

Taxonomic Novelties in *Astragalus* (Leguminosae) for South America

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ABSTRACT. A new species in *Astragalus*, endemic for Peru, is described for Leguminosae, Galegeae. *Astragalus sagasteguii* may be compared with the related *A. dillinghami* Macbride in Peru and *A. diminutivus* (Philippi) Gómez-Sosa in Bolivia and Argentina. The new combination *Astragalus diminutivus* is made, transferring the species from the genus *Phaca*. In addition, *Astragalus diminutivus* I. M. Johnston newly synonymizes to *A. diminutivus*. Further, *Astragalus dielsii* Macbride is recognized as a variety to *A. diminutivus*. The geographical distribution of *Astragalus diminutivus* var. *dielsii* extends from Peru into Bolivia and Argentina. Morphological description and comparison, illustration, as well as habitat and geographical distribution are provided.

RESUMEN. Una nueva especie de *Astragalus*, endémica del Perú, es descripta para Leguminosae, Galegeae. *Astragalus sagasteguii*, puede ser comparada con *A. dillinghami* Macbride, en Perú, y *A. diminutivus* (Philippi) Gómez-Sosa en Bolivia y Argentina. Además *A. dielsii* Macbride es transferida como una variedad de *A. diminutivus*. La distribución geográfica de *Astragalus diminutivus* var. *dielsii* se extiende desde Perú a Bolivia y Argentina. Se incluyen descripciones, tabla de relaciones, ilustraciones, datos sobre hábitat y distribución geográfica.

Key words: Argentina, *Astragalus*, Bolivia, Chile, Galegeae, Leguminosae, Peru.

The genus *Astragalus* L. includes ca. 2500 species (Podlech, 1986) with a worldwide distribution, except for Australia and New Zealand. There are about 110 species endemic to South America; they are found in Ecuador, Peru, Bolivia, Chile, Argentina, and Uruguay (Gómez-Sosa, 1979; Daviña & Gómez-Sosa, 1993). There is only one species of the genus, *A. distinens* Macloskie, known from Uruguay (Gómez-Sosa, 2003).

There is a group of South American *Astragalus* species of tiny, matted or tufted herbs. In many instances, these taxa have unknown fruit or have

been incompletely collected; consequently, it is difficult to delimit species. Inside this group are the taxa currently presented in this manuscript.

Among *Astragalus* specimens received as a gift for determination from the New York Botanical Garden, the following new species from Peru was found.

1. *Astragalus sagasteguii* Gómez-Sosa, sp. nov.

TYPE: Peru. Cajabamba, Cajamarca, jalca, 3800 m, 17 Nov. 1983, *A. Sagástegui Alba et al. 11181* (holotype, SI; isotypes, F, MO, NY). Figure 1.

Habitus prostratus-pulvinatus, pubescens; stipulis amplexicaulibus, pubescentibus; foliola 15 ad 17, elliptico-cuneata, apice retuso; 1(ad 2) flores parvi, calyx 4 mm; vexillum ultra unguem obovatum 7–8 mm longum; legumen 0.3×0.2 cm, subglobosum, subbiloculare, cum margine dorsale inflexo 1 mm lato et cum margine membranaceo inconspicuo 0.5 mm lato solum basi; semina 1 ad 2, reniformia.

Depressed-pulvinate herb, 4–16 cm diam., acaulescent, the stoutly branched caudex 4–8 cm, stipules amplexicaul, membranous, densely sericeous-villous. Leaves to 1.4 cm long; leaflets 15 to 17, opposite, decrescent distally, folded, in outline elliptic-cuneate, retuse, subsessile, $2.5\text{--}3 \times (1\text{--})1.5$ mm, cinereous-villous trichomes 0.5–1 mm long. Bracts subulate 2.5×1 mm; bracteoles 2×0.5 mm, pubescent, ciliate; flowers purple 1(to 2), subsessile, 8–9 mm long; calyx 4 mm, villous, tube 2 mm long, teeth subulate, 2 mm; banner 8×6 mm, obovate; wings 5×1.5 mm, the claws included; keel 4 mm; ovary substipitate, scattered pilose, style glabrous, incurved at apex, the stigma capitate; ovules 2. Legume evanescent, subglobose, 0.3×0.2 cm, truncate at base, apex rounded, valves membranaceous, inflexed below middle of pod, with an incipient septum to 0.5 mm only at base, obsolete in the apical half of the dorsal suture, commonly concealed by petals, bract, and mature stipule; seed 1 or 2, reniform, brown, generally mottled.

