
A Taxonomic Reevaluation of the South American *Myosotis* Species Described by José Arechavaleta

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ABSTRACT. In *Flora Uruguayana*, José Arechavaleta described two Uruguayan species of *Myosotis* L. (Boraginaceae) that I. M. Johnston later placed within *Antiphytum* DC. ex Meisn. Johnston considered *M. uruguayensis* Arechav. to be a doubtful species that was probably in *Antiphytum*, apparently nearest to *A. cruciatum* (Cham.) DC., whereas he treated *M. berroi* Arechav. as a synonym of *A. stoechadifolium* (Cham.) DC. We studied the type specimens and protologues of these two names in *Myosotis*. We conclude that *M. berroi* belongs to *Antiphytum* but is not conspecific with *A. stoechadifolium* based on eremocarp features, such as pericarp ornamentation and size, together with shorter leaves. We provide an updated circumscription and distribution, publish the new combination *A. berroi* (Arechav.) N. Mend. & Flores Oliv., and clarify the type. A taxonomic key for the South American species of *Antiphytum* is provided. *Myosotis uruguayensis* does not belong to *Antiphytum* due to its shallowly divided calyx entirely covering the immature eremocarps; it retains its uncertain taxonomic status due to the scanty and immature original material and inadequate protologue.

Key words: *Antiphytum*, Boraginaceae, Brazil, *Myosotis*, new combination, Uruguay.

The genus *Antiphytum* DC. ex Meisn. (Boraginaceae subfamily Echiochiloideae; see Chacón et al., 2016) was published by Meisner (1840), containing two South American species previously described by Chamisso (1829) as *Anchusa cruciata* Cham. and *Anchusa stoechadifolia* Cham. Both species were transferred to *Antiphytum* by de Candolle (1846), i.e., *Antiphytum cruciatum* (Cham.) DC. and *Antiphytum stoechadifolium* (Cham.) DC. These species were later treated as heterotypic synonyms by Johnston (1923), who lectotyped the genus with *Antiphytum cruciatum*. In a

subsequent work, Johnston (1927) accepted both species as the only two well-supported South American species of *Antiphytum*. At the same time, Johnston (1927) also cited for the first time in the literature the two species described by José Arechavaleta, a Spanish botanist based in Uruguay, under *Myosotis* L. in the *Flora Uruguayana* (Arechavaleta, 1898–1911): *M. berroi* Arechav. and *M. uruguayensis* Arechav. Johnston (1927) treated the former as a heterotypic synonym of *Antiphytum stoechadifolium* and the latter as probably a species of *Antiphytum*, apparently nearest to *Antiphytum cruciatum*. However, he did not transfer the name to *Antiphytum*. In the meantime, between Arechavaleta's and Johnston's publications, no work dealing with Boraginaceae referred to *Flora Uruguayana* nor the *Myosotis* species there described.

As part of the taxonomic revision of the genus *Antiphytum* currently underway by the lead author, we reviewed the treatment of the Boraginaceae in the *Flora Uruguayana* (Arechavaleta, 1898–1911) with a focus on the two species of *Myosotis* as possible species of *Antiphytum*. In parallel, we revisited Johnston's hypothesis on Arechavaleta's species. We searched for the types in Uruguayan and international herbaria where Arechavaleta's specimens may be, according to Stafleu and Cowan (1976–1988) in the second edition of *Taxonomic Literature* (TL-2), checked the protologues, and examined specimens to clarify the taxonomic affinities of these names.

TAXONOMIC HISTORY

Flora Uruguayana (Arechavaleta, 1898–1911) is one of the first botanical works published in South America together with *Flora de Chile* (Reiche, 1896–1911). In *Flora Uruguayana*, Boraginaceae s. str. is only represented by *Myosotis*, for which Arechavaleta described

M. berroi and *M. uruguayensis* (Arechavaleta, 1911a, 1911b).

Myosotis berroi was named to honor Mariano B. Berro, a botanist who collected plants of the species in the department of Rivera in northern Uruguay. The collection information on *Berro 4975* (MVFA and MVM; acronyms according to Thiers, 2022) perfectly matches the information in the protologue: “Vive en campos de Rivera en los llamados Cerros del Gobierno, pedregosos áridos. Florece en Diciembre. Hallado por el Sr. Berro a quien se lo dedico” (Arechavaleta, 1911a: 70). As annotated on the specimen at MVFA (Fig. 1), this final epithet was chosen after Arechavaleta initially named the specimen in sched. as “*Myosotis rupestris* n. sp. non Pall. nec Willd.” *Myosotis rupestris* had been used already by Pallas (published in Georgi, 1775) and even by Willdenow (Ledebour, 1847) as a later homonym. Arechavaleta later wrote a second label with the name that would eventually be validly published, along with the publication information (Fig. 1).

Myosotis uruguayensis was also collected in northern Uruguay in the department of Tacuarembó in sand-clay soils (Arechavaleta, 1911a). It seems that the collection was not made by Arechavaleta himself, although the protologue lacks a collector’s name and number. The name Pantaleón Pintos appears on the label of the only located original material (MVM; Fig. 2). Pantaleón Pintos likely is the collector of this specimen, as in the case of *Bambusa tacuara* Arechav. as recognized in the protologue (Arechavaleta, 1897). No information regarding a specific locality is given either in *Flora Uruguay* or on the label of the specimen; “Campos de Tacuarembó” is reported, but Tacuarembó covers a very large area. As in the case of *M. berroi*, the final epithet “*uruguayensis*” was chosen after two unavailable epithets were considered, as the label shows.

