AN ANNOTATED CHECKLIST OF FERNS AND LYCOPHYTES FROM THE BIOLOGICAL RESERVE OF UATUMÃ, AN AREA WITH PATCHES OF RICH-SOILS IN CENTRAL AMAZONIA, BRAZIL

G. ZUQUIM[1,2], J. PRADO[3] & F.R.C. COSTA[1]

[1] Instituto Nacional de Pesquisas da Amazônia, Coordenação de Pesquisas em Ecologia, C.P. 478, CEP 69083-000, Manaus, AM, Brazil.

[2] Author for correspondence: gabizuquim@gmail.com

[3] Instituto de Botânica, Seção de Curadoria do Herbário, C.P. 3005, CEP 01061-970, São Paulo, SP, Brazil.

Key words: Amazonia, Brazil, diversity, edaphic factor, floristic survey, pteridophytes, rainforest

Palavras-chave: Amazônia, Brasil, diversidade, levantamento florístico, pteridófitas

ABSTRACT

There are few inventories of ferns and lycophytes of the Brazilian Amazon and most of them were made in areas of poor soils. The general species richness found in previous studies is low. This study presents an annotated list containing 122 species and three varieties of ferns and lycophytes from Biological Reserve of Uatumã, a large reserve that includes small patches of rich soils in Central Amazonia. The study site is located ca. 200 km north of Manaus, AM, Brazil. Inventories were made more intensively inside a grid system of trails of 5 x 5 km and less intensively in some white-sand forests and waterfalls in the surroundings of Balbina's Village. Reference to the original description, habit, habitat, material examined, geographic distribution and voucher information are presented for each taxon. This is the first floristic survey of ferns and lycophytes from areas with relatively rich soils of Central Amazonia. The high number of species found challenges the concept that Central Amazonia is species-poor for the two groups studied and the strong relationship with soil conditions reinforces the proposal to include ferns and lycophytes as indicator groups of the distribution of biodiversity in the region.

RESUMO

Poucos são os inventários de samambaias e licófitas feitos na Amazônia brasileira e a maioria destes foram feitos em áreas cujos solos são pobres em nutrientes. Não obstante, a riqueza de espécies encontrada em estudos prévios foi baixa. Neste estudo é apresentada uma lista anotada de 122 espécies e três variedades de samambaias e licófitas da Reserva Biológica do Uatumã, uma reserva grande em extensão e com pequenas manchas de solo rico na Amazônia Central. O estudo foi realizado a cerca de 200 km ao norte de Manaus, AM, Brasil. Os inventários foram mais intensos dentro de uma grade de trilhas de 5 x 5 km e com menor intensidade em áreas de campinas e campinaranas e em cachoeiras nos arredores da Vila de Balbina. Para cada táxon são apresentadas informações acerca do local da publicação original, hábito, habitat, material examinado, distribuição geográfica e *voucher*. Este é o primeiro estudo sobre samambaias e licófitas em áreas com solos relativamente ricos na Amazônia

Central. A alta riqueza de espécies encontrada afeta a idéia geral de que a Amazônia Central é pobre em espécies destes dois grupos e a forte relação entre as espécies e as condições do solo reforça a sugestão de se incluir samambaias e licófitas como grupos indicadores da distribuição da biodiversidade.

INTRODUCTION

Central Amazonian soils are generally deep, highly lixiviated and nutrient-poor (Chauvel *et al.*, 1987, Laurence, 2001, Mertens, 2004), and this may be the reason for the low species richness of ferns and lycophytes (39 to 83 species per site) reported in many inventories in this region (Costa *et al.*, 1999, Costa *et al.*, 2005, Zuquim *et al.*, 2007). The same pattern is probably true for the Rio Negro Basin, which is mainly covered by poor sandy soils (Freitas & Prado, 2005). In Western Amazon, Tuomisto *et al.* (2002) sampled relatively richer-soil areas and found 140 species in a 20 x 25 km study site in Ecuador.

To contribute to the knowledge of the Brazilian Amazonian flora, we present here an annotated checklist of the species of ferns and lycophytes found in the Biological Reserve of Uatumã. Our evidence suggests that the low species richness in Central Amazonia sampled until now (as compared with other Neotropical forests) may be due to low sampling effort from the infrequent patches of rich soils that are difficult to access.

MATERIALS AND METHODS

Study area - the study was conducted at the Biological Reserve of Uatumã (Rebio Uatumã) and surroundings of Balbina's Village, about 200 km to the North of the city of Manaus, AM, Brazil (Fig. 1). It is located in the municipalities of Presidente Figueiredo, São Sebastião do Uatumã, and Urucará. The Reserve was created in 1990 and it is the largest Biological Reserve in Brazil.

The reserve comprises a mosaic of white-sand shrublands (*campinas*), white-sand forests (*campinaranas*), and dense Terra Firme forests. The gradient of soils is broad and varies from very poor and coarse sandy soils to rich clayey soils. We have considered as rich soils those with more than 3 cmol/kg of exchangeable bases[(Research Program in Biodiversity (PPBio) - *unpublished data*] since this concentration represents around three times the amount found in the soils of the most studied areas in Central Amazonia (see Laurance 2001 - DBFFP Reserves, and Mertens 2004 - Reserva Ducke).

Inventory of ferns and lycophytes

Field work was carried out from July 2006 to February 2008. In 2006, the Research Program in Biodiversity (hereafter PPBio – the Portuguese acronym) with the support of the Chico Mendes Institute of Biodiversity Conservation installed a 5 x 5 km grid system of trails in the southernmost part of Rebio Uatumã (Fig. 1). Sampling effort was more intense in the trail system, and special attention was given to the streams crossing the trails. The trail system encompasses only 25 km^2 of the 5,600,000 km^2 of the limits of the reserve. The grid comprises non-inundated Tropical Dense Forest (also called Terra Firme forests) and is crossed by many streams. To cover the variety of environments found in the region, one waterfall and a surrounding *campinarana* area close to the village of Balbina were visited. These two habitats occur in the landscape but were not included within the grid system.

