



# Fern Flora of Viçosa, Minas Gerais State, Brazil: Blechnaceae (Polypodiopsida)

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**ABSTRACT** – (Fern Flora of Viçosa, Minas Gerais State, Brazil: Blechnaceae (Polypodiopsida)). We present the taxonomic treatment of the fern family Blechnaceae for the Flora of Viçosa, based on typology, morphology, and field observations. We report the occurrence of seven species and two putative hybrids, belonging to three genera: *Blechnum appendiculatum*, *B. ×caudatum*, *B. ×confluens*, *B. gracile*, *B. aff. juergensii*, *B. occidentale*, *B. polypodioides*, *Neoblechnum brasiliense*, and *Parablechnum brasiliense*, *comb. nov.* Among these taxa, four names are rescued from synonymy: *B. appendiculatum*, *B. ×confluens*, *B. juergensii* and *P. brasiliense* (this, with a new combination into *Parablechnum*). The putative hybrids, *B. ×caudatum* and *B. ×confluens*, are formed by the crossing of *B. gracile* × *B. occidentale*, and *B. occidentale* × *B. polypodioides*, respectively – as suggested by our observations in the field, morphological intermediacy, and literature review. Future studies involving cytogenetics, genetics, and palynology will be needed to better understand the complex of *Blechnum* hybrids, including the best status for *B. aff. juergensii*.

**Keywords:** *Blechnum*, conservation, hybrids, *Parablechnum*, southeastern Brazil

**RESUMO** – (Flora de samambaias de Viçosa, Estado de Minas Gerais, Brasil: Blechnaceae (Polypodiopsida)). É apresentado o tratamento taxonômico da família de samambaias Blechnaceae, para a Flora de Viçosa, baseado em tipologia, morfologia e observações em campo. São registradas a ocorrência de sete espécies e dois supostos híbridos, pertencentes a três gêneros: *Blechnum appendiculatum*, *B. ×caudatum*, *B. ×confluens*, *B. gracile*, *B. aff. juergensii*, *B. occidentale*, *B. polypodioides*, *Neoblechnum brasiliense* e *Parablechnum brasiliense*, *comb. nov.* Dentre estes táxons, quatro nomes são resgatados da sinonímia: *B. appendiculatum*, *B. ×confluens*, *B. juergensii* e *P. brasiliense* (este, com uma combinação nova em *Parablechnum*). Os supostos híbridos, *B. ×caudatum* e *B. ×confluens*, são formados pelo cruzamento de *B. gracile* × *B. occidentale*, e *B. occidentale* × *B. polypodioides*, respectivamente – como sugerido pelas observações em campo, morfologia intermediária e revisão da literatura. Estudos futuros envolvendo citogenética, genética e palinologia serão necessários para melhor se entender o complexo de híbridos de *Blechnum*, incluindo o melhor *status* para *B. aff. juergensii*.

**Palavras-chave:** *Blechnum*, conservação, híbridos, *Parablechnum*, sudeste do Brasil

## Introduction

Blechnaceae is a monophyletic family of leptosporangiate ferns found on every continent except Antarctica. It is more frequent in the southern hemisphere, where it is also more diverse (Tryon & Tryon 1982, Kramer *et al.* 1990, Gasper *et al.* 2016, PPG I 2016). These plants are, in general, characterized by the 1-pinnate leaves that are commonly

dimorphic, with a reddish tonality when young, and by the pinnae with a pair of linear sori adjacent to the the costa, protected by introrse indusia (Gasper *et al.* 2016).

Traditionally, Blechnaceae encompassed only a few genera (e.g., Tryon & Tryon 1982, Kramer *et al.* 1990, Rolleri & Prada 2006), but recent molecular phylogenetic works proposed narrower circumscriptions for its genera. This started with Cranfill (2001) in his unpublished PhD

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Dissertation, but it was effectively followed and published by Perrie *et al.* (2014) and Gasper *et al.* (2016). Gasper *et al.* (2016) circumscribed 24 genera in the family, with an estimate of ca. 270 species. Following this last classification for the family, Dittrich *et al.* (2020) listed 10 genera in Brazil: *Austroblechnum* Gasper & V.A.O. Dittrich, *Blechnum* L., *Cranfillia* Gasper & V.A.O. Dittrich, *Lomaria* Willd., *Lomariidium* C. Presl, *Lomariocycas* (J. Sm.) Gasper & A.R. Sm., *Neoblechnum* Gasper & V.A.O. Dittrich, *Parablechnum* C. Presl, *Salpichlaena* J. Sm., and *Telmatoblechnum* Perrie *et al.*

The number of Brazilian species, on the other hand, is still debatable. One school of Botanists tends to adopt broad species conceptions, and so they lump species and synonymize many described names; whereas the other school is more splitter, adopting narrower species conceptions, considering valid much more species and putative hybrids formed by their interbreed. There are, obviously, intermediate conceptions as well. Roughly, the first school is represented by the works of Murillo (1968) and Dittrich *et al.* (2015, 2017, 2018, 2020). The second school is represented by Brade (1935, 1940), Sehnem (1968), and other authors not specifically dealing with Brazilian plants, such as Moran (1995), Mickel & Smith (2004), Kessler *et al.* (2007), and Smith & Kessler (2018). Rolleri & Prada (2006), Prada *et al.* (2008), and Rolleri *et al.* (2013) stays more or less in between the two schools, while considering a stricter species conceptions on *Blechnum* and *Lomariocycas*, for example (in comparison to Dittrich *et al.* 2015, 2020), they use the same broad species conception for *Parablechnum*, for example (as similar to Dittrich *et al.* 2018, 2020). The ultimate lists of Brazilian Blechnaceae were provided by Dittrich *et al.* (2015, 2017, 2018, 2020), therefore they list only 32 valid species of Blechnaceae for this country, and only two putative hybrids (*B. ×caudatum* Cav. and *B. ×leopoldense* (Dutra) V.A.O. Dittrich & Salino) there. Among these taxa, they listed 26 as occurring in the State of Minas Gerais.

Although most hybrids in ferns are easily characterized by collapsed spores or abortive sporangia, this is not the case in Blechnaceae, specially in *Blechnum*. *Blechnum* species generally occur on roadsides and disturbed sites, and they hybridize often, sometimes in a system of infertile diploid hybrids, allotetraploid fertile hybrids, and even backcrosses (Smith & Mickel 2004: 148–149), making the taxonomy of this group tentative and confusing. Besides, the infertile spores apparently do not collapse, and so they cannot be easily distinguished from well-developed spores, using regular microscopic observations (Mickel & Smith 2004).

This work is part of the Flora of ferns and lycophytes from Viçosa and its surroundings, of which some fascicles have already been published: Salviniaceae (Miranda & Schwartsburd 2016), Schizaeales (Rabelo & Schwartsburd 2016), Didymochlaenaceae and Dryopteridaceae (Matos

& Schwartsburd 2022), and Polypodiaceae (Gonçalves da Silva & Schwartsburd 2017). Other fascicles are in preparation: Gleicheniales and Osmundales (Miranda & Schwartsburd *in prep*), and Dennstaedtiaceae, Lindsaeaceae, and Saccolomataceae (Pena & Schwartsburd 2022). Here we present the taxonomic treatment of Blechnaceae, enumerating the genera, species, and putative hybrids.

## Material and methods

We made expeditions in the main forest fragments in the municipality of Viçosa and its surroundings: Recanto das Cigarras, Mata do Seu Nico, Mata do Paraíso, Pedreira da Caprinocultura, Mirante de São Geraldo, and Road to São Miguel. The forest fragments of Viçosa are considered Semi-Deciduous Seasonal Forest (IBGE 2012), and they range from around 600 to 900 m altitude (Gonçalves da Silva & Schwartsburd 2017).

