernandes et al. 2007, 2010, Silva et al. 2017) and Amazonia (e.g., Silva Junior et al. 2020) in Maranhão State also recorded more diversity for this family. In PNCM, 10 of the 14 Pteridaceae species recorded prefer a rocky substrate (Table 1). *Adiantum* L. (Pteridaceae) had the highest number of recorded species (10 species), of which two are new records for Maranhão (*Adiantum intermedium* Sw. and *A. tetraphyllum* Humb. & Bonpl. ex Willd.) and one (*A. petiolatum* Desv.) is a new record for the Brazilian Cerrado (Prado et al. 2020, Silva Junior et al. 2020).

The second most representative fern family is Thelypteridaceae with 11 species, of which three are reported for the first time for Maranhão State (*Goniopteris biformata* (Rosenst) Salino & T.E. Almeida, *Macrothelypteris torresiana* (Gaudich.) Ching, and

Meniscium chrysodioides Fée); *Goniopteris biformata* is also a new record for the Northeast Region of Brazil (Fernandes & Salino 2020, Salino et al. 2020.

The diversity of lycophytes (17 species) in PNCM is high compared to other areas sampled in the state (e.g., Fernandes et al. 2007, 2010, Conceição & Rodrigues 2010). In Amazonia in Maranhão, for example, only two species of lycophytes have been recorded (Silva Junior et al. 2020), which is nine times less than that in PNCM. The lycophyte family with the most species is Selaginellaceae (12 species), of which three are reported for the first time for Maranhão State (*Selaginella convoluta* (Arn.) Spring, *Selaginella minima* Spring, and *Selaginella sulcata* (Desv. ex Poir.) Spring ex Mart.); the last one is also a new record for the Northeast Region of Brazil (Góes-Neto et al. 2020). Compared to Amazonia in Maranhão (Silva Junior et al. 2020), the high diversity of Selaginellaceae recorded in our study is due to the predominance of rupicolous habitats associated with waterfalls in PNCM (nine rupiculous species, Table 2).

The predominance of rupicolous species (22 species) in the present study was expected and is probably due to the wide availability of rock substrates in PNCM, such as rock walls of waterfalls and surroundings, and extensive rocky fragments inside riparian forest. Since there is a lot of rock substrate, species that are normally epiphytic (e.g., *Didymoglossum angustifrons* Fée) or terrestrial (e.g., *Trichomanes hostmannianum*) (Costa & Pietrobom 2007) in the study area develop on rocks. The second most recorded habit was terrestrial (15 species). A high number of terrestrial species is common in most studies about ferns in Maranhão State, for example, Bastos & Cutrim (1999), Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Ruggieri (2010), Conceição & Rodrigues (2010), Conceição et al. (2015), Silva et al. (2017), and Silva Junior et al. (2020).

In relation to environment type, most fern and lycophyte species generally occur in microhabitats in riparian forest, such as rocky banks, non-rocky banks, rock walls, waterfall areas and marshy areas (Table 2 and Supplementary file 1). Some species of Schizaeaceae (e.g., *Actinostachys pennula* (Sw.) Hook., *Schizaea incurvata* Schkuhr) and Anemiaceae (e.g., *Anemia elegans* (Gardner) C.Presl, *A. trichorhiza* Gardner) were collected in Cerrado sensu stricto (Table 1) in distinct microhabitats (inside forest in flat area and rock wall, respectively) (Table 2).

Figure 8. A. *Tectaria incisa* Cav. Habit. B-C. *Christella conspersa* (Schrad.) Á.Löve & D.Löve. B.| Habit. C. Detail of fertile pinnae showing a sori. D. *Goniopteris biformata* (Rosenst) Salino & T.E. Almeida. Habit. E. *Meniscium chrysodioides* Fée. Habit. F-G. *Meniscium delicatum* R.S. Fernandes & Salino. F. Habit. G. Detail of fertile pinnae showing a sori and anastomosing veins. H-I. *Meniscium hostmannii* (Klotzsch) R.S. Fernandes & Salino. H. Habit. I. Detail of fertile pinnae showing a sori.

Conclusion

The present work shows that the fern and lycophyte diversity in the Cerrado in Maranhão is underestimated. This is mainly due to low sampling in previous studies, or a low number of sampling points (locations), and because the collections in Maranhão herbaria do not properly represent these groups. Based on this study, we encourage others to conduct similar studies that collect a lot of material and deposit specimens in herbaria that are open to the public. Overall, this will contribute to a more accurate estimate of the diversity of ferns and lycophytes in the Cerrado in Maranhão.

Supplementary Material

The following online material is available for this article:

Supplementary file 1 - List of ferns and lycophytes species recorded to the Maranhão State according to Scientific studies.

Supplementary file 2 - List of material examined.

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Associate Editor

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Author Contributions

Rozijane Santos Fernandes: identified the plants, elaboration of the species list for Maranhão State, prepared the figure boards, writing and proofreading the text.

Laryssa Reis Silva: collected and photographed the plants, identified. the plants, writing the text.

Sirlane Santos Oliveira: collected and photographed the plants, identified the plants, elaboration of the species list for Maranhão State, writing the text.

Felipe Polivanov Ottoni: collected and photographed the plants, writing and proofreading the text.

Marcio Roberto Pietrobom: collected and photographed the plants, identified the plants, writing and proofreading the text.

Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

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CAPÍTULO III

1. CONCLUSÃO GERAL

O Cerrado, segundo maior Domínio Fitogeográfico do Brasil, sofre cada vez mais com a degradação ambiental e as atividades antrópicas. Entretanto, abriga uma enorme biodiversidade ainda pouco conhecida. Neste estudo pudemos observar que o Parque Nacional Chapada das Mesas (PNCM), que se encontra dentro deste domínio tão importante, possui uma flora riquíssima de samambaias e licófitas. Assim, reafirmando a necessidade de proteger e conservar esse Domínio Fitogeográfico e o ecossistema ali presente. Para isso, o estudo florístico e taxonômico é uma ferramenta imprescindível para ampliar o conhecimento científico desse grupo de plantas, não apenas no Cerrado e no PNCM, mas em todo o país.

Este estudo permitiu conhecer a diversidade de samambaias e licófitas do Parque Nacional Chapada das Mesas (PNCM), incluindo distribuição geográfica e aspectos ecológicos, tais como: forma de vida e habitat, sendo essa unidade uma área de grande interesse florístico. A riqueza de espécies observada, além dos hábitos de vida, demonstra também a importância das samambaias e licófitas como bioindicadoras ambientais, principalmente em áreas de extrema prioridade de conservação, tais como: Parques Nacionais, Parques Estaduais, Reservas Biológicas, áreas de transição, dentre outros. Além disso, destaca a importância de se conhecer a flora do Maranhão, do Cerrado e do Parque, para que sejam traçadas estratégias apropriadas de conservação das espécies.

Com a amostragem realizada na área de estudo foi possível implementar ao acervo do herbário CCAA uma coleção de referência para o Parque Nacional Chapada das Mesas e arredores, uma importante área do Cerrado Norte brasileiro, que servirá para futuros estudos sobre a biodiversidades, além de estimar a diversidade presente nessa importante área.

Embora os estudos sobre a taxonomia, ecologia e distribuição das samambaias e licófitas no Brasil e no Maranhão tenham aumentado significativamente nos últimos anos, a publicação de levantamentos florísticos contribuem para que novas normas, decretos e decisões venham a ser tomadas a fim de proteger e preservar espécies endêmicas e ameaçadas de extinção. Entretanto, são necessários mais investimento em coletas e um maior esforço amostral em áreas nunca estudadas ou áreas sub amostradas.

Por fim, os resultados do presente estudo propiciaram a publicação de um artigo científico na revista Biota Neotropica, intitulado “Ferns and lycophytes in Chapada das Mesas National Park and surroundings, Maranhão state, Brazil”, que faz parte do Capítulo II desta

Dissertação. Além disso, contribuiu para o conhecimento da atual situação das espécies das samambaias e licófitas no PNCM e no estado do Maranhão, como meio de chamar a atenção da sociedade em geral, dos órgãos fiscalizadores e demais pesquisadores para a elaboração de novos estudos no estado.

ANEXOS

Anexo 1: Instruções aos autores

Fonte: Site do periódico (https://www.biotaneotropica.org.br/BN/about/submissions)

Author Guidelines

Manuscripts for publication in **BIOTA NEOTROPICA** are to be submitted **EXCLUSIVELY** through the website http://mc04.manuscriptcentral.com/bn-scielo and must be prepared in accordance with the instructions below. After successful submission you will receive a confirmation email along with an ID number for your paper.

All subsequent correspondence should be sent to the Managing Editor at ea@biotaneotropica.org.br .

Currently the publication fee charged is R$ 1200.00 (One Thousand and Two Hundred Reais) for Brazilian authors or US$ 450 (Four Hundred and Fifty Dollars) for foreign authors, irrespective of the number of pages published. Payment details will be sent to authors in the final editorial stage of articles accepted for publication.

BIOTA NEOTROPICA does not publish papers that include descriptions of new species of taxonomic groups whose Nomenclatural Code requires printed copies. Authors are responsible to check if the specific requirements of the Nomenclatural Code of the organism they are working with. If your taxonomic group does require printed copies of your publication, you should look for another journal to submit your paper.

BIOTA NEOTROPICA publishes eight types of manuscript: editorial, points of view, articles, thematic reviews, short communications, identification keys, inventories and taxonomic reviews. Only the Editorial is written by the Editorial Board or by an invited researcher and is therefore subject to different submission rules.

The submitting author and co-authors must provide a confirmed ORCID ID (Open Researcher and Contributor ID, http://orcid.org) at the time of submission by entering it in the user profile in the submission system

Manuscripts submitted under any category should be written entirely in **English**. The authors are responsible for presenting the article in good scientific English, and it is strongly recommended that the manuscript undergo a final revision by a specialized proofreading company such as American Journal Experts/AJE, Nature Publishing Group Language Editing, Edanz and/or other SciELO-approved services. Should the Editorial Board consider the level of English to be below journal standards, the paper may be refused even after approval by the Area Editor. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

1 – Manuscript Category

To follow is a brief description of how the Editorial Board defines each manuscript category

Editorial

For each issue of **BIOTA NEOTROPICA**, the Editor-in-Chief may invite a researcher to write an Editorial on relevant topics, from a scientific standpoint and in terms of creating policies for the conservation and sustainable use of biodiversity in the Neotropical region. Editorials should contain a maximum of 3000 words.

Points of View

This section acts as a forum for academic discussion of a relevant issue within the scope of the journal, whereby the researcher will write a short, thought-provoking, article expressing his/her viewpoint on the issue in question. At the discretion of the Editorial Board, the journal may publish responses or considerations of other researchers to stimulate discussion on the issue. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

Articles

Articles are submitted spontaneously by their authors in the System of Submission of the Journal at http://mc04.manuscriptcentral.com/bn-scielo. The manuscript must bring new data, not published or submitted to publication, in part or entirely, in other journals or books, and must be results of research in characterization, conservation, restoration and sustainable use of biodiversity in the Neotropical region. The manuscript is expected to discuss an issue of scientific interest within the scope of the journal and include a review of the specialized literature, as well as a discussion of articles recently published in the international literature. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

Thematic Reviews

Thematic Reviews are also submitted spontaneously by their authors through the Journal Submission System. The manuscript is expected to develop a scientific concept or theme related to the scope of the journal, based on references that are essential to understanding the subject of the reviews, and including the most recent published articles on the issue. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

Short Communications

These are short articles submitted spontaneously by their authors. The manuscript must contain new data, not previously published and/or submitted for publication in part or in whole, in any other periodical or book, and be the result of research on the characterization, conservation, restoration or sustainable use of Neotropical biodiversity. The manuscript is expected to briefly discuss a new component among the issues of scientific interest related to the scope of BIOTA NEOTROPICA, based on recently published articles. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

Papers that only report the occurrence of species in a region where their presence would be expected, but have yet to be recorded, are not published by BIOTA NEOTROPICA.

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Identification Keys are submitted spontaneously by their authors through the Journal Submission System. The manuscript is expected to describe, to the fullest extent possible, the taxonomic group characterized by the identification key. It should be firmly based on the taxonomic literature regarding the group in question. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

Inventories

Inventories are submitted spontaneously by their authors through the Journal Submission System. The manuscript should contain new data, not previously published and/or submitted for publication in part or in whole, in any other periodical or book, and be the result of research on the characterization, conservation, restoration or sustainable use of Neotropical biodiversity. In addition to the list of inventoried species, the manuscript should include the authors' selection criteria (assemblage, guild, locality etc.), the methodology used and the geographic coordinates of the study area. It must be strongly based on the best taxonomic literature available for the group, and must clearly inform the institution where testimony specimens are deposited. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

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Taxonomic Reviews are submitted spontaneously by their authors through the Journal Submission System. The manuscript should contain new data, not previously published and/or submitted for publication in part or in whole, in any other periodical or book, and be the result of research on the characterization, conservation, restoration or sustainable use of Neotropical biodiversity. The manuscript is expected to contain comprehensive information on the taxon under review, elucidate the main taxonomic issues and justify the need to revise it. The review should be based on the current and historical scientific literature regarding the taxon in question, and must clearly inform the institution where the testimony specimens are deposited. The content of manuscripts accepted for publication, regardless of category, is the sole responsibility of the author(s).

2 - Data availability

Data are important products of the scientific enterprise, and they should be preserved and usable for decades in the future. Following the standard of international publications in the area of biodiversity, and after two years of keeping data availability as a recommendation, the Editorial Committee of **Biota Neotropica decided that, from 1st of January 2022, as a condition for publication, all data supporting the results in papers published in the journal must be archived in an appropriate public archive offering open access and guaranteed preservation. Submissions will not be accepted without a link to the repository where the data has been deposited. Preferably data should be deposited in domain-specific data repositories, but authors are free to select other repositories such as the Biota Neotropica Dataverse (https://data.scielo.org/dataverse/brbn), Sistema de Informação Ambiental do Programa Biota/Fapesp/SinBiota, Dryad Digital Repository - Dryad, TreeBASE Web, GenBank, Figshare, Sistema de Informação sobre a Biodiversidade Brasileira/SiBBr or another repository that provides comparable access**

and guaranteed preservation. Data URL must be mentioned in the Data availability section of the manuscript.

When submitting the paper to Biota Neotropica the provisional URL of the dataset must be included in the Data availability section. The provisional URL shows that the data deposited is in a Draft Format and can be deleted if the paper is not accepted. For accepted papers, the final URL of the data deposited must be included in the Data Availability section.

For theoretical papers, the underlying model code must be archived. Authors should take care to maximize the accessibility and reusability of the data by selecting a file format from which data can be efficiently extracted (for example, spreadsheets or flat files should be provided rather than PDFs when providing tabulated data).

The data underlying all the results presented in the paper must be archived in a format that allows a third party to interpret the data. The archived data must allow each result in the published paper to be recreated and the analyses reported in the paper to be replicated in full to support the conclusions made. Authors are welcome to archive more than this, but not less.

This policy applies to the research data that would be required to verify the results of the research reported in articles published in the journal. Research data include data produced by the authors ("primary data") and data from other sources that are analyzed by authors in their study ("secondary data"). Research data includes any recorded factual material that is used to produce the results in digital and non-digital form. This includes tabular data, code, images, audio, documents, video, maps, raw and/or processed data.

For **sensitive data relating to endangered species or protected locations**, authors should transform locality details or provide an anonymized version of the dataset whenever possible. In situations when endangered species or protected locations cannot be transformed, when data access is politically or culturally sensitive, or when datasets include sensitive social data/information, editors may waive the archiving requirement. Authors must provide a short explanation in the **Data Availability Statement** when the archiving requirement has been waived.

General Guidelines for data publishing:

- **Large primary biodiversity data sets (e.g., institutional collections of species-occurrence records) should be published with the Sistema de Informação Ambiental do Programa Biota/Fapesp/SinBiota, Sistema de Informação sobre a Biodiversidade Brasileira/SiBBr or GBIF Integrated Publishing Toolkit (IPT);**

- **Gene sequence and genomic data should be deposited with INSDC (GenBank/EMBL/DDBJ), either directly or via a partnering repository, e.g. Barcode of Life Data Systems (BOLD). Transcriptomics data should be deposited in Gene Expression Omnibus (GEO) or ArrayExpress.**

- **Phylogenetic data should be deposited at TreeBASE.**

- **Biodiversity-related geoscience and environmental data should be deposited in PANGAEA.**

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- **Videos should be uploaded to video-sharing sites like YouTube, Vimeo or SciVee and linked back to the article text. Similarly, audio files should go to platforms like FreeSound or SoundCloud, and presentations to Slideshare. In addition, multimedia files can also be uploaded as on the journal's Dataverse (https://data.scielo.org/dataverse/brbn).**

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3 – Submission and Publishing

The manuscripts that meet the guidelines will be sent to the Editor-in-Chief, who will forward them to the Area Editors, who in turn will select at least two "ad hoc" reviewers. Authors are asked to suggest at least three possible reviewers, being at least one from abroad, and indicate researchers with whom they might have some conflicts.

Area Editors are responsible for the entire publishing phase of the manuscript, sending feedback to authors and reformulated versions of the work to the reviewers. Once all requirements and recommendations made by reviewers and the Area Editors are met, the manuscript is preliminarily accepted and forwarded to the Chief Editor. It is up to the Editor-in-Chief, in common agreement with the Editorial Board, to definitively accept the paper.

Authors must submit the definitive version of their work (including text, tables and figures) through the Submission System, incorporating the final alterations/corrections requested by the reviewers and/or Area Editor, since this is the version that will be sent to the Editor-in-Chief for publication. Care taken at this stage significantly reduces the need for corrections/alterations to the article proofs.

Search tools, as well as indexation services, use the words in the title and the keywords to locate and classify an article. Therefore, the selection of keywords ensures that the author's manuscript can be found by other authors interested in the same issue, increasing the likelihood of using their results and, consequently, of citations. The information available at http://www.editage.com/insights/why-do-journals-ask-for-keywords is a good source for selecting keywords.

Upon submitting a manuscript to Biota Neotropica, the author(s) transfer(s) copyright to the journal. In any subsequent use of parts of the text, figures and tables, Biota Neotropica must be cited as the source.

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The manuscripts should be sent in DOC format (Word 97-2003 Document) or DOCX format (modern Word format) using Times New Roman font size 10. Section titles must be in font size 12. Boldface, italics, underlines, subscripts and superscripts can be used when pertinent, but excessive use of these resources should be avoided. In special cases (see formulas below), the following fonts can be used: Courier New, Symbol, and Wingdings. Manuscripts can contain electronic links that the author judges appropriate. These must be included using the appropriate resources available in the word processors software (e.g. MS Word, LibreOffice).

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Template

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A single file (called Principal.doc(x)) containing the authors' name and affiliation, titles, abstracts, and keywords (also included in another submission step) in English and in another language (Portuguese or Spanish), the full text of the manuscript, references, and tables. **Figures must NOT be included in this file**, which must be entered separately in the system, as described below. The manuscript should use the following format:

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The title of each section should be written without numbering, in boldface, with only the first letter capitalized (Ex. **Introduction**, **Materials and Methods** etc.). Only two levels of subtitles, below the title of each section, will be permitted. Subtitles must be numbered in Arabic numerals followed by a period to help identify their order in the final format of the manuscript. Ex. **Material and Methods**; 1. Subtitle; 1.1. Sub-subtitle.

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In the case of species citations, they must comply with the respective Nomenclature Codes. In the area of Zoology, all the species cited in the paper must be followed by the author and date of the original publication of the description, or by the author and/or revisor of the species in the case of Botany. In the field of Microbiology, specific sources should be consulted, such as the International Journal of Systematic and Evolutionary Microbiology.