Etymology. This species is dedicated to the type collector, Abundio Sagástegui Alba, professor

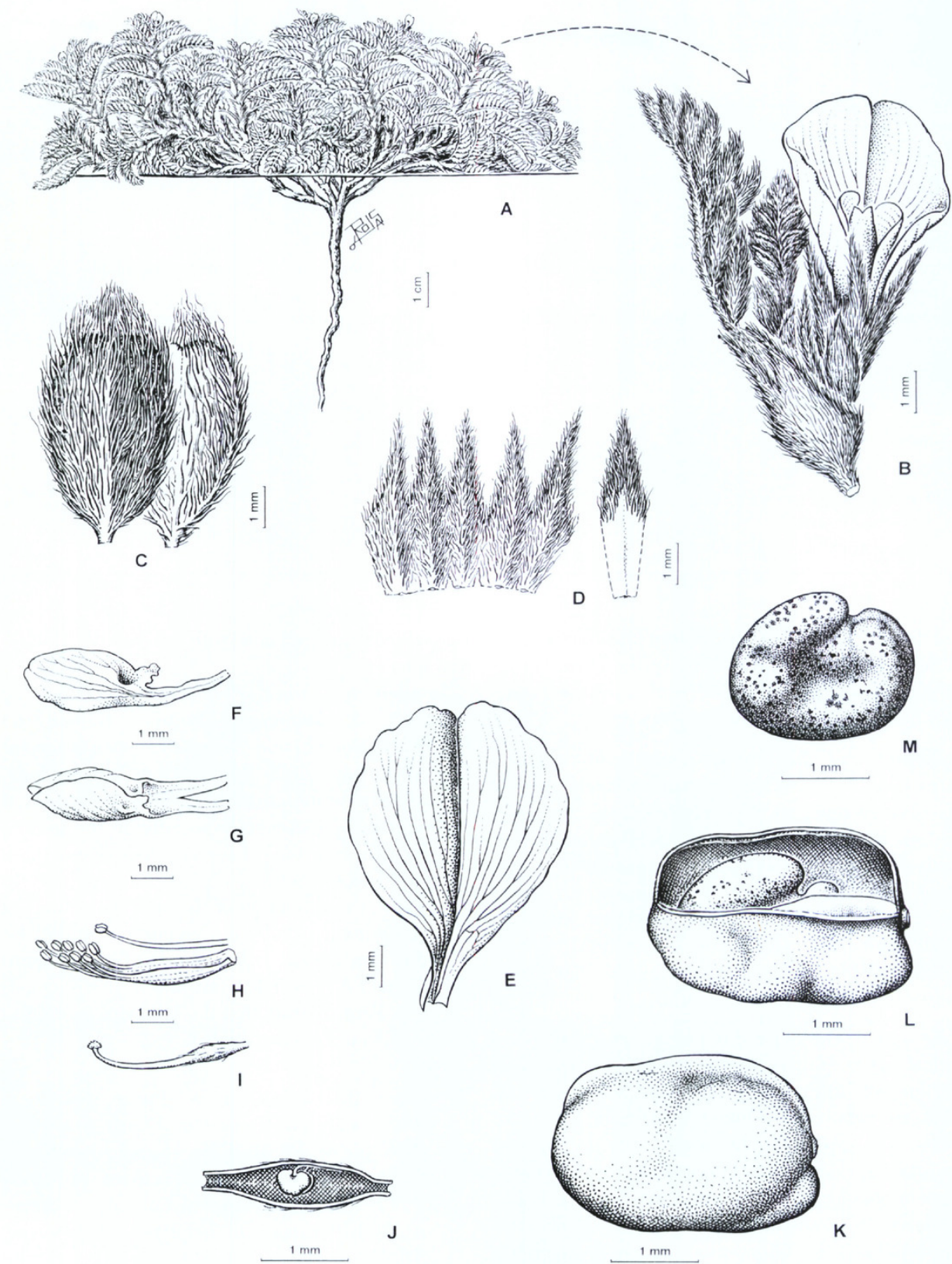


Figure 1. *Astragalus sagasteguii* Gómez-Sosa. —A. Plant habit. —B. Apex of branch with flower. —C. Leaflets, below and above. —D. Calyx and internal pubescence of the teeth. —E. Banner. —F. Wing. —G. Keel. —H. Androecium. —I. Gynoecium. —J. Ovary, longitudinal section. —K. Fruit, lateral view. —L. Fruit, longitudinal section, with an incipient septum only at the base. —M. Seed. Based on *Sagástegui et al. 11181* (holotype, SI).

Table 1. Comparison of *A. sagasteguii*, *A. diminutivus* var. *diminutivus*, and *A. dillinghami*

	<i>A. sagasteguii</i>	<i>A. diminutivus</i> var. <i>diminutivus</i>	<i>A. dillinghami</i>
Leaves			
Length (cm)	to 1.4	1–2	1.5–2
Leaflets			
Number	15 to 17	13 to 17(to 19)	9 to 13
Size (mm)	2.5–3 × (1–)1.5	1.5–2 × 0.6–1	4 × 2
Shape	elliptic-cuneate	elliptic to subcircular	ovate-lanceolate
Apex	retuse	obtuse to slightly retuse	acute
Pubescence	cinereous-villous on both surfaces	glabrous above/villous below	silvery-villous on both surfaces
Trichome length (mm)	0.5–1	0.5–1	1.5–2.5
Flowers			
Number	1(to 2)	1(to 2)	4 to 8
Length (mm)	8–9	7–9	8–10
Calyx length (mm)	4	3–4	7
Legume	subbilocular septum to 0.5 mm only at base	unilocular	unknown

and director of the Natural History Museum (HAO) at Antenor Orrego University, Trujillo, Peru. He is an enthusiastic collector and student of the Peruvian flora.