We observed the ferns under magnifying glass to see hairs, scales, grooves, and veins, and prepared exsiccates and incorporated them into herbarium VIC (with duplicates to be sent to RB and SP). We also analyzed the whole fern collection of VIC. We also consulted herbaria online, to search for types and additional specimens from Viçosa, especially those collected by Ynes Mexia and Jorge Kuhlmann, from the following websites: SpeciesLink (<http://www.splink.org.br/>), Reflora (<http://floradobrasil.jbrj.gov.br/reflora/herbarioVirtual/>), JStor Global Plants (<https://plants.jstor.org/>), and the Pteridophyte Collections Consortium (<http://www.pteridoportal.org/portal/collections/>).

The Classification System adopted here is that of PPG I (2016), which had adopted the proposal of Gasper *et al.* (2016) for family level and below. Herbaria acronyms follow Index Herbariorum (2023). The illustrations were prepared by Reinaldo Pinto.

## Results and discussion

Species delimitation – Based on our observations of populations in the field, on the typological and morphological study of herbarium material, and critical review of the pertinent literature, we here opted to follow the second school of Botanists on the species delimitation, *i.e.*, we here adopt narrow species conceptions, moving in the direction of Brade (1935, 1940), Sehnem (1968), Mickel & Smith (2004), Rolleri & Prada (2006), Kessler *et al.* (2007), and Smith & Kessler (2018); and moving away from the conceptions of Murillo (1968), Prada *et al.* (2008), and Dittrich *et al.* (2015, 2017, 2018, 2020). This is especially notable in the *Blechnum occidentale*-complex, from which we recognize *B. occidentale* L. *s. str.*, *B. appendiculatum* Willd., and *B. ×confluens* Schlecht. & Cham. (putative hybrid between *B. occidentale* and *B. polypodioides*), instead of considering these three taxa as “*B. occidentale s.l.*”.

We also recognize *Blechnum aff. juergensii* Rosenst., an abnormal taxon that has 1-pinnate-pinnatifid leaves (Figures 1d, f), which are quite uncommon in genus *Blechnum*. The true (or, the type) of *B. juergensii* has small, 1-pinnate-pinnatifid leaves, to 18 cm long, which are conspicuous pilose throughout the laminae. It was considered a valid species by Sehnem (1968), but a synonym of the 1-pinnate *B. laevigatum* Cav. by Murillo (1968), Rolleri & Prada (2006) and Dittrich *et al.* (2015). The taxon from Viçosa has 1-pinnate-pinnatifid leaves, similar to the typical *B. juergensii*, but with much longer leaves, to 90 cm long, which are essentially glabrous (except for the presence of sessile glands – Figure 1e). Therefore, in an absence of a better name, and yet recognizing their differences, we identified the taxon from Viçosa as *B. aff. juergensii*. We speculate that such abnormal leaves (1-pinnate-pinnatifid) might be due to an aneuploidy, a polyploidy, a hybridization, or just mutations. We further speculate that true *B. juergensii* is derived from *B. laevigatum*, due to leaf sizes, indumenta similarity, and sympatry, whereas the Viçosense *B. aff. juergensii* might be derived from *B. occidentale* by the same reasons. Further studies involving cytogenetics, genetics, and palinology are necessary to reveal the best status for the specimens classified here as *B. aff. juergensii*. Anyway, for the time being, we would rather maintain it segregated from “*B. occidentale s.l.*”, or from *B. laevigatum*, which does not occur in Viçosa.

Another species in which we disagree from the taxonomy of Prada *et al.* (2008) and Dittrich *et al.* (2018, 2020) is *Parablechnum brasiliense* (Raddi) M.T. Medeiros & Schwartsb., *comb. nov.* For these authors, this species is a synonym of the widespread *Parablechnum cordatum* (Desv.) Gasper & Salino *s.l.*, whose type is from the Andes. In our view, *P. cordatum s. str.*, as delimited by Kessler *et al.* (2007) and Smith & Kessler (2018), for example, does not occur in the Brazilian Atlantic Forest. The best name for the most common species of *Parablechnum* from this region is *P. brasiliense*. This conception is also similar to those of Brade (1935, 1940) and Sehnem (1968) – for differentiation

between the Andean *P. cordatum s. str.* and *P. brasiliense*, see the comments under this species.

Our conceptions on *Blechnum ×caudatum*, *B. gracile* Kaulf., *B. polypodioides* Raddi, and *Neoblechnum brasiliense* (Desv.) Gasper & V.A.O. Dittrich are in accordance with those of Rolleri & Prada (2006) and Dittrich *et al.* (2015, 2017, 2020).

Diversity and Distribution – From Viçosa and surroundings, we report the occurrence of seven species and two putative hybrids, belonging to three genera: *Blechnum appendiculatum*, *B. ×caudatum*, *B. ×confluens*, *B. gracile*, *B. aff. juergensii*, *B. occidentale*, *B. polypodioides*, *Neoblechnum brasiliense*, and *Parablechnum brasiliense*. Among these taxa, *B. aff. juergensii* is possibly a local endemic and *P. brasiliense* is probably endemic to the Brazilian Atlantic Forest; the other taxa are widespread in the Neotropics.

The putative hybrids *Blechnum ×caudatum* and *B. ×confluens* are formed by the crossing of *B. gracile* × *B. occidentale*, and *B. occidentale* × *B. polypodioides*, respectively – as suggested by our observations in the field, morphological intermediancy, and literature review.

We collected all taxa except for *Blechnum ×caudatum* and *B. gracile*, whose collections from Viçosa were made on 1930 by Mexia. According to her annotations on the labels, these taxa were already rare on 1930.

### Taxonomic Treatment Blechnaceae

Plants terrestrial or epipetric. Stems erect or creeping, commonly stoloniferous, sometimes forming trunks, scaly. Leaves monomorphic, hemidimorphic, or dimorphic, commonly reddish when young; laminae simple to 2-pinnate; veins free or anastomosing, lacking included veinlets; sori borne on commissural veins parallel and next to the costae, or acrostichoid; indusia introrse; spores monoletic.

Twenty four genera, with ten occurring in Brazil, and only three in Viçosa.

### Key to genera of Blechnaceae from Viçosa, MG, Brazil

1. Leaves dimorphic (Figure 4e) ..... *Parablechnum*
1. Leaves monomorphic
  2. Stems forming small trunks, to 1 m long (Figure 4a); stem scales black and linear (Figure 4c); leaves more than 1 m long ..... *Neoblechnum*
  2. Stems erect and stoloniferous (e.g., Figure 1d), not forming trunks; stem scales brown and lanceate; leaves to 90 cm long ..... *Blechnum*

### *Blechnum*

Stems erect, stoloniferous, not forming trunks, with brown, lanceate scales. Leaves monomorphic; laminae simple,

deeply pinnatisect, 1-pinnate, or rarely 1-pinnate-pinnatifid; sori linear, along the costae.

Seven taxa in Viçosa: four species, two putative hybrids, and one taxon with doubtful status.

