PEDRO BOND SCHWARTSBURD

O GÊNERO *HYPOLEPIS* BERNH. (DENNSTAEDTIACEAE) NA AMÉRICA DO SUL

SÃO PAULO – SP

2012

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Tese apresentada ao Instituto de Biociências da Universidade de São Paulo, como quesito a obtenção do título de Doutor em Ciências - Programa Ciência Biológicas (Botânica), Área de Concentração: Botânica (sub-área Sistemática, Evolução e Biogeografia de Plantas Vasculares).

Orientador: Prof. Dr. Jefferson Prado

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Orientador: Prof. Dr. Jefferson Prado

À minha Família, aos meus Verdadeiros Amigos, e aos Grandes Nomes da Ciência

Polypodium (*Phegopteris*) *rugosulum* Labill.:
“*Perhaps no Fern has been so generally
misunderstood as the present, both in regard
to genus and to the limits of the species...*”
Hooker (Sp. Fil. 4: 272–273. 1862)

Hypolepis rugosula var. *poeppigii:* (Kunze) C. Chr.:
“*The specimens from Juan Fernandez are
also very similar to* Polypodium viscidum *Roxb.
[=* Hypolepis helenesis *Fée] from St. Helena,
and there is little doubt that* P. villoso-viscidum
Thouars from Tristan d’Acugna is the same.”
Christensen & Skottsberg (Nat. Hist. Juan
Fernandez, Pterid.: 31. 1920)

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Obviamente esqueci-me de mencionar várias pessoas... desculpem-me.

E a você que está lendo...

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RESUMO

Hypolepis Bernh. é um gênero sub-cosmopolita com ca. 80 táxons, e com pouquíssimos estudos taxonômicos. O presente trabalho trata da revisão taxonômica das espécies ocorrentes na América do Sul, incluindo a Ilha de Cocos (Costa Rica). O mesmo se desenvolveu, principalmente, através do estudo morfológico dos tipos nomenclaturais e de exsicatas oriundas de herbários europeus, sul-americanos e de um neo-zeolandês. Algumas espécies também foram estudadas em campo. Para a América do Sul (incl. Cocos) são aqui reconhecidas 27 espécies, e um total de 31 táxons (espécies, subespécies e variedades). Destas, 11 representam novidades nomenclaturais: *H. acantha* Schwartsb., *H. bogotensis* var. *glabra* H. Karst. ex Schwartsb. & J. Prado, *H. flexuosa* var. *zimmerae* Schwartsb. & J. Prado, *H. galapagensis* Schwartsb. & J. Prado, *H. krameri* Schwartsb. *et al., H. paulistana* Schwartsb. & J. Prado, *H. pedropaloensis* Schwartsb. & J. Prado, *H. rugosula* subsp. *poeppigiana* (Mett.) Schwartsb. & J. Prado, *H. rugosula* subsp. *pradoana* Schwartsb., *H. stolonifera* var. *nebularis* Schwartsb., e *H. trinationalis* Schwartsb. Grande parte dos táxons foram re-circunscritos, especialmente *H. flexuosa* Sodiro var. *flexuosa, H. mitis* Kunze ex Kuhn, *H. poeppigii* (Kunze) R.A. Rodr., *H. repens* (L.) C. Presl, *H. rigescens* (Kunze ex Mart.) T. Moore, e *H. stolonifera* Fée var. *stolonifera*. Foram reconhecidos oito padrões biogeográficos para os táxons: "neotropical", "circum-caribenho", "circum-amazônico", "Monte Roraima", "andino", "ilhas", "sul-brasileiro", e "austral". Altitudes mínimas e máximas parecem ser fortes fatores limitantes de distribuição. O tratamento taxonômico apresenta chaves de identificação, sinonímias, tipificações, descrição dos táxons, mapas de distribuição, ilustrações, material examinado, e comentários taxonômicos e/ou nomenclaturais. Em adição, são apresentadas breves discussões morfológicas, ecológicas, biogeográficas, de conceitos específicos e infra-específicos de alguns táxons, e de grupos informais de espécies; além de pranchas com secções anatômicas de quatro espécies.

ABSTRACT

Hypolepis Bernh. is a sub-cosmopolitan genus with ca. 80 *taxa*, and with few taxonomic studies. The present work deals with the taxonomic revision of the South American species, including the Cocos Island (Costa Rica). It has been based, mainly, on the morphological study of nomenclatural types and exsiccates from European, South American, and New Zealand herbaria. Some species were also studied in nature. For South America (incl. Cocos Island), 27 species are here recognized, and a total of 31 *taxa* (species, subspecies, and varieties). Among these, 11 represent nomenclatural novelties: *H. acantha* Schwartsb., *H. bogotensis* var. *glabra* H. Karst. ex Schwartsb. & J. Prado, *H. flexuosa* var. *zimmerae* Schwartsb. & J. Prado, *H. galapagensis* Schwartsb. & J. Prado, *H. krameri* Schwartsb. *et al., H. paulistana* Schwartsb. & J. Prado, *H. pedropaloensis* Schwartsb. & J. Prado, *H. rugosula* subsp. *poeppigiana* (Mett.) Schwartsb. & J. Prado, *H. rugosula* subsp. *pradoana* Schwartsb., *H. stolonifera* var. *nebularis* Schwartsb., and *H. trinationalis* Schwartsb. Most *taxa* were re-circunscribed, especially *H. flexuosa* Sodiro var. *flexuosa, H. mitis* Kunze ex Kuhn, *H. poeppigii* (Kunze) R.A. Rodr., *H. repens* (L.) C. Presl, *H. rigescens* (Kunze ex Mart.) T. Moore, and *H. stolonifera* Fée var. *stolonifera.* Eight bio-geographical patterns were recognized: “Neotropical”, “circum-Caribbean”, “circum-Amazonian”, “Mount Roraima”, “Andean”, “islanders”, “southern Brazilian”, and “Austral”. Minimum and maximum elevations seem to be strong limiting factors of distribution. The taxonomic treatment presents keys to *taxa*, synonymies, typifications, *taxa* description, distribution maps, illustrations, studied material, and taxonomic and/or nomenclatural comments. In addition, it is presented short discussions about morphology, ecology, bio-geography, specific/infra-specific concepts of some *taxa*, and informal groups of species; also, plates with anatomical sections of four species.

INTRODUÇÃO GERAL

O presente trabalho trata da Revisão Taxonômica do gênero *Hypolepis* Bernh. (Dennstaedtiaceae) para a América do Sul. O trabalho encontra-se dividido em um grande capítulo contendo o tratamento taxonômico geral e mais cinco anexos.

O grande capítulo geral foi redigido na língua Inglesa, uma vez que se prevê sua publicação neste idioma. Este capítulo contém:

I. Introdução, com os sub-itens: Histórico do gênero, Classificações supra-genéricas tradicionais, Abordagens recentes – relações filogenéticas de *Hypolepis*, e A necessidade de estudos taxonômicos adicionais.

II. Materiais e Métodos.

III. Resultados e Discussão, com os subitens: Conceitos de espécie conflitantes, *Hypolepides* no Mundo, Aspectos ecológicos, Padrões biogeográficos, Morfologia, Grupos de espécies, Tratamento taxonômico, Espécies exóticas cultivadas, Nomes excluídos, Nomes duvidosos, e Registros duvidosos para a América do Sul.

IV. Referências Bibliográficas.

V. Lista de Nomes Científicos.

Neste grande capítulo também são apresentadas ilustrações da maioria das espécies, mapas de distribuição, e pranchas com fotos de secções anatômicas.

Os cinco anexos (também na língua Inglesa) são referentes a artigos já publicados durante o desenvolvimento da Tese, manuscritos aceitos para publicação, porém ainda aguardando a publicação efetiva (no prelo), ou a manuscritos submetidos à publicação e aguardando aceite efetivo. Tais anexos contêm autorias distintas, ou são referentes a temas a serem publicados independentemente (*e.g.* propostas de conservação de nomes científicos), por isso foram segregados do capítulo principal, e enviados a publicação anteriormente à defesa da Tese; são eles:

Anexo I – (1911) Proposal to conserve the name *Hypolepis nigrescens* Hook. (Dennstaedtiaceae) against *Hypolepis nigrescens* (Schrad.) Nees (Cyperaceae). Publicado na revista *Taxon*, vol. 58, fasc. 4, pág. 1369, ano 2009, de autoria de Pedro Bond Schwartsburd (Doutorando) e Jefferson Prado (Orientador). Este artigo é referente ao pedido de conservação do nome *Hypolepis nigrescens* Hook. (Dennstaedtiaceae), usado por mais de 150 anos, perante um homônimo mais antigo: *Hypolepis nigrescens* (Schrad.) Nees (Cyperaceae). Tal pedido foi deferido, e o nome publicado por Hooker agora é um *nomen conservandum.*

Anexo II – (1990) Proposal to conserve the name *Pteris arachnoidea* (*Pteridium arachnoideum*) against *Aspidium brasilianum* and *Pteris psittacina* (Dennstaedtiaceae). Publicado na revista *Taxon*, vol. 60, fasc. 1, págs. 234-235, ano 2011, de autoria de Pedro Bond Schwartsburd (Doutorando) e Jefferson Prado (Orientador). Um nome atrelado ao gênero *Hypolepis* (*Hypolepis brasiliana* (C. Presl) Kuhn) revelou ter um basiônimo mais antigo (*Aspidium brasilianum* C. Presl) para a uma das samambaias mais conhecidas e economicamente importantes da América do Sul: *Pteridium arachnoideum* (Kaulf.) Maxon. A fim de se evitar uma mudança nomenclatural drástica, foi pedida a conservação do basiônimo mais utilizado (*Pteris arachnoideum* Kaulf.), perante *Aspidium brasilianum* (e *Pteris psittacina* C. Presl). Este pedido também foi deferido, e o nome publicado por Kaulfuss é agora um *nomen conservandum.*

Anexo III – Typification of *Polypodium rugosulum* Labill. (= *Hypolepis rugosula*, Dennstaedtiaceae), a new subspecies, a new status for one variety. Publicado na revista Webbia, vol. 66, fasc. 2, págs. 155-163, ano 2011, de autoria de Pedro Bond Schwartsburd (Doutorando) e Jefferson Prado (Orientador). Este artigo trata da lectotipificação de *Polypodium rugosulum* Labill. (*Hypolepis rugosula* (Labill.) J. Sm., tipo da Tasmânia), uma nova subespécie (*H. rugosula* subsp. *pichi-sermolliana* Schwartsb. & J. Prado, ocorrente na África Continental e Ilha de Fernando Po), e uma nova combinação (*H. rugosula* subsp. *africana* (C. Chr.) Schwartsb. & J. Prado, ocorrente em Madagascar e Bourbon). Embora este artigo possa aparentar não ter relação direta com a Tese, ele é estritamente relacionado a ela: *Hypolepis rugosula* é uma espécie sub-cosmopolita, com duas subespécies presentes na América do Sul (subsp. *poeppigiana* (Mett.) Schwartsb. & J. Prado *ined.*, e subsp. *pradoana* Schwartsb. *ined.*), e necessitava de uma efetiva lectotipificação e esclarecimentos taxonômicos.

Anexo IV – Two new species of *Hypolepis* (Dennstaedtiaceae: Pteridophyta) from Mount Roraima region (N South America) and a revised key for the Guianan species. Artigo aguardando publicação efetiva (no prelo) pela revista *Fern Gazette*, vol. 19, fasc. 1, págs. 1-9, ano 2012, de autoria de Pedro Bond Schwartsburd (Doutorando), Michel

Boudrie (Pesquisador autônomo, da Guiana Francesa), e George Cremers (Pesquisador do Museu de História Natural de Paris). Este artigo trata da descrição de duas espécies novas de *Hypolepis,* ocorrente na região do Monte Roraima, e de uma lista atualizada das espécies ocorrentes nas três Guianas, com chave de identificação. O Anexo 4 consiste na prova gráfica do artigo, previamente a suas últimas mínimas modificações.

Anexo V – Three new taxa of *Hypolepis* (Dennstaedtiaceae) from the Brazilian Atlantic Forest, and a key to the Brazilian taxa. Artigo “provisoriamente aceito” à publicação, aguardando “confirmação de aceite” e “instruções futuras”, pela revista *Kew Bulletin,* previsão de publicação em 2012, de autoria de Pedro Bond Schwartsburd (Doutorando). Este manuscrito trata da descrição de uma espécie, uma subespécie, e uma variedade novas de *Hypolepis,* além de uma chave para os táxons brasileiros. A versão em anexo refere-se à segunda submissão do manuscrito, pós-revisão; originalmente, as fotos dos táxons *in vivo* são coloridas.

HYPOLEPIDES SUD-AMERICANAE – A TAXONOMIC REVISION OF THE GENUS *HYPOLEPIS* BERNH. (DENNSTAEDTIACEAE) IN SOUTH AMERICA

PEDRO BOND SCHWARTSBURD

INTRODUCTION

History of the genus

The genus *Hypolepis* was originally described by Johann J. Bernhardi (1806 [1805]) based on *Lonchitis tenuifolia* G. Forst. (= *Hypolepis tenuifolia* (G. Forst.) Bernh.), a plant from the Tanna Island (Vanuatu), collected by Johann G.A. Forster, during the second James Cook's expedition in search for the *Terra Australis,* between 1772 and 1775 (Forster 1786, Stafleu & Cowan 1976, Brownsey & Chinnock 1984, 1987, Brownsey 1987, Nicolson & Fosberg 2004).

About thirty years later, Karel B. Presl (1836) "restored" and re-circumscribed the genus *Hypolepis* ("*Nomen Bernhardianum restituendum erat*"), combining into it plants from the Neotropics, New Zealand, and Africa, especially the (pre-)Linnaean *Lonchitis repens* L. (= *Hypolepis repens* (L.) C. Presl – described by Linnaeus 1753, based on Plumier 1705), plus *Cheilanthes dicksonioides* Endl. (= *H. dicksonioides* (Endl.) Hook.), *C. anthriscifolia* Kaulf. (= *H. sparsisora* (Schrad.) Kuhn), and two South-American species that had just been described by Gustav Kunze (1835), based on Eduard F. Poeppig's collections: *C. hostilis* Kunze (= *H. hostilis* (Kunze) C. Presl) and *C. parallelogramma* Kunze (= *H. parallelogramma* (Kunze) C. Presl). Presl (1836) segregated such names mainly from the genus *Cheilanthes* Sw., which presents the sori morphology very similar (marginal, punctual, the receptacle originated at the tip of a vein, and protected by a semi-lunate pseudo-indusia), but their position is along the lamina margins, and they can often be confluent; on the other hand, the sori of *Hypolepis* is located at the sinuses of the lamina. Presl (1836) also added vegetative characters as diagnostic for *Hypolepis,* for example, the rhizomes creeping, the fronds big and highly dissected, the petioles and rachises "muricate" in *H. repens,* etc.

A second addition to the circumscription of *Hypolepis* was done by John Smith (1846), who combined *Polypodium rugosulum* Labill. (= *H. rugosula* (Labill.) J. Sm.), a plant collected in van Diemen's Land (Tasmania) by Jacques J. H. de Labillardière (or, "de la Billardière"), during the French expedition *in search of la Pérouse* (Labilardière 1800, 1802, 1806, Brownsey & Chinnock 1984, 1987, Apfelbaum 1977, Schwartsburd & Prado 2011b). Smith (1846 - continuing his previous ideas in Smith 1842) transferred this species to *Hypolepis* based on the vegetative similarities between this *taxon* and the other *Hypolepides*, since its sori is sub-marginal and the lamina margins are *not* differentiated into a pseudo-indusia – the sorus is, or, better, seems, unprotected. Later, Friedrich A. M. Kunh (1868) reinforced this conception combining Carl P. Thunberg's (1784) well known *Polypodium punctatum* Thunb., whose type is from Japan, into *H. punctata* (Thunb.) Mett. *in* Kuhn – although wrongly identifying plants from Fernando Po Island with this name (see for example Adams 1975, Schwartsburd & Prado 2011b).

But, from the mid XIX to the early XX centuries, the other Pteridologists (*e.g.* Fée 1852, 1869, 1873, Hooker 1858, 1862, Mettenius 1858, 1865, Hooker & Baker 1868, Bentham & Mueller 1878, Philippi 1881, Colenso 1883, 1891, Diels 1902, Christ 1905, Christensen 1906 (but see below), van Alderwerelt van Rosenburgh 1908, Domin 1914, Cheeseman 1925) have not fully accepted (or understood) such circumscription for *Hypolepis*. They confused within it some pseudo-indusiate species nowadays ascribed to *Adiantopsis* Fée, *Aspidotis* (Nutt. ex Hook. & Baker) Copel., *Cheilanthes*, *Dennstaedtia* Bernh., *Plecosorus* Fée, and *vice-versa* - due to soral similarities, and not considering the vegetative differences; and, contemporary, they regarded *Polypodium punctatum* and *Pol. rugosulum* (and their allies/synonyms) within *Dryopteris* Adans., *Nephrodium* Michx., *Phegopteris* (C. Presl) Fée, *Polypodium* L., *Polypodium* sect. *Phegopteris* C. Presl, or *Polypodium* sect. *Euphegopteris* Hook. & Baker – that would nowadays represent plants ascribed to the families Dryopteridaceae and Thelypteridaceae, respectively – due to the sub-marginal "naked" sori.

The idea about regarding *Polypodium punctatum* and *Pol. rugosulum* within genus *Hypolepis* arouse again, reinforced by the studies on the anatomy of such ferns in comparison to *Hypolepis s.str.* by Gwinne-Vaughan (1903) and Bower (1928). With this, Christensen (1913, 1920, 1924, 1925, *apud* Carse 1926, 1931, 1932, 1934; and Christensen & Skottsberg 1920) finally accepted the concept of *Hypolepis* as suggested by Smith (1846), considering in this genus both *H. punctata* and *H. rugosula*. He also drew a clearer line between the pseudo-indusiate *Hypolepides* and the species of *Cheilanthes, Aspidotis,* and *Adiantopsis*. Christensen (1913, 1934) was immediately followed by Ching (1940) and Copeland (1947), and since then, *Hypolepis'* concept has stabilized (*e.g.* Tryon & Tryon 1982, Bronwsey & Chinnock 1987, Kramer 1990, Moran 1995, Mickel & Smith 2004, Schwartsburd & Prado 2011b, etc.).

Traditional supra-generic classifications

Throughout the different Classification Systems, based mainly on morphology (see Pichi-Sermolli 1973), *Hypolepis* has generally being considered as related to other ferns with marginal sori (with the exception of *H. punctata* and *H. rugosula* until 1920-1930's), for example in: *Adiantaceae: Lonchitideae* (Presl 1836); *Polypodiaceae: Pterideae: Chilosoreae* (Smith 1842); *Polypodiaceae: Pteridineae: Cheilantheae: Hypolepideae* (Fée 1852); *Polypodiaceae: Pterideae* (Hooker 1858), *Polypodiaceae: Dennstaedtioideae: Hypolepideae* (Christensen 1938); *Hypolepidaceae* (Ching 1940); *Pteridaceae* (Copeland 1947); *Hypolepidaceae* (Pichi-Sermolli 1977); *Dennstaedtiaceae: Dennstaedtieae* (Tryon & Tryon 1982); and *Dennstaedtiaceae: Dennstaedtioideae* (Kramer 1990).

In a different point of view, and because of *Hypolepis rugosula,* Smith (1846, 1875) went against his own previous System (Smith 1842), and placed *Hypolepis* within the ferns with abaxial sori, in *Polypodiaceae: Polypodieae*, and in Polypodiaceae: *Desmobrya: Phegopterideae: Phegoptereae,* respectively. Mettenius (1865) had a similar concept, placing *Hypolepis* along with *Phegopteris,* in *Aspidiaceae.*

Recent approaches - phylogenetic relationships of *Hypolepis*

The current tendency of the Systematic of ferns and plants in general is to circumscribe the *taxa* according to their phylogenetic relationships, recognizing monophyletic units. The Dennstaedtiaceae circumscription (*sensu* Smith *et al.* 2006, 2008 – based on Hasebe *et al.* 1994, 1995, Wolf *et al.* 1994, Wolf 1995, Pryer *et al.* 2004, etc.) has become reasonably stable and well defined, both by genetic evidences and morphological consistency.

But, concerning the generic monophyly of *Hypolepis* little is known, and the circumscription of *Hypolepis sensu* Smith (1846) is, once again, doubtful. The unique study which dealt with *Hypolepis'* species was that of Wolf (1995). His results suggest that *Hypolepis* as considered as sub-Cosmopolitan is indeed monophyletic – since the three species analysed (from Australia, Western Samoa, and Ecuador) appeared grouped together with a *bootstrap* of 100% (parsimony, testing *rbcL*), in comparison with other Dennstaedtiaceae species. But, since only three species (among a Universe of ca. 80 *taxa* of *Hypolepis,* plus dozens placed in other genera) were analysed, it is hard to tell about the whole monophyly of the genus.

Thus, the aim of the present work is to deal with the South-American species themselves, and infra-specific *taxa* (characterization, distribution, synonymies, typification, etc.), rather than to deal with a *generic unit*. Possibly, the four *informal groups* named below, based just on their morphological characters, may be further split into four genera, intermixed within another Dennstaedtiaceae genera, segregated within *Hypolepis* as *subgenera* or *sections,* or yet be maintained as a monophyletic genus as currently defined. But, of course, a Word-wide molecular/morphological analysis for the whole family is required to solve these hypotheses, and to reach a more natural classification.

The need of additional taxonomic studies

Hypolepis is commonly recognized as genus lacking taxonomic studies, and in urgent need of local to World-wide revisions, as lately pointed out: “Over 20 species have been recognized in America but there are probably fewer; a modern revision of these and of the paleotropical species is needed.” (Tryon & Tryon 1982: 400); “Species delimitation in *Hypolepis* is often difficult, and is made more so by the absence of a monographic revision of the group.” (Proctor 1989: 177); “*Hypolepis* (...). The American species are in need of a modern taxonomic revision.” (Tryon & Stolze 1989: 109); “*Hypolepis* (…). The number of species is estimated at about 40, but the genus is not well known.” (Kramer 1990: 88); “*Hypolepis* es uno de los géneros de helechos menos estudiados taxonómicamente. (...) y probablemente varias especies nuevas esperan descripción.” (Moran 1995: 153); “*Hypolepis thysanochlaena* (…). The New World taxa with non-spiny axes are in need of revision.” (Mickel & Smith 2004: 353);

"*Hypolepis scandens* (...). Given its similarity to *H. parallelogramma* and the inadequate taxonomic knowledge of the genus *Hypolepis*, we would not be surprised if *H. scandens* is fairly widespread in the tropical Andes" (Kessler & Smith 2007: 194).

These authors estimated ca. 40-50 species of *Hypolepis* for the whole World, and ca. 15-20 for the Americas.

MATERIAL AND METHODS

The following herbaria were personally visited (some loaned material, afterwards): Austria (W), Belgium (BR), Brazil (ALCB, BHCB, EAC, HAS, HB, HBR, HRB, HUEFS, HVASF, ICN, IPA, MBM, MPUC, OUPR, PEUFR, RB, SMDB, SP, SPF, UFP and UPCB), Czech Republic (PR and PRC), Germany (B), Italy (FI), Holland (L and U), Russia (LE and LECB), Spain (BCN), Swiss (G), United Kingdom (BM, K and OXF), and Uruguay (MVFQ, MVJB and MVM). To personally check the collection is of great importance, since there were found *Hypolepis* specimens under folders of the following genera: *Aspidium, Cheilanthes, Dennstaedtia, Dryopteris, Hypolepis, Macrothelypteris, Nephrodium, Phegopteris, Polypodium, Pteridium,* and *Thelypteris.*

Loans were obtained from the following herbaria: Argentina (BAB, BCRU, CORD, LP and SI), Bolivia (LPB), Brazil (ESA, HRCB, HUCS, and UCS), Colombia (HUA), French Guiana (CAY), New Zealand (WELT), Venezuela (MY and VEN), and Sweden (UPS).

Field trips were made within the Brazilian territory, in the States of Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Rio de Janeiro, Espírito Santo, Minas gerais, Bahia, Pernambuco, and Ceará. The following *taxa* were personally studied in the field and collected: *Hypolepis acantha* Schwartsb. *ined., H. mitis* Kunze ex Kuhn, *H. paulistana* Schwartsb. & J. Prado *sp. nov., H. repens, H. rugosula* subsp. *pradoana* Schwartsb. *ined., H. stolonifera* Fée var. *stolonifera,* and *H. stolonifera* var. *nebularis* Schwartsb. *ined.* Certainly, their habit and self-ecology can be extrapolated for most of South-American species; except for *H. flexuosa* Sodiro (and its varieties) and *H. nigrescens* Hook., which present a different habit. *Hypolepis nigrescens* was easily defined; on the other hand *H. flexuosa* remained doubtful whether it is a species complex or a variable species. More studies are needed, especially in the field and/or with more complete collections.

The estimated coordinates were obtained through search in Google™ Earth, and they are written inside square brackets. Some estimates previous written in the labels had to be corrected; they are written inside square brackets and within apostrophes. The maps were drawn using Diva-Gis, version 7.4.0.1., using altitudinal and administrative layers. The layers were obtained from its website. For most Countries, only the ‘Country level’ was used, except for Brazil, Argentina and U.S.A., for which the ‘State’ (or ‘Department’) level was also used. The altitudinal layer are in gray scale (white – sea level; black – over 4,500 m), and they were patronized manually.

The anatomical studies were done by some materials preserved in alcohol 70%, and others first fixed in FAA, then preserved in alcohol 70%. Sections were made manually. The alcoholic series/dyeing methodology followed the usual methods of Johansen (1940) and Sass (1951). The dyes used were astra blue and safranin, at 9:1 (Bukatsch 1972). The photos were taken in a microscope Olympus®, model BX41, using a camera Motic®, model Moticam 2500, 5.0 MP resolution. The following species and materials were analyzed: *Hypolepis acantha* (*Schwartsburd 2264*), *H. repens* (*Schwartsburd 2335*), *H. rugosula* subsp. *pradoana* (*Schwartsburd 2310*), and *H. stolonifera* var. *stolonifera* (*Labiak 4269*).

The drawings were made by Biol. Klei R. Sousa; and one (Fig. 9) by the author and Mrs. Pat Davies (from K).

All cited specimens have been analyzed, otherwise they are indicated (“*n.v.*”); the types analyzed bear additionally an exclamation mark (“!”), re-assuring the author have personally analyzed them.

The species in the taxonomic treatment are presented in alphabetic order.

The authors of scientific names are abbreviated according to Pichi-Sermolli (1986), and additions from IPNI website.

RESULTS

Conflicting species concepts

An important matter concerning the genus *Hypolepis*, especially the two "exindusiate" species (*H. punctata* and *H. rugosula*) is about their *species concept.* Contemporary to the debate about their genera placement (see Introduction), their *species concept* and their consequent geographical distribution have also been of great discussion. Some authors have considered them as sub-Cosmopolitan entities, while others considered them more restricted, and described other related (similar) endemic species. This matter is still nowadays being discussed. The authors can be briefly named into three categories:

I. Those who merged *Polypodium rugosulum* within *P. punctatum* (as a synonym, sub-species or variety), consequently considering "it" as sub-Cosmopolitan: *e.g.* Hooker & Baker (1868), Bentham & Mueller (1878), Diels (1902? – not explicit), Christensen (1906, but see below), van Alderwerelt van Rosenburgh (1908), Domin (1915), Cheeseman (1925), Stewart (1945?), and Clifton (1997 – but with doubts about their identities).

II. Those who considered both distinct, but yet as sub-Cosmopolitan entities, especially *Polypodium rugosulum*: *e.g.* Labillardière (1806), Kaulfuss (1824), Gay (1853), Brackenridge (1854), Moore (1857), Hooker (1862), Mettenius (1858, 1865), Cordemoy (1891), Christensen (1920, 1924, 1925, 1931, 1932, 1934, 1937, 1940 - splitting *Hypolepis rugosula* into several geographical *varieties*), Skottsberg (1920-1956, 1935 - same concept as Christensen's), Christensen & Skottsberg (1920 – same as Christensen), Brade (1956), Tardieu-Blot (1958 – considering *H. villoso-viscida* (Thouars) Tardieu with priority over *H. rugosula*), Alston (1959 - same as Christensen), Pizarro (1959 - same as Christensen), Schelpe (1970 - same as Christensen), Kornas´ (1979 - same as Christensen), Tryon & Tryon (1982), Pichi-Sermolli (1983 - same as Christensen), Cronk (1989), Agnew & Agnew (1994), Schwartsburd (2010), Schwartsburd & Prado (2011 - adapted from Christensen's concept, splitting *H. rugosula* into several geographical *sub-species*), and Schwartsburd (2012 *in press* – same as Schwartsburd & Prado 2011).

III. Those who considered them as distinct and restricted, naming (and/or describing) several species in their “groups”: Petit-Thouars (1803 [1808], 1811), Roxburgh (1816), Kunze (1835, 1837, 1848, 1850), Fée (1850-1852, 1854-1857), Jenman (1881 – although also considering *Polypodium punctatum* for Jamaica), Philippi (1881 – although also considering *Phegopteris rugosula* (Labill.) Fée for Chile), Colenso (1883), Hicken (1906), Underwood & Maxon (1930), Reimers (1934), Copeland (1942), Wakefield (1955, 1956), Rawlings (1974), Brownsey & Chinnock (1984, 1987), Brownsey *et al.* (1985), Brownsey (1987), Proctor (1989), Meurk *et al.* (1994), Moran (1995), Verdcourt (2000), Mickel & Smith (2004), Autrey *et al.* (2008), Ponce *et al.* (2008), and Roux (2001, 2009).

In the present work *Hypolepis punctata* is considered as occurring in Japan and other places in Southeast Asia (the same concept as in Brownsey 1987); on the other hand, *H. rugosula* is regarded as a sub-Cosmopolitan entity, divided into geographical sub-species, adapted from Christensen’s concepts (1920, 1924, 1925, 1931, 1932, 1934, 1937, 1940), but furthering the range of the species also to Cancer Tropical regions of the Americas (Jamaica, Cuba, Mesoamerica, Mexico, etc.) – see the treatment of this species. This concept of *H. rugosula* is a continuation on previous studies (Schwartsburd & Prado 2011, and Schwartsburd 2012 *in press*), and a treatment of all subspecies of *H. rugosula* will be later released (Schwartsburd & Prado *in prep.*).

Another name that was widely applied, especially for the Neotropical *Hypolepides,* is *Hypolepis repens.* Although with an almost Neotropical distribution, many authors used this name for many other species, ranging too much its distribution, and underestimating the genus diversity – see the discussion of *H. repens,* in the ‘Taxonomic Treatment’. A similar situation happened with the name *H. hostilis* (see its discussion).

Hypolepides World-wide

As a whole, the unique attempts of a Word-wide taxonomic treatment of the *Hypolepis* species are those of Hooker[1] (1858 – *Hypolepis p.p.*; plus 1862 – *Polypodium* sect. *Phegopteris p.p.*) and Hooker & Baker[1] (1868 – *Hypolepis* sect. *Euhypolepis* Hook. & Baker, plus *Polypodium* sect. *Euphegopteris p.p.*). In a modern format, the works of Brownsey & Chinnock (1984, 1987) and Brownsey (1987) greatly contributed for the understanding of the genus. Apart from these, the other important works, both classical and modern, are either based on World-wide lists or local taxonomic treatments, like Floras.

For Central and North Americas, the most important taxonomic works involving the *Hypolepides* are those of Plumier (1705), Sprengel (1822), Liebmann (1849 - *et* Mickel *et al.* 1987), Fée (1866), Baker *et al.* (1898), Jenman (1881, 1892), Christ (1901a, 1904, 1905), Underwood (1906), Maxon (1924a, 1924b, 1930), Christensen (1935), Smith (1975, 1981), Proctor (1977, 1985, 1989), Stolze (1981), Mickel & Beitel (1988), Moran (1990, 1995), Nauman (1993), Rojas-Alvarado (2001), Lellinger, (2003), Mickel & Smith (2004), Cremers & Aupic (2008), Christenhusz (2009), and Gómez & Aberláez (2009).

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1. Note: *Hypolepis "rugulosa"* (Labill.) Hook., cited by Hooker (1858: 68), refers to *Pteris rugosula* Labill., and *not* to *Polypodium rugosulum* Labill. This last name is currently known as *Hypolepis rugosula* (Labill.) J. Sm., and has priority over Hooker's combination. *Pteris rugosula* is nowadays ascribed to *Paesia* (*Paesia rugosula* (Labill.) Kuhn), as Hooker & Baker (1868: 163) had later agreed (as *Pteris* (*Paesia*) "*rugulosa*"). Hooker (1862: 272-273) and Hooker & Baker (1868: 312) considered Labillardière's *Polypodium rugosulum* as *Polypodium* (*Phegopteris*) "*rugulosum*" and *Polypodium* (*Euphegopteris*) *punctatum* var. "*rugulosum*" (Labill.) Hook. & Baker, respectively.

And for South America, which is the main target of the present work, the following taxonomic works and check-lists are the most important works: Raddi (1819, 1825), Presl (1822, 1830), Kaulfuss (1824), Hooker (1831), Kunze (1835) Martius (1837, 1839), Klotzsch (1840, 1847), Gay (1853), Brackenridge (1854), Mettenius (1856, 1864), Karsten (1865), Fée (1852, 1857, 1869, 1873), Eaton (1861), Baker (1870), Sodiro (1893), Christ (1901b), Hieronymus (1905, 1909), Hicken (1906), Rosenstock (1914, 1928), Christensen & Skottsberg (1920), Skottsberg (1920-1956), Svenson (1938), Brade (1956), Looser (1963), Tryon (1964), Vareschi (1968), Morton & Wiggins (1971), Sehnem (1972), Sota (1972, 1977), Tryon & Conant (1975), Kramer (1978), Tryon & Tryon (1982), Lüer (1984), Smith (1985, 1995), Rodríguez (1989, 1995), Smith & Todzia (1989), Tryon & Stolze (1989), Murillo-Pulido & Harker-Useche (1990), Cremers & Kramer (1991), Ricardi & Marín (1996), Boggan *et al.* (1997), Prado (1998, 2004), Navarrete (1999, 2008), Marticorena *et al.* (2001), Ponce *et al.* (2002, 2007, 2008), Mynsen & Windisch (2004), Santiago *et al.* (2004), Moreno & Murillo (2005), Kessler & Smith (2007), Murillo-Pulido *et al.* (2008), Schwartsburd & Prado (2009, 2011a), Schwartsburd (2010, 2012 *in press*), Assis & Salino (2011), and Schwartsburd *et al.* (2012 *in press*).

Compiling the latest World-wide information, *Hypolepis* as currently defined is a sub-cosmopolitan genus with ca. 80 *taxa* (species, subspecies and varieties), distributed from temperate regions of the Southern hemisphere up to tropical regions of the Northern hemisphere. It is especially diverse in the Americas and Australasia, with ca. 40-45 and 30 *taxa* respectively, but there are only three or four *taxa* in the whole African Continent (*e.g.* authors cited in the two paragraphs above, plus Carmichael 1818, Kuhn 1868, 1869, 1869-1870, Christophersen 1934, Schelpe & Diniz (1979), Groves 1981, Jacobsen 1983, Pichi-Sermolli 1983, Brownsey & Chinnock 1984, 1987, Biswas 1985, Schelpe & Anthony (1986), Brownsey 1987, Burrows 1990, Kramer 1990, Verdcourt 2000, Palmer 2002, Boufford *et al.* 2003, Roux 2009, Schwartsburd & Prado 2011b, and the present study). In South America (including Cocos Island), 27 species occur, of which one is split into two sub-species, and three species are split into two varieties each (in total 31 *taxa*). The table below shows the Countries and the *Hypolepis taxa* occurring there:

Table 1 – Distribution of *Hypolepis* in South America, including Cocos Island (Costa Rica)

Country	***Taxon(a)***
Cocos Island (Costa Rica)	*H. lellingeri*
Colombia	*H. bogotensis* var. *bogotensis, H. bogotensis* var. *glabra, H. flexuosa* var. *flexuosa, H. flexuosa* var. *zimmerae, H. hostilis, H. nigrescens, H. nuda, H. obtusata, H. parallelogramma, H. pedropaloensis, H. pteroides, H. repens, H. rigescens, H. stuebelii, H. viscosa*
Venezuela	*H. flexuosa* var. *flexuosa, H. guianensis, H. hostilis, H. krameri, H. melanochlaena, H. nigrescens, H. nuda, H. parallelogramma, H. repens, H. rigescens, H. stuebelii, H. trinationalis, H. viscosa*
Guyana	*H. guianensis, H. hostilis, H. krameri, H. nigrescens, H. repens, H. rigescens, H. trinationalis*
Suriname	*H. hostilis, H. repens, H. rigescens*
French Guiana (France)	*H. hostilis, H. repens, H. rigescens*
Ecuador	*H. crassa, H. flexuosa* var. *flexuosa, H. galapagensis, H. hostilis, H. obtusata, H. parallelogramma, H. pteroides, H. repens, H. rigescens, H. stuebelii*
Peru	*H. flexuosa* var. *flexuosa, H. flexuosa* var. *zimmerae, H. hostilis, H. nigrescens, H. obtusata, H. parallelogramma, H. pteroides, H. rigescens, H. stuebelii*
Bolivia	*H. flexuosa* var. *flexuosa, H. hostilis, H. nigrescens, H. obtusata, H. parallelogramma, H. poeppigii, H. repens, H. rigescens, H. scandens*
Brazil	*H. acantha, H. guianensis, H. hostilis, H. krameri, H. mitis, H. paulistana, H. repens, H. rigescens, H. rugosula* subsp. *pradoana, H. stolonifera* var. *stolonifera, H. stolonifera* var. *nebularis, H. trinationalis*
Paraguay	*H. repens*
Uruguay	none
Chile	*H. poeppigii, H. rugosula* subsp. *poeppigiana*
Argentina	*H. poeppigii, H. rugosula* subsp. *poeppigiana*

Ecological aspects

In South America, the species of *Hypolepis* occur from the sea level up to ca. 4,600 m in elevation (Map 1). Each species has its own altitudinal preference, and they seem to have their distribution limited by minimum and maximum elevations (Table 2).

Most species are terrestrial, but some of them can grow between rocks or even as humiculous-epipetric (like *Hypolepis rugosula, H. crassa* Maxon, *H. obtusata* (C. Presl) Kuhn, *and H. trinationalis* Schwartsb. *ined.*).

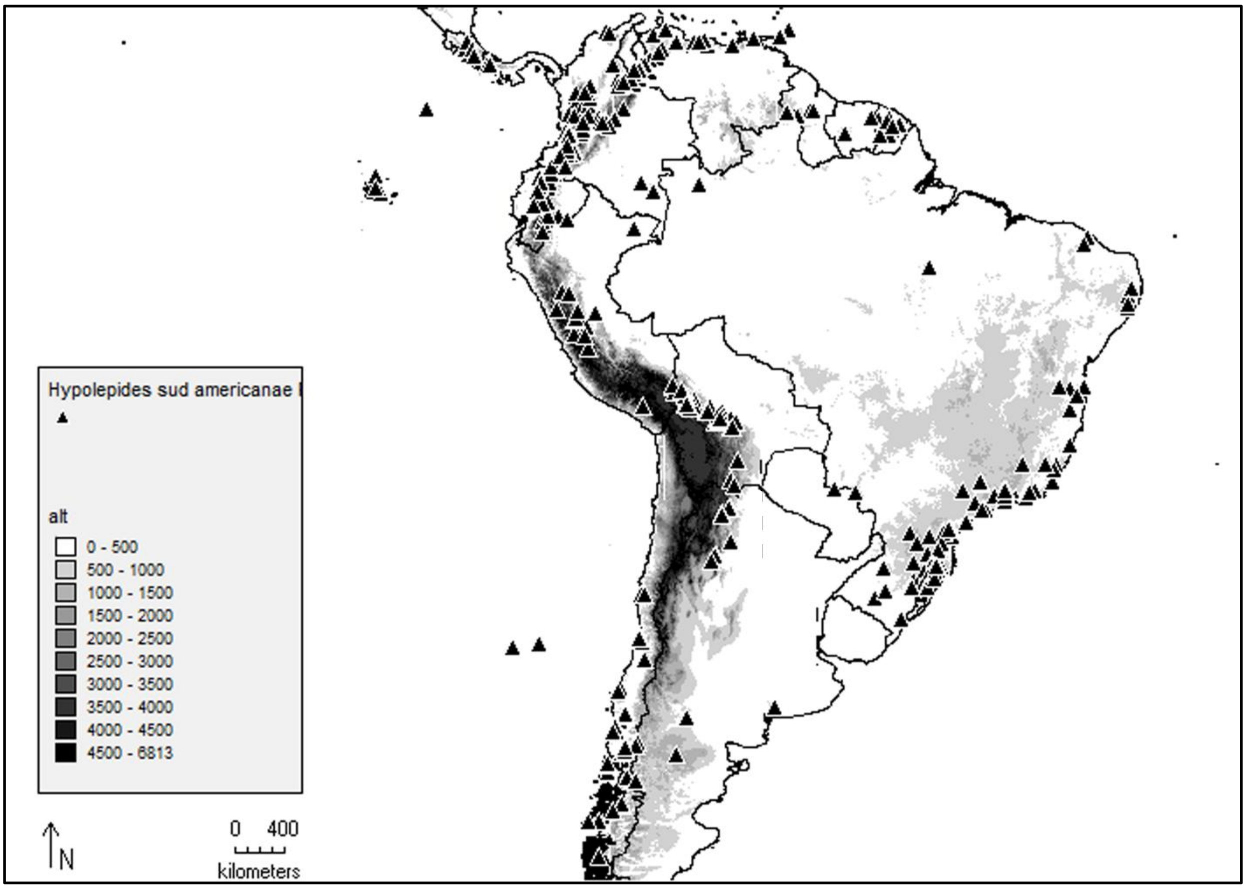
The species seen alive in nature prefer to live in half shadow/half sunny areas, like borders of forests, and clearings inside forests. One specimen of *Hypolepis rugosula* subsp. *pradoana* was found inside a cave. The bigger species (*e.g. H. acantha, H. mitis, H. repens,* and *H. stolonifera* var. *stolonifera*) prefer plane grounds with little other vegetation (like clearings). They also prefer to live in wet grounds, or in grounds near water courses. They seem very dependent on water.

Hypolepis stolonifera var. *nebularis* occur in dried fields, under full sunshine, but in regions constant “embraced” by clouds, thus permanently humid (see also Schwartsburd 2012 *in press*). This was the only ‘thicket forming’ species seen in nature. *Hypolepis rugosula* subsp. *pradoana* also occur in such habitat, but not exclusively, and not forming big thickets.

Table 2 – Elevation preferences of the South American *taxa* of *Hypolepis*

Taxon	**Minimum elevation**	**Maximum elevation**
H. acantha	sea level	100 (–1000) m
H. bogotensis var. *bogotensis*	2400 m	3000 m
H. bogotensis var. *glabra*	2400 m	3000 m
H. crassa	3800 m	3850 m
H. flexuosa var. *flexuosa*	(2000–) 2500 m	4050 m
H. flexuosa var. *zimmerae*	(2750?) 3000 m	3500 m
H. galapagensis	(250–) 500 m	750 m
H. guianensis	?	?
H. hostilis	sea level	500 (–685) m
H. krameri	?	?
H. lellingeri	50 m	500 m
H. melanochlaena	900 m	1450 (2600?) m
H. mitis	350 m	1800 m
H. nigrescens	(900–) 1000 m	2800 m
H. nuda	1450 m	2350 m
H. obtusata	3800 m	4600 m
H. parallelogramma	(550?) (850–) 1100 m	2700 m
H. paulistana	ca. 1900 m	ca. 1900 m
H. pedropaloensis	1900 m	2900 m
H. poeppigii	100 m (Ch), 1450 m (Bol, Arg)	500 m (Ch), 2800 m (Bol, Arg)
H. pteroides	3400 m	4200 m
H. repens	50 m	1800 m
H. rigescens	(400–550–) 600 m	2000 m
H. rugosula s.l.	ca. sea level (Temp), ca. 1000 m (S-Trop), ca. 2000 m (Trop)	ca. 1000 m (Temp), ca. 2000 m (S-Trop), 3450 m (Trop)
H. rugosula subsp. *poeppigiana*	sea level	800 (1200?) m
H. rugosula subsp. *pradoana*	1200 m (S Br), 2000 m (SE Br)	1800 m (S Br), 2600 m (SE Br)
H. scandens	1700 m	2500 m
H. stolonifera var. *stolonifera*	550 m	2250 m
H. stolonifera var. *nebularis*	1300 m	2350 m
H. stuebelii	(300–) 1000 m	1500 m
H. trinationalis	ca. 2100 m	ca. 2300 m
H. viscosa	(1600–) 1800 m (Col, Ven), ca. 1100 m (Hisp)	3100 m (Col, Ven) ca. 1100 m (Hisp)

Arg – Argentina, Bol – Bolivia, Ch – Chile, Col – Colombia, Hisp – Hispaniola, S Br – South Brazil, SE Br – Southeast Brazil, S-Trop – Sub-tropical regions, Temp – Temperate regions, Trop – Tropical regions, Ven – Venezuela.



Map 1 General distribution of genus *Hypolepis* in South America, including Cocos Island (Costa Rica).

Bio-geographical patterns

In South America (including Cocos Island), genus *Hypolepis* is richest in the Andes (10 *taxa*), followed by Southern Brazil (six *taxa*) – see below. Apparently, the genus is absent only in Uruguay. There is also a huge gap in the heart of South America, especially in Central Brazil (Map 1). *Hypolepis* probably do not occur in the semi-Arid regions of Brazil (Caatinga and Cerrado), and Bolivia and Paraguay (Chaco); the gap in the Amazon Forest might be due to the poor soil, with a distribution similar to genus *Megalastrum* Holltum (see Moran *et al.* 2009).

Among the South-American species of *Hypolepis* (incl. Cocos Island), there were found eight patterns of distribution. Such categories are adapted from Tryon (1972, 1986), and they represent sub-divisions of those categories, as follows.

I. Neotropical (Maps 2A–E) – wide spread species, occurring almost in the whole Neotropical region: *Hypolepis nigrescens* Hook. and *H. repens.*

II. Circum-Caribbean (Maps 3A–D) – species occurring around the Caribbean Sea, especially in S Mexico, Continental Central America, Florida (U.S.A.), Antilles, Colombia, and Venezuela: *Hypolepis melanochlaena* A.R. Sm., *H. nuda* Mett. *in* Kuhn, *H. stuebelii* Hieron., and *H. viscosa* H. Karst.

III. Circum-Amazonian (Maps 4A–D) – species occurring around the Amazon Forest, in low to mid elevation; a similar pattern is found in genus *Megalastrum* (Moran *et al.* 2009): *Hypolepis hostilis,* and *H. rigescens* (Kunze ex Mart.) T. Moore.

IV. Mount Roraima (Maps 5A, B) – species narrow endemic to the Mount Roraima region; such species are known from a few collections, and seem to co-occur in a narrow region (see also the discussion of Schwartsburd *et al.* 2012 *in press*): *Hypolepis guianensis* Klotzsch, *H. krameri* Schwartsb. *et al. ined.,* and *H. trinationalis.*

V. Andean (Maps 6A–F) – species occurring in the high lands of the Andes; some of them more restricted, and others more wide spread, but all of them with the distribution limited by a minimum elevation (see also Table 2): *Hypolepis bogotensis* H. Karst. var. *bogotensis, H. bogotensis* var. *glabra* Schwartsb. & J. Prado *ined., H. crassa, H. flexuosa* var. *flexuosa, H. flexuosa* var. *zimmerae* Schwartsb. & J. Prado *ined., H. obtusata, H. parallelogramma, H. pedropaloensis* Schwartsb. & J. Prado *ined., H. pteroides* Mett., and *H. scandens* Kessler & A.R. Sm.

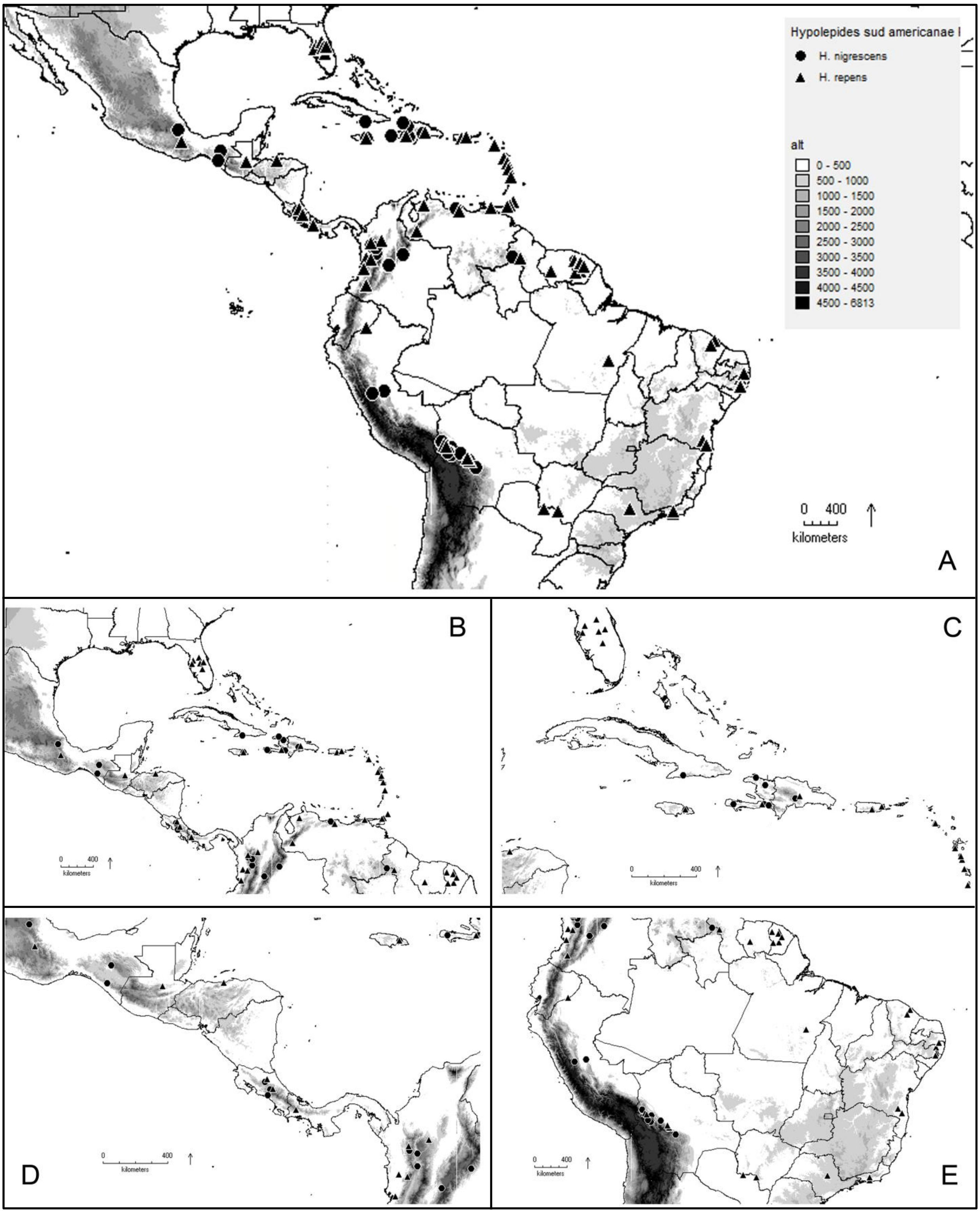
VI. Islanders (Maps 7A–D) – species narrow endemic to Galapagos and Cocos Islands, respectively: *Hypolepis galapagensis* Schwartsb. & J. Prado *ined.* and *H. lellingeri* A. Rojas.

VII. Southern Brazilian (Maps 8A–D) – species occurring in the Atlantic Forest of the South and Southeast Brazil, especially in the states of Rio Grande do Sul, up to Southern Bahia: *Hypolepis acantha, H. mitis, H. paulistana, H. rugosula* subsp. *pradoana, H. stolonifera* var. *stolonifera,* and *H. stolonifera* var. *nebularis.*

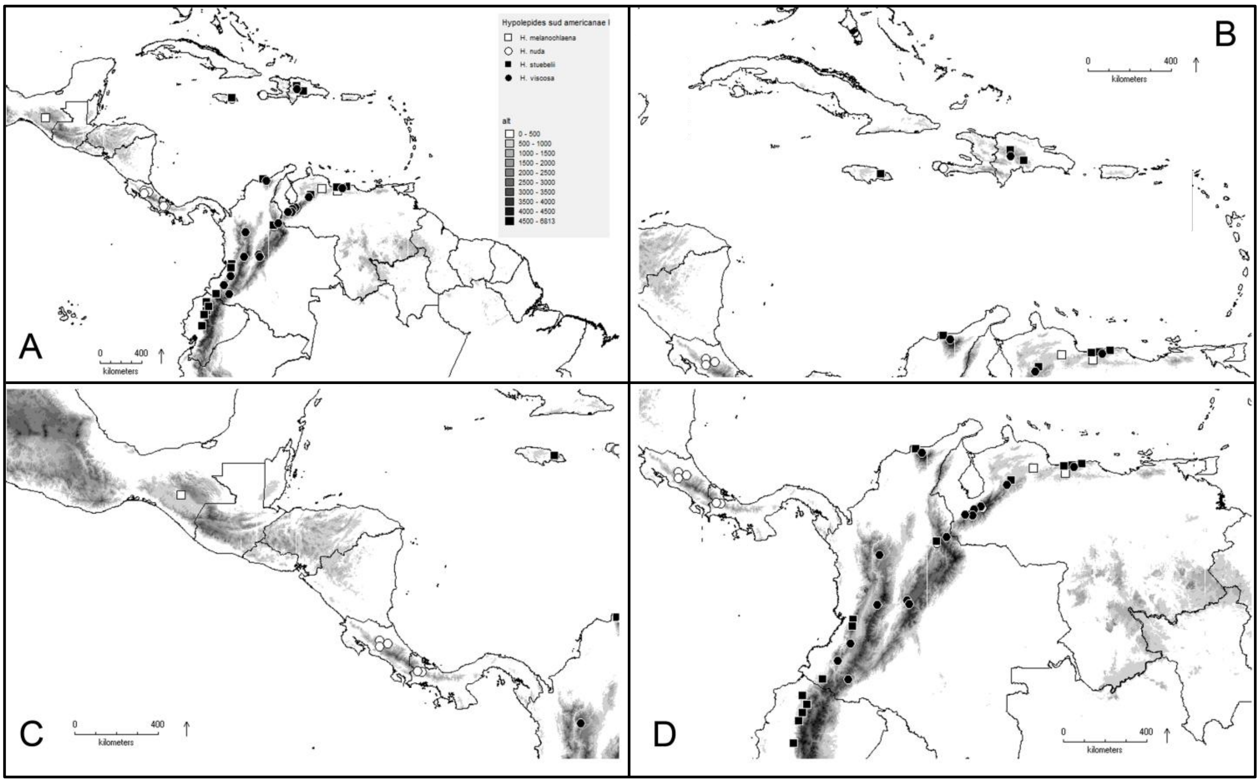
VIII. Austral (Maps 8A–D) – species occurring in the Austral region of South America, more or less in the 'South Cone', reaching as south as 48°S: *Hypolepis poeppigii* (Kunze) R.A. Rodr. and *H. rugosula* subsp. *poeppigiana* (Mett.) Schwartsb. & J. Prado *ined.*

Note: as discussed above ('Conflicting species concept'), one species (*Hypolepis rugosula*) presents a sub-Cosmopolitan distribution (see its taxonomic treatment). In South America, two subspecies of *H. rugosula* occur, and they are listed respectively in the two last categories.

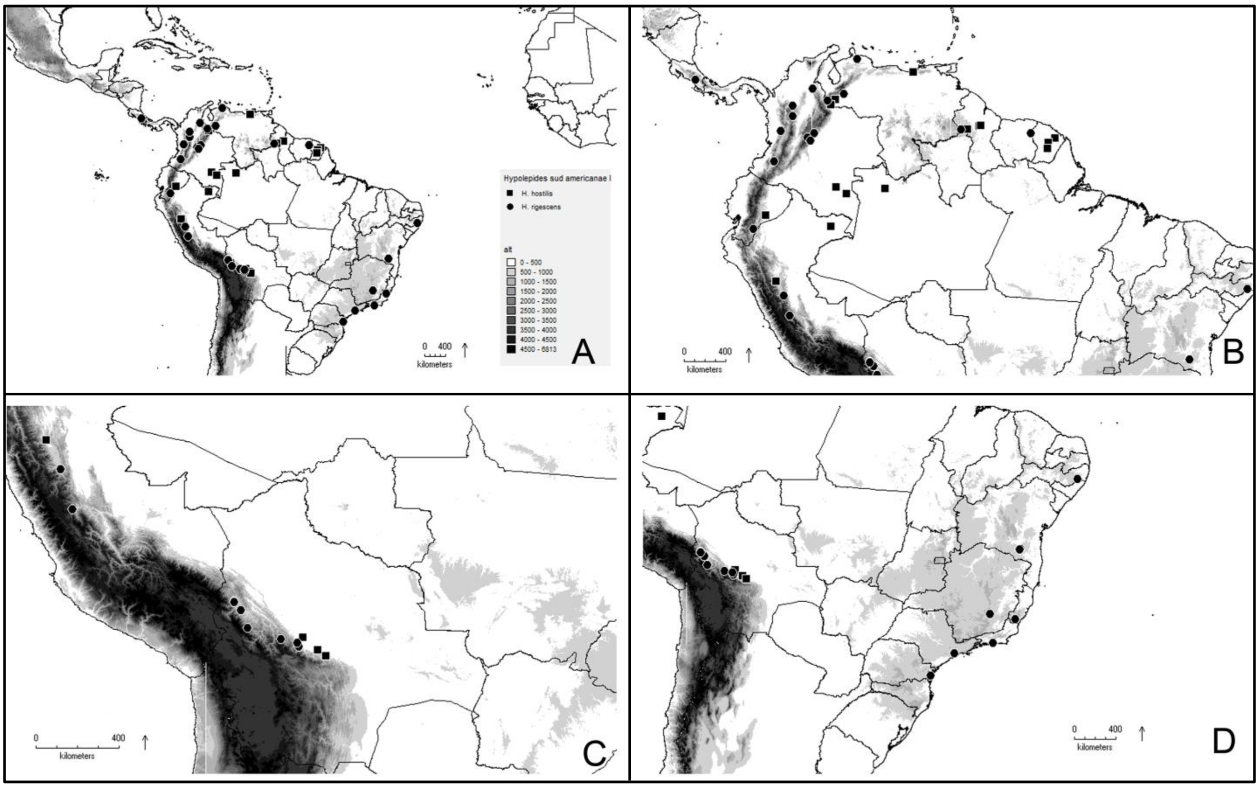
Considering also the Central and North Americas (*e.g.* Proctor 1977, 1985, 1989, Moran 1995, and Mickel & Smith 2004), the genus richness follows the Centers of Diversity stated by Tryon (1972) for most ferns in the Americas.



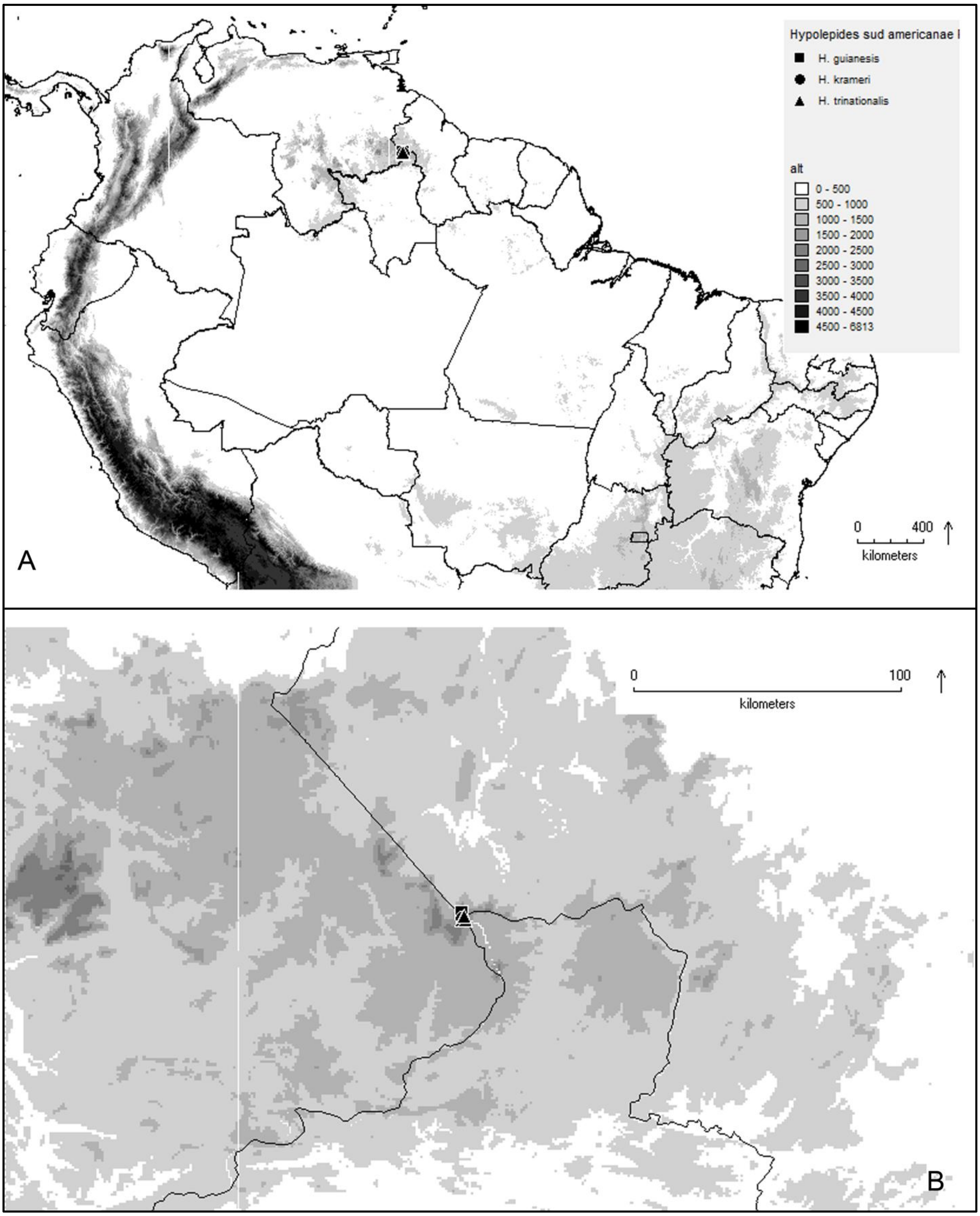
Map 2 Bio-geographical pattern I. Neotropical: **A** general view, **B** detail of North, Central, and northern South Americas, **C** detail of the Antilles and Florida, **D** detail of Mesoamerica, **E** detail of South America.



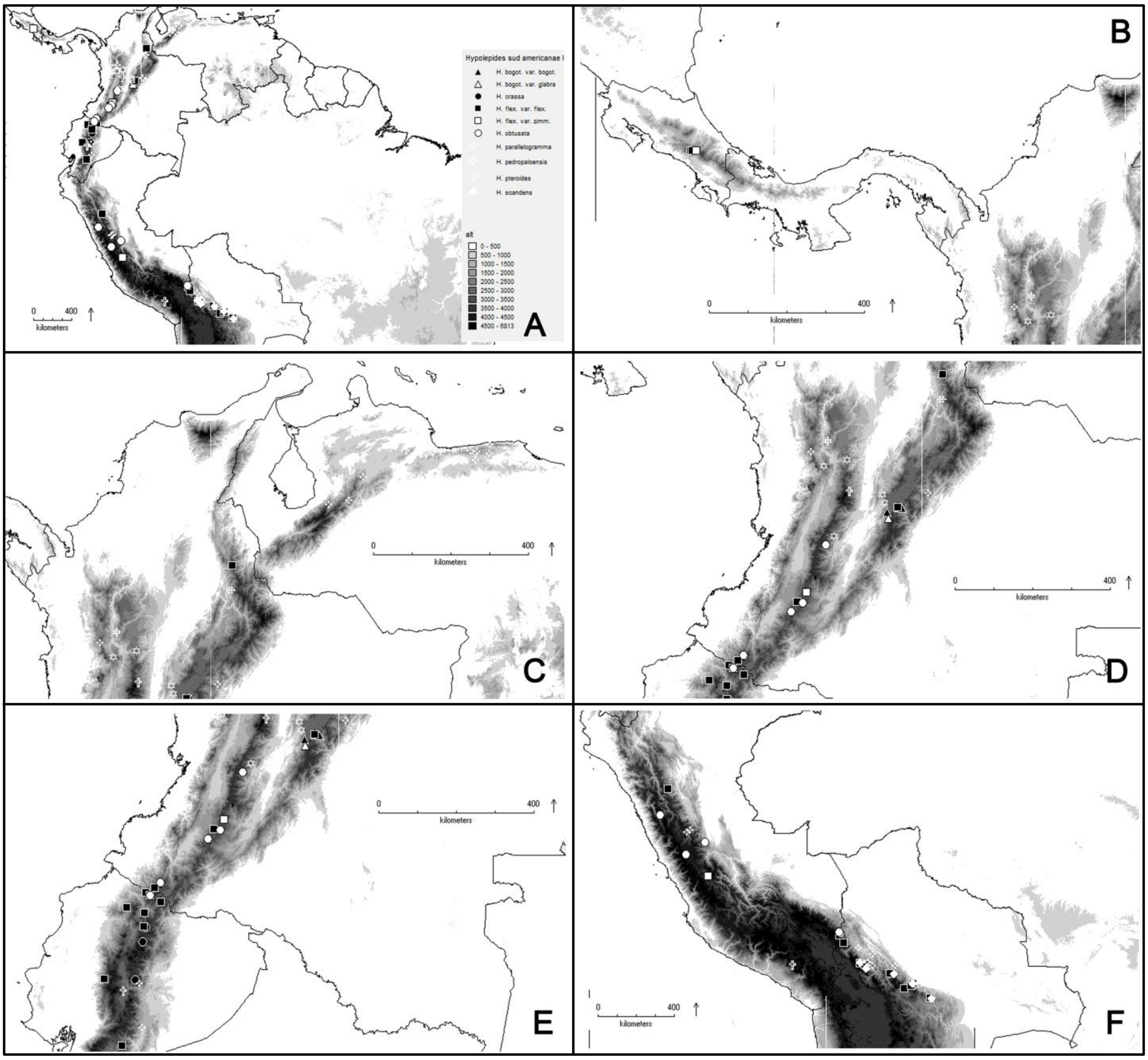
Map 3 Bio-geographical pattern II. Circum-Caribbean: **A** general view, **B** detail of the Antilles, **C** detail of Mesoamerica, **D** detail of northern South America.



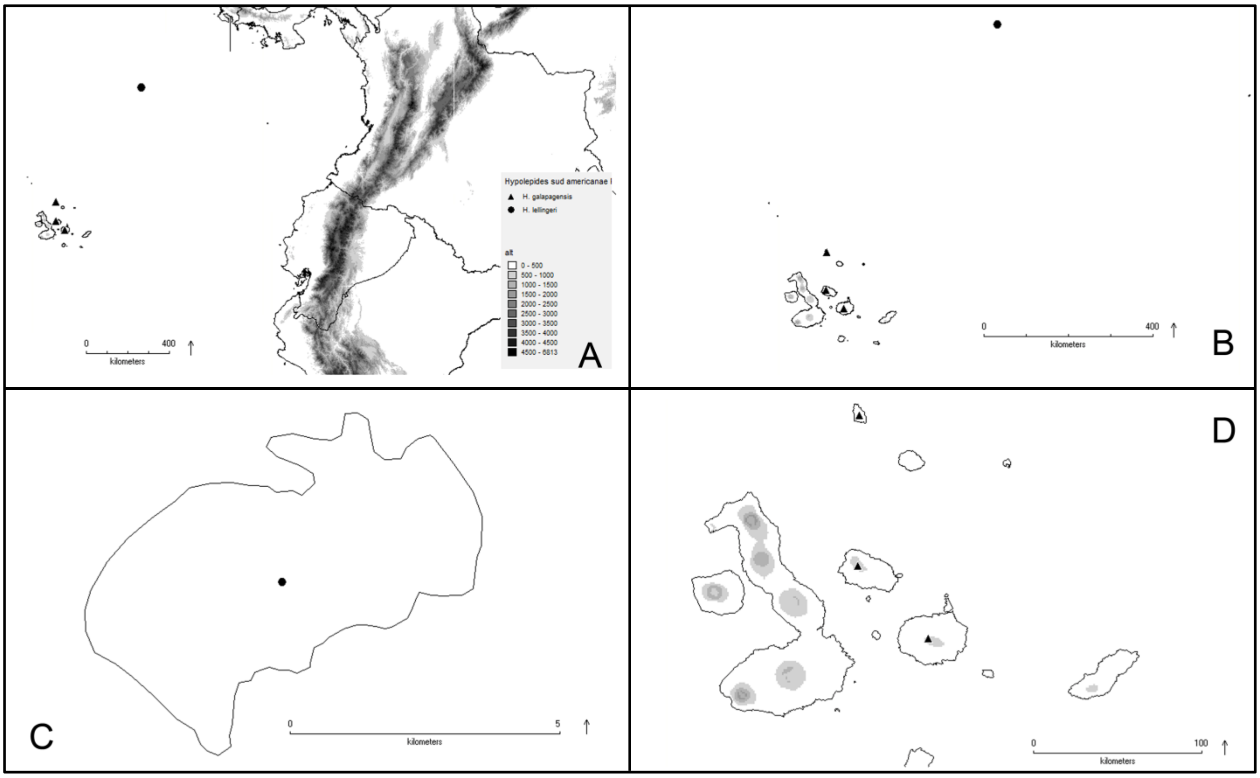
Map 4 Bio-geographical pattern III. Circum-Amazonian: **A** general view, **B** detail of northern South America, **C** detail of western South America, **D** detail of eastern South America.



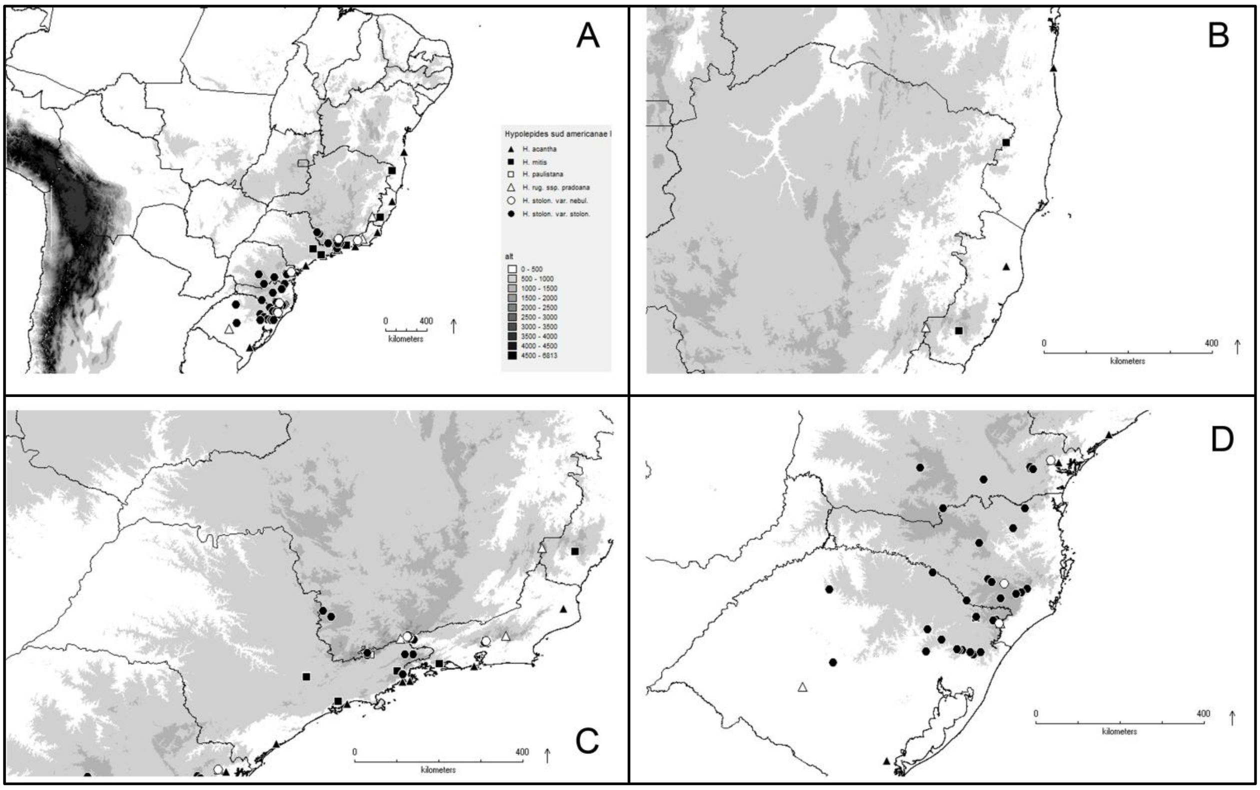
Map 5 Bio-geographical pattern IV. Mount Roraima: **A** general view, **B** detail of Mount Roraima region (intersection between Venezuela, Guyana, and northern Brazil).



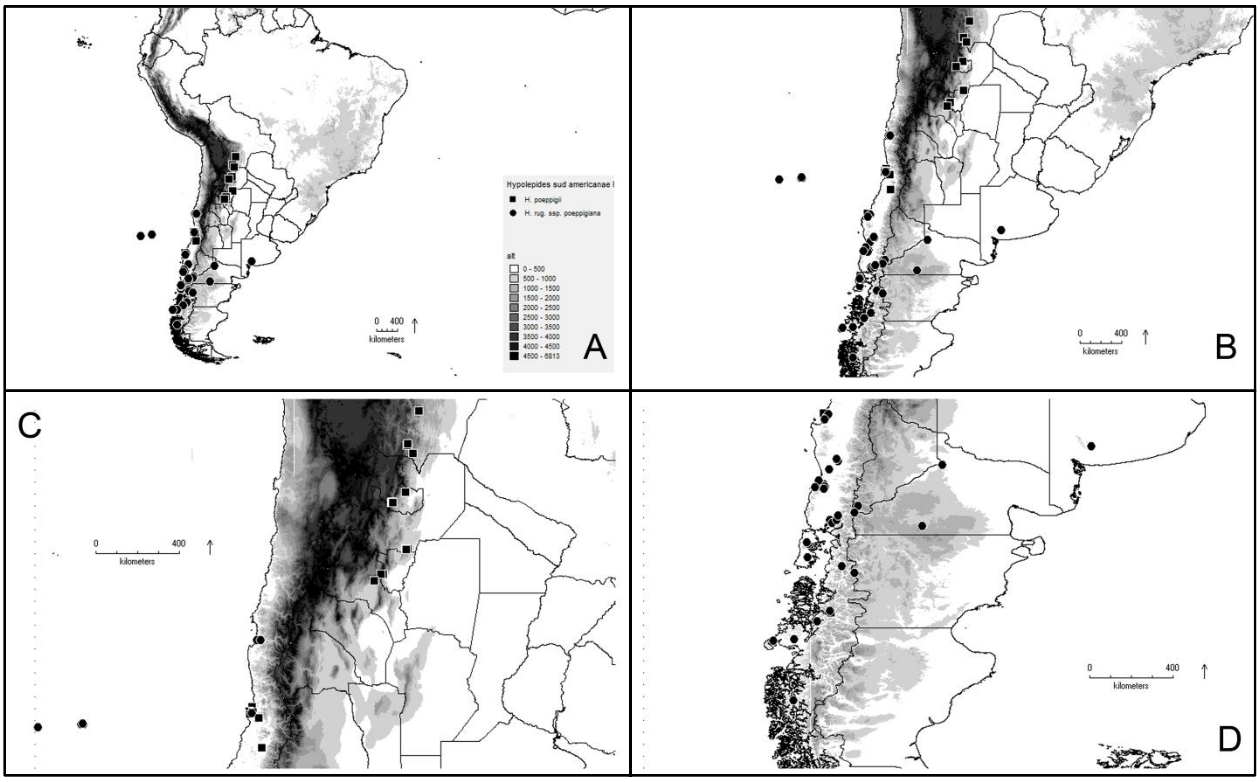
Map 6 Bio-geographical pattern V. Andean: **A** general view, **B** detail of Mesoamerica, **C** detail of northern South America, **D** detail of northwestern South America, **E** detail of northwestern South America, **F** detail of western South America.



Map 7 Bio-geographical pattern VI. Islanders: **A** general view, **B** detail of Cocos and Galapagos Islands, **C** detail of Cocos Island, **D** detail of Galapagos Islands.



Map 8 Bio-geographical pattern VII. Southern Brazilian: **A** general view, **B** detail of Northeast and Southeast Brazil, **C** detail of Southeast Brazil, **D** detail South Brazil.



Map 9 Bio-geographical pattern VIII. Austral: **A** general view, **B** general view magnified, **C** detail of southern Bolivia, and northern/central Argentina and Chile (including Juan Fernandez Islands), **D** detail of central/southern Argentina and Chile (including Chiloé Islands).

Morphology

(Figs. 1–16)

The *Hypolepis* species are commonly big plants, with horizontal branching rhizomes, reaching dozens of meters long, and leaves up to 10 m long. The herbarium material, on the other hand, is mostly fragmentary, composed by one or a few pieces of a frond. Thus, in order to complete understand their morphology, their habit, and their self-ecology, they must also be studied in the field. This had already been stressed out by Brownsey & Chinnock (1984) and Moran (1995).

For the present study, most Brazilian species were studied in the field. The way they "behave" in nature can be somehow extrapolated to most South American species. The only ones which present a different growth pattern are *Hypolepis bogotensis, H. crassa, H. flexuosa, H. nigrescens, H. nuda, H. pteroides,* and *H. trinationalis.* Most of these are small species, and the herbarium materials were complete; only for *H. flexuosa* and *H. nigrescens* some speculations were done.

Stems and habits

In *Hypolepis,* as well as in nearly all Dennstaedtiaceae genera, the stems are usually rhizomes. They are mostly subterraneous, with some parts slightly over ground, especially at the stem ends. They are long-creeping and branched, and they can grow, possibly, indefinitely. As in *Pteridium* Gled. ex Scop., it is common several "levels" of rhizomes; in other words, one main deeper rhizome, and some other less deep, formed by buds at the base of the petioles. They are often called 'secondary rhizomes' or 'epipetiolar rhizomes' (*e.g.* Lellinger 2002) – Figs. 1A, B; see also Gruber (1981: Fig. 4).

This growth ability is responsible for forming a "rhizome net" underground (and slightly over ground). One individual can bear several fronds. It is quite hard to differentiate one individual from the population. As in *Pteridium,* one individual can get very big dimensions, maybe up to a block area, being one the biggest plants in the World. A studied carried out by Gruber (1981), showed an example of how big one individual of *Hypolepis repens* can get, with a rhizome ca. 30 m long, occupying an area of 13 m^2, and bearing 53 leaves (croziers, developed leaves, and dead leaves). Not every *Hypolepis* species has this ability; for example the Andean *H. crassa* Maxon and *H. obtusata* (C. Presl) Kuhn probably bear only a few fronds.

The Brazilian living plants studied in the present study showed the following patterns (very probably related with the distance between the internodes):

1. One population (or one big individual?), with lots of leaves growing very next to each other, without any other plants within. Such pattern occurs the same way in *Pteridium* populations growing in open areas, and they are often called as 'dense colonies' (Tryon & Tryon 1982), 'extensive colonies' (Brownsey & Chinnock 1984), or 'thicket-forming' (Mickel & Smith 2004). The *taxa* occurring in open sunny areas normally develop this way, for example *Hypolepis rugosula* subsp. *pradoana* Schwartsb., and *H. stolonifera* var. *nebularis* Schwartsb.

2. One population (or one big individual?), with some leaves growing sparse from each other, with other plants in between. This pattern is similar to individuals of *Pteridium* growing at the edges of forests, or in clearings inside the forest. Leaves ca. 1−2 m distant from each other, connected by the underground/slightly over ground rhizomes were seen (*e.g.* Fig. 1B). This pattern was observed in *Hypolepis acantha* Schwartsb., *H. mitis* Kunze ex Kuhn, *H. repens,* and *H. stolonifera* Fée var. *stolonifera.*

3. A small individual bearing less than six leaves. This is the regular pattern of ferns with creeping rhizomes, like some *Dennstaedtia* Bernh. species, for example. No studied species showed this kind of growth; only young individuals of *Hypolepis rugosula* subsp. *pradoana* growing in rocky sites – thus a growth probably limited by age and substrate. But, probably some Andean species do grow normally this way, for example *H. crassa* and *H. obtusata*.

The vascular system of the rhizomes is the "perfect solenostele" type (following Gwinne-Vaughan 1903), or also sub-named as 'sifonostelic' (following Ogura 1972) – Figs. 2A, 3A, 4A. There were found two kinds of sifonostele in *Hypolepis:* 1. Cylinder vascular bundle (Fig. 2A), found only in *H. rugosula* subsp. *pradoana;* and 2. Stellar vascular bundle (Figs. 3A, 4A), found in *H. acantha* and *H. stolonifera* var. *stolonifera.* The studies species also present an external ring of schlerenchimatous cells surrounding the main vascular bundle (Figs. 2A, 3 A–C, 4A–D), which is probably related to the supporting of the stem and/or for protection.

As shown and discussed by Gwinne-Vaughan (1903), Gruber (1981), and *personal observations*, the leaves in *Hypolepis* are arranged in two rows upon the adaxial surface of the rhizome, in a somehow adaxial/lateral position and in an alternate way, and he leaf-gaps are formed much before the departure of the leaf itself (see Gwinne-Vaughan 1903: Figs. 5, 6).

The rhizomes bear two 'lateral lines' *sensu* Mitchell (1924 *apud* Ogura 1972), or 'respiratory lines' *sensu* Ogura (1938 *apud* Ogura 1972), or 'linear aerophores' *sensu* Davies (1991) – the name adopted here is 'lines of aerophores' (Figs. 2B, 3C, D). Actually, this is quite a new finding for the rhizomes; it had been mostly described for petioles and rachises (*e.g.* Ogura 1972, Davies 1991). They are originated in the rhizomes, and they continue onto the petioles, rachises, and also on the pinna-rachises – the details of the lines of aerophores are better presented under 'Petioles and rachises', below.

