

Morphology, Fruit Anatomy and Taxonomy of the South Andean Genus *Laretia* (Azorelloideae, Apiaceae)

Martina Fernández,^{1,2} Cecilia Ezcurra,¹ and Carolina I. Calviño¹

¹INIBIOMA, CONICET-Universidad Nacional del Comahue, Quintral 1250, 8400 Bariloche, Argentina.

²Author for correspondence (mfernandez@comahue-conicet.gob.ar)

Communicating Editor: Marcia Waterway

Abstract—The genus *Laretia* Gillies & Hook. comprises a single species, *L. acaulis* (Cav.) Gillies & Hook., of xerophilous subshrubs that form flat compact cushions. It is endemic to southern South America and is distributed through the high Andes of San Juan and Mendoza provinces in Argentina, and Atacama to Maule regions in Chile. Descriptions of *Laretia* are available only from the protologue and from a few regional floras; these are not comprehensive and are based on few specimens. Moreover, the actual geographic distribution of the genus has been questioned. In this work we present a taxonomic treatment for *Laretia* that includes field work, analysis of the protologue, and an exhaustive revision of herbarium material. We also analyze and describe the morphology and anatomy of its fruits because of their diagnostic importance in the family. We provide a detailed morphological description, ecological and ethnobotanical information, and illustrations of the genus. Additionally, we present a map that shows the geographical distribution of *Laretia*, designate lectotypes for three names, and finally analyze and resolve nomenclatural problems regarding two names (*Laretia compacta* and *Laretia yareta*) that have not been included in recent treatments and require revision in order to understand the limits of the genus.

Keywords—Argentina, Chile, Nomenclature, South America.

The genus *Laretia* Gillies & Hook. comprises a single species, *L. acaulis* (Cav.) Gillies & Hook., of xerophilous subshrubs that form flat compact cushions (Fig. 1). It is endemic to South America and is distributed at high altitudes (1,900–3,600 m) in the Andes of San Juan and Mendoza provinces in Argentina and Atacama to Maule regions in Chile (III–VII and Región Metropolitana de Santiago). This species was initially treated under the genus *Selinum* L. (Cavanilles 1799), and then transferred to the genus *Mulinum* Pers. because of its shrubby habit and its winged, dorsally compressed fruits (Persoon 1805). Subsequently Gillies and Hooker (1830) transferred the species to their new genus *Laretia* based on its distinctive development of the fruit wings (originating from marginal ribs and not from lateral ribs as in *Mulinum*; rib nomenclature sensu Kljuykov et al. 2004). *Laretia* is therefore a genus comprised of compact cushion plants (like *Azorella*) with winged fruits (like *Mulinum*), but whose wings are prolongations of the marginal ribs. Indeed, many authors recognized the morphological similarities among *Laretia*, *Azorella*, and *Mulinum* (e.g. Weddell 1857; Baillon 1880; Martínez 1989), and chloroplast DNA-based phylogenies support the non-monophyly of these genera (Andersson et al. 2006; Nicolas and Plunkett 2009, 2012). Despite these observations, the genus has been maintained as a different entity since its creation in 1830 (Mathias and Constance 1962; Constance 1984; Martínez 1989, 2008). Until we can consider comparable morphological and anatomical knowledge for all species of the three genera (Calviño et al. 2016; Fernández et al. 2016), together with molecular phylogenies from both chloroplast and nuclear genomes, we maintain a conservative approach and continue treating the three genera separately, given the extensive nomenclatural changes that the re-circumscription of *Azorella*, *Mulinum* and *Laretia* will certainly imply. In addition to *L. acaulis*, two other names are listed in IPNI under *Laretia*: “*L. compacta* Reiche” and “*L. yareta* (Hauman) Mathias & Constance in R. L. Rodrig.”. These names are putative synonyms of *Azorella compacta* Phil.; indeed Mathias and Constance (1962) included *L. compacta* under the synonymy of *A. compacta*. However, neither of these names have been included in recent treatments (e.g. Martínez 1989, 2008) and require revision in order to understand the limits of *Laretia*.

Until now, the genus has only been described in the protologue (Gillies & Hooker 1830) and in a few regional floras (Gay 1848–1849; Reiche 1899; Martínez 2003). These descriptions, however, are not comprehensive and are based on only a few specimens. Moreover, the type specimen was apparently collected near the Atlantic coast, in Puerto Deseado, whereas the rest of the specimens are from the Andes (Gillies & Hooker 1830, Gay 1848–1849; Reiche 1899; Martínez 2003), raising questions on the actual distribution of the genus that need to be answered by doing field work (especially in Puerto Deseado and neighboring regions), and by analyzing the protologue and exhaustively revising herbarium material.

The fruits of *Laretia acaulis* have been studied morphologically and anatomically by Tseng (1967) and Liu et al. (2009, 2012), in each case based on a single specimen from Chile. Because fruit characters are diagnostic, and because the position of vascular bundles in the wings can vary in putative closely related species (e.g. *Mulinum microphyllum*; Tseng, 1967), we considered it important to study fruits from a broader sampling of *Laretia* from other parts of Chile and from Argentina. *Azorella* and *Mulinum* have been revised taxonomically (Martínez 1989, 1995; Calviño et al. 2016; Fernández et al. 2016). These studies include detailed morphological descriptions and morpho-anatomical analyses of fruit for all species. Obtaining the same information for *Laretia* will allow comparative studies that will help to determine their generic limits and to understand the evolution of the diagnostic characters by mapping them on robust phylogenies.

In this work we contribute to the knowledge of the South Andean genus *Laretia*. We analyze and describe the morphology and anatomy of its fruits and provide a detailed morphological description, ecological and ethnobotanical information, and illustrations of the genus. We also present a map that shows the geographical distribution of *Laretia*, and analyze and resolve lectotypifications and nomenclatural problems regarding species names that were once included in this genus.