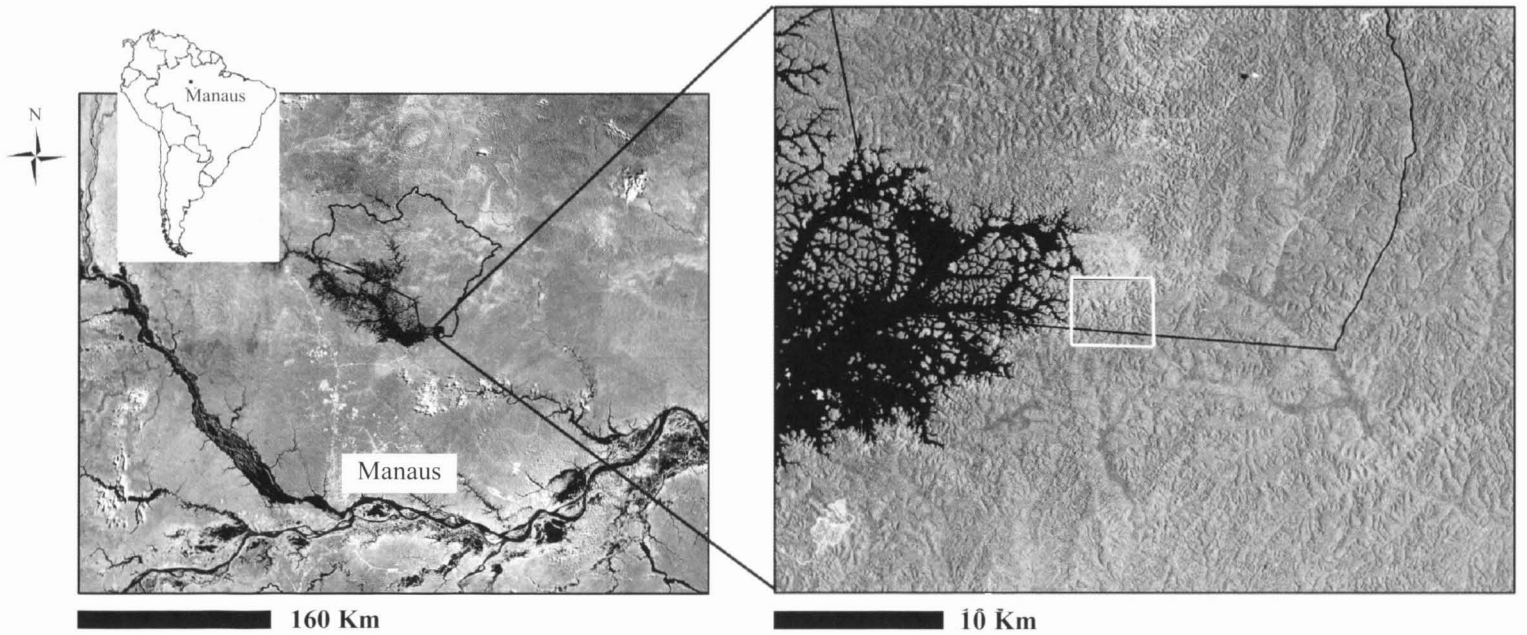

Figure 1. Location of the study site. Black patches represent water and gray scale patches represents vegetation. Solid lines are the limits of the Biological Reserve of Uatumã, AM, Brazil. The white square shows the area intensively sampled.

Presentation of the checklist

The list is arranged in alphabetic order by families, genera, species, and varieties. The arrangement of families and genera follows Smith *et al.* (2006).

For each species and variety the full name of the taxon is given, followed by the reference of original publication, as well as additional information such as: habit, habitat, material examined, and geographic distribution. Voucher information for each species and variety is also cited. Author abbreviations follow Pichi-Sermolli (1996).

RESULTS

One hundred and twenty two species and three varieties of pteridophytes distributed in 21 families were found. The richest families were Pteridaceae (with 22 species.), Polypodiaceae (18 spp.), and Dryopteridaceae (16 spp.). The most diverse genera were *Adiantum* (with 13 species) and *Trichomanes* (12 spp.). Near 35 % of the species are epiphytes, but these were probably underestimated due to the difficulty to access the canopy. Four species (*Blechnum serrulatum*, *Gleichenella pectinata*, *Dicranopteris flexuosa,* and *Palhinhaea cernua*) were found only in disturbed areas along road margins. *Actinostachys pennula, Adiantum cinnamomeum, Lindsaea tetraptera*, *L. schomburgkii*, *Elaphoglossum plumosum*, *Thelypteris arborescens*, *Trichomanes bicorne,* and *T. martiusii* were collected exclusively in white-sand forests (*campinaranas*). A population of around 50 individuals of *Hemionitis rufa* was found in a conspicuous rocky patch of ca. 100 m^2 covered by open vegetation (mainly grasses and ground bromeliads). Apparently, *H. rufa* is strongly related to this kind of habitat in Amazonia, but more observations are needed. The other species were distributed over habitats ranging from stream valleys to hillsides, plateaus, rocky soils and tree-fall gaps in the Terra Firme forests. Images of almost all species can be accessed by downloading the "Guide to the ferns and lycophytes of REBIO Uatumã – Central Amazonia" at http://ppbio.inpa.gov.br/Port/guias/. Two species (*Schizaea elegans* and *Gleichenella pectinata*) were accidentally not collected but are common in the region and are easy to recognise. Both were recorded in photographs.

LIST OF SPECIES

ASPLENIACEAE

Asplenium auritum Sw., J. Bot. (Schrader) 1800(2): 52. 1801.
Habit/Habitat: herb, epiphytic (canopy), Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 296* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, N South America.

Asplenium cirrhatum Rich. ex Willd., Sp. Pl. 5: 321. 1801.
Habit/Habitat: herb, epiphytic (base of trunks and rocks), Terra Firme forest over rich soils.
Studied specimen(s): *Tuomisto & Prado 15699* (INPA, SP, TUR).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Asplenium cristatum Lam., Encycl. 2(1): 310. 1786.
Habit/Habitat: herb, epiphytic (base of trunks and rocks), Terra Firme forests.
Studied specimen(s): *Zuquim 241* (INPA).
Distribution: Antilles, Mesoamerica, and tropical South America.

Asplenium laetum Sw., Syn. Fil.: 79, 271. 1806.
Habit/Habitat: herb, terrestrial or rupiculous, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Figueiredo 97* (INPA); *107* (INPA); *Zuquim & Braga-Neto 138* (INPA); *Zuquim & Jakovac 228* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South Amarica.

Asplenium pearcei Baker, Syn. Fil. (ed. 2): 483. 1874.
Habit/Habitat: herb, terrestrial, rupiculous or epiphytic, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Braga-Neto 185* (INPA); *Zuquim 232* (INPA).
Distribution: N South America.

Asplenium salicifolium L., Sp. Pl. 2: 1080. 1753.
Habit/Habitat: herb, epiphytic (canopy), Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 297* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and tropical South America.

Asplenium serratum L., Sp. Pl. 2: 1079. 1753.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 105* (INPA); *106* (INPA); *Zuquim & Costa 252* (INPA).
Distribution: S Florida, Mexico, Antilles, Mesoamerica, tropical and subtropical South America.

Asplenium stuebelianum Hieron., Hedwigia 47: 222. 1908.
Habit/Habitat: herb, terrestrial or epiphytic, in Terra Firme forests over rich soils*.
Studied specimen(s): *Tuomisto & Zuquim 15609* (INPA, SP, TUR).
Distribution: Tropical South America.
* Prado & Moran (2009) report it in open forest with bamboo in Acre State.