The induments of the rhizomes are always formed by multi-cellular hairs. They are brown (ranging from yellowish to reddish-brown), linear, with one row of cells, never furcate or stellate. They are here called 'catenate-acicular hairs', and they normally are 1–3 mm long and 10–25-celled (except in *Hypolepis flexuosa*, which is smaller). They can be seen as rigid, with a more or less elongated conical shape, with the cells fulfilled; or, as lax, with a true catenate, stair-like look, with the cells contracted and twisted in different angles – but , probably, such differences are more related to drying procedures.

Leaves

As any other ferns, the leaves in *Hypolepis* are better named as fronds – due to the circinate venation with the apex developing as a fiddlehead (= crozier; "báculo" in Portuguese), and uncoiling with the abaxial surface outwards.

The leaves of the *Hypolepides* are amongst the biggest in the group of ferns. Moran (1995) reported for *Hypolepis nigrescens* fronds up to 10 m long; in the present work, a specimen of *H. acantha* was recorded with fronds up to 6.5 m long (*Schwartsburd 1344;* see Fig. 6A). Similar frond sizes can be reached by other Dennstaedtiaceae, *e.g.* species of *Blotiella* R.M. Tryon, *Dennstaedtia, Odontosoria* Fée, and *Pteridium* – thus, being a common feature in the family.

Most species has the usual pattern of growth, with the apex and the lateral pinnae developing at the same time (*e.g.* Figs. 1.A, 6D, 7H, J, 8F, 10A, F, 11A, 13A, B, G, 15A, 16A, B). But, some species have a partly dormant apex that "rests" while the lateral pinnae develop, then "wakes up" again and grows more. This is the case of *Hypolepis nigrescens,* and is possibly related to an "infinite growth" of the frond (and thus the species get so big frond dimensions) – Fig. 12A. The other South-American species that grows this way is *H. flexuosa* (Fig. 7A). Such pattern is similar to the growth of some Gleicheniaceae species – see the comments of Moran (1995, 2004). But, the growth patterns of *Hypolepis nigrescens* and *H. flexuosa* may be slight different from each other. Apparently, the fronds of *H. nigrescens* grows regularly up (Fig. 12A), while in *H. flexuosa* the probably grow in a zig-zag way (flexuous), since the fronds are pseudo-dichotomus, and the rachises strongly flexuous too (Figs. 7A, B).

Normally, in *Hypolepis,* when a frond gets very big dimensions, it is not self-supported. They are supported by the surrounding vegetation, acting like as a scandent frond, growing in between the other plants' branches. But not as a true scandent that really "climbs" other plants, growing embraced in a spiral way; they just go in between the branches. This frond habit is not entirely and restrictedly linked to species. Individuals, for example, of *H. stolonifera* growing in sunny open areas have erect to slight arched fronds, while inside the forest, in a shade habitat, the individuals do not self-support, and have scandent fronds. This same pattern can be found in *Pteridium.*

On the other hand, the smallest species, *e.g. Hypolepis crassa, H. obtusata,* and *H. rugosula* subspp., probably have always erect to slightly arched fronds (see Figs. 13A, B, 16A, B).

Another intriguing pattern found in *Hypolepis* is related to the size of the fronds. For example, in one population (or one individual!) of *Hypolepis repens* studied (*Schwartsburd 2335*), there were fronds completely developed ranging from 0.5 up to 3 m long, possibly connected by the same rhizome. In the same "population", there were crosiers ranging from a few centimeters long up to 1.5 m! It was difficult to determinate which factor was responsible for that, or if it is some kind of dimorphism of fronds. It is difficult to get a general conclusion, but it seems that the smaller fronds were growing at the rhizome ends, and near the water, while the bigger were in the middle parts of the rhizome and further from the water.

These frond size differences were also seen in *Hypolepis acantha, H. mitis, H. rugosula* subsp. *pradoana, H. stolonifera* var. *stolonifera,* and *H. stolonifera* var. *nebularis* – for a substantial example, compare the Figs. 1A, 6D, 7A, 11A, 16A, B, to the description of the respective *taxa*). Although normally seen in vegetative fronds, it could also be observed in fertile fronds. But, the descriptions given in the taxonomic treatments are all based in ‘fertile fully developed leaves’, and the illustration of some *taxa* were based on small, complete developed, not fertile fronds.

Petioles and rachises

From the solenostelic-sifonostelic rhizome, the leaves depart with a leaf gap on the adaxial side (Gwinne-Vaughan 1903). This gap is responsible for the fronds to bear at the base only one almost circular, but interrupted, vessel. This interruption is reflected on the adaxial groove (Fig. 1.C), which can be seen from the base of the petioles up to the apex of the rachises. On the studied species, the one big vessel becomes fragmented upwards, seeming three to four different vessels. Based on the *Hypolepis* species here studied, at least two types of vascular bundles at the base of the petioles can be recognized, which are named ahead as Greek letters (upside down, since the groove is adaxial):

1. The π-shaped (“pi-shaped”): at the petiole base it looks like the *pi* letter (Fig. 2C), and upwards it becomes fragmented mainly in two vessels, seeming two snakes facing each other (Fig. 2D). This type was found only in *Hypolepis rugosula* subsp. *pradoana*.

2. The Ω-shaped (“omega-shaped” or “mushroom-like”): at the petiole base it looks like the *omega* letter or as a mushroom, then it becomes fractioned upwards into several vessels (Fig. 5A). An early fragment of the vessel, at the base of the petiole is also reflected externally in the epipetiolar rhizomes (Figs. 1A, B, 3E). The Ω-shaped type was found in *Hypolepis acantha, H. repens,* and *H. stolonifera* var. *stolonifera.* The rachises and pinna-rachises of such species are also probably Ω-shaped; Figures 4E–H

show the ontogeny of the pinna-rachis vascular bundle, departing from the rachis, in *H. acantha.*

The two lateral lines of aerophore in the petioles are clearly visible both externally (Fig. 1C) and internally in cross section. The cross-section images show the lines of aerophore internally as interruptions of the hypodermis (layer of sclerified cells), and filled by connecting parenchimatous tissue, with gaps (Figs. 2G, H, 3G, H, 5B, C). There is no apparent difference between all studied species, regarding the lines of aerophores internally. The drawings of the tangential sections made by Ogura (1972: Fig. 91) for *Onychium japonicum* (Thunb.) Kunze show a high density of stomata in the region of the lines of aerophores. Since most *Hypolepis* species occur in wet grounds, it is reasonable to believe that these lines of aerophore are responsible for gas exchanges, and for eliminating water through evaporation – see also Davies (1991: 118).

The color of the lines of aerophores may be of taxonomical significance, especially for the group of *Hypolepis hostilis,* in which they are very dark and contrasting with the petioles and rachises, but they were not described in this treatment.

Note: one must be careful when analyzing dried material of *Hypolepis.* When dry, the petioles and rachises can falsely seem to be three-grooved – this is due, sometimes, to the weakening at the lines of aerophores, similar as reported by Moran (1987) for the genus *Polybotrya* Humb. & Bonpl. ex Willd.

Some species have sharp conical emergences of the epidermis on the petioles, rachises, and pinna-rachises (*e.g.* Figs. 6B, 8B, 10G, 11B, G, 12C, F, 14C, G, 15E, F). In the general taxonomic literature, such projections have been named as “spines”, “prickles”, or “aculei”. The term adopted here is ‘*aculeus’* (aculei), since they are not vascularized, and they are originated by the epidermis, filled only with hypodermis and parenchyma (Figs. 5D, E). Such feature is quite uncommon among ferns in general. On the other hand, within Dennstaedtiaceae it is somehow common: some species of *Dennstaedtia* and *Odontosoria* also bear such emergences.

The aculei probably act as protectors against herbivores, since they are sharp and harmful. They might possibly secrete some chemical compounds as well, since many species bear glandular hairs, but this is only a speculation and more studies are necessaries to confirm this hypothesis.

Some other species have rounded tip, obtuse emergences. Since they are not pointed and sharp, they are not named here as aculei, but as '*tuberculous'* (tuberculei), even though they probably have the same origin of the aculei.

The color of the petioles and rachises as a whole is of great taxonomic value but must be studied carefully. Some patterns are quite exclusive of some *taxa*, and not variable; but the main color of some species can differ according to the degree of development of the fronds. For example, *Hypolepis rugosula* is the only species in the Americas with a true atropurpureous petioles and rachises; the petioles are always entirely atropurpureous; the rachises are sometimes entirely atropurpureous, but some other times they are stramineous at the apices. Another example is *H. hostilis* and *H. galapagensis*, which has a characteristic petiole bases very dark, black, while in the medial region and apex, they are very light (light brown to stramineous).

On the other hand, some populations of *Hypolepis stolonifera* and *H. mitis* studied showed the following pattern: the younger fronds have the petioles and rachises entirely green, while the older fronds have them wine red at base transitioning to brown, then light brown upwards. Such respective specimens later dried showed the following colors: stramineous greenish axes – younger fronds; and wine red, brown to light brown, to stramineous – older fronds.

In general, the color of the axes was not applied in the present study to recognize species and infraspecific taxa, except when they are very characteristic and secure. But, whenever reading the descriptions, the reader must be careful since the descriptions do not take in account the young fronds.

Another feature present in rachises (in the pinna insertions) is the *nectaries* (Figs. 1E). Either they are functional or not must be further studied.

Laminae, pinnae, pinnulae, costae, and costules

In the majority of the South American *Hypolepides*, the laminae are proximally bipinnate-pinnatisect with segments pinnatifid, bipinnate-bipinnatisect with segments pinnatifid, or tripinnate-pinnatisect with the segments pinnatifid; they are rarely less dissected (*e.g. H. bogotensis* H. Karst. and *H. obtusata*).

Note: as in the case of ranging the leaf sizes (see above), some species also range the degree of dissection of the laminae. For example, in a population (or one individual?) of *Hypolepis rugosula* subsp. *pradoana* studied (*Schwartsburd 2310*), there were found fertile fully developed fronds with the laminae proximally ranging from pinnate-pinnatisect with segments pinnatifid, up to bipinnate-bipinnatisect with segments pinnatifid (Figs. 16A, B). Such ranges were included in the descriptions, but, unfortunately they were mostly based solely on herbarium material, and only fully developed and fertile material were considered.

Most of earlier literature accounted the division of the lamina in *Hypolepis* as, for example, "tripinnate", quadripinnate, or "bipinnate-pinnatifid", "tripinnate-pinnatifid", not taking in account the "pinnatisect levels". In this work, the 'levels of dissection' are defined as follows:

Pinnate – fully dissection; *pinnatisect* – an almost full dissection, but with very thin wings (alas) of green tissue connecting the next divisions (better seen under the binocular); *pinnatifid* – more or less a middle incision; *lobed* – a very slight incision, much less than half of an incision. In the morphology here adopted, all species have one or two 'pinnatisect level(s)'.

Figures 1D and 1F shows a clear example of a lamina proximally bipinnate-bipinnatisect (with lobed segments). At a macro view (Fig. 1D) it seems that the lamina is tripinnate-pinnatisect or quadripinnate, but when looked under the binocular, it is easily seen that the two last orders of division are indeed connected by laminar tissue – thus not composing a true 'pinnate level.

Of course, whenever adopting such morphology, not only the nomenclature of the division of the lamina changes, but also the concepts of *costa* and *costule*. In the present work, the following nomenclature is applied:

Costa – the last axis immerse only in wings; *costule* – the following axis immersed in true laminar tissue (in segments), and in wings; then, *veins* – the next order of axis (secondary and tertiary veins are not recognized here). By means of standardization, the reader must follow Fig. 1F, which it is represented by: a *pinna-rachis,* a *costa,* three costules, and then *veins.* Figure 1G shows a *costule* and *veins;* Figure 1H shows part of a *costa,* a *costule,* and *veins.*

Actually it is easier if the reader counts backwards to identify the costules and costae. In this work the induments of the pinna-rachises (1st, 2nd orders, etc.), are not described, because they vary little from the costae, or sometimes they are just a transitional state between the rachises and the costae, and they would lead to very long and tiring descriptions, with unnecessary and taxonomically non-important features.

An isolated pinna resembles a fractal of the lamina itself, although sometimes there is a slight difference which is taxonomically fundamental: if they are either equilateral or inequilateral. Such difference is more easily visible in the proximal pair of pinnae. If the researcher has only a piece of the frond, lacking the proximal pinnae, he can apply the concept to the second proximal pair of pinnae and so on, but, the feature goes less and less secure. Also, within the basal pinnae, the proximal pair of pinnules shows easier such characteristics. Three states for this character are here adopted:

Strongly inequilateral – the basiscopic pinnules bigger (longer and larger) and more dissected than the acroscopic pinnules (*e.g.* Figs. 1A); *slightly inaequilateral* – the basiscopic pinnules bigger than the acroscopic ones, but equally dissected (*e.g.* Fig. 8F); *equilateral* – the basiscopic and acroscopic pinnulae equal in size and in degree of dissection (*e.g.* Figs. 16A).

Most *Hypolepis* species with big fronds have strongly inequilateral pinnae, while the species of small leaves tend to have slightly inequilateral pinnae (*e.g. H. obtusata*, *H. pteroides* Mett.), or equilateral (*e.g. H. rugosula*).

Veins and receptacle

The veins in *Hypolepis* have little taxonomically importance. Every species have free veins, which are primarily pinnate, and then furcate. The vein ends are maybe important, but it does not represent a secure taxonomical character, thus their details were omitted in the species description. In a few species the veins end in lamina emarginations (maybe only in *H. distans* Hook.). In most species the veins end at the margin, or slightly before. Usually, they have a clavate (enlarged) ending. Possibly, the veins ends determinate the place of the receptacles, and thus a species can have them either marginal or sub-marginal, culminating into developed or undeveloped pseudo-indusia (see the images of Schölch 2000).

The indument of the veins is of taxonomic importance (see below).

Sori and indusia

Since the place of the receptacle might be responsible for the states of marginal and sub-marginal sori and, therefore, such plants having developed pseudo-indusia or not, there is no reason for treating the non pseudo-indusiate species in a different genus, based only on that.

In the present work, the two states of both characters are generally linked to each other: *1. Species with marginal and pseudo-indusiate sori* (*e.g.* Fig. 1I), and *2. Species with submarginal sori, lacking pseudo-indusa* (*e.g.* Fig. 16D). There are a few exceptions for these patterns.

Among the pseudo-indusiate species, some have them more developed than others. The degree of development can be seen, and was described here, as the *color and thickness of the pseudo-indusia.* They are named green (or yellow) and coriaceous when they are poorly differentiated from the lamina margins, but yet differentiated; hyaline and membranaceous when they are effectively developed and differentiated; and there are also intermediate states, like chartaceous pseudo-indusia, and/or partly green and partly hyaline. Also, some features can be found in these structures, like hairs. Such hairs are here called *cilia,* since they are located at the margins of the pseudo-indusia (Fig. 1I). These cilia are similar to the hairs of the other parts of the lamina (see below), and they can be classified as catenate-acicular and catenate-glandular.

The species lacking developed pseudo-indusia not necessary have their sori unprotected. The normal state is the sori away from the margin, and the lamina margins not at all recurved; but, whenever the leaf tissue is contracted, the sori can be slightly protected by the lamina margins. It is a common feature for the subspecies of *H. rugosula* (subsp. *africana,* subsp. *pichi-sermolliana,* subsp. *poeppigiana,* and subsp. *pradoana*), and *H. poeppigii* to have the lamina margins recurved over the sori. But, in no case, they are differentiated into pseudo-indusia (Figs. 10C–E, 16D).

Bower (1928) presented drawings about a possible vestigial inner indusium (true indusium), in a “*Hypolepis repens*” specimen from Jamaica. He believed it could be an inheritance from the *Dennstaedtia*-type, which he regarded as an ancestral type for *Hypolepis.* In the present study all sori were studied under the stereomicroscopy and all main types of sori here recognized were based on the morphological aspect in general. To access the Bower's hypothesis of the evolution of the indusia, a molecular, and a further anatomical approaches are necessary. Additionally, those specimens studied by Bower where not located to check his supposition and to verify their best identities.

Bower (1928) also concluded the non pseudo-indusiate species of *Hypolepis* would be the "more advanced forms", in a phyletic line: *Cibotium* – *Dennstaedtia* – *Hypolepis* (pseudo-indusiate species) – *Hypolepis* (non pseudo-indusiate species). A similar hypothesis was once again tried to be proven by Scölch (2000).

Indument

As in most Dennstaedtiaceae genera, the indumenta of *Hypolepides* are formed solely by hairs, lacking any kind of scales. Using the regular concept of such structures, they are defined here as epidermal appendices with only one row of cells, while the scales are several cells wide (several rows of cells).

The hairs in *Hypolepis* are always multi-cellular, ranging from two, three, up to twenty-five cells, always in a row. They are never furcate, stellate, etc. Most of them are *catenate, i.e.,* whenever dried they get a chain-like (or stair-like) aspect, with the cells contracted and twisted in different angles. They are usually lax, and decumbent. Among the catenate forms, there are two kinds present in *Hypolepis,* here named as: 1. *Catenate-acicular,* which is a catenate hair with a sharp conical cell at the tip; and 2. *Catenate-glandular,* which is a catenate hair with a spherical glandular cell at the tip.

There are three more kinds of hairs that are here named as: 3. *Acicular,* which is a straight erect acicular hair, formed by two or three cells, especially found in *Hypolepis acantha, H. pedropaloensis* and *H. stuebelii;* 4. *Baciliform trichomidia,* which is a club-like trichomidia, formed by two cells, especially found in *H. nuda;* and 5. *Trichomidium* (Trichomidia), which is a very small, appressed hair, filiform, ca. 0.2 mm long, with ca. 6 cells, especially found in *H. bogotensis, H. melanochlaena, H. parallelogramma,* and *H. scandens.*

While in the trichomidia the hair cells measures ca. 0.05 mm, in the other types of hair, they measure ca. 0.1 mm. This important feature was used in the key.

For conclusion, in *Hypolepis* there are no branched hairs (in any way: furcate, stellate, etc.), nor uncinate hairs, nor scales of any kind, nor sessile glands, nor setae.

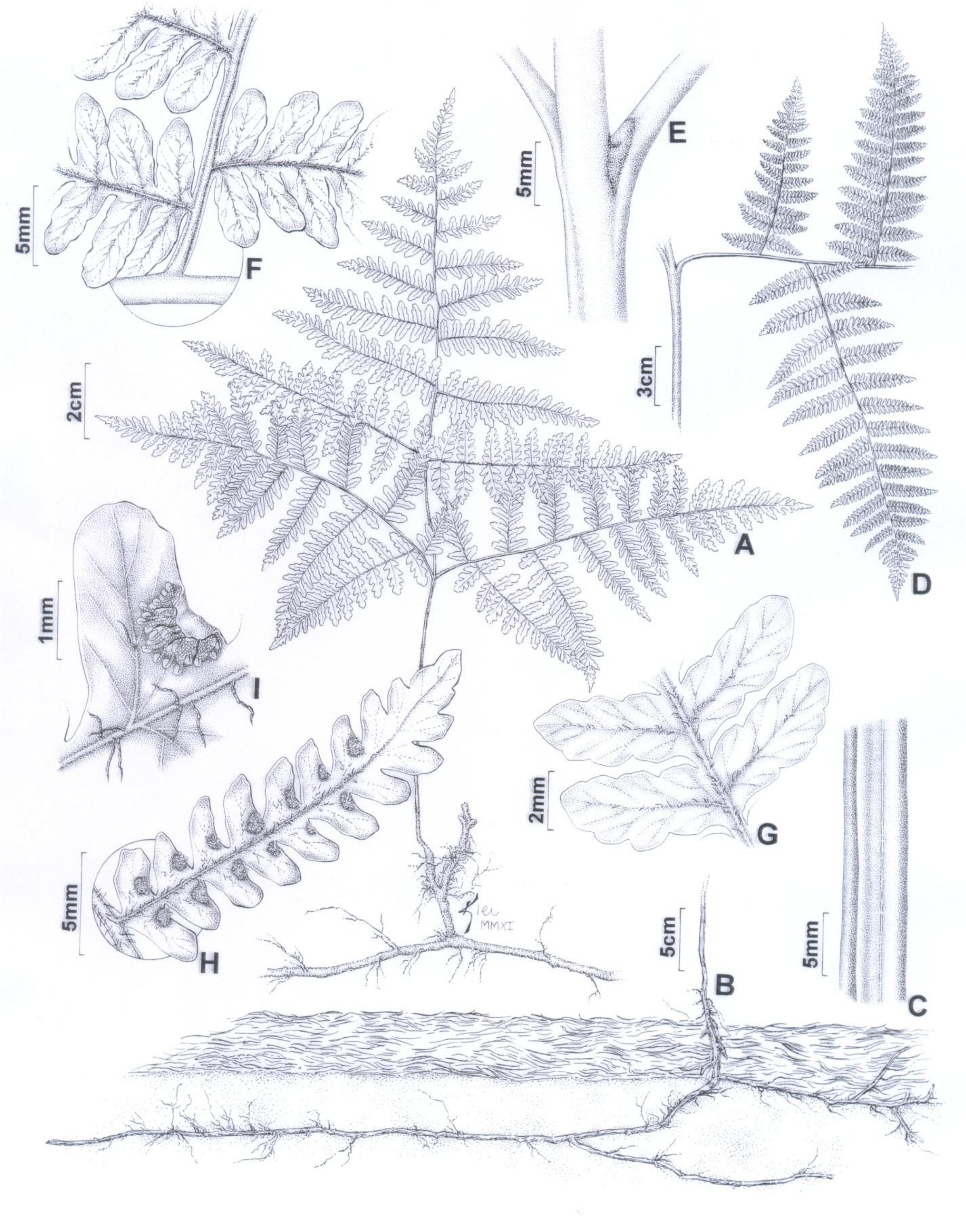


Fig. 1 *Hypolepis stolonifera* var. *stolonifera:* **A** habit of a small frond (*Schwartsburd 1369*), **B** habit of the rhizome (*Schwartsburd 2209*), **C** line of aerophore (*Schwartsburd 1426*), **D** proximal pinna (*Schwartsburd 1928*), **E** intersection petiole/rachis, showing a nectary (*Schwartsburd 1928*), **F** pinnules abaxially (*Schwartsburd 1928*), **G** segments abaxially (*Schwartsburd 1928*), **H** fertile pinnule abaxially (*Labiak 4429*), **I** fertile segment abaxially (*Labiak 4429*).

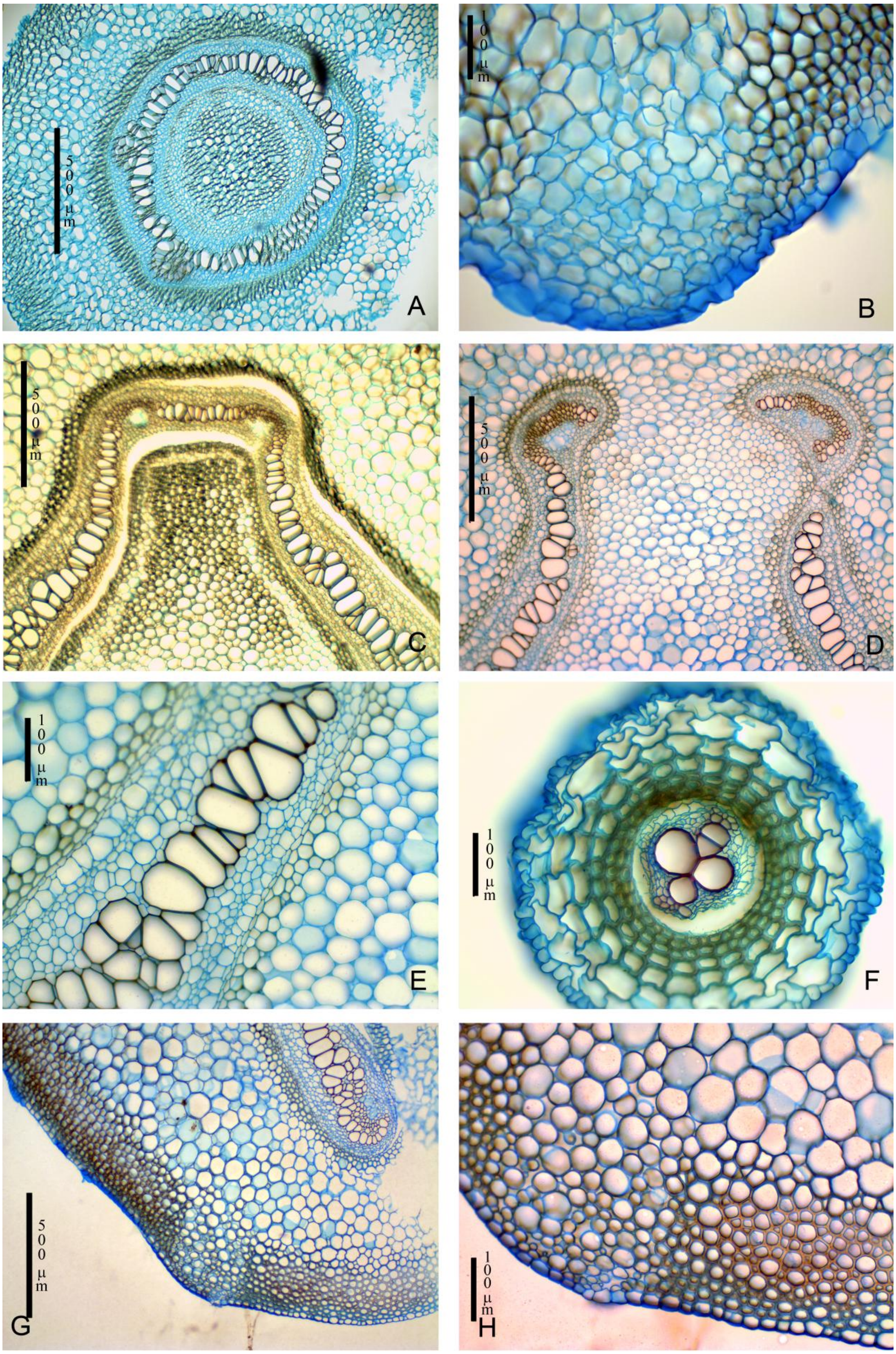


Fig. 2 *Hypolepis rugosula* subsp. *pradoana* (*Schwartsburd 2310*): **A** cross section of the rhizome, **B** line of aerophore in detail (rhizome in cross section), **C** cross section of the petiole proximally, **D** cross section of the petiole distally, **E** vascular bundle in detail (cross section of petiole), **F** root in cross section, **G** line of aerophore (petiole in cross section), **H** line of aerophore in detail (petiole in cross section).

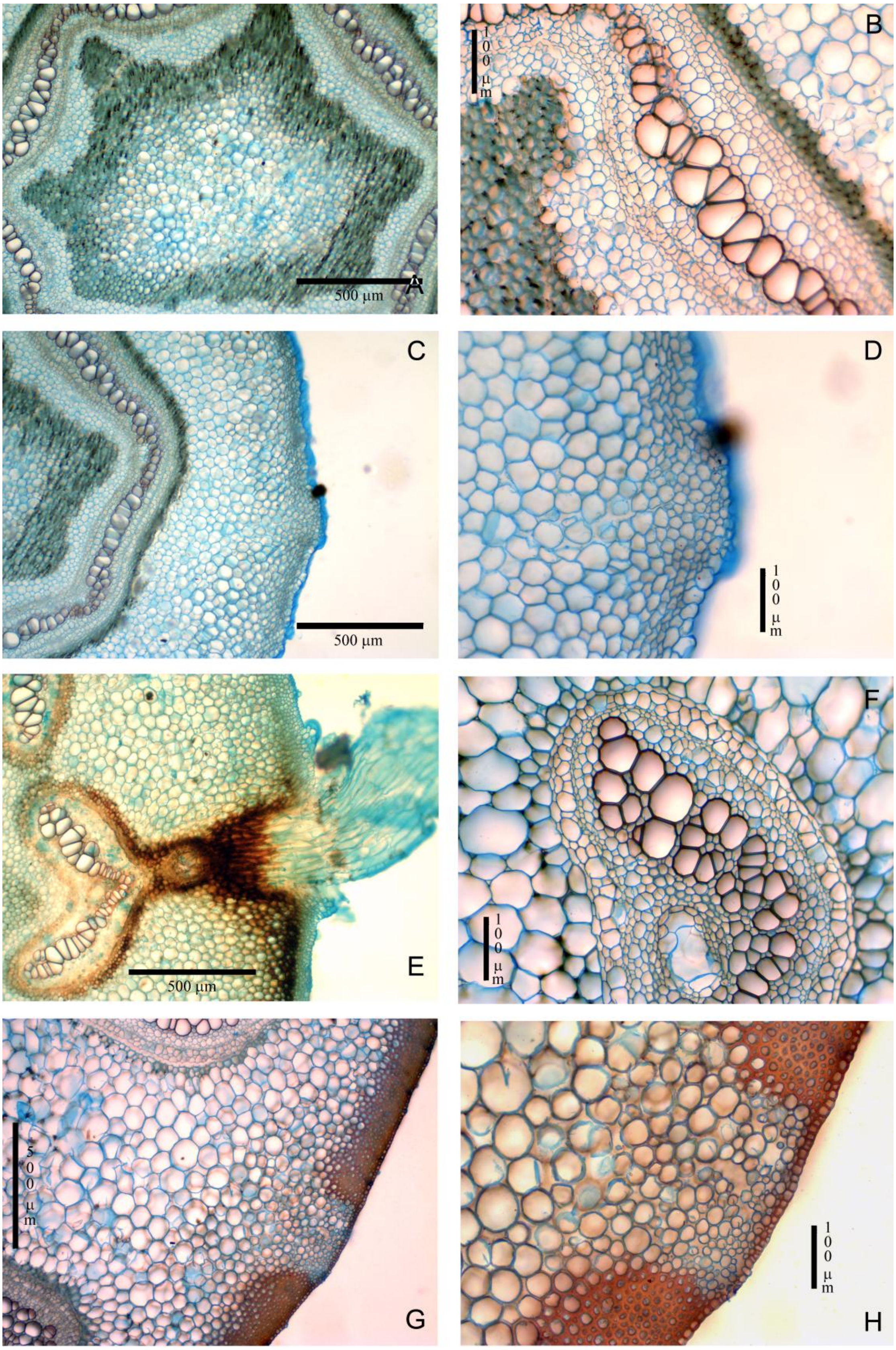


Fig. 3 *Hypolepis stolonifera* var. *stolonifera* (*Labiak 4269*): **A** cross section of the rhizome, **B** vascular bundle in detail (cross section of rhizome), **C** line of aerophore (rhizome in cross section), **D** line of aerophore in detail (rhizome in cross section), **E** departure of a epipetiolar rhizome (petiole in cross section), **F** vascular bundle in detail (petiole in cross section), **G** line of aerophore (petiole in cross section), **H** line of aerophore in detail (petiole in cross section).

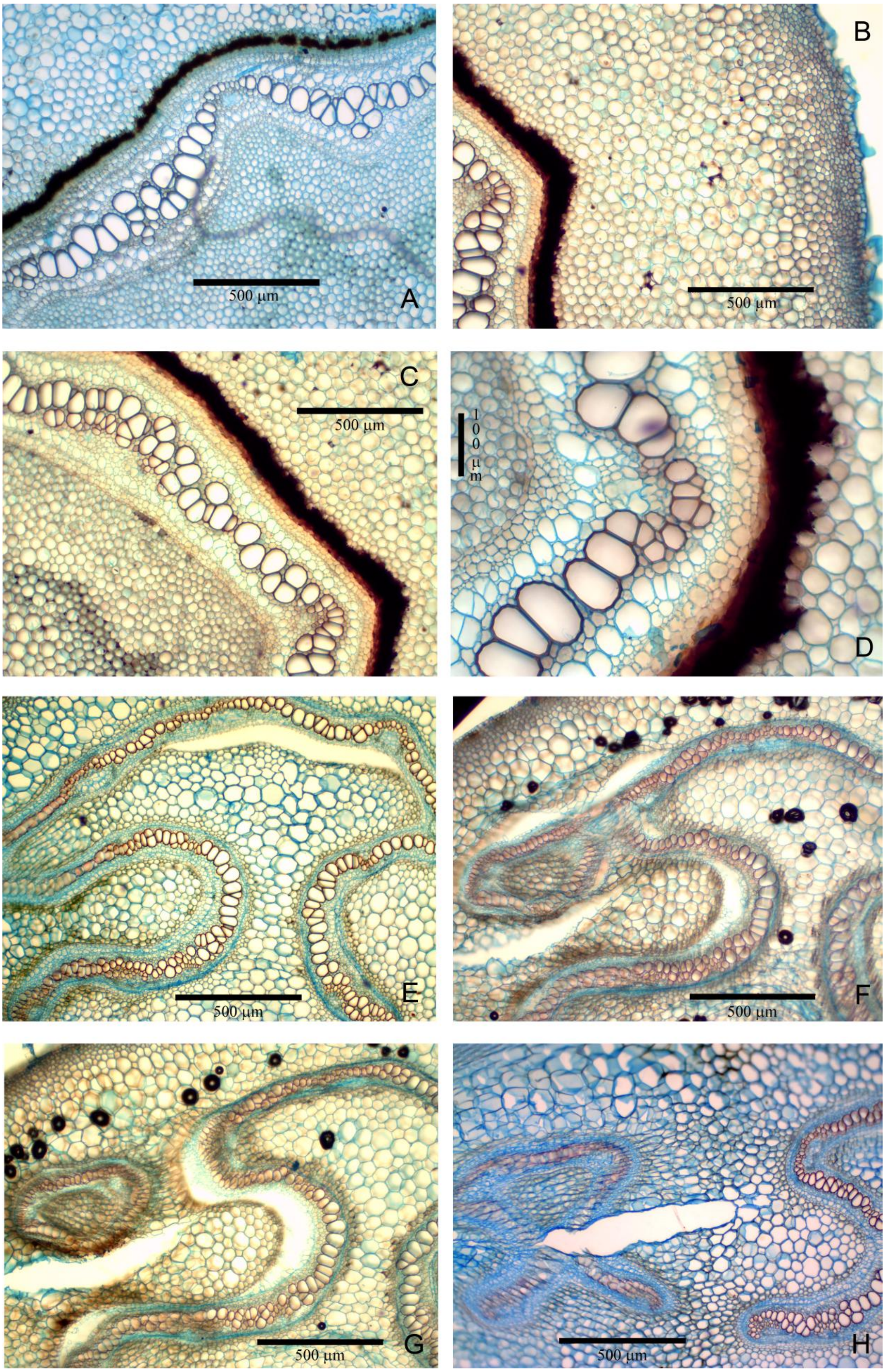


Fig. 4 *Hypolepis acantha* (*Schwartsburd 2264*): **A** cross section of the rhizome, **B** cross section of the rhizome, **C** cross section of the rhizome, **D** vascular bundle in detail (cross section of rhizome); **E – F** ontogeny of a pinna departure, showing the formation of the vascular bundle of the pinna-rachis (rachis in cross section, going upwards).

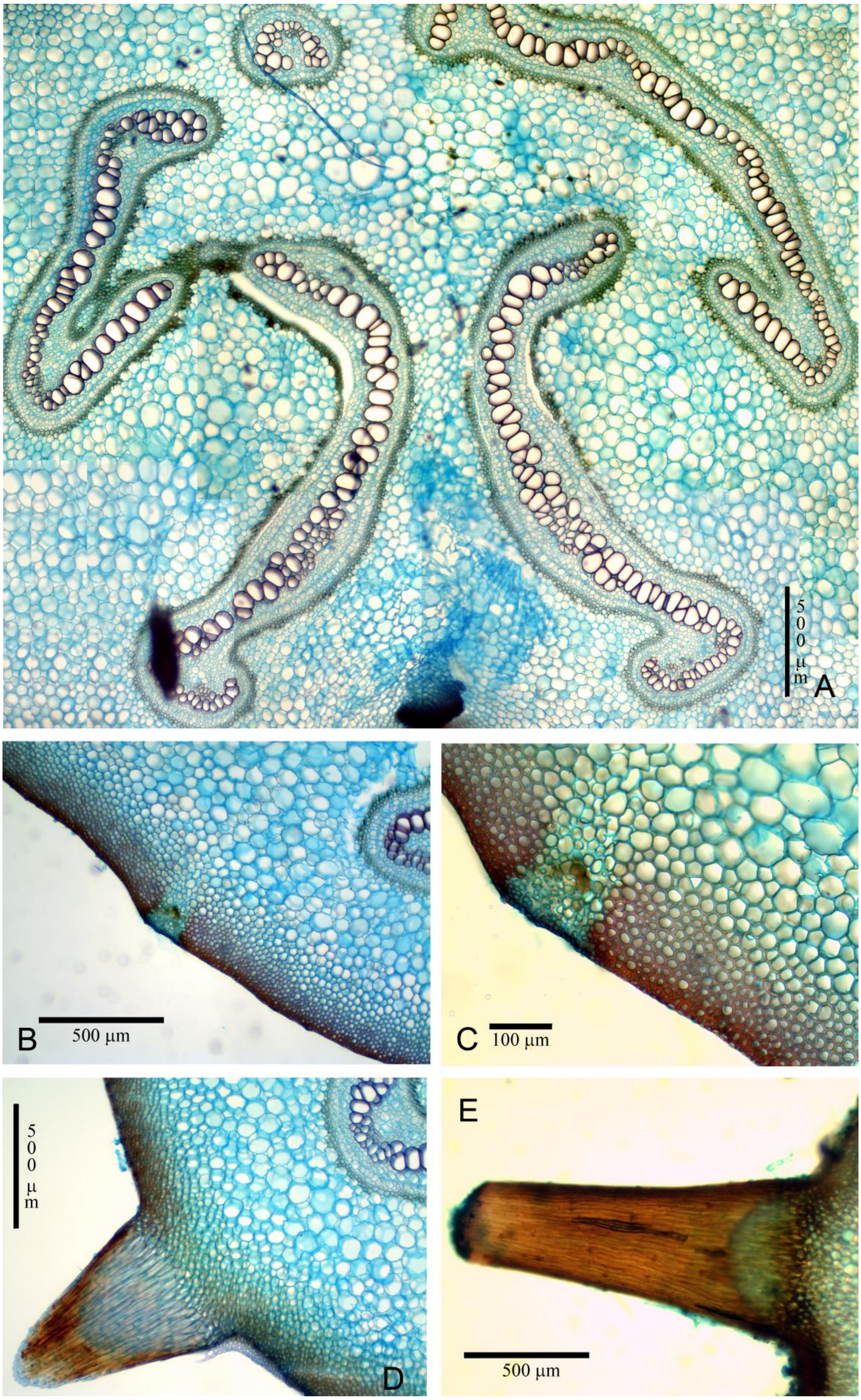


Fig. 5 *Hypolepis repens* (*Schwartsburd 2335*): **A** cross section of the petiole (picture mounted by several others), **B** line of aerophore (petiole in cross section), **C** line of aerophore in detail (petiole in cross section), **D** aculeus in detail (petiole in cross section), **E** aculeus in detail (petiole in cross section).

Groups of species

Based on the results of the morphological studies on nearly 70-80% of the *Hypolepides* World-wide, is possible to reach an informal grouping for the species, with a more detailed and complete reference for the South American *taxa*. This grouping is a speculative hypothesis based exclusively on morphology, and lacks confirmation (or rejection) by molecular data.

Four principal groups of species can be readily recognized: *Hypolepis nigrescens* group (with three or four spp.), *H. flexuosa* group (one to four spp.), *H. rugosula* group (one spp. split into several subspp.), and a big group (*H. tenuifolia* group, with ca. 60–70 spp.). *Hypolepis tenuifolia* group can be split into several sub-groups of species. Doubts remain whether *H. punctata* sub-group should be placed within *H. tenuifolia* group or merged with *H. rugosula* group.

For practical purposes, all 'sub-groups', independently of their position in the main groups, are listed below as 'groups', alphabetically ordered, and without hierarchy into the four major groups:

I. Group of *Hypolepis bogotensis:*

In this group is solely *Hyoplepis bogotensis* (with its two varieties). It is characterized by the small fronds (Figs. 7H, J), especially furnished with trichomidia (catenate-acicular hairs also present; Fig. 7I), the petioles and rachises inermous, the proximal pinnae slightly inequilateral (Figs. 7H, J), and the pseudo-indusia mostly yellowish, chartaceous. In addition, the two varieties are narrow endemic to the Bogota Cordillera, in Colombia.

II. Group of *Hypolepis flexuosa:*

In this group is *Hypolepis flexuosa* Sodiro (with its two varieties), and possibly also some species endemic to Mexico (like *H. muenchii* (H. Christ) J. Mickel, *H. thysanochlaena* J. Mickel & Beitel, and *H. trichochlaena* J. Mickel & Beitel – all not studied in this work). It is different from any other group, and can be characterized by the hairs of the rhizome much shorter than the other species (up to 0.6(−1) mm long *vs.* 1–3 mm; exclusive character), big fronds, furnished with lax catenate-acicular hairs, and with interrupted growth (exclusive character; similar to *H. nigrescens* group, but in a different way; Figs. 7A, E, G), the petioles and rachises inermous (Fig. 7B), the proximal pinnae strongly inequilateral, and the pseudo-indusia chartaceous (Fig. 7E). This group occurs in the Andes, and through the highlands of Mesoamerica (up to Mexico?; possibly also in the Great Antilles).

III. Group of *Hypolepis guianensis:*

In this group are the poorly known endemic species from Mount Roraima: *Hypolepis guianensis* Klotzsch, *H. krameri* Schwartsb. *et al. ined.*, and *H. trinationalis* Schwartsb. *ined.* It is characterized by the small to medium-sized fronds, and copiously furnished by catenate-acicular and catenate-glandular hairs, the petioles and rachises inermous (tuberculate in *H. krameri*), and the pseudo-indusia well developed and ciliate (as a rule). In addition, this group is narrow endemic to the Mount Roraima region.

IV. Group of *Hypolepis hostilis:*

In this group are *Hypolepis galapagensis* Schwartsb. & J. Prado *ined.*, *H. hostilis* (Kunze) C. Presl, *H. lellingeri* A. Rojas, *H. rigescens* (Kunze) T. Moore, *H. tenerrima* Maxon, and *H. viscosa* H. Karst (maybe also *H. microchlaena* J. Mickel & Beitel – not studied here). It is characterized by the medium-sized fronds (Fig. 10F), and furnished with catenate-acicular and short catenate-glandular hairs (Figs. 9A−C), the petioles proximally very dark (dark wine red or black), and much lighter (light brown or stramineous) above (as a rule, and very characteristic), the lines of aerophores are also very dark and strongly apparent (exclusive character), the petioles and rachises aculeate (except in *H. viscosa;* Fig. 10G), the proximal pinnae equilateral to slightly inequilateral (Fig. 10F), the segments relatively small (very characteristic; Figs. 9A–C, 10I), and the pseudo-indusia commonly small and poorly differentiated (Fig. Figs. 9A, B, 10I). *Hypolepis galapagensis* and *H. lellingeri* are two Islanders narrow endemic species; they have probably differentiated not a long time ago, and they have possibly originated from either *H. hostilis* or *H. rigescens,* which occur in the Continent, nearby. The remaining species occur especially in northern South America, but also reaching Mesoamerica and the Antilles (Mexico?).

V. Group of *Hypolepis nigrescens:*

This is the most peculiar group, and probably do not belong to genus *Hypolepis s. str.*, as many times pointed out in literature (*e.g.* Bronsey 1983, 1987, Mickel &

Smith 2004). Belong to this group: *H. brooksiae* Alderw., *H. nigrescens* Hook., and *H. scabristipes* Brownsey. The group can be characterized by plants with big and scandent fronds (up to ca. 10 x 2 m), with interrupted growth (exclusive character, shared only with *H. flexuosa* group, but in a different way; Fig. 12A), the petioles, rachises, and pinna-rachises aculeate, the aculei black and curved (exclusive of *H. brooksiae, H. nigrescens;* Figs. 12C, F) or black, hollow, and deciduous (exclusive of *H. scabristipes*), the proximal acroscopic pinnules revolute and protecting the pinnae departures (exclusive character; Fig. 12B), and the costae with adaxial wings decurrent onto the costules (exclusive character; Figs. 12D, E). Also, the chromosome number of such species ($n = 29$ in *H. nigrescens*) is different from the basic numbers of *Hypolepis* ($n = 52$ or 104) − see Brownsey 1983, 1987, Mickel & Smith 2004, etc. The aculei black and curved is shared with *Dennstaedtia scandens* (Blume) T. Moore; the connecting adaxial wings are shared with *Dennstaedtia globulifera* (Poir.) Hieron. (and related species), and to genus *Paesia* A.St.-Hil.

VI. Group of *Hypolepis nuda:*

This group is formed only by *Hypolepis nuda* Mett. It is characterized by the small to medium-sized fronds, and furnished only with bacilliform trichomidia (exclusive character), the petioles and rachises tuberculate and non-rugose (very characteristic), the sori sub-marginal, and the pseudo-indusia absent or the lamina margins slightly differentiated but no covering the whole sori (somehow exclusive). This group has a more or less Circum Caribbean distribution (northern South America, Mesoamerica, and Antilles).

VII. Group of *Hypolepis obtusata:*

In this group are *Hypolepis crassa* Maxon, *H. obtusata* (C. Presl) Kuhn, and *H. pteroides* Mett. It is characterized by the plants occurring in extremely high elevation (3400–4600 m), small fronds (Figs. 13A, B, G), furnished only with long catenate-acicular hairs, 2–4 mm long (exclusive character; Figs. 8K, L, 13C–F), the petioles and rachises inermous, the laminae not much dissected, the pseudo-indusia poorly differentiated and coriaceous (exclusive; Figs. 8K, L, 13D–F). In addition, the sori are commonly confluent, seeming falsely acrostichoid (Fig. 13F). This group occurs in the Andes (Bolivia up to Colombia).

VIII. Group of *Hypolepis punctata:*

In this group are *Hypolepis ambigua* (A. Rich.) Brownsey & Chinnock, *H. glandulifera* Brownsey & Chinnock, *H. poeppigii* (Kunze) R.A. Rodr., *H. polypodioides* (Blume) Hook., *H. punctata* (Thunb.) Kuhn, and also most of Japanese and Chinese *taxa*. This group is similar to *H. rugosula* group, especially by the fronds furnished with catenate-acicular and catenate-glandular hairs, the petioles and rachises inermous and copiously rugose (Fig. 10B), the proximal pinnae equilateral to slight inequilateral (Fig. 10A), the sori sub-marginal, and the pseudo-indusia absent (Figs. 10D, E). But this group essentially differs from *H. rugosula* group by the color tone of the petioles and rachises (light to dark brown brown *vs.* atropurpureous). Doubts remain either this group is more closely related to *H. rugosula* group (and should be merged within), to *H. hostilis* group, or even to *H. guianensis* group. This group is especially diverse in East and Southeast Asia, Oceania, and some Pacific Islands; the solely South American species occurs in southern Bolivia and northern/central Argentina and Chile.

IX. Group of *Hypolepis repens:*

This is the biggest group in South America, and except for the species in *Hypolepis hostilis* group and *H. nigrescens,* houses every other aculeate *taxa.* In this group are *H. acantha* Schwartsb. *ined., H. grandis* Lellinger, *H. melanochlaena* A.R. Sm., *H. mexicana* Liebm., *H. mitis* Kuhn, *H. parallelogramma* (Kunze) C. Presl, *H. pedropaloensis* Schwartsb. & J. Prado *ined., H. repens, H. scandens* Kessler & A.R. Sm., and *H. stuebelii* Hieron. (possibly also some Antillean and/or Mesoamerican species). It is characterized by the rhizomes with a stellar vascular bundle (Fig. 4A), medium-sized to big fronds (Figs. 6A, 11A, 15A), the petioles proximally with an Ω-shaped vascular bundle (Figs. 4E and 5A), the petioles and rachises aculeate (as a rule, but except in *H. pedropaloensis;* Figs. 5D, E, 6B, 8B, 11B, G, 14C, G, 15E, F), and the pseudo-indusia well developed and strongly differentiated (sometimes ciliate; Fig. 8D, E). This group has a typical Neotropical distribution, but with its austral limits in Bolivia (not reaching northern Argentina). The species are clearly segregated into three sub-groups:

IXa. with *Hypolepis mitis, H. mexicana,* and *H. repens* – fronds furnished with only catenate-acicular hairs (a few trichomidia sparse on the petioles and rachises; Figs. 8D, E), and the pseudo-indusia hyaline, commonly ciliate (Figs. 8D, E, 11E);

IXb. with *Hypolepis melanochlaena, H. parallelogramma,* and *H. scandens* – fronds furnished mainly with trichomidia (also catenate-acicular hairs on major axis; Figs. 14 D, H), and the pseudo-indusia chartaceous and yellowish (*H. parallelogramma* and *H. scandens*), or hyaline and blackish (*H. melanochlaena;* Fig. 11I);

IXc. with *Hypolepis acantha, H. grandis, H. pedropaloensis,* and *H. stuebelii* – fronds furnished with acicular and catenate-acicular hairs (also sometimes catenate-glandular hairs), the laminar tissue between the veins abaxially hirsute (exclusive character; Figs. 6C, 15C, D, G, H), and the pseudo-indusia hyaline, commonly ciliate (Figs. 15C, D, G, H). Possibly *H. stuebelii* is a species complex (maybe with unknown species from the Antilles), and further studies are need to confirm this hypothesis.

X. Group of *Hypolepis rugosula:*

In this group is solely *Hypolepis rugosula* (Labill.) J. Sm. with its ca. 10 subspecies (*e.g.* subsp. *africana* (C. Chr.) Schwartsb. & J. Prado, subsp. *pichi-sermolliana* Schwartsb. & J. Prado, subsp. *poeppigiana* (Mett.) Schwartsb. & J. Prado *ined.,* and subsp. *pradoana* Schwartsb. *ined.*), in the present *sensu*, or ca. 10−15 species in the concept of some other authors (see ‘Conflicting species concept’; *e.g. H. amaurorachis* (Kunze) Hook., *H. goetzei* Reimers, *H. helenensis* Fée, *H. poeppigiana* Mett., *H. pulcherrima* Underw. & Maxon, and *H. villoso-viscida* (Thouars) Tardieu). It is characterized by the rhizomes with a cylinder vascular bundle (Fig. 2A; exclusive?), the petioles proximally with a vascular bundle π-shaped, splitting into “two snakes facing each other” upwards (Figs. 2C, D; exclusive?), small to medium-sized fronds, and copiously furnished with catenate-acicular and catenate-glandular hairs, and also often with entirely reddish hairs (Figs. 16A–E), the petioles and rachises atropurpureous (exclusive character), inermous and copiously rugose, the proximal pinnae equilateral, and more distant to the next pair than the ones above (Figs. 16A, B), the lamina margins commonly hairy (Fig. 16C–E), the sori sub-marginal, and the lamina margins not differentiated into pseudo-indusia (Fig. 16D). In addition, this group occur only in relatively temperate conditions, be it in high southern latitudes, or in high elevations of low latitudes; especially in Oceania, Pacific and Atlantic Islands, southern South America, highlands of S/SE Brazil, highlands of Central America and Mexico, southern Africa, highlands of Northern Africa, and SE Asia (for a more detailed account see the taxonomic treatment of *H. rugosula*).

XI. Group of *Hypolepis tenuifolia:*

The type of the genus *Hypolepis* is in this group, so it is probably the strictest sense of *Hypolepis.* In this group are *H. dicksonioides* (Endl.) Hook., *H. elegans* Carruth. (with its two subspecies), *H. pallida* (Blume) Hook., *H. paulistana* Schwartsb. & J. Prado, *H. stolonifera* Fée (with its two varieties), *H. tenuifolia*, and possibly more species from the Pacific Islands. It is characterized by the rhizomes with stellar vascular bundle (Fig. 3A), the petioles proximally with an Ω-shaped vascular bundle, medium-sized to big fronds (Figs. 1D, 8F), the petioles proximally wine red (as a rule) and brown above, the petioles and rachises inermous (Figs. 1C, E, 8G), the proximal pinnae strongly inequilateral (as a rule, and very characteristic; Figs. 1A, D, 6D), and the pseudo-indusia strongly differentiated and hyaline, often ciliate (Figs. 1I, 6E, F, 8I). This group has a Circum-Antarctic distribution, in Oceania, Southeast Asia, Pacific Islands, and S/SE Brazil.

Other groups that do not harbor any South American species, but are quite distinct are: XII. Group of *Hypolepis distans* Hook. (*n* = 28, probably related to *H. nigrescens* group – see Brownsey 1983), and XIII. group of *H. millefolium* Hook. Most species Word-wide might possibly be fit in the groups named above.

Taxonomic treatment

Description of the genus

Hypolepis Bernh., Neues J. Bot. 1(2): 34. 1806 [Nov 1805], based on *Lonchitis tenuifolia* G. Forst., Fl. Ins. Austr.: 80. 1876 [Oct-Nov 1876]. = *Hypolepis tenuifolia* (G. Forst.) Bernh., Neues J. Bot. 1(2): 34. 1806 [Nov 1805]. *Cheilanthes arborescens* Sw., Syn. Fil.: 129, 336. 1806 [Mar-Apr 1806], *nom. nov.* pro *Lonchitis tenuifolia* G. Forst., (*non Cheilanthes tenuifolia* (Burm.) Sw., Syn. Fil.: 129. Mar-Apr 1806). *Phegopteris tenuifolia* (G. Forst.) Keyserl., Polyp. Herb. Bunge.: 51. 1873 (*apud* Brownsey & Chinnock 1987, *opus non vidi*). **Lectotype,** designated by Brownsey & Chinnock (1987: 25): Tanna, *G. Forster s.n.* (BM! [as "Insulae Oceani Pacifici"]; probable isolectotypes: B!-frag., BM!, GOET-*n.v.*, image!).

Cheilanthes Sw. sect. *Hypolepis* (Bernh.) Kunze, Linnaea 23(2): 242. 1850.

Hypolepis Bernh. sect. *Euhypolepis* Hook. & Baker, Syn. Fil.: 129. 1867. Lectotype, designated here: *Lonchitis tenuifolia* G. Forst. (= *Hypolepis tenuifolia* (G. Forst.) Bernh.).

Plants terrestrial, rarely humiculous-epipetric. *Rhizomes* solenostelic-sifonostelic, long-creeping, branched, bearing several fronds, lanose or glabrescent, with two lateral lines of aerophores; *hairs* catenate-acicular, lax or rigid, yellowish or reddish-brown, (0.3–)1–3(–4) mm long, (6–)10–30(–35)-celled. *Fronds* small (25–100 cm long), medium sized (1-2 m long), or big (2-10 m long), erect, arched, or scandent, with continuous or interrupted growth. *Petioles* (6–)15–400 cm x (0.8–)2–12(–15) mm, proximally atropurpureous, wine red, brown, or black, generally lighter above, proximally with hairs similar to the rhizomes, medially and distally with other kinds of hairs, glabrescent, or glabrous, smooth, rugose, tuberculate, or aculeate, with one adaxial groove and two lateral lines of aerophores; the *vascular bundle* proximally Ω-shaped or π-shaped, fractioned above; the *aculei* straight or curve, 0.2–3 mm long; the *tuberculei* round, 0.1–0.3 mm long. *Laminae* linear-lanceolate, ovate, rombic, or pseudo-dichotomus, 7–700 x 2–210(–300?) cm, proximally ranging from pinnate-pinnatisect with segments pinnatifid, bipinnate-bipinnatisect with segments pinnatifid, up to tripinnate-pinnatisect with segments pinnatifid, medially less dissected, distally pinnatisect or rarely uncoiled; *rachises* atropurpureous, brown, greenish-stramineous, or stramineous, straight or flexuous, glabrous to lanose, smooth to aculeate; *pinnae insertions* with or without nectaries (functional?), rarely protected by the proximal abaxial pinnule revolute; *proximal pinnae* equilateral, slightly inequilateral, or strongly inequilateral, 1.5–105(–150?) x 0.8–60(–70) cm; *pinna rachises* glabrous to lanose, smooth to aculeate; *costae* with or without decurrent adaxial wings subintending onto the costule, glabrous to lanose; *veins* free, primarily pinnate, then furcate; *laminar tissue between the veins* pubescent or glabrous; *lamina margins* pubescent or glabrous. *Indument* formed by a combination of several kinds of hairs: acicular, catenate-acicular, catenate-gladular, baciliform trichomidia, and trichomidia. *Receptacle* formed at a tip of a single vein; *sori* roundish and punctual, marginal or submarginal, protected by a pseudo-indusium, or by the lamina margin not differentiated, or not protected; *pseudo-indusia* semilunate, of adaxial origin, formed by the revolute lamina margins, greenish to hyaline, the margins smooth, wavy, crenate, dentete, to ciliate, absent in a some species; *cilia* catenate-acicular or catenate-glandular; *spores* bilateral, monolete. *n* = 28, 29, (39?), 52, 98, 104.

Hypolepis Bernh. (Dennstaedtiaceae) has priority over two later homonyms: *Hypolepis* P. Beauv. ex Lestib. (Essai Cipér.: 33. 1819 - Cyperaceae), and *Hypolepis* Pers. (Syn. Pl. (Persoon) 2: 598. 1807 [Sep 1807] - Raflesiaceae) – Farr *et al.* (1979).

The genus can be readily reconized by the rhizmomes long-creeping, branched, and bearing several fronds, the laminae usually highly dissected, the indument formed solely by hairs and trichomidia (the hairs normally catenate and multicellular), the receptacle formed at a tip of a single vein, the sori roundish and puncual and the pseudo-indusia formed by the lamina margins revolute, or absent.

Key to the South-American species of Hypolepis, *including Cocos Island (infra-specific taxa treated under each species):*

1. Petioles and rachises aculeate (sometimes aculeate and tuberculate)

    2. Fronds with interrupted growth; aculei black and curved; laminae distally uncoiled; proximal acroscopic pinnule next to the rachis and protecting the pinnae departures; costae adaxially with wings decurrent onto the costules ………………………………………………………………………………...... 12. *H. nigrescens*

2. Fronds with continuous growth; aculei of the same color of the axis, and straight; laminae distally pinnatisect; proximal acroscopic pinnule away from the rachis, and not protecting the pinnae departures; costae without adaxial decurrent wings

3. Laminar tissue between the veins abaxially glabrous

4. Fronds smaller than 1.5 m long, and furnished with both catenate-acicular and catenate-glandular hairs; petioles proximally black

5. Petioles glabrous; rachises abaxially glabrous, adaxially with hairs 0.1–0.3 mm long, 2–5(–6)-celled; veins abaxially and adaxially with catenate-glandular hairs; plants from Continental South/Central Americas ……….. …... 7. *H. hostilis*

5. Petioles villous; rachises abaxially and adaxially with hairs 0.3–1.0 mm long, 5–12-celled; veins abaxially and adaxially glabrous; plants endemic to the Cocos Islands …... 9. *H. lellingeri*

4. Fronds bigger than 2.0 m long, and furnished with catenate-acicular hairs and/or trichomidia (catenate-glandular hairs absent); petioles proximally brown or wine red

6. Costae, costules and veins abaxially with catenate-acicular hairs (each hair cell ca. 0.1 mm long)

7. Petioles proximally dark brown, lighter brown above; petioles and rachises copiously aculeate, non-tuberculeate; laminae chartaceous; margins of the pseudo-indusia glabrous; plants wide spread ………….. ……………………………………………………....... 20. *H. repens*

7. Petioles proximally wine red, greenish stramineous above; petioles and rachises sparsely aculeate and tuberculate; laminae membranaceous; margins of the pseudo-indusia commonly with one or two cilia, rarely with none or more; plants endemic to SE Brazil …...…… 11. *H. mitis*

6. Costae, costules and veins abaxially with trichomidia (each hair cell ca. 0.05 mm long)

8. Laminae rhombic, drying black; pseudo-indusia entirely black, or partly black and partly hyaline, membranaceous ……………………… .... 10. *H. melanochlaena*

8. Laminae oblong, drying olive green; pseudo-indusia entirely stramineous, chartaceous .... 15. *H. parallelogramma*

3. Laminar tissue between the veins abaxially with hairs or trichomidia

9. Fronds smaller than 1.5 m long; laminar tissue between the veins abaxially with short catenate-glandular hairs

10. Petioles, rachises, and costae with two kinds of hair: catenate-acicular and catenate-glandular, both hyaline with the base and cross-walls reddish, lax, and no longer than 0.1–0.5 mm long, 4–7(–8)-celled; plants from Continental South/Central Americas ………………..….. …………………………………………………..…...…. 21. *H. rigescens*

10. Petioles, rachises, and costae with three kinds of hair: two of them similar than the ones above, and a third kind, hyaline with the base, cross-walls and the apex (two/three last cells) reddish, or entirely reddish, rigid, 0.5–1(–1.3) mm long, 7–10(–15)-celled; plants endemic to the Galapagos Islands .... 5. *H. galapagensis*

9. Fronds bigger than 2.0 m long; laminar tissue between the veins abaxially with catenate-acicular hairs, acicular hairs, or trichomidia

11. Laminar tissue between the veins abaxially with trichomidia (each hair cell ca. 0.05 mm long); pseudo-indusia chartaceous, the margins smooth or dentate, glabrous; plants endemic to Bolivia ……..…. 23. *H. scandens*

11. Laminar tissue between the veins abaxially with catenate-acicular or acicular hairs (each hair cell ca. 0.1 mm long); pseudo-indusia membranaceous, the margins usually ciliate; plants from Peru northwards, or from S/SE/NE Brazil

12. Petioles and rachises sparsely aculeate and tuberculate; laminar tissue between the veins abaxially strigose, the hairs sparse, catenate acicular, and decumbent .... 11. *H. mitis*

12. Petioles and rachises copiously aculeate; laminar tissue between the veins abaxially hirsute, the hairs conspicuous, acicular, and erect

13. Fronds furnished with three kinds of hair: catenate-acicular, acicular, and catenate-glandular; pseudo-indusia copiously ciliate; plants from western South, Central and North Americas (from Peru northwards to Mexico, and Jamaica) ……………….. .... 25. *H. stuebelii*

13. Fronds furnished with two kinds of hair: catenate-acicular and acicular (the catenate-glandular lacking); pseudo-indusia mostly wavy, generally glabrous, rarely with one or two cilia; plants from eastern South America (endemic to S/SE/NE Brazil) …….. .... 1. *H. acantha*

1. Petioles and rachises inermous (sometimes tuberculate, but non-aculeate)

14. Hairs of the rhizomes 0.3–0.6(–1) mm long, 6–12(–15)-celled; fronds with interrupted growth; laminae pseudo-dichotomus, distally always uncoiled ……… .... 4. *H. flexuosa*

14. Hairs of the rhizomes 1–3(–4) mm long, 10–30(–35)-celled; fronds with continuous growth; laminae bilateral (rombic, ovate, lanceolate, etc.), distally pinnatisect

15. Sori submarginal; pseudo-indusia absent (sometimes the lamina margins revolute and protecting the sori, but not differentiated into a pseudo-indusia)

16. Fronds furnished with sparse catenate-acicular hairs and conspicuous bacilliform trichomidia; petioles sparsely tuberculate, otherwise smooth; plants from northern South America and Central America (Venezuela up to Costa Rica, and Jamaica and Haiti) .... 13. *H. nuda*

16. Fronds furnished with catenate-acicular and catenate-glandular hairs; petioles and rachises non-tuberculate, copiously rugose; plants from southern South America (Argentina, Chile, Bolivia, and S/SE Brazil)

17. Petioles entirely atropupureous; rachises proximally atropurpureous; proximal pinnae equilateral; veins abaxially and adaxially with hairs; lamina margins with both catenate-acicular and catenate-glandular hairs throughout; plants from C/S Argentina and Chile (including Chiloé and Juan Fernandez), and S/SE Brazil ……………………........ 22. *H. rugosula*

17. Petioles proximally dark brown, lighter above; rachises proximally light brown; proximal pinnae slightly inequilateral; veins abaxially and adaxially glabrous; lamina margins glabrous or with catenate-acicular hairs restricted to the soral region; plants from Bolivia, and N/C Argentina and Chile .... 18. *H. poeppigii*

15. Sori usually marginal (submarginal only in *H. obtusata* and *H. nuda*); pseudo-indusia developed (sometimes not protecting the whole sori, but the lamina margins always differentiated into thinner flaps)

18. Fronds lanose, furnished only with long catenate-acicular hairs, lax, (0.7–)1–3 mm long, (10–)15–35-celled, especially abaxially on the costae and costules; plants occurring in altitudes higher than 3400 m elev.

19. Laminae proximally pinnate-pinnatisect with the segments pinnatifid to pinnate-bipinnatisect; proximal pinnae (1.5–)2.5–4.5(–5.5) x (0.8–)1.2–2(–2.8) cm .... 14. *H. obtusata*

19. Laminae proximally bipinnate-pinatissect with the segments pinnatifid to bipinnate-bipinnatisect; proximal pinnae 6–20 x 3–12 cm

20. Laminae linear-lanceolate; proximal pinnae 6–15 x 3–7 cm; rachises, costae and costules abaxially with catenate-acicular hairs 0.7–1 mm long, 10–15-celled; plants endemic to Ecuador …..…….. 3. *H. crassa*

20. Laminae ovate; proximal pinnae 15–20 x 5–12 cm; rachises, costae and costules abaxially with catenate-acicular hairs 1–2(–3) mm long,

15–25(–35)-celled; plants more spread in the Andes (Colombia, Ecuador, and Peru) .... 19. *H. pteroides*

18. Fronds glabrescent, pilose, villous, and/or with trichomidia, the hairs not longer than 1.5 mm long, 15(–17)-celled; plants occurring in altitudes lower than 3100 m

21. Laminar tissue between the veins abaxially glabrous

22. Fronds furnished with only catenate-acicular hairs; proximal pinnae strongly inequilateral (the basiscopic pinnules more dissected) .... 24. *H. stolonifera*

22. Fronds furnished with catenate-acicular and catenate-glandular hairs; proximal pinnae slightly inequilateral (acroscopic and basicopic pinnules equally dissected)

23. Petioles and rachises sparsely tuberculate; costules and laminar tissue between the veins adaxially with trichomidia (each hair cell ca. 0.05 mm long); plants endemic to Mount Roraima …................. .... 8. *H. krameri*

23. Petioles non-tuberculate; costules adaxially with catenate-acicular hairs (each hair cell ca. 0.1 mm long); laminar tissue between the veins adaxially glabrous; plants endemic to SE Brazil …………….. .... 16. *H. paulistana*

21. Laminar tissue between the veins abaxially with hairs or trichomidia

24. Laminar tissue between the veins abaxially with trichomidia (each hair cell ca. 0.05 mm long)

25. Fronds furnished with catenate-acicular hairs (hyaline with the base and cross-walls reddish, 0.3–0.7 mm long, 7–10-celled) and filiform trichomidia (entirely reddish, 0.2–0.3(–0.5) mm long, 5–10-celled); petioles non-tuberculate, sparsely rugose; proximal pinnae 9–18 x 3–10 cm, slightly inequilateral; plants endemic to the Bogota Cordillera (in Colombia) ....…….. 2. *H. bogotensis*

25. Fronds furnished with only baciliform trichomidia (entirely yellowish or reddish, 0.07–0.2(–0.3) mm long, 1–3(–4)-celled); petioles tuberculate, otherwise smooth; proximal pinnae 20–45(–65?) x 10–30 cm, strongly inequilateral; plants from Central and northern South Americas (Jamaica, Hispaniola, Costa Rica, Panama, Colombia, and Venezuela) .... 13. *H. nuda*

24. Laminar tissue between the veins abaxially with acicular, or short catenate-glandular hairs (each hair cell ca. 0.1 mm long)

26. Petioles tuberculate; laminar tissue between the veins abaxially hirsute, the hairs acicular .... 17. *H. pedropaloensis*

26. Petioles non-tuberculate; laminar tissue between the veins abaxially with catenate-glandular hairs

27. Laminar tissue between the veins adaxially glabrous; lamina margins glabrous .... 6. *H. guianensis*

27. Laminar tissue between the veins adaxially with hairs; lamina margins with hairs

28. Rachises and costae with catenate-acicular hairs 1–1.2 mm long, 13–17-celled; costules, veins and lamina margins with only catenate-glandular hairs; laminar tissue between veins adaxially with catenate-glandular hairs; plants from northern Colombia and Venezuela, and Hispaniola ....…….. .... 27. *H. viscosa*

28. Rachises and costae with catenate-acicular hairs 0.2–0.5(–1) mm long, 4–7(–15)-celled; costules, veins and laminar margins with both catenate-acicular and catenate-glandular hairs; laminar tissue between veins adaxially with catenate-acicular hairs; plants endemic to Mount Roraima …………. .... 26. *H. trinationalis*

The South American species, sub-species, and varieties (incl. Cocos Island)

1. ***Hypolepis acantha*** Schwartsb., *sp. nov. ined.,* submitted to the Kew Bull. **Type:** Brasil, Paraná, Antonina, Reserva Rio Cachoeira (SPVS), Floresta Ombrófila Densa, [25º18'S, 48º41'W], 100 m, 26/VI/2007, *P.B. Schwartsburd & F.B. Matos* 1344 (holotype: SP!-on 4 sheets; isotypes: B!-on 3 sheets, FI!-on 2 sheets, G!-on 3 sheets, K!-on 3 sheets, NY!-on 4 sheets, P!-on 3 sheets, PRC!-on 3 sheets, RB!-on 3 sheets, UPCB!-on 3 sheets). **Figs. 4A–H , 6A–C, Map 10A.**

Plants terrestrial. *Rhizomes* 3.5–7 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, 1–2 mm long, 15–20-celled. *Fronds* scandent, with continuous growth, (1.7–)3–6.5 m long; *petioles* (0.8–)1.5–4 m x (5–)6.5-10 mm, proximally dark brown, lighter above, with sparse trichomidia, aculeate, the *trichomidia* appressed, ca. 0.2 mm long, 4-celled, the *aculei* conspicuous, straight , (0.5–)1–2.5 mm long, commonly with a hair at the tip; *laminae* rhombic, proximally tripinnate-pinnatisect with segments pinnatifid, medially bipinnate-pinnatisect with segments pinnatifid, distally pinnatisect, (1.1–)1.7–2.5 x (1.1–)1.4–2.1 m; *rachises* straight, light brown to brown in all its length, the indument similar to the petioles, aculeate; *proximal pinnae* (55–)70–105 x (36–)40–60 cm, strongly inequilateral; *costae* abaxially and adaxially pilose, the *hairs* catenate-acicular, hyaline with the base and cross-walls reddish, 0.3–0.6(–0.8) mm long, 6–8(–12)-celled; *costules* abaxially pilose, adaxially sparsely pilose, the *hairs* similar to those from the costae but smaller, 0.2–0.4 mm long, 3–6-celled; *veins* abaxially pilose, the *hairs* similar to those from the costules, adaxially glabrous; *laminar tissue between the veins* abaxially hirsute, the *hairs* acicular, hyaline, erect, 0.1–0.15 mm long, 1–3-celled, adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, proximally greenish, distally hyaline, membranaceous in the hyaline portion, the *margins* wavy, rarely with one or two cilia, the *cilia* 0.15–0.2 mm long, 2 or 3-celled.

Distribution and ecology. Mostly in the coastal lowlands of S/SE/NE Brazil, in the "Restinga" forest ("white-sand forest") and low Atlantic Forest *s. str.*; from sea level up to 100 m; but also with a few records from the inland region, in middle-elevation Atlantic Forest, at ca. 1000 m – Map 10A.

Additional material examined: BRAZIL. BAHIA: Ilhéos [Ilhéus], [14°47’S, 39°02’W], s.d., *C. F. P. von Martius, Herb. Fl. Bras. 382* (BR-2 sheets); Ilhéus, [14°47’S, 39°02’W], 11/XII/1836(?), *B. Luschnath s.n.* (BR); id., 1833-1836, *J.S. Blanchet 2460* (B, G-4 collections [12 sheets], K [as “*Morichaud 2460*”], LE, NY-*n.v.*); ad flumen Moju, s.d., *Anonymous s.n.* (B [20 0074965]); ESPÍRITO SANTO: Linhares, Reserva Florestal de Linhares, Estrada do Louro, 19º05’58”S, 40º02’55”W, 30-60 m, 09/II/2007, *T.E. Almeida et al. 687* (BHCB); RIO DE JANEIRO: Parati [Paraty], Condomínio Laranjeiras, 23º19’44”S, 44º40’53”W, 31/I/1996, *A. Salino 2478* (UEC-on 2 sheets); Rio de Janeiro, Gavia [Gávea], [23°00’S, 43°17’W], s.d., *A. Glaziou 5328* (B-2 sheets, K-3 sheets [one *p.p.*]); Sumaré, [21°45’S, 41°20’W], XI/1928, *A.C. Brade 8596* (HB); Serra da Carioca, 28/XI/1928, *A.C. Brade s.n., ex R 18517* (BM-on 3 sheets, G, NY-*n.v.*); Locality unknown, s.d., *G.H. von Langsdorff s.n.* (L); Locality unknown [Bahia, Ilhéus?], s.d., *C. F. P. von Martius s.n.* (B-2 sheets [20 0074964 et ?]); Locality unknown [Bahia, Ilhéus?], s.d., *C. F. P. von Martius s.n.* (FI-W); id., 1867(?), *A. Glaziou 2154* (B, BR-on 2 sheets, K); SÃO PAULO: SÃO PAULO: Santo André, Parque Natural Municipal Nascentes de Paranapiacaba, [-23.7684°, -46.2895°], 1000 m, 25/IX/2009, *P.B. Schwartsburd et al. 2264* (SP); Bertioga, Praia de São Lourenço, Fazenda da Família Pinto, 23.27ºS, 43.00ºW [23.820216°S, 46.041931°W], 26/II/2008, *J. Prado et al. 1966* (NY-*n.v.* [on 2 sheets], SP, TUR-*n.v.*); Iguape, Pinduva, [24°42’S, 47°35’W], III/1924, *A.C. Brade 8273* (HB-on 2 sheets); Ubatuba, Parque Estadual da Serra do Mar, Núcleo Picinguaba, [23º20’26”S, 44º50’13”W], 09/XI/1993, *A. Salino 1844* (BHCB); Ubatuba, Parque Estadual da Serra do Mar, 23º20’26”S, 44º50’13”W, 0–40 m, 04/V/2001, *A. Salino et al. 6739* (BHCB); PARANÁ: Antonina, Reserva Natural do Rio Cachoeira, Trilha dos Pinheiros, 25º18’S, 48º41’W, 30 m, 30/IV/2006, *F.B. Matos & G. Weiss 1123* (SP, UPCB); RIO GRANDE DO SUL: Pelotas, [31°47’S, 52°25’W], 11/III/1956, *A.R.H. Schultz 3648* (ICN); STATE UNKNOWN: Locality unknown, 1841, *L. Duparquier s.n.* (BM-*p.p.* [labelled “A” by Schwartsburd]); Locality unknown, s.d., *W.J. Burchell 1914* (K); Locality unknown, s.d., *W.J. Burchell 1916* (K). **COUNTRY UNKNOWN [probably BRAZIL].** Locality unknown, *Anonymous s.n.* (BM).

Juvenile specimens: SÃO PAULO: Santo André, Parque Natural Municipal Nascentes de Paranapiacaba, 26/IX/2009, *P.B. Schwartsburd et al. 2279* (SP).

Among the aculeate *taxa* of *Hypolepis* from S/SE/NE Brazil, *H. acantha* is the unique species with the laminar tissue between the veins abaxially hirsute (Fig. 6C). Such hairs are conspicuous, acicular, short, 0.1–0.15 mm long, and erect. The other aculeate taxa are: *H. repens*, which has this region glabrous (Figs. 11D, E); *H. mitis*, which has this region glabrescent or sparsely strigose (the hairs are sparse, catenate-acicular, decumbent, and longer, 0.2–0.3 mm long; Figs. 8C–E); and *H. rigescens*, which has sparse short catenate-glandular hairs on this region (Fig. 9B). *Hypolepis acantha* also differs from *H. mitis* by the petioles and rachises copiously aculeate and non-tuberculate (*vs.* sparsely aculeate and tuberculate), light brown to brown (*vs.* greenish stramineous), the aculei (0.5–)1–2.5 mm long (*vs.* 0.2–1.0(–1.5) mm long), the lamina chartaceous (*vs.* membranaceous), and the veins abaxially yellowish green and raised (*vs.* black and immersed) – Fig. 6B *vs.* Fig. 8B.

Morphologically, especially regarding the laminar tissue between the veins abaxially hirsute, the species most similar to *Hypolepis acantha* are *H. stuebelii* Hieron., which occurs in Peru (*apud* Tryon & Stolze 1989 – no material seen), Ecuador, Colombia, Venezuela, Panama (*apud* Moran 1995), Costa Rica (*apud* Moran *loc. cit.*), Hispaniola, and Jamaica, and *H. pedropaloensis,* an endemic species from Colombia. Besides the geographic distribution, *H. acantha* differs from *H. stuebelli* by the absence of catenate-glandular hairs (*vs.* present throughout all axis), and by the margins of the pseudo-indusia mostly wavy, rarely with one or two cilia (*vs.* copiously ciliate; Fig. 6C *vs.* Figs. 15G, H). For further differentiation with *H. pedropaloensis,* see its discussion.

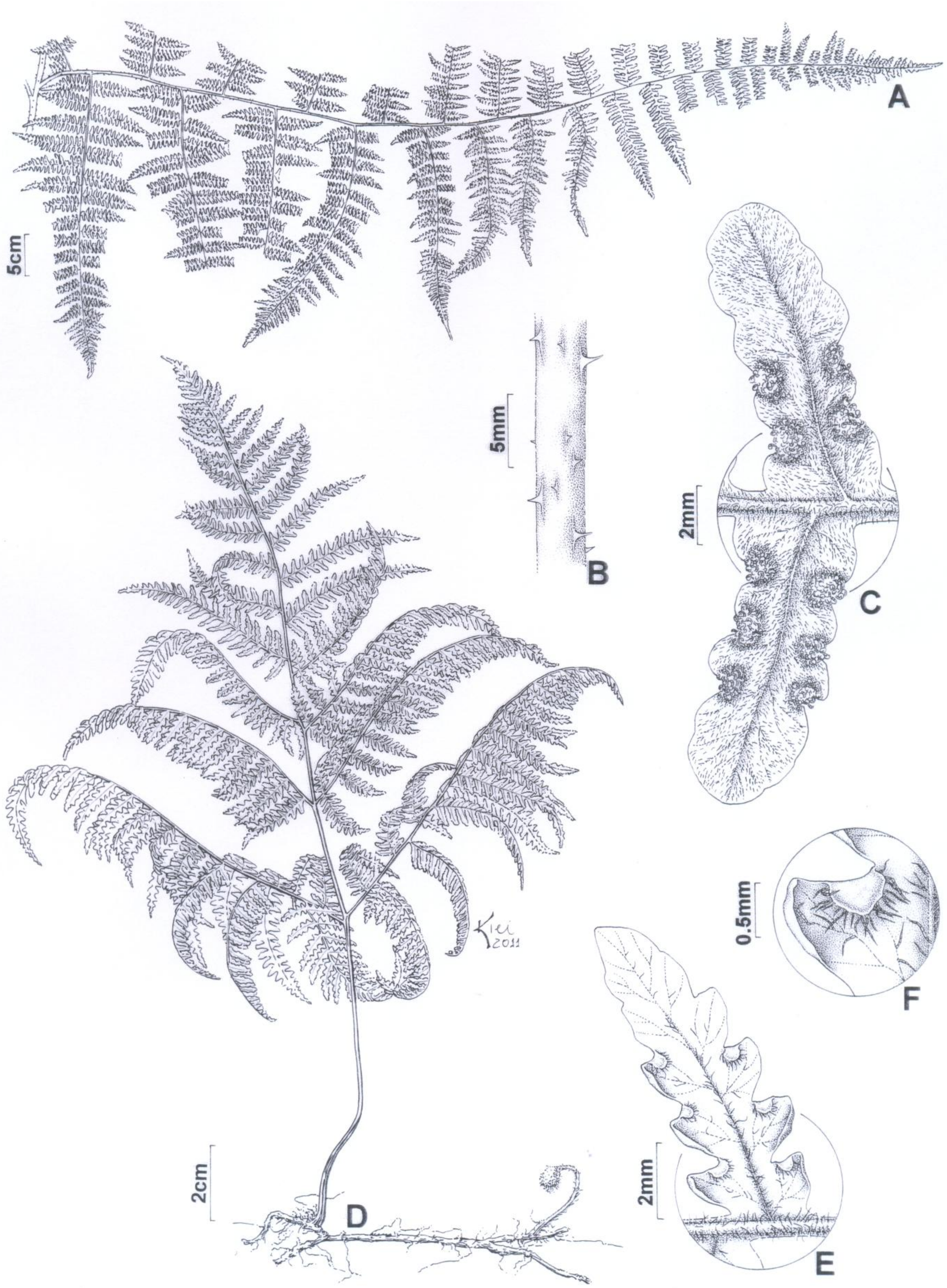
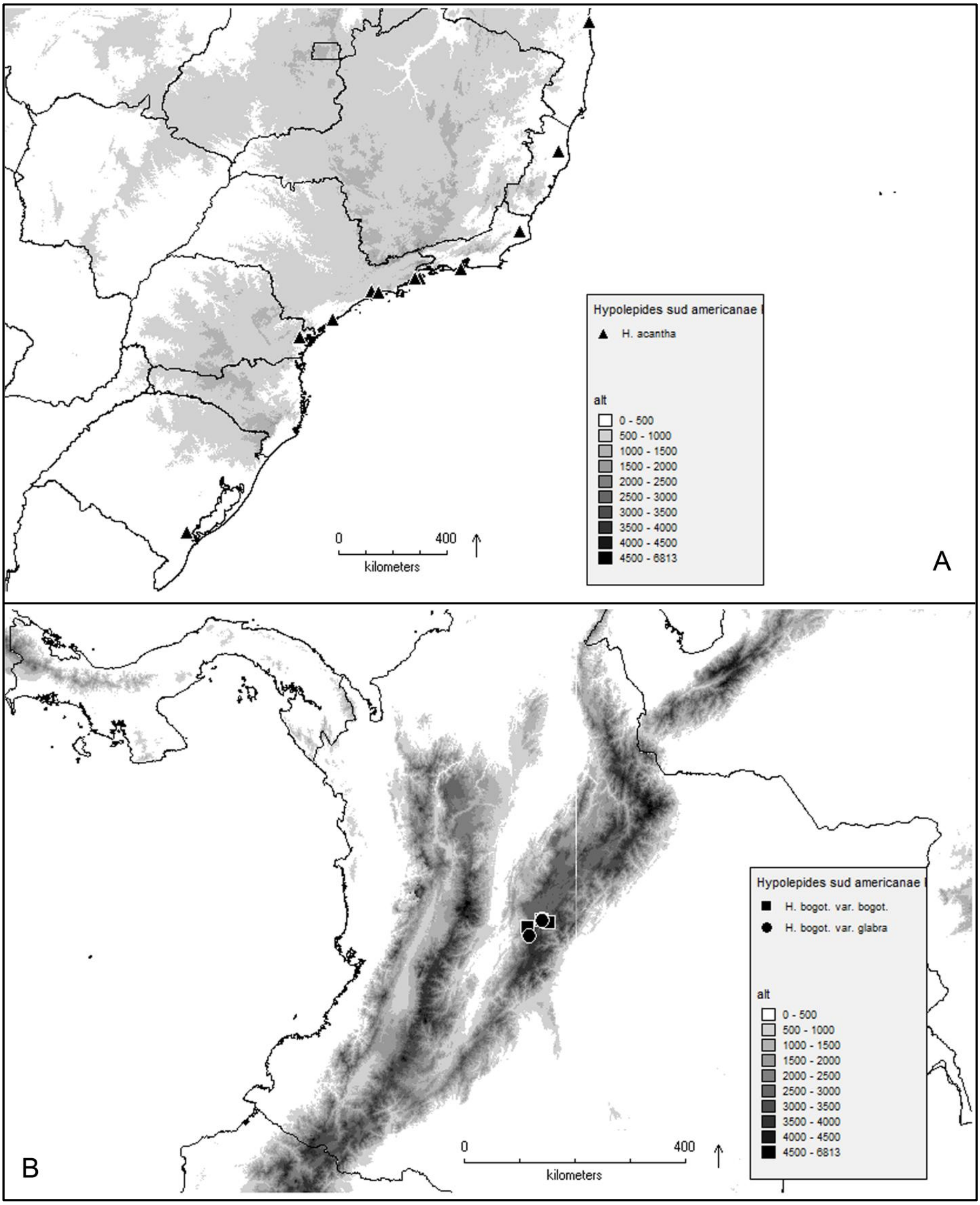


Fig. 6 **A–C** *Hypolepis acantha* (*Schwartsburd 1344*): **A** proximal pinna, **B** rachis, **C** segments abaxially; **D**–**F** *Hypolepis stolonifera* var. *nebularis:* **D** habit of a small frond (*Labiak 4433*), **E** segment abaxially (*Schwartsburd 2309*), **F** detail of the pseudo-indusium abaxially (*Schwartsburd 2309*).