MATERIALS AND METHODS

Fruit Morphology and Anatomy—Studies of the fruit were performed on herbarium material. Morphological traits were observed on all the

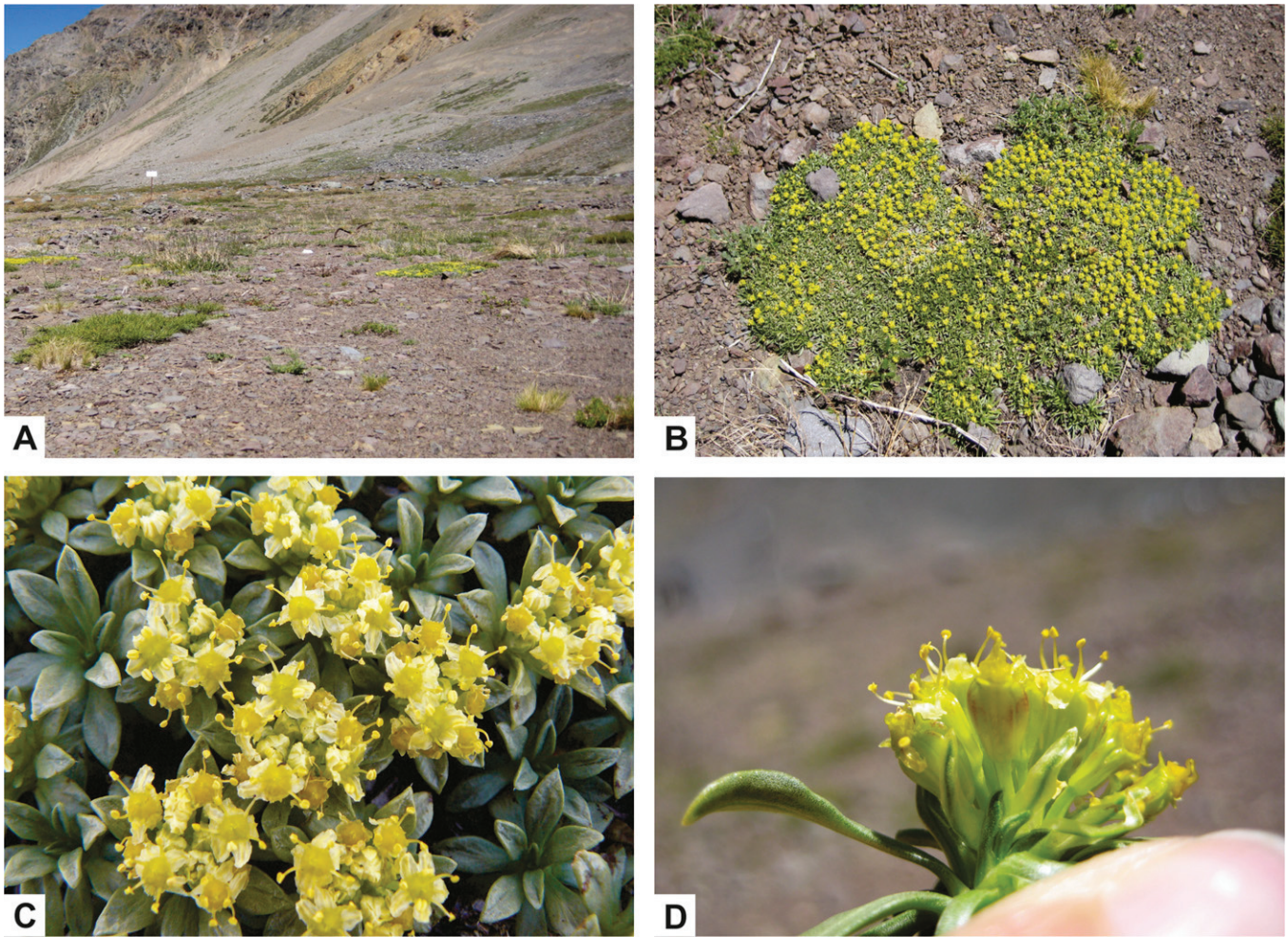


FIG. 1. Living plants of *Laretia acaulis*. A. Habitat. B. Habit. C. Umbels with flowers. D. Umbel with immature fruits. Photographs by: Martina Fernández (A, B), Carolina I. Calviño (C, D).

specimens studied for the taxonomic revision (approx. 80). The specimens used for anatomical studies are marked with an asterisk under the examined material of the Taxonomic Treatment; these include plants from Argentina and from Chile, and cover most of the range of geographical distribution of the species. One to three mature fruits from each specimen were hydrated in hot water with a few drops of detergent, and transverse sections were cut in the middle of the fruit using a razor blade. Sections were observed with a SZ30 Olympus stereoscopic microscope and photographed. These images were used to prepare diagrams following the nomenclature of Tseng (1967) and Martínez (1995).

Taxonomy and Nomenclature—This revision is based on approximately 80 herbarium specimens from the following herbaria: BA, BCRU, CONC, E, K, LP, M, MA, MERL, SI, and UC (abbreviations according to Thiers 2016) and on personal observations from field trips across the south Andean region and Patagonia, where the presence/absence of the species was also corroborated. One particular place visited that deserves to be mentioned is Puerto Deseado and nearby areas (Santa Cruz, Argentina), which are important because the type specimen was collected in Puerto Deseado according to its label. In addition, most of the type material was examined from photographs from herbarium databases available on-line and from the website in JSTOR Plant Science (<http://plants.jstor.org/>). Photographs are designated by the bar code number followed by an exclamation point (!) which indicates we have viewed the image. Author names are cited according to Brummitt and Powell (1992).

Morphological measurements for the description of the species were obtained from herbarium material as well as from samples we collected in the field, where we also observed intraspecific morphological variation. Descriptions of the shape of the lamina and the fruit follow the criteria of the Systematics Association Committee for Descriptive Biological Terminology (1962).

The map of geographical distribution was prepared using the program QGIS 2.10 Pisa (QGIS Development Team 2012) based on the geographical references given in herbarium labels for all specimens examined.