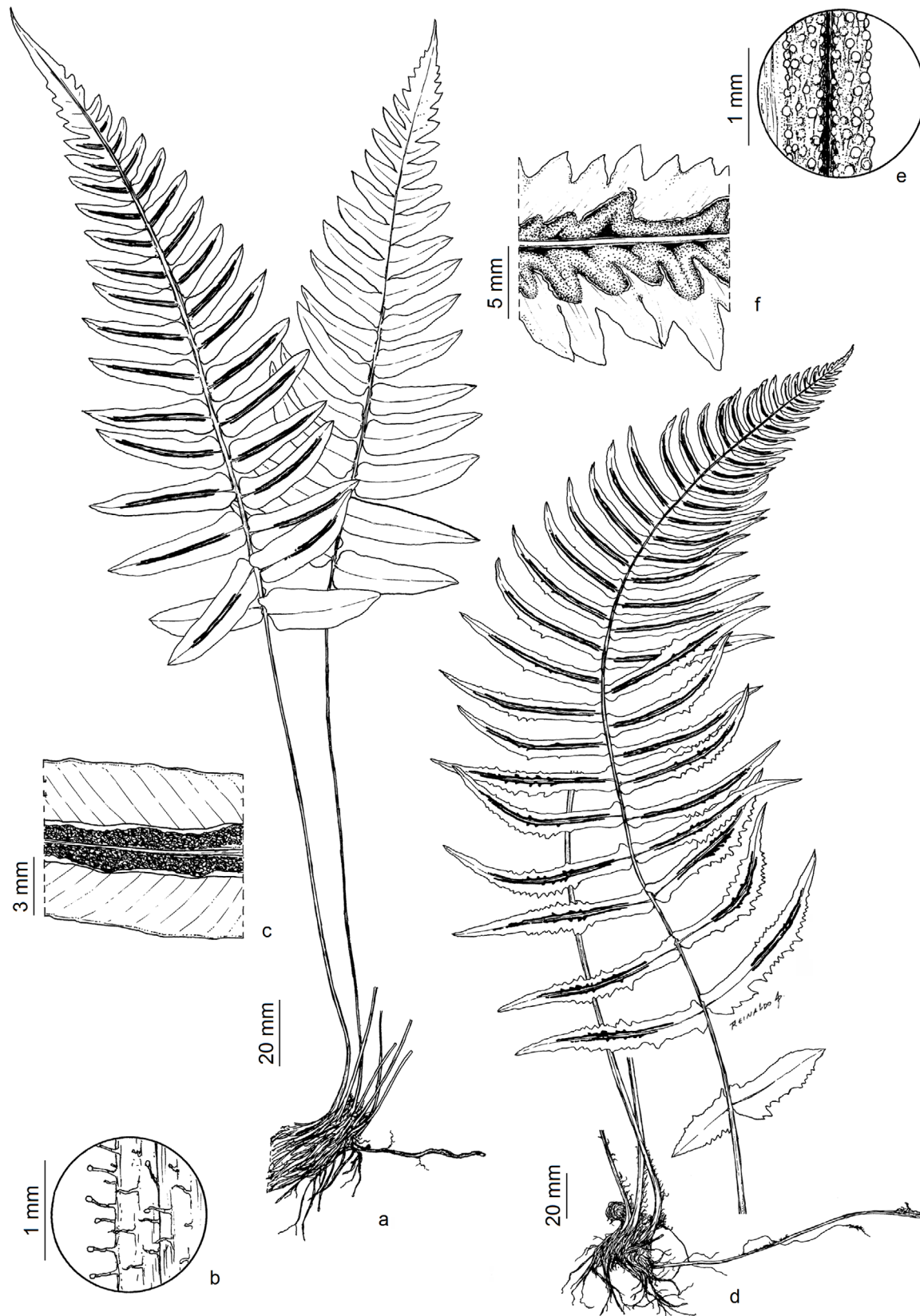


Figure 1. a-c. *Blechnum appendiculatum* Willd. a. Habit. b. Detail of rachises, adaxially, showing multicellular, glandular hairs. c. Detail of pinnae, abaxially. d-f. *Blechnum* aff. *juergensii* Rosenst. d. Habit. e. Detail of rachises, adaxially, showing sessile glands. f. Detail of pinnae, abaxially.

Key to species and hybrids of *Blechnum* from Viçosa

1. Laminae 1-pinnate-pinnatifid (Figures 1d, f) ..... *B. aff. juergensii*
1. Laminae deeply pinnatisect to 1-pinnate
  2. Laminae with conform apices (i.e., pinna-like apices – Figures 2a, d)
    3. Laminae with 3-7 pairs of pinnae (Figure 1a); medial pinnae petiolulate ..... *B. gracile*
    3. Laminae with more than 8 pairs of pinnae (Figure 1d); medial pinnae adnate ..... *B. ×caudatum*
  2. Laminae with pinnatifid apices (e.g., Figure 2g)
    4. Laminae attenuate, with the basal pinnae gradually reduced (Figures 3d, g)
      5. Basal pinnae adnate, strongly reduced to auricles ..... *B. polypodioides*
      5. Basal pinnae petiolulate, reduced (but not to auricles) ..... *B. ×confluens*
    4. Laminae truncate, with the basal pinnae slightly or not reduced (e.g., Figure 3a)
      6. Rachises and costae with only sessile glands, otherwise glabrous (Figure 3c) ..... *B. occidentale*
      6. Rachis and costa with sessile glands and multicellular hairs (glandular and/or eglandular – Figure 1b) .....  
..... *B. appendiculatum*

***Blechnum appendiculatum*** Willd., Sp. Pl. 5(1): 410. 1810. *Mesothema appendiculatum* (Willd.) C. Presl, Epimel. Bot.: 112. 1851. *Blechnum occidentale* var. *appendiculatum* (Willd.) Hieron., Hedwigia 47: 235. 1908. Type: Venezuela, Caracas, s.d., *Bredemeyer* (B-W-20038, image!).

Figures 1 a-c

Plants terrestrial. Stems erect to decumbent, stoloniferous; scales brown with a black medial stripe, to 0.5 cm. Leaves monomorphic, 15-70 cm long; petioles 5-45 cm long, with brown scales at the base; laminae 10-40 × 3-20 cm, 1-pinnate, with truncate bases and pinnatifid apices; basal pinnae sessile; medial pinnae adnate; rachises abaxially with multicellular hairs, both glandular and eglandular, adaxially with sessile glands; costae abaxially glabrescent or with sparse glandular hairs, adaxially with sessile glands and sparse glandular hairs; veins abaxially glabrous, adaxially with scarce glandular hairs; laminar tissue between the veins abaxially and adaxially glabrous.

Material examined: BRAZIL. MINAS GERAIS: Viçosa, UFV, 30-VII-1976, *M.P. Coons* 76 (VIC); Viçosa, Rua Nova, 14-VI-1999, *A.F. Carvalho* 619 (VIC); Viçosa, UFV, Pedreira da Caprinocultura, 20°46'18"S, 42°51'06"W, ca. 780 m, 20-I-2014, *P.B. Schwartsburd et al.* 2916 (VIC); Viçosa, UFV, atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartsburd & M.L.D. Pimenta* 3495 (VIC); Viçosa, UFV, atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartsburd & M.L.D. Pimenta* 3496 (VIC); Viçosa, estrada para São Geraldo, 20°48'S, 42°48'W, 20-X-2020, *M.T. Medeiros et al.* 8 (VIC); Viçosa, UFV, estrada próxima à Divisão de Saúde, 9-II-2021, *M.T. Medeiros* 28 (VIC); Viçosa, UFV, estrada próxima à Divisão de Saúde, 9-II-2021, *M.T. Medeiros* 30 (VIC); Viçosa, UFV, Pedreira da Caprinocultura, 8-III-2021, *M.T. Medeiros et al.* 36 (VIC).

Comments: *Blechnum appendiculatum* differs from *B. occidentale* by the presence of sessile glands and multicellular hairs (both glandular and eglandular) on some parts of the leaves (rachises, costae, and veins – Figure 1b), whereas *B. occidentale* is essentially glabrous, having only sessile glands (Figure 2h).

***Blechnum ×caudatum*** Cav., Descr. Pl. 1: 262. 1802. *Blechnum occidentale* var. *caudatum* (Cav.) Hook., Sp. Fil. [W.J. Hooker] 3: 51. 1860. Type: “Philippines”, s.d., *L. Née s.n.* (MA-213344, image!, SEV-H3661, image!).

Figures 2d-f

Plants terrestrial. Stems erect to decumbent, stoloniferous; scales brown with a black medial stripe, to 0.5 cm long. Leaves monomorphic, 20-70 cm long; petioles 8-35 cm long, proximally with brown scales; laminae 12-35 × 6-18 cm, 1-pinnate, with truncate bases and conform apices; basal pinnae petiolulate, slightly or not reduced; medial pinnae adnate; rachises abaxially glabrous, adaxially with sessile glands; costae abaxially glabrous, adaxially with sessile glands; veins abaxially and adaxially glabrous; laminar tissue between the veins abaxially and adaxially glabrous.