Map 10 A distribution of *Hypolepis acantha;* **B** distribution of *Hypolepis bogotensis* var. *bogotensis* and *Hypolepis bogotensis* var. *glabra.*

2. ***Hypolepis bogotensis*** H. Karst., Fl. Columb. 2: 91, t. 147, habit + figs. 1,2, 5. 1865. **Lectotype,** designated here: Fl. Columb. 2: t. 147, habit + figs. 1,2, 5!. 1865; **epitype,** designated here: [Colombia]. Bogotá, [04.5734°, -74.0652°], 2800 m, s.d., *A. Lindig 224* (B!-20 0074561-*p.p.* [ex Herb. Mettenius]; iso-epitypes: B!-frag. [20 0074561- *p.p;* ex Herb. Kuhn], BM!-*p.p.* [labelled "b" by A.R. Smith], K!-2 sheets, P?-*n.v.*). **Figs. 7H–J, Map 10B.**

Hypolepis bogotensis H. Karst. ex Mett. *in* Triana & Planch., Ann. Sci. Nat., Bot., ser. 5, 2: 238. 1864, *nom. nud.*

Plants terrestrial (or from the bases of rocks?). *Rhizomes* 2–3 mm diam., with hairs, the *hairs* catenate-acicular, reddish-brown, rigid, 1–2(–3) mm long, 15–30(–40)-celled. *Fronds* erect (var. *bogotensis*) or sub-scandent (var. *glabra*), with continuous growth, 40–90 cm long; *petioles* 15–50 cm x 2–4 mm, entirely light brown, abaxially glabrous, adaxially glabrescent or with scattered hairs restricted to the groove, inermous, sparsely rugose, the *hairs* catenate-acicular, hyaline with the base and cross-walls reddish, 0.3–0.7 mm long, 7–10-celled; *laminae* ovate (var. *bogotensis*) or broadly ovate (var. *glabra*), proximally pinnate-bipinnatisect with segments lobed (var. *bogotensis*), or bipinnate-pinnatisect with segments pinnatifid to bipinnate-bipinnatisect (var. *glabra*), medially pinnate-pinnatisect with segments pinnatifid (var. *bogotensis*) or bipinnate-pinnatisect with segments pinnatifid (var. *glabra*), distally pinnatisect, 25–50 x 18–32 cm (var. *bogotensis*), or 25–40 x 34–36 cm (var. *glabra*); *rachises* straight (var. *bogotensis*) or flexuous (var. *glabra*), proximally and medially light brown, distally stramineous, the indument pattern similar to the petioles, but the hairs more conspicuous in the groove, inermous, sparsely rugose; *proximal pinnae* 9–16 x 3–5 cm (var. *bogotensis*), or 17–18 x 8–10 cm (var. *glabra*), slightly inequilateral; *costae* abaxially glabrous or with scattered hairs, adaxially sparsely pilose, the *hairs* similar to those of the petioles and rachises; *costules* abaxially and adaxially with trichomidia, apressed, entirely reddish, 0.2–0.3(–0.5) mm long, 5–10-celled; *veins* with the same indument pattern that of the costules; *laminar tissue between the veins* with the same indument pattern that of the costules and veins, but the *trichomidia* conspicuous in var. *bogotensis* and scattered in var. *glabra; sori* marginal; *pseudo-indusia* inconspicuous, 1/3 green, 2/3 yellowish, chartaceous, glabrous or with trichomidia, the *margins* smooth, glabrous.

The name '*Hypolepis bogotensis*' has been misunderstood nearly for the last 50 years. Due to a false type in LE, Tryon (1964) assumed for this name the concept of *H. flexuosa* (inclusive, putting this name under the synonymy of that). Then, he has been followed by nearly everyone who studied the *Hypolepides* from the Andes up to Southern Mexico and Jamaica, for example: Smith (1981), Proctor (1985), Mickel & Beitel (1988 – comparing to *H. thysanochlaena* Mickel & Beitel), Smith & Todzia (1989), Tryon & Stolze (1989), Moran (1995), Navarrete (1999, 2008), Mickel & Smith (2004 – comparing to *H. thysanochlaena*), and Murilo-Pulido *et al.* (2008).

But, *Hypolepis bogotensis* is indeed an endemic species to the Bogota Cordillera, in Colombia (Cundinamarca and Distrito Capital). It is readily characterized by the fronds small (40-90 x 18-36 cm), with continuous growth, copiously furnished by trichomidia, and sparsely furnished by small catenate-acicular hairs (0.3-0.7 mm long, 7-10-celled), and the lamina ovate or broadly ovate, distally pinnatisect (Figs. 7H–J). On the other hand, *H. flexuosa* is readly characterized by the large fronds ((1–)2–4(–6?) x (0.6–)1–1.5(–3?) m), with interrupted growth (a somehow almost exclusive pattern), copiously lanate, furnished with long catenate-acicular hairs (0.3–1 mm, 6–15-celled), and the laminae pseudo-dichotomus, distally uncoiled (Figs. 7A–E).

The material at LE, labeled as "*Hypolepis Bogotensis* Krst., Bogota, 2900 m, *H. Karsten*" can not be considered as a type (neither holotype, nor lectotype inferentially chosen by Tryon 1964: 36). It strongly disagrees with the protologue and the illustration provided by Karsten (1862-1869), and it is not an original element. It is, in fact, a specimen of *H. flexuosa*. There has certainly been a mislabelling in some point of history.

The true type of *Hypolepis bogotensis* is now lost. It could not be found either in B, LE, nor W. There are only available the types of *H. bogotensis* var. "*β*" (at B and W-2 sheets), which is validly publish below as var. *glabra*. In the absence of any original material of *H. bogotensis* (var. *bogotensis*), its ilustartion is chosen as the lectotype; in addition, an epitype is designated (see above), which perfectly meets the protologue and the illustration, is from the same locality stated, and fits exactly in the differences between this and the var. *glabra*, pointed out by Karsten (1865).

Hypolepis bogotensis is not similar to any other species in South America. Its features cited above, allied to the following combinations of characters serves to distinguish it from all others: the fronds egalndular, the petioles and rachises inermous, the costules, veins and laminar tissue between the veins abaxially and adaxially furnished with trichomidia (Fig. 7I), and the pseudo-indusia chartaceous. For a further differentiation with *H. krameri,* see its discussion.

Following, complementing, and validing the concept of Karsten (1862-1869), *Hypolepis bogotensis* can be split into two co-occurrent varieties.

Key to the varieties:

1. Fronds erect; laminae ovate, proximally pinnate-bipinnatisect with segments lobed; rachises straight; proximal pinnae 9-16 x 3-5 cm; laminar tissue between the veins abaxially and adaxially with conspicuous trichomidia .... 2a. *H. bogotensis* var. *bogotensis*

1. Fronds sub-scandent; laminae broadly ovate, proximally bipinnate-pinnatisect with segments pinnatifid to bipinnate-bipinnatisect; rachises flexuous; proximal pinnae 17-18 x 8-10 cm laminar tissue between the veins abaxially and adaxially with scattered trichomidia .... 2b. *H. bogotensis* var. *glabra*

2a. *Hypolepis bogotensis* H. Karst. var. ***bogotensis.* Figs. 7H, I, Map 10B.**

Distribution and ecology: Endemic to the Cordillera of Bogota, in Colombia (Cundinamarca and Distrito Capital), in wet forests of rocky mountains; from 2400 to 3000 m – Map 10B.

Additional material examined: NOVA GRANADA [COLOMBIA]. CUNDINAMARCA and DISTRITO CAPITAL: Below Alto de Cuchuco, 7 km Southwest of Sibate, [04.4577°, -74.3132°], 2600-2650 m, 19/X/1961, *R.M. Tryon & A.F. Tryon 6129* (GH-*n.v.,* K); Páramo de Coachí, al comenzar el descenso hacia el oriente, [04.5474°, -73.9589°], ca. 3000 m, 11/VII/1974, *C.E. Acosta-Arteaga et al. 579* (COL-*n.v.,* U).

2b. *Hypolepis bogotensis* H. Karst. var. ***glabra*** H. Karst. ex Schwartsb. & J. Prado, ***var. nov.*** Latin diagnosis, description and illustration in H. Karst., Fl. Colomb. 2: 91–92, t. 147, figs. 3, 4. 1865, sub *Hypolepis bogotensis* H. Karst "*variatio β*". **Type:** [Colombia]. Bogota, [04.5945°, -74.0603°], 2900 m, [26/III/1859?], *G.K.W.H. Karsten s.n.* (holotype: W! [as "*Hypolepis Bogotensis* Krst. var. *glabra,* Bogota, 2900 m, *H. Karsten*"]; isotypes: B!-20 0019935, W! [as "*Hypolepis Bogotensis* Krst. (var. *glabra*), Bogota, H. Karsten"]). **Fig. 7J, Map 10B.**

Distribution and ecology: Endemic to the Cordillera of Bogota, in Colombia (Cundinamarca and Distrito Capital), in wet forests of rocky mountains; from 2400 to 3000 m – Map 10B.

Additional material examined: NOVA GRANADA [COLOMBIA]. CUNDINAMARCA and DISTRITO CAPITAL: Prov. de Bogotá, La Peña, [04.5888°, -74.0658°], 2700 m, 1851-1857, *J. Triana s.n.* (FI, W); Nuñez, near Sumapaz, [04.3173°, -74.2904°], 2400 m, 11/VI/1952, *M. Køie 4681* (BM, C-*n.v.*).

Etimology: The infra-specific epithet had already been chosen by Karsten, since the sheets (types) are written this way; it reffers to the laminar tissue between the veins abaxially and adaxially with scattered trichomidia (*vs.* trichomidia conspicuous in var. *bogotensis*).

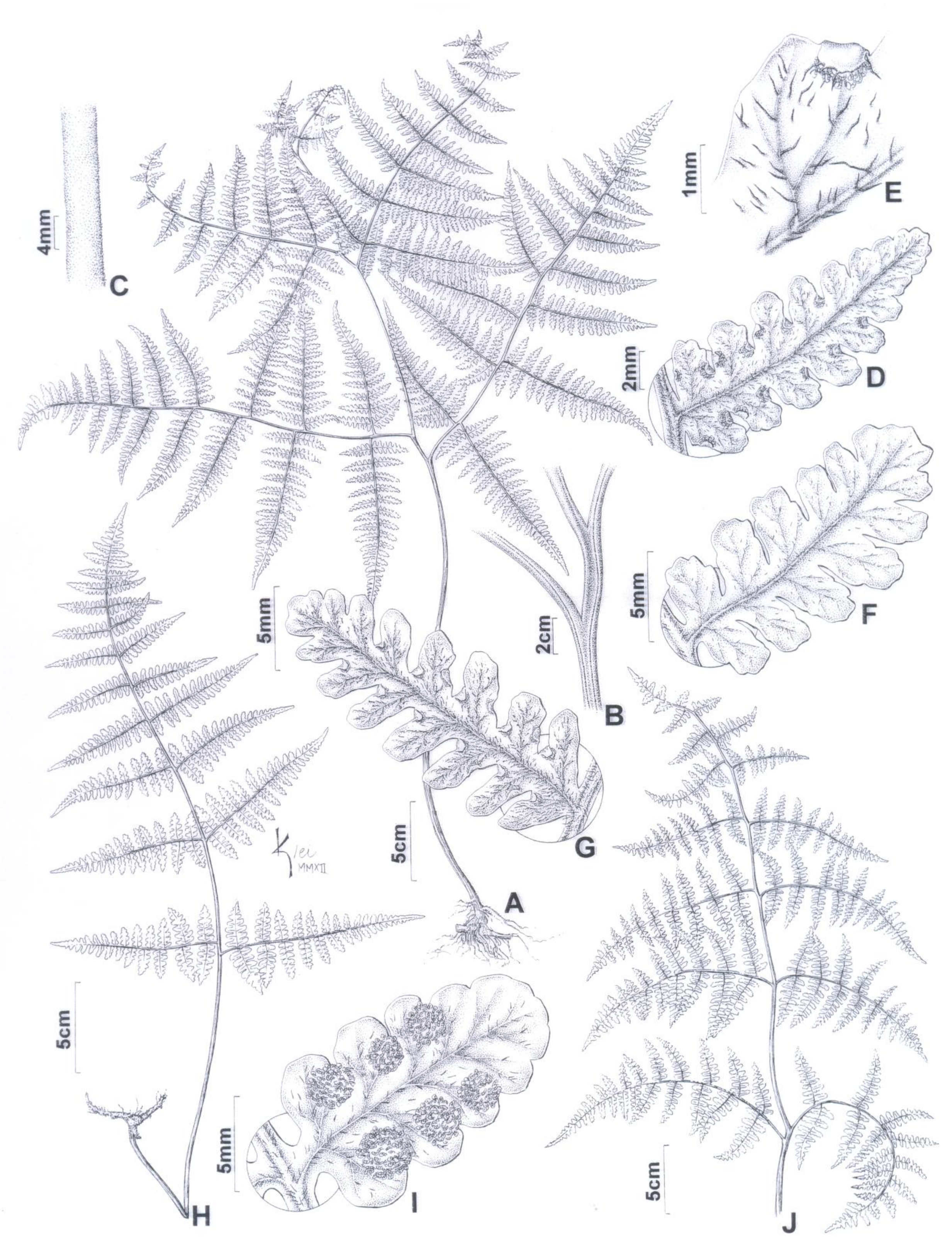


Fig. 7 A, B, D–G *Hypolepis flexuosa* var. *flexuosa:* **A** habit of a small frond (*Beck 1435*), **B** intersection petiole/rachis adaxially (*Kessler 6776*), **D** fertile secondary pinnule abaxially (*Beck 1435*), **E** detail of the pseudo-indusium abaxially (*Beck 1435*), **F** secondary pinnule abaxially (*Kessler 9331*), **G** fertile secondary pinnule abaxially (*Solomon 16418*); **C** *Hypolepis flexuosa* var. *zimmerae* (*Lehmann 4441*)*:* petiole; **H–I** *Hypolepis bogotensis* var. *bogotensis* (*Lindig 224*): **H** habit, **I** pinnule abaxially; **J** *Hypolepis bogotensis* var. *glabra* (*Karsten s.n.*): habit.

3. *Hypolepis crassa* Maxon, Contr. Gray Herb. 165: 69, pl. 4. 1947. **Type:** Ecuador, Imbabura Province, on headwaters of east fork of Río Desaguadero, northwest slopes of Cayambe, collected in dense chaparral, [00.0225°, -78.0479°], ca. 3840 m (12800 ft), 10/VII/1944, *I.L. Wiggins 10386* (holotype: US-1859521, *n.v.*, image!; isotype: DS-*n.v.*, image!). **Figs. 8J–L, Map 11A.**

Plants terrestrial. *Rhizomes* 2–5 mm diam., with hairs, the *hairs* not seen. *Fronds* erect, with continuous growth, 45–70 cm long; *petioles* ca. 20–35 cm x 2–3(–5?) mm, reddish-brown in all its length, glabrescent, inermous, rugose; *laminae* linear-lanceolate, proximally bipinnate-pinnatisect with segments pinnatfid, medially pinnate-bipinnatisect, distally pinnatisect, 30–40 x 12–22 cm; *rachises* mainly straight, but slightly flexuous distally, proximally and medially reddish-brown, distally stramineous, essentially glabrescent, but abaxially and adaxially with some hairs very scattered, inermous, rugose, the *hairs* catenate-acicular, lax, hyaline with the base and cross-walls reddish, 0.7–1 mm long, 10–15-celled; *proximal pinnae* ca. 6–15 x 3–7 cm, equilateral; *costae* abaxially sparsely lanose, adaxially with some hairs very scattered, the *hairs* similar to those from the rachises; *costules* abaxially sparsely lanose, adaxially glabrous, the hairs similar to those from the rachises and costae; *veins* with the same indument pattern that from the costules; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* not differentiated, entirely green, coriaceous, the *margins* crenate to dentate, glabrous.

Distribution and ecology: Endemic to Ecuador, known only in the Páramos and *Polylepis* Forest of Napo and Tungurahua; from 3800-3850 m – Map 11A.

Additional material examined: ECUADOR. NAPO: Road Quito-Baeza, 7-8 km NW of Laguna de Papallacta, Páramo de Guamaní, 00°19'S, 78°08'W, 3800 m, 20/VII/1976, *B. Øllgaard H. Balsev 8155* (AAU-*n.v.*, HB, K); TUNGURAHUA: Cordillera de los Llanganates, saddle between Río Topo and Río Verde Grande, on W slope of Cerro Hermoso, 2.4 km from the summit, 01°13'S, 78°18'W, 3850 m, 10/XI/1980, *L. Holm-Nielsen & J. Jaramillo 28361* (AAU-*n.v.*, K, QCA-*n.v.*, QNA-*n.v.*, U).

Hypolepis crassa is very similar to *H. obtusata*, and maybe should be treated as the same species. That really looks like a terrestrial/sheltered form of this. On the other hand, there are some slight differences that seem to be stable, and, in addition, the apparent “sheltered forms” of *H. obtusata* show a different pattern (see discussion of *H. obtusata*). Thus, both are regarded here as distinct. Further collections of *H. crassa* are needed to reveal its best identity.

Hypolepis crassa differs from *H. obtusata* by the laminae 12–22 cm wide (*vs.* (2–)3.5–11 cm), the pinnae patent (*vs.* slightly to strongly ascendant), the costae, costules and veins sparsely lanose (*vs.* copiously lanose), the hairs of these regions much smaller, 0.7–1 mm long, 10–15-celled (*vs.* (1–)2–3 mm, (10–)15–35-celled), the veins abaxially green and immersed (*vs.* brown and raised). In addition, the sori in *H. crassa* seem marginal, whereas in *H. obtusata* they seem submarginal – Figs. 8J–L *vs.* Figs. 13A–F.

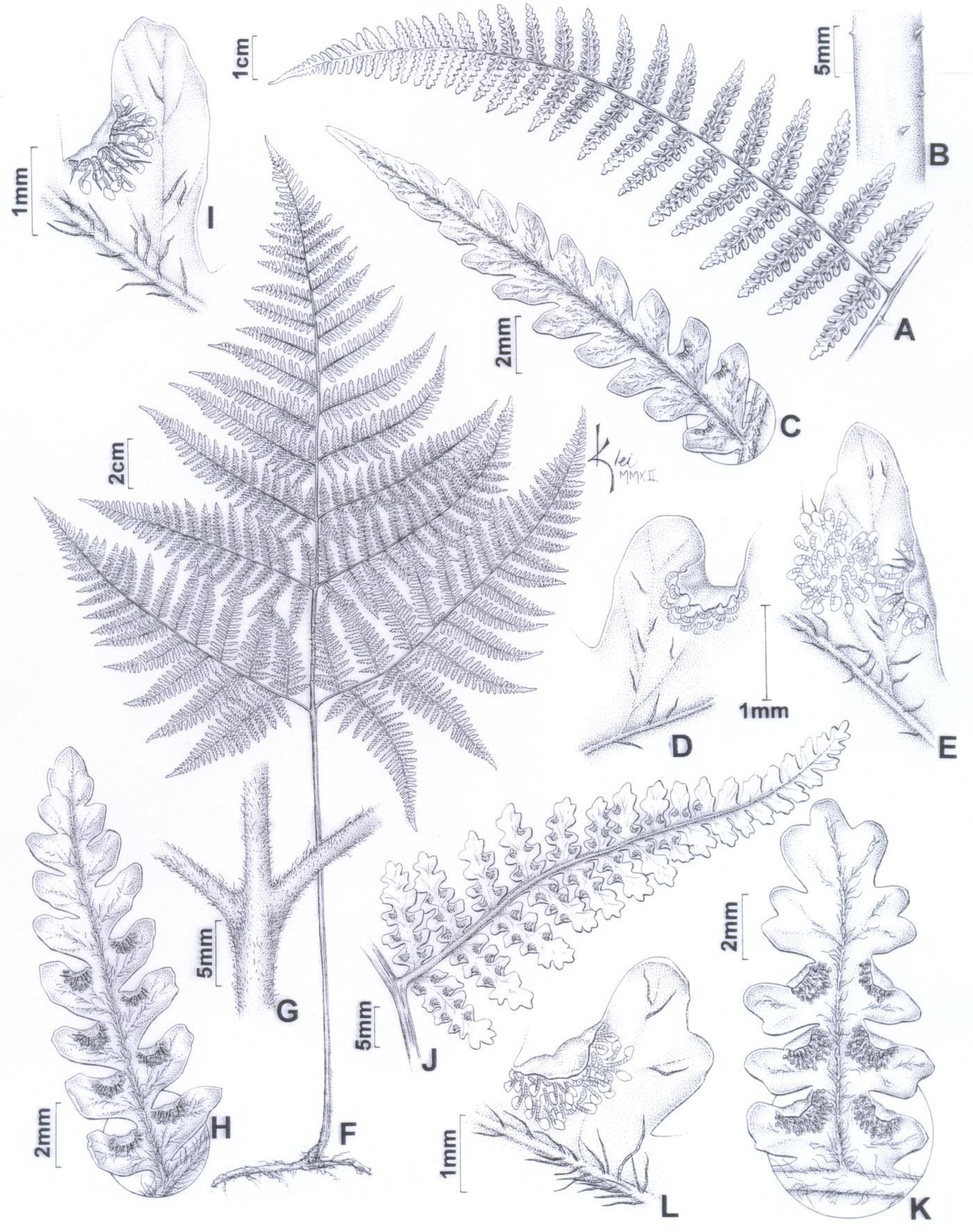
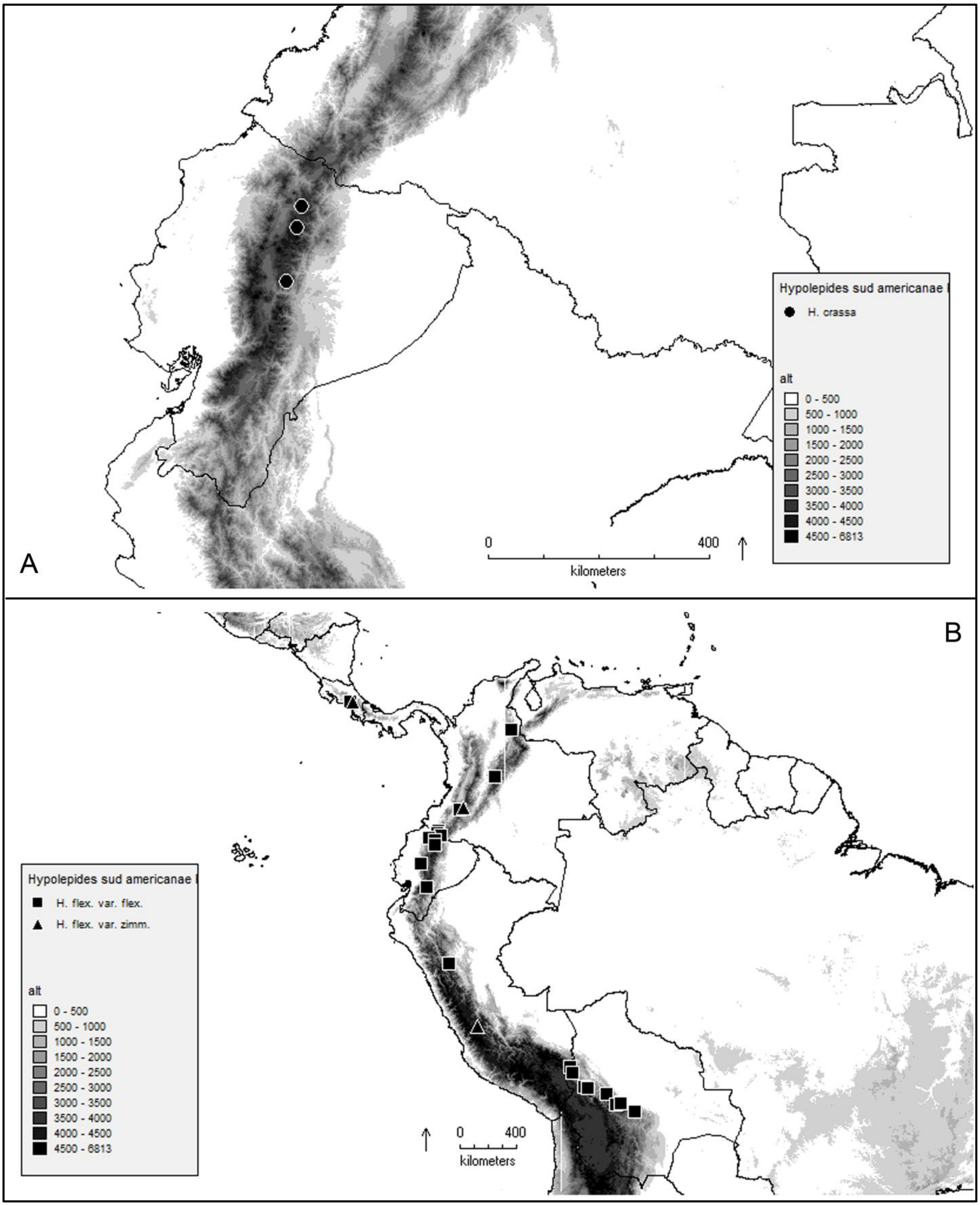


Fig. 8 A–E *Hypolepis mitis:* **A** pinnule (*Schwartsburd 2317*), **B** petiole (*Schwartsburd 2317*), **C** secondary pinnule abaxially (*Gardner 199*), **D** detail of the pseudo-indusium abaxially (*Schwartsburd 2317*), **E** detail of the pseudo-indusium abaxially (*Schwartsburd 2317*); **F–I** *Hypolepis paulistana* (*Schwartsburd 2298*): **F** habit, **G** intersection petiole/rachis, **H** secondary pinnule abaxially, **I** detail of the pseudo-indusium abaxially; **J–L** *Hypolepis crassa* (*Øllgaard 8155*): **J** pinna, **K** pinnule abaxially, **L** detail of the pseudo-indusium abaxially.



Map 11 A distribution of *Hypolepis crassa;* **B** distribution of *Hypolepis flexuosa* var. *flexuosa* and *Hypolepis flexuosa* var. *zimmerae.*

4. *Hypolepis flexuosa* Sodiro, Crypt. Vasc. Quit.: 634. 1893. **Lectotype**, designated by Tryon (1964: 36 – first step), and here (second step): [Ecuador], crece en las pendientes occidentales del volcán el Corazón [crescit in silv. suband. vulc. Corazón], [-01.2016°, -79.0347°], á 2900 m [2800-3000 m], [X/1891], *A.L. Sodiro s.n.* (P-00633382, *n.v.*, image!; isolectotypes: G!-on 2 sheets [00048254], P-00633383, *n.v.*, image!, SI-006396, *n.v.*, image!, SI-006397, *n.v.*, image!). **Figs. 7A–G, Map 11B.**

Hypolepis repens (L.) C. Presl var. *inermis* Hook., Sp. Fil. 2: 64. 1852 (as "*β.* ? *inermis*"). *Hypolepis inermis* (Hook.) H. Christ, Bull. Herb. Boissier, ser. 2, 4(11): 1095. 1904. Lectotype, designated here: New Grenada, [1844 or 1846?], *W. Purdie s.n.* (K [labeled as "Holotype" by Schwartsburd]; isolectotypes: BM [ex Herb. J. Smith], K).

Plants terrestrial. *Rhizomes* 4–10 mm diam., with hairs, the *hairs* catenate-acicular, yellowish brown, lax, 0.3–0.6(–1) mm long, 6–12(–15)-celled. *Fronds* scandent, with interrupted growth, (1–)2–4(–6?) m long; *petioles* (0.5–)1–2(–3) m x (4–)7–12(–15) mm, proximally dark wine red, light reddish-brown above, commonly abaxially glabrescent, and adaxially glabrescent with sparse hairs restricted to the groove, or rarely abaxially and adaxially copiously lanose (in var. *zimmerae*), inermous, rugose, the *hairs* catenate-acicular, hyaline with the base and cross-walls reddish, or entirely yellowish, lax, 0.2–0.4 mm long, 4–8-celled; *laminae* pseudo-dichotomous, proximally bipinnate-bipinnatisect with the segments pinnatifid to tripinnate-pinnatisect with the segments pinnatifid, medially bipinnate-bipinnatisect with the segments pinnatifid, distally always uncoiled, (0.5–)1–2(–3?) x (0.6)1–1.5(–3?) m; *rachises* strongly flexuous, proximally light reddish-brown, stramineous above, the indument pattern similar to the petioles, inermous, rugose; *proximal pinnae* (30–)50–70(–150?) x (20–)40–60(–70) cm, strongly inequilateral; *costae* abaxially moderately to copiously lanose, adaxially moderately lanose, with two kinds of hairs, the *first kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, or entirely yellowish, rarely entirely hyaline, lax, 0.3–1 mm, 6–15-celled, much more conspicuous, the *second kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, lax, 0.2–0.3 mm, 4–6-celled, very scattered, and often absent; *costules* abaxially sparsely to copiously lanose, adaxially with scattered hairs, the *hairs* similar to those from the costae, both kinds, but the *first kind* commonly entirely hyaline, the *second kind* very scattered to absent; *veins* abaxially sparsely to copiously lanose, adaxially essentially glabrous, sometimes with scattered hairs, the *hairs* (both kinds) similar to those from the costules, the *first kind* usually smaller, 0.2–0.4 mm long, 4–8-celled; *laminar tissue between the veins* abaxially glabrous, or sparsely to copiously lanose, adaxially glabrous, the *hairs* only of the *first kind,* similar to those from the veins; *lamina margins* essentially glabrous, rarely with a few scattered hairs, the *hairs* only the of the *first kind,* similar to those from the veins and the lamina margins between the veins; *sori* marginal; *pseudo-indusia* conspicuous, 2/3 green, 1/3 hyaline, chartaceous, the *margins* crenate, dentate, or sometimes with one or two cilia, rarely more, the *cilia* 0.2–0.4 mm long, 4–8-celled.

Hypolepis flexuosa has often been considered as a synonym of *H. bogotensis,* due to Tryon's (1964) interpretation upon a 'false type' in LE. But, both species are completely different. In most works (*e.g.* Smith 1981, Proctor 1985, Mickel & Beitel 1988, Smith & Todzia 1989, Tryon & Stolze 1989, Moran 1995, Navarrete 1999, 2008, Mickel & Smith 2004, and Murilo-Pulido *et al.* 2008), the plants named as *H. bogotensis* are better classified as *H. flexuosa* – see further discussion of *H. bogotensis.*

Hypolepis flexuosa is not similar to any South American species, possessing some exclusive characters, as follows: the hairs of the rhizomes 0.3–0.6(–1) mm long, 6–12(–15)-celled, the fronds with interrupted growth (somehow similar to *H. nigrescens,* but in a different way), and the laminae pseudo-dichotomous – Figs. 7A, B. Additionally, *H. flexuosa* has fronds (1–)2–4(–6?) x (0.6)1–1.5(–3?) m, the laminae distally always uncoiled (Fig. 7A), the costae and costules abaxially with lax catenate-acicular hairs, 0.3–1 mm, 6–15-celled (Fig. 7E), and the pseudo-indusia conspicuous, 2/3 green, 1/3 hyaline, chartaceous.

Hypolepis flexuosa may represent a species-complex, with some populations of alloploidy origin, and/or hybrids, especially because the populations live somehow isolated from each other, in very severe habitats (*e.g.* Andes, Páramos), usually above 3000 m – see also the comments of Moran (1995: 156) and Mickel & Smith (2004: 353) under *H. thysanochlaena* J. Mickel & Beitel, regarding cytology. But, apparently, within the populations, the plants are indeed very variable, especially regarding the thickness of the lamina and indument patterns. The indument is variable within the same frond: while the proximal pinnae commonly tend to be glabrescent (veins, laminar tissue between the veins, abaxially), the distal pinnae tend to be copiously lanose by lax catenate-acicular hairs (sometimes the laminar tissue between the veins is abaxially totally covered, and not visible). The catenate-glandular hairs are also intriguing: in the majority of the material examined, they are absent; and in a few, they are usually very scattered – see Figs. 7D–G. But, such differences could not be plotted upon geographical distributions. It seems that both kinds of hair are deciduous, probably due to age, season of the year, etc. Thus, the indument pattern, which is a very secure diagnostic character for nearly 90% of species of *Hypolepis,* must be carefully analyzed in *H. flexuosa.*

Another two "species" probably also belonging to this complex are *Hypolepis muenchii* (H. Christ) J. Mickel, and *H. thysanochlaena* (also possibly *H. trichochlaena* J. Mickel & Beitel) – types not seen, neither consistent materials. According to Mickel & Smith (2004) they differ from *H. flexuosa* (as "*H. bogotensis*"), respectively by the width of the pseudo-indusia (0.5–0.8 *vs.* 0.1–0.3 mm), and the margins (copiously ciliate *vs.* mostly crenate or dentate, rarely with one or two cilia).

Key to the varieties:

1. Petioles and rachises glabrescent .... 4a. *H. flexuosa* var. *flexuosa*

1. Petioles and rachises copiously lanose, fully covered by lax catenate-acicular hairs .... 4b. *H. flexuosa* var. *zimmerae*

4a. *Hypolepis flexuosa* Sodiro var. ***flexuosa.* Figs. 7A, B, D–G, Map 11B.**

Distribution and ecology: Jamaica (no material seen; *apud* Proctor 1985, and Moran 1995, as "*H. bogotensis*"), El Salvador (*apud* Moran *l.c.*), Honduras (*apud* Moran *l.c.*) Costa Rica, Panama (*apud* Moran *l.c.*), Venezuela? (*apud* Moran *l.c.*), Colombia, Ecuador, Peru, and Bolivia; from (2000–)2500 to 4050 m – Map 11B.

Additional material examined: COSTA RICA. SAN JOSE: Cordillera de Talamanca, lungo la strada tra Cartago e Cerro de la Muerte, Paramos di Cerro de la Muerte, 19/V/1955, *R.E.G. Pichi-Sermolli 4791* (FI-PS); Cerro de La Muerte, Páramo Buena Vista, 1-3 km S of Interamerican Highway, [09.5667°, -83.7497°], 3350 m, 09/VIII/1967, *J.T. Mickel 3248* (FI-PS); CARTAGO: Interamerican Highway, slope below Hotel La Georgina, 09°33'29"N, 83°43'24"W, 3093 m, *M. Sundue et al. 1690* (NY-*n.v.*, SP-on 3 sheets); DEPARTMENT UNKNOWN: open pastures of the Aromal del Barba, 2000 m, 01/V/1969, *L.D. Gómez-P 2180* (W). **NOVA GRANADA [COLOMBIA].** [CUNDINAMARCA or DEPARTAMENTO CAPITAL]: near Bogotá, [04.5734°, -74.0652°], I/1846, *Purdie s.n.* (K – type of *Hypolepis repens* var. *inermis*?); CAUCA: Mun. Puracé, por la carretera al Huila, entrando por Pilimbalá, cereca a la mina de azufre, [02.3387°, -76.4405°], 3320 m, 06/V/1984, *J. Santa et al. 1006* (HUA); DEPT. UNKNOWN: [NORTE DE SANTANDER?], Ocaña, Páramos de San Pedro, [07.6987°, -72.9998°], [9,000?-]10,000-11,000 ft, 1846-1852 [I/1851], *L. Schlim 329* (B, G, K, L, W); [NARINO?], reise von Pasto nach Tulcan, Cumbal, s.d., *A. Stübel 334* (B); [NARINO?], in silvis prope Boca del Mundo Nuevo, in Monte Cumbal, reise von Pasto nach Tulcan, [00.9482°, -77.8374°], 3500 m, s.d., *A. Stübel 341* (B-3 sheets, K-on 2 sheets); [NARINO?], reise von Pasto nach Tulcan, Cumbal, s.d., *A. Stübel 342* (B-3 sheets). **ECUADOR:** AZUAY: Sevilla de Oro, old Road 10-12 km N of the village, 02°46’S, 78°37’W, 2750-2850 m, 11/IX/1976, *B. Øllgaard & H. Balsev 9383* (AAU-*n.v.*, GH-*n.v.*, HB, K-on 2 sheets); CARCHI: Valle de Maldonado, km 53 on the road Tulcán-Maldonado, 00°50’N, 78°03’W, 3150-3250 m, 17-18/V/1973, *L. Holm-Nielsen et al. 5646* (AAU-*n.v.*, K-on 2 sheets); Base of Volcán Chiles, km 34-36 on Road Tulcán-Maldonado, 00°47’N, 77°57’W, 3900-4050 m, 19/V/1973, *L. Holm-Nielsen et al. 5902* (AAU-*n.v.*, K-on 2 sheets); about ½ hr E of Huaca, past Colonia Huaceña, [00.6234°, -77.6971°], 3100-3200 m, 19/II/1989, *H. van der Werff & W. Palacios 10612* (G); ESMERALDAS: Crescit in Prov. Esmeraldas ad fl. “Siba” [Silva?], [00.4879°, -78.5058°], VIII/1904?, *A. Sodiro 13/2* (GH-*n.v.*, image!, K); IMBABURA: Hacienda Yura Cruz, 10 km N of Ibarra, 00°22’N, 78°05’W, 3700-3800 m, 25/V/1973, *L. Holm-Nielsen et al. 6502* (AAU-*n.v.*, K-on 2 sheets); Lago San Marcos, Cayambe, [00.0395°, -78.0945°], 11,200 ft, 02/XII/1961, *P.C.D. Cazalet & T.D. Pennington 5464* (B-on 2 sheets, BM-*n.v.*, K-*n.v.*, NY-*n.v.*, UC-*n.v.*, US-*n.v.*). **PERU.** SAN MARTIN: Dist. Huallaga, Valley of Rio Apisoncho, 30 km above Jucusbamba, 07°55’S, 77°10’W, 3600 m, 02/IX/1965, *A.C. Hamilton & P.M. Holligan 547* (K, L). **BOLIVIA.** LA PAZ: Prov. Franz Tamayo, Pelechuco, [-14.8192°, -69.0666°], 3550 m, 09/III/1980, *T. Feuerer 9349 e* (LPB); Prov. Bautista Saavedra, Charanzani, Rückseite Chullinahang, 3000 m, 16/I/1994, *B. Herzog H 425* (LPB); Prov. J. Bautista Saavedra M., 15 km de Charazani hacia Chullina, 15°10’S, 68°53’W, 3400 m, 05/VII/1997, *M. Kessler et al. 10580* (LPB, UC-*n.v.*); Prov. Murillo, Valle del Río Zongo, 23.8 km al norte de la cumber, 16°08’S, 68°07’W, 2900 m, 18/III/1987, *J.C. Solomon 16418* (LPB-on 2 sheets, MO-*n.v.*, UC-*n.v.*); Nord Yungas, 3300 m, XI/1910, *O. Buchtien s.n., Rosenst.*

Fil. Bol. Exsicc. 41 (L); Prov. Nor Yungas, Parque Nacional Cotapata, 16°12’S, 67°53’W, 3450 m, 09/IX/1997, *M. Kessler et al. 11701* (LPB, UC-*n.v.*); COCHABAMBA: Prov. Ayopaya, Pujyani, 10 km Cocapata – Cotacajes, 16°38’S, 66°41’W, 2900 m, 07/V/1997, *M. Kessler et al. 9331* (LPB, UC-*n.v.*); Prov. Chapare, Centr. Hidroel. Corani, km 61.4 Cochabamba-Chapare road, [-17.3218°, -66.0301°], 2750 m, 27/VII/1989, *M. Kessler & M. Kelschebach 270* (GOET-*n.v.*, LPB); Prov. Chapare, Cochabamba 54 kms hacia Villa Tunari, 2750 m, 10°S, 30/IV/1979, *G. Beck 1435* (LPB, UC-*n.v.*); Prov. José Carrasco Torrico, 130 km antigua carretera Cochabamba – Villa Tunari, 17°07’S, 65°36’W, 2000 m, 11/VII/1996, *M. Kessler et al. 7191* (LPB-on 2 sheets, UC-*n.v.*); Prov. José Carrasco Torrico, 94 km antigua carretera Cochabamba – Villa Tunari, 17°12’S, 65°41’W, 3500 m, 28/VI/1996, *M. Kessler et al. 6776* (LPB, UC-*n.v.*); Prov. José Carrasco Torrico, 3 km de Enpalme hacia Siberia, 17°47’S, 64°48’W, 2700 m, 21/X/1996, *M. Kessler et al. 9179* (LPB-on 2 sheets, UC-*n.v.*). **“ECUADOR” [or COLOMBIA?].** Cerro de Columba, Gepfel, reise von Pasto nach Tulcan, s.d., *A. Stübel 346* (B). **ECUADOR?** Volcán Turrialba, [1905?], *C.R. Wercklé 1905* [*vel s.n.*?] (K-on 2 sheets).

4b. *Hypolepis flexuosa* Sodiro var. ***zimmerae*** Schwartsb. & J. Prado, ***var. nov.*** **Type:** Colombia, Páramo de las Delicias, Central Andes von Popayan, [02.5554°, -76.2094°], 3200-3500 m, s.d., *F.C. Lehmann 4441* (holotype: B!; isotype: K!-on 2 sheets). **Fig. 7C, Map 11B.**

Distribution and ecology: Costa Rica, Colombia, and Peru; from ca. (2750?) 3000 to 3500 m – Map 11B.

Additional material examined: COSTA RICA. CARTAGO: Vic. of Millsville, Pan-American highway, about 3km above Nivel, [09.5569°, -83.6157°], 3000-3300 m, 22/VII/1949, *R.W. Holm & H.H. Iltis 501* (BM). **PERU.** Reise von Pacaomayo-Mogobamba, Bogazan, [-12.0434°, -75.2507°], 3000 m, s.d., *A. Stübel 1071* (B).

Etymology: the varietal epithet honours Dr. Briggite Zimmer, from Botanischer Garten und Botanisches Museum Berlin-Dahlem (B), who has enormously contributed to Pteridology and Botanical Nomenclature.

5. *Hypolepis galapagensis* Schwartsb. & J. Prado, ***sp. nov.*** **Type:** [Ecuador], Flora Insularum Galapagensium, [Santa Cruz, Indefatigable Island?], Pampa zone near Media Luna, terrestrial fern with creeping rhizome, fronds solitary, [-00.6223°, -90.3831°], 1750 ft., V/1974, *H.H. v.d. Werff 955* (holotype: U!-0256186; isotype: MO?-*n.v.*). **Maps 12A, B.**

Plants terrestrial. *Rhizomes* 1.5–3.5 mm diam., hairy or glabrescent, the *hairs* catenate-acicular, rigid, reddish-brown, 1–2 mm long, 10–15-celled. *Fronds* erect to decumbent, with continuous growth, ca. 55–75 cm long; *petioles* ca. 33–37 cm x ca. 2–4 mm, proximally red wine, medially reddish-brown, distally light brown, abaxially glabrescent or with scattered hairs, adaxially sparsely villous (especially in the groove), with three kinds of hairs, sparsely aculeate, copiously rugose, the *first kind hair* catenate-acicular, hyaline with the base and cross-walls reddish, lax, 0.4–1 mm long, 5–15-celled, more conspicuous, the *second kind of hair* catenate-acicular, hyaline with the base, cross-walls and the apex (two/three last cells) reddish, or entirely reddish, rigid, 0.5–1(–1.3) mm long, 7–10(–15)-celled, sparse, the *third kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, 0.3–1(–1.2) mm long, 4–8(–12)-celled, in moderate quantity, the *aculei* straight, of the same color of the petioles, 0.2–0.6 mm long; *laminae* rombic, proximally bipinnate-bipinnatisect with segments pinnatifid, medially pinnate-bipinnatisect with segments pinnatifid, distally pinnatisect, ca. 25–50 x 30–50 cm; *rachises* proximally slightly curved, otherwise straight, proximally and medially light brown, distally stramineous, abaxially glabresccent to sparsely villous, adaxially copiously villous, the three kinds of *hairs* conspicuous, aculeate, rugose; *proximal pinnae* ca. 18–25 x 13–18 cm, slightly inequilateral; *costae* abaxially villous, adaxially copiously villous, the three kind of *hairs* conspicuous; *costules* abaxially villous, adaxially sparsely villous, with only the *third kind of hair*, these much smaller, abaxially 0.1–0.2(–0.3) mm long, 2–4(–5)-celled, adaxially 0.1–0.7 mm long, 2–10-celled; *veins* abaxially sparsely villous, adaxially with scattered hairs, the *hairs* similar to those from the abaxial surface of the costules; *laminar tissue between the veins* abaxially essentially glabrous, but with a few scattered hairs, adaxially glabrous, the *hairs* similar to those from the abaxial surface of the costules and veins; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, partly green, partly hyaline, membranaceous in the hyaline part, the *margins* usually denteate, rarely with one or two cilia, the *cilia* catenate-acicular, ca. 0.2–0.3 mm long, 5 or 6-celled.

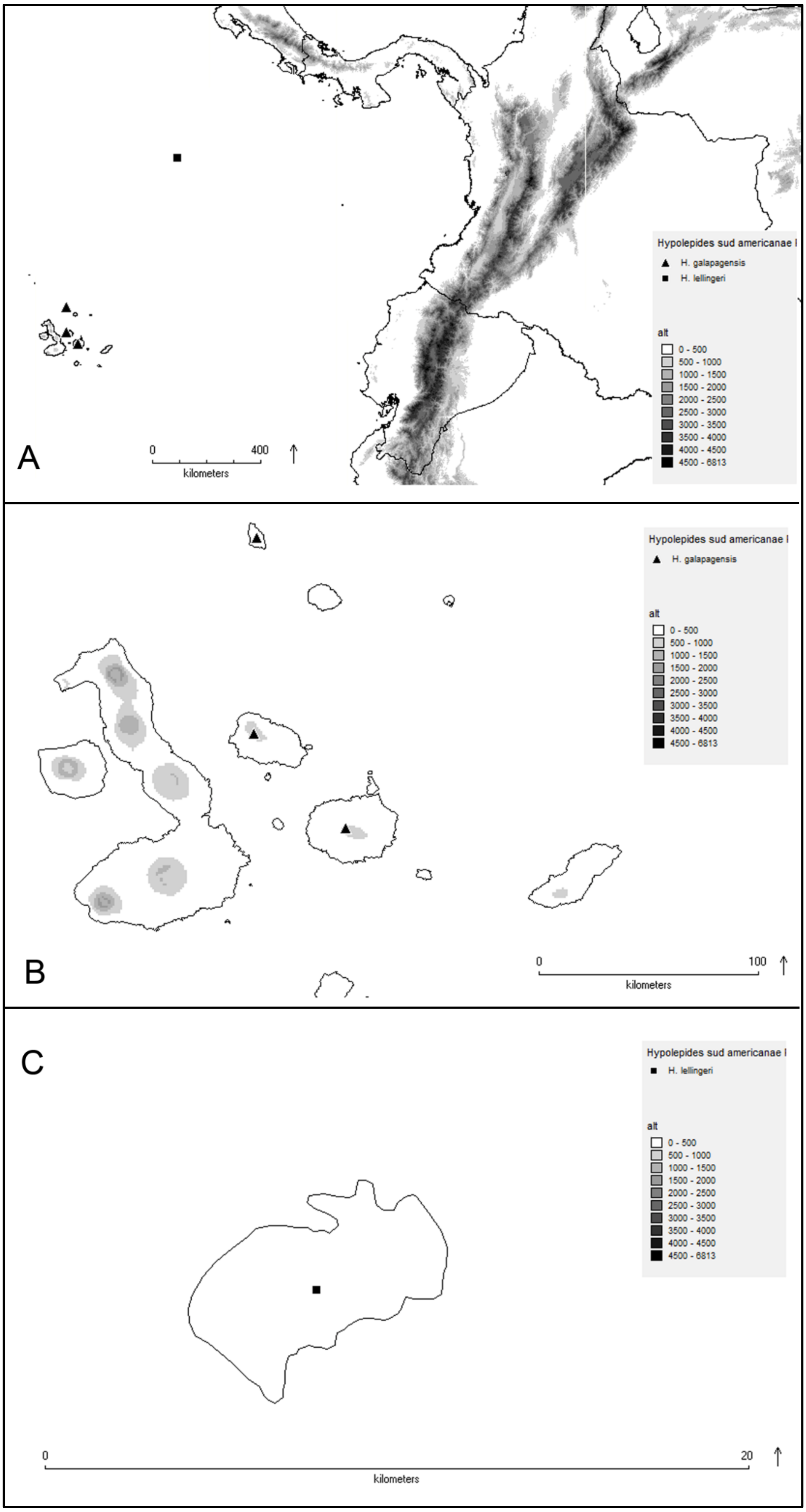
Distribution and ecology: Endemic to the Galapagos Islands (Pinta, San Salvador and Santa Cruz); from ca. 500 m to 750 m, but also reported at ca. 250 m by Svenson (1938) – Maps 12A, B.

Additional material examined: ECUADOR, GALAPAGOS ISLANDS. PINTA [ABINGDON] ISLAND: fern peat on summit, [00.5855°, -90.7532°], 2200 ft, VI/1975, *H.H. v.d. Werff 2118* (U); SAN SALVADOR [SANTIAGO, JAMES] ISLAND: near summit, [-00.2301°, -90.7648°], 2400 ft, IX/1975, *H.H. v.d. Werff 2348* (U); ISLAND UNKNOWN: [ca. 1800-1810], *Capt. J. Wood s.n.* (K).

This endemic species has been identified as *Hypolepis repens* (by Svenson 1938) and *H. hostilis* (by Morton & Wiggins 1971). Although closely related to *H. hostilis*, both are actually distinct. In their "sub-group of species" (see 'Results, Groups of species'), *H. galapagensis* is the unique species that present three kinds of hairs, of which the *second kind* (catenate-acicular, rigid, with the tip reddish or entirely reddish) is exclusive. No other species from this sub-group bear such hairs.

Apart from the indument, *Hypolepis galapagensis* differs from *H. hostilis* by the petioles proximally red wine (*vs.* black), the rachises essentially light brown (*vs.* stramineous), and the margins of pseudo-indusia commonly denteate, rarely with one or two cilia (*vs.* crenate, never ciliate – Fig. 9A). *Hypolepis galapagensis* differs from *H. lellingeri* (endemic to Cocos Island) by the fronds furnished with the three kinds of hair (*vs.* only two kinds, the reddish tipped absent), the petioles proximally red wine (*vs.* black), the veins abaxially with short catenate-glandular hairs (*vs.* glabrous – Fig. 10I), and the laminar tissue between the veins abaxially glabrous or with scattered catenate-glandular hairs (*vs.* always glabrous). For further differentiation, see discussion of *H. hostilis, H. lellingeri, H. rigescens,* and *H. viscosa.*

In the label of the type, H.H. van der Werff wrote "terrestrial fern with creeping rhizome, fronds solitary", but this is certainly a mistake. Apparently, no *Hypolepis* species in the World present only one frond per rhizome; the fronds were probably growing far from each other, in a very long creeping rhizome, seeming falsely "solitary". Otherwise this species has a unique habit.



Map 12 A distribution of *Hypolepis galapagensis* and *Hypolepis lellingeri*, **B** detail of the distribution of *Hypolepis galapagensis*, **C** detail of the distribution of *Hypolepis lellingeri*.

6. *Hypolepis guianensis* Klotzsch, Linnaea 20: 339. 1847. **Lectotype,** designated by Cremers & Kramer (1991: 24): [Guyana], Habitat in Guiana Anglicana, [05.2160°, -60.7360°], s.d., *R. Schomburgk 1166* (B!-20 0074653). **Map 13A.**

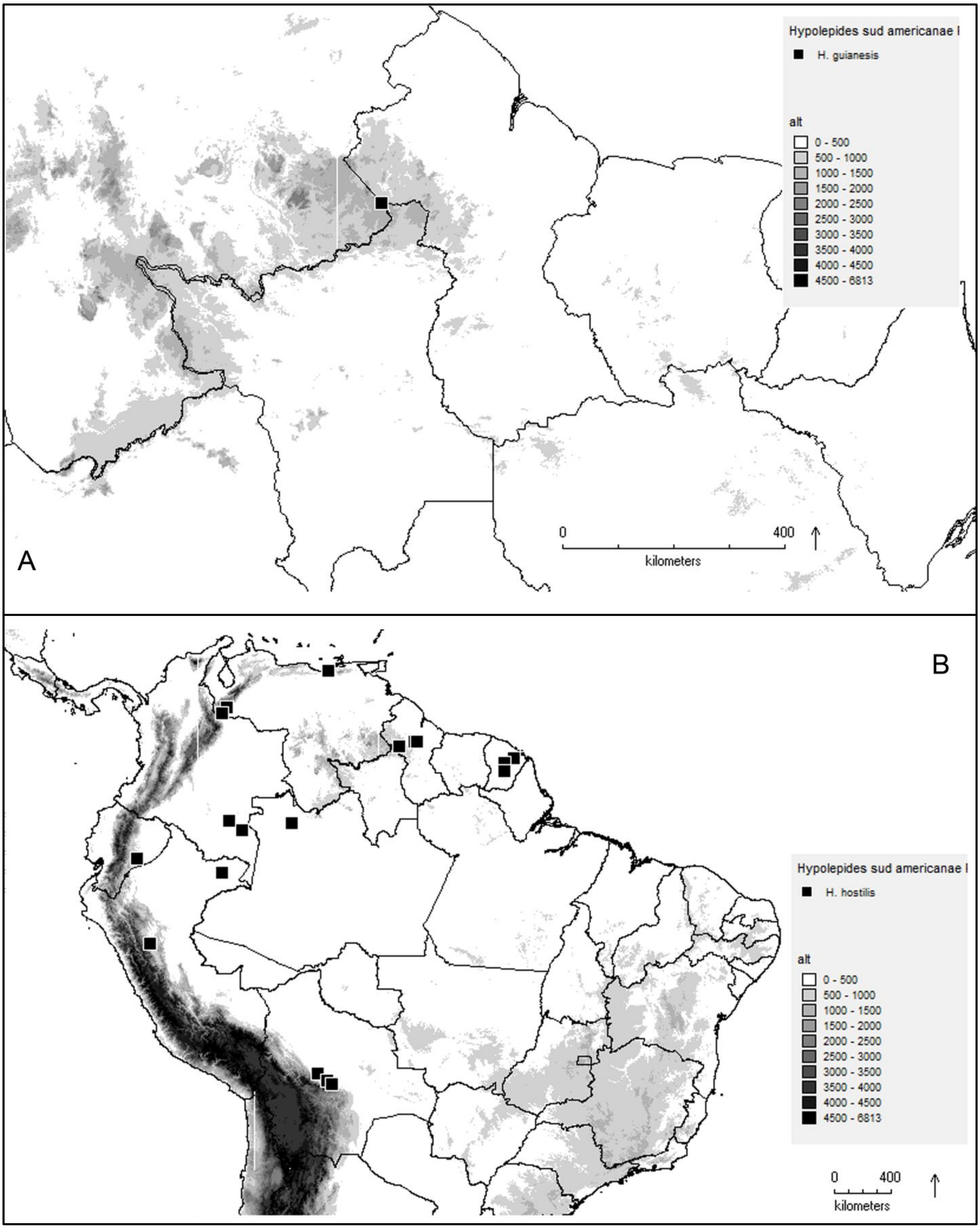
Plants terrestrial. *Rhizomes* not seen. *Fronds* complete not seen; *petioles* not seen; *laminae* ovate?, proximally bipinnate-pinnatisect with segments pinnatifid, medially pinnate-bipinnatisect with segments pinnatifid, distally pinnatisect, ca. 55 x 40 cm; *rachises* straight, proximally and medially golden-brown, distally stramineous, abaxially villous, adaxially copiously villous, with two kinds of hairs, inermous, copiously rugose, the *fisrt kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, or entirely yellowish, 1–2 mm long, 15–25-celled, sparse, the *second kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, 0.2–0.5(–0.7) mm long, 4–10(–12)-celled, more conspicuous; *proximal pinnae* ca. 22 x 7 cm, slightly inequilateral(?); *costae* abaxially villous, adaxially copiously villous, with both kinds of hair similar to those from the rachises, but both kinds conspicuous; *costules* abaxially sparsely villous with only the second kind of hair, adaxially sparsely villous with both kinds of hair, the *first kind of hair* smaller, 0.4–0.7 mm long, 6–10-celled, the *second kind of hair* mostly bigger, 0.2–0.7(–1) mm long, 4–12(–15)-celled; *veins* abaxially sprselly villous, adaxially with scattered hairs, with only the *second kind of hair*, these mostly smaller 0.1–0.3(–0.5) mm long, 2–5(–10)-celled; *laminar tissue between the veins* abaxially with the *second kind of hair* similar to those from the veins, adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, partly green, partly hyaline, membranaceous in the hyaline part, the *margins* ciliate, the *cilia* catenate-glandular, 0.2–0.4 mm long, 4–7(–10)-celled.

Distribution and ecology: Known only from the type collection; probably endemic to the Mount Roraima region, in the intersection of Venezuela, Guyana and Northern Brazil; elevation unknown – Map 13A.

This species is known only from the type, which represents only part of the frond. It is probably the medial and distal parts of the lamina, but it was described above here as ‘the entire lamina’ – special care should be taken while analysing the degree of dissection of the lamina, and the features of the proximal pinnae, of this species.

Hypolepis guianensis is the unique species in South America (maybe World wide?) with the margins of the pseudo-indusia with catenate-glandular cilia. In every other species with ciliate pseudo-indusia, the cilia are catenate-acicular. The combination of the following characters also serves to distinguish *H. guianensis:* the fronds furnished with both catenate-acicular and catenate-glandular hairs, the petioles (probably) and rachises inermous and with long catenate-acicular hairs (1–2 mm long, 15–25-celled), the laminar tissue between the veins abaxially with short catenate-glandular hairs and adaxially glabrous, and the lamina margins glabrous.

Hypolepis guianensis differs from *H. trinationalis* by the costules abaxially with only catenate-glandular hairs (*vs.* with both catenate-acicular and catenate-glandular hairs), the laminar tissue between the veins adaxially glabrous (*vs.* with catenate-acicular hairs), the lamina margins glabous (*vs.* with catenate acicular and catenate-glandular hairs), and the margins of the pseudo-indusia with catenate-glandular cilia (*vs.* catenate-acicular cilia). Another similar species is *H. krameri* - for a further differentiation with it, see its discussion.



Map 13 A distribution of *Hypolepis guianensis;* **B** distribution of *Hypolepis hostilis.*

7. *Hypolepis hostilis* (Kunze) C. Presl, Tent. Pterid.: 162. 1836. *Cheilanthes hostilis* Kunze, Linnaea 9: 86. 1834. *Hypolepis repens* (L.) C. Presl var. *hostilis* (Kunze) Baker *in* Mart. & Eichler, Fl. Bras. 1(2): 383. 1870. **Lectotype,** designated here: [Peru], Cresc. in flora Huallagae superior, Peruvia fruticetis graminosis raro ad Mission, Tocache, [-08.0475°, -76.5996°], VII-VIII/1830, *E. Poeppig, diar. n. 1957* (W! [as "Maijnas. Inter frutices. Tocache. Jul. 1830, *Poeppig*"]; probable isolectotypes: K!-000640334, PRC!, US-frag., *n.v.*). **Fig. 9A, Map 13B.**

Hypolepis parviloba Fée, Crypt. Vasc. Brésil 1: 53, t. 20, fig. 1. 1869. Lectotype, designated by Tryon (1964: 38): [Brazil], Brasilia borealis, Amazonas, Serra de São Gabriel, prope San Gabriel da Cachoeira, ad Rio Negro, [-00.0132°, -67.1625°], I-VIII/1852 [II/1852], *R. Spruce 2119* (P-00633386, ex Herb. Glaziou, *n.v.*, image!; isolectotypes: B-20 0074671, *n.v.*, image!, B-20 0074672, *n.v.*, image!, BM!-000937674, BM!-000937675, BM!-frag. [ex Herb. Christensen], BR! [2 sheets and a frag.], G! [ex Herb. Dellesert], G! [ex Herb. Barbey-Boissier], GH-*n.v.*, K!-on 2 sheets [000640336 and 000640337], LE!, OXF!, NY-*n.v.*, image!, P-00633384, *n.v.*, image!, P-00633385, *n.v.*, image!, RB!-on 2 sheets [6831], RB!-215824 [ex Herb. Fée], U!-frag., US-*n.v.*, image!).

Plants terrestrial. Rhizomes 2–3.5 mm diam., glabrescent or hairy, the *hairs* catenate-acicular, rigid, yellowish-brown, 1–2 mm long, 15–20-celled. *Fronds* erect to decumbent, with continuous growth, (40–)80–110 cm long; *petioles* (25–)30–40 cm x (1.2–)3–5.5 mm diam., proximally black, medially wine red, distally stramineous, glabrous, aculeate, sparsely rugose, the *aculei* straight, of the same colour of the petioles, (0.3–)0.5–1(–1.7) mm long; *laminae* ovate to rombic, proximally bipinnate-bipinnatisect with segments lobed, medially bipinnate-pinnatisect with segments pinnatifid, distally pinnatisect, (30–)60–85 x (25–)60–100 cm; *rachises* slightly curved at base, otherwise straight, entirely stramineous, abaxially glabrous, adaxially with two kinds of hairs restricted to the groove, copiously aculeate, rugose, the *first kind of hair* catenate-acicular, hyaline, 0.1–0.4(–0.5) mm long, 2–6(–7)-celled, the *second kind of hair* catenate-glandular, hyaline, 0.1–0.4(–0.5) mm long, 2–6(–7)celled; *proximal pinnae* (12–)30–50 x (7–)20–28 cm, slightly inequilateral; *costae* abaxially glabrescent, with both the *first* and *second kinds of hairs* very sparse, adaxially pubescent with only the *first kind of hair*, these usually longer, 0.4–0.6 mm long, 6–8-celled; *costules* abaxially and adaxially pubescent with only the *second kind of hair*; *veins* with the same indument pattern that of the costules, but much more sparse; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, partly green, partly hyaline, membranaceous in the hyaline region, the *margins* crenate, glabrous.

Distribution and ecology: Northern region of South America in the lowlands of the Amazon Forest, in French Guiana, Suriname (probably, no material seen), Guyana, Venezuela, Colombia, Northern Brazil, Ecuador, Peru, and Bolivia; from sea level ("15 m") to 500 m (only one collection from 685 m). Also reported for Panama (*apud* Moran 1995; only a doubtful fragmentary material seen) and Costa Rica (*apud* Moran *l.c.*, no material seen) – Map 13B.

Additional material examined: COLOMBIA. AMAZONAS-VAUPÉS: Río Apaporis, entre el Río Pacoa y el Río Kananarí, Mouth of Pacoa, [00.1064°, -71.3714°], ca. 250 m, 17/VI/1951, *R.E. Schultes & I. Cabrera 12603* (U); AMAZONAS: Río Popeyacá (affluent of Río Apaporis), lower course, [-00.4995°, -70.4703°], 25/II/1952, *R.E. Schultes & I. Cabrera 15616* (BM). **VENEZUELA.** [MÉRIDA or BARINAS]: Along stream and steep slopes with patches of primary vegetation, 5 km SW of Dam site on Río Caparo, 31 km ESE of Santa Barbara, ca. 07°41'N, 71°28'W, ca. 100-300 m, 10/III/1980, *R. Liesner & A. González 9335* (MO-*n.v.*, VEN); APURE: Reserva Florestal San Camilo, selva siempreverde a lo largo de La Quebrada de la Cristalina hasta la vega del Cerro La Nulita, [07.2452°, -71.8439°], 250-280 m, 02/IV/1968, *J.A. Steyermark et al. 101758* (G, MY?-*n.v.*, VEN-*n.v.*); MIRANDA: Dept. Paéz, Fila La Tigra, Qda. San Juan, 18 km al SW de Cúpira, 10°04-05'N, 64°45'W, 500 m, 02-07/IX/1977, *F. Ortega & A. González 389* (MO-*n.v.*, VEN). **BRITISH GUIANA [GUYANA].** POTARO-SIPARUNI: Potaro River, Sheenabowa, IX-X/1881, [05.3619°, -59.0087°], *G.S. Jenman 1401* (K); Demerara, Potaro River, Sheenabowa, [05.3944°, -58.8427°], 1885, *G.S. Jenman s.n.* (NY-*n.v.*); Pakaraima Mountains, Ireng River, 4 km upstream from Kurutuik Falls along Topaima stream, 05°05'N, 60°02'W, 685 m, 27/X/1994, *P. Mutchnick et al. 255* (CAY, U, US-*n.v.*). **FRANCE, FRENCH GUIANA.** [CAYENNE]: Piste de Bélizon vers Montagne Tortue (bassin de la Comté), 04°18'N, 52°28'W, 480 m, 17/XI/1994, *F. Billiet et al. 6348* (BR-on 3 sheets, CAY-on 2 sheets, K, P-*n.v.*, US-*n.v.*); Montagnes de la Trinité, Inselberg Nord-Ouest, [03.9733°, -53.0538°], 200 m, 18/I/1984, *J.J. de Granville et al. 6138* (CAY, U, Z-*n.v.*); Bassin du Haut Inipi, crique Emerillon, au Nord du Massif des Emerillons, [03.4150°, -53.0677°], 140 m, 24/IX/1980, *J.J. de Granville 3958* (CAY-on 2 sheets, P-*n.v.*, Z-*n.v.*). **ECUADOR.** SANTIAGO-ZAMORA [MORONA SANTIAGO]: Taisha, [-02.3312°, -77.4747°], 1500 ft, 07/II/1962, *P.C.D. Cazalet & T.D. Pennington 7707* (B-*n.v.*, BM-*n.v.*, K-on 2 sheets, NY-*n.v.*, US-*n.v.*). **PERU.** LORETO: Provincia de Mcal. Ramon Castilla, ca. 3 km south of the village of Huanta, 03°17'S, 71°51'W, ca. 15 m, 16/IX/1992, *H. Tuomisto et al. 5227* (AMAZ-*n.v.*, TUR-*n.v.*, U). **BOLIVIA.** COCHABAMBA: Prov. Chapare, San Rafael, [-16.6079°, -65.4799°], 500 m, 10/XI/1966, *R.F. Steinbach 477* (LPB, U, UC-*n.v.*); Prov. José Carrasco Torrico, Valle del Sajta, 17°08'S, 64°50'W, 220 m, 03/X/1996, *M. Kessler et al. 8795* (LPB, UC-*n.v.*); Prov. José Carrasco Torrico, Parque Nacional Carrasco, al S Del campamento Ichoa, 17°23'S, 64°30'W, 400 m, 16/IX/1997, *A. Acebey 616* (LPB-on 2 sheets, UC-*n.v.*). **LOCALITY UNKNOWN [VENEZUELA?].** Locality unknown, s.d., *J.J. Linden s.n.* (BR).

Not as much as '*Hypolepis repens*', but the name '*H. hostilis*' has also been widely misapplied. Morton & Wiggins (1971), for example, attributed this name for the islander species of Galapagos (see *H. galapagensis*); Sehnem (1979) classified some plants from S/SE Brazil with this name; and many authors embeebed the concept of *H. rigescens* within *H. hostilis* (see discussion of *H. rigescens*).

Hypolepis hostilis is easily recognized by the following combination of characters: the fronds medium sized, (40–)80–110 x (25–)60–100 cm, the petioles proximally black and the rachises entirely stramineous, both aculeate, the segments relatively small, the costae, costules and veins with short catenate-glandular hairs, mostly 0.1–0.4 mm long, 2–6-celled, the laminar tissue between the veins abaxially glabrous, the lamina margins glabrous, and the margins of the pseudo-indusia glabrous – (Fig. 9A).

The most similar species are *Hypolepis galapagensis*, *H. lellingeri*, *H. rigescens*, *H. tenerrima*, and *H. viscosa*, and they probably form a natural sub-group of species (see 'Results, Species groups'). For differentiation between these *taxa*, see their respective discussion (comments of *H. tenerrima* in *H. rigescens*).

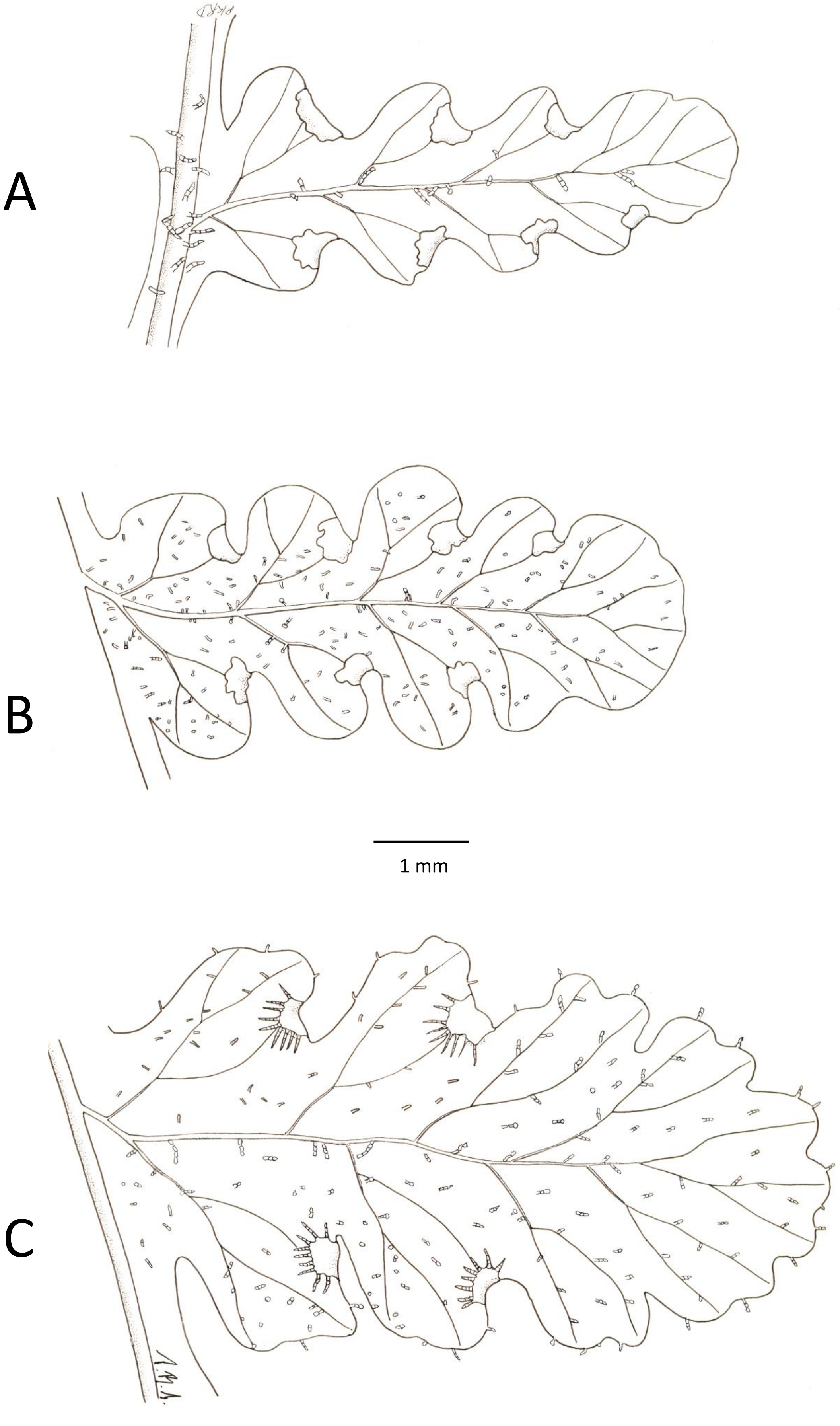


Fig. 9 **A** *Hypolepis hostilis* (*Cazalet 7707*): segment abaxially; **B** *Hypolepis rigescens* (*van der Werff 3040*): segment abaxially; **C** *Hypolepis viscosa* (*Moritz 387*): segment abaxially.

8. *Hypolepis krameri* Schwartsb., Boudrie & Cremers, *sp. nov. ined.*, Fern Gaz.: *in press.* **Type:** [Venezuela, Guyana, or Brazil?], Mt. Roraima, base of cliff, [05.1966°, -60.7364°], X/1884-I/1885, *E.F. im Thurn 161, Mt. Roraima Exped.* (holotype: BM! [as "set B"]; isotype: K! [as "set A"]). **Map 14A.**

Plants terrestrial. *Rhizomes* not seen. *Fronds* complete not seen; *petioles* not seen; *laminae* proximally bipinnate-pinnatisect with segments pinnatifid, medially pinnate-bipinnatisect with segments pinnatifid, distally pinnatisect, ca. 65–70 x 30–46 cm; *rachises* straight, proximally and medially light golden-brown, distally stramineous, abaxially glabrescent or with very scattered hairs, adaxially sparsely pilose with two kind os hair, sparsely tuberculate, copiously rugose, the *fisrt kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, 0.2–0.5 mm long, 3–7-celled, the *second kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, 0.2–0.5 mm long, 3–7-celled, the *tuberculei* rounded with the apex obtuse, of the same color as the rachises, 0.2–0.3 mm long; *proximal pinnae* ca. 18–23 x 6.5–10 cm, slightly inequilateral; *costae* abaxially glabrescent or with very scattered hairs, adaxially sparsely pilose with both kinds of hairs, similar to those from the rachises; *costules* abaxially with both kinds of hair, similar to those from the rachises, adaxially with sparse trichomidia, the *trichomidia* 0.2–0.3 mm long, 3–6-celled; *veins* abaxially and adaxially glabrous or with very scattered trichomidia; *laminar tissue between the veins* abaxially glabrous, adaxially essentially glabrous, but with very scattered trichomidia; *laminar margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, entirely hyaline, membranaceous, the *margins* ciliate, the *cilia* catenate-acicular, 0.2–0.3 mm long, 4–6-celled.

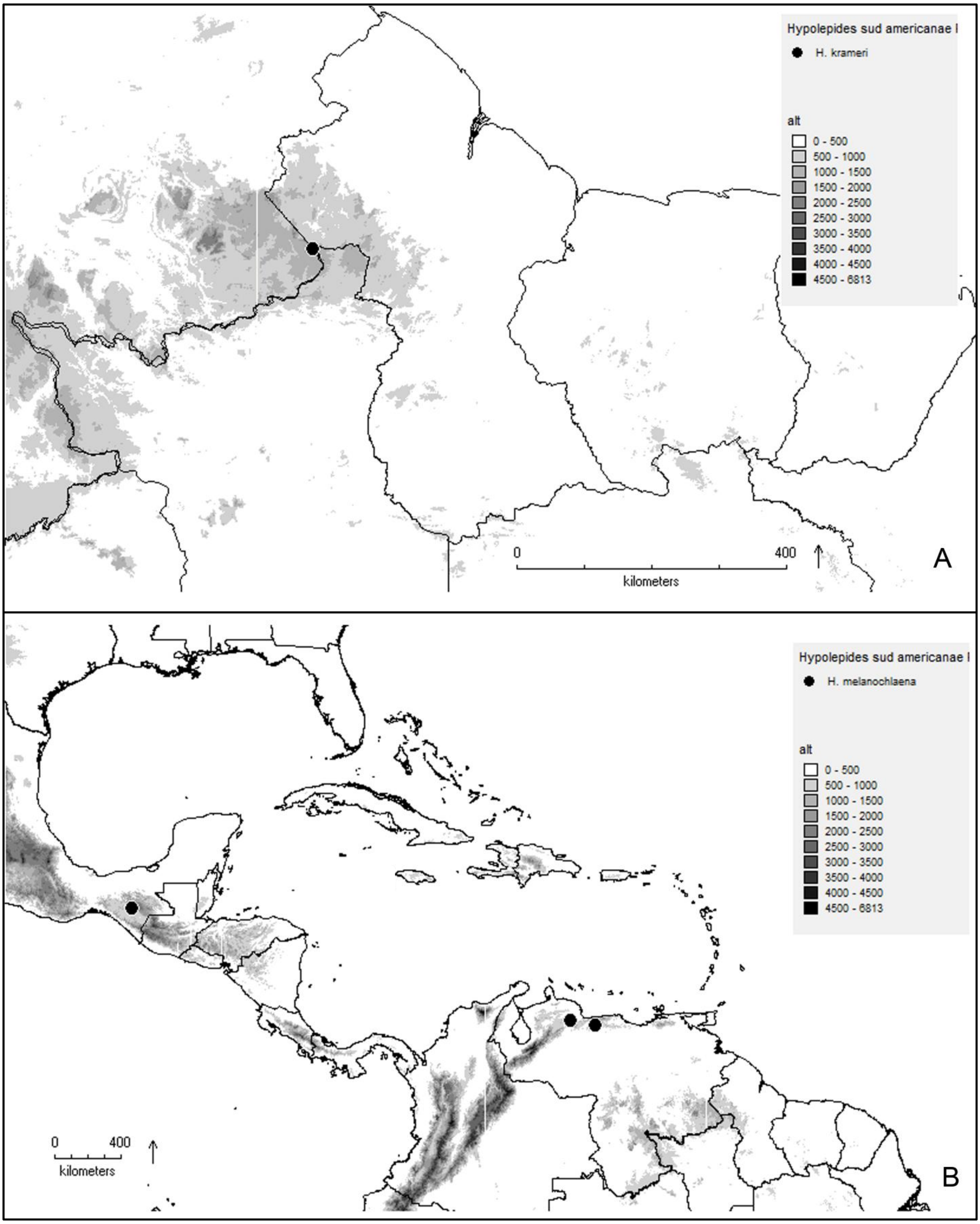
Distribution and ecology: Known only from the type collection; probably endemic to the Mount Roraima region, in the intersection of Venezuela Guyana and Northern Brazil; elevation unknown – Map 14A.

It is impossible to determinate whether the material seen corresponds to the entire lamina, the apex of the lamina, or only a pinna (if so, probably the proximal one). Here, it is interpreted as the "entire lamina", and this supposition is reflected in the description above (see also Schwartsburd *et al.* 2012 *in press*).

Hypolepis krameri can be easily recognized by the following combinations of characters: the fronds furnished with both catenate-acicular and catenate-glandular hairs, the petioles (probably) and rachises sparsely tuberculate, the costules and the laminar tissue between the veins adaxially with trichomidia, the laminar tissue between the veins abaxially glabrous, the lamina margins glabrous, and the margins of the pseudo-indusia ciliate.

Apart from *Hypolepis krameri*, the only inermous *taxon* with trichomidia in South America is *H. bogotensis* (endemic to the Bogota Cordillera, in Colombia). Apart from the distribution, *H. krameri* differs from this species by the fronds furnished with catenate-glandular hairs (*vs.* fronds eglandular), the rachises straight and sparsely tuberculate (*vs.* straight or flexuous, and non-tuberculate – Figs. 7H, J), and the margins of the pseudo-indusia ciliate (*vs.* glabrous).

Hypolepis krameri differs from *H.guianensis* (a similar species, also endemic to Mount Roraima) by the fronds (especially the adaxial surface of the costules, veins and laminar tissue between the veins) furnished with trichomidia (*vs.* trichomidia absent), the petioles (probably) and rachises sparsely tuberculate (*vs.* non-tuberculate), the costules abaxially with both catenate-acicular and catenate-glandular hairs (*vs.* only catenate-glandular hairs), the laminar tissue between the veins abaxially glabrous (*vs.* with catenate-glandular hairs), and the margins of the pseudo-indusia with catenate-acicular cilia (*vs.* catenate-glandular cilia).



Map 14 A distribution of *Hypolepis krameri;* **B** distribution of *Hypolepis melanochlaena*.

