



Jamesonia (Pteridaceae) in Brazil

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Abstract: *Jamesonia* is a genus of Neotropical ferns that comprises about 50 species, distributed from Mexico to Uruguay. In spite of this wide distribution, this group is more diverse in Andean páramos and subpáramos. Due to the recent changes in its circumscription, with the junction of *Eriosorus* and segregation of *Tryonia*, the objective of this work was to carry out the taxonomic study of *Jamesonia* for Brazil, in order to elaborate its monograph to the Flora of Brazil 2020. This study was based on morphological analyses of specimens deposited in 25 Brazilian herbaria, plus online images of types, field expeditions in the southern and southeastern regions of Brazil, revision of the literature, and scanning electronic microscopy of the spores. Seven species and two hybrids were recognized: *J. biardii*, *J. brasiliensis*, *J. cheilanthoides*, *J. flexuosa*, *J. insignis*, *J. osteniana*, *J. rufescens*, *J. brasiliensis* × *J. cheilanthoides*, and *J. ×intermedia*, respectively. A distinct specimen, from the border of Brazil (Amazonas) and Venezuela, was treated as *Jamesonia* sp., due to the presence of only one material. Identification key, descriptions and illustrations are provided for the species and hybrids, as well as, geographical distribution data, comments, list of selected material examined for each taxon, and a full list of all exsiccatae analyzed. We also present an identification key for the genera *Jamesonia* and *Tryonia*.

Keywords: Brazilian Atlantic Rainforest; *Eriosorus*; ferns; flora; High Altitude Fields; Pteridoideae.

Jamesonia (Pteridaceae) no Brasil

Resumo: *Jamesonia* é um gênero de samambaias Neotropical, que compreende cerca de 50 espécies, distribuídas do México ao Uruguai. Apesar dessa ampla distribuição, o grupo é mais diverso nos páramos e subpáramos andinos. Devido às recentes mudanças na sua circunscrição, com a junção de *Eriosorus* e a segregação de *Tryonia*, o objetivo desse trabalho foi realizar o estudo taxonômico de *Jamesonia* para o Brasil, a fim de elaborar sua monografia para a Flora do Brasil 2020. Esse estudo foi baseado na análise morfológica de espécimes depositados em 25 herbários nacionais, mais imagens dos tipos online, expedições de campo para as regiões sul e sudeste do Brasil, revisão de literatura, e microscopia eletrônica de varredura dos esporos. Sete espécies e dois híbridos foram reconhecidos: *J. biardii*, *J. brasiliensis*, *J. cheilanthoides*, *J. flexuosa*, *J. insignis*, *J. osteniana*, *J. rufescens*, *J. brasiliensis* × *J. cheilanthoides* e *J. ×intermedia*, respectivamente. Um espécime distinto, oriundo da fronteira do Brasil (Amazonas) com a Venezuela, foi tratado como *Jamesonia* sp., devido à presença de somente um material. Chaves de identificação, descrições e ilustrações foram apresentadas para as espécies e híbridos, bem como, dados de distribuição geográfica, comentários, lista de material selecionado examinado para cada táxon e uma lista contendo todas as exsiccatas analisadas. Nós também apresentamos uma chave de identificação para os gêneros *Jamesonia* e *Tryonia*.

Palavras-chave: campos de altitude; *Eriosorus*; Flora; Mata Atlântica Brasileira; Pteridoideae; samambaias.

Introduction

Jamesonia Hook. & Grev. (Pteridaceae) is a Neotropical fern genus with ca. 50 species (PPG 2016), which occurs from southern Mexico to southern Bolivia, north and southeast Brazil, Uruguay, and the islands of Tristan da Cunha and Gough, located in the South Atlantic Ocean (Tryon 1970, Sánchez-Baracaldo 2004a). In spite of this wide distribution, this group is more diverse in Andean páramos and subpáramos, occurring frequently associated with rocks and cloud forests, from 1500 to 5000 m elevation (Tryon 1970, Sánchez-Baracaldo 2004a).

Jamesonia, in the present circumscription, encompasses the genus *Eriosorus* Fée, since phylogenetic analysis based on molecular data has concluded, when treated separately, these genera are polyphyletic and paraphyletic, respectively (Sánchez-Baracaldo 2004a). Thus, the intimate association of these genera proposed by Alice Tryon in 1970, based only on morphology, has been proved.

Plants of *Jamesonia* can be distinguished by the “specialized” fronds, complex and scandent, or compact and linear, and by the color brown of the rachis (Cochran et al. 2014). Besides, two morphotypes can be seen, according to the correspondence between the pattern of frond morphology and occupied habitat. The plants with the “*Jamesonia* morphotype” has many fronds, and short pinnae, often coriaceous, which are associated with exposed areas, predominantly of the páramos (Sánchez-Baracaldo & Thomas 2014). And, the “*Eriosorus* morphotype” has few fronds, and long pinnae, chartaceous to membranaceous, which are associated with cloud forests and habitats sheltered in the páramos (Sánchez-Baracaldo & Thomas 2014).

After the monographs of Tryon (1962, 1970), few taxonomic works have been done with the group, we can highlight: Sánchez-Baracaldo (2004b), who presented a phylogeny for the subfamily Taenitoidae, where she verified that *Jamesonia* and *Eriosorus* are not monophyletic. The same author (Sánchez-Baracaldo 2004a), with extensive sampling of species of these genera, found that the “*Jamesonia* morphotype” probably had several origins, which were derived from more than one element of *Eriosorus*. Christenhusz et al. (2011) performed the combinations of several (thirty-six combinations) *Eriosorus* species in *Jamesonia*. Sánchez-Baracaldo & Thomas (2014), who presented biogeographic analyses, in which they considered possible adaptive radiation of *Jamesonia* with the emergence of the Andes, as well as, evolutionary convergence among species with the “*Jamesonia* morphotype”. Cochran et al. (2014), who segregated some species, previously part of *Eriosorus*, to form a new genus, *Tryonia* Schuettp. et al. And more recently the description of some new species, *J. erecta* A. Rojas, *J. panamensis* A. Rojas and *J. retroflexa* A. Rojas, from the Andes of Colombia, Panama, and Ecuador, respectively, by Rojas-Alvarado (2017b). *Tryonia* was recently revised to Brazil by Della & Prado (2020, accepted)

In Brazil, some floristic studies treated species that now are included in *Jamesonia*, such as: Baker (1870) (*Gymnogramma*), Schwacke (1900) (*Jamesonia*), Brade (1942, 1956) (*Jamesonia*), Sehnem (1972) (*Anogramma*), Windisch (1984) (*Eriosorus*), Condack (2006) (*Jamesonia* and *Eriosorus*), Prado & Sylvestre (2010) (*Jamesonia* and *Eriosorus*), Prado & Hirai (2011) (*Eriosorus*), Salino & Viveros (2012) (*Eriosorus*), Prado (2015) (*Jamesonia*), Prado et al. (2015) (*Jamesonia*), Gonzatti et al. (2016) (*Jamesonia*), and Pereira & Labiak (2018) (*Jamesonia*). In parentheses, the genus in which the species were treated.

Thus, the main goal of the present study is to present a taxonomic treatment of *Jamesonia* for Brazil, to provide information for a better understanding and identification of its species, and contribute with the project Flora of Brazil 2020, coordinated by the Instituto de Pesquisas Jardim Botânico do Rio Janeiro (JBRJ).

Material and Methods

For this study were analyzed material from the following herbaria: BHC, CESJ, ESA, FCAB, FLOR, FURB, HAS, HB, HBR, HRCB, ICN, MBM, MBML, PACA, R, RB, RBR, RFA, SJRP, SP, SPF, UB, UEC, UCPB, and VIES (herbaria acronyms according to Thiers (2019, continuously updated)). The types and another specimens stored in international herbaria were consulted through the available online images.

Field expeditions were carried out in the states of Minas Gerais, Rio de Janeiro, and Rio Grande do Sul. The specimens were collected according to the technical recommendations proposed by Fidalgo & Bononi (1984) and incorporated in the Herbaria of the Instituto de Botânica (SP) and of the Departamento de Botânica, Universidade de São Paulo (SPF).

The terminology of vegetative and reproductive structures followed Lellinger (2002) and Tryon & Lugardon (1990). Habitat characteristics and ecological aspects were described from the information present in the herbarium labels, direct observations in the field, and bibliography.

Spore images of all taxa were taken with a Scanning Electronic Microscope (SEM). The spores of specimens stored in the SP herbarium were fixed on stubs using double-sided tape and were not submitted to any previous chemical treatment. The stubs were then coated with gold and analyzed under the SEM (Model: Philips XL30).

The distribution maps were drawn using the software ArcGIS v. 10.5 (ESRI 2016). The geographical coordinates were taken from the herbarium labels or taken during the field works. For the materials without information on geographic coordinates, the coordinates of the municipality were estimated using Google Earth (www.google.com/intl/en/earth/). The estimated coordinates were cited in brackets in the material examined. The shapefile of Brazil and the Conservation Units were obtained from IBGE (2015) and ICMBio (2019) websites, respectively.

In the selected material examined, only one specimen per state was listed and the states were cited in alphabetic order. All specimens examined (which include those not cited in the select material examined section) are listed in Appendix I (the number in parentheses corresponds to the number of the species in the taxonomic treatment).

Results

Due to the recent changes in the circumscription of *Jamesonia* and segregation of *Tryonia*, confusions can be generated to identify these taxa, so the key below can be used to distinguish them.

Key for the genera *Jamesonia* and *Tryonia* in Brazil

1. Rachises brown; petioles concolorous; adaxial and abaxial surfaces of the pinna covered by eglandular hairs; fronds erect, arcuate, semi-scandent, scandent or scrambling. ***Jamesonia***
1. Rachises stramineous; petioles bicolorous; adaxial and abaxial surfaces of the pinna covered by glandular hairs; fronds erect, arcuate or decumbent. ***Tryonia***

Jamesonia Hook. & Grev., Icon. Filic.: t. 178. 1830. Type: *Jamesonia pulchra* Hook. & Grev.

Plants terrestrial or rupicolous. **Rhizomes** short-creeping, dark brown, moderately to densely covered by erect to appressed hairs and rigid bristles, the hairs dark brown, reddish-brown or golden-brown, multicellular, glandular or eglandular, the apical cell elongated with apex rounded, globose, or rarely slightly bulbous, the bristles dark brown, reddish-brown, or golden-brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2–7 cells wide, the apical cell elongated with apex rounded, globose or rarely slightly bulbous. **Fronds** monomorphic, erect, arcuate, semi-scandent, scandent or scrambling, with indeterminate or determinate growth; **petioles** semi-cylindrical, adaxially grooved, rarely cylindrical or plane, concolorous, dark brown, sometimes shiny, glabrous to moderately covered by hairs on both surfaces, the hairs glandular or eglandular, hyaline to brown, tortuous to erect, multicellular, the apical cell elongated with apex rounded or globose; **laminae** pinnate to 3-pinnate-pinnatisect, or more divided into *J. flexuosa*, triangular, linear, or less often narrowly triangular and narrowly elliptic, membranaceous to coriaceous; **rachises** straight or flexuous, ellipsoidal, triangular, or more often semi-cylindrical, adaxially grooved, dark brown, glabrous to densely covered by hairs on both surfaces, the hairs eglandular similar to those of the petioles; **pinnae** reflexed, patent or ascending, often triangular, sometimes orbicular, ovate, deltate, lanceolate or oblong, alternate to opposite, gradually tapering towards the apex, stalked, the stalk cylindrical to semi-cylindrical, adaxially grooved, dark brown, straight or sometimes curved, adaxial and abaxial surface of pinnae glabrous to densely covered by hairs, the hairs eglandular similar to those of the petioles; **ultimate segments** bifurcate, sometimes simple, orbicular or ovate, the margins entire, crenate or crenate-denticulate, plane, sometimes recurved, whitish; occasionally with hairs, the hairs eglandular similar to those of the petioles; **veins** usually furcate, sometimes simple, reaching or not the laminae margin. **Sori** along the veins or sometimes spread along of all abaxial surface of the segments; **sporangia** with capsule usually pyriform or orbicular, stoma with 12–26 indurated cells, short-stalk, stalks 2 or 3 celled (Tryon 1970); **spores** trilete, tetrahedral, brown, with equatorial flange, 40.0–67.8 µm diam., x=29 (Tryon 1970). Gametophyte spatulate with lateral meristem (Tryon 1970).

According Sánchez-Baracaldo (2004a) and PPG I (2016), *Jamesonia* is a monophyletic and Neotropical genus of leptosporangiate ferns, composed by ca. 50 species. The species occur from southern Mexico to southern Bolivia, north, southeast and south Brazil, Uruguay, and in the islands of Tristan da Cunha and Gough. Most of these species occur in the Andean páramos and subpáramos, at 1500–5000 meters of elevation. In Brazil, there are 8 species and two hybrids, which occur in the Brazilian Atlantic Rainforest, in high altitude fields and cloud forests (Figure 1), at 1000–2700 meters of elevation (with the exception of *J. osteniana*, which occurs at lower elevations, 50–140 m).

Key for *Jamesonia* species in Brazil

- 1. Plants annual, not exceeding 8.0 cm tall; rhizomes erect, covered by glandular hairs, the hairs often with 2–4 celled; Rio Grande do Sul (Brazil) and Uruguay ***J. osteniana***
- 1. Plants perennial, 8.0 cm – 4 m long; rhizomes creeping, covered by glandular or eglandular hairs and bristles, the hairs often with 10 or more celled; Brazil (North, Southeast, and South) 2
- 2. Laminae linear; pinnate or pinnate-pinnatisect 3

- 2. Laminae triangular or elongate triangular, less often narrowly triangular or narrowly elliptic; 2-pinnate-pinnatifid or more divided; if pinnate-pinnatisect never linear 4
- 3. Pinnae orbicular, coriaceous, 0.1–0.3 × 0.2–0.3 cm. ***J. brasiliensis***
- 3. Pinnae ovate to triangular, chartaceous, 0.3–1.2 × 0.3–0.7 cm. ***J. cheilanthoides***
- 4. Rachises flexuous; fronds semi scandent, scandent or scrambling, rare erect 5
- 4. Rachises straight; fronds erect to slightly arcuate 7
- 5. Ultimate segments bifurcate; margins entire ***J. flexuosa***
- 5. Ultimate segments ovate to orbiculate, or elongate triangular to ovate; margins crenate or denticulate-crenate 6
- 6. Laminae chartaceous; adaxial surface of the pinnae moderately covered by hairs; spores well-formed with content. ***J. insignis***
- 6. Laminae coriaceous; adaxial surface of the pinnae glabrous to sparsely covered by hairs; spores commonly aborted, without content. ***J. ×intermedia***
- 7. Ultimate segments ovate, margins crenate ***J. rufescens***
- 7. Ultimate segments bifurcate; margins entire. 8
- 8. Hairs and bristles of the rhizome golden-brown; petioles and rachises moderately covered by hairs ***Jamesonia* sp.**
- 8. Hairs and bristles of the rhizome dark brown; petioles and rachises glabrous or with sparse hairs ***J. biardii***

1. ***Jamesonia biardii*** (Fée) Christenh., Phytotaxa 19: 20. 2011. *Anogramma biardii* Fée, Crypt. Vasc. Brésil 1: 241, pl. 77, Fig. 1. 1869. *Psilogramme biardii* (Fée) Kuhn, Festschr. 50 Jähr. Jub. Königstätt. Realschule Berlin: 336. 1882. *Eriosorus biardii* (Fée) A.F.Tryon, Contr. Gray Herb. 200: 166, Fig. 36. 1970. Lectotype (designated by Tryon 1970); BRAZIL. Rio de Janeiro: Serra dos Órgãos, VI-1869, A.F.M. Glaziou 3331 (P barcode P0060351[image!]; isolectotypes: NY barcodes 00144494[image!]; 00144495[image!]; 00144496[image!]; S-R n.S-R321[image!], US barcode 00142117[image!]).