References in the text

Insert references in accordance with the following standard:

Silva (1960) or (Silva 1960)

Silva (1960, 1973)

Silva (1960a, b)

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(Silva 1989, Pereira & Carvalho 1993, Araújo et al. 1996, Lima 1997)

Biota Neotropica does not accept references to unpublished data that are inaccessible to the reviewers or readers. In taxonomic studies, include citations of the material examined in accordance with the specific rules of the type of organism under study.

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SMITH, P.M. 1976. The chemotaxonomy of plants. Edward Arnold, London.
SNEDECOR, G.W. & COCHRAN, W.G. 1980. Statistical methods. 7 ed. Iowa State University Press, Ames.

SUNDERLAND, N. 1973. Pollen and anther culture. In Plant tissue and cell culture (H.F. Street, ed.). Blackwell Scientific Publications, Oxford, p.205-239.

BENTHAM, G. 1862. Leguminosae. Dalbergiae. In Flora Brasiliensis (C.F.P. Martius & A.G. Eichler, eds). F. Fleischer, Lipsiae, v.15, pars 1, p.1-349.

MANTOVANI, W., ROSSI, L., ROMANIUC NETO, S., ASSAD-LUDEWIGS, I.Y., WANDERLEY, M.G.L., MELO, M.M.R.F. & TOLEDO, C.B. 1989. Estudo fitossociológico

de áreas de mata ciliar em Mogi-Guaçu, SP, Brasil. In Simpósio sobre mata ciliar (L.M. Barbosa, coord.). Fundação Cargil, Campinas, p.235-267.

STRUFFALDI-DE VUONO, Y. 1985. Fitossociologia do estrato arbóreo da floresta da Reserva Biológica do Instituto de Botânica de São Paulo, SP. Tese de doutorado, Universidade de São Paulo, São Paulo

FISHBASE. http://www.fishbase.org/home.htm (last access in dd/mmm/aaaa)

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SANTOS, R.M., SCHLINDWEIN, M.N., VIVIANI, V.R. Survey of Bioluminescent Coleoptera in the Atlantic Rain Forest of Serra da Paranapiacaba in São Paulo State (Brazil). Biota Neotropica. 16(1): e0045. http://dx.doi.org/10.1590/1676-0611-BN-2015-0045 (last access on dd/mm/yyyy)

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Tables can be inserted directly into MS Excel software but must be saved in a spreadsheet, not workbook format.

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In the case of drawings, the texts contained in the figures should use sans-serif fonts, such as Arial or Helvetica, for better legibility. Figures composed of several others should be identified by letters (Ex. Figure 1a, Figure 1b). Use a scale bar to indicate size. Figures should not contain legends; these must be included in their own file.

Figure legends should be part of the Principal.rtf or Principal.doc text file, and included after the references. Each legend should be contained in a single paragraph and be identified, starting the paragraph with Figure N, where N is the number of the figure. Compound figures can or not have independent legends.

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After acknowledgements, create the item Authors' Contributions, containing information about the contribution of each of the authors, which should be described using one of the following:

Substantial contribution in the concept and design of the study;

Contribution to data collection

Contribution to data analysis and interpretation

Contribution to manuscript preparation

Contribution to critical revision, adding intellectual content

The contributions of each co-author must be included in the system to appear as a note in the published manuscript.

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Anexo 2: Artigo publicado na revista Biota Neotropica

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Inventory

Ferns and lycophytes in Chapada das Mesas National Park and surroundings, Maranhão State, Brazil

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FERNANDES, R.S., SILVA, L.R., OLIVEIRA, S.S., OTTONI, F.P., PIETROBOM M.R. **Ferns and lycophytes in Chapada das Mesas National Park and surroundings, Maranhão State, Brazil**. 22(1): e20211273. http://dx.doi.org/10.1590/1676-0611-BN-2021-1273

Abstract: In Brazil, the number of floristic inventories involving ferns and lycophytes in the Cerrado domain is considerable. However, most of the diversity is recorded for states in the Central-West Region. In addition to the Cerrado domain, Maranhão State contains part of Amazonia and a small portion of the Caatinga. However, for this state, ferns and lycophytes are poorly sampled in floristic studies and data related to the diversity of these species are insufficient. Due to the scarcity of data about these groups, conducting floristic inventories in the state is extremely important, mainly in protected areas that contain regional vegetation near primary vegetation. Thus, the objective of the present study was to conduct a floristic inventory of the fern and lycophyte species in Chapada das Mesas National Park. We identified 86 species: 69 species of ferns, distributed in 35 genera and 17 families; and 17 species of lycophytes, distributed in five genera and three families. Among the species identified, five are new records for the Northeast Region of Brazil, twenty-one are new records for Maranhão State and eleven are new records for the Cerrado; until now, these were only recorded for Amazonia and the Atlantic Forest. The most representative families were Pteridaceae with 14 species, Selaginellaceae with 12 species, Thelypteridaceae with 11 species, and Anemiaceae, Hymenophyllaceae and Dryopteridaceae with six species each. The rupicolous life form was predominant. The new occurrence records for the Cerrado, Northeast Region and Maranhão are evidence that floristic research of ferns and lycophytes is still insufficient in these areas, and a greater sampling effort is needed to increase what is known about the diversity of these plants.
Keywords: *Cerrado; Riparian forest; Northeast; Vascular plants; Rupicolous.*

Samambaias e licófitas do Parque Nacional da Chapada das Mesas e arredores, Estado do Maranhão, Brasil

Resumo: No Brasil o número de inventários florísticos envolvendo samambaias e licófitas no domínio Cerrado são consideráveis. Entretanto, a maior parte dessa diversidade é registrada para os estados da região Centro-Oeste. Além do domínio Cerrado, o território do estado do Maranhão inclui parte da Amazônia e uma pequena porção da Caatinga. No entanto, para este estado, samambaias e licófitas são pouco amostradas nos estudos florísticos e os dados relacionados à diversidade dessas espécies são insuficientes. Devido à escassez de dados sobre esses grupos, a realização de inventários florísticos no estado é de extrema importância, principalmente em unidades de conservação que contêm vegetação regional similar à vegetação primária. Assim, o objetivo do presente estudo foi realizar um inventário florístico das espécies de samambaias e licófitas no Parque Nacional da Chapada das Mesas. Nós identificamos 86 espécies: 69 espécies de samambaias, distribuídas em 35 gêneros e 17 famílias; e 17 espécies de licófitas, distribuídas em cinco gêneros e três famílias. Dentre as espécies identificadas, cinco são novos registros para a região Nordeste do Brasil, vinte e uma são novos registros para o Estado do Maranhão e onze são novos registros para o Cerrado; até agora, esses foram registrados apenas para a Amazônia e a Mata Atlântica. As famílias mais representativas foram Pteridaceae com 14 espécies, Selaginellaceae com 12 espécies, Thelypteridaceae com 11 espécies e Anemiaceae, Hymenophyllaceae e Dryopteridaceae com seis espécies cada. A forma de vida rupícola foi predominante. Os novos registros de ocorrência para o Cerrado, Nordeste e Maranhão evidenciam que a pesquisa florística de samambaias e licófitas ainda é insuficiente nessas áreas, sendo necessário um maior esforço amostral para aumentar o conhecimento em relação a diversidade dessas plantas.
Palavras-chave: *Cerrado; Mata ciliar; Nordeste; Plantas vasculares; Rupícolas.*

Introduction

Ferns and lycophytes are seedless vascular plants that reproduce from spores (Schuettpelz & Pryer 2008). They occur as various life forms, of which the most common are terrestrial, epiphytic, rupicolous and aquatic, and this has allowed them to widely colonize environments worldwide, excepts for the poles (Mehltreter 2008, Zuquim et al. 2008).

For the world, the PPG I (2016) classified ferns and lycophytes into two classes, 14 orders, 51 families, 337 genera, and 11,916 species. In Brazil, it is estimated that there are 1,403 species, including 315 species in the Cerrado phytogeographic domain, which represents 22.45% of the species in Brazil (Samambaias e Licófitas *in* Flora do Brasil 2020). Floristic inventories of these groups in the Cerrado have mostly been conducted in the Southeast and Central-West regions of Brazil (e.g., Athayde Filho & Felizardo 2010, Forsthofer & Athayde Filho 2012, Miguez et al. 2013).

The Cerrado occupies 21% of Brazil and is the second largest biome in the country; only Amazonia is larger. It is a world biodiversity hotspot (Myers et al. 2000, Silva & Bates 2002) and widely used for agricultural activities (Borlaug 2002). Although a large part of the Cerrado is extremely important to the conservation of biodiversity, only 5.5% of its original area consists of protected areas (PAs). Further, it is the world hotspot with the lowest percentage of areas that are completely protected (Brasil, Mittermeier et al. 2021).

In addition to the Cerrado domain, Maranhão contains other phytogeographic domains (i.e., a portion of Amazonia and a small part of the Caatinga) and extensive transition areas between them, resulting in high biodiversity in the state. However, the biodiversity in Maranhão, especially lycophytes and ferns, could be underestimated because not many areas have been sampled and studied (Table 1) (e.g., Bastos & Cutrim 1999, Azevedo & Silva 2001, Fernandes et al. 2007, 2010, Conceição & Ruggieri 2010, Conceição & Rodrigues 2010, Conceição et al. 2015, Santos-Silva 2016, Silva et al. 2017, Santos-Silva et al. 2018, Silva-Júnior et al. 2018, Santos-Silva et al. 2019a, b, c, Barbieri et al. 2020, Almeida et al. 2020, Silva-Junior et al. 2020). According to Samambaias e Licófitas *in* Flora do Brasil (2020), only 97 species of ferns and lycophytes have been recorded in Maranhão. However, based on a compilation of data published in floristic inventories about the state (mentioned above), there are 24 families and 130 species (Supplementary file 1). Among the studies cited above, most sampling was conducted in the Amazon domain (64 species) (e.g., Silva Junior et al. 2020), which includes an important federal protected area called the Gurupi Biological Reserve (Reserva Biológica do Gurupi) (Table 1). In Maranhão State, 12.5% of the Cerrado is within PAs, of which 5.7% is completely protected under the category National Park (Parque Nacional) and 6.8% is sustainably used and mainly environmental protection areas (Áreas de Proteção Ambiental) (Spinelli-Araújo et al. 2016). In the Cerrado in the state, 74 species of ferns and lycophytes have been recorded (Fernandes et al. 2007, 2010, Conceição & Ruggieri 2010, Conceição & Rodrigues 2010, Conceição et al. 2015, Silva et al. 2017, Santos-Silva et al. 2019b, c, Almeida et al. 2020, Samambaias e Licófitas *in* Flora do Brasil 2020) (Supplementary file 1). Despite the considerable number of studies conducted, the greatest diversity recorded was 21 species for the municipality of Caxias, which includes the Inhamum Environmental Protection Area (Área de Proteção Ambiental do Inhamum) (Fernandes et al. 2007, 2010). Among the studies published, only two were conducted in completely protected PAs: an inventory of ferns and lycophytes in Mirador State Park (Parque Estadual do Mirador) (e.g., Conceição & Rodrigues 2010), which is the largest protected area in Maranhão State (437,000 ha); and an inventory of lycophytes conducted in Chapada das Mesas National Park (Parque Nacional da Chapada das Mesas) (e.g., Almeida et al. 2020).

Chapada das Mesas National Park (PNCM) is a protect area in Maranhão that is predominantly Cerrado, in an environment that transitions with the Caatinga and Amazon biomes (ICMBio 2021). All stratifications associated with the Cerrado biome occur in this area, including humid and dry forests, cerradão, cerrado ralo, marshes and veredas. This PA is part of the Araguaia Bananal ecological corridor, which is an important ecotone between the Cerrado and Amazon biomes (MMA 2007).

Despite being created over 15 years ago and possessing diverse phytophysiognomies of the Cerrado domain, including large areas of field and savanna formations, the management plan of the park lacks data about the floristic diversity (MMA 2012, ICMBio 2021). Further, studies about the plant diversity of the area are recent (e.g., Silva et al. 2018, Oliveira et al. 2018, Fernandes et al. 2021, Silva et al. 2021) and only one is about vascular plants (e.g., Almeida et al. 2020).

Thus, the objective of this work was to conduct a floristic survey in PNCM, an extremely important region for the conservation of biodiversity in the Cerrado that is in a transition area, with the goal of providing new information about the ferns and lycophytes of the Cerrado domain and Brazil. This data will contribute to future works about ecology, conservation and environmental education in the area, as well as the management plan for the park.

Material and Methods

1. Study area

The Chapada das Mesas National Park, comprises approximately 160,000 ha of Cerrado divided into two polygons, one with around 120,000 ha and another with about 40,000 ha, which are distributed in the municipalities of Carolina, Riachão and Estreito in southeastern Maranhão State (Brasil 2006, ICMbio 2021).

The climate is predominantly seasonal tropical, type Aw (Köppen 1948), with a dry season for 3 to 5 months and a rainy season with average rainfall ranging from 1,250 to 1,500 mm, an average annual temperature between 20ºC and 27ºC and average relative air humidity of approximately 60% (Pereira et al. 2011).

Hydrologically, the area is very rich. The main watercourses are the Farinha River (norther portion) and Itapecuru River (southern portion), there are over 400 springs in the interior, and along the watercourses there are well-conserved riparian forests (ICMBio 2021).

The relief is characterized by the presence of sandstone and typical forms of paleokarst in sandstone (e.g., hilltop arches, small cavities, canyons, paleosinkholes, sinkholes and river resurgences), which is closely related to the evolution of the subterranean drainage and river incision (Martins et al. 2017). The soil is predominantly sandy where there are Cerrado *sensu stricto* and *campo sujo* physiognomies. However, there are also places with richer soils, mainly on the tops of mountains that have patches of semideciduous forest (ICMBio 2021).

In addition to the natural vegetation cover typical of the Cerrado biome that contains many phytophysiognomies, among which savanna

Table 1. Scientific studies of ferns and lycophytes conducted Maranhão State. Author(s), article title, species, genus and family numbers (Quant. spp./gen./fam.), new records, size of area and phytogeographic domain.

Author(s)	Article title	Quant. spp./ gen./ fam.	New records	Size of area	Phytogeographic domain
Bastos & Cutrim 1999	Pteridoflora da Reserva Florestal do Sacavém, São Luíz-Maranhão	15 / 12 / 9	15	-	Amazonia
Azevedo & Silva 2001	Ocorrência de *Lycopodiella cernua* (L.) Pichi-Sermolli (Pteridophyta: Lycopodiopsida: Lycopodiaceae) nas bordas de manguezal, São Luís – Maranhão – Brasil	1 / 1 / 1	-	-	Amazonia
Fernandes et al. 2007	Diversidade Florística de Pteridófitas da Área de Preservação Ambiental do Inhamum, Caxias, Maranhão, Brasil	13 / 12 / 9	7	4,500 ha	Cerrado
Fernandes et al. 2010	Samambaias e licófitas do município de Caxias, Maranhão, Brasil	21 / 16 / 11	6	531,350 ha	Cerrado
Conceição & Rodrigues 2010	Pteridófitas do Parque Estadual do Mirador, Maranhão, Brasil	7 / 7 / 6	-	450,838 ha	Cerrado
Conceição & Ruggieri 2010	Pteridófitas do município de Tufilândia, estado do Maranhão, Brasil	9 / 9 / 7	-	134,6 km²	Transition areas Cerrado and Amazonia
Conceição et al. 2015	Pteridoflora e seus aspectos ecológicos no município de Timon, Maranhão, Brasil	9 / 7 / 6	-	-	Cerrado
Santos-Silva 2016	Cyathea delgadii Sternb. (Cyatheaceae, Samambaia): Caracterização e ecologia populacional no domínio fitogeográfico do Cerrado	1 / 1 / 1	-	-	Cerrado
Silva et al. 2017	Licófitas e Samambaias no Cerrado do Leste do Maranhão, Brasil	19 / 15 /11	1	1.439,1 km²	Cerrado
Santos-Silva et al. 2018a	Nova ocorrência de Lycopodiaceae (Lycophyta) para o estado do Maranhão: *Pseudolycopodiella carnosa* (Silveira) Holub	1 / 1 / 1	1	-	Cerrado
Santos-Silva et al. 2018b	Association of Anuran to Cyathea delgadii Sternb. (Cyatheaceae) in Cerrado from Brazil	1 / 1 / 1	-	-	Cerrado
Silva-Junior et al. 2018	First record of the exotic fern Pteris tripartita Sw. (Pteridaceae) for the Maranhão state, northeastern Brazil	1 / 1 / 1	1	-	Amazonia
Santos-Silva et al. 2019a	Formigas associadas à Cyathea delgadii Sternb. (Cyatheaceae) em um fragmento de Cerrado maranhense, Nordeste, Brasil	1 / 1 / 1	-	-	Cerrado
Santos-Silva et al. 2019b	New occurrences of Schizaeaceae for the Maranhão and Brazilian Cerrado	3 / 2 / 1	1	-	Cerrado
Santos-Silva et al. 2019c	Structure and spatial distribution pattern of *Cyathea delgadii* Sternb. (Cyatheaceae) in two Cerrado areas, in the Northeast of Brazil	1 / 1 / 1	-	1.438,1 km ², e 2.107,403 km²	
Almeida et al. 2020	Lycophytes of the Chapada das Mesas National Park, Cerrado, Maranhão, Brazil	6 / 3 / 3	1	160,000 ha	Cerrado
Silva Junior et al. 2020	Ferns and lycophytes of remnants in Amazônia Maranhense, Brazil	64 / 36 / 18	24	81.208,40 km²	Amazonia
Barbieri et al. 2020	Distribuição, Morfologia e Anatomia de Monilófitas (Samambaias) Aquáticas de pequenas lagoas na área Itaqui-Bacanga, ilha de São Luís – Ma	3 / 2 / 2	-	-	Amazonia

and forest aspects are notable, there are also Caatinga and Amazonian species, which help characterize the high diversity of the area (ICMBio 2021). These vegetation characteristics, including the presence of well-conserved riparian forests along watercourses, large patches of *cerradão* and other types of phytophysiognomies, are essential for maintaining the biodiversity in the region (Marques 2012).

2. Data collection

The species were collected during four expeditions, in March and October 2017, June 2018 and February 2020, which were three days each and included the dry and rainy seasons. Collecting was based on the methods proposed by Filgueiras et al. (1994). Microenvironments in the study area were selected and explored randomly, with the goal of visiting the greatest number of places where taxa might occur. The sampling points were mapped (Figure 1).

Herbarium specimens were made based on standard techniques used for seedless vascular plants (Silva 1989). All the material was deposited in the CCAA herbarium (RBH 2019), at the Federal University of Maranhão, Campus Chapadinha. When available, duplicates were sent to the following institutions: MG, HBRA and BHCB (Thiers 2019).

The identification and distribution of the species and genera were based on specialized literature, such as PPG I (2016), IPNI (2019) the Flora do Brasil 2020 monographs, as well as revisions and regional floras (e.g., Tryon & Stolze 1994, Moran & Riba 1995, Mickel & Smith 2004). When needed, some species were sent to specialists to confirm the identification.