Habitat and distribution. *Astragalus sagasteguii* occurs in “jalca” in the Andean mountains of Peru, which refers to the ecological zone along the Andean divide between the drier Paramo to the north and the wetter Puna to the south. Found above 3300 m, the jalca vegetation is predominantly grassland, and the predominant grass is “ichu” [*Stipa ichu* (Ruiz & Pavón) Kunth]. Native fauna include frogs, lizards, birds, small mammals, and deer.

Climate. The climate of the this new species is typical of Andean regions near the equator: cool and humid, with a distinct rainy season. Temperatures are relatively constant throughout the year, and seldom dip below freezing even at the highest mountain elevations. Conditions are often windy, especially at higher elevations. The climate is characterized by a distinct rainy season (October to April) followed by a dry period (May to September).

The genus *Astragalus* is represented by 23 species (Zarucchi, 1993) in the flora of Peru. The new species *A. sagasteguii* is in close relationship with *A. dillinghami* J. F. Macbride “depressed, compact, . . . flowers crowded or few in the axils, about 1 cm long. . .”(Macbride, 1943: 396). Moreover, *A. dillinghami* is distinguished by its 4 to 8 flowers, leaflets ovate-lanceolate with acute apex, and a sil-

very-villous pubescence with trichomes 1.5–2.5 mm long.

In addition, *Astragalus sagasteguii* appears to be related to *A. diminutivus* (Philippi) Gómez-Sosa from Peru, Bolivia, and Argentina, which it resembles by having a single flower that is 7–9 mm long. In contrast *A. diminutivus* has smaller leaflets that are sericeous-pubescent, especially on the unilocular legume. (See Table 1 for a comparison of these three species.)