RESULTS

Fruit Morphology and Anatomy—The fruits of *Laretia acaulis* are schizocarps composed of two mericarps that are yellow to red and glabrous (Fig. 1D). Each mericarp is broadly elliptical to circular in contour, variable in size (6–12 mm long \times 5–12 mm wide) and broadly winged with wings always wider than the body of the fruit. Generally, both wings of a mericarp are aligned in the commissural plane so that wings from different mericarps are parallel to each other, and the two wings from each mericarp are separated 180° from each other (Fig. 2). Each mericarp is compressed dorsally, and in dorsal view three ribs are evident (one dorsal and two lateral) plus the two wings which are extensions of the marginal ribs (Fig. 2). The two mericarps of the fruit are initially united by their commissures, but they separate at maturity revealing a specialized structure called a carpophore composed of ventral vascular bundles plus surrounding tissue. In *Laretia acaulis*, the carpophore is not completely free, because only one of the mericarps separates from this structure (Fig. 2C).

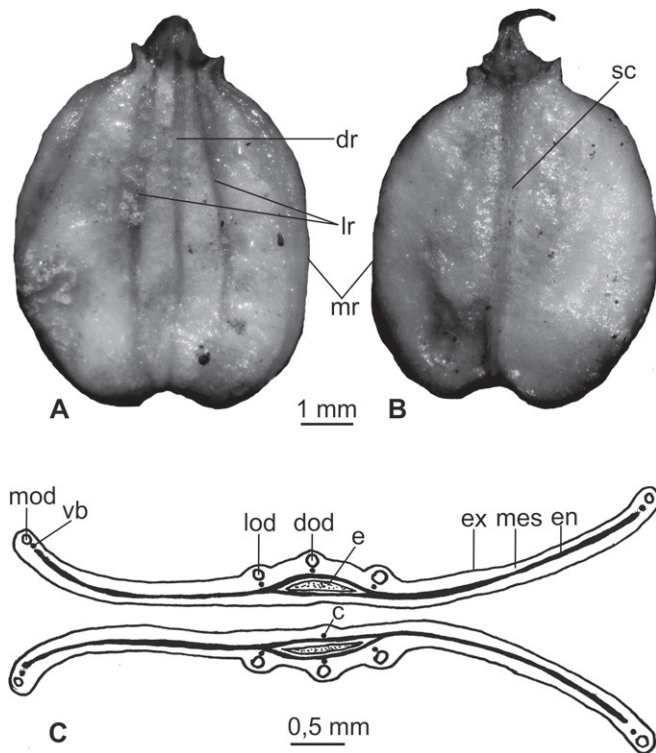


FIG. 2. Fruit of *Laretia acaulis*. A. Dorsal view of mericarp. B. Ventral view of mericarp. C. Transverse section through both mericarps. A–B. From Arroyo & Humaña 991220 (CONC). C. From Jiles 4435 (CONC). Dorsal rib (dr), lateral ribs (lr), marginal ribs (mr; wings), scar of the carpophore (sc), marginal intrajugal oil duct (mod), vascular bundle (vb), lateral intrajugal oil duct (lod), dorsal intrajugal oil duct (dod), endosperm (e), carpophore adhered to one mericarp (c), exocarp (ex), mesocarp (mes), endocarp (en).

Anatomically, each mericarp consists of exocarp, mesocarp and endocarp. The exocarp is formed by a single layer of epidermal cells. The mesocarp has five vascular bundles with their respective oil ducts on the dorsal side of each vascular bundle under the ribs (Fig. 2). These intrajugal oil ducts are highly developed. The endocarp is woody, surrounds the seed cavity, and extends into the wings (Fig. 2). The wings are therefore formed by exocarp, mesocarp, and endocarp layers, with a marginal vascular bundle and its associated intrajugal oil duct positioned at the edge of the wing.

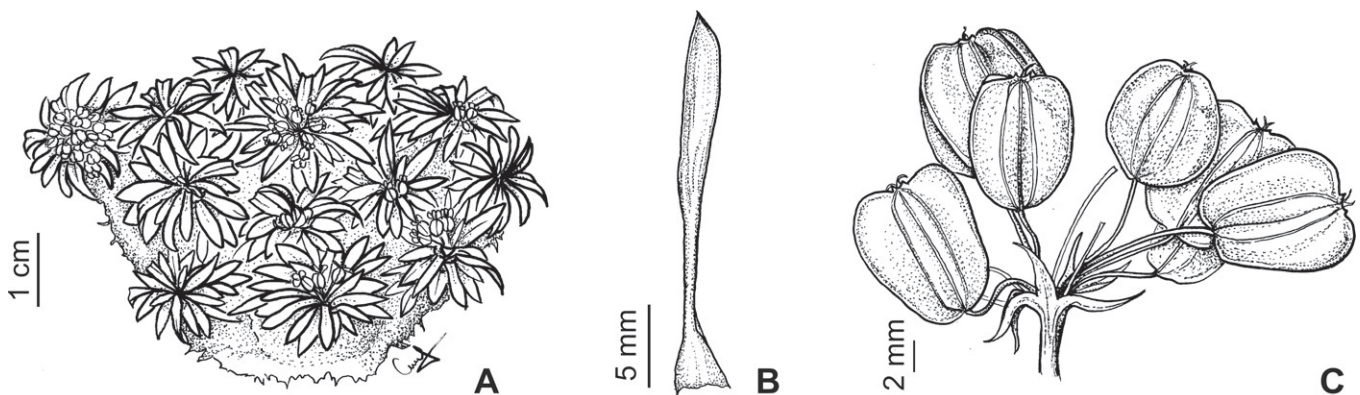


FIG. 3. Morphology of *Laretia acaulis*. A. Habit. B. Leaf. C. Umbel with mature fruits. From Jiles 4435 (CONC). Drawn by Ailén Santomé.

TAXONOMIC TREATMENT

LARETIA Gillies & Hook., Bot. Misc. 1: 329, t. 65. 1830.—
TYPE: *Laretia acaulis* (Cav.) Gillies & Hook.

