



## ***Weberbauerella chilensis* (Fabaceae: Papilionoideae), a new species from the Atacama Desert, Chile**

PATRICIO SALDIVIA<sup>1</sup> & LUIS FAÚNDEZ<sup>1,2</sup>

<sup>1</sup> Biota, Gestión y Consultorías Ambientales Ltda. Av. Miguel Claro 1224, Providencia, Santiago, Chile.

<sup>2</sup> Laboratorio de Morfología y Taxonomía Vegetal, Facultad de Ciencias Agronómicas, Universidad de Chile. Av. Santa Rosa 11315, Casilla 1004, La Pintana, Santiago Chile.

E-mail: [psaldivia@biota.cl](mailto:psaldivia@biota.cl), [lfaundez@biota.cl](mailto:lfaundez@biota.cl).

### **Abstract**

A new legume species, *Weberbauerella chilensis*, from the Andean foothills in the Tarapacá region in Chile, is described and illustrated. This species represents the first record of the genus in Chile and the Southern Cone of South America and is the third species described for the genus. *Weberbauerella chilensis* resembles *W. brongnartioides* from Peru, but differs primarily in its smaller size, fewer leaflets and habitat conditions.

**Key words:** Chile, Tarapacá, Perú, new taxon, *Weberbauerella*, Atacama Desert

### **Introduction**

During several field flora studies in the Andean foothills of northern Chile, a Fabaceae-Papilionoideae species was collected that did not belong to any genus known to occur in Chile (Muñoz-Pizarro 1966, Marticorena & Quezada 1985, Marticorena 1990) nor to any other known genus in the Southern Cone of South America (Zuloaga *et al.* 2008a, b). Instead, the morphological features of these specimens indicate that it is a member of the Peruvian genus *Weberbauerella* Ulbrich (1906: 551).

The genus *Weberbauerella* was erected with *Weberbauerella brongnartioides* Ulbrich (1906: 551), based on specimens that Weberbauer collected in 1902 in areas associated with the Lomas formation (oasis de neblina in Chile) on the southern Peruvian coast near Mollendo. *Weberbauerella raimondiana* Ferreyra (1951: 2), was the second species described within the genus. This species is also associated with the Lomas formation and is found near Chala on the Peruvian coast. This genus, characterized by the presence of pustular glands on stems, leaves and flowers, one or few tubers and subshrub or herbaceous habit, has been considered, until now, to be the only Fabaceae genus that is endemic to Peru and its only two known species are considered endangered (Baldeón *et al.* 2006). *Weberbauerella* has been treated within the subtribe Poiretiinae (tribe Aeschynomeneae), together with genera *Amicia* Kunth, *Poiretia* Vent. and *Zornia* J.F.Gmel. (Rudd 1981). However, currently, and based on molecular analysis of the "dalbergioid legumes", these genera form a monophyletic group within the clade *Adesmia*, phylogenetically separated from *Weberbauerella* (Lavin *et al.* 2001), which is considered an isolated genus within the *Dalbergia* clade of the tribe Dalbergieae *s.l.* (Klitgaard & Lavin 2005).

Although the *Weberbauerella* specimens collected in Chile perfectly align with Ulbrich's (1906) description of the genus, their morphological, geographical, and environmental differences from the two known species of *Weberbauerella* are substantial enough to recognize a third, presently undescribed species of this genus.

## Taxonomy

### *Weberbauerella chilensis* Faúndez & Saldivia, sp. nov. (Fig. 1–2)

*Haec species W. brogniartioides similis, sed differ per suam minoris formae (10–15 non 25–30 cm), prostratus non erecti habitus; paria foliolis minus (7–12 non 17–20); forma foliolis (linearibus-ellipticis, non ovalibus) et apicem mucronatus, non truncatus vel emarginatus.*

**Type:**—CHILE. Tarapacá: Comuna de Pica, Camino a Salar del Huasco, 3600 m, 31 March 2008, L. Faúndez & B. Larrain s.n. (holotype SGO 162972!, isotypes SGO 162973!, CONC 177641!).

