

A synopsis of the fern family Blechnaceae in Santa Catarina, Brazil: reviewing Sehnem's 1968 flora

Guilherme Salgado Gritz¹; Vinicius Antonio de Oliveira Dittrich²; André Luis de Gasper³

Abstract: We reviewed the fern family Blechnaceae in Santa Catarina, southern Brazil, in order to update the work done by Sehnem in Flora Ilustrada Catarinense. Ten genera and 21 species in the family have been recognized. In this work, descriptions and identification keys for the species are presented, as well as comments and a comparative list of Sehnem's nomenclature and the current state-of-the-art in Blechnaceae nomenclature.

Keywords: *Blechnum*, Brazil, eupolypods II, pteridophytes, ferns

[es] Sinopsis de la familia Blechnaceae en Santa Catalina, Brasil: una revisión de la Flora de Sehnem de 1968.

Resumen: Revisamos la familia de helechos Blechnaceae para Santa Catarina, sur de Brasil, con el objetivo de actualizar el trabajo realizado por Sehnem en la Flora Ilustrada Catarinense. Se han reconocido diez géneros y 21 especies dentro de la familia. En este trabajo se presentan descripciones y claves de identificación de las especies, así como comentarios y una lista comparativa de la nomenclatura de Sehnem y el estado actual de la nomenclatura de Blechnaceae.

Palabras clave: *Blechnum*, Brasil, eupolipoideas II, pteridófitos, helechos

Introduction

The Blechnaceae family is nested within eupolypods II clade and contains 25 genera and more than 250 species (PPG 1 2016; Molino et al. 2018). Its main characteristics are the sori that borne on a commissural vein parallel to the midvein or costae, and young red fronds (Tryon & Tryon 1982; Gasper et al. 2016). The family is subcosmopolitan and more diversified in Neotropics and Oceania (Dittrich et al., 2007).

In Neotropics, Rolleri & Prada (2006) recognized 92 taxa, based on local surveys and published floras, of which Moran (1995) registered 31 in the Mesoamerican region. In Mexico 15 taxa are known (Smith 1981; Mickel & Beitel 1988; Mickel & Smith 2004), 20 in Peru, (Tryon & Stolze 1993), 15 in Guatemala (Stolze 1981), 34 in Brazil (Dittrich et al. 2020), 22 in Argentina (Ramos Giacosa 2016), 14 in Chile (Aguar et al. 2007) and 46 in Bolivia — the richest country in this region (Smith & Kessler 2018).

In Brazil, the first records of Blechnaceae were made by Fée (1869a, b). In these works, the author describes 17 species of *Blechnum* L. and eight of *Loma-*

ria Willd. Nowadays, numerous regional works can be referred, e.g., Pietrobon & Rosário (2008), Dittrich et al. (2007, 2015, 2017, 2018), Salino et al. (2017) and, among them, the 'Flora Ilustrada Catarinense', published by Aloysio Sehnem. In his Blechnaceae treatment, Sehnem (1968) recognized three genera (*Blechnum*, *Salpichlaena*, and *Stenochlaena*) and described 29 taxa. However, one of the species identified by Sehnem (1968) as *Stenochlaena erythrodes* (Kunze) Underw. is, as a matter of fact, *Lomariopsis marginata* (Schrad.) Kuhn, a species belonging to the family Lomariopsidaceae — leaving 28 species of Blechnaceae in his treatment (most of which were synonymized or re-circumscribed since 1968). Given nomenclatural updates throughout these 50 years, changes in species circumscription, and a new record for Santa Catarina State, our work aims to review the taxonomic treatment of Blechnaceae for Santa Catarina State, Brazil.

Material and methods

We have consulted specimens from the following herbaria: B, BHC, B, CRI, FLOR, FURB, HB,

¹ Universidade Regional de Blumenau, Rua Antônio da Veiga, 140 - Itoupava Seca, 89030-903 - Blumenau - SC (Brasil). G.S. Gritz

E-mail: ggritz@outlook.com
ORCID: 0000-0001-6500-4422

² Departamento de Botânica, Instituto de Ciências Biológicas, Universidade Federal de Juiz de Fora, Rua José Lourenço Kelmer, s/n- Campus Universitário, Bairro São Pedro, 36036-900, Juiz de Fora - MG (Brasil). V.A.O. Dittrich

E-mail: vinarc@gmail.com
ORCID: 0000-0002-6950-1335

³ Universidade Regional de Blumenau, Rua Antônio da Veiga, 140 - Itoupava Seca, 89030-903 - Blumenau - SC (Brasil). A.L. Gasper

E-mail: algasper@furb.br
ORCID: 0000-0002-1940-9581.

HBR, HUEFS, ICN, JOI, K, MB, MO, NYBG, PACA, R, RB, SJRP, SP, UPCB (herbarium abbreviations follow Thiers 2020). The terminology follows Lellinger (2002), with modifications. All species descriptions were elaborated based exclusively on examined specimens, and only a selection of them is presented. The synopsis is arranged in alphabetical order and, finally, we present a comparison between the nomenclature adopted by Sehnem (1968) and the most updated one.

Study area

The State of Santa Catarina, Brazil, covers an area of $\approx 96,000$ km² and is located within the subtropical Atlantic Forest (Figure 1). The State has three dominant vegetation types (Atlantic rain and cloud forests, *Araucaria* forest, and semi-deciduous forest) and highland prairies (Oliveira-Filho et al. 2015). The climate type is Cfa and Cfb (Alvares et al. 2013), with average annual precipitation between 1,100–2,900 mm. The altitude ranges from 0 to 1800 m a.s.l.

