



Novelties in *Parablechnum* (Blechnaceae) from Colombia: two new species, a lectotypification and the rediscovery of *Parablechnum gemmascens*

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Summary. Two new species of *Parablechnum* are described and illustrated. *P. mariae-teresae*, is characterised by having foliar veins and tuberculiform to reniform aerophores. *P. tectum* has a long, erect rhizome, with broad, generally imbricate pinnae. A discussion is presented on the separation of the new taxa from those which are morphologically most similar. The new species are distributed in the southern Andean region of Colombia, at elevations between 1650 and 2100 m. In addition, the description is expanded for *P. gemmascens*. This species was known only from its type specimen but has now been rediscovered and found to be widely distributed in the central zone of the Eastern Cordillera of Colombia. A linear discriminant analysis is performed to define limits between two often-confused species, *P. gemmascens* and *P. proliferum*. Lastly, a lectotype is designated for *P. lima*.

Key Words. Diversity, ferns, taxonomy.

Introduction

Parablechnum C.Presl is a pantropical genus with approximately 65 species (Molino 2022), recently re-established by Gasper *et al.* (2016) on the basis of molecular data. The genus is characterised morphologically by having pinnate laminae with truncate bases, conform to subconform terminal pinna (Gasper *et al.* 2016) and petiolulate pinnae (Molino 2022).

In a taxonomic review of the family Blechnaceae in Colombia, some specimens were found that represent new species. Among these new species are *Austroblechnum bullatum* J.Murillo & L.A.Triana (Murillo-A. & Triana-Moreno 2022), and *Parablechnum prostratum* J.Murillo & L.A.Triana (Murillo-A. & Triana-Moreno 2023), together with two species of the same genus from southern Colombia, which are currently being described. In addition to these, two new species of *Parablechnum* are presented here, which increases the number of known species in the genus to 70.

Few species in the Blechnaceae subfamily Blechnoideae have laminar buds, but in *Woodwardia* Sm., subfamily Woodwardioideae, they are very common (Gasper *et al.* 2016). *Cranfillia caudata* (Baker) V.A.O.Dittrich & Gasper has a flagelliform apex, on which the buds are present (Dittrich *et al.* 2017a). In *Parablechnum*, *P. proliferum* (Rosenst.) Gasper & Salino has buds in the axils of distal pinnae and in *P. sessilifolium* (Klotzsch ex Christ) Gasper & Salino the buds are at the base of the pinnae, on their adaxial surfaces (Moran 1995; Molino 2022). The study of specimens determined as *P. proliferum* through multivariate analyses, which have been used to establish the limits among

these taxa (Sneath & Sokal 1973), separated *P. gemmascens* (Alston) Gasper & Salino, which also has buds in the axils of its pinnae. A new species, described in this study, *P. mariae-teresae*, also features buds at the bases of pinnae, similar to the condition in *P. sessilifolium*. The objectives of this study are to propose two new species, as well as redescribing *P. gemmascens*, a poorly known species from the central Andean region of Colombia, for which a linear discriminant analysis (LDA) is performed to define limits among closely related species. A lectotype for *P. lima* (Rosenst.) Gasper & Salino is also designated.

Materials and Methods

Sampling. Specimens deposited in COL were studied and specimens in US were reviewed online (<https://collections.nmnh.si.edu/search/botany/>). In addition, field trips to the municipalities of Bojacá (Department of Cundinamarca) and San José del Palmar (Department of Chocó) were conducted to study the species in their natural habitats. Herbarium acronyms follow Thiers (2023, continuously updated). Type specimens on JSTOR (2000 – 2023), together with taxonomical keys and descriptions (Moran 1995; Gasper *et al.* 2016; Smith & Kessler 2018; Molino 2022) of *Parablechnum* were consulted in order to compare the species proposed herein with those previously described. Descriptive terminology follows Lellinger (2002).

Statistical analyses. An LDA was performed, using the software PAST v4.10 (Hammer *et al.* 2001), to compare *Parablechnum gemmascens* with the species

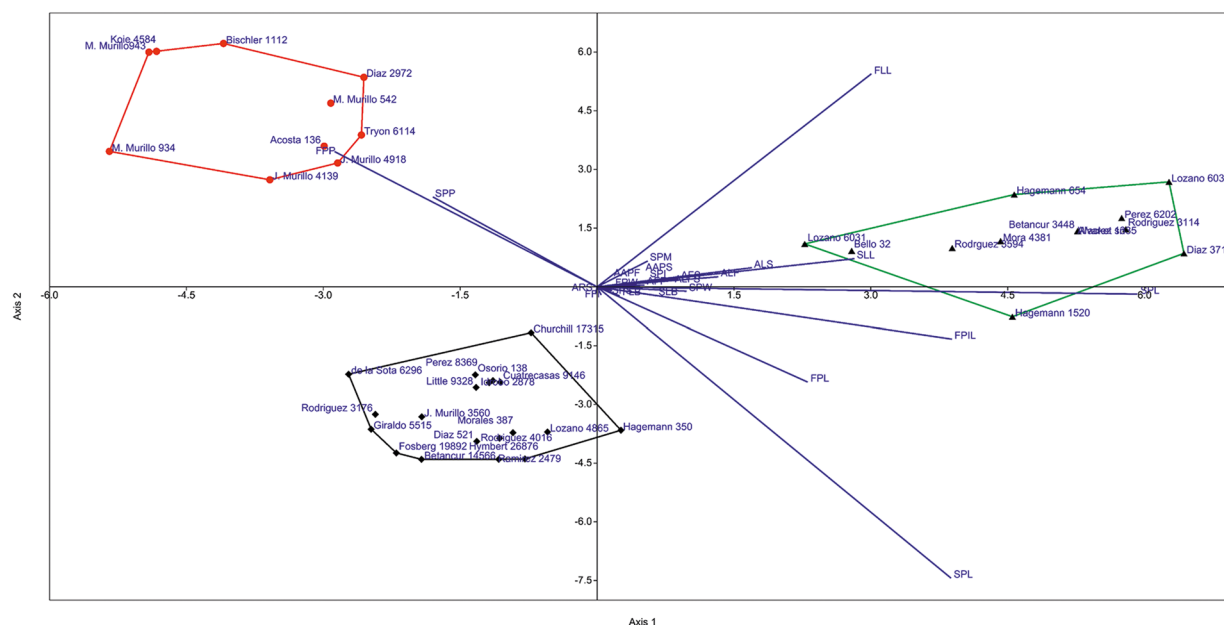


Fig. 1. Linear Discriminant Analysis Biplot for *Parablechnum gemmascens* (●), *P. proliferum* (▲), and *P. schiedeana* (◆). Points are labelled with collector names and numbers. Character loadings are shown and acronyms are explained in Electronic Supplementary Information S2.