Herbaceous perennial, ephemeral. Tubers deep underground, one or several, spherical or oval, blackish brown, 2–4 × 2–4 cm. Plant prostrate, notably branched from the base, 10–15 cm high, 30 cm in diameter; branches zigzag, up to 15 cm long, smooth, densely sericeous-pubescent, with scattered dark glands, internodes 15–20 mm long in mature branches. Leaves imparipinnate; stipules caducous, linear-lanceolate, 4–5 mm long, 0.7 wide at the base, white-hairy with hairs to 1 mm long, abaxial side also covered with scattered dark pustular glands; petioles 0.5–1 cm long, base and adaxial side densely covered with up to 0.5 mm long white hairs; leaflets 7–12 pairs, terminal leaflet caducous, 1–1.7 cm long, 5–7 mm wide, linear-elliptic, base obtuse, margin entire, apex acute, shortly mucronate, glandular, adaxial surface eglandular, pubescent, abaxial surface with sparse pubescence, numerous flat to depressed glands, 0.5 mm long whitish hairs. Inflorescence a raceme, 2–5-flowered; rachis 2–3 cm long. Flowers zygomorphic, papilionoid, 13–18 mm long; pedicel 5–10 mm long. Calyx strongly bilabiate, glandular, pubescent with trichomes short, antrorse, whitish; upper lip bilobed, lobes 4 × 3.5 mm, oblong, apex rounded; lower lip three-lobed, lobes 5 × 1.5 mm, linear-lanceolate, apex of lateral lobes acuminate, apex of central lobe acute to obtuse. Standard petal, 15 × 15 mm, base unguiculate, yellow-green, intermediate zone purplish, margin whitish, nerves dichotomously branching toward the margin or occasionally anastomosing, pustular glands slightly convex, brownish, concentrated and larger towards the base; wing petals, 10 × 8 mm, slightly obovate, base auriculate, unguiculate, apex obtuse, white-purple, internerves with grooves on the lower half, pustular glands few and scattered; keel 16 × 8 mm, claw 2 mm long, base strongly auriculate, auricle 1.5 mm long, slightly unguiculate, inner margin irregularly notched, apex obtuse, whitish, the outer face with numerous prominent glands. Stamens 10, filaments united in basal half, 16–18 mm long, 15 mm wide, glabrous; anthers 1.3 mm long. Gynoecium 20 mm long, base stipitate, ovary moniliform, slightly arched upwards, 11 × 0.7 mm at the seminal portion, 0.3 mm wide between the ovules, 4–6 septate, margin hairy, seminal portion glandular, style 9 mm long, cylindrical, glabrous, stigma punctiform. Legume shortly pedunculate, 15–16 mm long not including the remains of the style, articles 4–6 (2–3 with complete development and the remaining underdeveloped), 4–6 × 4 mm, circular to elliptic, margin slightly hairy, conspicuously dotted-glandular; seeds one per article, 3 × 2.2 mm, reniform, laterally flattened, black, glabrous, glossy.

**Habitat and distribution:**—*Weberbauerella chilensis* is found in the Atacama Desert in the Tarapacá region on a narrow altitudinal strip in the upper boundaries of absolute desert. This species grows on sandy soils between 2500 to 3600 meters altitude. It only appears above ground after precipitation, which is infrequent and irregular. *Weberbauerella chilensis* grows in open habitats that include other annual or geophyte ephemeral herbaceous species such as *Metharme lanata* Phil. (Zygophyllaceae), *Nolana tarapacana* (Phil.) I.M. Johnst. (Nolanaceae), and *Tiquilia grandiflora* (Phil.) A.T. Richardson (Boraginaceae).