9. ***Hypolepis lellingeri*** A. Rojas, Rev. Biol. Trop. 49(2): 439, fig. 2 a-c. 2001. **Type:** Costa Rica, Puntarenas, Puntarenas, Parque Nacional Isla del Coco, Isla del Coco, sendero a Cerro Iglesias, entre la base y la punta de Cerro Pelón, 05°31’55”N, 87°06’45”W [‘05.5284°, -87.0613°’], 530 m, 18/VI/1997, *A. Rojas 3617* (holotype: INB-*n.v.*; isotypes: CR-*n.v.*, MO-*n.v.*). **Figs. 10F–I, Maps 12A, C.**

Hypolepis hostilis (Kunze) C. Presl var. *major* Hook., Sp. Fil. 2: 69. 1852, as “var. *β major*”. Lectotype, designated here: [Costa Rica], Cocos Island, [Voyage of H.M.S. Sulphur], [1836-1841], *G.W. Barclay s.n.* [*2201*?] (K!-on 2 sheets; probable isolectotypes: BM!-2 sheets [“1838, *Barclay 2201*”], BM! [“1840”], BM!-on 2 sheets [“Ins. Cocos”, without colector’s name], BM!-on 2 sheets [“Panama”], HB!-83826 [“Panama”]).

Plants terrestrial. *Rhizomes* ca. 2–3 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, 1–2 mm long, 15–20-celled. *Fronds* erect to decumbent, with continuous growth, ca. 85–110 cm long; *petioles* ca. 35–50 cm x ca. 2.5 mm, proximally black, medially and distally reddish-brown, abaxially and adaxially villous, sparsely aculeate, rugose, the *hairs* catenate-glandular, hyaline with the base and cross-walls reddish, 0.1–0.6(–1.0) mm long, 2–8(–12)-celled, the *aculei* straight, of the same color of the petioles, 0.3–1.1 mm long, commonly with a hair at the tip; *laminae* rombic, proximally and medially bipinnate-pinnatisect with segments pinnatifid, distally pinnatisect, ca. 50–70 x 40–70 cm; *rachises* straight proximally and medially light brown, distally stramineous, abaxially and adaxially villous, aculeate, rugose, the *hairs* similar to those of the petioles but bigger, 0.3–1.0 mm long, 5–12-celled; *proximal pinnae* ca. 20–35 x 7–10 cm, equilateral; *costae* abaxially villous, adaxially sparsely villous, the hairs similar to those from the rachises but even bigger, 0.5–1.3 mm long, 8–17-celled; *costules* abaxially villous, adaxially glabrous or with scattered hairs, the *hairs* similar to those from the rachises; *veins* abaxially and adaxially glabrous; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, 2/3 green, 1/3 hyaline, membranaceous, the *margins* slightly crenate, glabrous.

Distribution and ecology: Endemic to the Cocos Island; from ca. 50 to 500 m – Maps 12A, C.

Additional material examined: COSTA RICA, COCOS ISLAND. Forêts de la Valée de Wafer, “40 m”(?), II/1902, “*H.P.*” [*H. Pittier*?] *16237* (G).

Among the types of *Hypolepis hostilis* var. *major,* I can only be almost certain about the material at K, which bears the name of the *taxon* written by W.J. Hooker, and is from his former herbarium. But, even this material is not 100% certain, because in the protologue Hooker (1858) said the collector was “*Banks*” – this was probably a typing mistake, since there is no *Hypolepis* specimen from “*Banks*”, at K. The several materials at BM are either labeled with a collector’s number, or with different dates, or even with information of being collected in “Panama” (see above). They all taxonomically agree with the lectotype chosen, but it is impossible to know if any specific exsiccatae (or all) is (are) a true duplicate(s) of the material at K; similar toughts regarding the material at HB. “Panama” is probably a wrong locality given (or, maybe, Barclay considered the Island belonging to Panama), since, apparently, this *taxon* does not occur in the Continent (*fide* Moran 1995, and Rojas-Alvarado 2001).

The most similar species are *Hypolepis galapagensis, H. hostilis,* and *H. rigescens,* due to the fronds medium sized and furnished with catenate-glandular hairs, the petioles aculeate and proximally very dark, the segments relatively small, and the lamina margins glabrous. *Hypolepis lellingeri* differs from these three species by the proximal pinnae equilateral (*vs.* slightly inequilateral), the costules abaxially with much longer catenate-glandular hairs, 0.3–1.0 mm long, 5–12-celled (*vs.* 0.1–0.5 mm long, 2–7-celled), and the veins abaxially glabrous (*vs.* with catenate-glandular hairs) – Figs. 10F–I *vs.* Figs. 9A, B.

Hypolepis lellingeri also differs from *H. hostilis* by the petioles villous (*vs.* glabrous), and the rachises light brown and abaxially villous (*vs.* stramineous and abaxially glabrous). It also differs from *H. rigescens* by the laminar tissue between the veins abaxially glabrous (*vs.* with catenate-glandular hairs), and the pseudo-indusia never ciliate (*vs.* mostly not ciliate, but commonly with one or two cilia) – Figs. 10F–I *vs.* Figs. 9A, B. See further differentiation from *H. galapagensis* under this species.

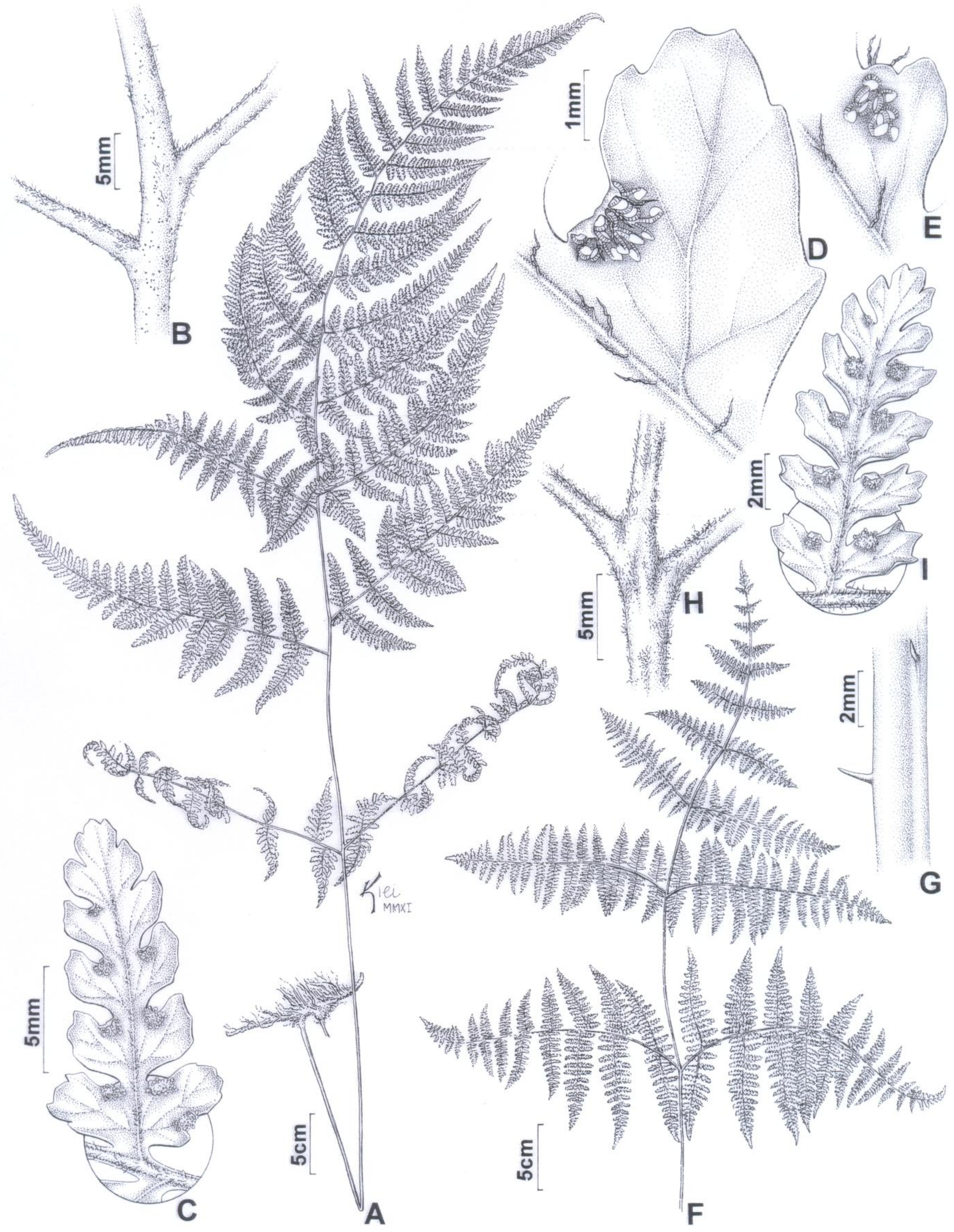


Fig. 10 A–E *Hypolepis poeppigii:* **A** habit (adapted from *Martínez 1879 B* and *Cabrera 24186*), **B** intersection petiole/rachis (*Martínez 1879 B*), **C** secondary pinnule abaxially (*Martínez 1879 B*), **D** detail of a protected sorus abaxially (*Martínez 1879 B*), **E** detail of an unprotected sorus abaxially (*Castellan 12*); **F–I** *Hypolepis lellingeri* (*Barclay s.n.*): **F** habit, **G** petiole, **H** intersection petiole/rachis, **I** secondary pinnule abaxially.

10. *Hypolepis melanochlaena* A.R. Sm., Proc. Calif. Acad. Sci., ser. 4, 40(8): 221, fig. 7 d-e. 1975. **Type:** Mexico, Chiapas, [16.4119°, -92.7436°], s.d., *G. Münch 35* (holotype: DS-CAS 0002968, *n.v.,* image!; probable isotypes: DS-CAS 0003086, *n.v.*, image!, US-00048932, *n.v.*, image!). **Figs. F–I, Map 14B.**

Plants terrestrial. *Rhizomes* 2.5–6 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, 1–2 mm long, 15–20-celled. *Fronds* complete not seen, ca. 1.7 m long; *petioles* complete not seen, ca. 85 cm x 6.5–7 mm, proximally dark brown, lighter above, abaxially and adaxially glabrous, sparsely aculeate, sparsely rugose, the *aculei* straight, of the same color of the petioles, 0.2–1 mm long; *laminae* rombic, proximally tripinnate-pinnatisect with segments pinnatifid, medially bipinnate-pinnatisect with segments pinnatifid, distally pinnatisect, ca. 1 x 0.8–1.2 m; *rachises* straight, proximally and medially golden-brown, distally stramineous to light brown, abaxilly glabrous, adaxially with hairs restricted to the groove, aculeate, copiously rugose (especially adaxially), the *hairs* catenate-acicular, hyaline with the base and cross-walls reddish, 0.2–0.4 mm long, 4–6-celled; *proximal pinnae* ca. 40–60 x 25–30 cm, slightly inequilateral; *costae* abaxially with sparse trichomidia, adaxially strigose with hairs, the *trichomidia* hyaline with the cross-walls reddish, laterally apressed, 0.15–0.4 mm long, 4–8-celled, the *hairs* similar to those from the rachises but longer, 0.3–0.7 mm long, 5–10-celled; *costules* with the same indumenta pattern that of the costae; *veins* abaxially with very scattered trichomidia, adaxially glabrous; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, entirely black, or partly black, partly hyaline with the cell walls black, membranaceous, the *margins* smooth or crenate, glabrous.

Distribution and ecology: A disjunctive distribution in Mexico (Chiapas; possibly also in Veracruz) and Northwestern Venezuela (Lara-*n.v.*, Yaracuy, Aragua, and Barinas-*n.v.*); from 900 to 1450 m – Map 14B. There might be possibly a third disjunctive locality in Ecuador (Carchi), at 2600 m.

Additional material examined: VENEZUELA. YARACUY: Dept. Bruzual, Mun. Campoelías, en la carretera Campoelías-Tierrita Blanca, km 13-14, vertiente Norte, cabeceras del Río Tupe, Sierra de Aroa, entre La Capilla y la quebrada La Tigra, [10.3205°, -68.8933°], 1300-1450 m, 17/XI/1980, *B. Trujillo 16492* (MY-on 2 sheets);

ARAGUA: Rancho Grande, [10.0858°, -67.5169°], 1000 m, VIII/1937, *H. Pittier 13849* (K); Rancho Grande, XI/1953, *"Enchudi" 56* (VEN-35202).

This species was originally described for Chiapas, Mexico (Smith 1975, 1981). Then, Smith (1985) himself reported it to Venezuela. Such disjunctive distribution was later accepted and commented by Moran (1995), Mickel & Smith (2004), and Navarrete (2008). Mickel & Smith (2004) also cited a doubtful material from Veracruz, Mexico (which, according to their comments, would perfectly agree with the concept here adopted for *H. melanochlaena*). Unfortunately, the type of *Hypolepis melanochalena* have not been seen for this study, only the Venezuelan material; but, according to the original description, the images of the types available online, and the conception of these authors, the material from Venezuela is here identified as *H. melanochlaena.* Both the Mexican and Venezuelan materials are incomplete and scarce, and further collections are needed to understand better this species. There is also a collection from Ecuador (*L. Holm-Nielsen et al. 6249,* K-on 2 sheets) that seems to be *H. melanochlaena*, that would attest this species to another disjunctive locality, but it is also an incomplete specimen to be sure.

The species most similar to *Hypolepis melanochlaena* are *H. parallelogramma* and *H. scandens,* due to the costae, costules and veins abaxially with trichomidia (also the apexes of the segments are obtuse, as in *H. parallelogramma*). But, *H. melanochlaena* is the unique species World-wide with the pseudo-indusia black. In addition, the lamina dries black, which is quite uncommon among the genus – Figs. 11F–I *vs.* Figs. 14A–H.

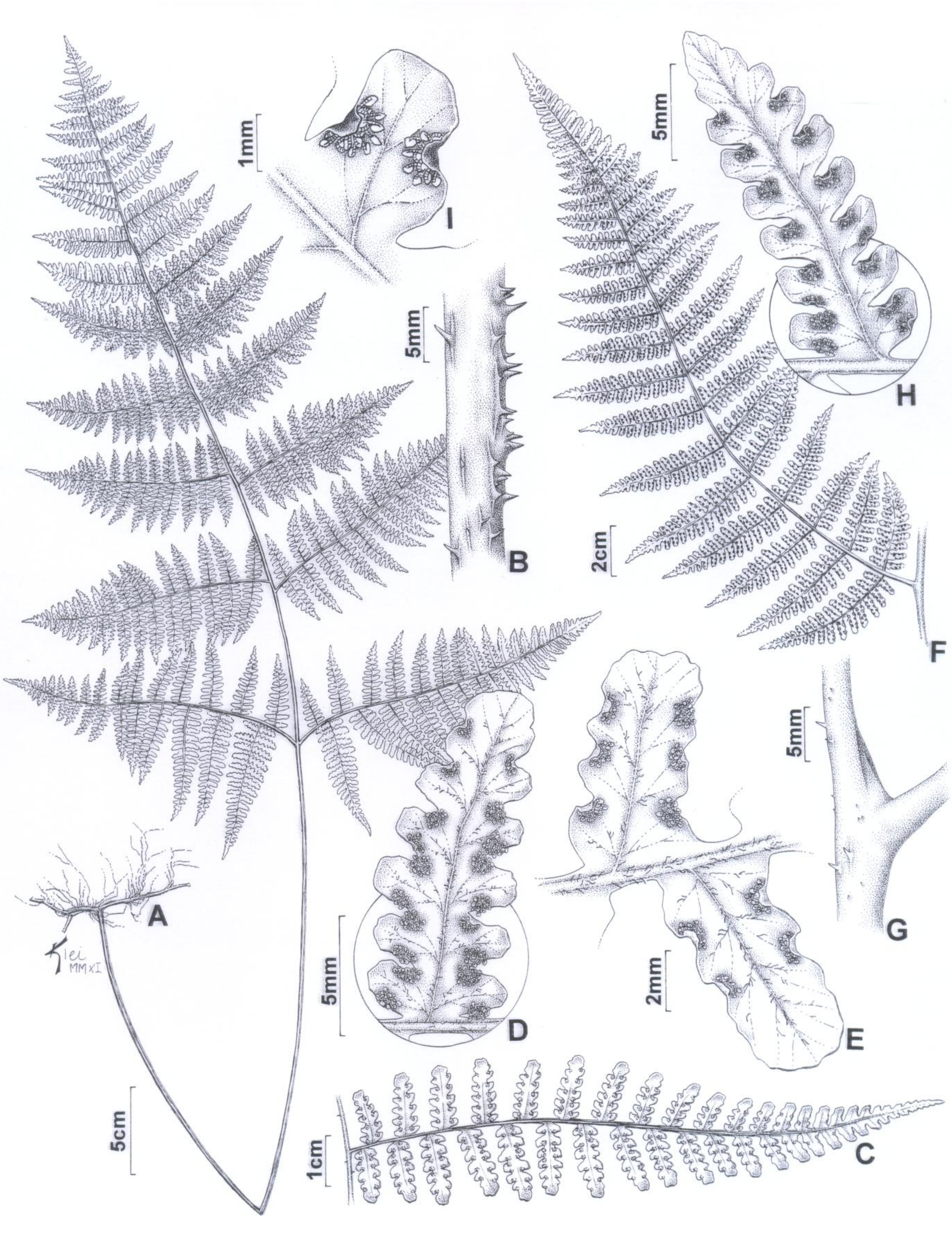


Fig. 11 A–E *Hypolepis repens:* **A** habit of a small frond (*Schwartsburd 2510*), **B** petiole (*Schwartsburd 2510*), **C** pinnule (*Boudrie 3210*), **D** fertile secondary pinnule abaxially (*Boudrie 3210*), **E** fertile segments abaxially (*Boudrie 3210*); **F–I** *Hypolepis melanochlaena:* **F** pinnae (*Enchudi 56*), **G** intersection petiole/rachis (*Trujillo16492*), **H** fertile secondary pinnule abaxially (*Enchudi 56*), **I** detail of pseudo-indusia abaxially (*Enchudi 56*).

11. ***Hypolepis mitis*** Kunze ex Kuhn, Linnaea 36: 105-106. 1870. **Lectotype,** designated here: [Brazil, Rio de Janeiro], Brasilia, Organ Mountains, in dry bushy places, 1838, *G. Gardner 199* (BM!-000937676; isolectotypes: B!-frag., FI-W!-214900, G!-2 sheets, K!-000640335, OXF!, PRC!-frag. *p.p.*, RB!-frag. [“*Gardner 551*”], W!). **Figs. 8A–E, Map 15A.**

Plants terrestrial. *Rhizomes* (2–)2.5–6 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, 1–2 mm long, 15–20-celled. *Fronds* erect to scandent, with continuous growth, (0.75–)1.75–3.5 m long; *petioles* (0.4–)0.7–1.5 m x (4–)5–7.5 mm, proximally wine red, greenish stramineous above, abaxially glabrous, adaxially with sparse trichomidia, especially in the groove, sparsely aculeate and tuberculate, rugose, the *trichomidia* apressed, ca. 0.2–0.4 mm long, 4–8-celled, the *aculei* inconspicuous, straight , 0.2–1.0(–1.5) mm long, the *tuberculei* 0.2–0.3 mm long; *laminae* rhombic, proximally bipinnate-bipinnatisect with segments pinnatifid or tripinnate-pinnatisect with segments pinnatifid, medially bipinnate-bipinnatisect, distally pinnatisect, (0.45–)1.25–2.5 x (0.6–)1–1.4 m; *rachises* straight, greenish stramineous in all its length, the indument similar to the petioles, sparsely aculeate and tuberculat, rugose; *proximal pinnae* (30–)50–70 x (24–)40–50 cm, slightly inequilateral; *costae* abaxially and adaxially sparsely pilose, the *hairs* catenate-acicular, hyaline, 0.3–0.6 mm long, 3–8-celled; *costules* abaxially sparsely pilose, adaxially glabrous or with very scattered hairs, the *hairs* similar to those from the costae but smaller, 0.2–0.4 mm long, 3–6-celled; *veins* abaxially with very scattered hairs, the *hairs* similar to those from the costules, adaxially glabrous; *laminar tissue between the veins* abaxially sparsely strigose or gabrescent, the *hairs* catenate-acicular, hyaline, decumbent, 0.2–0.3 mm long, 2–4-celled, often very scatterred or caducous, adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, proximally greenish, distally hyaline, membranaceous in the hyaline portion, the *margins* dentate, commonly with one or two cilia, rarely none or three or more, the *cilia* 0.15–0.3 mm long, 2–4-celled.

Distribution and ecology: Endemic to SE Brazil (with only one dubious record for S Brazil - *J. Dutra 261 p.p.* (ICN)), in the Atlantic Forest *s.str.;* from 350 m up to 1800 m – Map 15A.

Additional material examined: BRAZIL. RIO DE JANEIRO: Teresópolis, Parque Nacional da Serra dos Órgãos, trilha para a Pedra do Sino, 1200-1800 m, 13/III/2008, *C.M. Mynssen et al. 1114* (RB-*n.v.*, SP, TUR-*n.v.*); Teresópolis [Guapimirim], Parque Nacional da Serra dos Órgãos, Sede Guapimirim, 22°29’37”S, 43°00’05”W, 350 m, 14/I/2008, *P.H. Labiak et al. 4521*(SP, UPCB); Guapimirim, Parque Nacional da Serra dos Órgãos, Sede Guapimirim, em frente à entrada do Parque, 22°29’37”S, 43°00’05”W, 350 m, 08/I/2011, *P.B. Schwartsburd et al. 2317* (SP); Locality unknown, Lote 88, 900 m, 28/II/1942, *A.C. Brade 17196* (NY-*n.v.*, RB-*n.v.*, SP-on 2 sheets); Locality unknown, *A. Glaziou 2380* (K, RB); SÃO PAULO: [Cunha?], Parque Estadual da Serra do mar, Núcleo de Cunha, [-23.1129°, -44.9497°], 15/XII/1996, *A. Salino 2858* (BHCB-*n.v.*, UEC); Santo André, Reserva Biológica do Alto da Serra de Paranapiacaba, [-23.7845°, -46.2309°], 14/I/1982, *A.T. Silva 376* (SP-on 3 sheets); Santo André, Reserva Biológica do Alto da Serra de Paranapiacaba, 15/IV/1982, *A.T. Silva 530* (SP); RIO GRANDE DO SUL: Bom Jesus, Capão na Fazenda Caraúna, [-28.6828°, -50.4717°], s.d., *J. Dutra 261 p.p.* (ICN).

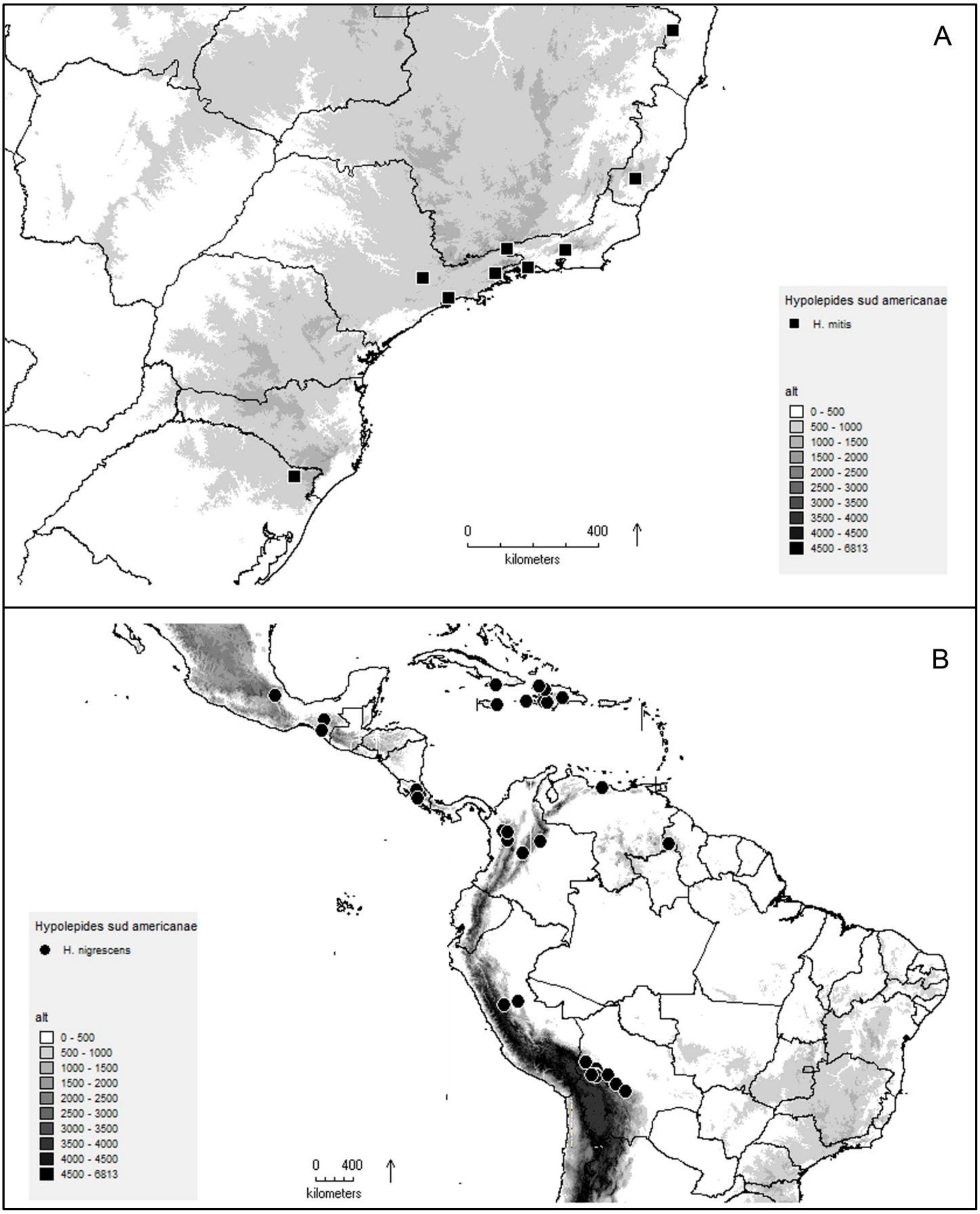
“Glabrescent” material (laminar tissue between the veins abaxially glabrescent): **BRAZIL.** MINAS GERAIS: Santa Maria do Salto, Distr. Talismã, Fazenda Duas Barras, 16°24’50.0”S, 40°02’57.4”W, 820 m, 07/III/2004, *A. Salino et al. 9462* (BHCB); ESPÍRITO SANTO: Castelo, Parque Estadual do Forno Grande, trilha para o Forninho, 20°30’58”S, 41°05’01”W, 1100 m, 12/II/2008, *P.H. Labiak et al. 4545* (CEPEC-*n.v.*, MBML, RB-*n.v.*, UPCB-on 2 sheets); RIO DE JANEIRO: Mangaratiba, Reserva Biológica do Rio das Pedras, trilha para o Mirante, 27/VIII/1998, *C.M. Mynssen 227* (RB); Mangaratiba, Reserva Rio das Pedras, trilha do Mirante, 22/III/1999, *C.M. Mynssen 259* (RB); Mangaratiba, Reserva Rio das Pedras, trilha do Cambucá, [-22.9646°, -44.0372°], 100 m, 20/I/2000, *M.G. Santos 1370* (RB-on 2 sheets); Teresópolis, Parque Nacional da Serra dos Órgãos, 22°26’56’S, 42°59’06”W [‘-22.4649°, -43.0173°’], 1700 m, 13/I/2008, *P.H. Labiak et al.* 4478* (SP, UPCB-on 2 sheets); Teresópolis, Parque Nacional da Serra dos Órgãos, trilha para a Pedra do Sino, [-22.4630°, -43.0196°], 06/I/2011, *P.B. Schwartsburd & J.B.S. Pereira 2308* (SP); Organ Mountains, III/1837, *J. Miers 222* (BM-2 sheets, K, OXF); Itatiaia, Parque Nacional do Itatiaia, Trilha para os Três Picos, 22°25’49”S, 44°36’02”W, 1220 m, 10/I/2008, *P.H. Labiak et al* 4426* (SP, UPCB); Itatiaia, Maromba, [22°25’42”S, 44°37’10”W], 24/XI/1927, *C. Porto 1555* (RB); Itatiaia, Parque Nacional do Itatiaia, Estrada para o Maromba, 22°25’42”S, 44°37’10”W, 1100 m, 09/I/2008, *P.H. Labiak et al.* 4383* (SP, UPCB); SÃO PAULO: Mun. Jundiaí, Serra do Japi, na trilha à esquerda antes de chegar na base da Reserva, indo para a Cachoeira Paraíso, 23°14’S, 46°56’W, 996 m, 13/XI/2009, *J. Prado et al. 2057* (SP); Mun. Jundiaí, Serra do Japi, na trilha à esquerda antes de chegar na base da Reserva, indo para a Cachoeira Paraíso, 23°14’S, 46°56’W, 996 m, 13/XI/2009, *J. Prado et al. 2062* (SP); Mun. Jundiaí, Serra do Japi, na estrada para a torre da TV Cultura, 23°15’S, 46°56’W, 1116 m, 14/XI/2009, *R.Y. Hirai et al. 674* (SP); STATE UNKNOWN: “Brasilia”, *W.J. Burchell 2360* (B [20 0074699], K – syntypes of *Hypolepis mitis*).

When describing the species, Kuhn (1869-1870) mixed at least two different species of *Hypolepis* within the syntypes: *Gardner 199 – H. mitis s.str.* (as here defined); *Lindberg 587 – H. stolonifera;* and *Burchell 2360 – H. mitis* (“glabrescent form”, see below). The material which suits best the protologue is *Gardner 199:* “*folia (...) dense pubescentia; petiolus (...) basi rufescens, stramineous (...); rhaches (...), rarius aculeo minuto (...); involucrum (...) margine ciliatum*”. The material at B (from Kuhn’s former herbarium) is only a fragment, so the material at BM is here chosen as the lectotype (which is from Gardner’s former herbarium).

The isolectotype in RB is written as “*Gardner 551*” by A.L.A. Fée. But this is probably due to an upside-down original label containing Gardner’s number, received by Fée. In FI-W the original label with Gardner’s number is actually upside-down and the number “9” is written in an “open manner” that the number “199” seems the number “551” (or “661”). In every other aspect these two materials agree with the others correctly numbered as “199”.

Hypolepis mitis is the only species in S/SE Brazil with the laminar tissue between the veins abaxially sparsely strigose (the hairs catenate-acicular, decumbent, 0.2–0.3 mm long – Fig. 8C) – see further differentiation from *H. acantha* under it. But, such hairs are commonly very sparse and not easy detected (*e.g.* Fig. 8D), and sometimes they are even totally caduceus (Fig. 8E). Such “glabrescent forms” can thus be confused with *H. repens* or *H. stolonifera,* which have the laminar tissue between the veins abaxially glabrous. Apart from the strigose laminar tissue, *H. mitis* can be differentiated from *H. repens* by the petioles proximally wine red and greenish stramineous above (*vs.* proximally dark brown, lighter brown above), the petioles and rachises very sparsely aculeate and tuberculate (*vs.* copiously aculeate), the lamina membranaceous (*vs.* chartaceous), and the pseudo-indusia commonly with one or two cilia, rarely with none or more (*vs.* never ciliate) – Figs. 8A–E *vs.* Figs. 11A–E.

And, also besides the laminar tissue between the veins abaxially strigose, *Hypolepis mitis* differs from *H. stolonifera* by the petioles and rachises sparsely aculeate and tuberculate (*vs.* inermous), and the pseudo-indusia commonly with only one or two cilia, rarely with none or more (*vs.* copiously ciliate) – Figs. 8A–E *vs.* Figs. 1A–I, 6D–F.



Map 15 A distribution of *Hypolepis mitis;* **B** distribution of *Hypolepis nigrescens.*

12. *Hypolepis nigrescens* Hook., Sp. Fil. 2: 66, t. 90c, figs. 1-3. 1852 [tabula publ. in 1851], *nom. cons*. **Lectotype,** designated by Proctor (1985: 179): Jamaica, [18.0548°, -76.7010°], [Catherine's Peak, scandent on trees, 15 Feb.], *N. Wilson s.n.* [*555*] (K-*n.v.*; isolectotypes: BM!-000605263, P-*n.v.*, image!; probable isolectotype: B!-20 0074711). **Figs. A–F, Map 15B.**

Dennstaedtia rubicaulis H. Christ, Bull. Herb. Boissier, sér. 2, 5(3): 258. 1905. Type: Avec *Pteris anfractusosa* couvrant les arbres de moyenne taille en liane au bord des forêts à Navarro, Costa Rica, [09.8117°, -83.8872°], [1400 m], [1901-1905], *I. Werckle s.n.* (holotype: BAS?-*n.v.* or P-*n.v.*, image!; isotypes: US-*n.v.*, image!, NY-frag.-*n.v.*, image!, S-*n.v.*, image!).

Hypolepis hispaniolica Maxon, J. Wash. Acad. Sci. 14(4): 88. 1924. Type: Haiti, Vicinity of Furcy, 1300 m, open slopes of Morne de Ouésane, [18.4130°, -72.3013°], 26/V-15/VI/1920 [13/VI/1920], *E.C. Leonard 4796* (holotype: US-on 3 sheets [1077327, 1077328, and 1077329], *n.v.*, image!; isotypes: B!, BM!, GH?-*n.v.*, NY-*n.v.*, image!, US-1077326, *n.v.*, image!).

Plants terrestrial. *Rhizomes* (1.5–)2–5 mm diam, glabrescent to sparsely hairy, the *hairs* catenate-acicular, yellowish-brown, 1–2.5 mm long, 15–20-celled. *Fronds scandent*, with interrupted growth, 3–5(–10?) m long; *petioles* ca. 1–2.5(–?) m x 3–5(–8) mm, proximally wine red to black, medially brown, distally light brown, abaxially glabrous, adaxially essentially glabrous, but with scattered hairs and trichomidia restricted to the groove, copiously aculeate, rugose, the *hairs* catenate-acicular, hyaline with the base and cross-walls reddish, or rarely entirely reddish, 0.4–1 mm long, 6–12-celled, the *trichomidia* hyaline with the cross-walls reddish, or entirely reddish, laterally apressed, 0.2–0.3(–0.5) mm long, 5–7(–10)-celled, the *aculei* curved, blackish, 0.5–1.5 mm long, commonly with a hair at the tip; *laminae* ovate(?), proximally bipinnate-bipinnatisect with segments pinnatifid to tripinnate-pinnatisect with segments pinnatifid, medially bipinnate-bipinnatisect with segments pinnatifid, distally constantly uncoiled, 2–4.5(–7?) x 0.8–1.6(–?) m; *rachises* straight entirely stramineous to light brown, abaxially and adaxially essentially glabrous, but with scattered hairs and trichomidia, especially in the groove and in the pinnae departures, the *hairs* and *trichomidia* similar to those from the petioles, copiously aculeate, rugose, with protecting pinnules envolving the pinnae departures and the uncoiled apex; *proximal pinnae* 40–80(–?) x

40–60(–?) cm, slightly inequilateral; *costae* abaxially with trichomidia and very scattered hairs, adaxially with trichomidia and with wings subintending onto the next axis, the *hairs* and *trichomidia* similar to those from the petioles and rachises; *costules* abaxially with trichomidia, adaxially glabrous or with very scattered trichomidia, and with wings departed from the costae; *veins* abaxially with trichomidia, adaxially glabrous or with very scattered trichomidia; *laminar tissue between the veins* abaxially essentially glabrous, raraely with some scattered trichomidia, and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, entirely yellowish, chartaceous, the *margins* crenate to dentate, glabrous.

Distribution and ecology: Cuba, Jamaica, Hispaniola, Central/Southern Mexico, Mesoamerica (only material from Costa Rica seen), Colombia, Venezuela, Guyana (in Mount Roraima; maybe Venezuela and/or Northern Brazil?), Peru, and Bolivia; from (900–) 1000 to 2800 m – Map 15B.

Additional material examined: CUBA. Prov. Oriente, Sierra Maestra, La Gran Piedra, ca. 1000 m, 28-29/VI/1914, *E.L. Ekman, Pl. Itin. Regnell. III 1642* (B, G, S-*n.v.*); Prov. Oriente, Sierra Maestra, Loma del Gato, ca. 900 m, 29/III/1916, *E.L. Ekman, Pl. Ind. Occid. 6968* (B, S-*n.v.*); Prov. Oriente, Sierra Maestra, El Gigante (a rather isolated mountaintop, Southeast of Bayamo, on Rio Guisa), [20.0017°, -76.8148°], ca. 1100 m, 04/I/1923, *E.L. Ekman, Pl. Ind. Occid. ex Itin. Ekman 16086* (B, S-*n.v.*). **JAMAICA.** Locality unknown, *Wiles s.n.* (K-000640340, BM-000605262 - syntypes of *Hypolepis nigrescens*); Locality unknown, *W. Purdie s.n.* (K-000640339 - syntype of *Hypolepis nigrescens*); Locality unknown, 1853-1855, *H. Barkly &* [*E.H.T.*?] *Barkly s.n.* (BM); Locality unknown, 1874-1879 [VII/1878?], *G.S. Jenman 71* (B, K, OXF-00072091); Locality unknown, *Anonymous n. 193, ex Herb. Hooker* (K); “Clyclesdale” 20/V/1898, *W. Harris 7206, Fl. Jamaicensis 660* (K); Chinchona, 5000 ft, 09/II/1900, *W.N. Clute 110* (K-on 2 sheets); Mórcés Gap, 4943 ft, 04/III/1909, *M.D. Watt 23* (K); Hardwar Gap, border of St. Andrew and Portland, [18.0758°, -76.6530°], 15/V/1945, *A.M. Barry P 65* (FI-PS); Parish, Portland, Port Roayl Mts., Blue Mts., trail from Harwar Gap, [18.1163°, -76.6821°], 3800-4000 ft, 27/IV/1961, *K.U. Kramer & G.R. Proctor 1783* (U). Locality unknown, *Anonymous, ex Herb. Kienpreuss* (B-20 0074710). **[HISPANIOLA], HAITI.** Massif de la Selle, gr. Crête-à-Piquants, Port-au-Prince, M. Malanga high ridge, [18.3050°, -72.0037°], 1300-1475 m [ca. 1400 m], 16/XII/1926, *E.L. Ekman, Pl. Ind. Occid. H 7390* (B, K, S-*n.v.*); Massif de la Selle, Croix-des-

Bouquets, in “Laubwald” near Mare-Rouge, [18.3374°, -72.0526°], ca. 1950 m, 11/III/1927, *E.L. Ekman, Pl. Ind. Occid. H 7824* (B, G, S-*n.v.*); Massif de la Hotte, western group, Torbec, top of M. Formon, [18.3831°, -74.0256°], 2225 m, 03/I/1927, *E.L. Ekman, Pl. Ind. Occid. H 7559* (BM [as “2250 m”], K, S-*n.v.*); Massif du Nord, Port-de-“Paise”, Mont Piton, [19.4714°, -72.2591°], 1100-1200 m, laubwald, 30/III/1928, *E.L. Ekman, Pl. Ind. Occid. H 9815* (B, S-*n.v.*); Vicinity of Bassin Bleu, summit of Haut Pitori, [19.8632°, -72.7623°], 630-1500 m, 14-27/IV/1929, *E.C. Leonard & G.M. Leonard 15169* (K). **[HISPANIOLA], SANTO DOMINGO.** Prov. Barahoma, 1911, *M. Fuertes 1335b* (B-on 2 sheets, BM, G-on 2 sheets, G-on 2 sheets, K, U, W); Cordillera Central, prov. Monte Cristi, Monción, Lagunas Cenobí, [18.7348°, -70.5690°], ca. 1100 m, 03/VI/1929, *E.L. Ekman, Pl. Ind. Occid. H 12706* (B, G, K-on 2 sheets, S-*n.v.*). **MEXICO.** VERACRUZ: [19.0241°, -97.2849°], *E. Berge 46* [or *7946*?] (LE); CHIAPAS: San Pablo, [16.7433°, -92.7161°], 2000 m, 1904, *G. Münch 158* (BAS?-*n.v.*, DS-*n.v.*, K, US-*n.v.* - syntypes?, or probably paratypes of *Dennstaedtia rubicaulis*); “Linea” Mexiquita, VI/1913, *A. Purpus 6710* (G-on 2 sheets); Cerro del Boqueron, [15.7470°, -92.9547°], VI/1914, *C.A. Purpus 6868’* (B-2 sheets). **COSTA RICA.** HEREDIA: Braulio Carrillo National Park, 10°15’N, 84°10’W, 1865 m, 11/XI/1986, *E. Hennipman et al. 6839* (BR, CR-*n.v.*, K-on 5 sheets, U?-*n.v.*). SAN JOSÉ: Dota. Zona Protectora Cerro Nara, Fila, 09°29’40”N, 84°00’50”W, 900-1000 m, 03/XII/1997, *A. Estrada 1348* (CR-*n.v.*, K-on 2 sheets). **COLOMBIA.** ANTIOQUIA: Urrao, El Chuscal, bosque cerca a la finca La Granada, prop. del señor Bernardo Restrepo, [06.4236°, -76.1464°], 2780 m, 17/V/1985, *L. Atehortúa et al. 1268* (HUA-on 2 sheets); Caramanta, límites con el Municipio de Támesis, sector nacimientos Quebrada El Conde, 05°33’27.5”N, 75°40’51.2”W, 2650 m, 16/IV/2005, *W.D. Rodríguez et al. 5438* (HUA-on 4 sheets); Medellín, Corregimiento de San Antonio de Prado, vereda Yarumalito, divisoria de aguas con el Mun. Heliconia, 06°15’03.16”N, 75°42’42.38”W, 2725 m, 27/X/2006, *W.D. Rodríguez et al. 6031* (HUA-on 2 sheets); CUNDINAMARCA et DISTRITO CAPITAL: Bogotá, “Tusugasuga” [Fusagasugá], 1800 m, *G.K.W.H. Karsten s.n.* (W); “Tusagasuga”, [Fusagasugá], [04.3384°, -74.3564°], 1800 m, *A. Lindig 96* (K); Mun. Silvania, vereda Aguabonita, carretera antigua Fusagasugá-Bogotá, km 21, [04.3363°, -74.3346°], 2350 m, 20/VI/1983, *F. Mejía P. 77* (LE); BOYACÁ: Carretera Sogamoso-Pajarito, bosque húmedo al borde del Río Cusiana, [05.4357°, -72.7210°], 2000 m, 04/II/1959, *H. Bischler 1779* (FI-PS, G-on 3 sheets). **VENEZUELA.** [DISTRITO CAPITAL?]: Caracas, [10.4041°, -

66.9721°], IV/1842, *J.J. Linden 516* (BM, BM-frag., BR, G, FI-W [as "*515*"], K, OXF, W – syntypes of *Hypolepis nigrescens,* as "*Linden 5 and 6*" in the protologue). **GUYANA [or VENEZUELA, BRAZIL?].** Mt. Roraima, [05.1968°, -60.7381°], 2300 m, *Tate 498* (NY-*n.v.* [*apud* Cremers & Kramer 1991, and Moran *pers. comun.*]). **PERU.** HUÁNUCO: Southwestern slope of the Río LullaPichis watershed, on the ascent of Cerros del Sira, beyond Camp 4 (Peligroso), 09°25'S, 74°44'W, ca. 1540 m, 25/VII/1969, *T.R. Dudley 13277* (W-2 sheets); Huanuco-Tingo Maria Road, ceja de la montaña, km 456, [-09.7096°, -76.0208°], ca. 2400 m, 13/IV/1977, *A. Gentry et al. 19308* (AMAZ-*n.v.*, F-*n.v.*, G-on 2 sheets, MO-*n.v.*, USM-*n.v.*). **BOLIVIA.** LA PAZ: Saavedra, Camata, Cerro Asunta Pata, entre el Cerro Yuyo y Camata, camino hacia Apolo 15°05.23'S, 68°29.33'W, 1420 m, 02/XI/2003, *J.R.I. Wood et al. 19800* (K, USZ-*n.v.*); Prov. B. Saavedra, Area Natural de Manejo Integrado Apolobamba, Wayrapata, ca. 1 km NE del caserío, 15°05'24"S, 68°29'30"W, 1470 m, 13/V/2004, *F. Miranda & A. Fuentes 84* (LPB, MO-*n.v.*, UC-*n.v.*); Prov. Caranavi, Serranía Bella Vista, 37 km de Caranavi hacia Sapecho, 15°40'S, 67°29'W, 1500 m, 24/VIII/1997, *M. Kessler et al. 11284* (LPB, UC-*n.v.*); Prov. Nor Yungas, Coroico, faldas del Cerro Uchimachi, [-16.2034°, -67.7160°], 2200 m, 01/I/1994, *G. Beck 21293* (LPB, UC-*n.v.*); Sud Yungas Prov., La Paz-Chulumani Road, 15.1 km W of Chulumani, 9.3 km from Huancané, 16°15'S, 67°30'W, 2450 m, 02/VIII/1989, *A. Fay & L. Fay 2519* (LPB, MO-*n.v.*); Sud Yungas Prov., La Paz-Chulumani Road, 15.1 km W of Chulumani, 9.3 km from Huancané, 16°15'S, 67°30'W, 2450 m, 02/VIII/1989, *A. Fay & L. Fay 2527* (LPB, MO-*n.v.*); Sud Yungas Prov., La Paz-Chulumani Road, 15.1 km W of Chulumani, 9.3 km from Huancané, 16°15'S, 67°30'W, 2450 m, 02/VIII/1989, *A. Fay & L. Fay 2531* (LPB-on 2 sheets, MO-*n.v.*, UC-*n.v.*); Sud Yungas Prov., 9 km de Huancané en la carretera hacia San Isidro, 16°21'S, 67°31'W, 2400 m, 02/V/1989, *D.N. Smith & J.F. Smith 13103* (LPB-on 2 sheets, MO-*n.v.*); COCHABAMBA: Prov. Chapare, Territorio Indígena Parque Nacional Isiboro-Secure, Cordillera de Mosetenez, cresta arriba de laguna Carachupa, 16°14'S, 66°25'W, 1550 m, 02/IX/2003, *M. Kessler et al. 13186* (LPB, UC-*n.v.*); Prov. José Carrasco Torrico, 136 km antigua carretera Cochabamba-Villa Tunari, 17°06'S, 65°35'W, 1900 m, 15/VII/1996, *M. Kessler et al. 7301* (LPB, UC-*n.v.*). **LOCALITY UNKNOWN.** Indiae Occidentalis, *Carmichael s.n.* (K); West India, *Anonymous, ex Herb. Kew n. 328* (LE); Locality unknown, *Anonymous* (LE-*p.p.* [as *"Trichomanes aculeatum"*]).

Juvenile specimens: BOLIVIA. LA PAZ: Prov. J. Bautista Saavedra M., Pauji-Yuyo, entre Apolo y Charazani, 15°03'S, 68°29'W, 14/VI/1997, *M. Kessler et al. 10119* (LPB, UC-*n.v.*); Prov. Nor Yungas, Estación Biológica de Tuquini, Hornuni Bajo, senda de Don Pedro al camino de la mina, 16°12'S, 67°53'W, 1900 m, 20/VII/2000, *K. Bach 1202* (LPB); Prov. Nor Yungas, Estacion Biologica de Tuquini, Hornuni Bajo, senda del campo de Don Pedro al pajonal atrás del rio Cedroni, 16°12'S, 67°52'W, 1850 m, 21/VIII/2001, *K. Bach et al. 1522* (LPB, UC-*n.v.*); Prov. Nor Yungas, Estación Biológica de Tuquini, Hornuni Bajo, senda cafetal al camino de la mina, 16°12'S, 67°53'W, 1900 m, 22/VIII/2001, *K. Bach et al. 1596* (LPB); COCHABAMBA: Prov. José Carrasco Torrico, a 3 km aproximadamente desde el campamento locotal, en dirección NW, a lo largo de la antigua senda de Cara Wasi a Pojo, 17°46'S, 64°45'W, 2200 m, 02/II/2000, *I. Jiménez 294* (AAU-*n.v.*, LPB).

All the syntypes originally cited by Hooker (1858) correspond to *Hypolepis nigrescens* in the present concept, except for *Cuming 271* (K-000492487, FI-W-on 2 sheets, LE-2 sheets, OXF-2 sheets, RB, UPS), which is a specimen of *Dennstaedtia scandens* (Blume) T. Moore. Hooker & Baker (1868: 130) had already excluded this collection from the syntypes.

Schwartsburd & Prado (2009 – annexe 1) showed the name *Hypolepis nigrescens* Hook. is a later homonym of *Hypolepis nigrescens* (Schrad.) Nees (Cyperaceae), and had been equivocally used for nearly 150 years. Hooker's name is now a *nomen conservandum* (see Brummit 2011 for more details).

As discussed above ('Results, Species groups'), *Hypolepis nigrescens* is strongly different from any other *Hypolepides* from the Americas, and probably deserves generic segregation. Its exclusive characters, shared only with the Australasian *H. brooksiae* Alderw., *H. celebica* C. Chr. *in* Kjellberg & C. Chr. (synonym of *H. brooksiae*, *apud* Brownsey 1987), and *H. scabristipes* Brownsey are: the petioles and rachises with curved and blackish aculei (Figs. 12C, F; *vs.* aculei always straight and of the same color of the axes), the pinnae departures protected by accessory pinnules (Fig. 12B; *vs.* always unprotected), and the costae with adaxial wings subintending onto the costules (Figs. 12D, E; *vs.* connecting wings always absent). In addition, the growth pattern of the fronds of *H. nigrescens* (and allies) is the interrupted one (Fig. 12A), shared only with *H. flexuosa* subgroup, but in a different way (see also ‘Results, Morphology, Leaves’).

Apart from the distribution, *Hypolepis nigrescens* differs from *H. brooksiae* and *H. celebica* by segments and lobes with the apexes dentate (Fig. 12F; *vs.* rounded), and the costae, costules and veins abaxially with trichomidia (*vs.* with catenate-acicular hairs). *Hypolepis nigrescens* differs from *H. scabristipes* by these same differences, and by the aculei rough, fulfilled, and persistent (Figs. 12C, F; *vs.* fragile, hollow, and caducous).

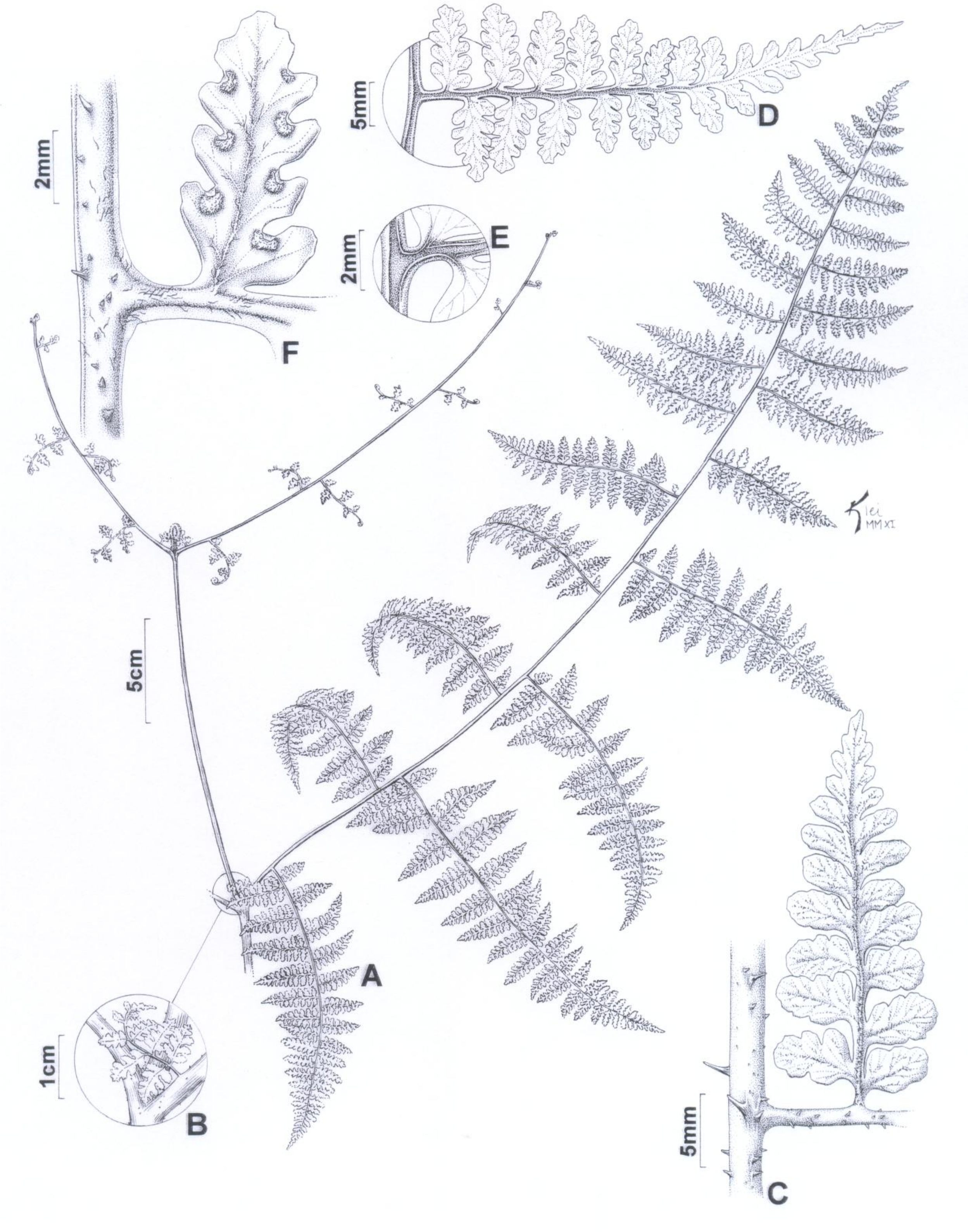


Fig. 12 *Hypolepis nigrescens:* **A** apex of lamina (*Rodríguez 5438*), **B** proximal acroscopic pinnule protecting the pinna departure (*Rodríguez 5438*), **C** pinna-rachis and secondary pinnule abaxially (*Atehortúa 1268*), **D** secondary pinnule adaxially (*Rodríguez 5438*), **E** detail of the adaxial connecting wing (*Rodríguez 5438*), **F** fertile segment abaxially (*Rodríguez 5438*).

13. ***Hypolepis nuda*** Mett. *in* Kuhn, Linnaea 36: 105. 1870. **Lectotype,** designated by Proctor (1985: 177 - first step), and here (second step): Venezuela, Mérida, [08.6038°, -71.1140°], s.d., *F. Engel 171* (B!-20 0074725 *p.p.* [ex Herb. Mettenius]; isolectotypes: B!-frag.-20 0074725 *p.p.* [ex Herb. Kuhn], US-frag., *n.v.*; probable isolectotypes: LE!-2 sheets). **Map 16A.**

Hypolepis ekmanii Maxon, Proc. Biol. Soc. Wash. 43: 84. 1930, as "*ekmani*". Type: Haiti, Massif de la Hotte, [Western group], [Torbec], [top of] Morne Formon, [18.3827°, -74.0250°], 2200 m, 01/I/1927, *E.L. Ekman,* [*Pl. Ind. Occid.*] *H. 7503* (holotype: US-1302995, *n.v.*; isotypes: BM!, C-*n.v.*, S?-*n.v.*).

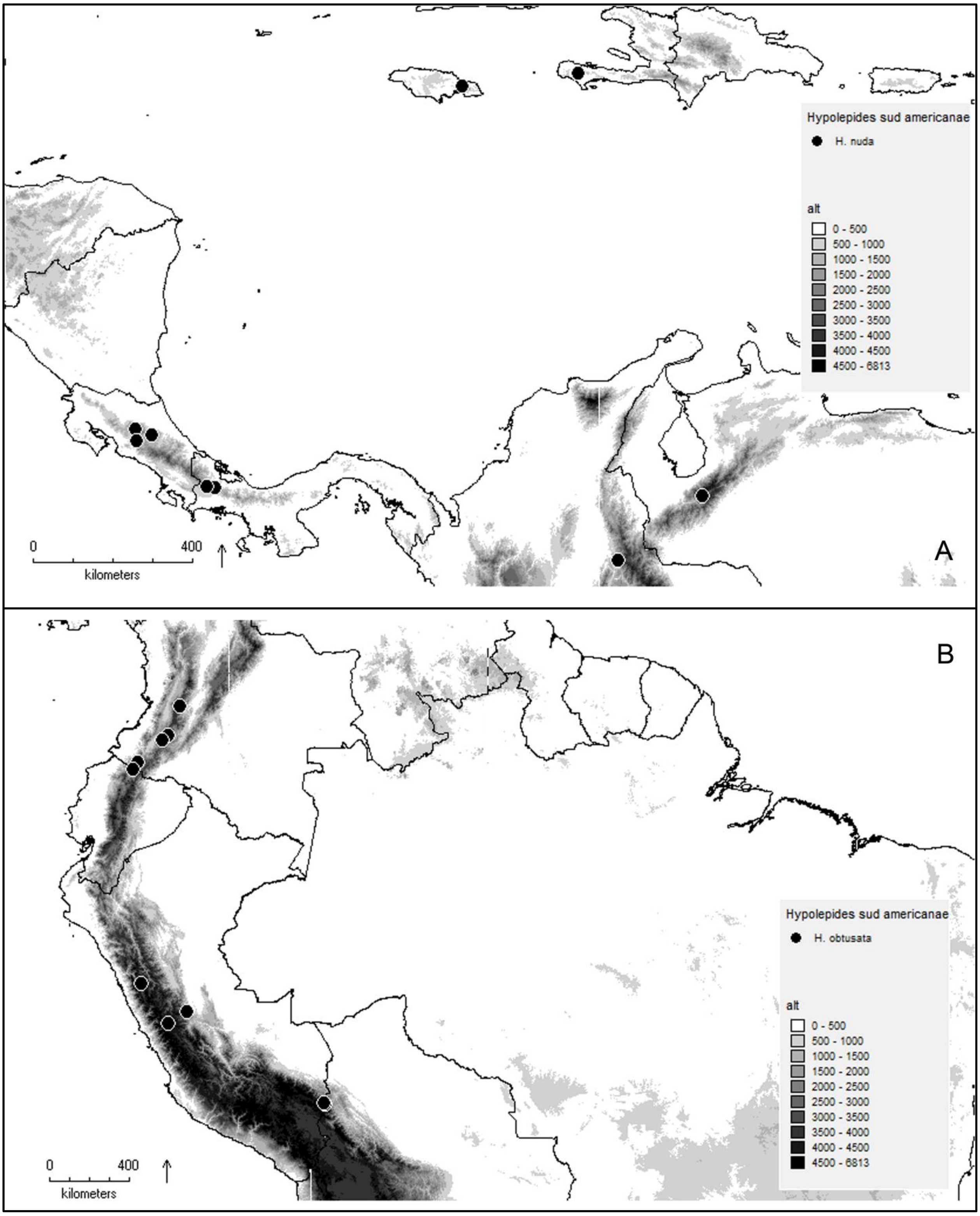
Hypolepis trichobacilliformis R.C. Moran, Ann. Missouri Bot. Gard. 77(4): 847, figs. 3d-f. 1990. Type: Panama, Chiriquí, along trail between N fork of Río Palo Alto and Cerro Pate Macho, ca. 6 km NE of Boquete, 08°48'N, 82°23.5'W, 1600-2000 m, 6/II/1986, *A.R. Smith et al. 2361* (holotype: MO-*n.v.*; isotype: UC-*n.v.*). *ex descr., icon, et paratypi.*

Plants terrestrial. *Rhizomes* 3.5–9 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, lax, 1.5–2(–3) mm long, 15–20(–30)-celled. *Fronds* erect (to arched?), with continuous growth, 60–100(–200?) cm long; *petioles* 15–30(–50?) cm x 2.5–5 mm, proximally brown to dark brown, golden-brown above, abaxially and adaxially glabrous, sparsely tuberculate (especially proximally), non-rugose, the *tuberculei* rounded, 0.1–0.15 mm long, of the same color of the petioles; *lamina* ovate (or rombic?), proximally ranging from pinnate-bipinnatisect with segments pinnatifid, to bipinnate-pinnatisect with segments pinnatifid, up to bipinnate-bipinnatisect with segments pinnatifid, medially pinnate-bipinnatisect with segments pinnatifid, distally pinnatisect, 40–75(–1.5?) x 40–90(–130?) cm; *rachises* straight, proximally golden-brown, light brown above, abaxially and adaxially glabrous, inermous, non-tuberculate, non-rugose; *proximal pinnae* 20–45(–65?) cm x 10–30 cm, strongly inequilateral; *costae* abaxially and adaxially glabrescent or with scattered trichomidia, the *trichomidia* baciliform, entirely yellowish or reddish, apressed, 0.07–0.2(–0.3) mm long, 1–3(–4)-celled; *costules* abaxially and adaxially sparsely with *trichomidia*, these similar to those from the costae; *veins* abaxially with sparse trichomidia, adaxially glabrous or with scattered trichomidia, the *trichomidia* similar to those from the costae and costules, but usually smaller, 0.07–0.1 mm long, 1 or 2-celled; *laminar tissue between the veins* with the same indument pattern that of the veins; *lamina margins* glabrous; *sori* submarginal; *pseudo-indusia* usually absent, rarely the lamina margins slightly differentiated, only partly protetcting the sori, partly green, partly hyaline, chartaceous, the *margins* smooth to slightly crenate, glabrous.

Distribution and ecology: Jamaica, Hispaniola, Costa Rica, Panama, Colombia, and Venezuela; from 1450 to 2350 m – Map 16A.

JAMAICA. [18.1019°, -76.6691°], 5000-6000 ft, VII/1878, *G.S. Jenman 30* (K, OXF-2 sheets). **[HISPANIOLA], HAITI.** Dep. du Sud, Massif de la Hotte, western group, on the western ridge of La Blanche, [18.3926°, -73.9813°], 1500 m (?), 08/VIII/1917, *E.L. Ekman, Pl. Ind. Occid. H 579* (K, S-*n.v.*). **COSTA RICA.** Entre le Rancho del Achote et le Potiero del Alto, au flane S. du Poas, [10.1625°, -84.2271°], 2350 m, 26/VII/1888, *H. Pittier 376* (BR-on 2 sheets); Entre le Potiero del Alto et le Rancho del Achiote, Massif du Poas, [10.1560°, -84.2294°], 2200 m, I/1889, *H. Pittier 825* (BR [as *825 b*], G, G-on 2 sheets); Forêts de l'Achiote, Volcan du Poas, 2200 m, XI/1896, *A. Tonduz 10696* (BR, G-2 sheets, LE-2 sheets, US-*n.v.*); Forêts du Roble, massif du Volcan de l'Irazu, [10.0304°, -83.8575°], ca. 2000 m, 10/VII/1891, *H. Pittier 4173* (B, BM, BR, G-on 2 sheets, G-2 sheets, US-*n.v.*); La Palma, [09.9020°, -84.2157°], 1450 m, 17/III/1916, *Brade 354 (Rosenst. Fil. Costar. Exsic. 235)* (B, W). **PANAMA.** CHIQUIRI: Cerro Punta, Las Nubes, Parque Internacional La Amistad, sendero al Castillo, próximo a la cabaña, [08.8354°, -82.5670°], 2300 m, 19/IX/1994, *I. González 55* (K-on 2 sheets [labelled as "*55 a1*" and "*55 a2*"]). **COLOMBIA.** SANTANDER: "Lisabita", [07.1156°, -73.0760°], 05/IV/1879, *W. Kalbreyer 1111* (B-6 sheets). **VENEZUELA.** [MÉRIDA]: Mérida, s.d., *G.K.W.H. Karsten s.n.* (W-2 sheets); Mérida, 1859, *Engel 103b* (B). **UNKNOWN LOCALITY.** *Anonymous s.n., ex Herb. T. Moore* (B-20 0074726); West Indies, *Anonymous?* (W-198945).

Hypolepis nuda is unique with the following combination of chararacters: the fronds medium-sized, 60–100(–200?) x 40–90(–130?) cm, furnished only with baciliform trichomidia, especially on the abaxial surface of the laminar tissue between the veins, the petioles glabrous, inermous, sparsely tuberculate, and non-rugose, the rachises glabrous and non-rugose, the sori submarginal, and the pseudo-indusia mostly absent. In some specimens, the lamina margins are slightly differentiated into pseudo-indusia (even partly hyaline), but they never protect the whole sori. *Hypolepis nuda* is not similar to any species from South America.



Map 16 A distribution of *Hypolepis nuda;* **B** distribution of *Hypolepis obtusata.*

14. *Hypolepis obtusata* (C. Presl) Kuhn, Festschr. Jubil. Königstädt. Realsch. Berlin: 347 (Chaetopterides: 27). 1882. *Cheilanthes obtusata* C. Presl, Reliq. Haenk. 1: 64, t. 11, fig. 1. 1830. **Lectotype,** designated by Tryon (1964: 36): [Peru], Peruanae Montanae, 1790, *T.P.X. Haenke s.n.* (PR!-5735; isolectotype: PRC!-450746). **Figs. 13A–F, Map 16B.**

Polypodium fulvescens Hook. & Grev. *in* Hook., Bot. Misc. 2: 239. 1831. Lectotype, designated by Tryon (1964: 36): Peru, near Pasco, Huaylluay, [-10.4289°, -75.4211°], s.d., *A. Cruckshanks s.n.* (GH-*n.v.*; isolectotypes: K [labeled as "Holotype 1/2" by Schwartsburd], K [as "Holotype 2/2"], US-frag., *n.v.*; probable isolectotypes: B-frag., LE [ex Herb. Greville]).

Hypolepis purdieana Hook., Sp. Fil. 2: 69, t. 91, fig. B. 1852. Lectotype, designated here: New Grenada [Colombia], Paramo of Ruiz, 1844, *W. Purdie s.n.* (K!-000640330; isolectotype: BM!; probable isolectotype: B!-frag.).

Plecosorus peruvianus Fée, Gen. Filic.: 151. 1852. Lectotype designated by Tryon (1964: 36): [Peru], Habitat in Peruviâ, (Pavon, dedit nobis Matrit. ann. 1809; Donné par Ruiz/Pavon à Madrid en 1809-1810), *H. Ruiz López & J.A. Pavón y Jimenez s.n.* (K!-frag. [000640333 *p.p.*]; isolectotypes:, MA?-*n.v.*, OXF!, P?-*n.v.*, RB! [ex Herb. Fée]).

Plants from bases of rocks. *Rhizomes* 1.5–3.5 mm diam., with hairs, the *hairs* catenate-acicular, lax, yellowish-brown, 2–3(–4) mm long, 20–30(–35)-celled. *Fronds* erect, with continuous growth, (15–)25–60 cm long; *petioles* 10–25 cm x 0.8–2.8 mm, proximally wine red, medially and distally reddish-brown, or entirely reddish-brown, mostly glabrescent, but sometimes with sparse hairs similar to those from the rhizomes, inermous, rugose; *laminae* linear-lanceolate, proximally and medially pinnate-pinnatisect with segments pinnatifid to pinnate-bipinnatisect, distally pinnatisect, (7–)13–38 x (2–)3.5–11 cm; *rachises* straight, proximally and medially reddish-brown, distally stramineous to reddish-brown, abaxially and adaxially sparsely lanose, the *hairs* catenate-acicular, lax, hyaline with the base and cross-walls reddish, or entirely reddish, (1–)2–3 mm long, (10–)15–35-celled; *proximal pinnae* (1.5–)2.5–4.5(–5.5) x (0.8–)1.2–2(–2.8) cm, slightly inequilateral; *costae* abaxially lanose, adaxially glabrous to sparsely lanose, the *hairs* similar to those from the rachises, but the entirely reddish absent; *costules* abaxially lanose, the *hairs* similar to those from the costae, adaxially glabrous; *veins* with the same indument pattern that the costules; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* sub-marginal, frequently confluent, seeming falsely acrostichoid; *pseudo-indusia* slightly differentiated, entirely green, coriaceous, the margins smooth to slightly crenate, glabrous.

Distribution and ecology: Andes of Colombia, Ecuador, Peru and Bolivia, in the Andine/Paramos vegetation; from 3800 to 4600 m – Map 16B.

Additional material examined: COLOMBIA. TOLIMA: Tolima, "Hoha" Paramo, [03.6805°, -75.7625°], 4600 m, s.d., *A. Stübel 70* (B); [CAUCA]: Popayan, [02.3207°, -76.3048°], s.d., *A. Stübel 94* (B); Puracé, Puracé-Sutará [Sotará], [02.1091°, -76.5819°], 3900 m, s.d., *A. Stübel 129* (B); [NARIÑO]: Azufral de Túquerres, Laguna Verde, [01.0725°, -77.6909°], s.d., *A. Stübel 315* (B); Ualcalá, Pasto nahn Tuquerres Azüfral, [01.0876°, -77.7108°], 3800 m, s.d., *A. Stübel 317b* (B). **ECUADOR.** CARCHI: Road Tulcán-Maldonado, at the base of Volcán Chiles, 34-36 km from Tulcán, 00°47'N, 77°57'W, 3950 m, 02/VIII/1976, *B. Øllgaard & H. Balslev 8374* (AAU-*n.v.*, HB, K, U). **PERU.** ANCASH: Cordillera Blanca, Quebrada Honda, West side of L. Vinouyo on moraine, [-09.1327°, -77.5455°], 4300 m, 26/VI/1979, *M. Gibby &* [*P.*?] *Barrett 38* (BM); Cordillera Blanca, Quebrada Honda, West side of L. Vinouyo on moraine, 4300 m, 26/VI/1979, *M. Gibby &* [*P.*?] *Barrett 44* (BM); [PASCO]: "Huaylluay" [Huayllay], [-10.9974°, -76.3292°], *A. Mathews 968* (K, OXF); Huayllay(?), 19/VII/1954 [or 1959?], *Anonymous* [*unreadable*] *n. P 1893* (B); LOCALITY UNKNOWN: Tabina, "Ost Abhang der Cordilleren", VI/1854, *W. Lechler 2094* (B); Pavon, III/1885, *H.C. Levinge s.n.* (K). **BOLIVIA.** LA PAZ: Franz Tamayo, Comunidad Kiara (antiguo), desde el pueblo bajando hacía el río Ventitani, subiendo río arriba por este hasta la altura de una cascada, para luego ir por la izquierda en dirección a la laguna Waka qocha, [-14.7183°, -69.0425°], 17/VI/2005, *I. Jiménez et al. 2781* (BOLV-*n.v.*, CTES-*n.v.*, HSB-*n.v.*, LPB, MO-*n.v.*, UC-*n.v.*, USZ-*n.v.*); Franz Tamayo, sendero Kiara (nuevo)-Puina, antes de llegar a la cumbre, en las cercanías de una laguna, 14°40'38"S, 69°06'22"W, 4300 m, 19/VI/2005, *I. Jiménez et al. 2802* (BOLV-*n.v.*, LPB, MO-*n.v.*, USZ-*n.v.*).

Hypolepis obtusata is easily recognized by occurring at extremely high elevations (3800 to 4600 m), the fronds small, (15–)25–60 x (2–)3.5–11 cm, the axes with long catenate-acicular hairs, 2–3(–4) mm long, 20–30(-35)-celled, the lamina proximally pinnate-pinnatisect with segments pinnatifid to pinnate-bipinnatisect, the pinnae strongly ascendant, the lamina margins strongly revolute, the sori commonly confluent, and the pseudo-indusia slightly differentiated and entirely green – Figs. 13A–F. Some specimens, apparently the "sheltered forms", have the pinnae slightly ascendant, and the lamina margins flat (Figs. 13B, D *vs.* Figs. 13A, F), and thus this species can be confused with *H. crassa* (but, see discussion of *H. crassa* for differentiation).

Another similar species, which Tryon (1964) and Tryon & Stolze (1989) considered as a synonym, is *Hypolepis pteroides.* Although *H. pteroides* is known only from a few collections, seeming just a "giant form" of *H. obtusata*, there are indeed consistent differences between these two *taxa. Hypolepis obtusata* differs from *H. pteroides* by the hairs of the rhizome much longer, 2–3(–4) mm long, 20–30(–35)-celled (*vs.* 1–2 mm long, 15–20-celled), the lamina linear-lanceolate (*vs.* ovate), proximally pinnate-pinnatisect with segments pinnatifid to pinnate-bipinnatisect (*vs.* bipinnate-pinnatisect with segments pinnatifid to bipinnate-bipinnatisect), and much smaller, (7–)13–38 x (2–)3.5–11 cm (*vs.* 40–50 x 20–35 cm), the sori sub-marginal (*vs.* marginal), and the pseudo-indusia not differentiated and entirely green (*vs.* slightly differentiated, partly green, partly hyaline) – Figs. 13A–F *vs.* Fig. 13G.

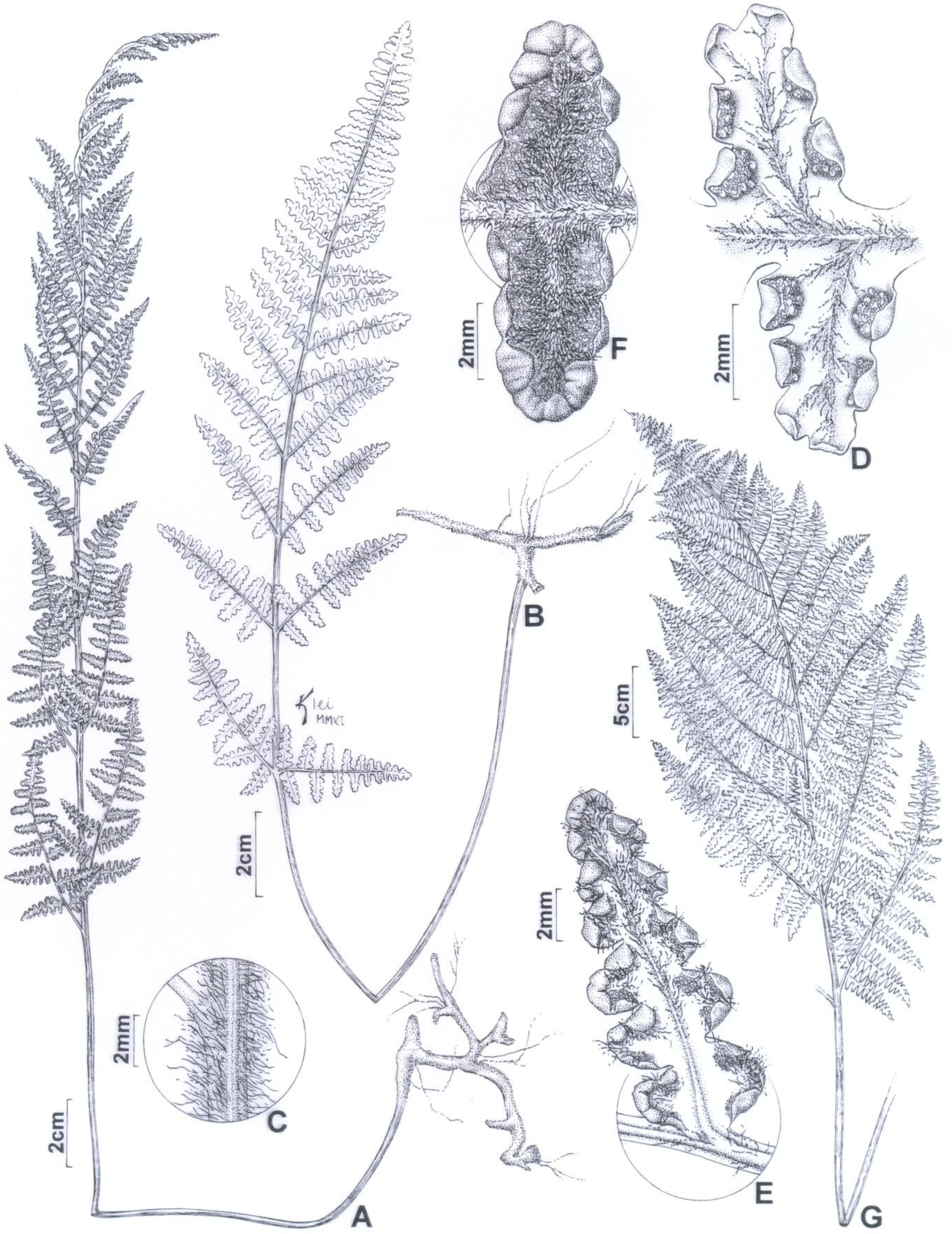


Fig. 13 A–F *Hypolepis obtusata:* **A** habit (*Jiménez 2781*), **B** habit (*Jiménez 2802*), **C** intersection petiole/rachis (*Jiménez 2781*), **D** fertile flat segments abaxially (*Jiménez 2802*), **E** fertile pinnule abaxially (*Jiménez 2781*), **F** fertile contracted segments abaxially (*Jiménez 2781*); **G** *Hypolepis pteroides* (*Lechler 2152*): habit.

15. *Hypolepis parallelogramma* (Kunze) C. Presl, Tent. Pterid.: 162. 1836. *Cheilanthes parallelogramma* Kunze, Linnaea 9: 85. 1834. **Lectotype,** designated here: [Peru], In sylvis montium fl. Peruv. altiorum densioribus ad Pampayaco [Peru, Huánuco, Pampayaco], [-09.9465°, -76.2629°], VII/1829, *E. Poeppig s.n.* (W! ["Peruv. subandin. In sylv. mont. 'editiorum'(?) ad Cuchero, Aug. 1829, *Poeppig* "]; probable isolectotypes: K!-on 2 sheets ["*Dicksonia erosa* Kunze, Peruvia, 1830"], LE!-frag. ["*Poeppig 220*"], PRC!-frag. ["Kunze dedit 1835"]). **Figs. 14A–D, Map 17A.**

Cheilanthes radula Kunze ex Hook. & Baker, Syn. Fil.: 130. 1867, *nom. nud.*

Cheilanthes scabra H. Karst. ex Hook. & Baker, Syn. Fil.: 130. 1867, *nom. nud.*

Plants terrestrial. *Rhizomes* 3–6 mm diam., with hairs, the *hairs* catenate-acicular, lax, yellowish-brown, 1–2 mm long, 7–15-celled. *Fronds* scandent, with continuous growth, (2–)3–8 m long; *petioles* (60–)75–200 cm x 4.5–6 mm, proximally dark brown, medially and distally stramineous to light brown, glabrous, copiously aculeate, non-rugose, the *aculei* straight, the same color of the petioles, 0.2–0.6 mm long; *laminae* oblong, with parallel architecture, proximally bipinnate-pinatisect with segments slightly lobed (or rarely, tripinnate-pinnatisect), medially bipinnate-pinatisect, distally pinnatisect, (1.25–)2–6 x (0.5–)1–1.7(–2?) m; *rachises* straight, entirely stramineous to light brown, abaxially with very scattered trichomidia, adaxially (especially in the groove) pilose with hairs and trichomidia, aculeate, non-rugose, the *hairs* catenate-acicular, hyaline with the base and cross-walls reddish, 0.3–0.5(–0.7) mm long, 5–7(–10)-celled, sparse, the *trichomidia* hyaline with the cross-walls and apex reddish, laterally apressed, 0.2–0.5 mm long, 5–12-celled; *proximal pinnae* (25–)50–85 x (12–)25–35(–45) cm, equilateral; *costae* abaxially mainly with trichomidia, and a very few scattered hairs, adaxially with hairs, the *hairs* similar to those from the rachises, but usually entirely hyaline, the *trichomidia* similar to those from the rachises; *costules* abaxially with trichomidia, adaxially glabrous; *veins* abaxially glabrous or with very scattered trichomidia, adaxially glabrous; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, entirely stramineous, chartaceous, the *margins* smooth to crenate, glabrous.

Distribution and ecology: Venezuela, Colombia, Ecuador, Peru, and Bolivia, in the sub-Andine/Amazon forested regions; from (850–) 1100 to 2700 m. Tryon & Stolze (1989) also cites it for 550 m – Map 17A.