morphologically closest to it, *P. proliferum*. Morphological characters were selected and assessed, 14 from sterile and 10 from fertile fronds (see Electronic Supplementary Material S1) and 23 specimens were included, 10 corresponding to *P. gemmascens* and 13 to *P. proliferum*. In addition, 13 specimens of *P. schiedeana* (Schltdl. ex C.Presl) Gasper & Salino, a species which, according to Moran (1995), may hybridise with *P. proliferum*, were included. Specimens were selected to encompass the geographic range for each species, while featuring fertile frond characters. Qualitative characters were coded as binary, with states 1 and 2. All characters were row normalised and length transformed with the transformation function of PAST.

Results

Three morphologically distinct groups, as delineated, are separated in the LDA plot (Fig. 1). The first group, on the right, includes the specimens of *Parablechnum proliferum*, the second group, in the lower left part, is *P. schiedeana* and the group on the upper left side is *P. gemmascens*, within which the type specimen of this species is also included (Køie 4584, Alston 1957). The first two LDA axes account for 100% of morphological variation in the three species (52.39%, eigenvalue = 12.066, and 47.61%, eigenvalue = 10.966, respectively). The form of the aerophore on the sterile frond (AFS, 586.05) and the pinnae margins (serrulate) of

the sterile frond (SPM, -346.33) contributed most to the first component, whereas the width of fertile pinnae (FPW, -834.49), the pinnae margins (entire) of the sterile frond (SPM, 527.58) and the arachnoid layer of filiform scales in the sterile frond (ALFS, 436.28) contributed most to the second component (see Electronic Supplementary Material S2). The LDA confusion matrix shows that all specimens were correctly assigned to their own species (see Electronic Supplementary Material S3). Electronic Supplementary Material S1 shows the characters used in the LDA, as well as the variations observed among specimens and between the three species assessed.

Taxonomic Treatment

***Parablechnum mariae-teresae* J. Murillo & L.A. Triana, sp. nov.** Type: Colombia, Valle del Cauca, El Cairo, vereda El Pacífico, carretera a San José del Palmar, 4°49'44"N, 76°10'49"W, 2020 m, 26 July 2023, J. Murillo-A. et al. 4923 (holotype COL!; isotype FAUC!).

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Terrestrial plants. *Rhizome* short; densely covered with ovate to ovate-lanceolate scales, 14 – 18 × 2 – 3 (– 5) mm, margins entire, apices acuminate, basifixed. *Fronds* dimorphic. **Sterile fronds** 71 – 116 cm long. *Stipes* 39 – 60 cm long, 0.5 – 1 cm in diam., adaxially grooved,

atropurpureus to yellowish-brown, transversely papillose; densely covered with light brown scales, apically long-acuminate, of two sizes; larger scales ovate, $14 - 18 \times 2 - 3$ (– 5) mm, bases cordate and forming two auriculae, margins toothed; smaller scales ovate-lanceolate (2 –) $4 - 7 \times (0.3 -) 0.5 - 0.7$ mm, margins serrate to ciliate, with teeth and cilia from 0.1 to 0.2 mm long. *Lamina* $32 - 56 \times 7 - 10.5$ cm, pinnate, oblong, base truncate. *Rachis* atropurpureus, transversely papillose, densely covered with scales similar to those of the stipe but smaller; larger scales $7 - 10 \times 2 - 3$ mm, originating on a small protuberance c. 0.1 mm high; mixed with shorter scales $0.5 - 2.5 \times 0.2 - 0.5$ mm; aerophores tuberculiform, 1 – 1.5 mm in length, distally shorter; *buds* present adaxially, at the base of most pinnae, 0.5 – 0.9 mm in diam. *Pinnae* (29 –) 38 – 50 pairs, ovate-lanceolate, falcate, basal ones sometimes deflexed, (3.5 –) $4.5 - 5.5 \times 1$ cm, chartaceous, apices obtuse to rounded, bases cordate, equilateral, margins serrulate and revolute, adaxially glabrescent; costae and margins abaxially covered with abundant scales similar to those of the rachis, but less than 4 mm in length; terminal pinna 3.5×0.9 cm, with a basal lobe; petiolules atropurpureus, 1.5 – 2 mm in length; apical pinnae sessile to basiscopically adnate; veins free, simple, sometimes furcate at the base, generally covered with orbicular to ovate scales, c. 0.5 mm in length, ciliate margins; adaxially raised, abaxially immersed; conspicuous hydathodes on vein endings. **Fertile fronds** 91 – 106 cm in length, erect. *Stipes* yellowish-brown to atropurpureus at the apex, 61 – 76 cm in length, 5 – 6 mm in diam., slightly grooved adaxially, densely covered with scales similar to those on the stipes of the sterile fronds. *Lamina* 30×6.5 cm, pinnate, ovate-lanceolate, base truncate, covered with abundant scales similar to those of the sterile frond lamina. *Rachis* atropurpureus, slightly grooved adaxially, aerophores similar to those of the sterile fronds. *Buds* present adaxially at the bases of most pinnae, 0.5 mm in diam. *Pinnae* 28 – 30 pairs; linear, $3.3 - 4 \times 0.4 - 0.6$ cm, chartaceous, apices rounded, bases cordate and slightly broader than the rest of the pinna, equilateral; margins undulate to crenulate, abundantly covered with scales similar to those of sterile pinnae; petiolules atropurpureus, 1.5 – 2 mm in length; veins free, inconspicuous, ending in hydathodes. *Sori* abaxial, elongate, one on each side of the costa; indusium the same shape as the sorus, dark brown, margin erose, moderately covered with orbicular to filiform scales; indusium scales c. 0.3 – 0.5 mm in length, margins ciliate. *Spores* yellowish, reticulate, with large polygonal areolae. Figs 2 & 3.