Before the publication of *Flora Uruguay*, Meisner (1840) had published the genus *Antiphytum*, and de Candolle (1846) had formalized it. However, neither *Antiphytum* nor the two species originally described in *Anchusa* by Chamisso (1829) were mentioned in the *Flora Uruguay*. Arechavaleta may not have been aware of the presence of *Antiphytum* in Uruguay, or he may have considered that the morphological features defining the genus did not match the Uruguayan specimens known to him.

Johnston (1927) had access to Arechavaleta’s *Flora Uruguay* when he published the revision of the South American “Boraginoideae.” However, Johnston did not have access to specimens, so his understanding of the two *Myosotis* species came from Arechavaleta’s descriptions alone. Based on the description and the type locality, Johnston (1927) considered *M. berroi* a heterotypic synonym of *Antiphytum stoechadifolium*. According to Johnston (1927), the German botanist Friedrich

Sellow explored northern Uruguay during the early part of 1823. Because Sellow’s collections were used by Chamisso to describe *Anchusa stoechadifolia* (the basionym of *Antiphytum stoechadifolium*), Johnston wrote that, “it is, hence, not impossible that the types of *Anchusa stoechadifolia* and *Myosotis Berroi* were both obtained in northern Uruguay and perhaps in the same region” (Johnston, 1927: 13–14). On the other hand, Johnston (1927) considered *M. uruguayensis* a doubtful species of *Antiphytum*. He wrote that it is “a fruticose plant probably of this genus [*Antiphytum*] and apparently nearest to *A. cruciatum* but differing in its alternate leaves and tubular calyx. I have seen no material of this species” (Johnston, 1927: 14). Johnston’s description of *Antiphytum cruciatum* was thus adapted from the original description only (Johnston, 1927: 12).

None of Johnston’s subsequent publications include South American species of *Antiphytum* or Uruguayan species of *Myosotis*. In an unpublished letter to Uruguayan botanist Bernardo Rosengurt dated 1938 (held at MVFA), Johnston considered *M. berroi* to be a third species of the genus *Antiphytum* based on observation of the specimen *Rosengurt 2346*. We studied this specimen on loan from GH (see Additional specimens examined). Although this specimen actually corresponds to *A. cruciatum*, Johnston annotated it as “*Antiphytum Berroi* (Arech.) Johnston” (Fig. 3B), this being the first time that this combination was used, although he never formally published it. No mention of *M. uruguayensis* was made in the above-mentioned letter.

The taxonomic status of *Myosotis* species described by Arechavaleta therefore remains yet unresolved. Although both species were validly published, and the names are cited in current floristic works such as *Catálogo de las Plantas Vasculares del Cono Sur* (Zuloaga et al., 2021), their circumscriptions have not been updated and the type specimens have not yet been examined.

MATERIALS AND METHODS

Literature and herbarium specimens of South American species of *Antiphytum*, including protologues and types, were located and examined. To locate original material of the species of *Myosotis* described by Arechavaleta (1898–1911) in *Flora Uruguay*, we first searched Uruguayan herbaria MVFA and MVM for historic collections of Mariano Berro and José Arechavaleta, who were both based in Uruguay and collected throughout the country in the late 1800s and early 1900s. We found one specimen of *M. berroi* each at MVFA and MVM, and one specimen of *M. uruguayensis* at MVM. Based on information in TL-2 (Staffleu & Cowan, 1976–1988), we then sought information from the following herbaria to determine whether they housed



Figure 1. Lectotype of *Antiphytum berroi* (Arechav.) N. Mend. & Flores Oliv. at MVFA collected by Mariano Berro. Note the label with the basionym *Myosotis berroi* Arechav. and the data of publication annotated by José Arechavaleta.



Figure 2. Original material of *Myosotis uruguayensis* Arechav. at MVM collected by Pantaleón Pintos.