A critical examination of the type collections of *Phaca diminutiva* Philippi from northern Chile, *Astragalus deminutivus* I. M. Johnston from southern Bolivia, and *A. dielsii* J. F. Macbride from Lima, in northern Peru, reveals that the following new combination should be recognized.

2. *Astragalus diminutivus* (Philippi) Gómez-Sosa, comb. nov. Basionym: *Phaca diminutiva* Philippi, Anales Mus. Nac. Santiago de Chile, 2° Sección, Cat. Pl. Itin. Tarapacá 14. 1891. TYPE: Chile. “inter Aguas Calientes et Socaire, *R. A. Philippi s. n.* (holotype, SGO; isotype, SI). Figure 2.

Astragalus deminutivus I. M. Johnston, J. Arnold Arbor. 28: 406. 1947. Syn. nov. TYPE: Bolivia. Tarija: Puna de Patanca, 3700 m, 7 Jan. 1904, K. A. Fiebrig 2608 (holotype, GH; isotypes, K, P, SI).

Because of the very short original diagnosis of this taxon (Philippi, 1891) a more complete description of the type variety is given here.

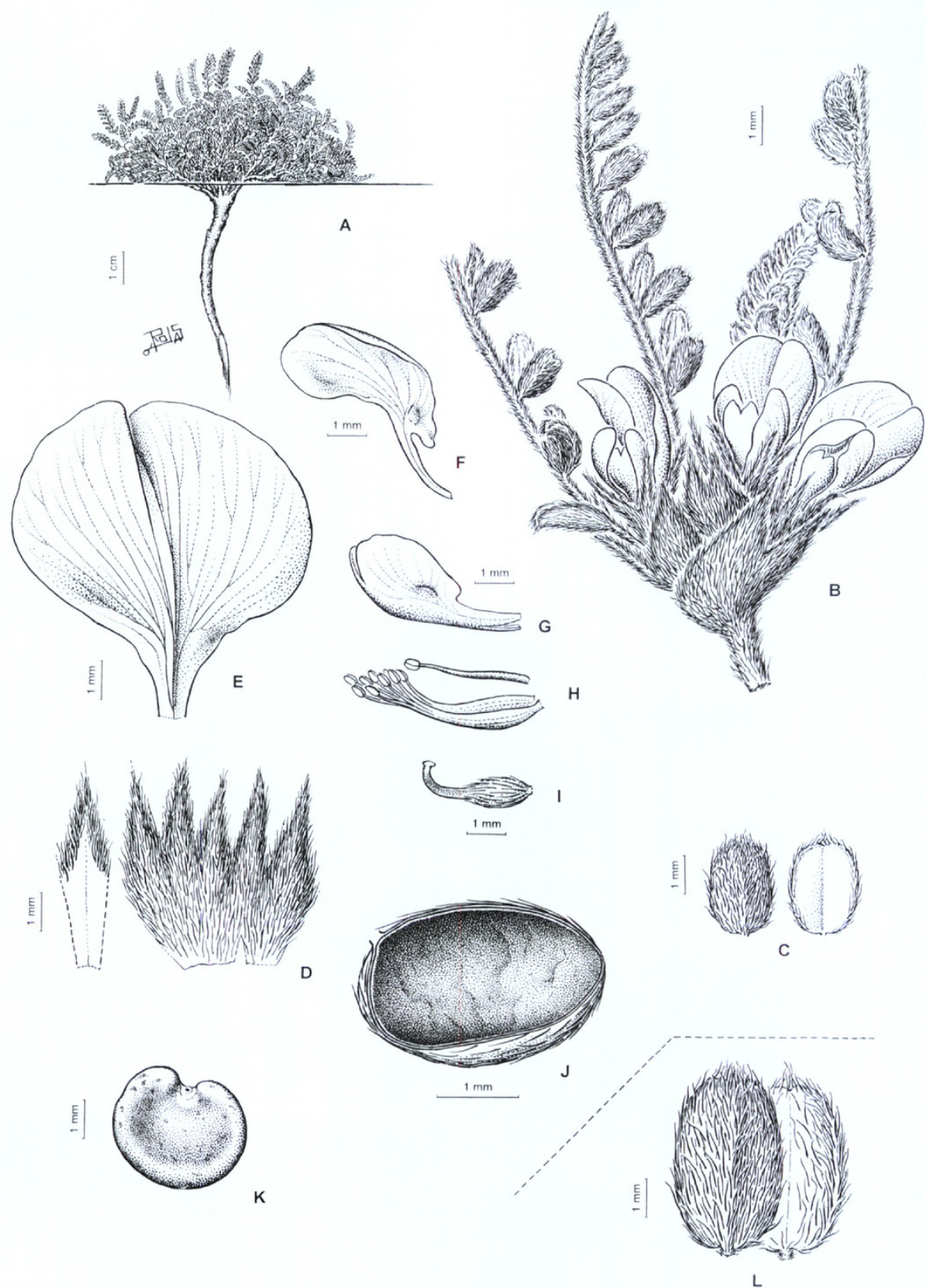


Figure 2. *Astragalus diminutivus* (Philippi) Gómez-Sosa var. *diminutivus*.—A. Plant habit. —B. Apex of branch with flowers. —C. Leaflets, below and above. —D. Calyx and internal pubescence of the teeth. —E. Banner. —F. Wing. —G. Keel. —H. Androecium. —I. Gynoecium. —J. Fruit, longitudinal section. —K. Seed. *Astragalus diminutivus* var. *dielsii* (J. F. Macbride) Gómez-Sosa. —L. Leaflets, below and above. A–D based on J. H. Hunziker 10503; E–K, Macbride & Featherstone 2479 (isotype, SI); L, V. Cabezas 60.

***Astragalus diminutivus* (Philippi) Gómez-Sosa
var. *diminutivus***