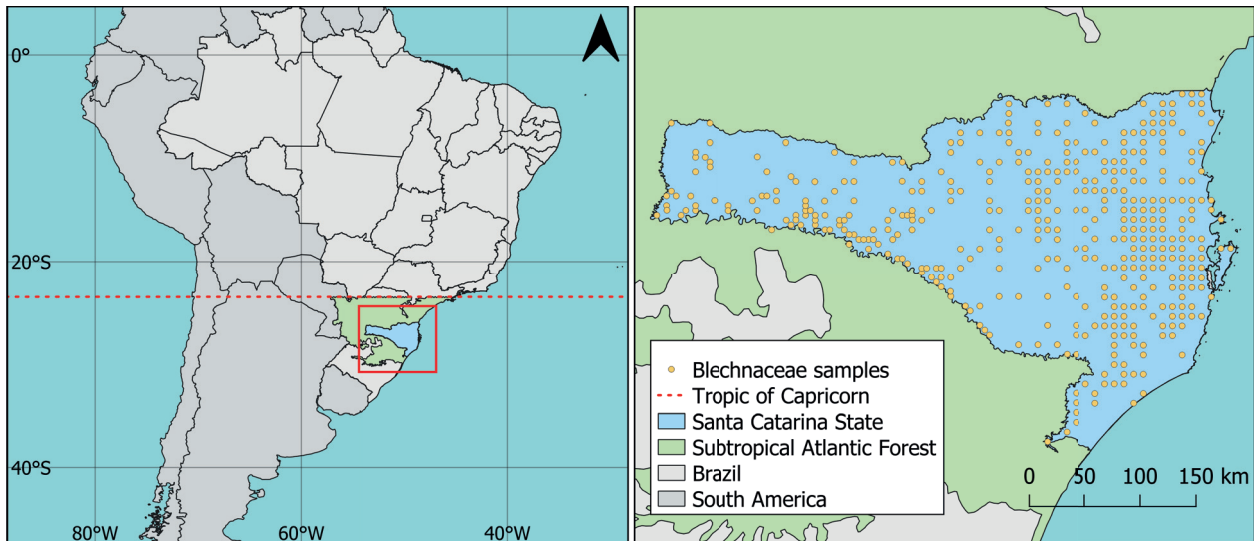


Figure 1. Geographical position of Santa Catarina, Brazil. The State is located within the subtropical Atlantic Forest (tea green). Samples of Blechnaceae (orange-yellow) were collected throughout the whole State during the Floristic and Forest Inventory of Santa Catarina (IFFSC, still ongoing).

Results and discussion

We recognized 21 species in 10 genera. The names applied by Sehnem (1968) and recognized here can be seen in Table 1.

Dichotomous identification key to the species of Blechnaceae in Santa Catarina State

- | | |
|---|------------------------------------|
| 1a) Sterile fronds bipinnate <i>Salpichlaena volubilis</i> | |
| 1b) Sterile fronds entire to 1-pinnate | 2 |
| 2a) Fronds dimorphic, fertile fronds with few or no photosynthetic tissue visible, pinnae strongly contracted | 3 |
| 2b) Fronds monomorphic or subdimorphic | 13 |
| 3a) Rhizomes scandent-epiphytic with denticulate scales | <i>Lomaridium plumieri</i> |
| 3b) Rhizomes terrestrial, not scandent-epiphytic, clothed with scales with entire margins, never denticulate | 4 |
| 4a) Blades fully pinnate | 5 |
| 4b) Blades pinnatisect at least at the apex | 6 |
| 5a) Rhizomes erect, sometimes bearing greenish stolons | <i>Parablechnum cordatum</i> |
| 5b) Rhizomes long-creeping and nigrescent, without stolons | <i>Parablechnum usterianum</i> |
| 6a) Rhizomes forming a stout caudex, clothed with linear scales | 7 |
| 6b) Rhizomes erect, ascending or creeping, sometimes with a small, thin caudex, clothed with nonlinear scales | 8 |
| 7a) Blades chartaceous, the veins clearly visible; apical pinnae surcurrent; costae deeply sulcate | <i>Lomaria spannagelii</i> |
| 7b) Blades coriaceous, the veins hardly visible; apical pinnae not surcurrent; costae not deeply sulcate | <i>Lomariocycas schomburgkii</i> |
| 8a) Rhizomes long-creeping | <i>Austroblechnum penna-marina</i> |
| 8b) Rhizomes erect or ascending to short-creeping | 9 |
| 9a) Blades truncate at base (with or without vestigial pinnae towards the base of the frond) | 10 |
| 9b) Blades gradually reduced at base | 12 |
| 10a) Vestigial pinnae absent | <i>Cranfillia mucronata</i> |
| 10b) Vestigial pinnae present | 11 |
| 11a) Number of pinnae ≤ 15 pairs, vestigial pinnae 0–3 | <i>Austroblechnum organense</i> |
| 11b) Number of pinnae 15–20 pairs, vestigial pinnae 3–6 | <i>Austroblechnum divergens</i> |
| 12a) Rhizomes stoloniferous | <i>Austroblechnum squamipes</i> |

- 12b) Rhizomes without stolons *Austroblechnum lehmannii*
- 13a) Fronds subdimorphic, the sori sometimes partially discontinuous *Blechnum auriculatum*
- 13b) Fronds monomorphic with continuous sori 14
- 14a) Pinnae articulate to the rachis; rhizomes long-creeping *Telmatoblechnum serrulatum*
- 14b) Pinnae continuous with the rachis; rhizomes erect to ascending or short-creeping 15
- 15a) Scales of stipe bases > 1.5 cm, linear, nigrescent, lustrous *Neoblechnum brasiliense*
- 15b) Scales of stipe bases < 1.5 cm, narrowly triangular to lanceolate, light brown to nigrescent, non-lustrous 16
- 16a) Blade apex with an apical pinna, conform to subconform 17
- 16b) Blade apex pinnatifid 18
- 17a) Apical pinna conform, 3–5 pinnae pairs *Blechnum gracile*
- 17b) Apical pinna subconform, 7 or more pinnae pairs *Blechnum × caudatum*
- 18a) Basal pinnae gradually reduced *Blechnum polypodioides*
- 18b) Basal pinnae not gradually reduced 19
- 19a) Acroscopic side of the proximal pair of pinnae completely free from rachis *Blechnum occidentale*
- 19b) Acroscopic side of the proximal pair of pinnae partially or completely adnate to the rachis 20
- 20a) Hairs on stipe, rachis and blade, usually abundant *Blechnum laevigatum*
- 20b) Hairs, if present, only on the rachis, rare in other parts, and not abundant *Blechnum austrobrasilianum*

1. *Austroblechnum divergens* (Kunze) Gasper & V.A.O.Dittrich

Rhizomes erect to decumbent, sometimes forming a thin caudex; **fronds** dimorphic; **stipes** usually atropurpureous or nigrescent; **sterile blades** pinnatisect, truncate at the base, with 3–6 pairs of vestigial pinnae; **rachises** glabrous in both surfaces or rarely clothed with linear scales; **sterile pinnae** 15–20 pairs, entirely adnate to the rachises, patent to ascendant, ensiform; **veins** free, bifurcate, or simple at the pinnae apices, ending before the margin in a clavate apex.