RECOGNITION. *Parablechnum mariae-teresae* is characterised by having stipes and rachis densely covered with serrate to ciliate scales; pinnae subsessile, revolute, with veins adaxially raised and abaxially immersed, and

very small buds (<0.9 mm in diam.) on the adaxial bases of the pinnae. It is similar to *P. lima*, *P. sessilifolium* and *P. tuerckheimii* (Brause) Gasper & Salino in lamina and pinnae shape and in having pinnae with short petiolules. However, in all these species pinnae are longer, 6 – 13 cm (vs 3.3 – 5.5 in *P. mariae-teresae*) (Christ 1904; Brause 1911; Moran 1995); with longer acuminate apices (vs obtuse to rounded) and the terminal pinna is half the length or shorter than the lateral ones (vs similar in size to lateral ones). *P. mariae-teresae* also resembles *P. stuebelii* (Hieron.) Gasper & Salino in pinnae shape, but the latter has a creeping rhizome (vs short in *P. mariae-teresae*), buds absent (vs present), the terminal pinna is longer than the lateral ones, and, in general, the plants are smaller (Dittrich *et al.* 2017b). Table 1.

DISTRIBUTION. This species is found in the Western Cordillera on the border between the Departments of Chocó and Valle del Cauca, at elevations close to 2000 m (Map 1).

SPECIMENS EXAMINED. COLOMBIA. Chocó: San José del Palmar, alto de Galápagos, descenso desde la antenna hacia San José del Palmar, 2000 m, $4^{\circ}49'57''\text{N}$, $76^{\circ}10'55''\text{W}$, 26 July 2023, *J. Murillo-A. et al.* 4939 (COL, FAUC). **Valle del Cauca:** El Cairo, vereda El Pacífico, carretera a San José del Palmar, $4^{\circ}49'44''\text{N}$, $76^{\circ}10'49''\text{W}$, 2020 m, 26 July 2023, *J. Murillo-A. et al.* 4923 (holotype COL!; isotype FAUC!); *ibid.*, 4933 (COL, FAUC).

HABITAT. *Parablechnum mariae-teresae* can be found growing on shady places on wet cliffs bordering roads and on trails within the sub-Andean forest.

CONSERVATION STATUS. *Parablechnum mariae-teresae* has been recorded only in its type locality, in Alto de Galápagos, in the ravines of the road leading to San José del Palmar. There are no additional records and the species was not seen growing in other parts of the region. Due to the lack of data, the species is herein provisionally assessed as Data Deficient [DD] (IUCN 2012, 2022). The region where *P. mariae-teresae* grows is a forested zone that is being preserved, and the low traffic, secondary road, where it is located, ensures a good degree of protection. However, it is possible that future plans for the region include the construction of a larger road, ostensibly altering the location where this species grows.

ETYMOLOGY. The species name is dedicated to María Teresa Murillo Pulido, the first, and, for a long time, the only Colombian botanist studying ferns in Colombia.

NOTES. *Parablechnum mariae-teresae* described here, together with *P. gemmascens* (Alston 1957), *P. proliferum* and *P. sessilifolium* (Moran 1995; Molino 2022) are the only species in the genus which have leaf buds. However, in this study, laminar buds were also found in specimens of *P. schiedeanum*. Phylogenetic analyses by Molino (2022) show that specimens identified as *P. proliferum* do not form a monophyletic group, therefore