Material examined: BRAZIL. MINAS GERAIS: Viçosa, estrada para São Miguel, km 8, 600 m, Córrego Sujo, 20-VII-1930, *Y. Mexia* 4877b (F, NY, U, UC).

Comments: *Blechnum ×caudatum* is a putative hybrid between *B. gracile* and *B. occidentale*, with intermediate morphological characteristics (see Figure 2), and found alongside populations of the two parental species (e.g., *Mexia* 4877a, 4877b, and 4877c).

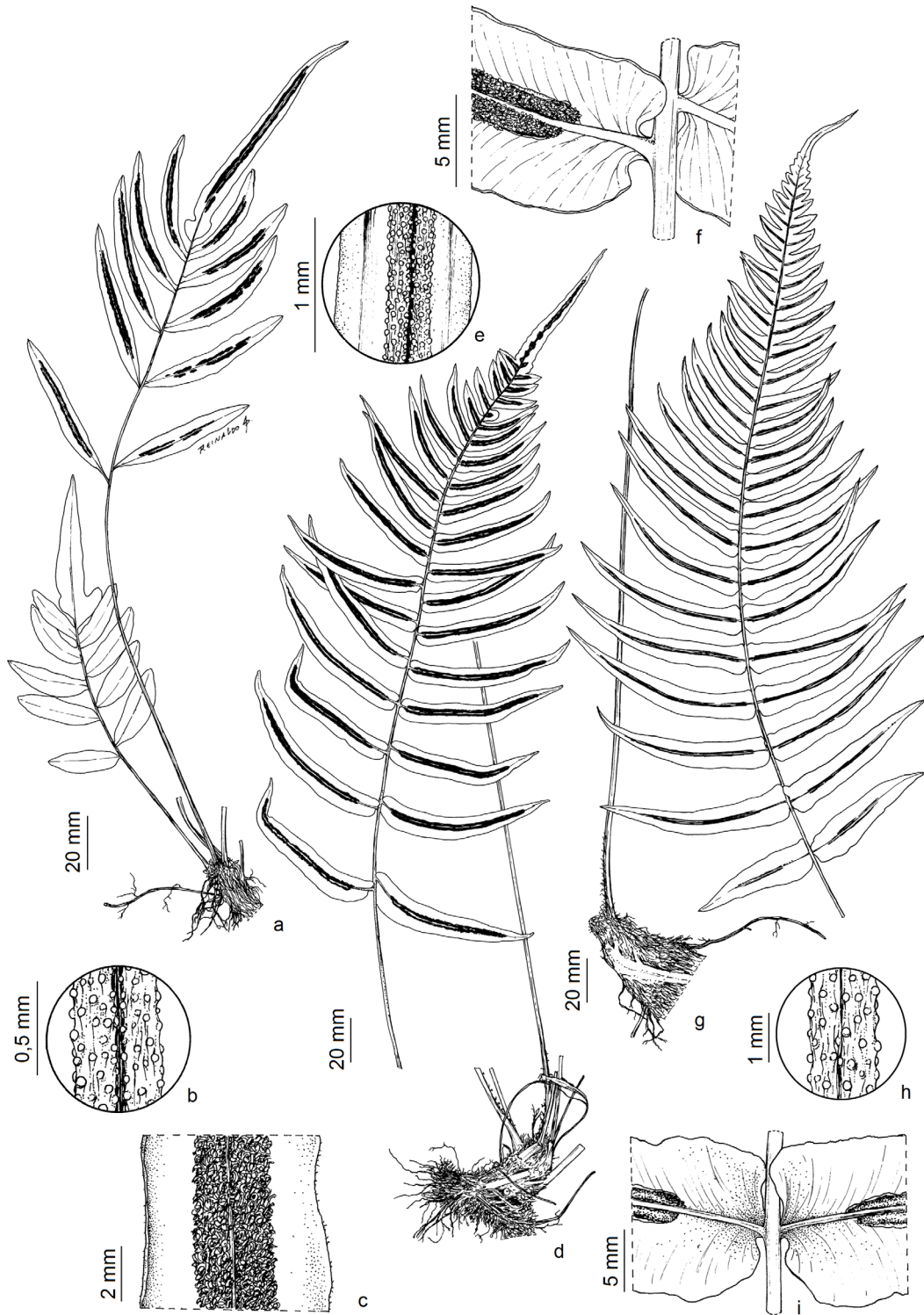


Figure 2. a-c. *Blechnum gracile* Kaulf. a. Habit. b. Detail of rachises, adaxially, showing sessile glands. c. Detail of pinnae, abaxially. d-f. *Blechnum xcaudatum* Cav. d. Habit. e. Detail of rachises, adaxially, showing sessile glands. f. Detail of base of pinnae, abaxially. g-i. *Blechnum occidentale*. g. Habit. h. Detail of rachises, adaxially, showing sessile glands. i. Detail of base of pinnae, abaxially.

***Blechnum xconfluens*** Schlecht. & Cham., Linnaea 5: 613.  
 1830. Type: Mexico, Hacienda de la Laguna, X-1828,  
 C.J.W. Schiede 759 (HAL-0081871, image!).

Figures 3g-i

Plants terrestrial. Stems decumbent to erect, stoloniferous; scales brown with black medial stripe; 0.6-1 cm long. Leaves monomorphic, 20-70 cm long; petioles 4-35 cm long, proximally with brown scales, abaxially glabrous, adaxially

with sessile glands; laminae 10-40 × 4-15 cm, 1-pinnate, with attenuate bases, and pinnatifid apices; basal pinnae petiolulate, reduced; medial pinnae adnate; rachises abaxially with multicellular, glandular hairs, or glabrous, adaxially with sessile glands; costae abaxially with multicellular, glandular hairs, or glabrous, adaxially with sessile glands; veins abaxially and adaxially with sparse glandular hairs, or glabrous; laminar tissue between the veins abaxially and adaxially with sparse glandular hairs, or glabrous.

Material examined: BRAZIL. MINAS GERAIS: Viçosa, ESAV 670 m, 3-III-1930, *Y. Mexia 4416b* (UC, VIC); Viçosa, Escola de Agricultura, north bordering wagon road, 675 m, 14-IV-1930, *Y. Mexia 4608* (F, MO, NY, UC, US, VIC); Viçosa, ESAV, 22-II-1959, *H.S. Irwin 2697* (VIC); Viçosa, Belvedere, 28-VIII-1977, “*Maria Augusta*” 37 (VIC); Viçosa, UFV, Silvicultura, 23-II-1987, *G.E. Valente & A. Azevedo 6* (VIC); Viçosa, UFV, Silvicultura, 23-II-1987, *G.E. Valente & A. Azevedo 10* (VIC); Viçosa, UFV, atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartsburd & M.L.D. Pimenta 3490* (VIC); Viçosa, UFV, atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartsburd & M.L.D. Pimenta 3493* (VIC); Viçosa, UFV, atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartsburd & M.L.D. Pimenta 3497* (VIC); Viçosa, estrada para São Geraldo 20°48’S, 42°48’W, 20-X-2020, *M.T. Medeiros et al. 1* (VIC); Viçosa, estrada para São Geraldo 20°48’S, 42°48’W, 20-X-2020, *M.T. Medeiros et al. 4* (VIC); Viçosa, estrada para São Geraldo 20°48’S, 42°48’W, 20-X-2020, *M.T. Medeiros et al. 15* (VIC); Viçosa, estrada para São Geraldo 20°48’S, 42°48’W, 20-X-2020, *M.T. Medeiros et al. 17* (VIC); Viçosa, UFV, trilha próxima à Divisão de Saúde, 9-II-2021, *M.T. Medeiros 29* (VIC); Viçosa, UFV, Pedreira da Caprinocultura, 8-III-2021, *M.T. Medeiros et al. 35* (VIC).