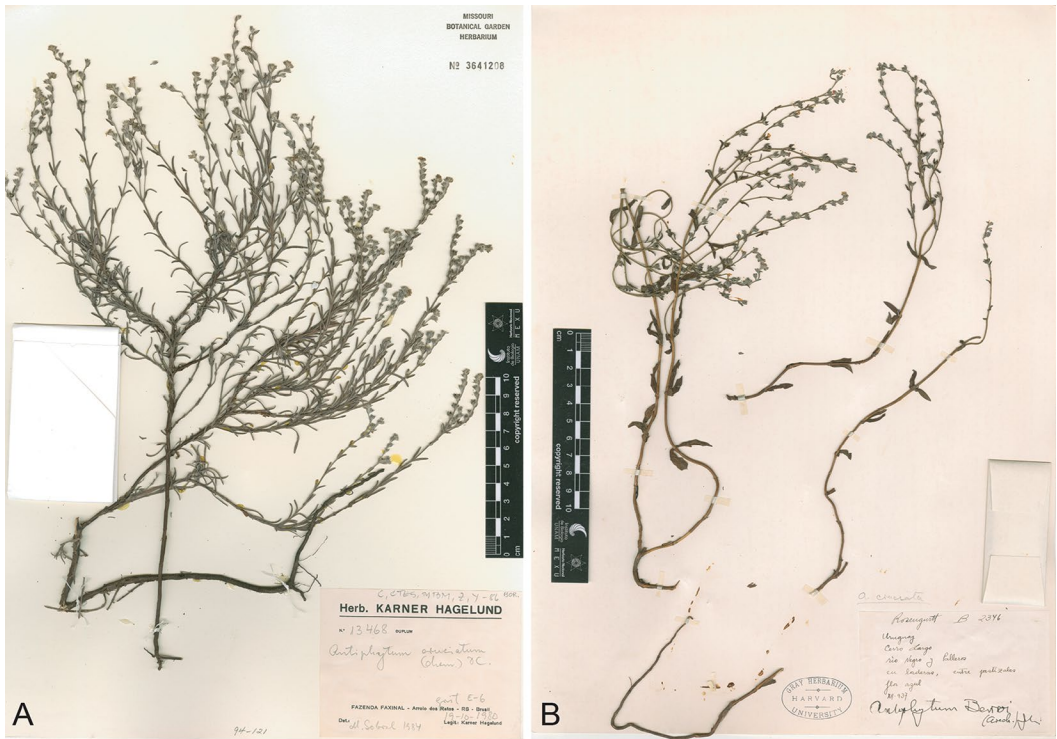


Figure 3. Reference specimens. —A. Specimen of *Antiphytum berroi* (Arechav.) N. Mend. & Flores Oliv. collected by Karner Hagelund in Rio Grande do Sul, Brazil (MO). Note the mention of his own herbarium. —B. Specimen of *Antiphytum cruciatum* (Cham.) DC. collected in Uruguay and annotated as “*Antiphytum Berroi*” by I. M. Johnston (GH).

original material from these species: B, BAF, CORD, F, G, K, L, LD, M, MIN, NY, PH, R, WRSL, and ZT. Answers from most of the herbaria indicate that there is no more additional material out of Uruguay, but GH holds a phototype of the MVM specimen of *M. berroi*. As we found collections referable to *M. berroi* that were made in southern Brazil, the ICN herbarium was also checked for additional collections to upgrade taxonomic and geographic information of the species. Fieldwork was conducted in the departments of Tacuarembó and Rivera in Uruguay.

Morphological characters, particularly from the fruit and the inflorescence (following Weberling, 1989) were used to differentiate and to describe the species: eremocarp number and size, pericarp ornamentation, cleft of the calyx lobes, kind of diaspore. Material from *Myosotis berroi* was available from type specimens and recent collections, including our own collections (see Additional specimens examined). Since there are no duplicates or additional collections of *M. uruguayensis*, it was not possible to make direct observation of the fruits. Mature eremocarps (nutlets or mericarps, terminology sensu Hilger, 2014) from our collected specimens of *M. berroi* and one specimen of *Antiphytum*

stoechadifolium (Marchesi 1420) were observed with a confocal stereo microscope (Leica Z16 APO A, Leica Microsystems GmbH, Wetzlar, Germany), and photographed with a camera (Leica DFC490, Leica Microsystems GmbH) at Laboratorio de Microscopía y Fotografía de la Biodiversidad II of Instituto de Biología, Universidad Nacional Autónoma de México (UNAM). SEM photographs were also taken (Hitachi SU1510, Hitachi Ltd., Tokyo, Japan) at Laboratorio de Microscopía Electrónica y Fotografía de la Biodiversidad I.

A distribution map was made using QGIS (2.6.1-Brighton) (QGIS Development Team, 2014) and the GIS layers from official websites of Argentina (Instituto Geográfico Nacional de la República Argentina, 2020), Brazil (Fundação Estadual de Proteção Ambiental Henrique Luiz Roessler, 2020; Núcleo de Economia Regional e Urbana da Universidade de São Paulo, 2020; Serviço Geológico do Brasil, 2020), and Uruguay (Infraestructura de Datos Espaciales del Ministerio de Transporte y Obras Públicas de Uruguay, 2020; Instituto Nacional de Estadística, 2020; Ministerio de Industria, Energía y Minería de Uruguay, 2020). For the delimitation of Serra Geral Formation, Brazil, we followed Wildner et al. (2004).

The designation of types follows McNeill (2014) and Article 9 of the *International Code of Nomenclature for algae, fungi, and plants* (Turland et al., 2018).

RESULTS

We propose transferring *Myosotis berroi* to the genus *Antiphytum*, which would make it the fourth species native to South America, and the third with blue corollas (see Mendoza Díaz et al., 2020). Features from the eremocarp, along with the cleft of the calyx lobes almost to the base in the flower, and the extended calyx in the fruit that does not enclose the four eremocarps, are characteristic of *Antiphytum* and exclude *A. berroi* (Arechav.) N. Mend. & Flores Oliv. from genera of Moritzziinae. *Antiphytum berroi* comprises a well-defined species that differs from *A. stoechadifolium* by the eremocarp ornamentation and leaf length. From the two syntypes found, the specimen at MVFA (*M. B. Berro 4975*) is designated as the lectotype.

By contrast, based on the short protologue description and the type found in MVM, we conclude that *Myosotis uruguayensis* does not belong in *Antiphytum* due to its shallowly divided calyx and the eremocarps that remain enclosed in the accrescent calyx. *Myosotis uruguayensis*, although valid, remains with uncertain taxonomic status since there are not enough features to reliably assign it to any genus of Boraginaceae. After our search to find duplicates, only the specimen at MVM is known. In the face of the uncertainty of the original gathering, it seems unnecessary to designate a lectotype according to McNeill (2014).