Subshrubs forming flat and compact cushions with old branches densely covered with dead persistent leaves, monoecious, odorous, resinous. Leaves forming rosettes at the ends of the branches, shortly petiolate, narrowly elliptic or narrowly obovate, coriaceous, glabrous; lamina entire, flat; apex obtuse to rounded, mucronate, not sharp-pointed; base sheathing, sheaths open, scarious, margin entire. Inflorescence of simple umbels, terminal, slightly exceeding the level of the leaves, pedunculate, involucre, multiflowered; involucre bracts generally reflexed, connate only at the base and forming a shallow cup, glabrous, margins entire. Flowers pedicellate, pentamerous; sepals reduced to small teeth, triangular, much shorter than the petals, persistent at maturity; corolla yellow, petals ovate, reflexed, apex weakly inflexed, deciduous at maturity; stamens longer than the styles, yellow, filaments subulate, anthers globose; styles 2, divergent and persistent, stylopodium conical; ovary inferior, bicarpelar, bilocular, with 1 ovule per locule. Fruit a schizocarp formed by two mericarps, yellow to red, elliptical to circular or oblong in contour, glabrous, strongly compressed dorsally, markedly winged, with parallel or slightly divergent wings from marginal ribs, dorsal and lateral ribs evident, mesocarp with five conspicuous intrajugal oil ducts on the dorsal side of each vascular bundle, endocarp woody; carpophore present, persistent, adhering to one of the mericarps at maturity.

LARETIA ACAULIS (Cav.) Gillies & Hook. Bot. Misc. 1: 329, t. 65. 1830. *Selinum acaule* Cav., Icon. Pl. 5: 59–60, t. 487, f. 2. 1799. *Mulinum acaule* (Cav.) Pers., Syn. Pl. 1: 309. 1805.—TYPE: “Puerto Deseado”, *Née s.n.* (lectotype, designated here: MA 476255!).

Subshrubs 3–15 cm tall × 15–200 cm diameter. Leaves 15–30 mm long; lamina 10–20 × 3–6 mm, entire, glabrous; petiole 2–4 mm long. Umbels with 7–16 perfect flowers; peduncles 2–15 mm long; involucre with 4–8 bracts, 5–10 mm long. Flowers with pedicels 4–15 mm long, petals 1.5–2 × 1–1.8 mm, styles 1–2 mm long. Fruits 6–12 × 5–12 mm; mericarp 1–2.5 mm thick; wings wider than the body, 2–4 mm wide. (Fig. 3).

Chromosome Number— $2n = 18$ (Rahn 1960).

Distribution and Habitat—Argentina (provinces: San Juan, Mendoza) and Chile (regions: III Atacama, IV Coquimbo, V Valparaíso, VI Libertador General Bernardo O’Higgins,

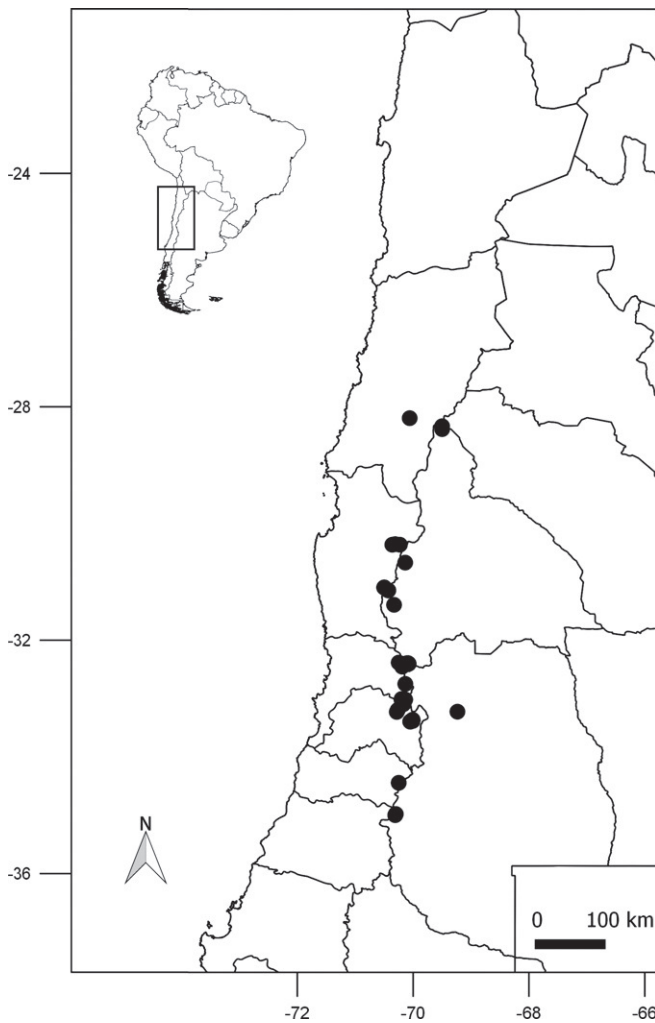


FIG. 4. Geographical distribution of *Laretia acaulis*, endemic to central Chile and western Argentina.

VII Maule, RM Metropolitana de Santiago), frequently in sandy, rocky and stony soils in open, high elevation environments between 1,900–3,600 m (Figs. 1A, 4).

Phenology—Flowers from November to January. Fruits from December to March.

Ecology—*Laretia acaulis*, like other high-elevation cushion plants, can modify microclimatic conditions within and under its canopy, generating less severe microsites than the surrounding environment. Thus, it has been reported as an important nurse plant for other plant species and as a microclimatic shelter for insects in high Andean communities (e.g. Alliende and Hoffmann 1983; Acuña-Rodríguez et al. 2006; Cavieres et al. 2006; Molina-Montenegro et al. 2006). Sandoval et al. (2009) studied the germination and growth of seeds of *Laretia acaulis*. The results showed that low temperatures are needed for seed germination, as seeds without exposure to cold rarely germinated.

Vernacular Names—Llaretia or Yareta (Gillies & Hooker 1830; Gay 1848–1849; Reiche 1899; Hauman 1919; Ruiz Leal 1972; De Mösbach 1992; Barboza et al. 2009), from which derives the generic name *Laretia*. These common names have also been used for other Andean compact cushion-forming species such as *Azorella compacta* Phil., *A. madreporica* Clos and *A. monantha* Clos (Martínez 1989; Wickens 1995).