The terminology follows Lellinger (2002). Family and genus delimitations are based on PPG I (2016). Nomenclature and authors of the species follow the International Plant Names Index (IPNI 2019) and Tropicos (2019). The images of species were taken with a digital

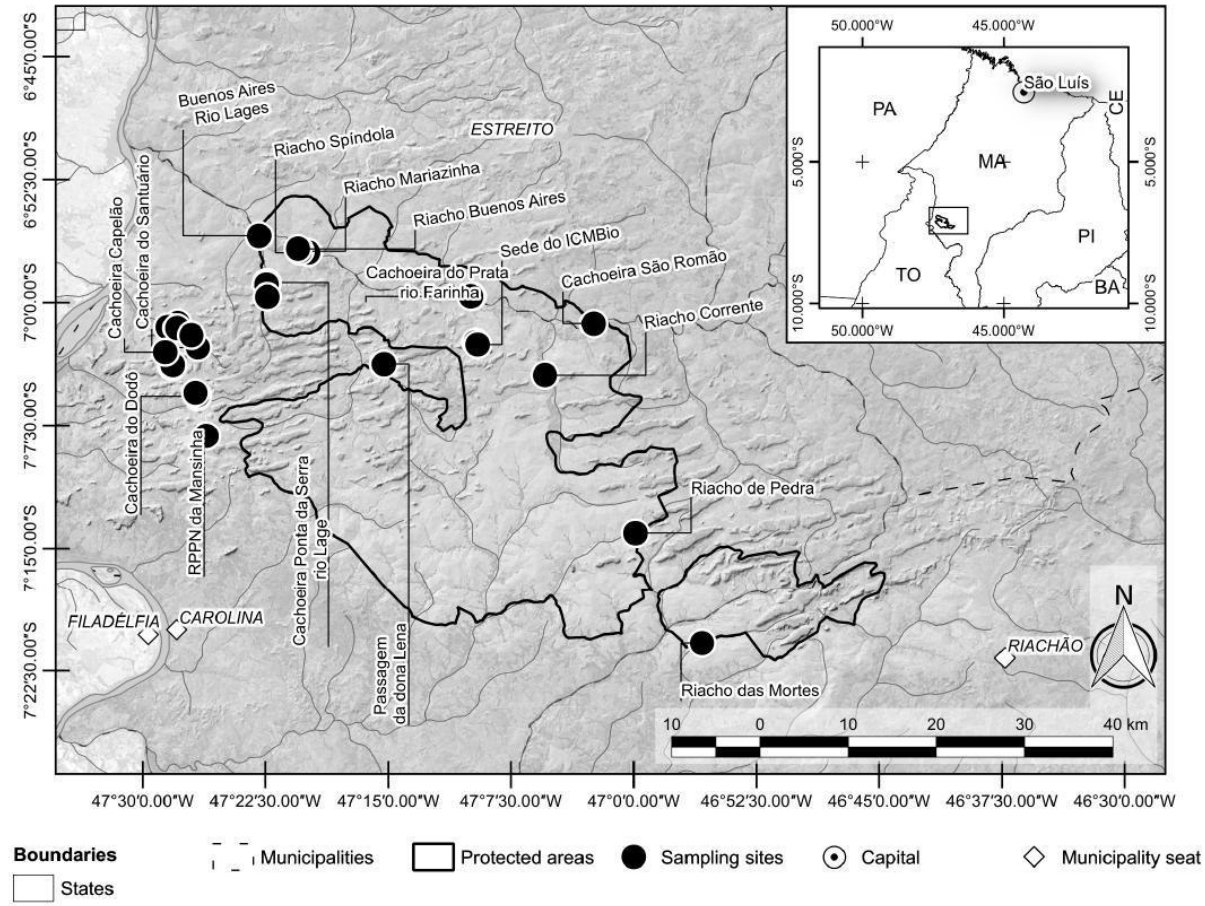

Figure 1. Localization map of the study area, showing samples sites inside and outside the Chapada das Mesas National Park (Modified from: Silva et al. 2021).

camera in the field or from herbarium specimens (fertile parts). The photographic plates, preferentially of new records for Maranhão State, were made with Photoshop® CS6 v.13.0 (Adobe Systems 2012). Comments about the environment of occurrence are based on the area where the material was collected. Life forms were determined based on Lellinger (2002), Zuquim et al. (2008) and Irgang et al. (1984). For floating aquatic plants that grow exclusively in aquatic environments (e.g., lakes, ponds), without connection to the soil, we follow Pedralli et al. (1985) *apud* Pott et al. (1989).

The **types of phytophysiognomies** (or habitat of occurrence) of the species were based on field observations and follow the classification of Flora do Brasil (2020). The following categories were considered:

- **Open riparian forest:** forest vegetation associated with watercourses that is wide with trees spaced apart; - **Closed riparian forest:** forest vegetation associated with watercourses that is narrower with trees closer together and a canopy; - **Cerrado *sensu stricto*:** presence of short, inclined, tortuous trees with thin trunks and irregular, twisted branches, generally with signs of past fires, and the presence of a lot of grass in the understory; - **Anthropogenic area (pasture):** environment where the original vegetation was destroyed in relation to the primary phytophysiognomy and transformed into pasture with babaçu palms; - **Vereda:** area of open marsh with grasses, buriti palms and a few shrubs, which is associated with nearby forest with watercourses.

The **microenvironments** preferred by the species were defined based on field observations, such as the following:

Rocky banks: located along the margins of watercourses inside forests, formed by rocks that are bare or only have a thin layer of humus, with a slight to vertical (90°) incline; - **Non-rocky banks:** located along the margins of watercourses inside forests, formed by various soil types (non-rocky), with a slight to vertical incline (90°); - **Waterfall areas:** locations near a waterfall and formed by vertical (90°) rock faces with constant water vapor; - **Rock walls:** blocks of continuous rock forming vertical (90°) rock extensions (taller than the banks), with bare rock or only a thin layer of humus, located along the margins of watercourses inside riparian forest or between Cerrado *sensu stricto* vegetation; - **Marshy areas with buriti palms:** locations with wet soil that are associated with watercourses inside forest where buriti palms predominate; -**Marshy areas with grasses:** locations with wet soil that are associated with watercourses in open areas where there are a few shrubs and grasses predominate; - **Pasture with babaçu palms; - Forest interior in flat area; - Open flooded area.**

Results

1. *Ferns and lycophytes diversity*

We identified 86 species of ferns and lycophytes: 69 species of ferns, distributed in 35 genera and 17 families; and 17 species of lycophytes, distributed in five genera and three families (Table 2 and Supplementary file 2).

Among the species identified, five are new records for the Northeast Region of Brazil, twenty-one are new records for Maranhão State and eleven are new records for the Cerrado of Brazil that, until now, were only recorded for Amazonia and the Atlantic Forest (Table 2 and Supplementary file 2).

The most representative families were Pteridaceae with 14 species, Selaginellaceae with 12 species, Thelypteridaceae with 11 species, and Anemiaceae, Hymenophyllaceae and Dryopteridaceae with six species each (Table 2).

Seven species were identified to the genus level, and all other species were identified to the species level. *Elaphoglossum* sp. was identified to the genus level since only sterile material was collected. The other six species (*Selaginella* sp.1, *Selaginella* sp.2, *Selaginella* sp.3, *Blechnum* cf. *occidentale*, *Blechnum* sp., and *Adiantum sp*.) were identified to the genus level due to the confusing taxonomy or probably hybrid (*pers. com.*, Vinicius Dittrich, Luis Armando Góes Neto and Jefferson Prado).

The rupicolous life form had the highest number of species, with 22 species (58% of the total number of species), followed by terrestrial with 15 species (22% of the total), epiphytic with three species, terrestrial climber with three species, fixed aquatic with two species, and floating aquatic with one species. Forty species had more than one life form: 32 terrestrial and rupicolous; seven epiphytic and rupicolous; and one terrestrial, epiphytic and rupicolous (Table 2).

2. *New records: Northeast Region, Maranhão and the Cerrado domain*

Selaginella convoluta (Arn.) Spring.

(Figure 2A)

Rupicolous on a rocky bank in a waterfall area. **Habitat:** open riparian forest.

Geographic distribution: AL, BA, CE, MA, PB, PE, PI, RN, SE, GO, MS, MT, ES, MG, RJ, SP, PR (Caatinga, Cerrado and Atlantic Forest). New record: Maranhão.

Selaginella minima Spring.

(Figure 2C)

Terrestrial on a non-rocky bank and rupicolous plant collected on a rocky bank in a waterfall area, near the margin of a trail. **Habitat:** closed riparian forest. **Geographic distribution:** AM, AP, PA, RO, MA, PI, GO, MT (Amazonia and Cerrado). New record: Maranhão.

Selaginella sulcata (Desv. ex Poir.) Spring ex Mart.

(Figure 2F)

Rupicolous on a rocky bank on the top of a hill, near a watercourse. **Habitat:** open riparian forest, closed riparian forest. **Geographic distribution:** AC, AM, PA, BA, CE, MA, PB, PE, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão and Cerrado.

Lycopodiella longipes (Grev. & Hook.) Holub.

(Figure 3A)

Terrestrial in an open marshy area with grasses. **Habitat:** vereda. **Geographic distribution:** AC, AM, RR, BA, MA, DF, GO, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado, Atlantic Forest and Pampa). New record: Maranhão and Cerrado.

Palhinhaea camporum (B. Øllg. & Windisch) Holub.

(Figure 3B)

Terrestrial in an open marshy area with grasses. **Habitat:** vereda. **Geographic distribution:** AC, AM, AP, PA, RO, RR, TO, BA, MA, PE, PI, DF, GO, MS, MT, MG, SP, PR, SC (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Anemia buniifolia (Gardner) T.Moore.

(Figure 4A)

Rupicolous near the margin of a trail on a rocky bank in a waterfall area. **Habitat:** open riparian forest. **Geographic distribution:** AM, PA, TO, BA, MA, DF, GO, MT, MG (Amazonia and Cerrado). New record: Maranhão.

Anemia elegans (Gardner) C.Presl.

(Figure 4B)

Rupicolous on a rock wall and in rock cracks on the margin of a trail. **Habitat:** Cerrado *sensu stricto*. **Geographic distribution:** TO, BA, MA, DF, GO, MT, MG (Cerrado). New record: Maranhão.

Anemia trichorhiza Gardner.

Table 2. List of fern and lycophyte species in Chapada das Mesas National Park, Maranhão State, Brazil. New records for Maranhão, the Northeast Region and the Cerrado are in bold. Life form/growth, Habitat, Microenvironments.

CLASS, FAMILY, species	Life forms/growth	Habitat	Microenvironments
LYCOPODIOPSIDA			
ISOETACEAE			
Isoetes panamensis Maxon & C.V. Morton	Fixed aquatic	Open riparian forest	Waterfall areas
SELAGINELLACEAE			
Selaginella conduplicata Spring	Terrestrial/Rupicolous	Open riparian forest	Rocky banks/Waterfall areas
Selaginella convoluta (Arn.) Spring	Rupicolous	Open riparian forest	Rocky banks/Waterfall areas
Seleginella erythropus (Mart.) Spring	Terrestrial/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella flagellata Spring	Terrestrial	Closed riparian forest	Non-rocky banks
Selaginella marginata (Humb. & Bonpl. ex Willd.) Spring	Terrestrial/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella minima Spring	Terrestrial/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella radiata (Aubl.) Spring	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Non-rocky banks/Rock walls/ Waterfall areas
Selaginella simplex Baker	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Non-rocky banks/Waterfall areass
Selaginella sulcata (Desv. ex Poir.) Spring ex Mart.	Rupicolous	Open riparian forest/Closed riparian forest	Rocky banks
Selaginella sp.1	Epiphytic	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella sp.2	Epiphytic	Closed riparian forest	Non-rocky banks/Waterfall areas
Selaginella sp.3	Epiphytic/Rupicolous	Closed riparian forest	Non-rocky banks/Waterfall areas
LYCOPODIACEAE			
Lycopodiella longipes (Grev. & Hook.) Holub	Terrestrial	Vereda	Marshy areas with grasses
Palhinhaea camporum (B. Øllg. & Windisch) Holub	Terrestrial	Vereda	Marshy areas with grasses
Palhinhaea cernua (L.) Franco & Vasc.	Terrestrial	Vereda	Marshy areas with grasses
Pseudolycopodiella meridionalis (Underw. & Loyd) Holub	Terrestrial	Vereda	Marshy areas with grasses
ANEMIACEAE			
Anemia buniifolia (Gardner) T.Moore	Rupicolous	Open riparian forest	Rocky banks; Waterfall areas
Anemia elegans (Gardner) C.Presl	Rupicolous	Cerrado sensu stricto	Rock walls
Anemia ferruginea Humb. & Bonpl. ex Kunth	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks
Anemia hirsuta (L.) Sw.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks
Anemia oblongifolia (Cav.) Sw.	Terrestrial/Rupicolous	Closed riparian forest/Open riparian forest/ Cerrado sensu stricto	Rocky banks/Non-rocky banks/Rock walls
Anemia trichorhiza Gardner	Rupicolous	Cerrado sensu stricto	Rock walls
BLECHNACEAE			
Blechnum cf. *occidentale*	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Blechnum sp.	Rupicolous	Closed riparian forest/ Cerrado sensu stricto	Rock walls
Salpichlaena hookeriana (Kuntze) Alston	Terrestrial climber	Closed riparian forest	Rocky banks/Waterfall areas

Continued...

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Telmatoblechnum serrulatum (Rich.) Perrie, D.J. Ohlsen & Brownsey	Terrestrial	Closed riparian forest	Marshy areas with buriti palms
CYATHEACEAE			
Cyathea delgadii Sternb.	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Cyathea microdonta (Desv.) Domin	Terrestrial	Closed riparian forest	Rock walls/Waterfall areas
DENNSTAEDTIACEAE			
Pteridium esculentum (G.Forst.) Cockayne subsp. *gryphus* Schwartsb. var. *harpianum* Schwartsb. & a.Yanez	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
DRYOPTERIDACEAE			
Bolbitis serratifolia Schott	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Cyclodium meniscioides (Willd.) C. Presl	Terrestrial/Rupicolous	Closed riparian forest	Marshy areas with buriti palms/Waterfall areas
Dryopteris patula (Sw.) Underw.	Rupicolous	Closed riparian forest	Rock walls
Elaphoglossum scalpellum (Mart.) T. Moore	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Elaphoglossum sp.	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Polybotrya sorbifolia Mett. ex Kuhn	Rupicolous	Closed riparian forest	Waterfall areas
GLEICHENIACEAE			
Dicranopteris flexuosa (Schrad.) Underw.	Terrestrial/Rupicolous	Closed riparian forest/ Cerrado sensu stricto/Vereda with grasses	Margin of riparian forest/ Waterfall areas
HYMENOPHYLLACEAE			
Didymoglossum angustifrons Fée	Epiphytic/Rupicolous	Closed riparian forest	Rocky banks/ Waterfall areas
Didymoglossum pinnatinervium (Jenman) Pic.Serm.	Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Trichomanes arbuscula Desv.	Rupicolous	Closed riparian forest	Rocky banks
Trichomanes cristatum Kaulf.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Trichomanes hostmannianum (Klotzsch) Kunze	Rupicolous	Closed riparian forest	Rocky banks
Trichomanes pinnatum Hedw.	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Rocky banks/Waterfall areas
LINDSAEACEAE			
Lindsaea divaricata Klotzsch	Terrestrial/Rupicolous/ Epiphytic	Closed riparian forest	Marshy areas with buriti palms/Waterfall areas/ Rock walls
Lindsaea guianensis subps. *lanceastrum* K.U.Kramer	Rupicolous	Closed riparian forest	Rocky banks
Lindsaea lancea (L.) Bedd.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks
Lindsaea pallida Klotzsch	Terrestrial	Closed riparian forest	Non-rocky banks
LYGODIACEAE			
Lygodium venustum Sw.	Terrestrial climber	Open riparian forest	Rocky banks/Non-rocky banks
Lygodium volubile Sw.	Terrestrial climber	Open riparian forest	Rocky banks/Non-rocky banks
METAXYACEAE			
Metaxya parkeri (Hook. & Grev.) J. Sm.	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Marshy areas with buriti palms/Waterfall areas/ Rocky banks/Non-rocky banks
NEPHROLEPIDACEAE			
Nephrolepis biserrata (Sw.) Schott	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Marshy areas with buriti palms
Nephrolepis pectinata (Willd.) Schott	Epiphytic	Anthropogenic area	Pasture with babaçu palms

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POLYPODIACEAE			
Microgramma persicariifolia (Schrad.) C.Presl	Epiphytic/Rupicolous	Closed riparian forest	Shaded riparian forest/ Rock walls/Waterfall areas
Phlebodium aureum (L.) J. Sm.	Epiphytic/Rupicolous	Anthropogenic area/Open riparian forest	Pasture with babaçu palms; Rocky banks
Pleopeltis burchellii (Baker) Hickey & Sprunt ex A.R. Sm.	Epiphytic/Rupicolous	Closed riparian forest	Rock walls
Serpocaulon triseriale (Sw.) A.R.Sm.	Terrestrial/Rupicolous	Open riparian forest	Rocky banks/Non-rocky banks
PTERIDACEAE			
Adiantum deflectens Mart.	Terrestrial/Rupicolous	Open riparian forest/Closed riparian forest	Rocky banks/Non-rocky banks/Waterfall areas
Adiantum intermedium Sw.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks/Waterfall areas
Adiantum latifolium Lam.	Terrestrial/Rupicolous	Closed riparian forest	Rocky banks/Non-rocky banks
Adiantum petiolatum Desv.	Rupicolous	Closed riparian forest	Rocky banks
Adiantum pulverulentum L.	Rupicolous	Closed riparian forest	Rocky banks
Adiantum serratodentatum Willd.	Terrestrial	Open riparian forest	Non-rocky banks
Adiantum sinuosum Gardner	Rupicolous	Cerrado sensu stricto	Rock walls
Adiantum terminatum Kunze ex Miq.	Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
Adiantum tetraphyllum Willd.	Terrestrial	Open riparian forest	Forest interior in flat area
Adiantum sp.	Terrestrial	Open riparian forest	Forest interior in flat area
Ceratopteris thalictroides (L.) Brongn.	Fixed aquatic	Open riparian forest	Open flooded area
Cheilanthes pohliana Mett.	Rupicolous	Cerrado sensu stricto	Rock walls
Pityrogramma calomelanos (L.) Link	Terrestrial/Rupicolous	Closed riparian forest	Marshy areas with buriti palms/Rock walls/Non-rocky banks
Vittaria lineata (L.) Sm.	Epiphytic/Rupicolous	Open riparian forest/Closed riparian forest	Rock walls
SALVINIACEAE			
Azolla microphylla Kaulf.	Floating aquatic	Open riparian forest	Open flooded area
SCHIZAEACEAE			
Actinostachys pennula (Sw.) Hook.	Terrestrial	Cerrado sensu stricto	Forest interior in flat area
Schizaea elegans (Vahl) Sw.	Terrestrial/Rupicolous	Closed riparian forest/ Cerrado sensu stricto	Non-rocky banks/Forest interior in flat area
Schizaea incurvata Schkuhr	Terrestrial	Cerrado sensu stricto	Forest interior in flat area
TECTARIACEAE			
Tectaria incisa Cav.	Rupicolous	Closed riparian forest	Rocky banks/Waterfall areas
THELYPTERIDACEAE			
Christella conspersa (Schrad.) Á.Löve & D.Löve	Terrestrial/Rupicolous	Closed riparian forest	Marshy areas with buriti palms/ Rock walls/Non-rocky banks
Christella hispidula (Decne.) Holttum	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Non-rocky banks
Goniopteris biformata (Rosenst) Salino & T.E. Almeida	Terrestrial/Rupicolous	Open riparian forest	Rock walls/Waterfall areas
Macrothelypteris torresiana (Gaudich.) Ching	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Meniscium angustifolium Willd.	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Meniscium arborescens Humbl & Bonpl. ex Willd.	Terrestrial	Open riparian forest/Closed riparian forest	Marshy areas with buriti palms/Rock walls/Non-rocky banks
Meniscium chrysodioides Fée.	Terrestrial	Open riparian forest/Closed riparian forest	Marshy areas with buriti palms/ Rock walls/Non-rocky banks/ Waterfall areas

Continued...