Additional material examined: VENEZUELA. ARAGUA: [Tovar], Coloniae Tovar, [10.3539°, -67.2589°], s.d., *J.W.K. Moritz s.n.* (BM, BR-on 3 sheets, K-on 2 sheets); [Tovar], Coloniae Tovar, [ad vias in nemorib. sub alpinis; vel, ad marg. sylvarum...], IX/1847, *J.W.K. Moritz 388* (BR, K-on 3 sheets, K-3 sheets, W-3 sheets); [Tovar], prope coloniam Tovar, [10.4000°, -67.2120°], 6.500 ft, 1854-1855, *A. Fendler 66* (BM, BR, G-on 2 sheets, G-2 sheets, K, MO-*n.v.*, OXF, YU-*n.v.* [on 2 sheets]); "Caracas" [Tovar], Colonia Tovar, s.d., *G.K.W.H. Karsten s.n.* (LE, W-2 sheets); "Caracas" [probably Tovar], s.d., *G.K.W.H. Karsten s.n.* (W); "Caracas" [or Coloniae Tovar?], 1852 [or 1847?], *J.W.K. Moritz 388* (BM, FI-W-on 4 sheets); Cordillera de La Costa, Serranía del Litoral, Monumento Natural Pico Codazzi, 4-5 km de La carretera Colonia Tovar-La Victoria, em la carretera Los Anaucos, después de la bifurcación em el sector La Cruz hacía Las Marías y Buenos Aires, em el sector Cueva de La Burra, 10°24–25'N, 67°22'15"W, 1650 m, 08/II/2000, *J. Mostacero et al. 491* (VEN-on 2 sheets); Cordillera Interior, Cerro El Pauji, Topo El Pauji, al Sur de El Consejo, 10°11'N, 67°15'W, 1450 m, 14/VII/1979, *J.A. Steyermark & A. Stoddart 118009* (MY, VEN-on 2 sheets); [DISTRITO CAPITAL]: Prov. Caracas, [10.3484°, -66.9143°], 4000 ft, II/1846, *N. Funck & L.J. Schlim 492* (BM, BR-on 2 sheets, G-on 2 sheets, L, LE, W-2 sheets); Caracas, *Anonymous [possibly Moritz] s.n.* (L-908286-222); "DISTRITO FEDERAL", Parque Nacional El Ávila, Cerro El Ávila, vertiente sur, carretera Caracas-Galipan, Los Asientos, 10°33'N, 66°54'W, 1800-1900 m, 11/II/2006, *W. Meier 13087* (B-*n.v.*, G, UC-*n.v.*, VEN-*n.v.*); YARACUY: Sierra de Aroa, 9 km W of San Felipe air distance, on Road 0-3 km NE of road between Cocorote and Aroa, 15 km NW of Cocorote and 1 km SW of Los Cruceros, 10°21'N, 68°49'W, 1100-1500 m, 04/IV/1980, *R, Liesner & A. González 9988* (VEN); FALCÓN: Sierra de San Luis, arriba de La Chapa, [11.2212°, -69.5559°], 1200 m, 01/VI/1979, *Flora Falcón (HW, TR) n. 700* (MY); LARA: Dept. Morán, [09.7833°, -69.8976°], 1500 m, 06/III/1983, *F. Ortega et al. 1631* (VEN); TRUJILLO: Mun. Boconó, Parque Nacional Guaramacal, sector El Santuario, La Punta, 1009381 N, 19358403 W ['09.2425°, -70.2230°'], 1860 m, 09-16/VII/1998, *B. Stergios 17460* (VEN); arriba de La Puerta, cerca del Hotel Valera-Alta, a la cumbre de la Cordillera, [09.1373°, -70.7104°], 2100 m, 18/I/1986, *J. Bono 5702* (VEN);

LOCALITY UNKNOWN: locality unknown, in “nemorib.” mont. elevat., s.d., *J.W.K. Moritz s.n.* (L-on 2 sheets [908286-224, 908286-225). **COLOMBIA.** [MAGDALENA]: Santa Marta, [11.1132°, -74.0347°], 1898-1901, *H.H. Smith 2217* (G, NY-*n.v.*); SANTANDER: Mun. “Bmanga” [Bucaramanga?], km 29-30 vía Pamplona, [07.1146°, -72.9849°], 2700 m, 02/VIII/1984, *G. Díaz et al. 45* (HUA); Floridablanca, alrededores de El Dieciocho, bosque entre la carreteraBucaramanga-Pamplona y la carretera a Tona, [07.1274°, -73.0500°], 1800-2000 m, 21/VI/2004, *J. Murillo & D. Foreno 3595* (HUA); ANTIOQUIA: Mun. Angelópolis, vereda Romeral, sector Bocatoma, acueducto multiveredal, Quebrada Los Animas, 06°09’29”N, 75°42’05”W, 2100-2200 m, 29/X/2005, *W.D. Rodíguez et al. 5562* (HUA-on 3 sheets); Mun. Angelópolis, sector Bocatoma acueducto, Quebrada Las Animas, 06°06’55.08”N, 75°41’54.16”W, 1950 m, 06/II/2005, *W.D. Rodríguez et al. 5090* (HUA-on 3 sheets); [CHOCÓ]: at and on both sides of the principal ridge W of La Mansa, at ca. 105.5 km of the Ciudad Bolivar-Quibdo Road, [05.8836°, -76.0999], 2100-2200 m, 04/IV/1971, *D. Lellinger & E.R. de la Sota 921* (HUA, LP-*n.v.*, US-*n.v.*); BOYACÁ: Santa María, vereda Cano Negro, camino a Palo Negro, entre las fincas Santa Rosita, El Recuerdo y El Tesoro, hacía La Cuchilla Negra, [04.9112°, -73.3345°], 1520-1930 m, 04/XI/2003, *J. Murillo & C. Méndez 3395* (HUA); LOCALITY UNKNOWN: Locality unknown [probably Venezuela, Colonia Tovar], *Anonymous [possibly Moritz] s.n.* (UPS [499366]). **ECUADOR.** [PASTAZA?]: In Andibus Ecuadoriensibus, in sylvis “Pastasie” superioris, ad fl. Verde ostia, [-01.2962°, -78.1955°], 1857-1859, *R. Spruce 5287* (G-3 sheets, K, LE, OXF); MORONA SANTIAGO: Morona, near city of Macas, 02°20’S, 78°08’W, 1100 m, 07/XI/1993, *A. Fay & L. Fay 4049* (K-on 2 sheets, MO-*n.v.*, QCNE-*n.v.*); LOCALITY UNKNOWN: in Andibus Ecuadorensibus, 1857-1859, *R. Spruce 5349* (BM, W); Crescit in reg. tropis et subtr. “passeum”, *A. Sodiro s.n.* (G). **PERU.** HUÁNUCO: Prov. Huanuco, Distr. Churubamba, Pampa Hermosa, trail Puente Duran to Exito, [-09.8356°, -76.1087°], 1500 m, 08/IX/1936, *Y. Mexia 8149* (BM, F-*n.v.*, G-on 2 sheets, GH-*n.v.*, K, MO-*n.v.*, U, UC-*n.v.*, US-*n.v.*, USM-*n.v.*). **BOLIVIA.** LA PAZ: Mapiri region, San Carlos, [-15.3956°, -68.1805°], 850 m, 22/V/1927, *O. Buchtien 294* (BM, K-on 2 sheets); Prov. Caranavi, Serranía Bella Vista, 41 km de Caranavi hacía Sapecho, 15°41’S, 67°30’W, 1450 m, 25/VIII/1997, *M. Kessler et al. 11462* (LPB, UC-*n.v.*); Prov. Nor Yungas, Caranavi, hacía el N, via Puerto Linares, de Carrasco 17 km subiendo, [-16.0695°, -67.7131°], 1700 m, 30/VI/1983, *G. Beck 9243* (LPB-on 2 sheets); Prov. Nor Yungas Estación Biológica Tunquini, 16°11’S, 67°52’W, 1710 m, 24/VIII/1998, *A. Portugal et al. 285* (LPB-on 3 sheets, UC-*n.v.*); Prov. Nor Yungas, Estación Biológica de Tunquini, Bajo Hornuni, senda del campo de Don Pedro al camino de la mina, 16°12'S, 67°53'W, 1900 m, 20/VII/2000, *D. Quintana et al. 34* (LPB, UC-*n.v.*); Prov. Nor Yungas, Estación Biológica de Tunquini, Bajo Hornuni, senda del campo de Don Pedro al camino de la mina, 16°12'S, 67°53'W, 1900 m, 24/VII/2001, *K. Bach et al. 1291* (LPB-on 2 sheets); Prov. Nor Yungas, Estación Biológica de Tunquini, Hornuni Bajo, senda cafetal al camino de la mina, 16°12'S, 67°52'W, 1800 m, 29/VIII/2001, *K. Bach et al. 1700* (LPB); Sud Yungas Prov., La Paz-Chulumani Road, 15.1 km W of Chulumani, 9.3 km from Huancané, 16°15'S, 67°30'W, 2450 m, 02/VIII/1989, *A. Fay & L. Fay 2590* (LPB); COCHABAMBA: Prov. Chapare, Territorio Indígena Parque Nacional Isiboro-Secure, cordillera de Mosetetenez, arriba de la Laguna Carachupa, 16°14'S, 66°25'W, 1350 m, 30/VIII/2003, *M. Kessler et al. 13054* (LPB, UC-*n.v.*); Prov. José Carrasco Torrico, 136 km antigua carretera Cochabamba-Villa Tunari, 17°06'S, 65°35'W, 1900 m, 15/VII/1996, *M. Kessler et al. 7300* (LPB-on 2 sheets, UC-*n.v.*); Prov. José Carrasco Torrico, 143 km antigua carretera Cochabamba-Villa Tunari, 17°07'S, 65°34'W, 1300 m, 22/VIII/1996, *M. Kessler et al. 7570 B* (LPB-on 3 sheets, UC-*n.v.*). **COUNTRY UNKNOWN.** [probably Venezuela, Colonia Tovar], *J.W.K. Moritz 15* (W-on 2 sheets); [probably Venezuela, Colonia Tovar], *Anonymous, ex Drége* [*probably Moritz*] (LE).

Young specimens: BOLIVIA. LA PAZ: Prov. Caranavi, serranía Bella Vista, 36 km de Caranavi hacía Sapecho, 15°41'S, 67°30'W, 1300, 22/VIII/1997, *M. Kessler et al. 11262* (LPB, UC-*n.v.*); Prov. Nor Yungas, Estación Biológica de Tunquini, 500 m hacía El Chairo, 16°11'S, 67° 53'W, 1700 m, 14/VIII/2000, *D. Eberhardt et al. 33* (LPB, UC-*n.v.*).

Hypolepis parallelogramma is easily recognized by its parallel lamina architecture: the pinnae, pinnules and segments are patently inserted and parallel to each other, and in a regular decreasing towards their apexes; also the apexes of the segments are usually (but not always) obtuse, also in a parallel way among each other (Figs. 14A, B, D). Another two diagnostic features of *H. parallelogramma* are: the typical trichomidia present especially on the abaxial surface of the costae, costules and veins, and the pseudo-indusia entirely stramineous and chartaceous.

Some specimens of *Hypolepis repens* have the apexes of the segments obtuse and such material have led to wrong identifications, citing *H. parallelogramma* for a wider distribution (*e.g.* Tryon & Stolze 1989 for Brazil, and Cremers & Kramer 1991 for the Guianas). But, in *H. repens* the lamina does not have a parallel architecture, the abaxial surface of the costae, costules and veins are furnished with catenate-acicular hairs (trichomidia absent), and the pseudo-indusia are entirely hyaline and membranaceous – Figs. 11A–E *vs.* Figs. 14A–D.

On the other hand, some materials from Ecuador (*Spruce 5349* [BM, W], and *Sodiro s.n.* [G]) seem to be possible hybrids between *Hypolepis parallelogramma* and *H. repens.* They have the petioles and rachises shortly aculeate (as in *H. parallelogramma*), the lamina membranaceous, with a non-parallel architecture (as in *H. repens*), and the costules and veins abaxially with trichomidia (typical of *H. parallelogramma*).

Other somehow similar species are *Hypolepis melanochlaena* and *H. scandens* – see discussion of both for differentiation.

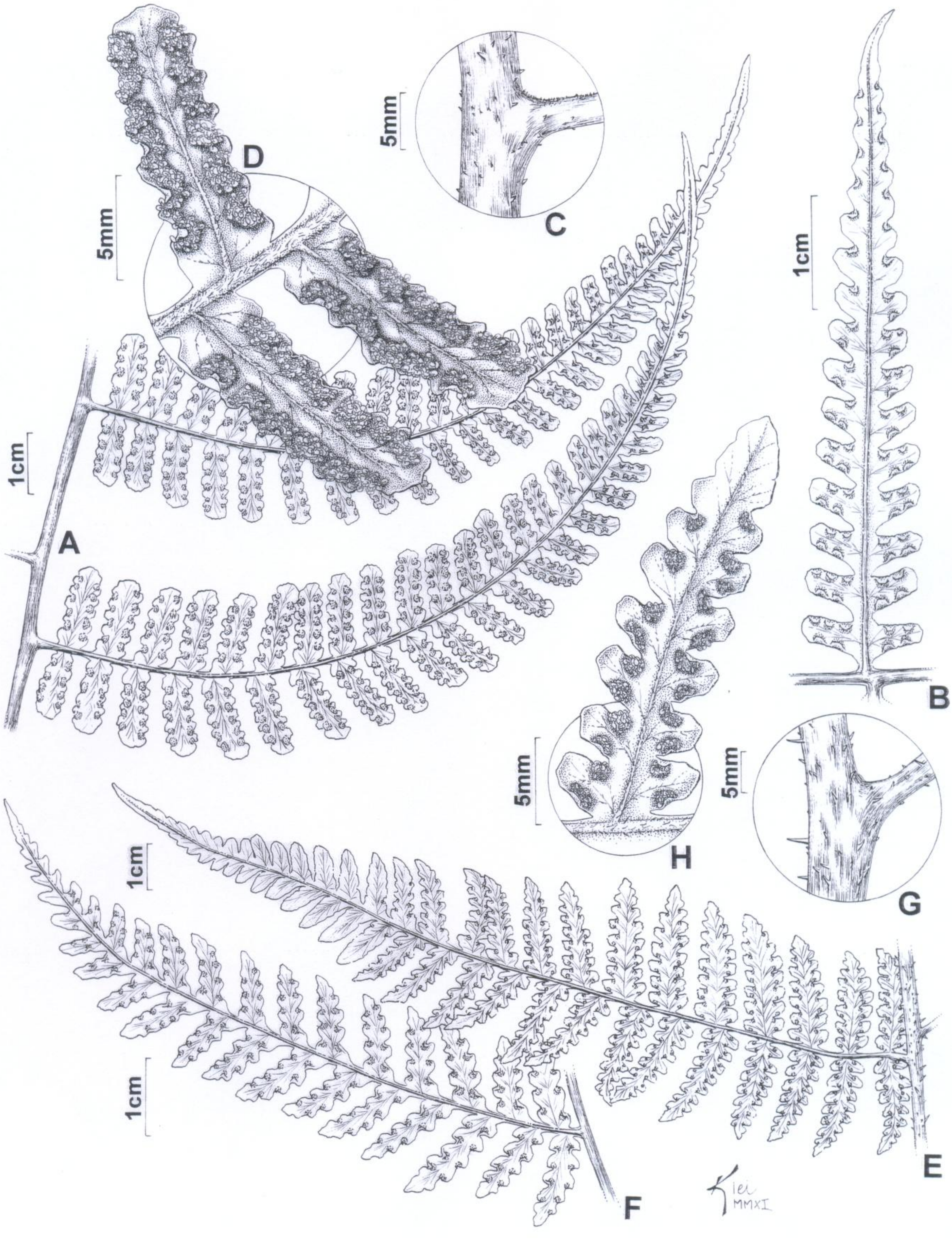
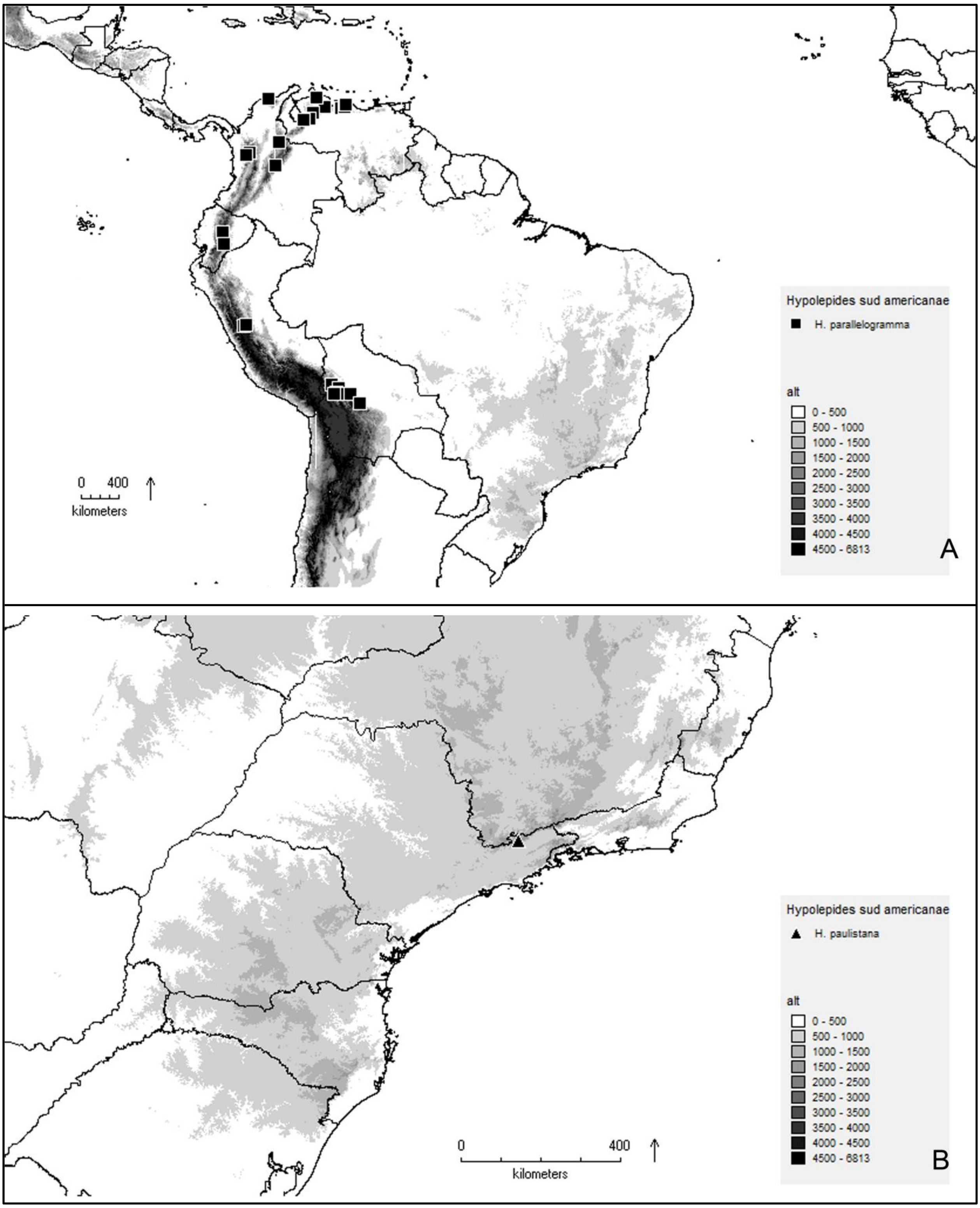


Fig. 14 A–D *Hypolepis parallelogramma:* **A** pinnules (*Rodríguez 5090*), **B** secondary pinnule abaxially (*Rodríguez 5090*), **C** intersection petiole/rachis (*Kessler 11462*), **D** fertile segments abaxially (*Rodríguez 5090*); **E–H** *Hypolepis scandens:* **E** pinnule (*Jiménez 1604*), **F** pinnule (*Kessler 9068*), **G** intersection petiole/rachis, **H** fertile secondary pinnule abaxially (*Jiménez 1604*).



Map 17 A distribution of *Hypolepis parallelogramma;* **B** distribution of *Hypolepis paulistana.*

16. *Hypolepis paulistana* Schwartsb. & J. Prado, ***sp. nov.*** **Type:** Brasil, São Paulo, Pindamonhangaba, estrada para o Pico do Itapeva, 22°46'05"S, 45°32'17"W, 1881 m, 23/I/2010, *P.B. Schwartsburd, J. Prado, G. Yatschievych & E. Schuettpelz 2298* (holotype: SP!; isotypes: DUKE!, K!, MO!). **Figs. 8F–I, Map 17B.**

Plants terrestrial. *Rhizomes* 1.5–3 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, 1.5–2.5 mm long, 12–25-celled. *Fronds* erect, with continuous growth, 50–100 cm long; *petioles* 25–60 cm x 2.5–3 mm, proximally dark brown, lighter above, abaxially and adaxially sparsely villose, especially distally, with two kinds of hairs, inermous, rugose, the *first kind of hair* catenate-acicular, hyaline, 0.2–0.4 mm long, 2–6-celled, the *second kind of hair* catenate-acicular, entirely yellowish-brown, 1.5–2.5 mm long, 12–25-celled, sparse and caducous, but leaving persistent bases; *laminae* ovate, proximally bipinnate-bipinnatisect with segments pinnatifid, medially pinnate-bipinnatisect with segments pinnatifid, distally pinnatisect, 35–50 x 35–50 cm; *rachises* straight, proximally light brown, stramineous above, abaxially moderate villose, adaxially densely villose, inermous, rugose, the *hairs* similar to those from the petioles, but the *first kind of hair* hyaline with the base and cross-walls reddish, and longer, 0.3–0.6(–1) mm long, 4–8(–15)-celled, the *second kind of hair* very scattered; *proximal pinnae* 18–27 x 12–18 cm, slightly inequilateral; *costae* abaxially and adaxially densely villose, with only the *first kind of hair*, but this hyaline or hyaline with the base and cross-walls reddish, and even longer, (0.8–)1–2 mm long, (8–)10–20-celled; *costules* abaxially villose, adaxially sparsely villose, with only the *first kind of hair*, these hyaline, smaller, 0.5–1 mm long, 6–12-celled; *veins* abaxially with the *first* and a *third kind of hair*, adaxially with only the *first kind* very scattered, the *first kind* similar in size to those from the costules, the *third kind of hair* catenate-glandular, hyaline, 0.2–0.3 mm long, 4–6-celled; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, proximally green, distally hyaline, membranaceous in the hyaline part, the *margins* copiously ciliate, the *cilia* catenate-acicular, 0.2–0.3 mm long, 4–6-celled.

Distribution and ecology: Known only from the type collection; probably endemic to the highlands of São Paulo, Brazil; from ca. 1900 m – Map 17B.

Etimology: the specific epithet refers to the locality of the type: State of São Paulo. This species is probably endemic to this State.

Apart from *Hypolepis paulistana*, the other South/Southeastern Brazilian *Hypolepides* with the petioles and rachises inermous are only: *H. rugosula* subsp. *pradoana*, *H. stolonifera* var. *stolonifera*, and *H. stolonifera* var. *nebularis*. *Hypolepis paulistana* differs from both varieties of *H. stolonifera* by the petioles and rachises copiously rugose and villose (*vs.* moderately rugose and glabrous), the proximal pinnae slightly inequilateral (*vs.* strongly inequilateral), and the veins abaxially with catenate-glandular hairs (*vs.* fronds eglandular) – Figs. 8 F–I *vs.* Figs. 1A–I, 6D–F. *Hypolepis paulistana* differs from *H. rugosula* subsp. *pradoana* by the petioles and rachises light to dark brown (*vs.* atropurpureous), the lamina margins glabrous (*vs.* with both catenate-acicular and catenate-glandular hairs), the sori marginal (*vs.* sub-marginal), and the pseudo-indusia conspicuous and with the margins copiously ciliate (*vs.* pseudo-indusia absent) – Figs. 8 F–I *vs.* Figs. 16A–E.

Since *Hypolepis paulistana* is known only from the type collection, and has intermediate features between two co-occurrent *taxa* (*H. rugosula* subsp. *pradoana* and *H. stolonifera* var. *stolonifera*), it is tempty to speculate that *H. paulistana* migh have had a hybrid origin between those two. The spores seem well developed, so it might be a fertile hybrid. Future studies are needed to reveal the best identity of *H. paulistana*. The intermediate features are: the petioles and rachises inermous (as both *taxa*), the petioles and rachises light to dark brown (more related to *H. stolonifera*), the proximal pinnae slightly inequilateral (intermediate between the two *taxa*), the veins abaxially with catenate-glandular hairs (as in *H. rugosula*), and the pseudo-indusia conspicuous with the margins copiously ciliate (as *H. stolonifera*).

17. *Hypolepis pedropaloensis* Schwartsb. & J. Prado, ***sp. nov.*** **Type:** Colombia, Depto. Cundinamarca, Municipio de Tena, laguna de Pedropalo, bosque al lado S, [04.6847°, -74.3847°], 2060 m, 09/VI/1967, *R. Jaramillo Mejía, T. van der Hammen & G. Lozano C. 2665* (holotype: K!-on 2 sheets; isotype: COL?-*n.v.*). **Figs. 15A–D, Map 18A.**

Plants terrestrial. *Rhizomes* not seen. *Fronds* probably erect or decumbent, with continuous growth, ca. 80(–?) cm long; *petioles* ca. 32(–?) cm x ca. 5.5 mm, proximally dark brown, lighter above, abaxially sparsely hirsute to glabrescent, adaxially hirsute, especially in the groove, with one kind of hair, inermous, (tuberculate?), copiously rugose, the *hairs* (*first kind*) acicular, hyaline, erect, 0.2–0.4(–0.5) mm long, 3–5(–6)-celled; *laminae* rombic to ovate, proximally tripinnate-pinnatisect with segments lobed, medially pinnate-bipinnatisect with segments lobed, distally pinnatisect, ca. 60(–?) x 60–96 cm; *rachises* straight, proximally brown, lighter above, abaxially hirsute, adaxially copiously hirsute, with three kinds of hair, inermous, (tuberculate?), the *first kind of hair* similar to those from the petioles, conspicuous, the *second kind of hair* catenate-acicular hyaline with the base and cross-walls reddish, or entirely yellowish, 1.5–2 mm long, 15–20-celled, sparse, the *third kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, or entirely yellowish 0.4–1 mm long, 6–13-celled, sparse; *proximal pinnae* ca. 32–52 x 20–25 cm, strongly inequilateral; *costae* abaxially hirsute, adaxially copiously hirsute, with *the three kinds of hair,* similar to those from the rachises; *costule* abaxially copiously hirsute with the *three kinds of hair,* adaxially hirsute with only the *first second of hair,* but these smaller, 0.5–1 mm long, 4–10-celled, and entirely hyaline; *veins* with the same indument pattern that of the costules, but abaxially the second and third kind of hairs smaller, the *second kind of hair* similar to those from the adaxial surface of the costules, and the *third kind of hair* 0.2–0.3 mm long, 2–4-celled, scattered; *laminar tissue between the veins* abaxially copiously hirsute with only the *first kind of hair,* adaxially glabrous; *lamina margins* glabrous; *sori* marginal, *pseudo-indusia* conspicuous, but the lamina margins not differentiated, entirely blackish green, coriaceous, hirsute, the *margins* ciliate, the *cilia* and *hairs* catenate-acicular, 0.2–0.4 mm long, 3–6-celled.

Distribution and ecology: Endemic to Eastern Cordillera (Cordillera Oriental) of Colombia (Antioquia, Cundinamarca, and Tolima); from 1900 to 2900 m – Map 18A.

Additional material examined: NOVA GRANADA [COLOMBIA]. ANTIOQUIA: Mun. Jardín, Vereda Quebrada Bonita, sector Alto de Ventanas, límites entre Antioqui-Caldas, 05°32’30.4”N, 75°48’27.1”W, 2870 m, 12/I/“2036” [2003?], *W.D. Rodríguez et al. 5026* (HUA-on 3 sheets); 10 km al Este de Sonsón, [05.6980°, -75.2578°], ca. 2700 m, 18/III/1949, *R. Scolnik et al. 19 An 240* (CORD); CUNDINAMARCA: Albán, Vereda Las Marías, Fundación Granjas Infantíles del Padre Luna, Granja del Gran Ciudadano, frente al peaje de Jalisco, vertiente occidental de la Cordillera Oriental, 04°52’N, 74°26’W, 1900-2100 m, 24/II/2003, *L.A. Triana-M. 133* (HUA); [TOLIMA?]: S. Antonio, [03.8960°, -75.5726°], 2400 m, *A. Lindig 359* (B, K).

Etimology: The specific epithet is a refference for the locality of the type collection: ‘Laguna de Pedropalo’.

This species is similar to *Hypolepis stuebelii*, which also occurs in Colombia but apparently only in the Eastern Cordillera (Cordillera Oriental; in Magdalena, Santander, Valle del Cauca, and Nariño), and *H. acantha*, which is endemic to S/SE/NE Brazil, especially due to the laminar tissue between the veins abaxially hirsute (the hairs acicular, erect, ca. 0.1–0.4 mm long), and the pseudo-indusia copiously ciliate. *Hypolepis pedropaloensis* differs from both species (and *H. grandis* Lellinger), by the fronds much smaller, ca. 80 cm (*vs.* (1.7–)2.5–6.5 m), the laminae drying blackish green (*vs.* drying olive green), the petioles and rachises inermous (*vs.* copiously aculeate), and the pseudo-indusia entirely blackish green (*vs.* hyaline; at least partly), chartaceous (*vs.* membranaceous; at leats in the hyaline part), and pilose and copiously ciliate (*vs.* glabrous and copiously ciliate in *H. stuebelii*, and glabrous and rarely with one or two cilia, in *H. acantha*). *Hypolepis pedropaloensis* also differs from *H. acantha* by the fronds furnished with catenate-glandular hairs (*vs.* fronds eglandular) – Figs. 15A–D *vs.* Figs. 6A–C, 15E–H.

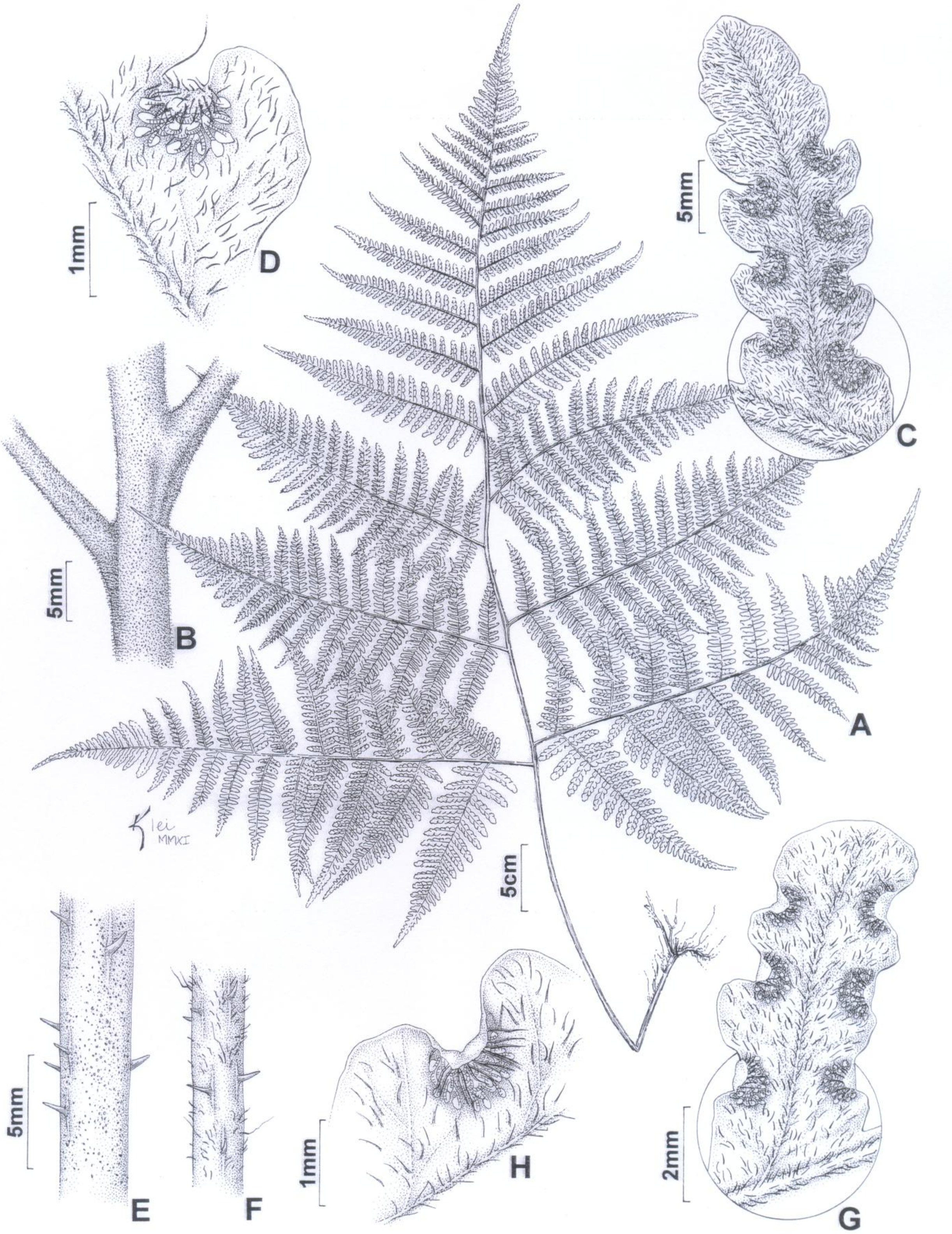
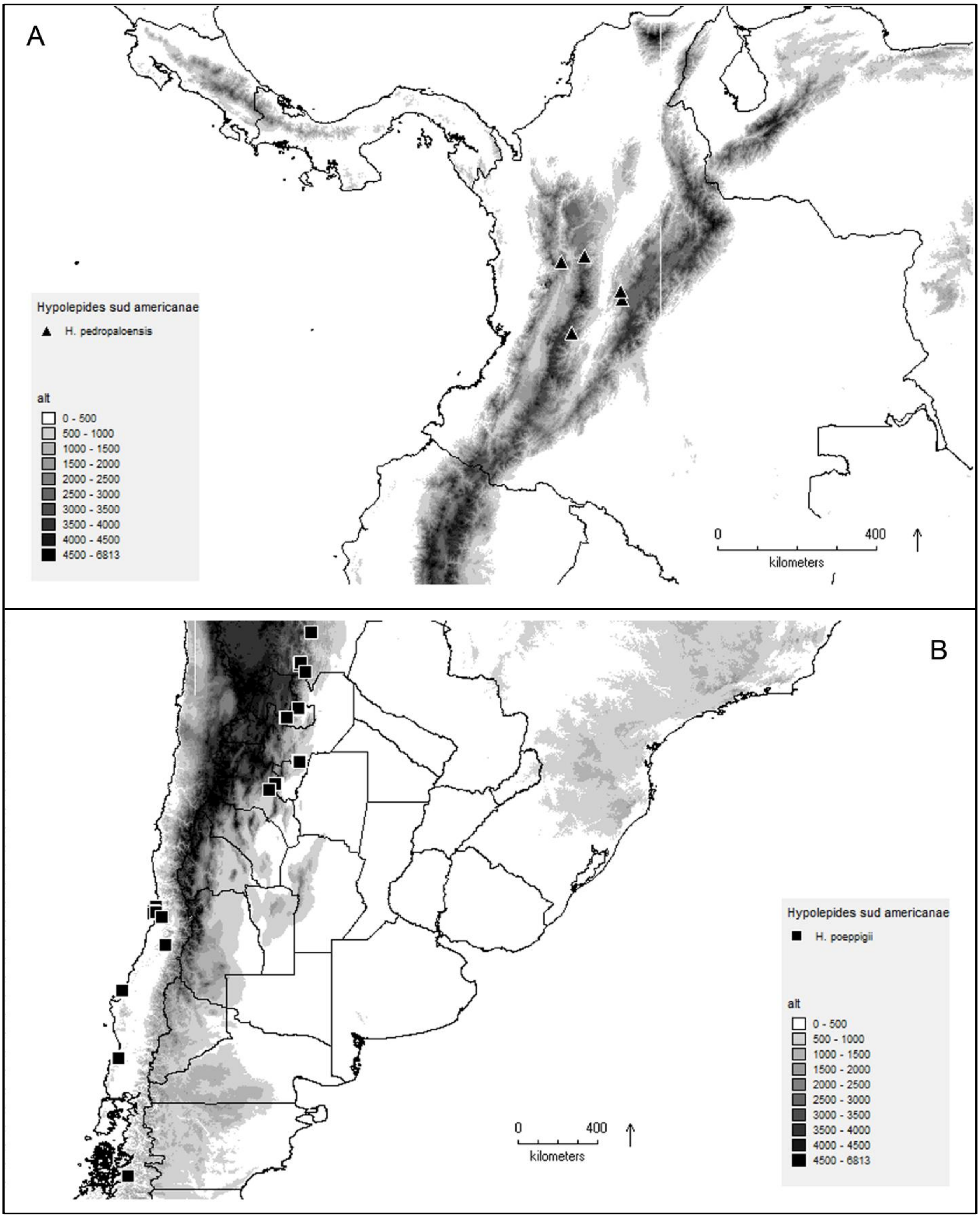


Fig. 15 A–D *Hypolepis pedropaloensis* (*Rodríguez 5026*): **A** habit, **B** intersection petiole/rachis, **C** fertile segment abaxially, **D** detail of a pseudo-indusium abaxially; **E–H** *Hypolepis stuebelii:* **E** rachis (*de Tussac s.n.*), **F** rachis (*Ortega 1640*), **G** fertile segment abaxially (*Ortega 1640*), **H** detail of a pseudo-indusium abaxially (*Ortega 1640*).



Map 18 A distribution of *Hypolepis pedropaloensis;* **B** distribution of *Hypolepis poeppigii.*

18. ***Hypolepis poeppigii*** (Kunze) R.A. Rodr., Gayana Bot. 46 (3,4): 202. 1989. *Polypodium poeppigii* Kunze, Linnaea 9: 50. 1834. *Phegopteris poeppigii* (Kunze) Fée ex Gay, Fl. Chil. (Gay) 6: 506. 1854. *Hypolepis rugosula* (Labill.) J. Sm. var. *poeppigii* (Kunze) C. Chr., Monogr. Dryopteris 2: 127. 1920 [Jan-Sep 1920]. *Hypolepis rugosula* (Labill.) J. Sm. var. *poeppigii* (Kunze) C. Chr & Skottsb. *in* Skottsb., Pterid. Juan Fernandez: [page?]. 1920 [Oct 1920], reprinted in Nat. Hist. Juan Fernandez and Eastern Island 2(Bot.): 31. 1920, *nom. illeg.,* non *Hypolepis rugosula* (Labill.) J. Sm. var. *poeppigii* (Kunze) C. Chr. (Jan-Sep 1920). **Lectotype,** designated here: Chile, in turfosis paludosis littoris oceani pacifici prope Concon, [-32.8957°, -71.4968°], VIII/1827 [or 1828?, 1829?], *E. Poeppig, diar. 182, Col. pl. Chil. I. n. 264* (G! [ex Herb. de Candolle]; isolectotypes: B!, BM!, K!-000640327 *p.p.* [labeled “A” by Schwartsburd], LE!, PR!, PRC!, W!-on 2 sheets). **Figs. 10A–E, Map 18B.**

Hypolepis chilensis Fée, Ic. Sp. Nouv.: 76. 1857 (or 1858?) *p.p., nom. superfl.* Syntypes: Chile, Valparaiso, [-33.1069°, -71.6445°], [1834 or 1835], *C. Gaudichaud s.n.* [*31*?] (BR!, FI-W!-214906, FI-W!-214910, FI-W!-216216, G!, RB!, W!; probable duplicate: FI-W!-214917); Chile, San Juan Fernandez, *C. Gay* (P?-*n.v.,* PC?-*n.v.*); Chile, près de la colonie Arique, province de Valdivia, [V/1851],*W. Lechler* [*Pl. Chil. 194*] (B!-3 sheets [20 0074789, 20 0074790, 20 0074791], FI!, FI-W!-214914, G!-on 2 sheets, GOET-*n.v.,* K!-000640324, K!-000640325, K!-000640326, L!, LE!-2 sheets, UPS!, W!).

Phegopteris sturmii Phil., Anales Univ. Chile 94: 58. 1896, as “*Phegopteris*?”. *Dryopteris sturmii* (Phil.) C. Chr., Index Filic.: 295. 1905. Lectotype, designated here: [Chile], ad ripam fluminis Pilmaiquen haud procul a lacu Puyehue provinciae Valdivia, [-39.8834°, -73.3156°], I/1877 [or 1878?], *D. Cueto s.n.* (SGO-000000469, *n.v.*, image!; probable isolectotype: SGO-000000470, *n.v.*, image!).

Plants terrestrial. *Rhizomes* 2–3 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, 1–2 mm long, 10–15(–20)-celled. *Fronds* erect to arched, with continuous growth, 0.6–1.2 m long; *petioles* (15–)20–50 cm x 3–4.5 mm, proximally dark brown, lighter above, abaxially and adaxially glabrescent or sparsely with two kinds of hairs, inermous, copiously rugose, the *first kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, or entirely reddish, 0.4–1 mm long, 4–10-celled, the *second kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, 0.2–0.7 mm long, 4–10-celled, the *persistent cell bases* sometimes elevated up to 0.1 mm long; *laminae* ovate, proximally bipinnate-pinnatisect with segments pinnatifid, medially pinnate-bipinnatisect with segments pinnatifid, distally pinnatisect, 45–80 x 30–60 cm; *rachises* straight, proximally light brown, stramineous above, abaxially sparsely pilose, adaxially copiously pilose, especially on the groove, with both kinds of hair, the *hairs* similar to those from the petioles; *proximal pinnae* 15–30 x 9–20 cm, slightly inequilateral; *costae* abaxially sparsely pilose, adaxially pilose, with both kinds of hair, the *hairs* similar to those from the petioles nad rachises, but smaller, both kinds 0.2–0.5 mm long, 3–5-celled; *costules* abaxially and adaxially with both kinds of hair sparse, the *hairs* similar to thiose from the costae; *veins* abaxially and adaxially glabrous; *laminar tissue between the veins* abaxially glabrous, adaxially with only the *first kind of hair,* these scattered, similar to those from the costae; *lamina margins* essentially glabrous, but sometimes with hairs restricted to the soral region, the *hairs* only of the *first kind*, similar to those from the costae, but even smaller, 0.2–0.3 mm long, 3–5-celled; *sori* submarginal; *pseudo-indusia* absent, sometimes the lamina margins revolute and protecting the sori, but never differentiated into a hyaline flap.

Distyribution and ecology: Southern Bolivia, Northern Argentina, and Central Chile; from 100 to 500 m (in Chile), and from 1450 to 2800 m (in Argentina and Bolivia) – Map 18B.

Additional material examined: BOLIVIA. CHUQUISACA: Azurduy, Angostura, ca. 18 km Azurduy, camino hacia Pomabanbillo, 20°08.57’S, 64°19.29’W, 2666 m, 10/I/2004, *H. Huaylla & I. Guachalla 635* (HSB-*n.v.*, K). TARIJA: Prov. Cercado, San Andrés, por el camino a San Pedro de Sola, 21°37’46”S, 64°50’40”W, 1990 m, 17/XI/2007, *I. Jiménez et al. 4724* (LPB-on 3 sheets); Prov. Cercado, Bellavista, camino Tarija-Bellavista, 21°38’56”S, 64°50’11”W, 1990 m, 17/XI/2007, *I. Jiménez et al. 4712* (LPB-on 2 sheets, TA-*n.v.*); Aviles, by road between San Andres and Bellavista, SW of Tarija, [-21.5680°, -64.8138°], 2220 m, 05/III/2000, *J.R.I. Wood 15939* (LPB-on 2 sheets, UC-*n.v.*); Prov. Aniceto Arce Ruíz, Reserva Natural de Flora y Fauna Tariquía, campamento Alisos, subiendo por el sendero que va a la cumbre, 22°00’S, 64°35’W, 2220 m, 13/VI/2004, *I. Jiménez 2418* (LPB, GOET-*n.v.*, NY-*n.v.*, UC-*n.v.*). **ARGENTINA.** JUJUY: Depto. Ledesma, Sierra de Calilegua, Abra de Cañas, [-23.6734°, -64.9094°], 1907 m, 13/XI/1961, *H.A. Fabris 3461* (LP); [Depto. Ledesma],

P. N. Calilegua, Abra de Cañas, [-23.6986°, -64.8685°], 02/XII/1981, *A. Brown 1735* (SI); Depto. Ledesma, Pque. Nac. Calilegua, RP 83, Bosque del Cielo, 23°40.1'S, 64°54.0'W, 1688 m, 04/VII/2010, *O. Martínez & J. Prado 1897 B* (SP-on 3 sheets); Depto. Capital, Lagunas de Yala, 30/I/1947, *C.A. O'Donell 4663* (RB-2 sheets); Depto. Capital, Lagunas de Yala, [-24.0955°, -65.4969°], 2400 m, 19/II/1965, *P.R. Legname & A.R. Cuezzo 5090 C* (LP); Depto. Capital, Lagunas de Yala, [-24.1186°, -65.4699°], 1900 m, 12/I/1966, *A.L. Cabrera & H.A. Fabris 17455* (LP); Depto. Capital, Lagunas de Yala, [-24.1039°, -65.4828°], 2000-2500 m, 04/XII/1969, *A.L. Cabrera & R. Kiesling 20130* (LP); Depto. Capital, Lagunas de Yala, [-24.0913°, -65.4832°], 2000-2500 m, 15/II/1970, *A.L. Cabrera & J. Frangi 20603* (LP); Depto. Capital, Lagunas de Yala, 04/I/1971, *A. Krapovickas & C.L. Cristóbal 17459* (MBM); Depto. Capital, Lagunas de Yala, 12-14/II/1971, *A.L. Cabrera et al. 21233* (LP); Depto. Capital, Lagunas de Yala, 12-14/II/1971, *A.L. Cabrera et al. 21239* (LP); Depto. Capital, Lagunas de Yala, 15/XI/1973, *A.L. Cabrera et al. 24186* (MBM); Depto. Capital, Lagunas de Yala, 2100-2300 m, 18/XI/1986, *A. Charpin & U. Eskuche 20503* (G-on 2 sheets); Depto. Capital, Lag. de Yala, [-24.1227°, -65.4527°], 1640 m, 16/II/1987, *C. Palací et al. 892* (SI); Yala, Alisal, II/1965, *Eskuche 115* (LP); Yala, Lago "El Comedoro", 17/I/1974, *C.V. de Varetti 424* (LP); SALTA: [Depto. Capital], Quebrada de San Lorenzo, [-26.1045°, -64.8130°], 1460 m, 17/IV/1908, *M. Lillo s.n.* (SI [072574], U [0256183]); Depto. Capital, San Lorenzo, [-26.1023°, -64.8959°], 28/V/1933, *A.L. Cabrera 3029* (LP); Depto. Capital, Quebrada de San Lorenzo, [-26.1368°, -64.8588°], 1600-1700 m, 22/X/1991, *A. Charpin & L. Novara 22922* (G); Depto. Guachipas, "Alemania"(?), [-25.4114°, -65.6661°], 1600 m, 08/XII/1929(?), *S. Venturi 9858* (LP); TUCUMÁN: Depto. Chicligasta, Estancia Los Povos, [-27.1973°, -65.8590°], 1500 m, 10/XII/1925(?), *S. Venturi 4034* (SI); Depto. Chicligasta, entre El Saladillo y El Bolsón, [-27.2061°, -65.9500], ca. 2000 m, 27/III/1953, *T. Meyer 18790* (LP); Clavillo de Aconquija, [-27.2008°, -65.9719°], 2800 m, I/1937, *M.M. Job 1394* (LP); CATAMARCA: Andalgalá, Esquina Grande, [-27.4657°, -66.2595°], 2400 m, V/1915, *P. Jörgensen 1502* (SI); **CHILE.** [VALPARAÍSO]: Valparaiso, [-33.2254°, -71.6232°], VII/1830, *Bertero 1775* (G); Valparaiso, 1832, *H. Cuming 635* (BM, K-on 2 sheets); Valparaíso, Peñuelas, Fundo San Juan, [-33.1446°, -71.4900°], 500 m, 17/XII/1940, *K. Behn s.n.* (LP [ex CONC 20011]); Valparaiso, Las Docas, 26/XII/1949, *O. Boelcke 382* (L, SI); [METROPOLITANA DE SANTIAGO]: Near "Suintero (Suintevo?)", and at Salto del Agua, near Santiago, [-33.3807°, -71.2178°], III/1821, *Gillies s.n.* [*N. 3*?] (K-on 2 sheets, OXF-on 2 sheets); [LIBERTADOR GENERAL BERNARDO O'HIGGINS]: Prov. Colchagua, [-34.6735°, -71.1034°], s.d., [*R.A.* or *F.*?] *Philippi s.n.* (W-2 sheets); [BÍO-BÍO]: Concepción, [-36.8077°, -73.0052°], III/1879, *R.A. Philippi s.n.* (SI [23828]); Concepción, kullar bakom Talcahuano, 22/XI/1916, *C. Skottsberg & I. Skottsberg 1123* (UPS); Concepción, Talcahuano, Parque "Hualpén", [-36.7584°, -73.1054°], 21/IV/1970, *E.R. de la Sota 6031* (LP); [LOS RÍOS]: Valdivia, [-39.9013°, -73.2395°], 15/II/1904, *O. Buchtien s.n.* (FI-*p.p.* [labelled "1" by Schwartsburd, 2010]); [AISÉN DEL GENERAL CARLOS IBAÑEZ DEL CAMPO]: Aysen, [-45.3832°, -72.8049°], ca. 100 m, 06/II/1938, *C.H. Andreas 521* (L-on 3 sheets, U); LOCALITY UNKNOWN: Locality unknown, *Chamisso s.n.* (LE, PRC); Locality unknown, *Anonymous, ex Herb. Fischer* (LE); "Cruz"(?), *H. Cuming s.n.* (LE [probably a duplicate of *Cuming 635*]); Talcumann, VI/1856, *W.H. Harvey "882"* (L [0835839]).

Hypolepis poeppigii s. str. is plant endemic to the Tucumán vegetation (Bosque Tucumano-Boliviano), in Northern Argentina and Southern Bolivia, and also in the wet forests of Central Chile. When Kunze (1835) published his *Polypodium poeppigii*, he rightly differentiated it from *Polypodium rugosulum.* Then, Fée (ex Gay 1853) and Mettenius (1858) transferred it to *Phegopteris poeppigii.* Contemporary, these two authors named the *Hypolepis* species from Central/Southern Argentina/Chile (and Islands) respectively as *Hypolepis chilensis* (Fée 1857-1858), and *H. poeppigiana* (Mettenius 1856).

But, when Christensen (1920) and Christensen & Skottsberg (1920) were studying the *Hypolepides* from Juan Fernandez Islands, they used Kunze's name on them, relating it with *Hypolepis rugosula* (*Polypodium rugosulum*): *H. rugosula* var. *poeppigii.* This "mistake" (or this strange conception) was later followed by the other authors, who used this name (or *H. poeppigii*) for the C/S entity (for example, Sota 1972, 1977, Ponce *et al.* 2002), or who considered the two species as only one *taxon* (for example Lüer 1985, Rodriguez 1989, 1995, Squeo *et al.* 2001). Contemporary, those authors named the Northern Argentinean entity as *H. repens.*

The species from C/S Argentina/Chile (plus Islands) is in fact related to *Hypolepis rugosula.* I here consider it as *H. rugosula* subsp. *poeppigiana* (see discussion of this *taxon*). The species from C/N Argentina/Chile (plus S Bolivia) is the "true" *H. poeppigii s. str.*, and is *not* related either to *H. rugosula* nor *H. repens.*

Hypolepis poeppigii differs from *H. repens* by the fronds furnished with both catenate-acicular and catenate-glandular hairs (*vs.* with only catenate-acicular hairs), the petioles and rachises inermous (*vs.* aculeate), the laminar tissue between the veins adaxially with catenate-acicular hairs (*vs.* glabrous), the lamina margins commonly with catenate-acicular hairs on the soral region (*vs.* glabrous), the sori sub-marginal (*vs.* marginal), and the lamina margins never differentiated into a pseudo-indusia (*vs.* pseudo-indusia conspicuous, hyaline) – Figs. 10A–E *vs.* Figs. 11A–E. *Hypolepis repens* does not occur in Argentina or in Chile.

Hypolepis poeppigii is somehow similar to the subspecies of *H. rugosula* (for differentiation and further comments, see discussion of *H. rugosula* subsp. *poeppigiana*), but is more morphologicaly related to *H. punctata* and its allies, due to the tone-color of the axes (see also 'Results, Species groups').

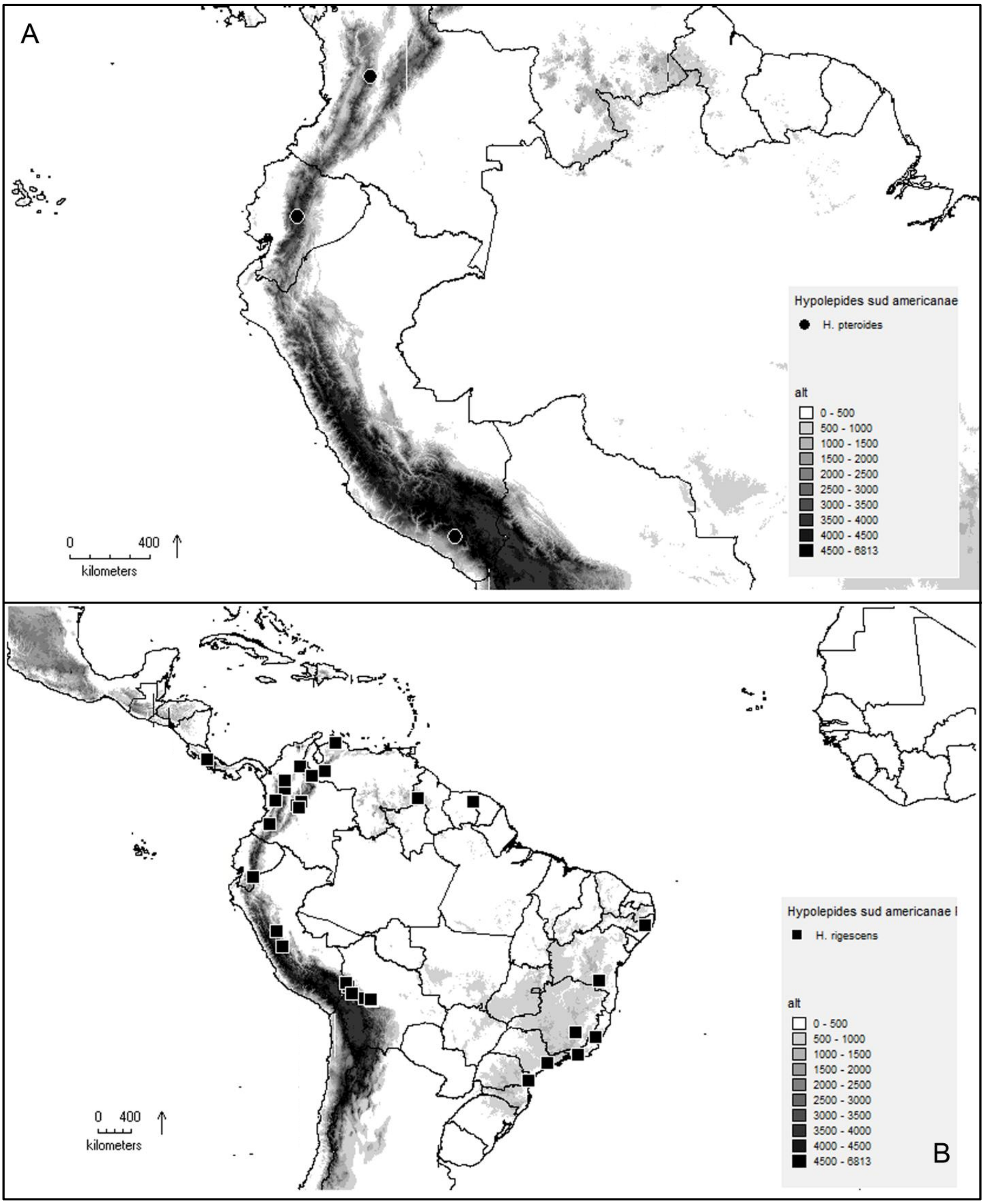
19. ***Hypolepis pteroides*** Mett. *in* Hohen., Fil. Lechler. 1: 17, t. 3, figs. 7-13. 1856. **Lectotype,** designated by Tryon (1964: 36 – first step), and here (second step): Peru, St. Gavan in summis jugis Cordillera, [-16.2307°, -71.2780°], VII/1854, *W. Lechler, Pl. Pervuvian. 2152* (B!-20 0074829 *p.p.* [ex Herb. Mettenius]; isolectotypes: B!-frag. [20 0074829 *p.p.*; ex Herb. Mus. Bot. Berolinense], G!-2 sheets, GOET-*n.v.*, K!-000640331, K!-000640332, L!-908 286 223, L!-908 286 228, LE!-2 sheets, US-*n.v.* [2 frags.], W!). **Fig. 13G, Map 19A.**

Plants terrestrial (or from bases of rocks?). *Rhizomes* 1.5–2.5 mm diam., hairy or glabrescent, the *hairs* catenate-acicular, lax, yellowish-brown, 1–2 mm long, 15–20-celled, or tending to grabrescent. *Fronds* erect, with continuous growth, 60–100 cm long; *petioles* 20–35 cm x 2.5–5.5 mm, entirely dark reddish-brown, glabrescent, inermous, rugose; *laminae* ovate, proximally bipinnate-pinnatisect with segments pinnatifid to bipinnate-bipinnatisect, medially pinnate-bipinnatisect to bipinnate-pinatisect, distally pinnatisect, 40–50 x 20–35 cm; *rachises* straight, proximally dark reddish-brown, lighter above, abaxially and adaxially sparsely lanose, the *hairs* catenate-acicular, lax, hyaline, hyaline with the base and cross-walls reddish, or entirely reddish, 1–2(–3) mm long, 15–25(–35)-celled; *proximal pinnae* 15–20 x 5–12 cm, slightly inequilateral; *costae* abaxially and adaxially slightly lanose, the *hairs* similar to those from the rachises; *costules* abaxially lanose, adaxially glabrescent or with very scattered hairs, the *hairs* similar to those from the rachises and costae; *veins* with the same indument pattern that of the costules; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal, frequently confluent, and seeming falsely acrostichoid; *pseudo-indusia* slightly differentiated, 2/3 green, 1/3 hyaline, coriaceous in the green part, membranaceous in the hyaline part, the margins crenate, glabrous.

Distribution and ecology: Andes of Colombia, Ecuador and Peru, in the Andine/Paramos vegetation (?); from 3400 to 4200 m – Map 19A.

Additional material examined: GUATEMALA, COSTA RICA, and COLOMBIA [COLOMBIA]. [TOLIMA]: [Villahermosa], Páramo de Ruiz [Nevado del Ruiz], [04.9423°, -75.2075°], 3400 m, 11/IX/1883, *F.C. Lehmann "XVII"* (G). **ECUADOR(?).** Locality unknown, ['-01.4870°, -78.5725°'], s.d., *J. Verleysen 201* (U).

There are only a few materials available of this species. Tryon (1964) and Tryon & Stolze (1989) considered it as a synonym of *Hypolepis obtusata*, but there are some stable differences, and here they are kept as two distinct *taxa* (see discussion of *H. obtusata*).



Map 19 A distribution of *Hypolepis pteroides;* **B** distribution of *Hypolepis rigescens.*

20. *Hypolepis repens* (L.) C. Presl, Tent. Pterid.: 162. 1836. *Lonchitis repens* L., Sp. Pl. 2: 1078. 1753. *Cheilanthes repens* (L.) Kaulf., Enum. Filic.: 215. 1824. **Lectotype,** designated by Underwood (1906: 192): *Filix aculeata repens* Plum., "Hanc Filicem reperi apud insulam Martinicanam, cum ab arce divi Petri ascenditur ad montem Noel, & ad montem de la Calebasse, secus iter quo tenditur ad partem ejusdem insulae Orientalem la Cabsterre dictam", *C. Plumier,* Traité Foug. Amér.: 11, t. 12!. 1705; **epitype,** designated by Cremers & Aupic (2008: 24): *Plumier,* ex *Herb. Tournefort 5228* (P-TRF-*n.v.*). [14.8096°, -61.1670°], [14.7822°, -61.1695°], [14.8003°, -61.1443°]. **Figs. 5A–E, 11A–E, Maps 20A**–C.

Dicksonia aculeata Spreng., Neue Entd. 3: 7. 1822. *Cheilanthes aculeata* (Spreng.) Kaulf., Flora 6(1): 367. 1823. *Hypolepis aculeata* (Spreng.) J. Sm., J. Bot. (Hooker) 4: 157. 1842. Lectotype, designated here: Martinique, VI/1822 (1819-1821?), *F. Kohaut s.n., Sieber Fl. Martin. no. 373* (PRC!-on 2 sheets [ex Herb. Presl; as "*Hypolepis repens* Presl, *Lonchitis repens* Lin., *Dicksonia aculeata* Spr."]; isolectotypes: BM!, BR!, FI-W!, G!, K!-2 sheets, L!-2 sheets, LE!-4 sheets, PR!-2 sheets, PRC! [ex Herb. Univ. Prag.], PRC!-2 sheets [ex Herb. Presl]; probable isolectotypes: LE!, PRC! ["*Sikorn 836*"]).

Hypolepis delicatula Fée, Hist. Foug. Ant.: 28, t. 21, fig. 1. 1866. *Hypolepis dicksonioides* Fée, Crypt. Vasc. Brésil 1: 53. 1869, *nom. nov.* for *Hypolepis delicatula* Fée (1866), *nom. superfl. et illeg.*, non *Hypolepis dicksonioides* (Endl.) Hook. (1852). Lectotype, re-designated here: La Guadalupa [Guadeloupe], [16.0896°, -61.6841°], 1864, *F.J. L'Herminier s.n.* (RB!-120407; isolectotype: G!-on 2 sheets).

Plants terrestrial. *Rhizomes* 3.5–5 mm diam., with hairs, the *hairs* yellowish-brown, (1–)2–3 mm long, 15–20-celled. *Fronds* arched or scandent, 1.5–3 m long; *petioles* 50–100 cm x 4–10 mm, proximally dark brown, lighter above, essentially glabrous, but with scattered hairs and sparse trichomidia, copiously aculeate, sparsely rugose, the *hairs* catenate-acicular, entirely hyaline, or hyaline with the base and cross-walls reddish, 0.3–0.6(–0.8) mm long, 4–8(–10)-celled, the *trichomidia* 0.2–0.3 mm long, 4–6-celled, the *aculei* straight, of the same color of the petioles, 0.3–2.5 mm long, commonly with a hair at the tip; *laminae* ovate, proximally bipinnate-bipinnatisect with the segments lobed, medially bipinnate-pinnatisect with the segments pinnatifid, distally pinnatisect, 1.3–2 x 1–1.4 m; *rachises* straight, entirely stramineous to light brown, abaxially with trichomidia, adaxially with hairs restricted to the groove, and trichomidia, copiously aculeate, non-rugose, the *hairs* and *trichomidia* similar to those from the petioles; *proximal pinnae* 50–70 x 20–55 cm, slightly inequilateral; *costae* abaxially sparsely pilose, adaxially copiously pilose, the *hairs* similar to those from the petioles and rachises; *costules* abaxially and adaxially sparsely pilose, the *hairs* similar to those from the petioles, rachises, and costae; *veins* abaxially sparsely pilose to glabrescent, adaxially glabrous, the *hairs* similar to those from the other axes; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, entirely hyaline, the *margins* smooth or slightly crenate, glabrous.

Distribution and ecology: USA (Florida), Jamaica, Hispaniola, Puerto Rico, Saint Christopher, Guadeloupe, Dominica, Martinique, Saint Lucia, Trinidad & Tobago, Mexico, Guatemala, Honduras, Costa Rica, Panama, Colombia, Venezuela, Guyana, Suriname, French Guiana, Brazil (Pará, Ceará, Pernambuco, Alagoas, Rio de Janeiro, and São Paulo), Ecuador, Bolivia, and Paraguay; from 50 to 1800 m, in wet forests – Maps 20A–C.

Additional material examined: UNITED STATES OF AMERICA. FLORIDA: 1.5 miles east of St. Leo, "Pasco" County, [28.3301°, -82.2547°], 1925, *H. O'Neill s.n.* (FI-PS); Sandhills near DeSoto City, [27.9287°, -82.4083°], 20/V/1925, *J.K. Small & E.T. Wherry 12637* (K); Orange County, near Zellwood, [28.6888°, -81.6366°], 20/V/1925, *E.J. Palmer 27455* (K); Highlands County, Sweet Bay hammock, near Lake Annie, [27.3708°, -81.2579°], 12/I/1925, *J.K. Small & P. Matthaus 11638* (LE); County Highlands, about 4 miles southeast of Childs, 08/II/1836 (or 02/VIII/1836?), *D.S. Correl 6165* (FI-PS, MO-*n.v.*); Polk County, Lake Pierce, [27.9853°, -81.5056°], III/1986, *A.M. Evans 3410* (U); Osceola County, hammock, SW corner of County, [28.1360°, -81.1362°], 13/III/1969, *G.R. Cooley et al. 12635* (LE). **JAMAICA.** [18.1233°, -76.6779°], 1874-1879, *G.S. Jenman s.n.* (OXF 00072103). **[HISPANIOLA], HAITI.** Massif de la Selle, Port-au-Prince, Morne Malanga, [18.4034°, -72.4108°], 1200 m, 27/I/1926, *E.L. Ekman, Pl. Ind. Occid. H 5444* (K, S-*n.v.*). **[HISPANIOLA], SANTO DOMINGO.** Cordillera Central, prov. de la Vega, near Piedra Blanca, [18.8487°, -70.3112°], ca. 200 m, 12/II/1929, *E.L. Ekman, Pl. Ind. Occid. H 11541* (K, S-*n.v.*). **PUERTO RICO.** Aybonito [Aibonito], in sylvis ad "Ciujon", [18.1320°, -66.2598°], 02/XI/1885, *P. Sintenis, Pl. Portoricenses 2028* (LE, NY-*n.v.*); Aybonito [Aibonito], ad La Lima, [18.1030°, -66.2964°], 28/X/1885, *P. Sintenis, Pl. Portoricenses 2058* (NY-*n.v.*, PR, PRC); Sierra de Naguabo, [18.2599°, -65.7704°], 2400 ft, 08/III/1914, *W.E. Hess 326* (LE, W). **SAINT CHRISTOPHER [SAINT KITTS].** "Moly new Estate", [17.3688°, -62.8029°], 08/IX-05/X/1901, *N.L. Britton & J.F. Cowell 320* (K); Phillips Level, [17.3507°, -62.7642°], 1400 ft, 24/VII/1932, *H.E. Box 264* (K-on 2 sheets). **GUADELOUPE.** *E. Marie s.n.* (G-on 2 sheets); *M. [F.J.?] L'Herminier s.n.* (K, ex Herb. Fac. Strasb.); *M. [F.J.?] L'Herminier s.n.* (K, ex Herb. Mus. Paris); [16.1113°, -61.6768°], 1862, *M. [F.J.?] L'Herminier 63* (K, W); 1862, *M. [F.J.?] L'Herminier s.n.* (BR); 130-1100 m, VII/1881, *Mazé s.n.* or *21129*? (K); *Anonymous, ex Herb. Bory* (U); Forêt domaniale de la Basse-Terre, Trace Victor-Hugue, en partant de Matouba, [15.9731°, -61.6906°], 07/IX/1981, *S. Barrier 2971* (U). **DOMINICA.** *D. "Inray" 29* (W); in silvis ad Grande Bay, [15.3232°, -61.2946°], XI/1881, *B. Eggers, Fl. Exs. Ind. Occid. 551* (LE, W); [15.5109°, -61.3511°], I/1882(?), *"B. Eggers 865"* (K); 1890, *Anonymous, ex Herb. Cartwright* (OXF-00072111). **MARTINIQUE.** s.d., [?] *Belange 467* (K); Mont Parnaise, XI/1867, *L. Hahn 61* (FI, K); VI/1871, *Anonymous, ex Herb. Le Jolis* (LE); s.d., [?] *Perrolet s.n.* (W); Morne Rouge, Morne Calebasse, foothill SE of Montagne Pelée, 14°48'N, 61°09'W, 753 m, 19/III/2003, *M.J.M. Christenhusz & S. Bollendorff 2690* (SP, U). **MARTINIQUE ET GUADELOUPE.** 1868, *T. Husnot, Pl. des Antilles 285* (FI, K). **SAINT LUCIA.** [13.9058°, -60.9596°], s.d., *H.B. Murray 08* (K); VII/1887(?), *J. Gray 16* (K). **TRINIDAD AND TOBAGO.** TOBAGO: [11.2554°, -60.6456°], 21/IX/1910, *W.E. Broadway 3882* (K-2 sheets). TRINIDAD: [10.7849°, -61.0750°], 1877-1880, *A. Fendler 148* (K, OXF-on 2 sheets); Mount Tocuche, 03-05/IV/1920, *N.L. Britton et al. 1306* (K); Blanchisseuse Road, near 10 mile post, [10.7499°, -61.2831°], 02/I/1925, *W.E. Broadway 5512* (FI-PS, PR). **MEXICO.** OAXACA: Mount Cuicatlan, [17.7985°, -96.9520°], 16-22/VI/1898, *V. González & C. Conzatti 737* (K). **GUATEMALA.** ALTA VERAPAZ: Cubilquitz, [15.5710°, -89.8710°], 350 m, I/1902, *H. von Tuerckheim 8346* (K, LE). **[BRITISH] HONDURAS.** Middlesex, [15.7576°, -86.4498°], 200 ft, 19/VII/1929, *W.A. Schipp 258* (G, K-on 2 sheets). **COSTA RICA.** HEREDIA: Parque Nal. Braulio Carrillo, Estación Magsasay, Sarapiquí, 10°24'18"N, 84°03'30"W, 200 m, 23/VI/1990, *D. Acevedo 84* (CR-*n.v.*, K-2 sheets). [CARTAGO?]: Tucurrique, Las Vueltas, [09.8546°, -83.7183°], 600-700 m, XII/1898, *A. Tonduz 12870* (G-on 2sheets, G-2 sheets, LE, W). **PANAMA.** Chiriqui, [08.7008°, -82.4478°], s.d., *J.H. Hart C 252* (K). **NOVA GRANADA [COLOMBIA].** ANTIOQUIA: Mun. Anorí, Vereda Madre Seca, quebrada Pilones, sector Juanico, 07°01’00.2”N, 75°03’00.0”W, 610 m, 22/I/2004, *W.D. Rodríguez et al. 4549* (HUA-on 3 sheets); Mun. Frontino, Corrigimiento La Blanquita, Región de Murrí, vía Nutibara-La Blanquita, 14.5 km W de Nutibara, colecciones entre 15-16 kms del Alto de Cuevas a La Blanquita, 06°40’N, 76°10’W, 900 m, 13/VII/1988, *A.L. Arbeláez et al. 371* (HUA-on 4 sheets); CHOCÓ: Río Salto (tributary of the Río Suruco), 9 km W of Andagoya, [05.0875°, -76.7099°], 75-100 m, 23/II/1971, *D.B. Lellinger & E.R. de la Sota 439* (LP, US-*n.v.*); 0.5 km N of San José del Palmar on the slope behind the cemetery, [04.9768°, -76.2374°], 1100 m, 26/III/1971, *D.B. Lellinger & E.R. de la Sota 772* (HUA, LP-*n.v.*, US-*n.v.*); “EL VALLE” [VALLE DEL CAUCA?]: Cordoba, Dagua Valley, [03.8808°, -76.9280°], 80-100 m, 08/V/1922, *E.P. Killip 5040* (GH-*n.v.*, K, NY-*n.v.*, PH-*n.v.*); CAUCA or CUNDINAMARCA [probably CAUCA]: La Vega, [02.1022°, -76.7794°], 1800 m, XII/1860, *A. Lindig 328* (BM, K); [ARAUCA?]: Sarare [El Sarare?], Santa Librada, [08.0421°, -71.2110°], 1300-1600 m, 24-25/III/1959, *H. Bischler 1972* (BM, FI-PS, G-on 2 sheets). **VENEZUELA.** FALCÓN: Sierra de San Luis, arriba de Santa Maria, [10.8253°, -70.4661°], 1300 m, 26/VII/1979, *‘Flora Falcón’ (HW, BV) 921* (U-on 3 sheets); MIRANDA: Alpes del Tuy, [10.1738°, -66.5379°], 500 m, 27/XI/1956, *L. Bernardi 5863* (G); SUCRE: límite distritos Arismendi/Bermúdez/ Benítez, Península de Paria, 10°38’N, 63°10’W, 750-1000 m, 01/IX/2002, *W. Meier & P. Molina 9223* (B-*n.v*, G, PORT-*n.v.*, UC-*n.v.*, VEN-*n.v.*). **GUYANA.** POTARO-SIPARUNI: Pakaraima Mts., Mt. Wokomung, Suruwabaru Creek, E side river line slopes 1-2 km from juncture Yuarba, 05°02’N, 59°54’W, 750-800 m, 09/XI/1993, *T.W. Henkel et al. 4219* (CAY, US-*n.v.*). **SURINAME.** [SIPALIWINI]: In montibus, qui dicuntur Emmaketen [Emma Keten], loodrecht op Zuidlijn, [03.6951°, -56.5131°], ca. 800 m, 23/IX/1959, *A.G.H. Daniëls & F.P. Jonker 1253* (U-on 2 sheets). **FRANCE, FRENCH GUIANA.** [SAINT-LAURENT-DU-MARONI]: Secteur Elysée, Région de Paul-Isnard, Collines et criques situées à l’ouest de la la vallée de la crique Elysée et de la piste allant d’Elysée à Emmanuel, à 9.5 km à l’WNW de Citron, à 80 km au sud de St-Laurent-du Maroni, St. MB 973-72, 04°45’N, 54°02’W, 100 m, 16/VII/1999, *M. Boudrie 3210* (CAY-on 5 sheets); Layon Eaux Claires, Région de Saül, 03°37’N, 53°12’W, 250 m, 13/II/1993, *G. Cremers et al. 12994* (CAY-on 2 sheets, P-*n.v.*); Mont Galbao, secteur est, 03°36’N, 53°17’W, 550 m, 12/I/1986, *J.J. de Granville et al. 8631* (B-*n.v.*, BM-*n.v.*, CAY-on 3 sheets, G, MG-*n.v.*, MO-*n.v.*, NY-*n.v.*, P-*n.v.*, U-*n.v.*, US-*n.v.*, Z-*n.v.*); Montagne de l’Inini, zone est, extrèmité est, 03°34’N, [53°55’W], 700 m, 02/IX/1985, *G. Cremers et al. 9261*(BR, CAY-on 2 sheets, G-on 3 sheets, K-on 5 sheets, NY-*n.v.,* P-*n.v.,* U-on 3 sheets); Région de l'Inini, Mont Atachi Bacca, 03°33'N, 53°55'W, 700 m, 17/I/1989, *G. Cremers et al. 10293* (B-*n.v.,* CAY-on 3 sheets, NY-*n.v.,* P-*n.v.,* U, US-*n.v.,* Z-*n.v.*); Région de l'Inini, Mont Atachi Bacca, 03°33'N, 53°55'W, 720 m, 23/I/1989, *G. Cremers et al. 10345* (B-*n.v.,* CAY-on 3 sheets, G, HAMAB-*n.v.,* NY-*n.v.,* P-*n.v.,* SJPR-*n.v.,* U-on 2 sheets, US-*n.v.,* Z-*n.v.*); [CAYENNE]: Commune de Saint-Elie, Bassin du Sinnamary, Colline de Virgile, aud sud de l'ancien village de Dieu-Merci, à 800 m environ au NW du Camp Ceïde (Société Texmine), à 5 km au SE de Saint Elie, St: 973-31, [04.8224°, -53.2859°], 05/V/1997, *M. Boudrie 2807* (CAY-on 2 sheets, UC-*n.v.*); Montagnes de la Trinité, zone sud, Bassin de la Mana, 04°34'N, 53°21'W, 100 m, 18/I/1998, *J.J. de Granville & F. Crozier 13681* (B-*n.v.,* CAY-on 3 sheets, K-on 2 sheets, NY-*n.v.,* P-*n.v.,* U, US-*n.v.*); Embouchure de la Crique des Frères Anicet, Bassin du Sinnam, 04°11'N, 52°59'W, 65 m, 09/XI/1992, *M. Hoff 7828* (CAY, NY-*n.v.,* P-*n.v.,* US-*n.v.,* Z-*n.v.*). **BRAZIL.** PARÁ: Serra dos Carajás, AMZA camp AZUL, 06°06'S, 50°17'W, 500-550 m, 31/V/1982, *C.R. Sperling et al. 5912* (HUEFS, INPA-*n.v.,* MG-*n.v.,* NY-*n.v.*); CEARÁ: Pacatuba, Serra da Aratanha, Sítio Pitaguari, [-03.9771°, -38.6389°], 05/X/1979, *P. Martins & A.J. Castro s.n.* (EAC [7064], UFP [7172]); Maranguape, Serra de Maranguape, Serra (Morro) da Pedra Rajada, 03°54'05"S, 38°43'12"W, 900 m, 10/IV/2011, *P.B. Schwartsburd & J.A.P. Araújo 2510* (SP); Serra do Baturité, Sítio Santa Clara, [-04.4023°, -39.0412°], 27/XII/1937, *J. Eugênio 38* (RB-*n.v.,* SP); PERNAMBUCO: Bonito, Mata da Colônia, 19/VI/1998, *I.C.L. Barros et al. 13* (PEUFR); Bonito, Mata da Colônia, 07/V/1999, *I.C.L. Barros et al. s.n.* (PEUFR [40767]); Bonito, Mata da Colônia, 08°30'14"S, 35°42'56"W, ca. 800 m, 14/VII/2000, *A.C.P. Santiago & M.R. Pietrobom-Silva 172* (PEUFR-on 2 sheets); Bonito, Mata da Colônia, 08°30'14"S, 35°42'56"W, ca. 800 m, 29/XI/2000, *A.C.P. Santiago & M.R. Pietrobom-Silva 357* (PEUFR-on 2 sheets); Bonito, Mata da Reserva Biológica, 07/V/1999, *I.C.L. Barros et al. s.n.* (PEUFR [40766]); Bonito, Mata da Reserva Biológica Municipal de Bonito, 08°30'30.5"S, 35°43'18.2"W, ca. 750-800 m, 19/V/2000, *A.C.P. Santiago et al. 152* (PEUFR-on 2 sheets); Jaqueira, Usina Colônia, Mata do Jasmim, 08°04'15"S, 35°50'13"W, ca. 650 m, 17/X/2001, *M.S. Lopes & M.R. Pietrobom-Silva 326* (HUEFS, MBM, RB); Jaqueira, Usina Colônia, Mata do Quengo, ca. 08°42'50.4"S, 35°50'25. 8"W, 713 m, 31/V/2001, *M.S. Lopes & M.R. Pietrobom-Silva 216* (HUEFS, MBM, SP, RB-on 2 sheets); Jaqueira, Usina Colônia, Mata Córrego do Guariba, 08°43'00.2"S, 35°50'20.2"W, 652 m, 19/X/2001, *M.S. Lopes & M.R.*

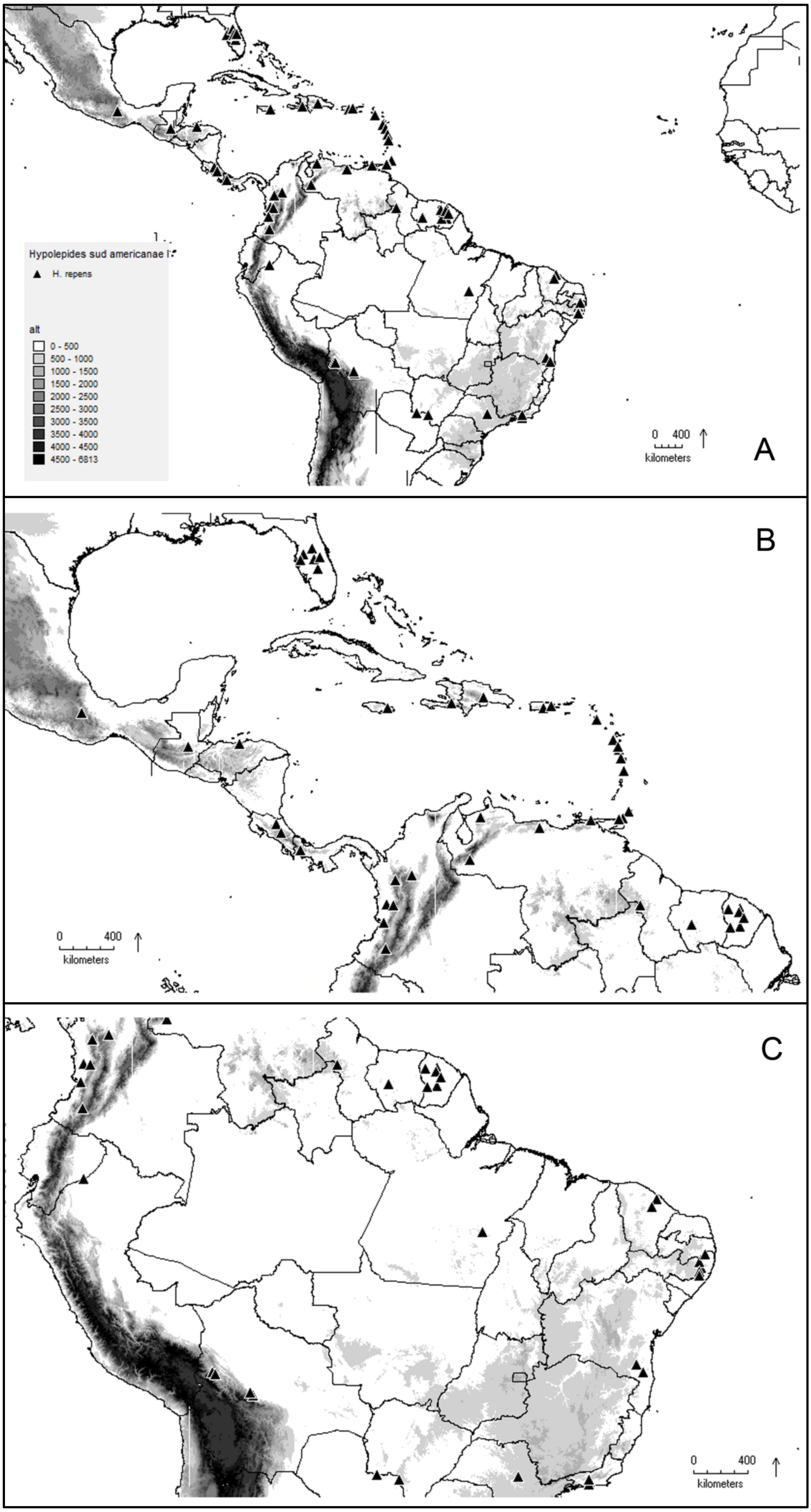
Pietrobom-Silva 473 (MBM); Jaqueira, Usina Colônia, RPPN Frei Caneca, Mata do Córrego do Guariba, 08°43’00”S, 35°50’20”W, 650 m, 15/III/2011, *P.B. Schwartsburd et al. 2335* (SP, UFP); Jaqueira, Usina Colônia, RPPN Frei Caneca, Mata do Córrego do Guariba, 08°43’00”S, 35°50’20”W, 650 m, 17/III/2011, *P.B. Schwartsburd & Seu Dejau 2337* (SP, UFP); São Vicente Ferrer, Complexo da Serra do Mascarenhas, Mata do Estado, 07°35’00”S, 35°30’00”W, ca. 600-650 m, 17/VIII/1998, *M.R. Pietrobom-Silva 4397* (HB, MBM, PEUFR, UFP); São Vicente Ferrer, Complexo da Serra do Mascarenhas, Mata do Estado, 07°35’00”S, 35°30’00”W, ca. 600-650 m, 16/XI/1998, *M.R. Pietrobom-Silva 4485* (HB, PEUFR, SP, UFP); São Vicente Ferrer, Complexo da Serra do Mascarenhas, Mata do Estado, 07°35’00”S, 35°30’00”W, ca. 600-650 m, 29/I/1999, *M.R. Pietrobom-Silva 4514* (HB, MBM, PEUFR, SP, SPF, UFP-on 2 sheets); ALAGOAS: Ibateguara, Usina Serra Grande, Engenho Coimbra, Grota do Dudé, 09°00’03.0”S, 35°51’14.2”W, 390-415 m, 09/II/2001, *M.R. Pietrobom-Silva & A.C.P. Santiago 4847* (HB, NY-*n.v.*, UFP); BAHIA: Ilheos [Ilhéus], [-14.9208°, -40.0264°], *L. Riedel s.n.* (L); Camacan, Fazenda Serra Bonita, 9.7 km W de Camacan, na estrada para Jacarecí, daí 6 km SW na estrada para RPPN Serra Bonita e Torre da Embratel, Trilha da Pousada, 15°23’30”S, 39°33’55”W, 730 m, 27/VII/2008, *F.B. Matos & R.R. Santos 1522* (SP, UPCB-*n.v.*); RIO DE JANEIRO: sylvis montanis prope Tejiucca [Rio de Janeiro, Tijuca], [-22.9462°, -43.2356°], *G. Raddi s.n.* (FI-on 3 sheets); Serra Estrella, [22°53’S, 43°13’W], I/1823, *L. Riedel 90a* (LE-3 sheets [one of them *p.p.*]); Petrópolis, Independência, [-22.5491°, -43.2070°], 23/X/1938, *A.H.G. Alston & A. Lutz 278* (BM-on 2 sheets); SÃO PAULO: Itirapina, Serra de Itaqueri, às margens de riacho afluente do Rio da Cachoeira, [-22.3592°, -47.8837°], 10/I/1992, *A. Salino 1248* (BHCB, UEC-on 2 sheets); STATE UNKNOWN: Locality unknown [Serra da Estrela?], *L. Riedel s.n.* [*90a*?] (BR, W); Locality unknown, 1820(?), *G.H. von Langsdorff s.n.* (BR). **ECUADOR.** LOCALITY UNKNOWN: Andes, Rio Bombonasa, [‘-02.5757°, -76.7447°’], *R. Spruce 5349* (K). **BOLIVIA.** [LA PAZ]: San Carlos de Mapiri, “15°S”, [-15.4095°, -68.1854°], 750 m, X/1907, *O. Buchtien 1134* (BCN-2 sheets, K [re-written as “*Buchtien 11*”], L, LE, PR, SI, UC-*n.v.*); Chuquini, Rio Tipuani, [-15.5441°, -68.0055°], 3000 ft, IV/1926, *G.H.H. Tate 1157*(LPB); COCHABAMBA: 160 km von Cochabamba, 750 m, [-16.9894°, -65.4539°], VI/1909, *O. Buchtien 10* (G); Chapare, road from Villa Tunari to El Palmar, ca. 1 km above Las Cuevas, [-16.7543°, -65.6578°], 500 m, 06/VII/1997, *J.R.I. Wood 12392* (LPB, UC-*n.v.*). **PARAGUAY.** [AMAMBAY]: Paraguaria septentrionali, Sierra de Amambay, Punta Pará [Ponta Porã, Brazil?], [-22.5343°, -55.7741°], IV/1907-1908, *T. Rojas 10447* (BM-on 2 sheets, G-on 2 sheets, G-on 5 sheets); [CONCEPCIÓN or AMAMBAY]: Regione calcarea cursus superioris fluminis Apa, [-22.2522°, -57.2733°], IV/1912-1913, *E. Hassler 11620* (G-on 3 sheets). **COUNTRY UNKNOWN [MARTINIQUE or SAINT LUCIA?].** Locality unknown, *Anonymous, Sieber Fl. Mixta n. 347* (BM, G, K, L, LE, PRC – syntypes of *Dicksonia aculeata*).