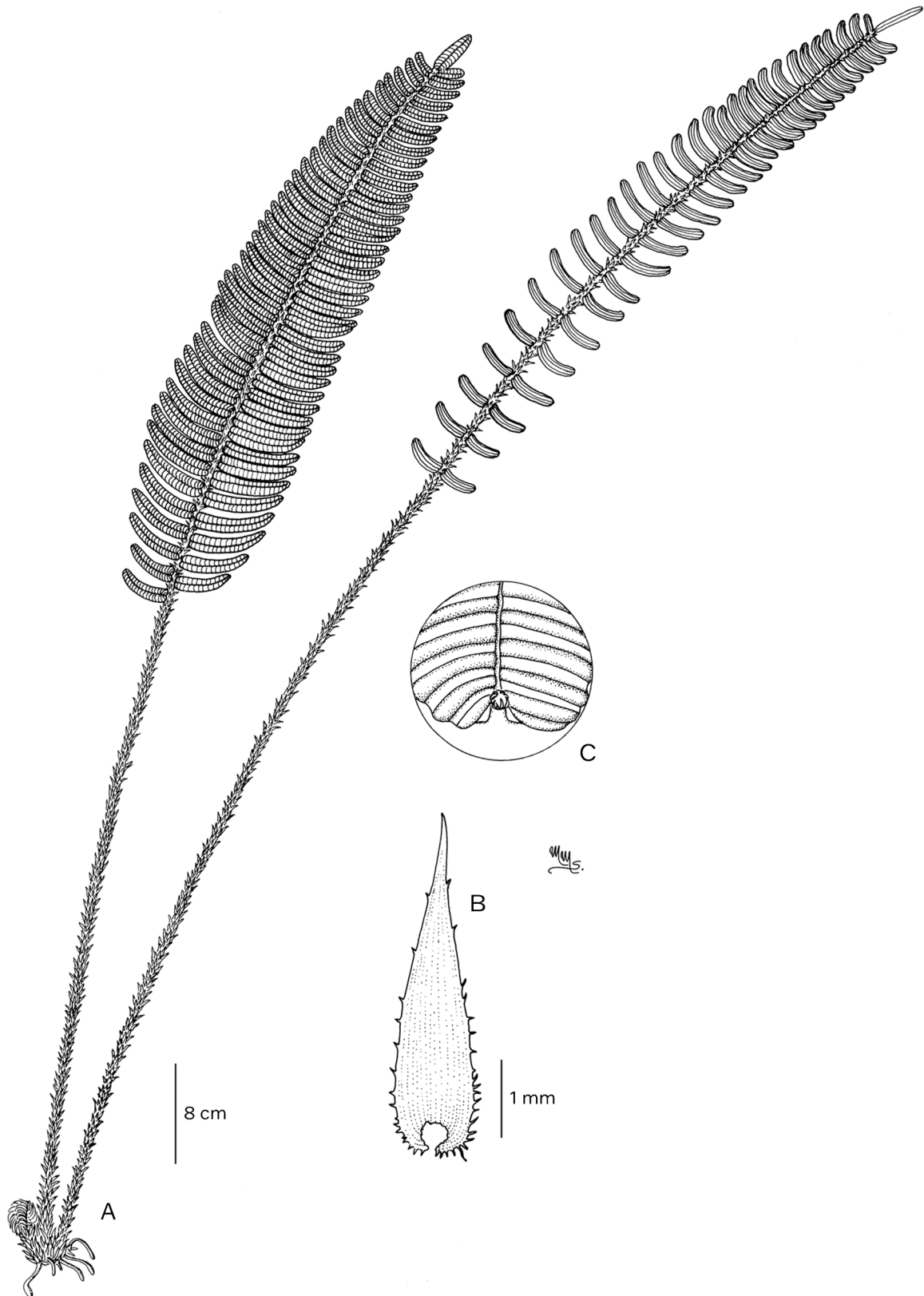


Fig. 2. *Parablechnum mariae-teresae*. **A** habit; **B** stipe scale; **C** detail of a bud on the adaxial surface of a sterile pinna. All from *J. Murillo-A. et al.* 4923 (COL). DRAWN BY M. MORALES.



Fig. 3. *Parablechnum mariae-teresae*. **A** habit; **B** scales from the base of the stipe; **C** scales on the rachis of a juvenile sterile lamina; **D** detail of an aerophore (arrow); **E** detail of a bud on the adaxial surface of a sterile pinna (arrow); **F** detail of a fertile pinna; **G** detail of the abaxial surface of a sterile pinna; **H** detail of an aerophore and the papillae on a rachis; **J** detail of venation; **K** fertile lamina. Scale bars: **A**=5 cm; **B**, **G**=5 mm; **C**, **D**, **J**=1 cm; **E**, **F**=3 mm; **H**=2 mm; **K**=2 cm. PHOTOS BY J. MURILLO-A.

Table 1. Comparisons between *Parablechnum mariae-teresae* and morphologically similar species.

	<i>P. mariae-teresae</i> ¹	<i>P. lima</i> ²	<i>P. sessilifolium</i> ³	<i>P. tuerckheimii</i> ⁴	<i>P. stuebelii</i> ⁵
Rhizome	short	arborescent	short	short	creeping
Rhizome scales (mm)	14 – 18×2 – 3 (– 5)	15×2– 3	10 – 20×3– 6	10×5	8 – 10×1 – 2.5
Frond length (cm)	71 – 116	80	43 – 150	92 – 118	15 – 45
Frond dimorphism	strongly	strongly	strongly	strongly	slightly
Pinnae pairs	(29 –) 38 – 50	37– 40	27 – 70	c. 58	18 – 25
Pinnae length (cm)	(3.5 –) 4.5 – 5.5×1	10×1.7	6 – 10×0.7 – 1.5	6.2×0.8	1.2 – 3×0.3 – 0.6
Pinnae apices	obtuse to rounded	long acuminate	long acuminate	long acuminate	rounded
Terminal pinna	similar or shorter than the lateral ones	shorter than the lateral ones	shorter than the lateral ones	shorter than the lateral ones	longer than the lateral ones
Leaf buds	present	absent	present	absent	absent

¹ this study; ² Rosenstock (1912); ³ Christ (1904), Moran (1995); ⁴ Brause (1911); ⁵ Dittrich *et al.* (2017b)

P. proliferum may be a complex formed by species with very similar morphologies, which needs to be reviewed. Among these species that exhibit leaf buds, the most similar to *P. mariae-teresae* is *P. sessilifolium*, which it resembles in the shape and disposition of buds, but differs in having an atropurpureus rachis (vs brown to yellowish in *P. sessilifolium*), in addition to the characters previously mentioned.

***Parablechnum tectum* J. Murillo & L.A. Triana, sp. nov.**
Type: Colombia, Chocó, San José del Palmar, sendero hacia cascadas San Antonio, 4°50'20"N, 76°13'10"W, 1680 m, 28 July 2023, J. Murillo-A. *et al.* 5000 (holotype COL!; isotype FAUC!).