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Meniscium delicatum R.S. Fernandes & Salino	Rupicolous	Closed riparian forest	Rock walls/Waterfall areas
Meniscium hostmannii (Klotzsch) R.S. Fernandes & Salino	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Non-rocky banks
Meniscium maxonianum (A.R. Sm.) R.S. Fernandes & Salino	Terrestrial/Rupicolous	Closed riparian forest	Rock walls/Non-rocky banks
Meniscium serratum Cav.	Terrestrial/Rupicolous	Open riparian forest	Marshy areas with buriti palms/ Rock walls/Non-rocky banks

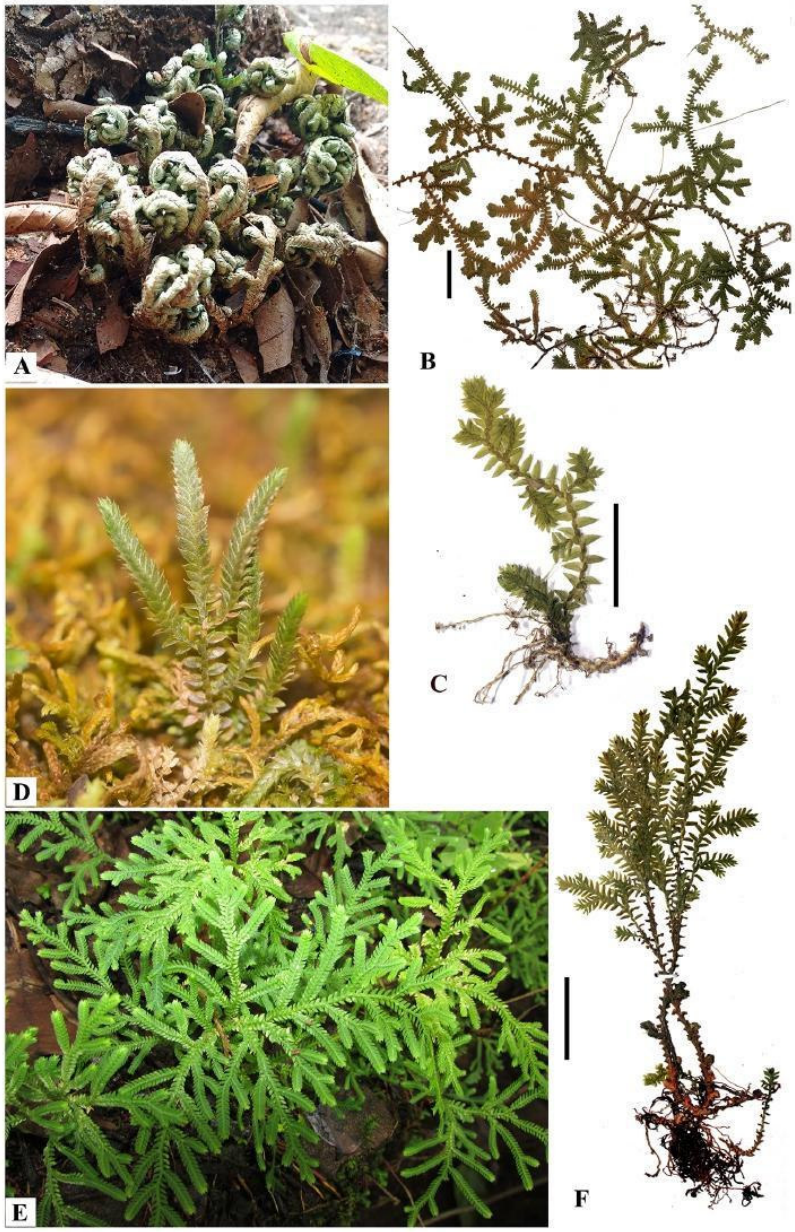

Figure 2. Habit. A. *Selaginella convoluta* (Arn.) Spring. B. *Selaginella marginata* (Humb. & Bonpl. ex Willd.) Spring. C. *Selaginella minima* Spring. D. *Selaginella simplex* Baker. Habit. E. *Seleginella erythropus* (Mart.) Spring. F. *Selaginella sulcata* (Desv. ex Poir.) Spring ex Mart. Scale bar: B; F = 2cm; C=1cm.

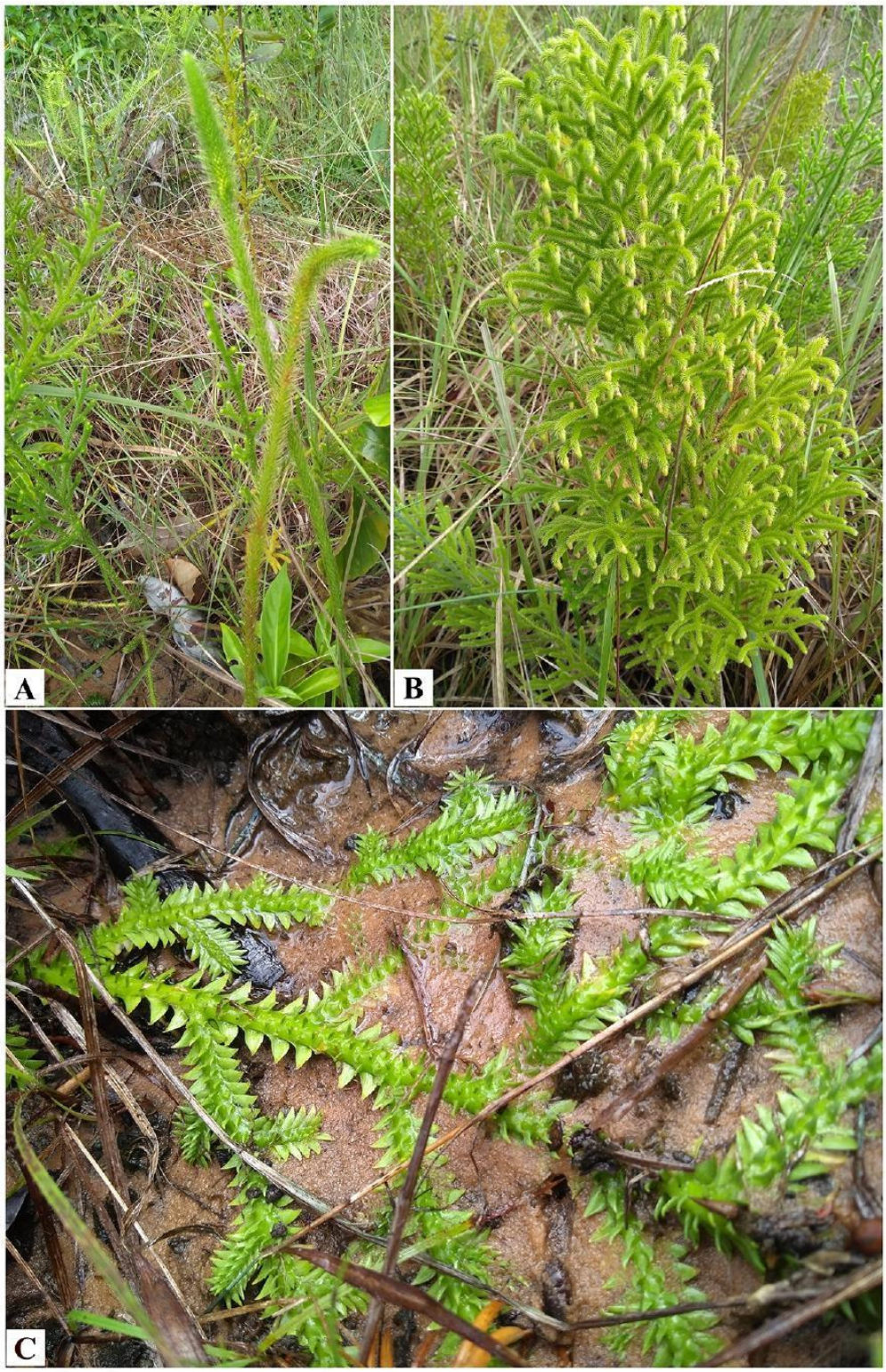

Figure 3. Habit. A. *Lycopodiella longipes* (Grev. & Hook.) Holub. B. *Palhinhaea camporum* (B. Øllg. & Windisch) Holub. C. *Pseudolycopodiella meridionalis* (Underw. & Loyd) Holub.

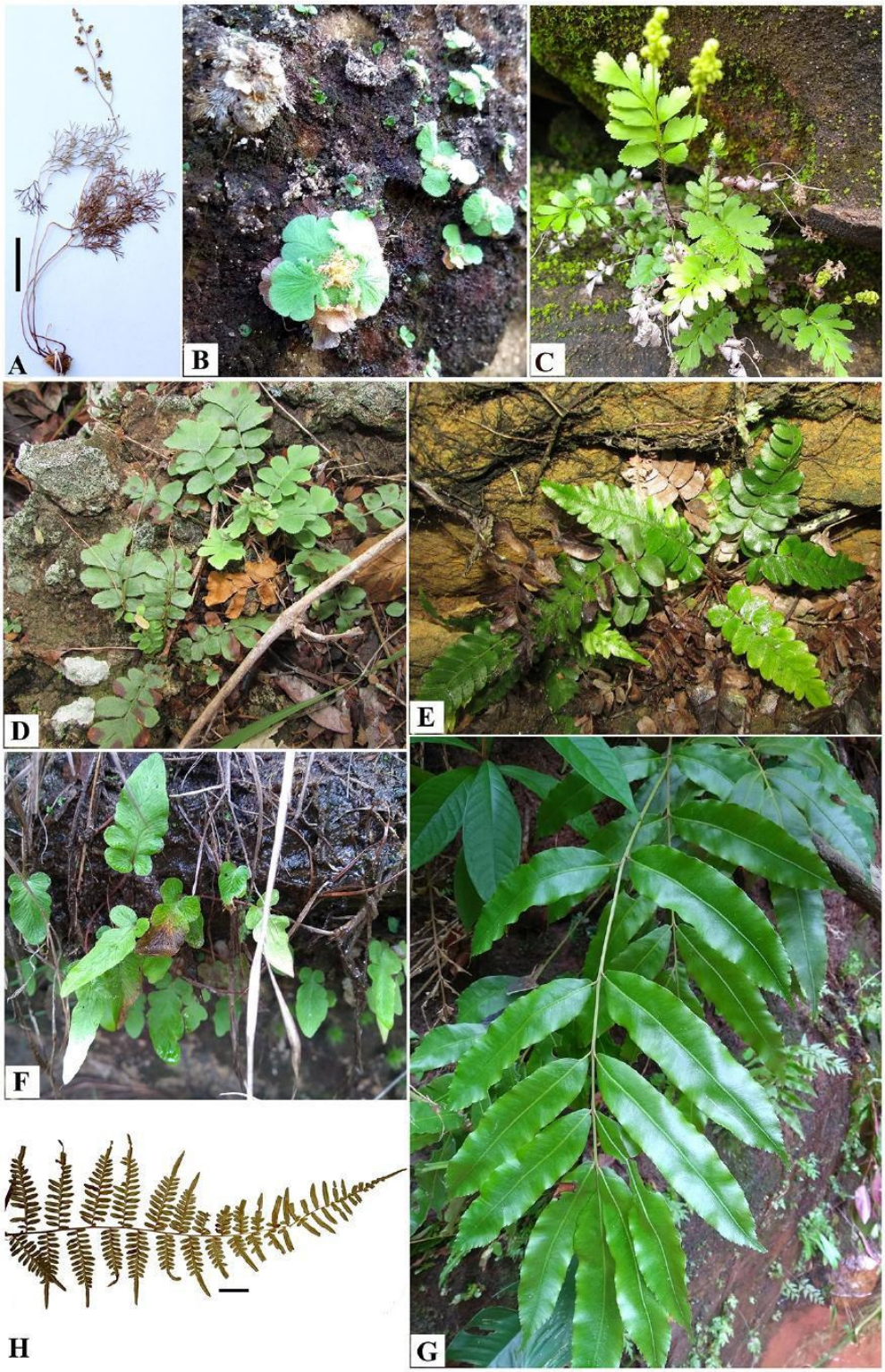

Figure 4. A. *Anemia buniifolia* (Gardner) T.Moore. Habit. B. *Anemia elegans* (Gardner) C.Presl. Habit. C. *Anemia hirsuta* (L.) Sw. Habit. D. *Anemia oblongifolia* (Cav.) Sw. Habit. E. *Blechnum* cf. *occidentale*. Habit. F. *Blechnum sp.* Habit. G. *Salpichlaena hookeriana* (Kuntze) Alston. Habit. H. *Pteridium esculentum* (G.Forst.) Cockayne subsp. *gryphus* Schwartsb. var. *harpianum* Schwartsb. & A.Yanez. Sterile Pinnae. Scale bar: A; H = 2cm.

Illustration. Mickel (2016: 126, fig. 13A–C).

Rupicolous on a rock wall on the margin of a trail. **Habitat:** Cerrado *sensu stricto*. **Geographic distribution:** MA, DF, GO, MS, MT, MG, SP, PR (Cerrado and Pantanal). New record: Northeast Region.

Salpichlaena hookeriana (Kuntze) Alston

(Figure 4G)

Terrestrial climber growing on a rocky bank near a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, PA, MA, RO, MS, MT (Amazonia and Cerrado). New record: Northeast Region and Cerrado.

Bolbitis serratifolia Schott.

(Figure 5A)

Rupicolous on a rock wall near a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, PA, RO, CE, MA, GO, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão and Cerrado.

Cyclodium meniscioides (Willd.) C. Presl

(Figure 5B)

Terrestrial in a marshy area with buriti palms and rupicolous plant in a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, AP, PA, RO, TO, BA, CE, MA, PB, PE, PI, RN, DF, GO, MS, MT, ES, MG, SP (Cerrado and Atlantic Forest). New record: Maranhão.

Dryopteris patula (Sw.) Underw.

(Figure 5C)

Rupicolous on a rock wall on the margin of a watercourse. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, AP, PA, RO, BA, MA, PI, GO, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Elaphoglossum scalpellum (Mart.) T. Moore.

(Figure 5D)

Rupicolous on a rock wall and near a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** AM, RO, TO, BA, MA, PI, DF, GO, MT, MG, SP (Cerrado). New record: Maranhão.

Polybotrya sorbifolia Mett. ex Kuhn.

(Figure 5E)

Rupicolous on a rock wall. **Habitat:** closed riparian forest. **Geographic distribution:** PA, RO, AL, MA, PE, GO, MT, MG, SP (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Didymoglossum angustifrons Fée

(Figure 5F-G)

Epiphytic from the base of a trunk of a live tree and rupicolous plant on a rocky bank in a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** AM, AP, PA, RO, BA, MA, CE, MT, MG, RJ, SP, PR (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Didymoglossum pinnatinervium (Jenman) Pic.Serm.

(Figure 5H)

Rupicolous on a rocky bank in a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** MA (Cerrado). New record: Northeast Region and Cerrado.

Trichomanes arbuscula Desv.

(Figure 5I)

Rupicolous on a rocky bank. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, AP, PA, BA, MA, PE, MT, ES (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão and Cerrado.

Lindsaea pallida Klotzsch

(Figure 6B)

Terrestrial on a sandy bank near the margin of a river. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, AP, PA, BA, MA, PE, MT (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Metaxya parkeri (Hook. & Grev.) J. Sm.

(Figure 6D)

Terrestrial on a sandy bank with litter and rupicolous plant on rock walls near watercourses, such as creek banks and waterfalls. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, AP, PA, BA, MA, PE, MT (Amazonia, Cerrado and Atlantic Forest). New record: Cerrado.

Nephrolepis pectinata (Willd.) Schott.

Illustration. Maciel (2016: 80, fig. 1h-k).

Epiphytic in the upper part of a babaçu palm in an area of pasture. **Habitat:** anthropogenic area. **Geographic distribution:** AC, AM, AP, PA, BA, MA, PE, MT (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Serpocaulon triseriale (Sw.) A.R.Sm.

(Figure 6C).

Terrestrial on a non-rocky bank near an area with buriti palms and rupicolous plant collected on a rocky bank. **Habitat:** open riparian forest. **Geographic distribution:** AC, AM, PA, TO, AL, BA, CE, MA, PE, DF, GO, MS, MT, ES, MG, RJ, SP, PR, RS, SC. (Amazonia, Caatinga, Cerrado, Atlantic Forest, Pampa and Pantanal). New record: Maranhão.

Adiantum intermedium Sw.

(Figure 7A)

Rupicolous on a rocky bank and terrestrial plant collected on a non-rocky bank in a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** MA, DF, GO, MS, MT, MG, RJ, SP, PR, SC (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Adiantum tetraphyllum Humb. Bonpl. ex Willd..

Illustration. Prado et al. (2017: 45, fig. 46E, F).

Terrestrial in *capoeira* in terra firme forest near a watercourse. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, AP, PA, RO, RR, TO, BA, CE, MA, PE, DF, GO, MS, MT, ES, MG, RJ, SP, PR, SC (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Azolla microphylla Kaulf..

(Figure 7G)

Floating aquatic in open flooded area above a waterfall. **Habitat:** open riparian forest. **Geographic distribution:** AM, BA, CE, MA, PE, SE, MG, PR, SC. (Amazonia, Caatinga, Cerrado and Atlantic Forest). New record: Cerrado.

Schizaea incurvata Schkuhr.

Terrestrial on a non-rocky bank inside a forest in a flat area with litter. **Habitat:** Cerrado *sensu stricto*. **Geographic distribution:** AM, AP, PA, RO, MA (Amazonia and Cerrado). New record: Northeast Region and Cerrado.

Tectaria incisa Cav.

(Figure 8A)

Rupicolous on a rocky bank in a waterfall area. **Habitat:** closed riparian forest. **Geographic distribution:** AC, AM, AP, PA, RO, RR,

Figure 5. A. *Bolbitis serratifolia* Schott. Habit. B. *Cyclodium meniscioides* (Willd.) C. Presl. Habit. C. *Dryopteris patula* (Sw.) Underw. Habit. D. *Elaphoglossum scalpellum* (Mart.) T. Moore. Sterile fronds. E. *Polybotrya sorbifolia* Mett. ex Kuhn. F-G. *Didymoglossum angustifrons* Fée. F. Habit. G. Fertile frond. H. *Didymoglossum pinnatinervium* (Jenman) Pic.Serm. Fertile frond I. *Trichomanes arbuscula* Desv. Habit. Scale bar: D = 2cm.

Figure 6. A. *Lindsaea guianensis* subsp. *lanceastrum* K.U.Kramer. Habit. B. *Lindsaea pallida* Klotzsch. Fertile frond. C. *Serpocaulon triseriale* (Sw.) A.R.Sm. Habit. D. *Metaxya parkeri* (Hook. & Grev.) J. Sm.. Habit. E. *Microgramma persicariifolia* (Schrad.) C.Presl. Habit. Scale bar: B = 2cm.

AL, BA, CE, MA, PE, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Amazonia, Cerrado and Atlantic Forest). New record: Cerrado.

Goniopteris biformata (Rosenst) Salino & T.E. Almeida

(Figure 8D)

Terrestrial on the margin of a waterfall and rupicolous plant collected on a rock wall. **Habitat:** open riparian forest. **Geographic distribution:** AC, PA, GO, MS, MT, MG, SP (Amazonia, Cerrado and Atlantic Forest). New record: Cerrado.