Selected specimens: Antônio Carlos, Antinha, *R.Reitz 234*, 04/03/1943, PACA; Blumenau, Parque Ecológico Spitzkopf, -27.02575, -49.10475, *A.L. Gasper 3426*, 02/03/2013, FURB; Rio do Sul, Estrada Rio do Sul-Lontras, -27.2475, -49.54027, *A.L. Gasper 3276*, 03/12/2013, FURB.

Comments: Similar to *Austroblechnum organense*, which has a smaller size and fewer pinnae (vestigial or not) than *A. divergens*. Dittrich et al. (2017) also mention the scales, which are lustrous in *A. organense* and opaque in *A. divergens*.

2. *Austroblechnum lehmannii* (Hieron.) Gasper & V.A.O.Dittrich

Rhizomes erect to decumbent; **fronds** dimorphic; **stipes** atropurpureous at the base and stramineous towards the apex; **sterile blades** pinnatisect, gradually reduced towards the apex and base, proximal pinnae reduced to semi-elliptical to semicircular lobes; **rachises** glabrous or clothed with ovate scales abaxially; **sterile pinnae** 15–19 pairs, fully adnate to the rachises, patent to slightly ascending, falcate; **veins** free, usually bifurcate, rarely simple close to the pinnae apices, sometimes 2x-bifurcate only at the pinnae bases, ending before the margin in a clavate apex.

Selected specimens: Joinville, Serra Dona Francisca, -26.1925, -49.04777, *T.J.Cadorin 933*, 10/12/2009, FURB; Treviso, Nova Brasília, -28.4436, -49.49861, *M.Verdi 3533*, 30/01/2010, FURB.

Comments: Similar to *A. squamipes*, from which it differs by its non-stoloniferous rhizome, stipe color (usually stramineous towards the apex), falcate pinnae, and pinnae apices obtuse. Furthermore, this species is found in forest formations whilst *A. squamipes* is found in grasslands.

3. *Austroblechnum organense* (Brade) Gasper & V.A.O.Dittrich

Rhizomes erect to ascending, sometimes forming a thin caudex; **fronds** dimorphic; **stipes** usually atropurpureous at the base and stramineous towards the apex; **sterile blades** pinnatisect, truncate at the base, with 1–3 pairs of vestigial pinnae; **rachises** glabrous; **sterile pinnae** 13–14 pairs, fully adnate to the rachises, ensiform; **veins** free, simple (the distal ones) or commonly bifurcate, ending before the margin in a clavate apex.

Selected specimens: Alfredo Wagner, -27.6783, -49.175, *N.P.Smith 665*, 27/09/2019, FLOR; Grão Pará, -28.05, -49.35, *F.B.Matos 2018*, 20/01/2012, UPCB; Rancho Queimado, *R.Reitz 5481*, 04/02/1953, PACA.

Comments: A rare species in Santa Catarina State. It is similar to *A. divergens*, from which it differs by its smaller size and lustrous rhizome scales. This species was not recorded by Sehnem (1968).

4. *Austroblechnum penna-marina* (Poir.) Gasper & V.A.O.Dittrich

Rhizomes ascending to short-creeping, stoloniferous; **fronds** dimorphic; **stipes** usually atropurpureous, rare stramineous and nigrescent at the base; **sterile blades** pinnatisect, narrowly obtusulate to oblanceolate, gradually reduced at the apex and base, without vestigial pinnae; **rachises** glabrous or with brownish scales in both surfaces; **sterile pinnae** 25–45 pairs, fully adnate to the rachises, patent or the basal ones sometimes slightly reflexed, oblong; **veins** free, bi-

furcate, sometimes simple, ending in a clavate apex before the margin.

Selected specimens: Lages, *C.Spannagel* 84, 1921, NY; São Joaquim, Rodovia de acesso a São Joaquim, -28.36083, -49.97111, *A.Salino* 14786, 09/04/2010, BHCB; Urubici, Campo dos Padres, -27.9816, -49.33083, *A.L.Gasper* 2988, 13/11/2011, FURB.

Comments: In Santa Catarina State the species is recorded in high altitudes, and is commonly found in rocky, open environments. It differs from the other species of the genus by its long-creeping, stoloniferous rhizome, sometimes forming dense populations in grasslands and *Araucaria* forest fragment edges. Furthermore, the narrower blade width and fertile pinnae longer than sterile distinguishes this species from the others in *Austroblechnum*.

5. *Austroblechnum squamipes* (Hieron.) Gasper & V.A.O.Dittrich

Rhizomes erect to ascending, stoloniferous; **fronds** dimorphic; **stipes** atropurpureous throughout or stramineous at the base and atropurpureous towards the apex; **sterile blades** pinnatisect, narrowly oblanceolate, gradually reduced towards the apex and base; **rachises** adaxially glabrous, abaxially glabrous or with sparse scales; **sterile pinnae** 14–18 pairs, fully adnate to the rachises, fully patent or patent in the proximal region and ascendant in medial and distal region, triangular; **veins** free, bifurcate, ending in a clavate apex before the margin.

Selected specimens: Urubici, RPPN Leão da Montanha, -28.0149, -49.59170, *A.L.Gasper* 2959, 13/11/2011, FURB. Bom Jardim da Serra, Morro da Igreja, -28.1233, -49.48000, *A.Salino* 14737, 08/04/2010, FURB.

Comments: see *Austroblechnum lehmannii* for comparison.

6. *Blechnum auriculatum* Cav.

Rhizomes erect to ascending; **fronds** subdimorphic; **stipes** stramineous, atropurpureous or slightly whitish at the base, with light brownish, linear-lanceolate scales; **blades** pinnate at the base, pinnatisect towards the apex, narrowly elliptic, rarely rhombiform, glabrous; **rachises** with linear-lanceolate, brownish scales on both surfaces, usually with hyaline, catenate hairs on the adaxial surface; **pinnae** 24–40 pairs, basal pinnae proximally auriculate on both sides; **veins** free, bifurcate or 2x bifurcate, ending at the margin.

Selected specimens: Bom Retiro, *R. Reitz* 3468, 28/12/1948, PACA; Ibicaré, Lageado Cruzeiro, -27.1355, -51.38944, *A.L.Gasper* 1937, 20/11/2008, FURB; São Joaquim -28.43888, -49.94777, *A.L.Gasper* 1800, 27/05/2008, FURB.

Comments: In the study region it is the only species with subdimorphic fronds. Sehnem recognized two varieties, but here we follow Dittrich et al.