TAXONOMIC TREATMENT

Antiphytum berroi (Arechav.) N. Mend. & Flores Oliv., comb. nov. Basionym: *Myosotis berroi* Arechav., *Anales Mus. Nac. Montevideo* ser. 2, 1(3): 69. 1911. TYPE: Uruguay. Dpto. Rivera: “Vive en campos de Rivera en los llamados Cerros del Gobierno, pedregosos áridos,” *M. B. Berro 4975* (lectotype, designated here, MVFA!; isolectotype, MVM!, MVM photo at GH!). Figure 4C–H.

Suffrutex, erect, 25–35(–40) cm tall; stems (usually 3) broadly branching, arising from a main slender stem (ca. 2–3 mm diam.); branches opposite, solid (non-fistulose), slender (ca. 1 mm diam.), later exfoliating, densely strigose, each trichome with several mineralized foot cells (lithocystic structures). Leaves pseudo-basal and cauline, the cauline opposite, without a basal rosette, sessile; lamina linear-lanceolate or linear-oblong to linear-oblongate, in cauline leaves (10–)14.6–20.9(–30) × 1–1.6(–2.3) mm, becoming gradually smaller on the branch distally, in youngest pseudo-basal leaves ca. 5 × 0.4 mm; base truncate, connate-sheathing; apex acute, mucronate; margins thickened,

entire; surfaces strigose, with trichomes more densely and finely distributed on abaxial surface, concolorous; midvein not visible on adaxial surface, but groove-like at the very base, visible and raised on abaxial surface; secondary veins not visible. Inflorescences ending in a flower (monotelic) forming a terminal homocladic determinate thyrse (thyroid); most distal node with paired scorpioid cymes (boragoids) up to 170 mm when mature, loosely many-flowered, bracteate, with well-developed terminal flower arising from a dichasial division; previous nodes (until 3) often with opposite boragoids as paraclades of the thyrsoid, but sometimes one side on the distal nodes as a new flower branch; most proximal internode of a lateral axis 13–26 mm; bracts subtending the inflorescence and inflorescence nodes opposite, sessile, triangular-lanceolate, the largest 11.5 × 2.5–3 mm, becoming gradually smaller distally, base truncate, apex acute, mucronate, margins hispid, indumenta and midvein as on leaves; flower-subtending bracts sessile, triangular-lanceolate, the largest 4.5 × 1.5–2 mm, becoming gradually smaller toward the apex of the cyme, apex mucronate, margins hispid, indumenta and midvein as on the leaves. Flowers monoclinal, pedicellate; pedicel 1.2–1.5 mm; calyx accrescent, divided ± to the base, strigose on both surfaces, scarious at the very base, calyx lobes ± symmetric, lanceolate, 2.2–3.5 × 0.5–1.5 mm, longer than or equal to corolla tube at anthesis, up to 4 mm in fruit, apex slightly acuminate, mucronate in fruit, trichomes more densely distributed on abaxial surface, few amber-colored and hyaline glandular-capitate at margins, more at base; corolla hypocrateriform (rotate), blue, with 5 white trapezoid papillose faucal appendages on throat in sinuses of corolla lobes, tube light blue, 2.2–2.7 mm, 1 mm wide at base, limb purple-blue, 6 mm diam., lobes oriented perpendicular to tube, imbricate, oblong, 2.1–2.3 × 1.6–2.2 mm, apex rounded-sinuate, abaxial surface densely pilose at middle; stamens included, alternate to corolla lobes, adnate to corolla tube ca. 1.2 mm from base of tube; filaments up to 0.5 mm, slender; anthers dorsifixed, oblong, sub-lanceolate, ca. 1.3 mm; style gynobasic, 1.7–2.2 mm at anthesis; stigma bilobed, branches short (subterminal), included; ovules 4. Fruit dry, subtended by a persistent extended calyx with acuminate lobes apically recurved; eremocarps usually 4, rarely 3 by abortion, 1.6–1.9 × 1.3–1.5 mm, ovate and apically acute in ventral view, dorsally convex, lustrous, striate; cicatrix at basal position under a stipelike projection, ovate to elliptic, ca. 1 mm; 1 ventral keel (apical) straight from apex of eremocarp to base, forming a stipe; lateral (basal) keels absent; gynobase flat to slightly raised (length:width ratio ca. 1:6), with 4 areoles corresponding to the cicatrix of each eremocarp; style plus stigmas 2.4 mm, surpassing the eremocarps.