Comments: Murillo (1968) considered “*Blechnum confluens*” as a valid species, whereas Mickel & Smith (2004) suggested it to be a hybrid between *B. occidentale* and *B. polypodioides*. In Viçosa, the populations of *B. ×confluens* are found alongside populations of *B. occidentale* and *B. polypodioides*. This, allied to the intermediate morphological characteristics (see Figure 3), suggest *B. ×confluens* to be a hybrid, indeed. The intermediate morphology is specially seen on the laminar shape and indument: the laminae has attenuate base, with reduced basal pinnae, but not as reduced as *B. polypodioides* (in *B. occidentale* the laminae is truncate); the basal pinnae are petiolulate, similar to *B. occidentale* (in *B. polypodioides* they are adnate); some specimens of *B. ×confluens* are hairy, like *B. polypodioides*, whereas others are glabrous, just as *B. occidentale*.

***Blechnum gracile*** Kaulf., Enum. Filic.: 158. 1824. *Blechnum longifolium* var. *gracile* (Kaulf.) Mett. in Triana & Planch., Ann. Sci. Nat., Bot., sér. 5, 2: 224. 1864. Type:

Brazil, *Otto comunicavit* (B, n.v., LE?).

Figures 2a-c

Plants terrestrial. Stems decumbent to erect, stoloniferous, with black scales, to 0.2 cm long. Leaves monomorphic, 18-37 cm long. Stipes 6-15 cm long, with black scales at the base and sessile glands. Laminae 12-22 × 5-9 cm, 1-pinnate, with truncate bases and conform apices; basal pinnae petiolulate, slightly or not reduced; medial pinnae petiolulate; rachises abaxially and adaxially with sessile glands; costa abaxially and adaxially with sessile glands; veins abaxially and adaxially glabrous; laminar tissue between the veins abaxially and adaxially glabrous.

Material examined: BRAZIL. MINAS GERAIS: Viçosa, Estrada para São Miguel km 8, 600 m, Córrego Sujo, 20-VII-1930, *Y. Mexia 4877a* (NY, UC, US, VIC).

***Blechnum* aff. *juergensii*** Rosenst., Festschrift Albert von Bamberg. 59. 1905. Type: Brazil, Rio Grande do Sul, Rio Pardo, Serra do Acre, 1906, *C. Jürgens 162* [*Rosenst. Filic. Austrobras. Exsicc.* 262] (BM, image!, GH, image!, K, image!, P, image!, R, image!, S, image!, UC, image!, US-00067426, image!).

Figures 1d-f

Plants terrestrial. Stems erect to decumbent, stoloniferous, with black scales with brown edges, 5-6 mm long. Leaves monomorphic, 35-90 cm long; stipes, 12-40 cm long, with brown scales at the base; laminae 20-40 × 5-18 cm, 1-pinnate-pinnatifid, with truncate bases and pinnatifid apices; basal pinnae petiolulate, slightly or not reduced; medial pinnae basiscopically sessile, acroscopically adnate; rachises abaxially glabrous, adaxially with sessile glands; veins abaxially and adaxially glabrous; laminar tissue between the veins abaxially and adaxially glabrous.

Material examined: BRAZIL. MINAS GERAIS: Viçosa, UFV, Mata da Biologia, 8-III-2021, *M.T. Medeiros 31* (VIC); Viçosa, UFV, Trilha para a Pedreira da Caprinocultura, 9-II-2021, *M.T. Medeiros et al. 34* (VIC); Viçosa, UFV, Trilha para a Pedreira da Caprinocultura, 8-III-2021, *M.T. Medeiros et al. 37* (VIC); Viçosa, UFV, Trilha para a Pedreira da Caprinocultura, 8-III-2021, *M.T. Medeiros et al. 38* (VIC); Viçosa, UFV, Trilha para a Pedreira da Caprinocultura, 8-III-2021, *M.T. Medeiros et al. 39* (VIC); Viçosa, UFV, Estrada para São Miguel, entrada antes da Medicina Veterinária, 8-III-2021, *M.T. Medeiros 44* (VIC); Viçosa, UFV, Pedreira da Caprinocultura, 20°46’18” S, 42°51’06”, 780 m, 20-I-2014, *P.B. Schwartsburd et al. 2916b* (VIC); Viçosa, UFV, Mata da Dendrologia, 15-XII-2014, *P.B. Schwartsburd 3471* (VIC); Viçosa, 1930, *Y. Mexia 4607* (MO, NY, UC, VIC); Viçosa, ESAV 670 m, 3-III-1930, *Y. Mexia 4416c* (US).

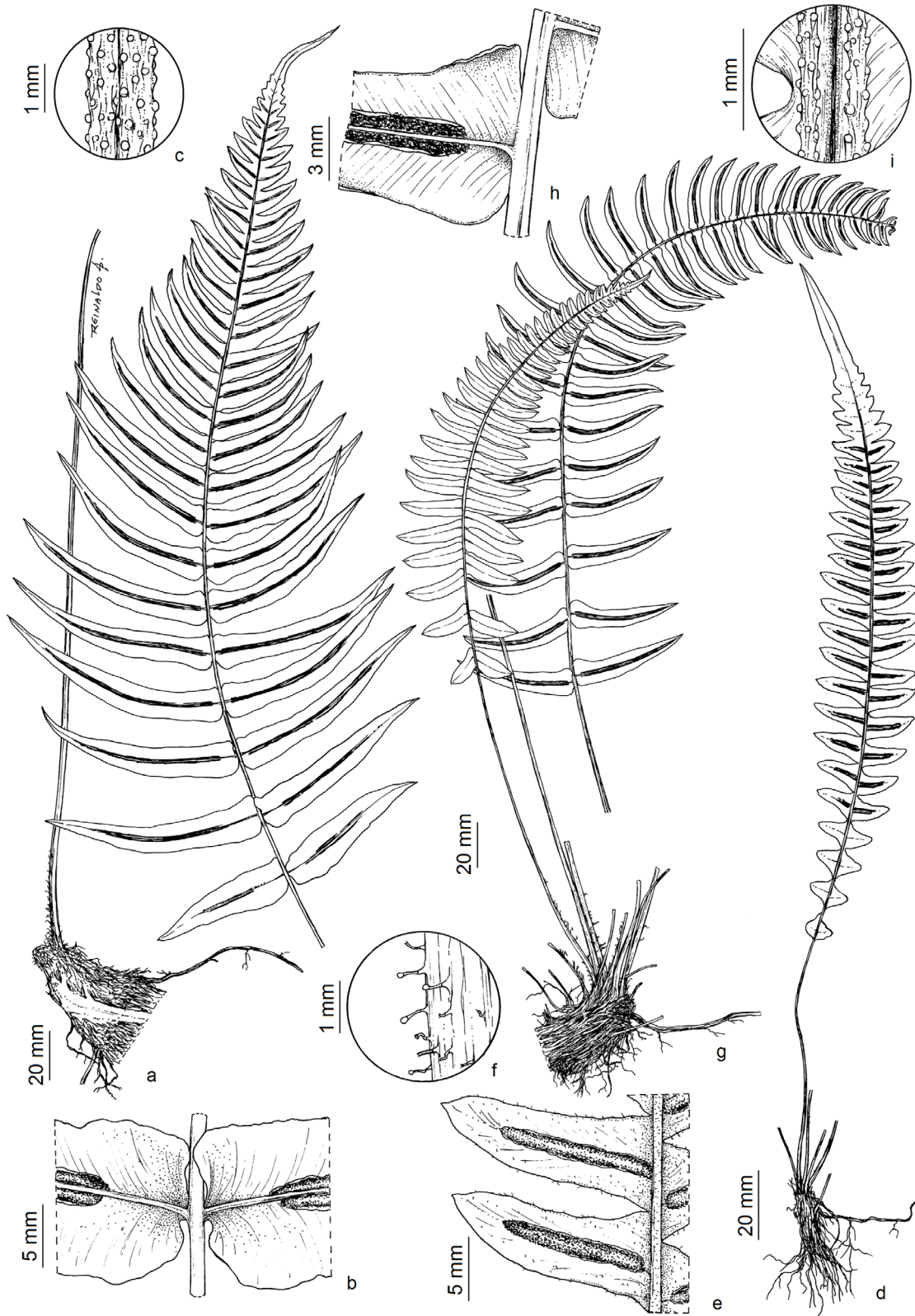


Figure 3. a-c. *Blechnum occidentale* L. a. Habit. b. Detail of base of pinnae, abaxially. c. Detail of rachises, adaxially, showing sessile glands. d-f. *Blechnum polypodioides* Raddi. d. Habit. e. Detail of pinnae, abaxially. f. Detail of rachises, adaxially, showing multicellular, glandular hairs. g-i. *Blechnum xconfluens* Schlecht. & Cham. g. Habit. h. Detail of base of pinnae, abaxially. i. Detail of rachises, adaxially, showing sessile glands.