Herb caespitose, 2–8 cm diam., green-cinereous, caudex 1–2(–3) cm, with membranous stipules imbricate, white-pubescent, 2.5–3.5 mm long. Leaves 1–2 cm long, petiole 0.2–0.5 mm long; leaflets 13 to 17(to 19), elliptic to subcircular, 1.5–2 × 0.6–1 mm, obtuse to slightly retuse at apex, thickened, folded, glabrous above, villous-pubescent below, covered with trichomes 0.5–1 mm long. Bracts triangular-ovate, 1.5–3(–4.5) mm long; bracteoles the same length, filiform, both pubescent and ciliate; flowers 1(to 2) erect, sessile, blue to light blue; calyx pubescent, tube campanulate, 2–2.5 mm long, teeth subulate, 1–1.5 mm long; banner 6–8 × (2.5–)3–4.5 mm, obovate to widely obovate, emarginate at the apex, basally narrowed to claw; wings 5–6(–8) × 1–1.5 mm, rectangular, obtuse; keel 4.5–5 mm long; ovary shortly stipitate, pubescent, style glabrous, laterally compressed and inflexed at apex, stigma minutely-capitate; ovules 2(to 4). Legume membranaceous, evanescent, subglobose, 0.2–0.25 × 0.2–0.25 cm, unilocular, covered by remains of bracts and perianth; seed 1, subglobose, sometimes mottled, hilum apical, 2–2.5 × 2–2.5 mm.

Distribution and habitat. A regional endemic in western South America, cited for Peru and reported now with a southern range extension to Bolivia, Chile, and northwest Argentina, inhabiting higher elevations 3600–4300 m. Collector's notes (*R. Ehrich* 75) indicate it occurs on sandy or clayey limestone.

Climate. This region is in the biogeographic province of Puna (Cabrera & Willink, 1973) between 15° and 27° S, with the Andean mountains to the west and the "Cordillera Real" mountain range to the east at elevations of 3200 to 4000 m. Moreover, the Puna is in the Neotropical subregion (Crisci et al., 2000). The climate of this region is dry and cold, with a large contrast in temperature and rainfall during the year. The principal rainfall occurs only in summer, varying from approximately 700 to 50 mm, decreasing along gradients from north to south and from east to west.