Chemical Composition and Uses—There are several chemical and ethnobotanical studies in *Laretia*. Extracts of the aerial parts of *L. acaulis* have been investigated for their biological activities and uses in traditional medicine (Alliende and Hoffmann 1983; De Mösbach 1992; Niemeyer 1995; Bórquez et al. 2007; Barboza et al. 2009; Molina-Salinas et al. 2010). It has been shown that *L. acaulis* is a rich source of diterpenoids of yaretan and azorellan type. Measurements of their biological activity have been conducted, and it has been found that they have anti-inflammatory, antiparasitic, spermicidal, analgesic, and anti-hyperglycemic activity (Niemeyer 1995; Bórquez et al. 2007; Molina-Salinas et al. 2010). The roots, stems, and leaves are used to prepare infusions as a traditional remedy for bronchial, urinary, digestive, and diabetic conditions, and as analgesics (De Mösbach 1992; Niemeyer 1995; Barboza et al. 2009). The species is considered Vulnerable in conservation assessments, mainly because of human activities, as it is much collected as a medicinal plant and for lighting fire (Sandoval et al. 2009).

Observations—In the protologue of *Selinum acaule* (= *Laretia acaulis*), Cavanilles cited a figure of the plant (Cav., Icon. Pl. 5: 59–60, t. 487, f. 2. 1799) and an herbarium specimen from “Portu Deseado”. Because there was no designation of a holotype, and there is also an illustration which is part of the original material, there would be no holotype under Art. 9.1 of the ICN (McNeill et al. 2012). We have selected the specimen MA 476255 as lectotype of the species as it is a complete fruiting specimen that agrees well with the protologue in morphology and the indication of Puerto Deseado in a label.

The labels on the type specimen of *Selinum acaule* (= *Laretia acaulis*) indicate “Portu Deseado” as the locality of collection. This locality (Puerto Deseado) is found near sea level close to the Atlantic coast in the province of Santa Cruz in southern Argentina. However all other specimens of the species come from high elevation areas of the Andes in western Argentina and central Chile. Moreover, despite extensive searching, we have not found the species in recent collecting trips to Puerto Deseado and vicinity, a region of flat Patagonian steppe near sea level. Luis Née, the collector of the type specimen, was a member of the crew of the Malaspina Expedition (1789–1794). That expedition explored Puerto Deseado, but also travelled along the Andes from Santiago, Chile to Mendoza, Argentina (Malaspina et al. 1885; Sagredo Baeza and González Leiva 2004), where the species is currently distributed. Errors in labels of herbarium material collected on the Malaspina Expedition are abundant and have been described by several authors (e.g. Merrill 1915; Fernández-Alonso and Ramón Morales 2013; O’Leary et al. 2013). Therefore, it is most likely that the type material of *Laretia acaulis* originates from the Andean region and not from the Atlantic coast as indicated in the type labels.

Additional Specimens Examined—ARGENTINA. Mendoza: Dpto. Las Heras, Las Cuevas, bajada Cristo Redentor a Refugio Militar Lamadrid, 3,300–3,600 m, 10 Jan 1963, Boelcke et al. 9757 (SI, UC); Quebrada de Navarro, al N de Las Cuevas, 3,580 m, Miehle 210/80/5.4 (UC). Dpto. Malargüe, 2–4 km NW of Las Leñas on ski road. Transition zone of Patagonian steppe and altoandine zone, 2,750 m, 7 Feb 1987, Stuessy et al. 10331 (LP, UC). Dpto. San Rafael, Alto Valle del Atuel, en inmediaciones de la mina del Volcán Overo, 2,100 m, 9–17 Jan 1954, Ruiz Leal & Roig 15759 (MERL, UC); Alto Valle del Atuel, margen izquierda del río homónimo, 2,100 m, 4 Jan 1955, Ruiz Leal & Roig 16774 (MERL, UC); Alto Valle del Atuel, entre Sominar y Laguna Atuel, 2,700 m, 6–7 Feb 1955, Ruiz Leal & Roig 16794 (MERL, UC); Valle del Río Atuel, 79 km al O de El Sosneado, próximo a planta de mina de azufre, 26 Jan 1963, Boelcke

et al. 10234* (SI, UC). Dpto. Tunuyán, Valle del Alto Tunuyán, cerca del Co. Palomares, 1 Feb 1934, *Ruiz Leal 3054* (MERL, UC). Dpto. Tupungato, Cordillera, Río Blanco afluente del Tupungato, 2,400 m, 1908, *Hauman-Merck s.n.* (SI 161794); Río Blanco, 3,350 m, *Miehe 60/80/20.1* (UC). San Juan: Dpto. Calingasta: Valle Hermoso, camino a Peñon del Llapel, 3,600 m, 22 Feb 1990, *Kiesling et al. 7598* (SI).