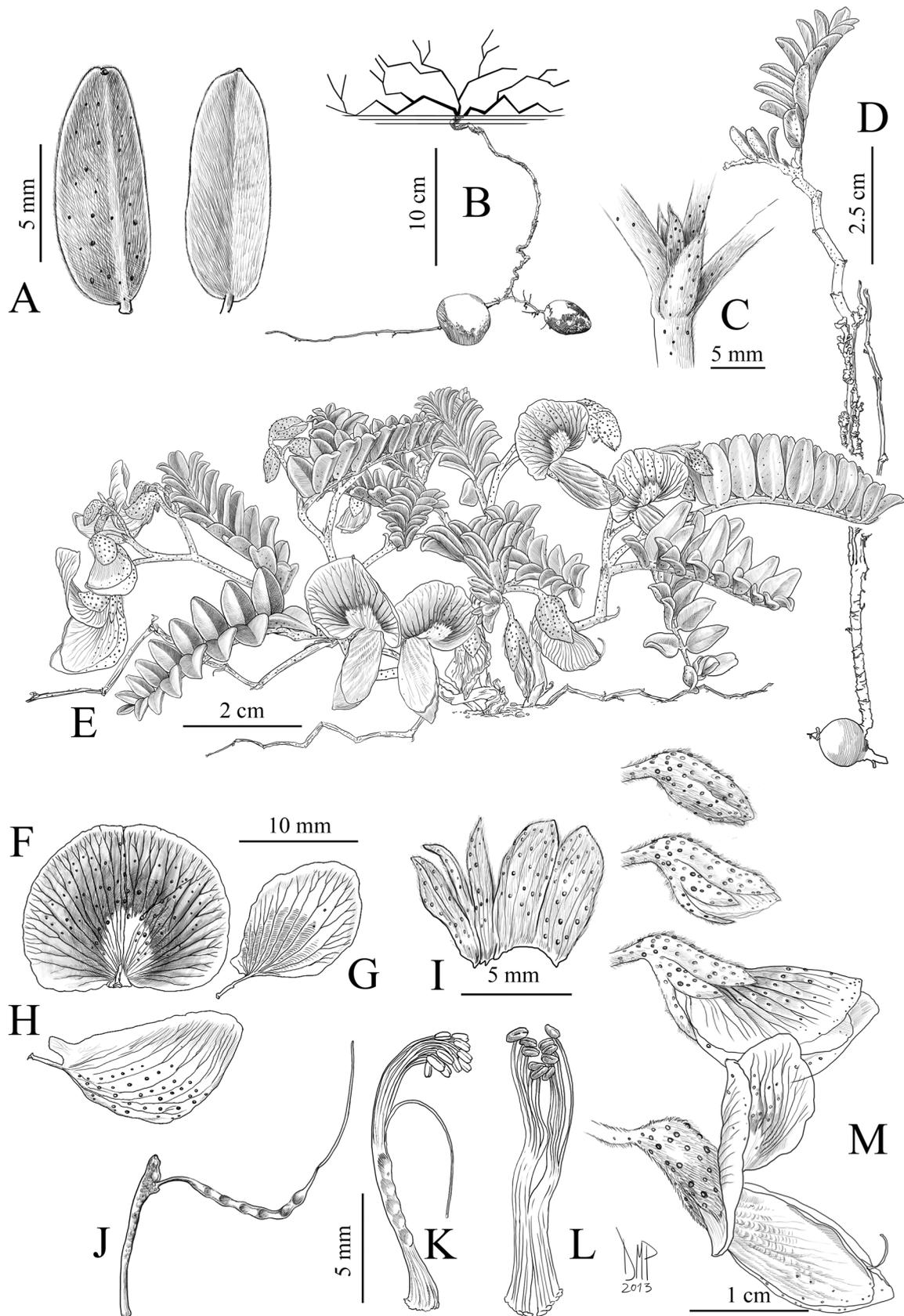
**Etymology:**—The specific epithet refers to Chile, where *W. chilensis* is found.

**Phenology:**—Flowering from September to March.

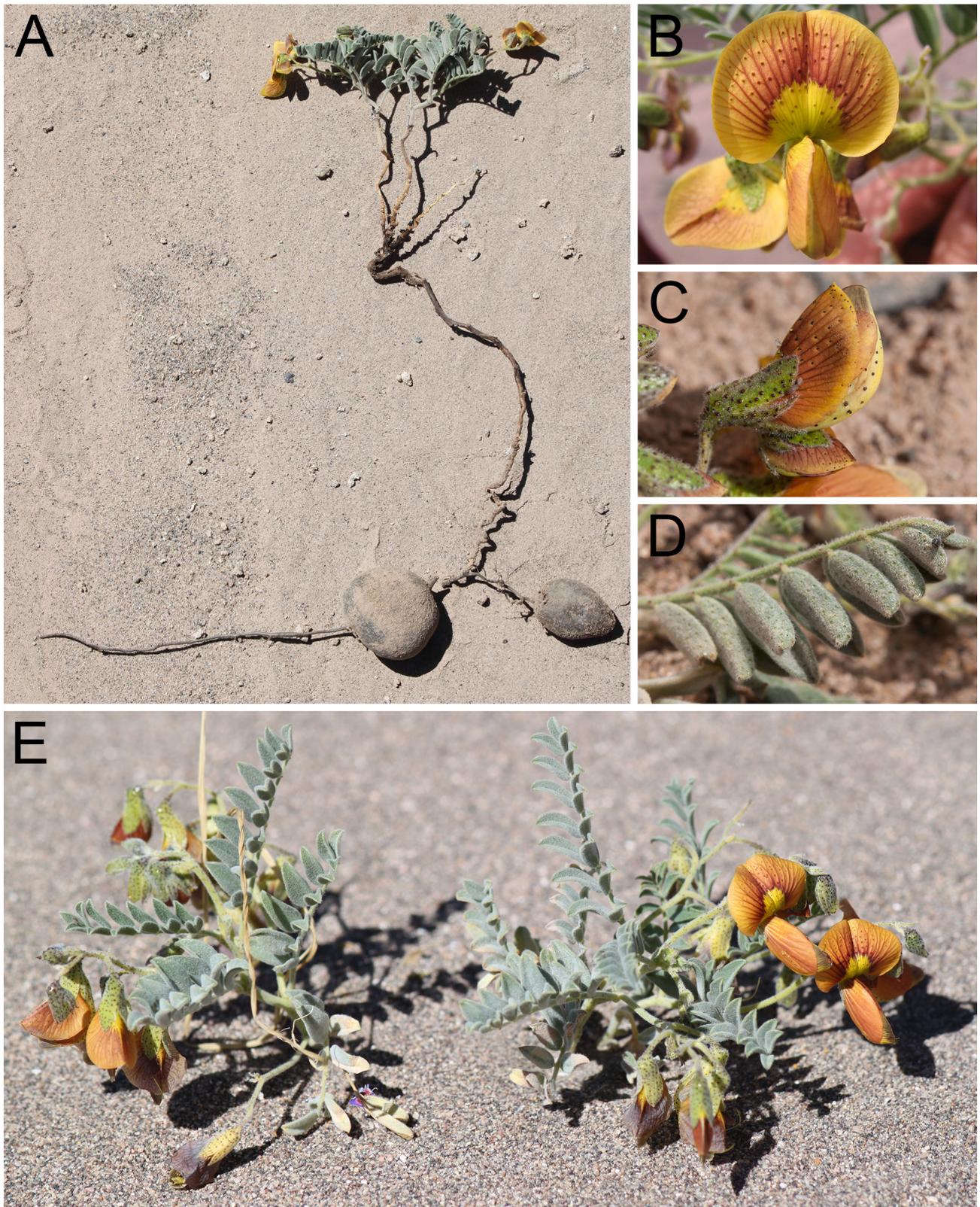
**Conservation Status:**—*W. chilensis* can be considered as Endangered (EN) under the IUCN (2012) categories and criteria B1ab(iii), since it is known only from a few locations and has a small area of occupancy, and because habitat loss is a latent threat, mainly from mining expansion.