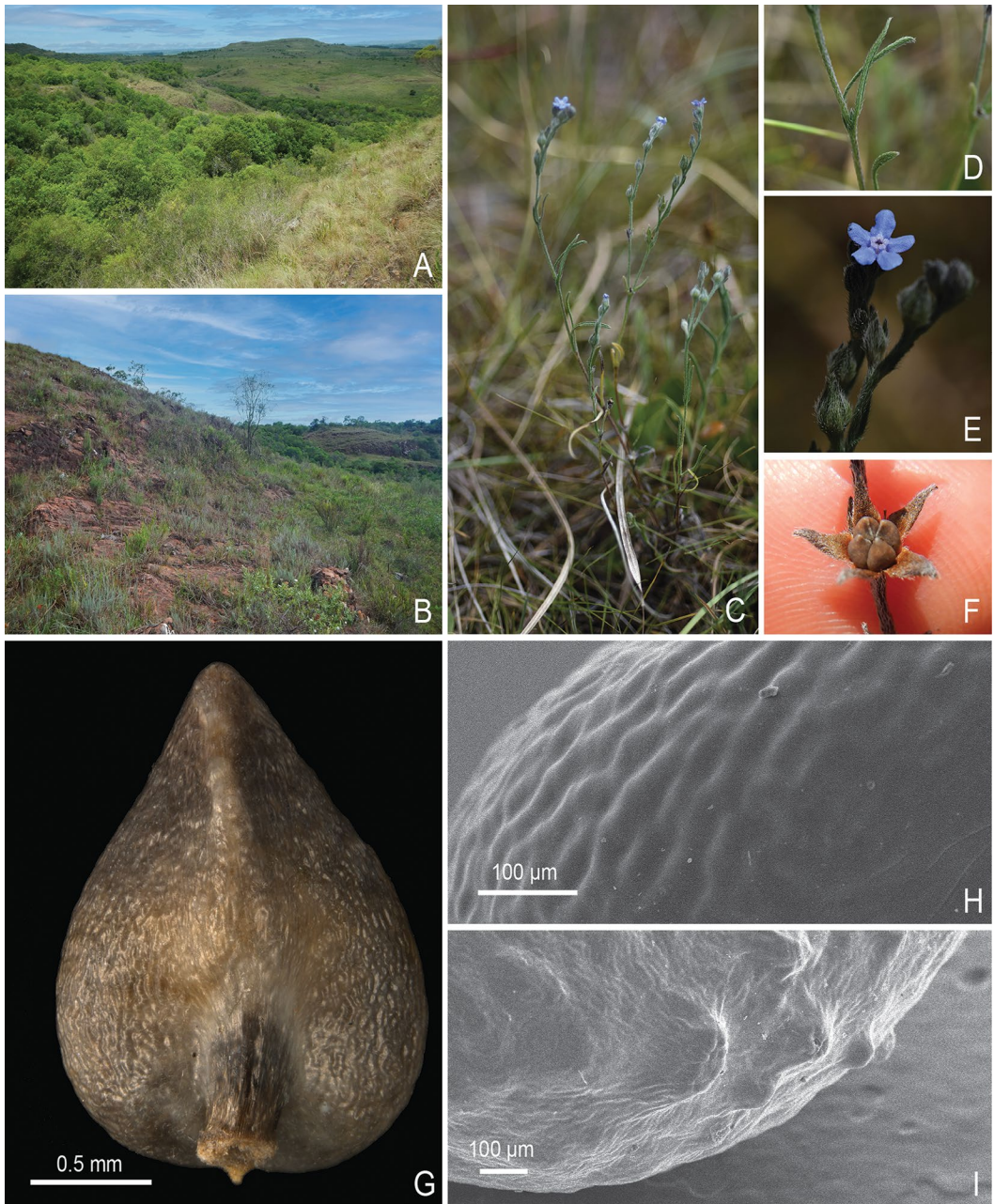


Figure 4. *Antiphytum berroi* (Arechav.) N. Mend. & Flores Oliv. —A. Habitat; note the grassland near to deciduous forest. —B. Habitat close up, with sedimentary rocks in foreground. —C. Habit. —D. Linear leaves. —E. Portion of scorpioid cyme and flower. —F. Fruit. —G. Front view of one eremocarp (Mendoza-Díaz et al. 650A). —H. Eremocarp ornamentation of *A. berroi* (Mendoza-Díaz et al. 650B). I. Eremocarp ornamentation of *A. stoehadifolium* (Cham.) DC. (Marchesi 1420). Photographs: A, B, F, G by Nidia Mendoza-Díaz; C–E by Camilo Pérez; H, I by Berenit Mendoza-Garfias.