CHILE. no loc., Cordillera, *Cumming 320* (K 000529710). III Región de Atacama: Pcia. Copiapó, Cord. Pulido, vega de los helados, 3,250 m, 25 Nov 2007, *Niemeyer s.n.* (CONC 114931). Pcia. Huasco, Qda. Cantarito, 3,500 m, 9 Oct 2007, *Marticoarena et al. 83465* (CONC); 3,400 m, 14 Oct 2007, *Arroyo 81647* (CONC). IV Región de Coquimbo: Pcia. Limarí, Combarbalá, Potrero Grande, 2,650–2,800 m, 5 Jan 1963, *Jiles 4435**, 4436 y 4560 (SI, CONC); Ovalle, Río Molles, 2,800 m, 29 Dec 1959, *Jiles 2105* (CONC); Qda. Larga, 3,200 m, 1-V-2008, *Jiles 3406* (CONC); Río Molles, 2,700 m, 30-IV-1908, *Jiles 2105* (CONC); 2,000 m, 1 May 2008, *Zöllner 5571* (CONC). Pcia. Choapa, Illapel, La Vega Escondida, 3,5 hs a caballo desde Cuncumen, 2,800–3,000 m, 22 Dec 1938, *Morrison 16949* (SI, UC); Cordillera de Illapel, 3,000 m, 19 Jul 2008, *Jiles 4180* (CONC); Río Cenicero, 3,200 m, 19 Jul 2008, *Jiles 4180* (CONC); Cajón de los Pelambres, Hda. Cuncumen, 2,500 m, 13 Aug 1908, *Looser s.n.* (CONC 150265). V Región de Valparaíso: Pcia. Aconcagua, near Río Blanco, 3,000 m, 28 Feb 1970, *Zöllner 3745* (UC); near Río Blanco on Los Tres Lagos, 3,000 m, 10 Apr 1971, *Zöllner 5025* (UC); in the high cordillera near the Río Colorado, 2,500 m, 2 Jan 1966, *Zöllner 794* (UC); above Río Colorado, 1,200 m, 22 Jan 1902, *Hastings 444* (UC). Pcia. Los Andes, Uspallata-Pass der chilenischen Hochcordillere (33°S Breite), Juncal auf den Bergen, 2,500 m, 30 Jan 1903, *Buchtien s.n.* (SI 045759); Juncal, 3,600 m, 22 Jan 1914, *Sanzin 356* (SI); Potrero Escondido, 2,800 m, 22 Feb 1947, *Boelcke 2486* (UC); Portillo, 2,740–2,800 m, 24 Dec 1993, *Charpin & Lazare 23762* (UC); Portillo, por RN 60, unos kms después de pasar la aduana, aerosilla en caracoles, “Centro de Ski Portillo”, 2,600 m, 9 Dec 2010, *Calviño 759**, 760 y 761 (BCRU); 2,450 m, 22 Nov 2008, *Marticoarena & Matthei 604* (CONC); 2,870 m, 23 Nov 2008, *Ricardi 2856* (CONC); 2,800 m, 23 Nov 2008, *Milner s.n.* (CONC 22352); 23 Nov 2008, *Ricardi 2212* (CONC); Laguna del Inca, 3,100 m, 22 Nov 2008, *Marticoarena & Matthei 589* (CONC); 2,900 m, 22 Nov 2008, *Arroyo 81253* (CONC); 2,870 m, 23 Nov 2008, *Weldt 248* (CONC); Tres Lagunas, Río Blanco, 3,000 m, Apr 1971, *Zöllner 5025* (CONC); Los Ojos de Agua, 1832, *Bridges 251* (K 000529712). VI Región del Libertador General Bernardo O’Higgins: Pcia. Colchagua, Vegas del Flaco, Alto de las Cabras, 2,870 m, 17 Jun 2009, *Ricardi 3218* (CONC); Hacienda de Cauquenes, La Chapa, 1875, *Dessauer s.n.* (M 0172614). VII Región del Maule: Pcia. Curicó, Camino a Paso Vergara, km 2, 2,550 m, 10 Aug 1909, *Marticoarena & Matthei 944* (CONC); Paso Vergara, 2,500 m, 12 Aug 1909, *Marticoarena & Matthei 1043* (CONC); in Andibus Chilensibus, ad vallem del Fray Carlos, prope radices montium ignivomarum Peteroa, et Penquenes, 3,000–3,400 m, *Gillies s.n.* (K 000529711). Región Metropolitana de Santiago: Pcia. Santiago, Santuario de la Naturaleza Yerba Loca, sector vegas de las vacas, 2,600 m, 3 Feb 1999, *Arroyo & Humaña 991220** (CONC); encima del Río San Francisco a 6 km al S de Pérez Caldera, 1,900 m, 12 Feb 1954, *Constance 3504* (CONC, UC); 2,700 m, 24 Jan 1909, *Constance 3500* (CONC, UC); 2,900 m, 24 Jan 1909, *Sparre 10621* (CONC); 2,600 m, 25 Jan 1909, *Marticoarena & Matthei 655* (CONC); Fierro Carrera, 2,800 m, 23 Jan 1909, *Montero 1026* (CONC); 24 Jan 1909, *Looser s.n.* (CONC 150953); 3,000 m, Feb 1925, *Werdermann 646* (E, SI, UC); La Parva, 2,800 m, 1 Feb 2009, *Stuessy & Ruiz 12736* (CONC); 0,5–1 km al E de La Parva, 1 Feb 2009, *Stuessy et al. 11130* (CONC); La Parva, al E de los andariveles, 3,150 m, 27 Apr 1978, *Mahu 11692* (UC); 3,240 m, 27 Apr 1978, *Mahu 11693*, 11695 (UC); Laguna del Morado, 2,400 m, 28 Feb 2009, *Grandjot s.n.* (CONC 114839); Lo Valdés a la Yesera, 2,450 m, 2 Mar 2009, *Ricardi et al. 862* (CONC); Cajón de Morales, 2,000 m, 3 Mar 2009, *Ricardi et al. 862* (CONC); Cerro El Roble, 2,220 m, 28 Jan 1973, *Weisser 9277* (UC). Pcia. Cordillera, estación de sky El Colorado, 2,800 m, 11 Dec 2001, *Aedo 7095** (CONC).

Excluded Names—

Laretia compacta (Phil.) Reiche. *Anales Univ. Chile* 104: 784. 1899. *Azorella compacta* Phil. *Anales Mus. Nac. Santiago de Chile Botánica* 8: 28. 1891.—TYPE: CHILE. II Región de Antofagasta, Prov. El Loa: Copacoya-Inacaliri. Feb 1885, *F. Philippi 2011* (lectotype, designated here: SGO 041536 barcode SGO000003647!) [= *Azorella compacta* Phil.].

Observations—*Azorella compacta* is part of a well supported clade that includes *Laretia acaulis* and other *Azorella* species in plastid DNA phylogenies (Andersson et al. 2006; Nicolas & Plunkett 2009, 2012). These results question the limits of

Azorella/Laretia that need to be further evaluated in the light of comparative morphological data (presented herein and in Calviño et al. 2016; Fernández et al. 2016) in conjunction with additional phylogenetic studies based on both chloroplast and nuclear data. Until we gather additional phylogenetic data, we maintain the *status quo* (Mathias and Constance 1962; Martínez 1989, 2008) that *Laretia compacta* belongs to the genus *Azorella* because it lacks wings in the fruits.

The name *Laretia compacta* is cited as *L. compacta* Reiche (1899) in IPNI and in Mathias and Constance (1962), however, the analysis of the protologue makes it clear that the name is based on *Azorella compacta* Phil., and therefore the correct citation is *Laretia compacta* (Phil.) Reiche.