(2015) who recognized only *B. auriculatum* in Santa Catarina — including the two vouchers cited by Sehnem (1968) as *B. auriculatum* var. *hastatum*. *Blechnum hastatum* Kaulf. (= *Blechnum auriculatum* var. *hastatum* (Kaulf.) Looser) occurs only in Chile and Argentina (Ramos Giacosa 2016)

7. *Blechnum austrobrasilianum* de la Sota

Rhizomes erect to ascending; **fronds** monomorphic; **stipes** atropurpureous at the base, stramineous towards the apex, with narrowly triangular to lanceolate, light brownish to nigrescent scales at the base; **blades** pinnate at the base, pinnatisect towards the apex, the base truncate, deltoid to lanceolate, with pinnatifid apex, glabrous; **rachises** with catenate, whitish or brownish hairs abaxially, sometimes with brown scales; **pinnae** 16–36 pairs, the first pair basiscopically free, acroscopically expanded, slightly adnate, or auriculate; **veins** free, bifurcate or 2x bifurcate (rarely 3x bifurcate proximally), ending in a clavate apex before the margin.

Selected specimens: Blumenau, Parque Ecológico Spitzkopf, -27.02575, -49.10475, *L.A.Funez* 1808, 25/02/2013, FURB; Lages, *C.Spannagel* 30, 12/1904, NY; Seara, Nova Teutônia, *F.Plaumann* 526, 04/08/1944, HBR.

Comments: This species is similar to *B. occidentale*. *Blechnum austrobrasilianum* has a chartaceous blade consistency and basal pinnae partially or fully adnate to the rachises on the acroscopic side and free from the rachis on the basiscopic side (in *B. occidentale* both sides are free). In *B. occidentale* the basal pinnae are virtually perpendicular to the longitudinal rachis axis, whilst in *B. austrobrasilianum* the pinnae are parallel to the longitudinal rachis axis, a feature difficult to observe in herbaria. It is also similar to *B. laevigatum*, however its hairs are restricted to the rachis and rare in other parts of the plant. This species was described only in 1973 by de la Sota, without records for Santa Catarina (de la Sota 1973).

8. *Blechnum gracile* Kaulf.

Rhizomes erect to ascending; **fronds** monomorphic; **stipes** stramineous throughout or atropurpureous at the base and stramineous towards the apex, with concolorous scales; **blades** pinnate, ovate or deltoid, at the apex reduced to a conform pinna, glabrous; **rachises** with linear, brownish scales on both surfaces and catenate brownish hairs adaxially; **pinnae** 3–4 pairs, partially adnate, narrowly elliptic to linear, the apex acute to cuspidate; **veins** free, bifurcate or 2x bifurcate, ending in a clavate apex before the margin.

Selected specimens: Garuva, -26.0267, -48.855, *J.Cordeiro* 2182, 10/11/2002, MBM; Grão Pará, Parque Estadual da Serra Furada, -28.1175, -49.43305, *S.Z.Custódio* 8, 29/06/2011, CRI; Rio dos Cedros, Parque Águas de São Bernardo, -26.73472, -49.29555, *L.A.Funez* 2545, 06/01/2014, FURB.

Comments: the closest taxon is the hybrid *Blechnum* × *caudatum*. *Blechnum gracile* differs by its smaller size, fewer pinnae pairs (four pairs at most in *B. gracile*). Also, we can highlight the presence of auricles on the acroscopic side at basal pinnae in *B. × caudatum*, and the surcurrent and decurrent apical pinnae.

9. *Blechnum laevigatum* Cav.

Rhizomes erect to ascending; **fronds** monomorphic; **stipes** tan or atropurpureous at the base, stramineous towards the apex, bearing hyaline catenate hairs mainly distally; **blades** pinnate at the base, pinnatisect towards the apex, lanceolate, hairy, the hairs similar to those found on the stipes; **rachises** bearing hairs identical to the ones on the stipes and blades; **pinnae** 17 pairs, patent, fully adnate to the rachises except the basalmost two pinnae pairs (basiscopically excavate), oblong; **veins** free, 2x bifurcate, ending in a in a clavate apex before/or at the margin.

Selected specimens: Sombrio, Furnas do Sombrio, *O.R. Camargo* 3962, 28/01/1964, PACA.

Comments: The few samples from Santa Catarina State are similar to *B. occidentale* and *B. austrobrasilianum*. They differ from both by its hairy stipes, rachises, blades, and veins.

10. *Blechnum occidentale* L.

Rhizomes erect to ascending; **fronds** monomorphic; **stipes** stramineous; **blades** pinnate at the base, pinnatisect towards the apex, glabrous; **rachises** glabrous on both surfaces or with hyaline, catenate hairs (mainly abaxially), rarely scaly abaxially; **pinnae** 13–23 pairs, basal pinnae reflexed, sessile, with an acroscopic auricle overlapping the rachis (rarely not), medial and distal pinnae ascending, distal pinnae fully adnate; **veins** free, bifurcate, ending in a clavate apex before the margin.

Selected specimens: Blumenau, Parque Ecológico Spitzkopf, -27.022, -49.11472, *L.A. Funez* 1806, 25/02/2013, FURB; Três Barras, Floresta Nacional de Três Barras, -26.21555, -50.29333, *M.P. Reinert*, 16/09/2003, JOI.

Comments: see *B. occidentale* and *B. laevigatum* for discussion. Some authors consider specimens with hairy rachises as *B. appendiculatum* Willd. (Mickel and Smith 2004), however, here we include this name under *B. occidentale* following Dittrich et al. (2015)

11. *Blechnum polypodioides* Raddi

Rhizomes erect to ascending; **fronds** monomorphic; **stipes** stramineous, sometimes atropurpureous at the base, usually bearing hyaline, catenate hairs; **blades** pinnate at the base, pinnatisect towards the apex, elliptic-lanceolate, gradually to abruptly attenuate toward base and apex, glabrous; **rachises** hairy, bearing

hyaline and catenate hairs on both surfaces; **pinnae** 13–30 pairs, fully adnate to the rachises, abaxially glabrous or bearing hyaline hairs, adaxially bearing similar hairs; **veins** free, simple or rarely bifurcate, ending in a slightly clavate apex at the margin.

Selected specimens: *Ascurra*, Garinacas, -27.0000, -49.4100, *A.Korte* 2834, 15/03/2010, FURB; Santa Rosa de Lima, Nova Fátima, -28.08055, -49.1369, *M.Verdi* 4671, 05/05/2010, FLOR; São Francisco do Sul, Vila da Glória, *M.Kersling s.n.*, 14/05/2004, MBM.

Comments: The species can be distinguished among monomorphic species by its narrow blade and basal pinnae strongly reduced — which are fully adnate.

12. *Blechnum* × *caudatum* Cav.