Christenhusz (2009: 239) designated the tabula 21, fig. 1, of Fée's Hist. Foug. Ant. (1866) as the lectotype of *Hypolepis delicatula* Fée, "because no herbarium material is in existence". In Fée's (1866) protologue, the material used for the description is written as "Habitat in Guadalupa. *L'Herminier,* 1864". There are a lot of collections of L'Herminier from Guadeloupe, dated from 1862 or not dated at all, throughout many herbaria (see material examined) – certainly they cannot be considered as syntypes. But there is one material at RB, from Fée's original herbarium, which perfectly meets the protologue ("La Guadaloupe, 1864, *L'Herminier*"), is written "*H. dicksonioides* (...) in textu *delicatula*" by Fée, and it is also signed by him. Additionally, there is a dateless material at G (mounted on 2 sheets), written "*Hypolepis delicatula*" by Fée, from L'Herminier's original herbarium. Thus, following Art. 9.17, and Recs. 9A.1, 9A.3 of the ICNB (McNeill *et al.* 2006), the previous lectotype chosen is superseded here by the material at RB, and the material at G is considered as an isolectotype.

Hypolepis repens was the first *Hypolepis* species described for the Americas: primary as *Filix acueata repens* Plum., then as *Lonchitis repens* L., then as *Cheilanthes repens* (L.) Kaulf., and finally as *Hypolepis repens* (L.) C. Presl. And, since this was the first name available for this intriguing aculeate fern, this name was consequently widely applied, throughout most of the Neotropical *Hypolepides.* Many authors considered *Hypolepis repens* as one of a few (if not the only one) *Hypolepis* species occurring in the Neotropics, sometimes split in a few varieties, for example, Hooker (1858), Hooker & Baker (1868), Baker (1870), Christ (1901a), etc. Other authors amplified too much its distribution, for example Christ (1908), Svenson (1938), Sehnem (1972), Sota (1972, 1977), Ponce *et al.* (2008), etc., as far as Southern Brazil and Northern Argentina, plus Galapagos Islands (see also the discussion of *H. galapagensis* and *H. poeppigii*).

Hypolepis repens s. str. is indeed wide spread in the Americas: occurring from Florida (USA) through the Antilles; from Mexico through Mesoamerica; from Northern South America (Colombia, Venezuela, Guianas) eastwards surrounding the Amazon through Brazil (Pará, Ceará, Pernambuco, Alagoas), then southwards to Bahia, Rio de Janeiro, and São Paulo; and from Northern South America (Colombia) southwards (between the Andes and the Amazon) to Ecuador, Bolivia, and Paraguay. *Hypolepis repens* has its austral limits in São Paulo (Brazil) and Amambay (Paraguay); and it does not occur in the American Pacific Islands (*e.g.* Cocos and Galapagos Islands).

Hypolepis repens is easily identified by the following combinations of characters: the fronds furnished only and sparsely with catenate-acicular hairs and trichomidia, the petioles and rachises ranging proximally from dark brown, lighter above, up to stramineous, copiously aculeate (as a rule), the costae, costules, and veins with only catenate-acicular hairs, the laminar tissue between the veins abaxially and adaxially glabrous, the lamina margins glabrous, and the pseudo-indusia conspicuous, entirely hyaline, with the margins smooth to slightly crenate (never ciliate) – Figs. 11A–E. For a further differentiation with the most similar species in South America (*H. acantha, H. galapagensis, H. melanochlaena, H. mitis, H. parallelogramma,* and *H. poeppigii*), see their respective discussion.



Map 20 distribution of *Hypolepis repens:* **A** general view, **B** detail of North, Central, and northern South Americas, **C** detail of South America.

21. ***Hypolepis rigescens*** (Kunze ex Mart.) T. Moore, Index Fil. (T. Moore) 11: 252. 1861. *Cheilanthes rigescens* Kunze ex Mart., Flora 22(1), Beibl. 4: 51. 1839. *Polypodium punctatum* Thunb. f. *rigescens* (Kunze ex Mart.) Baker *in* Mart. & Eichler, Fl. Bras. 1(2): 503, t. 65. 1870. **Lectotype,** designated here: Brasil, Crescit in sylvis siccioribus, locis montanis prope Ilheos et álibi, Dryas, [-14.7746°, -40.7961°], *Anonymous* [*Martius*?], *Martii Herb. Fl. Brasil. n. 383* (BR!). **Fig. 9B, Map 19B.**

Hypolepis rubiginosopilosula Lellinger, Amer. Fern J. 93(3): 147. 2003. Type: Costa Rica, Prov. San José, Vicinity of El General, [09.3962°, -83.6294°], 1160 m, XII/1936, *A.F. Skutch 2975* (holotype: US-on 2 sheets, *n.v.*; isotype: K!).

? *Hypolepis minima* M. Kessler & A.R. Sm., Brittonia 59(2): 194, figs. 3a, b. 2007. Type: Bolívia, La Paz, Prov. Franz Tamayo, PN-ANMI Madidi, senda Keara-Mojos, Chunkani, 14º 38’ S, 68º 57’ W, 2950 m, 11/X/2001, *I. Jiménez 972* (holotype: UC-*n.v.*; isotypes: GOET-*n.v.*, LPB!).

Plants terrestrial. *Rhizomes* 1.5–4.5 mm diam., glabrescent or hairy, the *hairs* catenate-acicular, reddish-brown, rigid, 1–2 mm long, 15–20 celled. *Fronds* erect or arched, with continuous growth, (40–)100–150(–230) cm long; *petioles* (15–)40–70(–100) cm x (2–)2.5–5(–6) mm, proximally commonly dark red wine, rarely black, medially and distally golden-brown, abaxially and adaxially sparsely pilose to glabrescent with two kinds of hairs (rarely one kind absent), moderately aculeate, sparsely rugose, the *fisrt kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, 0.1–0.2 mm long, 4–7-celled, the *second kind of hairs* catenate-glandular, hyaline with the base and cross-walls reddish, 0.1–0.3(–0.5), 4–6(–8)-celled, the *aculei* straight, (0.2–)0.3–1(–1.2) mm long; *laminae* ovate, proximally bipinnate-bipinnatissect with segments lobed, medially bipinnate-pinnatissect with segments pinnatifid, distally pinnatisect, (25–)70–100(–130) x (25–)50–80 cm; *rachises* slightly curved at base, otherwise straight, proximally and medially golden-brown, distally stramineous, abaxially and adaxially sparsely pilose with both kinds of *hairs*, similar to those from the petioles, moderately aculeate, sparsely rugose; *proximal pinnae* (12–)25–40 x (4.5–)12–25 cm, slightly inaequilateral; *costae* abaxially and adaxially pilose with both kinds of hairs, the *first kind of hairs* bigger, 0.4–1.2(–1.5) mm long, 7–12(–15)-celled, more conspicuous abaxially, the *second kind of hairs* similar to those from the petioles and rachises, but commonly slightly bigger, 0.2–0.5 mm long, 4–7-celled; *costules* abaxially pilose, adaxially glabresccent or with scattered hairs, the *hairs* similar to those from the costae, but the *first kind* more scattered; *veins* abaxially sparsely pilose, adaxially glabrous or with scattered hairs, only the *second kind of hair* present, and much smaller, ca. 0.1–0.15 mm long, 2–3-celled; *laminar tissue between the veins* abaxially with sparse hairs similar to those from the veins, adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* inconspicuous, 2/3 green, 1/3 hyaline, mostly chartaceous but membranaceous in the hyaline part, the *margins* regularly crenate to dentate, rarely with one or two cilia, the *cilia* catenate-acicular, ca. 0.2 mm long, 4 or 5-celled.

Distribution and ecology: Central and Northern South America, plus Southern Central America, in mid to high elevations, surrounding the Amazon Forest, in: S Brazil (doubtful record), SE/NE Brazil, French Guiana (probably), Suriname, Guyana(?), Venezuela, Colombia, Costa Rica, Panama (*apud* Lellinger 2003), Ecuador, Peru, and Bolivia; from 600 to 2000 m (plus only one collection labeled as “400-550 m”) – Map 19B.

Additional material examined: COLOMBIA. BOLIVAR: Antizales, [‘08.6600°, -73.4622°’], 1200-1600 m, 25-26/II/1918, *F.W. Pennell 4464* (K, NY-*n.v.*); ANTIOQUIA: Mun. Guatapé, vereda Santa Rita, finca Montepinar, 06°15’N, 75°10’W, ca. 1850 m, 02/X/1990, *D.L. Echeverri-V. 401* (HUA-on 3 sheets); Mun. Anorí, Vereda Santa Gertrudis, finca La Estrella, 07°07’58.8”N, 75°09’34.9”W, 1420 m, 03/X/2003, *W. Rodríguez et al. 4118* (HUA-on 3 sheets); CHOCÓ: Principal ridge and slopes 2 km E of San José del Palmar, [04.9676°, -76.2322°], 1550-1650 m, 26/III/1971, *D.B. Lellinger & E.R. de la Sota 734* (HUA, LP-*n.v.*, US-*n.v.*); [CUNDINAMARCA?]: Caqueza, [04.4004°, -73.9106°], s.d., *G.K.W.H. Karsten s.n.* (W); BOYACÁ: Santa María, via al Bosque la Almenara, 04°45’26”N, 73°18’20 ”W, 1200 m, 13/XI/2003, *C.M. Méndez-A. et al. ‘71’* (HUA); [ARAUCA?]: Sarare [El Sarare?], Gibraltar, [08.1630°, -70.7617°], 700-900 m, 26-27/III/1959, *M. Bischler 2053* (FI-PS, G-2 sheets); [META]: Villavicensio, [04.1454°, -73.6571°], 600 m, 03/I/1876, *E. André 1069-bis* (K); [CAUCA?]: Andium occidentalium popayanensium, [02.3717°, -76.8009°], 1000-1500 m, *F.C. Lehmann 6952* (B?-*n.v.*, K-2 sheets). **VENEZUELA.** TÁCHIRA: Distr. Uribante, in forest along road from La Siberia to entrance to Las Cuevas, Represa, [07.6291°, -72.1664°], 10/VII/1983, *H. van der Werff & A. González 5238* (MO-*n.v.*, VEN); FALCON: Sierra San Luis, cerca del Hotel Parador, [11.2265°, -

69.5884°], 1300 m, 03/IX/1978, *H.v.d. Werff & R. Wingfield 3040* (CORO-*n.v.*, U). **GUYANA[?].** [CUYUNI-MAZARUNI]: Roraima, [05.1279°, -60.5888°], 1863-1864, *C. Appun 1349* (K). **SURINAME.** [MAROWIJNE or SIPALIWINI]: Nassau Mountains, Marowijne River, [04.7858°, -54.5571°], 400-550 m, 07/I/1955, *B. Maguire et al. 39196 A* (HB, K-on 2 sheets, NY-*n.v.*, UC-*n.v.*, US-*n.v.*). **BRAZIL**. PERNAMBUCO: Jaqueira, Usina Colônia, Mata Córrego da Guariba, 08°43'00.2"S, 35°50'20.2"W, 652 m, 06/XII/2001, *M.S. Lopes & M.R. Pietrobom-Silva 510* (RB, UFP); BAHIA: Castelnovo, 1821, *L. Riedel 102* (LE-2 sheets); Locality unknown, ['-14.7970°, -40.8484°'], 05/II/1838(?), *B. Luschnath 109* (B-on 2 sheets, B-2 sheets, LE-5 sheets - excluded sintypes of *Hypolepis repens* var. *selloana* Klotzsch ex Baker); Locality unknown, *J.S. Blanchet 753* (G-on 2 sheets); Locality unknown, *J.S. Blanchet 2497* (G-on 2 sheets, G-on 3 sheets); MINAS GERAIS: Ouro Preto, [-20.3986°, -43.4707°], 1937, *J. Badini 312* (RB); ESPÍRITO SANTO: Cachoeira de Itapemirim, Vargem Alta, [-20.8526°, -41.2307°], 24/VIII/1948, *A.C. Brade 19355* (RB-*n.v.*, SP); RIO DE JANEIRO: in nemoribus Serra Estrella, [22°53'S, 43°13'W], I/1823, *L. Riedel s.n.* (LE-3 sheets); in montibus Estrellae, *G.H. von Langsdorff & L. Riedel 99* (LE); Serra Estrella, *Anonymous* [*Riedel* ?] *s.n.* (LECB); SÃO PAULO: Rio Grande, [-23.7939°, -46.5225°], 1906, *L. Wacket s.n.*, *Rosenst. Filic. Austrobras. Exsic. 183* (B); PARANÁ (doubtful localities): Alexandra, in cultis, [-25.7152°, -48.6115°], 05/IX/1910, *P.K.H. Dusén 10222* (BM, BR, G, K, LE, NY-*n.v.*); Jacarehý [SÃO PAULO, Jacareí?], 25/III/1914, *P.K.H. Dusén 14740* (G); STATE UNKNOWN: Locality unknown, *L. Riedel s.n.* (BR-*p.p.*, FI-*p.p.*, OXF, W['1245']); Locality unknown, *L. Riedel 90* (LE); Locality unknown, *L. Riedel 132* (LE); Locality unknown, *G.H. von Langsdorff & L. Riedel 191* (LE); Locality unknown, 1841, *L. Duparquier s.n.* (BM-*p.p.* [labelled "B" by Schwartsburd]); Locality unknown, *Anonymous [Capanema ?] s.n., ex Herb. Capanema* (RB-on 2 sheets ['6833']). **ECUADOR.** MORONA SANTIAGO: Misión Bomboiza, 03°29'S, 78°34'W, ca. 800 m, 23/IV/1973, *L. Holm-Nielsen et al. 4267* (K-on 2 sheets). LOCALITY UNKNOWN: Locality unknown, 1860, *Fraser s.n.* (G). **PERU.** HUÁNUCO: Huanuco, Tingo Maria, [-09.2969°, -75.9916°], 700 m, 01/IX/1956, *R.M. Tryon & A.F. Tryon 5240* (BM, F-*n.v.*, GH-*n.v.*, U, US-*n.v.*, USM-*n.v.*); JUNÍN: Carpapata, [-11.0261°, -75.4647°], 2000 m, 13/XI/1960, *E. Kunkel '6654'* [*'550'*] (G-on 2 sheets, GH-*n.v.*). **BOLIVIA.** LA PAZ: San Carlos, Mapiri region, [-15.4001°, -68.1875°], 850 m, 17/V/1927, *O. Buchtien 296* (G, UC-*n.v.*); Prov. J. Bautista Saavedra M., Pauji-Yuyo, entre Apolo y Charazani, 15°02’S, 68°29’W, 1200 m, 12/VI/1997, *M. Kessler et al. 10078* (LPB, UC-*n.v.*); Prov. J. Bautista Saavedra M., cerro Asunta Pata, entre Apolo y Charazani, 15°03’S, 68°29’W, 1450 m, 22/VI/1997, *M. Kessler et al. 10256* (LPB, UC-*n.v.*); Prov. Nor Yungas, Estación Biológica de Tunquini, hacia el Chairo, 16°11’S, 67°53’W, 1600 m, 16/VIII/2000, *D. Eberhardt et al. 75* (LPB, UC-*n.v.*); Prov. Nor Yungas, Estación Biológica de Tunquini, 16°11’S, 67°53’W, 1565 m, 19/VIII/2000, *D. Eberhardt et al. 151* (LPB, UC-*n.v.*); COCHABAMBA: Prov. Ayopaya, Comunidad Pampa Grande, sobre el sendero que va desde Carmen Pampa a Tunki, 16°40’S, 66°28’W, 1920 m, 09/IX/2002, *I. Jiménez & A. Moguel 1462* (LPB); Chapare, San Onofre, [-16.9813°, -65.6829°], 1600 m, 21/II/1929, *J. Steinbach 9302* (BM, K, U, UC-*n.v.*); Chapare/Tiraque, on the escarpment above El Palmar, [-16.8159°, -65.7573°], 1200 m, 06/VI/1998, *J.R.I. Wood 13672* (K-on 3 sheets, LPB).

Young specimens: BOLIVIA: LA PAZ: Prov. J. Bautista Saavedra M., Pauji-Yuyo, entre Apolo y Charazani, 15°02’S, 68°29’W, 1050 m, 09/VI/1997, *M. Kessler et al. 9941* (LPB).

In the XIX Century, *Hypolepis rigescens,* originally placed in *Cheilanthes,* was described as an endemic species from Northeastern Brazil (Martius 1837, 1839). Then, Moore (1861) transferred it to *Hypolepis,* without mentioning its distribution. Baker (1870) regarded it as a “*forma brasiliensis*” of the sub-cosmopolitan *Polypodium* (*Phegopteris*) *punctatum* (= *Hypolepis punctata*) - apparently regarding it as a local variant of a sub-cosmopolitan species. Fée (1873) transferred it again to genus *Hypolepis* (he did not mention Moore’s name), considering it at *species level* and regarding it again as endemic to NE Brazil.

In the early XX Century, Hieronymus (1905), when identifying the Central/South American plants collected by F.C. Lehmann, used the name *Hypolepis rigescens*. He thus amplified its distribution also to Colombia and Peru, mentioning the similarity of the Brazilian material with the Western South American. Nearly contemporary, A.C. Brade used the name *Hypolepis rigescens* to identify some specimens from Costa Rica (unpubl. data, herbarium material).

But, in the mid and late XX’s, the sequent pteridologists apparently have neglected the identity of *Hypolepis rigescens:* Tryon (1964), Tryon & Stolze (1989), and Cremers & Kramer (1991) embeebed its concept within the concept of *H. hostilis*;

Moran (1995) embeebed it with *H. viscosa* - both concepts probably reflected on the check-lists of Navarrete (1999, 2008), embeebing *H. rigescens* either to *H. hostilis* and/or *H. viscosa.*

In the XXI Century, Lellinger (2003), re-analysing the *Hypolepides* from Costa Rica and Panama, noticed again some specimens “generally been called *H. rigescens*”, and commented their differences with *H. viscosa s. str.* But, unfortunately, Lellinger (*l.c.*) also compared those specimens with a false “isotype” at FI (probably a specimen of *H. acantha*?; there is no type of *H. rigescens* at FI), and thus described a new species, “endemic” to Costa Rica and Panama: *H. rubiginosopilosula.*

So, in this work, after analyzing the types of the names cited above, and studying many herbarium materials, the concept of Hieronymus for *H. rigescens* is resurrected, and its distribution is amplified to more Countries in Central/South America (see above).

Hypolepis rigescens is in fact very similar to *H. hostilis* and *H. viscosa* (also to *H. galapagensis* and *H. lellingeri* – see their discussion and ‘Results, Species groups’). *Hypolepis rigescens* differs from *H. hostilis* by the petioles proximally usually dark wine red, rarely black (*vs.* always black), the rachises golden-brown (*vs.* stramineous), both usually sparsely pilose on both sides (*vs.* hairs restricted to the adaxial groove), the laminar tissue between veins abaxially with short catenate-glandular hairs (*vs.* glabrous), and the margins of the pseudo-indusia crenate to dentate, rarely with one or two cilia (*vs.* crenate, never ciliate) – Fig. 9B *vs.* Fig. 9A. Also their differences seem to be linked with elevation differences: while *H. hostilis* occurs in the low elevations of Amazonia (0–500(–685) m), *H. rigescens* occurs in the mid to high elevations, surrounding the Amazon ((400–)600–2000 m) – see Map 4.

Another species very similar to *Hypolepis rigescens* (and not present in this treatment), is *H. tenerrima* Maxon, a species apparently endemic to Hispaniola and Puerto Rico (Maxon 1924, Proctor 1989). *Hypolepis rigescens* differs from *H. tenerrima* by the laminar tissue between the veins abaxially with short catenate-glandular hairs (Fig. 9B; *vs.* with short catenate-acicular hairs). One material from Venezuela (*J.A. Steyermark et al. 124843* [VEN]) seems similar to *H. tenerrima*, but further collections are needed to be sure.

22. *Hypolepis rugosula* (Labill.) J. Sm., Bot. Mag. 3rd ser., 2: 8. 1846, as "*rugulosa*". *Polypodium rugosulum* Labill., Nov. Holl. Pl. 2: 92, t. 241. 1806 [1807?]. *Phegopteris rugosula* (Labill.) Fée, Gen. Filic.: 243. 1852, as "*rugulosa*". *Polypodium punctatum* Thunb. var. *rugosulum* (Labill.) Hook. & Baker, Syn. Fil.: 312. 1867, as "*rugulosum*". *Dryopteris punctata* (Thunb.) C. Chr. subsp. *rugosula* (Labill.) C. Chr., Index Filic.: 287. 1905. *Phegopteris punctata* (Thunb.) Mett. var. *rugosula* (Labill.) Alderw., Malayan Ferns: 495. 1908, as "*rugulosa*". *Dryopteris punctata* (Thunb.) C. Chr. var. *rugosula* (Labill.) Domin, Biblioth. Bot. 85: 41.1913. *Hypolepis rugosula* (Labill.) J. Sm. var. *rugosula* C. Chr. & Skottsb. *in* Skottsb., Nat. Hist. Juan Fernandez (Botany): 32. 1920, as "*typica*". **Lectoype,** designated by Pichi-Sermolli (1983: 260 – first step), and by Schwartsburd & Prado (2011: 157 – second step): Habitat in Capite Van-Diemen [Tasmania], *J.J.H. de Labillardière s.n.* (FI-W!-214897; isolectotypes: FI-W!-214898, FI-W!-214899, FI-W!-on 2 sheets [214903 and 214904], FI-W!-216239, FI-W!-218473], G!-on 2 sheets [00048249 and 00048250], G!-on 2 sheets [00048252 and 00048253], G!-00048255, LE!-2 sheets [probably 2 parts of the same frond]; probable isolectotypes: G!-00048251, K!, PRC!). **Figs. 2A–H, 16A–E, Maps 21A–C.**

Plants terrestrial or humiculous-epipetric. *Rhizomes* (1.2–)2–4 mm diam., with hairs, the *hairs* catenate-acicular, yellowish to reddish-brown, 1–3(–4) mm long, 15–30-celled. *Fronds* erect or arched, with continuous growth, (15–)60–140 cm long; *petioles* (6–)20–50 cm x (0.8–)1.5–4 mm, atropurpureous in all its length, abaxially and adaxially sparsely villous with three kinds of hairs, inermous, rugose, the *first kind of hair* catenate-acicular, hyaline, hyaline with the base and cross-walls reddish, or rarely entirely reddish, 0.3–0.7 mm long, 5–10-celled, the *second kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, or rarely entirely reddish, 0.3–0.7 mm long, 5–10-celled, the *third kind of hair* catenate-acicular, entirely yellowish-brown, 1–2(–2.5) mm long, 10–15(–20)-celled, sparse and caducous; *laminae* lanceolate or ovate, proximally ranging from pinnate-pinnatisect with segments pinnatifid, up to bipinnate-bipinnatisect with segments pinnatifid, medially less decompound, distally pinnatisect, (10–)40–95 x (4–)20–50(–60) cm, with the two basal pair of *pinnae* much more distant among themselves than the ones above; *rachises* straight, atropurpureous in all its length, or proximally atropurpureous and stramineous above, inermous, rugose, the indument similar to the petioles, but the *hairs* more numerous, especially on the adaxial groove; *proximal pinnae* (2–)12–30 x (1.5–)4–12 cm, equilateral; *costae* abaxially sparsely villous, adaxially copiously villous, the *hairs* similar to those from the petioles and rachises, but the *third kind of hair* usually absent or very scattered; *costules* abaxially with both the *first* and *second kinds of hairs* (subsp. *poeppigiana*), or with only the *second kind of hair* (subsp. *pradoana*), adaxially with both the *first* and *second kinds of hair*, these smaller, 0.2–0.5 mm long, 4–7-celled; *veins* with the same pattern of indument of the costules; *laminar tissue between the veins* abaxially glabrous, adaxially with both the *first* and *second kinds of hair*, these ca. 0.2–0.3 mm long, 3 or 4-celled; *lamina margins* with the *first* and *second kinds of hair* sparsely throughout, and only the *first kind* on the soral region, these the same size of those from the laminar tissue between the veins; *sori* submarginal, unprotected or slightly protected; *pseudo-indusia* absent, sometimes the lamina margin slightly revolute and protecting the sori, but never differentiated into a membranaceous hyaline flap.

Distribution and ecology: Sub-cosmopolitan; the macro-populations (subspecies) segregated from each other: Tasmania and Australia, New Zealand, New Guinea, Luzon (Philippines), Santa Helena and Ascension Islands, Madagascar and Réunion Island (Ile Bourbon), Fernando Po Island and Continental Central Africa (Democratic Republic of the Congo, Ethiopia, Uganda, Kenya, Tanzania, and Rwanda), Tristan d'Acugna and Gough Islands, C/S Argentina and Chile (incl. Chiloé and Juan Fernandez Islands), S/SE Brazil, Mesoamerica (Panama(?), Costa Rica and S Mexico), West Indies (Hispaniola(?), Jamaica and Cuba). From sea level upwards in the temperate regions; from ca. 1000 m upwards in the sub-tropical regions; and from ca. 2000 m upwards in the tropical regions, reaching 3450 m in Uganda.

With the following combination of characters, *Hypolepis rugosula* can be distinguished from all other *Hypolepis* species of the World: the fronds furnished with both catenate-acicular and catenate-glandular hairs (especially in the main axes), the petioles and rachises atropurpureous, the vascular bundle π-shaped at the base of the petioles, the proximal pinnae equilateral and more distant to the next pair than the ones above, the sori sub-marginal, and the lamina margins not differentiated into pseudo-indusia – Figs. 2C, 16A–E.

Continuing the previous concepts of Schwartsburd & Prado (2011) and Schwartsburd (2012 – see also 'Conflicting species concepts' above), *Hypolepis* *rugosula* is split into several geographical subspecies. Two of them occur in South-America (see Map 21).

Key to the subspecies of *Hypolepis rugosula,* in South America:

1. Costules and veins abaxially with both catenate-acicular and catenate-glandular hairs; plants from Central/Southern Argentina and Chile (incl. Chiloé and Juan Fernandez Islands) ………………...……………………..…… 22a. *H. rugosula* subsp. *poeppigiana*

1. Costules and veins abaxially with only catenate-glandular hairs; plants from the highlands of S/SE Brazil ………..…..………...…… 22b. *H. rugosula* subsp. *pradoana*

22a. ***Hypolepis rugosula*** (Labill.) J. Sm. subsp. ***poeppigiana*** (Mett. *in* Hohen.) Schwartsb. & J. Prado, ***stat. nov.*** for *Hypolepis poeppigiana* Mett. *in* Hohen., Fil. Lechler. 1: 18. 1856. **Lectotype,** designated here: Chile, prope coloniam Arique in prov. Valdivia, [-39.8985°, -73.2394°], V/1851, *W. Lechler, Pl. Chil. 194* (B!-20 0074790 [ex Herb. Mettenius]; isolectotypes: B!-20 0074789 [ex Herb Mettenius], B!-20 0074791, FI!, FI-W!-214914, G!-on 2 sheets, GOET-*n.v.,* K!-000640324, K!-000640325, K!-000640326, L!, LE!-2 sheets, UPS!, W!). **Maps 21A, C.**

Hypolepis chilensis Fée, Ic. Sp. Nouv.: 76. 1857 (or 1858?) *p.p., nom. superfl.* Syntypes: Chile, Valparaiso, [1834 or 1835], *C. Gaudichaud s.n.* [*31*?] (BR!, FI-W!-214906, FI-W!-214910, FI-W!-216216, G!, RB!, W!; probable duplicate: FI-W!-214917); Chile, San Juan Fernandez, *C. Gay* (P?-*n.v.,* PC?-*n.v.*); Chile, près de la colonie Arique, province de Valdivia, [V/1851],*W. Lechler* [*Pl. Chil. 194*] (B!-3 sheets [20 0074789, 20 0074790, 20 0074791], FI!, FI-W!-214914, G!-on 2 sheets, GOET-*n.v.,* K!-000640324, K!-000640325, K!-000640326, L!, LE!-2 sheets, UPS!, W!).

Phegopteris poeppigii (Kunze) Fée ex Gay var. *hirsuta* Phil., Anales Univ. Chile: 583. 1873 (or 1872?). Lectotype, designated here (or holotype?): [Chile], Puerto Lagunas, I/1872, *E. Simpson s.n.* (SGO-000000467, *n.v.* image!).

Hypolepis hauman-merckii Hicken, Anal. Soc. Cient. Arg. 62: 212, t. *s.n.* 1906. Lectotype, designated here: Argentina, Prov. Buenos Aires, Sierra de la Ventana, [-38.1625°, -61.5912°], 25/XII/1905, *M. Hauman-Merck s.n.* (SI-000095, *n.v.*, image!).

Distribution and ecology: Central and Southern Argentina and Chile (including Juan Fernandez and Chiloé Islands); from sea level up to ca. 800(–1200?) m – Maps 21A, C.

Additional material examined: ARGENTINA. BUENOS AIRES: celle du Tandil, s.d., *M. Hauman-Merck* (SI?-*n.v.* - syntype of *Hypolepis hauman-merckii*); NEUQUÉN: Correntoso, [-38.9872°, -68.0025°], 10/I/1935, *A.L. Cabrera & M.M. Job 227* (LP); Brazo Rincón, [-40.7352°, -71.7422°], XI/1985, *B. Polastry s.n.* (BCRU); [Villa la Angostura?], Quetrihué, [-40.7555°, -71.6434°], 06/VI/1943, *J. Diem 728* (SI); [RIO NEGRO]: Puerto Blest, picada a Pto. Cántaros, [-41.0289°, -71.8153°], 29/XI/1997, *J. Puntieri 396* (BCRU-on 2 sheets); Puerto Blest, picada a Pto. Cántaros, 29/XI/1997, *J. Chiapella & J. Puntieri s.n.* (BCRU). **CHILE.** [COQUIMBO]: Bosque Fray Jorge, [-30.0312°, -71.3262°], 500 m, 07/VII/1938, *C.H. Andreas 856* (L-on 2 sheets, U); Bosque de Talinay, [-30.0040°, -71.1607°], 08/II/1948, *C. Jiles 576* (SI); [VALPARAÍSO]: Valparaiso, [-33.1538°, -71.5462°], s.d., *Anonymous* [*unreadable*, "*Bredger*"?] *562* (W); [BÍO-BÍO]: prope Conception, [-36.9080°, -73.0088°], 1832, *H. Cuming 149* (BM); Concepción, Southern Chili [Chile], [-36.7792°, -72.9187°], s.d., *R.A. Philippi s.n.* (K); ad Portum Coronel, [-37.0198°, -73.0883°], 1866, *"Buehenau" s.n., ex Herb. Martii* (BR-on 2 sheets); [LA ARAUCANÍA]: Tolten forest, [-39.1714°, -72.8980°], 10/I/1902, *H.J. Elwes s.n.* (K); Telmuco [Temuco?], Malquehue, [-38.8019°, -72.5104°], I/1905, *Anonymous [R.M. Middleton?] s.n., ex Herb. Middleton* (G); Prov. Cautín, Telmuco, Cierro Ñielol, 38°43'S, 72°35'W, 150 m, 15/VII/1939, *G. Montero 3696* (G-on 2 sheets); [LOS RÍOS]: Valdívia, [-39.8288°, -73.1161°], *Anonymous s.n., ex Herb. Reed* (K); circa Valdivia, s.d., *Brudgel & Osorio 813* (FI-W); Valdivia, [-39.8961°, -73.0784°], s.d., *Krause s.n., ex Herb. Fil. Christensen 2897* (BM); Valdivia, 24/VI/1898, *O. Buchtien s.n.* (G, L); Valdívia, 40°S [-40.0047°, -73.1234°], 01/II/1906, *O. Buchtien s.n.* (B ['084677']); near Arique, 7 leagues above Valdívia, *Anonymous 813* (K); Prov. Valdivia, "Pauquipulei", [-39.9440°, -73.5471°], ca. 200 m, V/1926, *A. Hollermayer s.n., Werdermann Pl. Chilensis n. 1880* (B-*n.v.,* U); Prov. Valdivia, "Pauquipulei", [-39.6617°, -73.3362°], ca. 200 m, X/1928, *A. Hollermayer s.n., Werdermann Pl. Chilensis n. 1940* (U); (as "X Región"), Prov. Valdivia, Camino de Corral a Amargos, 01/II/1935, *C.C. Hosseus 113* (CORD); Prov. Valdivia, Chaiguín, Corral, 39°57'S, 73°30'W, 100 m, 19/XII/1953, [*B.*?] *Sparre &* [?] *Smith 280* (G); Valdivia, s.d., *Anonymous s.n.* (SI-22740); [LOS LAGOS]: Puerto Varas, [-41.3394°, -72.8580°], 26/I/1929, *C.M. Hicken 51* (SI); Puerto Montt, [-41.4721°, -72.7735°], s.d., [*R.A.* or *F.*?] *Philippi s.n.* (K); Puerto Montt, *Anonymous, ex Herb. Reed* (LE-on 2 sheets?); Prov. Llanquihue, Puerto Montt, Contao, Camino al Sur, [-41.3596°, -72.5720°], 12/I/1981, *G. Montero 12011* (G); Prov. Llanquihue, Dpto. Puerto Vargas, Volcán Osorno, 41°10’S, 72°30’W, 500 m, 19/I/1971, *E. Weldt & R. Rodríguez 826/121* (G-on 2 sheets); as “Prov. Chiloé”, Llanquihue, road from Hotel Ensenada to Cochamo and Laguna Patos, 75 m, 21/III/1939, *J.L. Morrison 17569* (G, K); Santa Lucia, sur le Carretera “Austral”, à 81 km de Chaiten, [-43.3409°, -72.3585°], 200 m, 09/II/1985, *C. Evrard 10627* (BM-*n.v.*, BR, MO-*n.v.*); Prov. Palena, near Villa Sta. Lucía, [-43.6215°, -71.8160°], 29/I/1986, *T.M. Pedersen 14329* (BR, MBM); [AISÉN DEL GENERAL CARLOS IBAÑEZ DEL CAMPO]: Aysén, [-45.2868°, -72.8575°], 11/II/1959, *Anonymous [Kunkel?] n. 2963* (G [as “f. *patagonica*” – type?]); Aysén, Pto. Aysén, 11/II/1959, *Anonymous* [*unreadable*] *n. 2692* (G-on 2 sheets); Prov. Aysén, Fjord Quitralco, 45°43’S, 73°25’W, 01/XII/1987, *K.H. Rechinger & W. Rechinger 63988* (W); Halbinsel Taitao, [Laguna San Rafael National Park], 46-47°S [-46.5008°, -74.4068°], II/1921, *M. Gusinde 460* (W); Patagonia Occid., Golfo de Peñas, Pto. Hale, [-46.5632°, -75.2995°], 09/VI/1908, *C. Skottsberg 302* (UPS); MAGALLANES [or NATALES?]: Puerto Edén, [-49.1153°, -74.4315°], 23/VII/1970, *O. Parra 106* (INTA); LOCALITY UNKNOWN: Locality unknown, *Philippi s.n.* (BM); Locality unknown, *Philippi “3”* (BM, G, K); Locality unknown, *H. Cuming s.n.* (OXF [as *“Cumming”*]); Locality unknown, 1833, *Anoymous* [*unreadable*] *s.n.* (K); Locality unknown, 1870, *Shazmann s.n.* (G); Locality unknown, *Anonymous s.n.* (W [‘364981’]); South Chile, VIII/1919(?), *Anonymous* [*unreadable*, “*Escherholz*”?] *s.n.* (LE, LECB); San Rafael, 150 m, 16/II/1921, *F. Reichert s.n.* (SI-2 sheets [ex Herb. *Hicken 33* [as “16/III/1921”] *et 34*]); Melinka, 20 m, 27/I/1938, *C.H. Andreas 473* (U). **CHILE, JUAN FERNÁNDEZ ISLANDS.** MÁS A TIERRA [ROBINSON CRUSOE]: [-33.6565°, -78.7996°; -33.6298°, -78.8664°; -33.6515°, -78.8898°], Valle Colonial, 11/XII/1916, *C. Skottsberg & I. Skottsberg 120* (K, UPS); Kolonidalen, 03/IV/1917, *C. Skottsberg & I. Skottsberg 587* (UPS); Cumberland Bay, San Juan Bautista, in one of the Spanish Caves, at the Settlement, 13/XII/1965, *F.G. Meyer 9536* (K, LP, NA-*n.v.*); Grutas de los Patriotas, 10-25/II/1955, *B. Sparre 14* (K); San Juan Bautista, along road in Village, 33°37’S, 78°50’W, 30 m, 11/I/ 1996, *U. Swenson 379* (UPS); MÁS AFUERA: [ALEJANDRO SELKIRK]: Quebrada del Mono, [-33.7612°, -80.7694°], ca. 400 m, 12/II/1917, *C. Skottsberg & I. Skottsberg 439* (UPS); ISLAND UNKNOWN: “In sylvatica ad rivulorum marginae collinae”, IV/1830 [or V/1830], *M. Bertero 1664* (G-2 sheets, K-3 sheets); *Anonymous [Bertero?] 1348* (K); *M. Bertero s.n.* (G-on sheets). **CHILE, CHILOÉ ISLANDS.** CHILOÉ [ISLA GRANDE DE CHILOÉ]: [-42.9494°, -73.8340°], s.d., *Cap. King s.n.* (K-on 2 sheets); 1830, *R. Brown(?) s.n.* (BM); 08/IV/1868, *R.O. Cunningham 26* (K); "Yenam", 18/V/1868, *Anonymous* [probably *Cunningham*] *s.n.* (K [same sheet as *Cunningham 26*]); Castro [Dalcahue], Piruquina, [-42.3668°, -73.7887°], 200 m, III/1924, *E. Werdermann, Pl. Chilensis n. 304* (G, SI, U); [Dalcahue], "Tiruquina" [Piruquina], [-42.3220°, -73.8470°], 04/X/1931, *C. Junge 32* (MO-*n.v.*, PRC, SI); [Dalcahue], Piruquina, 04/X/1931, *C. Junge 40* (L); 20/II/1971, *O. Zöllner 4779* (L). **ARGENTINA or CHILE.** Patagonia, ['-41.6050°, -68.8782°'], *F. Steindachner s.n.* (W ['9293']); Puerto Leopoldo, II/1921, *Hicken s.n.* (SI [ex Herb. Hicken 35]); Locality unknown, 22/I/1909, *P. "Nurett"*(?) *53* (SI).

This *taxon* has been historically and most commonly named either as *Hypolepis rugosula* (without infra-specific epithet), *H. rugosula* var. *poeppigii*, or as *H. poeppigii.* Although the concept of *H. rugosula* adopted here is basically adapted from Christensen & Skottsberg's (see discussion in 'Conflicting species concepts'), *H. poeppigii* is here regarded as a distinct species, *not* related to the *H. rugosula-complex,* and occurring in Central/Northern Argentina/Chile and Southern Bolivia (see also discussion of *H. poeppigii*). The best names available for the *taxon* from Central/Southern Argentina/Chile (and Islands) are either *H. rugosula* subsp. *poeppigiana* or *H. poeppigiana* (if considered elevated at species level) – see Map 9.

Apart from the geographical distribution, *H. rugosula* subsp. *poeppigiana* differs from *H. poeppigii* by the petioles and rachises atropurpureous (*vs.* dark brown below, transitioning to light brown and stramineous above), and the lamina margins with both catenate-acicular and catenate-glandular hairs (*vs.* glabrous, or with only catenate-acicular hairs restricted to the soral region – Figs. 10 C–E).

22b. ***Hypolepis rugosula*** (Labill.) J. Sm. subsp. ***pradoana*** Schwartsb., *subsp. nov. ined.,* submitted to the Kew Bull. **Type:** Brasil, Teresópolis, Parque Nacional da Serra dos Órgãos, Matas Nebulares e Campos de Altitude, Pedra do Sino, próximo ao Abrigo Quatro, no caminho para a caixa d'água, 22º27'42"S, 43º01'50"W, 2120 m, 07/I/2011, *P.B. Schwartsburd & J.B.S. Pereira 2310* (holotype: SP!-on 3 sheets; isotypes: B!, FI!, G!, K!-on 3 sheets, LP!, MBM!, NY!-on 2 sheets, P!-on 2 sheets, PRC!, RB!-on 2 sheets, SI!, SP!, UC!, UPCB!, WELT!). **Figs. 2A–H, 16A–E, Maps 21A, B.**

Distribution and ecology: Endemic to the highest peaks of S/SE Brazil, in the “Campos de Altitude” (“altitudinal fields”) and “Matas Nebulares” (“elfin cloudy forests”); from 1200 to1800 (in S Brazil), and from 2000 to 2600 m (in SE Brazil) – Maps 21A, B.

Additional material examined: BRAZIL. MINAS GERAIS: Alto Caparaó, Parque Nacional do Caparaó, Pico da Bandeira, [20°26’S, 41°48’W], 2600 m, 09/VII/2009, *P.B. Schwartsburd et al. 2000* (SP); Passa Quatro, Itaguaré, [22°25’S, 44°53’W], 2000 m, 09/V/1948, *A.C. Brade & S. Araújo 19100* (RB); Locality unknown, *Anonymous [T. de Moura?] 59, ex Herb. Moura* (B); RIO DE JANEIRO: Itatiaia, Serra do Itatiaia, [22°23’S, 44°40’W], 2000 m, VI/1913, *F. Tamandaré T. Jr. & A.C. Brade ‘839’ vel ‘1837’* (RB); Itatiaia, Serra do Itatiaia, 2000 m, 4-10/VI/1913, *F. Tamandaré T. Jr. & A.C. Brade 6501* (HB, NY-*n.v.*, RB); Itatiaia, Pedra do Echo, [22°23’S, 44°40’W], 2400 m, III/1937, *A.C. Brade 15540* (RB); Itatiaia, Estrada km 10, [22º21’47”S, 44º43’39”W], 21/XI/1948, *A.C. Brade 18882* (NY-*n.v.*, RB-*n.v.*, SP); Itatiaia, Estrada Nova km 11, [22°22’S, 44°42’W], 2100 m, V/1950, *A.C. Brade 20288* (NY-*n.v.*, RB-*n.v.*, SP-on 2 sheets); Itatiaia, Planalto of Itátiaia, vicinity of Agulhas Negras, near Piedra Atar [Pedra do Altar], [22°22’29”S, 44°40’30”W], 2300 m, 03/XI/1965, *R.M. Tryon & A.F. Tryon 6682* (GH-*n.v.* HB); Itatiaia, Planalto of Itátiaia, vicinity of Agulhas Negras, near Piedra Atar [Pedra do Altar], 2300 m, 03/XI/1965, *R.M. Tryon & A.F. Tryon 6683* (GH-*n.v.*, HB); Itatiaia, Parque Nacional do Itatiaia, Pedra Assentada, [22°24’S, 44°40’W], 2500 m, 07/VIII/2006, *J.P. Condack 513* (NY-*n.v.*, RB-*n.v.*, SP); Itatiaia, Parque Nacional do Itatiaia, Estrada para o Planalto entre os kms 9 e 10, 22º21’47”S, 44º43’39”W, 2200 m, 18/VII/2009, *P.B. Schwartsburd et al. 2197* (SP); Nova Friburgo, Pico da Caledônea, 22º21’13”S, 42º35’13”, 2220 m, 15/VI/2004, *R.C. Forzza et al. 3412* (RB-*n.v.*, SP-2 sheets, SPF); Petrópolis, Parque Nacional da Serra dos Órgãos, Castelo do Açu, 22°29’08” S, 43°03’42”W, 2100-2150 m, 10/I/2011, *P.B. Schwartsburd et al. 2323* (SP); Therezopolis [Teresópolis], 11/III/1938(?), *A.C. Brade s.n., ex Herb. Mus. Nac. Rio Janeiro 21047* (BM-on 2 sheets, R-*n.v.*); PARANÁ: Campina Grande do Sul, Parque Estadual do Pico do Paraná, 25º15’S, 48º50’W, 1500-1876 m, 09/VII/2008, *P.H. Labiak et al. 4778* (UPCB-on 2 sheets); SANTA CATARINA: Timbé do Sul, Serra da Rocinha, [28°48’S, 49°57’W], [1200 m], 04/XI/1991, *R.M. Bueno s.n.* (ICN-155000); RIO GRANDE DO SUL [doubtful record]: Santa Cruz, [-30.1847°, -54.2575°], XI/1911, *C. Jürgens 352, Rosenst. Fil. Austrobras. exsic. II 77* (B, NY-*n.v.* – type of *Hypolepis juergensii* Rosenst.?).

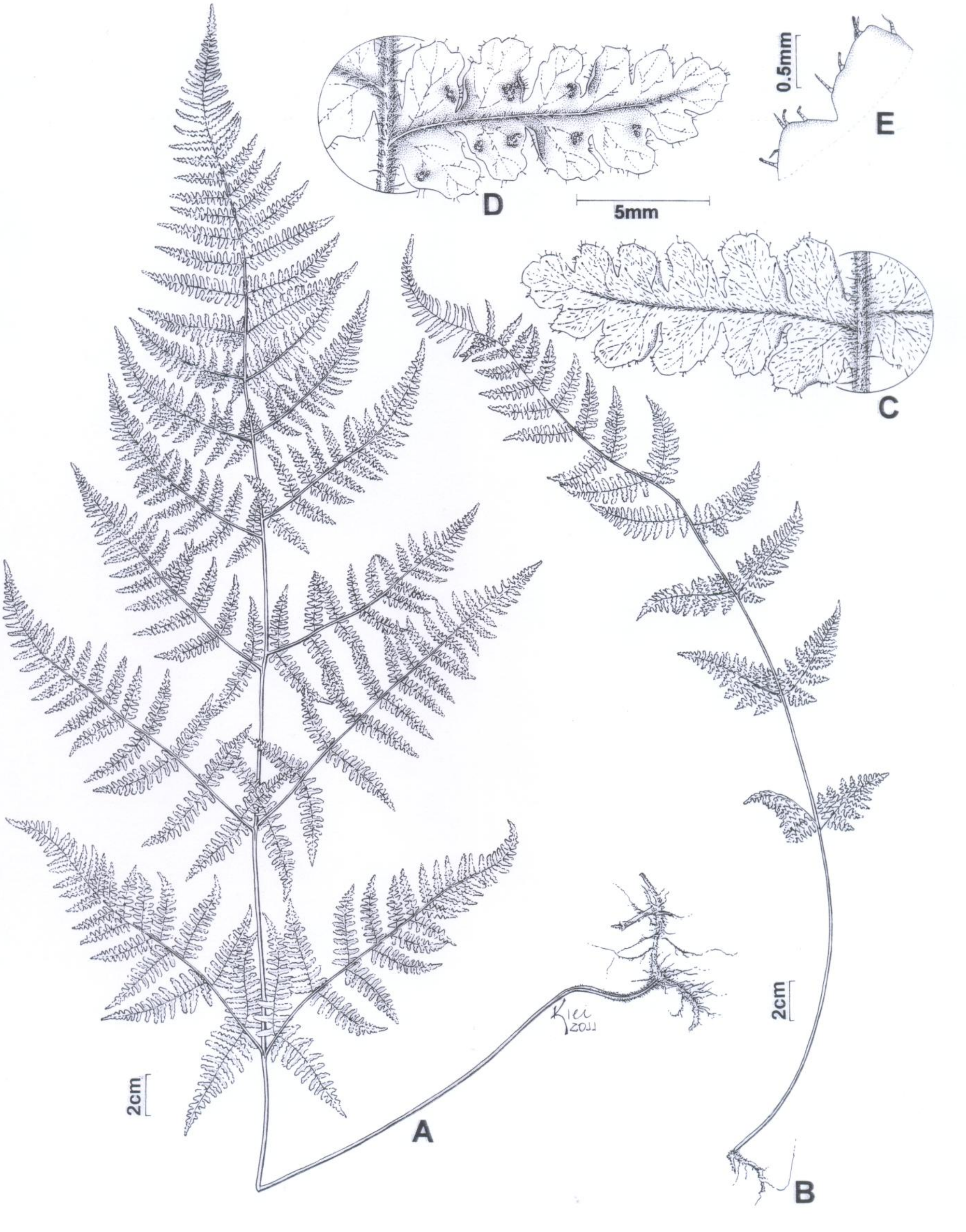
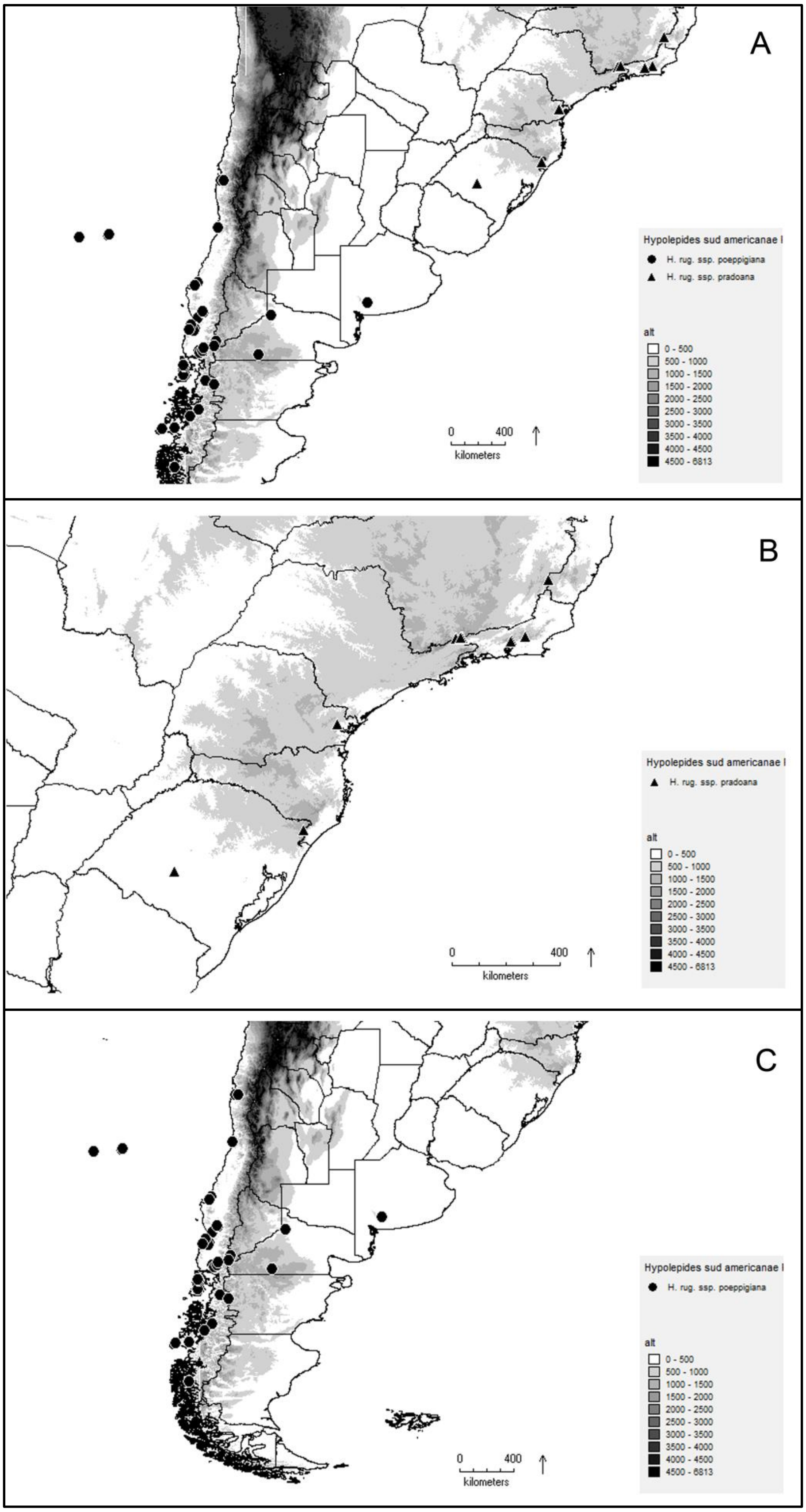


Fig. 16 *Hypolepis rugosula* subsp. *pradoana:* **A** habit of a big fertile frond (*Schwartsburd 2310*), **B h**abitat of a small fertile frond (*Schwartsburd 2310*), **C** secondary pinnule adaxially (*Forzza 3412*), **D** fertile secondary pinnule abaxially (*Forzza 3412*), **E** detail of the lamina margin (*Forzza 3412*).



Map 21 A distribution of *Hypolepis rugosula* subsp. *poeppigiana* and *Hypolepis rugosula* subsp. *pradoana*, **B** detail of the distribution of *Hypolepis rugosula* subsp. *pradoana*, **C** detail of the distribution of *Hypolepis rugosula* subsp. *poeppigiana*.

23. *Hypolepis scandens* M. Kessler & A.R. Sm., Brittonia 59(2): 193, fig. 3c. 2007. **Type:** Bolívia, Depto. La Paz, Prov. Nor Yungas, 10 km de Chuspipata hacia Coroico, al borde de la carretera, terrestre, fértil, 16°24’S, 67°47’W, 2500 m, 20/IX/1997, *M. Kessler, J. González, K. Bach & A. Portugal 12187* (holotype: UC-*n.v.*; isotypes: GOET-*n.v.*, LPB!). **Figs. 14E–H, Map 22A.**

Plants terrestrial. *Rhizomes* 3–5 mm diam., with hairs, the *hairs* catenate-acicular, lax, yellowish-brown, 1.5–3 mm long, 15–35-celled. *Fronds* scandent, with continuous growth, 1.5–2.5(–?) m long; *petioles* 75–130(–?) cm x 5–9 mm, proximally dark brown, medially and distally stramineous to light brown, abaxially and adaxially with trichomidia, copiously aculeate, non-rugose, the *trichomidia* hyaline with the cross-walls and the apex reddish, laterally apressed, 0.2–0.5 mm long, 4–12-celled, the *aculei* straight, the same color of the petioles, (0.3–)0.6–3 mm long; *laminae* rombic, proximally bipinnate-bipinatisect with segments pinnatifid to tripinnate-pinnatisect with segments pinnatifid, medially bipinnate-pinnatisect with segments pinnatifid, distally pinnatisect, 1–1.5(–?) x 1–1.2(–?) m; *rachises* straight, entirely stramineous to light brown, abaxially and adaxially with sparse trichomidia, aculeate, non-rugose, the *trichomidia* similar to those from the petioles; *proximal pinnae* 50–60(–?) x 40(–?) cm, strongly inequilateral; *costae* abaxially with trichomidia, adaxially with hairs and very scattered trichomidia, the *hairs* catenate-acicular, hyaline, 0.5–1 mm long, 7–12-celled, the *trichomidia* similar to those from the petioles and rachises; *costules* abaxially with conspicuous trichomidia, adaxially with very scattered hairs and trichomidia, the *hairs* and *trichomidia* similar to those from the costae; *veins* abaxially with conspicuous trichomidia, adaxially with sparse trichomidia, the *trichomidia* similar to those from the petioles, rachises, costae and costules; *laminar tissue between the veins* with the same indument pattern that of the veins; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, partly green, partly hyaline, chartaceous, the *margins* smooth or dentate, glabrous.

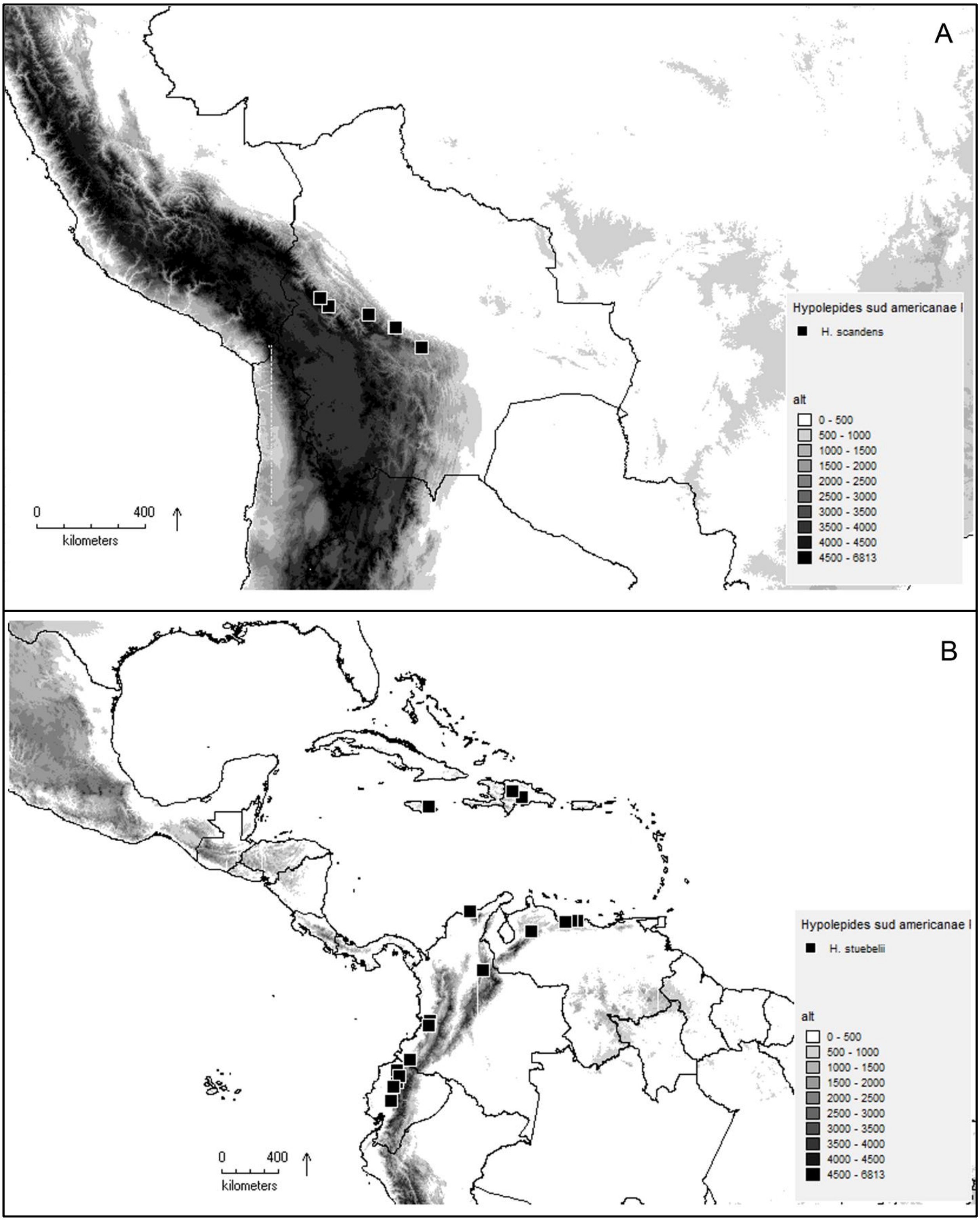
Distribution and ecology: Endemic to Bolivia, in the Departments of La Paz and Cochabamba; from 1700 to 2500 m – Map 22A.

Additional material examined: BOLIVIA. LA PAZ: Murillo Prov., Zongo Valley, 1.6 km down the valley from Sainani, 16°07’S, 68°05’W, 2100 m, 05-06/VIII/1990, *A. Fay & L. Fay 2889* (LPB-on 2 sheets, MO-*n.v.*, UC-*n.v.*); COCHABAMBA: Prov.

Ayopaya, Comunidad Pampa Grande, al inicio del sendero Pampa Grande-Carmen Pampa, 16°40'S, 66°28'W, 2110 m, 08/IX/2002, *I. Jiménez & A. Moguel 1454* (LPB-on 2 sheets); Prov. Ayopaya, Comunidad Pampa Grande, arroyo pequeño arriba de Pampa Grande, al inicio del sendero a Incacasani Grande, 16°40'S, 66°28'W, 2240 m, 13/IX/2002, *I. Jiménez & A. Moguel 1604* (LPB-on 2 sheets, UC-*n.v.*); Prov. José Carrasco Torrico, 130 km antigua carretera Cochabamba-Villa Tunari, 17°07'S, 65°36'W, 2000 m, 11/VII/1996, *M. Kessler et al. 7187 b* (LPB, UC-*n.v.*); Prov. José Carrasco Torrico, 135 km Antigua carretera Cochabamba-Villa Tunari, 17°07'S, 65°34'W, 1700 m, 17/VII/1996, *M. Kessler et al. 7355* (LPB-on 2 sheets, UC-*n.v.*); Prov. José Carrasco Torrico, 5 km de Siberia hacia Karahuasi, 17°48'S, 64°41'W, 2200 m, 15/X/1996, *M. Kessler et al. 9068* (LPB, UC-*n.v.*).

Although Kessler & Smith (2007) suggested this species would be more wide spread in South America, it is in fact endemic to Bolivia (Map 22A). It co-occurs with *Hypolepis parallelogramma,* the species most similar (especially regarding the indument formed by trichomidia, and the pseudo-indusia chartaceous), but both species are somehow separated by elevation preferences: while *H. parallelogramma* occurs in Bolivia at 1300–1900 m (only one collection seen from 2450 m), *H. scandens* occurs at 1700–2500 m – see Map 6.

Hypolepis scandens differs from *H. parallelogramma* by the petioles and rachises with bigger aculei, (0.3-)0.6-3 mm long (*vs.* 0.2-0.6 mm long), the lamina rombic, without parallel architecture (*vs.* oblong, with parallel architecture), the proximal pinnae strongly inequilateral (*vs.* equilateral), the laminar tissue abaxially with trichomidia (*vs.* glabrous), and the pseudo-indusia partly green, partly hyaline (*vs.* entirely stramineous) – Figs. 14E–H *vs.* Figs. 14A–D.



Map 22 A distribution of *Hypolepis scandens;* **B** distribution of *Hypolepis stuebelii.*

24. *Hypolepis stolonifera* Fée, Crypt. Vasc. Brésil 2: 35, t. 91, fig. 2. 1873 (*in tabula sub Cheilanthes*). **Lectotype,** designated here: [Brazil, Rio de Janeiro], Brasilia fluminensi, ad montes Orgaos, scaturigines amnis Soberbo, [-22.4536°, -42.9892°], [04/IV/1870], *A.F.A. Glaziou 4435* (P-00633494 [ex Herb. Fée], *n.v.*, image!; isolectotypes: B!-20 0074973, B!-20 0075126, C-*n.v.*, GH-*n.v.*, P-00633493 [ex Herb Glaziou], *n.v.*, image!, P-00633495 [ex Herb. Mus. Paris], *n.v.*, image!]). **Figs. 1A–I, 3A–H, 6D–F, Maps 23A, B.**

Plants terrestrial. *Rhizomes* 2–5 mm diam., the *hairs* catenate-acicular, yellowish-brown, 1–2 mm long, 15–20-celled. *Fronds* erect to arched, with continuous growth, 0.8–1.5 m long (var. *nebularis*), or 1.2–2 m long (var. *stolonifera*); *petioles* (35–)45–75(–95) cm x 3–7 mm, proximally wine red, medially brown, distally golden-brown, with wine red spots (only in var. *nebularis*), glabrescent, inermous, moderately rugose; *laminae* rhombic, proximally bipinnate-bipinnatifid to bipinnate-bipinnatisect with segments pinnatifid, medially pinnate-bipinnatisect, distally pinnatisect, 40–75 x 30–90 cm (var. *nebularis*), or 60–120 x 80–110 cm (var. *stolonifera*); *rachises* straight, proximally and medially light golden-brown, with wine red spots (only in var. *nebularis*), distally greenish stramineous to light brown, inermous, moderately rugose; *proximal pinnae* 15–45 x 15–40 cm (var. *nebularis*), 40–55 x 20–45 cm (var. *stolonifera*), strongly inequilateral; *costae* abaxially glabrescent to sparsely villous (var. *stolonifera*), or copiously villous (var. *nebularis*), adaxially copiously villous, the *hairs* catenate-acicular, hyaline (var. *stolonifera*), or yellowish (var. *nebularis*), 0.4–0.8(–1.2) mm long, 4–8(–10)-celled; *costules* abaxially villose, adaxially glabrous (var. *stolonifera*) or sparsely villose (var. *nebularis*), the *hairs* similar to those from the costae, but generally smaller, 0.4–0.8 mm long, 4–8-celled; *veins* abaxially with scattered hairs (var. *stolonifera*) or villous (var. *nebularis*), adaxially glabrous, the *hairs* similar to those from the costae and costules but smaller, 0.2–0.4 mm long, 3–5-celled; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, proximally green, distally hyaline, membranaceous in the hyaline part, the *margins* copiously ciliate, the *cilia* 0.2–0.3 mm long, 3 or 4-celled.

Hypolepis stolonifera is the most common and spread species occurring in South/Southeastern Brazil. It is easily identified by the following combinations of characters: the fronds eglandular, furnished only with catenate-acicular hairs, the petioles and rachises inermous, the proximal pinnae strongly inequilateral, the laminar tissue between the veins abaxially and adaxially glabrous, and the margins of the pseudo-indusia copiously ciliate – Figs. 1A–I, 6D–F. This species is more morphologically related to some Australasian species (*e.g. H. tenuifolia, H. elegans* Carruth. *in* Seeman, *H. dicksonioides* (Endl.) Hook. – see 'Results, Species groups'), than to any other South-American species.

The *taxon* especially similar to *Hypolepis stolonifera* is *H. elegans* subsp. *elegans,* which occurs in Australia and some Southwestern Pacific Islands (see Brownsey 1987, and Bronsey & Chinnock 1987), due to the fronds medium sized to big, eglandular, furnished with only catenate-acicular hairs, the petioles and rachises inermous, the proximal pinnae strongly inequilateral, the laminar tissue between the veins abaxially and adaxially glabrous, and the pseudo-indusia conspicuous. Apart from the distribution, *H. stolonifera* differs from *H. elegans* subsp. *elegans* by the petioles glabrous (Figs. 1C, E; *vs.* sparsely villous), and the margins of the pseudo-indusia copiously ciliate (Figs. 1I, 6F; *vs.* slightly crenate, never ciliate). *Hypolepis stolonifera* differs from *H. elegans* subsp. *carolinensis* Brownsey (endemic to the Caroline Islands) by the costules and veins abaxially with much smaller catenate-acicular hairs, respectively 0.4–0.8 and 0.2–0.4 mm long (*vs.* 1–2 mm long). In S/SE Brazil the *taxa* most similar to *Hypolepis stolonifera* are *H. mitis* and *H. pauslistana* – see their respective discussion for differentiation.

The individuals of *Hypolepis stolonifera* growing in the highest elevations of S/SE Brazil (in the top of the mountains, in cloud forests and altitudinal fields) show some morphological differences probably realeted to ecological factors (see discussion in Schwartsburd [submitted to Kew Bul. – Anex IV]). Thus, the species can be segregated into two varieties by the following key.

Key to the varieties:

1. Plants from Atlantic and *Araucaria* forests; fronds 1.2–2 m x 0.8–1.1 m, furnished with hyaline catenate-acicular hairs; petioles and rachises immaculate; laminae olive green; pinnae patent; the segments flattened; costules adaxially glabrous ………………………………..………………… 24a. *H. stolonifera* var. *stolonifera*

1. Plants from cloud forests and altitudinal fields; fronds 0.8–1.5 x 0.3–0.9 m long, furnished with yellowish catenate-acicular hairs; petioles and rachises with wine red spots; laminae yellowish green; pinnae strongly ascendant; the segments contracted; costules adaxially sparsely villose …………………. 24b. *H. stolonifera* var. *nebularis*

24a. *Hypolepis stolonifera* Fée var. ***stolonifera.*** **Figs. 1A–I, 3A–H, Maps 23A, B.**

Distribution and ecology: Endemic to South and Southeastern Brazil (Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul); from 550 to 2250 m, in the Atlantic and *Araucaria* forests – Maps 23A, B.

Additional material examined. BRAZIL. MINAS GERAIS: Caldas, in campis, [-21.9290°, -46.4055°], XII/1854, *G. Lindberg 587* (B-20 0074697, B-20 0074698, K-on 2 sheets [as "*587b*"] – excluded syntypes of *Hypolepis mitis*); Cidade de Caldas, [-21.8066°, -46.5803], 18/I/1857, *A.F. Regnell II 322* (BR-on 2 sheets [as "1869"], UPS-2 sheets); Caldas, 25/IX/1873, *H. Mosén 18, ex Herb. Bras. Regnell. Mus. Bot. Stock. 2066* (K, LE, S-*n.v.*, UPS); Bocaina de Minas, Parque Nacional do Itatiaia, Alto dos Brejos, fragmento 1 PMA, [-22.3352°, -44.7332°], 1900 m, 29/X/2004, *J.P.S. Condack & E. Cortines 293* (RB); RIO DE JANEIRO: Brasilia fluminensi, ad Itatiaia, *A.F.A. Glaziou 5329* (B-20 0075123, C-*n.v.*, K [a specimen of *Hypolepis mitis*?], P-00633496 [ex Herb. Fée], *n.v.*,image!, US-*n.v.*, image! – syntypes of *Hypolepis stolonifera*); Serra do Itatiaia, s.d., *A.C. Brade s.n.* (BM [ex R-21829]); Itatiaia, Serra do Itatiaia, [-22.3610°, -44.7325°], 2250 m, VI/1913, *F. Tamandaré T. Jr. & A.C. Brade 786* (RB-*n.v.*, SP [same as *6502*?]); Serra do Itatiaya [Itatiaia], 2250 m, 04-10/VI/1913, *F. Tamandaré T. Jr. & A.C. Brade 6502* (HB-2 sheets, NY-*n.v.*); Itatiaia, km 12, 26/II/1936, *A.C. Brade 15101 p.p.* (RB); Itatiaia, Parque Nacional do Itatiaia, subida para o planalto do Itatiaia, [-22.3748°, -44.7597°], 1700 m, 10/I/2008, *P.H. Labiak et al.* 4429* (SP-on 2 sheets, UPCB); Itatiaia, Parque Nacional do Itatiaia, estrada para o Planalto, 22°21'40"S, 44°44'09"w, 2100 m, 14/VII/2009, *P.B. Schwartsburd et al. 2121* (SP); Itatiaia, Parque Nacional do Itatiaia, estrada principal km 8, [-22.3722°, -44.7508°], 1800 m, 16/VII/2009, *P.B. Schwartsburd et al. 2182* (SP); Itatiaia, Parque Nacional do Itatiaia, trilha para os Três Picos, 22°25'49'S, 44°36'02"W, 1220 m, 10/I/2008, *P.H. Labiak et al.* 4419* (SP, UPCB); Rezende, Rio Palmital, 22/II/1966, *A. Castellanos 25697* (HB); Teresópolis, Parque Nacional da Serra dos Órgãos, trilha da

Pedra do Sino, 1900 m, 01/III/2005, *R. A. Engelmann RE 272* (CEPEC-*n.v.*, LZ-*n.v.*, MBM-*n.v.*, NY-*n.v.*, RB-on 3 sheets, SPF, UC-*n.v.*); Teresópolis, Parque Nacional da Serra dos Órgãos, 22°26'56"S, 42°59'06"W ['-22.4639°, -43.0183°'], 1800 m, 13/I/2008, *P.H. Labiak et al.* 4482* (SP-on 2 sheets, UPCB-on 2 sheets); Teresópolis, Parque Nacional da Serra dos Órgãos, 22°26'56"S, 42°59'06"W ['-22.4628°, -43.0220°'], 1900 m, 13/I/2008, *P.H. Labiak et al.* 4488* (SP-on 2 sheets); Teresópolis, Parque Nacional da Serra dos Órgãos, 22°26'56"S, 42°59'06"W, 1900 m, 13/I/2008, *P.H. Labiak et al.* 4494* (SP-on 2 sheets); [Petrópolis], Pedra Assú [Castelo do Açu], [-22.4847°, -43.0641°], 07/XI/1929, *A.C. Brade 9917* (B); SÃO PAULO: Silveiras, estrada do Parque Nacional da Serra da Bocaina, para Campos Novos, [-22.7458°, -44.7870°], 1400 m, 07/I/2008, *P.H. Labiak et al.* 4323* (SP-on 2 sheets, UPCB-on 2 sheets); Campos do Jordão, estrada de São Paulo, 05/II/1937, *P. Campos Porto 3107* (RB-*n.v.*, SP); Campos de Jordán [Campos do Jordão], III/1946, *P. Leite s.n.* (BCN [117176]); Campos de Jordán [Campos do Jordão], III/1946, [-22.7506°, -45.5899°], *P. Leite s.n.* (BCN-3 sheets [118380]); Campos do Jordão, 40 km N-NW of São José dos Campos, 1 ½ km W of Campos do Jordão, [-22.7729°, -45.6152°], 1600 m, 07/XII/1965, *R.M. Tryon & A.F. Tryon 6916* (GH-*n.v.*, HB, SP [not found]); Campos do Jordão, São José dos Alpes, junto ao parque Estadual Campos do Jordão, [-22.7170°, -45.6047°], 1800 m, 12/IV/1981, *J. Vieira Filho 23* (HRCB-on 3 sheets); Locality unknown, 1847, *J.F. Widgren 1139½* (UPS); PARANÁ: Guarapuava, Fazenda Três Capões/Maack-Kurowski, 25.41685°S, 51.69741°W, 940 m, 22/III/2008, *P.B. Schwartsburd et al. 1608* (SP, TUR); Curitiba, Barigui, [-25.4168°, -49.3049°], II/1974, *L.T. Dombrowski 5105* (MBM); Curitiba, Parque Barigüi, [-25.4245°, -49.3110°], 13/XII/1996, *V.A.O. Dittrich & C. Kozera 295* (BHCB, NY-*n.v.*, UPCB); Curitiba, Parque Tingüi, [-25.4000°, -49.3049°], 900 m, 14/I/2007, *P.B. Schwartsburd & J.B.S. Pereira 1339* (SP, UPCB); Curitiba, Parque Municipal Tingüi, [-25.3962°, -49.3052°], 900 m, 12/IX/2007, *P.B. Schwartsburd & T. Valente 1369* (SP, UPCB); Curitiba, Parque Tingüi, 950 m, 12/XI/2007, *P.B. Schwartsburd & H.T. Bettega 1384* (SP, UPCB); Curitiba, Parque Municipal Tingüi e arredores, [-25.3937°, -49.3094°], 950 m, 12/XI/2007, *P.B. Schwartsburd & H.T. Bettega 1396* (SP, UPCB); UFPR, Campus do Centro Politécnico, [-25.4540°, -49.2345°], 11/XII/1987, *A.C. Cervi & L.A. Acra 2564* (UPCB); Campina Grande do Sul, Parque Estadual Pico do Marumbi, 25°15'S, 48°50'W, 1450 m, 24/X/2008, *J.B.S. Pereira & F. Marinero 282* (UPCB-on 2 sheets); Quatro Barras, Morro do Sete, 26.3047°S, 49.4175°W, 900 m, 09/II/2008, *P.B.*

Schwartsburd et al. 1426 (SP, UPCB, TUR); São João do Triunfo, Fazenda Experimental da UFPR, [-25.6744°, -50.3129°], III/2001, *S. Bittencourt s.n.* (MBM [317755]); São João do Triunfo, Fazenda Experimental da UFPR, III/2001, *S. Bittencourt s.n.* (MBM [317756]); Porto Vitória, Fazenda Vitória, 26.29228°S, 51.19749°W, 900 m, 21/III/2008, *P.B. Schwartsburd et al. 1598* (SP-on 2 sheets, TUR); SANTA CATARINA: near the City São Bento do Sul and Rio Negrinho, 26.3046°S, 49.4174°W, 800 m, 10/II/2008, *P.B. Schwartsburd et al. 1433* (SP); Timbó/Itaiópolis, Road Timbó-Itaiópolis, [-26.7389°, -49.6798°], 20/III/2008, *P.B. Schwartsburd et al. 1585* (SP-on 2 sheets, TUR); Santa Cecília, BR 116, km 160, entre Sta. Cecília e Ponte Alta do Norte, subindo a Serra, [-27.0494°, -50.4202°], 1050 m, 02/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1914* (SP); Lages, Fazenda Pedras Brancas, [-27.8380°, -50.2146°], 04/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1934* (SP); Painel, Base de Pesquisa do IBAMA, [-27.9095°, -50.1408°], 03/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1928* (SP); Painel, Base de Pesquisa do IBAMA, 03/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1230* (SP); Urupema, Pico do Morro das Antenas, [-27.9257°, -49.8596°], 1700 m, 05/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1984* (SP); Urupema, Fazenda Farofa, 27°55’17.7”S, 49°52’05.3”W, 1535 m, 04/IV/2007, *A. Salino et al. 11961* (BHCB); Urubici, próximo ao Parque Nacional de São Joaquim, Serra do Corvo Branco, 28°03’18”S, 49°22’08”W, 1630 m, 30/VII/2009, *P.B. Schwartsburd et al. 2209* (SP); Urubici, Parque Nacional de São Joaquim, estrada para o Pico da Igreja, 28°07’14”S, 49°29’25”W, 1730 m, 31/VII/2009, *P.B. Schwartsburd et al. 2211* (SP); Urubici, Parque Nacional de São Joaquim, Sta. Bárbara, 28°09’42”S, 49°36’42”W, 1650 m, 28/VII/2009, *P.B. Schwartsburd et al. 2205* (SP); São Joaquim, Varginha, [-28.2536°, -49.9400°], I/1956, *J. Mattos 2734* (HAS); RIO GRANDE DO SUL: Barracão, Parque Estadual Espigão Alto, [-27.6970°, -51.4258°], 04/II/1988, *N. Silveira et al. 5128* (HAS-on 4 sheets, SP); Fachinal, Capela Sta. Lúcia, [-28.0661°, -53.6784°], 600-700 m, I/1941, *J. Pivetta s.n.* (RB-on 3 sheets [43872]); Vacaria, Passo do Socorro, ad. fl. Uruguay superius, [-28.3052°, -50.6892°], 800 m, 28/I/1951, *A. Sehnem 5743* (B); Bom Jesus, [-28.6662°, -50.4758°], s.d., *J. Dutra 261* (ICN-*p.p.*, SI); São José dos Ausentes, próximo ao Rio Pelotas, [-28.7162°, -50.0452°], 09/XII/1994, *R.M. Bueno 4473* (ICN-on 2 sheets); São José dos Ausentes, sentido Trevo para Cambará do Sul, [-28.7455°, -50.1059°], 1000 m, 03/VIII/2009, *P.B. Schwartsburd et al. 2228* (SP); Veranópolis, no Parque da Femaçã, [-28.9323°, -51.5322°], 20/XII/1985, *N. Silveira & M. Guadagnim 3093* (HAS); Caxias [Caxias do Sul], Vila Oliva, [-

29.1567°, -51.2334°], 700 m, 09/I/1947, *A. Sehnem 2543* (MBM); Caxias do Sul, Vila Oliva, 750 m, 14/I/1947, *A. Sehnem 2565* (MBM); Canela, [-29.3772°, -50.7883°], 28/I/1959 [or 23/I/1959?], *E. Richter s.n.* (B-2 sheets [20 0074835 et 20 0074836], HB-2 sheets); Gramado, [-29.3752°, -50.8709°], 800 m, 28/XII/1949, *A. Sehnem 4190* (MBM); Gramado, prope urbem, 800 m, 28/XII/1948, *A. Sehnem 5586* (B); Gramado, próximo ao Corpo de Bombeiros, [-29.3634°, -50.8918°], 10/XI/2006, *P.B. Schwartsburd 1166* (UPCB); São Francisco de Paula, [-29.4570°, -50.5683°], 05/I/1937, *Maurmann s.n.* (SP [50609]); S. Franc. d. Paula [São Francisco de Paula], Faz. Englert, 900 m, 02/I/1954, *A. Sehnem 6518* (B); São Francisco de Paula, Alpes, [-29.4714°, -50.5397°], 25/X/1991, *R.M. Bueno s.n.* (ICN-on 4 sheets [155020]); São Francisco de Paula, RS 235, [-29.4267°, -50.6044°], 24/III/2002, *R. Wasum 1438* (UCS); São Francisco de Paula, Banhado Amarelo, 29/X/2005, *C. Scherer s.n.* (ICN [141592]); perto da Vila do Ouro, na subida da Serra Geral para São Francisco de Paula, [-29.4230°, -50.3894°], 27/IX/1978, *J. Mattos et al. 20053* (HAS); Montenegro, S. Salvador, [-29.4119°, -51.5642°], 550 m, 10/I/1943, *A. Sehnem 1156* (B); Silveira Martins, [-29.6544°, -53.5900°], 05/III/1893, *C.A.M. Lindman s.n., Imae. Regenllian. Exped. 171321* (G-on 2 sheets, K, NY-*n.v.*, S-*n.v.*); STATE UNKNOWN: ad flum. “Una” (?), VIII/1821(?), *L. Riedel 90* (LE [as “*Lonch. repens* var. *pilosiuscula*” *nomen?*]). **COUNTRY UNKNOWN [certainly S/SE BRAZIL].** ‘Am. Trop.’, Locality unknown, *Anonymous ‘882’* (W-2 sheets); Locality unknown, *Anonymous, ex Herb. Mus. Paulista* (SP [21871]).