Laretia yareta (Hauman) Mathias & Constance, *Univ. California Publ. Bot.* 29: 215. 1957. *Azorella yareta* Hauman, *Physis* 4: 485. 1919.—TYPE: ARGENTINA. Catamarca, Dpto. Andalgalá: *Jørgensen 1590* (lectotype, designated here: BA 1375!) [= *Azorella compacta* Phil.].

Observations—Rodríguez (1957), in a footnote, indicates a new combination “*Laretia yareta* (Hauman) Mathias & Constance, comb. nov. *Azorella yareta* Hauman, *Physis*, 4: 485. 1919”. Article 46.5 of the ICN (McNeill et al. 2012) states that “A new combination [...] is attributed to the author(s) of the publication in which it appears, although it was ascribed to a different author or different authors, when no separate statement was made that one or more of those authors contributed in some way to that publication”. In the acknowledgments on *Myrrhidendron* and other woody *Umbellales*, Rodríguez (1957) thanks Constance for guidance and inspiration throughout the course of the investigation. This “separate statement” certainly indicates that Constance contributed to the publication, so the standard (e.g. in IPNI) attribution of the combination to “Mathias & Constance” is here considered correct.

ACKNOWLEDGMENTS. The authors thank the curators of herbaria cited in the text for loans or access to specimens. We thank Ailén Santomé for illustrations, Susana Martínez, Andrea Romero and John McNeill for useful discussions on the nomenclature of *Laretia yareta*, and two anonymous reviewers for helpful comments on the manuscript. We also acknowledge financial support from Universidad Nacional del Comahue PIN B180, CONICET PIP 112-201301-00357, and ANPCyT-FONCyT PICT 2011-1036, and from CONICET for a Doctoral fellowship to MF.

LITERATURE CITED

- Acuña-Rodríguez, I. S., L. A. Cavieres, and E. Gianoli. 2006. Nurse effect in seedling establishment: facilitation and tolerance to damage in the Andes of central Chile. *Revista Chilena de Historia Natural* 79: 329–336.
- Alliende, M. C. and A. J. Hoffmann. 1983. *Laretia acaulis*, a cushion plant of the Andes: ethnobotanical aspects and the impact of its harvesting. *Mountain Research and Development* 3: 45–51.
- Andersson, L., M. Kocsis, and R. Eriksson. 2006. Relationships of the genus *Azorella* (Apiaceae) and other hydrocotyloids inferred from sequence variation in three plastid markers. *Taxon* 55: 270–280.
- Baillon, H. E. 1880. Ombellifères. Pp. 84–256 in *Histoire Naturelle des plantes* vol. 7, ed. H. E. Baillon. Paris: Librairie Hachette.
- Barboza, G. E., J. J. Cantero, C. Nuñez, A. Pacciaroni, and L. Ariza Espinar. 2009. Medicinal plants: A general review and a phytochemical and ethnopharmacological screening of the native Argentine Flora. *Kurtziana* 34: 7–365.
- Bórquez, J., L. A. Loyola, G. Morales, A. San-Martín, R. Roldán, N. Marquéz, and E. Muñoz. 2007. Azorellane diterpenoids from *Laretia acaulis* inhibit nuclear factor-kappa B activity. *Phytotherapy Research* 21: 1082–1086.
- Brummitt, R. K. and C. E. Powell. 1992. Authors of plant names: A list of authors of scientific names of plants, with recommended standard forms of their names, including abbreviations. Kew: Royal Botanic Gardens.