BLECHNACEAE
Blechnum serrulatum Rich., Actes Soc. Hist. Nat. Paris 1: 114. 1792.
Habit/Habitat: herb, terrestrial, in disturbed and loamy open areas.
Studied specimen(s): *Prado & Zuquim 1872* (INPA, SP, TUR).
Distribution: S. Florida, Mesoamerica, Antilles, tropical South America. Also occurs in Malasia and Australia.

Salpichlaena volubilis (Kaulf.) J. Sm., J. Bot. (Hooker) 4: 168. 1841.
Habit/Habitat: herb, terrestrial, climber, in plateaus or slopes of Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 103* (INPA); *Zuquim & Junqueira 325* (INPA).
Distribution: Antilles, Mesoamerica, and tropical South America.

CYATHEACEAE
Cyathea sp.
Habit/Habitat: tree-fern, terrestrial, in Terra Firme forests.
Studied specimen(s): *Tuomisto & Zuquim 15618* (INPA, SP, TUR).

Cyathea lasiosora (Kuhn) Domin, Pteridophyta: 262. 1929.
Habit/Habitat: tree-fern, terrestrial, in Terra Firme forests near streams.
Studied specimen(s): *Zuquim & Braga-Neto 386* (INPA).
Distribution: N South America.

Cyathea microdonta (Desv.) Domin, Pteridophyta: 263. 1929.
Habit/Habitat: tree-fern, terrestrial, in Terra Firme forests near streams.
Studied specimen(s): *Zuquim & Junqueira 323* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and N South America.

Cyathea pungens Domin, Sp. Pl. 5: 206. 1810.
Habit/Habitat: tree-fern, terrestrial, in Terra Firme forests near streams.
Studied specimen(s): *Zuquim & Jakovac 197* (INPA); *Zuquim & Jakovac 216* (INPA).
Distribution: Antilles and N South America.

DENNSTAEDTIACEAE
Dennstaedtia sp.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Braga-Neto 172* (INPA).

DRYOPTERIDACEAE
Bolbitis lindigii (Mett.) Ching, Index Filic., Suppl. 3: 48. 1934.
Habit/Habitat: herb, hemi-epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Vieira 444* (INPA).
Distribution: Mesoamerica and N South America.

Bolbitis nicotianifolia (Sw.) Alston, Bull. Misc. Inform. Kew 1932(7): 310. 1932.
Habit/Habitat: herb, terrestrial, rupiculous or hemi-epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 113* (INPA); *Zuquim & Braga-Neto 186* (INPA); *Zuquim & Costa 286* (INPA)
Distribution: Antilles, Mesoamerica, and N South America.

Bolbitis semipinnatifida (Fée) Alston, Bull. Misc. Inform. Kew 1932(7): 310. 1932.
Habit/Habitat: herbs, terrestrial and rupiculous, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Figueiredo 94* (INPA); *Zuquim & Jakovac 217* (INPA); *Zuquim 240* (INPA).
Distribution: Lesser Antilles and N South America.

Bolbitis serratifolia (Mert. ex Kaulf.) Schott, Gen. Fil., tab. 14. 1834.
Habit/Habitat: herb, terrestrial and rupiculous, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Junqueira 329* (INPA).
Distribution: S Mexico, Mesoamerica, and tropical South America.

Ctenitis refulgens (Klotzsch ex Mett.) Vareschi, Fl. Venezuela 1: 404. 1969.
Habit/Habitat: herb, terrestrial and rupiculous, in Terra Firme forests near streams.
Studied specimen(s): *Zuquim 231* (INPA).
Distribution: Mexico, Mesoamerica and N South America.

Cyclodium guianense (Klotzsch) L. D. Gómez, Phytologia 60(5): 371. 1986.
Habit/Habitat: herb, terrestrial and rupiculous, in Terra Firme forests over rich soils, near streams.
Studied specimen(s): *Zuquim & Jakovac 205* (INPA); *209* (INPA), *Zuquim 237* (INPA).
Distribution: N South America.

Cyclodium meniscioides (Willd.) C. Presl, Tent. Pterid.: 85. 1836.
Infraspecific: var. *meniscioides*
Habit/Habitat: herb, terrestrial or hemi-epiphytic, in swamps of Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 210* (INPA); *Zuquim & Fontelles 375* (INPA).
Distribution: N South America.

Didymochlaena truncatula (Sw.) J. Sm., J. Bot. (Hooker) 4: 196. 1841-1842 [1841].
Habit/Habitat: herb, terrestrial and rupiculous, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Braga-Neto 164* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and N South America. Tropical Asia and Africa.

Elaphoglossum flaccidum (Fée) T. Moore, Index Filic.: 356. 1862.
Habit/Habitat: herb, epiphytic (canopy), in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 391* (INPA).
Distribution: Antilles and N South America.

Elaphoglossum luridum (Fée) H. Christ, Neue Denkschr. Allg. Schweiz. Ges. Gesammten Naturwiss. 36(1): 33. 1899.
Habit/Habitat: herb, epiphytic (canopy), in Terra Firme forests.
Studied specimen(s): *Zuquim 337* (INPA); *Zuquim & Vieira 400* (INPA).
Distribution: Antilles, Mesoamerica, and N South America.

Elaphoglossum plumosum (Fée) T. Moore, Index Filic.: 364. 1862.
Habit/Habitat: herb, epiphytic, in white-sand forests (campinaranas).
Studied specimen(s): *Zuquim 125* (INPA).
Distribution: N South America.

Elaphoglossum raywaense (Jenm.) Aslton, Bol. Soc. Brot., ser. 2, 32: 24. 1958.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 66* (INPA).
Distribution: N South America.

Lomagramma guianensis (Aubl.) Ching, Amer. Fern J. 22: 17. 1932.
Habit/Habitat: herb, hemi-epiphytic, in Terra Firme forests over rich soils.
Studied specimen(s): *Tuomisto & Zuquim 15607* (INPA, SP, TUR).
Distribution: Greater Antilles (except Jamaica) and tropical South America.

Olfersia cervina (L.) Kunze, Flora 7: 312. 1824.
Habit/Habitat: herb, terrestrial and hemi-epiphytic.
Studied specimen(s): *Sobrinho 1026* (INPA).
Distribution: S. Mexico, Antilles, Mesoamerica, and tropical South America.

Polybotrya caudata Kunze, Linnaea 9: 23. 1834.
Habit/Habitat: herb, hemi-epiphytic, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Braga-Neto 178* (INPA); *Zuquim 242* (INPA).
Distribution: S Mexico, Mesoamerica, and N South America.

Polybotrya sessilisora R. C. Moran, Bull. Illinois Nat. Hist. Surv. 34: 108, fig. 51. 1987.
Habit/Habitat: herb, hemi-epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Vieira 401* (INPA).
Distribution: N South America.