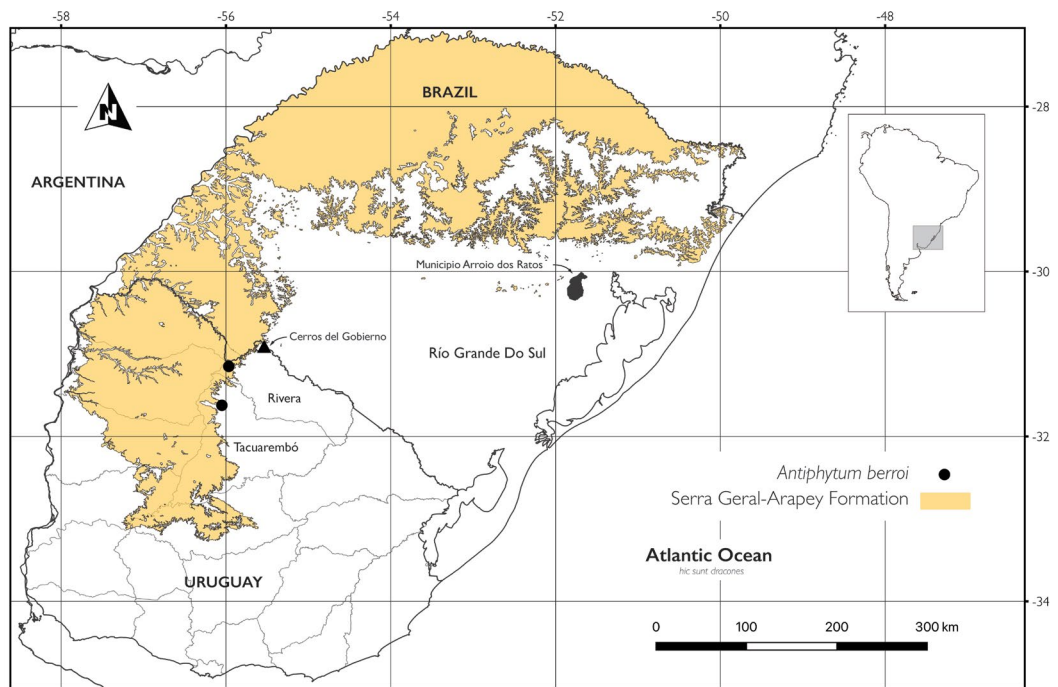


Figure 5. Distribution map of *Antiphytum berroi* (Arechav. N. Mend. & Flores Oliv. in both Uruguay (Tacuarembó and Rivera Departments) and Brazil (Rio Grande do Sul State, not indicated). ▲ “Cerros del Gobierno” locality [now destroyed]; ● other localities. Note the distribution of the Uruguayan localities over the Serra Geral–Arapey Formation and the distant Municipio Arroio dos Ratos.

Distribution. *Antiphytum berroi* is native to South America, occurring in southern Brazil (Rio Grande do Sul only) and northern Uruguay (adjacent departments Tacuarembó and Rivera) in disjunct localities (Fig. 5). A third locality in Rivera Department, i.e., the rocky habitat of the type locality of “Cerros del Gobierno” (*Berro* 4975; MVFA, MVM), no longer exists as the hill has been transformed into a quarry (Díaz, pers. obs.; Fig. 5, labeled triangle). The distribution of the species in southern Brazil is supported by Hagelund’s collections from Rio Grande do Sul, mainly from the ICN herbarium, but the precise localities remain unknown (see Notes).

Habitat and underlying geology. According to Uruguayan records from the departments of Rivera and Tacuarembó, *Antiphytum berroi* is found in grasslands near a riverside subtropical forest formed in the canyons (“quebradas”) with herbaceous species such as *Baccharis trimera* (Less.) DC., *Crocantemum brasiliensis* Spach., *Plantago myosuroides* Lam., *Schlechtendalia luzulifolia* Less., and species of *Andropogon* L., *Aristida* L., *Borreria* G. Mey., and *Chascolytrum* Desv. The area falls into what Lezama et al. (2019) classified as *Eryngium horridum* [Malme]–*Juncus capillaceus*

[Lam.] community, a densely vegetated grassland, dominated by mesophytic species, encompassing stands with high plant cover values (near 100%) that occupy medium and deep soils of the Eastern Hills, North Eastern Sedimentary Basin, and the South Central regions. We found and collected scattered individuals from one small population (*Mendoza-Díaz et al.* 650, to be sheltered in MEXU and MVFA) at ca. 200 m.s.m., mainly on a sedimentary rock wall in one locality in the department of Tacuarembó whose substrate comprised 2%–10% rocky outcrops and 1%–10% stones (according to GIS layers provided by Dirección General de Recursos Naturales Renovables, 2002). The underlying geology of these areas comprises basic lavas of tholeiitic basalt type with flow structure and intercalation of aeolian sandstones (Preciozzi et al., 1985). The localities of occurrence in Uruguay are part of the Arapey Formation (Upper Jurassic–Lower Cretaceous) of igneous volcanic origin that alternates on the east side with sandstones of sedimentary origin from Tacuarembó Formation. The Arapey Formation is an extension of the Serra Geral Formation in Brazil (Walther, 1911).

Phenology. The main flowering and fruiting period is from September to December.

Notes. After examining the type material and reviewing the protologue, we confirmed that the species *Myosotis berroi* belongs to the genus *Antiphytum*, a conclusion supported by the nature of the calyx almost entirely divided to the base, the flat gynobase, the eremocarp with its stipelike projection and basal cicatrix (scar), the bracteate flowers arranged in scorpioid cymes, the blue corolla, the open extended calyx subtending the four eremocarps, and the opposite leaves throughout the length of the stem. The calyx lobe features and the kind of diaspore exclude this species from any genera of Moritzziinae, which include *Thaumatocaryon* Baill. and *Moritzia* DC. ex Meisn., whose species are rosette herbs with fruits that consist of a single, ventrally and dorsally keeled nutlet enclosed into and dispersed with the calyx (Chacón et al., 2016). *Antiphytum berroi* is morphologically most similar to the South American species *A. cruciatum* and *A. stoechadifolium*. The blue corolla alone sets it apart from the North American species and the recently described Uruguayan species *A. charruasorum* N. Mend & Mar. Díaz (Mendoza-Díaz et al., 2020), all of which have white corollas.

Antiphytum berroi is easily distinguishable from *A. cruciatum* by its linear leaves that are 0.4–1.6 mm wide (vs. oblanceolate leaves ca. 3–4 mm wide), but also by the eremocarp size and ornamentation (1.3–1.4 × 1–1.1 mm and rugose in *A. cruciatum*). The general vegetative appearance is similar to that of *A. stoechadifolium*, which also bears linear leaves, but the leaves in *A. stoechadifolium* are considerably longer (ca. 5 cm long) than those of *A. berroi* (1–2[–3] cm long). Therefore, the length of the leaves gives a lax appearance to the internodes in *A. berroi*, in contrast to *A. stoechadifolium*, whose internodes are covered with leaves. Berro's specimens (*Berro 4975*, MVFA and MVM) have a pericarp ornamentation of the eremocarp that was described as “somewhat rugose” (Arechavaleta, 1911a: 69, “un tanto rugosa”) but is rather more or less striate as shown in the original illustration (Arechavaleta, 1911a: fig. 6F), and also in the SEM and stereoscope photographs (Fig. 4H, I). In marked contrast with this, Chamisso (1829: 440) described the pericarp ornamentation of *A. stoechadifolium* as “tuberculato-granulatae,” a description later ratified by Johnston (1927) and by our own observations (Fig. 4H, I). Although the descriptions of vegetative characters of both species by Chamisso (1829) and Arechavaleta (1911a, 1911b) are apparently similar, we found enough evidence in leaves and eremocarps to recognize *A. berroi* as a different species within *Antiphytum*, not conspecific with *A. stoechadifolium*, which seems to be allopatric.