- Calviño, C. I., M. Fernández, and S. Martínez. 2016. El género *Azorella* (Azorelloideae, Apiaceae) extra Argentina. *Darwiniana* 4 (in press).
- Cavanilles, A. J. 1799. *Selinum*. Pp. 58–60 in *Icones et descriptiones plantarum* vol. 5, ed. A. J. Cavanilles. Madrid: Typographia regia.
- Cavieres, L. A., E. I. Badano, A. Sierra-Almeida, S. Gómez-González, and M. A. Molina-Montenegro. 2006. Positive interactions between alpine plant species and the nurse cushion plant *Laretia acaulis* do not increase with elevation in the Andes of central Chile. *The New Phytologist* 169: 59–69.
- Constance, L. 1984. Apiaceae. Pp. 21–5 in *Los géneros de fanerógamas de Argentina, claves para su identificación*, ed. A. T. Hunziker. Córdoba: Sociedad Argentina de Botánica.
- De Mósbach, E. W. 1992. *Botánica indígena de Chile*. Ed. 1. Santiago de Chile: Andres Bello.
- Fernández-Alonso, J. L. and R. Ramón Morales. 2013. Las labiadas de la expedición Malaspina (1789–1794). I. *Botánica Complutensis* 37: 153–169.
- Fernández, M., C. Ezcurra, and C. I. Calviño. 2016. Revisión taxonómica del género sudamericano *Mulinum* (Azorelloideae, Apiaceae). *Anales del Jardín Botánico de Madrid* 73 (in press).
- Gay, C. 1848–1849. Umbelíferas. Pp. 61–145 in *Historia Física y Política de Chile, Botánica* vol. 3, ed. C. Gay. Santiago de Chile: Museo de Historia Natural de Santiago.
- Gillies, J. and W. J. Hooker. 1830. On the plants of the natural order Umbelliferae. Pp. 323–335 in *Botanical Miscellany* vol. 1, ed. W. J. Hooker. London: John Murray.
- Hauman, L. 1919. Notes sur les espèces argentines des genres “*Azorella*” et “*Bolax*”. *Physis (Rio de Janeiro, Brazil)* 4: 468–500.
- Liu, M., B.-E. Van Wyk, P. M. Tilney, G. M. Plunkett, and P. P. Lowry. 2009. Evidence from fruit structure supports in general the circumscription of Apiaceae subfamily Azorelloideae. *Plant Systematics and Evolution* 280: 1–13.
- Liu, M., G. M. Plunkett, B.-E. Van Wyk, P. M. Tilney, and P. P. Lowry. 2012. The phylogenetic significance of the carpophore in Apiaceae. *Annals of Botany* 110: 1531–1543.
- Kljuykov, E. V., M. Liu, T. A. Ostroumova, M. G. Pimenov, P. M. Tilney, and B.-E. Van Wyk. 2004. Towards a standardised terminology for taxonomically important morphological characters in the Umbelliferae. *South African Journal of Botany* 70: 488–496.
- Malaspina, A., J. Bustamante y Guerra, and P. Novo y Colson. 1885. Viaje político-científico alrededor del mundo por las corbetas Descubierta y Atrevida al mando de los capitanes de navío D. Alejandro Malaspina y Don José de Bustamante y Guerra, desde 1789 a 1794. Madrid: Imprenta de la Viuda é Hijos de Abienzo.
- Martínez, S. 1989. El género *Azorella* (Apiaceae-Hydrocotoyloideae) en la Argentina. *Darwiniana* 29: 139–178.
- Martínez, S. 1995. Caracteres foliares xeromorfos en *Azorella* (Apiaceae). *Boletín de la Sociedad Argentina de Botánica* 30: 167–181.
- Martínez, S. 2003. Umbelliferae. Pp. 214–234 in *Flora de San Juan* vol. 2, ed. R. Kiesling. Buenos Aires: Estudio Sigma.
- Martínez, S. 2008. Apiaceae. Pp. 1056–1090 in *Catálogo de las Plantas Vasculares del Cono Sur* vol. 2, eds. F. O. Zuloaga, O. Morrone, and M. J. Belgrano. St. Louis: Missouri Botanical Garden Press.
- Mathias, M. E. and L. Constance. 1962. Umbelliferae. Pp. 3–97 in *Flora de Perú* vol. 13, ed. J. F. Macbride. Chicago: Chicago Natural History Museum Press.
- McNeill, J., F. R. Barrie, W. R. Buck, V. Demoulin, W. Greuter, D. L. Hawksworth, P. S. Herendeen, S. Kanpp, K. Marhold, J. Prado, W. F. Prud'homme van Reine, G. F. Smith, J. H. Wiersema, and N. J. Turland. 2012. International Code of Nomenclature for algae, fungi and plants (Melbourne Code). *Regnum Vegetabile* 154. Königstein: Koeltz Scientific Books.
- Merrill, E. D. 1915. Genera and species erroneously credited to the Philippine flora. *Philippine Journal of Science* 10: 171–194.
- Molina-Montenegro, M. A., E. I. Badano, and L. A. Cavieres. 2006. Cushion plants as microclimatic shelters for two ladybird beetles species in alpine zone of Central Chile. *Arctic, Antarctic, and Alpine Research* 38: 224–227.
- Molina-Salinas, G. M., J. Bórquez, A. Ardiles, S. Said-Fernández, L. A. Loyola, A. San Martín, I. González-Collado, and L. M. Peña-Rodríguez. 2010. Antituberculosis activity of natural and semi-synthetic azorellane and mulinane diterpenoids. *Fitoterapia* 81: 50–54.
- Nicolas, A. N. and G. M. Plunkett. 2009. The demise of subfamily Hydrocotoyloideae (Apiaceae) and the re-alignment of its genera across the entire order Apiales. *Molecular Phylogenetics and Evolution* 53: 134–151.
- Nicolas, A. N. and G. M. Plunkett. 2012. Untangling generic limits in *Azorella*, *Laretia*, and *Mulinum* (Apiaceae: Azorelloideae): Insights from phylogenetics and biogeography. *Taxon* 61: 826–840.
- Niemeyer, H. M. 1995. Biologically active compounds from Chilean medicinal plants. Pp. 137–159 in *Phytochemistry of medicinal plants* vol. 29, eds. J. T. Arnason, R. Matta, and J. T. Romeo. New York: Plenum Press.
- O’Leary, N., P. Peralta, and M. E. Múlgura. 2013. Nomenclatural and taxonomical novelties in southamerican *Glandularia* (Verbenaceae). *Phytotaxa* 139: 63–64.
- Person, C. H. 1805. *Mulinum*. Pp. 309 in *Synopsis Plantarum, seu enchiridium botanicum* vol. 1, ed. C. H. Cramer. Paris: Parisiis Lutetiorum.
- QGIS Development Team. 2012. Quantum GIS Geographic Information System. Open Source Geospatial Foundation Project, v. 2.10 Pisa. Available online at: <http://qgis.org>.
- Rahn, A. 1960. Chromosome numbers in some South American angiosperms. *Botanisk Tidsskrift* 56: 117–127.
- Reiche, K. 1899. Umbelíferas. Pp. 767–842 in *Anales de la Universidad de Chile* vol. 104, ed. K. Reiche. Santiago de Chile: Editorial Universitaria.
- Rodríguez, R. L. 1957. Systematic anatomical studies on *Myrrhidendron* and other woody Umbellales. *University of California Publications in Botany* 29: 145–318.
- Ruiz Leal, A. 1972. *Deserta*. Ed. 3. Mendoza: IADIZA.
- Sagredo Baeza, R. and J. I. González Leiva. 2004. *La Expedición Malaspina en la frontera austral del imperio español*. Ed. 1. Santiago de Chile: Editorial Universitaria.
- Sandoval, A. C., S. I. Silva, M. Rosas, M. Acosta, and P. León-Lobos. 2009. Germinación y crecimiento de *Laretia acaulis* (Apiaceae), un recurso genético de la cordillera de los andes de Chile Central. *VII Simposio de Recursos Genéticos para América Latina y El Caribe, Chile* 1: 177–178.
- Systematics Association Committee for Descriptive Biological Terminology. 1962. II. Terminology of simple symmetrical plane shapes (Chart 1). *Taxon* 11: 145–156.
- Thiers, B. 2016 [continuously updated]. Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden’s Virtual Herbarium. <http://sweetgum.nybg.org/science/ih/> (accessed 2 October 2015).
- Tseng, C. C. 1967. Anatomical studies of flower and fruit in the Hydrocotoyloideae (Umbelliferae). *University of California Publications in Botany* 42: 1–59.
- Weddell, H. A. 1857. Umbelliferae. Pp. 186–206 in *Chloris Andina. Essai d’une flore de la région alpine des Cordillères de l’Amérique du Sud*, vol. 2, ed. H. A. Weddell. Paris: Bertrand.
- Wickens, G. E. 1995. *Llaretia (Azorella compacta, Umbelliferae): a review*. *Economic Botany* 49: 207–212.