Figures: 2a-i, 3a-b, 5.

Plants terrestrial. **Rhizomes** short-creeping, 1.0–4.0 mm diam, dark brown, densely covered by hairs and rigid bristles, the hairs dark brown, multicellular, glandular or eglandular, the apical cell elongated with apex rounded or globose, 0.5–2.0 mm long, the bristles dark brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2–4 cell wide, apical cell elongated with apex rounded or globose, 0.6–2.0 mm long. **Fronds** erect to slightly arcuate, determinate growth, 20.0–78.0 × 5.6–11.5 cm; **petioles** semi-cylindrical, adaxially grooved, 10.0–30.0 cm × 1.0 mm, dark brown, shiny, glabrous to sparsely covered by hairs on both surfaces, the hairs 0.5–1.6 mm long, eglandular, hyaline, tortuous, multicellular, the apical cell elongated with apex rounded; **laminae** 2-pinnate-pinnatisect, elongate-triangular, 11.0–64.0 × 5.6–11.5 cm, chartaceous; **rachises** straight, semi-cylindrical, adaxially grooved, dark brown, glabrous to sparsely covered by hairs on both surfaces, the hairs eglandular similar to those of the petioles; **pinnae** patent to slightly ascending, triangular, the basiscopic side slightly larger, 3.0–7.0 × 1.8–4.5 cm, alternate to subopposite, gradually tapering towards the apex (pinnatisect), stalked, the stalk 1.8–6.0 mm long, 0.6–0.8 mm diam, semi-cylindrical, adaxially grooved, dark brown, straight, adaxial and abaxial surfaces of pinnae glabrous to sparsely covered by hairs, the hairs eglandular similar



Figure 1. Habitats of *Jamesonia* species in Brazil. **A, B.** Trail to the Pico do Alcobaça, Parque Nacional da Serra dos Órgãos, Petrópolis (RJ). **C.** Parque Nacional do Itatiaia, Itatiaia (RJ), in background Pico das Agulhas Negras. **D, E.** Trail to the Pico Menor e Médio, Parque Estadual dos Três Picos, Nova Friburgo (RJ). **F.** Road ravine located in Viamão (RS). Photos: **A.** J.M. Braga. **B–F.** A.P. Della.

to those of the petioles; **costae** straight, semi-cylindrical, adaxially grooved, dark brown, glabrous; **pinnules** triangular, 1.0–3.0 × 0.5–2.3 cm, alternate, stalked, the stalk 1.0–3.0 mm long, 0.6 mm diam., semi-cylindrical, adaxially grooved, dark brown, straight; **ultimate segments** bifurcate, sometimes simple, margins entire, plane, whitish; **veins** usually furcate, not reaching the laminae margin. **Sori** on the veins in the proximal portion of the segments; **spores** dark brown, proximal surface tuberculate, mainly near trilete aperture, distal surface slightly rugose, 58.0–57.5 μm diam.

Distribution and ecology: *Jamesonia biardii* is endemic to Brazil, it grows in shrub forests in the Espírito Santo and Rio de Janeiro states, at 2000–2100 m elevation. It is a threatened species (in danger

- EN) according to the Red List of the Brazilian Flora, version 2012.2 (CNCFlora 2019).

Selected material examined: BRAZIL. Espírito Santo: Castelo, Forno Grande, [20°31'S, 41°06'W], 12-VIII-1948, *A.C. Brade 19246* (ICN, MO, RB). Rio de Janeiro: Serra dos Órgãos, Campo das Antas, [22°27'S, 43°02'W], 2100 m, 27-V-1869, *A.F.M. Glaziou s.n.* (RB 36474).

Jamesonia biardii can be recognized in having 2-pinnate-pinnatisect, elongated-triangular laminae, triangular, chartaceous pinnae, with the adaxial and abaxial surface glabrous or with sparse hairs, the hairs eglandular, hyaline, apical cell elongated with apex rounded, and straight and glabrous rachises.

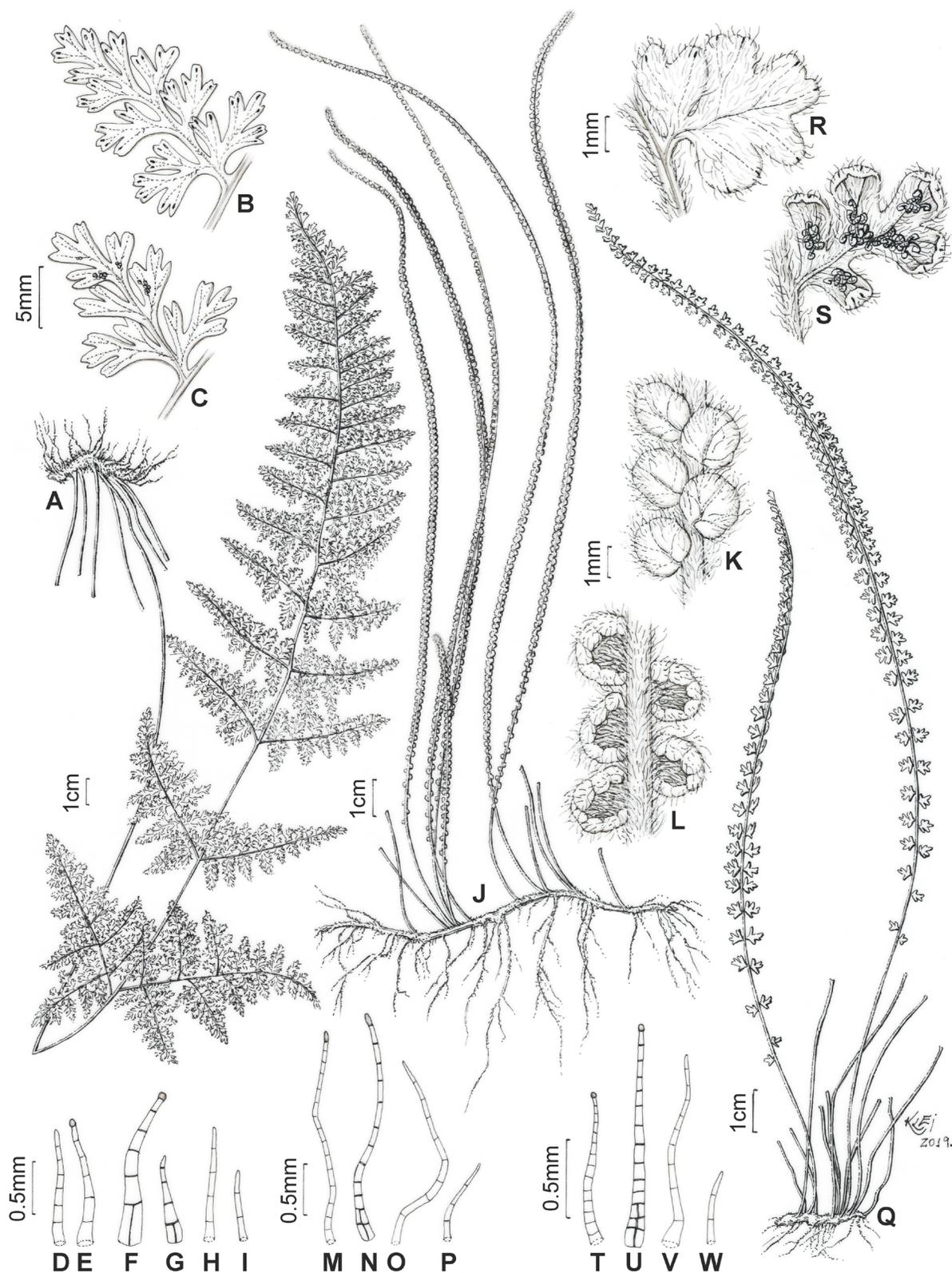


Figure 2. A–I. *Jamesonia biardii*. A. Habit. B, C. Adaxial and abaxial surfaces of the pinnule, respectively. D–G. Hairs and bristles of the rhizome. H. Hair of the petiole and rachis. I. Hair of the lamina. J–P. *J. brasiliensis*. j. Habit. K, L. Adaxial and abaxial surfaces of the pinna, respectively. M, N. Hair and bristle of the rhizome. O. Hair of the petiole, rachis and adaxial surface of the lamina. P. Hair of the abaxial surface of the lamina. Q–W. *J. cheilanthoides*. Q. Habit. R, S. Adaxial and abaxial surfaces of the pinna, respectively. T, U. Hair and bristle of the rhizome. V. Hair of the petiole, rachis and adaxial surface of the lamina. W. Hair of the abaxial surface of the lamina. A–I. A.C. Brade 16515 (RB). J. J. Prado 1122 (SP). K–P. A.P. Della et al. 49 (RB, SP). Q. A.P. Della & C.M. Mynssen 50 (RB, SP). R–W. P.G. Windisch 6111 (ICN).

Tryon (1970) emphasized the close relationship of *Jamesonia biardii* and *J. flexuosa* based on the similarity of the form and indument of ultimate segments, as well as through the geographic proximity. However, this relationship has not been proven by phylogenetic analysis based on molecular data yet, since the most recent record of *J. biardii* dated 1948 in the herbaria visited.

This species was cited by Garcia & Pirani (2005) for Núcleo do Curucutu, Serra do Mar (São Paulo, SP – *L.C.Q.M.P. Sampaio & R.J.F. Garcia 222*). Also for Serra da Mantiqueira by Menini-Neto et al. (2009) and for Serra Negra by Souza et al. (2012), both studies based in this collection: Minas Gerais – *P.L. Viana & F.S. Souza 2006*). However, these specimens were wrongly identified and in fact they are *Tryonia myriophylla* (Sw.) Schuettp. et al.

Tryonia myriophylla is easily distinguished from *Jamesonia biardii* by its stramineous petioles (distally) and rachises (vs. dark brown); pinnae moderately to densely covered by glandular hairs and less often eglandular on both surfaces (vs. surfaces glabrous to sparsely covered eglandular hairs).

2. *Jamesonia brasiliensis* Christ, Farnk. Erde: 75. 1897. Lectotype (designated by Tryon 1970): BRAZIL. Rio de Janeiro: Serra do Itatiaia, entre rochedos abaixo das Agulhas Negras, 2200 m, III-1984, *E.H.G. Ule s.n.* (P barcode P00602710[image!]; isolectotypes: R!; BM barcode BM000936676[image!]).

Figs. 2j-p, 3c-d, 4a-c, 5.

Plants rupicolous or terrestrial. **Rhizomes** short-creeping, 0.7–1.9 mm diam., dark brown, moderately to densely covered by hairs and rigid bristles, the hairs reddish brown, multicellular, glandular, the apical cell globose to slightly bulbous, 1.7–3.0 mm long, the bristles reddish brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2 cells wide, apical cell globose to slightly bulbous, 1.7–2.6 mm long. **Fronds** erect to arcuate, indeterminate growth, 26.0–61.5 × 0.4–0.7 cm; **petioles** cylindrical or semi-cylindrical, adaxially grooved, 4.0–7.5 cm × 0.4–0.6 mm, dark brown, shiny, glabrous to sparsely covered by hairs on both surfaces, the hairs 0.5–3.0 mm long, eglandular, hyaline, tortuous, multicellular, the apical cell elongated with apex rounded; **laminae** pinnate, linear, 21–54 × 0.4–0.7 cm, with apical bud densely covered by hairs, the hairs eglandular similar to those of the petioles, coriaceous; **rachises** straight, ellipsoidal or triangular, dark brown, adaxially moderately covered by the hairs, abaxially densely covered by hairs, the hairs eglandular similar to those of the petioles; **pinnae** reflexed to slightly ascending, orbicular, 0.1–0.3 × 0.2–0.3 cm, usually subopposite or sometimes alternate at lamina base, abrupt to gradually tapering proximally, sometimes gradually tapering towards the apex, short-stalked, the stalk 0.4–0.7 mm long, 0.1–0.2 mm diam., cylindrical, dark brown, curved, adaxial surface of pinnae sparsely to moderately covered by hairs, the hairs eglandular similar to those of the petioles, abaxial surface of pinnae densely covered by hairs, the hairs ca. 0.5–1.5 mm long, eglandular, hyaline, tortuous, 2–4-celled, apical cell elongated with apex rounded, the margins entire, sometimes undulate, strongly recurved, ciliate, whitish; **veins** usually furcate, sometimes simple, reaching or not the lamina margin. **Sori** usually on the proximal portion of the pinnae, or sometimes spread along of all abaxial surface of the pinnae; **spores** dark brown, proximal surface with coalescent tuberculate, mainly near trilete aperture, distal surface slightly rugose to laevigate, 48.0–53.5 µm diam.

Distribution and ecology: *Jamesonia brasiliensis* occurs in cracks of rocks partially shaded in the Itatiaia Mountains (Rio de Janeiro and Minas Gerais), at 2200–2600 m elevation. It is a threatened species (critically endangered - CR) according to the Red List of Brazilian Flora, version 2012.2 (CNCFlora 2019).

Selected material examined: BRAZIL. Minas Gerais: Itamonte, 22°22'21.5"S, 45°08'26.9"W, 2300–2500 m, 11-VII-2007, *A. Salino 12459* (BHCB). Rio de Janeiro: Itatiaia, Parque Nacional do Itatiaia, caminho para as Prateleiras, às margens do Rio Campo Belo, 22°21'95.3"S, 44°42'95.5"W, 2440 m, 01-IX-2017, *A.P. Della 49* (RB, SP).

Jamesonia brasiliensis is easily recognized by its linear and pinnate fronds, with indeterminate growth (with large apical bud), orbicular and coriaceous pinnae, abaxially densely covered by hairs, the hairs eglandular, hyaline, tortuous, 2–4-celled, apical cell elongated with apex rounded, and straight rachises.

This species has been considered endemic of Itatiaia (Brazil), however, Tryon (1962) cited some collections of this species for Bolivia and Peru. However, for Tryon, the Bolivian plants differ slightly from de Brazilian ones by the smaller pinnae, more rigid, and by the upper surface glabrous. Probably, this name is not correctly applied to the Bolivian plant.

3. *Jamesonia cheilanthoides* (Sw.) Christenh., Phytotaxa 19: 20. 2011. *Grammitis cheilanthoides* Sw., Syn. Fil. (Swartz) 23: 219, 419. 1806. *Gymnogramma cheilanthoides* (Sw.) Kaulf., Enum. Fil.: 71. 1824. *Psilogramme cheilanthoides* (Sw.) Kuhn, Festschr. 50 Jähr. Jub. Königstädt. Realschule Berlin: 335. 1882. *Eriosorus cheilanthoides* (Sw.) A.F. Tryon, Brit. Fern Gaz. 9: 271. 1966. Holotype: TRISTAN DA CUNHA, s. d., s. col. (S n.S-P-6352[image!]).

Figs. 2q-w, 3e-f, 4d-f, 6.