Macrothelypteris torresiana (Gaudich.) Ching.

Illustration. Smith (1992: 4, fig. 1a-d).

Rupicolous on a rock wall near a waterfall. **Habitat:** closed riparian forest. **Geographic distribution:** RO, AL, BA, CE, MA, PB, PE, RN, DF, GO, MS, MT, ES, MG, RJ, SP, PR, RS, SC (Cerrado, Atlantic Forest and Pampa). New record: Maranhão.

Meniscium chrysodioides Fée.

(Figure 8E)

Terrestrial on a non-rocky bank, in a marshy area with buriti palms, and rupicolous plant collected on a rock wall in a waterfall area. **Habitat:** open riparian forest; closed riparian forest. **Geographic distribution:** AC, PA, AL, MA, PE, GO, MS, MG, SP (Amazonia, Cerrado and Atlantic Forest). New record: Maranhão.

Discussion

Based on the present study, PNCM is the area (protected or not) with the greatest diversity of ferns and lycophytes (86 species) in Maranhão State. Mirador State Park is another protected area of Cerrado in the state. Despite its large size (450,838 hectares), only seven species of lycophytes and ferns have been recorded in the area (Conceição & Rodrigues 2010). However, this low diversity could be related

Figure 7. Habit. A. *Adiantum intermedium* Sw. B. *Adiantum latifolium* Lam. C. *Adiantum serratodentatum* Willd. D. *Adiantum terminatum* Kunze ex Miq. E. *Cheilanthes pohliana* Mett. F. *Vittaria lineata* (L.) Sm. G. *Azolla microphylla* Kaulf.

Figure 8. A. *Tectaria incisa* Cav. Habit. B-C. *Christella conspersa* (Schrad.) Á.Löve & D.Löve. B.| Habit. C. Detail of fertile pinnae showing a sori. D. *Goniopteris biformata* (Rosenst) Salino & T.E. Almeida. Habit. E. *Meniscium chrysodioides* Fée. Habit. F-G. *Meniscium delicatum* R.S. Fernandes & Salino. F. Habit. G. Detail of fertile pinnae showing a sori and anastomosing veins. H-I. *Meniscium hostmannii* (Klotzsch) R.S. Fernandes & Salino. H. Habit. I. Detail of fertile pinnae showing a sori.

to insufficient sampling, since it is a preserved area of Cerrado that probably has a diversity similar to PNCM. The Cerrado in Maranhão is strongly influenced by other domains (e.g., Amazonia and Caatinga) that, in general, favors a higher diversity of plant species (e.g., Ribeiro et al. 2020, Silva et al. 2021, Fernandes et al. 2021).

The species collected in the present study represent around 27.30% of the species recorded for the Brazilian Cerrado and increase the known diversity in this domain by 11 species that, until now, were only recorded for Amazonia and the Atlantic Forest (Flora do Brasil 2020). Additionally, this inventory resulted in 26 new records for Maranhão and five new records for the Northeast Region of Brazil. This shows the importance of this protected area for the conservation of the species of the groups studied. The number of new records in this study is probably a reflection of low sampling and local inventories (e.g., Fernandes et al. 2007, Conceição & Ruggieri 2010, Conceição & Rodrigues 2010, Fernandes et al. 2010, Conceição et al. 2015, Silva et al. 2017, Silva Júnior et al. 2018) that underestimated the diversity of lycophytes and ferns in the state.

The fern family with the most species is Pteridaceae (14 species). This can be explained by the wide distribution of the family in tropical regions and arid regions (Smith et al. 2006), and due to in Brazil the family is most diverse in Southeast (141 spp) and Northeast (104 spp) regions (Prado et al. 2020). Other studies in Cerrado (e.g., Fernandes et al. 2007, 2010, Silva et al. 2017) and Amazonia (e.g., Silva Junior et al. 2020) in Maranhão State also recorded more diversity for this family. In PNCM, 10 of the 14 Pteridaceae species recorded prefer a rocky substrate (Table 1). *Adiantum* L. (Pteridaceae) had the highest number of recorded species (10 species), of which two are new records for Maranhão (*Adiantum intermedium* Sw. and *A. tetraphyllum* Humb. & Bonpl. ex Willd.) and one (*A. petiolatum* Desv.) is a new record for the Brazilian Cerrado (Prado et al. 2020, Silva Junior et al. 2020).

The second most representative fern family is Thelypteridaceae with 11 species, of which three are reported for the first time for Maranhão State (*Goniopteris biformata* (Rosenst) Salino & T.E. Almeida, *Macrothelypteris torresiana* (Gaudich.) Ching, and *Meniscium chrysodioides* Fée); *Goniopteris biformata* is also a new record for the Northeast Region of Brazil (Fernandes & Salino 2020, Salino et al. 2020).

The diversity of lycophytes (17 species) in PNCM is high compared to other areas sampled in the state (e.g., Fernandes et al. 2007, 2010, Conceição & Rodrigues 2010). In Amazonia in Maranhão, for example, only two species of lycophytes have been recorded (Silva Junior et al. 2020), which is nine times less than that in PNCM. The lycophyte family with the most species is Selaginellaceae (12 species), of which three are reported for the first time for Maranhão State (*Selaginella convoluta* (Arn.) Spring, *Selaginella minima* Spring, and *Selaginella sulcata* (Desv. ex Poir.) Spring ex Mart.); the last one is also a new record for the Northeast Region of Brazil (Góes-Neto et al. 2020). Compared to Amazonia in Maranhão (Silva Junior et al. 2020), the high diversity of Selaginellaceae recorded in our study is due to the predominance of rupicolous habitats associated with waterfalls in PNCM (nine rupiculous species, Table 2).

The predominance of rupicolous species (22 species) in the present study was expected and is probably due to the wide availability of rock substrates in PNCM, such as rock walls of waterfalls and surroundings, and extensive rocky fragments inside riparian forest. Since there is a lot of rock substrate, species that are normally epiphytic (e.g., *Didymoglossum angustifrons* Fée) or terrestrial (e.g., *Trichomanes hostmannianum*) (Costa & Pietrobom 2007) in the study area develop on rocks. The second most recorded habit was terrestrial (15 species). A high number of terrestrial species is common in most studies about ferns in Maranhão State, for example, Bastos & Cutrim (1999), Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Ruggieri (2010), Conceição & Rodrigues (2010), Conceição et al. (2015), Silva et al. (2017), and Silva Junior et al. (2020).

In relation to environment type, most fern and lycophyte species generally occur in microhabitats in riparian forest, such as rocky banks, non-rocky banks, rock walls, waterfall areas and marshy areas (Table 2 and Supplementary file 1). Some species of Schizaeaceae (e.g., *Actinostachys pennula* (Sw.) Hook., *Schizaea incurvata* Schkuhr) and Anemiaceae (e.g., *Anemia elegans* (Gardner) C.Presl, *A. trichorhiza* Gardner) were collected in Cerrado *sensu stricto* (Table 1) in distinct microhabitats (inside forest in flat area and rock wall, respectively) (Table 2).

Conclusion

The present work shows that the fern and lycophyte diversity in the Cerrado in Maranhão is underestimated. This is mainly due to low sampling in previous studies, or a low number of sampling points (locations), and because the collections in Maranhão herbaria do not properly represent these groups. Based on this study, we encourage others to conduct similar studies that collect a lot of material and deposit specimens in herbaria that are open to the public. Overall, this will contribute to a more accurate estimate of the diversity of ferns and lycophytes in the Cerrado in Maranhão.

Supplementary Material

The following online material is available for this article:

Supplementary file 1 - List of ferns and lycophytes species recorded to the Maranhão State according to Scientific studies.

Supplementary file 2 - List of material examined.

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Associate Editor

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Author Contributions

Rozijane Santos Fernandes: identified the plants, elaboration of the species list for Maranhão State, prepared the figure boards, writing and proofreading the text.

Laryssa Reis Silva: collected and photographed the plants, identified the plants, writing the text.

Sirlane Santos Oliveira: collected and photographed the plants, identified the plants, elaboration of the species list for Maranhão State, writing the text.

Felipe Polivanov Ottoni: collected and photographed the plants, writing and proofreading the text.

Marcio Roberto Pietrobom: collected and photographed the plants, identified the plants, writing and proofreading the text.

Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

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Anexo 3: Material Suplementar 1 do Artigo publicado na revista Biota Neotropica – Lista de espécies

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Supplementary Material to "Ferns and lycophytes in Chapada das Mesas National Park and surroundings, Maranhão State, Brazil"

Supplementary file 1 - List of ferns and lycophytes species recorded to the Maranhão State according to Scientific studies.

Class, Family, species	Scientific studies
LYCOPODIOPSIDA	
SELAGINELLACEAE	
Selaginella conduplicata Spring	Almeida et al. (2020)
Selaginella radiata (Aubl.) Spring	Almeida et al. (2020), Flora do Brasil (2020)
Selaginella simplex Baker	Almeida et al. (2020), Flora do Brasil (2020)
Selaginella marginata (Humb. & Bonpl. ex. Willd.) Spring	Silva et al. (2017), Flora do Brasil (2020)
Selaginella erythropus (Mart.) Spring	Fernandes et al. (2010), Conceição & Rodrigues (2010), Almeida et al. (2020), Flora do Brasil (2020)
Selaginella flagellata Spring	Fernandes et al. (2010), Flora do Brasil (2020)
ISOETACEAE	
Isoetes panamensis Maxon & C.V. Morton	Almeida et al. (2020), Flora do Brasil (2020)
LYCOPODIACEAE	
Pseudolycopodiella meridionalis (Underw. & Loyd) Holub	Flora do Brasil (2020)
Pseudolycopodiella carnosa (Silveria) Holub	Santos-Silva et al. (2018a)
Lycopodiella alopecuroides (L.) Cranfill	Conceição & Rodrigues (2010)
Palhinhaea cernua (L.) Franco & Vasc.	Bastos & Cutrim (1999), Azevedo & Silva (2001), Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Rodrigues (2010), Silva Junior et al. (2020), Almeida et al. (2020), Flora do Brasil (2020)
POLYPODIOPSIDA	
ANEMIACEAE	

Class, Family, species	Scientific studies
Anemia ferruginea Humb. & Bonpl. ex Kunth	Flora do Brasil (2020)
Anemia ferruginea Humb. & Bonpl. ex Kunth var. *ferruginea*	Flora do Brasil (2020)
Anemia ferruginea var. *ahenobarba* (Christ) Mickel	Flora do Brasil (2020)
Anemia hirsuta (L.) Sw.	Flora do Brasil (2020)
Anemia hirta (L.) Sw.	Flora do Brasil (2020)
Anemia hispida Kunze	Flora do Brasil (2020)
Anemia oblongifolia (Cav.) Sw.	Flora do Brasil (2020)
Anemia tomentosa (Sav.) Sw.	Flora do Brasil (2020)
ASPLENIACEAE	
Asplenium salicifolium L..	Silva Junior et al. (2020)
Asplenium serratum L.	Silva Junior et al. (2020), Flora do Brasil (2020)
BLECHNACEAE	
Telmatoblechnum serrulatum (Rich.) Perrie, D.J. Ohsen & Brownsey	Bastos & Cutrim (1999), Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Ruggieri (2010), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
CYATHEACEAE	
Cyathea delgadii Sternb.	Conceição & Rodrigues (2010), Santos-Silva (2016), Silva et al. (2017), Santos-Silva et al. (2018B), Santos-Silva et al. (2019A), Santos-Silva et al. (2019C), Silva Junior et al. (2020)
Cyathea microdonta (Desv.) Domin	Bastos & Cutrim (1999), Silva Junior et al. (2020)
DENNSTADTIACEAE	
Pteridium caudatum (L.) Maxon	Silva Junior et al. (2020)
Pteridium esculentum (G. Forst.) Cockayne	Conceição & Ruggieri (2010), Flora do Brasil (2020)
DRYOPTERIDACEAE	
Ctenitis aspidioides (C. Presl) Copel	Flora do Brasil (2020)
Ctenitis submarginalis (Langsd. & Fisch.) Ching	Flora do Brasil (2020)
Ctenitis submarginalis var. *tenuifolia* (C. Presl) R.S. Viveros & Salino	Flora do Brasil (2020)
Ctenitis refulgens (Mett.) Vareschi	Silva Junior et al. (2020), Flora do Brasil (2020)
Elaphoglossum luridum (Fée) Christ	Silva Junior et al. (2020), Flora do Brasil (2020)

Class, Family, species	Scientific studies
Mickelia nicotianifolia (Sw.) R.C. Moran, Labiak & Sundue	Silva Junior et al. (2020), Flora do Brasil (2020)
Polybotrya caudata Kunze	Silva Junior et al. (2020)
Parapolystichum effusum (Sw.) Ching	Flora do Brasil (2020)
GLEICHENIACEAE	
Dicranopteris flexuosa (Schrad.) Underw.	Flora do Brasil (2020)
HYMENOPHYLLACEAE	
Didymoglossum angustifrons Fée	Silva Junior et al. (2020)
Didymoglossum punctatum (Poir.) Desv.	Silva Junior et al. (2020)
Trichomanes crispum L.	Flora do Brasil (2020)
Trichomanes hostmannianum (Klotzsch)Kunze	Flora do Brasil (2020)
Trichomanes pedicellatum Desv.	Silva Junior et al. (2020)
Trichomanes pinnatum Hedw.	Silva Junior et al. (2020), Flora do Brasil (2020)
Trichomanes pilosum Raddi	Flora do Brasil (2020)
Trichomanes polypodioides L.	Flora do Brasil (2020)
Trichomanes vittaria DC. ex. Poir	Silva Junior et al. (2020), Flora do Brasil (2020)
Trichomanes cristatum Kaulf.	Fernandes et al. (2007), Fernandes et al. (2010), Flora do Brasil (2020)
LYGODIACEAE	
Lygodium volubile Sw.	Bastos & Cutrim (1999), Fernandes et al. (2010), Conceição et al. (2015), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
Lygodium venustum Sw.	Bastos & Cutrim (1999), Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Ruggieri (2010), Conceição et al. (2015), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
LINDSAEACEAE	
Lindsaea stricta (Sw.) Dryand.	Bastos & Cutrim (1999), Flora do Brasil (2020)
Lindsaea guianensis (Aubl.) Dryand.	Silva et al. (2017), Flora do Brasil (2020)
Lindsaea divaricata Klotzsch	Fernandes et al. (2010)
Lindsaea guianensis subsp. *lanceastrum* K.U. Kramer	Flora do Brasil (2020)
Lindsaea parvula Fée	Flora do Brasil (2020)

Class, Family, species	Scientific studies
Lindsaea lancea (L.) Bedd.	Fernandes et al. (2007), Conceição & Rodrigues (2010), Conceição et al. (2015), Silva Junior et al. (2020), Flora do Brasil (2020)
LOMARIOPSIDACEAE	
Lomariopsis japurensis (Mart.) J.Sm.	Silva Junior et al. (2020), Flora do Brasil (2020)
Lomariopsis prieuriana Fée	Silva Junior et al. (2020), Flora do Brasil (2020)
MARSILEACEAE	
Marsilea polycarpa Hook. & Grev.	Silva Junior et al. (2020), Flora do Brasil (2020)
METAXYACEAE	
Metaxya parkeri (Hook. & Grev.) J. Sm.	Flora do Brasil (2020)
NEPHROLEPIDACEAE	
Nephrolepis undulata (Afzel.) J.Sm.	Flora do Brasil (2020)
Nephrolepis brownii (Desv.) Hovenkamp & Miyam.	Silva Junior et al. (2020)
Nephrolepis biserrata (Sw.) Schott	Bastos & Cutrim (1999), Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Ruggieri (2010), Conceição et al. (2015), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
Nephrolepis rivularis (Vahl) Mett. ex. Krug	Fernandes et al. (2007), Fernandes et al. (2010), Silva et al. (2017)
PSILOTACEAE	
Psilotum nudum (L.) P. Beauv.	Flora do Brasil (2020)
PTERIDACEAE	
Pityrogramma calomelanos (L.) Link	Bastos & Cutrim (1999), Fernandes et al. (2007), Conceição & Rodrigues (2010), Conceição & Ruggieri (2010), Conceição et al. (2015), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
Cheilantes pohliana Mett.	Flora do Brasil (2020)
Polytaenium guayanense (Hieron.) Alston	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantopsis radiata (L.) Fée	Flora do Brasil (2020)
Adiantopsis chlorophylla (Sw.) Fée	Flora do Brasil (2020)
Ananthacorus angustifolius (Sw.) Underw. & Maxon	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum pectinatum Kunze ex Baker	Flora do Brasil (2020)

Class, Family, species	Scientific studies
Adiantum sinuosum Gardner	Flora do Brasil (2020)
Adiantum petiolatum Desv.	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum paraense Hieron.	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum obliquum Willd.	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum glaucescens Kloztsch	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum lucidum (Cav.) Sw.	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum dolosum Kunze	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum cinnamomeum Lellinger & J. Prado	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum cajennense Willd. ex. Klotzsch	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum terminatum Kunze ex. Miq.	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum argutum Splitg.	Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum pulverulentum L.	Bastos & Cutrim (1999), Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum raddianum C. Presl	Bastos & Cutrim (1999)
Adiantum serratodentatum Willd.	Fernandes et al. (2010), Flora do Brasil (2020)
Adiantum latifolium Lam.	Bastos & Cutrim (1999), Conceição & Ruggieri (2010), Conceição et al. (2015), Silva Junior et al. (2020), Flora do Brasil (2020)
Adiantum deflectens Mart.	Fernandes et al. (2007), Fernandes et al. (2010), Conceição et al. (2015), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
Acrostichum danaeifolium Langsd. & Fisch.	Fernandes et al. (2010), Silva Junior et al. (2020), Flora do Brasil (2020)
Acrostichum aureum L.	Bastos & Cutrim (1999), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
Ceratopteris pteridoides (Hook.) Hieron.	Silva et al. (2017), Flora do Brasil (2020)
Ceratopteris thalictroides (L.) Brongn.	Fernandes et al. (2010), Conceição & Ruggieri (2010), Silva et al. (2017), Silva Junior et al. (2020), Barbieri et al. (2020), Flora do Brasil (2020)
Pteris denticulata Sw.	Flora do Brasil (2020)
Pteris denticulata var. *tristicula* (Raddi) J. Prado	Silva Junior et al. (2020)
Pteris denticulata Sw. var. *denticulata*	Flora do Brasil (2020)