Rhizomes erect; **fronds** monomorphic; **stipes** stramineous throughout or atropurpureous at the base; **blades** pinnate at the base, pinnatisect towards the apex, truncate, deltoid or ovate, abruptly reduced to a conform or subconform terminal pinna, glabrous; **rachises** glabrous or bearing hyaline, catenate hairs on both surfaces, rarely scaly; **pinnae** 9–15 pairs, basal pinnae petiolulate with acroscopic auricles overlapping the rachis, the basiscopical side excavate, gradually adnate towards the apex, ensiform to falcate; **veins** free, usually simple or bifurcate, and then only proximally, ending before the margin in a clavate apex.

Selected specimens: Ibirama, Nova Bremen, *R. Reitz* 3730, 20/09/1956, HBR, PACA; Luiz Alves, *R.Reitz*, 13/01/1941, PACA.

Comments: It differs from *B. occidentale* by its concolorous, dark brownish scales (bicolorous and atrocostate in *B. occidentale*) and terminal pinnae (conform or subconform). See *B. gracile* for further discussion.

13. *Cranfillia mucronata* (Fée) V.A.O.Dittrich & Gasper

Rhizomes erect to ascending, bearing nigrescent, lustrous scales at the apex; **fronds** dimorphic; **stipes** nigrescent at the base, brownish towards the apex; **sterile blades** pinnatisect, rarely pinnatifid at the apex, lanceolate, truncate or slightly reduced at the base, glabrous; **rachises** glabrous or rarely bearing catenate hairs; **sterile pinnae** 14–23 pairs, some basal and medial pinnae reflexed or patent to slightly ascending, the first pair basiscopically excavate, the remaining pinnae fully adnate to the rachises; **veins** free, bifurcate or 2x bifurcate, ending in a slightly clavate apex before the margin.

Selected specimens: Luiz Alves, Morro do Seba, -26.77833, -48.97333, *A.L. Gasper* 3661, 12/04/2015, FURB; Orleans, Brusque do Sul, -28.25972, -49.41194, *M.Verdi* 3999, 15/03/2010, FURB; São Martinho, Chicão, -28.0900, -48.8700, *J.L.Schmitt* 1073, 26/01/2010, FURB.

Comments: Similar to *A. divergens*, but differs from it by its nigrescent stipe at the base and brownish towards the apex, no vestigial pinnae, and by having the first pinnae pair basiscopically excavate.

14. *Lomaria spannagelii* (Rosenst.) Gasper & V.A.O.Dittrich

Rhizomes erect, forming a stout caudex; **fronds** dimorphic; **stipes** stramineous, atropurpureous or stramineous-brownish with an atropurpureous base; **sterile blades** pinnate about two thirds of the length, then pinnatisect, gradually reduced towards the apex and base, here to auriculiform pinnae; **rachises** scaly; **sterile pinnae** 36–53 pairs, fully adnate to the rachises, the abaxial surface bearing brownish, linear scales, the adaxial one glabrous or sometimes like the abaxial surface, albeit also bearing whitish, linear scales; **veins** free, bifurcate or 2x bifurcate (distally rarely simple), ending before the margin.

Selected specimens: Anitápolis, *R.Reitz* 4534, 28/12/1951, PACA; Lages, *C.Spannagel* 86, 1906, NY; Painel, Fazenda Farofa, Trilha do Pasto Sujo atrás da sede, -27.91722, -49.8825, *A.Salino* 11940, 03/04/2007, BHCB.

Comments: The species is notably defined by its heavily sulcate rachises and discoloured surfaces when herborized. It is usually found near watercourses in *Araucaria* forest.

15. *Lomaridium plumieri* (Desv.) C.Presl

Rhizomes long-creeping, bearing denticulate scales; **fronds** dimorphic; **stipes** usually atropurpureous at the base and stramineous towards the apex; **sterile blades** pinnate at the base, pinnatisect towards the apex or pinnatisect throughout, slightly to abruptly reduced at the base, bearing (0) 1–5 pairs of vestigial pinnae, gradually reduced towards the apex to a terminal subconform pinna; **rachises** glabrous or bearing linear, brownish scales on the adaxial surface, sometimes also bearing hyaline, catenate hairs, abaxially glabrous; **sterile pinnae** 17–37 pairs, fully adnate to the rachis, sursum-current, linear-oblong, glabrous on both surfaces; **veins** free, bifurcate or not, ending before the margin in a clavate apex.

Selected specimens: Blumenau, RPPN Bugarkopf, -27.00422, -49.07041, *L.A.Funez* 950, 20/09/2012, FURB; Florianópolis, Morro da Lagoa, -27.57666, -48.47555, *T.J.Cadorin* 2660, 19/06/2010, FURB; São Bento do Sul, CEPA Rugendas Univil, APA Municipal do Rio Vermelho/Humboldt, trilha na mata próxima ao alojamento, -26.3225, -49.30916, *F.Bittencourt* 51, 13/04/2014, FURB.

Comments: This species differs from the others in the study region by its long-creeping rhizome and usually scandent habit, becoming fertile only after climbing a tree. Moreover, another dis-

tingent feature is the marginally denticulate rhizome scales.

16. *Lomariocyas schomburgkii* (Klotzsch) Gasper & A.R.Sm.

Rhizomes erect, forming a stout caudex; **fronds** dimorphic; **stipes** usually stramineous with an atropurpureous base, sometime stramineous or brownish throughout; **sterile blades** pinnate at the basal and medial regions, distally pinnatisect, gradually reduced towards the apex and base (here to auricular projections), sometimes abruptly reduced at the base; **rachises** scaly on both surfaces; **sterile pinnae** 20–44 pairs (excluding auriculate pinnae), sessile, medial pinnae gradually adnate towards the apex, margin plane or slightly to strongly revolute; **veins** free, simple, ending in a clavate apex before the margin, hardly visible.

Selected specimens: Blumenau, Parque Nacional da Serra do Itajaí - Área Virgem, -27.0900, -49.14000, *A.Korte* 3479, 27/05/2010, FURB; Florianópolis, Parque do Rio Vermelho, final da estrada geral da praia, *D.B.Falkenberg* 6808, 28/12/1994, FLOR; Garuva, Serra Quiriri, -26,10027, -48,96055, *W.S.Mancinelli* 199, 28/03/2005, JOI; Urupema, Interior de Urupema / Rio Rufino (SC), -27.96341, -49.83688, *K.Kemmelmeier*, 28/03/2012, FURB.