Plants rupicolous or terrestrial. **Rhizomes** short-creeping, 0.2–2.6 mm diam., dark brown, moderately to densely covered by hairs and rigid bristles, the hairs reddish brown, multicellular, glandular, apical cell globose to slightly bulbous, 1.0–2.3 mm long, the bristles reddish brown to dark brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2 or 3 cells wide; apical cell globose to slightly bulbous, 0.7–1.6 mm long. **Fronds** erect to arcuate, indeterminate growth, 24.0–120.0 × 0.6–1.5 cm; **petioles** cylindrical or semi-cylindrical, adaxially grooved, sometimes plane, 5.0–17.0 cm × 0.4–1.0 mm, dark brown, shiny, glabrous to sparsely covered by hairs on both surfaces, the hairs of the proximal portion similar to those the rhizomes, of distal portion the hairs with 0.3–2.0 mm long, eglandular, hyaline or dark brown, tortuous, multicellular, the apical cell elongated with apex rounded; **laminae** pinnate-pinnatisect, linear, 19.0–113.0 × 0.6–1.5 cm, with a small apical bud moderately to densely covered by hairs, the hairs eglandular similar to those of distal portion of the petioles, chartaceous; **rachises** straight, semi-cylindrical, adaxially grooved, dark brown, moderately to densely covered by hairs on both surfaces, the hairs eglandular similar to those of the distal portion of the petioles; **pinnae** patent to slightly ascending, ovate to triangular, 0.3–1.2 × 0.3–0.7 cm, alternate, gradually tapering proximally, sometimes gradually tapering towards the apex, short-stalked, the stalk 0.4–1.7 mm long, 0.2–0.5 mm diam., cylindrical, dark brown, straight, sometimes curved, adaxial surface of pinnae sparsely to moderately covered by hairs, abaxial surface of pinnae sparsely to moderately covered by hairs

on the veins, the hairs eglandular similar to those of the distal portion of the petioles; **ultimate segments** bifurcate, sometimes simple, margins entire, plane, sometimes recurved, whitish; **veins** usually furcate, sometimes simple, reaching or not the laminae margin. **Sori** along the veins or sometimes spread along of all abaxial surface of the pinnae; **spores** dark brown, proximal surface tuberculate, mainly near trilete aperture, distal surface tuberculate, 51.5–54.0 µm diam.

Distribution and ecology: *Jamesonia cheilanthoides* occurs in Bolivia, Brazil, Peru, and Tristan da Cunha Island, mainly at 2400–3900 m elevation (Tryon 1970). In Brazil, it can be found in cracks of rocks partially shaded in the Itatiaia Mountains (Rio de Janeiro and Minas Gerais States), at 2300–2500 m elevation. It is a threatened species (critically endangered - CR) according to the Red List of Brazilian Flora, version 2012.2 (CNCFlora 2019).

Selected material examined: BRAZIL. Minas Gerais: Itamonte, Parque Nacional do Itatiaia, a caminho da nascente do Rio Aiuruoca, 22°22'21.3"S, 44°40'42.9"W, 2300–2500 m, 11-VII-2007, *A. Salino* et al. 12453 (BHCB). Rio de Janeiro: Itatiaia, Parque Nacional do Itatiaia, caminho para o abrigo Rebouças, 22°23'5.3"S, 44°40'94.3"W, 2400 m, 01-IX-2017, *A.P. Della & C. Mynssen* 50 (RB, SP).

Jamesonia cheilanthoides is characterized by having pinnate-pinnatisect and linear fronds, with indeterminate growth (with small apical bud), ovate to triangular and chartaceous pinnae, abaxially sparsely to moderately covered by hairs on veins, the hairs eglandular, hyaline, tortuous, multicellular, apical cell elongated with apex rounded, and straight rachises.

According to the available online image of the type (S-P barcode S-P6352), the collection site is Mauritius Islands, which was interpreted as an error. This specimen was actually collected in the Tristan da Cunha Island (Tryon 1970).

According to Tryon (1970), this species shows high chromosome number ($n=174$) and considerable morphological variation, mainly due to hybridization.

4. *Jamesonia brasiliensis* × *Jamesonia cheilanthoides*

Gymnogramma longifolia Baker, Ann. Bot. 5: 484. 1891. Lectotype (designated by Tryon 1970): BRAZIL CENTRAL. s.d., *Glaziou* 7017 (K barcode K000633139[image!]; isolectotypes: BM barcode BM000936694[image!]; NY barcodes 00144508 [image!], 00144509[image!]; B barcode B_20_0072891[image!]; P barcode P00603543[image!]; S n.S-R-2675[image!]).

Gymnogramma elongata Grev. & Hook. var. *itaiensis* Brade, Arch. Jard. Bot. Rio de Janeiro 13: 64, tab. 3, 5, Fig. 1–2. 1954. Lectotype first step designated by Tryon (1970) and second step here designed: BRAZIL. Rio de Janeiro: Serra do Itatiaia, Pedra do Altar, 2500 m, III-1937, *A.C. Brade* 15435 (RB barcode 00585705[image!]; isolectotype: RB barcode 00585575[image!]).

Gymnogramma jamesonioides Brade, Arch. Jard. Bot. Rio de Janeiro 13: 64, tab. 4, 5, Fig. 3. 1954. Lectotype first step designated by Tryon (1970) and second step here designed: BRAZIL. Rio de Janeiro: Serra do Itatiaia, Pedra do Eco, 2400 m, III-1937, *A.C. Brade* 15436 (RB barcode 00543307[image!]; isolectotypes: SP!; RB barcode 00585703[image!]; 00585702[image!]).

Figs. 3g-h, 6, 7p-w.

Plants rupicolous or terrestrial. **Rhizomes** short-creeping, 1.2–2.1 mm diam, dark brown, moderately covered by hairs and rigid bristles,

the hairs reddish brown, multicellular, glandular, the apical cell globose to slightly bulbous, 1.7–2.3 mm long, the bristles reddish brown to dark brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2–7 cells wide, apical cell globose to slightly bulbous, 2.7–3.2 mm long. **Fronds** erect to arcuate, indeterminate growth, rarely with determinate growth, 41.0–77.0 × 0.5–2.3 cm; **petioles** cylindrical or semi-cylindrical, adaxially grooved, 14.0–22.0 cm × 0.6–1.0 mm, dark brown, glabrous or sparsely covered by hairs on both surfaces, the hairs in the proximal portion similar to those the rhizomes, in distal portion hairs with 0.5–2.5 mm long, eglandular, hyaline, tortuous, multicellular, the apical cell elongated with apex rounded; **laminae** pinnate-pinnatifid to pinnate-pinnatisect, less frequent pinnate, linear, 24.0–53.0 × 0.5–2.3 cm, with apical bud moderately to densely covered by hairs, the hairs eglandular similar to those of the distal portion of the petioles, chartaceous to coriaceous; **rachises** straight, ellipsoidal, triangular or more often semi-cylindrical, adaxially grooved, dark brown, sparsely to densely covered by hairs on both surfaces, the hairs eglandular similar to those of the distal portion of the petioles; **pinnae** reflexed to slightly ascending, oblong, ovate or orbicular, 0.3–1.4 × 0.2–0.8 cm, alternate to subopposite, abrupt to gradually tapering proximally, sometimes gradually tapering towards the apex, short-stalked, the stalk 0.8–1.6 mm long., 0.3–0.4 mm diam., cylindrical, dark brown, straight to curved, adaxial surface of pinnae sparsely to moderately covered by hairs, abaxial surface of the pinnae moderately to densely covered by hairs, the hairs eglandular similar to those of the distal portion of the petioles; **ultimate segments** orbicular in the proximal portion of the pinnae, ovate in distal portion of the pinnae, the margins entire, sometimes undulate, recurved or not, whitish; **veins** usually furcate, sometimes simple, reaching or not the laminae margin. **Sori** along the veins; **spores** dark brown, proximal surface with coalescent tuberculate, mainly near trilete aperture, distal surface slightly rugose to laevigate, 50.3–64.4 µm diam.

Distribution and ecology: This hybrid taxon occurs in cracks of rocks partially shaded in the Itatiaia Mountains (Rio de Janeiro and Minas Gerais States), at 2400–2500 m elevation.

Selected material examined: BRAZIL. Minas Gerais: Itamonte, 22°22'21.5"S, 45°08'26.9"W, 2500 m, 11-VII-2007, *A. Salino* 12443 (BHCB). Rio de Janeiro: Itatiaia, Parque Nacional do Itatiaia, Pedra do Eco, [22°22'S, 44°37'W], 2400 m, III-1937, *A.C. Brade* s.n. (SP32847).

The specimens hybrid between *Jamesonia brasiliensis* × *J. cheilanthoides* are easily recognized by their aborted or irregular spores and by the intermediate morphology of the plants between the parental species. Sometimes, it is more like one of the parents (pinnae orbicular coriaceous, like in *J. brasiliensis*) or with pinnae ovate to triangular, chartaceous (like in *J. cheilanthoides*). The spores are badly formed due to the exaggerated development of equatorial expansion (Sylvestre 1995; Condaek 2006).

Brade (1954) treated the hybrid as *Gymnogramma elongata* var. *itaiensis* and as *G. jamesonioides*, when comparing these plants with *Jamesonia brasiliensis*, which are very similar, differing, however, by the herbaceous textured of the leaves.

Tryon (1970) observed that *Jamesonia cheilanthoides* and *J. brasiliensis* growing on the edges of the same rock, the first one mainly on the shaded sides or under the suspended rock, and the second in sunny and exposed places. In these places, where these two species occur nearby, there are aggregations of individuals with intermediate

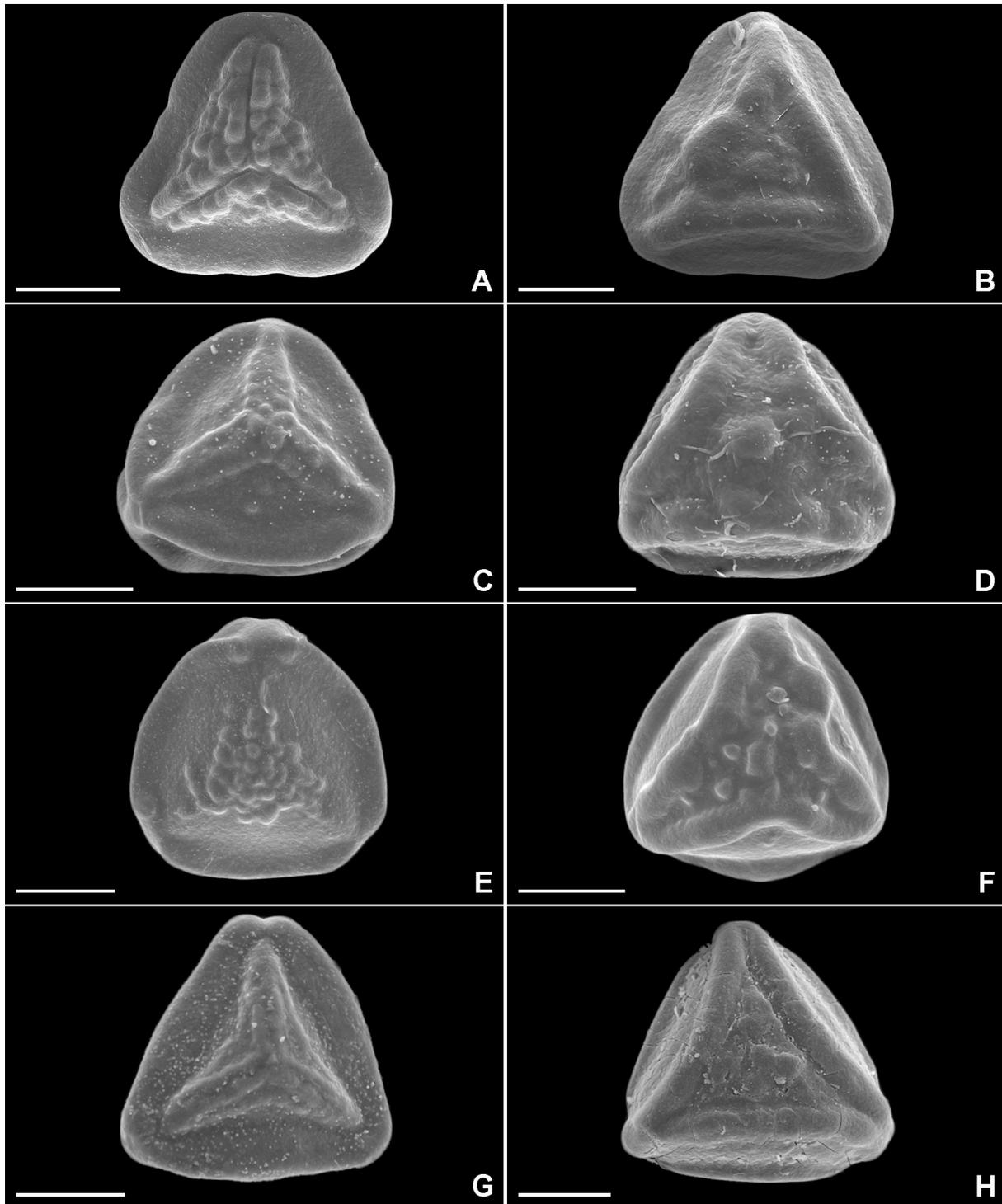


Figure 3. Photomicrographies of *Jamesonia* spores. **A, B.** *Jamesonia biardii*. **C, D.** *Jamesonia brasiliensis*. **E, F.** *Jamesonia cheilanthoides*. **G, H.** *Jamesonia brasiliensis* × *Jamesonia cheilanthoides* not collapsed. Left column showing proximal surface, right column showing distal surface. Scale bars = 20 µm. **A, B.** A.C. Brade 16515 (RB). **C, D.** J. Prado et al. 1122 (SP). **E, F.** A.P. Della & C.M. Mynssen 50 (RB, SP). **G, H.** *s. c., s.n.* (SP 468185).

characteristics and with aborted or irregular spores (Tryon 1970). Some of these forms were recognized as taxonomically distinct (species or varieties), when disassociated from the site of their collection (such as Brade 1954). However, they were interpreted by Tryon (1970) as

elements of a hybrid complex based on field observations and spore irregularity.

5. *Jamesonia flexuosa* (Kunth) Christenh., Phytotaxa 19: 21. 2011. *Grammitis flexuosa* Kunth., Nov. Gen. et Sp. 1: 5. 1815[1816]. *Psilogramme flexuosa* (Kunth) Kuhn., Festschr. 50 Jähr. Jub.

Königstädt. Realschule Berlin: 339. 1882. *Eriosorus flexuosus* (Kunth) Copel., Gen. Fil.: 58. 1947. Lectotype (designated by Tryon 1970): VENEZUELA. Near Caracas, s.d., *Humboldt & Bonpland s.n.* (B barcode B_20_0072743[image!]; isolectotype: P barcode P00603533[image!]).

Figs. 7a-g, 8a-d, 9.