Comments: *Blechnum aff. juergensii* differs from all other *Blechnum* from Viçosa due to its 1-pinnate-pinnatifid laminae (Figures 1d, f), whereas the other taxa are 1-pinnate. The true (or, the type of) *Blechnum juergensii* has small, 1-pinnate-pinnatifid leaves, to 18 cm long, which are conspicuous pilose throughout the laminae. The taxon from Viçosa has 1-pinnate-pinnatifid leaves, similar to the typical *B. juergensii*, but with much longer leaves, to 90 cm long, which are essentially glabrous (except for the presence of sessile glands – Figure 1e). Therefore, in an absence of a better name, and yet recognizing their differences, we identified the taxon from Viçosa as *B. aff. juergensii*. We speculate that such abnormal leaves (1-pinnate-pinnatifid) might be due to an aneuploidy, a polyploidy, a hybridization, or just mutations. We further speculate that the true *B. juergensii* is derived from *B. laevigatum*, due to leaf sizes, indumenta similarity, and sympatry, whereas the Viçosense *B. aff. juergensii* might be derived from *B. occidentale* by the same reasons.

***Blechnum occidentale* L., Sp. Fil. 2: 1077. 1753. Type:**  
Petiver, Pter. Amer.: t. 3, Figure 9, 1712.

Figures 2g-i, 3a-c

Plants terrestrial. Stems erect to decumbent, stoloniferous, with brown scales with red or black central stripes, 0.5-1.0 cm long. Leaves monomorphic, 12-72 cm long; stipes 3.5-34 cm long, with sparse brown scales at the base; laminae 7.5-40 × 2-20 cm, 1-pinnate, with truncate bases and pinnatifid apices; basal pinnae petiolulate, slightly or not reduced; medial pinnae adnate; rachises abaxially glabrous, adaxially with sessile glands; costae abaxially glabrous, adaxially with sessile glands; veins abaxially and adaxially glabrous; laminar tissue between the veins abaxially and adaxially glabrous.

Material examined: BRAZIL. MINAS GERAIS: Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros et al. 2* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros et al. 3* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros et al. 10* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros et al. 11* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros et al. 12* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros 13 et al.* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros 14 et al.* (VIC); Viçosa, UFV, Mata do Paraíso, 20°48' S, 42°51' W, 750 m, 14-XI-2014, *P.B. Schwartsburd 3424* (VIC); Viçosa, Mata do Paraíso, 20°48'04" S, 42°51'19" W, 800 m, 23-V-2013, *P.B. Schwartsburd 2803* (VIC); Viçosa, Escola de agricultura, Horticultura, 670 m, 3-VII-1930, *Y. Mexia 4836* (F, TEX, MO, U, NY, UC, VIC); Viçosa, UFV, Pedreira da Caprinocultura, 12-XII-1996, *G.E. Valente et al. 248* (VIC); Viçosa, UFV, Pasto da Zootecnia, 20-V-1997,

*S.J.S. Neto s.n.* (VIC 22922); Viçosa, UFV, Belvedere, 11-IX-1977, “*Rosângela & Rosane*” 14 (VIC); Viçosa, ESAV 670 m, 3-III-1930, *Y. Mexia 4416a* (F, MO, U, NY, US, VIC); Viçosa, UFV, Pasto da Zootecnia, 30-X-1996, *M.S. Borges et al. s.n.* (VIC); Viçosa, Alameda Professor Fábio Ribeiro Gomes, 9-IX-1996, *G.E. Valente 226* (VIC); Viçosa, UFV, Mata da Biologia, 13-VI-1995, *G.E. Valente 32* (VIC); Viçosa, Estrada para São Miguel do Anta, 26-IV-2021, *M.T. Medeiros 40* (VIC); Viçosa, UFV, Silvicultura, 23-II-1987, *G.E. Valente 11 & A. Azevedo* (VIC); Viçosa UFV, Estrada para a criação de Equídeos, 13-X-2016, *P.B. Schwartsburd 3802 & N.S. Smith-Braga* (VIC); Viçosa, Estrada para São Miguel km 8, 600 m, Córrego Sujo, 20-VII-1930, *Y. Mexia 4877c* (MO, US).

***Blechnum polypodioides* Raddi, Opusc. Sci. 3: 294. 1819.**

Type: Brazil, [Rio de Janeiro], Corcovado, s.d., *G. Raddi s.n.* (B-20 0032870a, image!, FI, n.v., PI-010206, image!, PI [2], n.v.).

Figures 3d-f

Plants terrestrial. Stems erect to decumbent, stoloniferous, with brown scales, 0.5-1.0 cm long. Leaves monomorphic, 9-60 cm long; stipes 0.2-25 cm long, with brown scales at the base, with glandular hairs; laminae 9-33 × 1.5-6 cm, deeply pinnatisect or 1-pinnate, with attenuate bases and pinnatifid apices; basal pinnae adnate, strongly reduced to auricles; medial pinnae adnate; rachises abaxially and adaxially pilose, with multicellular hairs both glandular and eglandular; costae abaxially and adaxially pilose; veins abaxially and adaxially sparsely pilose; laminar tissue between the veins abaxially and adaxially sparsely pilose.

Material examined: BRAZIL. MINAS GERAIS: Viçosa, ESAV, 28-II-1935, *Kuhlmann s.n.* (VIC 1895); Viçosa, Belvedere, 11-IX-1977, “*Rosane & Rosângela*” s.n. (VIC 7933); Viçosa, UFV, Estrada Próxima a Divisão de Saúde, 9-II-2021, *M.T. Medeiros 29* (VIC); Viçosa, Estrada para São Miguel, 26-IV-2021, *M.T. Medeiros 41* (VIC); Viçosa, Estrada para São Miguel, 26-IV-2021, *M.T. Medeiros 42* (VIC); Viçosa, UFV, Silvicultura, 23-II-1987, *G.E. Valente 5 & A. Azevedo* (VIC); Viçosa, ESAV, Terraço de Serras ao Sul, 710 m, 28-III-1930, *Y. Mexia 4528* (F, MO, U, NY, UC, US, VIC); Viçosa, UFV, Pedreira da Caprinocultura, 12-XII-1996, *G.E. Valente 247 et al.* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros 9* (VIC); Viçosa, Mata do Paraíso, 20°48'04" S, 42°51'19" W, 800 m, 23-VI-2013, *P.B. Schwartsburd 2798 & L. Rabelo-Sales* (VIC); Viçosa, Alameda Professor Fábio Ribeiro Gomes, 9-IX-1996, *G.E. Valente 227* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros et al. 5* (VIC); Viçosa, UFV, Mata da Biologia, 17-XII-1996, *G.E. Valente 267 et al.* (VIC); Viçosa, UFV, Mata da Biologia, 13-VI-1995, *G.E. Valente 31* (VIC); Viçosa, UFV, Mata da Biologia, 23-II-1987, *G.E. Valente 7 & A. Azevedo* (VIC); Viçosa, ESAV, 675 m, 11-IV-1930, *Y. Mexia 4594* (F, TEX,

MO, U, NY, UC, US, VIC); Viçosa, UFV, Silvicultura, 23-II-1987, *G.E. Valente 6 & A. Azevedo* (VIC); Viçosa, UFV, Pedreira da Caprinocultura, 20°46'18" S, 42°51'06" W, 760 m, 20-I-2014, *P.B. Schwartzburd 2911 et al.* (VIC); Viçosa, ESAV, 22-II-1959, *H.S. Irwin 2696* (VIC); Viçosa, UFV, Atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartzburd 3491 & M.L.D. Pimenta* (VIC); Viçosa, UFV, Atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartzburd 3492 & M.L.D. Pimenta* (VIC); Viçosa, UFV, Atrás do Horto Botânico, 27-IV-2015, *P.B. Schwartzburd 3494 & M.L.D. Pimenta* (VIC).