GLEICHENIACEAE
Dicranopteris flexuosa (Schrad.) Underw., Bull. Torrey Bot. Club 34(5): 254. 1907.
Habit/Habitat: herb, terrestrial, in disturbed and opened areas.
Studied specimen(s): *Zuquim & Jakovac 194* (INPA).
Distribution: SE USA, Antilles, Mesoamerica, and tropical South America.

Gleichenella pectinata (Willd.) Ching, Sunyatsenia 5(4): 276. 1940.
Habit/Habitat: herb, terrestrial, in disturbed and opened areas.
Distribution: S Mexico, Antilles, Mesoamerica, and tropical South America.

HYMENOPHYLLACEAE
Davalliopsis elegans (Rich.) Copel., Philipp. J. Sci. 67(1): 82. 1938.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams
Studied specimen(s): *Zuquim & Figueiredo 77* (INPA); *Zuquim& Jakovac 215* (INPA).
Distribution: Antilles, Mesoamerica, and tropical and subtropical South America.

Hymenophyllum polyanthos (Sw.) Sw., J. Bot. (Schrader) 1800(2): 102. 1801.
Habit/Habitat: herb, epiphytic, in Terra Firme forests
Studied specimen(s): *Zuquim & Junqueira 305* (INPA).
Distribution: Mexico, Mesoamerica, and tropical South America.

Trichomanes ankersii C. Parker ex Hook. & Grev., Icon. Filic. 2(11): tab. 201. 1831.
Habit/Habitat: herb, terrestrial with climbing raquis, in Terra Firme forest.
Studied specimen(s): *Zuquim & Costa 245* (INPA); *273* (INPA).
Distribution: Mesoamerica and N South America.

Trichomanes bicorne Hook., Icon. Plan. 9: tab. 892. 1854.
Habit/Habitat: herb, terrestrial or rupiculous, in Terra Firme and White Sand forests, in both cases, near streams.
Studied specimen(s): *Zuquim 123* (INPA).
Distribution: N South America.

Trichomanes cellulosum Klotzsch, Linnae 18: 531. 1844.
Habit/Habitat: herb, terrestrial, in Terra-Firme forests, near streams.
Studied specimen(s): *Zuquim & Figueiredo 71* (INPA); *Zuquim 121* (INPA).
Distribution: N South America.

Trichomanes cristatum Kaulf., Enum. Filic. 265. 1824.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 78* (INPA); *Zuquim 122* (INPA); *Zuquim & Braga-Neto 388* (INPA).
Distribution: tropical South America.

Trichomanes diversifrons (Bory) Mett. ex Sadeb., Nat. Pflanzenfam. I(4): 108. 1899.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 299* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, Trinidad, and N South America.

Trichomanes ekmanii Wess. Boer, Acta Bot. Neerl. 11: 319, fig. 33. 1962.
Habit/Habitat: herb, rupiculous and epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 118* (INPA); *Zuquim & Braga-Neto 153* (INPA); *191* (INPA); *Zuquim & Junqueira 292* (INPA).
Distribution: Antilles, Mesoamerica and N South America

Trichomanes martiusii C. Presl, Hymenophyllaceae 15, 36. 1843.
Habit/Habitat: herb, terrestrial, rupiculous and epiphytic, in Terra Firme and white sand forests, near streams.
Studied specimen(s): *Zuquim 120* (INPA).
Distribution: N South America.

Trichomanes pinnatum Hedw., *s.l.*, Fil. Gen. Sp., tab. 4, fig. 1. 1799.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 75* (INPA); *Zuquim & Braga-Neto 189* (INPA); *385* (INPA); *Zuquim & Junqueira 300* (INPA).
Distribution: Distribution: S Mexico, Antilles, Mesoamerica, and N South America.
NB. The material cited here probably belongs to more than one taxon, but more studies are necessary to clarify this situation.

Vandenboschia radicans (Sw.) Copel., (Philipp. J. Sci.) 67(1): 54. 1938.
Habit/Habitat: herb, rupiculous and epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 291* (INPA); *313* (INPA); *Zuquim & Braga-Neto 382* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and widespread in South America.

Trichomanes tuerckheimii H. Christ, Hedwigia 44: 361.1905.
Habit/Habitat: herb, terrestrial with climbing rachis, in Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 328* (INPA).
Distribution: S Mexico, Mesoamerica, and N South America.

Trichomanes vittaria DC. ex Poir., Encycl. 8: 65. 1808.
Habit/Habitat: herb, terrestrial, in Terra Firme Forest.
Studied specimen(s): *Zuquim & Braga-Neto 155* (INPA); *Zuquim & Jakovac 196* (INPA); *Zuquim 243* (INPA); *Zuquim & Junqueira 320* (INPA).
Distribution: N South America.

LINDSAEACEAE

Lindsaea divaricata Klotzsch, Linnaea 18: 547. 1844.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Figueiredo 67* (INPA); *Zuquim & Jacovak 218* (INPA); *Zuquim & Vieira 406* (INPA).
Distribution: Mesoamerica and tropical South America.

Lindsaea guianensis (Aubl.) Dryand., Trans. Linn. Soc. London 3: 42. 1797.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim 128* (INPA).
Distribution: Lesser Antilles, Mesoamerica, N South America.

Lindsaea sp.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Costa 248* (INPA); *253* (INPA); *Zuquim & Junqueira 295* (INPA).

Lindsaea lancea (L.) Bedd. var. *lancea*
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 74* (INPA); *Zuquim & Vieira 402* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and tropical South America.

Lindsaea lancea var. *falcata* (Dryand.) Rosenst., Hedwigia 46: 79. 1906.
Habit/Habitat: herb, terrestrial, occasionally epiphytic (in decaying wood), in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Figueiredo 70* (INPA).
Distribution: Mexico, Mesoamerica, and N South America.

Lindsaea quadrangularis subsp. *antillensis*, K. U. Kramer, Acta Bot. Neerl. 6(2): 194. 1957.
Habit/Habitat: herb, terrestrial, in white sand forests.
Studied specimen(s): *Zuquim & Braga-Neto 165* (INPA); *Zuquim 233* (INPA).
Distribution: Antilles, Guianas, and Brazil.

Lindsaea schomburgkii Klotzsch, Linnaea 18: 545. 1844.
Habit/Habitat: herb, terrestrial and epiphytic, in white sand forests.
Studied specimen(s): *Zuquim 338* (INPA).
Distribution: N South America.

Lindsaea tetraptera K. U. Kramer, Acta Bot. Neerl. 6(2): 181, fig. 38. 1957.
Habit/Habitat: herb, terrestrial, in white sand forests.
Studied specimen(s): *Zuquim 124* (INPA); *Tuomisto & Prado 15718* (INPA SP, TUR).
Distribution: N South America.

LOMARIOPSIDACEAE

Cyclopeltis semicordata (Sw.) J. Sm., Bot. Mag. 72: 36. 1846.
Habit/Habitat: herb, terrestrial, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Jakovac 140* (INPA); *221* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and N South America.