**Additional specimen examined (paratype):**—CHILE. Tarapacá: Comuna de Pica, Quebrada Choja, 2440 m, 8 September 2012, L. Faúndez, F. Larrain & M. Escobar s.n. (SGO 163429!, CONC 177642!).

**Additional specimens examined (related taxa):**—*W. brogniartioides*: PERU. Mollendo: solo arenoso parce plantis compto ad marginem inferiorem formationis, quae "Loma" dicitur in altitude 100–200 m, 4 October 1902, A. Weberbauer 1513 (holotype B!, isotype F!). *W. raimondiana*: PERU. Arequipa: near Chala, province of Camaná, 300–400 m, 14 November 1949, R. Ferreyra 6498 (holotype US!, isotype US!).



**FIGURE 1.** *Weberbauerella chilensis*. A. Leaflet, adaxial and abaxial surface. B. Habit with detail of the tubers. C. Stipules. D. Young plant. E. Habit. F. Standard petal. G. Wing petal. H. Keel petal. I. Calyx. J. Gynoecium. K. Gynoecium with androecium in lateral view. L. Androecium. M. Floral development. A, C, E–M from *Faúndez & Larrain s.n.* (holotype SGO); B, D from *Faúndez, Larrain & Escobar s.n.* (paratype CONC). Illustrations by Daniel Martínez Piña.



**FIGURE 2.** *Weberbauerella chilensis*. A. Complete specimen. B. Corolla, frontal view. C. Flower, lateral view. D. Leaf. E. Habit. Photographs by Luis Faúndez (A, E), Bárbara Larraín (B) and Pablo Sandoval (C, D).