Plants terrestrial. **Rhizomes** short-creeping, 2.5–4.0 mm diam., dark brown, densely covered by hairs and rigid bristles, the hairs reddish brown, multicellular, eglandular (rarely glandular), the apical cell elongated with apex rounded, rarely globose, 0.7–2.3 mm long, the bristles reddish-brown to dark brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 4–6 cells wide, apical cell elongated with apex rounded, less frequent globose, 1.2–3.0 mm long. **Fronds** scrambling or scandent, erect in young (rarely in older plants), indeterminate growth, (sometimes exceeding 4 m length); **petioles** semi-cylindrical, adaxially grooved, 24.0–88.0 × 0.6–1.7 mm (incomplete plant measures), dark brown, glabrous to sparsely covered by hairs, mainly in groove, the hairs 0.2–1.7 mm long, eglandular, dark brown or hyaline, tortuous, multicellular, the apical cell elongate with apex rounded; **laminae** 3-pinnate to 1–2-pinnatisect to 6-pinnate, triangular, 32.0–60.0 × 12.0–24.0 cm (incomplete plant measures), membranaceous to chartaceous; **rachises** flexuous, semi-cylindrical, adaxially grooved, dark brown, abaxially and adaxially glabrous or with sparse hairs, mainly in groove, the hairs eglandular similar to those of the petioles; **pinnae** usually ascending, triangular, 6.0–28.0 (43.0) × 3.0–11.0 (13.0) cm, alternate, gradually tapering towards the apex (pinnatisect), stalked, the stalk 2.0–17.0 mm long, 0.5–2.0 mm diam, semi-cylindrical, adaxially grooved, dark brown, straight, adaxial surface of pinnae glabrous to sparsely covered by hairs, abaxial surface of the pinnae sparsely covered by hairs, mainly in the ultimate segments near sporangia, and on veins, the hairs eglandular similar to those of the petioles; **costae** flexuous, semi-cylindrical, adaxially grooved, dark brown, glabrous to sparsely covered by hairs on both surfaces, mainly in groove, the hairs eglandular similar to those of the petioles; **pinnules** triangular to ovate, 2.0–12.0 × 1.5–5.0 cm; **costules** flexuous, semi-cylindrical, adaxially grooved, dark brown, glabrous or sparsely covered by hairs, mainly in groove, the hairs eglandular similar to those of the petioles; **segments** triangular, 0.8–1.2 × 0.3–0.7 cm; **ultimate segments** bifurcate, sometimes simple, the margin entire, plane, whitish; **veins** usually furcate, not reaching the laminae margin. **Sori** on the veins in the proximal or distal portion of the ultimate segments; **spores** dark brown, proximal surface with coalescent ridges, mainly near trilete aperture, distal surface laevigate, 43.2–50.3 µm diam.

Distribution and ecology: *Jamesonia flexuosa* is the species with broader geographic distribution of the genus. It occurs from southern Mexico to Bolivia, in north and southeast of Brazil and in the Greater Antilles, at 800–4200 m elevation. In Brazil, it can be found in humid places inside of cloud forest, at 1800–2702 m elevation, in the Amazonas, Roraima, and Minas Gerais States. It is a threatened species (in danger - EN) according to the Red List of Brazilian Flora, version 2012.2 (CNCFlora 2019).

Selected material examined: BRAZIL. Amazonas: Santa Isabel do Rio Negro, Parque Nacional do Pico da Neblina, trilha da Bacia do Gelo para Serra do Vento, 00°47'14"N, 66°01'26"W, 2000 m, 22-IX-2012, R.C. Forzza et al. 7280 (RB). Minas Gerais: Catas Altas, Parque

Natural do Caraça, no alto do Pico do Inficionado, 20°08'01.8"S, 43°45'31.1"W, 2030 m, 25-V-2004, A. Salino & R.C. Mota 9576 (BHCB). Roraima: Vira Onça, Monte Roraima, 05°18'N, 60°59'W, 2702 m, 07-I-2008, N.F.O. Mota 1240 (BHCB).

Jamesonia flexuosa is recognized by its 3-pinnate-1–2-pinnatisect to 6-pinnate very divided, scrambling or scandent laminae, with indeterminate growth (can reach up to 4 m in length), triangular, oblong or lanceolate, membranaceous to chartaceous pinnae, adaxial and adaxial surface glabrous or moderately covered by hairs, the hairs eglandular, apical cell are elongated with apex rounded, flexuous rachises, costa, and costule, bifurcate ultimate segments.

Jamesonia flexuosa was erroneously cited by Tryon (1970) for Espírito Santo State in Brazil, based on a collection by *Glaziou 17539*, carried out on the “Cerro Batatal”, which is located adjacent to the Reserva Particular do Patrimônio Natural Santuário do Caraça (Catas Altas) in Minas Gerais State (Salino & Viveros 2012).

According to Tryon (1970), there are many variants of this species, which are products of hybridization with other taxa. Recently, one variety of this species established by the author has been recognized as a distinct species, *Jamesonia galeana* (A.F.Tryon) A.Rojas (in Rojas-Alvarado 2017a). However, the segregation of this taxon was based only on the morphology.

In the specimens analyzed, we can observe a variation in the color of the petioles, rachises, costa, and costule. In the Brazilian and Venezuelan specimens, they are dark brown, whereas in the specimens from Colombia, Ecuador, and Bolivia they are stramineous. The gathering by *M. Sundue et al. 1715* (RB), from Costa Rica, presents rachises moderately covered by hairs on both surfaces.

According to Salino & Viveros (2012), the plants from Minas Gerais State (Serra do Caraça) present glandular hairs on the laminae, mainly on the veins, which have small and globular apical cells, almost inconspicuous. The verified specimens from this locality and those from Amazonas and Roraima States, do not present glandular hairs on the lamina. Glands are rarely seen in the bristles and hairs of the rhizomes, in specimens collected in Serra do Caraça.

6. *Jamesonia insignis* (Mett.) Christenh., Phytotaxa 19: 21. 2011. *Gymnogramma insignis* Mett., Linnaea 36: 70. 1869. *Psilogramme insignis* (Mett.) Kuhn, Festschr. 50 Jähr. Jub. Königstädt. Realschule Berlin: 337. 1882. *Eriosorus insignis* (Mett.) A.F.Tryon, Contr. Gray Herb. 200: 152, Fig. 32. 1970. Lectotype (designated by Tryon 1970): BRAZIL. Border of Rio de Janeiro and Minas Gerais, Serra Negra, 1816–1821, A.F.C.P. Saint-Hilaire B' 72 (B barcode B_20_0072879[image!]; isolectotypes: P barcodes P00603549[image!], P00603550[image!], P00603551[image!]).

Figs. 7h-o, 8e-f, 9.

Plants terrestrial or rupicolous. **Rhizomes** short-creeping, 0.3–3.5 mm diam, dark brown, densely covered by hairs and rigid bristles, the hairs dark brown, multicellular, glandular, the apical cell globose, 0.3–3.0 mm long, the bristles dark brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2–6 cells wide, apical cell globose, 3.0–3.7 mm long. **Fronds** erect or more often semi-scandent, indeterminate growth, 35.0–105.0 × 6.0–20.5 cm; **petioles** semi-cylindrical, adaxially grooved, rarely plane, 16.0–63.0 cm × 1.0–2.0 mm, dark brown, shiny, sparsely to moderately covered by hairs on both surfaces, the hairs in the proximal portion similar to those of the

rhizomes, at distal portion the hairs with 0.4–0.9 mm long, glandular or eglandular, hyaline to dark brown, sometimes bicolorous, erect, multicellular, the apical cell globose or elongated with apex rounded; **laminae** 2-pinnate-pinnatifid to 3-pinnate-pinnatisect, (rarely) pinnate-pinnatisect, triangular to elongate-triangular, 8.0–42.0 × 4.5–20.5 cm, with apical bud densely covered by hairs, the hairs eglandular similar to those at distal portion of the petioles, chartaceous; **rachises** flexuous, sometimes semi-flexuous, semi-cylindrical, adaxially grooved, dark brown, moderately covered by hair on both surfaces, especially in the axils of the pinnae, the hairs eglandular similar to those of the petioles; **pinnae** proximal usually reflexed or patent, distal ascending, triangular, the basiscopic side slightly larger, 2.1–17.5 × 1.2–8.3 cm, alternate, rarely sub opposite, gradually tapering towards the apex (pinnatisect to pinnatifid), long-stalked, the stalk 2.3–11.0 mm long, 0.1–0.7 mm diam., semi-cylindrical, adaxially grooved, dark brown, straight, adaxial surface of pinnae moderately covered by hairs, mainly between the veins, abaxial surface of pinnae moderately to densely covered by hairs mainly on veins, the hairs eglandular similar to those of the petioles; **costae** flexuous, semi-cylindrical, adaxially grooved, dark brown, moderately covered by hairs on both surfaces, the hairs eglandular similar to those of the petioles; **pinnules** ovate to triangular, 1.0–4.0 × 0.7–2.6 cm, alternate, short-stalked, the stalk 0.6–8.0 mm long, 0.6–0.7 mm diam., semi-cylindrical, adaxially grooved, dark brown, straight; **ultimate segments** ovate or orbiculate, margins crenate to denticulate-crenate, usually plane, sometimes slightly recurved, whitish, with hairs eglandular similar to those of the petioles; **veins** furcate, reaching the lamina margin. **Sori** on the veins in distal portion of the segments; **spores** dark brown, proximal surface with coalescent ridges, mainly near trilete aperture, distal surface slightly rugate, 67.1–68.0 μm diam.

Distribution and ecology: *Jamesonia insignis* occurs only in Brazil in the states of Minas Gerais, Paraná, Rio de Janeiro, and São Paulo, in moist and shady places in the cloud forest, rock fields, and high altitude fields, close to outcrops, at 1000–2000 m elevation. There is no record of occurrence for this species in the state of Espírito Santo (in the herbaria visited), but it is estimated that it occurs in this state. It is a threatened species (vulnerable - VU) according to the Red List of Brazilian Flora, version 2012.2 (CNCFlora 2019).

Selected material examined: BRAZIL. Minas Gerais: Carrancas, Serra dos Perdizes, 21°35'11.9"S, 44°35'48.9"W, 1560 m, 02-XII-2007, L.L. Giacomini 3330 (BHCB). Paraná: Campina Grande do Sul, Parque Estadual do Pico do Paraná, 25°15'S, 48°48'W, 1750 m, 22-V-2008, J.B.S. Pereira et al. 274 (UPCB). Rio de Janeiro: Frade de Macaé, [22°15'S, 42°06'W], 1000 m, 17-II-1932, A.C. Brade 15802 (ICN, RB). São Paulo: Campos do Jordão, [22°41'S, 45°28'W], 5–20-II-1937, P.C. Porto 3108 (RB).

Jamesonia insignis is characterized by having 2-pinnate-pinnatifid to 3-pinnate-pinnatisect, triangular fronds, triangular and chartaceous pinnae, with adaxial and abaxial surfaces moderately covered by hairs, the hairs eglandular, hyaline to brown, sometimes bicolorous, erect, apical cell elongated with apex rounded, flexuous rachises, ovate or orbiculate ultimate segments, with several superficial lobes, and the margins crenate to denticulate-crenate.

The presence of this species in the state of Paraná has been recently confirmed in a checklist of ferns and lycophytes from the highlands of the Pico Paraná State Park (Pereira & Labiak 2018). This is the southernmost location of its distribution.

Some studied specimens present morphological variations: The plants from Paraná State (p.e., *V. Ariati et al. 1220*; *J.B.S. Pereira et al. 274*) are smaller and less divided (pinnate-pinnatisect), whereas few specimens of the Rio de Janeiro State (p.e., *Santos-Lima 417*; *A.C. Brade s.n. (RB 33995)*) have robust leaves with few lobes and fully brown hairs on the fronds. According to Tryon (1970), these variations probably reflect different levels of ploidy, but this hypothesis was not tested in the present account. Additionally, some fronds have flexuous rachises more demarcated than others.

The plants from Paraná can be confused with *Jamesonia rufescens* by the shape and size of the frond and ultimate segments, as well as by the crenate margin of the segments. However, it is distinguished by presence of glandular hairs and bristles on the rhizome, whereas *J. rufescens* has eglandular hairs and bristles. In addition, *J. insignis* has flexuous or slightly flexuous rachises (vs. straight in *J. rufescens*).

7. *Jamesonia* × *intermedia* A.P.Della & J.Prado, Amer. Fern J. 110(1): 20–28, Fig. 1G–L, 2–5. 2020. Type: BRAZIL. Rio de Janeiro: Petrópolis, Parque Nacional da Serra dos Órgãos, Bonfim, Pico do Alcobaça, 22°28'22.9"S, 43°07'00.4"W, 1689 m, 27-II-2019, A.P. Della et al. 69 (holotype: SP; isotypes: NY, RB, SPF).

Figs. 4g-h, 8g-h, 10a-k, 11, 14a-c.

Plants terrestrial or rupicolous. **Rhizomes** short-creeping, 2.5–3.0 mm diam, dark brown, densely covered by hairs and bristles, the hairs dark brown, multicellular, glandular, the apical cell globose, 0.2–2.2 mm long, the bristles dark brown, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2–5 cells wide, apical cell globose, 1.3–2.4 mm long. **Fronds** semi-scandent, indeterminate growth, 83.0–125.0 × 13.0–19.5 cm; **petioles** semi-cylindrical, adaxially grooved, 60.0–92.5 cm × 0.6–1.6 mm, bicolorous (proximally dark brown and distally stramineous) on young plants and concolorous (dark brown) on adult plants, at proximal portion moderately covered by hairs on both surfaces, at distal portion sparsely covered by hairs to glabrous on both surfaces, the hairs with 0.3–1.6 mm long, glandular or eglandular, hyaline to dark brown, sometimes bicolor, erect, multicellular, the apical cell globose or elongated with apex rounded; **laminae** 2-pinnate-pinnatisect to 3-pinnate-pinnatifid, triangular, 18.0–32.5 × 13.0–19.5 cm, coriaceous; **rachises** flexuous, semi-cylindrical, adaxially grooved, stramineous in young plants and brown in adult plants, abaxially and adaxially glabrous or with sparse hairs, mainly in the groove and on the axils of the pinnae, the hairs eglandular, similar to those of the petioles; **pinnae** usually ascending, triangular, the basiscopic side slightly larger, 5.0–12.5 × 3.5–8.0 cm, alternate, gradually tapering towards the apex (pinnatisect, long-attenuate), long-stalked, the stalk 9.0–27.0 mm long, 0.6–1.2 mm diam, semi-cylindrical, adaxially grooved, stramineous in young plants and brown in adult plants, straight, adaxial surface of pinnae glabrous to sparsely covered by hairs, abaxial surface of pinnae sparsely to moderately covered by hairs, mainly on veins, the hairs eglandular, similar to those of the petioles; **costae** flexuous, semi-cylindrical, adaxially grooved, stramineous in young plants and brown in adult plants, abaxially and adaxially glabrous or with sparse hairs, mainly in the groove, the hairs eglandular, similar to those of the petioles; **pinnules** triangular, sometimes ovate, 1.2–4.5 × 1.0–3.7 cm, alternate, short-stalked, the stalk 4.0–1.2 mm long, 0.6–0.8 mm diam, semi-cylindrical, adaxially grooved, stramineous in young plants and brown in adult plants, straight; **costules** flexuous,