### *Neoblechnum* Gasper & V.A.O. Dittrich

Stems erect, stoloniferous, forming trunks, with blackish, linear scales. Leaves monomorphic; laminae 1-pinnate; sori linear, along the costae.

One species in Viçosa.

*Neoblechnum brasiliense* (Desv.) Gasper & V.A.O. Dittrich, *Phytotaxa* 275(3): 214. 2016. *Blechnum brasiliense* Desv., *Mag. Neuesten Entdeck. Gesammten Naturk. Ges. Naturf. Freunde Berlin* 5: 330. 1811. *Blechnopsis brasiliensis* (Desv.) C. Presl, *Epimel. Bot.*: 115. 1851. Type: Brazil, Rio de Janeiro, s.d., *J. Dombey s.n.* (P-00347414, image! P-00627567, image!, US, n.v.).

Figures 4a-d

Plants terrestrial. Stems erect, forming trunks to 1 m high, stoloniferous, with black, linear scales to 2.5 cm long. Leaves monomorphic, 50-135 cm long; stipes 1-15 cm, with black scales; laminae 48-122 × 10-45 cm, deeply pinatisect in general, 1-pinnate at the bases, attenuate at the bases, pinnatifid at the apices; basal pinnae adnate, strongly reduced to auricles; medial pinnae adnate; rachises abaxially and adaxially sparsely scaly; costae abaxially with sparse, multicellular, glandular hairs, adaxially glabrous; veins abaxially with sparse, multicellular, glandular hairs, adaxially glabrous; laminar tissue between the veins abaxially with sparse, multicellular, glandular hairs, adaxially glabrous.

Material examined: BRAZIL. MINAS GERAIS: Guaraciaba, Fazenda Bom Jardim, 3-VI-1995, *J.A.A. Meira Neto 109 et al.* (VIC). Rio Branco, Fazenda da Reserva, 3-I-1931, *Y. Mexia 5480* (F, MO, US, VIC). Viçosa, Escola de Agricultura e Veterinária (UFV), 13-VII-1930, *Y. Mexia, 4857* (MO, NY, US, VIC); Viçosa, Fazenda da Serra, 2-V-1930, *Y. Mexia 4654* (F, MO, U, NY, US, VIC); Viçosa, UFV Pasto da Zootecnia, 30-X-1996, *M.S. Borges s.n. et al.* (VIC 16600); Viçosa, BR-120, Mata do Sr. Nico, 1-IV-2002, *G.E. Valente 904 & J.A.A. Meira Neto* (VIC); Viçosa, Vila Gianetti, 25-II-1998, *A.F. Carvalho 528* (VIC); Viçosa, UFV, Horto Botânico, 15-XII-2014, *P.B. Schwartzburd 3429* (VIC); Viçosa, UFV, Trilha próxima à Divisão de Saúde, 9-II-2021, *M.T. Medeiros 32* (VIC); Viçosa, Mata do Paraíso, 20°48'04"S, 42°51'19"W, 23-V-2013, *P.B. Schwartzburd 2800 & L. Rabelo-Sales* (VIC).

### *Parablechnum* C. Presl

Stems erect, non stoloniferous, not forming trunks, with brown, lanceate scales. Leaves dimorphic; laminae 1-pinnate; sori acrostichoid.

One species in Viçosa.

*Parablechnum brasiliense* (Raddi) M.T. Medeiros & Schwartzb., *comb. nov.* pro *Lomaria brasiliensis* Raddi, *Pl. Bras. Nov. Gen.* 1: 50, t. 72, 72 bis. 1825. *Blechnum raddianum* Rosenst., *Hedwigia* 46: 91. 1907, *nom. nov.* *Blechnum raddianum* Hieron., *Hedwigia* 47: 238. 1908, *nom. sup. et illeg.* *Struthiopteris brasiliensis* (Raddi) Maxon & C.V. Morton, *Bull. Torrey Bot. Club* 66: 43. 1939. *Blechnum euraddianum* Brade, *An. Reunião Sul-Amer. Bot.* 2: 7. 1940, *nom. sup.* Type: Brasil, [Rio de Janeiro], Tijuca, s.d., *G. Raddi* (PI-01197, image!, PI-010198, image!).

Figures 4e-j

Plants terrestrial, rarely epipetric. Stems erect to decumbent, non-stoloniferous, with brown scales. Leaves dimorphic, the vegetative shorter than the sterile. Vegetative leaves 25-130 cm long; stipes 10-65 cm long, stramineous, stramineous with burgundy stains, to entirely burgundy, with brown scales at the base; laminae 12-65 × 7-30 cm, 1-pinnate, truncate at the bases, with conform apices; basal pinnae petiolulate, not reduced; medial pinnae petiolulate; rachises abaxially scaly and with sparse clavate hairs, adaxially with sessile glands; costae abaxially scaly and with sparse clavate hairs, adaxially with sessile glands; veins abaxially with sparse clavate hairs, adaxially glabrous; laminar tissue between the veins abaxially with sparse clavate hairs, adaxially glabrous. Fertile leaves 40-135 cm long; stipes 30-70 cm long, stramineous, stramineous with burgundy stains, to entirely burgundy, with brown scales at the base; laminae 10-65 × 3.5-20 cm, 1-pinnate, with truncate bases, with conform apices; basal pinnae petiolulate, not reduced; medial pinnae petiolulate.

Material examined: BRAZIL. MINAS GERAIS: Guaraciaba, Fazenda Bom Jardim, 1-VII-1995, *G.E. Valente s.n.* (VIC 20577). Viçosa, 1930, *Y. Mexia 4546* (MO, NY, US VIC); Viçosa, UFV, 3-VI-1930, *Y. Mexia 4782* (MO, NY, US); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-XI-2020, *M.T. Medeiros 16* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros 7* (VIC); Viçosa, Estrada para São Geraldo, 20°48' S, 42°48' W, 20-X-2020, *M.T. Medeiros 6* (VIC); Viçosa, Estrada para São Miguel, 26-IV-2021, *M.T. Medeiros 43* (VIC); Viçosa, UFV, Mata do Lago da Bovinocultura, Estábulo, 15-XII-2014, *P.B. Schwartzburd 3464 et al.* (VIC); Viçosa, UFV, Ranrio, 5-IX-2019, *N.T.L. Pena 832 & P.B. Schwartzburd* (VIC); Viçosa, UFV, Estrada para a Zootecnia, Laticínios Viçosa, 20°45'57"S 42°51'21", 650 m, 5-IX-2019, *N.T.L. Pena 833 & P.B. Schwartzburd* (VIC); Viçosa, UFV, Estrada para a Zootecnia, Laticínios Viçosa, 20°45'57"S 42°51'21",