Lomariopsis japurensis (Mart.) J. Sm., Hist. Fil.: 140. 1875.
Habit/Habitat: herb, hemi-epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 112* (INPA); *Zuquim & Braga-Neto 182* (INPA); *183* (INPA); *188* (INPA).
Distribution: Mesoamerica and N South America.

Lomariopsis prieuriana Fée, Mem. Foug. 2: 66, Tab. 25, fig. 1. 1845.
Habit/Habitat: herb, hemi-epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim 372* (INPA).
Distribution: Mesoamerica and N South America.

Nephrolepis rivularis (Vahl) Ching, Bot. Jahrb. Syst. 24: 122. 1897.
Habit/Habitat: herb, terrestrial, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim 126* (INPA); *127* (INPA); *Zuquim & Costa 251* (INPA); *Zuquim & Junqueira 289* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and N South America.

LYCOPODIACEAE
Palhinhaea camporum (B. Øllg. & P. G.Windisch), Holub, Folia Geobot. Phytotax. 26: 93. 1991.
Habit/Habitat: herb, terrestrial, in disturbed open areas.
Studied specimen(s): *Zuquim & Jakovac 195* (INPA).
Distribution: tropical South America.

LYGODIACEAE
Lygodium volubile Sw., J. Bot. (Schrader) 1801(2): 303. 1803.
Habit/Habitat: herb, terrestrial with climbing rachis, in Terra Firme forests.
Studied specimen(s): *Zuquim 332* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

MARATTIACEAE
Danaea leprieurii Kunze, Mém. Acad. Roy. Sci. (Turin) 5(1790-1791): 429 tab. 9. 1793.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Figueiredo 68* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and N South America.

Danaea nodosa (L.) Sm., Mem. Acad. Roy. Sci. (Turin) 5(1790-1791): 420, tab. 9, fig. 11. 1793.
Habit/Habitat: herb, terrestrial and rupiculous, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Braga-Neto 139* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and N South America.

Danaea trifoliata Reichenb. ex Kunze, Analecta Pteridogr.: 4, tab. 2. 1837.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 377* (INPA); *Zuquim & Junqueira 409* (INPA).
Distribution: Guianas and Brazil.

METAXYACEAE

Metaxya rostrata C. Presl, Tent. Pterid.: 60, tab. 1, fig. 5. 1836.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Costa 249* (INPA); *Zuquim & Junqueira 304* (INPA).
Distribution: S Mexico, Lesser Antilles, Mesoamerica, and N South America.

POLYPODIACEAE

Campyloneurum phyllitidis C. Presl, Tent. Pterid.: 190. 1836.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Costa 279* (INPA).
Distribution: S Florida, Mexico, Antilles, Mesoamerica, tropical and subtropical South America.

Campyloneurum repens (Aubl.) C. Presl, Tent. Pterid.: 190. 1836.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 108* (INPA); *Zuquim & Braga-Neto 157* (INPA); *383* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Cochlidium serrulatum (Sw.) L. E. Bishop, Amer. Fern J. 68(3): 80. 1978.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 408* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Dicranoglossum desvauxii (Klotzsch) Proctor, Rhodora 63: 35. 1961.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Costa 265* (INPA); *Zuquim & Junqueira 293* (INPA).
Distribution: Lesser Antilles, tropical South America.

Microgramma dictyophylla (Kunze ex Mett.) de la Sota, Novon 17(1): 27. 2007.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Costa 266* (INPA); *Zuquim 336* (INPA).
Distribution: Mesoamerica and N South America.

Microgramma lycopodioides (L.) Copel., Ann. Cryptog. Phytopathol. 5: 185. 1947.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 104* (INPA); *Zuquim & Junqueira 312* (INPA); *Zuquim & Braga-Neto 384* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, South America

Microgramma megalophylla (Desv.) de la Sota, Bol. Soc. Argent. Bot. 10: 158. 1963.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Neres 376* (INPA).
Distribution: N South America.

Microgramma percussa (Cav.) de la Sota, Physis (Buenos Aires) 44(106C): 28. 1986.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 168* (INPA).
Distribution: S Mexico, Mesoamerica, and tropical South America.

Microgramma reptans (Cav.) A. R. Sm., Proc. Calif. Acad. Sci., ser. 4, 40(8): 230. 1975.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 213* (INPA); *Zuquim & Costa 250* (INPA); *Zuquim & Junqueira 290* (INPA).
Distribution: Mexico, Cuba, Mesoamerica, and tropical South America.

Microgramma sp.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Vieira 405* (INPA).

Microgramma tecta (Kaulf.) Alston, J. Wash. Acad. Sci. 48: 232. 1958.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 152* (INPA); *170* (INPA); *Zuquim & Jakovac 229* (INPA).
Distribution: Guianas and Brazil.

Microgramma thurnii (Baker) R. M. Tryon & Stolze, Fieldiana, Bot., n.s. 32: 156. 1993.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Mesquita 129* (INPA); *Zuquim & Costa 274* (INPA).
Distribution: N South America.

Pecluma camptophyllaria (Fée) M. G. Price, Amer. Fern J. 73(4): 113. 1983.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 224* (INPA).
Distribution: Greater Antilles, Mesoamerica, amd N South America.

Pecluma pilosa (A. M. Evans) M. Kessler & A. R. Sm, Candollea 60(1): 281. 2005.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 389* (INPA).
Distribution: N South America.

Phlebodium decumanum (Willd.) J. Sm., J. Bot. (Hooker) 4: 59. 1841.
Habit/Habitat: herb, epiphytic, in Terra Firme forests and in open areas.
Studied specimen(s): *Zuquim & Figueiredo 111* (INPA).
Distribution: S Florida, Antilles, Mesoamrica, tropical and subtropical South America.

Pleopeltis bombycina (Maxon) A. R. Sm., Candollea 60(1): 281. 2005.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 201* (INPA).
Distribution: Mesoamerica and N South America.

Serpocaulon adnatum (Kunze ex Klotzsch) A. R. Sm., Taxon 55(4): 927. 2006.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 212* (INPA).
Distribution: N South America.

Serpocaulon caceresii (Sodiro) A. R. Sm., Taxon 55(4): 928, fig. 3A. 2006.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.

Studied specimen(s): *Zuquim & Jakovac 208* (INPA); *Zuquim & Junqueira 301* (INPA); *Zuquim & Braga-Neto 392* (INPA).
Distribution: N South America.

PTERIDACEAE
Adiantum adiantoides (J. Sm.) C. Chr., Ind.: 123. 1905.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 380* (INPA); *Zuquim & Vieira 395* (INPA).
Distribution: Guianas and Brazil.

Adiantum argutum Splitg., Tijdschr. Natuurl. Gesch. Physiol. 7: 427, fig. 1-2. 1840.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 142* (INPA); *167* (INPA).
Distribution: Guianas and Brazil.