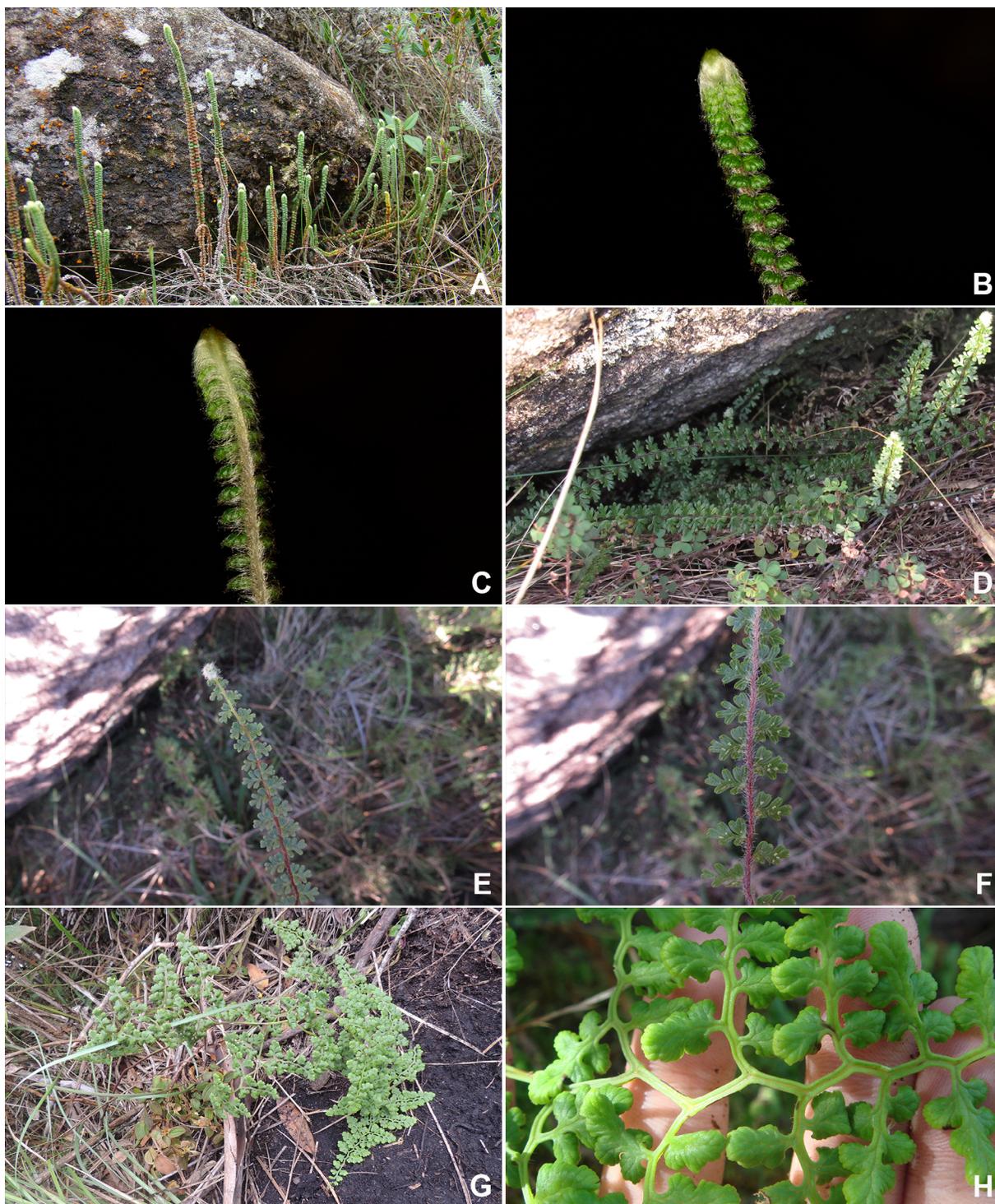
Jamesonia (Pteridaceae) in Brazil

Figure 4. A–C. *Jamesonia brasiliensis*. A. Habit. B, C. Adaxial and abaxial surfaces of the frond, respectively. D–F. *J. cheilanthoides*. D. Habit. E, F. Adaxial and abaxial surfaces of the frond, respectively. G–H. *J. × intermedia*. G. Habit. H. Adaxial surface of the pinna. A–C. *J. Prado & R.Y. Hirai 1122* (SP). D–F. *A.P. Della & C.M. Mynssen 50* (RB, SP). G. *J.M. Braga 17-002* (RB). H. *A.P. Della et al. 67* (SP). Photos: A–C. R.Y. Hirai & J. Prado. D–F. T.V. Costa. G. J.M. Braga. H. A.P. Della.

semi-cylindrical, adaxially grooved, stramineous in young plants and brown in adult plants, abaxially and adaxially glabrous or with sparse hairs, mainly in the groove, the hairs eglandular, similar to those of the petioles; **ultimate segments** triangular to ovate, 0.4–1.5 × 0.4–1.0 cm, margins crenate, plane to recurved, whitish; **veins** usually furcate

reaching the laminae margin. **Sori** on the veins, forming several lines along the segments; **spores** dark brown, without content, proximal surface with coalescent ridges, mainly near trilete aperture, distal surface, laevigate, 40.0–60.0 μm diam.

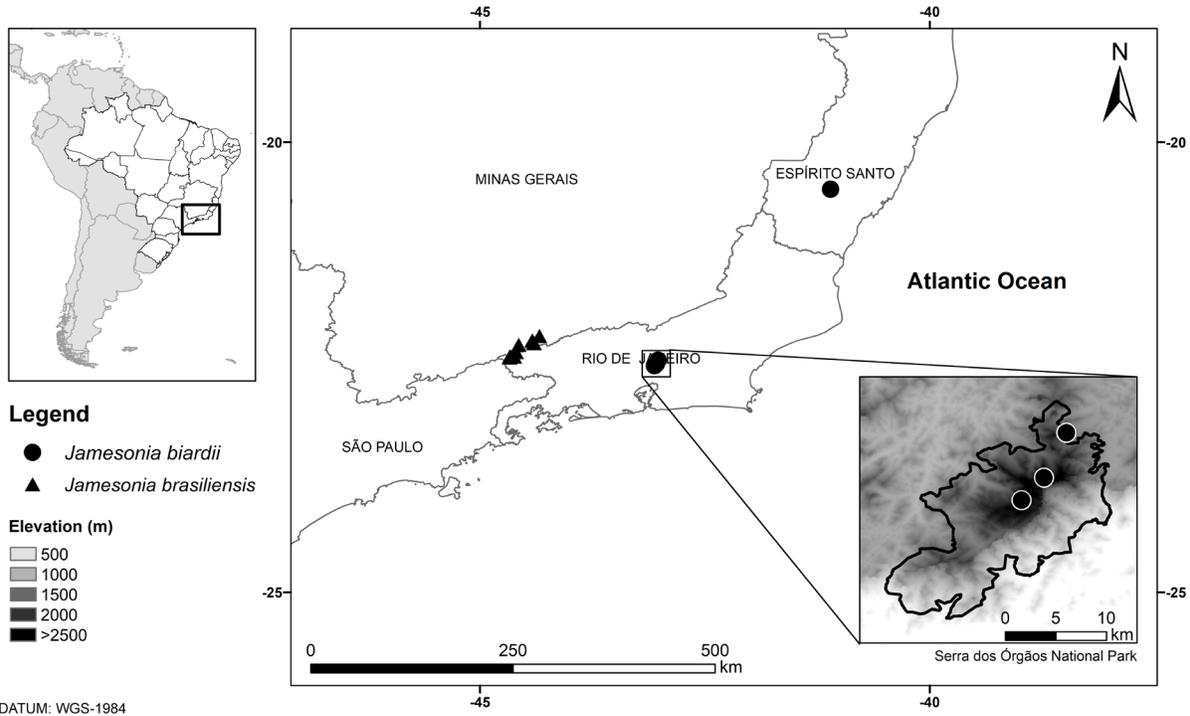


Figure 5. Distribution of *Jamesonia biardii* and *J. brasiliensis* in Brazil. In highlight it is the area of the Parque Nacional da Serra dos Órgãos.

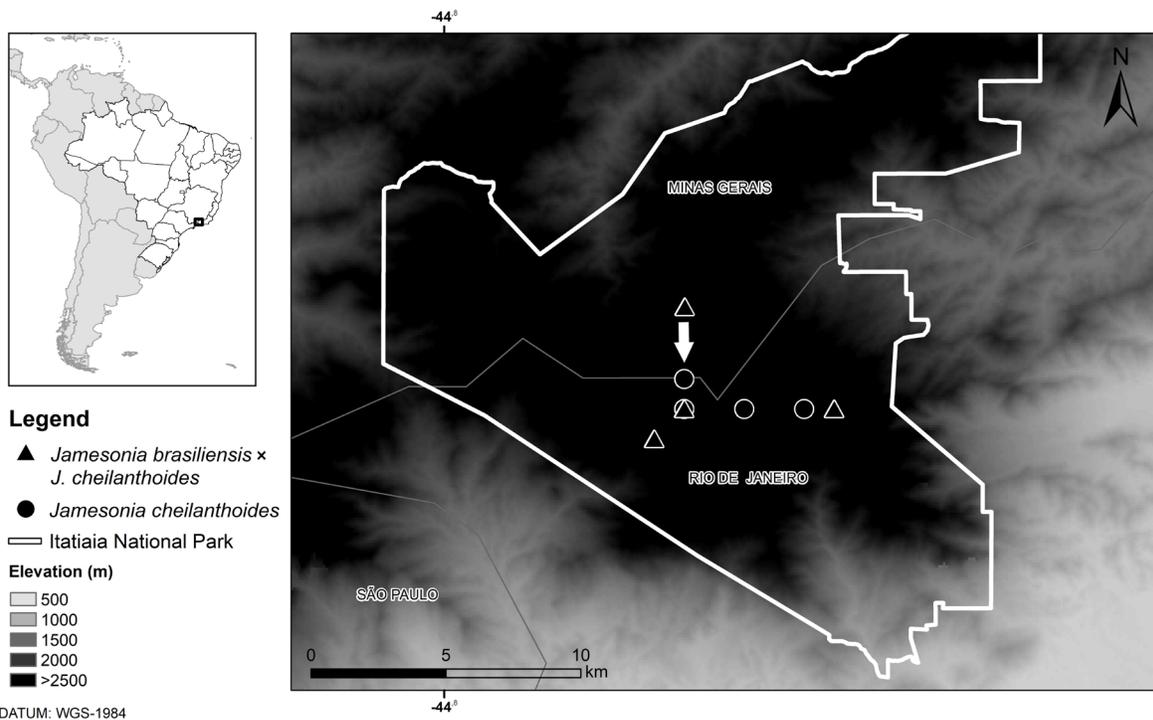


Figure 6. Distribution of *Jamesonia cheilanthoides* and *J. brasiliensis* × *J. cheilanthoides* in Brazil. In the highlight area is located the Parque Nacional do Itatiaia. The arrow indicates that the hybrid occurs at the same point as *Jamesonia cheilanthoides*.

Jamesonia (Pteridaceae) in Brazil

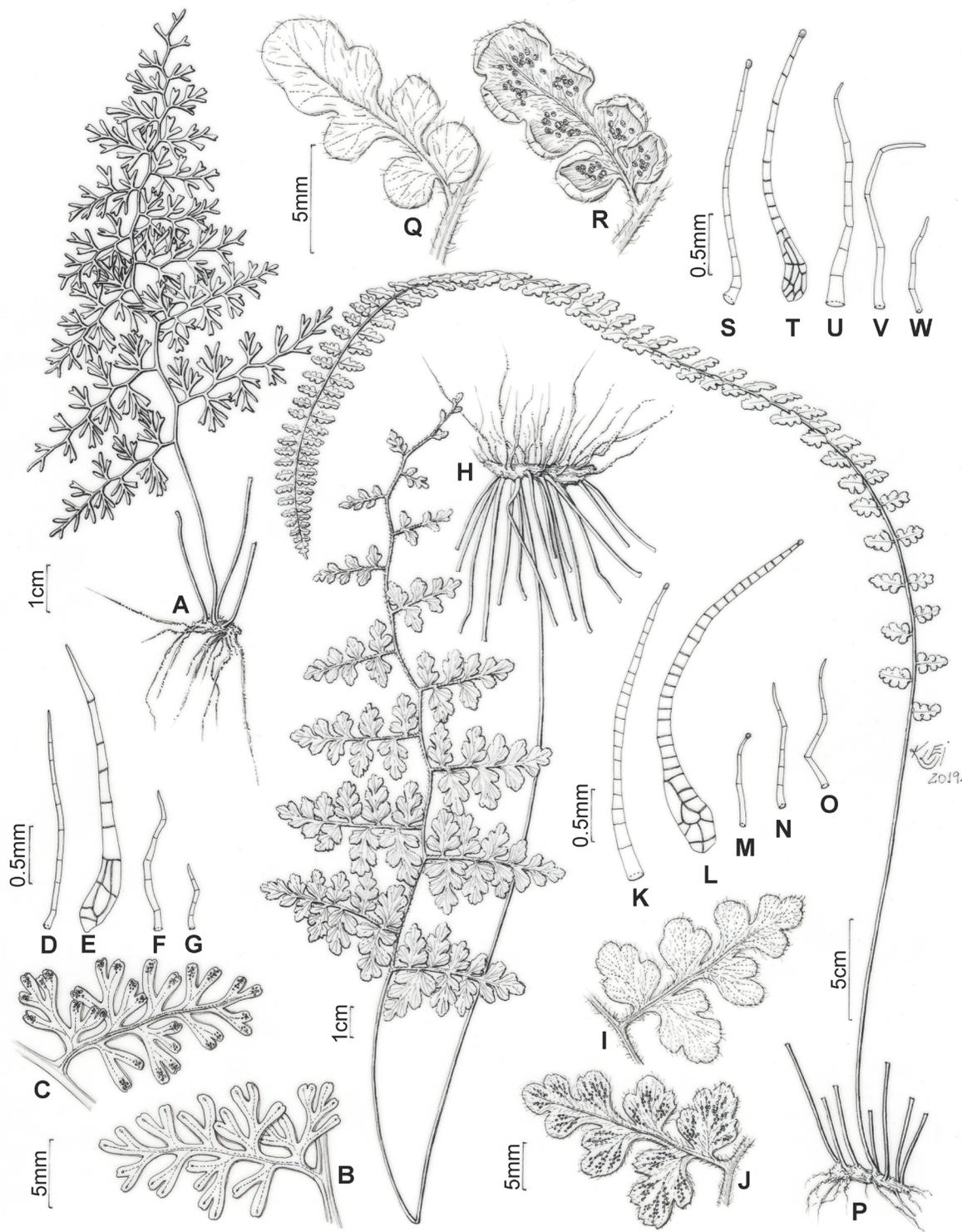


Figure 7. A–G. *Jamesonia flexuosa*. A. Habit. B, C. Adaxial and abaxial surfaces of the pinnule, respectively. D, E. Hair and bristle of the rhizome. F. Hair of the petiole and rachis. G. Hair of the lamina. H–O. *J. insignis*. H. Habit. I, J. Adaxial and abaxial surfaces of the pinnule, respectively. K, L. Hair and bristle of the rhizome. M, N. Hairs of the petiole. O. Hair of the rachis and lamina. P–W. *J. brasiliensis* × *J. cheilanthoides*. P. Habit. Q, R. Adaxial and abaxial surfaces of the pinna, respectively. S, T. Hair and bristle of the rhizome. U. Hair of the petiole and rachis. V, W. Hairs of the adaxial and abaxial surfaces of the lamina. A–G. R.C. Forzza et al. 7257 (RB). H–O. J. Prado et al. s.n. (SPF 60080). P–W. s. c. s.n. (SP 468185).