Comments: The most similar species is *Lomaria spannagelii*. *Lomariocyas schomburgkii* differs by its blade texture, its immersed veins in the blade and, its usually atrocostate scales at the stipe bases.

17. *Neoblechnum brasiliense* (Desv.) Gasper & V.A.O.Dittrich

Rhizomes erect, sometimes forming a stout caudex, bearing linear, nigrescent scales; **fronds** monomorphic; **stipes** nigrescent at the base, nigrescent or stramineous towards the apex; **blades** fully pinnatisect or pinnate at the base, oblanceolate; **rachises** glabrous on the adaxial surface, abaxially bearing scales mainly in the proximal region; **pinnae** 36–56 pairs, fully adnate to the rachises, adaxially glabrous, abaxially glabrous or bearing brownish, amorphous scales on costae; **veins** free, usually undivided, rarely bifurcate, ending in a slightly clavate apex at the margin.

Selected specimens: Brusque, *M.H.Queiroz* 483, 13/06/1991, FLOR; Lauro Müller, Rio Oratório/Cabo Aéreo, -28.3500, -49.49972, *M.Verdi* 3671, 19/02/2010, FURB; Xanxerê, Pesqueiro do Meio, -26.81972, -52.47027, *S.Dreveck* 740, 24/03/2009, FURB.

Comments: This is a monomorphic species of large size, characterized by its linear and nigrescent scales both on rhizome and stipe bases. Sehnem (1968) recognized two varieties, but here we subsume both into *Neoblechnum brasiliense*.

18. *Parablechnum cordatum* (Desv.) Gasper & Salino

Rhizomes erect to ascending, bearing concolorous scales; **fronds** dimorphic; **sterile stipes** usually atropurpureous (sometimes nigrescent) at the base or stramineous throughout with atropurpureous spots; **sterile blades** pinnate, truncate at the base, usually lanceolate, ending in a conform pinna; **rachises** scaly, the scales linear-lanceolate, brownish; **aerophores** present or not at pinnae bases, elliptical, discrete; **sterile pinnae** 6–26 pairs, the basal and medial petiolulate, apical pinnae decurrent, abaxially bearing brownish scales mostly on costae, sometimes in the photosynthetic tissue; **veins** free, simple or bifurcate, ending before the margin in a clavate apex or not.

Selected specimens: Blumenau, Parque Nacional da Serra do Itajaí, -27.05666, -49.0877, *A.L.Gasper 664*, 22/03/2007, FURB; Paulo Lopes, Espriado/Parque Estadual da Serra do Tabuleiro, -27.99000, -48.78000, *M.Verdi 4909*, 08/06/2010, FURB; São Bento do Sul, CEPA Rugendas Univille, APA Municipal do Rio Vermelho/Humboldt, estrada até alojamento, -26.3225, -49.30916, *F.Bittencourt 54*, 13/04/2014, FURB.

Comments: This is the only species in the study region that features aerophores. This species has a broad circumscription and distinguishes itself from *P. usterianum* by its erect rhizome and larger and bigger pinnae. Sehnem (1968) recognized several species of *Parablechnum* (as *Blechnum*), however, systematic studies are necessary to better delimit these taxa.

19. *Parablechnum usterianum* (Christ) Gasper & Salino

Rhizomes long-creeping, nigrescent, bearing concolorous scales; **fronds** dimorphic; **sterile stipes** usually atropurpureous at the base or stramineous throughout with atropurpureous spots; **sterile blades** pinnate, truncate at the base, usually lanceolate, ending in a conform pinna; **rachises** slightly scaly, bearing linear-lanceolate scales, these brownish and having marginal projections or entire; **aerophores** absent; **sterile pinnae** 10–12 pairs, basal and medial petiolulate, apical decurrent, abaxially bearing brownish scales, their margin slightly revolute; **veins** free, simple or bifurcate, ending before the margin in a clavate apex or not.

Selected specimens: Frei Rogério, Núcleo Tritícola, -27.18, -58.76, *A.Korte 6903*, 18/05/2011, FURB; Garuva, Alto Quiriri, -26.03916, -48.95444,

L.A.Funez 4302, 05/05/2015, FURB; Rio dos Cedros, Cachoeira Formosa, -26.7383, -49.27420, *L.A.Funez 7122*, 04/02/2018, FURB.

Comments: This species is remarkably similar to *P. cordatum*. However, it differs from *P. cordatum* by its long and sturdy stipes, its narrow and elongated pinnae, and its long-creeping rhizome.

20. *Salpichlaena volubilis* (Kaulf.) J.Sm.

Rhizomes long-creeping; **fronds** monomorphic; **stipes** stramineous; **petiolules** similar to the stipes; **blades** bipinnate, deltoid, truncate or obtuse at the base, gradually reduced towards the apex, ending in a subconform pinna; **rachises** scandent with indeterminate growth, reaching easily more than 10 meters, bearing brownish, catenate hairs (rarely hyaline) in both surfaces, the scales similar to those on rhizome or absent; **veins** free, simple or bifurcate, ending before the margin in a collecting vein.

Selected specimens: Botuverá, Cinema, -27.27000, -49.22999, *J.L.Schmitt 308*, 13/10/2009, FURB; Rio do Campo, Anta Branca (Antigo Alto Rio do Oeste), -26.91, -50.22019, *A.Korte 1975*, 22/02/2010, FURB; Timbé do Sul, Vila Belmiro, -28.80000, -49.85999, *M.Verdi 2850*, 17/10/2009, FURB.

Comments: This is the only species of the genus in Santa Catarina State. It can be distinguished by its lianescent habit and indeterminate growth of the fronds.

21. *Telmatoblechnum serrulatum* (Rich.) Perrie, D.J.Ohlsen & Brownsey

Rhizomes long-creeping; **fronds** monomorphic; **stipes** usually stramineous, rarely atropurpureous at the base; **blades** pinnate, truncate at the base, reduced at the apex to a conform pinna; **rachises** usually glabrous on both surfaces, sometimes scaly abaxially; **pinnae** 20–29 pairs, sessile, articulate to the rachises, the margin plane, rarely revolute, serrate; **veins** free, bifurcate, rarely 2x bifurcate, ending at the margin.

Selected specimens: Araquari, Canudo / WEG Floresta, -26.5525, -48.68888, *S.Dreveck 2043*, 08/04/2010, FURB; Balneário Barra do Sul, Canal do Linguado, -26.3652, -49.0664, *A.L.Gasper 166*, 30/03/2007, FURB; Palhoça, Campo do Maciambu, *R.Reitz 1025*, 24/09/1953, HBR.