Additional specimens examined. BOLIVIA. **Tarija:** Lago Taxara, *R. Ehrich* 75 (LPB, SI). **Potosí:** Porco, Uyuni, *E. Asplund* 3137 & 3138 (UPS). **La Paz:** Pacajes, Gral. Campero, *E. Asplund* 2780 (UPS); Sur Chichas, Atocha, *E. Asplund* 3025 (UPS). ARGENTINA. **Jujuy:** Humahuaca, Lag. Tres Cruces, *F. Claren* 11657 (SI, STOCK); Cochinoa, *V. Cabezas* 60 (SI); Abra Pampa, N Mina Aguilar, *E. Ancibor* & *B. Mujica* 18 (BAA); Yavi, Cerro Negro, *T. Meyer* 31462 (LIL, SI); arriba de Rincón de Cajas, *H. Sleumer* 3618 (LIL, SI). **Salta:** Caldera, subida

al Nevado del Castillo, Tres Lagunas, *H. Sleumer et al.* 2981 (LIL, SI).

2a. *Astragalus diminutivus* (Philippi) Gómez-Sosa var. *dielsii* (J. F. Macbride) Gómez-Sosa, stat. nov. Basionym: *Astragalus dielsii* J. F. Macbride., Publ. Field Mus. Nat. Hist., Bot. Ser. 11: 24. 1931. TYPE: Peru, Ancash, Yanashallas, Estación 35 mi. W of Huallanca, 2 Oct. 1922, "loose stony slopes, light blue fls., about 16,000 ft., the parts spreading," *J. F. Macbride* & *W. Featherstone* 2479 (holotype, FM; isotype, SI). Figure 2L.

Astragalus diminutivus var. *dielsii*, with leaflets pubescent above as well as below is thereby distinguished from *A. diminutivus* var. *diminutivus*.

Distribution and habitat. Found in western Peru, Bolivia, and Argentina, in high mountains at elevations of 3600–4400 m.

Additional specimens examined. BOLIVIA. Laguna de Potosí, *D'Orbigny* 1432 (P). ARGENTINA. **Jujuy:** Cochinoa, Abra de Rachaita, *M. Múlgura et al.* 1311 (SI); Casabindo, *N. Deginani et al.* 520 (SI); Humahuaca, Mina Aguilar, arriba del Molino, *H. Sleumer* 3428 (LIL, SI), *J. H. Hunziker et al.* 10503 (SI); Tres Cruces, *A. Soriano* 653 (SI); Susques, al pie del cerro Tuzle, *A. Cabrera* 8644 (SI), *A. Cabrera* 8748 (LP, SI); Abra Chorrillos, *A. Cabrera et al.* 31774 (SI); Rinconada, Ruta provincial 746, 13 km de Mina Pirquitas camino a Coranzulí, *O. Morrone et al.* 2589 (SI).

The name *Phaca diminutiva* Philippi was cited by I. M. Johnston (1947: 407) as an "unplaced species," because he had not seen the type specimen from Chile. In the same paper Johnston published *Astragalus deminutivus*, a new species for Bolivia and Argentina, with similar vegetative and floral characteristics to the ones that encompass *P. diminutiva*. The legume was described by Johnston (1947: 406) as "subglobosis ca. 2 mm longis et 1.5 mm crassis subtus introflexis" or as a subbilocular legume. A critical examination of the *Astragalus deminutivus* type collections at FM, GH, K, and P in addition to cited specimens of *E. Asplund* (UPS) reveals the legume is without inflexion of the suture, and thus the fruit is unilocular; these collections otherwise share the same characteristics as *A. diminutivus*. The Philippi type locality of *Phaca diminutiva* is noted between Aguas Calientes to So-caire, in northern Chile, east of the Salar of Atacama, at 5030–5070 m near the political boundary with Argentina, in Provinces of Jujuy and Salta, and in the vicinity of the Tropic of Capricorn, within the same distributional area as *A. deminutivus*.

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