Abnormal material (tetraploid or polluted specimens): **BRAZIL.** RIO DE JANEIRO: Parati, Parque Nacional da Serra da Bocaina, 23°10’15”S, 44°50’08”W, 1450 m, 07/I/2008, *P.H. Labiak et al.* 4358* (SP, UPCB); Parati, Parque Nacional da Serra da Bocaina, 23°11’22”S, 44°50’15”W, 1200 m, 07/I/2008, *P.H. Labiak et al.* 4370* (SP, UPCB); SÃO PAULO: São José do Barreiro, Parque Nacional da Serra da Bocaina, Cachoeira São Izidro, 22°44’31”S, 44°37’00”W, 1450 m, 06/I/2008, *P.H. Labiak et al.* 4269* (SP, UPCB-on 2 sheets); São José do Barreiro, Parque Nacional da Serra da Bocaina, Cachoeira São Izidro, 22°44’31”S, 44°37’00”W, 1450 m, 06/I/2008, *P.H. Labiak et al.* 4271* (SP, UPCB); São José do Barreiro, Parque Nacional da Serra da Bocaina, Cachoeira São Izidro, 22°44’31”S, 44°37’00”W, 1450 m, 06/I/2008, *P.H. Labiak et al.* 4291* (SP, UPCB); Silveiras, Estrada do Parque Nacional da Bocaina para

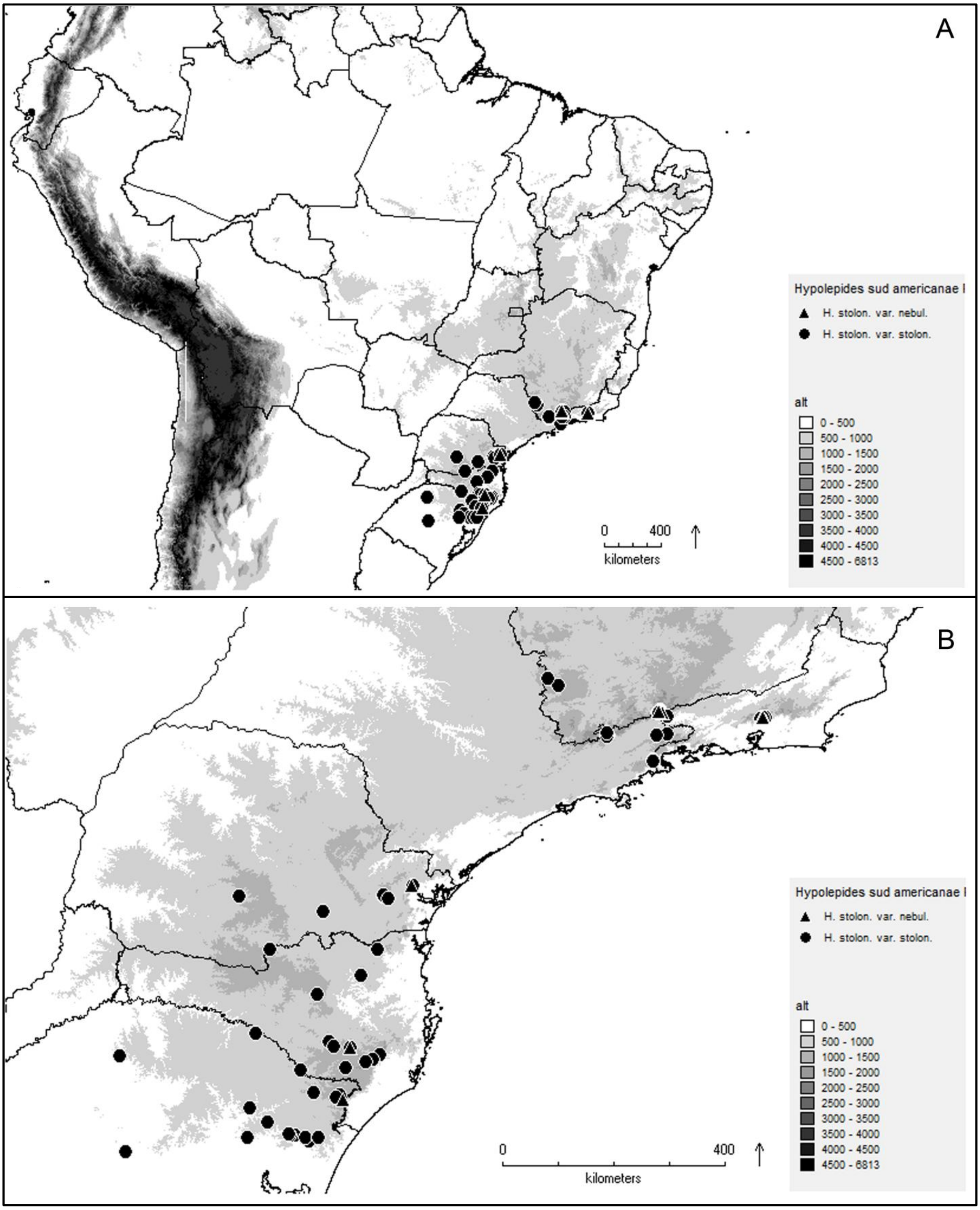
Campos Novos, [-22.7458°, -44.7870°], 1000 m, 07/I/2008, *P.H. Labiak et al.* 4318* (SP, UPCB); Locality unknown, 680 m, 07/I/2009, *P.B. Schwartsburd et al. 1888* (SP).

24b. ***Hypolepis stolonifera*** var. ***nebularis*** Schwartsb., *var. nov. ined.*, submitted to the Kew Bull. **Type:** Brasil, Teresópolis, Parque Nacional da Serra dos Órgãos, Matas Nebulares e Campos de Altitude, Pedra do Sino, próximo ao Abrigo Quatro, no caminho para a caixa d'água, 22º27'42"S, 43º01'50"W, 2120 m, 07/I/2011, *P.B. Schwartsburd & J.B.S. Pereira 2309* (holotype: SP!-on 2 sheets; isotypes: B!-on 3 sheets, FI!, K!, NY!-on 2 sheets, P!-on 2 sheets, RB!, SP!). **Figs. 6D–F, Maps 23A, B.**

Distribution and ecology: Endemic to the highlands of South and Southeastern Brazil (Rio de Janeiro, Paraná, and Santa Catarina); from 1300 to 2350 m, in the cloud forests and altitudinal fields – Maps 23A, B.

Additional material examined: BRAZIL. RIO DE JANEIRO: Itatiaia, Planalto, [22°22'S, 44°44'W], 2100-2200 m, 28/V/1935, *A.C. Brade 14497* (RB-*n.v.*, SP); Itatiaia, Parque Nacional do Itatiaia, subida para o Planalto, [22°22'S, 44°45'W], 1800 m, 10/I/2008, *P.H. Labiak et al.* 4431* (SP); Itatiaia, Parque Nacional do Itatiaia, subida para o Planalto, [22°22'S, 44°44'W], 2050 m, 10/I/2008, *P.H. Labiak et al.* 4433* (SP, UPCB); Itatiaia, Parque Nacional do Itatiaia, subida para o Planalto, [22°23'07"S, 44°40'43"W], 2350 m, 10/I/2008, *P.H. Labiak et al.* 4436* (SP, UPCB); Itatiaia, Parque Nacional do Itatiaia, em frente ao Abrigo Rebouças, [22°23'07"S, 44°40'43"W], 2370 m, 17/VII/2009, *P.B. Schwartsburd et al. 2186* (SP); Itatiaia, Parque Nacional do Itatiaia, Abrigo Rebouças, [22°23'07"S, 44°40'43"W], 2350 m, 20/I/2010, *P.B. Schwartsburd et al. 2293* (DUKE, MO, SP); Itatiaia, Parque Nacional do Itatiaia, Abrigo Rebouças, [22°23'07"S, 44°40'43"W], 2350 m, 12/I/2011, *P.B. Schwartsburd & F. Karstedt 2334* (SP); Itatiaia, Parque Nacional do Itatiaia, Estrada "Nova", 22º21'23"S, 44º44'11"W, 2175 m, 20/I/2010, *P.B. Schwartsburd et al. 2295* (DUKE, MO, SP); Itatiaia, Parque Nacional do Itatiaia, Estrada para o Planalto, 22º21'36"S, 44º44'14"W, 2120 m, 11/I/2011, *P.B. Schwartsburd et al. 2326* (SP); Teresópolis, Parque Nacional da Serra dos Órgãos, próximo à Pedra do Sino, 22º27'33"S, 43º01'39"W, 1840 m, 07/I/2011, *P.B. Schwartsburd & J.B.S. Pereira 2316* (SP); Locality unknown, II/1874, *A. Glaziou 7021* (B, K); PARANÁ: Campina Grande do Sul, Morro Capivari Grande, [25°15'S, 48°51'W], 1300 m, 04/III/2007, *P.B.*

Schwartsburd & A.M.X. Lima 1243 (SP, UPCB); SANTA CATARINA: Timbé do Sul, Serra da Rocinha, [28°48’S, 49°59’W], 1300 m, 06/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1995* (SP); Urupema, Cachoeira que Congela, [27°56’S, 49°52’W], 1550 m, 05/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1951* (SP); Urupema, Cachoeira que Congela, [27°56’S, 49°52’W], 1550 m, 05/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1954* (SP); Urupema, Cachoeira que Congela, 1550 m, 05/II/2009, *P.B. Schwartsburd & A.C. Corazzini 1969* (SP).



Map 23 distribution of *Hypolepis stolonifera* var. *stolonifera* and *Hypolepis stolonifera* var. *nebularis:* **A** general view, **B** general view magnified.

25. *Hypolepis stuebelii* Hieron., Hedwigia 48: 230, t. 10, figs. 8, 8a,b. 1909, as "*Stübelii*". **Lectotype,** designated by Tryon (1964: 34 - first step), and here (second step): Ecuador, Quito, Wag nach San Florencio, Excurs. nach dem Wag von Manabí, [-00.2205°, -78.8527°], *A. Stübel, Plantae Stübelianae, Filices n. 796* (B!-on 3 sheets [20 0019332, 20 0019333, 20 0019334]; isolectotypes: GH-*n.v.,* US-*n.v.*). **Figs. 15E–H, Map 22B.**

Plants terrestrial. *Rhizomes* 3–4.5 mm, with hiars, the *hairs* catenate-acicular, reddish-brown, 2–3(–5) mm long, 20–30-celled. *Fronds* entire not seen, probably decumbent to scandent, with continuous growth, ca. (1.1?–)2.5 m long; *petioles* complete not seen, ca. 75(–?) cm x 6.5–8 mm, proximally wine red, medially and distally brown, abaxially and adaxially glabrescent or with sparsely hirsute, aculeate, rugose, the *hairs* (*first kind*) acicular, hyaline, erect. 0.15–0.25 mm long, 2–3(–4)-celled, the *aculei* straight, of the same color of the petioles, (0.2–)0.5–2(–3) mm; *laminae* entire not seen, probably rombic elongate, proximally bipinnate-bipinnatisect with segments lobed, medially pinnate-bipinnatisect with segments lobed to bipinnate-pinnatisect with segments lobed, distally pinnatisect, ca. 80–150(–?) x (80–)100–130 cm; *rachises* straight, proximally brown, lighter above, adaxially and abaxially glabrescent to hirsute-villous with three kinds of hair, aculeate, copiously rugose, the *first kind of hair* similar to those from the petioles, conspicuous, the *second kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, 0.7–1.5 mm long, 7–15-celled, sparse, the *third kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, 0.3–1 mm long, 5–15-celled, sparse; *proximal pinnae* (40? –)50–65 x (16? –)25–50 cm, slightly inequilateral; *costae* with the same indument pattern that of the rachises, rarely the *first kind* absent; *costules* abaxially copisouly hirsute, with the *first kind of hair* much conspicuous, the *second* and *third kinds* sparse, adaxially with only the *second* and *third kinds of hair,* these sparse; *veins* abaxially hirsute with only the *first* and *third kinds of hair,* the *first kind* conspicuous, the *third kind* sparse, and smaller than those from the other axeses, 0.2–0.3 mm long, 3–5-celled, adaxially glabrescent or with scattered hairs, the *second* and *third kinds* only, similar to those from the those from the adaxial surface of the costules; *laminar tissue between the veins* abaxially copiously hirsute with only the *first kind of hair*, adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, 1/3 green and 2/3 hyaline, to entirely hyaline, membranaceous in the hyaline part, the *margins* copiously ciliate, the *cilia* catenate-acicular, 0.2–0.4 mm long, 3–6-celled.

Distribution and ecology: Jamaica, Hispaniola, Costa Rica (no material seen; *apud* Moran 1995), Panama (*apud* Moran *loc. cit.*), Colombia, Venezuela, Ecuador, and Peru (no material seen; *apud* Tryon 1964, and Tryon & Stolze 1989); from 1000 to 1500 m, but with one collection at 300 m – Map 22B.

Additional material examined: JAMAICA. Chinchona [Cinchona], below New Haven Cap., [18.1260°, -76.6797°], 02-10/IX/1906, *L.M. Underwood 3158* (B); Blue Mts., Big Gulley Way, to Vinegar Hill, [18.1245°, -76.6787°], ca. 3500 ft, 22/V/1916, *J.R. Perkins 1171* (B, K). **[HISPANIOLA], SANTO DOMINGO.** Península de “Pamaná” [Samaná?], Prov. de “Pamaná”, Sánchez, Road to La Terriena, [‘18.6898°, -70.5325°’], ca. 300 m, 25/IV/1930, *E.L. Ekman, Pl. Ind. Occid. H 14753* (BM, K, S-*n.v.*); Locality unknown, [‘19.1386°, -71.1022°’], s.d., *de Tussac s.n.* (RB). **COLOMBIA.** [MAGDALENA]: Santa Marta, [11.1577°, -73.9833°], 1898-1901 [VII/1903], *H.H. Smith 2586* (G-2 sheets, K, L, LE, NY-*n.v.*, U, W); SANTANDER: Eastern Cordillera, Vicinity of El Roble, [07.1622°, -73.0638°], ca. 1500 m, 16/II/1927, *E.P. Killip & A.C. Smith 19368* (A-*n.v.*, BM, GH-*n.v.*, NY-*n.v.*); “EL VALLE” [VALLE DEL CAUCA?]: Valley of R. Digua, [‘03.7948°, -76.6567°’], 1150 m, 05/IV/1939, *A.H.G. Alston 7890* (BM); Pass above Queremal, [03.5283°, -76.7135°], 1500 m, 05/IV/1939, *A.H.G. Alston 7938* (BM, COL-*n.v.*, MO-*n.v*); NARIÑO: near Ricuarte [Ricaurte], [01.2299°, -77.9902°], 1500 m, 07/V/1939, *A.H.G. Alston 8430* (BM). **VENEZUELA.** LARA: Dtto. Morán, [09.8007°, -69.8718°], 1500 m, 06/III/1983, *F. Ortega et al. 1640* (VEN); [DISTRITO CAPITAL] “Caraccas” [Caracas], [10.5127°, -66.8040°], 1852, *J.J. Linden s.n., mixtum cum 245* [*245b*] (G); [ARAGUA]: [Tovar], Prope Coloniam Tovar, [seaside of mountain range between Petaquire and the sea, also farther west], [10.4626°, -67.2344°], 3000 ft, 1858, *A. Fendler 431* (B, K, MO-*n.v.*, YU-*n.v.*); P.N. Aragua, [10.4098°, -67.5812°], 1000-1100 m, 02/XII/1938, *L.L. Williams & A.H.G. Alston 190* (BM-on 2 sheets, MO-*n.v.*). **ECUADOR.** [ESMERALDAS]: Forest Esmeraldas, [00.5179°, -78.8518°], s.d., [?] *Hall s.n.* (K); [PICHINCHA]: Crescit in Silv. subtr. vall. Nanegal, [00.1281°, -78.6685°], V/1907, *A. Sodiro s.n.* (U [103406]); [MANABÍ?]: Andium Quitensium, Manabi, S. Nicolas, [-00.5503°, -79.0184°], IX/1874, “*P.L.*” *A. Sodiro 24/1* (K); [CHIMBORAZO]: “Chimboraza”, Red Bark Woods, [-01.5284°, -79.2242°], 4500 ft, VIII/1860, *R. Spruce 5704* (BM, K); LOCALITY UNKNOWN: Locality unknown [probably Chimborazo], s.d., *R. Spruce '5716'* (K [probably part 2 of *Spruce 5704*]); Locality unknown, s.d., *W. Jameson s.n.* (K).

This species is similar to *Hypolepis acantha* and *H. pedropaloensis* due to the fronds hirsute, especially in the abaxial surface of the laminar tissue between the veins (which is diagnostic of these three species) – Figs. 6C, 15C, D, G, H. For differention between these three *taxa*, see discussion of *H. acantha* and *H. pedropaloensis.*

Hypolepis stuebelli may be further segregated into a species complex, especially because some specimens lack the acicular hairs on the petioles and rachises, and the sizes and quantity of the aculei are also variable – *e.g.* Figs. 15E, F. *Hypolepis stuebelli s. str*. probably occurs only in Colombia, Venezuela, Ecuador, and Peru. A similar species, *H. grandis* Lellinger (*Brade & Brade 348* [isotype: HB!-2 sheets]), endemic to Costa Rica and Panama (Lellinger 1985, Moran 1995), differs from *H. stuebelii* by the laminar tissue between veins adaxially hirsute (*vs.* glabrous); in addition, *H. grandis* probably has bigger fronds and the axeses more densely pilose/hirsute, than *H. stuebelii.*

26. *Hypolepis trinationalis* Schwartsb. *in* Schwartsb., Boudrie & Cremers, *sp. nov. ined.,* Fern. Gaz.: *in press.* **Type:** [Venezuela, Guyana or Brazil?], Mt. Roraima, ledge of mountain, crevices between rock, 22/XI/1973, [05.1942°, -60.7369°], 7600 ft, *R. Persaud 182* (holotype: K!; isotype: BRG-*n.v.*). **Map 24A.**

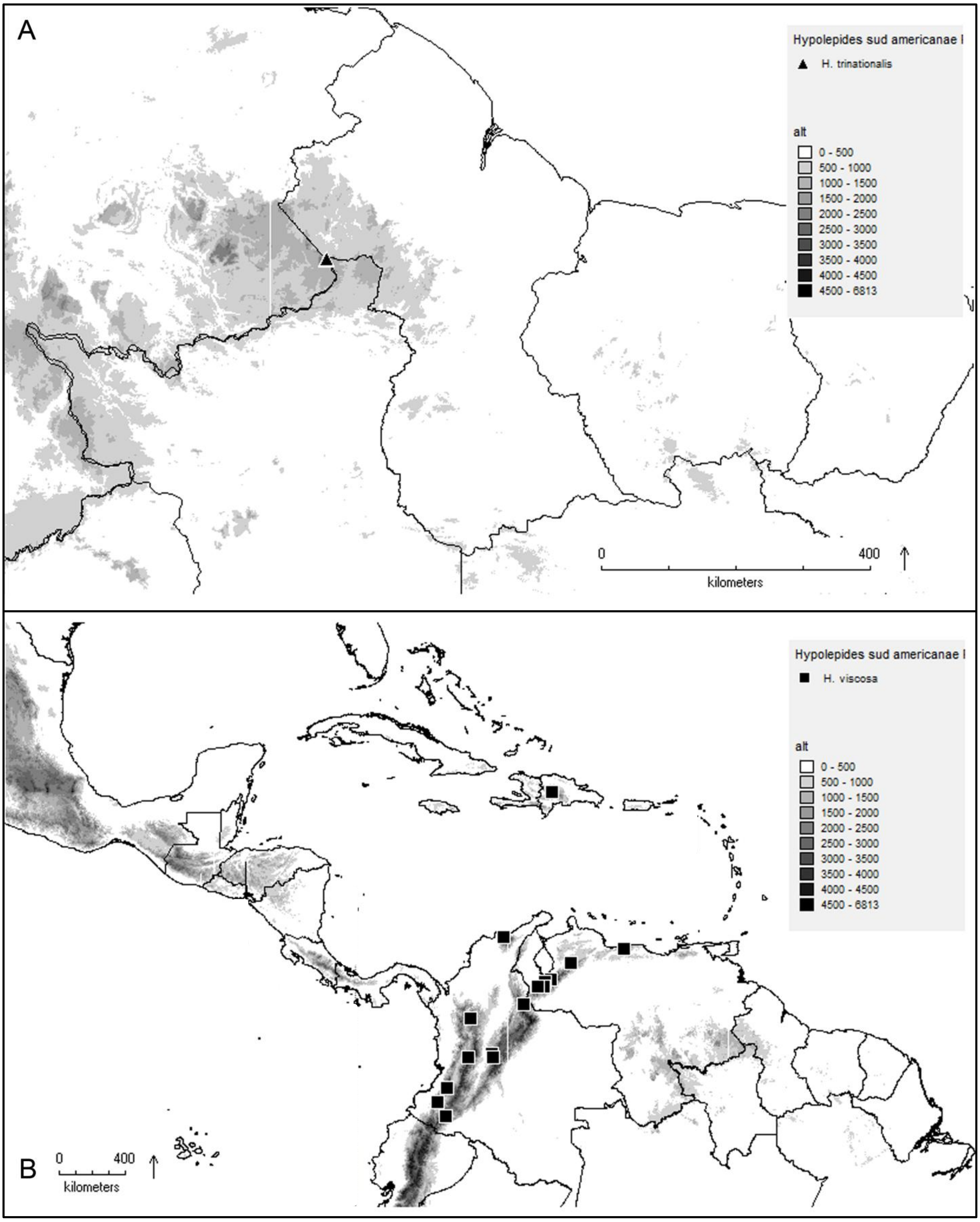
Plants epipetric (or also terrestrial?). *Rhizomes* ca. 4 mm diam., with hairs, the *hairs* catenate-acicular, yellowish-brown, 1–2 mm long, 15–20-celled. *Fronds* erect (to decumbent?), with continuous growth, 40–45(–200 estimate) cm long; *petioles* 13–20(–80 est.) cm x 2–2.5(–7.5) mm, proximally dark brown, lighter above, abaxially and adaxially glabrescent, inermous, copiously rugose; *laminae* ovate to deltate, proximally bi(-tri-)-pinnate-pinnatisect with segments pinnatifid, medially (bi?-)pinnate-bipinnatisect with segments pinnatifid, distally pinnatisect, ca. 30(–120 est.) x 18–25(–120) cm; *rachises* straight, proximally and medially light brown, distally lighter brown to stramineous, abaxially sparsely pilose, adaxially pilose (especially in the groove), with two kinds of hair, inermous, rugose, the *first kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, 0.2–0.5(–1) mm long, 4–7(–15)-celled, the *second kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, 0.2–0.5 mm long, 4–7-celled; *proximal pinnae* 7–15(–60) x 3–7(–35) cm, equilateral; *costae* abaxially sparsely pilose, adaxially pilose, with both kinds of hair, similar to those from the rachises; *costules* abaxially and adaxially sparsely pilose, the *hairs* similar to those from the rachises and costae, but the *second kind* much more conspicuous abaxially, and the *first kind* much more conspicuous adaxially; *veins* with the same indument pattern that of the costules; *laminar tissue between the veins* abaxially with only the *second kind of hair*, adaxially with only the *first kind of hair; lamina margins* with both kinds of hair; *sori* marginal; *pseudo-indusia* conspicuous, proximally green, distally hyaline, membranaceous in the hyaline part, the *margins* ciliate, the *cilia* catenate-acicular, 0.2–0.4 mm long, 4–7(–10)-celled.

Distribution and ecology: Known only from the Mount Roraima region, possibly in the intersection of Venezuela, Guyana and Northern Brazil; from ca. 2100 to 2300 m – Map 24A.

Additional material examined: VENEZUELA, GUYANA and/or BRAZIL. Mount Roraima, Rondon camp, “ledge”, [05.1950°, -60.7251°], ca. 6900 ft, 01/XII/1927, *G.H.H. Tate 461* (K, NY-*n.v.*); Roraima, base of cliff, [05.2066°, -60.7254°], XII/1884, *E.F. im Thurn 303* (BRG-*n.v.*, K).

Only three collections of this species have been studied. Two of them, the type and *Tate 461* (K), are composed by small complete fronds, and the third one (*im Thurn 303* [K]) by only one big pinna (probably the proximal one). Cremers & Kramer (1991) considered the small specimens as one species (as *Hypolepis* sp.2), while they considered the big pinna as another (as *Hypolepis* sp.1). Although their respective statures are strongly different, their induments are completely similar. Thus, the three specimens are here considered as only one *taxon*, with such proportion differences probably related to habitat conditions: exposed to sunlight or sheltered, wet or dry ground, growing in the earth or among rocks, elevation, etc. Only further and more complete collections can reveal if such "*taxa*" should be again segregated – see also Schwartsburd *et al*. (2012 *in press*). The description above, outside parenthesis, measures the range between the small complete fronds; the measurements of *im Thurn 303* (K) are inside parenthesis and, since the material is incomplete, some estimates were made; exception is made for the hairs measurements that applies equally to all three materials, and the abnormal numbers are inside parenthesis.

Although not belonging to the *Hypolepis hostilis* sub-group of species (see 'Results, Species groups'), *H. trinationalis* is somehow similar to *H. viscosa*, especially for occurring in high elevations, by the fronds copiously furnished by catenate-acicular and catenate-glandular hairs, the petioles and rachises inermous and rugose, and the margins of the pseudo-indusia ciliate. *Hypolepis trinationalis* differs from *H. viscosa* by the rachises and costae with much shorter catenate-acicular hairs, 0.2–0.5(–1) mm long, 4–7(–15)-celled (*vs.* 1–1.2 mm long, 13–17-celled), the costules, veins and laminar margins with both catenate-acicular and catenate-glandular hairs (*vs.* only catenate-glandular hairs – Fig. 9C), and the laminar tissue between veins adaxially with catenate-acicular hairs (*vs.* catenate-glandular hairs). For differentiation with *H. guianensis*, see discussion of this species.



Map 24 A distribution of *Hypolepis trinationalis;* **B** distribution of *Hypolepis viscosa.*

27. *Hypolepis viscosa* H. Karst., Fl. Columb. 2: 89, t. 145, habit, t. 146, habit, figs. 1–9. 1865. **Lectotype,** designated here: [Venezuela], Habitat silvas humidas frondosas coloniae Tovar prope Caracas, [08.3289°, -71.6130°], altitudine 1500-2000 metr., s.d., *G.K.W.H. Karsten s.n.* (W! [the sheet with rhizome, as "*Hypolepis viscosa* Krst. (*Cheilanthes visc.* mss), Colonia Tovar, Caracas"]; isolectotypes: B!-on 2 sheets [20 0075299, 20 0075301], B!-20 0075300, LE! [label engraved], LE! [label engraved; ex Herb. Ender], W! [ex Herb. Mus. Palat. Vindob.], W! [as "*Hypolepis viscosa* Krst., *Cheilanthes* __ K. mss"], W! [ex Herb. Reichenbach 128525], W! [ex Herb. Reichenbach 128526]). **Fig. 9C, Map 24B.**

Cheilanthes viscosa H. Karst. ex Drège, Bot. Zeit. 12: 855. 1854, *nom. nud. et illeg.*, non *Cheilanthes viscosa* Carmich., Trans. Linn. Soc. London 12(2): 511. 1819 [Jun-Aug 1819], nec *Cheilanthes viscosa* Link, Hort. Berol. 2: 43. 1833 [Jul-Dec 1833]. *Hypolepis viscosa* H. Karst. ex Mett. *in* Triana & Planch., Ann. Sci. Nat., Bot., ser. 5, 2: 238. 1864, *nom. nov.* pro *Cheilanthes viscosa* H. Karst. ex Drège, *nom. nud.*

Plants terrestrial. *Rhizomes* 2–3.5 mm diam., glabrescent or hairy, the *hairs* catenate-acicular, reddish-brown, rigid, 1–2(–2.5) mm long, 15–20 celled. *Fronds* erect or decumbent, with continuous growth, (40–)85–130(–200?) cm long; *petioles* (15–)25–45 cm x 2.5–6 mm, proximally dark brown, lighter above, abaxially sparsely villous, adaxially villous, with two kinds of hairs, inermous, rugose, the *first kind of hair* catenate-acicular, hyaline with the base and cross-walls reddish, or entirely yellowish, 1–1.2 mm long, 13–17-celled, sparse, the *second kind of hairs* catenate-glandular, hyaline with the base and cross-walls reddish, or entirely yellowish, 0.2–0.3(–0.4) mm long, 4–7-celled, more conspicuous; *lamina* ovate, proximally bipinnate-bipinnatisect with segments pinnatifid, medially bipinnate-pinnatisect with segments pinnatifid, distally pinnatisect, (20–)50–100(–150?) x (20–)50–100(–120) cm; *rachises* slightly curved at base, otherwise straight, proximally and medially golden-brown, distally stramineous, abaxially villous, adaxially copiously villous with both kinds of hair, similar to those from the petioles but more conspicuous, inermous, rugose; *proximal pinnae* (10–)25–50(–60) x (6–)15–30 cm, slightly inaequilateral; *costae* abaxially villous, adaxially copiously villous, the *hairs* similar to those from the petioles and rachises, but both kinds conspicuous; *costules* abaxially copiously villous, adaxially villous, only the *second kind of hair* present, these similar to those from the petioles, rachises and costae, but usually longer, 0.1–0.6 mm long, 2–7(–10)-celled; *veins* abaxially and abaxially villous, only the *second kind of hair* present, but much smaller, 0.1–0.2 mm long, 2–5-celled; *laminar tissue between the veins* with the same indument pattern that of the veins; *lamina margins* with hairs similar to those from the veins and the laminar tissue between the veins; *sori* marginal; *pseudo-indusia* conspicuous, partly green, partly hyaline, membranaceous in the hyaline part, the *margins* copiously ciliate, the *cilia* catenate-acicular, ca. 0.3–0.4 mm long, 4 or 5–celled.

Distribution and ecology: Endemic to the highlands (Cordilleras) of Northern Colombia and Venezuela; from (1600–)1800 to 3100 m; plus in Hispaniola at 1100 m – Map 24B.

Additional material examined: [HISPANIOLA], SANTO DOMINGO. Cordillera Central, Prov. Monte Christi, Monción, Lagunas de Cenobi, [18.8917°, -71.0921°], ca. 1100 m, 21/VI/1929, *E.L. Ekman, Pl. Ind. Occid. H 12944* (B, BM, G, K-on 2 sheets, S-*n.v.*). **COLOMBIA.** [MAGDALENA]: Santa Marta, [11.0091°, -73.7091°], 1898-1899[-1901?], *H.H. Smith 1022* (G, K, L, LE-frag.); NORTE DE SANTANDER: Paramo de Fontibon, Pamplona, [07.3632°, -72.6621°], 2400 m, 19/II/1939, *A.H.G. Alston 7134* (AAU-*n.v.*, BM, COL-*n.v.*, F-*n.v.*, MEXU-*n.v.*, MO-*n.v.*, VEN-*n.v.*); ANTIOQUIA: Mun. Belmira, vereda El Yerbal, sitio Los Patos, margen izquierda del Rio Chico, alto de Sabanazos, 06°35’N, 75°32’W, 3100 m, 24/IV/1991, *D.L. Echeverri et al. 464* (HUA-on 2 sheets); CUNDINAMARCA et DEPARTAMENTO CAPITAL: Prov. de Bogotá, [04.6368°, -74.3466°], 1800 m, 1851-1857, *J. Triana s.n.* (G); Municipio de Sibaté, Alto San Miguel, carretera Fusagasugá-Bogotá, 2 km antes de Sibaté, [04.4860°, -74.2742°], 2740 m, 22/VII/1983, *F. Mejía P. 143* (COL-*n.v.*, LE); QUINDIO: Andes de Mariquita, [04.4448°, -75.6544°], 1800 M, III/1852, *Anonymous [J.J. Triana?] n. ‘618’, ex Herb. Triana* (BM); CAUCA: Munchique, [02.7632°, -76.8077°], 2500 m, 21/IV/1939, *A.H.G. Alston 8167* (BM, MO-*n.v.*); NARIÑO: Cordillera Orientál, 5 km N of Victoria, Río Chingual drainage, [02.0440°, -77.3510°], 2680-2840 m, 23/IX/1944, *J.A. Ewan 16180* (BM); PUTUMAYO: above Sibundoty [Sibundoy], [01.2192°, -76.8945°], 2500 m, 04/V/1939, *A.H.G. Alston 8381* (BM, MO-*n.v.*); LOCALITY UNKNOWN: Locality unknown, *J. Triana 31* (W-frag.). **VENEZUELA.** MÉRIDA: Hautes Andes de Truxillo & de Mérida, [08.6821°, -71.1842°], 4000-14500 ft, 1842, *J.J. Linden 245* (FI-W); Sucre, en selvas nubladas al norte de la localidad conocida como La Trampa, 09°34’N, 71°26’W [‘08.5464°, -71.4536°’], 2000 m, 03/II/1987, *F. Ortega et al. 3016* (BM, PORT-*n.v.*); LARA: Distr.

Moran, carretera de Humocaro Bajo via Buenos Aires, 09°36'N, 70°03'W, 1600 m, 13/XI/1985, *H.v.d. Werff & R. Rivero 7852* (MO-*n.v.*, U); [ARAGUA]: [Tovar], prope Coloniam Tovar, [08.2931°, -71.5301°], 6.500 ft, 1854-1855, *A. Fendler 64* (B-frag., BM, G-3 sheets, K-on 2 sheets [one of them *p.p.*], YU-on 2 sheets, *n.v.*); "Caracas" [Tovar], Coloniae Tovar, locis subalpinis, [08.3374°, -71.8637°], IX/1847, *J.W.K. Moritz 387* (B, K-2 sheets, FI-W, L, W-2 sheets); "Caracas" [Tovar], Coloniae Tovar, *J.W.K. Moritz s.n.* (B-20 0075295, BR-3 sheets, L-0835834, LE, UPS-499355, W); [DISTRITO CAPITAL]: Caracas, [10.3991°, -67.1500°], I-IV/1842 [or VII/1842], *J.J. Linden 245* (G, G-on 2 sheets], K, OXF); LOCALITY UNKNOWN: Locality unknown [Coloniae Tovar?], "1865", *J.W.K. Moritz s.n.* (BM).

Tryon (1963) concluded the main personal set of plants of Karsten is at LE, mostly due to previous literature information, the engravings on the labels with Karsten name, and for finding more specimens of the *Jamesonia* Hook. & Grev. species described by Karsten (1862-1869). She considered the specimens at LE as Karsten's 'holotypes', while the materials at W as 'isotypes'; apparently she did not consider the materials at B, P or SP-A as 'types'.

But, more syntypes of *Hypolepis viscosa* were found at W (see above); in addition, there is also at W a more complete collection of other *Hypolepis* species collected by Karsten, than in B or LE (P and S-PA not analyzed): *H. bogotensis* var. *glabra* (B, W-2 sheets), *H. nigrescens* (W), *H. nuda* (W-2 sheets), *H. parallelogramma* (LE, W-3 sheets), and *H. rigescens* (W). The only "species" found in LE and nowhere else is the "false type" of *H. bogotensis* (but, see its comments). Thus, the selected lectotype is a material at W, the most complete and bearing Karsten's handwriting.

According to Smith & Todzia (1989), the materials *Fendler 64* and *64β* are both mixed collections of *Hypolepis viscosa* and '*H. bogotensis*' (= *H. flexuosa*, here). For the present study, only specimens annotated as *Fendler 64* (B-frag., BM, G-3 sheets, K-on 2 sheets [one of them *p.p.*]) were analized and they all are *H. viscosa.*

Among the *Hypolepis hostilis* sub-group (see 'Results, Species groups'), *H. viscosa* is the unique species with the petioles and rachises inermous (*vs.* aculeate), the laminar tissue between the veins adaxially with short catenate-glanduar hairs (*vs.* glabrous), the lamina margins with short catenate-glandular hairs (Fig. 9C; *vs.* glabrous), and the margins of the pseudo-indusia copiously ciliate (Fig. 9C; *vs.* mostly crenate or dentate, some species rarely with one or two cilia) – thus differing from *H. galapagensis, H. hostilis, H. lellingeri,* and *H. rigescens.* For further differentiation with *H. guianensis* and *H. trinationalis,* see their respective discussion.

Cultivated alien species

In the late 1920's and early 1930's, the Botanist Agustin Garaventa cultivated in his home garden, in Limache, Chile, an exotic species of *Hypolepis.* This species is similar to *Hypolepis tenuifolia* and *H. dicksonioides* – or another related species, probably from any Pacific Island, or Oceania. Apparently, the individual survived for at least three to four years. It is tempting to speculate if this same individual has survived up to nowadays, if it has spread and naturalized locally, or if it did not survived. A local search for this species would be interesting.

Material examined: CHILE. [VALPARAÍSO]: Limache, Jardín de mi casa, helecho cultivado, 15/I/1929, *A. Garaventa 220* (G); id., Jardín de mi casa, Pl. Cult., 07/III/1930, *A. Garaventa 1258* (G-on 5 sheets); id., quinta Garaventa, helecho cult., 19/IX/1932, *G. Looser 3132* (G-on 8 sheets).

Excluded names

Adiantopsis incisa Kunze ex T. Moore, Index Fil. (T. Moore): 243. 1857-1862, *nom. nud.* = ***Cheilanthes incisa*** Kunze ex Mett. (see this species below).

Adiantopsis monticola (Gardner) T. Moore, Index Fil. (T. Moore): 18. 1857-1862 = true *Adiantopsis* (see *Cheilanthes monticola* Gardner below).

Allosorus ciliatus C. Presl, Reliq. Haenk. 1: 59. 1830. Type: In Mexico legit, s.d., *T.P.X. Haenke s.n.* (PRC!-450749) = ***Cheilanthes* sp.**

Allosorus hirsutus C. Presl, Reliq. Haenk. 1: 59, t. 10, fig.1. 1830. Type: in Cordilleris? Chillensibus legit, s.d., *T.P.X. Haenke s.n.* (PRC!-450745) = ***Cheilanthes* sp.**

Allosorus psittacinus (C. Presl) C. Presl, Tent. Pterid.: 153. 1836, as "*psitaccinus*" = ***Pteridium arachnoideum*** (Kaulf.) Maxon (see *Pteris psittacina* C. Presl below).

Aspidium brasilianum C. Presl *in* J.S. Presl & C. Presl, Delic. Prag. 1: 176. 1822, *nom. rej.* Lectotype, designated by Schwartsburd & Prado (2011: 234): Ad Rio Janeiro Brasilia legit def. [In via ad S. João Mareos ad Engenho da Varge, Capit. Rio de Janeiro], [III/1818], *J.B.E. Pohl s.n.* [*3794*] (PRC!; probable isolectotype: W!) = ***Pteridium arachnoideum*** (Kaulf.) Maxon (bas.: *Pteris arachnoidea* Kaulf., Enum. Filic.: 190. 1824, *nom. cons.*). See further clarification in Schwartsburd & Prado (2011).

Aspidium coniifolium C. Presl *in* J.S. Presl & C. Presl, Delic. Prag. 1: 175. 1822. Type: Ad Rio Janeiro Brasilia legit. [Engenho da Varge, Cap. Rio de Janeiro], [III/1818], *J.B.E. Pohl s.n.* [*3833*] (PRC!, W!-3 sheets) = ***Adiantopsis chlorophylla*** (Sw) Fée *s.l.*

Cheilanthes aquilinaris Fée, Crypt. Vasc. Brésil 2: 37, t. 91, fig. 1. 1873. Lectotype, designated here: [Brazil, Rio de Janeiro] Brasilia fluminensis, s.d., *A.F.A. Glaziou 5330* (B!-20 0074529; isolectotypes: HBG-*n.v.*, K!-000640338, P-4 sheets, *n.v.*) = ***Pteridium arachnoideum*** (Kaulf.) Maxon.

Cheilanthes brasiliensis Raddi, Syn. Fil. Bras.: 17. 1819. Type: Brasilia, s.d., *G. Raddi s.n.* (PI-*n.v.*) = ***Adiantopsis chlorophylla*** (Sw.) Fée. For further clarification, see Pichi Sermolli & Bizzarri (2005).

Cheilanthes flexuosa Kunze, Linnaea 22: 578. 1849. Syntypes: Brasil, ad Megaponte, Capit. Goyaz b., *J.B.E. Pohl* (W-*n.v.*); Brasil, Sierra de Lapa, *Riedel* legerant (W-*n.v.*). = ***Adiantopsis* sp.**

Cheilanthes incisa Kunze ex Mett., Farngatt. 4 (Cheilanthes): 44, no. 65, t. 3, figs. 28-31. 1859. Lectotype (designated here): Mettenius, Farngatt. 4 (Cheilanthes): 44, no. 65, t. 3, figs. 28-31. 1859; epitype, designated by Ponce *et al.* (2007: 144, as “neotype”): Brazil, Rio de Janeiro, Mun. Teresópolis, Grotão, 800 m, nas pedras, 13/VI/1940, *A.C. Brade 16288* (RB-*n.v.*; iso-epitype: SI-*n.v.*, image!) = true *Cheilanthes*, similar to *Aspidotis* (for further clarification, see Ponce *et al.* 2007). The figures present in Mettenius (1859) are not enough to correctly identify the species, thus an epitype is desired.

Cheilanthes monticola Gardner *in* Hook., Icon. Pl. 5: t.487. 1842.Type: Brazil, Province of Goyaz [Goiás], on the perpendicular face of Schistose rocks, in a deep narrow ravine near the summit of the Serra de Natividade, I/1840, *G. Gardner, Herb. Bras. 3557* (K?-*n.v.*, W!) = ***Adiantopsis monticola*** (Gardner) T. Moore.

Cheilanthes sellowiana Klotzsch ex C. Presl, Tent. Pterid.: 160. 1836, *nom. nud.* = ***Eriosorus myriophyllus*** (Sw.) Copel. (see *Hypolepis repens* var. *selloana* Klotzsch ex Baker below).

Cheilanthes spectabilis Kaulf., Enum. Filic.: 214. 1824. Type: Habitat in Brasilia, s.d., *A. Chamisso s.n.* (LE!) = ***Adiantopsis chlorophylla*** (Sw.) Fée *s.l.*

Cystopteris brasiliana (C. Presl) C. Presl, Tent. Pterid.: 93. 1836. = ***Pteridium arachnoideum*** (Kaulf.) Maxon (see *Aspidium brasilianum* C. Presl above).

Cystopteris leptophylla C. Presl, Tent. Pterid.: 93. 1836, *nom. nov.* pro *Lonchitis tenuifolia* Beyrich ex C. Presl, Tent. Pterid.: 93. 1836, *nom. illeg. et nud.* (non *Lonchitis tenuifolia* G. Forst., 1786), based on: [Brazil], Serra d’Estrella, s.d., *Beyrich s.n.* (PRC!) = ***Cheilanthes incisa*** Kunze ex Mett.

Hypolepis aquilinaris (Fée) H. Christ, Bull. Herb. Boissier, ser. 2, 1: 636. 1901. = ***Pteridium arachnoideum*** (Kaulf.) Maxon (see *Cheilanthes aquilinaris* Fée above).

Hypolepis brasiliana (C. Presl) Kuhn, Festschr. Jubil. Königstädt. Realsch. Berlin: 347 (Chaetopterides: 27). 1882. = ***Pteridium arachnoideum*** (Kaulf.) Maxon (see *Aspidium brasilianum* C. Presl above).

Hypolepis pedata Hook., Sp. Fil. 2: 73, t. 92-A, figs. 1,2, 1852. Type: Jamaica, s.d., *W. Purdie s.n.* (BM-*n.v.*, K-*n.v.* [image!]) = ***Adiantopsis pedata*** (Hook.) T. Moore. For further clarification, see Proctor (1989).

Hypolepis coniifolia (C. Presl) C. Presl, Tent. Pterid.: 162. 1836. = ***Adiantopsis chlorophylla*** (Sw) Fée *s.l.* (see *Aspidium coniifolium* C. Presl above).

Hypolepis gardneri (Gardner) Hook., Sp. Fil. 2: 74. 1852, *nom. nov.* pro *Hypolepis monticola* (Gardner) Hook., *nom. sup.* = ***Adiantopsis monticola*** (Gardner) T. Moore (see this species, and also *Cheilanthes monticola* Gardner, and *Hypolepis monticola* (Gardner) Hook.) – Hooker (1852: 74) combined *Cheilanthes monticola* into *Hypolepis*, unnecessary changing the epithet into *gardneri*; then he himself fixed it (Hooker 1852: 114).

Hypolepis monticola (Gardner) Hook., Sp. Fil. 2: 74, 114, t. 92-B, figs. 1,2. 1852. = ***Adiantopsis monticola*** (Gardner) T. Moore (see also *Cheilanthes monticola* Gardner above).

Hypolepis neblinae A.R. Sm. ex Navarr. *in* O. Hokche, P.E. Berry & O. Huber, Nuevo Cat. Fl. Vasc. Venezuela: 123. 2008, *nom. nud.*

Hypolepis nigricans Hook., Sp. Fil. 2: 69. 1852. – Misspelling of ***Hypolepis nigrescens*** Hook.

Hypolepis incisa (Kunze ex Mett.) C. Chr., Index Filic.: 371. 1905. = ***Cheilanthes incisa*** Kunze ex Mett. (see this species above).

Hypolepis paupercula (Kunze) Hook., Sp. Fil. 2: 73. 1852. = ***Adiantopsis paupercula*** (Kunze) Fée (*fide* Proctor 1989).

Hypolepis poeppigii (Kunze) Mett. ex Maxon *in* Moldenke, Lilloa 6: 289. 1941, as “Kuntze”. This name must not be interpreted as a new combination; Maxon (1941) probably made confusion between *Hypolepis poeppigiana* Mett. and *Polypodium poeppigii* Kunze, which Mettenius (1858) regarded as *Phegopteris poeppigii* (Kunze) Fée (even attributing the combination to himself *Phegopteris poeppigii* (Kunze) “Mett.”). Thus, the combination of *Pol. poeppigii* into *Hypolepis,* is here accepted as done by Rodríguez (1989): ***Hypolepis poeppigii*** (Kunze) R.A. Rodr.

Hypolepis radiata (L.) Hook. = ***Adiantopsis radiata*** (L.) Fée.

Hypolepis repens (L.) C. Presl var. *selloana* Klotzsch ex Baker *in* Mart. & Eichler, Fl. Bras. 1(2): 384. 1870, as “var. γ *Selloana*”. Lectotype, designated here: Brasilia, [1837], *Sellow* [*Sello*] *s.n.* (K! [as “*Hypolepis Sellowiana* Klotzsch” by Klotzsch, and as “*Hypolepis repens* γ *Selloana* Baker” by Baker]; isolectotypes: B!-3 sheets, LE!-2 sheets) = ***Eriososrus myriophyllus*** (Sw.) Copel. Excluded syntypes: Bahia, locis umbrosis paludosis, 05/II/1838(?), *B. Luschnath 109* (B!-on 2 sheets, B!-2 sheets, LE!-5 sheets) = ***Hypolepis rigescens*** (Kunze ex. Mart.) T. Moore.

Hypolepis rugosula (Labill.) Hook., Sp. Fil. 2: 68. 1852, as “*rugulosa*”, *nom. illeg.,* non *Hypolepis rugosula* (Labill.) J. Sm. (Bot. Mag. 3rd ser., 2: 8. 1846) = ***Paesia rugosula*** (Labill.) Kuhn.

Hypolepis sellowiana Klotzsch ex Schlecht., Linnaea 14: 286. 1840, as "*Selloviana*", *nom. nud.* = ***Eriosorus myriophyllus*** (Sw.) Copel. (see *Hypolepis repens* var. *selloana* Klotzsch ex Baker above).

Hypolepis serrata Fée, Crypt. Vasc. Brésil 1: 53, t. 13, fig. 3. 1869. Lectotype, designated by Ponce *et al.* (2007: 144): Brazil, Rio de Janeiro, *A.F.A. Glaziou 2336* (K-*n.v.*; isolectotypes: B-*n.v.*, HBG-*n.v.*, P-*n.v.*). = ***Cheilanthes incisa*** Kunze ex Mett. For further clarification, see Ponce *et al.* (2007).

Hypolepis spectabilis (Kaulf.) Link, Fil. Sp.: 65. 1841 (*apud* Moore 1957-1862, IPNI; *opus non vidi*) = ***Adiantopsis chlorophylla*** (Sw.) Fée *s.l.* (see *Cheilanthes spectabilis* Kaulf. above).

Lonchitis tenuifolia Beyrich ex C. Presl, Tent. Pterid.: 93. 1836, *nom. illeg. et nud.* (non *Lonchitis tenuifolia* G. Forst., 1786). = ***Cheilanthes incisa*** Kunze ex Mett. (see *Cystopteris leptophylla* C. Presl above).

Pteridium aquilinum (L.) Kuhn subsp. *psittacinum*, Index Filic. Suppl. 3: 166.1934. = ***Pteridium arachnoideum*** (Kaulf.) Maxon (see *Pteris psittacina* C. Presl below).

Pteridium psittacinum (C. Presl) Maxon, Proc. Biol. Soc. Washington 46: 141. 1933. = ***Pteridium arachnoideum*** (Kaulf.) Maxon (see *Pteris psittacina* C. Presl below).

Pteris aquilina L. var. *psittacina* (C. Presl) Baker *in* Mart. & Eichler, Fl. Bras. 1(2): 403. 1870. = ***Pteridium arachnoideum*** (Kaulf.) Maxon (see *Pteris psittacina* C. Presl below).

Pteris psittacina C. Presl *in* J.S. Presl & C. Presl, Del. Prag. 1: 185. 1822, *nom. rej.* Lectotype, designated by Schwartsburd & Prado (2011: 234): Ad Rio Janeiro Brasilia [Circa Rio de Janeiro in collibus], [XII/1818], *J.B.E. Pohl s.n.* (PRC!; probable isolectotype: W!) = ***Pteridium arachnoideum*** (Kaulf.) Maxon (bas.: *Pteris arachnoidea* Kaulf., Enum. Filic.: 190. 1824, *nom. cons.*). See further clarification in Schwartsburd & Prado (2011).

Doubtful names

Cystopteris fragilis var. *pubescens* Phil., Anales Univ. Chile 43: 582. 1873 [1872?]. Rodríguez (1995) synonymized it under *Hypolepis poeppigii* (Kunze) R.A. Rodr. The image of the type at SGO is available online, at JStor web site. But, it is difficult to be sure about the identity of this *taxon*, by analysing only the image.

Hypolepis buchtienii Rosenst., Repert. Spec. Nov. Regni Veg. 25: 58. 1928. Lectotype, designated by Tryon (1964: 38): Bolivia, Casana in valle Tipuani, 1400 m, 29/IX/1922, *O. Buchtien 7014* (S-PA-*n.v.*; isolectotypes: UC-*n.v.* [image!], US-*n.v.*). No type specimen of this species was analysed, only one image. In this case, it is difficult to tell either this is a *good species,* or a synonym of any Bolivian species. Tryon (1964) placed it as a synonym of *H. hostilis* (Kunze) C. Presl, but, apparently *H. buchtienii* has inermous petioles and rachises, thus differing from *H. hostilis.* The images remind *H. rigescens* (Kunze) T. Moore, but this species also has aculei. It might be, on the other hand, an earlier name to *H. minima* Kessler & A.R. Sm. (which is regarded here, with doubts, as a synonym of *H. rigescens*).

Hypolepis juergensii Rosenst., *nom. nud.*? The publication of this name has not been found by the present author; nor any index list it as a 'valid published name'. One specimen assigned to this name was analyzed: Brazil, Rio Grande do Sul, Sta. Cruz [Santa Cruz], Linha Chaves, XI/1911, *C. Jürgens 352, Rosenst. Fil. Bras. Exsic. II 77* (B!, NY-*n.v.*). The specimen at B represents *H. rugosula* subsp. *pradoana* Schwartsb. *ined.* Another two materials are listed in the NY virtual herbarium with this name: Brazil, Rio de Janeiro, Serra dos Órgãos, Pedra Assú, 01/XI/1929, *A.C. Brade 9921* (NY-*n.v.*); Brazil, Rio de Janeiro, Itaiaia, Itatiaya, VI/1913, *A.C. Brade 6501* (NY-*n.v.*). This last specimen is also a duplicate of a specimen of *H. rugosula* subsp. *pradoana* analyzed at HB and RB (see its 'Additional material examined').

Polypodium austriacum Jacq., Obs. Bot. 1: 45. 1764 (*opus non vidi; apud* IPNI). Under this name, Swartz (1806) synonymised Plumier's (1707) *Filix aculeata repens,* which was the base for *Lonchitis repens* L. (= *Hypolepis repens*). But, in the same work, Swartz (1806) considered *L. repens* as a valid species. Further citations of *P. austriacum* could not be found.

Doubtful records for South America

Hypolepis microchlaena Mickel & Beitel – This species was originally described as endemic to Mexico (Mickel & Beitel 1988). Moran (1995) placed this species as a synonym of *H. viscosa.* Mickel & Smith (2004) regarded this species as endemic to Mexico, and known only from the type collection. Then, Murillo-Pulido *et al.* (2008) cited this species as occurring also in Colombia (*W. Rodríguez 3586* [COL-*n.v.*]). No material (neither Mexican nor Colombian), nor the type of this species have been analysed for the present paper. According to the description provided by Mickel & Beitel (1988) and Mickel & Smith (2004), this species is similar to *H. rigescens,* which does occur in Colombia, and it is not cited by Murillo-Pulido *et al.* (2008). Maybe *Rodríguez 3586* represents *H. rigescens.*

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(Accepted names in bold; numbers refer to *taxa* number assigned in the taxonomic treatment).

Hypolepis chilensis Fée – 18 *p.p.*, 22a *p.p.*

Hypolepis crassa Maxon – 3

Hypolepis delicatula Fée – 20

Hypolepis dicksonioides Fée – 20

Hypolepis ekmanii Maxon – 13

Hypolepis flexuosa Sodiro – 4

Hypolepis flexuosa Sodiro var. ***flexuosa*** – 4a

Hypolepis flexuosa Sodiro var. ***zimmerae*** Schwartsb. & J. Prado, *var. nov.* – 4b

Hypolepis galapagensis Schwartsb. & J. Prado, *sp. nov.* – 5

Hypolepis guianensis Klotzsch – 6

Hypolepis hauman-merckii Hicken – 22a

Hypolepis hispaniolica Maxon – 12

Hypolepis hostilis (Kunze) C. Presl – 7

Hypolepis hostilis (Kunze) C. Presl var. *major* Hook. – 9

Hypolepis inermis (Hook.) H. Christ – 4

Hypolepis krameri Schwartsb., Boudrie & Cremers, *sp. nov. ined.* – 8

Hypolepis lellingeri A. Rojas – 9

Hypolepis melanochlaena A.R. Sm. – 10

Hypolepis minima M. Kessler & A.R. Sm. – 21

Hypolepis mitis Kunze ex Kuhn – 11

Hypolepis nigrescens Hook. – 12

Hypolepis nuda Mett. *in* Kuhn – 13

Hypolepis obtusata (C. Presl) Kuhn – 14

CONSIDERAÇÕES FINAIS

Como mencionado na Introdução, *Hypolepis* é um gênero que foi pouquíssimo estudado taxonomicamente e, como se imaginava, várias novidades taxonômicas e nomenclaturais poderiam surgir. Realmente tal suposição foi confirmada: são reconhecidas para a América do Sul, incluindo a Ilha de Cocos (Costa Rica), 27 espécies, e um total de 31 táxons (incluindo espécies, subespécies e variedades). Destas, 11 apresentam novidades nomenclaturais: *H. acantha* Schwartsb. *ined., H. bogotensis* var. *glabra* H. Karst. ex Schwartsb. & J. Prado *var. nov., H. flexuosa* var. *zimmerae* Schwartsb. & J. Prado *var. nov., H. galapagensis* Schwartsb. & J. Prado *sp. nov., H. krameri* Schwartsb. *et al. ined., H. paulistana* Schwartsb. & J. Prado *sp. nov., H. pedropaloensis* Schwartsb. & J. Prado *sp. nov., H. rugosula* subsp. *poeppigiana* (Mett.) Schwartsb. & J. Prado *stat. nov., H. rugosula* subsp. *pradoana* Schwartsb. *ined., H. stolonifera* var. *nebularis* Schwartsb. *ined.,* e *H. trinationalis* Schwartsb. *ined.*

Além destas novidades, a maioria das outras espécies teve seu conceito re-circunscrito; inclusive, algumas foram "resgatadas" de sinonímias prévias. São elas: *Hypolepis bogotensis* var. *bogotensis, H. flexuosa* var. *flexuosa, H. hostilis, H. mitis, H. nuda, H. parallelogramma, H. poeppigii, H. pteroides, H. repens, H. rigescens, H. rugosula* (ver também Anexo III e V)*, H. stolonifera* var. *stolonifera,* e *H. viscosa.* Em adição, uma espécie é agora reconhecida por um *nomem conservandum* (*Hypolepis nigrescens* Hook.), e outra teve seu nome rejeitado (*Aspidium brasilianum* C. Presl, uma vez combinado como *Hypolepis brasiliana* (C. Presl) Kuhn) – ver Anexos I e II, respectivamente.

O número total de espécies pertencentes ao gênero, anteriormente estimado em 40–50 para o Mundo (das quais 15–20 ocorreriam nas Américas), é agora estimado em ca. 80 táxons (ca. 65 spp., mais algumas subespécie e variedades). Dos ca. 80 táxons, ca. 40–45 ocorrem nas Américas, ca. 30 na Australásia (Oceania, SE Asiático, E Asiático), e apenas três ou quatro na África.

Dentre as espécies sul-americanas, oito padrões biogeográficos de distribuição podem ser reconhecidos, e estes são baseados em subdivisões de padrões previamente identificados. São eles: "neotropical", "circum-caribenho", "circum-amazônico", "Monte Roraima", "andino", "ilhas", "sul-brasileiro", e "austral". Além da latitude e tipos vegetacionais, as atitudes mínimas e máximas parecem ser também fortes fatores limitantes da distribuição dos táxons. O padrão “andino” é o mais rico (com 10 táxons), seguido por “sul-Brasileiro” (com seis).

O resultado final do tratamento taxonômico é satisfatório no sentido em que quase a totalidade dos tipos nomenclaturais foi estudada, a maioria das espécies foi re-circunscrita (especialmente em comparação com espécies de outras áreas geográficas, *e.g.* Oceania, América Central, Ásia, África), e poucos nomes permaneceram dúbios. As espécies que merecem estudos futuros, pois podem se tratar de complexos específicos ou espécies com relativamente alta variabilidade morfológica são: *Hypolepis fexuosa* (incluindo var. *flexuosa,* var. *zimmerae,* e provavelmente *H. muenchii, H. thysanochlaena,* e *H. trichochlaena*), e *H. stuebelii* (incluindo *H. acantha, H. grandis,* e *H. pedropaloensis*). Outros nomes, que foram respectivamente tratados como sinônimo duvidoso e espécie duvidosa, e merecem estudos futuros, são *H. minima* e *H. buchtienii.*

Quanto ao estudo morfológico de *Hypolepis,* alguns termos morfológicos foram adaptados da terminologia tradicional, a fim de se padronizar uma descrição mais precisa. Por exemplo, os seguintes termos foram adaptados: *catenate-acicular* (catenado-acicular) e *catenate-glandular* (catenado-glandular), para os tricomas; e *π-shaped* (em forma da letra π) e *Ω-shaped* (em forma da letra Ω), para a forma do feixe vascular do pecíolo. Muitas características (e estados das características) das plantas, anteriormente negligenciadas, mostraram ter fundamental importância taxonômica, como por exemplo: o tamanho das frondes, os tipos de feixes vasculares presentes nos pecíolos, a coloração dos pecíolos e raques, a forma das pinas basais (equilaterais ou inequilaterais), o indumento em geral (tipos, tamanhos, e localização dos tricomas), características dos pseudo-indúsios (espessura, coloração, ciliados ou não ciliados, etc), etc. Algumas imagens de secções anatômicas revelaram caracteres inéditos ou pouco estudados das espécies de *Hypolepis,* como, por exemplo, as diferentes formas dos feixes vasculares, as linhas de aeróforos dos rizomas e pecíolos, a ontogenia do feixe vascular da raque de segunda ordem, bem como dos acúleos.

O estudo morfológico de ca. 70-80% dos táxons de *Hypolepis* distribuídos pelo Mundo serviu de base para a elaboração de um *agrupamento informal* dos táxons, baseado estritamente em morfologia. Esta hipótese é uma idéia inicial, e incentiva-se que sejam feitos futuros estudos moleculares a fim de se corroborar ou rejeitar os grupos aqui mencionados. Quatro grandes grupos de espécies são claramente distintos

(*H. flexuosa, H. nigrescens, H. rugosula,* e *H. tenuifolia*), com grande sustentação citogenética (número cromossômico), de morfologia externa, e de morfologia interna (anatomia). Os estudos anatômicos aqui apresentados são extremamente preliminares e devem ser continuados, aliados aos estudos moleculares, citogenéticos, e de morfologia externa. Algumas características destes grupos são compartilhadas com outros gêneros de Dennstaedtiaceae e, portanto, uma análise global dos gêneros relacionados deve ser realizada para melhor circunscrever os gêneros desta família. Grupos menores, pertencentes ao grande grupo de *H. tenuifolia* também foram caracterizados e devem ser futuramente investigados.

Quanto às discussões acerca dos *conceitos específicos* e *infra-específicos* aplicado a alguns táxons de *Hypolepis,* especialmente a *H. punctata, H. rugosula,* e espécies afins, destaca-se que um novo conceito foi formulado. Este foi adaptado basicamente dos conceitos prévios de Christensen (1920, 1932, 1937, e Christensen & Skottsberg 1920), porém segregando as macro-populações de *H. rugosula* em subespécies, e ampliando ainda mais sua distribuição (ver também Anexos III e V). O tratamento taxonômico reunindo todas as subespécies de *H. rugosula* encontra-se em andamento (Schwartsburd & Prado *in prep.*); encoraja-se um estudo que envolva também citogenética e biologia molecular destas subespécies, tendo em foco questões como *especiação, rotas de migração, poliploidia e aneuploidia, hibridação, adaptação, reprodução vegetativa e sexuada,* etc.

Anexo I

PROPOSALS TO CONSERVE OR REJECT NAMES

Edited by John McNeill, Scott A. Redhead & John H. Wiersema

(1911) Proposal to conserve the name *Hypolepis nigrescens* Hook. (*Dennstaedtiaceae*) against *Hypolepis nigrescens* (Schrad.) Nees (*Cyperaceae*)

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(1911) ***Hypolepis nigrescens*** Hook., Sp. Fil. 2: 66. Nov 1852, nom. cons. prop.
Typus: Jamaica, *Wilson* (K; isotypi: BM, P).

(H) *Hypolepis nigrescens* (Schrad.) Nees in Linnaea 7: 522. 1832 (*Melancranis nigrescens* Schrad. in Gött. Gel. Anz. 1821: 2072. 1821 ('*Melaenacranis*')) [*Monocot.: Cyper.*], nom. rej. prop.
Typus: S. Africa, Cape, *Hesse* (LE?).

During a taxonomic revision of the fern genus *Hypolepis* Bernh. in South America, we found a nomenclatural problem with the widely applied name *H. nigrescens* Hook. that needs to be solved.

The generic name *Hypolepis* Bernh. (in Neues J. Bot. 1(2): 34. 1805 ["1806"]) of the *Dennstaedtiaceae* (*Pteridophyta*) has priority over the illegitimate later homonym *Hypolepis* P. Beauv. ex Lestib. (Essai Cypér.: 33. 1819) of the *Cyperaceae* (*Spermatophyta*). The binomial *Hypolepis nigrescens* Hook. (Sp. Fil. 2: 66. 1852; *Dennstaedtiaceae*) has been used for about 150 years, since its publication up to now. However, there is an earlier homonym for that name: *Hypolepis nigrescens* (Schrad.) Nees (in Linnaea 7: 522. 1832; *Cyperaceae*), based on *Melancranis nigrescens* Schrad., and so *H. nigrescens* Hook. is an illegitimate name and unavailable for use unless conserved (Art. 53.1, McNeill & al. in Regnum Veg. 146. 2006) .

Hypolepis nigrescens Hook., as lectotypified by Proctor (Ferns Jamaica: 179. 1985) on a specimen at K, is a name applied to a distinct species of *Dennstaedtiaceae*. This name has been widely used in taxonomic, ecological, and biogeographic literature, as by Mettenius (in Triana & Planchon in Ann. Sci. Nat., Bot., sér. 5, 2: 238. 1864), Baker (in Martius & Eichler, Fl. Bras. 1(2): 384. 1870), Christensen (Index Filic.: 371. 1906), Hieronymus (in Hedwigia 48: 228. 1909), Christ (Geogr. Farne: 39, 288, etc. 1910), Bower (Ferns 3: 9. 1928), Smith (in Breedlove, Fl. Chiapas 2: 137. 1981), Stolze (in Fieldiana, Bot., n.s., 6: 278. 1981), Tryon & Tryon (Ferns Trop. Amer.: 400. 1982), Brownsey (in Amer. Fern J. 73(3): 101. 1983, in Blumea 32: 229. 1987), Proctor (l.c.), Mickel & Beitel (in Mem. New York Bot. Gard. 46: 220. 1988), Tryon & Stolze (in Fieldiana, Bot., n.s., 22: 109. 1989), Murilo & Harker (Helechos Pl. Afin. Colombia: 104. 1990), Moran (in Davidse & al., Fl. Mesoamer. 1: 155. 1995), Smith (in Steyermark & al., Fl. Venez. Guayana 2: 52. 1995), Nelson & al. (in Fontqueria 43: 72. 1996), Mickel & Smith (in Mem. New York Bot. Gard. 88: 351. 2004) and Navarrete (in Hokche & al., Nuevo Cat. Fl. Vasc. Venezuela: 121. 2008)—basically, in all fern floras where this species occurs (from the Amazon Basin and Andes up to Mexico and the Greater Antilles), plus the works with other focus.

Fortunately, the earlier *Hypolepis nigrescens* (Schrad.) Nees has been seldom cited in literature, apart from nomenclatural purposes, because: (1) its genus *Hypolepis* P. Beauv. ex Lestib. was early considered a synonym of *Ficinia* Schrad., *nom. cons.* (Jackson, Index Kew. 1: 1198. 1895) due to its later homonymy to *Hypolepis* Bernh.; (2) it was mostly considered a synonym of *F. bracteata* Boeck. (Clarke in Durand & Schinz, Consp. Fl. Afr. 5: 636. 1895; Jackson, l.c.); and (3) it is now regarded as an unavailable combination (due to generic homonymy), synonymised under *Ficinia nigrescens* (Schrad.) J. Raynal (in Adansonia, sér. 2, 14: 211. 1974). In other words, *H. nigrescens* (Schrad.) Nees has always been an obscure name, and will remain forever treated in synonymy.

There is at least one certain taxonomic synonym for *Hypolepis nigrescens* Hook., *Dennstaedtia rubicaulis* H. Christ, and another possible one, *H. hispaniolica* Maxon (Mickel & Smith, l.c.). But those names have also almost never been cited in general literature, and their adoption would cause instability. *Dennstaedtia rubicaulis* was never transferred to *Hypolepis* Bernh., and Christ (Geogr. Farne. 1910) himself seems to have later ignored his *D. rubicaulis* and accepted *H. nigrescens* Hook., citing it constantly in his biogeographical work. The other available name, *H. hispaniolica*, has never been formally treated as a synonym of *H. nigrescens* Hook., being still officially regarded as an endemic species from Hispaniola (see Mickel & Smith, l.c.).

In order to maintain nomenclatural stability we propose the conservation (Art. 14) of a 150-year-used name (*Hypolepis nigrescens* Hook.) against an earlier name that cannot be used (*H. nigrescens* (Schrad.) Nees). This conservation will not affect the basionym of the latter name, *Melancranis nigrescens* Schrad., neither in its past transfer to *Ficinia* nor in any future transfer to some other genus.

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Anexo II

(1990) Proposal to conserve the name *Pteris arachnoidea* (*Pteridium arachnoideum*) against *Aspidium brasilianum* and *Pteris psittacina* (*Dennstaedtiaceae*)

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(1990) ***Pteris arachnoidea*** Kaulf., Enum. Filic.: 190. 8 Apr-28 Mai 1824, nom. cons. prop.
Typus: Brazil, *Chamisso* (LE).
(=) *Aspidium brasilianum* C. Presl in J.S. Presl & C. Presl, Delic. Prag. 1: 176. Jul 1822, nom. rej. prop.
Lectotypus, hic designatus (vel holotypus?): Brazil, [ad Rio Janeiro], *Pohl* (PRC; isolectotypus: ? W [*Pohl 3794*]).
(=) *Pteris psittacina* C. Presl in J.S. Presl & C. Presl, Delic. Prag. 1: 185. Jul 1822, nom. rej. prop.
Lectotypus, hic designatus (vel holotypus?): Brazil, "ad Rio – Janeiro", *Pohl* (PRC; isolectotypus: ? W [*Pohl 4076*]).

After a visit to PR, PRC, and W herbaria, we concluded that some of the South Brazilian ferns described by C. Presl (in J.S. Presl & C. Presl, Delic. Prag. 1: 153–190. 1822) were based on J.B.E. Pohl's collections. This conclusion can be applied, at least, to the four species we've studied: the two present in this proposal, plus *Aspidium coniifolium* C. Presl (l.c.: 175) and *Dicksonia tenera* C. Presl (l.c.: 188). This information is not available within his work, and perhaps can be possibly applied to many more species described there, but further studies are required.

We also concluded that there are two earlier names at species rank for the Neotropical bracken fern widely and commonly known as *Pteridium arachnoideum* (Kaulf.) Maxon (in J. Wash. Acad. Sci. 14: 89. 1924), or as *Pteridium aquilinum* var. *arachnoideum* (Kaulf.) Brade (in Z. Deutsch. Verein Wiss. Kunst São Paulo 1: 56. 1920). These names are *Aspidium brasilianum* C. Presl (l.c.: 176) and *Pteris psittacina* C. Presl (l.c.: 185), and they had been published two years before Kaulfuss published *Pteris arachnoidea* Kaulf. (Enum. Filic.: 190. 1824).

Both Presl's names are based on juvenile, sterile forms, morphologically quite distinct from the regular adult forms (the morphological clarification between these "two forms" will soon be launched by Schwartsburd & Prado, in prep.), and they have led to an uncertain interpretation and characterization of such names. In addition to the type specimens of these two names at PRC, we have examined specimens at W that appear to be duplicates.

Aspidium brasilianum was never interpreted as belonging to the genus (or subgenus) most authors were considering for the bracken. Not by Presl himself, who described it in the same work as that in which he described *Pteris psittacina*, and later tentatively combined it into *Cystopteris brasiliana* (C. Presl) C. Presl (Tent. Pterid.: 93. 1836); nor even by Kuhn, who transferred it to *Hypolepis brasiliana* (C. Presl) Kuhn (Festschr. Jubil. Königstädt. Realsch. Berlin: 347 [Chaetopterides: 27]. 1882).

Although always included within the bracken group, *Pteris psittacina* (whenever mentioned) has usually been interpreted as a different taxon from *P. arachnoidea*, the regular S Brazilian bracken, and as a rare and unknown species (or variety, subspecies) hardly ever found fertile. Most authors did not consider its priority, because they were almost certain the two were not the same taxon. Presl himself (l.c. 1836: 153) accepted *Allosorus psittacinus* ("*psitaccinus*") and *A. arachnoideus* (ascribed to Desvaux); Hooker (Sp. Fil. 2: 196–201. 1858) treated *Pteris* (*Ornithopteris*) *aquilina* var. *esculenta* (with *Pteris arachnoidea* in synonymy) and *P. psittacina* (with doubts about its identity); Baker (in Martius, Fl. Bras. 1(2): 403. 1870) created two varietal names with equivalent priority, *Pteris aquilina* var. *psittacina* and *P. aquilina* var. *arachnoidea*, for Brazil; Maxon (l.c., and in Proc. Biol. Soc. Washington 46: 141–142. 1933) transferred the "two taxa" to *Pteridium*, as *P. arachnoideum* and *P. psittacinum*, respectively; Christensen (Index Filic. Suppl. 3: 166. 1934) considered them, informally, as two subspecies of *Pteridium aquilinum* s.l.; and Ponce & al. (in Zuloaga & al., Cat. Pl. Vasc. Cono Sur 1: 30–31. 2008) excluded *Pteridium psittacinum* from Cono Sur region. However, Tryon, in his revision of *Pteridium* (in Rhodora 43: 57–58. 1941), merged it into the synonymy of *Pteridium aquilinum* var. *arachnoideum*, without having seen its type, thereby establishing the priority of his chosen name at varietal rank.

Another early name that potentially applies to the Neotropical bracken fern, *Pteris campestris* Schrad. (in Gött. Gel. Anz. 1824: 871. 1824), must also be considered. Although *P. campestris* was relatively well described even compared to the other species included in *Pteridium* nowadays, it seems to have been neglected by most authors. The only ones who cited this name were Hooker (l.c.: 198), as just an herbarium name; Baker (l.c.), as a nomen nudum ("Mss."); Christensen (Index Filic.: 594. 1906), who considered it as a synonym of *Pteridium aquilinum* and never again mentioned this name; and Tryon (l.c.), who merged it into the synonymy of *Pteridium aquilinum* var. *arachnoideum* without even mentioning its type. Fortunately, the article containing Schrader's name is dated 29 May 1824, while according to Stafleu & Cowan (in Regnum Veg. 98: 508. 1979) Kaulfuss' work (l.c) was published between April 8 and May 28 of 1824, so *Pteris arachnoidea* maintains priority.

Because of the initial taxonomic misinterpretation of Presl's names and the later wide acceptance of Tryon's paper (l.c.), the great majority of authors have applied the names *Pteridium arachnoideum* or *P. aquilinum* var. *arachnoideum* to the Neotropical bracken. For example, Moran (in Davidse & al., Fl. Mesoamer. 1: 161–162. 1995), Smith (in Steyermark & al., Fl. Venez. Guayana 2: 69–70. 1995), Navarrete (in Jørgensen & León-Yánez, Cat. Vasc. Pl. Ecuador: 122. 1999), Dorr & al. (in Contr. U.S. Natl. Herb. 40: 20. 2000), Prado (in Hoehnea 31: 19. 2004), Mickel & Smith (in Mem. New York Bot. Gard. 88: 529–533. 2004), Boldrin & Prado (in Bol. Bot. Univ. São Paulo 25: 21. 2007), Schwartsburd & Labiak (in Hoehnea 34: 196. 2007), Ponce & al. (l.c.), Der & al. (in Amer. J. Bot. 96: 1041–1049. 2009), and many more.

The only paper which rightly considered the priority of *Pteridium psittacinum* over *P. arachnoideum* is Ramos Giacosa & al. (in Bol. Soc. Argent. Bot. 39: 127–128. 2004). But since *P. arachnoideum* (or *P. aquilinum* var. *arachnoideum*) has been so widely applied, a change of names at species rank is undesirable, causing enormous nomenclatural instability to one of the most (if not *the* most) economically important ferns from S Brazil (and the Neotropics)—it poisons cattle and horses, it behaves as a weed in plantations, and people eat its fiddle heads (although poisonous)—going against the recommendation of the ICBN regarding stability of names (Art. 14, McNeill & al. in Regnum Veg. 146. 2006).

Additionally, searching Google's international website on 16 December 2010, we found the following score for these species names: "*Pteridium arachnoideum*" appears 4940 times, "*Pteridium psittacinum*" 85 times, "*Aspidium brasilianum*" 5 times, "*Hypolepis brasiliana*" 6 times, "*Cystopteris brasiliana*" 17 times, and "*Pteris campestris*" 9 times. It is clear that the most commonly applied species name for this taxon is *Pteridium arachnoideum*, and this together with its economic importance are strong reasons for its conservation, as here proposed.

Acknowledgements

The first author thanks Dr. Thomson (NSW) for discussing ideas on *Pteridium*; Ms. Wood and Mr. Franzone (GH) for sending images of the photo-type of *Pteris arachnoidea*; Dr. Stepánec and Dr. Stefánec for the reception and help at PRC; Dr. Sida for the reception and help at PR; Dr. Zappi for the opportunity given to develop part of his thesis and this proposal at K; also to all the staff at K; Dr. Wiersema for corrections and suggestions on this proposal; and CNPq for both Doctoral fellowships given (at Brazil and for the sandwich program abroad).

Anexo III

Webbia **66**(2): 155-163. 2011

Typification of *Polypodium rugosulum* Labill. (= *Hypolepis rugosula*, Dennstaedtiaceae), a new subspecies, and a new status for one variety

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Tipificazione di Polypodium rugosulum Labill. (= *Hypolepis rugosula*, *Dennstaedtiaceae*), *nuova sottospecie, e un nuovo status varietale* — In questo lavoro, viene esaminato il materiale tipo di *Polypodium rugosulum* (= *Hypolepis rugosula*) e la loro interpretazione nella collezione Labillardière. Viene proposta una nuova sottospecie **H. rugosula** subsp. **pichi-sermolliana** Schwartsb. & J. Prado*,* oltre alla tipificazione di *H. rugosula* var. *africana* C. Chr. ex C. Chr. e il suo nuovo stato a rango sottospecifico: **H. rugosula** subsp. **africana** (C. Chr. ex C. Chr.) Schwartsb. & J. Prado.

Key words: *Dennstaedtiaceae*, *Hypolepis rugosula, Polypodium rugosulum.*

After three years without having any information upon the South Pacific expedition commanded by the Count of La Pérouse, the Constituent Assembly of France decided to invest in a new one to search for that. Along with the purpose of finding those men, there was also the aim of scientific and art research. Then, two ships were sent under the command of Rear Admiral A.R.J.B. d'Entrecasteaux, boarding men of many different skills: from carpenters, soldiers and gunners to naturalists, surgeons and astronomers. One of the naturalists present in this expedition was Jacques-Julien Houttou de Labillardière (or "de la Billardière"), who made many scientific observations, collections, and described many plants (Labillardière, 1800, 1802, 1806).

As compiled by Stafleu & Cowan (1979, 1988), Labillardière distributed the main sets of duplicates of this expedition to R.L. Desfontaines and J.P.B. Delessert; his main personal herbarium was later acquired by P.B. Webb; and Webb's herbarium was later incorporated in the Herbarium Universitatis Florentinae, Museo di Storia Naturale. Nowadays, at Florence (FI), Webb's former herbarium is kept separately from the main collection, under the acronym FI-W. Several other herbaria are also known to house at least a few Labillardière's duplicates (see Apfelbaum 1977, and Burdet 1979).

One of the most important species belonging to the genus *Hypolepis* Bernh. was described by Labillardière (1806 [1807?]: 92, t. 241), as a result of this expedition. He described it as *Polypodium rugosulum* Labill. (= *Hypolepis rugosula* (Labill.) J. Sm.), from "capite Van-Diemen"[1]. This species is very important in the sense that it was one of the first *Hypolepis* species described, and, in our *sensu* (Schwartsburd & Prado *in prep.* – to be well explained and detailed) it is a sub-cosmopolitan species – following also the *sensu* of Kaulfuss (1824), Brackenridge (1854), Hooker (1862), Hooker & Baker (1868), Cordemoy (1891), Domin (1914), Christensen & Skottsberg (1920), Christensen (1931, 1932, 1934, 1937), Brade (1956), and Tryon & Tryon (1982).

Technically (Art. 9.4, McNeill et al., 2006), as Labillardière (*l.c.*) did not specify a specific exsiccatum as the "type" or the "holotype" in the protologue, and he indeed collected, annotated and distributed lots of specimens, we must consider all of them as syntypes; especially, if more than one can be found in his former herbarium.

Pichi Sermolli (1983) actually mentioned the holotype of this species held at FI. Later, Brownsey & Chinnock (1987) mentioned a selected lectotype, also held at FI. But, during the visit to Florence, made by the first author of the present paper, no single specimen found could be identified as the holotype, or as the lectotype chosen by Brownsey & Chinnock (*l.c.*). Within the FI-W collection, we found six exsiccata (plus a second part of one) of *Polypodium rugosulum* attributed to Labillardière or to his herbarium, of which two bear his handwriting (identification based on Burdet, *l.c.*). Thus, following Art. 9.15 (McNeill et al., 2006), we interpret Pichi Sermolli's statement as the "first step" of an inferential lectotypification.

Among these six exsiccata, four (FI-W 214897, 214899, 216239, and 218473) are from Labillardière's own former herbarium, all labelled "Herb. Webbianum, ex Herb. Labillardière"; one (FI-W 214898) is from Desfontaine's former herbarium, also later transferred to Webb's, and now at FI-W; and one (mounted on two sheets: FI-W 214903 and 214904) is probably from Webb's former herbarium itself, apparently sent by Labillardière to Webb before the acquisition of his main herbarium.

Among the four exsiccata from Labillardière's own former herbarium, FI-W 214897 contains attached labels bearing the name of the species, the plate, the whole description of the plant later published in his work (with some corrections), comments distinguishing this species from another, and sketches of sporangia and spores, all by Labillardière's handwriting (of course, we cannot be sure about the sketches). In addition, it is a very good representative specimen of the species – to be digitalized and made available online. Following Rec. 9A.3 of Mc.Neill, et al. (2006), we here choose this exsiccatum as the lectotype (second step). This specimen has, as well, a label bearing Webb's handwriting, indicating the name of the species, the plate 241, and the locality of "Nova Hollandia".