Class, Family, species	Scientific studies
Pteris biaurita L.	Flora do Brasil (2020)
Pteris vittata L.	Silva Junior et al. (2020), Flora do Brasil (2020)
Pteris tripartita Sw.	Silva Junior et al. (2018), Silva Junior et al. (2020), Flora do Brasil (2020)
Vittaria lineata (L.) Sm.	Silva Junior et al. (2020), Flora do Brasil (2020)
POLYPODIACEAE	
Campyloneurum phyllitidis (L.) C.Presl	Silva Junior et al. (2020)
Microgramma lycopodioides (L.) Copel.	Silva Junior et al. (2020)
Microgramma percussa (Cav.) de la Sota	Flora do Brasil (2020)
Microgramma persicariifolia (Schrad.) C.Presl	Silva Junior et al. (2020)
Microgramma reptans (Cav.) A.R.Sm.	Silva Junior et al. (2020)
Niphidium crassifolium (L.) Lellinger	Flora do Brasil (2020)
Pleopeltis burchellii (Baker) Hickey & Sprunt ex. A.R.Sm.	Silva Junior et al. (2020), Flora do Brasil (2020)
Phlebodium decumanum (Willd.) J.Sm.	Bastos & Cutrim (1999), Flora do Brasil (2020)
Phlebodium aureum (L.) J.Sm.	Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Ruggieri (2010), Silva et al. (2017), Flora do Brasil (2020)
Phlebodium pseudoaureum (Cav.) Lellinger	Flora do Brasil (2020)
SALVINIACEAE	
Azolla filiculoides Lam.	Silva Junior et al. (2020)
Azolla microphylla Kaulf.	Flora do Brasil (2020)
Salvinia radula Baker	Flora do Brasil (2020)
Salvinia auriculata Aubl.	Fernandes et al. (2010), Conceição et al. (2015), Silva et al. (2017), Silva Junior et al. (2020), Barbieri et al. (2020), Flora do Brasil (2020)
Salvinia molesta D.S.Mitch.	Barbieri et al. (2020)
SCHIZAEACEAE	
Actinostachys pennula (Sw.) Hook.	Santos-Silva et al. (2019b), Flora do Brasil (2020)
Schizaea stricta Lellinger	Santos-Silva et al. (2019b)
Schizaea elegans (Vahl) Sw.	Santos-Silva et al. (2019b)
TECTARIACEAE	
Tectaria incisa Cav.	Silva Junior et al. (2020)

Class, Family, species	Scientific studies
Triplophyllum dicksonioides (Fée) Holttum	Silva Junior et al. (2020)
Triplophyllum funestum (Kunze) Holttum	Silva Junior et al. (2020), Flora do Brasil (2020)
Triplophyllum glabrum J.Prado & R.C.Moran	Silva Junior et al. (2020)
THELYPTERIDACEAE	
Goniopteris amazonica (Salino & R.S.Fernandes) Salino & T.E.Almeida	Silva Junior et al. (2020), Flora do Brasil (2020)
Christella dentata (Forssk.) Brownsey & Jermy	Flora do Brasil (2020)
Christella conspersa (Schrad.) Á.Löve & D.Löve	Flora do Brasil (2020)
Christella patens (Sw.) Pic.Serm.	Fernandes et al. (2007), Fernandes et al. (2010)
Christella hispidula (Decne.) Holttum	Flora do Brasil (2020)
Cyclosorus interruptus (Willd.) H.Ito	Bastos & Cutrim (1999), Fernandes et al. (2010), Conceição & Ruggieri (2010), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
Meniscium hostmannii (Klotzssch) R.S.Fernandes & Salino	Silva Junior et al. (2020), Flora do Brasil (2020)
Meniscium serratum Cav.	Bastos & Cutrim (1999), Fernandes et al. (2010), Silva et al. (2017), Silva Junior et al. (2020), Flora do Brasil (2020)
Meniscium arborescens Humb. & Bonpl. ex. Willd.	Fernandes et al. (2007), Fernandes et al. (2010), Conceição & Rodrigues (2010), Conceição et al. (2015), Silva et al. (2017), Flora do Brasil (2020)
Meniscium angustifolium Willd.	Flora do Brasil (2020)
Meniscium delicatum R.S. Fernandes & Salino	Flora do Brasil (2020)
Meniscium maxonianum (A.R.Sm.) R.S. Fernandes & Salino	Flora do Brasil (2020)

Anexo 4: Material Suplementar 2 do Artigo publicado na revista Biota Neotropica – Material Examinado

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Supplementary Material to "Ferns and lycophytes in Chapada das Mesas National Park and surroundings, Maranhão State, Brazil"

Supplementary file 2 - List of material examined

LYCOPODIOPSIDA

ISOETACEAE

***Isoetes panamensis* Maxon & C.V. Morton**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira do Prata, ca. 6°59'36,9"S, 47°9'58,5"W, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 45 (CCAA/UPCB/BHCB); idem. ca. 06°59'37,4"S, 047°09'57,1"W, 208 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 64 (CCAA/UPCB).

LYCOPODIACEAE

***Palhinhaea camporum* (B. Øllg. & P.G. Windisch) Holub**

Material examinado: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07°01'14,8"S, 047°27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 97 (CCAA/HBRA).

***Palhinhaea cernua* (L.) Franco & Vasc.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07º01'14,8"S, 047º27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 95 (CCAA/HBRA); idem. PARNA Chapada das Mesas, Cachoeira da Ponta da Serra, Riacho Lajes, ca. 6º58'47,4"S, 47º22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 31 (CCAA); idem. Riacho Corrente, ca. 7º4'25,6"S, 47º5'26,6"W, 284 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 78 (CCAA); idem. ca. 7º04'25,0"S, 047º05'26,2"W, 277 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 75 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 71 (CCAA).

***Lycopodiella longipes* (Grev. & Hooker) Holub**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07º01'14,8"S, 047º27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. *99* (CCAA/HBRA).

***Pseudolycopodiella meridionalis* (Underw. & Lloyd) Holub**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07º01'14,8"S, 047º27'52"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 96 (CCAA/HBRA).

SELAGINELLACEAE

***Selaginella convoluta* (Arn.) Spring**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira do Porão, ca. 06º55'55,6"S, 047º22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 31 (CCAA/HBRA).

***Selaginella conduplicata* Spring**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira do Prata, rio Farinha (bacia do rio Tocatins), ca. 6°59'37"S, 47°09'57"W, 197 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 03 (CCAA); idem. ca. 6°59'36,9"S, 47°9'58,5"W, 198 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 43 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 40 (CCAA); idem. ca. 6°59'37,4"S, 47°09'58,0"W, 194 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 84 (CCAA); idem. Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, margem direita do rio Farinha, ca. 6°59'36,7"S, 47°9'53,1"W, 210 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 29 (CCAA/HBRA).

***Selaginella erythropus* (Mart.) Spring**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 160 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 164 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R 156 (CCAA/HBRA); idem. Topo do Morro do Dôdo, ca. 07°05'30,1"S, 047°26'46,8"W, 389 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 130a (CCAA/HBRA); idem. PARNA Chapada das Mesas, Passagem da dona Lena, ca 07°03'45,1"S, 047°15'16,2"W, 230 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 85 (CCAA); idem. Próximo a Cachoeira do Siduca, ca. 06°58'54,1"S, 047°22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 43 (CCAA); idem. Cachoeira do Porão, ca. 06°55'55,6"S, 047°22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 33 (CCAA); idem. Cachoeira do Prata, rio Farinha, ca. 6°59'37,4"S, 47°09'58,0"W, 194 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 91 (CCAA); idem. Silva, L.R. & Almeida, F.C. 90 (CCAA); idem. Silva, L.R. & Almeida, F.C. 100 (CCAA); idem. ca. 6°59'36,9"S, 47°9'58,5"W, 198 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 39 (CCAA); idem. ca. 6°59'37"S, 47°09'57"W, 197 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 08 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 14 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 09 (CCAA); idem. ca. 6°59'41,3"S, 47°9'57,4"W, 213 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 37 (CCAA); idem. Cachoeira da Ponta da Serra, riacho Lajes, ca.

6°58’47,4”S, 47°22’25”W, 235 m, 11 October 2017, Silva, L.R. & Pietrobom, M.R. 24 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 29 (CCAA); idem. Cachoeira São Romão, rio Farinha, ca. 7°01’15,4”S, 47°02’28,2”W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 183 (CCAA); idem. ca. 7°01’17,1”S, 47°02’27,1”W, 256 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 65 (CCAA); idem. Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, margem direita do rio Farinha, ca. 6°59’36,7”S, 47°9’53,1”W, 210 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 26 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 28 (CCAA).

Selaginella flagellata **Spring**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, próximo a Cachoeira do Siduca, ca. 06°58’54,1”S, 047°22’26,8”W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 46 (CCAA).

Selaginella marginata **(Humb. & Bonpl. ex Willd.) Spring**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Passagem da dona Lena, ca. 07°03’45,1”S, 047°15’16,2”W, 230 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 89 (CCAA/HBRA); idem. Cachoeira do Porão, ca. 06°55’55,6”S, 047°22’53,6”W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 29 (CCAA/HBRA).

Selaginella minima **Spring**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Morro do Dôdo, ca. 07°05’39,3”S, 047°26’39,3”W, 256 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 126 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 121 (CCAA/HBRA); idem. Estância Ecológica Vereda Bonita, ca. 07°01’14,8”S, 047°27’52,6”W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 90 (CCAA/HBRA); idem. PARNA Chapada das Mesas, próximo a Cachoeira do Porão, ca. 06°55’58,2”S, 047°22’50,8”W, 175 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 36 (CCAA/HBRA).

***Selaginella radiata* (Aubl.) Spring**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07º01'14,8"S, 047º27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 100 (CCAA); idem. Resort da Pedra Caída, rio Vão Feio, próximo a Cachoeira da Caverna, ca. 07º03'53,2"S, 047º28'12,6"W, 200 m, 07 February 2020, Oliveira, S.S & Pietrobom, M.R. 187 (CCAA/HBRA); idem. Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 161 (CCAA); idem. Cachoeira do Dôdo, ca. 07º05'43,0"S, 047º26'39,5"W, 234 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 118 (CCAA/HBRA); idem. Topo do Morro do Dôdo, ca. 07º05'30,1"S, 047º26'46,8"W, 389 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 130b (CCAA/HBRA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 7º08'07,7"S, 47º26'07,1"W, 286 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 126 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 120 (CCAA/HBRA); idem. PARNA Chapada das Mesas, Cachoeira do Porão, ca. 06º55'55,6"S, 047º22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 24 (CCAA/HBRA); idem. Próximo a Cachoeira do Siduca, ca. 06º58'54,1"S, 047º22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 50 (CCAA/HBRA); idem. Riacho Lajes, próximo a Cachoeira do Siduca, ca. 06º59'38,99"S, 047º22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 58 (CCAA/HBRA); idem. Próximo a Cachoeira do Porão, ca. 06º55'58,2"S, 047º22'50,8"W, 175 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 39 (CCAA); idem. Cachoeira São Romão, ca. 7º1'17,2"S, 47º2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 59 (CCAA/MG); idem. Silva, L.R. & Pietrobom, M.R. 55 (CCAA/MG); idem. 7º01'17,1"S, 47º02'27,1"W, 256 m, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 47 (CCAA); idem. Cachoeira da Ponta da Serra, riacho Lajes, ca. 6º58'47,4"S, 47º22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 22 (CCAA/MG); idem. ca. 6º58'47,1"S, 47º22'25,5"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 114 (CCAA); idem. Estreito,

PARNA Chapada das Mesas, margem direita do rio Farinha, ca. 6°59'36,7"S, 47°9'53,1"W, 210 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 47 (CCAA/MG).

***Selaginella simplex* Baker**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Topo do Morro do Dôdo, ca. 07°05'30,1"S, 047°26'46,8"W, 389 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 129 (CCAA/HBRA); idem. Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, margem direita do rio Farinha, ca. 6°59'36,7"S, 47°9'53,1"W, 210 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 25 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 30 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 27 (CCAA/HBRA); idem. 12 March 2017, Silva, L.R. & Pietrobom, M.R. 48 (CCAA/MG); idem. Silva, L.R. & Pietrobom, M.R. 46 (CCAA/MG); idem. Cachoeira São Romão, ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 58 (CCAA/MG).

***Selaginella sulcata* (Desv. ex Poir.) Spring ex Mart.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Topo do Morro do Dôdo, ca. 07°05'30,1"S, 047°26'46,8"W, 389 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 130 (CCAA/HBRA).

***Selaginella* sp. 1**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 143 (CCAA/HBRA).

***Selaginella* sp. 2**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 143a (CCAA/HBRA).

***Selaginella* sp. 3**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 159 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 142 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 144 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 152 (CCAA/HBRA); idem. Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 175 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 176 (CCAA/HBRA); idem. Cachoeira do Capelão, ca. 07º03'01,5"S, 047º28'37,9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 199 (CCAA/HBRA).

POLYPODIOPSIDA

ANEMIACEAE

***Anemia buniifolia* (Gardn.) T. Moore**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, riacho Lajes, ca. 6º59'38,99"S, 047º22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 59 (CCAA); idem. Cachoeira do Siduca, ca. 06º58'54,1"S, 047º22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 42 (CCAA); idem. Cachoeira do Porão, ca. 06º55'55,6"S, 047º22'53,6"W, 174 m, Oliveira, S.S. & Pietrobom, M.R. 21 (CCAA/HBRA); idem. Borda do PARNA Chapada das Mesas, Cachoeira da Ponta da Serra, riacho Lajes (bacia do rio Tocantins), ca. 6º58'47,4"S, 47º22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 21 (CCAA); idem. ca. 6º58'47,1"S, 47º22'25,5"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 117 (CCAA).

***Anemia elegans* (Gardner) C. Presl**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, próximo a Cachoeira do Porão, ca. 06°55'58,2"S, 047°22'50,8"W, 175 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 40 (CCAA/HBRA); idem. Topo do Morro do Dodô, ca. 07°05'30,1"S, 047°26'46,8"W, 389 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 132 (CCAA).

***Anemia ferruginea* Humb. & Bonpl. ex Kunth**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, ca. 6°56'43,5"S, 47°20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 02 (CCAA); idem. Próximo a Cachoeira do Siduca, ca. 06°58'54"S, 047°22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 51 (CCAA); idem. Morro do Dodô, ca. 07°05'39,3"S, 047°26'39,3"W, 256 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 125 (CCAA/HBRA).

***Anemia hirsuta* (L.) Sw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira do Porão, ca. 06°55'55,6"S, 047°22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 27 (CCAA); idem. Próximo à casa do Siduca, ca. 06°58'54,1"S, 047°22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 52 (CCAA); idem. Riacho Lajes, próximo à casa do Siduca, ca. 06°59'38,99"S, 047°22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 55 (CCAA/HBRA); idem. Cachoeira do Prata, ca. 6°56'43,5"S, 47°20'30,2"W, 175 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 42 (CCAA); idem. Riacho Buenos Aires, ca. 6°56'43,5"S, 47°20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 03 (CCAA).

***Anemia oblongifolia* (Cav.) Sw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S.

& Pietrobom, M.R. 133 (CCAA); idem. Estância Ecológica Vereda Bonita, ca. 07°01'14,8"S, 047°27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 91 (CCAA/HBRA); idem. PARNA Chapada das Mesas, próximo a Cachoeira do Porão, ca. 06°55'58,2"S, 047°22'50,8"W, 175 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 37 (CCAA); idem. Próximo a Cachoeira do Siduca, ca. 06°58'54,1"S, 047°22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 44 (CCAA); idem. Cachoeira do Porão, ca. 06°55'55,6"S, 047°22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 22 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 34 (CCAA); idem. Cachoeira do Dodô, ca. 07°05'43,0"S, 047°26'39,5"W, 234 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 114 (CCAA); idem. Morro do Dodô, ca. 07°05'39,3''S, 047°26'39,3''W, 256 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 127 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 124 (CCAA); idem. Topo do Morro do Dodô, ca. 07°05'30,1"S, 047°26'46,8"W, 389 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 128 (CCAA); idem. Cachoeira São Romão, rio Farinha (bacia do rio Tocantins), ca. 7°1'17,2"S, 47°2'27,8"W, 256 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni. F. 66 (CCAA); idem. ca. 7°1'17,2"S, 47°2'27,8"W, 256 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 56 (CCAA); idem. ca. 7°01'15,4"S, 47°02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 157 (CCAA); idem. Cachoeira do Prata, rio Farinha, ca. 6°59'37,4"S, 47°09'58,0"W, 194 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 89 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 88 (CCAA); idem. ca. 6°59'41,3"S, 47°9'57,4"W, 213 m, 12 March 2017, SILVA, L.R. & Pietrobom, M.R. 35 (CCAA); idem. Borda do PARNA Chapada das Mesas, Cachoeira Ponta da Serra, rio Laje (bacia do rio Tocantins), ca. 6°58'47,1"S, 47°22'25,5"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni. F. 103 (CCAA); idem. ca. 6°58'47,4"S, 47°22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 20 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 7°08'07,7"S, 47°26'07,1"W, 286 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni. F. 122 (CCAA).

Anemia trichorhiza **Gardner**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Morro do Dodô, ca. 07º05'39,3"S, 047º26'39,3"W, 256 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 119 (CCAA/HBRA).

BLECHNACEAE

Blechnum* cf. *occidentale

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 163 (CCAA/HBRA); idem. PARNA Chapada das Mesas, Cachoeira São Romão, rio Farinha (bacia do Rio Tocatins) ca. 7º01'15,4"S, 47º02'28,2"W, 256 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 51 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 55 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 52 (CCAA); idem. ca. 7º1'17,2"S, 47º2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 71 (CCAA/CESJ/HBRA); idem. 31 October 2017, Silva, L.R. & Almeida, F.C. 165 (CCAA/CESJ).

***Blechnum* sp.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, topo do Morro do Dodô, ca. 07º05'30,1"S, 047º26'46,8"W, 389 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 131 (CCAA); idem. PARNA Chapada das Mesas, próximo a Cachoeira do Siduca, ca. 06º58'54,1"S, 047º22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 49 (CCAA); idem. Próximo a Cachoeira do Porão, ca. 06º55'58,2"S, 047º22'50,8"W, 175 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 38 (CCAA/HBRA); idem. Cachoeira da Ponta da Serra, Rio Laje (bacia do rio Tocantins), ca. 6º58'47,1"S, 47º22'25,5"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 116 (CCAA).

***Salpichlaena hookeriana* (Kuntze) Alsto**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 174 (CCAA/HBRA); idem. Cachoeira do Capelão, ca. 07º03'01,5"S, 047º28'37,9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 195 (CCAA); idem. Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 153 (CCAA).

***Telmatoblechnum serrulatum* (Rich.) Perrie, D.J. Ohlsen & Brownsey**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, riacho Fundo, próximo à sede do ICMBio, ca. 07º02'24,2"S, 047º09'39,5"W, 231 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 74 (CCAA/HBRA); idem. Riacho Buenos Aires, ca. 6º56'54,3"S, 47º20'36,0"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 90 (CCAA); idem. ca. 6º56'44,4"S, 47º20'37,4"W, 170 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 115 (CCAA); idem. Silva, L.R. & Almeida, F.C. 116 (CCAA); idem. Riacho das Rosas, ca. 7º6'51,14"S, 47º04'27,73"W, 292 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 177 (CCAA); idem. Riachão, PARNA Chapada das Mesas, riacho das Mortes, ca. 7º20'49,5"S, 46º55'50,3"W, 237 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 151 (CCAA); idem. Silva, L.R. & Almeida, F.C. 141 (CCAA).

CYATHEACEAE

***Cyathea delgadii* Sternb.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 172 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 07º08'07,7"S, 47º26'07,1"W, 286 m, 06.IV.2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 41 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 44 (CCAA); idem. PARNA Chapada das Mesas, riacho Buenos Aires, ca. 6º56'43,6"S,

47°20’31,2”W, 179 m, 08.IV.2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 88 (CCAA); idem. ca. 6°56’42,7”, 47°20’31,0”W, 155 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 112 (CCAA); idem. ca. 6°56’43,5”S, 47°20’30,2”W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 10 (CCAA); idem. ca. 6°56’42,7”S, 47°20’31,0”W, 155 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 111 (CCAA).

***Cyathea microdonta* (Desv.) Domin**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02’44,2”S, 047°26’38,0”W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 155 (CCAA).