Adiantum cajennense Willd. ex Klotzsch, Linnaea 18: 552. 1845
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 180* (INPA); *379* (INPA); *Zuquim 235* (INPA).
Distribution: Guianas and Brazil.

Adiantum cinnamomeum Lellinger & J. Prado, Amer. Fern J. 91(1): 4, fig. 1c-f, fig.1. 2001.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, in slightly disturbed areas.
Studied specimen(s): *Zuquim 130* (INPA).
Distribution: Guianas and N. Brazil.

Adiantum dolosum Kunze, Linnaea 21: 219. 1848.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Costa 278* (INPA); *Zuquim & Junqueira 288* (INPA).
Distribution: South America.

Adiantum glaucescens Klotzsch, Linnaea 18: 552. 1844.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 223* (INPA).
Distribution: South America.

Adiantum humile Kunze, Linnaea 9: 80. 1834.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 147* (INPA); *Zuquim & Junqueira 315* (INPA).
Distribution: Belize, and tropical South America.

Adiantum lucidum (Cav.) Sw., Syn. fil.: 121. 1806.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 207* (INPA).
Distribution: Meosamerica, Antilles, and South America.

Adiantum obliquum Willd., Sp. Pl. 5(1): 429. 1810.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 98* (INPA); *Zuquim & Braga-Neto 146* (INPA); *150* (INPA); *Zuquim & Junqueira 298* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Adiantum petiolatum Desv., Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 326. 1811.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Braga-Neto 163* (INPA); *Zuquim & Jakovac 225* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Adiantum pulverulentum L., Sp. Pl. 2: 1096. 1753.
Habit/Habitat: herb, terrestrial, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Braga-Neto 141* (INPA); *Zuquim & Jacovak 222* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Adiantum terminatum Kunze ex Miq., Verslagen Meded. Vier Kl. Kon. Ned. Inst. Wetensch. Letterk. Schoone Kunsten 1842: 187. 1843.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 69* (INPA); *99* (INPA); *101* (INPA); *Zuquim & Braga-Neto 148* (INPA); *169* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Adiantum tomentosum Klotzsch, Linnaea 18: 553. 1844.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovak 198* (INPA).
Distribution: Tropical South America.

Ananthacorus angustifolius (Sw.) Underw. & Maxon, Contr. U.S. Natl. Herb. 10: 487. 1908.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 302* (INPA); *309* (INPA).
Distribution: Mexico, Antilles and N South America.

Anetium citrifolium (L.) Splitg., Tijdschr. Natuurl. Gesch. Physiol. 7: 395. 1840.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 190* (INPA); *Zuquim 333* (INPA).
Distribution: Mexico, Mesoamerica and tropical South America.

Hecistopteris pumila (Spreng.) Benedict, London J. Bot. 1: 193. 1842.
Habit/Habitat: herb, epiphyti, in Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 294* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Hemionitis rufa (L.) Sw., J. Bot. (Schrader) 1800(2): 16. 1801.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, in rocky areas.
Studied specimen(s): *Zuquim & Jakovac 206* (INPA).
Distribution: S Mexico, Greater Antilles, Mesoamerica, and N South America.

Pityrogramma calomelanos (L.) Link, Handbuch 3: 20. 1833.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 173* (INPA).
Distribution: S Florida, Mexico, Antilles, Mesoamerica, and tropical South America.

Polytaenium guayanense (Hieron.) Alston, Kew Bull. 1932(7): 134. 1932.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Jakovac 211* (INPA).
Distribution: N South America.

Pteris pungens Willd., Sp. Pl. 5: 387. 1810.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 331* (INPA); *Zuquim & Vieira 399* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

Pteris tripartita Sw., J. Bot. (Schrader) 1800(2): 67. 1801.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Braga-Neto 171* (INPA); *Zuquim & Jakovac 226* (INPA).
Distribution: naturalized and widespread in tropical America, native in Africa, Asia, and Polynesia.

Vittaria lineata (L.) Sm., Mem. Acad. Roy. Sci. (Turin) 5(1790-1791): 421, pl. 9, fig. 5. 1793.
Habit/Habitat: herb, epiphytic, in Terra Firme forests.
Studied specimen(s): *Zuquim & Junqueira 303* (INPA); *310* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

SACCOLOMATACEAE
Saccoloma inaequale (Kunze) Mett., Ann. Sci. Nat., Bot., ser. 4, 15: 80. 1861.
Habit/Habitat: herb, terrestrial, in Terra Firme forest
Studied specimen(s): *Zuquim & Figueiredo 73* (INPA); *Zuquim & Braga-Neto 166* (INPA); *Zuquim & Junqueira 311* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and tropical South America.

SALVINIACEAE
Salvinia auriculata Aubl., Hist. Pl. Guiane 2: 969, pl. 367. 1775.
Habit/Habitat: herb, aquatic, in low energy and large water bodies.
Studied specimen(s): *Zuquim & Braga-Neto 187* (INPA).
Distribution: Mexico, Greater Antilles, Mesoamerica, and tropical South America.

SCHIZAEACEAE
Actinostachys pennula (Sw.) Hook., Gen. Fil., tab. 111A. 1842.
Habit/Habitat: herb, terrestrial, in white sand forests and shrub lands.
Studied specimen(s): *Prado et al. 1885* (INPA, SP, TUR).
Distribution: Mesoamerica, Trinidad, tropical South America, and Uruguay.

Schizaea elegans (Vahl) Sw., J. Bot. (Schrader) 1800(2): 103. 1801.
Habit/Habitat: herb, terrestrial, in Terra Firme and white sand forests.
Studied specimen(s): not collected
Distribution: S Mexico, Greater Antilles, Mesoamerica, and tropical South America.

SELAGINELLACEAE
Selaginella amazonica Spring, Fl. Bras. 1(2): 124. 1840.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Braga-Neto 393* (INPA).
Distribution: Colombia and Brazil.

Selaginella breynii Spring, Fl. Bras. 1(2): 121. 1840.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Vieira 404* (INPA).
Distribution: Colombia, French Guiana, and N Brazil.

Selaginella pedata Klotzsch, Linnaea 17: 521. 1844.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 95* (INPA); *96* (INPA); *Zuquim & Braga-Neto 181* (INPA); *Zuquim 234* (INPA).
Distribution: N South America.

TECTARIACEAE
Tectaria incisa Cav. Descr. Pl.: 249. 1802.
Habit/Habitat: herb, terrestrial and rupiculous, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Figueiredo 102* (INPA); *Zuquim & Braga-Neto 184* (INPA); *Zuquim & Junqueira 314* (INPA).
Distribution: S Florida, Mexico, Antilles, Mesoamerica, and tropical and subtropical South America.

Triplophyllum crassifolium Holttum, Kew Bull. 41(2): 257. 1986.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 100* (INPA); *Zuquim & Braga-Neto 158* (INPA); *159* (INPA); *162* (INPA); *193* (INPA); *387* (INPA); *Zuquim & Jakovac 200* (INPA); *Zuquim 239* (INPA); *Zuquim & Costa 246* (INPA).
Distribution: N South America.