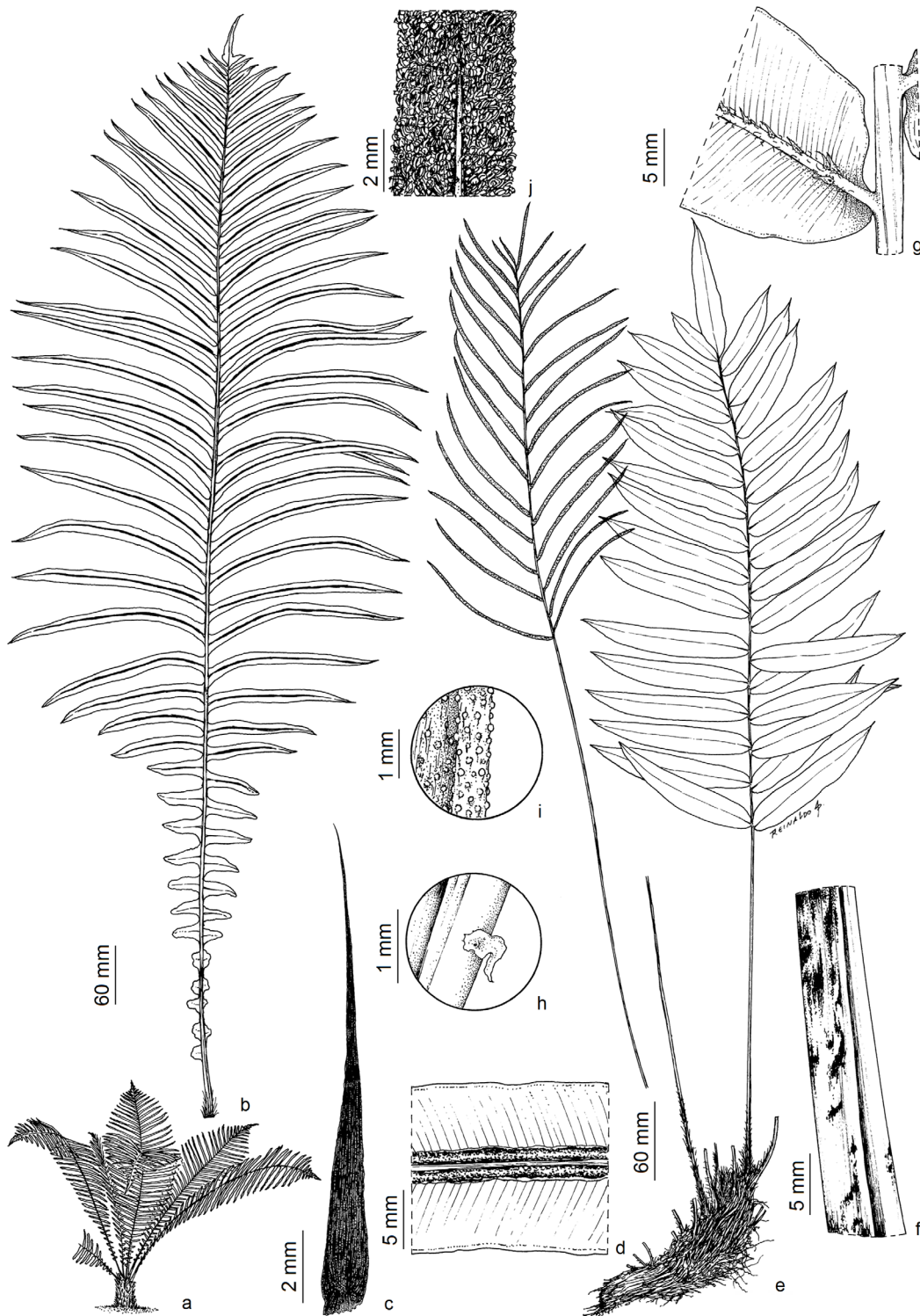


Figure 4. a-c. *Neoblechnum brasiliense* (Desv.) Gasper & V.A.O. Dittrich. a. Habit. b. Leaf. c. Stem scale. d. Detail of pinnae, abaxially. e-h. *Parablechnum brasiliense* (Raddi) M.T. Medeiros & Schwartsb. e. Habit. f. Detail of the stipe, showing burgundy stains. g. Detail of base of vegetative pinnae, abaxially. h. Scale from costa. i. Detail of rachises, adaxially, showing sessile glands. j. Detail of fertile pinnae, abaxially, showing acrotichoid sorus.

650 m, 5-IX-2019, *N.T.L. Pena 834 & P.B. Schwartsburd* (VIC); Viçosa, UFV, Estrada para a Zootecnia, Laticínios

Viçosa, 20°45'57"S 42°51'21", 650 m, 5-IX-2019, *N.T.L. Pena 835 & P.B. Schwartsburd* (VIC); Viçosa, UFV, Estrada

para a Zootecnia, Laticínios Viçosa, 20°45'57"S 42°51'21", 650 m, 5-IX-2019, *N.T.L. Pena 836 & P.B. Schwartzburd* (VIC); Viçosa, UFV, Estrada para a Criação de Equídeos, 13-X-2016, *P.B. Schwartzburd 3800 & N.S. Smith-Braga* (VIC).

Additional material examined: BRAZIL. ESPÍRITO SANTO: Santa Teresa, Estação Biológica, Santa Lúcia, 4-III-1997, *A.F. da Silva et al. 1914* (VIC). MINAS GERAIS: Araponga, Parque Estadual da Serra do Brigadeiro, 20°43'16"S, 42°29'00"W, 1350 m, 21-II-2014, *P.B. Schwartzburd et al. 2980* (VIC). PARANÁ: Jaguariaíva, Rio Jaguariaíva, 9-VII-2005, *P.B. Schwartzburd et al. 840* (UPCB). SÃO PAULO: Jundiá, Serra do Japi, 23°13'S, 46°57'W, 800 m, 17-X-2009, *J. Prado et al. 2051* (SP-n.v., UEC).

Comments: *Lomaria brasiliensis* has lately been considered a synonym of *Parablechnum caudatum* s.l. (= *Blechnum caudatum* (Desv.) Hieron.), whose type is from the Andes, by Rolleri & Prada (2006), Prada *et al.* (2008), and Dittrich *et al.* (2018, 2020). We here rescue that name from the synonymy, providing a new combination into the recently re-instated genus *Parablechnum*: *P. brasiliense*. Our taxonomic decision is in accordance with the interpretations of Brade (1935, 1940) and Sehnem (1968) for this complex of species, as well as of Kessler *et al.* (2007) and Smith & Kessler (2018), who provided a new circumscription for *P. cordatum* s. str.

Following these stricter definitions, *Parablechnum brasiliense* differs from *P. cordatum* s. str. by the color of the petioles (ranging from stramineous, to stained, to burgundy vs. regularly light brown), by the pinnae with obtuse bases, not trespassing the rachises (vs. pinnae with auriculate bases, trespassing the rachises), by the scaly costae, abaxially (vs. glabrous), and by the veins and the laminar tissue between the veins abaxially with sparse, clavate hairs (vs. glabrous).

In our circumscription, *Parablechnum brasiliense* is probably the most common species of *Parablechnum* in southern and southeastern Brazil; and *P. cordatum* s. str. does not occur there.

## Conclusions and future prospects

Based on typology, morphology, and field observations, we circumscribed seven species and two putative hybrids occurring in the region of Viçosa. One "species" (*Blechnum aff. juergensii*) might also be a hybrid, an aneuploid, a polyploid, or a mutant, due to its unique, abnormal, 1-pinnate-pinnatifid laminae. Further studies involving cytogenetics, genetics, and palynology are needed to investigate the ploidy of the circumscribed taxa, as well as the hybrid status, especially in genus *Blechnum*. A new taxonomic revision of *Parablechnum*, in a Neotropical perspective, is also required.

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## Conflict of interests

The authors declare no conflict of interests, from their part.

## Author contributions

**Pedro B. Schwartzburd:** conceived the project and collected data; wrote the manuscript.

**Miguel T. Medeiros:** conducted the project, collected data, and analyzed the data; wrote the manuscript.

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