DENNSTAEDTIACEAE

***Pteridium esculentum* (G. Forst.) Cockayne subsp. *gryphus* Schwartsb. var. *harpianum* Schwartsb. & A. Yanez**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Cachoeira da Mansinha, ca. 07°08’07,7”S, 47°26’07,1”W, 286 m, 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 13 (CCAA); idem. PARNA Chapada das Mesas, riacho Buenos Aires (bacia do Rio Tocantins), ca. 6°56’43,6”S, 47°20’31,2”W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 86 (CCAA); idem. Riachão, PARNA Chapada das Mesas, riacho das Mortes, ca. 7°20’49,5”S, 46°55’50,3”W, 237 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 143 (CCAA); idem. Silva, L.R. & Almeida, F.C. 142 (CCAA).

DRYOPTERIDACEAE

***Bolbitis serratifolia* Schott**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02’44,2”S, 047°26’38,0”W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 139 (CCAA/HBRA).

***Cyclodium meniscioides* (Willd.) C. Presl**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 154 (CCAA); idem. PARNA Chapada das Mesas, riacho Buenos Aires (bacia do Rio Tocantins), ca. 6º56'54,3"S, 47º20'36,0"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 92 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 94 (CCAA); idem. Cachoeira São Romão, rio Farinha, ca. 7º01'15,4"S, 47º02'28,2"W, 241 m, Silva, L.R. & Almeida, F.C. 174 (CCAA); idem. Riacho de Pedra, ca. 7º14'03,3"S, 46º59'53,8"W, 296 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 150 (CCAA); idem. Silva, L.R. & Almeida, F.C. 148 (CCAA); idem. Riacho Fundo, próximo à sede do ICMBio, ca. 07º02'24,2"S, 047º09'39,5"W, 231 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 69 (CCAA/HBRA); idem. Entorno do PARNA Chapada das Mesas, riacho RPPN Mansinha, ca. 7º08'07,7"S, 47º26'07,1"W, 286 m, 06 June 2018, Almeida, F.C.; Silva. J.A.S.; Oliveira, L. & Ottoni, F. 37 (CCAA).

***Dryopteris patula* (Sw.) Underw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira da Ponta da Serra, riacho Lajes, ca. 6º58'47,4"S, 47º22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 33 (CCAA); idem. Cachoeira São Romão, ca. 7º1'17,2"S, 47º2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 62 (CCAA/HBRA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 48 (CCAA).

***Elaphoglossum scalpellum* (Mart.) T. Moore**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira da Ponta da Serra, riacho Lajes, ca. 6º58'47,4"S, 47º22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 34 (CCAA).

***Elaphoglossum* sp.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, borda do PARNA Chapada das Mesas, Cachoeira da Ponta da Serra, riacho Laje, ca. 6°58'47,1"S, 47°22'25,5"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 115 (CCAA).

***Polybotrya sorbifolia* Mett. ex Kuhn**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 140 (CCAA/HBRA).

GLEICHENIACEAE

***Dicranopteris flexuosa* (Schrad.) Underw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, rio do Encontro, ca. 07°03'47,8"S, 047°28'10,4"W, 210 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 189 (CCAA); idem. Estância Ecológica Vereda Bonita, ca. 07°01'14,8"S, 047°27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 92 (CCAA); idem. Localidade Vereda Bonita, ca. 07°01'29,7"S, 047°28'28,3"W, 154 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 107 (CCAA); idem. Cachoeira do Dôdo, ca. 07°05'43,0"S, 047°26'39,5"W, 234 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 117 (CCAA); idem. PARNA Chapada das Mesas, riacho Fundo, próximo à sede do ICMBio, ca. 07°02'24,2"S, 047°09'39,5"W, alt 231 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 76 (CCAA); idem. Cachoeira do Porão, ca. 06°55'55,6"S, 047°22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 23 (CCAA/HBRA); idem. Riacho Lajes, próximo à casa do Siduca, ca. 06°59'38,99"S, 047°22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 60 (CCAA); idem. Cachoeira da Ponta da Serra, riacho Lajes, ca. 6°58'47,4"S, 47°22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 30 (CCAA); idem. Riacho Corrente, ca. 7°04'25,0"S, 47°05'26,2"W, 277 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. &

Ottoni, F. 74 (CCAA); idem. 7º4'25,6"S 47º5'26,6"W, 284 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 79 (CCAA/BHCB).

HYMENOPHYLLACEAE

***Didymoglossum angustifrons* Fée**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S & Pietrobom, M.R. 137 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 148 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 201 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 134 (CCAA/HBRA); idem. Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, margem direita do rio Farinha, ca. 6º59'36,7"S, 47º9'53,1"W, 210 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 53 (CCAA).

***Didymoglossum pinnatinervium* (Jenman) Pic. Serm.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S & Pietrobom, M.R. 148 (CCAA/HBRA).

***Trichomanes arbuscula* Desv.**

Specimens examined: BRAZIL, MARANHÃO, Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, margem direita do Rio Farinha, ca. 6º59'36,7"S, 47º9'53,1"W, 210 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 50 (CCAA).

***Trichomanes cristatum* Kaulf.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S & Pietrobom, M.R. 145 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 158

(CCAA/HBRA); idem. Rio Vão Feio, próximo a Cachoeira da Caverna, ca. 07º03'53,2"S, 047º28'12,6"W, 200 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 183 (CCAA); idem. Rio do Encontro, ca. 07º03'47,8"S, 047º28'10,4"W, 210 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 190 (CCAA); idem. PARNA Chapada das Mesas, Cachoeira São Romão, ca. 7º1'17,2"S, 47º2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 73 (CCAA); idem. Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, margem direita do rio Farinha, ca. 6º59'36,7"S, 47º9'53,1"W, 210 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 51 (CCAA); idem. 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 22 (CCAA).

***Trichomanes hostmannianum* (Klotzsch) Kunze**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07º01'14,8"S, 047º27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 93 (CCAA/HBRA); idem. Entorno do PARNA Chapada das Mesas, Cachoeira da Mansinha, 07º08'07,7"S, 47º26'07,1"W, 286 m, 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 04 (CCAA).

***Trichomanes pinnatum* Hedw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Cachoeira do Dodô, ca. 07º05'43,0"S, 047º26'39,5"W, 234 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 115 (CCAA); idem. Morro do Dodô, ca. 07º05'39,3"S, 047º26'39,3"W, 256 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 123 (CCAA); idem. Resort da Pedra Caída, rio Vão Feio, próximo a Cachoeira da Caverna, ca. 07º03'53,2"S, 047º28'12,6"W, 200 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 185 (CCAA); idem. Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 138 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 162 (CCAA); idem. Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 170 (CCAA); idem. PARNA Chapada das Mesas, próximo a Cachoeira do Siduca, ca. 06º58'54,1"S, 047º22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 48 (CCAA); idem.

Riacho Buenos Aires, ca. 6°56'43,5"S, 47°20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 12 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 07 (CCAA); idem. ca. 6°56'42,7"S, 47°20'31,0"W, 155 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 105 (CCAA); idem. Silva, L.R. & Almeida, F.C. 109 (CCAA); idem. ca. 6°56'43,6"S, 47°20'31,2"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 84 (CCAA); idem. ca. 06°59'38,99"S, 047°22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 54 (CCAA); idem. Riacho de Pedra, ca. 7°14'03,3"S, 46°59'53,8"W, 296 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 154 (CCAA); idem. Riacho Laje, ca. 6°58'47,4"S, 47°22'25,1"W, 236 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 132 (CCAA); idem. Cachoeira São Romão, ca. 7°01'15,4"S, 47°02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 163 (CCAA); idem. ca. 7°1'17,2"S, 47°2'27,8"W, 256 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 67 (CCAA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 50 (CCAA); idem. Riacho Corrente (bacia do rio Tocantins), ca.7°4'25,6"S, 47°5'26,6"W, 284 m, 13 March 2017, Silva, L.R. & Almeida, F.C. 80 (CCAA); idem. ca. 7°04'25,0"S, 47°05'26,2"W, 277 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 73 (CCAA); idem. Entorno do PARNA Chapada das Mesas, Cachoeira da Mansinha, 07°08'07,7"S, 47°26'07,1"W, 286 m, 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 14 (CCAA); idem. Borda do PARNA Chapada das Mesas, Cachoeira Ponta da Serra, rio Laje (bacia do rio Tocantins), ca. 6°58'47,1"S, 47°22'25,5"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 111 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 102 (CCAA).

LINDSAEACEAE

***Lindsaea divaricata* Klotzsch**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07°01'14,8"S, 047°27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 98 (CCAA); idem. Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 146 (CCAA); idem.

Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 173 (CCAA); idem. PARNA Chapada das Mesas, riacho Fundo, próximo à sede do ICMBio, ca. 07º02'24,2"S, 047º09'39,5"W, 231 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 68 (CCAA); idem. Riacho Lajes, próximo à casa do Siduca, ca. 06°59'38,99"S, 047º22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 61 (CCAA/HBRA); idem. Cachoeira do Prata, rio Farinha, ca. 6°59'41,3"S, 47°9'57,4"W, 213 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 36 (CCAA); idem. Riacho Corrente, ca. 7º04'25,0"S, 47º05'26,2"W, 277 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 72 (CCAA); idem. Cachoeira São Romão, rio Farinha, ca. 7º01'15,4"S, 47º02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 167 (CCAA); idem. ca. 7º1'17,2"S, 47º2'27,8"W, 258 m, 07 June 2018, Almeida, F.C., Silva, J.A.S.; Oliveira, L. & Ottoni, F. 49 (CCAA); idem. Trilha em Cerrado aberto, riacho Mariazinha, ca. 6°56'51,0"S, 47°20'23,1"W, 169 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 128 (CCAA); idem. Riacho de Pedra, ca. 7°14'03,3"S, 46°59'53,8"W, 296 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 145 (CCAA); idem. Riacho Buenos Aires, ca. 6°56'43,5"S, 47°20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 14 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 13 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 04 (CCAA); idem. ca. 6°56'54,3"S, 47°20'36,0"W, 179 m, 08 June 2018, Almeida, F.C., Silva, J.A.S.; Oliveira, L. & Ottoni, F. 91 (CCAA); idem. ca. 6°56'42,7"S, 47°20'31,0"W, 155 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 108 (CCAA); idem. ca. 6°56'44,4"S, 47°20'37,4"W, 170 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 126 (CCAA); idem. Silva, L.R. & Almeida, F.C. 125 (CCAA); idem. ca. 6°56'43,6"S, 47°20'31,2"W, 179 m, 08 June 2018, Almeida, F.C., Silva, J.A.S.; Oliveira, L. & Ottoni, F. 83 (CCAA); idem. Almeida, F.C., Silva, J.A.S.; Oliveira, L. & Ottoni, F. 85 (CCAA); idem. Borda do PARNA Chapada das Mesas, Cachoeira Ponta da Serra, Rio Laje, ca. 6°58'47,1"S, 47°22'25,5"W, 238 m, 08 June 2018, Almeida, F.C., Silva, J.A.S.; Oliveira, L. & Ottoni, F. 108 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 7º08'07,7"S, 47°26'07,1"W, 286 m, 06 June 2018, Almeida, F.C., Silva, J.A.S.; Oliveira, L. & Ottoni, F. 39 (CCAA).

***Lindsaea guianensis* subsp. *lanceastrum* K.U. Kramer**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Balneário Encontro das Águas, ca. 07°01'33,0"S, 047°27'54,7"W, 180 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 110 (CCAA/HBRA).

***Lindsaea lancea* (L.) Bedd.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Capelão, ca. 07°03'01,5"S, 047°28'37,9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 200 (CCAA); idem. Rio do Encontro, ca. 07°03'47,8"S, 047°28'10,4"W, 210 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 192 (CCAA/HBRA); idem. Rio Vão Feio, próximo a Cachoeira da Caverna, ca. 07°03'53,2"S, 047°28'12,6"W, 200 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 181 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 184 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 186 (CCAA); idem. PARNA Chapada das Mesas, Cachoeira do Prata, rio Farinha (bacia do rio Tocantins), ca. 06°56'43,5"S, 47°20'30,2"W, 175 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 13 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 7°08'07,7"S, 47°26'07,1"W, 286 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 78 (CCAA); idem. 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 40 (CCAA); idem. 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 20 (CCAA); idem. Oliveira, S.S. & Silva, J.A.S. 17 (CCAA); idem. Oliveira, S.S. & Silva, J.A.S. 06 (CCAA).

***Lindsaea pallida* Klotzsch**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, rio do Encontro, ca. 07°03'47,8"S 047°28'10,4"W, 210 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 191 (CCAA).

LYGODIACEAE

***Lygodium venustum* Sw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, ca. 6°56'56,9"S, 47°19'53"W, 184 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 19 (CCAA); idem. 29 October 2017, Silva, L.R. & Almeida, F.C. 86 (CCAA); idem. Cachoeira do Porão, ca. 06°55'55,6"S, 047°22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 28 (CCAA); idem. Riacho de Pedra, ca. 7°14'03,3"S, 46°59'53,8"W, 296 m, 31 October 2017, Silva, L.R. & Pietrobom, M.R. 152 (CCAA); idem. Riacho Buenos Aires, ca. 6°56'54,3"S, 47°20'36,0"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L.; Ottoni, F. 96 (CCAA); idem. 6°56'44,4"S, 47°20'37,4"W, 30 October 2017, Silva, L.R. & Almeida, F.C. 121 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho RPPN Mansinha, ca. 7°08'07,7"S, 47°26'07,1"W, 286 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 123 (CCAA).

***Lygodium volubile* Sw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Capelão, ca. 07°03'01,5"S, 047°28'37,9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 194 (CCAA); idem. Localidade Vereda Bonita, ca. 07°01'29,7"S, 047°28'28,3"W, 154 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 109 (CCAA); idem. Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 165 (CCAA); idem. Oliveira, S.S. & Pietrobom, M.R. 157 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 7°08'07,7"S, 47°26'07,1"W, 286 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 124 (CCAA); idem. PARNA Chapada das Mesas, riacho Buenos Aires, ca. 6°56'43,5"S, 47°20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 15 (CCAA); idem. ca. 6°56'54,3"S, 47°20'36,0"W, 179 m, 08 June 2018, Almeida, F.C.; Silva; J.A.S.; Oliveira, L. & Ottoni, F. 98 (CCAA); idem. ca. 6°56'44,4"S, 47°20'37,4"W, 170 m, 30 October 2017, Silva, L.R. & Pietrobom, M.R. 122 (CCAA).

METAXYACEAE

***Metaxya parkeri* (Hook. & Grev.) J. Sm.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Cachoeira do Dodô, ca. 07º05'43,0"S, 047º26'39,5"W, 234 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 113 (CCAA); idem. Localidade Vereda Bonita, ca. 07º01'29,7"S, 047º28'28,3"W, 154 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 106 (CCAA); idem. Estância Ecológica Vereda Bonita, ca. 07º01'14,8"S, 047º27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 94 (CCAA); idem. Resort da Pedra Caída, Cachoeira do Capelão, ca. 07º03'01,5"S, 047º28'37,9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 198 (CCAA); idem. Cachoeira da Caverna, ca. 07º03'53,2"S, 047º28'12,6"W, 200 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 182 (CCAA); idem. Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 177 (CCAA); idem. Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 141 (CCAA); idem. PARNA Chapada das Mesas, riacho Laje, ca. 6º58'47,4"S, 47º22'25,1"W, 236 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 133 (CCAA); idem. Silva, L.R. & Almeida, F.C. 130 (CCAA); idem. Silva, L.R. & Almeida, F.C. 131 (CCAA); idem. Silva, L.R. & Almeida, F.C. 129 (CCAA); idem. Riacho Lajes, próximo à casa do Siduca, ca. 06º59'38,99"S, 047º22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 53 (CCAA/HBRA); idem. Riacho de Pedra, ca. 7º14'03,3"S, 46º59'53,8"W, 296 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 146 (CCAA); idem. Silva, L.R. & Almeida, F.C. 144 (CCAA); idem. Silva, L.R. & Almeida, F.C. 149 (CCAA); idem. Silva, L.R. & Almeida, F.C. 147 (CCAA); idem. Borda do PARNA Chapada das Mesas, Cachoeira Ponta da Serra, rio Laje (bacia do rio Tocantins), ca. 6º58'47,1"S, 47º22'25,5"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 105 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 106 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 112 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 107 (CCAA); idem. Cachoeira da Ponta da Serra, riacho Lajes, ca. 6º58'47,4"S, 47º22'25"W, 235 m, 11 March 2017, Silva, L.R. &

Pietrobom, M.R. 23 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 07°08'07,7"S, 47°26'07,1"W, 286 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 43 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 79 (CCAA); idem. 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 19 (CCAA); idem. 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 08 (CCAA); idem. Oliveira, S.S. & Silva, J.A.S. 07 (CCAA); idem. Oliveira, S.S. & Silva, J.A.S. 09 (CCAA); idem. Oliveira, S.S. & Silva, J.A.S. 10 (CCAA).

NEPHROLEPIDACEAE

***Nephrolepis biserrata* (Sw.) Schott**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Margem direita do Rio Farinha, ca. 6°59'36,7"S, 47°9'53,1"W, 210 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 52 (CCAA); idem. Cachoeira São Romão, Rio Farinha, ca. 7°01'15,4"S, 47°02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 178 (CCAA); idem. ca. 7°4'25,6"S, 47°5'26,6"W, 284 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 77 (CCAA); idem. ca. 7°01'17,1"S, 47°02'27,1"W, 256 m, 07 June 2018, Almeida, F.C; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 69 (CCAA).

***Nephrolepis pectinata* (Willd.) Schott,**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, na estrada do riacho Fundo/Cachoeiras, ca. 07°03'19,4"S, 047°12'02,0"W, 292 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 84 (CCAA/HBRA).

POLYPODIACEAE

***Microgramma persicariifolia* (Schrad.) C.Presl.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, riacho Lajes, próximo à casa do Siduca, ca. 06°59'38,99"S, 047°22'23,9"W, 243 m, 04 February 2020,

Oliveira, S.S. & Pietrobom, M.R. 57 (CCAA/HBRA); idem. Cachoeira do Prata, rio Farinha, ca. 06°56'43,5"S, 47°20'30,2"W, 175 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 41 (CCAA); idem. 6°59'37,4"S, 47°09'58,0"W, 194 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 93 (CCAA); idem. Silva, L.R. & Almeida, F.C. 92 (CCAA); idem. 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 11 (CCAA); idem. Cachoeira São Romão, ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 70 (CCAA); idem. ca. 7°01'15,4"S, 47°02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 162 (CCAA); idem. Silva, L.R. & Almeida, F.C. 164 (CCAA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 59 (CCAA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 60 (CCAA); idem. Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, margem direita do rio Farinha, ca. 6°59'36,7"S, 047°9'53,1"W, 210 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 19 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 20 (CCAA).

***Phlebodium aureum* (L.) J. Sm.**

Specimens examined: BRAZIL, Maranhão, Carolina, PARNA Chapada das Mesas, Cachoeira do Porão, ca. 06°55'55,6"S, 047°22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 26 (CCAA); idem. Estrada do riacho Fundo/Cachoeiras, ca. 07°03'19,4"S, 047°12'02,0"W, 292 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 83 (CCAA/HBRA).

***Pleopeltis burchellii* (Baker) Hickey & Sprunt ex. A.R. Sm.**

Specimens examined: BRAZIL, Maranhão, Carolina, PARNA Chapada das Mesas, Cachoeira São Romão, rio Farinha, ca. 07°01'15,4"S, 47°02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 172 (CCAA); idem. ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Almeida, F.C. 75 (CCAA/HBRA).

***Serpocaulon triseriale* (Sw.) A.R.Sm.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira São Romão, ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 61 (CCAA); idem. Sede do ICMBio, ca. 07°02'33,2"S, 047°09'32,7"W, 254 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 81 (CCAA/HBRA).