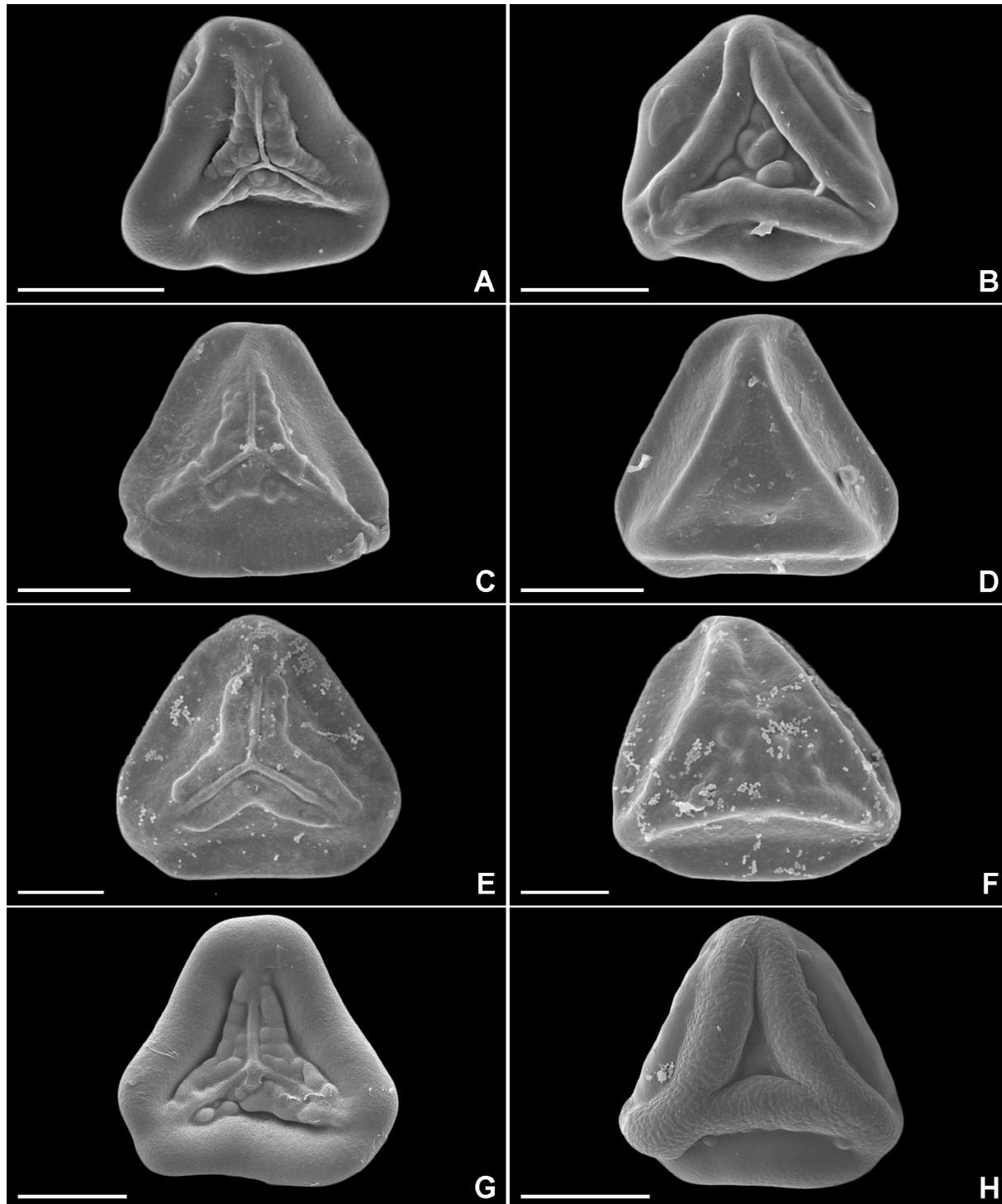


Figure 8. Photomicrographies of *Jamesonia* spores. **A, B.** *Jamesonia flexuosa*, from Brazil. **C, D.** *Jamesonia flexuosa*, from Colombia. **E, F.** *Jamesonia insignis*. **G, H.** *Jamesonia* ×*intermedia* collapsed. Left column showing proximal surface, right column showing distal surface. Scale bars = 20 μ m. **A, B.** R.C. Forzza et al. 7280 (RB). **C, D.** A.E. Brant & G.E. Martinez 1365 (MBM). **E, F.** V. Ariati et al. 1220 (MBM). **G, H.** A.P. Della et al. 72 (SP).

Distribution and ecology: This hybrid taxon is endemic to Brazil and occurs only in the Serra dos Órgãos, in the Rio de Janeiro State. It grows at the edge of the trail to the Pico do Alcobaça, at 1650–1670 m elevation. The soil of this region is shallow, dark, and humid, arranged under a rocky slab. The plant was found between grasses and bromeliads.

Selected material examined: BRAZIL. Rio de Janeiro: Petrópolis, Parque Nacional da Serra dos Órgãos, Bonfim, Pico do Alcobaça, 22°28'17"S, 43°07'00"W, 1650 m, 04-VI-2017, J.M.A. Braga 17-002 (RB).

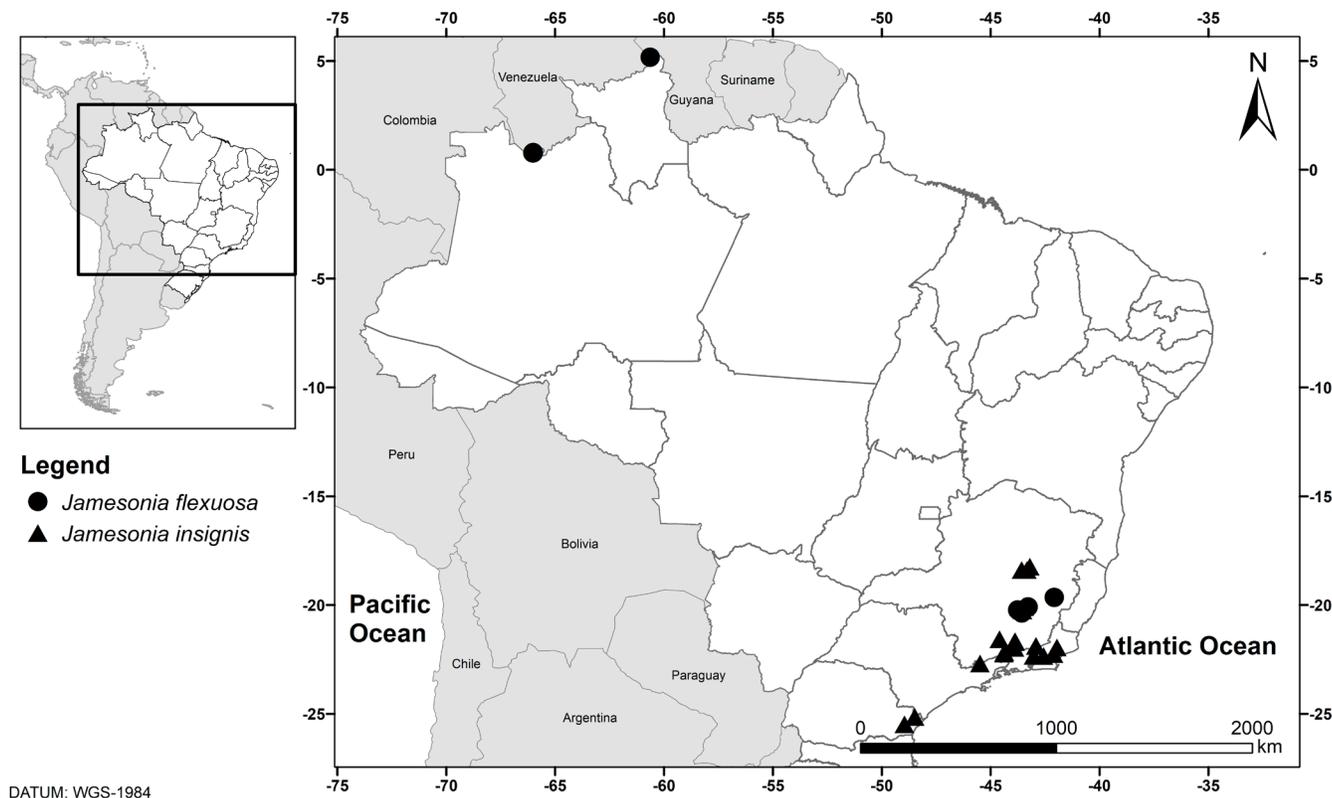
Jamesonia (Pteridaceae) in Brazil

Figure 9. Distribution of *Jamesonia flexuosa* and *J. insignis* in Brazil.

Jamesonia ×intermedia is recognized by its 2-pinnate-pinnatisect to 3-pinnate-pinnatifid laminae, triangular and coriaceous pinnae, with adaxial surface glabrous or with sparse hairs, abaxial surface moderately covered by hairs, mainly on veins, the hairs eglandular, hyaline, tortuous, apical cell elongated with apex rounded, rachises, costa and costule flexuous and stramineous in young plants and brown in adult plants, and elongate-triangular to ovate ultimate segments, with several superficial lobes, with crenate margins.

This taxon is a hybrid between *Jamesonia insignis* and *J. biardii* (Della et al., 2020). With the first shares size and shape of the pinnae, pinnules, and ultimate segments, as well as crenate margin of the lamina. With the second, it shares the pubescence of the lamina and rachises. Also, it presents withered spores, without content. See Della et al. (2020) for more details about distribution, ecology, and comments about this hybrid.

8. *Jamesonia osteniana* (Dutra) G.J.Gastony, Syst. Bot. 28(3): 490–502. 2003. *Anogramma osteniana* Dutra, Ostenia (Montevideo): 5–6, Figs. 1–2. 1933. Lectotype (designated by Nakazato & Gastony 2003): BRAZIL. Rio Grande do Sul: São Leopoldo, Morro das Pedras, 01-IX-1932, *J. Dutra* 48 (ICN!; isolectotypes: R!; BM barcodes BM000936633[image!], BM000936632[image!]; P barcode P00602783[image!], S n.S-R-323[image!]; US barcode 00142043[image!]). Figs. 11, 12a-e, 13a-b, 14d-e.

Plants terrestrial. **Rhizomes** erect, short, 0.5–1.2 mm diam., castaneous, moderately covered by hairs, the hairs hyaline, 2–4-celled,

glandular, the apical cell globose, 0.1–0.5 mm long. **Fronds** erect, determinate growth, 0.8–6.8(–8.5) × 0.6–2.2(–2.6) cm; **petioles** semi-cylindrical, adaxially grooved, to plane, 0.4–4.5 cm × 0.2–0.5 mm, bicolorous, proximally castaneous, distally stramineous, sparsely to moderately covered by hairs on both surfaces, the hairs glandular similar to those of the rhizomes; **laminae** 1-pinnatisect, 2-pinnatisect-pinnatifid, 1-pinnate-2-pinnatisect, ovate or deltate, 0.4–3.2(–4.2) × 0.6–2.2(–2.6) cm, membranaceous; **rachises** straight, semi-cylindrical, adaxially grooved, to plane, stramineous, sparsely to moderately covered by hairs on both surfaces, the hairs glandular similar to those of the rhizomes; **pinnae** ascending, deltate, 0.6–1.5 × 0.5–1.0 cm, alternate, gradually tapering towards the apex (pinnatisect to pinnatifid), stalked, the stalk 2.0–3.0 mm long, 0.3–0.4 mm diam., semi-cylindrical, adaxially grooved, stramineous, straight, sparsely to moderately covered by hairs on both surfaces, the hairs glandular similar to those of the rhizomes; **costae** inconspicuous, sparsely to moderately covered by hairs on both surfaces, the hairs glandular similar to those of the rhizomes; **segments** deltate; **ultimate segments** frequently bifurcate, sometimes simple, margins entire, sometimes undulate, plane, whitish, with hairs, the hairs glandular similar to those of the rhizomes; **veins** usually furcate, sometimes simple, not reaching the lamina margin. **Sori** on veins at distal portion of the segments; **spores** dark brown, proximal surface tuberculate, mainly near trilete aperture, distal surface laevigate, 48.8–49.4 μm diam.

Distribution and ecology: *Jamesonia osteniana* occurs in humid ravines along roadsides and river margins in the Rio Grande do Sul State (Brazil). Also, in Uruguay between rocks, at 50–140 m elevation. In

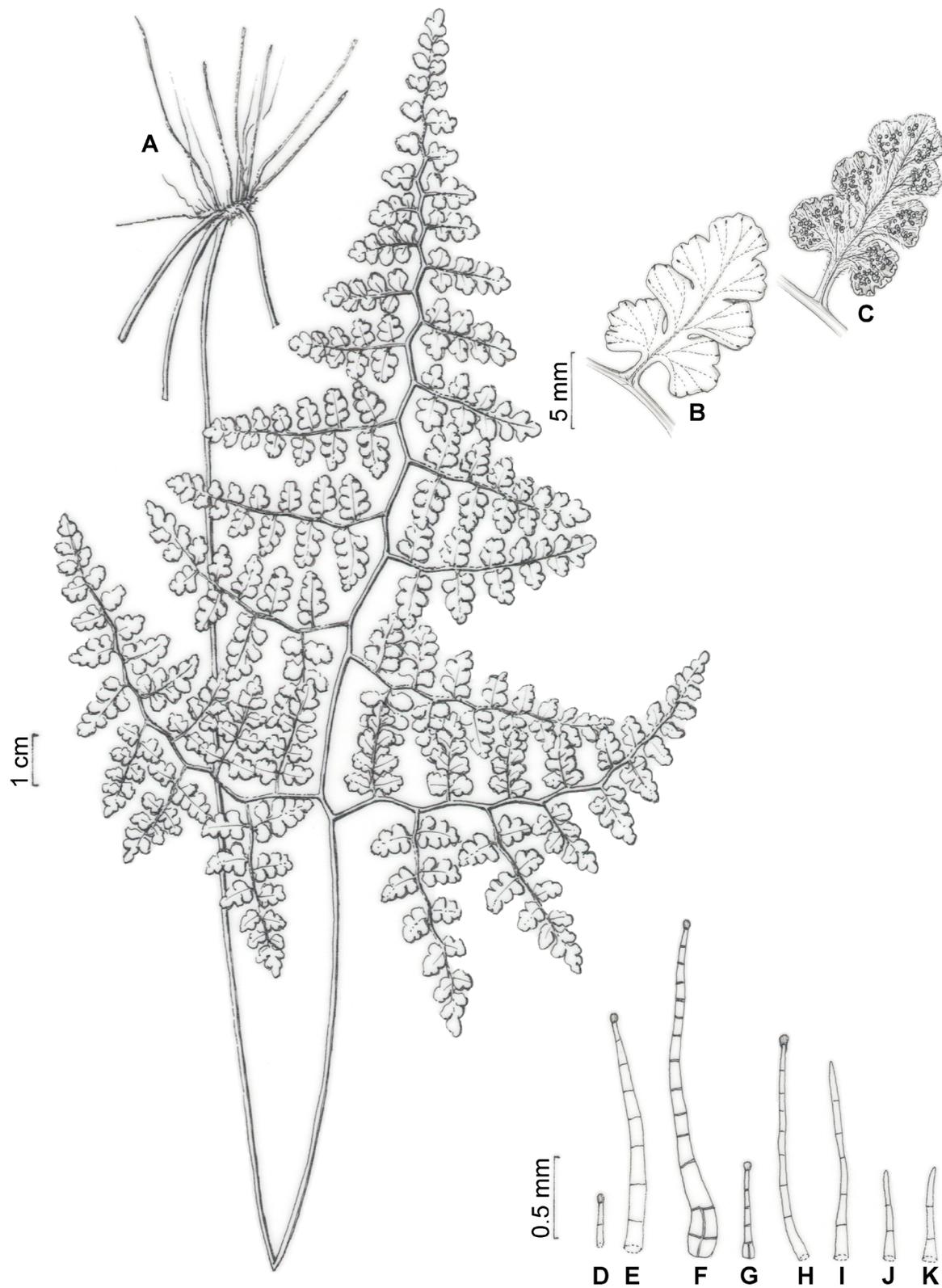


Figure 10. A–K. *Jamesonia xintermedia*. **A.** Habit. **B, C.** Adaxial and abaxial surface of the pinnule, respectively. **D, E.** Hairs of the rhizome. **F, G.** Bristles of the rhizome. **H, I.** Hairs of the petioles. **J.** Hair of the rachis. **K.** Hair of the lamina. **A–K.** *A.P. Della et al. 69 (SP).*