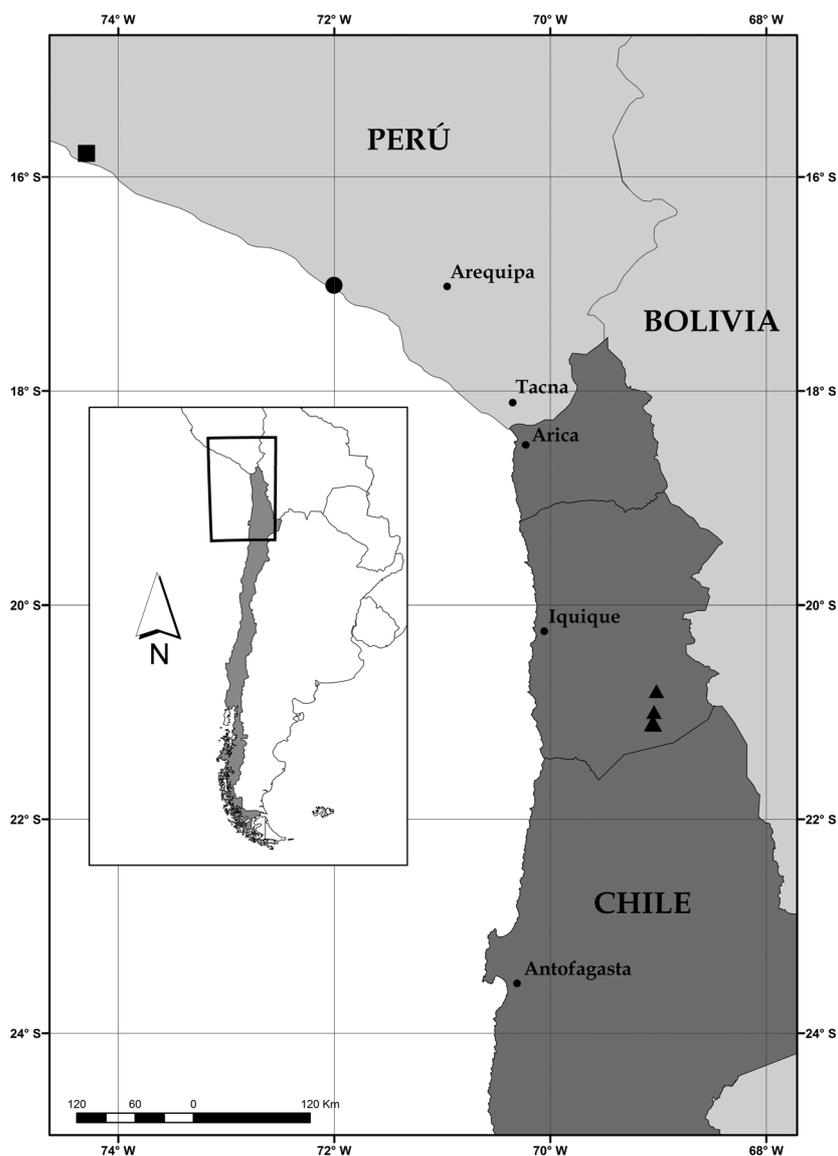
**Discussion:**—The diagnostic characters of the genus *Weberbauerella* are mainly the presence of one or more deep tubers, stems, leaves and flowers densely covered with pustular glands, and imparipinnate leaves (Ulbrich 1906) with more than 40 leaflets (Lavin *et al.* 2001). The number of leaflets is not a morphological character mentioned in the protologue of the genus, however it is one of the diagnostic characters established here for *W.*

*chilensis*, since this taxon has a lower number of leaflets (14–24) than the other species. Table 1 shows this and the other most important diagnostic morphological characters for the three species of *Weberbauerella*.

**TABLE 1.** Differences between *W. chilensis*, *W. brongniartoides* and *W. raimondiana*.

Characters	<i>W. chilensis</i>	<i>W. brongniartoides</i>	<i>W. raimondiana</i>
Size	10–15 cm	25–30 cm	22–35 cm
Habit	Herbaceous, prostrate	Subshrub, erect	Subshrub, erect
Florets per inflorescence	2–5	5–8	6–8
Pairs of leaflets per leaf	7–12	17–20	22–32
Leaflet apex	Acute, shortly mucronate, glandular	Obtuse, truncate or emarginate, glandular	Obtuse, rarely acute and mucronate, glandular
Leaflet size	10–17 × 5–7 mm	6–20 × 3–14 mm	2–7.5 × 1.6–4 mm
Leaflet shape	Linear-elliptic	Ovate	Ovate-elliptic
Elevation	2.500–3.600 m	20–300 m*	300–400 m*

\*: Baldeón *et al.* (2006).



**FIGURE 3.** Distribution map of the genus *Weberbauerella*. Square: type locality of *W. raimondiana*. Circle: type locality of *W. brongniartoides*. Triangles: Know localities of *W. chilensis*.

Figure 3 shows that the known populations of *W. chilensis* are located ca. 600 km from its two congeneric species, which are only known from the area close to their type localities. In addition, there are large environmental differences between the species. *Weberbauerella brongniartioides* and *W. raimondiana* are endemics restricted to Lomas formations below 400 m at the arid desert coast (León *et al.* 1996) in southern Perú (Baldeon *et al.* 2006). These two species are located phytogeographically within the Arequipeño sector (Galan de Mera *et al.* 1997) and have a marked dependence on ENSO events (El Niño-Southern Oscillation) for their proper development. In contrast, *W. chilensis* is a pre-Andean desert element in habitats under a strong influence of ‘La Niña’ events, which is an inverse climatic phenomenon.

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