Regarding the known distribution, specimens from Rio Grande do Sul are geographically unreliable. The collector of these specimens, Karner Hagelund (1913–

1988), was a researcher and collector who had his own herbarium in “Fazenda Faxinal,” in the municipality of Arroio dos Ratos, Rio Grande do Sul (Eisinger, 1987), a farm with a local traditional agrosilvopastoral system (*faxinal*) that is performed in some areas of southern Brazil (Antoneli et al., 2020). In 1988, Hagelund donated to the ICN herbarium his collections from areas of Rio Grande do Sul currently used for farming, especially from the northern region Alto Uruguai e das Missões, whose flora prior to their devastation is well represented in Hagelund's collection (Catálogo REMAM, 2013). Jesuit missions were located in western areas of Rio Grande do Sul, following the Uruguay River, along the Serra Geral Formation. This basaltic formation extends southward into Uruguay, where it is named Arapey Formation (Walther, 1911) and in which the Uruguayan populations of *Antiphytum berroi* are located. Hagelund's collections of *A. berroi* are labeled using the herbarium locality as the only geographic reference, “Fazenda Faxinal, Arroio dos Ratos, RGS [Rio Grande do Sul]” (Fig. 3A), which is far away from the known Uruguayan localities (Fig. 5); hence, there is doubt whether Arroio dos Ratos is actually the locality of distribution of *A. berroi* in Brazil. Therefore, new surveys in the Brazilian state of Rio Grande do Sul are warranted to relocate historical populations and find new populations of *A. berroi*. Such surveys should be conducted in areas where the Jesuit missions were based, as well as at additional localities in the Serra Geral and Arroio dos Ratos, to establish the current distribution and status of *A. berroi* in Brazil.

Additional specimens examined. BRAZIL. **Rio Grande do Sul:** Arroio dos Ratos, Fazenda Faxinal, 5 Sep. 1974, *Hagelund 8161* (ICN-162311); 18 Oct. 1976, *Hagelund 10541* (ICN-153403); 19 Oct. 1980, *Hagelund 13468* (ICN-153402, MO-3641208); 10 Oct. 1982, *Hagelund 14046* (ICN-162310). URUGUAY. **Dpto. Rivera:** 2 Nov. 1926, *Felippone 5224* (K-H2002/02368); Arroyo Gajo del Lunarejo, 17 Sep. 1995, *Bonifacino s.n.* (MVFA-25051). **Dpto. Tacuarembó:** Cd. Tacuarembó, Cerros Chatos, 31°37'16.4"S, 56°02'33.3"W, 215 m, 9 Dec. 2017, *Mendoza-Díaz et al. 650* (MEXU, MVFA).

Additional specimens examined (other species). *Antiphytum cruciatum* (Cham.) DC.: BRAZIL. **Rio Grande do Sul:** Arroio dos Ratos, Fazenda Faxinal, 5 Oct. 1979, *Hagelund 12846* (ICN); Canguçu, estrada Amaral Ferrador-Canguçu, 8 Oct. 1977, *Miotto 558* (ICN), entre Amaral Ferrador e Canguçu, 8 Dec. 1977, *Fleig 751* (ICN); Camaquã, Boa Vista, Sep. 1985, *Sobral et al. 4165* (ICN); Caçapava do Sul, Pedra do Segredo, 29 Nov. 2002, *Kinupp & Irgang 2504* (ICN), BR 290, 31 Oct. 2010, *Silva Filho 1603* (ICN); Guafba, Centro Agrônomico de Guafba, 10 Oct. 1974, *Schultz s.n.* (ICN); Lavras do Sul, Mina Volta Grande, 5 Oct. 1984, *Sobral 3074* (ICN); Piratini, Ponte Piratini, 15 Nov. 1975, *Arzivenco s.n.* (ICN); Porto Alegre, morro São Pedro, 30 Sep. 1956 (ICN), morro São Pedro, Econsciência Espaço de Conservação, 20 Oct. 2005, *Setubal 492* (ICN); Rio Pardo, na beira da RS-7, Km. 32, 4 Oct. 1972, *Lindeman et al. s.n.* (ICN); Santana da

Boa Vista, 2 Nov. 1995, *Jarenkow & Sobral 2777* (ICN); Toca do Tigre, perto de Itapoan, 27 Sep. 1950, *Rambo 48861* (ICN); Torres, Butiazal, 26 Feb. 1985, *Hagelund 15492* (ICN), Butiazal, 2 Oct. 1975, *Irgang s.n.* (ICN), Butiazal, 12 Oct. 1970 (ICN); Vacaria, BR 116, Km. 50, 6 Oct. 1985, *Miotto 1072* (ICN); Viamão, Itapuã, Sep. 1983, *Sobral 2237* (ICN); Viamópolis, 14 Nov. 1969, *Korner s.n.* (ICN). URUGUAY.