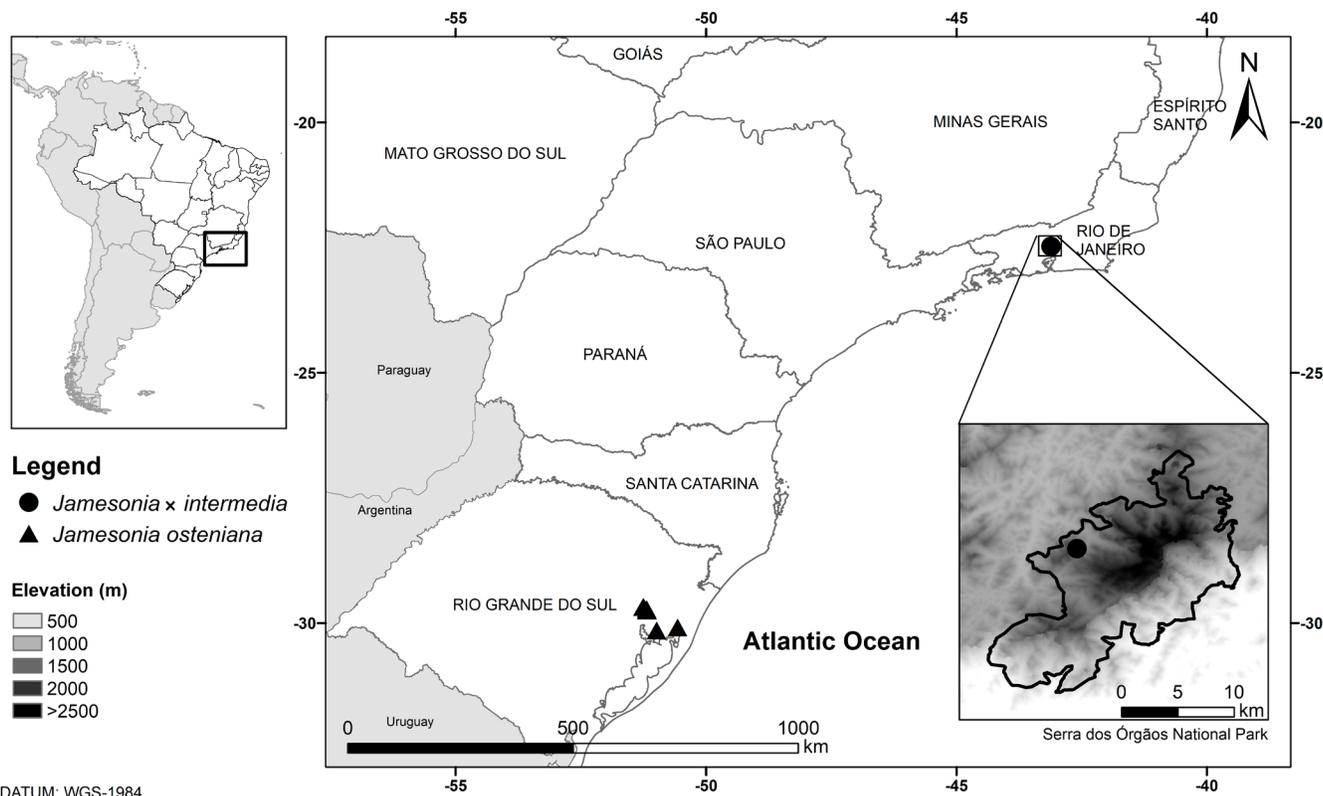
Jamesonia (Pteridaceae) in Brazil

Figure 11. Distribution of *Jamesonia* *x* *intermedia* and *J. osteniana* in Brazil. In the highlight area is located the Parque Nacional da Serra dos Órgãos.

Viamão (Rio Grande do Sul), a small population was verified in a ravine of roadside, between grasses, in an area of cattle pasture and cultivation of *Pinus*. The plants were present in small spots without vegetation around, with exposed soil. It is a plant with annual sporophyte (the sporophyte is “visible” and fertile, usually from September to January). The period between September and October is the best one to collect this species. This species was included in the list of priority species for conservation in Uruguay, because it is considered a threatened species (Soutullo et al. 2009).

Selected material examined: BRAZIL. Rio Grande do Sul: Viamão, Beco do Pesqueiro, [30°09’S, 50°57’W], 07-XI-2018, *A.P. Della* et al. 55 (SP).

This species is easily recognized by its small size (maximum 8.5 cm tall), 1-pinnatisect to 2-pinnatisect-pinnatifid, ovate or deltate, membranaceous laminae, sparsely to moderately covered on both surfaces by glandular, hyaline, 2–4-celled hairs, straight rachises, frequently bifurcate and, sometimes, simple ultimate segments, with entire or, sometimes, with undulate and plane margins.

This taxon was described as part of the genus *Anogramma*, but Nakazato & Gastony (2003), based on molecular phylogenetic analyses, found that *A. osteniana* is sister and more closely related to *Jamesonia* and *Eriosorus*. This species forms a monophyletic group together another species of these two genera and with high support (ML = 100). So it was combined into *Jamesonia*. The similarity of the laminae and spores have already been indicative of the phylogenetic proximity of *A. osteniana* with *Jamesonia* and *Eriosorus* (Nakazato & Gastony 2003).

However, this species can be distinguished from other *Jamesonia* by the presence of erect rhizome, covered only by glandular hairs and absence of bristles; by the color of the rachis stramineous, rather than brown or dark brown; and by the short (few cells) glandular hairs of the laminae. Additionally, this species is annual and occurs at 50–140 m elevation (vs. perennial plants and growing in high elevations). The phylogenetic position of this species is being studied by the present authors and the results will be part of another paper.

9. *Jamesonia rufescens* (Fée) Christenh., Phytotaxa 19: 21. 2011. *Gymnogramma rufescens* Fée, Gen. Filic.: 181, t. 19C, Fig. 3. 1852. *Psilogramme rufescens* (Fée) Kuhn, Festschr. 50 Jähr. Jub. Königstätt. Realschule Berlin: 336. 1882. *Eriosorus rufescens* (Fée) A.F. Tryon., Rhodora 65: 56. 1963. Lectotype (here designated): PERU. s.d., *Mathews 1814* (P barcode P00603554[image!]; isolectotype: P barcode P00603564[image!]).

Figs. 12f-l, 13c-f, 14f-h, 15.

Plants rupicolous or terrestrial. **Rhizomes** short-creeping, 1.0–3.0 mm diam, dark brown, moderately to densely covered by hairs and bristles, the hairs reddish brown to black, multicellular, eglandular, the apical cell elongated with apex rounded, 1.0–1.4 mm long, the bristles dark brown to black, with darker-colored thickened transverse cell walls, apex long-filiform, base with 2 cells wide, apical cell elongated with apex rounded, 1.0–1.4 mm long. **Fronds** erect to arcuate, determinate growth, 6.0–47.0 × 1.1–8.0 cm; **petioles** semi-cylindrical, adaxially grooved, 1.4–36.0 cm × 0.6–1.0 mm, dark brown, moderately to densely covered by hairs on both surfaces, the hairs at the proximal portion

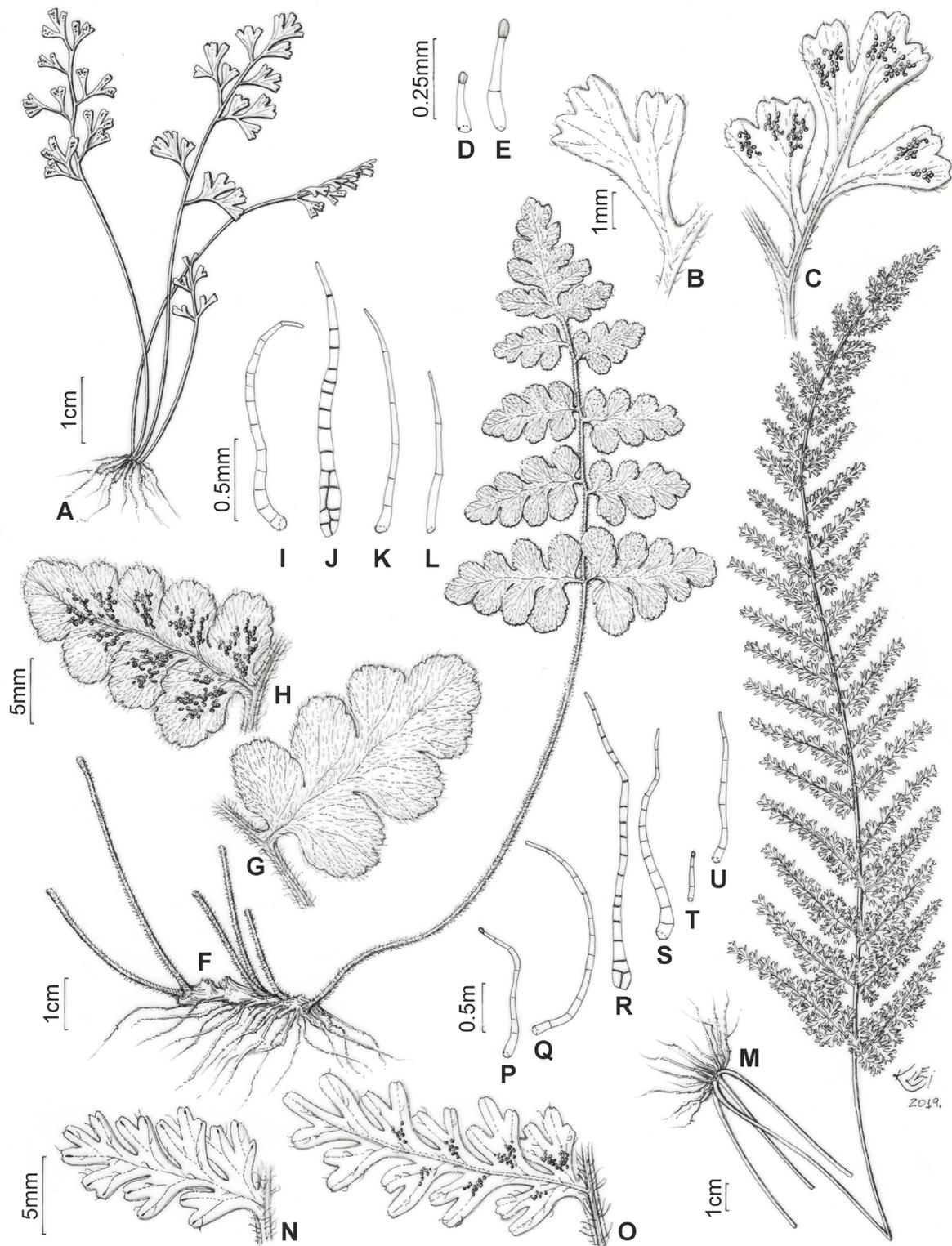


Figure 12. A–E. *Jamesonia osteniana*. A. Habit. B, C. Adaxial and abaxial surfaces of the lamina, respectively. D, E. Hair of the rhizome, petiole, rachis and lamina. F–L. *J. rufescens*. F. Habit. G, H. Adaxial and abaxial surfaces of the pinna, respectively. I, J. Hair and bristle of the rhizome. K. Hair of the petiole and rachis. L. Hair of the lamina. M–U. *J. sp.* M. Habit. N, O. Adaxial and abaxial surfaces of the pinna, respectively. P–R. Hairs and bristle of the rhizome. S, T. Hairs of the petioles. U. Hair of the rachis and lamina. A. A.P. Della et al. 55 (SP). B–E. Leite 1851 (SP). F–L. J.P.S. Condack & C.B. Gomes 721 (FCAB). M–U. R.C. Forzza et al. 7203 (RB).

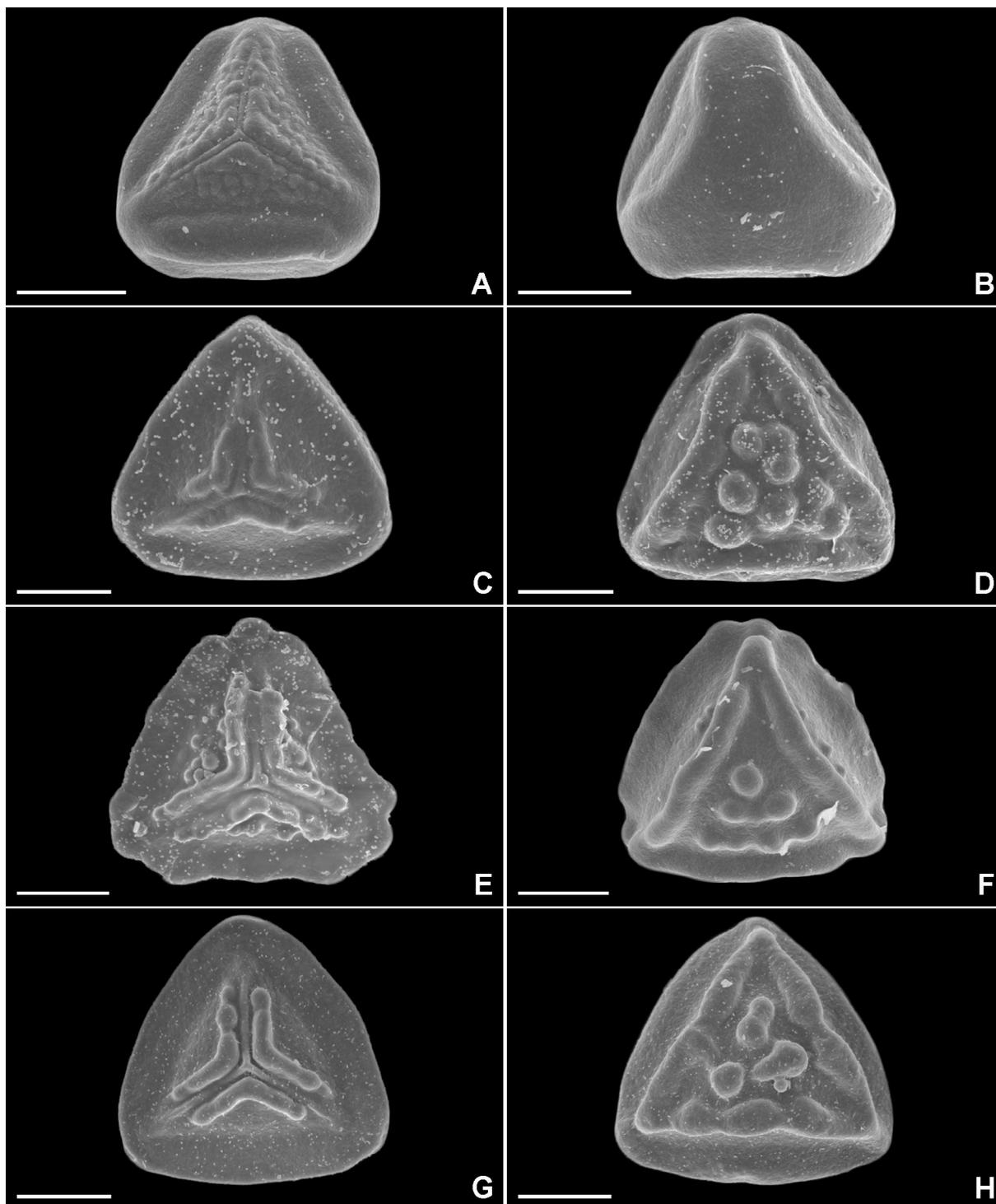


Figure 13. Photomicrographies of *Jamesonia* spores. **A, B.** *Jamesonia osteniana*. **C, D.** *Jamesonia rufescens*, from Brazil. **E, F.** *Jamesonia rufescens*, from Bolivia. **G, H.** *Jamesonia* sp. Left column showing proximal surface, right column showing distal surface. Scale bars = 20 μ m. **A, B.** A.P. Della et al. 56 (SP). **C, D.** J.P.S. Condock & C.B. Gomes 721 (FCAB). **E, F.** Solomon 16157 (MBM). **G, H.** R.C. Forzza et al. 7203 (RB).