PTERIDACEAE

***Adiantum deflectens* Mart.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Cachoeira do Dodô, ca. 07°05'43,0"S, 047°26'39,5"W, 234 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 112 (CCAA); idem. Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 168 (CCAA); idem. PARNA Chapada das Mesas, riacho Lajes, próximo à casa do Siduca, ca. 06°59'38,99"S, 047°22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 56 (CCAA); idem. Próximo a Cachoeira do Siduca, ca. 06°58'54,1"S, 047°22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 45 (CCAA/HBRA); idem. Passagem da dona Lena, ca. 07°03'45,1"S, 047°15'16,2"W, 230 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 86 (CCAA); idem. Cachoeira do Porão, ca. 06°55'55,5"S, 047°22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 25 (CCAA); idem. Borda da Cachoeira Ponta da Serra, riacho Lajes, ca. 6°58'47,4"S, 47°22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 25 (CCAA); idem. ca. 6°58'47,1"S, 47°22'25,5"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 104 (CCAA); idem. Cachoeira São Romão, ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 57 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 60 (CCAA); idem. Silva, L.R. & Pietrobom, M.R. 64 (CCAA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 63 (CCAA); idem. Cachoeira do Prata, rio Farinha (bacia do rio Tocantins), ca. 6°59'41,3"S, 47°9'57,4"W, 213 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 15 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 12 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 04

(CCAA); idem. 12 March 2017, Silva, L.R. & Pietrobom, M.R. 38 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho da RPPN Mansinha, ca. 7º08'07,7"S, 47º26'07,1"W, 286 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 121 (CCAA); idem. 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 03 (CCAA).

***Adiantum intermedium* Sw.**

Material examinado. BRAZIL, Maranhão, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom M.R. 166 (CCAA); idem. PARNA Chapada das Mesas, próximo a Cachoeira do Siduca, ca. 06º58'54,1"S, 047º22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S & Pietrobom, M.R 47 (CCAA/HBRA).

***Adiantum latifolium* Lam.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira São Romão, rio Farinha, ca. 7°01'15,4"S, 47º02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 181 (CCAA); idem. Silva, L.R. & Almeida, F.C. 169 (CCAA); idem. ca. 7°1'17,2"S, 47º2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 66 (CCAA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 53 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 64 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 56 (CCAA/HBRA); idem. Cachoeira do Prata, rio Farinha, ca. 6º59'36,1"S, 47º09'57,7"W, 200 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 103 (CCAA); idem. Silva, L.R. & Almeida, F.C. 99 (CCAA); idem. 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 07 (CCAA)

***Adiantum petiolatum* Desv.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira do Porão, ca. 06º55'55,6"S, 047º22'53,6"W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 32 (CCAA/SP).

***Adiantum pulverulentum* L.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07º02'44,2"S, 047º26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 135 (CCAA/HBRA).

***Adiantum serratodentatum* Willd.**

Material examinado. BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, ca. 6º56'43,5"S, 47º20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 01 (CCAA/HBRA); idem. Riacho Buenos Aires (bacia do rio Tocantins), ca. 6º56'43,6"S, 47º20'31,2"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 81 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 87 (CCAA); idem. ca. 6º56'44,4"S, 47º20'37,4"W, 170 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 118 (CCAA); idem. Silva, L.R. & Almeida, F.C. 119 (CCAA); idem. Silva, L.R. & Almeida, F.C. 118 (CCAA); idem. Silva, L.R. & Almeida, F.C. 120 (CCAA); idem. ca. 6º56'42,7"S, 47º20'31,0"W, 155 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 110 (CCAA); idem. Riacho Lajes, próximo à casa do Siduca, ca. 06º59'38,99"S, 47º22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 62 (CCAA).

***Adiantum sinuosum* Gardner**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Morro do Dodô, ca. 07º05'39,3"S, 047º26'39,3"W, 256 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 120 (CCAA).

***Adiantum terminatum* Kunze ex Miq.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 169 (CCAA/HBRA).

***Adiantum tetraphyllum* Willd.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Localidade Vereda Bonita, ca. 07°01'29,7"S, 047°28'28,3"W, 154 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 104 (CCAA/HBRA/SP).

***Adiantum* sp.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Localidade Vereda Bonita, ca. 07°01'29,7"S, 047°28'28,3"W, 154 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 105 (CCAA/SP).

***Ceratopteris thalictroides* (L.) Brongn.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira do Prata, rio Farinha (bacia do rio Tocantins), ca. 06°59'37"S, 47°09'57"W, 197 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 119 (CCAA); idem. Cachoeira São Romão, ca. 7°01'15,4"S, 47°02'28,2"W, 256 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 67 (CCAA).

***Cheilanthes pohliana* Mett.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Morro do Dôdo, ca. 07°05'39,3"S, 047°26'39,3"W, 256 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 122 (CCAA); idem. PARNA Chapada das Mesas, próximo a Cachoeira do Porão, ca. 06°55'58.2"S, 047°22'50.8"W, 175 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 35 (CCAA/HBRA).

***Pityrogramma calomelanos* (L.) Link**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, ca. 6°56'56,9"S, 47°19'53"W, 184 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 18 (CCAA); idem. Riacho das Rosas, ca. 7°6'51,14"S, 47°04'27,73"W, 292 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 175 (CCAA); idem. Cachoeira São Romão, ca. 7°01'15,4"S, 47°02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 170 (CCAA); idem. Silva, L.R. & Almeida,

F.C. 186 (CCAA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 58 (CCAA); idem. Cachoeira do Prata, ca. 6º59'37,4"S, 47º09'58,0"W, 194 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 87 (CCAA); idem. Silva, L.R. & Almeida, F.C. 102 (CCAA); idem. 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 06 (CCAA); idem. Sede do ICMBIO, ca. 07º22'33,2"S, 047º09'32,7"W, 254 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 79 (CCAA); idem. Passagem da dona Lena, ca. 07º03'45,1"S, 047º15'16,2"W, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 88 (CCAA/HBRA); idem. Entorno do PARNA Chapada das Mesas, Cachoeira da Mansinha, ca. 7º08'07,7"S, 47º26'07,1"W, 286 m, 03 February 2020, Oliveira, S.S & Pietrobom, M.R. 05 (CCAA).

***Vittaria lineata* (L.) Sm.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, rio Vão Feio, próximo a Cachoeira da Caverna, ca. 07º03'53,2"S, 047º28'12,6"W, 258 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 188 (CCAA); idem. PARNA Chapada das Mesas, Cachoeira São Romão, rio Farinha, ca. 7º1'17,2"S, 47º2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 63 (CCAA/HBRA); idem. ca. 7º01'15,4"S, 47º02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeira, F.C. 159 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 45 (CCAA).

SALVINIACEAE

***Azolla microphylla* Kaulf.**

Specimens examined: BRAZIL, MARANHÃO, PARNA Chapada das Mesas, Cachoeira São Romão, Rio Farinha, ca. 7º01'15,4"S, 47º02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 173 (CCAA).

SCHIZAEACEAE

***Actinostachys pennula* (Sw.) Hook.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Cachoeira do Dodô, ca. 07º05'43,0"S, 047º26'39,5"W, 234 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 116 (CCAA); idem. Balneário Encontro das Águas, ca. 07º01'33,0"S, 047º27'54,7"W, 180 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 111 (CCAA); idem. Cachoeira da Mansinha, ca. 07º08'07,7"S, 47º26'07,1"W, 286 m, 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 12 (CCAA); idem. Estância Ecológica Vereda Bonita, ca. 07º01'14,8"S, 047º27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 102 (CCAA); idem. ca. 07º01'14,8"S, 047º27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 101 (CCAA); idem. PARNA Chapada das Mesas, trilha em Cerrado aberto, riacho Mariazinha, ca. 6º56'48,4"S, 47º20'27,9"W, 169 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 127 (CCAA); idem. Trilha entre riacho Buenos Aires e riacho Mariazinha, ca. 6º56'48,5"S, 47º20'27,9"W, 182 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 17 (CCAA); idem. Riacho Corrente, ca. 7º4'25,6"S, 47º5'26,6"W, 284 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 82 (CCAA); idem. Riacho das Mortes, ca.7º20'49,5"S, 46º55'50,3"W, 237 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 140 (CCAA); idem. Riacho Fundo, próximo à sede do ICMBio, ca. 07º02'24,2"S, 047º09'39,5"W, 231 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 71 (CCAA); idem. Riacho Lajes, próximo à casa do Siduca, ca. 06º59'38,99"S, 047º22'23,9"W, 243 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 63 (CCAA/HBRA); idem. Riacho Buenos, ca. 6º56'54,3"S, 47º20'36,0"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 99 (CCAA); idem. ca. 6º56'43,6"S, 47º20'31,2"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 125 (CCAA);

***Schizaea elegans* (Vahl) Sw.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Cachoeira da Mansinha, ca. 07º08'07,7"S, 47º26'07,1"W, 286 m, 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 15 (CCAA); idem. PARNA Chapada das Mesas, riacho Buenos Aires, ca. 6º56'54,3"S, 47º20'36,0"W, 179 m, 08.VII.2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 93 (CCAA); idem. ca. 6º56'43,5"S, 47º20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom,

M.R. 06 (CCAA); idem. Riacho Corrente, ca. 7°4'25,6"S, 47°5'26,6"W, 284 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 81 (CCAA).

***Schizaea incurvata* Schkuhr**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Estância Ecológica Vereda Bonita, ca. 07°01'14,8"S, 047°27'52,6"W, 191 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 103 (CCAA/HBRA).

TECTARIACEAE

***Tectaria incisa* Cav.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 147 (CCAA/HBRA).

THELYPTERIDACEAE

***Christella conspersa* (Schrad.) Á. Löve & D. Löve**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 149 (CCAA); idem. Cachoeira do Capelão, ca. 07°03'01,5"S, 047°28'37,9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 197 (CCAA); idem. Localidade Vereda Bonita, ca. 07°01'29,7"S, 047°28'28,3"W, 154 m, 06 February 2020, Oliveira, S.S. & Pietrobom, M.R. 108 (CCAA); idem. PARNA Chapada das Mesas, Cachoeira do Prata, rio Farinha, ca. 6°59'37,4"S, 47°09'58,0"W, 194 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 85 (CCAA/BHCB); idem. ca. 6°59'36,1"S, 47°09'57,7"W, 200 m, 29 October 2017, Silva, L.R. & Almeida, F.C. 104 (CCAA/BHCB); idem. Silva, L.R. & Almeida, F.C. 101 (CCAA); idem. ca. 6°59'37"S, 47°09'57"W, 197 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 118 (CCAA); idem. Cachoeira São Romão, rio Farinha, ca. 7°01'15,4"S,

47°02’28,2”W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 166 (CCAA); idem. Silva, L.R. & Almeida, F.C. 187 (CCAA); idem. Silva, L.R. & Almeida, F.C. 185 (CCAA/BHCB); idem. ca. 7°1’17,2”S, 47°2’27,8”W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 69 (CCAA/BHCB); idem. ca. 7°01’17,1”S, 47°02’27,1”W, 256 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 57 (CCAA/BHCB); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 54 (CCAA/BHCB); idem. Riacho Lajes, ca. 6°58’47,4”S, 47°22’25,1”W, 236 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 139 (CCAA/BHCB); idem. Cachoeira do Porão, ca. 06°55’55,6”S, 047°22’53,6”W, 174 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 30 (CCAA/HBRA); idem. Passagem da dona Lena, ca. 07°03’45,1”S, 047°15’16,2”W, 230 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 87 (CCAA); idem. Sede do ICMBio, ca. 07°02’33,2”S, 047°09’32,7”W, 254 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 78 (CCAA/HBRA); idem. Riacho Fundo, próximo à sede do ICMBio, ca. 07°02’24,2”S, 047°09’39,5”W, 231 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 75 (CCAA/HBRA); idem. Borda do PARNA Chapada das Mesas, Cachoeira da Ponta da Serra, rio Laje, ca. 6°58’47,1”S, 47°22’25,5”W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 110 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 113 (CCAA/BHCB); idem. ca. 6°58’47,4”S, 47°22’25”W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 32 (CCAA/BHCB); idem. ca. 6°58’47,4”S, 47°22’25”W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 28 (CCAA/BHCB); idem. Entorno do PARNA Chapada das Mesas, riacho Serra Grande, ca. 7°03’45,1”S, 47°15’16,3”W, 237 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 34 (CCAA/BHCB); idem. Cachoeira da Mansinha, ca. 07°08’07,7”S, 47°26’07,1”W, 286 m, 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 16 (CCAA); idem. Estreito, Cachoeira do Prata, margem direita do rio Farinha, ca. 6°59’36,7”S, 47°9’53,1”W, 210 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 17 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 18 (CCAA/BHCB); idem. 12 March 2017, Silva, L.R. & Pietrobom, M.R. 49 (CCAA/BHCB).

***Christella hispidula* (Decne.) Holttum**

Specimens examined: BRAZIL, Maranhão, Carolina, PARNA Chapada das Mesas, Cachoeira São Romão, ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 68 (CCAA/BHCB); idem. Silva, L.R. & Pietrobom, M.R. 72 (CCAA/BHCB).

***Goniopteris biformata* (Rosenst.) Salino & T.E. Almeida**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 136 (CCAA/HBRA); idem. PARNA Chapada das Mesas, Cachoeira São Romão, ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 74 (CCAA/BHCB); idem. ca. 7°01'17,1"S, 47°02'27,1"W, 256 m, 07.IV.2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 61 (CCAA); idem. ca. 7°01'15,4"S, 47°02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 180 (CCAA); idem. Silva, L.R. & Almeida, F.C 188 (CCAA); idem. Silva, L.R. & Almeida, F.C 168 (CCAA).

***Macrothelypetris torresiana* (Gaudich.) Ching**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 151 (CCAA/HBRA).

***Meniscium angustifoium* Willd.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira da Pedra Furada, ca. 07°01'59,3"S, 047°27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 179 (CCAA); idem. Cachoeira do Santuário Ecológico, ca. 07°02'44,2"S, 047°26'38,0"W, 128 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 150 (CCAA/HBRA); idem. Oliveira, S.S. & Pietrobom, M.R. 167 (CCAA); idem. PARNA Chapada das Mesas, riacho Laje, ca. 6°58'47,4"S, 47°22'25,1"W, 236 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 138 (CCAA); idem. Silva, L.R. & Almeida, F.C. 137 (CCAA); idem. Silva, L.R. & Almeida, F.C. 135 (CCAA); idem. Riacho Fundo, ca. 07°02'24,2"S, 047°09'39.5"W, 231 m,

05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 70 (CCAA); idem. Próximo a Cachoeira do Siduca, ca. 06º58'54,1"S, 047º22'26,8"W, 241 m, 04 February 2020, Oliveira, S.S. & Pietrobom, M.R. 41 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho Serra Grande, 7º03'45,1"S, 47º15'16,3"W, 237 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 35 (CCAA); idem. Borda do PARNA Chapada das Mesas, Cachoeira Ponta da Serra, ca. 6º58'47,1"S, 47º22'25,1"W, 238 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 109 (CCAA); idem. ca. 6º58'47,4"S, 47º22'25"W, 235 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 27 (CCAA); idem. Riachão, PARNA Chapada das Mesas, riacho das Mortes, ca. 7º20'49,5"S, 46º55'50,3"W, 237 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 140 (CCAA).

***Meniscium arborescens* Humb. & Bonpl. ex Willd.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, sede do ICMBio, ca. 07º02'33,2"S, 047º09'32.7"W, 254 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 77 (CCAA); idem. Riacho Fundo, ca. 07º02'24,2"S, 047º09'39,5"W, 231 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 72 (CCAA); idem. Riacho das Rosas, ca. 7º6'51,14"S, 47º04'27,73"W, 292 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 176 (CCAA).

***Meniscium chrysodioides* Fée**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Capelão, ca. 07º03'01,5"S, 047º28'37,9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 196 (CCAA); idem. Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01.9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 171 (CCAA); idem. PARNA Chapada das Mesas, sede do ICMBio, ca. 07º02'33,2"S, 047º09'32,7"W, 254 m, 05 February 2020, Oliveira, S.S. & Pietrobom, M.R. 80 (CCAA); idem. Entorno do PARNA Chapada das Mesas, riacho RPPN Mansinha, ca. 07º08'07,7"S, 47º26'07,1"W, 286 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 42 (CCAA); idem. Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 36 (CCAA); idem. 07 June 2018, Almeida, F.C.; Silva,

J.A.S.; Oliveira, L. & Ottoni, F. 80 (CCAA); idem. 03 February 2020, Oliveira, S.S. & Silva, J.A.S. 18 (CCAA/HBRA).

***Meniscium delicatum* R.S. Fernandes & Salino**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira da Pedra Furada, ca. 07º01'59,3"S, 047º27'01,9"W, 195 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 178 (CCAA); idem. PARNA Chapada das Mesas, Cachoeira São Romão, rio Farinha, ca. 7º01'15,4"S, 47º02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 161 (CCAA); idem. ca. 7°1'17,2"S, 47°2'27,8"W, 258 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 65 (CCAA/BHCB/HBRA); idem. 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 46 (CCAA).

***Meniscium hostmannii* (Klotzsch.) R.S. Fernandes & Salino**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, riacho Buenos Aires, ca. 6º56'43,5"S, 47º20'30,2"W, 175 m, 11 March 2017, Silva, L.R. & Pietrobom, M.R. 11 (CCAA/HBRA); idem. Silva, L.R. & Pietrobom, M.R. 08 (CCAA); idem. ca. 6º56'44,4"S, 47º20'37,4"W, 170 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 117 (CCAA); idem. Silva, L.R. & Almeida, F.C. 124 (CCAA); idem. Silva, L.R. & Almeida, F.C. 113 (CCAA); idem. ca. 6º56'42,7"S, 47º20'31,0"W, 155 m, 30 October 2017, Silva, L.R. & Almeida, F.C. 107 (CCAA); idem. ca. 6º56'54,3"S, 47º20'36,0"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 97 (CCAA); idem. ca. 6º56'43,6"S, 47º20'31,2"W, 179 m, 08 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 82 (CCAA); idem. Riacho de Pedra, ca. 7º14'03,3"S, 46º59'53,8"W, 296 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 153 (CCAA).

***Meniscium maxonianum* (A.R. Sm.) R.S. Fernandes & Salino**

Specimens examined: BRAZIL, MARANHÃO, Carolina, Resort da Pedra Caída, Cachoeira do Capelão, ca. 07º03'01,5"S, 047º28'37.9"W, 216 m, 07 February 2020, Oliveira, S.S. & Pietrobom, M.R. 193 (CCAA).

***Meniscium serratum* Cav.**

Specimens examined: BRAZIL, MARANHÃO, Carolina, PARNA Chapada das Mesas, Cachoeira São Romão, ca. 7º4'25,6"S, 47º5'26,6"W, 284 m, 13 March 2017, Silva, L.R. & Pietrobom, M.R. 76 (CCAA); idem. ca. 7º01'15,4"S, 47º02'28,2"W, 241 m, 31 October 2017, Silva, L.R. & Almeida, F.C. 182 (CCAA); idem. ca. 7º01'17,1"S, 47º02'27,1"W, 256 m, 07 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 68 (CCAA); idem. Estreito, PARNA Chapada das Mesas, Cachoeira do Prata, ca. 6º59'37,4"S, 47º09'58,0"W, 210 m, 06 June 2018, Almeida, F.C.; Silva, J.A.S.; Oliveira, L. & Ottoni, F. 23 (CCAA); idem. Margem direita do Rio Farinha, ca. 6º59'36,7"S, 47º9'53,1"W, 210 m, 12 March 2017, Silva, L.R. & Pietrobom, M.R. 54 (CCAA/HBRA).