Triplophyllum dicksonioides (Fée) Holttum, Kew Bull. 41(2): 257. 1986.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Souza 444* (INPA); *Zuquim & Neres 445* (INPA).
Distribution: Trinidad and South America.

Triplophyllum funestum (Kunze) Holltum, Kew Bull. 41(2): 255. 1986.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim 238* (INPA).
Distribution: Antilles, Mesoamerica and N South America.

Triplophyllum glabrum J. Prado & R. C. Moran, Brittonia 60(1): 121, fig. 13, 14. 2008.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Costa 284* (INPA); *Zuquim & Vieira 403* (INPA).
Distribution: Venezuela, Guiana, and N Brazil.

Triplophyllum hirsutum (Holttum) J. Prado & R. C. Moran, Brittonia 60(1): 121, fig. 15, 16, 17. 2008.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 76* (INPA); *Zuquim & Costa 268* (INPA); *Zuquim & Vieira 298* (INPA).
Distribution: Mesoamerica, Antilles, and South America.

THELYPTERIDACEAE
Thelypteris abrupta (Desv.) Proctor, Rhodora 61(732): 305-306. 1959[1960].
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Figueiredo 109* (INPA); *Zuquim & Braga-Neto 144* (INPA); *149* (INPA); *175* (INPA); *176* (INPA); *192* (INPA); *381* (INPA).
Distribution: Antilles and N South America.

Thelypteris arborescens (Humb. & Bonpl. ex Willd.) C. V. Morton, Contr. U.S. Natl. Herb. 38: 50. 1967.
Habit/Habitat: herb, terrestrial, in Terra Firme and white-sand forests, near streams.
Studied specimen(s): *Zuquim 119* (INPA).
Distribution: Mesoamerica and tropical South America.

Thelypteris macrophylla (Kunze) C. V. Morton, Amer. Fern J. 61(1): 17. 1971.
Habit/Habitat: herb, terrestrial and rupiculous, in Terra Firme forests, near streams.
Studied specimen(s): *Zuquim & Braga-Neto 179* (INPA); *Zuquim & Junqueira 330* (INPA); *Zuquim & Jakovac 335* (INPA).
Distribution: N South America and southern Brazil.

Thelypteris opulenta (Kaulf.) Fosb., Smithsonian Contr. Bot. 8: 3-6. 1972.
Habit/Habitat: herb, terrestrial, in Terra Firme forests, in tree fall gaps or disturbed areas.
Studied specimen(s): *Zuquim & Braga-Neto 143* (INPA); *390* (INPA).
Distribution: Antilles, Mesoamerica, N South America. Native to Asia and Africa.

Thelypteris poiteana (Bory) Proctor, Bull. Inst. Jamaica, Sci. Ser. 5: 63. 1953.
Habit/Habitat: herb, terrestrial or rupiculous, in Terra Firme forests over rich soils.
Studied specimen(s): *Zuquim & Braga-Neto 145* (INPA); *174* (INPA).
Distribution: S Mexico, Antilles, and N South America.

WOODSIACEAE

Diplazium cristatum (Desr.) Alston, J. Bot. 74: 173. 1936.
Habit/Habitat: herb, terrestrial, in Terra Firme forests.
Studied specimen(s): *Zuquim & Neres 371* (INPA).
Distribution: S Mexico, Antilles, Mesoamerica, and tropical South America.

Diplazium grandifolium (Sw.) Sw., J. Bot. (Schrader) 1800(2): 62. 1801.
Habit/Habitat: herb, terrestrial or hemi-epiphytic, in Terra Firme forest over rich soils.
Studied specimen(s): *Zuquim & Braga-Neto 156* (INPA); *Zuquim & Jakovac 219* (INPA); *Zuquim & Junqueira 319* (INPA).
Distribution: Mexico, Antilles, Mesoamerica, and N South America.

DISCUSSION

The vegetation is heterogeneous in the Rebio Uatumã region; physiognomies vary from the open areas of *campinas* to the dense Terra Firme forests with closed canopy and emergent trees more than 45 m tall. Within the Terra Firme forests heterogeneity arises from variations in edaphic factors such as fertility (exchangeable bases content varies, at least, from 0.16 to 5.68 cmol/kg), texture (clay content varies from 16 to 85 %) and water availability (from stream margins to high plateaus). The environmental heterogeneity, including a large edaphic gradient, probably determined the high species richness (122 spp.) found in the area in comparison with previous inventories made in the Brazilian Amazon: 83 species in the North of Reserva Ducke (Costa *et al.*, 1999); 48 species in upper Rio Negro (Freitas & Prado, 2005); - 39 species in Madeira-Purus interfluve (Carvalho *et al.*, 2007); 60 species in DBFF Project areas (Zuquim, 2006); - 70 species in Eastern Amazon (Costa & Pietrobom, 2007); 39 species in the metropolitan region of the city of Belém (Maciel *et al.*, 2007); and 50 species in northern Amazon (Edwards, 1998).

In fact, ferns and lycophytes have been long recognised as habitat specialists in the Amazon (Tuomisto & Poulsen, 1996). In the present work, we found some genera that are not common in Central Amazonia such as *Bolbitis* and *Tectaria*. The species of these genera tend to colonise relatively rich soils (Tuomisto & Poulsen, 1996). On the other hand, some genera such as *Lindsaea*, that tends to be more diverse in poor soils (Tuomisto, 1998), also showed high number of species. High environmental heterogeneity itself tends to increase species richness for virtually every plant group. To our knowledge, Prado & Moran (2009) is the only checklist that found a comparative number of species (178 spp.). Their study comprises almost all the State of Acre and probably encompasses areas with rich soils since the checklist contains rich soil indicator species, such as *Adiantum pulverulentum, Bolbitis lindgii, B. nicotianifolia, Didymochlaena truncatula, Tectaria incisa* etc (Tuomisto & Poulsen, 1996).

Ferns and lycophytes are sensitive to changes in environmental conditions and land uses (Paciencia & Prado, 2005). The strong species-environment relationship and the diversity found in Uatumã region and in previous studies in Amazonia (Costa *et al.*, 2005, Tuomisto *et al.*, 2002, Tuomisto *et al.*, 2003, and Zuquim *et al.*, 2009) reinforce the proposal to include ferns and lycophytes as indicator groups of the distribution of biodiversity in Rapid inventories (RAP). RAP methodology is being applied widely in Amazonia by NGOs (e.g. World Wild Fund for Nature - WWF, Fundação Vitória Amazônica - FVA) and governmental institutions (Secretaria de Desenvolvimento Sustentável do Estado do Amazonas – SDS/AM, Instituto Nacional de Pesquisas da

Amazônia - INPA). Fern and lycophyte inventories would enhance the knowledge of the spatial distribution of diversity and heterogeneity of a given area, providing low-cost information for conservation planning and management.