Comments: The species differ from the others in the region by its articulate pinnae.

Table 1. Comparison of names between the treatment proposed here and Sehnem's (1968) proposal. Author names are cited exactly as written in the original work, and we listed only species that Sehnem cited for Santa Catarina State. The names on the left column are not necessarily synonyms of the names on the right column. *: Lomariopsidaceae.

Sehnem (1968)	This work (2021)
<i>Blechnum auriculatum</i> Cav. var. <i>auriculatum</i>	<i>Blechnum auriculatum</i> Cav.
<i>Blechnum auriculatum</i> var. <i>hastatum</i> (Kaulf.) Hier.	<i>Blechnum auriculatum</i> Cav.
<i>Blechnum brasiliense</i> Desv. var. <i>brasiliense</i>	<i>Neoblechnum brasiliense</i> (Desv.) Gasper & V.A.O.Dittrich
<i>Blechnum brasiliense</i> var. <i>angustifolium</i> Sehnem	<i>Neoblechnum brasiliense</i> (Desv.) Gasper & V.A.O.Dittrich
<i>Blechnum cordatum</i> (Desv.) Hier.	<i>Parablechnum cordatum</i> (Desv.) Gasper & Salino
<i>Blechnum distans</i> Presl	<i>Blechnum laevigatum</i> Cav.
<i>Blechnum divergens</i> Mett.	<i>Austroblechnum divergens</i> (Kunze) Gasper & V. A. O. Dittrich
<i>Blechnum euradianum</i> Brade	<i>Parablechnum cordatum</i> (Desv.) Gasper & Salino
<i>Blechnum exiguum</i> Dutra	<i>Lomariocycas schomburgkii</i> (Klotzsch) Gasper & A.R.Sm.
<i>Blechnum glandulosum</i> Link var. <i>glandulosum</i>	<i>Blechnum occidentale</i> L.
<i>Blechnum glandulosum</i> var. <i>meridionale</i> (Presl) Sehn.	<i>Blechnum occidentale</i> L.
<i>Blechnum gracile</i> Kaulf.	<i>Blechnum gracile</i> Kaulf.
<i>Blechnum imperiale</i> (Fée & Glaz.) Chr.	<i>Lomariocycas schomburgkii</i> (Klotzsch) Gasper & A.R.Sm.
<i>Blechnum lanceola</i> Swartz	<i>Blechnum lanceola</i> Sw.
<i>Blechnum lanceolatum</i> (R.Br.) St. var. <i>achalense</i> Hier.	<i>Austroblechnum squamipes</i> (Hieron.) Gasper & V. A. O. Dittrich
<i>Blechnum macahense</i> Brade	<i>Parablechnum cordatum</i> (Desv.) Gasper & Salino
<i>Blechnum meridense</i> (Kl.) Mett.	<i>Lomariidium plumieri</i> (Desv.) C.Presl
<i>Blechnum occidentale</i> L.	<i>Blechnum occidentale</i> L.
<i>Blechnum occidentale</i> var. <i>caudata</i> (Cav.) Ros.	<i>Blechnum</i> × <i>caudatum</i> Cav.
<i>Blechnum onocleoides</i> (Spreng.) Chr.	<i>Austroblechnum lehmannii</i> (Hieron.) Gasper & V. A. O. Dittrich
<i>Blechnum penna-marina</i> (Poiret) Kuhn	<i>Austroblechnum penna-marina</i> (Poir.) Gasper & V. A. O. Dittrich
<i>Blechnum plumierii</i> (Desv.) Mett.	<i>Cranfillia mucronata</i> (Fée) V.A.O.Dittrich & Gasper
<i>Blechnum raddianum</i> Ros.	<i>Parablechnum usterianum</i> (Christ) Gasper & Salino
<i>Blechnum regnellianum</i> (Kze.) C. Chr.	<i>Parablechnum cordatum</i> (Desv.) Gasper & Salino
<i>Blechnum serrulatum</i> Rich.	<i>Telmatoblechnum serrulatum</i> (Rich.) Perrie, D.J.Ohlsen & Brownsey
<i>Blechnum spannagelii</i> Ros.	<i>Lomaria spannagelii</i> (Rosenst.) Gasper & V.A.O.Dittrich
<i>Blechnum unilaterale</i> Sw.	<i>Blechnum polypodioides</i> Raddi
<i>Blechnum unilaterale</i> Sw. f. <i>maius</i> Sehnem	<i>Blechnum polypodioides</i> Raddi
<i>Salpichlaena volubilis</i> (Klf.) J. Sm.	<i>Salpichlaena volubilis</i> (Kaulf.) J.Sm.
<i>Stenochlaena erythrodes</i> (Kze.) Und.*	<i>Lomariopsis marginata</i> (Schrad.) Kuhn*

Acknowledgements

GSG thanks the Governo do Estado de Santa Catarina for a research grant and CAPES — Finance Code 001. ALG thanks CNPq for the productivity grant (311303/2020-0). The authors are grateful for the visit of Dr. José María Gabriel y Galán in 2019 to a field trip with ALG and GSG. This field trip yielded enjoyable talks about the species and the future of Blechnaceae studies. Unfortunately, Dr. José María

will not be able to see Blechnaceae destiny; nonetheless, he will serve as an inspiration.

Bibliographic references

Alvares, C.A., Stape, J.L., Sentelhas, P.C., de Moraes Gonçalves, J.L., & Sparovek, G. 2013. Köppen's climate classification map for Brazil. *Meteorologische Zeitschrift* 22(6), 711–728.