similar to those of the rhizome, at distal portion the hairs with 1.0–2.0 mm long, eglandular, brown to hyaline, sometimes bicolorous, erect to slightly tortuous, multicellular, the apical cell elongated with apex rounded; **laminae** pinnate-pinnatisect to pinnate-pinnatifid, triangular, sometimes ovate, 2.0–12.3 \times 1.1–8.0 cm, chartaceous to coriaceous; **rachises** straight, semi-cylindrical, adaxially grooved, dark brown,

moderately to densely covered by hair on both surfaces, the hairs eglandular similar to those of the distal portion of the petioles; **pinnae** patent to ascending, triangular to ovate, the basiscopic side slightly larger, 1.1–4.5 \times 0.5–3.0 cm, alternate to opposite, gradually tapering towards the apex (pinnatisect to pinnatifid), sessile to short-stalked, the stalk 0.2–2.0 mm long., 0.7–1.3 mm diam, semi-cylindrical, adaxially



Figure 14. A–C. *Jamesonia* ×*intermedia*. A. Abaxial surface of the lamina. B. Apex of the frond. C. Young frond. D–E. *J. osteniana*. D. Habit. E. Abaxial surface of the lamina. F–H. *J. rufescens*. F. Habit. G, H. Adaxial and abaxial surfaces of the pinna, respectively. A. J.M. Braga 17-002 (RB). B. A.P. Della et al. 67 (SP). C. A.P. Della et al. 69 (SP). D, E. A.P. Della et al. 55 (SP). F–H. A.P. Della et al. 74 (SP). Photos: A. J.M. Braga. B, C and F–H. A.P. Della. D, E. S. Bordignon.

grooved, dark brown, often with laminae decurrent, straight, adaxial surface of pinnae moderately to densely covered by hairs, abaxial surface of pinnae moderately to densely covered by hairs, mainly on veins, the hairs eglandular similar to those at distal portion of the petioles; **ultimate segments** ovate, the margin crenate, plane, sometimes

recurved, whitish, with hairs eglandular similar to those at distal portion of the petioles; **veins** furcate reaching or not the laminae margin. **Sori** on veins, forming several lines along the segments; **spores** dark brown, proximal surface with coalescent ridges, mainly near trilete aperture, distal surface strongly tuberculate, 59.3–60.0 µm diam.

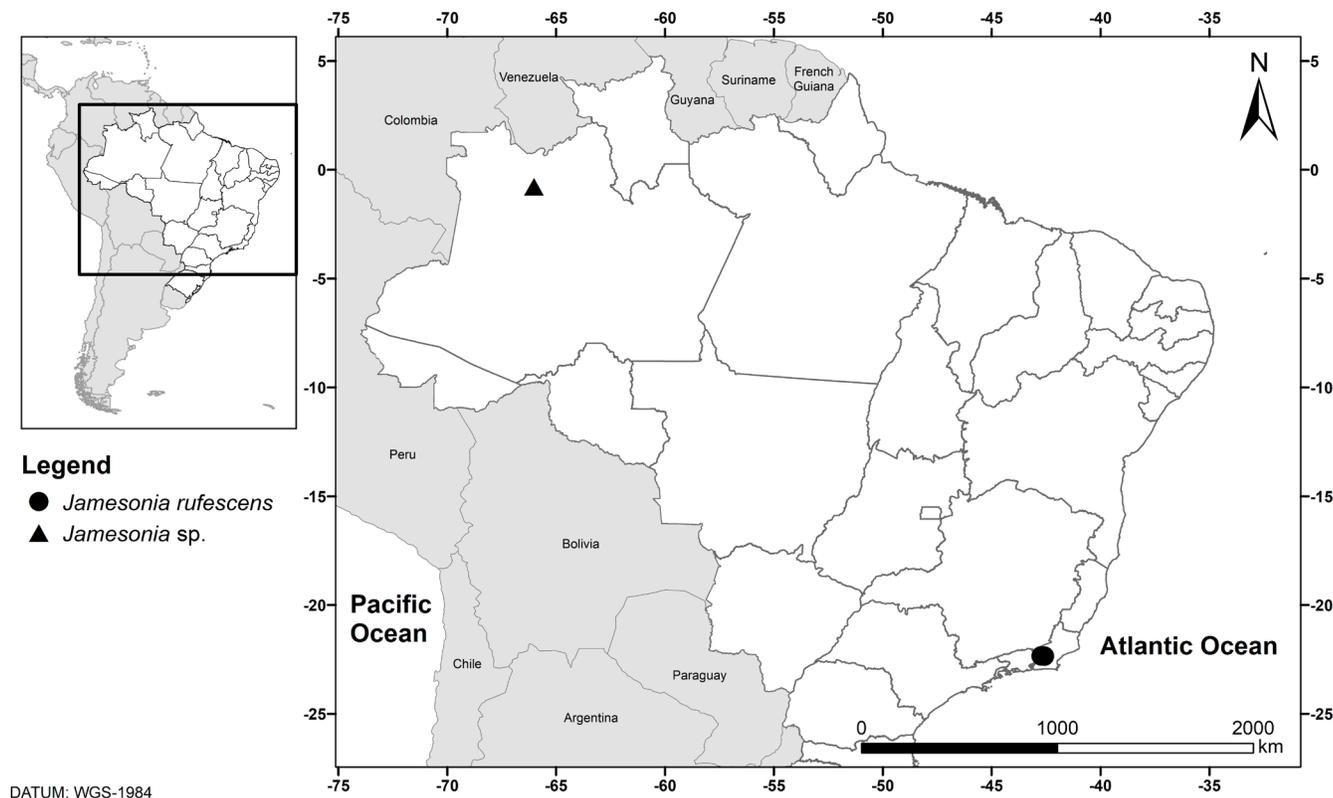
Jamesonia (Pteridaceae) in Brazil

Figure 15. Distribution of *Jamesonia rufescens* and *Jamesonia* sp. in Brazil.

Distribution and ecology: *Jamesonia rufescens* occurs in Bolivia, Brazil, Colombia, Ecuador, Peru, and Venezuela, at 2000–3600 m elevation (Tryon 1970). In Brazil, it can be found in Parque Estadual dos Três Picos (PETP), Rio de Janeiro State, at 2000 m elevation. It grows in a partially shaded place, with dark and shallow soil, arranged on a rock slab. It is a threatened species (critically endangered - CR) according to the Red List of Brazilian Flora, version 2012.2 (CNCFlora 2019).

Selected material examined: BRAZIL, Rio de Janeiro: Nova Friburgo, Parque Estadual dos Três Picos, trilha para os Picos Menor e Médio, [22°20'S, 42°43'W], 02-III-2019, *A.P. Della* et al. 73. (SP); Pico da Caledônia, [22°35'S, 42°57'W], 25-V-1952, *Capell s.n.* (FCAB 0273).

Jamesonia rufescens is recognized by its pinnate-pinnatisect to pinnate-pinnatifid, triangular or sometimes ovate lamina, triangular to ovate pinnae, moderately to densely covered by hairs, the hairs eglandular, brown to hyaline, sometimes bicolorous, erect to slightly tortuous, apical cell elongated with apex rounded, straight rachises, ovate ultimate segments, with several superficial lobes, and crenate margins.

Tryon (1970) selected the published illustration to be the lectotype of *Gymnogramma rufescens*. However, the original material was located at Paris Herbarium and according to the Article 9.12 of the International Code of Nomenclature for Algae, Fungi, and Plants (Turland et al. 2018), in the designation of a lectotype, specimens have priority over illustrations. So, the original material at P herbarium was chosen as the lectotype. Tryon (1970) did not mention the presence of this species

in Brazil. Only Windisch (1984) published a paper that presented its occurrence. He discussed the similarity of the plant collected by *Capell s.n.* (FCAB 0273), in the Pico da Caledônia, with *Jamesonia rufescens* described by Tryon (1970). Windisch (1984) concluded that it is another case of disjunction between species occurring in the Andes and in high regions of the southeastern of Brazil.

The Brazilian plants present only eglandular hairs on the rhizomes, petioles, rachises, and laminae, whereas a analyzed plant from Bolivia (*J.C. Solomon 16157*, MBM, MO) shows glandular hairs on the petioles, rachises, and laminae. It suggests that the Brazilian plants can be a distinct species, but more studies are necessary to confirm this assumption.

10. *Jamesonia* sp.

Figs. 12m-u, 13g-h, 15.

Plants terrestrial. **Rhizomes** short-creeping, 1.5–2.5 mm diam., dark brown, densely covered by tortuous hairs and bristles, the hairs golden-brown, multicellular, glandular or eglandular, the apical cell globose or elongated with apex rounded, 0.3–3.5 mm long., the bristles golden-brown, with darker-colored thickened transverse cell walls, apex long filiform, base with 2 cell of wide, apical cell globose or elongated with apex rounded, 3.0–3.5 mm long. **Fronds** erect to slightly arcuate, indeterminate growth, 42.0–53.0 × 5.0–9.0 cm; **petioles** semi-cylindrical, adaxially grooved, 17.0–21.0 cm × 1.0–2.0 mm, dark brown, shiny, moderately covered by hairs, mainly in groove, the hairs in the proximal portion similar to those of the rhizomes, at distal portion the hairs with 0.5–3.0 mm long, glandular or eglandular,

hyaline, tortuous, multicellular, the apical cell globose or elongated with apex rounded; **laminae** 2-pinnate-pinnatisect, less often pinnate-2-pinnatisect, narrowly triangular to narrowly elliptic, 30.0–32.0 × 5.0–9.0 cm, chartaceous; **rachises** straight, semi-cylindrical, adaxially grooved, dark brown, moderately covered by hairs, mainly in the groove, the hairs eglandular, similar to those at distal portion of the petioles; **pinnae** usually ascending, narrowly triangular, 3.5–6.0 × 1.4–2.5 cm, alternate to opposite, sometimes slightly tapering proximally, gradually tapering towards the apex (pinnatisect), short-stalked, the stalk 1.5–2.0 mm long, 0.6–0.8 mm diam., semi-cylindrical, adaxially grooved, dark brown, straight, adaxial surface of pinnae sparsely to moderately covered by hairs, abaxial surface of pinnae sparsely to moderately covered by hairs, mainly on the veins, the hairs eglandular, similar to those at distal portion of the petioles; **costae** straight, semi-cylindrical, adaxially grooved, dark brown, moderately covered by hairs, mainly in groove, the hairs eglandular, similar to those at distal portion of the petioles; **pinnules** (or segments) ovate to oblong, 0.6–1.4 × 0.5–0.7 cm, alternate, short-stalked, the stalk 1.0–2.0 mm long, 0.5–0.6 mm diam., semi-cylindrical, adaxially grooved, dark brown, straight; **ultimate segments** bifurcate, sometimes simples, margins entire, plane, whitish; **veins** usually furcate, sometimes simple, reaching or not the laminae margin. **Sori** on veins in the proximal portion of the ultimate segments; **spores** dark brown, proximal surface with coalescent ridges, mainly near trilete aperture, distal surface strongly tuberculate, 58.0–61.9 µm diam.

Distribution and ecology: *Jamesonia* sp. occurs in forests along river margins, mixed with dense populations of Bromeliaceae, in the Cuiabixi Igarapé, in the Parque Nacional do Pico da Neblina, at 2060 m elevation.

Material examined: BRAZIL. Amazonas: Santa Isabel do Rio Negro, Parque Nacional do Pico da Neblina, 00°47'18"N, 66°01'15"W, 2060 m, 20-IX-2012, R.C. Forzza et al. 7203 (RB).

Jamesonia sp. is characterized by having pinnate-2-pinnatisect to 2-pinnate-pinnatisect, narrowly triangular to narrowly elliptic fronds, narrowly triangular, and chartaceous pinnae, adaxial and abaxial surface sparsely to moderately covered by hairs, the hairs eglandular, hyaline, apical cell elongated with apex rounded, straight rachises, ovate to oblong pinnules (or segments), bifurcate ultimate segments, with entire or plane margins.

Based on the key of *Eriosorus* by Tryon (1970), the putative name for this specimen is *Jamesonia congesta* (Christ) Christenh., which resembles the studied specimen by the hairs and bristles of the rhizome, and the shape and division of the lamina (narrowly triangular to narrowly ovate, 2-pinnate-pinnatisect). However, *J. congesta* presents rachis and both surfaces of lamina densely covered by glandular and eglandular hairs (vs. rachises and both surfaces of the lamina sparsely to moderately covered by only eglandular hairs).

Conclusions

This is the first study carried out with the Brazilian *Jamesonia* after the monographs of Alice Tryon (1962, 1970). In these studies, the author cited a hybrid (*J. brasiliensis* × *J. cheilanthoides*) and five species of *Jamesonia* (*J. biardii*, *J. brasiliensis*, *J. cheilanthoides*, *J. flexuosa* and *J. insignis*), for our country. Thus, in the last five decades, there was an increase in the knowledge of this genus, due to the increment in the

number of specimens collected. Moreover, a new hybrid was described based on material collected in 2017 and 2019 (Della et al. 2020).

Jamesonia biardii is the only species that does not have recent materials collected in the visited herbaria. The existing records are from Glaziou and Brade (from 1868-1948) to Serra dos Órgãos (RJ) and Pico do Forno Grande (ES). Probably, the difficult accessibility to the place of occurrence, as well as anthropic alterations, must have reduced the populations of this species.

Two hybrids (*Jamesonia brasiliensis* × *J. cheilanthoides* and *J. × intermedia*) and four *Jamesonia* species (*J. biardii*, *J. insignis*, *Jamesonia* sp. and *J. brasiliensis*) are endemic to Brazil. Most of the *Jamesonia* species have a restricted geographic distribution. Due to deforestation and fragmentation, some of these species can already be categorized as endangered. Thus, actions that aim to conserve the areas where species occur are important and highly recommended. For example, *Jamesonia osteniana* was found in humid ravines along roadsides and river margins on the coast of Rio Grande do Sul, outside areas of environmental protection.

Rio de Janeiro is the Brazilian state with the largest number of *Jamesonia* species (*J. biardii*, *J. brasiliensis*, *J. cheilanthoides*, *J. insignis* and *J. rufescens*, in addition to the hybrids *J. × intermedia* and *J. brasiliensis* × *J. cheilanthoides*). Brade (1942, 1954) had already pointed out that the presence of Andean ferns is frequent in the high mountains, located in the southeastern region of Brazil (especially in the mountains of Rio de Janeiro). This author mentions that these Andean elements probably arrived in Brazil through the dispersion of spores (by currents of the wind).

In the southern region of Brazil, only one species is known, *Jamesonia osteniana*. This plant occurs in areas close to Porto Alegre (Rio Grande do Sul), at very low altitudes, compared with other species of this genus in Brazil. In the north, two species are known (*J. flexuosa* and *Jamesonia* sp.), probably other *Jamesonia* species occur in these areas, but the difficulty of access (indigenous areas) and travel costs are limiting factors for new field expeditions.

Supplementary Material

The following online material is available for this article:
Appendix 1 - List of examined materials

Acknowledgments

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Author's Contributions

Aline Possamai Della: substantial contribution to the concept and design of the study, contribution to data collection, contribution to data analysis and interpretation, and contribution to manuscript preparation.

Jefferson Prado: substantial contribution to the concept and design of the study, contribution to data analysis and interpretation, contribution to manuscript preparation, and contribution to critical revision, adding intellectual content.

Conflicts of Interest

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

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