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Terrestrial plants. *Rhizome* elongate, erect, 28 – 48 cm in length, 1.2 cm in diam.; densely covered with ovate to ovate-lanceolate scales, (7 –) 14 – 18×2 – 3 (– 5) mm, margins entire, apices acuminate, basifixed, cordate, auriculate, brown with a darker base; aerophores elongate and flattened, tongue shaped, 1 – 2 mm in length, forming lateral rows. *Fronds* dimorphic. **Sterile fronds** 77 – 112 (– 136) cm in length. *Stipes* 20 – 34 (– 48) cm in length, 0.7 – 1 cm in diam., adaxially grooved, atropurpureus; with minute striae, transversely arranged; covered with two types of scales; larger scales sparse, light brown, with dark brown bases, (3 –) 7 – 8×1 – 2 mm, ovate, apices acuminate, bases cordate, forming two auriculae, margins entire; smaller scales filiform, tortuous, c. 1 mm in length, sparsely ciliate, densely covering the stipe and forming a mat; aerophores similar to those of the rhizome. *Lamina* 57 – 78 (– 88)×28 – 30 (– 36) cm, pinnate, arched, elliptical, base truncate. *Rachis* greenish adaxially, atropurpureus abaxially;

with minute, transverse striae; covered with scales similar in shape and density to those of the stipes; buds absent; aerophores similar to those of the stipe, adjacent to the bases of petiolules on the abaxial side, 0.5 – 0.8 mm in length, also forming two rows, one on each side of the rachis, distally shorter. *Pinnae* (9 –) 14 – 15 (– 20) pairs, frequently imbricate when mature; proximal pinnae in adaxial view with their basiscopic margins overlapping the acroscopic margins of the adjacent pinna, distal pinnae imbricating in the opposite pattern; ovate, (12 –) 14 – 15 (– 18)×(4 –) 4.5 – 5.5 cm, chartaceous, apices acuminate, bases inequilaterally cordate, margins entire; covered with moderate to abundant filiform to orbicular scales, 0.5 – 3×0.1 – 0.2 mm in length; with scattered cilia; costae abaxially with ovate scales, 3 – 4×0.8 – 1 mm, brown, with basally denticulate margins; terminal pinna 12×4.2 cm; petiolules greenish, 5 – 6 mm in length; apical pinnae sessile; veins free, furcate, sometimes simple, with slightly conspicuous hydathodes at vein tips. **Fertile fronds** 113 – 128 cm in length, erect. *Stipes* similar to those of the sterile frond, 48 – 50 cm in length, 1 cm in diam. *Lamina* 65 – 78×32 – 34 cm, elliptical, base truncate, covered with abundant scales similar to those of the sterile frond lamina. *Rachis* atropurpureus adaxially, greenish basally, abaxially brown to atropurpureus, slightly grooved adaxially; aerophores similar to those in the sterile frond. *Pinnae* 14 pairs, linear, 16 – 17×0.6 cm, chartaceous, apices acute, bases inequilaterally cordate, margins entire, moderately covered with scales similar to those of sterile frond pinnae; petiolules atropurpureus, 3 – 6 mm in length; veins free, inconspicuous, ending in inconspicuous hydathodes. *Sori* abaxial, elongated, one on each side of the costae; indusium the same shape as the sorus, dark brown, subentire, glabrous. *Spores* yellowish, reticulate, with large polygonal areolae. Figs 4 & 5.



Map 1. Distributions of *Parablechnum mariae-teresae* ● and *P. tectum* ♦.

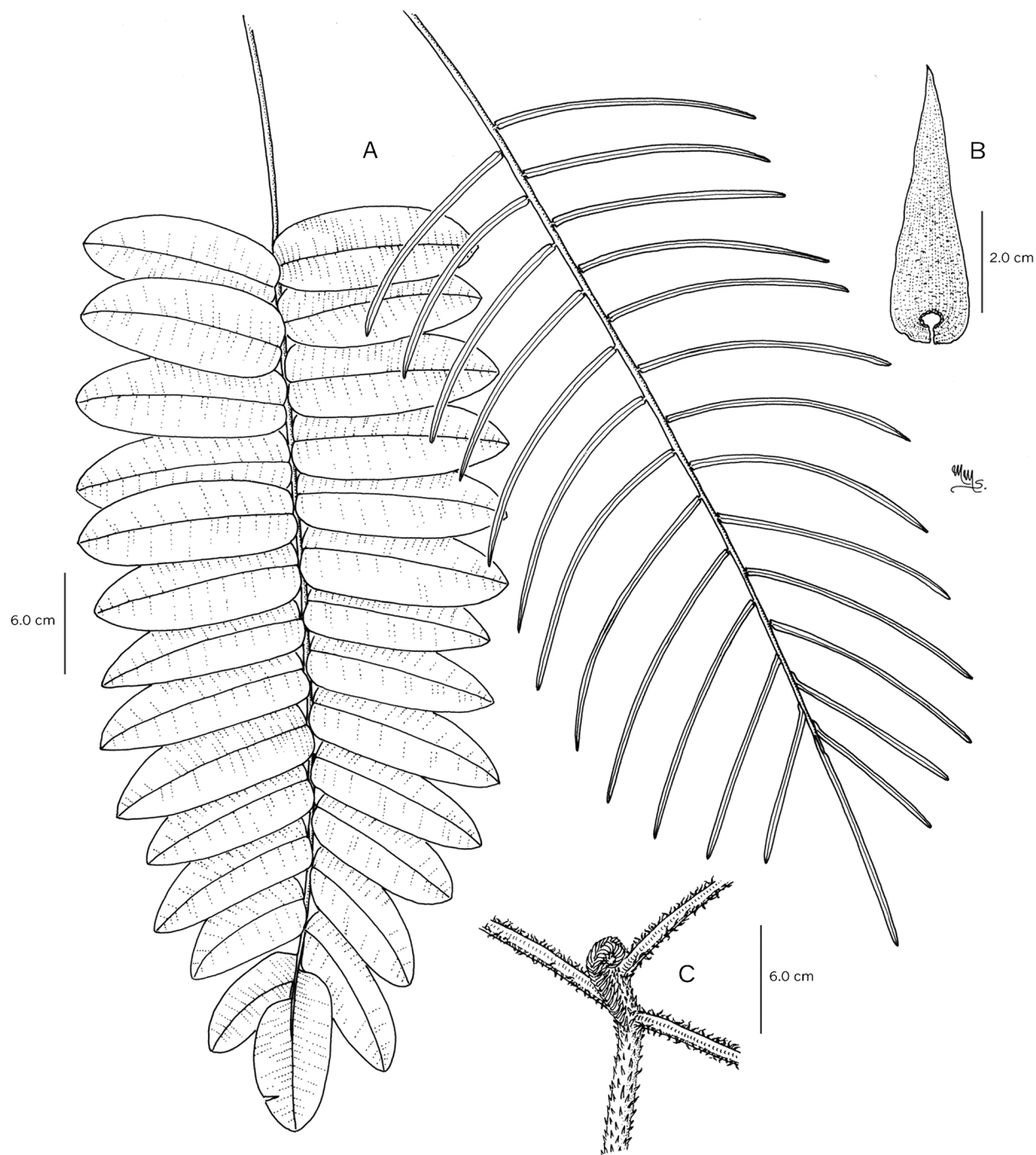


Fig. 4. *Parablechnum tectum*. **A** laminae, sterile (left) and fertile (right); **B** rhizome scale; **C** detail of a rhizome apex. All from *J. Murillo-A. et al.* 5000 (COL). DRAWN BY M. MORALES.