ACKNOWLEDGEMENTS

We acknowledge the assistance of Joelson Nogueira and Ailton Neres during field work. The ICMBio staff (especially Caio Pamplona) made it easier to work in REBIO Uatumã. We thank Carlos H. Franciscon for herbarium facilities at INPA and Hanna Tuomisto (TUR) for taxonomic and ecological discussions. This work was funded by CNPq/PPG7.

REFERENCES

CARVALHO, F.A.; COSTA, F.R.C. & SALINO, A. 2007. Determinantes da estrutura da comunidade de pteridófitas na BR 319, interflúvio Purus Madeira, Amazonas, Brasil. Braz. J. Bioscience (5, supl. 2): 1074-1076.

CHAUVEL, A.; LUCAS, Y. & BOULET, R. 1987. On the genesis of the soil mantle of the region of Manaus, Central Amazonia, Brasil. Experientia 43: 234-240

COSTA, F.R.C.; MAGNUSSON W.E. & LUIZÃO R.C. 2005. Mesoscale distribution patterns of Amazonian understorey herbs in relation to topography, soil and watersheds. J. Ecol. 93: 863–878.

COSTA, J.M. & PIETROBOM, M.R. 2007. Pteridófitas (Lycophyta e Monilophyta) da Ilha de Mosqueiro, município de Belém, estado do Pará, Brasil. Bol. Mus. Para. Emílio Goeldi, Ciênc. Nat. (2): 45-56.

COSTA, J.M.; SOUZA, M.G.C. & PIETROBOM, M.R. 2006. Levantamento florístico das Pteridófitas (Lycophyta e Monilophyta) do Parque Ambiental de Belém (Belém, Pará, Brasil). Rev. Biol. Neotrop. 3: 4-12.

COSTA, M. A. S.; PRADO, J.; WINDISCH, P.G.; FREITAS, C.A.A. & LABIAK, P. 1999. Pteridophyta. In: RIBEIRO, J.E.L.S.; HOPKINS, M.J.G.; VICENTINI, A.; SOTHERS, C.A.; COSTA, M.A.S.; BRITO, J.M.; SOUZA, M.A.; MARTINS, L.H.; LOHMANN, L.G.; ASSUNÇÃO, P.A.C.L.; PEREIRA, E.C.; SILVA, C.F. & PROCÓPIO, L.C. Flora da Reserva Ducke – Guia de identificação das plantas vasculares de uma floresta de terra firme na Amazônia Central, pp. 97-117. INPA. Manaus.

EDWARDS, P.J. 1998. The pteridophytes of the Ilha de Maracá. In: W. MILLIKEN & RATTER, J.A. (Eds) Maracá: the biodiversity and environment of an Amazonian rainforest, pp. 113-129. John Wiley & Sons, Chichester, United Kingdon.

FREITAS, C.A.A. & PRADO, J. 2005. Lista anotada das pteridófitas de florestas inundáveis do alto Rio Negro, Município de Santa Isabel do Rio Negro, AM, Brasil. Acta Bot. Bras. 19: 399-406.

LAURANCE, W.F. 2001. The hyper-diverse Flora of the Central Amazon-an overview. In: R.O. BIERREEGARD Jr., GASCON, C.; LOVEJOY, T.E. & MESQUITA, R. (Eds) Lessons from Amazonia. The Ecology and Conservation from a Fragmented Forest, pp. 47-53. Yale University Press, New Haven and London.

MACIEL, S.; SOUZA, M.G.C. & PIETROBOM, M.R. 2007. Licófitas e monilófitas do Bosque Rodrigues Alves Jardim Botânico da Amazônia, município de Belém, estado do Pará, Brasil. Bol. Mus. Para. Emílio Goeldi, Ciênc. Nat. 2: 69-83.

MERTENS, J. 2004. The characterization of selected physical and chemical soil properties of the surface soil layer in the 'Reserva Ducke', Manaus, Brazil, with

emphasis on their spatial distribution. Bachelor thesis. Humboldt University, Berlin.
PACIENCIA, M.L.B. & PRADO, J. 2005. Effects of forest fragmentation on pteridophyte diversity in a tropical rain forest in Brazil. Plant Ecol. 180: 87-107.
PICHI-SERMOLLI, R.E.G. 1996. Authors of scientific names in Pteridophyta. Royal Botanic Gardens. Kew.
PRADO, J. & MORAN, R.C. 2009. Checklist of the ferns and lycophytes of Acre state, Brazil. Fern Gaz. 18: 230-263.
RADAMBRASIL. 1976. Folha SC.19. Rio Branco: Geologia, Geomorfologia, Pedologia, Vegetação, Uso Potencial da Terra. Levantamento de Recursos Naturais 12. Ministério das Minas e Energia (Brazil), Departamento Nacional de Produção Mineral, Rio de Janeiro.
SMITH, A.R.; PRYER, K.M.; SCHUETTPELZ, E.; KORALL, P.; SCHNEIDER, H. & WOLF, P.G. 2006. A classification for extant ferns. Taxon 55: 705-731.
TUOMISTO, H. & POULSEN, A.D. 1996. Influence of edaphic specialization on pteridophyte distribution in neotropical rain forests. J. Veg. Sci. 23: 283-293.
TUOMISTO, H. 1998. What satellite imagery and large-scale field studies can tell about biodiversity patterns in Amazonian forests. Ann. Mo. Bot. Gard. 85: 48-62.
TUOMISTO, H.; RUOKOLAINEN, K. & YLI-HALLA, M. 2003. Dispersal, environment, and floristic variation of Western Amazonian forests. Science 299: 241-244.
TUOMISTO, H.; RUOKOLAINEN, K.; AGUILAR, M. & SARMIENTO, A. 2003. Floristic patterns along a 43-km long transect in an Amazonian rain forest. J. Ecol. 91: 743–756.
TUOMISTO, H.; RUOKOLAINEN, K.; POULSEN, A.D.; MORAN, R.C.; QUINTANA, C.; CANAS, G. & CELI, J. 2002. Distribution and diversity of pteridophytes and Melastomataceae along edaphic gradients in Yasuní National Park, Ecuadorian Amazonia. Biotropica 34: 516–533.
ZUQUIM, G.; COSTA, F.R.C. & PRADO, J. 2007. Fatores que determinam a distribuição de espécies de pteridófitas da Amazônia Central. Braz. J. Bioscience 5: 360-362.
ZUQUIM, G.; COSTA, F.R.C.; PRADO, J. & BRAGA-NETO, R. 2009. Distribution of pteridophyte communities along environmental gradients in Central Amazonia, Brazil. Biodiv. Conserv. 18: 151-166.
ZUQUIM, G. 2006. Diversidade da comunidade de pteridófitas de florestas de Terra Firme na Amazônia Central. Master dissertation. National Institute of Amazonian Research.