Regarding the other three exsiccata from Labillardière's former herbarium, only FI-W 218473 bears his handwriting as well, indicating the name of the species, the name of the work where he published it and the plate. FI-W 214899 and FI-W 216239 (this consists of a young sterile specimen) bear no Labillardière's handwriting, nor Webb's. FI-W 216239 bears only the brief writing "Terra Diemen", that could possibly have been written by Webb, but we cannot be sure. But, they do bear the label "…ex Herb. Labillardière". We consider all these materials as "duplicates of the lectotype"[2].

The remaining exsiccata at FI-W, from Desfontaine's and Webb's former herbaria, also lack Labillardière's handwriting. They do bear, instead, *their own* handwritings, with the following information, respectively: "*Polypodium* '*rugulosum*' bill., n. holl."; and "*Polypodium rugosulum,* tab. 241, Nova Hollandia". Since there is no doubt about the relation-

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[1] Van Diemen's Land is nowadays known as Tasmania. Although in the protologue *Polypodium rugosulum* is ascribed to "capite Van-Diemen", in most exsiccata seen the information of locality is given as "Nova Hollandia" (or an abbreviation of it), that would, nowadays, represent Australia. The same "error" has been reported by Apfelbaum (*l.c.*), and, as in his case, most of the locality information seen by the first author had *not* been written by Labillardière, but by other curators. We might also interpret that, at that time, Van Diemen's Land could have been considered as a sub region of the big Nova Hollandia. Also the name of the work where *P. rugosulum* and many other species from "capite Van-Diemen" were described is called *Novae Hollandiae Plantarum Specimen*.

[2] In this paper we adopt the term "duplicate of the lectotype". The term "isolectotype" is not yet accepted by the Code (McNeill et al., *l.c.*), thus we avoided it here. Maybe in the next edition of the Code this term will be available for use, and so our term can be renamed - see the proposal of Prado et al. (2010).

ship between Labillardière and these two botanists, we also consider them as duplicates of the lectotype.

At the herbarium of the Conservatoire et Jardin botaniques de la Ville de Genève (G), we found four collections of *Polypodium rugosulum* attributed to Labillardière. One material, mounted on two sheets (G 00048252 and G 00048253), is originally from A.P. de Candolle's herbarium, received by him in 1808, with Labillardière's handwriting ("*Polypodium rugosulum*"), and de Candolle's ("nov. hollande, m. Labillardiere, 1808").

Another material, also mounted on two sheets (G 00048249 and G 00048250), is from A.M.F.J. Palisot de Beauvois' former herbarium, secondly transferred to Delessert's, and now incorporated at G. This material also bears Labillardière's handwriting "*Polypodium rugosulum*". We consider these materials as duplicates of the lectotype.

The other two materials at G do not bear Labillardière's handwriting. G 00048251 is from E.P. Ventenat's herbarium, later transferred to Delessert's, and also now at G. This material bears only Ventenat's handwriting "*Polypodium* '*rugulosum*'… LaBillard… Cap. Diémen". G 00048255 was either sent by Labillardière to Webb's or acquired by Webb along with his whole herbarium, then later sent by Webb to Delessert in 1838, and now incorporated at G; this material has no Labillardière's handwriting, instead, there is a Webb's label exactly the same as the ones found in FI-W. We consider the former as a "probable duplicate of the lectotype", and the latter as a duplicate of the lectotype.

At the herbarium of the V.L. Komarov Botanical Institute (LE), we found two exsiccata of *Polypodium rugosulum* with Labillardière's handwriting. One is labelled "*Polypodium rugosulum,* nov. holl.", and the other "*Polypodium rugosulum,* n. h. pl. sp., t. 241". They are from former F.K. Mertens' herbarium, and, according to the information on the labels, they were send by Labillardière (or received by Mertens) on August 28th of 1815. They are probably two parts of the same frond, mounted on two sheets, but we cannot be sure. We also consider them as duplicates of the lectotype.

We also found in LE a type of *Dicksonia antarctica* Labill., with Labillardière's handwriting, from former H.A. Schrader's herbarium, sent (or received) also on August 28th of 1815; and a specimen of *Pteridium aquilinum* var. *esculentum* (G. Forst.) Kuhn, attributed to Labillardière, or, at least, apparently donated by him to Mertens in 1816, but without his handwriting, only with Merten's, stating "Herb. Mertens, *Pteris esculenta,* ded. Labillardière, 1816".

At the herbarium of the Royal Botanic Gardens, Kew (K), we found a specimen from R. Reward's former herbarium labelled "*Polypodium* '*rugulosum*', Lab. Van Diemen's Land, ex herb. Labillardiere", with a handwriting unknown to us. By the information on the labels, apparently this was from Webb's herbarium, sent to Reward in 1844, and incorporated at K in 1887. We consider this as a probable duplicate of the lectotype, since it doesn't bear Labillardière's handwriting.

In addition, we found one specimen at the herbarium of the Charles University in Prague (PRC). This material is labelled "Nova Hollandia, Labillardièr", by K.B. Presl. Since it does not either bear Labillardière's handwriting, we also consider it as a probable duplicate of the lectotype.

All above listed materials taxonomically agree with our considerations, in our *sensu.* According to the list of Burdet (*l.c.*), there is also a high probability that many other herbaria store some duplicates of the lectotype of *Polypodium rugosulum.*

So, the most actual nomenclatural paragraph of *Hypolepis rugosula* is the following:

Hypolepis rugosula (Labill.) J. Sm., Bot. Mag. 3rd ser., 2: 8. 1846 (as *"rugulosa"*).

LECTOTYPE designated by Pichi Sermolli (1983 – first step), and here (second step): "Habitat in capite Van-Diemen [= Tasmania], *J.J.H. de Labillardière s.n."* (FI-W! [214897].

DUPLICATES: FI-W! [214898], FI-W! [214899], FI-W!-on 2 sheets [214903 and 214904], FI-W! [216239], FI-W! [218473], G!-on 2 sheets [00048252 and 00048253], G!-on 2 sheets [00048249 and 00048250], G! [00048255], LE!-2 sheets [probably 2 parts of the same frond]; probable duplicates: G! [00048251], K!, PRC!).

Polypodium rugosulum Labill., Nov. Holl. pl. 2: 92, t. 241. 1806 [1807?].

Phegopteris rugosula (Labill.) Fée, Mém. Foug., 5. Gen. filic.: 243. 1850-1852 [1852?] (as *"rugulosa"*).

Polypodium punctatum var. *rugosulum* Hook. & Baker, Syn. fil.: 312. 1868 [1867] (as "*rugulosum*").

Dryopteris punctata ssp. *rugosula* (Labill.) C. Chr., Index filic.: 287. 1906 [1905].

Phegopteris punctata var. *rugosula* Alderw., Malayan Ferns: 495. 1908 (as "*rugulosa*").

Dryopteris punctata var. *rugosula* (Labill.) Domin, Biblioth. Bot. 85: 41. 1914 [1913].

Hypolepis rugosula var. *rugosula* C. Chr. & Skottsb. *in* Skottsb., Nat. Hist. Juan Fernandez (Botany): 32. 1920 (as *"typica"*).

Obs: The heterotypic synonymy will be presented in our next paper.

As mentioned above, we consider this species as of sub cosmopolitan distribution and we are segregating the regional forms into subspecies (Schwartsburd & Prado *in prep.*), somehow like Christensen (1931, 1932, 1937, and with Skottsberg 1920) did. But, instead of the *variety level,* we are adopting the *subspecies level* – to be well explained in our following paper. Thus, we describe here a new subspecies, honoring an Italian botanist (Rodolfo E.G. Pichi Sermolli) who made several contributions to the pteridology:

Hypolepis rugosula (Labill.) J. Sm. subsp. **pichi-sermolliana** Schwartsb. & J. Prado, **subsp. nov.**

DIAGNOSIS: *Differt a subspecie rugosulae folia margine glabra et breve revoluta supra soris (vs. folia margine ciliata et non revoluta supra soris).*

TYPE: "Congo Belga, Dorsale ad ovest Del Lago Kivu, Montagne di Shamulamba, crinale a sud del rifugio del Groupe de Montagne de Kivu, ca. 2600 m, 23/X/1953, *R.E.G. Pichi Sermolli 4441*" (holotypus FI-PS!-on 2 sheets [19686]. (Fig.1, 2) - isotypi FI-PS! [19441], FI-PS! [19665]) - Paratypes: **Fernando Po Island (Equatorial Guinea):** s.d., *Maun s.n.* (K); s.d., *Maun s.n.* (W); 7000 ft, 1860, *Maun 381* (K). **Belgian Congo (Democratic Republic of the Congo):** Kivu Nord, Virunga Westgruppe, ca. 2700 m, 21/VIII/1954, *H.U. Stauffer 122* (K); Vissoke Volcano, 10,500 ft, 15/XII/1930, *B.D. Burtt 3017* (K-on 2 sheets). **Ethiopia:** Bale Mountains, above Rira, 3400 m, 08/II/1990, *G. Miehe & S. Miehe 2011* (K-on 2 sheets); Bale Massif, 3000 m, 22/III/1958, *J. Eriksson F 87b* (FI-PS); 59 km S of Goba along the road across the Sanetti Plateau to Dolo Mena, just below Rira, 3250 m, 15/IX/2005, *I. Friis et al. 12074* (K-on 3 sheets). **Uganda:** Ruwenzori, 9000 ft, 04/X/1905, '*Baeor*'(?) *569* (K); id., Bujuku Valley, near Bigo camp, 3450 m, 02/IV/1948, *O. Hedberg 646* (K); Western Province, Kigezi District, Virunga Ostgruppe, ca. 3000 m, 14/XI/1954, *H.U. Stauffer 783* (K). **Kenya:** Murang'a, Nyandarua Districts, Kimakia forest station, 2475 m, 13/VII/1969, *R.B. Faden & A. Evans 69/897* (K-on 2 sheets); Embu District, above Castle Forest Station, ca. 2350 m, 19/XII/1972, *J.B. Gillett & R.E. Holttum 20098* (K); id., Versante meridionale del Monte Kenya, 2700-3000 m, 13/XII/1966, *R.E.G. Pichi Sermolli 6892* (FI-PS); id., Versante meridionale del Monte Kenya, 1800 m, 12/XII/1966, *R.E.G. Pichi-Sermolli 6865* (FI-PS); Samburu District, Mt. Nyiru, 7000 ft, 13/XII/1972, *J.B.C. Cameron 139* (K); Mount Kenia, 10,000 ft, 13/XII/1957, *B. Verdcourt 2039* (K-on 2 sheets); id., 15/XII/1957, *B. Verdcourt 2063* (K-on 2 sheets, W); NE Elgon, 9500 ft, IV/1959, *Tweedie 1810* (K-on 3 sheets); Mount Elgon, Kitale, 27/XII/1960-01/I/1961, *H. Löffler E-39* (W); id., 27/XII/1960-01/I/1961, *H. Löffler E-115* (W); North Nyeri District, Mt. Kenia, 9500 ft, 06/IX/1963, *B. Verdcourt 3727* (K); Western slopes of Mount Kenia, ca. 3000 m, 28/IX-07/X/1909, *E.A. Mearns 1698* (K); Nyeri District, Aberdare Mountains, Kiandongoro, 3020 m, 24/X/1971, *R.B. Faden & A.J. Faden 71/886* (FI-PS-on 2 sheets, K-on 2 sheets); Meru District, Volcanic cone Kirui, on the slopes of Ithanguni, ca. 2530 m, 28/II/1970, *R.B. Faden & A. Evans 70/116* (FI-PS, K-on 2 sheets); Narok District, Masailand, ca. 7100 ft, 11/VII/1961, *Glover et al. 2048* (FI-PS, K). **Tanzania:** Kilimanjaro, Umbwe route, 2800 m, 16/I/1997, *A. Hemp 1432* (K-on 2 sheets); id., above Nrwaa, 2300 m, 03/III/1997, *A. Hemp 1608* (K-on 2 sheets); Tanganjika, Kilimandscharo, 2900 et 2950 m, 07/III/1934, *H.J. Schlieben 4897* (B-5 sheets); S-Uluguru, Mts., E slope of Lunkwangule plateau, 2250-2350 m, 13/XI/1972, *A.T. Pócs & J. Kornas 6828/J* (FI-PS). **Rwanda:** Kareba, versant sud du Karisimbi, 3050 m, 10/X/1974, *P. Auquier 4509* (FI-PS).

DESCRIPTION: *Plants* terrestrial. *Rhizome* long-creeping, branched, bearing several fronds, 1.5-4 mm diam., with catenate-acicular hairs, lax, reddish, 1-2(-2.5) mm long, 15-20 celled. *Fronds* erect or arched, with uninterrupted and determinate growth, (45-)85-150 cm long; *stipe* 40-60 cm long, 2-4 mm diam., atropurpureous in all its length, abaxially villose, adaxially pilose, with catenate-acicular hairs, en-

Fig. 1 – Holotype of *Hypolepis rugosula* subsp. *pichi-sermolliana* (FI-PS, part I).

R. PICHI-SERMOLLI
N. 19686

HOLOTYPUS (2/2)
Hypolepis rugosula ssp. *pichi-sermolliana*
Schwartsb. & J. Prado, Webbia 66(2). 2011.

det.: P.B. Schwartsburd & J. Prado
V/2011

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*

Hypolepis rugosula var. africana C. Chr. ue C. Chr. (2/2)
Determinavit (conf.) P. B. Schwartsburd.
IX/2010.

HERBARIUM R. PICHI SERMOLLI

N.° Hypolepis rugosula (Labill.) J. Smith var. africana C. Chr.

Congo Belga: Dorsale ad ovest del Lago Kivu. Montagne di Shamulamba: crinale a sud del rifugio del Groupe de Montagne du Kivu. 2600 m. circa.
23 Ott. 1953

leg. R.E.G. Pichi-Sermolli, n. ~~41~~
det. Pi. Se.
29.VI.1967
4441

Fig. 2 – Holotype of *Hypolepis rugosula* subsp. *pichi-sermolliana* (FI-PS, part II).

tirely reddish or yellowish, (0.5-)1-2(-2.5) mm long, 5-10(-20) celled, with catenate-glandular hairs, entirely reddish or yellowish, (0.5-)1-2(-2.5) mm long, 5-10(-15) celled, without spine-like projections; *lamina* ovate or lanceolate, ranging from pinnate-bipinnatisect-pinnatifid, bipinnate-pinnatisect-pinnatifid to bipinnate-bipinnatisect-pinnatifid at base, less decompound in the middle region, pinnatisect at the apex, 45-90 cm long, 40-60 cm wide, with the basal par of pinnae more distant than the ones above; *rachis* straight, atropurpureous in all its length, or atropurpureous at base and middle region and paleaceous at apex, abaxially villose, adaxially pilose, the hairs similar to those of the stipe; *proximal pinnae* 20-30 cm long, 10-20 cm wide, equilateral or slightly inequilateral, with the basiscopic pinnae slightly longer, equally dissected; *pinna rachis* abaxially villose or pilose, adaxially lanose, the hairs similar to those of the stipe and rachis; *costae* abaxially and adaxially villose to pilose, the majority of hairs catenate-acicular; *costules and veins* abaxially and adaxially with only catenate-acicular hairs, slightly shorter than of the main axis, ca. 0.5-1 mm long, ca. (3-)5-10 celled; *laminar tissue* abaxially glabrous, adaxially with scattered catenate-acicular hairs; *lamina margins* glabrous; *sori* submarginal, slightly protected; *pseudo-indusia* absent, the lamina margin revolute and partly protecting the sori, but never differentiated into a membranaceous hyaline flap.

ETYMOLOGY: the sub specific epithet honors the former Italian botanist Rodolfo E.G. Pichi Sermolli, who made many contributions to the pteridology and studied ferns from this geographical area, collected some specimens of this *taxon* (which we consider as the holotype, isotypes and some paratypes), was a personal owner of one of the most comprehensive libraries about ferns (now at FI), and made many contributions to nomenclatural botany in general, as well. His former herbarium is also held at Florence, separated from the general collection, under the acronym FI-PS.

DISTRIBUTION: Fernando Po Island (Equatorial Guinea), from ca. 600-800 to 1250-1680 m (*fide* Adams 1975), but also recorded at 7000 ft (ca. 2130 m - *Maun 381* [K]); and continental Central Africa (Belgian Congo (Democratic Republic of the Congo), Ethiopia, Uganda, Kenya, Tanzania, and Rwanda), from ca. 1800 to 3450 m.

This *taxon* has been usually named either *Hypolepis rugosula* var. *africana* C. Chr. ex C. Chr. (*e.g.* Alston 1959, Adams *l.c.,* Pichi Sermolli *l.c.*), or *Hypolepis goetzei* Hieron. ex Reimers (e.g*.,* Reimers, 1934; Verdcourt, 2000). In our *sensu,* the var. *africana,* which we also consider as a subspecies of *H. rugosula* (see new status below), is a *taxon* endemic to Madagascar and the Réunion Island (Ile Bourbon), and the plants from continental Central Africa and Fernando Po Island are better classified as our new subsp. *pichi-sermolliana. Hypolepis goetzei* is a new name and new status for *H. rugosula* var. *africana.*

As we will demonstrate in our forthcoming paper, the subspecies differ little among themselves. Besides the geographical distribution, subsp. *pichi-sermolliana* differs from subsp. *africana* mainly by the petiole densely pilose, with the hairs persistent (*vs.* petiole glabrescent, with the hairs caducous), by usually having all the axis with the majority of the hairs entirely reddish or yellowish (*vs.* the majority hyaline with base and junctions reddish; only a few entirely reddish or yellowish intermixed), and by the abaxial side of the costules and veins with catenate-acicular hairs, 0.5-1 mm long, 5-10 celled (*vs.* catenate-glandular hairs, 0.3-0.6 mm long, 3-6 celled).

Subspecies *pichi-sermolliana* differs from subsp. *rugosula* in having the sori protected by the lamina margin, although this never differentiated (*vs.* unprotected), and by the lamina margins usually glabrous (*vs.* lamina margins with catenate-acicular hairs on the soral region).

Hypolepis rugosula (Labill.) J. Sm. subsp. **africana** (C. Chr. ex C. Chr.) Schwartsb. & J. Prado **stat. nov.** pro *Hypolepis rugosula* var. *africana* C. Chr. ex C. Chr., Dansk Bot. Ark. 7 (Pteridoph. Madagascar): 121. Jun 1932.

Hypolepis rugosula var. *africana* C. Chr. *in* H. Perrier, Cat. pl. Madag., Pterid.: 49. 1931 [Feb 1932], *nom. nud.*

Hypolepis goetzei Hieron. ex Reimers *in* J. Mildbraed, Notizbl. Bot. Gart. Berlin-Dahlem 112(12): 189. 1934 (as "*Goetzei*"), *nom. nov. et stat. nov* pro *Hypolepis rugosula* var. *africana* C. Chr. ex C. Chr.

LECTOTYPE (designated here): Madagascar, Süd-Betsiléo, Wald von Ankafina, III/1881, *J.M. Hildebrandt 4139* (B! [20 0075279]; duplicates: B! [20

0075278], B! [20 0075283], BM!, LE!-2 sheets, P-*n.v.*-2 sheets, G!-2 collections [one of them on 2 sheets], W!).

Further material examined (remaining syntypes): Madagascar, Tanala, *L. Kitching s.n.* (**K!**); Madagascar, Pic d'Ivohibe, *Humbert 3324* (**BM!**, C-*n.v.,* P-*n.v.*-3 sheets).

Distribution: Endemic to Madagascar and Réunion Island (Ile Bourbon).

We choose as lectotype the collection of *Hildebrandt 4139* because, apparently, it is the collection with the most duplicates in different herbaria - thus more "duplicates of the lectotype" are available. We choose the material at B because it is where the main set of plants from Madagascar, collected by Hildebrandt, is located; B [20 0075279] is the "best specimen", in our opinion. The material at BM is *not* from C. Christensen's former herbarium.

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Summary: In this paper we present new type data for *Polypodium rugosulum* (= *Hypolepis rugosula*) and complementary information about the possible herbaria location of Labillardière's collections. We also describe a new subspecies (*H. rugosula* subsp. **pichi-sermolliana**) and present a new status for a variety along with its lectotypification (*H. rugosula* subsp. **africana**).

Anexo IV

TWO NEW SPECIES OF *HYPOLEPIS* (DENNSTAEDTIACEAE: PTERIDOPHYTA) FROM MOUNT RORAIMA REGION (N SOUTH AMERICA) AND A REVISED KEY FOR THE GUIANAN SPECIES

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Keywords: Dennstaedtiaceae, French Guiana, Guyana, *Hypolepis,* Pteridophyta, Roraima, South America, Suriname.

ABSTRACT

Two new endemic species of *Hypolepis* are described from the Mount Roraima region, in northern South America: *Hypolepis trinationalis* and *Hypolepis krameri*. Also, the list of species occurring in the three Guianas is updated, with a revised key.

INTRODUCTION

The Mount Roraima region, culminating at 2,810 m elev. at the junction of Brazil, Guyana and Venezuela, is a special geographical area for the genus *Hypolepis* Bernh., concerning the endemism of its species. In this region, there are three, and possibly four (or more) narrowly endemic species - a pattern that is not very common for the genus, in such a relatively small area. Unfortunately, the area has not yet been very well explored, and thus we have little information and only a few collections available of these species.

Cremers & Kramer (1991) made the last taxonomic treatment of the genus in the Guianas. They identified some potentially undescribed endemic species (named as *Hypolepis* sp.1, *Hypolepis* sp.2, and *Hypolepis* sp.3), two of which we describe in this work. We consider *Hypolepis* sp.1 and *Hypolepis* sp.2 (*sensu* Cremers & Kramer *l.c.*) a single taxon, since there are only a few specimens available, and their differences are more related to frond size and degree of dissection of the lamina, which can be understood as individual and/or ecological differences due to age, exposition to shade/sunlight, elevation, humidity, kind of soil, substrate, or other environmental factors. Further collections and more study are needed.

Also, the relationships between *Hypolepis guianensis* Klotzsch and the two new species described here are not clear. *Hypolepis guianensis* seems somewhat intermediate between the other two, especially on the indument (see Table below). It is tempting to speculate that *H. guianensis* may have had a hybrid origin between the two new species, or, the three may be considered a single species, with indument differences related to ecological factors.

In this work we also give re-identifications and a revised key to the *Hypolepis* species occurring in the Guianas.

THE NEW TAXA

Hypolepis trinationalis Schwartsb., **sp. nov.** Type: [GUYANA?], Mt. Roraima, ledge of mountain, crevices between rock, 22/XI/1973, 7,600 ft, *R. Persaud 182* (holotype: K; isotype: BRG). Figs. 1 and 2A.

Differt a Hypolepide guianensi *contexto laminae supra et lamina margine pilis vestitis (vs. glabris).*

Plants epipetric (or also terrestrial?). *Rhizomes* long-creeping, ca. 4 mm diam., with catenate-acicular hairs, yellowish brown, 1–2 mm long, 15–20-celled. *Fronds* erect (to arching?), with continuous growth, 40–45(–200 estimate) cm long; *petioles* 13–20(–80 estimate) cm long, 2–2.5(–7.5) mm diam., dark brown at base, lighter brown at middle and apex, abaxially and adaxially glabrescent, with conspicuous persistent hair bases, non-aculeate; *laminae* ovate to deltate, proximally 2(–3)-pinnate-pinnatisect with penultimate segments pinnatifid, in the middle 1(–2?)-pinnate-bipinnatisect with penultimate segments pinnatifid, distally pinnatisect, 30(–120 estimate) cm long, 18–25(–120) cm wide; *rachises* straight, light brown at base and middle, lighter brown to stramineous at apex, abaxially sparsely pilose, adaxially pilose (especially in the groove) with catenate-acicular hairs, these hyaline with the base and cross-walls reddish, 0.2–0.5(–1) mm long, 4–7(–15)-celled, also with catenate-glandular hairs, these hyaline with the base and cross-walls reddish, 0.2–0.5 mm long, 4–7-celled, non-aculeate; *proximal pinnae* 7–15(–60) cm long, 3–7(–35) cm wide, equilateral; *costae* abaxially sparsely pilose, adaxially pilose, the hairs similar to those of rachises; *costules* abaxially and adaxially sparsely pilose, the hairs similar to the rachises and costae, but the catenate-glandular ones much more conspicuous abaxially and the catenate-acicular much more conspicuous adaxially; *veins* with the same pattern of indument as the costules; *laminar tissue between veins* abaxially with only catenate-glandular hairs, adaxially with only catenate-acicular hairs; *lamina margins* with both catenate-acicular and catenate-glandular hairs; *sori* marginal; *pseudo-indusia* conspicuous, proximally green, distally hyaline, membranaceous in the hyaline part, ciliate, the cilia catenate-acicular, 0.2–0.4 mm long, 4–7(–10)-celled.

Distribution: Known only from the Mount Roraima region.

Etymology: The species name is an allusion to the distribution of the species, which grows in the intersection of Brazil, Venezuela, and Guyana, thus having “three nationalities”.

Additional material examined: GUYANA AND NORTHERN BRAZIL. Mount Roraima, Rondon camp, “ledge”, ca. 6,900 ft, 01/XII/1927, *G.H.H. Tate 461* (K, NY). GUYANA [or VENEZUELAN RORAIMA?]. Roraima, base of cliff, XII/1884, *E.F. im Thurn 303* (BRG, K).

We have studied only three collections of this new species. Two of them (the type and *Tate 461*) are composed by small complete fronds, and the third one (*im Thurn 303*) by only one big pinna (probably the proximal one). The small specimens were cited by Cremers & Kramer (*l.c.*) as *Hypolepis* sp.2, while the big pinna was cited as *Hypolepis* sp.1. We here consider all of them as only one new species. The type selected here corresponds to *Hypolepis* sp.2, in a strict sense, and also the description measures the range between such small complete fronds. The measurements of *im Thurn 303* (K) are inside brackets (except for the hairs measurements that applies to all three materials, and the abnormal numbers are inside brackets) and, since the material is incomplete, some estimates were made.

Hypolepis trinationalis can be easily recognized by the lamina copiously furnished with catenate-acicular and catenate-glandular hairs, present on all axis, veins, laminar tissue between veins and lamina margins. It differs from *H. guianensis* by the laminar tissue between veins adaxially with catenate-acicular hairs (*vs.* glabrous), the lamina margins with catenate-acicular and catenate-glandular hairs (*vs.* glabrous), and the pseudo-indusia with catenate-acicular cilia (*vs.* catenate-glandular cilia).

Another similar species is *Hypolepis viscosa* H. Karst., which also occurs at high elevations (1000-2000 m), has similar blade indument (catenate-acicular and catenate-glandular hairs), lacks aculei on the petioles and rachises and has ciliate pseudo-indusia. *Hypolepis trinationalis* differs from *H. viscosa* by the rachises and costae having much shorter catenate-acicular hairs 0.2–0.5(–1) mm long, 4–7(–15)-celled (*vs.* 1–1.2 mm long, 13–17-celled), costules, veins and laminar margins having both catenate-acicular and catenate-glandular hairs (*vs.* only catenate-glandular hairs), and laminar tissue between veins adaxially having catenate-acicular hairs (*vs.* catenate-glandular hairs).

Hypolepis krameri Schwartsb., Boudrie & Cremers, **sp. nov.** Type: GUYANA [or VENEZUELAN RORAIMA?], Mt. Roraima, base of cliff, X/1884-I/1885, *E.F. im Thurn 161, Mt. Roraima Exped.* (holotype: BM [labeled as "set B"]; isotype: K [labeled as "set A"]). Fig. 2B.

Differt a Hypolepide guianensi *rhachide rugosa (vs. laevi), et pseudo-indusio eglanduloso (vs. glanduloso).*

Plants terrestrial? *Rhizomes* not seen. *Entire fronds* not seen; *petioles* not seen; *laminae* proximally 2-pinnate-pinnatisect with penultimate segments pinnatifid, in the middle pinnate-bipinnatisect with penultimate segments pinnatifid, distally pinnatisect, 65–70 cm long, 30–46 cm wide; *rachises* straight, light golden brown at base and middle, stramineous at apex, abaxially glabrescent or with very scattered hairs, adaxially sparsely pilose with catenate-acicular hairs, these hyaline with the base and cross-walls reddish, 0.2–0.5 mm long, 3–7-celled, also with catenate-glandular hairs, these hyaline with the base and cross-walls reddish, 0.2–0.5 mm long, 3–7-celled, with conspicuous persistent hair bases, sparsely tuberculate, the projections rounded with the apex obtuse, 2–3 mm long, the same color as the rachises; *basal pinnae* 18–23 cm long, 6.5–10 cm wide, slightly inaequilateral, the basiscopic pinnules slightly bigger, equally dissected; *costae* abaxially glabrescent or with very scattered hairs, adaxially sparsely pilose, the hairs similar to those of the rachises; *costules* abaxially with sparse hairs, similar to those of the rachises, adaxially with sparse trichomidia, 0.2–0.3 mm long, 3–6-celled; *veins* abaxially and adaxially glabrous or with very scattered trichomidia; *laminar tissue between veins* abaxially glabrous, adaxially subglabrous, with very scattered trichomidia; *laminar margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, entirely hyaline, membranaceous, ciliate, the cilia catenate-acicular, 0.2–0.3 mm long, 4–6-celled.

Distribution: Known only from the type collection, probably endemic to the Mount Roraima region.

Etymology: This species is dedicated to Dr. Prof. K.U. Kramer (…), former professor at the Zurich University (Switzerland), who passed away too early. He had helped us with the determination of large numbers of pteridophytes from French Guiana, and was the co-author of the first fascicles of the 'Flora of the Guianas'.

It is impossible to determinate whether the material seen corresponds to the entire lamina, the apex of the lamina, or only a pinna (if so, probably the proximal one). We have interpreted it as the "entire lamina", and this supposition is reflected in the

Figure 1. *Hypolepis trinationalis:* habit (*Tate 461* [NY]). Drawing by G. Cremers, reproduced from ‘Flora of the Guianas’ (Koeltz Scientific Books).

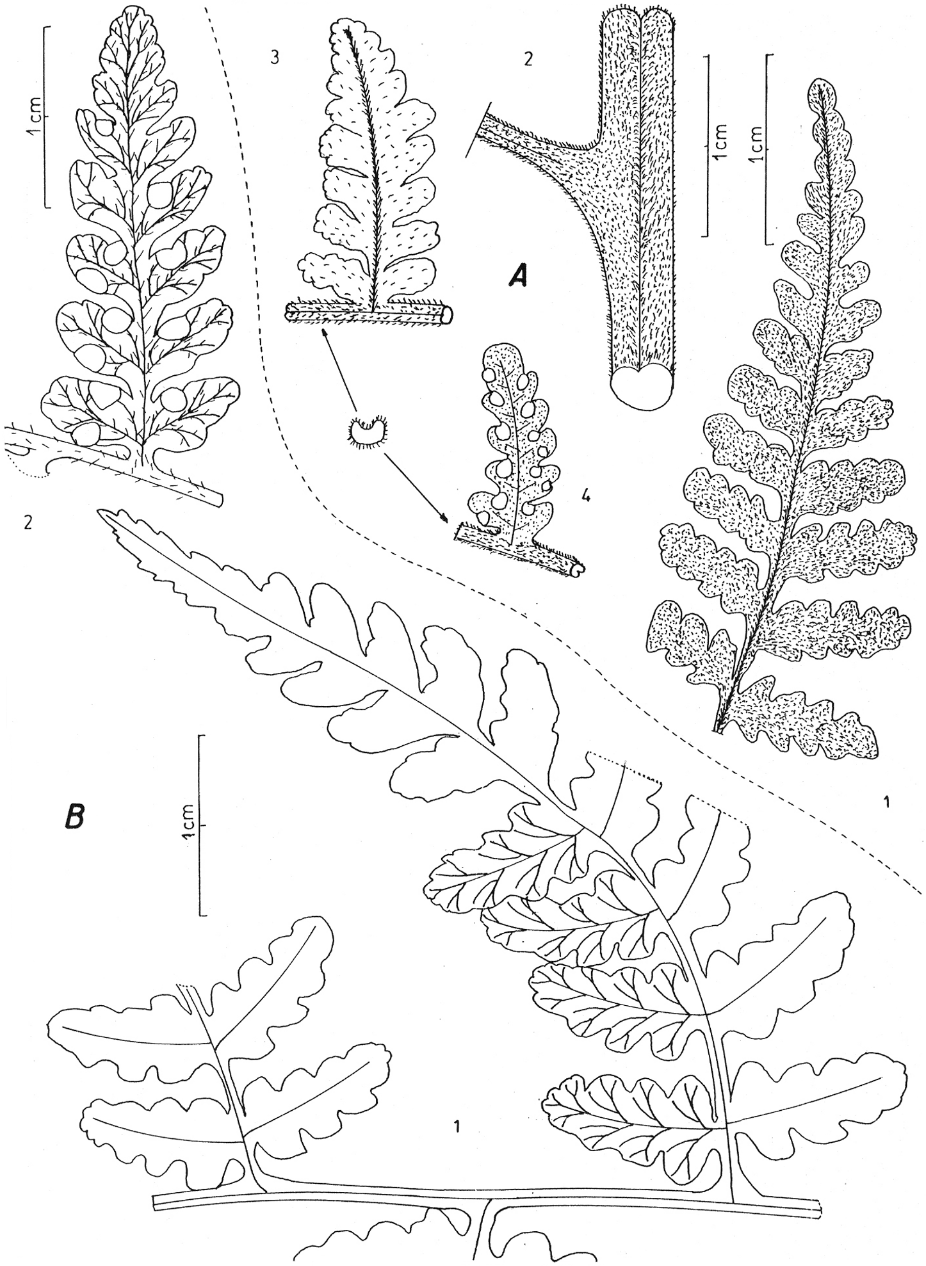

Figure 2A. *Hypolepis trinationalis:* 1. apex of a pinna, 2. rachis, 3. adaxial surface of a penultimate segment, 4. abaxial surface of a penultimate segment and pseudo-indusia (*im Thurn 303* [BRG]).

Figure 2B. *Hypolepis krameri:* 1. pinnule, 2. abaxial surface of a penultimate segment (*im Thurn 161* [BM]). Drawings by G. Cremers, reproduced from 'Flora of the Guianas' (Koeltz Scientific Books).

description above.

Hypolepis krameri can be easily recognized by the obtuse projections present on the petioles (probably) and rachises, by the trichomidia present on costules and laminar tissue between veins adaxially, by the glabrous laminar margins, and by the ciliate pseudo-indusia. This new species was noted as *Hypolepis* sp.3 in Cremers & Kramer (*l.c.*).

The most similar species are *Hypolepis guianensis* and *H. trinationalis,* which can be differentiated by the characteristics shown in the key and in the table below. In addition, *H. krameri* bears trichomidia on the adaxial side of the costules, both sides of the veins and on the adaxial side of the laminar tissue between veins, while Guianan congeners lack such hairs.

Another similar species is *Hypolepis fimbriata* Maxon ex Proctor, apparently endemic to Jamaica (Proctor 1985). However, in this species, the catenate-acicular hairs are up to 2(–3) mm long, while in *H. krameri*, they are 0.2–0.5 mm long.

RE-IDENTIFICATIONS

Apart from considering *Hypolepis* sp. 1 and *Hypolepis* sp. 2 (*sensu* Cremers & Kramer *l.c.*) as a single species, there are two additional re-identifications of material cited by Cremers & Kramer (*l.c.*):

1. What was named as *Hypolepis parallelogramma* (Kunze) C. Presl, represents *H. repens* (L.) C. Presl. These specimens are a bit different from most specimens of *H. repens,* especially regarding the apex of the ultimate segments (oblong, truncate), and the veins more raised with more and longer hairs abaxially. Further studies are needed to decide whether such specimens deserve taxonomic recognition or not. *Hypolepis parallelogramma s.s.* occurs only in the Andean region of Venezuela, Ecuador, Peru and Bolivia.
2. Some specimens named as *Hypolepis hostilis* (Kunze) C. Presl, are better referred to *H. rigescens* (Kunze ex Mart.) T. Moore. Although both species are very similar, their morphological differences are consistent throughout their range, and linked to elevation differences (Schwartsburd & Prado *in prep.*): *H. hostilis* occurs at low elevations of Amazonia, in Bolivia, Peru, Ecuador, Colombia, northern Brazil, probably Venezuela (no material seen), French Guiana, probably Suriname, and Guyana, and also probably in Costa Rica and Panama (*apud* Moran 1995); *H. rigescens* occurs at middle to high elevations, surrounding Amazonia, in Bolivia, probably Peru, Ecuador, Colombia, Costa Rica, probably Panama, Venezuela, Guyana and Suriname, with a disjunct population in northeastern Brazil.

Hypolepis rigescens differs from *H. hostilis* by the laminar tissue between veins abaxially with short catenate-glandular hairs (*vs.* glabrous), bases of petioles generally light to dark brown, rarely black (*vs.* always black), rachises generally sparsely pilose on both sides (*vs.* hairs restricted to the adaxial groove), and margins of the pseudo-indusia dentate and rarely with one or two cilia (*vs.* pseudo-indusia crenate, never ciliate).

Vouchers:

Hypolepis hostilis: FRENCH GUIANA. Piste de Bélizon vers Montagne Tortue (bassin de la Comté), 480 m, 17/XI/1994, *F. Billiet et al.* 6348 (BR-3 sheets, K); Montagnes de la Trinité, Inselberg Nord-Ouest, 200 m, 18/I/1984, *J.-J. de Granville et al. 6138* (CAY, U, Z); Bassin du Haut Inipi, crique Emerillon, au Nord du Massif des Emerillons, 140

Table 1. Table comparing the indument of *Hypolepis krameri, H. guianensis* and *H. trinationalis:*

Lamina region/*taxa*	***H. krameri***	***H. guianensis***	***H. trinationalis***
Projections on rachises	present, obtuse at apex	absent	absent
Costules abaxially	with catenate-acicular and catenate-glandular hairs	with catenate-glandular hairs	with catenate-acicular and catenate-glandular (more conspicuous) hairs
Costules adaxially	with trichomidia	with catenate-acicular and catenate-glandular hairs	with catenate-acicular (more conspicuous) and catenate-glandular hairs
Laminar tissue between veins abaxially	glabrous	with catenate-glandular hairs	with catenate-glandular hairs
Laminar tissue between veins adaxially	practically glabrous, but with a few, very scattered trichomidia	glabrous	with catenate-acicular hairs
Lamina margins	glabrous	glabrous	with catenate-acicular and catenate-glandular hairs
Margin of the pseudo-indusia	with catenate-acicular cilia	with catenate-glandular cilia	with catenate-acicular cilia

m, 24/IX/1980, *J.-J. de Granville 3958* (CAY-on 2 sheets, P, Z). GUYANA. Potaro River, Sheenabowa, IX-X/1881, *G.S. Jenman 1401* (K); Potaro-Siparuni, Pakaraima Mountains, Ireng River, 685 m, 27/X/1994, *P. Mutchnick et al.* 255 (CAY, US).

Hypolepis rigescens: [GUYANA?]. Roraima, 1863-1864, *C. Appun 1349* (K). SURINAME. Nassau Mountains, Marowijne River, 400-550 m, 07/I/1955, *B. Maguire et al. 39196 A* (HB, K-on 2 sheets, NY, UC, US).

KEY TO SPECIES

1. Petioles and rachises aculeate 2

2. Aculei dark and curved; pinna insertions with a pair of accessory pinnules; costae adaxially with wings decurrent onto the subtending pinna-rachis ....***H. nigrescens*** Hook.

2. Aculei of the same color as the axis and straight; pinna insertions without accessory pinnules; costae without decurrent wings...3

3. Fronds with only catenate-acicular hairs ....***H. repens*** (L.) C. Presl

3. Fronds with both catenate-acicular and catenate-glandular hairs...............................4

4. Laminar tissue between veins abaxially glabrous ....***H. hostilis*** (Kunze) C. Presl

4. Laminar tissue between veins abaxially with short catenate-glandular hairs ....***H. rigescens*** (Kunze ex Mart.) T. Moore

1. Petioles and rachises non-aculeate, with or without scattered obtuse projections.....5

5. Petioles (probably) and rachises with scattered obtuse projections; costules adaxially with trichomidia; laminar tissue between veins abaxially glabrous ....***H. krameri*** Schwartsb., Boudrie & Cremers

5. Petioles and rachises without projections; costules adaxially with catenate-acicular and catenate-glandular hairs; laminar tissue between veins abaxially with catenate-glandular hairs 6

6. Laminar tissue between veins adaxially with catenate-acicular hairs; laminar margins with catenate-acicular hairs; margins of pseudo-indusia with catenate-acicular cilia...... ....***H. trinationalis*** Schwartsb.

6. Laminar tissue between veins adaxially glabrous; laminar margins glabrous; margins of pseudo-indusia with catenate-glandular cilia ....***H. guianensis*** Klotzsch

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Anexo V

Three new taxa of *Hypolepis* (Dennstaedtiaceae) from the Brazilian Atlantic Forest, and a key to the Brazilian taxa

Pedro Bond Schwartsburd[1]

Sumary. Three new taxa of *Hypolepis* from the Brazilian Atlantic Forest s.l. (S/SE/NE Brazil) are here described, illustrated, and discussed: *H. acantha* Schwartsb. from the coastal and low-land forests, and *H. rugosula* subsp. *pradoana* Schwartsb. and *H. stolonifera* var. *nebularis* Schwartsb. from the high-elevation forests and fields. In addition, a key to the Brazilian taxa is presented.

Key Words. Atlantic Forest, Brazil, Campos de Altitude, Dennstaedtiaceae, *Hypolepis*, Matas Nebulares.

Introduction

Hypolepis Bernh. is a sub-cosmopolitan genus with ca. 80 taxa (species, subspecies and varieties), distributed from temperate regions of the Southern hemisphere up to tropical regions of the Northern hemisphere. It is especially diverse in the Americas and Australasia, but there are only three or four taxa in the whole African Continent (e.g. Tryon & Tryon 1982, Pichi-Sermolli 1983, Brownsey & Chinnock 1984, 1987, Biswas 1985, Proctor 1985, Brownsey 1987, Tryon & Stolze 1989, Kramer 1990, Moran 1995, Verdcourt 2000, Mickel & Smith 2004, Roux 2009, Schwartsburd 2010, Schwartsburd & Prado 2011).

Belonging to the genus, there are narrowly restricted species (e.g. *Hypolepis guianensis* Klotzsch, known only from Mount Roraima), as well as wide spread species (e.g. *H. repens* (L.) C. Presl, occurring almost in the whole Neotropical region). One species in particular, *H. rugosula* (Labill.) J. Sm., is thought to be sub-cosmopolitan by some authors

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(e.g. Kaulfuss 1824, Brackenridge 1854, Moore 1857, Mettenius 1865, Brade 1956, Tardieu-Blot 1958, Tryon & Tryon 1982, Cronk 1989); but, in a counterpoint view, other authors rather consider it as a species-complex and split it into several restricted species (e.g. Kunze 1850, Fée 1850 – 1852, Hicken 1906, Reimers 1934, Brownsey & Chinnock 1984, 1987, Verdcourt 2000, Autrey *et al.* 2008, Roux 2009). In a balanced way, Christensen & Skottsberg (1920) and Christensen (1931, 1932, 1937, 1940) accepted the sub-cosmopolitan pattern for *H. rugosula*, but split most of the geographical macro-populations into varieties. Christensen's concept was sequent followed by Alston (1959), Pizarro (1959), Schelpe (1970), Kornas´ (1979), and Pichi Sermolli (1983). Recently, Schwartsburd & Prado (2011) adapted Christensen's concept, changing the 'varietal level' into 'subspecies level', since the 'entities' are virtually isolated from each other.

There is no comprehensive taxonomic treatment of the *Hypolepis* taxa occurring in Brazil. The most complete works are those by Fée (1869, 1873 – 1872) and Baker (1870), but they are out of date both in generic boundaries and species number. Schwartsburd (2010) listed a provisory account, taking in consideration valid and (somehow) known names, and species number. But, after analysing a great number of exsiccates from European, New Zealand and South American Herbaria (see acknowledgements), and performing field expeditions, I concluded that some names were misapplied and there are three new taxa to be described, including a new subspecies of *Hypolepis rugosula*. They are here described, illustrated, and discussed.

Adding these novelties, the number of known taxa occurring in Brazil is eight (ca. 10% of the genus richness): two Neotropical wide spread species occurring in the Brazilian Atlantic Forest s.l., *Hypolepis repens* and *H. rigescens* (Kunze ex Mart.) T. Moore; three species, one subspecies and one variety endemic to the Brazilian Atlantic Forest s.l., *H. acantha* Schwartsb., *H. mitis* Kunze ex Kuhn, *H. rugosula* subsp. *pradoana* Schwartsb., *H.*

stolonifera Fée var. *stolonifera,* and *H. stolonifera* var. *nebularis* Schwartsb.; and one (almost) Neotropical wide spread species occurring in the Amazon region, *H. hostilis* (Kunze) C. Presl.

This work is part of the taxonomic revision of the South-American species of *Hypolepis,* in preparation by Schwartsburd & Prado, which is dealing with ca. 30 taxa.

All cited specimens have been analysed; otherwise they are indicated ("n.v."). The estimated coordinates were obtained through search in Google™ Earth. The maps were drawn using Diva-Gis, version 7.4.0.1, and the layers were obtained from its website.

Hypolepis acantha *Schwartsb.* **sp. nov.** Differt a omnis specierum autrobrasilianarum contextus laminae infra hirsutis. Typi: Brasil, Paraná, Antonina, Reserva Rio Cachoeira (SPVS), Floresta Ombrófila Densa, [25º18'S, 48º41'W], 100 m, 26 June 2007, *P.B. Schwartsburd & F.B. Matos* 1344 (holotypus SP-on 4 sheets; isotypi B-on 3 sheets, FI-on 2 sheets, G-on 3 sheets, K-on 3 sheets, NY-on 4 sheets, P-on 3 sheets, PRC-on 3 sheets, RB-on 3 sheets, UPCB-on 3 sheets).

Plants terrestrial. *Rhizomes* long-creeping, branched, bearing several fronds, 3.5 – 7 mm diam., the *hairs* catenate-acicular, yellowish-brown, 1 – 2 mm long, 15 – 20-celled. *Fronds* scandent, with continuous growth, (1.7 –) 3 – 6.5 m long; *petioles* (0.8 –) 1.5 – 4 m long, (5 –) 6.5 – 10 mm diam., proximally dark brown, lighter above, with sparse trichomidia, aculeate, the *trichomidia* appressed, ca. 0.2 mm long, 4-celled, the *aculei* conspicuous, straight , (0.5 –) 1 – 2.5 mm long, commonly with a hair at the tip; *laminae* rhombic, proximally tripinnate-pinnatisect with the segments pinnatifid, medially bipinnate-pinnatisect with the segments pinnatifid, distally pinnatisect, (1.1 –) 1.7 – 2.5 x (1.1 –) 1.4 – 2.1 m; *rachises* straight, light brown to brown in all its length, the indument similar to the petioles, aculeate; *proximal pinnae* (55 –) 70 – 105 x (36 –) 40 – 60 cm, inequilateral, the basiscopic *pinnules* bigger and more dissected; *costae* abaxially and adaxially pilose, the *hairs* catenate-acicular, hyaline with the base and cross-walls reddish, 0.3 – 0.6 (– 0.8) mm long, 6 – 8 (– 12)-celled; *costules* abaxially pilose, adaxially sparsely pilose, the *hairs* similar to those from the costae but smaller, 0.2 – 0.4 mm long, 3 – 6-celled; *veins* abaxially pilose, the *hairs* similar to those from the costules, adaxially glabrous; *laminar tissue between the veins* abaxially hirsute, the *hairs* acicular, hyaline, erect, 0.1 – 0.15 mm long, 1 – 3-celled, adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, proximally greenish, distally hyaline, membranaceous in the hyaline portion, the *margins* wavy, rarely with one or two cilia, the *cilia* 0.15 – 0.2 mm long, 2 – 3-celled; *spores* not seen. Figs. 1.A – C, 3.A – B.

DISTRIBUTION. Brazil: Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, and Rio Grande do Sul; also expected in Santa Catarina (no records found) – Maps 1.A and B.

ADDITIONAL SPECIMENS EXAMINED. BRAZIL. Bahia: Ilhéos [Ilhéus], [14°47'S, 39°02'W], s.d., *Martius, Herb. Fl. Bras.* 382 (BR-2 sheets); id., [14°47'S, 39°02'W], 11 Dec. 1836(?), *Luschnath* s.n. (BR); Mun unknown, 1833 – 1836, *Blanchet* 2460 (B, G-12 sheets, K, LE); Espírito Santo: Linhares, Reserva Florestal de Linhares, Estrada do Louro, 19º05'58"S, 40º02'55"W, 50 m [30 – 60 m], 9 Feb. 2007, *Almeida et al.* 687 (BHCB); Paraná: Antonina, Reserva Natural do Rio Cachoeira, Trilha dos Pinheiros, 25º18'S, 48º41'W, 50 m [30 m], 30 April 2006, *Matos & Weiss* 1123 (SP, UPCB); Rio de Janeiro: Parati [Paraty], Condomínio Laranjeiras, 23º19'44"S, 44◦40'53"W, 31 Jan. 1996, *Salino* 2478 (UEC-on 2 sheets); Rio de Janeiro, Gavia [Gávea], [23°00'S, 43°17'W], s.d., *Glaziou* 5328 (B-2 sheets, K-3 sheets [one p.p.]); Sumaré, [21°45'S, 41°20'W]. Nov. 1928, *Brade* 8596 (HB); Mun unknown, s.d., *Langsdorff* s.n. (L); id., 1867(?), *Glaziou* 2154 (B, K); Rio Grande do Sul: Pelotas, [31°47’S, 52°25’W], 11 March 1956, *Schultz* 3648 (ICN); São Paulo: Bertioga, Praia de São Lourenço, Fazenda da Família Pinto, 23.27ºS, 43.00ºW [23.820216°S, 46.041931°W], 26 Feb. 2008, *Prado et al.* 1966 (SP, TUR-n.v.); Iguape, Pinduva, [24°42’S, 47°35’W], March 1924, *Brade* 8273 (HB-on 2 sheets); Ubatuba, P.E. Serra do Mar, Núcleo Picinguaba, [23º20’26”S, 44º50’13”W], 9 Nov. 1993, *Salino* 1844 (BHCB); ibid., 23º20’26”S, 44º50’13”W, 0 – 50 m [0 – 40 m], 4 May 2001, *Salino et al.* 6739 (BHCB); State unknown: Mun unknown, 1841, “*Duparquier*”(?) *s.n.* (BM-p.p. [labelled “A” by Schwartsburd]); id., s.d., *Burchell* 1914 (K); id., s.d., *Burchell* 1916 (K).

HABITAT. Endemic to the coastal lowlands of S/SE/NE Brazil, in the “Restinga” forest (“white-sand forest”) and low Atlantic forest s.s., from sea level up to 100 m elev. – Maps 1.A and B.

CONSERVATION STATUS. Near Threatened (NT) – It is known from less than ten localities, and the habitat (Restinga) has been continuously being destroyed. But apparently the total range of the species is superior than 20,000 km^2.

ETYMOLOGY. *Acanth_* (Greek, “thorny, spiny, aculeate”) + *a* (Latinized form for feminine adjective) – reference to the aculeate petioles and rachises.

NOTES. Among the aculeate taxa of *Hypolepis* from S/SE/NE Brazil, *H. acantha* is the unique species with the laminar tissue between the veins abaxially hirsute. Such hairs are conspicuous, acicular, short (0.1 – 0.15 mm long), and erect (Fig. 1.C). The other aculeate taxa are: *H. repens*, which has this region glabrous; *H. mitis*, which has this region sparsely strigose – the hairs are sparse, catenate-acicular, decumbent, and longer (0.2 – 0.3 mm long); and *H. rigescens*, which has sparse glandular hairs on this region.

Hypolepis acantha also bears much bigger fronds (up to 6.5 x 2.1 m; petioles up to 10 mm diam. – Fig. 1.A), than *H. repens* (fronds up to 3 x 1.4 m; petioles up to 10 mm diam.), *H.*

mitis (up to 3.5 x 1 m; up to 7 mm diam.), and *H. rigescens* (up to 1.2 x 0.55 m; up to 5 mm diam.).

Hypolepis acantha also differs from *H. mitis* by the petioles and rachises (Figs. 1.B and 3.B) copiously aculeate (vs. aculei very scattered) and light brown to brown (vs. greenish stramineous), the lamina chartaceous (vs. membranaceous), and veins abaxially yellowish green and raised (vs. black and immersed). Also, their distribution does not overlap: *H. mitis* seems to be restricted to the sub-mountain and mountain regions of the Atlantic Forest s.s., only in the states of Rio de Janeiro and São Paulo, while *H. acantha* is more spread, occurring in the coastal regions of the states of Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, probably Santa Catarina, and Rio Grande do Sul (Map 1.B).

Morphologically (especially regarding the hirsute laminar tissue), the species most similar to *Hypolepis acantha* is *H. stuebelii* Hieron., which occurs in Peru (according to Tryon & Stolze 1989 – no material seen), Ecuador, Colombia, Venezuela, Panama (according to Moran 1995), Costa Rica (according to Moran *loc. cit.*), Hispaniola, and Jamaica. Besides the geographic distribution, *H. acantha* differs from *H. stuebelli* by the absence of catenate-glandular hairs (vs. present throughout all axis), and by the margins of the pseudo-indusia mostly wavy, rarely with one or two cilia (vs. copiously ciliate).

Some paratypes of *Hypolepis acantha* had been previously identified as *Cheilanthes repens* (L.) Kaulf. by Martius (1837 – *Martius, Fl. Herb. Bras.* 382), as *Hypolepis repens* by Fée (1869, 1872 – 1873 – *Martius* 382, *Glaziou* 2154 *et* 5328), and as *H. repens* var. *repens* by Baker (1870 – *Martius* 382, *Burchell* 1914 *et* 1916, *Blanchet* 2460). But, as said above, *H. repens* is a very different species, although also occurring in the Brazilian Atlantic Forest s.l.

Hypolepis rugosula subsp. **pradoana** *Schwartsb.* **subsp. nov.** Differt a subspecie *rugosulaea* costulae infra et folia marginibus pilis glandulosis vestitae (vs. pilis eglandulosis vestitae). Typi: Brasil, Teresópolis, Parque Nacional da Serra dos Órgãos, Matas Nebulares e Campos de Altitude, Pedra do Sino, próximo ao Abrigo Quatro, no caminho para a caixa d'água, 22º27'42"S, 43º01'50"W, 2100 m [2120 m], 7 Jan. 2011, *P.B. Schwartsburd & J.B.S. Pereira* 2310 (holotypus SP-on 3 sheets; isotypi B, FI, G, K-on 3 sheets, LP, MBM, NY-on 2 sheets, P-on 2 sheets, PRC, RB-on 2 sheets, SI, SP, UC, UPCB, WELT).

Plants terrestrial or humiculous-epipetric. *Rhizomes* long-creeping, branched, bearing several fronds, (1.2 –) 2 – 4 mm diam., the *hairs* catenate-acicular, yellowish to reddish brown, 1 – 3 (– 4) mm long, 15 – 30-celled. *Fronds* erect or arched, with continuous growth, (15 –) 60 – 140 cm long; *petioles* (6 –) 20 – 50 cm long, (0.8 –) 1.5 – 4 mm diam., atropurpureous in all its length, abaxially and adaxially sparsely villose with three kinds of hairs, inermous, the *first kind of hair* catenate-acicular, hyaline, hyaline with the base and cross-walls reddish, or rarely entirely reddish, 0.3 – 0.7 mm long, 5 – 10-celled, the *second kind of hair* catenate-glandular, hyaline with the base and cross-walls reddish, or rarely entirely reddish, 0.3 – 0.7 mm long, 5 – 10-celled, the *third kind of hair* catenate-acicular, entirely yellowish brown, 1 – 2 (– 2.5) mm long, 10 – 15 (– 20)-celled, sparse and caducous, but leaving persistent bases; *laminae* lanceolate or ovate, proximally ranging from pinnate-pinnatisect with the segments pinnatifid, up to bipinnate-bipinnatisect with the segments pinnatifid, medially less decompound, distally pinnatisect, (10 –) 40 – 95 x (4 –) 20 – 50 (– 60) cm, with the two basal pair of *pinnae* much more distant among themselves than the ones above; *rachises* straight, atropurpureous in all its length, or proximally atropurpureous and stramineous above, inermous, the indument similar to the petioles, but the *hairs* more numerous, especially on the adaxial groove; *proximal pinnae* (2 –) 12 – 30 x (1.5 –) 4 – 12 cm, equilateral, the basicopic and acroscopic *pinnules* equal in size and equally dissected; *costae* abaxially sparsely villose, adaxially copiously villose, the *hairs* similar to those from the petioles and rachises, but the *third kind of hair* usually absent or very scattered; *costules* abaxially with only the *second kind of hair,* adaxially with both the *first* and *second kinds of hair,* these smaller, 0.2 – 0.5 mm long, 4 – 7-celled; *veins* with the same pattern of indument of the costules; *laminar tissue between the veins* abaxially glabrous, adaxially with both the *first* and *second kinds of hair,* these ca. 0.2 – 0.3 mm long, ca. 3 – 4-celled; *lamina margins* with the *first* and *second kinds of hair* sparsely throughout, and only the *first kind* on the soral region, these the same size of those from the laminar tissue between the veins; *sori* submarginal, unprotected or slightly protected; *pseudo-indusia* absent, sometimes the lamina margin slightly revolute and protecting the sori, but never differentiated into a membranaceous hyaline flap; *spores* not seen. Figs. 2. A – E, 3.C – D.

DISTRIBUTION. Brazil: Minas Gerais, Rio de Janeiro, Paraná, and Santa Catarina; also expected in São Paulo and Rio Grande do Sul (no records found) – Maps 1.A and C.

ADDITIONAL SPECIMENS EXAMINED. BRAZIL. Minas Gerais: Alto Caparaó, Parque Nacional do Caparaó, Pico da Bandeira, [20°26’S, 41°48’W], 2600 m, 9 July 2009, *Schwartsburd et al.* 2000 (SP); Passa Quatro, Itaguaré, [22°25’S, 44°53’W], 2000 m, 9 May 1948, *Brade & Araújo* 19100 (RB); Mun unknown, s.d., *de Moura* 59 (B); Paraná: Campina Grande do Sul, Parque Estadual do Pico do Paraná, 25°15’S, 48º50’W, 1500 – 1900 m [1500 – 1876 m], 9 July 2008, *Labiak et al.* 4778 (UPCB-on 2 sheets); Rio de Janeiro: Itatiaia, Serra do Itatiaia, [22°23’S, 44°40’W], 2000 m, June 1913, *Tamandaré & Brade* 839 (RB); ibid., [22°23’S, 44°40’W], 2000 m, 4 – 10 June 1913, *Tamandaré & Brade* 6501 (HB, RB); id., Pedra do Echo, [22°23’S, 44°40’W] 2400 m, March 1937, *Brade* 15540 (RB); id., Estrada km 10, [22º21’47”S, 44º43’39”W,], 21 Nov. 1948, *Brade* 18882 (RB-n.v., SP); id., Estrada Nova km 11, [22°22’S, 44°42’W], 2100 m, May 1950, *Brade* 20288 (RB-n.v., SP-2 sheets); id., Planalto of Itatiaia, Pedra do Altar, [22°22'29"S, 44°40'30"W], 2300 m, 3 Nov. 1965, *Tryon & Tryon* 6682 (HB); id., Parque Nacional do Itatiaia, Pedra Assentada, [22°24'S, 44°40'W], 2500 m, 7 Aug. 2006, *Condack* 513 (RB-n.v., SP); ibid., Estrada para o Planalto entre os kms 9 e 10, 22º21'47"S, 44º43'39"W, 2200 m, 18 July 2009, *Schwartsburd et al.* 2197 (SP); Nova Friburgo, Pico da Caledônea, 22º21'13"S, 42º35'13", 2200 m [2220 m], 15 June 2004, *Forzza et al.* 3412 (RB-n.v., SP-2 sheets, SPF); Petrópolis, Parque Nacional da Serra dos Órgãos, Castelo do Açu, 22°29'08" S, 43°03'42"W, 2100 – 2150, 10 Jan. 2011, *Schwartsburd et al.* 2323 (SP); Teresópolis, [22º27'42"S, 43º01'50"W],11 March 1938(?), *Brade* s.n. (BM-2 sheets); Santa Catarina: Timbé do Sul, Serra da Rocinha, [28°48'S, 49°57'W], [1200 m], 4 Nov. 1991, *Bueno* s.n. (ICN-155000).

HABITAT. Endemic to the very highlands (highest peaks) of S/SE Brazil, known only in the states of Minas Gerais (ca. 2000 – 2600 m elev.), Rio de Janeiro (ca. 2000 – 2500 m), Paraná (ca. 1800 m), and Santa Catarina (ca. 1200 m – estimated), in the "Campos de Altitude" ("altitudinal fields") and "Matas Nebulares" ("elfin cloudy forests") – Maps 1.A and C.

CONSERVATION STATUS. Vulnerable (VU B2ac(i-iv) + D1). But, there is still little knowledge about this taxon. It is really hard to find in nature, it is narrowly restricted to a few spots located at the highest peaks in S/SE Brazil, and the sub-populations are all relatively isolated from each other (Map 1.C). Thus, it might be further re-evaluated as Endangered (EN). The species itself is sub-cosmopolitan.

ETYMOLOGY. The sub-specific epithet honors Dr. *Jefferson Prado* (Herbarium SP), whose work has been enormously contributing to Pteridology, especially concerning Brazilian ferns.

NOTES. The nearest subspecies (macro populations) known of *Hypolepis rugosula* are those from: Central – South Argentina/Chile, known as '*H. rugosula* var. *poeppigii* (Kunze) C. Chr. & Skottsb.' which are distant ca. at least 1,500 km (in a straight line); and those from the island of Tristán d'Acugna, known as '*H. rugosula* var. *villoso-viscida* (Thouars) C. Chr.', distant ca. 3,500 km. Subspecies *pradoana* differs from 'var. *poeppigii*' and 'var. *villoso-viscida*' by the costules and veins abaxially with only catenate-glandular hairs (vs. with both catenate-acicular and catenate-glandular hairs, and with only catenate-acicular hairs, respectively) – Fig. 2.D.

In the present concept, *Hypolepis rugosula* subsp. *rugosula* occurs only in Tazmania and Australia. Besides the geographical distribution, subsp. *pradoana* differs from subsp. *rugosula* by the costules and veins abaxially with only catenate-glandular hairs (vs. with only catenate-acicular hairs), and the lamina margins with both catenate-acicular and catenate-glandular hairs sparsely throughout, and catenate-acicular hairs on the soral region (vs. glabrous throughout, with catenate-acicular hairs restricted to the soral region) – Figs. 2.C – E.

Hypolepis rugosula subsp. *pradoana* differs from all other Brazilian taxa of *Hypolepis* by the petioles and rachises atropurpureous, the proximal pinnae equilateral, the lamina margins with hairs, the sori submarginal, and lack of pseudo-indusia – Figs. 2.A – E and 3.D. Also, *H. rugosula* subsp. *pradoana* is the only inermous taxa with glandular hairs in Brazil – Fig. 2.E.

Some paratypes of *Hypolepis rugosula* subsp. *pradoana* had been previously identified as *Hypolepis rugosula* without infra-specific rank, by Brade (1956, as "*rugulosa*"), and Schwartsburd (2010).

Hypolepis stolonifera var. **nebularis** *Schwartsb.* **var. nov.** Differt a varietate *stoloniferae* rhachidibus maculatis (vs. rhachidibus immaculatis), pinnae ascendentis (vs. pinnae patentis), et segmentis contractis (vs. segmentis applanatis). Typi: Brasil, Teresópolis, Parque Nacional da Serra dos Órgãos, Matas Nebulares e Campos de Altitude, Pedra do Sino, próximo ao Abrigo Quatro, no caminho para a caixa d'água, 22º27'42"S, 43º01'50"W, 2100 m [2120 m], 7 Jan. 2011, *P.B. Schwartsburd & J.B.S. Pereira* 2309 (holotypus SP-on 2 sheets; isotypi B-on 3 sheets, FI, K, NY-on 2 sheets, P-on 2 sheets, RB, SP).

Plants terrestrial. *Rhizomes* long-creeping, branched, bearing several fronds, 2 – 5 mm diam., the *hairs* catenate-acicular, yellowish brown, 1 – 2 mm long, 15 – 20-celled. *Fronds* erect to arched, with continuous growth, 0.8 – 1.5 m long; *petioles* 45 – 75 (– 95) cm long, 3 – 6 mm diam., proximally wine red, medially brown, distally golden brown with wine red spots, glabrescent, with conspicuous persistent hair bases, inermous; *laminae* rhombic, proximally bipinnate-bipinnatifid to bipinnate-bipinnatisect with the segments pinnatifid, medially pinnate-bipinnatisect, distally pinnatisect, 40 – 75 x 30 – 90 cm; *rachises* straight, proximally and medially golden brown with wine red spots, distally light brown or greenish, glabrous, inermous; *proximal pinnae* 25 – 55 x 17 – 40 cm, strongly inequilateral, the basiscopic *pinnules* bigger and more dissected; *costae* abaxially and adaxially villose, the *hairs* catenate-acicular, yellowish, 0.4 – 0.8 (– 1.2) mm long, 4 – 8 (– 10)-celled; *costules* abaxially villose, adaxially sparsely villose, the *hairs* similar to those from the costae; *veins* abaxially sparsely villose, the *hairs* similar to those from the costae and costules but smaller, 0.2 – 0.4 mm long, 3 – 5-celled, adaxially glabrous; *laminar tissue between the veins* abaxially and adaxially glabrous; *lamina margins* glabrous; *sori* marginal; *pseudo-indusia* conspicuous, proximally green, distally hyaline, membranaceous in the hyaline part, the *margins* copiously ciliate, the *cilia* 0.2 – 0.3 mm long, 3 – 4-celled; *spores* not seen. Figs. 1.D – F, 3.E – F.

DISTRIBUTION. Brazil: Rio de Janeiro, Paraná, and Santa Catarina; also expected in Minas Gerais, São Paulo, and Rio Grande do Sul (no records found) – Maps 1.A and D.

ADDITIONAL SPECIMENS EXAMINED. BRAZIL. Paraná: Campina Grande do Sul, Morro Capivari Grande, [25°15’S, 48°51’W], 1300 m, 4 March 2007, *Schwartsburd & Lima* 1243 (SP, UPCB); Rio de Janeiro: Itatiaia, Planalto, [22°22’S, 44°44’W], 2100 – 2200 m, 28 May 1935, *Brade* 14497 (RB-n.v., SP); id., P.N. Itatiaia, subida para o Planalto, [22°22’S, 44°45’W], 1800 m, 10 Jan. 2008, *Labiak et al.* 4431 (SP); ibid. subida para o Planalto, [22°22’S, 44°44’W], 2050 m, 10 Jan. 2008, *Labiak et al.* 4433 (SP, UPCB); ibid., subida para o Planalto, [22°23’07”S, 44°40’43”W], 2350 m, 10 Jan. 2008, *Labiak et al.* 4436 (SP, UPCB); ibid., Abrigo Rebouças, [22°23’07”S, 44°40’43”W], 2350 m, 20 Jan. 2010, *Schwartsburd et al.* 2293 (SP); ibid., Estrada “Nova”, 22º21’23”S, 44º44’11”W, 2200 m [2175 m], 20 Jan. 2010, *Schwartsburd et al.* 2295 (DUKE, MO, SP); ibid., Estrada para o Planalto, 22º21’36”S, 44º44’14”W, 2100 m [2120 m], 11 Jan. 2011, *Schwartsburd et al.* 2326 (SP); ibid., Abrigo Rebouças, [22°23’07”S, 44°40’43”W], 2350 m, 12 Jan. 2011, *Schwartsburd & Karstedt* 2334 (SP); Teresópolis, Parque Nacional da Serra dos Órgãos, próximo à Pedra do Sino, 22º27’33”S, 43º01’39”W, 1850 m [1840 m], 07 Jan. 2011, *Schwartsburd & Pereira* 2316 (SP); Mun unknown, Feb. 1874, *Glaziou* 7021 (K); Santa Catarina: Timbé do Sul, Serra da Rocinha, [28°48’S, 49°59’W], 1300 m, 6 Feb. 2009, *Schwartsburd & Corazzini* 1995 (SP); Urupema, Cachoeira que Congela, [27°56’S, 49°52’W], 1550 m, 5 Feb. 2009, *Schwartsburd & Corazzini* 1951 (SP); ibid., [27°56’S, 49°52’W], 1550 m, 5 Feb. 2009, *Schwartsburd & Corazzini* 1954 (SP).

HABITAT. Endemic to the highlands of S/SE Brazil, known in the states of Rio de Janeiro (ca. 1800 – 2400 m elev.), Paraná (ca. 1300 m to?), and Santa Catarina (ca. 1300 – 1600 m elev.), in the “Campos de Altitude” (“altitudinal fields”) and borders of the “Matas Nebulares” (“elfin cloudy forests”), generally forming “thickets” (see Fig. 3.E) – Maps 1.A and D.

CONSERVATION STATUS. Least Concern (LC). Although known from a few localities, this taxon is apparently an ecological variety of a somehow common and spread species.

ETYMOLOGY. *Nebula* (Latin, "cloud") + *-aris* (Latin, "belonging to"), "belonging to the clouds" – reference for the habitat of the variety, which grows exclusively in areas constantly embraced by clouds (see Fig. 3.E).

NOTES. *Hypolepis stolonifera* is the most common species occurring in the S/SE Brazil, from the states of Minas Gerais and Rio de Janeiro Southwards to Rio Grande do Sul. It occurs mainly in the mountain regions of the Atlantic forest s.s. and *Araucaria* forest, especially in clearings inside the forest and at the edges of the forest (wherever it is not very disturbed), in half shadow/half sunny places, and forming big populations. At the highest peaks of such mountain regions (the top of the mountains), where there is a constant cloud action, the main forest is absent, and the "Matas Nebulares" ("elfin cloud forests") and the "Campos de Altitude" ("altitudinal fields") are the main vegetation types (e.g. Fig. 3.E, Map 1.D). There, the individuals of *H. stolonifera* are morphologically quite different, both visually in the field and as herbarium material. Such differences are probably related to the elevation, temperature oscillation, constant humidity, and sunlight exposition – which are much higher in the peaks. In addition, the same stable and well defined morphological pattern can be seen from the state of Santa Catarina up to Rio de Janeiro (Map 1.D). Thus, instead of recognizing the new taxon as a new species, it is here considered as a variety of *H. stolonifera,* adapted to different ecological factors and type of vegetation.

Variety *nebularis* differs from var. *stolonifera* by the smaller fronds, up to 1.5 m long (vs. up to 2.5 m long), the petioles and rachises with wine red spots (vs. immaculate), laminae yellowish green (vs. olive green), the axis more densely villose, the pinnae strongly ascendant (vs. patent), the segments contracted (vs. flattened), and the hairs yellowish (vs. hyaline) – Figs. 1.D – E, 3.E – F.

Apart from *Hypolepis stolonifera* var. *stolonifera* and var. *nebularis,* the only inermous taxa occurring in S/SE Brazil is *H. rugosula* subsp. *pradoana.* The two varieties can be differentiated from *H. rugosula* subsp. *pradoana* by the proximal pinnae strongly inequilateral (vs. equilateral), the lack of glandular hairs (vs. present throughout the frond), the sori marginal (vs. submarginal), and the pseudo-indusia conspicuous and ciliate (vs. absent) – Figs. 1.D – F, vs. Figs. 2.A – F.

Key to the Brazilian taxa of *Hypolepis:*

1. Petioles and rachises aculeate

  2. Laminar tissue between the veins abaxially glabrous

    3. Fronds furnished with glandular hairs; base of the petioles black …........… **H. hostilis**

    3. Fronds eglandular; base of the petioles brown……....................................... **H. repens**

  2 . Laminar tissue between the veins abaxially with hairs

    4. Fronds furnished with glandular hairs ……………………………….…….... **H. rigescens**

    4. Fronds eglandular

      5. Veins abaxially black and immersed; laminar tissue between the veins abaxially strigose (the hairs sparse, decumbent, 0.2 – 0.3 mm long) ………………. **H. mitis**

5. Veins abaxially yellowish green and raised; laminar tissue between the veins abaxially hirsute (the hairs conspicuous, erect, 0.1 – 0.15 mm long) ..………………………………………………………..…………… **H. acantha**

1. Petioles and rachises inermous

6. Fronds furnished with glandular hairs; basal pinnae equilateral; pseudo-indusia absent ……………………………………………..……..……… **H. rugosula** subsp. **pradoana**

6. Fronds eglandular; basal pinnae strongly inequilateral; pseudo-indusia ciliate

7. Petioles and rachises immaculate; lamina olive green; pinnae patent; segments flattened ……………………………………..….…….. **H. stolonifera** var. **stolonifera**

7. Petioles and rachises with wine red spots; lamina yellowish green; pinnae ascendant; segments contracted …………….................………….. **H. stolonifera** var. **nebularis**

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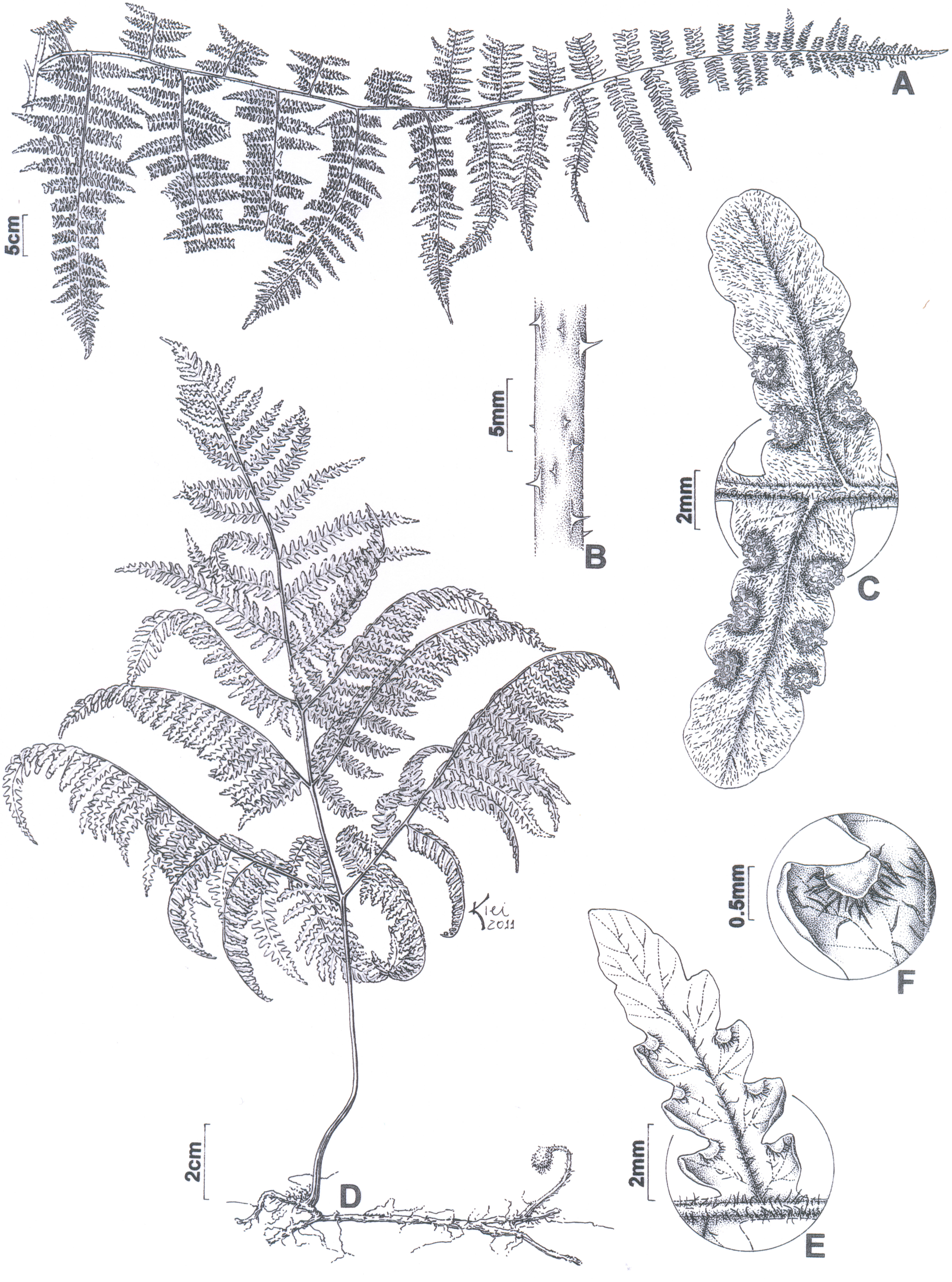
Figure Legends

Fig. 1. A – C *Hypolepis acantha:* **A** Proximal pinna (*Schwartsburd* 1344 [SP]), **B** Part of the pinna-rachis (*Schw.* 1344 [SP]), **C** Abaxial surface of segments (*Schw.* 1344 [SP]). **D** – **F** *Hypolepis stolonifera* var. *nebularis:* **D** Habit of a small frond (*Labiak* 4433 [SP]), **E** Abaxial surface of a segment (*Schw.* 2309 [NY]), **F** Detail of the pseudo-indusia (*Schw.* 2309 [NY]). Drawn by Klei de Souza.

Fig. 2. *Hypolepis rugosula* subsp. *pradoana:* **A** Habit of a big fertile frond (*Schwartsburd* 2310 [FI]), **B** Habiat of a small fertile frond (*Schw.* 2310 [SP-isotype]), **C** Adaxial surface of a segment (*Forzza* 3412 [SP 370620]), **D** Abaxial surface of a segment (*Forzza* 3412 [SP 370620]), **E** Detail of the lamina margin (*Forzza* 3412 [SP 370620]). Drawn by Klei de Souza.

Fig. 3. A – B *Hypolepis acantha* (type specimen). **C – D** *Hypolepis rugosula* subsp. *pradoana* (type specimen). **E – F** *Hypolepis stolonifera* var. *nebularis* (type specimen). Photos by the author.

Map 1. A Distribution of *Hypolepis acantha, H. rugosula* subsp. *pradoana,* and *H. stolonifera* var. *nebularis* (altitudinal and administrative layers), **B** Distribution of *H. acantha* (altitudinal layer), **C** Distribution of *H. rugosula* subsp. *pradoana* (altitudinal layer), **D** Distribution of *H. stolonifera* var. *nebularis* (altitudinal layer).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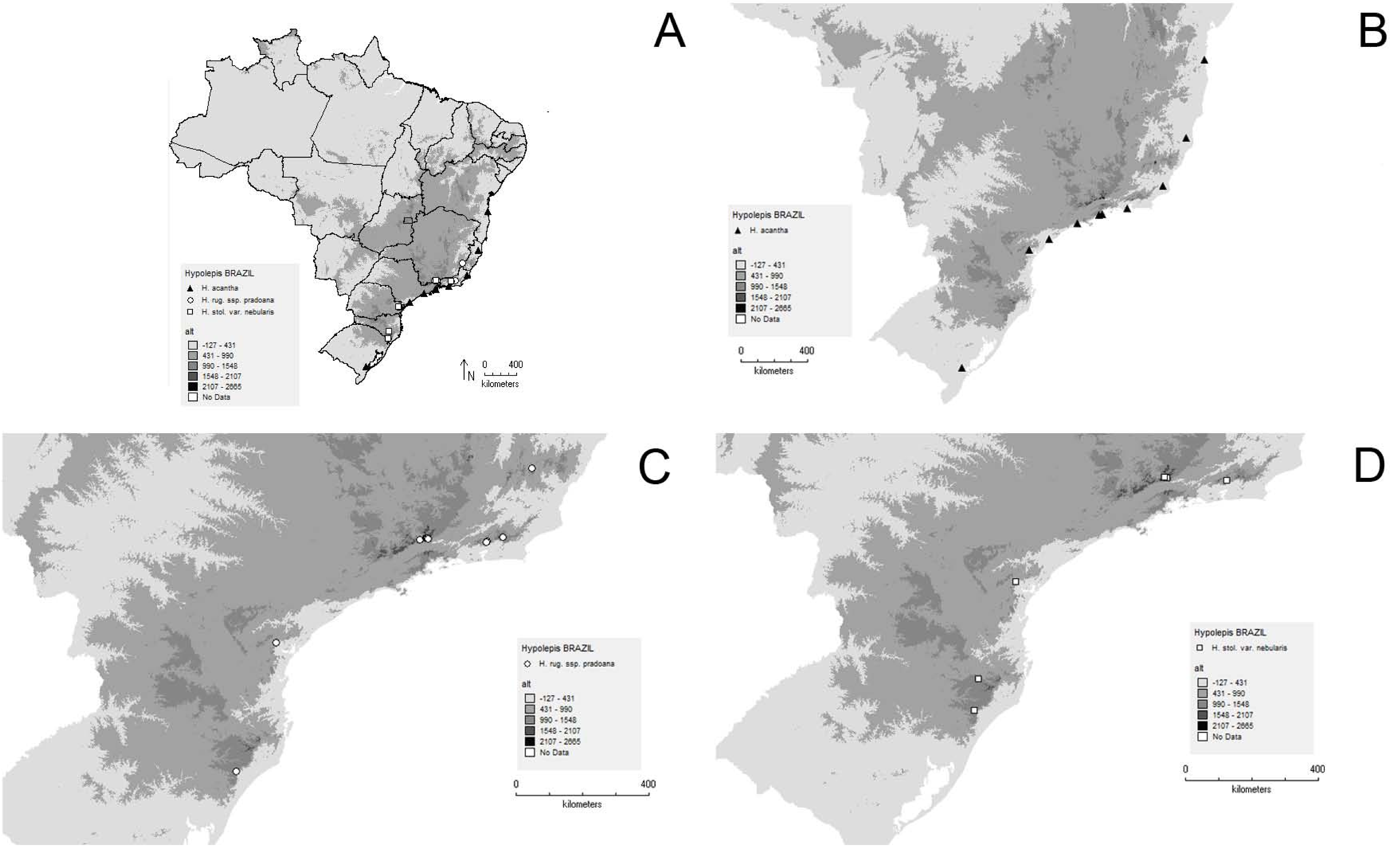
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