RECOGNITION. *Parablechnum tectum* is characterised by an elongate, erect rhizome up to 48 cm long; stipes and rachises densely covered with filiform scales c. 1 mm in length with ciliate margins, mixed with ovate scales 3 – 8 × 1 – 2 mm; mature pinnae are frequently imbricate; aerophores are elongate and flattened, 1 – 2

mm in length, tongue shaped, forming two lateral rows along the stipe and rachis and two rows of shorter (0.8 mm long) aerophores along the rachis.

Parablechnum tectum is similar to *P. proliferum* and *P. lechleri* (Mett.) Gasper & Salino in the size and shape of laminae, as well as in the elongate aerophores.



Fig. 5. *Parablechnum tectum*. **A** habit; **B** rhizome; **C** detail of the rachis of a sterile lamina, showing a row of aerophores (arrows); **D** detail of the sterile lamina stipe, showing two rows of aerophores (arrows); **E** detail of the abaxial surfaces of sterile pinnae; **F** detail of a fertile pinna; **G** detail of both types of aerophores on the rachis. Scale bars: **A, B** = 10 cm; **C** = 2 cm; **D, F** = 1 cm; **E** = 3 cm; **G** = 1 mm. PHOTOS BY J. MURILLO-A.

Table 2. Comparisons between *Parablechnum tectum* and morphologically similar species.

	<i>P. tectum</i>	<i>P. lechleri</i>	<i>P. proliferum</i>	<i>P. schiedeanaum</i>
Aerophore shape	tongue-shaped	conical to cylindrical	conical to cylindrical	oblong
Aerophore length (mm)	1 – 2	2 – 5	2 – 5	<0.5
Length of filiform scales	c. 1 mm	–	>2 cm	–
Width of pinnae (cm)	4 – 5.5	2 – 4	2.3 – 4	1.4 – 2.4
Pinnae margins	entire	entire	serrulate	serrulate on the apex

However, aerophores are elongated and flattened and smaller, 1 – 2 mm (vs conical and cylindrical, larger, 2 – 5 mm in *P. proliferum* and *P. lechleri*). In the dense cover of filiform scales it resembles *P. proliferum*, but scales are c. 1 mm in length (vs >2 cm) and sterile pinnae are wider, 4 – 5.5 cm (vs 2.3 – 4 cm) with an entire (vs serrulate) margin. In the entire pinnae margins it can resemble *P. schiedeanaum*, however, it has broader sterile pinnae, 4 – 5.5 cm (vs narrower, 1.4 – 2.4 cm in *P. schiedeanaum*), has filiform scales (vs filiform scales absent), and has aerophores that are tongue shaped, 1 – 2 mm long (vs oblong, <0.5 mm). Table 2.

DISTRIBUTION. This species has been found only on the western flank of the Western Cordillera in the Chocó Department, at an altitude of 1680 m (Map 1).

SPECIMENS EXAMINED. COLOMBIA. Chocó: San José del Palmar, sendero hacia cascadas San Antonio, 4°50'20"N, 76°13'10"W, 1680 m, 28 July 2023, *J. Murillo-A. et al.* 4995 (COL, FAUC); *ibid.*, 4997 (COL); *ibid.*, 5000 (holotype COL!; isotype FAUC!).

HABITAT. In altered but shady, very humid sites, along roadsides or in ravines, places where *Sphagnum* L. grows abundantly.

CONSERVATION STATUS. *Parablechnum tectum* has been recorded only in the type locality, and, due to the lack of additional data, we provisionally assess this species as Data Deficient [DD] (IUCN 2012, 2022). This species was found only in a small, very humid area located within a farm. Therefore, the permanence of the species on the site is uncertain, as it depends on what decisions the owner of the property will take with regard to the use of the land.

ETYMOLOGY. The specific epithet refers to the frequently imbricate, mature pinnae, which resemble roof tiles.

***Parablechnum gemmascens* (Alston) Gasper & Salino** (Gasper *et al.* 2016: 216) ≡ *Blechnum gemmascens* Alston (1957: 57). Type: Colombia, Cundinamarca: Paraíso (cerca de Sumapaz), 1400 m, 5 June 1952, *Køie* 4584, (holotype C; isotype [BM001079672 Photo!]).