- Aguilar, S., Quintanilla, L.G. & Amigo, J. 2007. *Blechnum* × *rodriguezii* Hyb. Nov., a Deer Fern Hybrid from Southern Chile. *American Fern Journal* 97: 225–229. [https://doi.org/10.1640/0002-8444\(2007\)97\[225:BRHNAD\]2.0.CO;2](https://doi.org/10.1640/0002-8444(2007)97[225:BRHNAD]2.0.CO;2)
- de la Sota, E.R. 1973. Sinopsis de las Pteridófitas del Noroeste de Argentina, II. *Darwiniana* 2: 173–263. <https://www.jstor.org/stable/23215042>
- Dittrich, V.A.O., Heringer, G. & Salino, A. 2007. Blechnaceae. In: T.B. Cavalcanti and A.E. Ramos (eds.), *Flora do Distrito Federal* 91–108. Embrapa Recursos Genéticos e Biotecnologia, Brasília.
- Dittrich, V.A.O., Salino, A. & Monteiro, R. 2015. The *Blechnum occidentale* (Blechnaceae, Polypodiopsida) species group in southern and southeastern Brazil. *Phytotaxa* 231: 201–229. <https://dx.doi.org/10.11646/phytotaxa.231.3.1>
- Dittrich, V.A.O., Salino, A., Monteiro, R. & Gasper, A.L. 2017. The family Blechnaceae (Polypodiopsida) in Brazil: key to the genera and taxonomic treatment of *Austroblechnum*, *Cranfillia*, *Lomaridium*, *Neoblechnum* and *Telmatoblechnum* for southern and southeastern Brazil. *Phytotaxa* 303: 1–33. <https://dx.doi.org/10.11646/phytotaxa.303.3.1>
- Dittrich, V.A.O., Salino, A., Monteiro, R. & Gasper, A.L. 2018. The fern genera *Lomaria*, *Lomariocycas*, and *Parablechnum* (Blechnaceae, Polypodiopsida) in southern and southeastern Brazil. *Phytotaxa* 362: 245–262. <https://dx.doi.org/10.11646/phytotaxa.362.3.1>
- Fée, A.L.A. 1869a. Cryptogames vasculaires (fougères, lycopodiacées, hydroptéridées, équisétacées) du Brésil matériaux pour une flore générale de ce pays par. J.B. Baillièrre et Fils. Available from: <https://books.google.com.br/books?id=YPZGAQAAMAAJ>.
- Fée, A.L.A. 1869b. Cryptogames vasculaires du Brésil. II partie: supplément et révision. Berger-Levrault & Cie, Paris. Available from: <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:CRYPTOGAMES+VASCULAIRES#2> (March 24, 2011).
- Gasper, A.L., Dittrich, V.A.O., Smith, A.R., & Salino, A. 2016. A classification for Blechnaceae (Polypodiales: Polypodiopsida): New genera, resurrected names, and combinations. *Phytotaxa* 275: 191–227. <https://dx.doi.org/10.11646/phytotaxa.275.3.1>
- Dittrich, V.A.O., Gasper, A.L. & Cárdenas, G.G. 2020. Blechnaceae. *Flora do Brasil 2020*. Available from: <http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB90784> (May 13, 2021).
- Lellinger, D.B. 2002. A modern multilingual glossary for taxonomic pteridology. American Ferns Society, Washington, DC.
- Mickel, J.T. & Beitel, J.M. 1988. Pteridophyte flora of Oaxaca, Mexico. *Memoirs of the New York Botanical Garden* 46: 79–89.
- Mickel, J.T. & Smith, A.R. 2004. The pteridophytes of Mexico. *The New York Botanical Garden*, New York.
- Molino, S., Gabriel y Galán, J.M., Wasowicz, P., Fuente, P. & Sessa, E.B. 2018. The *Struthiopteris spicant* (Blechnaceae, Polypodiopsida) complex in Western Europe, with proposals for taxonomic and nomenclatural changes. *Plant Systematics and Evolution* 305: 255–268. <https://dx.doi.org/10.1007/s00606-019-1565-0>
- Moran, R.C. 1995. *Flora Mesoamericana*, Volumen 1: Psilotaceae a Salviniaceae. Universidad Nacional Autónoma de México, Ciudad Universitaria-México.
- Oliveira-Filho, A.T., Budke, J.C., Jarenkow, J.A., Eisenlohr, P.V. & Neves, D.R. 2015. Delving into the variations in tree species composition and richness across South American subtropical Atlantic and Pampean forests. *Journal of Plant Ecology* 8(3), 242–260.
- Pietrobon, M.R. & Rosário, S.M. 2008. Licófitas e monilófitas (Pteridophyta) da Floresta Nacional de Caxiuanã, estado do Pará, Brasil: chave para as famílias e as espécies de Aspleniaceae e Blechnaceae. *Boletim do Museu Paraense Emílio Goeldi Ciências Naturais* 3: 151–163. http://scielo.iec.gov.br/scielo.php?script=sci_arttext&pid=S1981-81142008000200005
- PPG 1. 2016. A community-derived classification for extant lycophytes and ferns. *Journal of Systematics and Evolution* 54: 563–603. <https://doi.org/10.1111/jse.12229>
- Ramos Giacosa, J.P. 2016. Familia Blechnaceae Newman. In: F. O. Zuloaga and M. J. Belgrano (eds.), *Flora Vascular de la República Argentina 2: Licofitas, Helechos, Gymnospermae*, 2: 86–104. Instituto de Botánica Darwinion - CONICET.
- Rolleri, C.H. & Prada, C. 2006. Catálogo comentado de las especies de *Blechnum* L. (Blechnaceae, Pteridophyta) de Mesoamérica y Sudamérica. *Anales del Jardín Botánico de Madrid* 63: 67–106. <https://doi.org/10.3989/ajbm.2006.v63.i1.36>
- Salino, A., Arruda, A. J. & Dittrich, V.A.O. 2017. Flora das cangas da Serra dos Carajás, Pará, Brasil: Blechnaceae. *Rodriguésia* 68: 833–841. <https://doi.org/10.1590/2175-7860201768310>
- Sehnem, A. 1968. Blechnaceae. In: P. R. Reitz (ed.) *Flora Ilustrada Catarinense*. Herbário Barbosa Rodrigues, Itajaí, Brasil.
- Smith, A.R. 1981. *Blechnum*. In: D. E. Breedlove (ed.), *Flora of Chiapas* 2: 57–61. California Academy of Sciences, San Francisco.
- Smith, A.R. & Kessler, M. 2018. Prodrómus of a fern flora for Bolivia. XXXIII. Blechnaceae. *Phytotaxa* 334: 99–117. <https://dx.doi.org/10.11646/phytotaxa.334.2.1>
- Stolze, R.G. 1981. Ferns and fern allies of Guatemala. Part II Polypodiaceae. *Fieldiana Botany, New Series* 6: 1–522. <https://doi.org/10.2307/1547081>
- Thiers, B. 2020. Index Herbariorum: A global directory of public herbaria and associated staff. *New York Botanical Garden's Virtual Herbarium*. Available from: <http://sweetgum.nybg.org/science/ih/> (May 26, 2020).
- Tryon, R.M. & Stolze, R.G. 1993. Pteridophyta of Peru. Part V. *Fieldiana Botany*, Chicago.
- Tryon, R.M. & Tryon, A.F. 1982. Blechnaceae. In: *Ferns and Allied Plants With Special Reference to Tropical America* 22: 662–683. Springer-Verlag New York Inc., New York.