Dpto. Cerro Largo: Río Negro y Palleros, Dec. 1937, *Rosen-gurt 2346* (GH).

Antiphytum stoechadifolium (Cham.) DC.: BRAZIL (?). Brasília meridionali, *Sellow s.n.* (holotype, GH [barcode] 00032786 fragment! and image!; isotype GH [barcode] 00032785!). URUGUAY. **Dpto. Maldonado:** Sierra de las Ánimas, 26 Dec. 1965, *Marchesi 1420* (MVFA).

KEY TO THE SOUTH AMERICAN SPECIES OF *ANTIPHYTUM*

1. Inflorescences with flowers not arranged in scorpioid cymes, but only the terminal flower in each dichasial branch; corollas white; eremocarp cicatrix infra-ventral *A. charruasorum* N. Mend. & Mar. Díaz
- 1'. Inflorescences with flowers arranged in scorpioid cymes, therefore more than the terminal flower in each dichasial branch; corollas blue; eremocarp cicatrix basal.
 2. Leaves 3–4(–6) mm wide, oblanceolate; eremocarps 1.3–1.4 × 1–1.1 mm *A. cruciatum* (Cham.) DC.
 - 2'. Leaves < 3 mm wide, linear-lanceolate or linear-oblong to linear-oblanceolate; eremocarps 1.6–2 × 1.3–1.6 mm.
 3. Pericarp ornamentation ± striate; leaves up to 3 cm long. *A. berroi* (Arechav.) N. Mend. & Flores Oliv.
 - 3'. Pericarp ornamentation tuberculate-granulate; leaves ca. 5 cm long *A. stoechadifolium* (Cham.) DC.

UNCERTAIN TAXONOMIC STATUS

Myosotis uruguayensis Arechav., *Anales Mus. Nac. Montevideo* ser. 2, 1(3): 68. 1911. TYPE: Uruguay. Dpto. Tacuarembó: “Vive en Tacuarembó, en terrenos arcillo-arenosos. Florece por noviembre y diciembre,” *P. Pintos s.n.* (type, MVM!).

Distribution and habitat. *Myosotis uruguayensis* is known from only the type collection and reportedly occurs in Tacuarembó, Uruguay, on sandy-clay soils.

Phenology. Flowering is in November and December (Arechavaleta, 1911a).

Notes. According to the original description and illustrations of the calyx and corolla (Arechavaleta, 1911a: 68 and fig. 4), *Myosotis uruguayensis* bears alternate linear leaves (ca. 4–5 × 0.3 cm), violet corollas, pubescent corolla faucal appendages (“escamillas trap-zoides circundadas de pelos gruesos dactiloides”), and a shallowly divided calyx (“lacinas breves”). We were not able to fully observe all these features on the type specimen because of the immature and scanty nature of the original material, which prevented direct examination of the necessary fruit features to identify this specimen, but what we observed allowed us to associate the material with the protologue.

The short description of the fruit allows placement of the taxon under Boraginaceae, but it lacks characters to place it confidently within any genus since it only mentions three to four ovoid eremocarps (“aque-nios”) with an acute apex, without an accompanying illustration. Even with the poor original material and short description, we can exclude *Myosotis uruguayensis* from *Antiphytum* because the calyx is not divided almost to the base and the eremocarps are not free from the calyx, as is characteristic of that genus. *Myosotis uruguayensis* seems closer to the Moritziinae subtribe

(see Weigend et al., 2010: fig. 1), whose genera *Moritzia* and *Thaumatocaryon* have no records from Uruguay. Species in Moritziinae may have alternate leaves, a shallowly divided calyx, and pubescent corolla faucal appendages. However, *Thaumatocaryon* and *Moritzia* produce only one eremocarp due to abortion of the other three (Weigend et al., 2010, 2016), a key feature that may exclude *Myosotis uruguayensis* from these genera. In addition, *Moritzia* species have ebracteate inflorescences and uncinatate trichomes in the calyx, unlike the original material of *Myosotis uruguayensis*; hence, we strongly doubt its affiliation to this genus. Furthermore, in both genera the species have conspicuous basal leaves forming a rosette. Since Arechavaleta was not the collector of the specimen, the absence of the basal rosette in both the description and the collection can be expected. *Myosotis uruguayensis* could also be part of *Myosotis*, as diagnosed by the length of the calyx cleft and the number of eremocarps. *Myosotis* has exotic representatives in Uruguay, such as *Myosotis latifolia* Poir. and *Myosotis verna* Nutt. (Zuloaga et al., 2021). Unfortunately, an exact identification is not possible, even at the generic level. Except for *A. berroi*, which occurs in Tacuarembó, and recent records of *A. cruciatum* (Patricia Brussa, pers. comm.), no other native Boraginaceae have been reported from the type locality of *Myosotis uruguayensis* nor from neighboring areas. Therefore, *Myosotis uruguayensis*, which is a validly published name, remains as a name with uncertain status. Finding new populations of this taxon will be the only reliable way to know its identity by examining key fruit characteristics, such as pericarp ornamentation and cicatrix position. However, the lack of information on the locality of collection will be a challenge due to the large area of Tacuarembó.

Typification notes. The MVM specimen is currently the only known original material, but following the rec-

ommendation in McNeill (2014), lectotypification is not required.

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