Terrestrial plants. *Rhizome* short, erect, 1.5 – 2.5 (– 3.5) cm in diam. including stipe bases, mucilaginous;

rhizome and stipe bases densely covered with ovate scales, 2.1 × 0.2 – 0.4 cm, brown, apices long-acuminate, basifixed, entire, opaque. *Fronds* dimorphic. **Sterile fronds** (26 –) 46 – 65 (– 119) cm in length. *Stipes* (8 –) 15 – 19 (– 36) cm in length, 2 – 3.5 (– 10) mm in diam., adaxially grooved, light brown to dark brown, smooth to papillose; glabrous or sparsely covered with ovate-lanceolate scales, 3 – 9 × 0.8 – 1.2 mm, ascending, apices long-acuminate, margins entire. *Lamina* (18 –) 31 – 46 (– 83) × (8.5) 15 – 18 (– 29) cm; pinnate, elliptical; rachis dark brown to atropurpureus, sometimes stramineous at the base of the adaxial face, transversely papillose; sparsely covered with ovate-lanceolate to filiform scales, (0.2 –) 0.8 – 6 × 0.1 – 0.8 mm, ascending, sometimes appressed, apices filiform, margins entire, sometimes denticulate or with few cilia basally, light brown; buds in the axils of medial to distal pinnae, covered with abundant scales ovate, 4 – 5.5 × 0.8 – 1.7 mm, apices acuminate, margins entire, brown; aerophores tuberculiform to oblong, 0.5 – 1 mm in length. *Pinnae* (13 –) 24 – 32 pairs; without reduced pinnae at the base, oblong, (7 –) 9.5 – 10.5 (– 14.5) × 1.2 – 1.9 (– 2.2) cm, chartaceous, apices slightly acuminate or sometimes acute, bases inequilaterally cordate, margins serrulate; glabrous or sometimes covered with sparse, ovate scales, (0.4 –) 1.5 – 2 × (0.2 –) 0.5 – 0.8 mm, apices acuminate, margins entire, light to dark brown, scales sometimes only on the abaxial surfaces of the costae; petiolules 1 – 3 (– 4) mm in length, generally sessile in the distal part of the lamina, adnate on their acroscopic sides, free on their basiscopic sides; conform terminal pinnae; veins free, simple to furcate at the base, hydathodes adaxially conspicuous. **Fertile fronds** erect. *Stipes* (14 –) 28 – 42 (– 70) cm in length, 3 – 5 (– 8) mm in diam., adaxially grooved, brown with yellow spots, atropurpureus at the base; sparsely covered with ovate-lanceolate to filiform scales, 4 – 12 × 1 – 1.5 (– 2) mm, ascending, apices slightly acuminate to filiform, margins entire; mixed with smaller, ovate to ovate-lanceolate scales, 1 – 1.1 × 0.4 – 0.5 mm, margins entire or with sparse teeth. *Lamina* (31 –) 53 – 66 × (8 –) 16 – 22 cm, pinnate, elliptical, without reduced pinnae at the base, rachis adaxially grooved, brown to atropurpureus; sparsely to densely covered with filiform to lanceolate scales, (1 –) 2.5 – 6 × 0.1 – 0.2 mm, ascendent

to appressed, bases sometimes broadened and with a pair of cilia, margins entire, light brown to whitish; aerophores oblong, 1 – 2 mm in length, c. 0.3 mm in height; buds present in the axils or on the middle portion of distal pinnae. *Pinnae* 18 – 23 (– 28) pairs, linear, (5.5 –) 10 – 11 (– 15.5) × 0.2 – 0.3 cm, apices obtuse to rounded, bases inequilaterally cordate, margins entire; adaxial surfaces sparsely to moderately covered with ovate to rounded scales, 0.2 – 0.8 × 0.1 – 0.2 mm, whitish, appressed, sometimes with scales similar to those of the rachis; abaxially glabrous or costa moderately covered with ovate scales, 1.5 – 2.1 × 0.8 – 1.5 mm, apices acuminate, margins entire or with sparse teeth, brown; petiolules 1.5 – 3 (– 7) mm in length, sessile to adnate pinnae towards the apex, dark brown to atropurpureous; veins inconspicuous, hydathodes conspicuous. *Sori* abaxial, elongated, one on each side of the costa; indusium the same shape as the sorus, dark brown, fimbriate to entire, glabrous. *Spores* light brown, reticulate, with large polygonal areolae. Fig. 6A – G.

DISTRIBUTION. Recorded in the Departments of Boyacá and Cundinamarca in Colombia, on the western flank of the Eastern Cordillera, growing at altitudes between 1800 and 2700 m.

SPECIMENS EXAMINED. COLOMBIA. Boyacá: Carretera entre Chiquinquirá y Pauna; arriba de San Antonio, 2450 m, 3 Sept. 1967, *R. Jaramillo-Mejía et al.* 3317 (COL); entre Arcabuco y Villa de Leyva, camino de Las Coloradas, 2750 m, *R. Jaramillo-Mejía et al.* 2992, 2997 (COL). **Cundinamarca:** Camino real Bojacá-Tena, 2300 – 2800 m, 8 Nov. 1958, *H. Bischler* 1112 (COL); *ibid.*, 11 May 2023, *J. Murillo-A. et al.* 4917, 4918, 4919, 4920, 4921, 4922 (COL); Bogotá hacia Aguadita, 2 Dec. 1966, *M. T. Murillo et al.* 934, 935, 941, 942, 943, 944, 945, 946 (COL); Madrid, autopista Bogotá-Medellín, bosques en contorno a la casa de L. Richter, 2650 m, 23 Nov. 1961, *M. T. Murillo* 534 (COL); entre Mosquera y La Mesa, 2700 m, 11 Aug. 1967, *W. Hagemann* 6 (COL); Paraíso (cerca de Sumapaz), 1400 m, 5 June 1952, *Køie* 4584, (isotype BM001079672 Photo!); San Bernardo, vereda Santa Marta, alrededores de la laguna La Chorrera, 2300 – 2350 m, 20 July 1981, *S. Díaz et al.* 2972 (COL, MO); San Miguel, 2650 m, 23 Nov. 1961, *M. T. Murillo* 542 (COL); entre San Miguel y Fusagasugá, 5 Feb. 1962, *M. T. Murillo* 549 (COL); Sibaté, Alto de San Miguel, Km 31 de la carretera a Fusagasugá, 2730 m, 2 March 1974, *C. Acosta-Arteaga* 136 (COL); Below Alto de Cuchuco, 7 km SW of Sibaté, 19 Oct. 1961, *R. & A. Tryon* 6114 (COL, US Imagen!).

HABITAT. A terrestrial plant, growing in shady places, which can be present within forest or on the sides of roads.

CONSERVATION STATUS. *Parablechnum gemmascens* grows in the Boyacá Department of Colombia, but the largest number of records are in the Department

of Cundinamarca near Bogotá. The Extent of Occurrence is approximately 4000 km², and the Area of Occupancy is close to 500 km². The species is, therefore, provisionally assessed as Endangered [EN B2ab(iii)] (IUCN 2012, 2022). In the places where *P. gemmascens* grows we have detected at least ten populations with a good number of individuals in each. However, the large areas occupied by the species in the vicinity of large urban centres means that its habitat is deteriorating and permanently in danger of further deterioration. An event arising from this development threat is likely to affect multiple (therefore single sensu IUCN 2022) populations.

NOTES. *Blechnum gemmascens* was described originally by Alston (1957) based on collection *Køie* 4584. According to Alston, this specimen was deposited in C, with duplicates in BM and Bogotá (presumably in COL). There are no ferns collected by *Køie* in COL. However, there is a duplicate in BM, which was cited by Molino (2022) as holotype. In his publication, Alston (1957, pp. 56, Fig. 4) shows a photo of *Parablechnum gemmascens*, which could be the holotype of this species. This specimen is not in BM (Alison Paul pers. comm.) which allows us to conclude that it could have been deposited in C, but we were not able to find this specimen. A more exhaustive review of herbaria is necessary to locate the holotype and to confirm in which herbarium it is deposited.

Parablechnum gemmascens is characterised by having abundant buds on the laminae, sterile pinnae between 1.2 – 2.2 cm wide and tuberculiform to oblong aerophores. This species may be confused with *P. cordatum* (Desv.) Gasper & Salino and *P. stipitellatum* (Sodirol) Gasper & Salino, due to the shape of the fronds and aerophores, and with *Parablechnum falciforme* (Liebm.) Gasper & Salino because of the serrated margins of pinnae. However, none of these species has foliar buds or filiform scales.

Parablechnum gemmascens has been confused with *P. proliferum* due to the presence of laminar buds, but the LDA showed that they represent two distinct morphological entities. Among the most important characters to separate these species are the length of the laminar aerophores (0.2 – 0.7 mm vs 2 – 5 mm in *P. proliferum*), as well as the shape of the aerophores, which are tuberculiform to oblong (Fig. 6G) (vs conical or cylindrical, Fig. 6H). In addition, the fronds in veneration of *P. gemmascens* lack mucilage (Fig. 6G), whereas those of *P. proliferum* are covered with abundant mucilage (Fig. 6H). Both species have filiform scales, but in *P. proliferum* these scales are distributed both on the sterile and fertile fronds, being abundant and forming a dense and appressed (arachnoid) layer, mainly covering the stipes and rachis. In *P. gemmascens*, filiform scales are present only on the fertile fronds and ascendent, but if appressed they do not form a dense layer on stipes or rachises surfaces.



Fig. 6. *Parablechnum gemmascens*. **A** habit; **B** laminae, fertile (in front) and sterile (behind); **C** detail of a bud on a sterile lamina; **D** detail of buds on fertile laminae; **E** detail of an indusium; **F** detail of venation; **G** detail of a leaf in vernation. *P. proliferum*. **H** detail of a frond in vernation. Scale bars: **A**=20 cm; **B**=5 cm; **C, F, G, H**=1 cm; **D**=5 mm; **E**=2 mm. PHOTOS BY J. MURILLO-A.

The presence of buds has been used to differentiate *Parablechnum proliferum* from the remaining species in the genus. However, most specimens reviewed did not feature these structures. In the LDA, specimens with and without buds, but exhibiting all other characters distinctive of *P. proliferum*, were placed in a single group. In his discussion of Mesoamerican Blechnaceae, Moran (1995) interpreted all budless specimens of *P. proliferum* as hybrids between *P. proliferum* and *P. schiedeanaum*. However, in Colombian specimens, all examined spores were well developed and did not feature malformations. In addition, no specimens were found with characters shared with both species. Such specimens would have suggested a possible hybrid origin of specimens without laminar buds. The LDA, therefore, showed that *P. proliferum* and *P. schiedeanaum* represent two separate, morphologically well-defined taxa.

During the review of *Parablechnum schiedeanaum* specimens, some were found to exhibit inconspicuous (2 – 3 mm) laminar buds (see Electronic Supplementary Material S1). The LDA resulted in specimens with all other characters of *P. schiedeanaum* being grouped within this taxon, regardless of the presence or absence of buds. Therefore, the presence of laminar buds does not seem to be a constant character for either *P. proliferum* or *P. schiedeanaum*.

Parablechnum lima (Rosenst.) Gasper & Salino, (Gasper *et al.* 2016: 216) ≡ *Blechnum lima* Rosenst. (Rosenstock 1912: 53). Type: Bolivia, Región andina. Unduavi, Nordyungas, Buchtien, O. 2691 (lectotype S [S-R-677!] designated here; isolectotypes S [S16-7204!], US [US-109619, US-00067430!], UC [UC-477679, UC-477679!]).

DISTRIBUTION. According to Smith & Kessler (2018), the species has been recorded from Bolivia to Venezuela and Cuba, but these authors confirm its presence only in Bolivia and Peru. Specimens Tryon, R. & Tryon, A. 5962 (US), and Fosberg, F. 21,163 (US), determined as *Parablechnum lima*, were found to belong to *P. prostratum*, a recently described species (Murillo-A. & Triana-Moreno 2023). Therefore, *P. lima* is not recorded for Colombia. Nevertheless, a review of this taxon along its entire distribution range may clarify its morphological variation and geographical distribution.

NOTES. Rosenstock (1912) described *Blechnum lima* Rosenst. (= *Parablechnum lima*) based on the collection of Buchtien, O. 2691, without designating a holotype. In this collection there are two specimens in S, one in UC and one more in US. The specimen S-R-677 is the most complete and, therefore, is designated as lectotype.

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Declarations

Conflicts of interest The authors declare they have no conflicts of interest.

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